Hydrologic and Hydraulic Analysis of Road Crossing Culverts Tributary to Pine Swamp Brook Dam

Harvard Terrace
Ledyard, Connecticut

Prepared For:

Town of Ledyard
741 Colonel Ledyard Highway
Ledyard, Connecticut 06339

December 15, 2025

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Introduction

Harvard Terrace is a local residential road that crosses Pine Swamp Brook, which is a named watercourse providing the outlet for Pine Swamp; a large wetland complex to the northeast. The road crossing comprises the dam of Moulthrop Pond (Dam #7212). Two 36" diameter culverts pass through the dam conveying Pine Swamp Brook beneath Harvard Terrace downstream. Beyond the dam, the road has no outlet and provides the only access to a residential neighborhood comprising approximately 23 residences.

In May 1989, a rain event caused overtopping of Harvard Terrace by approximately 1-foot, stranding residents from access and emergency vehicles. In March 2010, another rain event caused overtopping of Havard Terrace by approximately 6-inches of water. Prior to the 2010 event, damage to the road edge was temporarily repaired by the Town using a steel plate.

The Southeast Connecticut Road-Stream Crossing Assessment for Community and Wildlife Resilience produced by Save the Sound also listed numerous safety concerns for the community citing fall hazards around structures and guardrail.

The town has retained CLA Engineers, Inc to analyze the hydraulic capacity of the Harvard Terrace culverts to determine if they are sufficiently sized, and the extent to which they may be impacting the frequency and severity of the overtopping of Hazard Terrace.

Three other road crossing culverts immediately upstream of Moulthrop Pond will also be analyzed. Specifically, this report aims to:

1. Locate and obtain critical dimensions and elevations at the above-mentioned locations.
2. Investigate the Pine Swamp Brook watershed and determine peak flows at the following road crossing locations:
    a. Christy Hill Road (tributary to Local Basin 3000-06)
    b. Christy Hill Road (tributary to Local Basin 3000-07)
    c. CT Rte 12
    d. Harvard Terrace (Pine Swamp Brook Dam)
3. Perform hydraulic analysis to determine capacity of each road crossing to determine available freeboard and overtopping depths for various design storm frequencies.

Pine Swamp Brook Hydrology

Pine Swamp is a wetland complex approximately 100 acres in area and serves as an important groundwater recharge area and flood mitigation feature. It is located in southwest Ledyard and is at the hydrological head of CTDEEP Local Drainage Basin 3000-06; a 1.56 square mile watershed that eventually discharges to the Thames River (See Figure 1).

The outlet from Pine Swamp is Pine Swamp Brook which originates at the west side of Pine Swamp and flows west and south through a series of other wetlands and beneath several roadways. The brook crosses beneath Christy Hill Road and is conveyed some 285 feet via 4 24” reinforced concrete pipes before daylighting to the immediate east of CT Route 12.

At this point, flow from an adjacent Local Drainage Basin (3000-07) merges with the brook before flowing beneath CT Route 12. Local Drainage Basin 3000-07 is approximately 309 acres in area comprising mostly of undeveloped woodlands with some residential development and stormwater infrastructure.

The Brook continues west before entering Moulthrop Pond which is an impoundment caused by Pine Swamp Brook Dam (#7212) located at the pond’s southern end. Two 36” corrugated metal pipes beneath the dam serve as the primary and secondary outlets of Moulthrop Pond. Pine Swamp Brook continues south approximately 800 feet before entering Smith Pond; a slightly larger pond also impounded by a dam (Smith Pond Dam #7213). The Brook then flows a short distance until it discharges into a tidal inlet of the Thames River.

Culvert Capacity Analysis

This investigation aims to assess and compare the existing hydraulic capacity of the culverts subject to investigation, to that of current hydraulic design criteria for culverts. Analysis of the crossroad culverts was performed using two separate computer software applications. Analysis of the Pine Brook Swamp Dam was performed using Hydraflow Hydrographs Extension (HHE) for Autodesk. The dam has two separate outlets, one of which is multi-staged, meaning outlet type varies based on water elevation. Water elevation at the dam is also influenced by the stage storage characteristics of Moulthrop Pond. HHE can model multi-stage outlets and include upstream storage capacity.

The culverts on Route 12 and Christy Hill Road were analyzed using Hydraflow Express, which follows the procedures outlined in FHWA's Hydraulic Design of Highway Culverts (HDS-5). It uses sophisticated energy-based methods to compute the hydraulic grade line (HGL), which can be used to determine the theoretical peak flow at which roadway overtopping will occur. Flow volume can be increased incrementally to determine optimum flow conditions and critical conditions such as overtopping. It should be noted the analysis does not consider upstream or downstream flow conditions or storage. Outlet tailwater conditions have been considered in the analysis.

CLA visited the culvert on October 6, 2025 during a particularly dry period, allowing collection of specific topographic information about the culverts and their immediate surroundings. Pertinent data including pipe inverts, structure dimensions and water elevations were observed and recorded. Horizontal information was oriented to CT NAD 83 and vertical information is NAVD 88 based on field GPS observations. Sketch Plans are included at the end of this Report.

Peak Flow

To compare flow capacity of the road crossings with current design standards, an understanding of the peak flow for various storm return events immediately upstream of each road crossing must be determined. Streamflow statistics for any user defined point along named streams in Connecticut can be determined from the web-based Geographic Information System application StreamStats, developed by the U.S. Geological Survey. Statistics for three of the four road crossing locations were determined using this application. Peak flows were determined for the 2-year, 10-year, 25, year, 50-year and the 100-years storm events. Output data from StreamStats is shown in **Appendix 1.** An estimate of peak flow associated with the minor 1-pipe road crossing on Christy Hill Road was determined by using the Rational Method.

Design Standards

The CTDOT Drainage Design Manual stipulates the flood frequency used to design or review culverts. CTDOT states that flood frequency used to design or review culverts shall be based on human risk factors and economic assessment, and the following design criteria listed in Table 8-4 (from the CTDOT Drainage Design Manual).

Table 8-4

SUMMARY OF HYDRAULIC DESIGN CRITERIA FOR CULVERTS

CONNDOT STRUCTURE CLASS ***	DRAINAGE AREA km^2 (mi^2)	DESIGN FREQUENCY (year)	CHECK FREQUENCY (year)	BACKWATER m (ft)	MINIMUM ** FREEBOARD m (ft)
Minor	< 2.59 (1) (no established watercourse)	25	-	-	0.3 (1)
Small	< 2.59 (1)	50	100	-	0.3 (1)
Intermediate *	≥ 2.59(1) < 25.9(10)	100	500	≤ 0.3 (1)	0.3 (1)
Large *	≥ 25.9(10) < 2590(1000)	100	500	0.3 (1)	0.6 (2)

Results from the hydraulic capacity analysis conducted as part of this report will be compared to the CTDOT design standards, specifically those presented in Table 8-4 above.

Christy Hill Road (Tributary to CT Local Basin 3000-07)

This culvert is located on Christy Hill Road on the west side of the intersection with Crest View Drive. It is part of the Town of Ledyard's drainage system and conveys runoff beneath Christy Hill Road from an area to the northeast including a portion of Crest View Drive. The watershed contributing to this culvert lies within local drainage basin 3000-07, which merges with local drainage basin 3000-08 before the Route 12 road crossing. The culvert watershed was approximated using the Connecticut 5-foot contours (2023) and determined to be approximately 3.6 acres **(See Fig. 2).**

The culvert comprises a single 12” corrugated metal pipe with no observed headwalls. The contributing watershed has no established watercourse, making this a ‘Minor’ structure class according to CTDOT criteria (See Fig. 2). According to Table 8.4, the design flood frequency for this culvert is the 25-year event.

Dense brush and vegetation prevented the inlet from being observed. The outlet discharges on the south side of Christy Hill Road into a depressed area that would collect water before reaching an elevation that would force the water south and west, around the perimeter of the former Kartway entertainment facility before merging with Pine Swamp Brook. The culvert showed signs of sediment deposition. According to town officials, downstream beaver activity to the west of Route 12 has been impounding water, restricting flow through the culvert and flooding property on the north side of Christy Hill Road. The Town has since taken action to relieve the effects of the beaver activity.

The centerline road elevation of Christy Hill Road at this location is approximately 30.8 with the upstream invert being 27.04 (3.76’ Difference).

Christy Hill Road Outlet Pipe

Since peak flow information is not available from StreamStats, an estimate of peak flow for the design storm events was obtained using the Rational Method. At the time of inspection, no water was flowing through the pipe. Analysis of the culvert was performed using Hydraflow Express assuming tailwater conditions equal to Critical depth + Rise) / 2. A summary of the results is shown in the table below.

Christy Hill Road (1-Pipe)				
Storm Return Period	**Peak Flow (cfs)**	**Headwater Elevation**	**Headwater Depth (ft)**	**Freeboard (ft)**
2-Year	3.1	28.5	1.5	2.3
10-Year	4.5	30.0	2.9	0.8
Overtopping Occurs	**5.2**	**30.8**	**3.8**	**0.0**
25-Year	5.5	-	-	-
50-Year	6.2	-	-	-
100-Year	6.9	-	-	-

The analysis estimated the culvert can pass flow associated with the 2-yr and 10-yr storm events without overtopping Christy Hill Road. Flow volume was increased incrementally until the headwater elevation reached the elevation of the roadway. It was estimated flow volume causing overtopping of the road is approximately 5.2 c.f.s., equivalent to a storm return period of between 10 and 25 years. It should be noted the analysis assumes the pipe is not restricted with sediment or debris. Given the size of the upstream watershed, it can be concluded the culvert does not have the hydraulic capacity to meet current design standards. Detailed hydraulic capacity analysis results are presents in **Appendix 1.**

Christy Hill Road (Tributary to CT Local Basin 3000-08)

The Christy Hill Road culvert is part of the Town of Ledyard's drainage system and conveys flow from the Pine Swamp Brook beneath Christy Hill Road and through the parking lot of the former Kartway entertainment facility. The contributing watershed is approximately 1.02 square miles, making this an 'Intermediate' structure according to CTDOT criteria **(See Fig. 3).** According to Table 8.4, the design flood frequency for this culvert is the 100-Year event.

At the inlet, the culvert comprises a simple, straight concrete headwall with four, squared end 24" pipes. Two of the pipes are reinforced concrete (RCP) while the remaining two are corrugated metal pipe (CMP). The two CMPs transition to RCP at some point downstream. The pipes convey the Pine Swamp Brook south approximately 285 feet before discharging through a similar headwall configuration into a natural channel.

Christy Hill Road Inlet Structure

According to town officials, during heavy rain events, the culvert becomes inundated, allowing flow to overtop Christy Hill Road. The centerline road elevation of Christy Hill Road is approximately 28.75 in the vicinity of the culvert with the average pipe invert being 24.35 (4.4' Difference). At the time of inspection, the water elevation was just below the invert elevation of all four pipes. No flow was observed discharging from the downstream outlet structure. Analysis of the culvert was performed using Hydraflow Express assuming no tailwater conditions. A summary of the results is shown in the table below.

Christy Hill Road (4-Pipes)				
Storm Return Period	**Peak Flow (cfs)**	**Headwater Elevation**	**Headwater Depth (ft)**	**Freeboard (ft)**
2-Year	39	26.1	1.7	2.7
10-Year	79	28.0	3.6	0.8
Overtopping Occurs	**90**	**28.8**	**4.4**	**-0.1**
25-Year	107	-	-	-
50-Year	130	-	-	-
100-Year	156	-	-	-

The culvert was able to pass flow associated with the 2-yr and 10-yr storm events without overtopping the road. Flow volume was increased incrementally until the headwater elevation reached the elevation of the roadway. It was estimated the flow volume to cause overtopping of the road is approximately 90 c.f.s., equivalent to a storm return period of between 10 and 25 years. Given the size of the upstream watershed, it can be concluded the culvert does not have the hydraulic capacity to meet current design standards. Detailed hydraulic capacity analysis results are presents in **Appendix 2.**

Route 12

Flow from Pine Swamp Brook crosses Christy Hill Road and runs beneath the parking lot of the abandoned Kartway entertainment facility and discharges to a wetland channel that runs parallel to CT Route 12 for approximately 85 feet before converging with flow from Local Drainage Basin 300-07. This combined flow passes beneath Route 12 in a southwesterly direction via a 48" reinforced concrete pipe before continuing towards Maulthrop Pond.

The contributing watershed is approximately 1.52 square miles, making this an 'Intermediate' structure according to CTDOT criteria **(See Fig. 4).** According to Table 8.4, the design flood frequency for this culvert is the 100-Year event. The road crossing inlet takes the form of concrete, winged headwall which retains the embankment supporting Route 12.

Route 12 Road Crossing Inlet

During inspection, water was present along the channel feeding the inlet and within the pipe itself. The water elevation was observed as being approximately half the depth of the culvert. Given the severity of the dry spell, it is likely this water is a constant presence and sediment accumulation in the pipe is likely. The observed water exhibited no signs of stagnation and showed signs of movement through the pipe however, these conditions are an indication that water flow downstream of the culvert is restricted, due in part to the impoundment of Moulthrop Pond by Pine Brook Swamp Dam.

The water elevation at the entrance to 48" culvert was measured at approximately 23.7 feet, while at the outlet of Moulthrop Pond the water elevation was observed at approximately 21.7 (2-Foot elevation difference over a 2,130-foot flow path, which equates to an average grade of approximately 1/10th of 1%). While this does not technically compromise the capacity of the 48" culvert, it does impact the hydrology of the watershed upstream and east of Route 12, particularly if additional impediments such as beaver activity is left uncontrolled.

This is also likely the case for the 36" culvert associated with the multi-stage outlet at the dam at Harvard Terrace. The downstream baseline watercourse elevation level is also approximately half the depth of the culvert, which is likely controlled by the impoundment of water by Smith Pond Dam.

The road crossing outlet takes the form of a similar concrete winged headwall. Water was also present at the outlet.

Route 12 Crossing Outlet

According to CTDOT criteria, the culvert is classified as an Intermediate Structure, since it provides a waterway for a drainage area of more than 1 square mile but less than 10 square miles. Intermediate structures should be designed to pass a discharge equal to the 100-year flood and a backwater usually not to exceed 0.3m (1 ft) above that which would have been obtained in the natural channel. Analysis of the culvert was performed using Hydraflow Express assuming tailwater conditions equal to Critical depth + Rise) / 2. A summary of the results is shown in the table below.

Route 12 Culvert				
Storm Return Period	**Peak Flow (cfs)**	**Headwater Elevation**	**Headwater Depth (ft)**	**Freeboard (ft)**
2-Year Storm Event	55	25.0	3.3	11.0
10-Year Stom Event	110	27.4	5.7	8.6
25-Year Stom event	148	29.9	8.2	6.1
50-Year Storm event	181	32.6	10.9	3.4
Overtopping Occurs	**191**	**36.0**	**14.3**	**0.0**
100-Year Storm Event	216	-	-	-

Analysis shows the culvert able to pass flows up to the 50-year storm event without overtopping the road. Flow volume was added incrementally until the headwater elevation reached the elevation of the roadway. It was estimated the flow volume to cause overtopping of the road is approximately 191 c.f.s., equivalent to a storm return period of between 50 and 100 years. Given the size of the upstream watershed, it can be concluded the culvert does not have the hydraulic capacity to meet current design standards. Detailed hydraulic capacity analysis results are presents in **Appendix 2.**

Pine Swamp Brook Dam

Moulthrop Pond is owned by Avalonia Land Trust. The pond is roughly 3-acres in area and is the first of two water bodies that are fed by Pine Swamp Brook. The second body of water is Smith Pond which is slightly larger and lies approximately 850 feet downstream to the south.

The pond's impoundment is created by Pine Swamp Brook Dam. The dam is owned and maintained by the Town of Ledyard and has a Hazard Classification A – a low hazard potential dam. The most recent dam inspection report of December 18, 2024, prepared by WMC Consulting Engineers, reported the dam as being in 'Fair' condition. It is understood a water main that supplies the neighborhood crosses the dam, passing either under or over the two culverts. The watershed area contributing to Moulthrop Pond is approximately 1.52 square miles **(See Fig. 5).**

By virtue that Harvard Road is located directly on the embankment, the dam has no engineered spillway. The dam has two outlets, both of which are in the form of piped culverts passing through the dam's embankment. Located at the left abutment, is a three-sided rectangular concrete drop inlet with a steel grate installed on the top. The upstream side of the structure has been cast with slots and has timber stop boards installed, presumably to control the level of the pond.

The grate is at elevation 23.6. At the time of inspection, water was seeping through the stop logs at elevation 20.6. Flow drops vertically to a stone channel which is lined with a 36" corrugated metal pipe (CMP). Observed flow seeping through the boards was approximately 1 c.f.s. or less. The CMP was observed in poor condition.

The second outlet is located at the right abutment and comprises a 36" CMP. The invert elevation of the pipe is 21.8. At the time of inspection, the pond water elevation was too low to allow flow through this pipe (21.7). The pipe's leading edges at its invert are corroded and deformed, which could easily trap debris and restrict flow entering the pipe. Under the CTDOT hydraulic design criteria, the two outlets combined should accommodate flows associated with the 100-year storm event, (Intermediate Structure).

Multi-Stage Outlet Structure (Upstream)

36” Corrugated Metal Pipe Inlet (Upstream)

Spillways or outlets from dams are typically referenced as principal or auxiliary based on the order in which they discharge. In its current condition, the 36” corrugated metal pipe is functioning as the principal outlet since this is the lowest outlet.

The concrete inlet structure can function as both the principal and auxiliary outlet since the discharge elevation can be adjusted by the stop boards. During inspection, it did not appear the stop boards are actively managed.

36” Corrugated Metal Pipe Outlet (Downstream)

Multi-Stage Structure Outlet (Downstream)

Internal Photo of 36" Culvert (Multi-Stage Outlet) with Flow Seen Penetrating Stop Boards at Head of Pipe.

At some point in the past, a stone and earthen berm has been constructed upstream of the left abutment. The berm forms an arc shape in plan and is constructed of earth and stone. The berm is relatively old given the size and maturity of the trees and vegetation established on the berm. More recently, a concrete retaining wall and timber backboard have been constructed, presumably to eliminate a gap in the berm.

Earthen and Concrete Berm Separating the two Outfalls

At the time of observation, the water elevation on both sides of the berm was equal and given that flow was observed passing through the stop logs of the concrete inlet structure, it is acknowledged that berm has a negative impact on the combined hydraulic capacity of the outlets during low flow conditions. During periods of increased flow, it is likely the berm would restrict flow to the inlet structure, directing more water to the 36” CMP until such time the berm is overtopped.

The berm is not believed to be original to the dam construction and is thought to have possibly been constructed by residents of the neighborhood, presumably to manage the pond elevation for recreational and/or aesthetic purposes. However, the invert elevation of the 36” pipe at the right abutment is approximately 1.8 feet lower than the grate of concrete inlet elevation, suggesting water elevations would typically be regulated by the 36” pipe and not the concrete inlet structure.

Computational Hydraulic Analysis

Combined outlet capacity through the dam was analyzed using Hydraflow Hydrographs Extension (HHE) for Autodesk. The software allows flow from a specified watershed to be routed through a pond that has multi-stage outlets and calculates pond storage and elevation characteristics that can be used to estimate when and to what extent overtopping of the pond occurs.

To simulate the design return flood events, a hydrograph was created with a watershed area equal to that determined by StreamStats and precipitation characteristics determined from NOAA Atlas 14 Precipitation Frequency Data Server for Ledyard. A curve number of 60 was used from Table 2-2a of the NRCS report Urban hydrology for small watersheds (TR-55) and the time of concentration was adjusted to generate peak flows equaling those determined by StreamStats.

A pond having similar characteristics to Moulthrop Pond was created by tracing its outline using aerial imagery. The software considers pond stage storage in its analysis and therefore it is important to set the pond bottom equal to the pond water elevation during ‘normal’ conditions.

The dam and culverts were originally observed on October 6th, 2025, during an exceptional dry spell. At this time, the water level of the pond was below the 36” RCP invert and considered lower than normal. The dam was revisited on November 17, 2025, after several rain events. The water elevation was observed as being approximately 8-inches above the 36” RCP invert. Consequently, the pond’s bottom elevation was set at elevation 22.5.

Inlet (10/6/25)

Inlet (11/17/25)

Although it is acknowledged that the stone and earth berm has a negative impact on the combined hydraulic discharge conditions of the pond during low flow conditions, it was not considered as part of the analysis. It is understood the Town of Ledyard is currently pursuing efforts to modify the berm to ensure outlet capacity is not adversely impacted. Results of the hydraulic analysis are as follows:

Pine Swamp Brook Dam				
Storm Return Period	**Peak Flow In (cfs)**	**Peak Flow Out (cfs)**	**Pond Elevation**	**Freeboard (ft)**
2-Year	60.0	59.1	24.1	1.9
10-Year	118.0	111.4	25.0	1.0
25-Year	**159.0**	**155.7**	**26.4**	**-0.4**
50-Year	194.0	-	-	-
100-Year	231.0	-	-	-

The culverts were able to pass flow associated with the 2-yr and 10-yr storm events without overtopping Harvard Terrace. Results for the 25-Year storm event show the culverts not having sufficient capacity to prevent the road being overtopped. Once flow reaches the top of the road, the software calculates the depth of overtopping, assuming a simple broad crested weir of specified length (10-feet). Flow depths across the road are difficult to predict given the parabolic nature of the road profile and the complicated nature of how flow will spread. Of importance is that overtopping is predicted to occur during a storm event of between 10-year and 25-year return period and therefore, it can be concluded the culverts do not meet current design standards for the size of watershed. Detailed analysis results are presented in **Appendix 2**.

Summary

The culverts regulating Moulthrop Pond (Pine Swamp Brook Dam) and three culverts upstream were investigated to determine their hydraulic capacity and under what conditions overtopping of the roadway might be expected to occur. Theoretical capacity of each culvert was determined using hydraulic modeling software using available peak flow data for the 2-year, 10-year, 25-year, 50-year and 100-year storm events.

	Culvert Classification	CTDOT Hydraulic Design Frequency	Peak Flow for Design Frequency (cfs)	Peak Flow at Overtopping (cfs)	Does Culvert have Sufficient Capacity?
Christy Hill Road (1-Pipe)	Minor	25	5.5	5.2	No
Christy Hill Road (4-Pipes)	Intermediate	100	156	90	No
Route 12	Intermediate	100	216	191	No
Pine Swamp Brook Dam	Intermediate	100	231	159	No

The 12" CMP single culvert at Christy Hill Road is classified as a minor structure and should be capable of passing flow associated with the 25-year storm event (5.5 cfs). Analysis showed the allowable capacity to be approximately 5.2 cfs before the upstream water elevation reached the top of the road. Although this is somewhat close to the required criteria, the culvert does not meet the minimum freeboard requirement of 1-foot.

