THE Chazen COMPANIES®

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Town of Lake George
Cedar Lane and Beatty Road
Green Infrastructure Feasibility Study

Town of Lake George
Warren County, New York

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Chazen Project No. 92001.06

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1.0 EXECUTIVE SUMMARY

The southern basin of Lake George is the most developed portion of the Lake George watershed, and experiences the greatest challenges associated with stormwater runoff. Improved management of stormwater systems in the Town of Lake George is imperative to keeping Lake George clean, which is the basis of the tourism economy in Warren County. This report examines the feasibility of implementing Green Infrastructure (GI) practices along Cedar Lane and Beatty Road within the Town of Lake George, an area which is largely devoid of any stormwater management facilities. Stormwater runoff from this area has been exemplified through NYS DEC testing to affect the lake's water quality via non-point source pollution. The Town was recently awarded a Non-Agricultural Nonpoint Source Planning Grant from the NYS DEC to develop this report.

The study includes a site survey and a corresponding engineering assessment that is strictly limited to exploring the feasibility of green infrastructure implementation within the subject road right-of-way boundaries. Conceptual schematic designs that identify areas for capturing, infiltrating, and treating runoff to reduce the amount of pollution entering Lake George are provided. The Chazen Companies (Chazen) has identified suitable green infrastructure practices that can be employed and maintained within the limited available right-of-way space, including vegetated swales to stabilize the road edges and convey stormwater, and tree plantings, tree pits, and rain gardens that will serve to promote infiltration and enhance landscape aesthetics.

2.0 PROJECT AREA WATER QUALITY ISSUES

Cedar Lane and Beatty Road, as well as most of the residence driveways are currently unpaved, gravel surfaces that subsequently erode during storm events. Stormwater runoff from residences and surrounding areas flow over and down the roads and drives, picking up sediments and roadway pollutants, where they then enter into an existing ditch/culvert system that ultimately discharges directly into a wetland complex that connects to Lake George at East Brook Harbor. Roadway runoff contains numerous pollutants such as nitrogen, phosphorus, oils and greases, heavy metals, chlorides, and total suspended solids (TSS). Nutrients, chlorides, and TSS have been widely and repeatedly reported as current detriments to water quality in Lake George.

Proposed GI practices will aim to reduce runoff volume, and also the amount of pollutants entering Lake George from the areas surrounding Cedar Lane and Beatty Road. Vegetated swales can be lined with grass and/or stone and are specifically designed to convey stormwater at a low velocity, promoting natural treatment and infiltration, and reducing peak discharges from a site. Tree plantings and tree pits also aid in reducing stormwater runoff, as well as increasing nutrient uptake, enhancing infiltration, and promoting evapotranspiration and rainfall interception. Rain gardens manage and treat small volumes of stormwater runoff through a conditioned planting soil bed and planting materials that help to filter runoff within a shallow depression. Although traditional infiltration practices are not listed as GI practices, the NYS Stormwater Management Design Manual gives traditional infiltration practices equal weight as GI practices (in Hydrologic Soil Groups A and B) as they are capable of achieving similar runoff reduction volume capacities. Thus, all proposed practices will aim to slow and capture stormwater, thereby allowing for infiltration and treatment to occur prior to runoff reaching Lake George.

3.0 EXISTING SITE CONDITIONS

3.1 Description of Project Area Watershed

The project site encompasses approximately 12.8 acres made up of the areas surrounding the two roadways, which primarily are occupied by residential housing and seasonal rental properties, bound by Beach Road to the North, NYS Route 9L to the east, a wetland to the west, and the terminus' of Cedar Lane and Beatty Road to the south. The surrounding watershed consists of forested areas and roadways and is moderately populated by residence and business properties. Located west and downgradient of the project site is a sensitive freshwater forested/shrub wetland that discharges directly into Lake George. The overall project site slopes gradually to the northwest towards Lake George. See Appendix A for a project survey map.

Beatty Road, approximately 980 feet long, and Cedar Lane, approximately 1,000 feet long, run parallel to each other through the site, sloping from the south to the north, and consist of unpaved, gravel drives. Currently, apparent erosion exists within the roadways, especially along the road edges, as shown in Figure 1 below. Runoff starts off as sheet flow and then transitions to shallow concentrated flow, resulting in rill erosion along the roadsides as no roadway stabilization or stormwater conveyance measures are in place. Limited space exists for stormwater management practices to be implemented within this area due to the tight residential property layout resulting in a narrow right-of-way along the roads.

Figure 1. Erosion within the roadways along Cedar Lane and Beatty Road.

Due to the close proximity of the properties within the area, a high amount of impervious cover exists, largely made up of house roofs and driveways. Most homes (but not all) currently have gutters installed along the roof eaves to collect and direct roof runoff. However, the majority of the roof leader downspouts discharge directly to impervious surfaces, as shown in Figure 2, subsequently resulting in increased runoff volumes and flow rates from the project site area.

Figure 2. Downspouts that connect to impervious areas (left two photos) versus disconnected downspouts (right).

Other roof gutter systems are already "disconnected", meaning roof runoff is directed to pervious areas leading to increased overland flow time of concentration and reduced peak flows.

3.2 Soil Conditions

Subsurface conditions can vary greatly from place to place. Consequently, detailed onsite investigations are needed to assess the suitability of the soils for stormwater management practices. Deep soil test pits and infiltration tests were performed within the Town's right-of-way along Beatty Road and Cedar Lane on August 21, 2020 by Chazen. The resulting subsurface investigation report and testing locations can be found in Appendix B. The United States Department of Agriculture (USDA) Natural Resources Conservation Science (NRCS) Web Soil Survey was used to verify surficial soil conditions located outside of the Town's right-of-way. A printout of the soil map is also located in Appendix B.

Three test pits (TP) and two infiltration tests (IT) were performed along Beatty Road. TP-6 was conducted at the south end, TP-2 was conducted near the mid-portion, and TP-1 was excavated in the northern end. TP-6 primarily consisted of a coarse sand and TP-2 consisted entirely of a fine, sandy loam. There was no mottling or groundwater observed in TP-6 and TP-2. The infiltration tests (IT-3) taken in the location of TP-6 resulted in an average infiltration rate of about 80 inches per hour. TP-1 revealed a mix of sand, silt, and clay to a depth of about 5 feet, at which the soil then transitioned entirely to consisting of clay. At TP-1 groundwater was encountered at around 3.5 feet below the surface. As a result, the infiltration test taken in this location (IT-1) resulted in a soil infiltration rate close to zero inches per hour.

Three test pits (TP) and one infiltration test (IT) were performed along Cedar Lane. TP-4 and 5 were conducted near the southern end of Cedar Lane and TP-3 was conducted near the northern end. TP-5 consisted entirely of the same fine, sandy loam material encountered at TP-2 on Beatty Road. TP-4 primarily consisted of sand with mottling displayed around three feet below the surface. TP-3 consisted

of a coarse sand in which infiltration tests (IT-2) resulted in an infiltration rate of around 65 inches per hour.

Overall, the soil characteristics were relatively uniform throughout the site, consisting of coarse sands and fine, sandy loams in the southern and middle portions of the project site, with the exception of clay being discovered in the northwest area. No bedrock was encountered on the site. This compares similarly to the USDA NRCS Web Soil Survey results, which state the underlying soils in the general project area consist of Charlton fine sandy loam (ChB). ChB soil is classified under Hydrological Soil Group B as having a moderate infiltration rate and is generally deep and well drained.

3.3 Flood Zone

According to the National Flood Insurance Program Flood Insurance Rate Map (FIRM), Town of Lake George, New York, Community Panel Number 360876 0010 B, the project site lies within Flood Zone X, an area determined to be outside of the 0.2% annual chance floodplain (500-year reoccurrence). The FIRM map depicting the flood zone areas is included in Appendix H.

3.4 Overall Watershed Boundary Extents

Site visits conducted revealed that the watershed to the project site area extends to include approximately 26 acres east of NYS Route 9L, which slopes uphill to the east, and includes the residential and forested areas surrounding Mocking Bird Hill road, as well as a portion of Bloody Pond Road that stretches from the northern road end to a culvert located approximately 700 feet south of the road terminus. This culvert crosses underneath Bloody Pond Road, and therefore serves as the watershed divide. Catch basins located along the northern end of Bloody Pond Road collect stormwater runoff from the road that is then piped to the intersection of Bloody Pond Road and NYS Route 9L.

Running perpendicular between Cedar Lane and Beatty Road, in the northernly portion of the site, is an existing stormwater conveyance system that runs behind The Garrison Restaurant property and through the residential areas of Cedar and Beatty. This storm sewer originates near Bloody Pond Road and presumably connects the eastern watershed area consisting of the Mocking Bird Hill Road residences, which then crosses under NYS Route 9L, and subsequently outlets through a concrete headwall located directly behind The Garrison Restaurant property. After passing through the headwall, stormwater then enters a riprap lined swale that runs along the south perimeter of the restaurant parking lot (see Figure 3).

Figure 3. Existing stormwater conveyance system running around The Garrison property.

This stormwater conveyance system continues downhill, crosses underneath Beatty Road, and then transitions into an open rock-lined swale that is routed between residences located off of the northern end of Cedar Lane. The swale then enters a closed system as it travels underneath Cedar Lane and the adjacent grassed field, where it then daylights into the nearby wetland as shown in Figure 4.

Figure 4. Western end of swale running between residences located off of Cedar Lane (left), culvert outlet in wetland, with Lake George in background (right).

4.0 PROJECT DESCRIPTION

4.1 Green Infrastructure Practices Alternatives Analysis

The selected GI practices were developed in accordance with the design specifications set forth in the 2015 NYS Stormwater Management Design Manual. Accepted GI practices stated within the Design Manual and their applicability to this project are as follows:

- Conservation of Natural Areas
    - This practice aims to maintain and preserve natural areas, including stream and wetland buffers, within a site. However, since the project site currently consists of a fully developed residential area, conservation of natural areas is not feasible.

- Sheetflow to Riparian Buffers or Filter Strips
    - With the site structures and surrounding landscape already established, it is not feasible to re-establish sheetflow within the Town's right-of-way. Thus, this practice would not help achieve the objectives for this project.

- Vegetated Swale
    - Vegetated swales can be implemented along roadways within the right-of-way to help filter and convey stormwater in a non-erosive manner and serve as a green alternative to underground storm sewers or hardened channels. Vegetated swales are proposed in the concept design.

- Tree Plantings/ Tree Pits
    - Planting trees not only improves stormwater management within an area by increasing canopy interception and nutrient uptake, but also enhances landscaping aesthetics and promotes natural area restoration and preservation. This practice is small-scale and requires minimal disturbance, and therefore can also be implemented within road rights-of-way. This practice receives a runoff reduction credit of 100 square feet per tree. Tree plantings/ tree pits are proposed in the concept deign.

- Disconnection of Rooftop Runoff
    - Although some homes within the project area are already practicing rooftop disconnection, it is recommended that additional efforts be made to further disconnect the remaining rooftops. This will help to increase overland flow time for stormwater runoff and reduce peak discharges. However, since this project is limited to siting practices within the road rights-of-way, this practice is not further discussed.

- Stream Daylighting
    - Stream daylighting is not feasible since the potential features to daylight are not entirely within the Town's right-of-way.

- Rain Gardens
    - Rain gardens are effective at managing and treating small volumes of stormwater runoff, promoting infiltration, and can also be implemented in various sizes, including at a small-scale. They can be integrated into a site with a high degree of flexibility and work well in combination with other stormwater infrastructure. Rain gardens are proposed in the concept design.

- Green Roofs

  - Green roofs are not applicable to this feasibility study as there are no structures located within the road rights-of-way.

- Stormwater Planters
  - Stormwater planters are not designed to treat runoff from roadways and are ideally suited for treating rooftop runoff. Thus, this practice is also recommended on individual property sites and can also be employed in conjunction with rooftop disconnection. However, stormwater planters are not feasible within the Town's right-of-way.

- Rain Barrels/ Cisterns
  - Rooftop disconnect is also encouraged on individual residential properties through the use of rain barrels. Again, this practice would also occur at the homeowner's discretion and therefore is not further discussed in this report.

- Porous Pavement
  - Portions of Cedar Lane and Beatty Road could be paved with porous pavement. However, without paving the gravel driveways and stabilizing offsite tributary areas, the potential risk of the pavement voids clogging is increased significantly. Maintenance costs would most likely be high to keep the pavement functioning as intended. Porous pavement does not appear to be feasible. As such, porous pavement is not further discussed in this report.

4.2 Recommended Conceptual Green Infrastructure Layout and Design

Based on the applicability of the green infrastructure alternatives described above and due to the design being strictly limited to the road rights-of-way, Chazen recommends that the Town incorporate the design elements depicted within the concept plans as shown in Appendix D. Both gravel roads are suggested to be paved and re-graded to encourage improved stormwater sheetflow. Consequently, eliminating the gravel road surfaces will also reduce the TSS loading leaving the site.