The 24" RCP, four-pipe culvert arrangement at Christy Hill Road is classified as an Intermediate structure and should be capable of passing flow associated with the 100-year storm event (156 cfs). Analysis showed the allowable capacity to be approximately 90 cfs, before the upstream water elevation reached the top of the road. Culvert capacity was determined to be between the 10-year and 25-year storm events (79 cfs and 107 cfs respectively).

The 48" RCP culvert beneath Route 12 is classified as an Intermediate structure and should be capable of passing flow associated with the 100-year storm event (216 cfs). Analysis showed the allowable capacity to be approximately 191 cfs, before the upstream water elevation reached the top of the road. Culvert capacity was determined to be between the 50-year and 100-year storm events (181 cfs and 216 cfs respectively).

The Pine Swamp Brook Dam is responsible for impounding Moulthrop Pond. The inlet to the Pond is the Pine Swamp Brook. The pond's outlet comprises two 36" corrugated metal pipes that convey flow simultaneously through the dam embankment and beneath Harvard Terrace. The two culverts act as both primary and auxiliary spillways in that they are the only means of regulating the pond's water elevation.

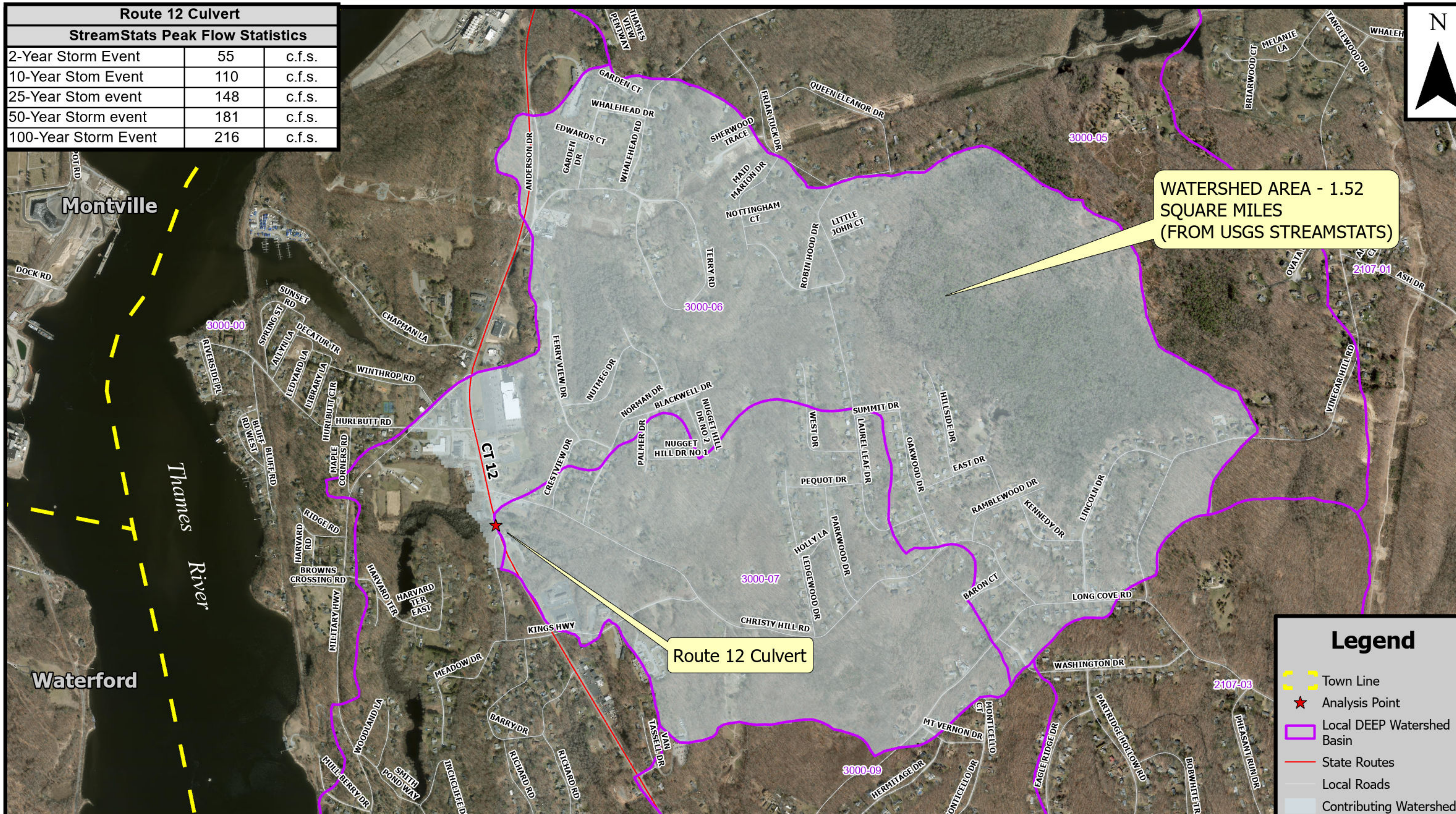
The culverts combined are classified as an Intermediate structure and should be capable of passing flow associated with the 100-year storm event (231 cfs). Analysis showed that overtopping of the Harvard Terrace is expected to occur during the 25-year storm event, which was determined to produce a peak flow of 159 cfs.

While the effect of the stone and earthen berm surrounding the concrete inlet structure was not analyzed, it is our belief that its presence restricts flow to this structure during heavier rain events, which ultimately negatively impacts the culverts combined hydraulic capacity. Nonetheless, the combined hydraulic capacity of both culverts is not sufficient to pass the 25-year storm event and therefore, it can be concluded that overtopping of Harvard Terrace will likely occur more frequently than current design standards recommend.

This will result in the dam and roadway being more frequently exposed to hydraulic forces that will cause erosion and damage like that experienced in recent years. This will ultimately increase the risk that the temporary measures installed to reinforce the dam will fail which could lead to more serious implications and possible dam failure. While dam failure may not result in significant damage or loss of life due to the dam's classification, it would result in the loss of direct access into and out of the neighborhood and the possible loss of potable water.

Figures

Route 12 Culvert		
StreamStats Peak Flow Statistics		
2-Year Storm Event	55	c.f.s.
10-Year Stom Event	110	c.f.s.
25-Year Stom event	148	c.f.s.
50-Year Storm event	181	c.f.s.
100-Year Storm Event	216	c.f.s.



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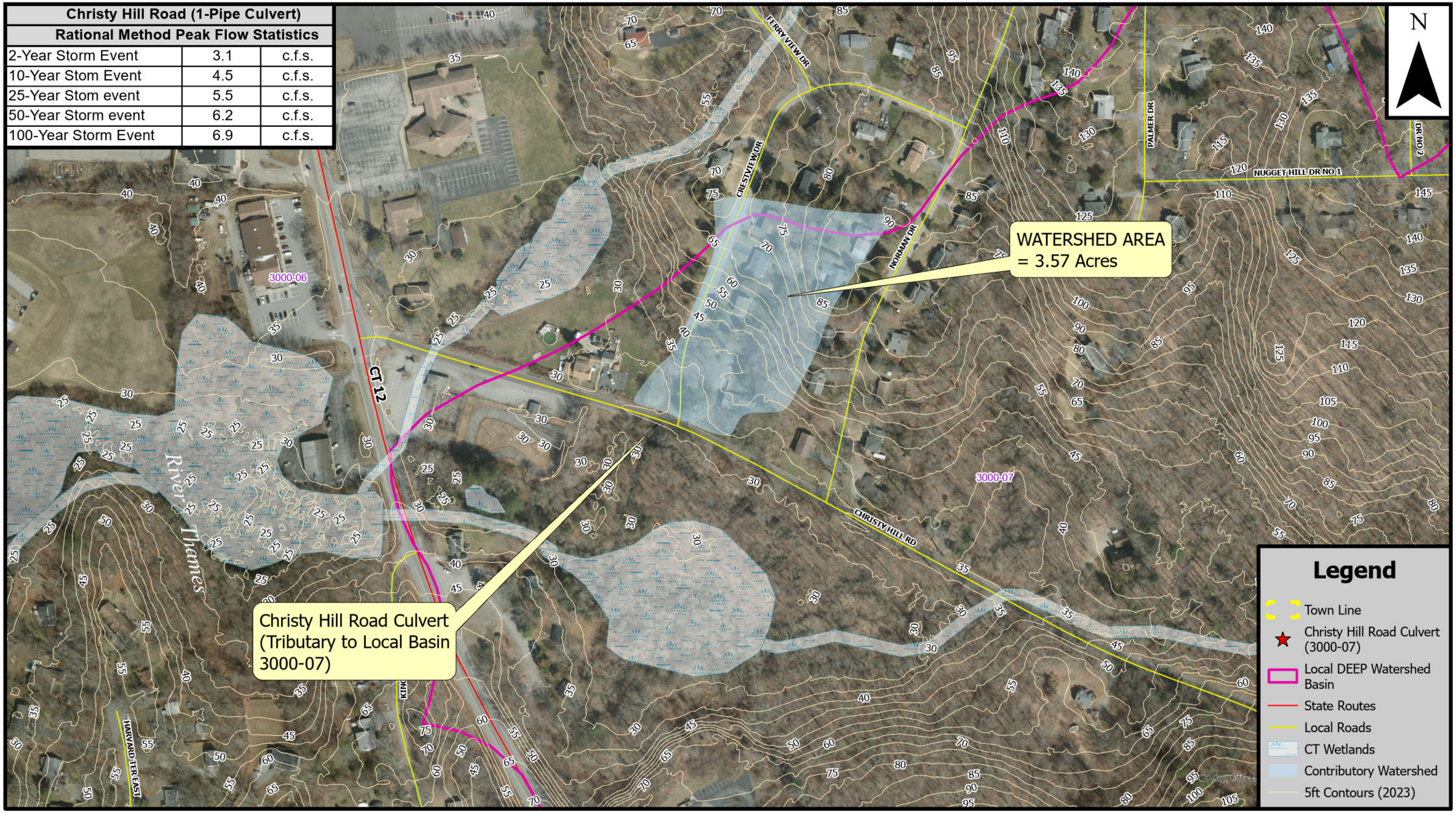
Route 12 Watershed Plan

ROUTE 12 CUVERT
TOWN OF LEDYARD

CLA No:	8282
DATE:	12/8/2025
SCALE:	1"=1,000'
FIGURE	4

Christy Hill Road (1-Pipe Culvert)		
Rational Method Peak Flow Statistics		
2-Year Storm Event	3.1	c.f.s.
10-Year Stom Event	4.5	c.f.s.
25-Year Stom event	5.5	c.f.s.
50-Year Storm event	6.2	c.f.s.
100-Year Storm Event	6.9	c.f.s.



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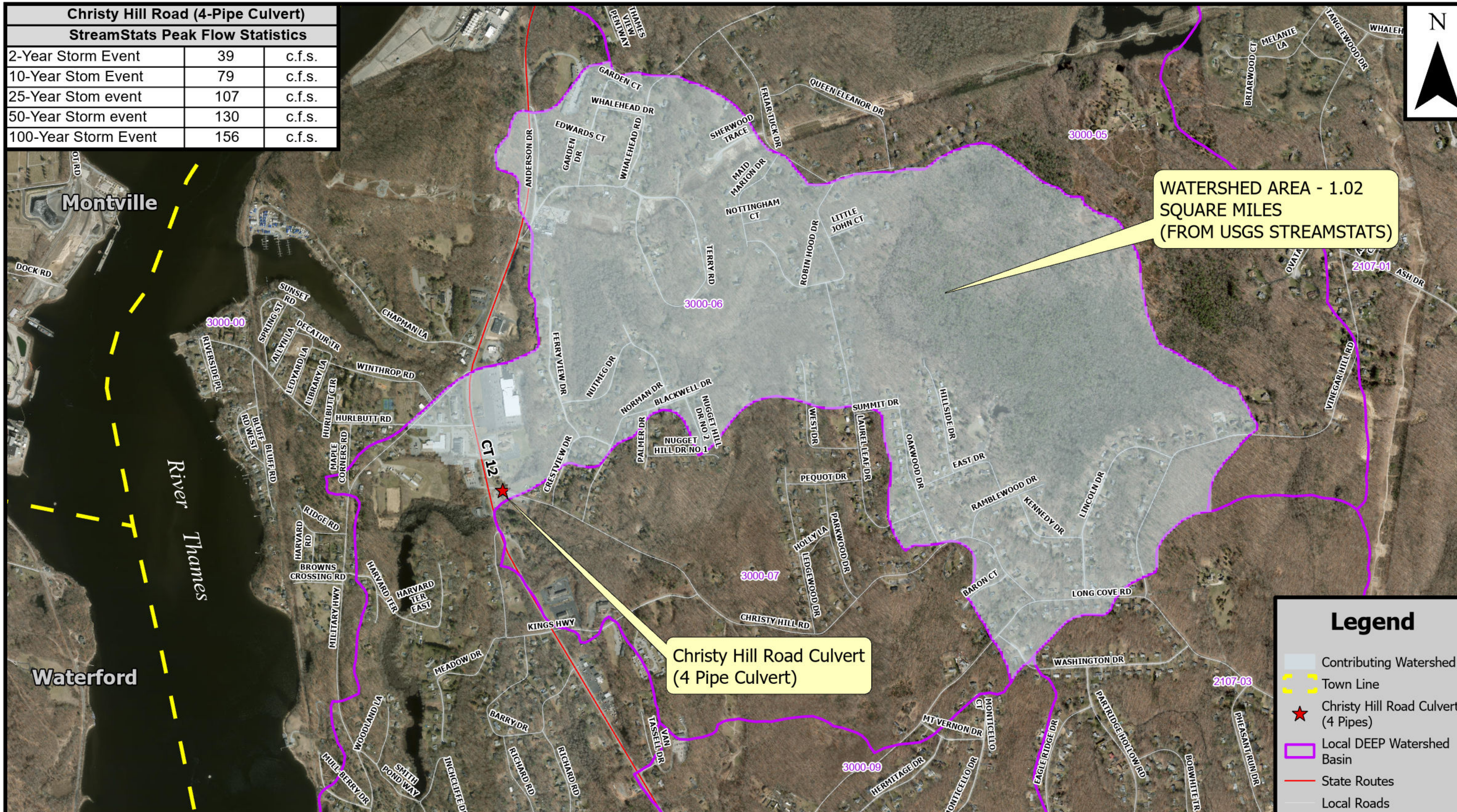
Christy Hill Road (1-Pipe) Watershed Plan

CHRISTY HILL ROAD CULVERT
(TRIBUTARY TO LOCAL BASIN 3000-07)
TOWN OF LEDYARD

CLA No: 8282
DATE: 12/3/2025
SCALE: 1"=200'
FIGURE 2

Christy Hill Road (4-Pipe Culvert)		
StreamStats Peak Flow Statistics		
2-Year Storm Event	39	c.f.s.
10-Year Stom Event	79	c.f.s.
25-Year Stom event	107	c.f.s.
50-Year Storm event	130	c.f.s.
100-Year Storm Event	156	c.f.s.



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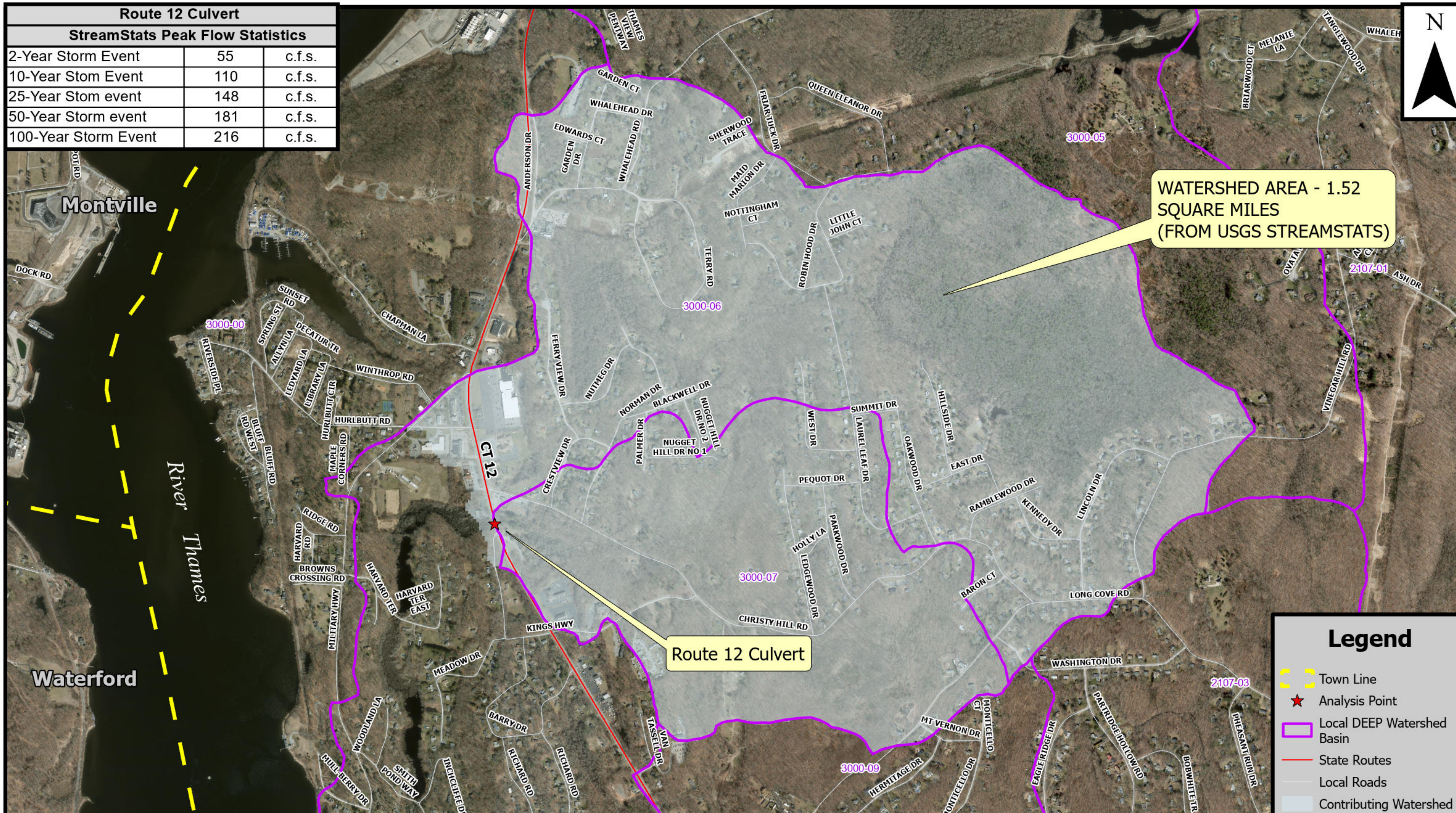
Christy Hill Road (4-Pipes) Watershed Plan

CHRISTY HILL ROAD (4-PIPE CULVERT)
TOWN OF LEDYARD

CLA No: 8282
DATE: 12/3/2025
SCALE: 1"=1,000'
FIGURE 3

Route 12 Culvert		
StreamStats Peak Flow Statistics		
2-Year Storm Event	55	c.f.s.
10-Year Stom Event	110	c.f.s.
25-Year Stom event	148	c.f.s.
50-Year Storm event	181	c.f.s.
100-Year Storm Event	216	c.f.s.



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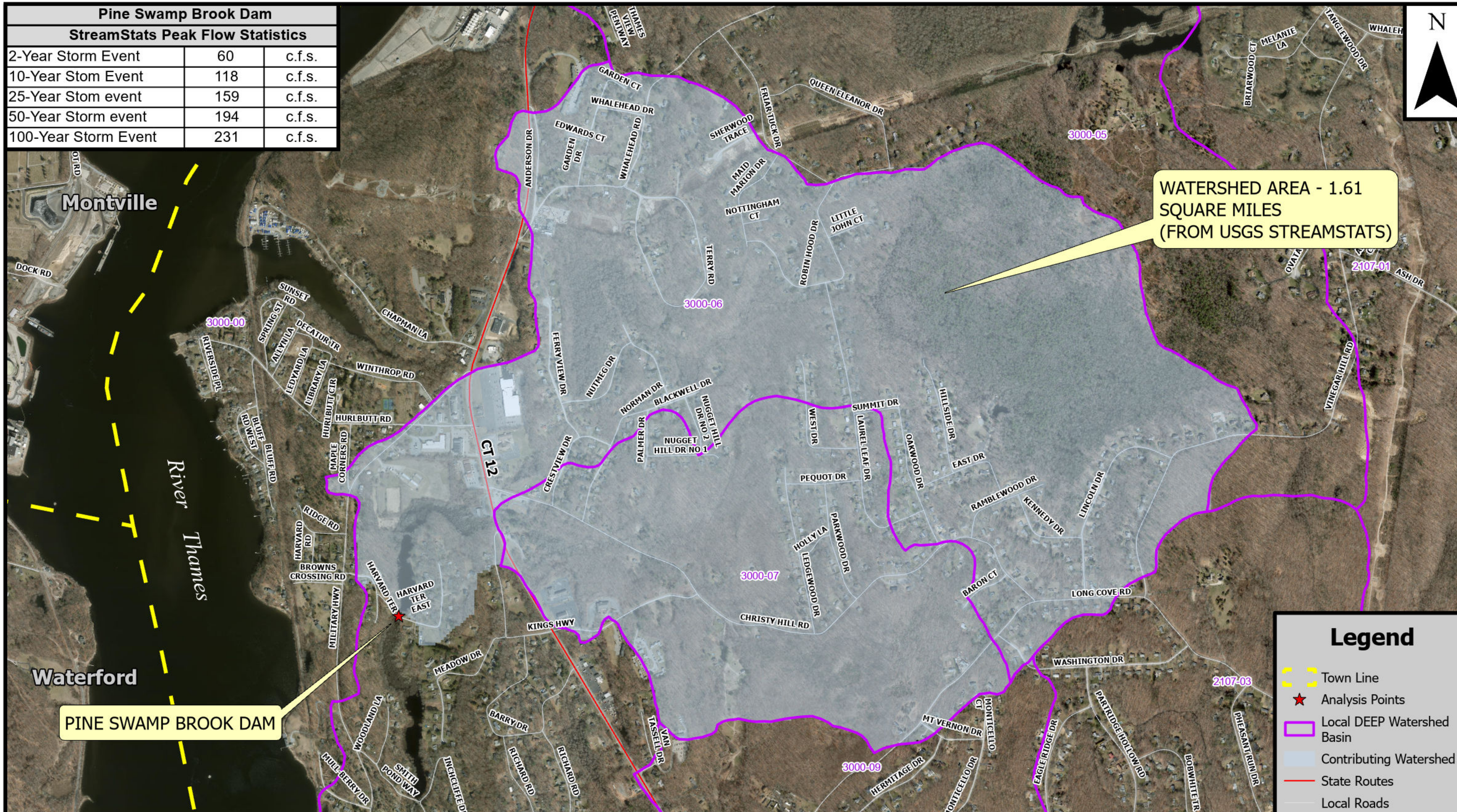
Route 12 Watershed Plan

ROUTE 12 CUVERT
TOWN OF LEDYARD

CLA No: 8282
DATE: 12/3/2025
SCALE: 1"=1,000'
FIGURE 4

Pine Swamp Brook Dam		
StreamStats Peak Flow Statistics		
2-Year Storm Event	60	c.f.s.
10-Year Stom Event	118	c.f.s.
25-Year Stom event	159	c.f.s.
50-Year Storm event	194	c.f.s.
100-Year Storm Event	231	c.f.s.



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e-mail: cla@claengineers.com

Pine Swamp Brook Dam Watershed Plan

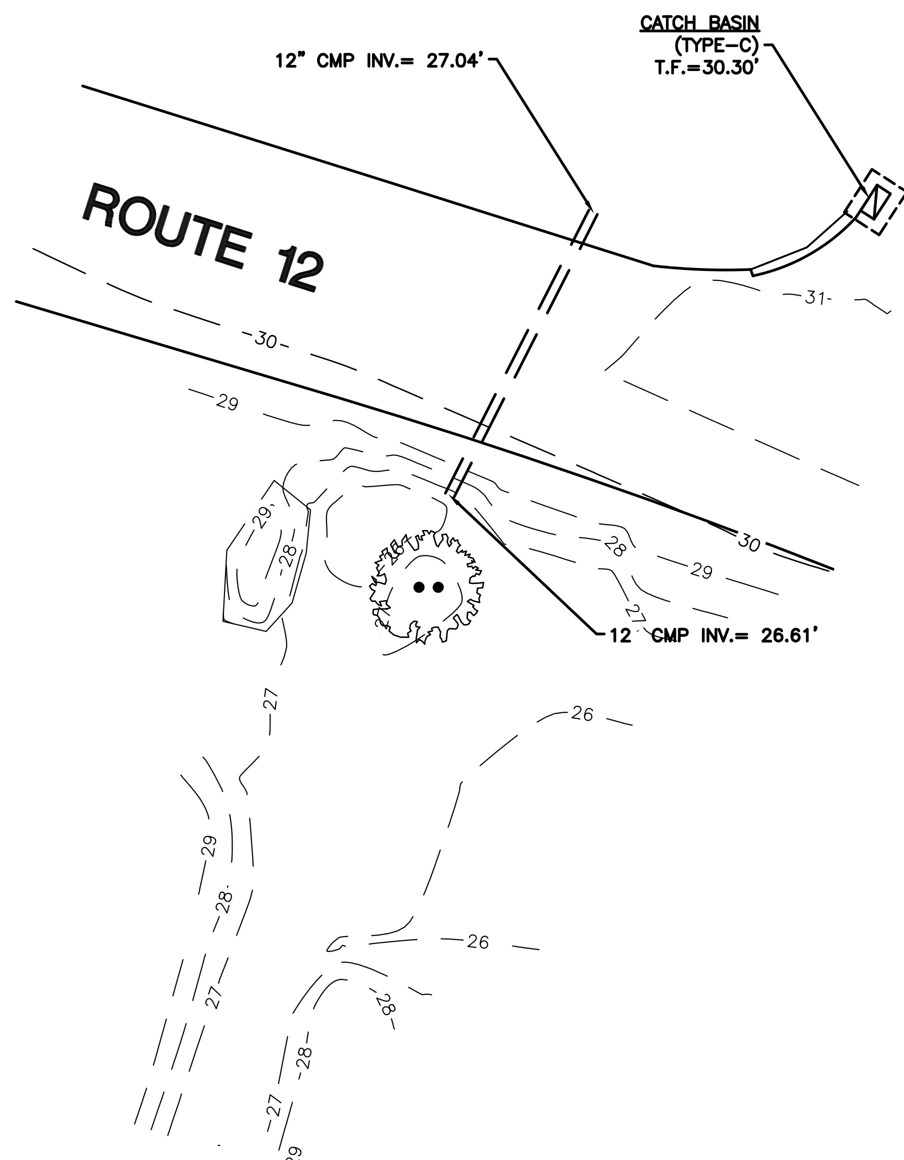
PINE BROOK SWAMP DAM
TOWN OF LEDYARD

CLA No: 8282
DATE: 12/3/2025
SCALE: 1"=1,000'
FIGURE 5

Sketch Plans

Christy Hill Road (1-Pipe)				
Strom Return Period	Peak Flow (cfs)	Headwater Elevation	Headwater Depth (ft)	Freeboard (ft)
2-Year	3.1	28.5	1.5	2.3
10-Year	4.5	30.0	2.9	0.8
Overtopping Occurs	**5.2**	**30.8**	**3.8**	**0.0**
25-Year	5.5	-	-	-
50-Year	6.2	-	-	-
100-Year	6.9	-	-	-

OUTLET (12" CMP)



20' 0 20' 40'

SCALE: 1"=20'

No.	DATE	REVISION

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TOWN OF LEDYARD

PINE BROOK SWAMP DAM

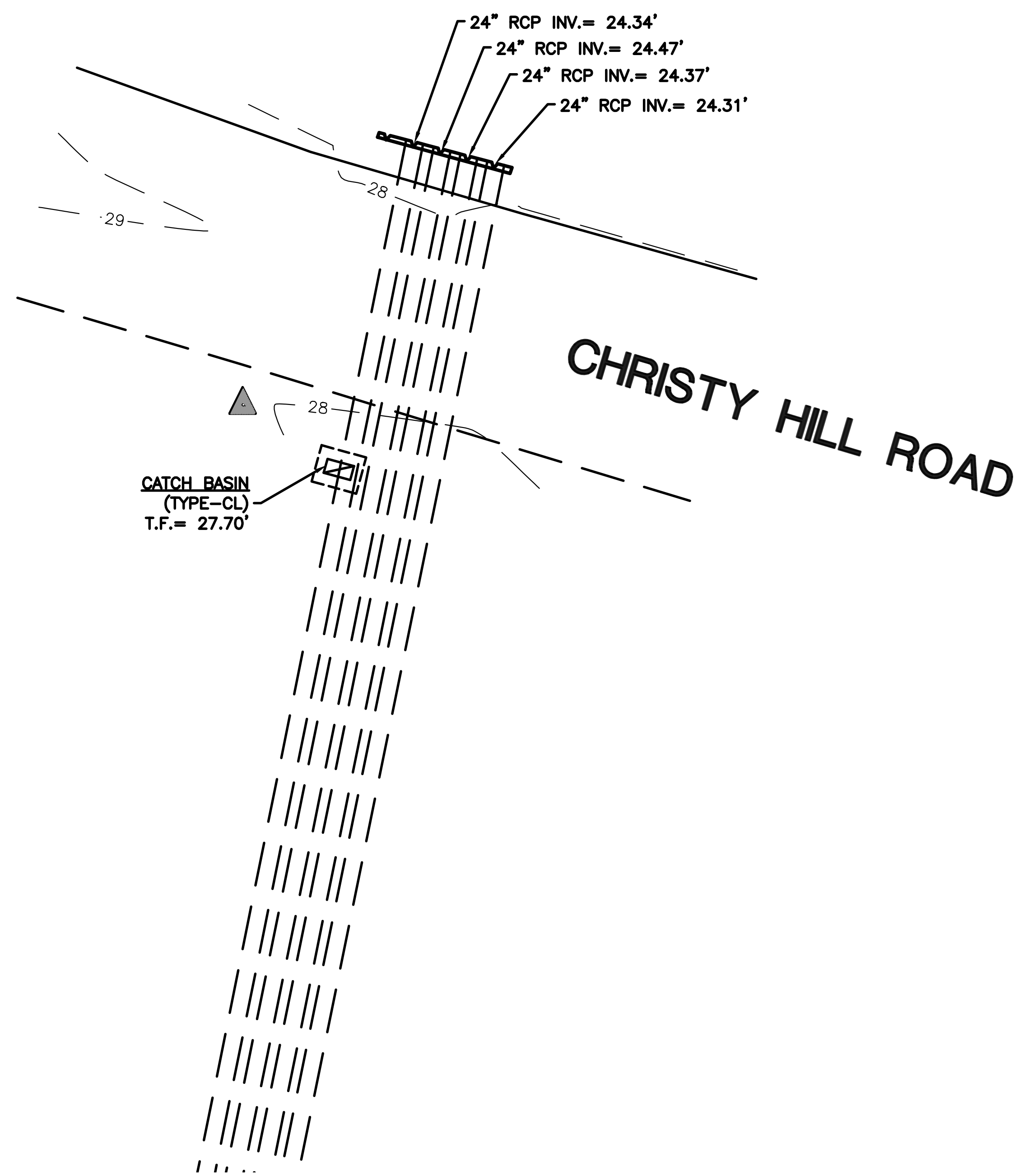
CHRISTY HILL ROAD (1 PIPE)

Project No. CLA-8282
Proj. Engineer D.P.H.
Date: 12/05/25
Sheet No. SK-1

CLA

Christy Hill Road (4-Pipes)				
Strom Return Period	Peak Flow (cfs)	Headwater Elevation	Headwater Depth (ft)	Freeboard (ft)
2-Year	39	26.1	1.7	2.7
10-Year	79	28.0	3.6	0.8
Overtopping Occurs	**90**	**28.8**	**4.4**	**-0.1**
25-Year	107	-	-	-
50-Year	130	-	-	-
100-Year	156	-	-	-

UPSTREAM (4 x 24" RCP SQUARE EDGE WITH HEADWALL)



20' 0 20' 40'

SCALE: 1"=20'

No.	DATE	REVISION

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TOWN OF LEDYARD

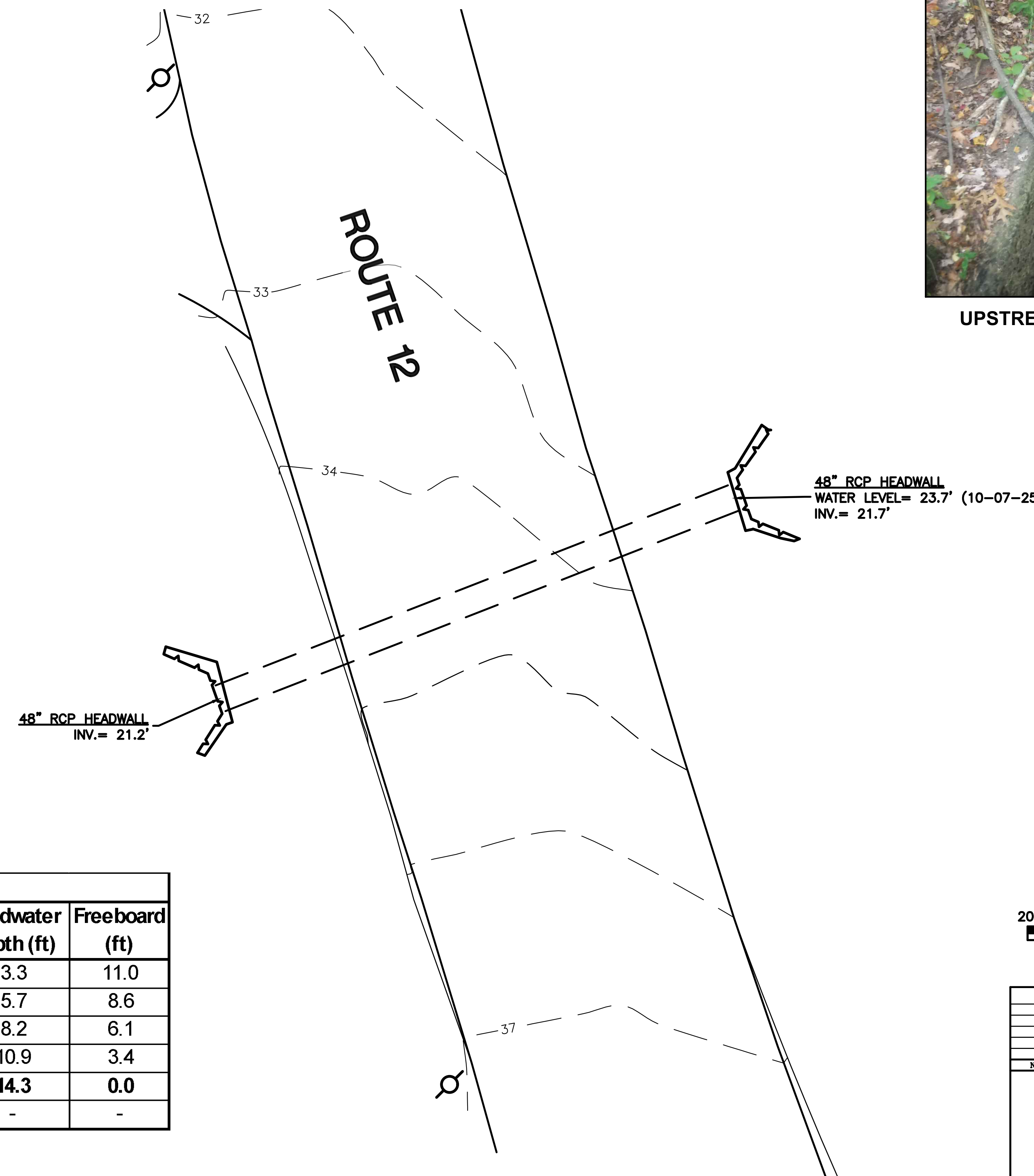
PINE BROOK SWAMP DAM

CHRISTY HILL ROAD (4 PIPES)

Project No. CLA-8282
Proj. Engineer D.P.H.
Date: 12/05/25
Sheet No. SK-2

CLA

UPSTREAM (48" RCP SQUARE EDGE WITH HEADWALL)



Route 12 Culvert				
Strom Return Period	Peak Flow (cfs)	Headwater Elevation	Headwater Depth (ft)	Freeboard (ft)
2-Year Storm Event	55	25.0	3.3	11.0
10-Year Stom Event	110	27.4	5.7	8.6
25-Year Stom event	148	29.9	8.2	6.1
50-Year Storm event	181	32.6	10.9	3.4
Overtopping Occurs	**191**	**36.0**	**14.3**	**0.0**
100-Year Storm Event	216	-	-	-

20' 0 20' 40'

SCALE: 1"=20'

No.	DATE	REVISION

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TOWN OF LEDYARD

PINE BROOK SWAMP DAM

ROUTE 12

Project No. CLA-8282

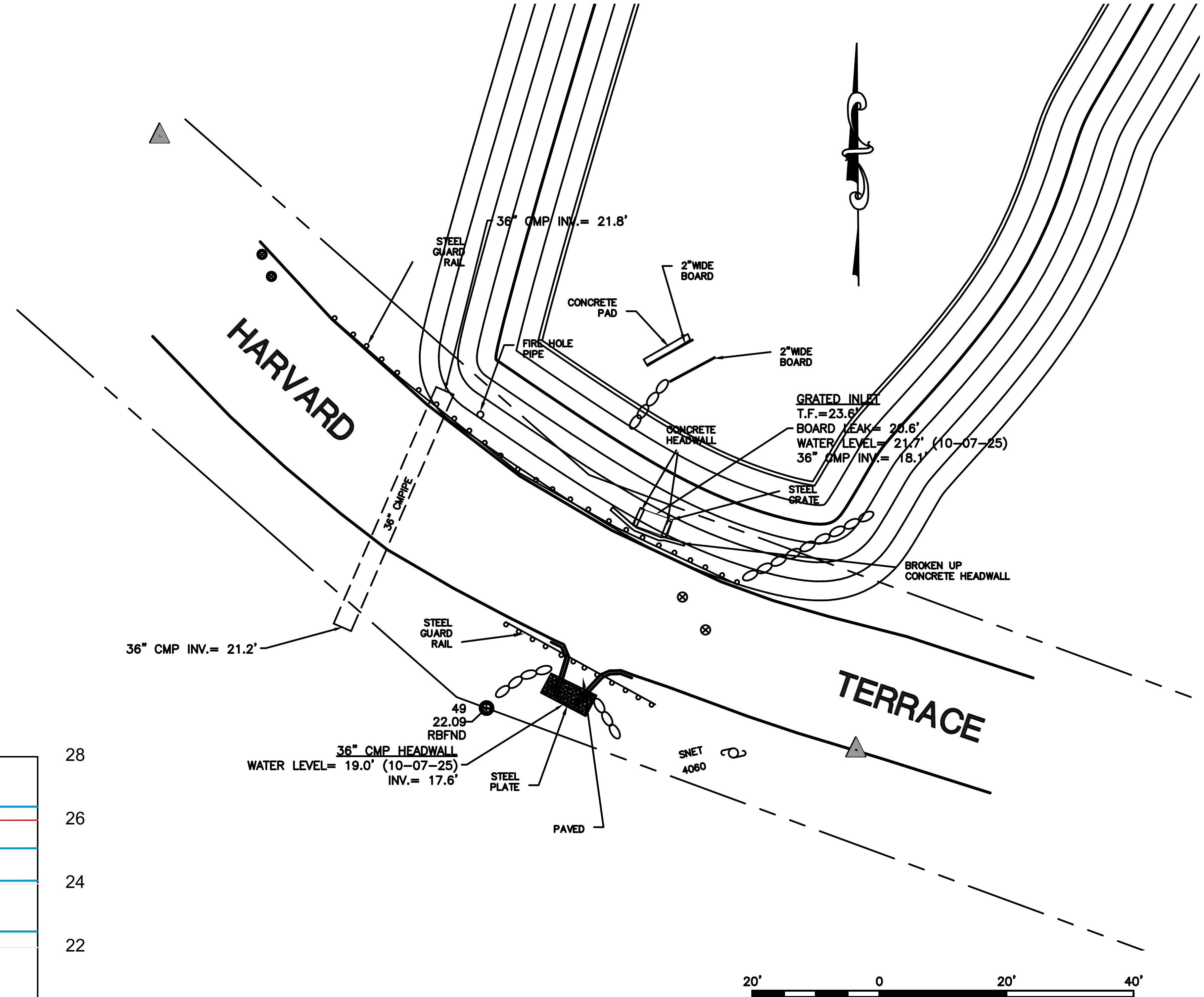
Proj. Engineer D.P.H.

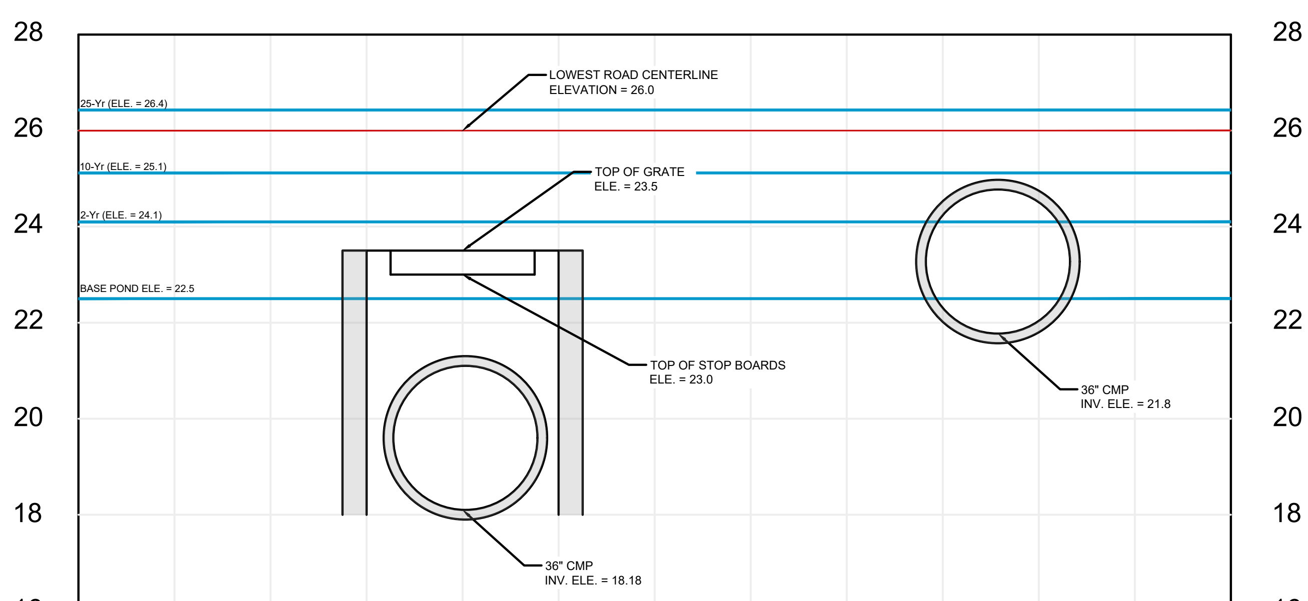
Date: 12/05/25

Sheet No. SK-3

CLA

VIEW LOOKING SOUTHWEST FROM BERM TOWARDS DAM AND OUTLETS





CROSS SECTION

(Horizontal Axis Not to Scale)

Pine Swamp Brook Dam				
Strom Return Period	Peak Flow In (cfs)	Peak Flow Out (cfs)	Pond Elevation	Freeboard (ft)
2-Year	60	59.1	24.09	1.91
10-Year	118	111.4	24.99	1.01
25-Year	**159**	**155.68**	**26.43**	**-0.43**
50-Year	194	-	-	-
100-Year	231	-	-	-

No.	DATE	REVISION

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TOWN OF LEDYARD

PINE BROOK SWAMP DAM

PINE SWAMP BROOK DAM

Project No. CLA-8282
Proj. Engineer D.P.H.
Date: 12/05/25
Sheet No. SK-4

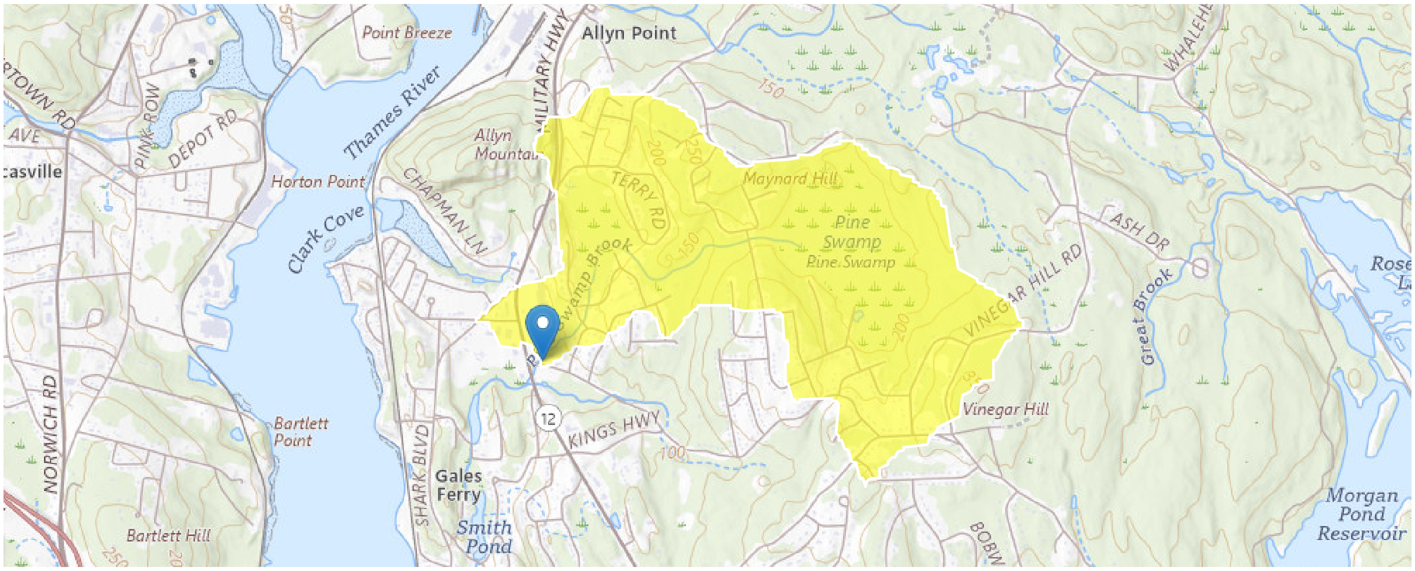
CLA

Appendix 1

StreamStats Peak Flow Statistics

StreamStats Report - Christy Hill Road (4 Pipes)