Along Beatty Road, a vegetated swale is proposed to adjoin the eastern road edge and to be located in between driveways. The vegetated swale will be trapezoidal shape and will have a bottom width of two feet, side slopes at 3:1, and a flow depth of one foot, consistent with the design standards put forth in the Design Manual. At the upstream end of each driveway, a catch basin will be located to eliminate driveway washout and serve as sediment traps. A piped conveyance consisting of an underdrain is proposed to connect the catch basins and will run the length of the swale. Along the southern end of the road, where deep, well-drained sandy soils exist, the conveyance will be perforated pipe to promote infiltration. In the northern half, where clay soils were discovered, the conveyance will transition to a non-perforated pipe. The underdrain will terminate at a hydrodynamic treatment unit whose outlet will then daylight to a vegetated swale that is to discharge just upstream of the culvert that passes under Beatty Road.

Similarly, a vegetated swale is also proposed along the eastern road edge of Cedar Lane with catch basins connecting the underdrain, which will be perforated the entire swale length due to the presence of acceptable soils. The perforated underdrain will terminate before and discharge into the swale that conveys the stream underneath Cedar Lane. Along the northeastern end of Cedar Lane, a vegetated swale will convey stormwater to a catch basin that will route stormwater underneath the road into four drywells. A vegetated swale located along the northwestern end of Cedar Lane will also discharge into

these drywells, as well as three tree pits proposed to be located next to the row of cedar trees on the west side of the road.

Tree plantings are suggested in locations within the rights-of-ways that are currently lacking vegetation; tree planting is a GI practice. Rain gardens are also sited in various locations and will improve the area aesthetics and also help to promote infiltration through specialized soil media and drainage layers. Implementing these practices will result in the reduction of runoff pollutants entering Lake George, and thereby will help to maintain and preserve the water quality integrity of a vital resource.

4.3 Hydrologic and Hydraulic Analysis of Proposed Practices

Rainfall data utilized in the modeling and analysis for the proposed GI practices was obtained from the Cornell University online Extreme Precipitation in New York & New England website (http://precip.eas.cornell.edu/). The standard SCS/NRCS rainfall distributions were applied to evaluate the pre- and post-development stormwater runoff characteristics. Rainfall data specific to the portion of Warren County under consideration, for various 24-hour storm events, is presented in Table 1.

Table 1: Rainfall Data for Design-Storm Events

Storm Event Return Period	24-Hour Rainfall (inches)
1-year	2.15
10-year	3.54
25-year	4.30
100-year	5.78

It should be noted that the model is strictly conceptual based on the design put forth in Appendix D. Modeling has been performed to ensure proposed stormwater practices are feasible and can successfully achieve appropriate stormwater rate and volume mitigation. The model was based on a cursory desktop review of subcatchment boundaries, which is considered acceptable for high-level conceptual designs such as this one.

It should also be noted that storms and runoff are dynamic by their very nature, and the dynamics of which can never be fully predicted or modeled. Traditional hydrologic and hydraulic models (especially those using HydroCAD as proposed herein) provide theoretical results that are not calibrated by in-field measurements. As such, the model used for this conceptual design will provide data to be used for evaluating and sizing proposed drainage infrastructure and is based on theory only.

Changes in hydrologic and hydraulic conditions of any given watershed are constantly occurring. Minor changes in vegetation, leaf litter, minor grading activities, animal activity, etc. can all affect peak discharge and volumes of runoff. As such, drainage infrastructure and the watersheds it serves need to be constantly monitored and maintained and/or adjusted to suit actual conditions.

Hydrologic and hydraulic changes occur with any infrastructure modifications within existing watersheds and therefore can have consequences on downstream environs and infrastructure. This of course can change downstream flow dynamics. Chazen does not accept responsibility for any downstream impacts due to the proposed infrastructure changes.

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

As stated above, the watershed area was divided into four subcatchments: the residential area surrounding Cedar Lane and Beatty Road, of which one portion is tributary to the East Brook Harbor and another portion is tributary to an existing catch basin located at the corner of the intersection of Cedar Lane and Beach Road, the residential area surrounding Mocking Bird Hill Road east of NYS Route 9L, and the grassed area west of Cedar Lane owned by the State of New York. For the proposed model, the residential area of Cedar Lane and Beatty Road was split into two subcatchments so that the swales adjacent to the roadways could be analyzed separately.

The overall watershed was broken down into smaller watersheds, or subcatchments, to allow for analysis of runoff conditions at several locations throughout the study area. Each of these locations was defined as a Design Point in order to compare the effects resulting from stormwater management facilities proposed as part of the project. Descriptions of each of the selected design points are provided below.

- Design Point 1 consists of the wetland complex located west and downslope of Cedar Lane that drains into Lake George at East Brook Harbor. The existing stormwater system that runs east to west from behind the Garrison Restaurant through the residential area of Cedar Lane and Beatty Road discharges directly into this wetland, and also receives off-site discharge from the field and Cedar Lane.
- Design Point 2 is a catch basin located at the west corner of the intersection of Cedar Lane and Beach Road.

The hydrologic and hydraulic analysis of the pre- and post-development conditions was performed using the Natural Resources Conservation Service Technical Release 20 (TR-20) and Technical Release 55 (TR-55) methodologies. HydroCAD, developed by HydroCAD Software Solutions LLC of Tamworth, New Hampshire, is a Computer-Aided-Design (CAD) program for analyzing the hydrologic and hydraulic characteristics of a given watershed and associated stormwater management facilities. HydroCAD uses the TR-20 algorithms and TR-55 methods to create and route runoff hydrographs. The results of the computer modeling used to analyze the overall watershed under pre and post-development conditions are presented in Appendix F. A summary of the pre and post-development watershed runoff rates and volumes at each design point is presented in the following tables.

Table 2: Summary of Pre- and Post-Development Peak Discharge Rates

Pre- vs. Post-Development Discharge Rate (cfs)						
Design Point (DP)	**10-year 24-hour storm event**		**25-year 24-hour storm event**		**100-year 24-hour storm event**	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
1	38.02	33.81	51.43	48.36	79.18	77.20
2	1.86	0.00	2.46	0.130	3.39	2.76

Table 3: Summary of Pre- and Post-Development Discharge Volumes

Pre- vs. Post-Development Discharge Volume (af)						
Design Point (DP)	**10-year 24-hour storm event**		**25-year 24-hour storm event**		**100-year 24-hour storm event**	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
1	5.494	4.681	7.466	6.53	11.550	10.433
2	0.084	0.00	0.112	0.001	0.170	0.019

In order to meet the Town of Lake George Code stormwater regulations for projects within the Lake George Watershed, stormwater control measures had to be designed so that no increase occurred in runoff volume from a ten-year frequency/twenty-four-hour-duration storm event following development over the predevelopment volume. Additionally, for storm events exceeding the ten-year design storm, the stormwater control measures must function to attenuate peak runoff flow rates for a twenty-five-year-frequency storm to be equal to or less than predevelopment flow rates. This comparison demonstrates that both of these requirements are met with the conceptually proposed practices.

4.4 Water Quality Volume Estimation

Using the following equation as defined in the Design Manual, the total water quality volume (WQv) to be managed by the proposed practices was determined to be 0.642 ac-ft.

$$WQv = \frac{[(P)(R_v)(A)]}{12}$$

Where: P = 90% Rainfall Event Number
= 1.2 inches according to Figure 4.1 of the Design Manual
R_v = 0.05 + 0.009 (I)
I = Impervious Cover (Percent)
A = Contributing Area in Acres

The water quality volume calculations are provided in Appendix G.

4.5 Pollutant Loading Reduction Analysis of Proposed Practices

The pollutant load analysis was used to determine the overall project site pollutant export reduction achieved by the implementation of the proposed practices. The "Simple Method" was used to estimate pollutant loads for total phosphorous (TP), total nitrogen (TN), and total suspended solids (TSS). Flow weighted mean concentration of the pollutants ("C") have been selected from Table 2.1 – "National Median Concentrations for Chemical Constituents in Stormwater" of the Design Manual.

The Simple Method employs the following formula:

$$\text{Storm Pollutant Export (lbs/yr)} = (P)(Pj)(Rv/12)\,(C)\,(A)\,(2.72)$$

Where:
- P = Average Annual Rainfall Depth (inches)
- Pj = Runoff Frequency Factor (0.9 for annual calculations)
- Rv = Runoff Coefficient
- C = Pollutant Concentration (mg/L)
- A = Area of Watershed (acres)

The average annual rainfall at the project site is determined to be 53.5 inches per year (taken from the United States Department of Agriculture (USDA) Soil Survey of Warren County). The stormwater pollutant concentrations listed in Table 2.1 of the Design Manual are summarized in the following table.

Table 4: Pollutant Concentrations "C"

Constituent	**Concentration (mg/l)**
Total Phosphorus (TP)	0.26
Total Nitrogen (TN)	2.00
Total Suspended Solids (TSS)	54.5

Using the Simple Method, the proposed reduction in stormwater pollutant exports from the project site were calculated and are summarized in Table 5.

Table 5: Pollutant Loading Reduction Achieved by Proposed Practices

Constituent	Proposed Pollutant Load Reduction (lbs/yr)
Total Phosphorus (TP)	20.9
Total Nitrogen (TN)	56.6
Total Suspended Solids (TSS)	3,256

The pollutant loading analysis indicates that best management practices and the utilization of multiple green infrastructure facilities will be effective in reducing the amount of stormwater pollutant discharges to Lake George. Refer to Appendix G for the complete pollutant loading reduction analysis.

5.0 ANTICIPATED REGULATORY APPROVALS AND PERMITS

The project site is located roughly 200 feet from the nearest freshwater wetland and 200 feet from the receiving water body, which is Lake George. Lake George is classified as an AA-special waterbody by the NYSDEC and is listed on its Waterbody Inventory/Priority Waterbodies List as number 1006-0016. This segment is listed as having silt/sediment as a pollutant impacting the waterbody with Urban/Stormwater Runoff listed as part of the source of pollutant. A map showing the proximate surface water and wetland locations is in Appendix H.

While this is noted, it has been our experience that any watercourse connected and directly discharging to Lake George is also assigned the same NYS DEC stream class as Lake George. As such, the stream segment that exists between Cedar Lane and Beatty Road and easterly from Beatty Road and adjacent to the Garrison would likely be considered an AA-S by the NYS DEC. If so, work within fifty feet of the bed and bank of the stream would require an Article 15 permit from the NYS DEC. Work may also require permits from the US Army Core of Engineers (USACOE). Finally, the area of proposed work near the stream should be evaluated for the presence of wetlands. If they exist, permits or approvals from the Adirondack Park Agency or the USACOE may be required.

The area adjacent to the western side of the project site is registered as a National Building Site and the entire site is located in an archaeologically sensitive area. As a result, consultation with the NY State Historic Preservation Office (SHPO) would be required in order to determine whether or not historic properties, including archaeological and/or historic resources, will be affected by the undertaking of the project. A printout of the historic places screening map is presented in Appendix H.

Lastly, due to proximity of proposed stormwater projects to DEC's Million Dollar Beach and Lake George Battlefield land tract, coordination with DEC staff is expected. Final determination on all permits would occur as part of final design.

6.0 ESTIMATED COST AND POTENTIAL FUNDING SOURCES

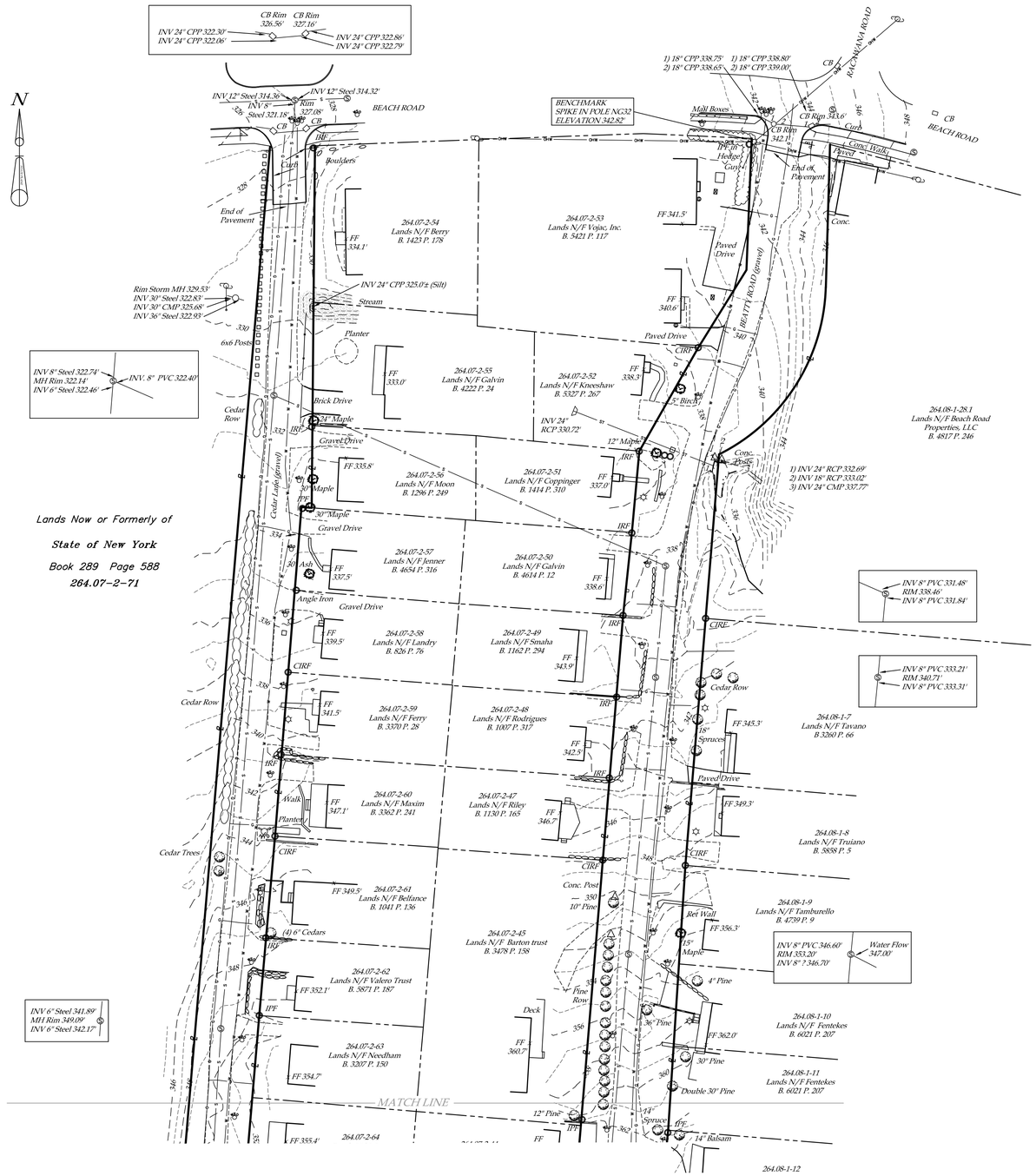
The cost of proposed improvements is estimated to be $1.05 million. The conceptual cost breakdown is provided in Appendix E. The proposed project protects and improves the water quality of Lake George. As such, the project may be eligible for grant funding from the following sources:

- NYSDEC Water Quality Improvement Project (WQIP) Program
- Lake Champlain Basin Program
- Potential funding from the Lake George Association and the FUND for Lake George

We encourage the Town to explore these sources as the Town advances the project.

Appendix A:
Boundary and Topographic Survey

The Chazen Companies
First Draft: November 6, 2020



SIGN POST
GAS METER
WATER SHUT OFF
POWER POLE
LAMP POST
SANITARY MANHOLE
RETAINING WALL
UNDERGROUND GAS
OVERHEAD WIRE
WATER
STORM SEWER
SANITARY SEWER
FENCE
CB CATCH BASIN
IPF IRON PIPE FOUND
IRF IRON ROD FOUND
CIRF CAPPED IRON ROD FOUND
xxx FF FINISHED FLOOR ELEVATION

Lands Now or Formerly of
State of New York
Book 289 Page 588
264.07-2-71

"ONLY BOUNDARY SURVEY MAPS WITH THE SURVEYOR'S EMBOSSED SEAL ARE GENUINE TRUE AND CORRECT COPIES OF THE SURVEYOR'S ORIGINAL WORK AND OPINION."

MAP NOTES

1. Topographic and Planemetric information shown hereon was compiled from an actual field survey conducted on March 26 & 31 & April 1 & 2, 2020. Road boundaries shown per field data capture and a compilation of map references 1-11.
2. North orientation and bearing base per NY State Plane Coordinate System.
3. The location of underground improvements or encroachments, if any exist, or as shown hereon, are not certified. There may be other underground utilities, the existence of which are unknown. Size and location of all underground utilities must be verified by the appropriate authorities. The Underground Facilities Protective Organization must be notified prior to conducting test borings, excavation and construction.
4. This survey was prepared without the benefit of an up to date abstract of title.
5. Horizontal coordinates relative to the New York State plane coordinate system, East zone. Based on the North American Datum of 1983, EPOCH:2010.0000.
6. Elevations relative to the North American Vertical Datum of 1988 GEOID18. One Foot Contour Interval.
7. Horizontal coordinate and elevation units are U.S. survey feet.
8. Reproduction or copying of this document may be a violation of copyright law unless permission of the author and / or copyright holder is obtained.
9. A copy of this document without a proper application of the surveyor's embossed seal should be assumed to be an unauthorized copy.

MAP REFERENCES:

1. Map entitled "Melview Heights", prepared by F. C. Meldola, dated September 20, 1949, filed in the Warren County Clerks Office on December 6, 1949 as map number 1949-3000031.
2. Map entitled "Melview Heights", prepared by Frederick C. Meldola, dated May 5, 1953, filed in the Warren County Clerks Office on June 22, 1953 as map number 1953-3000012.
3. Map entitled "Map showing parcels to be conveyed in the Town of Caldwell, Warren County, N. Y. made for Morris Moon", prepared by John B. Van Dusen, dated September 10, 1956, filed in the Warren County Clerk's Office on October 22, 1956 as map number 1956-3000051.
4. Map entitled "Map of a survey of a parcel of land to be conveyed to Frederick J. Bellance", prepared by John B. Van Dusen, dated July 13, 1960, filed in the Warren County Clerk's Office on August 3, 1960 as map number 1960-3000026.
5. Map entitled "Map of a Survey of the lands of Mrs. Howard Kinnicutt", prepared by John B. Van Dusen, dated October 3, 1963, filed in the Warren County Clerk's Office on November 8, 1963 as map number 1963-3000033.
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KRISTIN M. DARRAH
050803
LICENSED LAND SURVEYOR
STATE OF NEW YORK

DATE	REVISIONS RECORD/DESCRIPTION	DRAFTER

APPROVED: KMD
DRAFTED: MWB
CHECKED: KMD
PROJ. NO: 20039
SCALE : 1"=40'
DATE : 5/27/20

Topographic & Boundary Survey

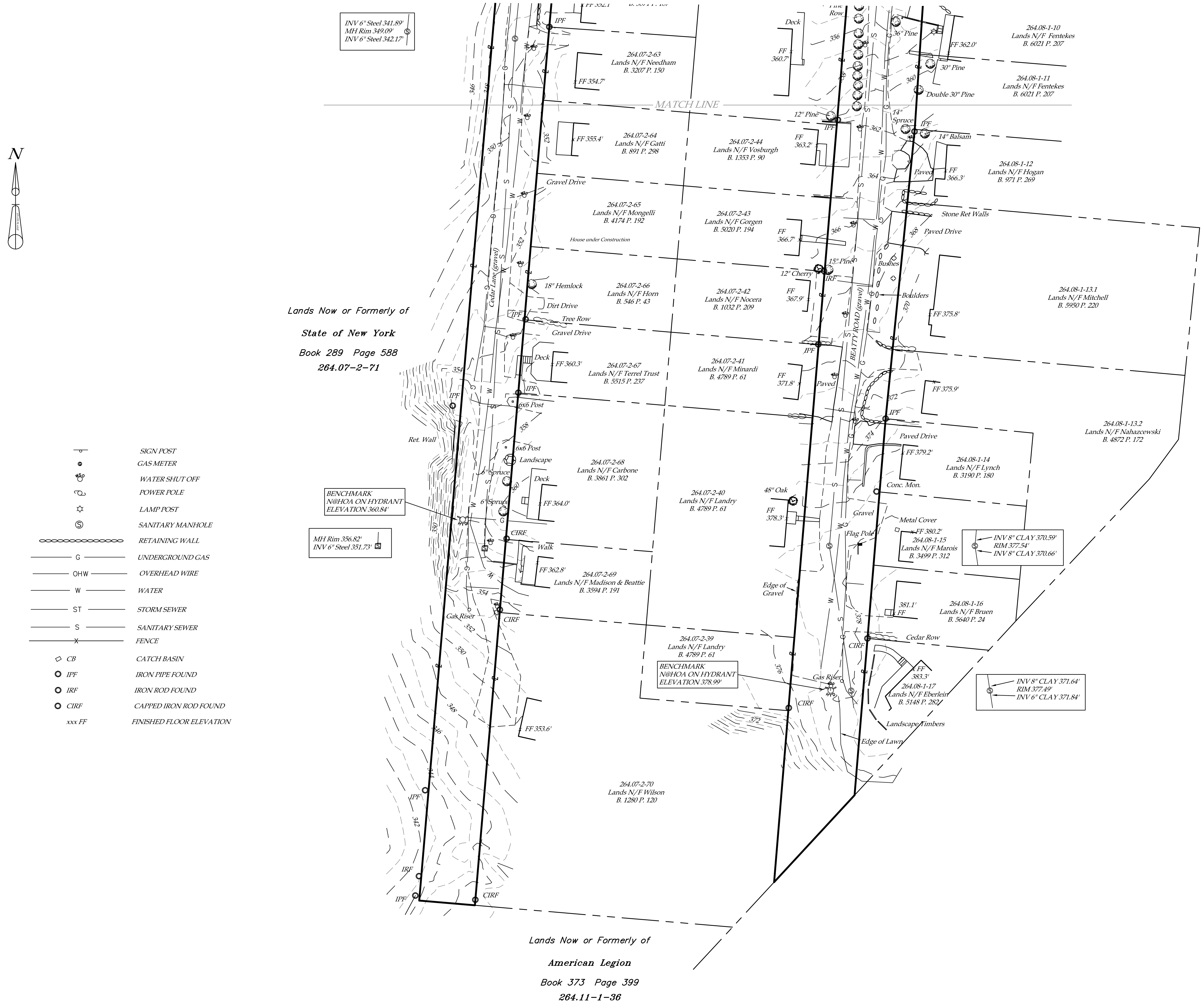
Roads Known As

Cedar Lane and Beatty Road

TOWN OF LAKE GEORGE — WARREN COUNTY, NEW YORK

Darrah Land Surveying, PLLC
59 Lake Avenue, Lake Luzerne, New York 12846
Voice: (518) 798-4692
or (518) 654-9416

20039-1
SHEET: 1 OF 2
PROJ NO: 20039



Symbol	Description
	SIGN POST
	GAS METER
	WATER SHUT OFF
	POWER POLE
	LAMP POST
	SANITARY MANHOLE
	RETAINING WALL
G	UNDERGROUND GAS
OHW	OVERHEAD WIRE
W	WATER
ST	STORM SEWER
S	SANITARY SEWER
X	FENCE
CB	CATCH BASIN
IPF	IRON PIPE FOUND
IRF	IRON ROD FOUND
CIRF	CAPPED IRON ROD FOUND
xxx FF	FINISHED FLOOR ELEVATION

MAP NOTES

1. Topographic and Planemetric information shown hereon was compiled from an actual field survey conducted on March 26 & 31 & April 1 & 2, 2020. Road boundaries shown per field data capture and a compilation of map references 1-11.
2. North orientation and bearing base per NY State Plane Coordinate System.
3. The location of underground improvements or encroachments, if any exist, or as shown hereon, are not certified. There may be other underground utilities, the existence of which are unknown. Size and location of all underground utilities must be verified by the appropriate authorities. The Underground Facilities Protective Organization must be notified prior to conducting test borings, excavation and construction.
4. This survey was prepared without the benefit of an up to date abstract of title.
5. Horizontal coordinates relative to the New York State plane coordinate system, East zone. Based on the North American Datum of 1983, EPOCH:2010.0000.
6. Elevations relative to the North American Vertical Datum of 1988 GEOID18. One Foot Contour Interval.
7. Horizontal coordinate and elevation units are U.S. survey feet.
8. Reproduction or copying of this document may be a violation of copyright law unless permission of the author and / or copyright holder is obtained.
9. A copy of this document without a proper application of the surveyor's embossed seal should be assumed to be an unauthorized copy.

MAP REFERENCES:

1. Map entitled "Melview Heights", prepared by F. C. Meldola, dated September 20, 1949, filed in the Warren County Clerks Office on December 6, 1949 as map number 1949-3000031.
2. Map entitled "Melview Heights", prepared by Frederick C. Meldola, dated May 5, 1953, filed in the Warren County Clerks Office on June 22, 1953 as map number 1953-3000012.
3. Map entitled "Map showing parcels to be conveyed in the Town of Caldwell, Warren County, N. Y. made for Morris Moon", prepared by John B. Van Dusen, dated September 10, 1956, filed in the Warren County Clerk's Office on October 22, 1956 as map number 1956-3000051.
4. Map entitled "Map of a survey of a parcel of land to be conveyed to Frederick J. Belfance", prepared by John B. Van Dusen, dated July 13, 1960, filed in the Warren County Clerk's Office on August 3, 1960 as map number 1960-3000026.
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"ONLY BOUNDARY SURVEY MAPS WITH THE SURVEYOR'S EMBOSSED SEAL ARE GENUINE TRUE AND CORRECT COPIES OF THE SURVEYOR'S ORIGINAL WORK AND OPINION."