Region ID: CT
Workspace ID: CT20251006193022862000
Clicked Point (Latitude, Longitude): 41.42638, -72.08085
Time: 2025-10-06 15:30:44 -0400



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	1.02	square miles
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	7.74	inches
I24H10Y	Maximum 24-hour precipitation that occurs on average once in 10 years	5.06	inches
I24H200Y	Maximum 24-hour precipitation that occurs on average once in 200 years	8.81	inches
I24H25Y	Maximum 24-hour precipitation that occurs on average once in 25 years	6.13	inches
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	3.18	inches
I24H500Y	Maximum 24-hour precipitation that occurs on average once in 500 years	10.23	inches
I24H50Y	Maximum 24-hour precipitation that occurs on average once in 50 years	6.93	inches
I24H5Y	Maximum 24-hour precipitation that occurs on average once in 5 years	4.25	inches
SSURGOCCDD	Percentage of area with hydrologic soil types C, D, or C/D from SSURGO	0.0844	percent

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Statewide DA only SIR 2020 5054]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.02	square miles	0.69	325

Peak-Flow Statistics Parameters [Statewide Multiparameter SIR 2020 5054]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.02	square miles	0.69	325
I24H100Y	24 Hour 100 Year Precipitation	7.74	inches	7.62	9.38
I24H10Y	24 Hour 10 Year Precipitation	5.06	inches	4.86	5.79
I24H200Y	24 Hour 200 YearPrecipitation	8.81	inches	8.7	11.22
I24H25Y	24 Hour 25 Year Precipitation	6.13	inches	5.99	7.22
I24H2Y	24 Hour 2 Year Precipitation	3.18	inches	2.77	3.32
I24H500Y	24 Hour 500 Year Precipitation	10.23	inches	10.1	13.64
I24H50Y	24 Hour 50 Year Precipitation	6.93	inches	6.81	8.3
I24H5Y	24 Hour 5 Year Precipitation	4.25	inches	4	4.7
SSURGOCCDD	Percent soil type C or D from SSURGO	0.0844	percent	0.118	0.945

Peak-Flow Statistics Flow Report [Statewide DA only SIR 2020 5054]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	ASEp
Drainage Area Only 50-percent AEP flood	65.1	ft^3/s	35
Drainage Area Only 20-percent AEP flood	115	ft^3/s	35
Drainage Area Only 10-percent AEP flood	156	ft^3/s	36.3
Drainage Area Only 4-percent AEP flood	218	ft^3/s	37.8
Drainage Area Only 2-percent AEP flood	269	ft^3/s	39.8
Drainage Area Only 1-percent AEP flood	327	ft^3/s	42.4
Drainage Area Only 0.5-percent AEP flood	391	ft^3/s	44.4
Drainage Area Only 0.2-percent AEP flood	487	ft^3/s	48

Peak-Flow Statistics Disclaimers [Statewide Multiparameter SIR 2020 5054]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [Statewide Multiparameter SIR 2020 5054]

Statistic	Value	Unit
50-percent AEP flood	39.2	ft^3/s
20-percent AEP flood	61.6	ft^3/s
10-percent AEP flood	78.9	ft^3/s
4-percent AEP flood	107	ft^3/s
2-percent AEP flood	130	ft^3/s
1-percent AEP flood	156	ft^3/s
0.5-percent AEP flood	187	ft^3/s
0.2-percent AEP flood	237	ft^3/s

Peak-Flow Statistics Flow Report [Area-Averaged]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	ASEp
Drainage Area Only 50-percent AEP flood	65.1	ft^3/s	35
Drainage Area Only 20-percent AEP flood	115	ft^3/s	35

Statistic	Value	Unit	ASEp
Drainage Area Only 10-percent AEP flood	156	ft^3/s	36.3
Drainage Area Only 4-percent AEP flood	218	ft^3/s	37.8
Drainage Area Only 2-percent AEP flood	269	ft^3/s	39.8
Drainage Area Only 1-percent AEP flood	327	ft^3/s	42.4
Drainage Area Only 0.5-percent AEP flood	391	ft^3/s	44.4
Drainage Area Only 0.2-percent AEP flood	487	ft^3/s	48
50-percent AEP flood	39.2	ft^3/s	
20-percent AEP flood	61.6	ft^3/s	
10-percent AEP flood	78.9	ft^3/s	
4-percent AEP flood	107	ft^3/s	
2-percent AEP flood	130	ft^3/s	
1-percent AEP flood	156	ft^3/s	
0.5-percent AEP flood	187	ft^3/s	
0.2-percent AEP flood	237	ft^3/s	

Peak-Flow Statistics Citations

Ahearn, E.A., and Hodgkins, G.A.,2020, Estimating flood magnitude and frequency on streams and rivers in Connecticut, based on data through water year 2015: U.S. Geological Survey Scientific Investigations Report 2020–5054, 42 p. (https://doi.org/10.3133/sir20205054)

NHD Features of Delineated Basin

NHD Streams Intersecting Basin Delineation Boundary

This functionality attempts to find the stream name at the delineation point. The name of the nearest intersecting National Hydrography Dataset (NHD) stream is selected by default to appear in the report above. NHD streams do not correspond to the StreamStats stream grid and may not be accurate. If you would like a different stream to appear in the above section, please make a selection below.

No NHD streams intersect the delineated basin.

Watershed Boundary Dataset (WBD) HUC 8 Intersecting Basin Delineation Boundary

This functionality attempts to find the intersecting HUC 8 of the delineated watershed. HUC boundaries do not correspond to the StreamStats data and may not be accurate.

No WBD HUC8s intersect the delineated basin.

NHD Hydrologic Features Citations

U.S. Geological Survey, 2022, USGS TNM - National Hydrography Dataset, accessed July 21, 2022 at URL https://hydro.nationalmap.gov/arcgis/rest/services/nhd/MapServer/6. (https://hydro.nationalmap.gov/arcgis/rest/services/nhd/MapServer/6) U.S. Geological Survey, 2022, USGS TNM - National Hydrography Dataset, accessed July 21, 2022 at URL https://hydro.nationalmap.gov/arcgis/rest/services/wbd/MapServer/4. (https://hydro.nationalmap.gov/arcgis/rest/services/wbd/MapServer/4)

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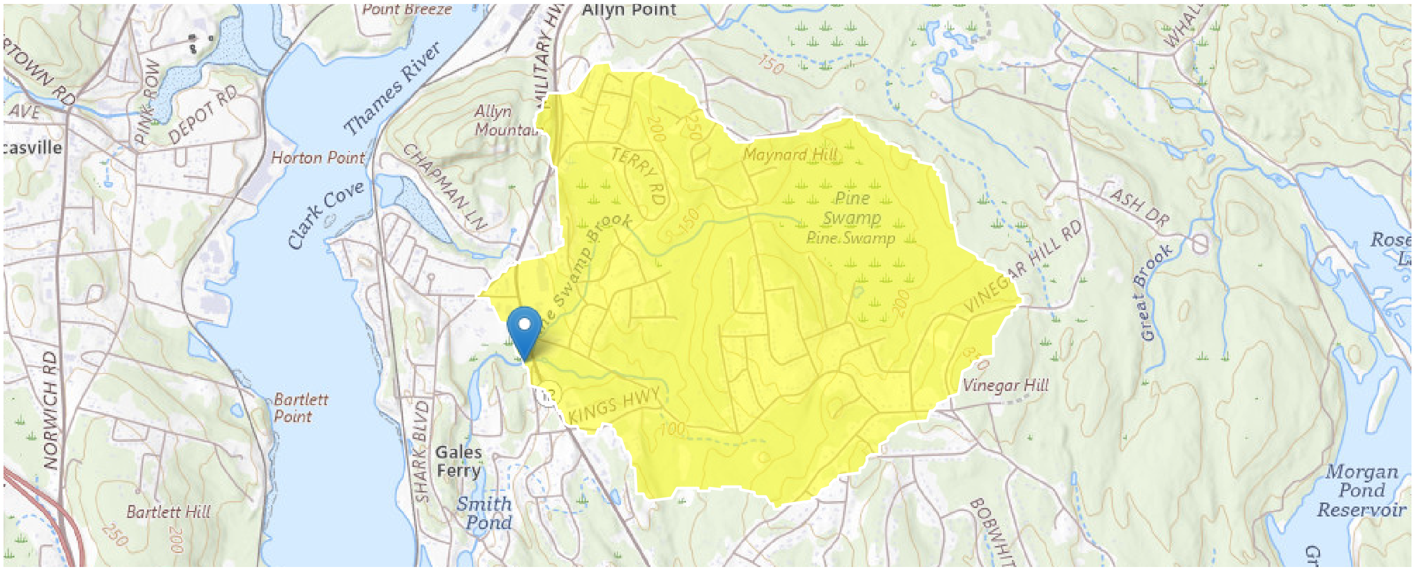
Application Version: 4.29.3

StreamStats Services Version: 1.2.22

NSS Services Version: 2.2.1

Route 12 Culvert - Peak Flow Statistics

Region ID: CT
Workspace ID: CT20251007155358347000
Clicked Point (Latitude, Longitude): 41.42518, -72.08192
Time: 2025-10-07 11:54:37 -0400



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	1.52	square miles
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	7.74	inches
I24H10Y	Maximum 24-hour precipitation that occurs on average once in 10 years	5.06	inches
I24H200Y	Maximum 24-hour precipitation that occurs on average once in 200 years	8.82	inches
I24H25Y	Maximum 24-hour precipitation that occurs on average once in 25 years	6.13	inches
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	3.18	inches
I24H500Y	Maximum 24-hour precipitation that occurs on average once in 500 years	10.23	inches
I24H50Y	Maximum 24-hour precipitation that occurs on average once in 50 years	6.94	inches
I24H5Y	Maximum 24-hour precipitation that occurs on average once in 5 years	4.25	inches
SSURGOCCDD	Percentage of area with hydrologic soil types C, D, or C/D from SSURGO	0.0977	percent

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Statewide DA only SIR 2020 5054]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.52	square miles	0.69	325

Peak-Flow Statistics Parameters [Statewide Multiparameter SIR 2020 5054]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.52	square miles	0.69	325
I24H100Y	24 Hour 100 Year Precipitation	7.74	inches	7.62	9.38
I24H10Y	24 Hour 10 Year Precipitation	5.06	inches	4.86	5.79
I24H200Y	24 Hour 200 YearPrecipitation	8.82	inches	8.7	11.22
I24H25Y	24 Hour 25 Year Precipitation	6.13	inches	5.99	7.22
I24H2Y	24 Hour 2 Year Precipitation	3.18	inches	2.77	3.32
I24H500Y	24 Hour 500 Year Precipitation	10.23	inches	10.1	13.64
I24H50Y	24 Hour 50 Year Precipitation	6.94	inches	6.81	8.3
I24H5Y	24 Hour 5 Year Precipitation	4.25	inches	4	4.7
SSURGOCCDD	Percent soil type C or D from SSURGO	0.0977	percent	0.118	0.945

Peak-Flow Statistics Flow Report [Statewide DA only SIR 2020 5054]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	ASEp
Drainage Area Only 50-percent AEP flood	88.8	ft^3/s	35
Drainage Area Only 20-percent AEP flood	156	ft^3/s	35
Drainage Area Only 10-percent AEP flood	212	ft^3/s	36.3
Drainage Area Only 4-percent AEP flood	295	ft^3/s	37.8
Drainage Area Only 2-percent AEP flood	365	ft^3/s	39.8
Drainage Area Only 1-percent AEP flood	443	ft^3/s	42.4
Drainage Area Only 0.5-percent AEP flood	531	ft^3/s	44.4
Drainage Area Only 0.2-percent AEP flood	661	ft^3/s	48

Peak-Flow Statistics Disclaimers [Statewide Multiparameter SIR 2020 5054]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [Statewide Multiparameter SIR 2020 5054]

Statistic	Value	Unit
50-percent AEP flood	55.3	ft^3/s
20-percent AEP flood	86.2	ft^3/s
10-percent AEP flood	110	ft^3/s
4-percent AEP flood	148	ft^3/s
2-percent AEP flood	181	ft^3/s
1-percent AEP flood	216	ft^3/s
0.5-percent AEP flood	260	ft^3/s
0.2-percent AEP flood	328	ft^3/s

Peak-Flow Statistics Flow Report [Area-Averaged]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	ASEp
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Drainage Area Only 20-percent AEP flood	156	ft^3/s	35

Statistic	Value	Unit	ASEp
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Drainage Area Only 2-percent AEP flood	365	ft^3/s	39.8
Drainage Area Only 1-percent AEP flood	443	ft^3/s	42.4
Drainage Area Only 0.5-percent AEP flood	531	ft^3/s	44.4
Drainage Area Only 0.2-percent AEP flood	661	ft^3/s	48
50-percent AEP flood	55.3	ft^3/s	
20-percent AEP flood	86.2	ft^3/s	
10-percent AEP flood	110	ft^3/s	
4-percent AEP flood	148	ft^3/s	
2-percent AEP flood	181	ft^3/s	
1-percent AEP flood	216	ft^3/s	
0.5-percent AEP flood	260	ft^3/s	
0.2-percent AEP flood	328	ft^3/s	

Peak-Flow Statistics Citations

Ahearn, E.A., and Hodgkins, G.A.,2020, Estimating flood magnitude and frequency on streams and rivers in Connecticut, based on data through water year 2015: U.S. Geological Survey Scientific Investigations Report 2020–5054, 42 p. (https://doi.org/10.3133/sir20205054)

NHD Features of Delineated Basin

NHD Streams Intersecting Basin Delineation Boundary

This functionality attempts to find the stream name at the delineation point. The name of the nearest intersecting National Hydrography Dataset (NHD) stream is selected by default to appear in the report above. NHD streams do not correspond to the StreamStats stream grid and may not be accurate. If you would like a different stream to appear in the above section, please make a selection below.

Watershed Boundary Dataset (WBD) HUC 8 Intersecting Basin Delineation Boundary

This functionality attempts to find the intersecting HUC 8 of the delineated watershed. HUC boundaries do not correspond to the StreamStats data and may not be accurate.

No WBD HUC8s intersect the delineated basin.

NHD Hydrologic Features Citations

U.S. Geological Survey, 2022, USGS TNM - National Hydrography Dataset, accessed July 21, 2022 at URL https://hydro.nationalmap.gov/arcgis/rest/services/nhd/MapServer/6. (https://hydro.nationalmap.gov/arcgis/rest/services/nhd/MapServer/6) U.S. Geological Survey, 2022, USGS TNM - National Hydrography Dataset, accessed July 21, 2022 at URL https://hydro.nationalmap.gov/arcgis/rest/services/wbd/MapServer/4. (https://hydro.nationalmap.gov/arcgis/rest/services/wbd/MapServer/4)

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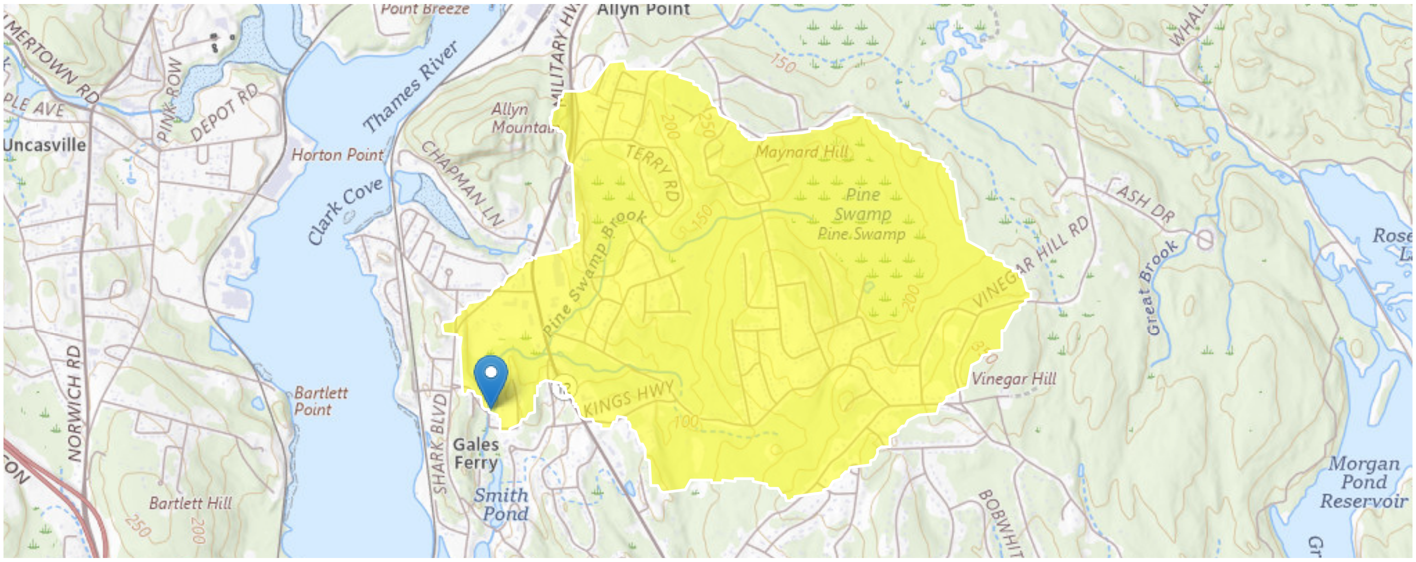
Application Version: 4.29.3

StreamStats Services Version: 1.2.22

NSS Services Version: 2.2.1

Pine Swamp Brook Dam - Peak Flow Statistics

Region ID: CT
Workspace ID: CT20250924151958307000
Clicked Point (Latitude, Longitude): 41.42268, -72.08499
Time: 2025-09-24 11:20:22 -0400



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	1.61	square miles
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	7.74	inches
I24H10Y	Maximum 24-hour precipitation that occurs on average once in 10 years	5.06	inches
I24H200Y	Maximum 24-hour precipitation that occurs on average once in 200 years	8.82	inches
I24H25Y	Maximum 24-hour precipitation that occurs on average once in 25 years	6.13	inches
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	3.18	inches
I24H500Y	Maximum 24-hour precipitation that occurs on average once in 500 years	10.23	inches
I24H50Y	Maximum 24-hour precipitation that occurs on average once in 50 years	6.94	inches
I24H5Y	Maximum 24-hour precipitation that occurs on average once in 5 years	4.25	inches
SSURGOCCDD	Percentage of area with hydrologic soil types C, D, or C/D from SSURGO	0.1199	percent
STRDEN	Stream Density -- total length of streams divided by drainage area	1.9	miles per square mile

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Statewide DA only SIR 2020 5054]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.61	square miles	0.69	325

Peak-Flow Statistics Parameters [Statewide Multiparameter SIR 2020 5054]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.61	square miles	0.69	325
I24H100Y	24 Hour 100 Year Precipitation	7.74	inches	7.62	9.38
I24H10Y	24 Hour 10 Year Precipitation	5.06	inches	4.86	5.79
I24H200Y	24 Hour 200 YearPrecipitation	8.82	inches	8.7	11.22
I24H25Y	24 Hour 25 Year Precipitation	6.13	inches	5.99	7.22
I24H2Y	24 Hour 2 Year Precipitation	3.18	inches	2.77	3.32
I24H500Y	24 Hour 500 Year Precipitation	10.23	inches	10.1	13.64
I24H50Y	24 Hour 50 Year Precipitation	6.94	inches	6.81	8.3
I24H5Y	24 Hour 5 Year Precipitation	4.25	inches	4	4.7
SSURGOCCDD	Percent soil type C or D from SSURGO	0.1199	percent	0.118	0.945

Peak-Flow Statistics Flow Report [Statewide DA only SIR 2020 5054]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	ASEp
Drainage Area Only 50-percent AEP flood	92.9	ft^3/s	35
Drainage Area Only 20-percent AEP flood	163	ft^3/s	35
Drainage Area Only 10-percent AEP flood	221	ft^3/s	36.3
Drainage Area Only 4-percent AEP flood	308	ft^3/s	37.8
Drainage Area Only 2-percent AEP flood	381	ft^3/s	39.8
Drainage Area Only 1-percent AEP flood	463	ft^3/s	42.4
Drainage Area Only 0.5-percent AEP flood	554	ft^3/s	44.4
Drainage Area Only 0.2-percent AEP flood	691	ft^3/s	48

Peak-Flow Statistics Flow Report [Statewide Multiparameter SIR 2020 5054]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	PIL	PIU	ASEp
50-percent AEP flood	59.7	ft^3/s	14	254	26.5
20-percent AEP flood	92.7	ft^3/s	20	430	26.3
10-percent AEP flood	118	ft^3/s	23.5	591	28.4
4-percent AEP flood	159	ft^3/s	28.8	878	31.5
2-percent AEP flood	194	ft^3/s	32	1170	34.3
1-percent AEP flood	231	ft^3/s	34.7	1540	37.1
0.5-percent AEP flood	278	ft^3/s	47.5	1630	40.6
0.2-percent AEP flood	350	ft^3/s	64	1910	45

Peak-Flow Statistics Flow Report [Area-Averaged]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	ASEp
Drainage Area Only 50-percent AEP flood	92.9	ft^3/s	35
Drainage Area Only 20-percent AEP flood	163	ft^3/s	35
Drainage Area Only 10-percent AEP flood	221	ft^3/s	36.3
Drainage Area Only 4-percent AEP flood	308	ft^3/s	37.8

Statistic	Value	Unit	ASEp		
Drainage Area Only 2-percent AEP flood	381	ft^3/s	39.8		
Drainage Area Only 1-percent AEP flood	463	ft^3/s	42.4		
Drainage Area Only 0.5-percent AEP flood	554	ft^3/s	44.4		
Drainage Area Only 0.2-percent AEP flood	691	ft^3/s	48		
50-percent AEP flood	59.7	ft^3/s	14	254	26.5
20-percent AEP flood	92.7	ft^3/s	20	430	26.3
10-percent AEP flood	118	ft^3/s	23.5	591	28.4
4-percent AEP flood	159	ft^3/s	28.8	878	31.5
2-percent AEP flood	194	ft^3/s	32	1170	34.3
1-percent AEP flood	231	ft^3/s	34.7	1540	37.1
0.5-percent AEP flood	278	ft^3/s	47.5	1630	40.6
0.2-percent AEP flood	350	ft^3/s	64	1910	45

Peak-Flow Statistics Citations

Ahearn, E.A., and Hodgkins, G.A.,2020, Estimating flood magnitude and frequency on streams and rivers in Connecticut, based on data through water year 2015: U.S. Geological Survey Scientific Investigations Report 2020–5054, 42 p. (https://doi.org/10.3133/sir20205054)

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Application Version: 4.29.3
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

Appendix 2

Hydraulic Capacity Analysis

Christy Hill Road (1-Pipe)
Tribunary to 3000-07

Hydraulic Capacity Analysis

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 2 2025

Christy Hill Road (1-Pipe)

Invert Elev Dn (ft)	=	26.61
Pipe Length (ft)	=	33.00
Slope (%)	=	1.30
Invert Elev Up (ft)	=	27.04
Rise (in)	=	12.0
Shape	=	Circular
Span (in)	=	12.0
No. Barrels	=	1
n-Value	=	0.023
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Mitered to slope (C)
Coeff. K,M,c,Y,k	=	0.021, 1.33, 0.0463, 0.75, 0.7

Embankment

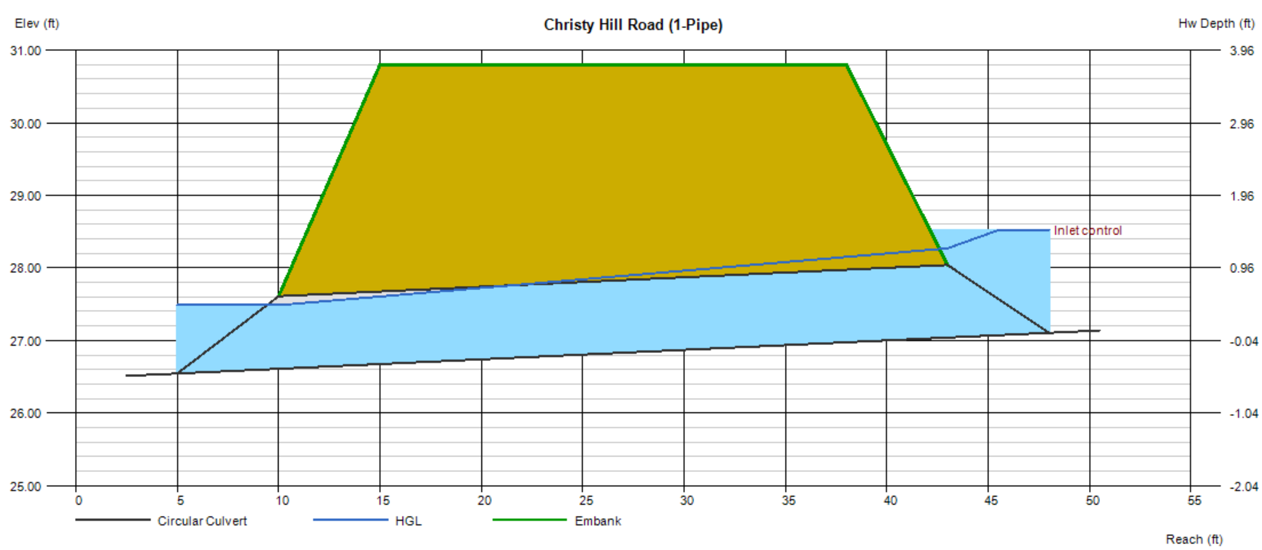
Top Elevation (ft)	=	30.80
Top Width (ft)	=	23.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	3.10
Qmax (cfs)	=	3.10
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	3.10
Qpipe (cfs)	=	3.10
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.25
Veloc Up (ft/s)	=	3.95
HGL Dn (ft)	=	27.49
HGL Up (ft)	=	28.27
Hw Elev (ft)	=	28.52
Hw/D (ft)	=	1.48
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. — Tuesday, Dec 2 2025

Christy Hill Road (1-Pipe)

Invert Elev Dn (ft)	=	26.61
Pipe Length (ft)	=	33.00
Slope (%)	=	1.30
Invert Elev Up (ft)	=	27.04
Rise (in)	=	12.0
Shape	=	Circular
Span (in)	=	12.0
No. Barrels	=	1
n-Value	=	0.023
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Mitered to slope (C)
Coeff. K,M,c,Y,k	=	0.021, 1.33, 0.0463, 0.75, 0.7

Embankment

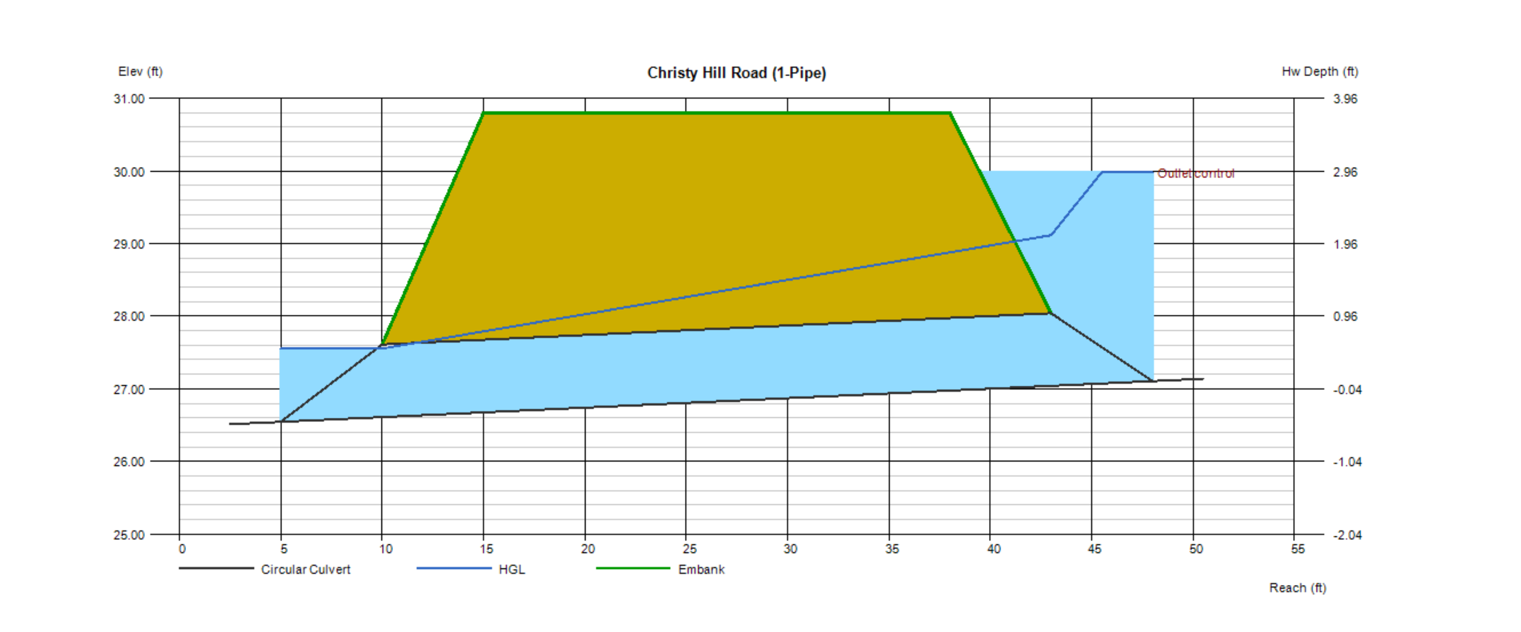
Top Elevation (ft)	=	30.80
Top Width (ft)	=	23.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	4.50
Qmax (cfs)	=	4.50
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	4.50
Qpipe (cfs)	=	4.50
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.86
Veloc Up (ft/s)	=	5.73
HGL Dn (ft)	=	27.55
HGL Up (ft)	=	29.11
Hw Elev (ft)	=	29.98
Hw/D (ft)	=	2.94
Flow Regime	=	Outlet Control



Culvert Report

Christy Hill Road (1-Pipe)

Invert Elev Dn (ft)	= 26.61
Pipe Length (ft)	= 33.00
Slope (%)	= 1.30
Invert Elev Up (ft)	= 27.04
Rise (in)	= 12.0
Shape	= Circular
Span (in)	= 12.0
No. Barrels	= 1
n-Value	= 0.023
Culvert Type	= Circular Corrugate Metal Pipe
Culvert Entrance	= Mitered to slope (C)
Coeff. K,M,c,Y,k	= 0.021, 1.33, 0.0463, 0.75, 0.7

Embankment

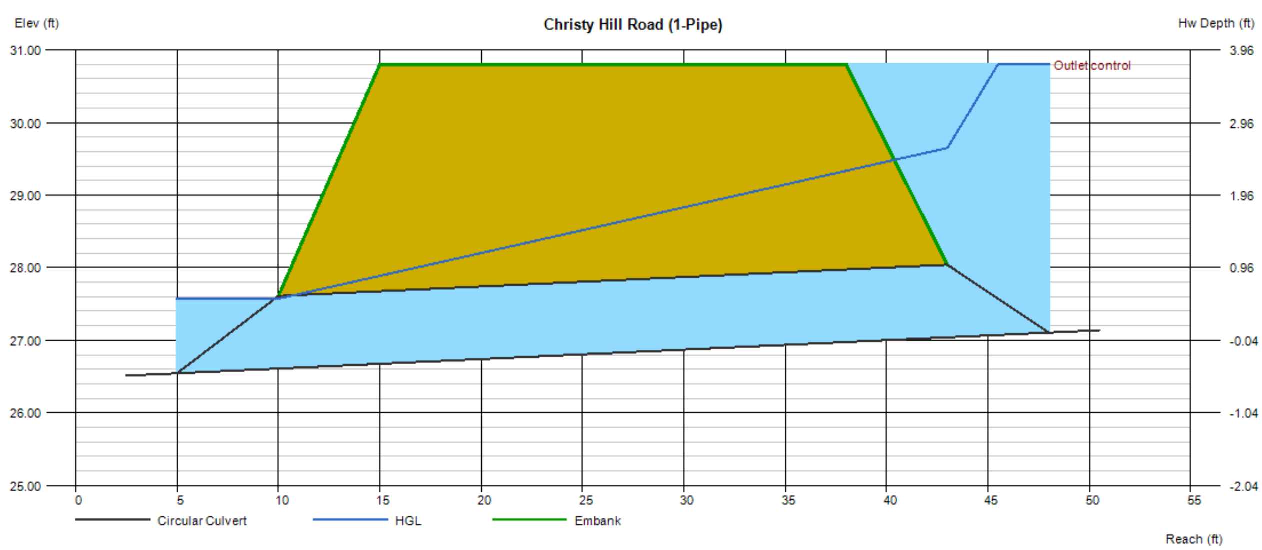
Top Elevation (ft)	= 30.80
Top Width (ft)	= 23.00
Crest Width (ft)	= 10.00

Calculations

Qmin (cfs)	= 4.50
Qmax (cfs)	= 10.00
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 5.20
Qpipe (cfs)	= 5.19
Qovertop (cfs)	= 0.01
Veloc Dn (ft/s)	= 6.69
Veloc Up (ft/s)	= 6.61
HGL Dn (ft)	= 27.57
HGL Up (ft)	= 29.65
Hw Elev (ft)	= 30.80
Hw/D (ft)	= 3.76
Flow Regime	= Outlet Control



Christy Hill Road (4-Pipes) Tributary to 3000-08)

Hydraulic Capacity Analysis

Culvert Report

Christy Hill Road (4-Pipes)

Invert Elev Dn (ft)	=	23.50
Pipe Length (ft)	=	235.00
Slope (%)	=	0.38
Invert Elev Up (ft)	=	24.40
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	4
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

Top Elevation (ft)	=	28.75
Top Width (ft)	=	24.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	39.00
Qmax (cfs)	=	39.00
Tailwater Elev (ft)	=	0.00

Highlighted

Qtotal (cfs)	=	39.00
Qpipe (cfs)	=	39.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.41
Veloc Up (ft/s)	=	5.41
HGL Dn (ft)	=	24.62
HGL Up (ft)	=	25.52
Hw Elev (ft)	=	26.06
Hw/D (ft)	=	0.83
Flow Regime	=	Inlet Control

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 2 2025

Christy Hill Road (4-Pipes)

Invert Elev Dn (ft)	=	23.50
Pipe Length (ft)	=	235.00
Slope (%)	=	0.38
Invert Elev Up (ft)	=	24.40
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	4
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

Top Elevation (ft)	=	28.75
Top Width (ft)	=	24.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	79.00
Qmax (cfs)	=	79.00
Tailwater Elev (ft)	=	0.00

Highlighted

Qtotal (cfs)	=	79.00
Qpipe (cfs)	=	79.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.35
Veloc Up (ft/s)	=	6.29
HGL Dn (ft)	=	25.10
HGL Up (ft)	=	27.16
Hw Elev (ft)	=	28.08
Hw/D (ft)	=	1.84
Flow Regime	=	Outlet Control

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 2 2025

Christy Hill Road (4-Pipes)

Invert Elev Dn (ft)	=	23.50
Pipe Length (ft)	=	235.00
Slope (%)	=	0.38
Invert Elev Up (ft)	=	24.40
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	4
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

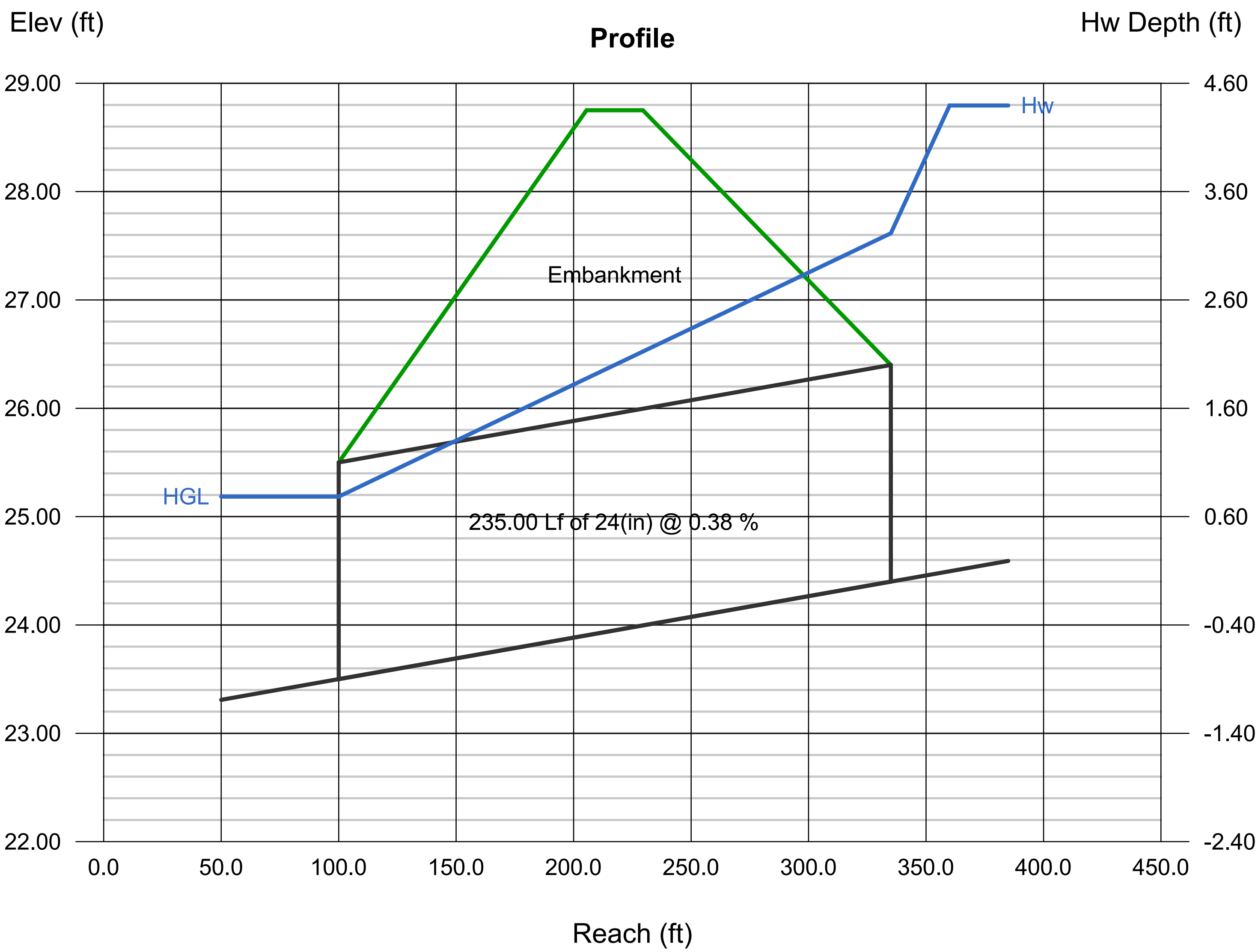
Top Elevation (ft)	=	28.75
Top Width (ft)	=	24.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	90.00
Qmax (cfs)	=	90.00
Tailwater Elev (ft)	=	0.00

Highlighted

Qtotal (cfs)	=	90.00
Qpipe (cfs)	=	89.41
Qovertop (cfs)	=	0.59
Veloc Dn (ft/s)	=	7.91
Veloc Up (ft/s)	=	7.12
HGL Dn (ft)	=	25.19
HGL Up (ft)	=	27.61
Hw Elev (ft)	=	28.80
Hw/D (ft)	=	2.20
Flow Regime	=	Outlet Control



Route 12

Hydraulic Capacity Analysis

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Dec 3 2025

Route 12 (48-Inch RCP)

Invert Elev Dn (ft)	= 21.20
Pipe Length (ft)	= 80.00
Slope (%)	= 0.63
Invert Elev Up (ft)	= 21.70
Rise (in)	= 48.0
Shape	= Circular
Span (in)	= 48.0
No. Barrels	= 1
n-Value	= 0.013
Culvert Type	= Circular Concrete
Culvert Entrance	= Square edge w/headwall (C)
Coeff. K,M,c,Y,k	= 0.0098, 2, 0.0398, 0.67, 0.5

Embankment

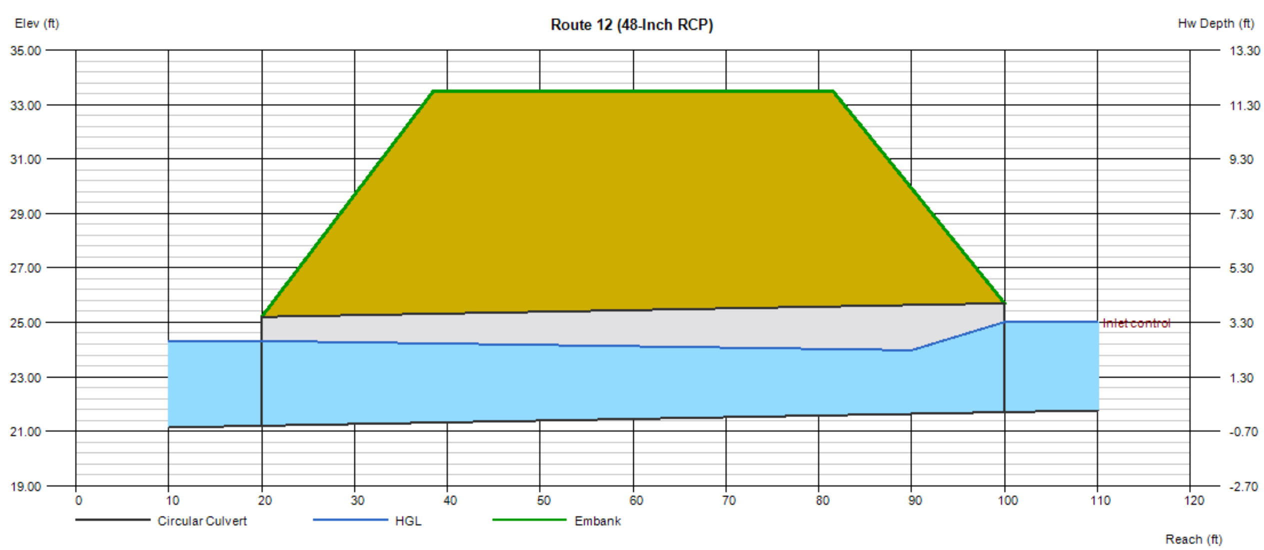
Top Elevation (ft)	= 33.50
Top Width (ft)	= 43.00
Crest Width (ft)	= 10.00

Calculations

Qmin (cfs)	= 55.00
Qmax (cfs)	= 55.00
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 55.00
Qpipe (cfs)	= 55.00
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 5.24
Veloc Up (ft/s)	= 7.65
HGL Dn (ft)	= 24.31
HGL Up (ft)	= 23.93
Hw Elev (ft)	= 25.01
Hw/D (ft)	= 0.83
Flow Regime	= Inlet Control



Culvert Report

Route 12 (48-Inch RCP)

Invert Elev Dn (ft)	= 21.20
Pipe Length (ft)	= 80.00
Slope (%)	= 0.63
Invert Elev Up (ft)	= 21.70
Rise (in)	= 48.0
Shape	= Circular
Span (in)	= 48.0
No. Barrels	= 1
n-Value	= 0.013
Culvert Type	= Circular Concrete
Culvert Entrance	= Square edge w/headwall (C)
Coeff. K,M,c,Y,k	= 0.0098, 2, 0.0398, 0.67, 0.5