KRISTIN M. DARRAH
050803

STATE OF NEW YORK · KRISTIN MARIE DARRAH · 050803 · LICENSED LAND SURVEYOR

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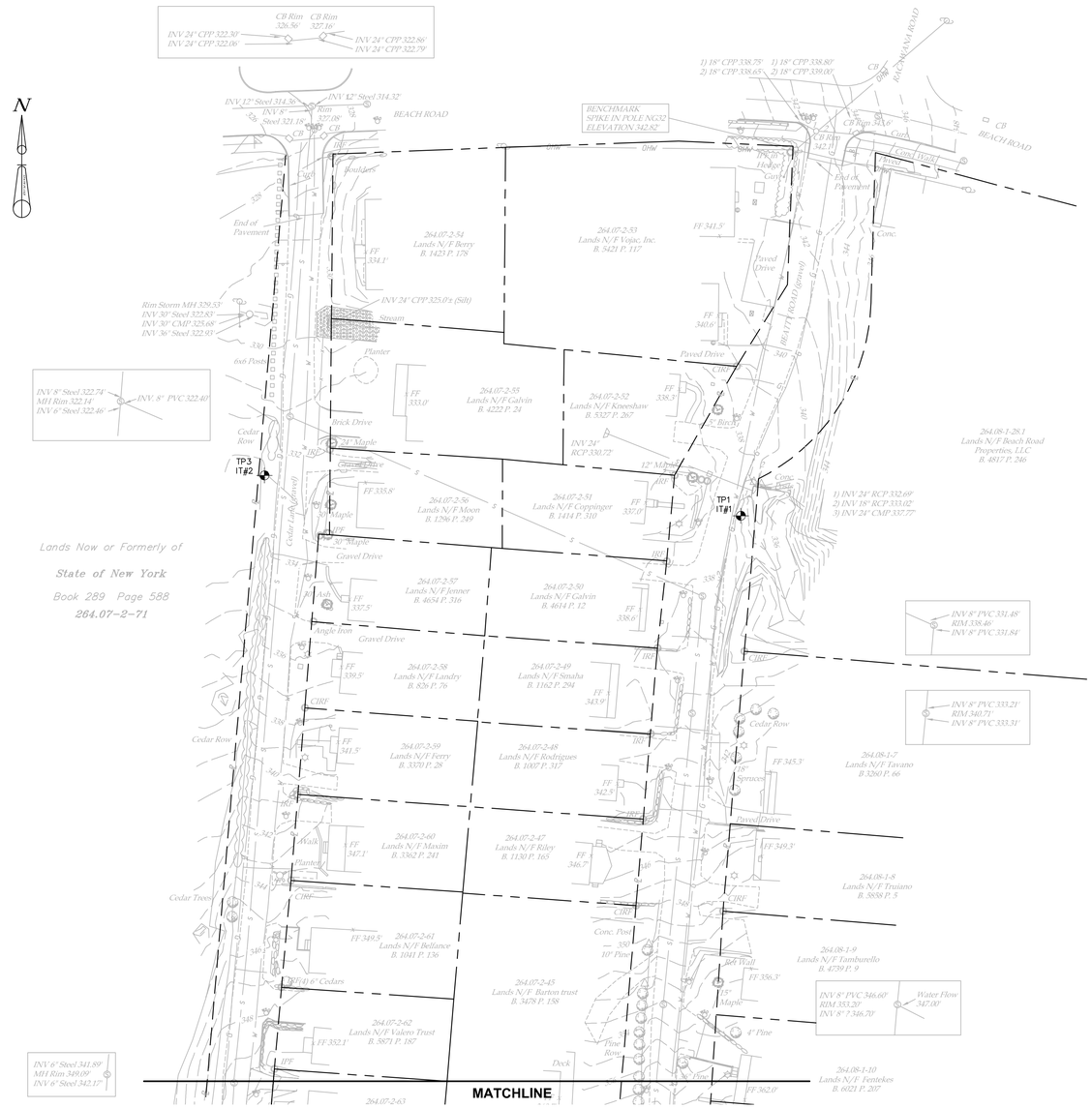
20039-1
SHEET: 2 OF 2
PROJ NO: 20039

Appendix B:
Soil Testing Plan and Report

The Chazen Companies
First Draft: November 6, 2020



NOTES

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2. ONLY COPIES FROM THE ORIGINAL OF THIS SURVEY MARKED WITH AN ORIGINAL OF THE LAND SURVEYOR'S INKED SEAL OR HIS EMBOSSED SEAL SHALL BE CONSIDERED TO BE VALID TRUE COPIES.

3. THE CONTRACTOR SHALL COMPLY WITH NEW YORK STATE INDUSTRIAL CODE RULE 753 – 48 HOURS PRIOR TO DIGGING CALL DIG SAFELY NEW YORK 1–800–962–7962 TO HAVE PUBLIC UTILITY LOCATIONS PAINTED.

4. TOPOGRAPHY SHOWN HEREON WAS COMPILED FROM A FIELD SURVEY COMPLETED APRIL 6, 2018 BY CHAZEN ENGINEERING, LAND SURVEYING & LANDSCAPE ARCHITECTURE CO., D.P.C., DATUM NAVD–88, 1 FOOT CONTOUR INTERVAL.

5. BOUNDARY LINES SHOWN HEREON ARE BASED ON TAX MAP LINES AND ARE APPROXIMATE. THEY ARE SUBJECT TO WHATEVER STATE OF FACTS THAT AN ACCURATE BOUNDARY SURVEY MAY REVEAL.

6. HORIZONTAL DATUM AND NORTH ORIENTATION ARE BASED ON THE NYS PLANE COORDINATE SYSTEM (EAST ZONE) AND VERTICAL DATUM IS BASED ON NAVD88. HORIZONTAL AND VERTICAL DATUMS WERE DETERMINED BY GPS OBSERVATION AT THE TIME OF FIELD SURVEY.

7. RECORD GAS UTILITY INFORMATION OBTAINED FROM NATIONAL GRID.

8. THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THE SURVEYOR DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

9. DWELLINGS SHOWN ARE ASSUMED TO BE SERVICED BY UNDERGROUND UTILITIES (GAS, SEWER, WATER, ELECTRIC). THE LOCATION OF THE LATERALS SHOWN THAT DO NOT HAVE A GAS VALVE, WATER SHUT OFF, OR CLEAN OUT MUST BE VERIFIED IN THE FIELD BY THE CONTRACTOR.

SYMBOLS

SOIL TEST PIT

SOIL DATA

SOIL TESTING CONDUCTED BY THE CHAZEN COMPANIES ON 8/21/2020

TP1

0–10"	TOPSOIL
10–30"	SANDY CLAY, GRAY
30–38"	COARSE SAND, LIGHT BROWN
38–58"	SILT CLAY MIXED WITH DARK BROWN SAND
58–75"	CLAY, BLUE–GRAY, GRAVEL AND LARGE COBBLES THROUGHOUT

ROOTS ENCOUNTERED 0–10"
LEDGE AT 75"
GROUNDWATER ENCOUNTERED AT 41"

IT#1

INFILTRATION RATE = 0 INCHES/HOUR AT 48 INCHES*

*DUE TO THE PRESENCE OF CLAY, INFILTRATION RATES RESULTED IN CLOSE TO ZERO.

TP3

0–11"	TOPSOIL
11–34"	COARSE SAND, LIGHT BROWN, TRACES OF RED
34–80"	COARSE SAND, GRAYISH BROWN, TRACES OF CLAY, BOULDERS AND COBBLES SCATTERED THROUGHOUT

ROOTS ENCOUNTERED 0–5"
NO REFUSAL
NO GROUNDWATER ENCOUNTERED

IT#2

INFILTRATION RATE = 65 INCHES/HOUR AT 48 INCHES

0 1 2 3
ORIGINAL SCALE IN INCHES

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Glens Falls, New York 12801
Office Locations
- Glens Falls, NY
- Troy, NY
- Poughkeepsie, NY
- White Plains, NY
- New York City, NY

rev.	date	description

CEDAR LANE & BEATTY ROAD GI FEASIBILITY STUDY

SOIL TESTING LOCATIONS

TOWN OF LAKE GEORGE, WARREN COUNTY, NEW YORK

designed AMH	checked RMA
date	scale 1"=40'
project no. 92001.06	
sheet no. SB-1	

Drawing Name: Z:\projects\92000-92099\92001.00 – T. Lake George\92001.06 – T. Lake George GI Feasibility Study\DWG\Z_92001-06_SOIL_BORING.dwg
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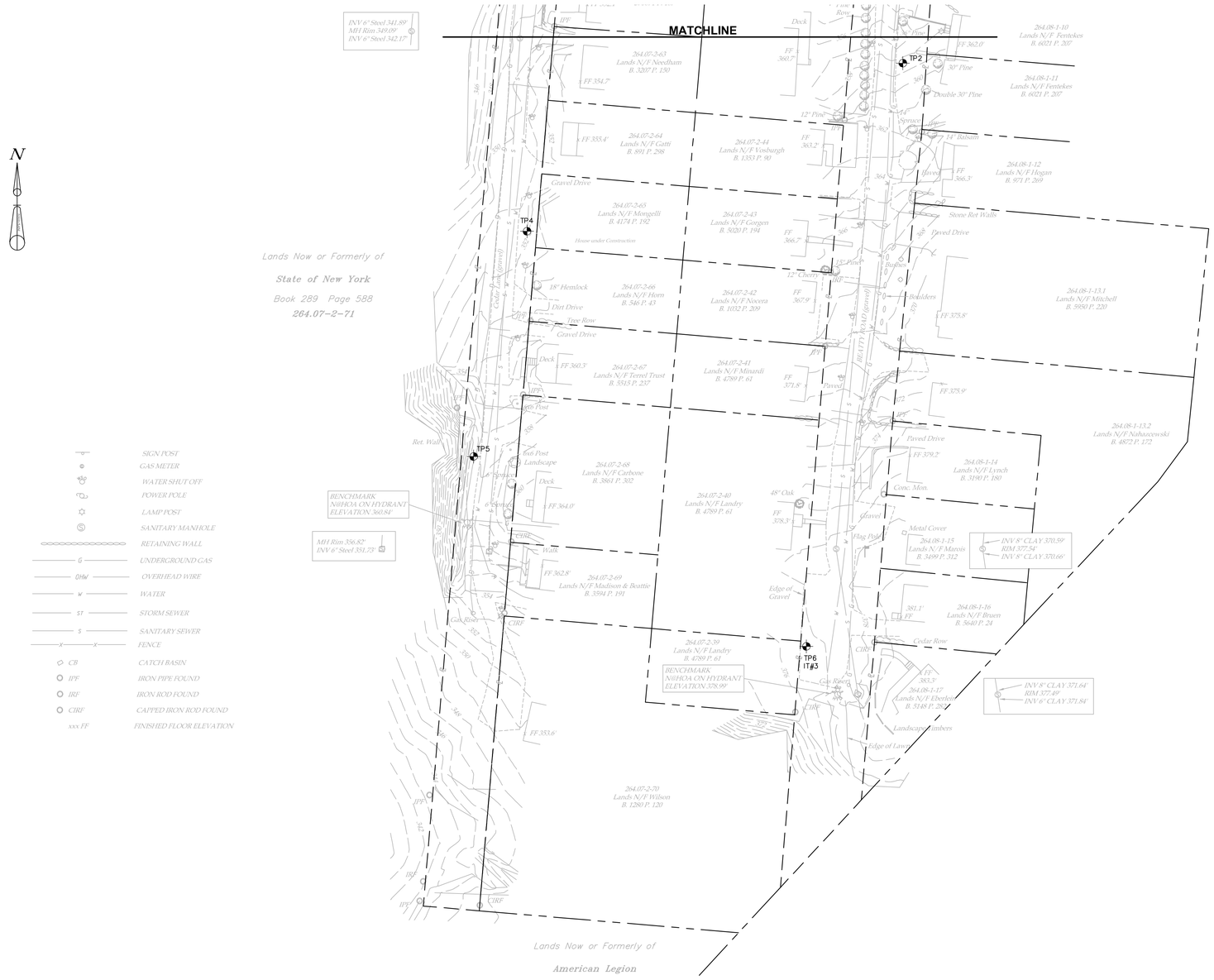

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SYMBOLS

SOIL TEST PIT

SOIL DATA

SOIL TESTING CONDUCTED BY THE CHAZEN COMPANIES ON 8/21/2020

TP2

0–3" TOPSOIL
3–72" FINE, SANDY LOAM, LIGHT BROWN, COBBLES AND BOULDERS SCATTERED THROUGHOUT

ROOTS ENCOUNTERED 0–6"
NO REFUSAL
NO GROUNDWATER ENCOUNTERED

TP4

0–7" TOPSOIL
7–16" LOAMY SAND, REDDISH BROWN
16–78" SAND, LIGHT BROWN, COBBLES AND BOULDERS SCATTERED THROUGHOUT

ROOTS ENCOUNTERED 0–7"
MOTTLING ENCOUNTERED AT 34"
NO GROUNDWATER ENCOUNTERED
NO REFUSAL

TP5

0–3" TOPSOIL
3–90" FINE, SANDY LOAM, LIGHT BROWN

ROOTS ENCOUNTERED 0–3"
NO GROUNDWATER ENCOUNTERED
NO REFUSAL

TP6

0–8" GRAVEL
8–12" COARSE SAND, GRAY, MOIST
12–18" SILTY CLAY, DARK BROWN
18–84" SAND, DARK BROWN, TRACES OF RED, MINOR COBBLES THROUGHOUT

ROOTS ENCOUNTERED 8–12"
NO GROUNDWATER ENCOUNTERED
NO REFUSAL

IT#3

INFILTRATION RATE = 81 INCHES/HOUR AT 48 INCHES

0 1 2 3
ORIGINAL SCALE IN INCHES

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rev.	date	description

CEDAR LANE & BEATTY ROAD GI FEASIBILITY STUDY

SOIL TESTING LOCATIONS

TOWN OF LAKE GEORGE, WARREN COUNTY, NEW YORK

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Date Printed: Oct 27, 2020, 12:18pm

THE Chazen COMPANIES®
Proud to be Employee Owned

MEMORANDUM

Date: August 24, 2020

Re: Soil Testing Investigations – Cedar Lane and Beatty Road, Lake George, NY

Job #: 92001.06

The Chazen Companies (Chazen) performed onsite soil testing at the above referenced location on August 21, 2020. The purpose of this testing was to investigate subsurface soil conditions to assess the potential for implementation of green infrastructure practices within the road's right-of-way as part of a feasibility study being conducted in the area to reduce stormwater runoff into nearby Lake George. The testing was performed by Michael Bellack, EIT, and Abby Hill, EIT from Chazen.

Soil testing was performed in accordance with the requirements as specified in Appendix D of the NYS Stormwater Management Design Manual. A total of six deep soil test pits and three infiltration tests were conducted in the general area of the proposed green infrastructure practices. Please see the attached map reference depicting the soil testing locations.

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DEEP TEST PIT SOIL DATA

TP1
0” – 10” Topsoil
10” – 30” Sandy clay, gray
30” – 38” Coarse sand, light brown
38” – 58” Silty clay mixed with dark brown sand
58” – 75” Clay, blue-gray, gravel and large cobbles throughout

Roots encountered 0” – 10”
Ledge at 75”
Groundwater encountered around 41”, water sitting in bottom of hole at end of test


Deep Test Pit #1

TP2
0” – 3” Topsoil
3” – 72” Fine, sandy loam, light brown, cobbles and boulders scattered throughout

Roots encountered 0” – 6”
No refusal
No groundwater encountered


Deep Test Pit #2

TP3
0” – 11” Topsoil
11” – 34” Coarse sand, light brown, traces of red
34” – 80” Coarse sand, grayish brown, traces of clay, boulders and cobbles scattered throughout

Roots encountered 0” – 5”
No refusal
No groundwater encountered


Deep Test Pit #3

TP4
0” – 7” Topsoil
7” – 16” Loamy sand, reddish brown
16” – 78” Sand, light brown, cobbles and boulders throughout

Roots encountered 0” – 7”
Mottling encountered at 34”
No groundwater encountered
No refusal

Deep Test Pit #4

TP5
0” – 3” Topsoil
3” – 90” Fine, sandy loam, light brown, possible fill material

Roots encountered 0” – 3”
No groundwater encountered
No refusal


Deep Test Pit #5

TP6
0” – 8” Gravel
8” – 12” Coarse sand, gray, moist
12”- 18” Silty clay, dark brown
18” – 84” Sand, dark brown, traces of red, minor cobbles throughout

Roots encountered 8”-12”
No groundwater encountered
No refusal


Deep Test Pit #6

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INFILTRATION TEST RESULTS

IT#1
Infiltration rate = 0 inches/hour at 48 inches*

*Due to the presence of clay, infiltration rates resulted in close to zero.

IT#2
Trial 1:
Infiltration rate = 57 inches in 1 hour

Trial 2:
Infiltration rate = 94 inches in 1 hour

Trial 3:
Infiltration rate = 58 inches in 1 hour

Trial 4:
Infiltration rate = 51 inches in 1 hour

Average infiltration rate = 65 inches/hour at 48 inches

IT#3
Trial 1:
Infiltration rate = 69 inches in 1 hour

Trial 2:
Infiltration rate = 96 inches in 1 hour

Trial 3:
Infiltration rate = 85 inches in 1 hour

Trial 4:
Infiltration rate = 72 inches in 1 hour

Average infiltration rate = 81 inches/hour at 48 inches

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Warren County, New York

July 8, 2020

Preface

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

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

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

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

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

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

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

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How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

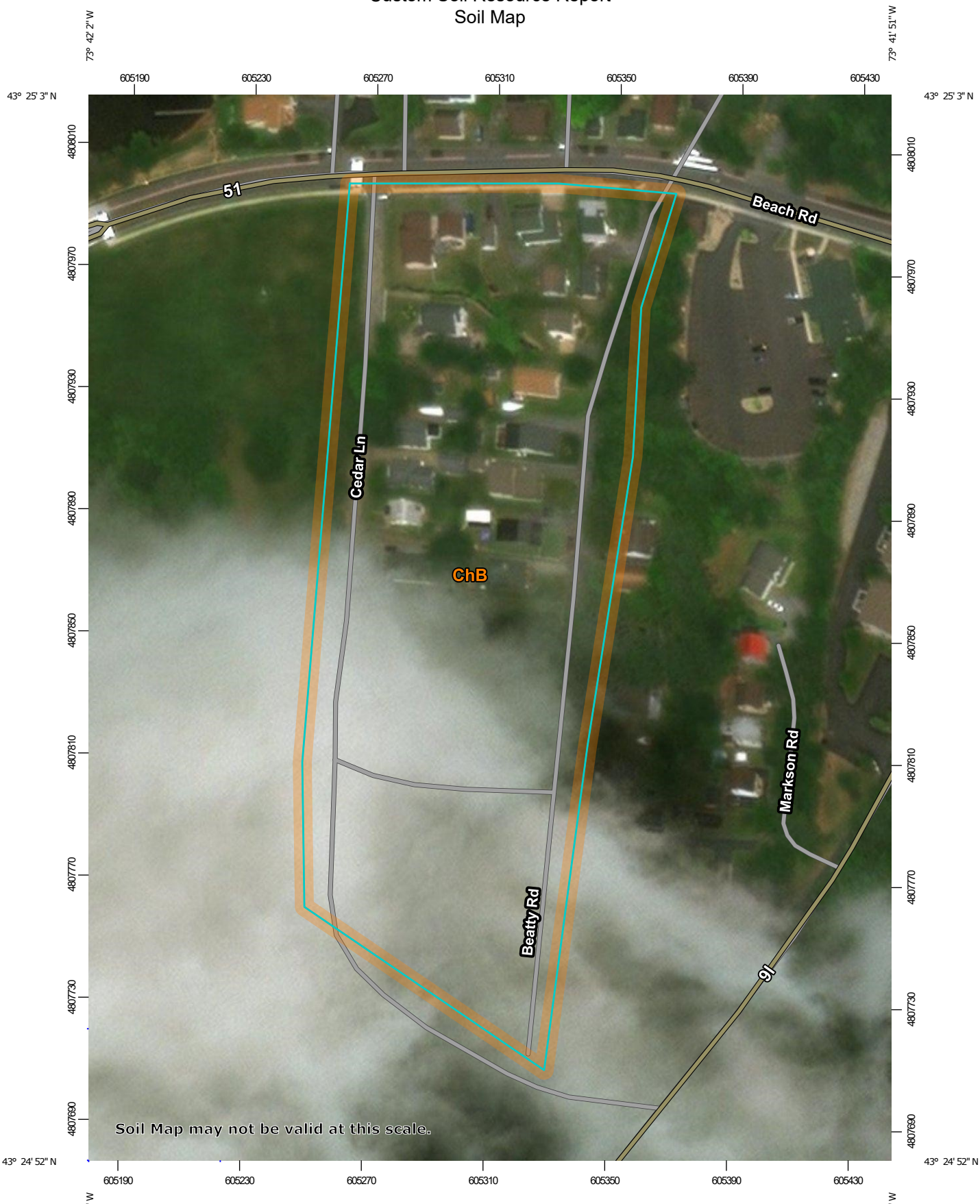
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,700 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

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 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Warren County, New York
Survey Area Data: Version 20, Jun 11, 2020

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

Date(s) aerial images were photographed: Jun 10, 2015—Mar 29, 2017

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
ChB	Charlton fine sandy loam, 3 to 8 percent slopes	6.3	100.0%
Totals for Area of Interest		**6.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Warren County, New York

ChB—Charlton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2wh0n
Elevation: 0 to 1,440 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Charlton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw - 7 to 22 inches: gravelly fine sandy loam
C - 22 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: Well Drained Till Uplands (F144AY034CT)
Hydric soil rating: No

Minor Components

Sutton

Percent of map unit: 8 percent
Landform: Ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Paxton

Percent of map unit: 5 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Chatfield

Percent of map unit: 1 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Leicester

Percent of map unit: 1 percent
Landform: Drainageways, depressions
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

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Appendix C:
Site Photographs

Photo #1
Description: Looking south at the beginning of Beatty Road

Photo #2
Description: Existing erosion along the northeastern edge of Beatty Road

Photo #3
Description: Looking north on Beatty Road about 250 feet off Beach Road

Photo #4
Description: Driveway entrance adjoining Beatty Road

Photo #5
Description: Looking north on Beatty Road about 600 feet off of Beach Road

Photo #6
Description: Residential properties adjacent to Beach Road located between Beatty Road and Cedar Lane, looking east

Photo #7
Description: Looking south on Cedar Lane about 150 feet from Beach Road

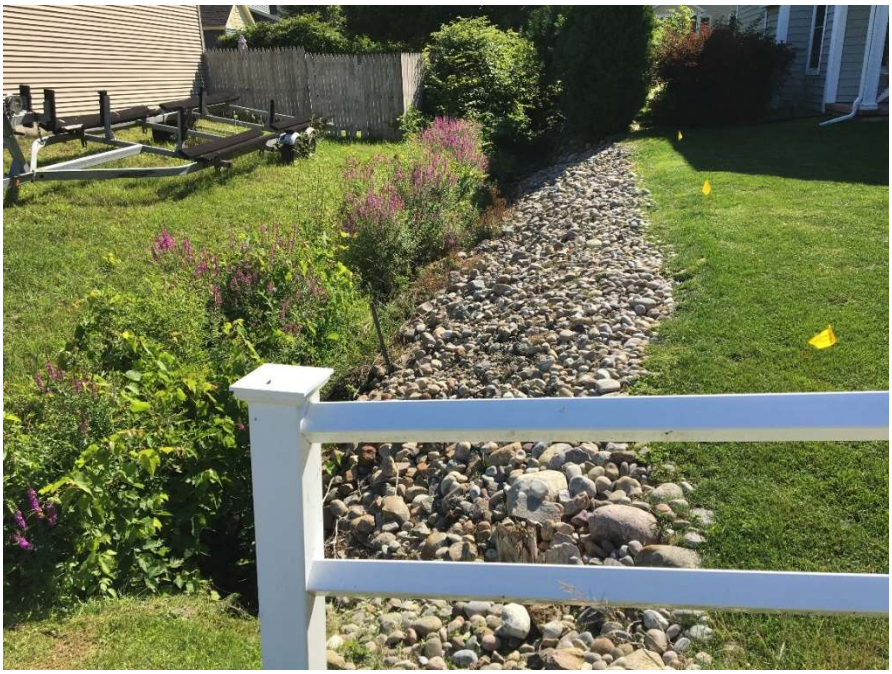


Photo #8
Description: Swale that runs between residences located near northern end of Cedar Lane; flags on neighboring property's lawn indicate recently fertilization

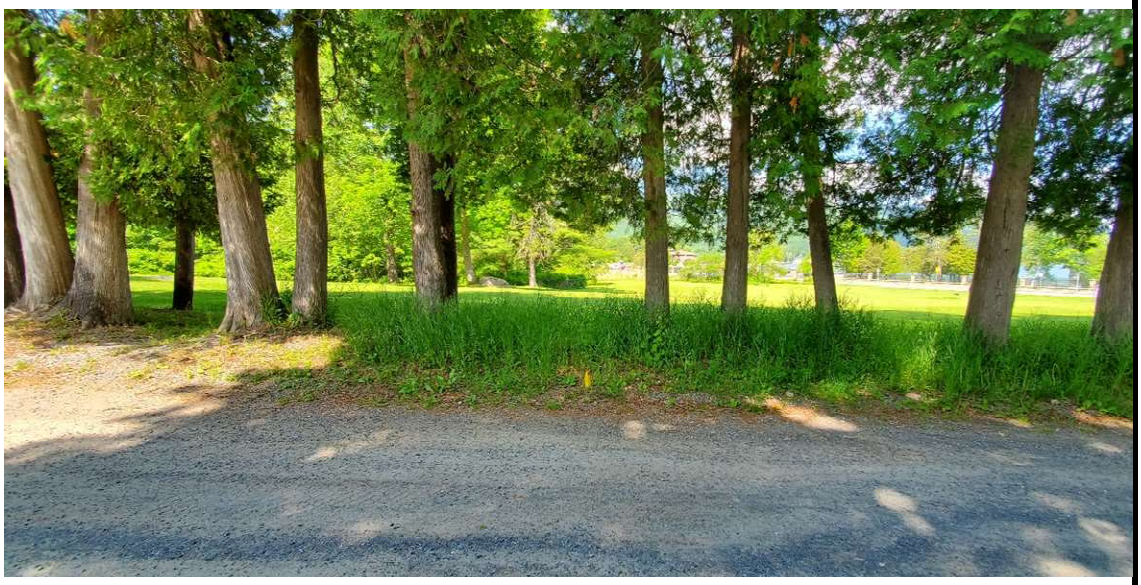


Photo #9
Description: Stand of Cedar Trees located about 350 feet off of Beach Road, looking west on Cedar Lane