Embankment

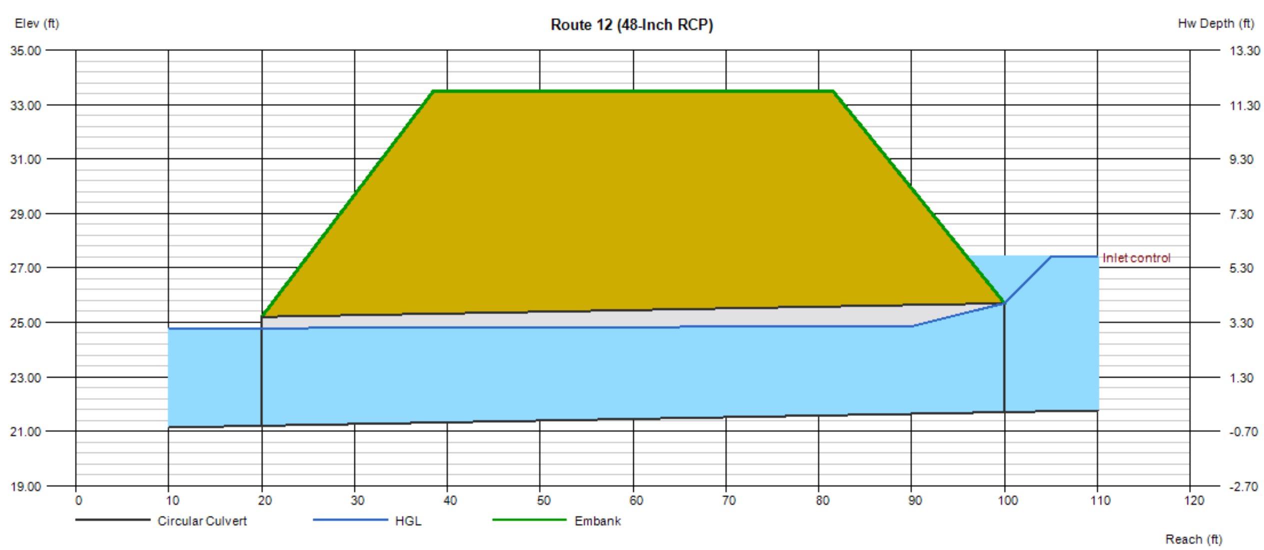
Top Elevation (ft)	= 33.50
Top Width (ft)	= 43.00
Crest Width (ft)	= 10.00

Calculations

Qmin (cfs)	= 110.00
Qmax (cfs)	= 110.00
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 110.00
Qpipe (cfs)	= 110.00
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 9.26
Veloc Up (ft/s)	= 10.31
HGL Dn (ft)	= 24.78
HGL Up (ft)	= 24.87
Hw Elev (ft)	= 27.42
Hw/D (ft)	= 1.43
Flow Regime	= Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Dec 3 2025

Route 12 (48-Inch RCP)

Invert Elev Dn (ft)	=	21.20
Pipe Length (ft)	=	80.00
Slope (%)	=	0.63
Invert Elev Up (ft)	=	21.70
Rise (in)	=	48.0
Shape	=	Circular
Span (in)	=	48.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

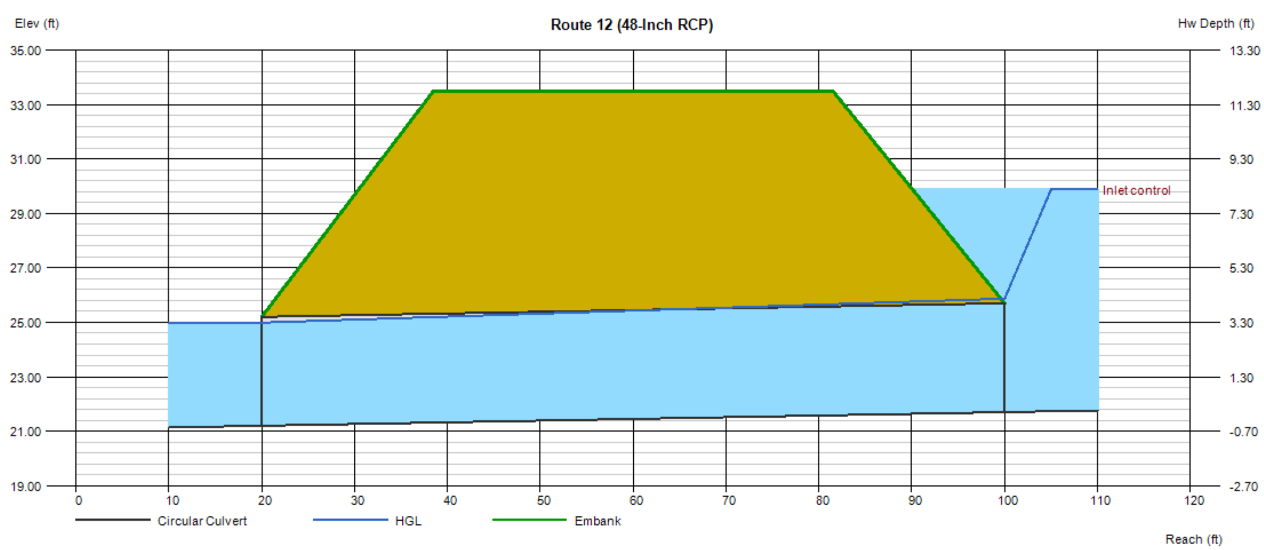
Top Elevation (ft)	=	33.50
Top Width (ft)	=	43.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	148.00
Qmax (cfs)	=	148.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	148.00
Qpipe (cfs)	=	148.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	12.02
Veloc Up (ft/s)	=	11.78
HGL Dn (ft)	=	24.99
HGL Up (ft)	=	25.87
Hw Elev (ft)	=	29.89
Hw/D (ft)	=	2.05
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Dec 3 2025

Route 12 (48-Inch RCP)

Invert Elev Dn (ft)	=	21.20
Pipe Length (ft)	=	80.00
Slope (%)	=	0.63
Invert Elev Up (ft)	=	21.70
Rise (in)	=	48.0
Shape	=	Circular
Span (in)	=	48.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

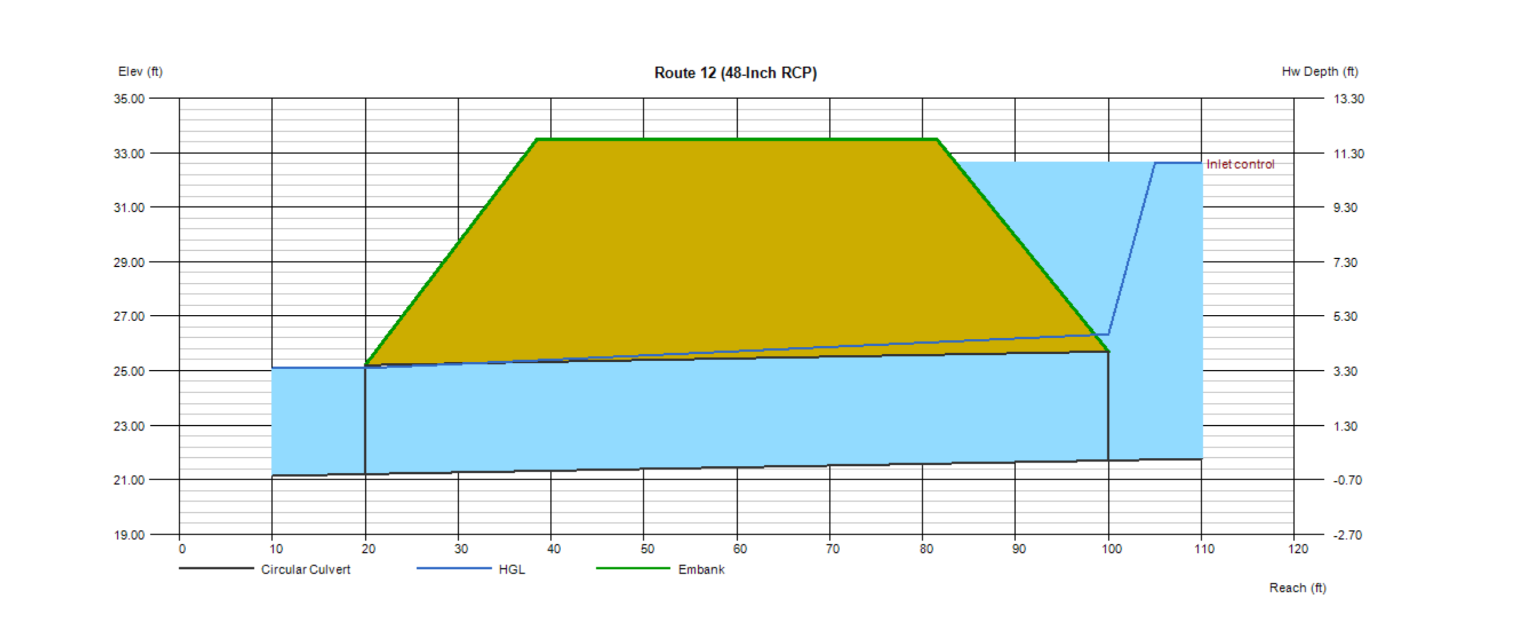
Top Elevation (ft)	=	33.50
Top Width (ft)	=	43.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	181.00
Qmax (cfs)	=	181.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	181.00
Qpipe (cfs)	=	181.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	14.52
Veloc Up (ft/s)	=	14.40
HGL Dn (ft)	=	25.09
HGL Up (ft)	=	26.34
Hw Elev (ft)	=	32.62
Hw/D (ft)	=	2.73
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. — Wednesday, Dec 3 2025

Route 12 (48-Inch RCP)

Invert Elev Dn (ft)	=	21.20
Pipe Length (ft)	=	80.00
Slope (%)	=	0.63
Invert Elev Up (ft)	=	21.70
Rise (in)	=	48.0
Shape	=	Circular
Span (in)	=	48.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

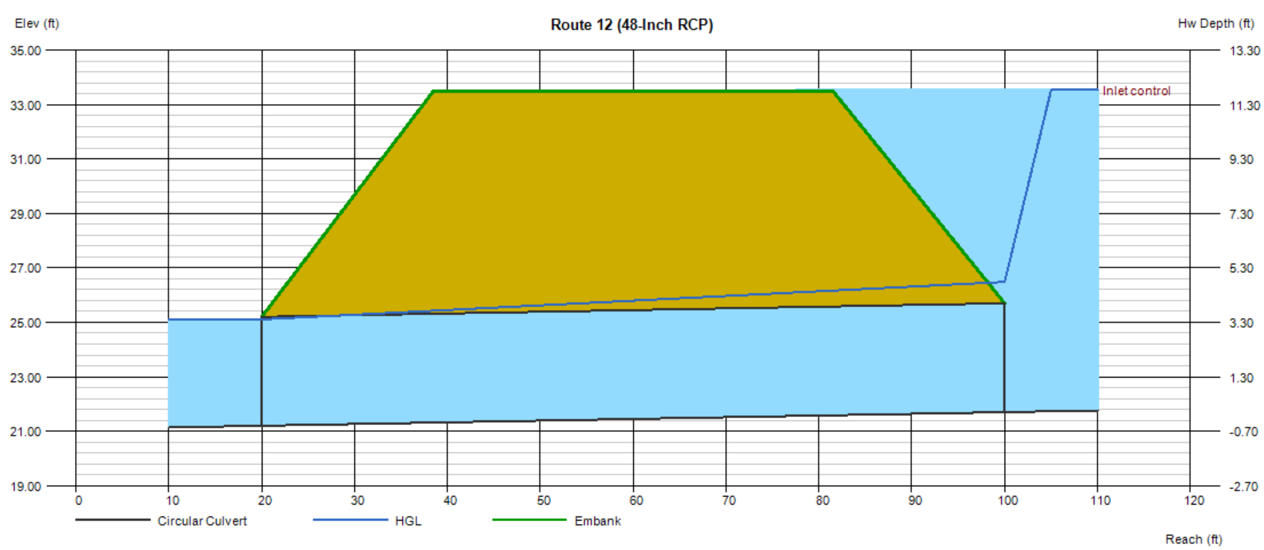
Top Elevation (ft)	=	33.50
Top Width (ft)	=	43.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	191.00
Qmax (cfs)	=	191.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	191.00
Qpipe (cfs)	=	190.76
Qovertop (cfs)	=	0.24
Veloc Dn (ft/s)	=	15.27
Veloc Up (ft/s)	=	15.18
HGL Dn (ft)	=	25.11
HGL Up (ft)	=	26.48
Hw Elev (ft)	=	33.54
Hw/D (ft)	=	2.96
Flow Regime	=	Inlet Control



Pine Swamp Brook Dam

Hydraulic Capacity Analysis

CLA Engineers, Inc.

Civil · Structural · Survey

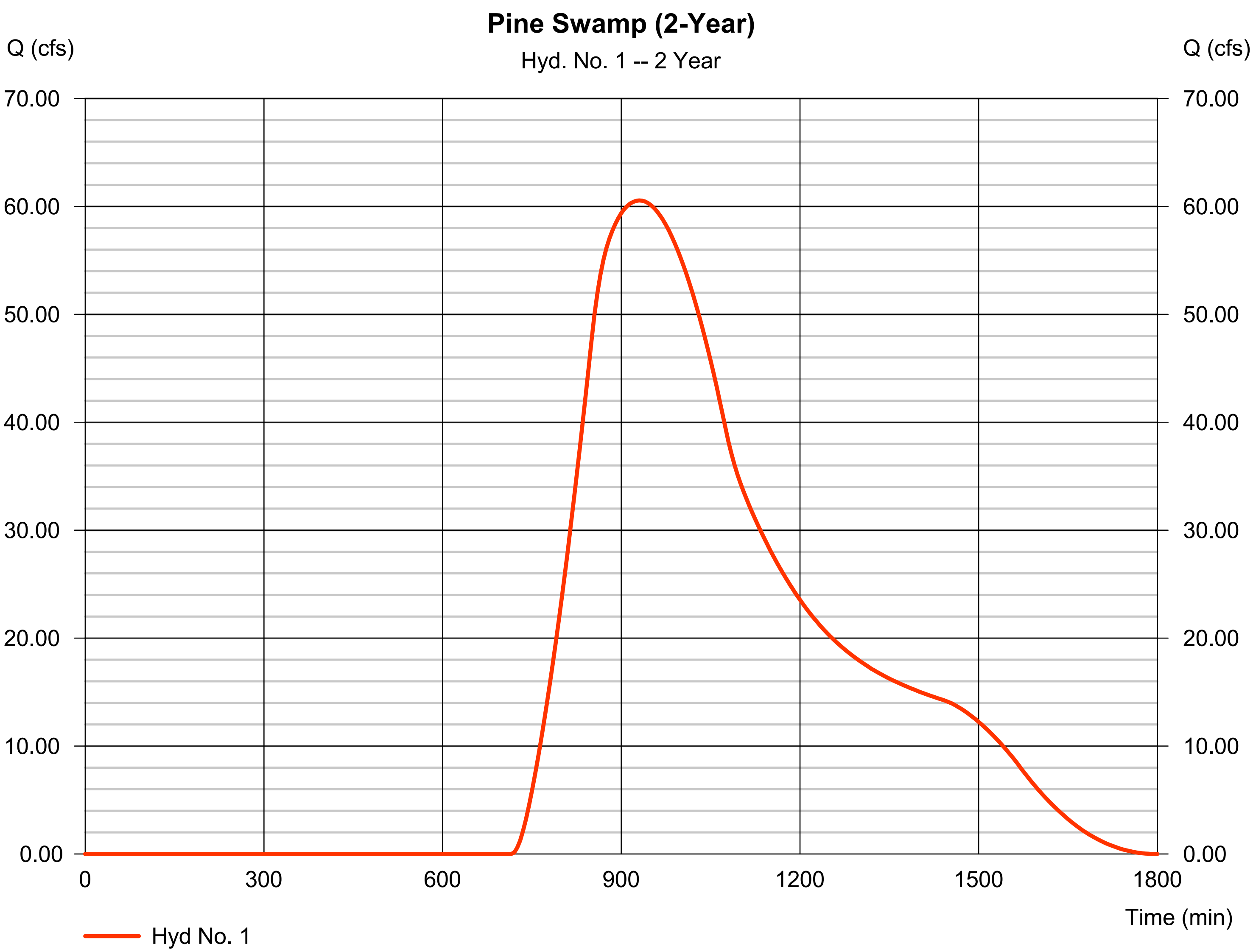
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 | Wednesday, 12 / 3 / 2025

Hyd. No. 1

Pine Swamp (2-Year)

Hydrograph type	= SCS Runoff	Peak discharge	= 60.56 cfs
Storm frequency	= 2 yrs	Time to peak	= 930 min
Time interval	= 5 min	Hyd. volume	= 1,497,510 cuft
Drainage area	= 1030.000 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 225.00 min
Total precip.	= 3.18 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

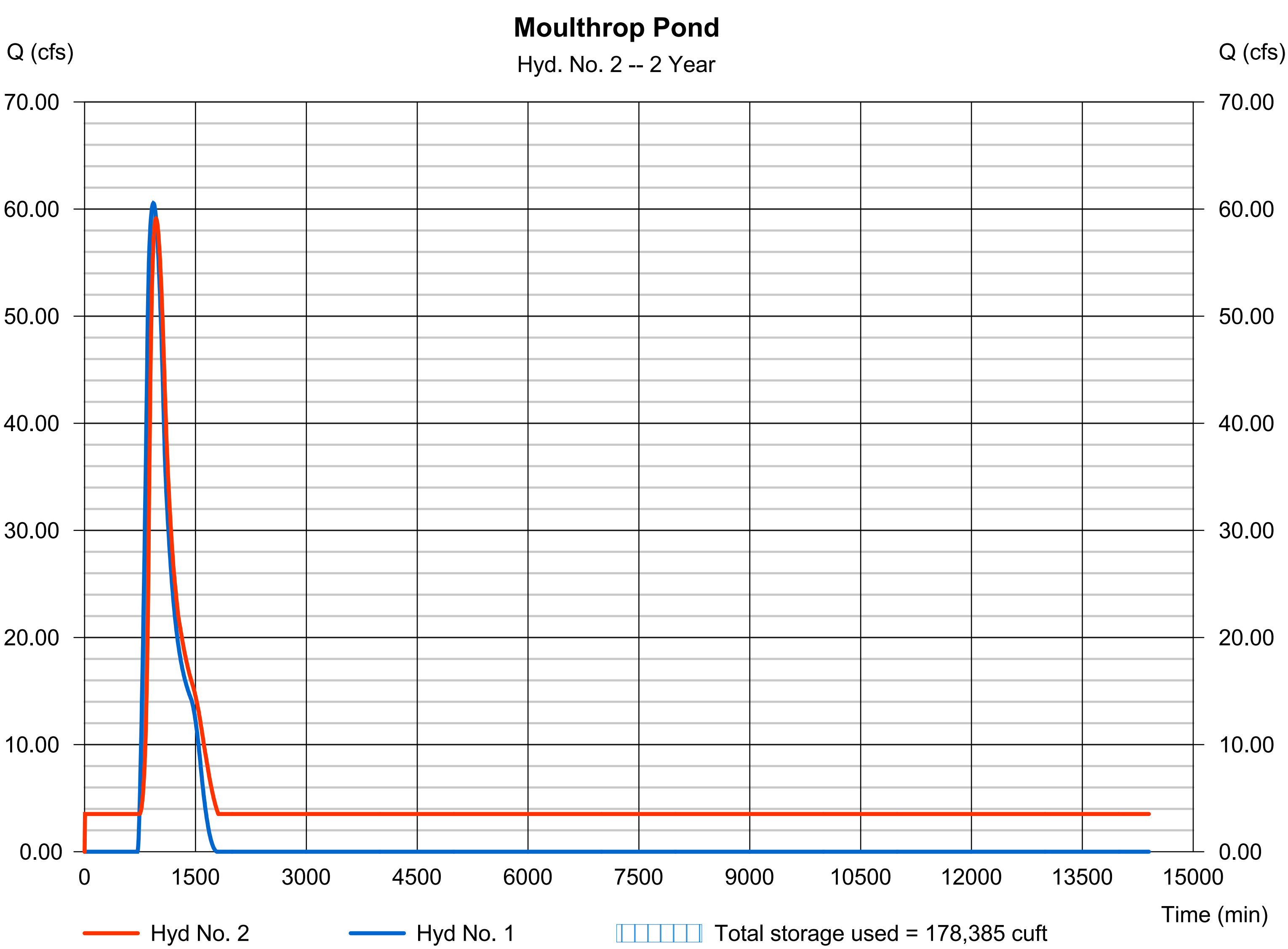
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Wednesday, 12 / 3 / 2025

Hyd. No. 2

Moulthrop Pond

Hydrograph type	= Reservoir	Peak discharge	= 59.10 cfs
Storm frequency	= 2 yrs	Time to peak	= 965 min
Time interval	= 5 min	Hyd. volume	= 4,314,228 cuft
Inflow hyd. No.	= 1 - Pine Swamp (2-Year)	Max. Elevation	= 24.09 ft
Reservoir name	= Moulthrop Pond	Max. Storage	= 178,385 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Moulthrop Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 22.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	22.50	107,211	0	0
0.50	23.00	110,126	54,327	54,327
1.50	24.00	116,000	113,039	167,366
2.50	25.00	121,931	118,941	286,307
3.50	26.00	127,920	124,901	411,209
4.50	27.00	133,966	130,918	542,127
5.50	28.00	140,068	136,992	679,119
6.50	29.00	146,227	143,122	822,241