Photo #10
Description: Vegetation along west side of Cedar Lane near top of hill on south side

Photo #11
Description: Near south end of Cedar Lane at top of hill

Photo #12
Description: State lands; looking east at Cedar Lane across field

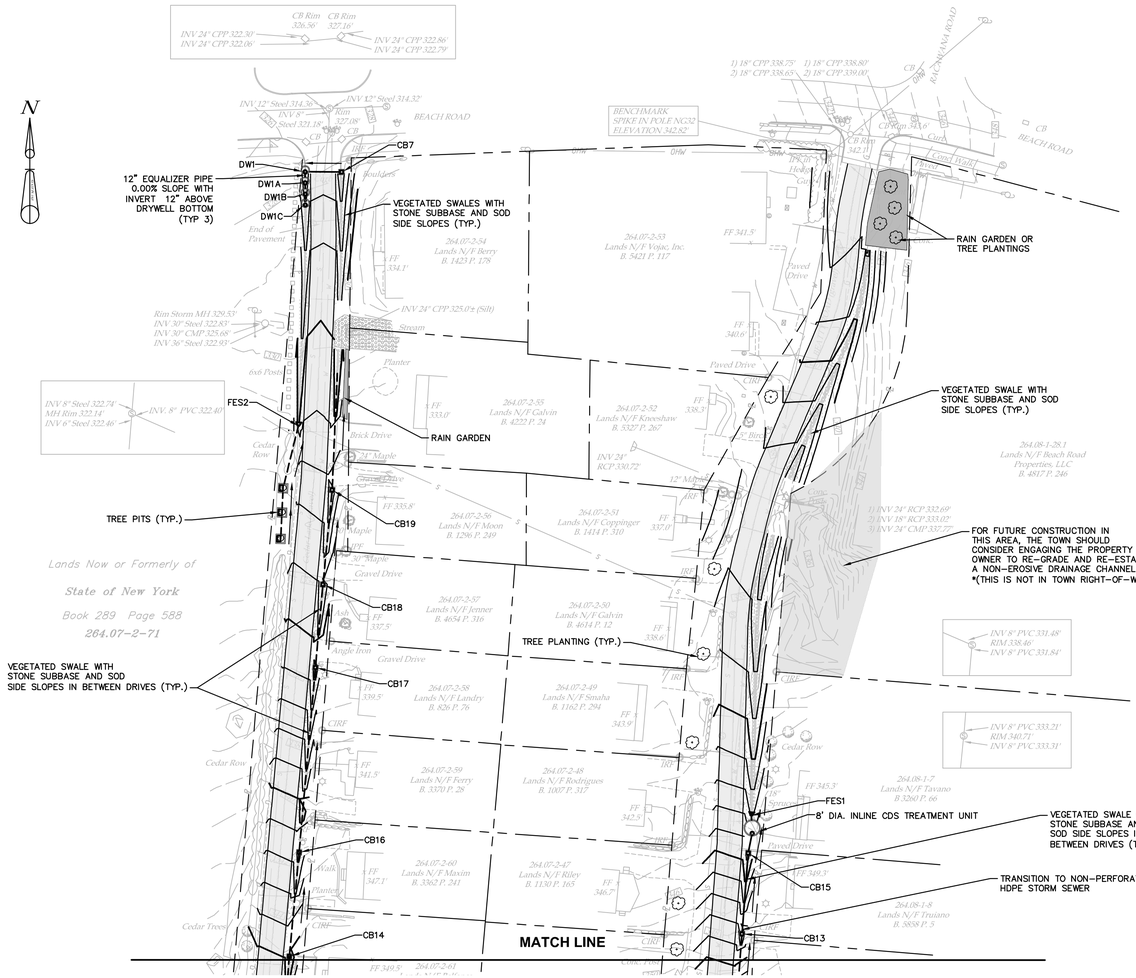
Appendix D:
Concept Design Plans

The Chazen Companies
First Draft: November 6, 2020

TREE PLANTINGS/ TREE PITS

PLANTINGS CONSISTING OF DECIDUOUS, FLOWERING TREE SPECIES IS PREFERRED TO FURTHER ENHANCE AND CONTRIBUTE TO THE BEAUTIFICATION OF LANDS SURROUNDING LAKE GEORGE.

FOR THE PURPOSE OF THIS FEASIBILITY STUDY, TREE PLANTINGS AND TREE PITS WERE SITED IN LOCATIONS WITHIN THE TOWN'S RIGHT-OF-WAY. HOWEVER, THIS PRACTICE IS HIGHLY ENCOURAGED ON PRIVATE PROPERTY, WHERE POSSIBLE, IN ORDER TO MAXIMIZE THE BENEFITS RECEIVED BY THIS PRACTICE.



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- Poughkeepsie, NY
- White Plains, NY
- New York City, NY

rev.	date	description

CEDAR LANE & BEATTY ROAD GI FEASIBILITY STUDY

CONCEPT SITE PLAN

TOWN OF LAKE GEORGE, WARREN COUNTY, NEW YORK

designed	checked
AMH	RMA
date	scale
	1"=40'
project no.	
92001.06	
sheet no.	
C130	

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TREE PLANTINGS/ TREE PITS

PLANTINGS CONSISTING OF DECIDUOUS, FLOWERING TREE SPECIES IS PREFERRED TO FURTHER ENHANCE AND CONTRIBUTE TO THE BEAUTIFICATION OF LANDS SURROUNDING LAKE GEORGE.

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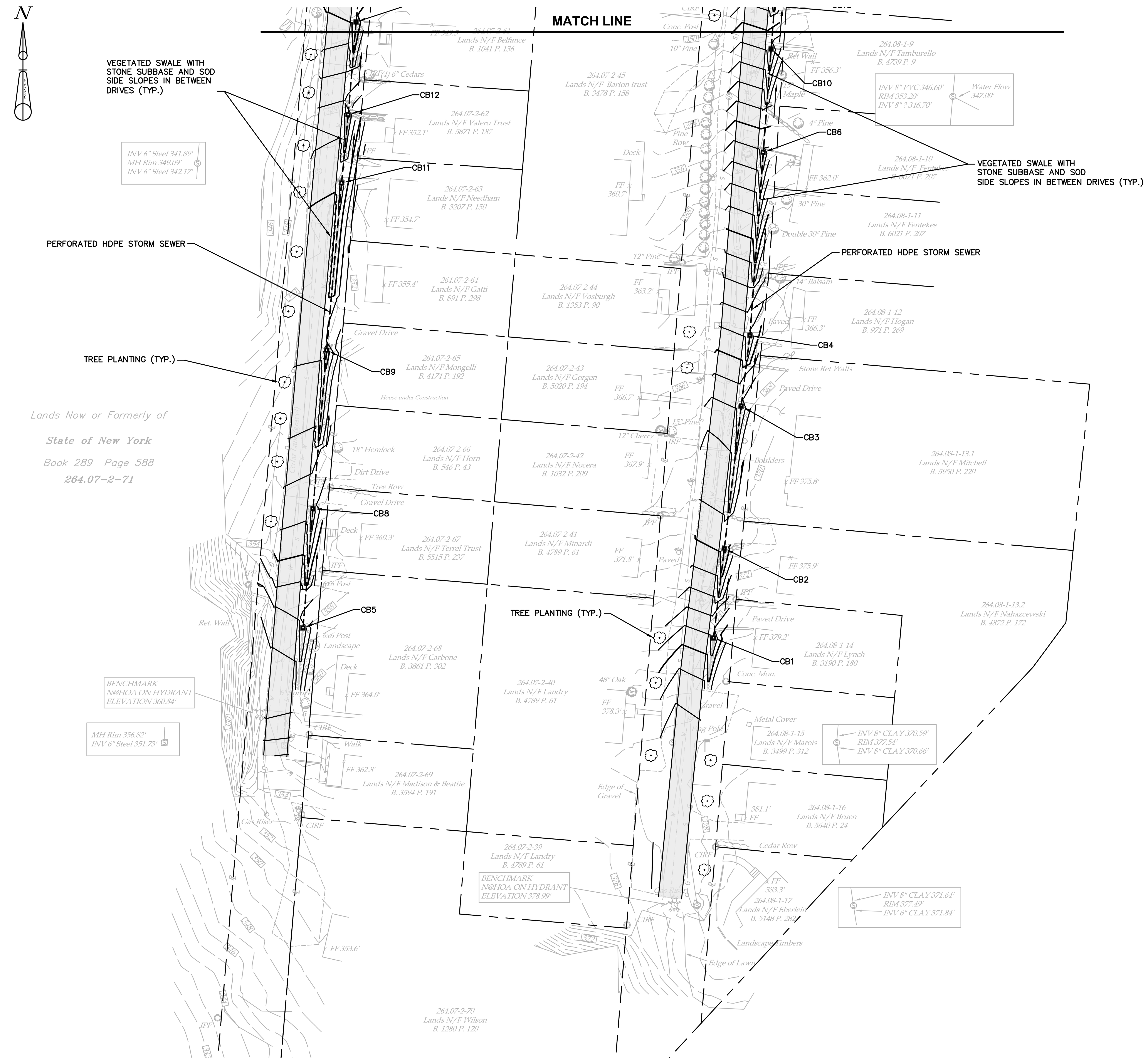

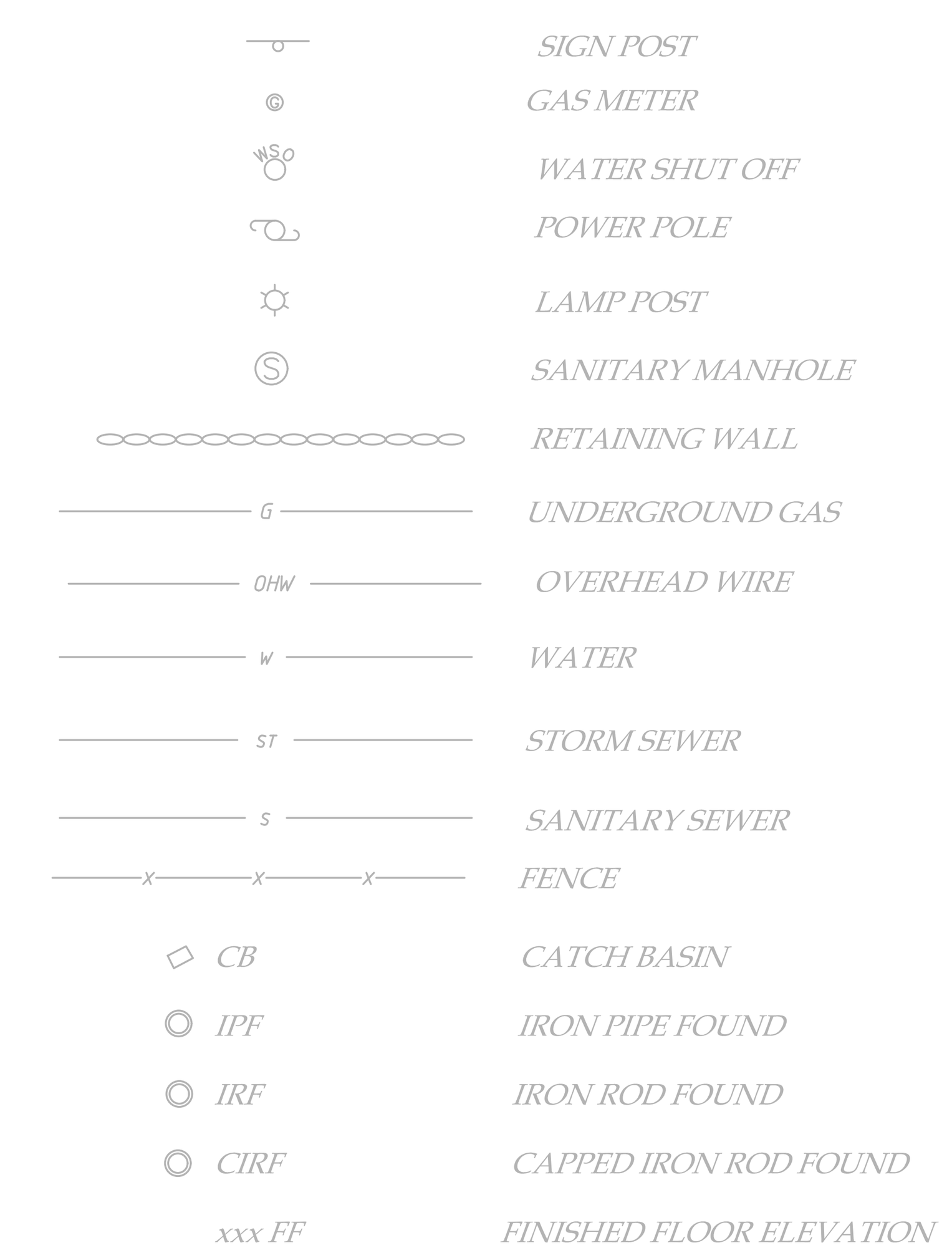

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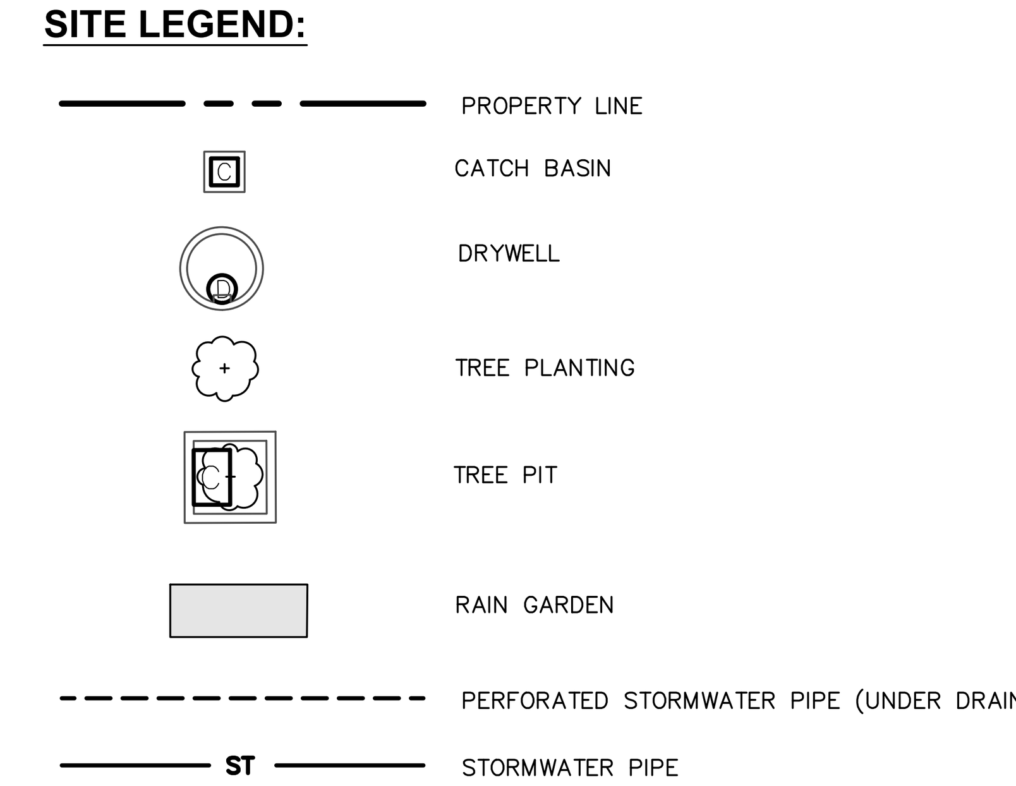

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rev.	date	description

CEDAR LANE & BEATTY ROAD GI FEASIBILITY STUDY

CONCEPT SITE PLAN

TOWN OF LAKE GEORGE, WARREN COUNTY, NEW YORK

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Appendix E:
Concept Design Cost Estimate

The Chazen Companies
First Draft: November 6, 2020

THE Chazen COMPANIES
Engineers/Surveyors
Planners
Environmental Scientists
Landscape Architects

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Capital District Office (518) 273-0055

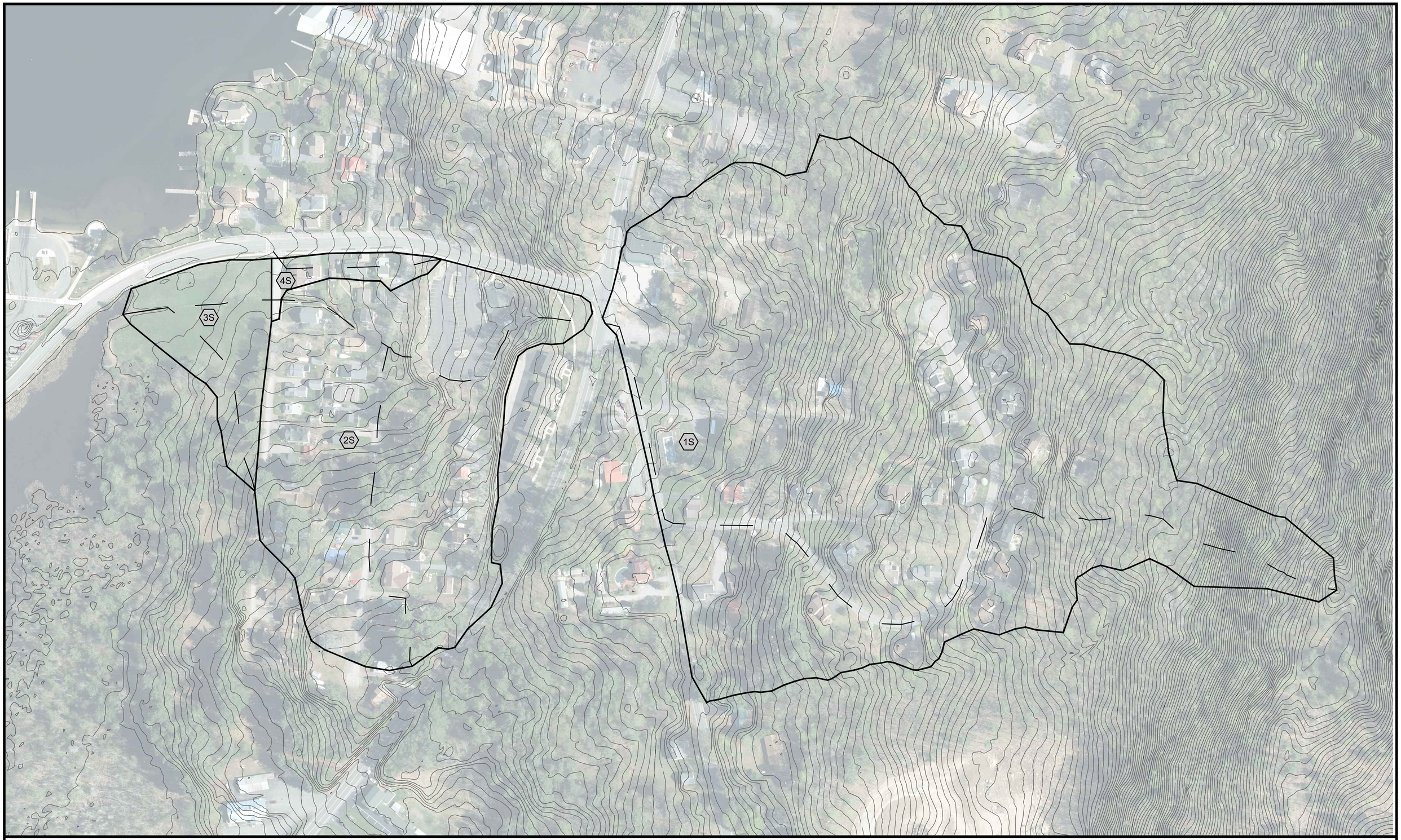
Town of Lake George - Beatty Road/Cedar Lane GI Feasibility Study

Preliminary Engineer's Opinion of Probable Cost

Concept Estimate (Unit Prices Based On a Publicly Bid Project)					
				Total Project	
Item No.	Description	Units	Unit Price	QTY	Cost
1	Mobilization (4%)	LS	$24,196	1	$24,196
2	Record Documents	LS	$3,000	1	$3,000
3	Sediment and Erosion Control	LS	$10,000	1	$10,000
4	Maintenance and Protection of Traffic	LS	$10,000	1	$10,000
5	Site Restoration	LS	$60,000	1	$60,000
6	2'x2' Catch Basins	EA	$2,500	20	$50,000
7	Flared End Section	EA	$800	2	$1,600
8	12" Corrugated HDPE Storm Pipe	LF	$90	120	$10,800
9	8" Perforated HDPE Storm Pipe Underdrain	LF	$115	1,300	$149,500
10	4' Dia. Drywells	EA	$6,000	4	$24,000
11	Contech CDS Treatment Unit	EA	$12,000	1	$12,000
12	Tree Plantings	EA	$400	30	$12,000
13	Precast Concrete Storm Catch Basin/Tree Planter, Frame & Grate	EA	$7,350	3	$22,050
14	Vegetated Swales	LS	$15,000	1	$15,000
15	Rain Garden Construction and Installation	EA	$5,000	2	$10,000
16	Retaining Wall Rehabilitation Construction Allowance	LS	$40,000	1	$40,000
17	Road Earthwork (Potential for Town forces to perform)	CY	$6	1,192	$7,154
18	Road Pavement - 1.5" Asphalt Top Course (Potential for Town forces to perform)	TON	$350	273	$95,550
19	Road Pavement - 3.5" Asphalt Binder Course (Potential for Town forces to perform)	TON	$150	635	$95,250
20	Field Change Allowance (10%)	LS	$50,000	1	$50,000
				Construction Subtotal	**$702,100**
				Design Development Contingency (20%)	$140,420
				Legal Technical and Administrative Services (25%)	$210,630
				Total	**$1,053,150**

Appendix F:
Concept HydroCAD Model

The Chazen Companies
First Draft: November 6, 2020



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rev.	date	description

CEDAR LANE & BEATTY ROAD GI FEASIBILITY STUDY

EXISTING CONDITIONS

TOWN OF LAKE GEORGE, WARREN COUNTY, NEW YORK

designed	checked
AMH	RMA
date	scale
	1"=90'
project no.	
92001.06	
sheet no.	
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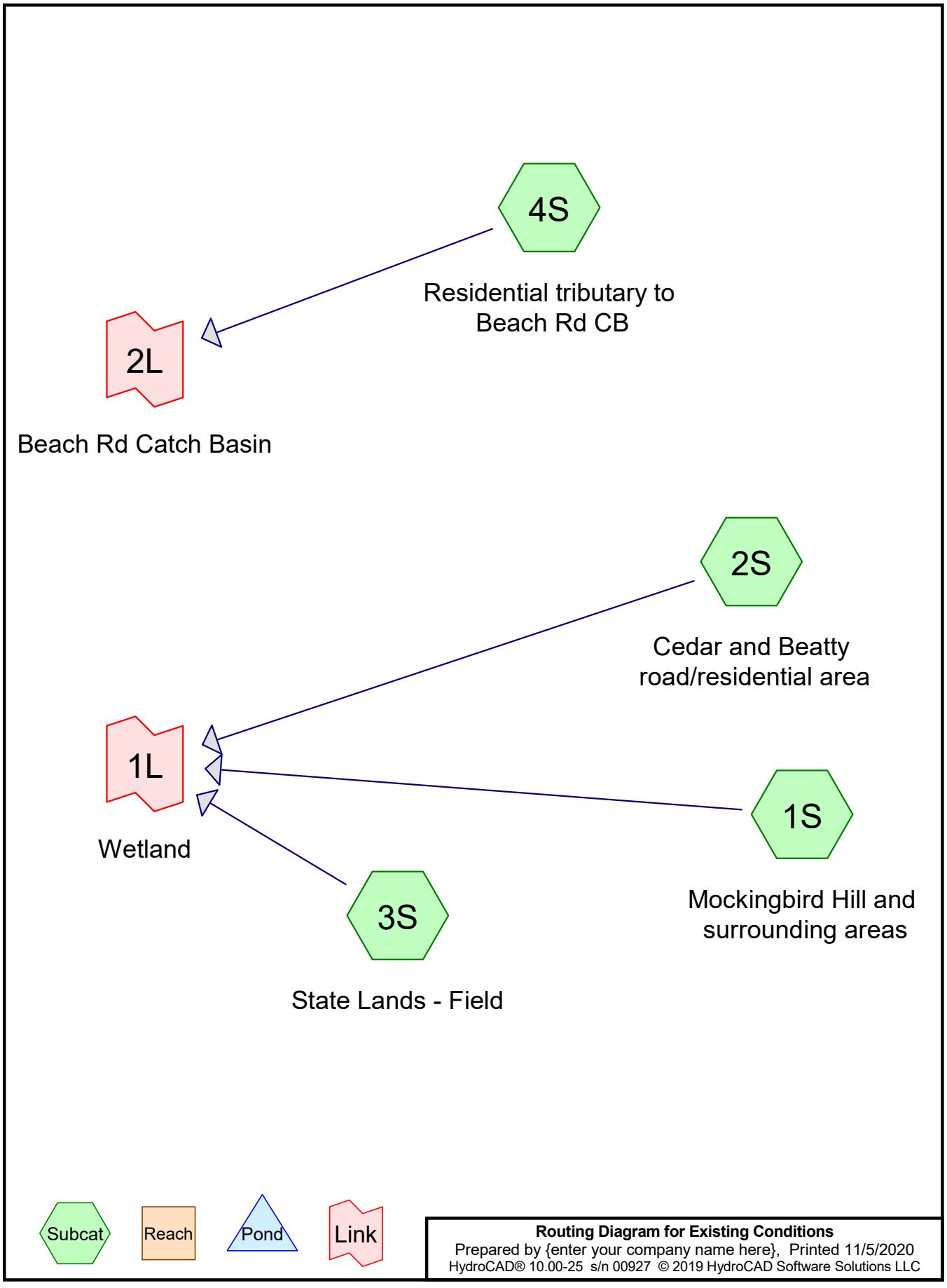
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Residential tributary to
Beach Rd CB
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Beach Rd Catch Basin
2S
Cedar and Beatty
road/residential area
1L
Wetland
1S
Mockingbird Hill and
surrounding areas
3S
State Lands - Field
Subcat
Reach
Pond
Link
Routing Diagram for Existing Conditions
Prepared by {enter your company name here}, Printed 11/5/2020
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.518	69	50-75% Grass cover, Fair, HSG B (1S, 2S, 4S)
2.071	61	>75% Grass cover, Good, HSG B (3S)
13.000	98	Impervious areas, including roofs, driveways, and roads (1S)
7.689	98	Impervious surfaces including, roofs, gravel roads, driveways, parking lots, etc. (2S)
11.500	55	Woods, Good, HSG B (1S)
0.255	98	roofs, road, sidewalks, etc (4S)
39.033	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
18.089	HSG B	1S, 2S, 3S, 4S
0.000	HSG C	
0.000	HSG D	
20.944	Other	1S, 2S, 4S
39.033		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover
0.000	4.518	0.000	0.000	0.000	4.518	50-75% Grass cover, Fair
0.000	2.071	0.000	0.000	0.000	2.071	>75% Grass cover, Good
0.000	0.000	0.000	0.000	13.000	13.000	Impervious areas, including roofs, driveways, and roads
0.000	0.000	0.000	0.000	7.689	7.689	Impervious surfaces including, roofs, gravel roads, driveways, parking lots, etc.
0.000	11.500	0.000	0.000	0.000	11.500	Woods, Good
0.000	0.000	0.000	0.000	0.255	0.255	roofs, road, sidewalks, etc
0.000	**18.089**	**0.000**	**0.000**	**20.944**	**39.033**	**TOTAL AREA**