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	36.00	0.00	0.00
Span (in)	= 36.00	36.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 18.10	21.80	0.00	0.00
Length (ft)	= 30.00	40.00	0.00	0.00
Slope (%)	= 1.70	1.50	0.00	n/a
N-Value	= .026	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 13.30	3.00	10.00	0.00
Crest El. (ft)	= 23.50	23.00	26.00	0.00
Weir Coeff.	= 3.33	3.33	2.60	3.33
Weir Type	= 1	Rect	Broad	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	22.50	0.00	3.57 ic	---	---	0.00	0.00	0.00	---	---	---	3.572
0.05	5,433	22.55	51.00 oc	4.08 ic	---	---	0.00	0.00	0.00	---	---	---	4.080
0.10	10,865	22.60	51.00 oc	4.61 ic	---	---	0.00	0.00	0.00	---	---	---	4.610
0.15	16,298	22.65	51.00 oc	5.18 ic	---	---	0.00	0.00	0.00	---	---	---	5.176
0.20	21,731	22.70	51.00 oc	5.78 ic	---	---	0.00	0.00	0.00	---	---	---	5.780
0.25	27,164	22.75	51.00 oc	6.38 ic	---	---	0.00	0.00	0.00	---	---	---	6.378
0.30	32,596	22.80	51.00 oc	7.03 ic	---	---	0.00	0.00	0.00	---	---	---	7.030
0.35	38,029	22.85	51.00 oc	7.71 ic	---	---	0.00	0.00	0.00	---	---	---	7.714
0.40	43,462	22.90	51.00 oc	8.41 ic	---	---	0.00	0.00	0.00	---	---	---	8.407
0.45	48,894	22.95	51.00 oc	9.13 ic	---	---	0.00	0.00	0.00	---	---	---	9.128
0.50	54,327	23.00	51.00 oc	9.85 ic	---	---	0.00	0.00	0.00	---	---	---	9.852
0.60	65,631	23.10	51.00 oc	11.40 ic	---	---	0.00	0.32	0.00	---	---	---	11.72
0.70	76,935	23.20	51.00 oc	13.04 ic	---	---	0.00	0.89	0.00	---	---	---	13.94
0.80	88,239	23.30	51.00 oc	14.77 ic	---	---	0.00	1.64	0.00	---	---	---	16.41
0.90	99,543	23.40	51.00 oc	16.53 ic	---	---	0.00	2.53	0.00	---	---	---	19.06
1.00	110,847	23.50	51.00 oc	18.37 ic	---	---	0.00	3.53	0.00	---	---	---	21.90
1.10	122,151	23.60	51.00 oc	20.25 ic	---	---	1.40	4.64	0.00	---	---	---	26.30
1.20	133,455	23.70	51.00 oc	22.16 ic	---	---	3.96	5.85	0.00	---	---	---	31.97
1.30	144,758	23.80	51.00 oc	23.65 oc	---	---	7.28	7.15	0.00	---	---	---	38.07
1.40	156,062	23.90	51.00 oc	24.98 oc	---	---	11.20	8.53	0.00	---	---	---	44.72
1.50	167,366	24.00	51.00 oc	26.31 oc	---	---	15.66	9.99	0.00	---	---	---	51.96
1.60	179,260	24.10	51.00 oc	27.56 oc	---	---	20.58	11.53	0.00	---	---	---	59.67
1.70	191,154	24.20	51.00 oc	28.73 oc	---	---	25.94	13.13	0.00	---	---	---	67.80
1.80	203,049	24.30	51.00 oc	29.83 oc	---	---	31.69	14.81	0.00	---	---	---	76.33
1.90	214,943	24.40	54.36 oc	30.83 oc	---	---	37.81	16.55	0.00	---	---	---	85.19
2.00	226,837	24.50	61.69 oc	31.70 oc	---	---	44.29	17.40 s	0.00	---	---	---	93.38
2.10	238,731	24.60	65.84 oc	32.41 oc	---	---	48.56 s	17.27 s	0.00	---	---	---	98.25
2.20	250,625	24.70	68.40 oc	32.91 oc	---	---	51.04 s	17.36 s	0.00	---	---	---	101.30
2.30	262,519	24.80	70.46 oc	32.86 oc	---	---	53.01 s	17.45 s	0.00	---	---	---	103.32
2.40	274,413	24.90	72.23 oc	35.49 oc	---	---	54.70 s	17.53 s	0.00	---	---	---	107.72
2.50	286,307	25.00	73.79 oc	37.94 oc	---	---	56.18 s	17.60 s	0.00	---	---	---	111.73
2.60	298,798	25.10	75.19 oc	40.25 oc	---	---	57.52 s	17.67 s	0.00	---	---	---	115.44
2.70	311,288	25.20	76.49 oc	42.42 oc	---	---	58.74 s	17.74 s	0.00	---	---	---	118.91
2.80	323,778	25.30	77.70 oc	44.49 oc	---	---	59.88 s	17.81 s	0.00	---	---	---	122.19
2.90	336,268	25.40	78.83 oc	46.47 oc	---	---	60.94 s	17.89 s	0.00	---	---	---	125.30

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Moulthrop Pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.00	348,758	25.50	79.91 oc	48.37 oc	---	---	61.95 s	17.96 s	0.00	---	---	---	128.28
3.10	361,248	25.60	80.95 oc	50.20 oc	---	---	62.91 s	18.04 s	0.00	---	---	---	131.14
3.20	373,738	25.70	81.94 oc	51.96 oc	---	---	63.82 s	18.12 s	0.00	---	---	---	133.89
3.30	386,228	25.80	82.90 oc	53.66 oc	---	---	64.70 s	18.20 s	0.00	---	---	---	136.55
3.40	398,718	25.90	83.84 oc	54.87 ic	---	---	65.54 s	18.28 s	0.00	---	---	---	138.69
3.50	411,209	26.00	84.74 oc	55.92 ic	---	---	66.38 s	18.36 s	0.00	---	---	---	140.66
3.60	424,300	26.10	85.63 oc	56.94 ic	---	---	67.17 s	18.45 s	0.82	---	---	---	143.39
3.70	437,392	26.20	86.50 oc	57.95 ic	---	---	67.95 s	18.54 s	2.33	---	---	---	146.77
3.80	450,484	26.30	87.35 oc	58.94 ic	---	---	68.72 s	18.63 s	4.27	---	---	---	150.56
3.90	463,576	26.40	88.09 ic	59.92 ic	---	---	69.37 s	18.69 s	6.58	---	---	---	154.56
4.00	476,668	26.50	88.80 ic	60.88 ic	---	---	70.00 s	18.76 s	9.19	---	---	---	158.83
4.10	489,759	26.60	89.49 ic	61.82 ic	---	---	70.63 s	18.83 s	12.08	---	---	---	163.37
4.20	502,851	26.70	90.17 ic	62.75 ic	---	---	71.24 s	18.90 s	15.23	---	---	---	168.11
4.30	515,943	26.80	90.84 ic	63.67 ic	---	---	71.84 s	18.97 s	18.60	---	---	---	173.08
4.40	529,035	26.90	91.51 ic	64.57 ic	---	---	72.44 s	19.05 s	22.20	---	---	---	178.26
4.50	542,127	27.00	92.17 ic	65.46 ic	---	---	73.02 s	19.12 s	26.00	---	---	---	183.59
4.60	555,826	27.10	92.82 ic	66.34 ic	---	---	73.59 s	19.19 s	30.00	---	---	---	189.12
4.70	569,525	27.20	93.46 ic	67.21 ic	---	---	74.14 s	19.26 s	34.18	---	---	---	194.78
4.80	583,224	27.30	94.10 ic	68.06 ic	---	---	74.72 s	19.35 s	38.54	---	---	---	200.67
4.90	596,924	27.40	94.73 ic	68.91 ic	---	---	75.27 s	19.42 s	43.07	---	---	---	206.67
5.00	610,623	27.50	95.35 ic	69.74 ic	---	---	75.84 s	19.51 s	47.77	---	---	---	212.86
5.10	624,322	27.60	95.98 ic	70.57 ic	---	---	76.34 s	19.58 s	52.62	---	---	---	219.10
5.20	638,021	27.70	96.59 ic	71.38 ic	---	---	76.89 s	19.66 s	57.63	---	---	---	225.57
5.30	651,720	27.80	97.20 ic	72.19 ic	---	---	77.40 s	19.74 s	62.79	---	---	---	232.11
5.40	665,419	27.90	97.81 ic	72.99 ic	---	---	77.92 s	19.82 s	68.09	---	---	---	238.82
5.50	679,119	28.00	98.41 ic	73.78 ic	---	---	78.49 s	19.91 s	73.54	---	---	---	245.72
5.60	693,431	28.10	99.01 ic	74.56 ic	---	---	78.95 s	19.98 s	79.12	---	---	---	252.61
5.70	707,743	28.20	99.60 ic	75.33 ic	---	---	79.47 s	20.06 s	84.84	---	---	---	259.70
5.80	722,055	28.30	100.19 ic	76.10 ic	---	---	79.97 s	20.15 s	90.69	---	---	---	266.91
5.90	736,368	28.40	100.77 ic	76.85 ic	---	---	80.48 s	20.23 s	96.67	---	---	---	274.24
6.00	750,680	28.50	101.35 ic	77.60 ic	---	---	81.00 s	20.32 s	102.77	---	---	---	281.69
6.10	764,992	28.60	101.93 ic	78.34 ic	---	---	81.42 s	20.39 s	109.00	---	---	---	289.15
6.20	779,304	28.70	102.50 ic	79.08 ic	---	---	81.98 s	20.48 s	115.35	---	---	---	296.89
6.30	793,616	28.80	103.07 ic	79.81 ic	---	---	82.45 s	20.57 s	121.82	---	---	---	304.64
6.40	807,928	28.90	103.64 ic	80.53 ic	---	---	82.96 s	20.66 s	128.40	---	---	---	312.55
6.50	822,241	29.00	104.20 ic	81.25 ic	---	---	83.40 s	20.73 s	135.10	---	---	---	320.48

...End

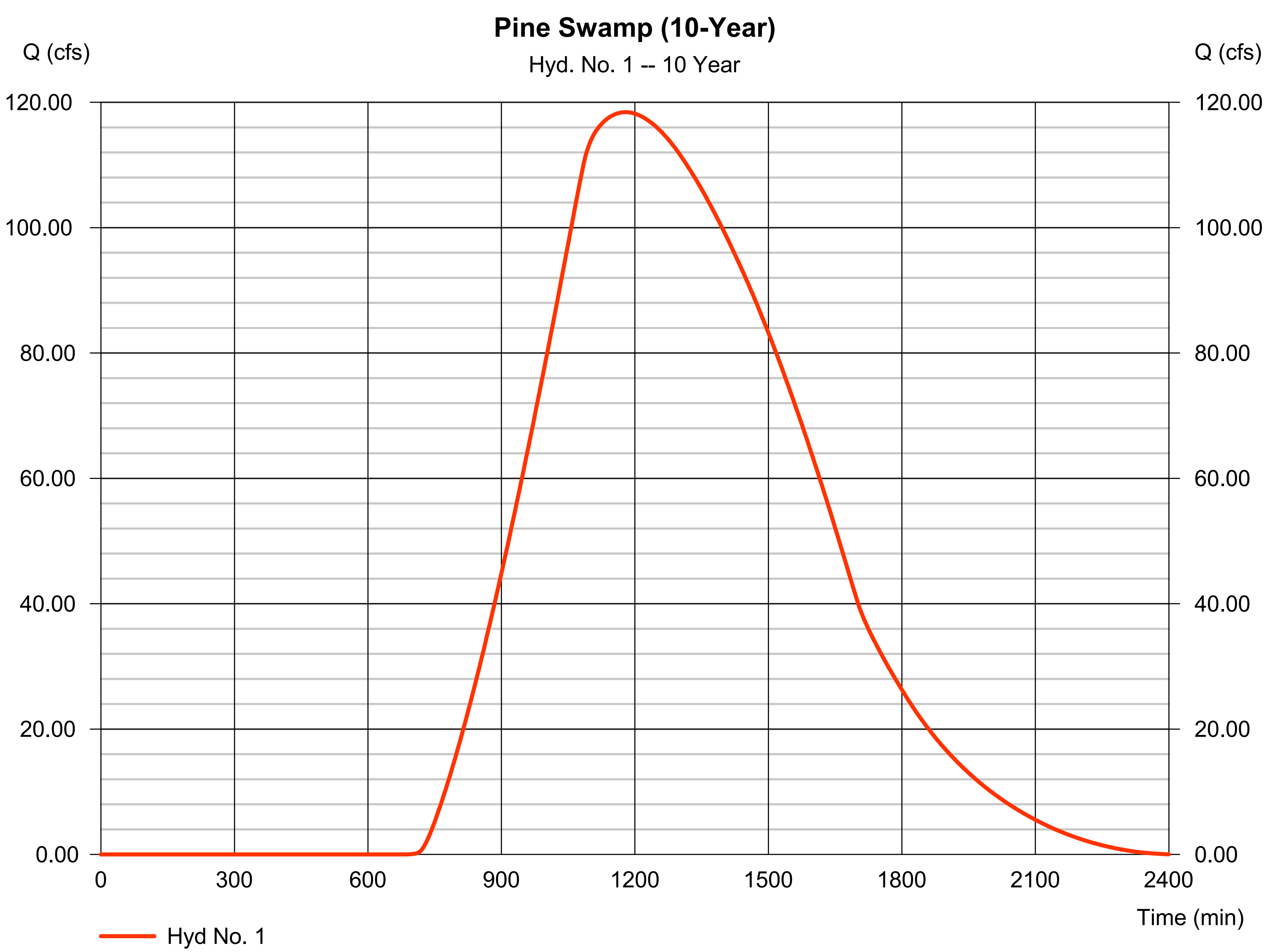
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Wednesday, 12 / 3 / 2025

Hyd. No. 1

Pine Swamp (10-Year)

Hydrograph type	= SCS Runoff	Peak discharge	= 118.42 cfs
Storm frequency	= 10 yrs	Time to peak	= 1180 min
Time interval	= 5 min	Hyd. volume	= 4,987,647 cuft
Drainage area	= 1030.000 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 620.00 min
Total precip.	= 5.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

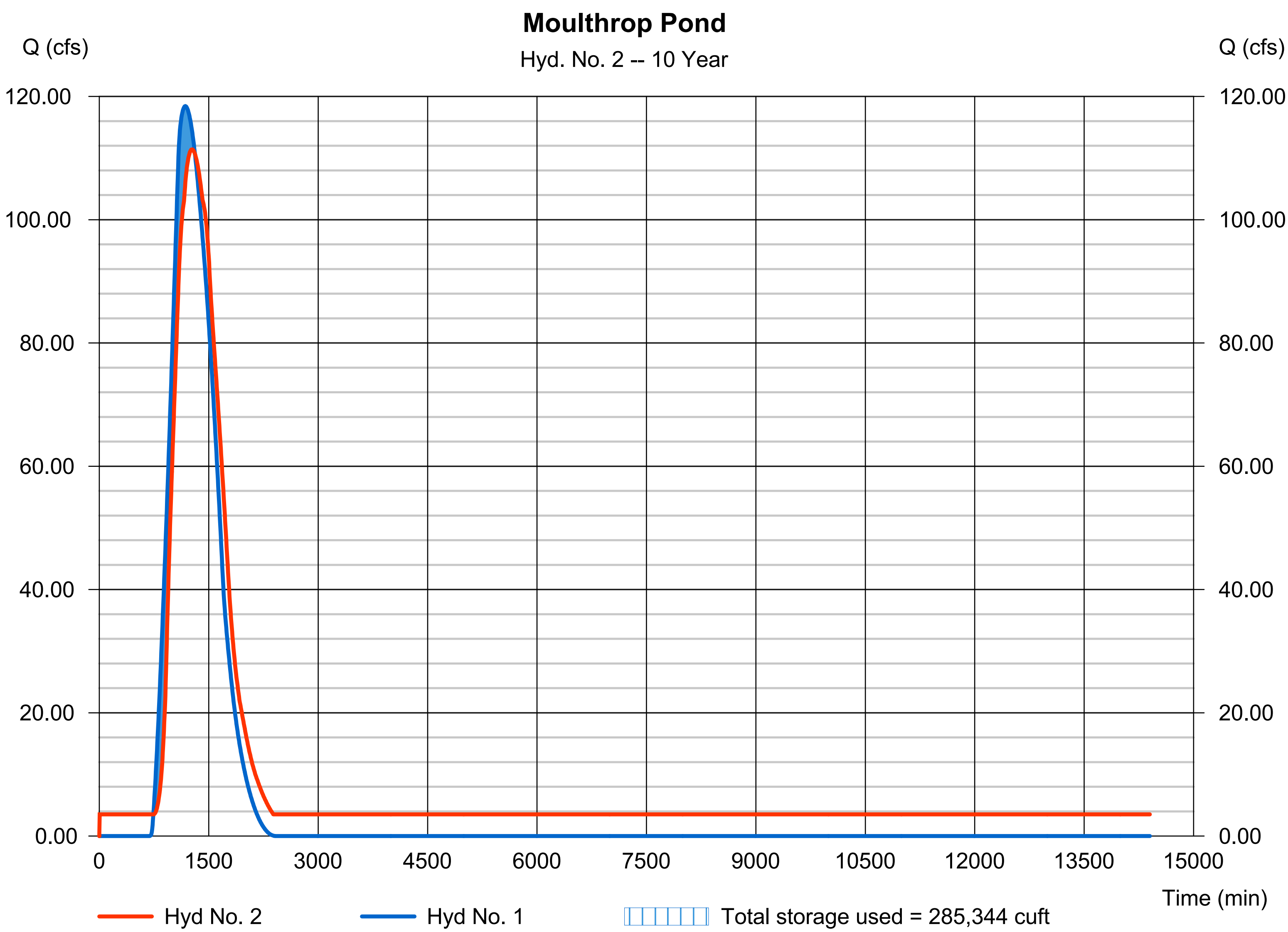
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 — Wednesday, 12 / 3 / 2025

Hyd. No. 2

Moulthrop Pond

Hydrograph type	= Reservoir	Peak discharge	= 111.40 cfs
Storm frequency	= 10 yrs	Time to peak	= 1270 min
Time interval	= 5 min	Hyd. volume	= 7,696,977 cuft
Inflow hyd. No.	= 1 - Pine Swamp (10-Year)	Max. Elevation	= 24.99 ft
Reservoir name	= Moulthrop Pond	Max. Storage	= 285,344 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Wednesday, 12 / 3 / 2025

Pond No. 1 - Moulthrop Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 22.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	22.50	107,211	0	0
0.50	23.00	110,126	54,327	54,327
1.50	24.00	116,000	113,039	167,366
2.50	25.00	121,931	118,941	286,307
3.50	26.00	127,920	124,901	411,209
4.50	27.00	133,966	130,918	542,127
5.50	28.00	140,068	136,992	679,119
6.50	29.00	146,227	143,122	822,241

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	36.00	0.00	0.00
Span (in)	= 36.00	36.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 18.10	21.80	0.00	0.00
Length (ft)	= 30.00	40.00	0.00	0.00
Slope (%)	= 1.70	1.50	0.00	n/a
N-Value	= .026	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 13.30	3.00	10.00	0.00
Crest El. (ft)	= 23.50	23.00	26.00	0.00
Weir Coeff.	= 3.33	3.33	2.60	3.33
Weir Type	= 1	Rect	Broad	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	22.50	0.00	3.57 ic	---	---	0.00	0.00	0.00	---	---	---	3.572
0.05	5,433	22.55	51.00 oc	4.08 ic	---	---	0.00	0.00	0.00	---	---	---	4.080
0.10	10,865	22.60	51.00 oc	4.61 ic	---	---	0.00	0.00	0.00	---	---	---	4.610
0.15	16,298	22.65	51.00 oc	5.18 ic	---	---	0.00	0.00	0.00	---	---	---	5.176
0.20	21,731	22.70	51.00 oc	5.78 ic	---	---	0.00	0.00	0.00	---	---	---	5.780
0.25	27,164	22.75	51.00 oc	6.38 ic	---	---	0.00	0.00	0.00	---	---	---	6.378
0.30	32,596	22.80	51.00 oc	7.03 ic	---	---	0.00	0.00	0.00	---	---	---	7.030
0.35	38,029	22.85	51.00 oc	7.71 ic	---	---	0.00	0.00	0.00	---	---	---	7.714
0.40	43,462	22.90	51.00 oc	8.41 ic	---	---	0.00	0.00	0.00	---	---	---	8.407
0.45	48,894	22.95	51.00 oc	9.13 ic	---	---	0.00	0.00	0.00	---	---	---	9.128
0.50	54,327	23.00	51.00 oc	9.85 ic	---	---	0.00	0.00	0.00	---	---	---	9.852
0.60	65,631	23.10	51.00 oc	11.40 ic	---	---	0.00	0.32	0.00	---	---	---	11.72
0.70	76,935	23.20	51.00 oc	13.04 ic	---	---	0.00	0.89	0.00	---	---	---	13.94
0.80	88,239	23.30	51.00 oc	14.77 ic	---	---	0.00	1.64	0.00	---	---	---	16.41
0.90	99,543	23.40	51.00 oc	16.53 ic	---	---	0.00	2.53	0.00	---	---	---	19.06
1.00	110,847	23.50	51.00 oc	18.37 ic	---	---	0.00	3.53	0.00	---	---	---	21.90
1.10	122,151	23.60	51.00 oc	20.25 ic	---	---	1.40	4.64	0.00	---	---	---	26.30
1.20	133,455	23.70	51.00 oc	22.16 ic	---	---	3.96	5.85	0.00	---	---	---	31.97
1.30	144,758	23.80	51.00 oc	23.65 oc	---	---	7.28	7.15	0.00	---	---	---	38.07
1.40	156,062	23.90	51.00 oc	24.98 oc	---	---	11.20	8.53	0.00	---	---	---	44.72
1.50	167,366	24.00	51.00 oc	26.31 oc	---	---	15.66	9.99	0.00	---	---	---	51.96
1.60	179,260	24.10	51.00 oc	27.56 oc	---	---	20.58	11.53	0.00	---	---	---	59.67
1.70	191,154	24.20	51.00 oc	28.73 oc	---	---	25.94	13.13	0.00	---	---	---	67.80
1.80	203,049	24.30	51.00 oc	29.83 oc	---	---	31.69	14.81	0.00	---	---	---	76.33
1.90	214,943	24.40	54.36 oc	30.83 oc	---	---	37.81	16.55	0.00	---	---	---	85.19
2.00	226,837	24.50	61.69 oc	31.70 oc	---	---	44.29	17.40 s	0.00	---	---	---	93.38
2.10	238,731	24.60	65.84 oc	32.41 oc	---	---	48.56 s	17.27 s	0.00	---	---	---	98.25
2.20	250,625	24.70	68.40 oc	32.91 oc	---	---	51.04 s	17.36 s	0.00	---	---	---	101.30
2.30	262,519	24.80	70.46 oc	32.86 oc	---	---	53.01 s	17.45 s	0.00	---	---	---	103.32
2.40	274,413	24.90	72.23 oc	35.49 oc	---	---	54.70 s	17.53 s	0.00	---	---	---	107.72
2.50	286,307	25.00	73.79 oc	37.94 oc	---	---	56.18 s	17.60 s	0.00	---	---	---	111.73
2.60	298,798	25.10	75.19 oc	40.25 oc	---	---	57.52 s	17.67 s	0.00	---	---	---	115.44
2.70	311,288	25.20	76.49 oc	42.42 oc	---	---	58.74 s	17.74 s	0.00	---	---	---	118.91
2.80	323,778	25.30	77.70 oc	44.49 oc	---	---	59.88 s	17.81 s	0.00	---	---	---	122.19
2.90	336,268	25.40	78.83 oc	46.47 oc	---	---	60.94 s	17.89 s	0.00	---	---	---	125.30

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Moulthrop Pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.00	348,758	25.50	79.91 oc	48.37 oc	---	---	61.95 s	17.96 s	0.00	---	---	---	128.28
3.10	361,248	25.60	80.95 oc	50.20 oc	---	---	62.91 s	18.04 s	0.00	---	---	---	131.14
3.20	373,738	25.70	81.94 oc	51.96 oc	---	---	63.82 s	18.12 s	0.00	---	---	---	133.89
3.30	386,228	25.80	82.90 oc	53.66 oc	---	---	64.70 s	18.20 s	0.00	---	---	---	136.55
3.40	398,718	25.90	83.84 oc	54.87 ic	---	---	65.54 s	18.28 s	0.00	---	---	---	138.69
3.50	411,209	26.00	84.74 oc	55.92 ic	---	---	66.38 s	18.36 s	0.00	---	---	---	140.66
3.60	424,300	26.10	85.63 oc	56.94 ic	---	---	67.17 s	18.45 s	0.82	---	---	---	143.39
3.70	437,392	26.20	86.50 oc	57.95 ic	---	---	67.95 s	18.54 s	2.33	---	---	---	146.77
3.80	450,484	26.30	87.35 oc	58.94 ic	---	---	68.72 s	18.63 s	4.27	---	---	---	150.56
3.90	463,576	26.40	88.09 ic	59.92 ic	---	---	69.37 s	18.69 s	6.58	---	---	---	154.56
4.00	476,668	26.50	88.80 ic	60.88 ic	---	---	70.00 s	18.76 s	9.19	---	---	---	158.83
4.10	489,759	26.60	89.49 ic	61.82 ic	---	---	70.63 s	18.83 s	12.08	---	---	---	163.37
4.20	502,851	26.70	90.17 ic	62.75 ic	---	---	71.24 s	18.90 s	15.23	---	---	---	168.11
4.30	515,943	26.80	90.84 ic	63.67 ic	---	---	71.84 s	18.97 s	18.60	---	---	---	173.08
4.40	529,035	26.90	91.51 ic	64.57 ic	---	---	72.44 s	19.05 s	22.20	---	---	---	178.26
4.50	542,127	27.00	92.17 ic	65.46 ic	---	---	73.02 s	19.12 s	26.00	---	---	---	183.59
4.60	555,826	27.10	92.82 ic	66.34 ic	---	---	73.59 s	19.19 s	30.00	---	---	---	189.12
4.70	569,525	27.20	93.46 ic	67.21 ic	---	---	74.14 s	19.26 s	34.18	---	---	---	194.78
4.80	583,224	27.30	94.10 ic	68.06 ic	---	---	74.72 s	19.35 s	38.54	---	---	---	200.67
4.90	596,924	27.40	94.73 ic	68.91 ic	---	---	75.27 s	19.42 s	43.07	---	---	---	206.67
5.00	610,623	27.50	95.35 ic	69.74 ic	---	---	75.84 s	19.51 s	47.77	---	---	---	212.86
5.10	624,322	27.60	95.98 ic	70.57 ic	---	---	76.34 s	19.58 s	52.62	---	---	---	219.10
5.20	638,021	27.70	96.59 ic	71.38 ic	---	---	76.89 s	19.66 s	57.63	---	---	---	225.57
5.30	651,720	27.80	97.20 ic	72.19 ic	---	---	77.40 s	19.74 s	62.79	---	---	---	232.11
5.40	665,419	27.90	97.81 ic	72.99 ic	---	---	77.92 s	19.82 s	68.09	---	---	---	238.82
5.50	679,119	28.00	98.41 ic	73.78 ic	---	---	78.49 s	19.91 s	73.54	---	---	---	245.72
5.60	693,431	28.10	99.01 ic	74.56 ic	---	---	78.95 s	19.98 s	79.12	---	---	---	252.61
5.70	707,743	28.20	99.60 ic	75.33 ic	---	---	79.47 s	20.06 s	84.84	---	---	---	259.70
5.80	722,055	28.30	100.19 ic	76.10 ic	---	---	79.97 s	20.15 s	90.69	---	---	---	266.91
5.90	736,368	28.40	100.77 ic	76.85 ic	---	---	80.48 s	20.23 s	96.67	---	---	---	274.24
6.00	750,680	28.50	101.35 ic	77.60 ic	---	---	81.00 s	20.32 s	102.77	---	---	---	281.69
6.10	764,992	28.60	101.93 ic	78.34 ic	---	---	81.42 s	20.39 s	109.00	---	---	---	289.15
6.20	779,304	28.70	102.50 ic	79.08 ic	---	---	81.98 s	20.48 s	115.35	---	---	---	296.89
6.30	793,616	28.80	103.07 ic	79.81 ic	---	---	82.45 s	20.57 s	121.82	---	---	---	304.64
6.40	807,928	28.90	103.64 ic	80.53 ic	---	---	82.96 s	20.66 s	128.40	---	---	---	312.55
6.50	822,241	29.00	104.20 ic	81.25 ic	---	---	83.40 s	20.73 s	135.10	---	---	---	320.48

...End

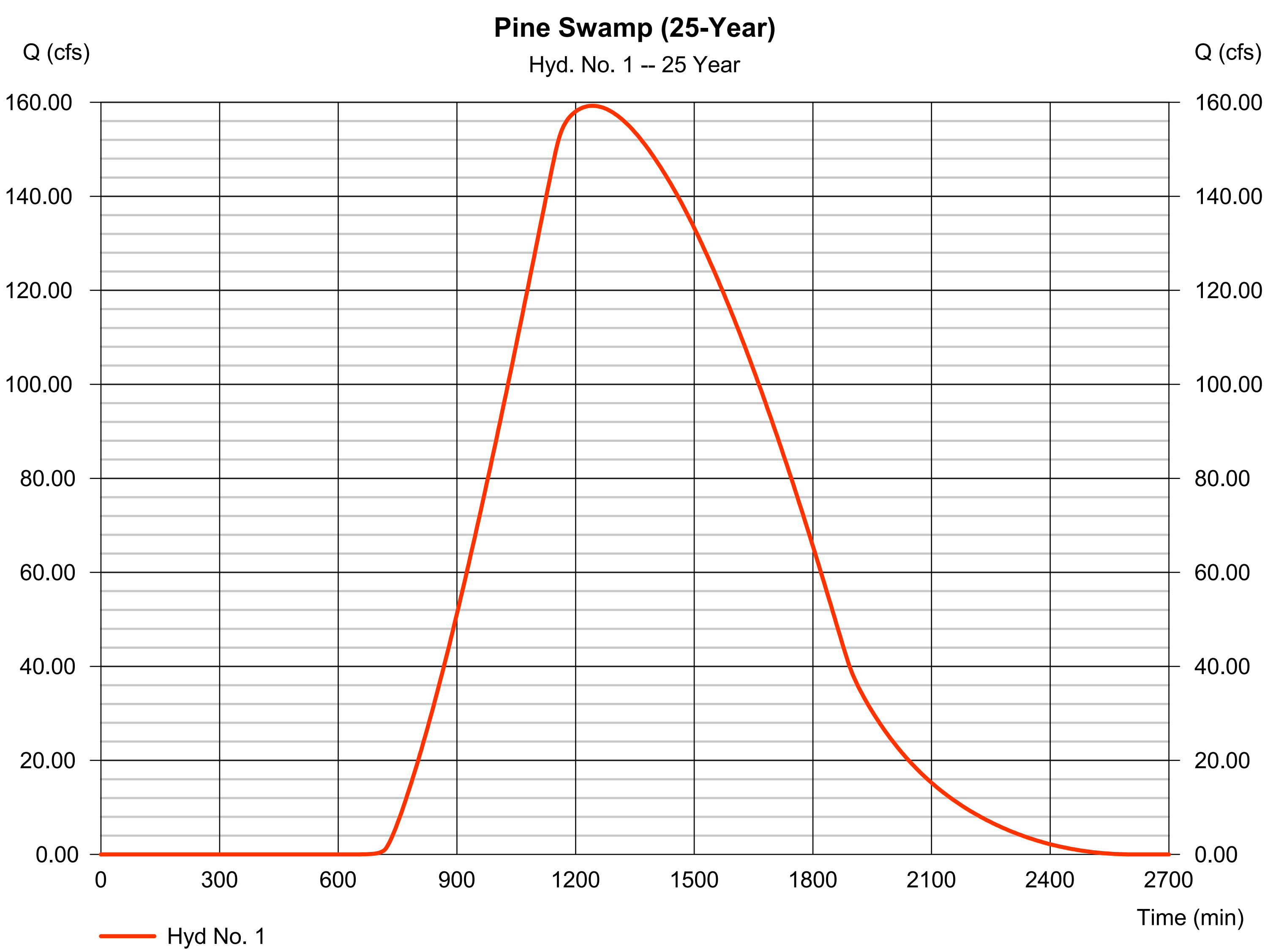
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Wednesday, 12 / 3 / 2025

Hyd. No. 1

Pine Swamp (25-Year)

Hydrograph type	= SCS Runoff	Peak discharge	= 159.26 cfs
Storm frequency	= 25 yrs	Time to peak	= 1245 min
Time interval	= 5 min	Hyd. volume	= 7,514,955 cuft
Drainage area	= 1030.000 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 740.00 min
Total precip.	= 6.13 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

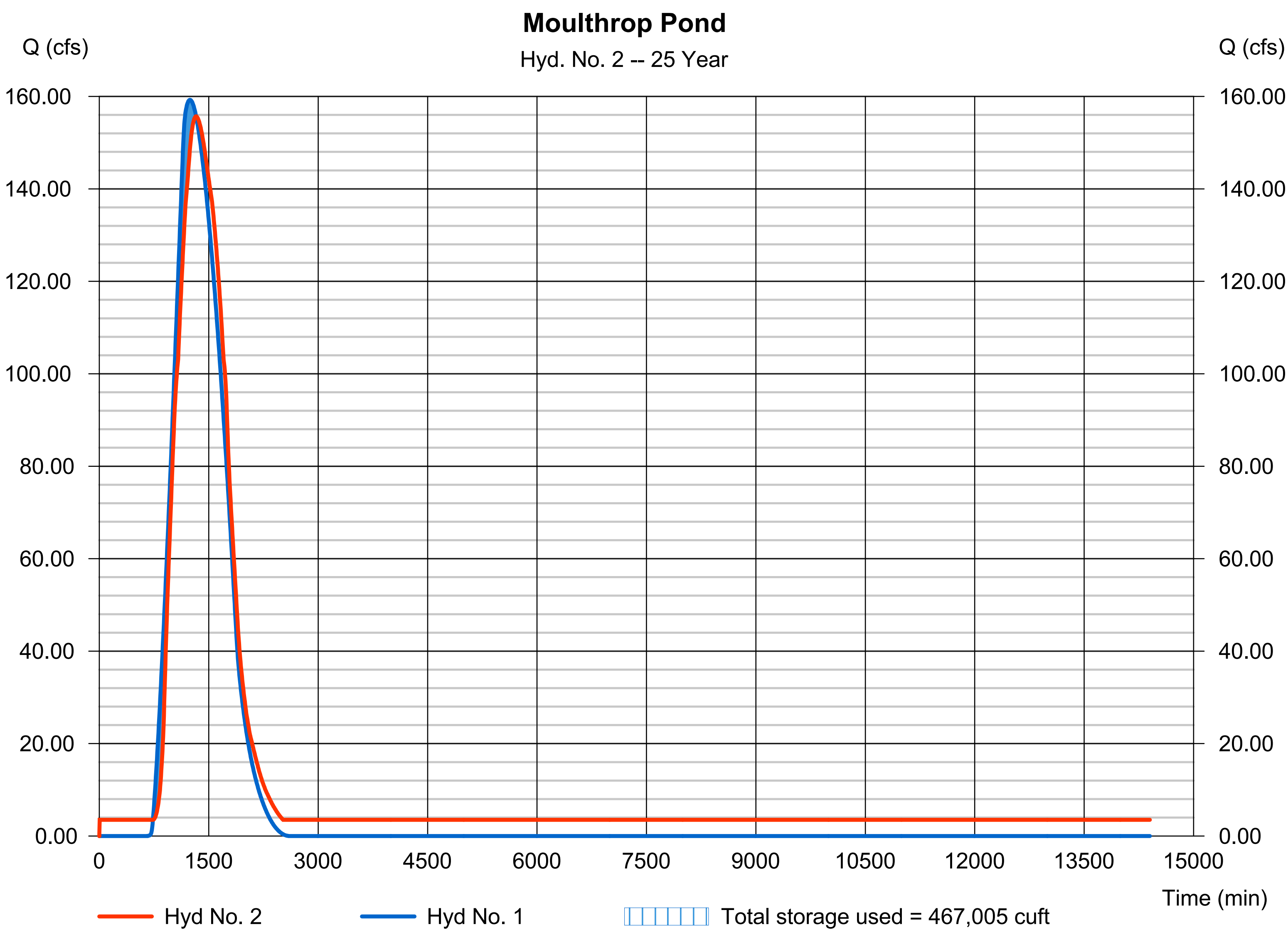
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 — Wednesday, 12 / 3 / 2025

Hyd. No. 2

Moulthrop Pond

Hydrograph type	= Reservoir	Peak discharge	= 155.68 cfs
Storm frequency	= 25 yrs	Time to peak	= 1325 min
Time interval	= 5 min	Hyd. volume	= 10,178,340 cuft
Inflow hyd. No.	= 1 - Pine Swamp (25-Year)	Max. Elevation	= 26.43 ft
Reservoir name	= Moulthrop Pond	Max. Storage	= 467,005 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Wednesday, 12 / 3 / 2025

Pond No. 1 - Moulthrop Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 22.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	22.50	107,211	0	0
0.50	23.00	110,126	54,327	54,327
1.50	24.00	116,000	113,039	167,366
2.50	25.00	121,931	118,941	286,307
3.50	26.00	127,920	124,901	411,209
4.50	27.00	133,966	130,918	542,127
5.50	28.00	140,068	136,992	679,119
6.50	29.00	146,227	143,122	822,241

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	36.00	0.00	0.00
Span (in)	= 36.00	36.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 18.10	21.80	0.00	0.00
Length (ft)	= 30.00	40.00	0.00	0.00
Slope (%)	= 1.70	1.50	0.00	n/a
N-Value	= .026	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 13.30	3.00	10.00	0.00
Crest El. (ft)	= 23.50	23.00	26.00	0.00
Weir Coeff.	= 3.33	3.33	2.60	3.33
Weir Type	= 1	Rect	Broad	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	22.50	0.00	3.57 ic	---	---	0.00	0.00	0.00	---	---	---	3.572
0.05	5,433	22.55	51.00 oc	4.08 ic	---	---	0.00	0.00	0.00	---	---	---	4.080
0.10	10,865	22.60	51.00 oc	4.61 ic	---	---	0.00	0.00	0.00	---	---	---	4.610
0.15	16,298	22.65	51.00 oc	5.18 ic	---	---	0.00	0.00	0.00	---	---	---	5.176
0.20	21,731	22.70	51.00 oc	5.78 ic	---	---	0.00	0.00	0.00	---	---	---	5.780
0.25	27,164	22.75	51.00 oc	6.38 ic	---	---	0.00	0.00	0.00	---	---	---	6.378
0.30	32,596	22.80	51.00 oc	7.03 ic	---	---	0.00	0.00	0.00	---	---	---	7.030
0.35	38,029	22.85	51.00 oc	7.71 ic	---	---	0.00	0.00	0.00	---	---	---	7.714
0.40	43,462	22.90	51.00 oc	8.41 ic	---	---	0.00	0.00	0.00	---	---	---	8.407
0.45	48,894	22.95	51.00 oc	9.13 ic	---	---	0.00	0.00	0.00	---	---	---	9.128
0.50	54,327	23.00	51.00 oc	9.85 ic	---	---	0.00	0.00	0.00	---	---	---	9.852
0.60	65,631	23.10	51.00 oc	11.40 ic	---	---	0.00	0.32	0.00	---	---	---	11.72
0.70	76,935	23.20	51.00 oc	13.04 ic	---	---	0.00	0.89	0.00	---	---	---	13.94
0.80	88,239	23.30	51.00 oc	14.77 ic	---	---	0.00	1.64	0.00	---	---	---	16.41
0.90	99,543	23.40	51.00 oc	16.53 ic	---	---	0.00	2.53	0.00	---	---	---	19.06
1.00	110,847	23.50	51.00 oc	18.37 ic	---	---	0.00	3.53	0.00	---	---	---	21.90
1.10	122,151	23.60	51.00 oc	20.25 ic	---	---	1.40	4.64	0.00	---	---	---	26.30
1.20	133,455	23.70	51.00 oc	22.16 ic	---	---	3.96	5.85	0.00	---	---	---	31.97
1.30	144,758	23.80	51.00 oc	23.65 oc	---	---	7.28	7.15	0.00	---	---	---	38.07
1.40	156,062	23.90	51.00 oc	24.98 oc	---	---	11.20	8.53	0.00	---	---	---	44.72
1.50	167,366	24.00	51.00 oc	26.31 oc	---	---	15.66	9.99	0.00	---	---	---	51.96
1.60	179,260	24.10	51.00 oc	27.56 oc	---	---	20.58	11.53	0.00	---	---	---	59.67
1.70	191,154	24.20	51.00 oc	28.73 oc	---	---	25.94	13.13	0.00	---	---	---	67.80
1.80	203,049	24.30	51.00 oc	29.83 oc	---	---	31.69	14.81	0.00	---	---	---	76.33
1.90	214,943	24.40	54.36 oc	30.83 oc	---	---	37.81	16.55	0.00	---	---	---	85.19
2.00	226,837	24.50	61.69 oc	31.70 oc	---	---	44.29	17.40 s	0.00	---	---	---	93.38
2.10	238,731	24.60	65.84 oc	32.41 oc	---	---	48.56 s	17.27 s	0.00	---	---	---	98.25
2.20	250,625	24.70	68.40 oc	32.91 oc	---	---	51.04 s	17.36 s	0.00	---	---	---	101.30
2.30	262,519	24.80	70.46 oc	32.86 oc	---	---	53.01 s	17.45 s	0.00	---	---	---	103.32
2.40	274,413	24.90	72.23 oc	35.49 oc	---	---	54.70 s	17.53 s	0.00	---	---	---	107.72
2.50	286,307	25.00	73.79 oc	37.94 oc	---	---	56.18 s	17.60 s	0.00	---	---	---	111.73
2.60	298,798	25.10	75.19 oc	40.25 oc	---	---	57.52 s	17.67 s	0.00	---	---	---	115.44
2.70	311,288	25.20	76.49 oc	42.42 oc	---	---	58.74 s	17.74 s	0.00	---	---	---	118.91
2.80	323,778	25.30	77.70 oc	44.49 oc	---	---	59.88 s	17.81 s	0.00	---	---	---	122.19
2.90	336,268	25.40	78.83 oc	46.47 oc	---	---	60.94 s	17.89 s	0.00	---	---	---	125.30

Continues on next page...

Moulthrop Pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.00	348,758	25.50	79.91 oc	48.37 oc	---	---	61.95 s	17.96 s	0.00	---	---	---	128.28
3.10	361,248	25.60	80.95 oc	50.20 oc	---	---	62.91 s	18.04 s	0.00	---	---	---	131.14
3.20	373,738	25.70	81.94 oc	51.96 oc	---	---	63.82 s	18.12 s	0.00	---	---	---	133.89
3.30	386,228	25.80	82.90 oc	53.66 oc	---	---	64.70 s	18.20 s	0.00	---	---	---	136.55
3.40	398,718	25.90	83.84 oc	54.87 ic	---	---	65.54 s	18.28 s	0.00	---	---	---	138.69
3.50	411,209	26.00	84.74 oc	55.92 ic	---	---	66.38 s	18.36 s	0.00	---	---	---	140.66
3.60	424,300	26.10	85.63 oc	56.94 ic	---	---	67.17 s	18.45 s	0.82	---	---	---	143.39
3.70	437,392	26.20	86.50 oc	57.95 ic	---	---	67.95 s	18.54 s	2.33	---	---	---	146.77
3.80	450,484	26.30	87.35 oc	58.94 ic	---	---	68.72 s	18.63 s	4.27	---	---	---	150.56
3.90	463,576	26.40	88.09 ic	59.92 ic	---	---	69.37 s	18.69 s	6.58	---	---	---	154.56
4.00	476,668	26.50	88.80 ic	60.88 ic	---	---	70.00 s	18.76 s	9.19	---	---	---	158.83
4.10	489,759	26.60	89.49 ic	61.82 ic	---	---	70.63 s	18.83 s	12.08	---	---	---	163.37
4.20	502,851	26.70	90.17 ic	62.75 ic	---	---	71.24 s	18.90 s	15.23	---	---	---	168.11
4.30	515,943	26.80	90.84 ic	63.67 ic	---	---	71.84 s	18.97 s	18.60	---	---	---	173.08
4.40	529,035	26.90	91.51 ic	64.57 ic	---	---	72.44 s	19.05 s	22.20	---	---	---	178.26
4.50	542,127	27.00	92.17 ic	65.46 ic	---	---	73.02 s	19.12 s	26.00	---	---	---	183.59
4.60	555,826	27.10	92.82 ic	66.34 ic	---	---	73.59 s	19.19 s	30.00	---	---	---	189.12
4.70	569,525	27.20	93.46 ic	67.21 ic	---	---	74.14 s	19.26 s	34.18	---	---	---	194.78
4.80	583,224	27.30	94.10 ic	68.06 ic	---	---	74.72 s	19.35 s	38.54	---	---	---	200.67
4.90	596,924	27.40	94.73 ic	68.91 ic	---	---	75.27 s	19.42 s	43.07	---	---	---	206.67
5.00	610,623	27.50	95.35 ic	69.74 ic	---	---	75.84 s	19.51 s	47.77	---	---	---	212.86
5.10	624,322	27.60	95.98 ic	70.57 ic	---	---	76.34 s	19.58 s	52.62	---	---	---	219.10
5.20	638,021	27.70	96.59 ic	71.38 ic	---	---	76.89 s	19.66 s	57.63	---	---	---	225.57
5.30	651,720	27.80	97.20 ic	72.19 ic	---	---	77.40 s	19.74 s	62.79	---	---	---	232.11
5.40	665,419	27.90	97.81 ic	72.99 ic	---	---	77.92 s	19.82 s	68.09	---	---	---	238.82
5.50	679,119	28.00	98.41 ic	73.78 ic	---	---	78.49 s	19.91 s	73.54	---	---	---	245.72
5.60	693,431	28.10	99.01 ic	74.56 ic	---	---	78.95 s	19.98 s	79.12	---	---	---	252.61
5.70	707,743	28.20	99.60 ic	75.33 ic	---	---	79.47 s	20.06 s	84.84	---	---	---	259.70
5.80	722,055	28.30	100.19 ic	76.10 ic	---	---	79.97 s	20.15 s	90.69	---	---	---	266.91
5.90	736,368	28.40	100.77 ic	76.85 ic	---	---	80.48 s	20.23 s	96.67	---	---	---	274.24
6.00	750,680	28.50	101.35 ic	77.60 ic	---	---	81.00 s	20.32 s	102.77	---	---	---	281.69
6.10	764,992	28.60	101.93 ic	78.34 ic	---	---	81.42 s	20.39 s	109.00	---	---	---	289.15
6.20	779,304	28.70	102.50 ic	79.08 ic	---	---	81.98 s	20.48 s	115.35	---	---	---	296.89
6.30	793,616	28.80	103.07 ic	79.81 ic	---	---	82.45 s	20.57 s	121.82	---	---	---	304.64
6.40	807,928	28.90	103.64 ic	80.53 ic	---	---	82.96 s	20.66 s	128.40	---	---	---	312.55
6.50	822,241	29.00	104.20 ic	81.25 ic	---	---	83.40 s	20.73 s	135.10	---	---	---	320.48

...End