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1S	0.00	0.00	650.0	0.0500	0.025	24.0	0.0	0.0
2	1S	0.00	0.00	90.0	0.0200	0.012	24.0	0.0	0.0
3	1S	0.00	0.00	360.0	0.0400	0.025	30.0	0.0	0.0
4	2S	0.00	0.00	90.0	0.0200	0.012	24.0	0.0	0.0
5	2S	0.00	0.00	360.0	0.0400	0.025	30.0	0.0	0.0

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Mockingbird Hill and Runoff Area=26.200 ac 49.62% Impervious Runoff Depth=0.53"
Flow Length=3,400' Tc=51.6 min CN=77 Runoff=6.97 cfs 1.159 af

Subcatchment 2S: Cedar and Beatty Runoff Area=10.252 ac 75.00% Impervious Runoff Depth=1.30"
Flow Length=1,380' Tc=23.2 min CN=91 Runoff=13.50 cfs 1.107 af

Subcatchment 3S: State Lands - Field Runoff Area=2.071 ac 0.00% Impervious Runoff Depth=0.10"
Flow Length=550' Tc=29.6 min CN=61 Runoff=0.04 cfs 0.018 af

Subcatchment 4S: Residential tributary to Runoff Area=0.510 ac 50.00% Impervious Runoff Depth=0.85"
Tc=6.0 min CN=84 Runoff=0.76 cfs 0.036 af

Link 1L: Wetland Inflow=16.01 cfs 2.284 af
Primary=16.01 cfs 2.284 af

Link 2L: Beach Rd Catch Basin Inflow=0.76 cfs 0.036 af
Primary=0.76 cfs 0.036 af

Total Runoff Area = 39.033 ac Runoff Volume = 2.321 af Average Runoff Depth = 0.71"
46.34% Pervious = 18.089 ac 53.66% Impervious = 20.944 ac

Summary for Subcatchment 1S: Mockingbird Hill and surrounding areas

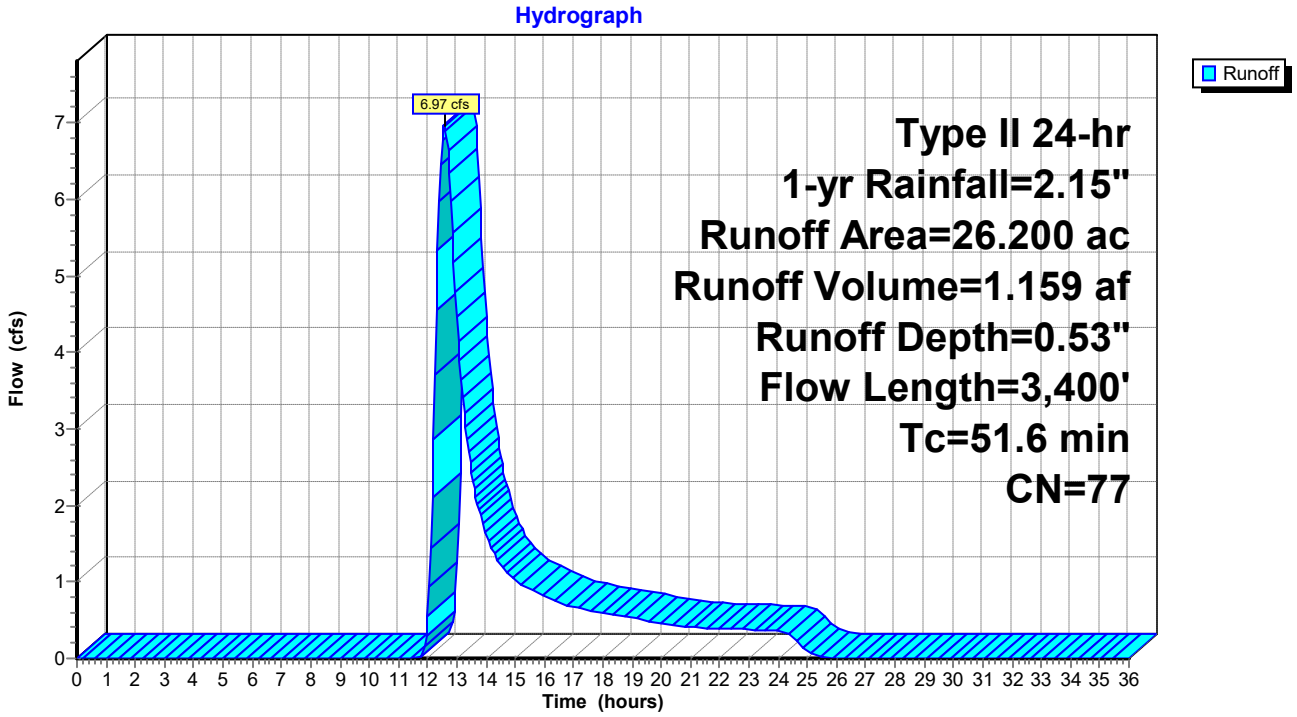
Runoff = 6.97 cfs @ 12.57 hrs, Volume= 1.159 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.15"

	Area (ac)	CN	Description
	11.500	55	Woods, Good, HSG B
*	13.000	98	Impervious areas, including roofs, driveways, and roads
	1.700	69	50-75% Grass cover, Fair, HSG B
	26.200	77	Weighted Average
	13.200		50.38% Pervious Area
	13.000		49.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.4	300	0.2000	0.12		**Sheet Flow, Through woods** Woods: Dense underbrush n= 0.800 P2= 2.52"
4.7	450	0.1000	1.58		**Shallow Concentrated Flow, Through backyard to road** Woodland Kv= 5.0 fps
2.6	1,000	0.1000	6.42		**Shallow Concentrated Flow, Flow down road** Paved Kv= 20.3 fps
1.3	650	0.0500	8.37	26.30	**Pipe Channel, Existing storm sewer along Bloody Pond Rd to Gar** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
0.9	370	0.0500	6.86	41.14	**Trap/Vee/Rect Channel Flow, Swale around Garrison parking lot** Bot.W=2.00' D=3.00' n= 0.040 Earth, cobble bottom, clean sides
0.1	90	0.0200	11.03	34.66	**Pipe Channel, Existing storm sewer, 24" RCP** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.9	180	0.0400	3.42	25.63	**Trap/Vee/Rect Channel Flow, Overgrown Swale** Bot.W=2.50' D=3.00' n= 0.080
0.7	360	0.0400	8.69	42.66	**Pipe Channel, Existing Storm Sewer, 30" CMP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.025
51.6	3,400	Total			

Subcatchment 1S: Mockingbird Hill and surrounding areas



Summary for Subcatchment 2S: Cedar and Beatty road/residential area

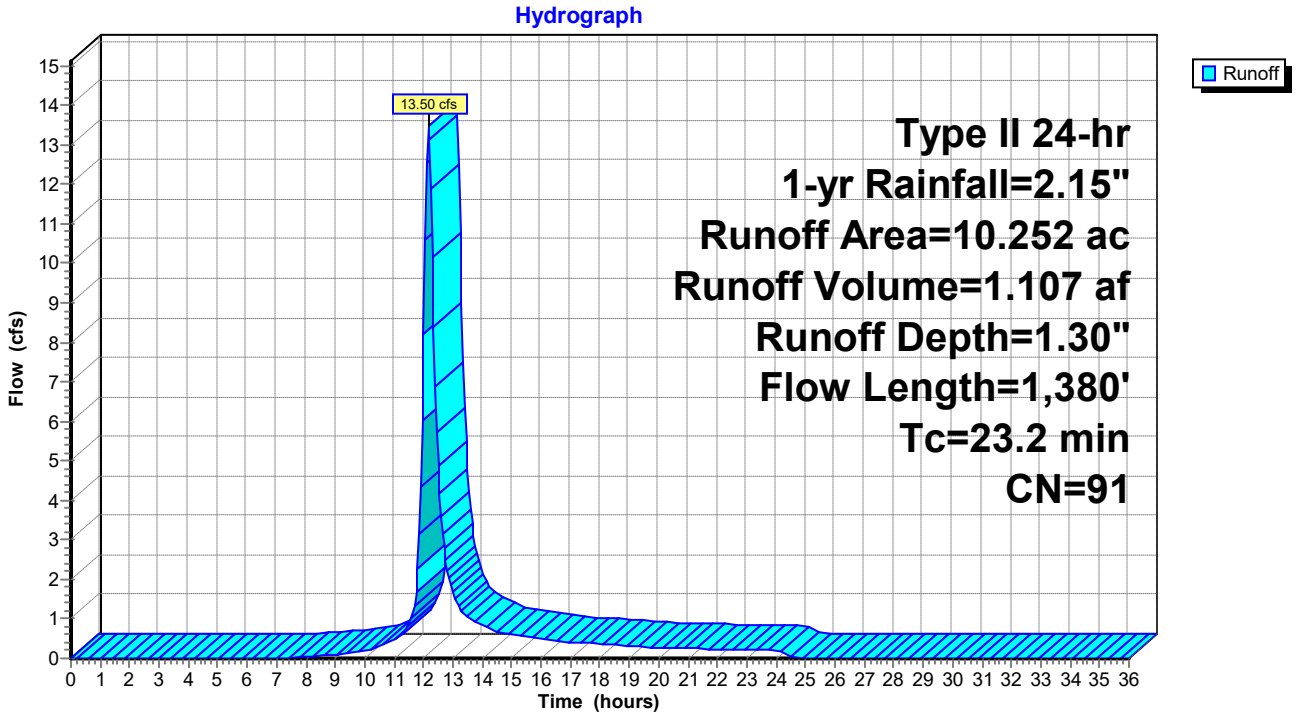
Runoff = 13.50 cfs @ 12.16 hrs, Volume= 1.107 af, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.15"

	Area (ac)	CN	Description
*	7.689	98	Impervious surfaces including, roofs, gravel roads, driveways, parking lots, etc.
	2.563	69	50-75% Grass cover, Fair, HSG B
	10.252	91	Weighted Average
	2.563		25.00% Pervious Area
	7.689		75.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.2	150	0.0800	0.13		**Sheet Flow, Sheet flow through woods** Woods: Light underbrush n= 0.400 P2= 2.52"
2.3	600	0.0700	4.26		**Shallow Concentrated Flow, Across driveway and gravel road** Unpaved Kv= 16.1 fps
0.1	90	0.0200	11.03	34.66	**Pipe Channel, Existing storm sewer, 24" RCP** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.9	180	0.0400	3.42	25.63	**Trap/Vee/Rect Channel Flow, Overgrown Swale** Bot.W=2.50' D=3.00' n= 0.080 Earth, long dense weeds
0.7	360	0.0400	8.69	42.66	**Pipe Channel, Existing storm sewer, 30" CMP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.025 Corrugated metal
23.2	1,380	Total			

Subcatchment 2S: Cedar and Beatty road/residential area



Summary for Subcatchment 3S: State Lands - Field

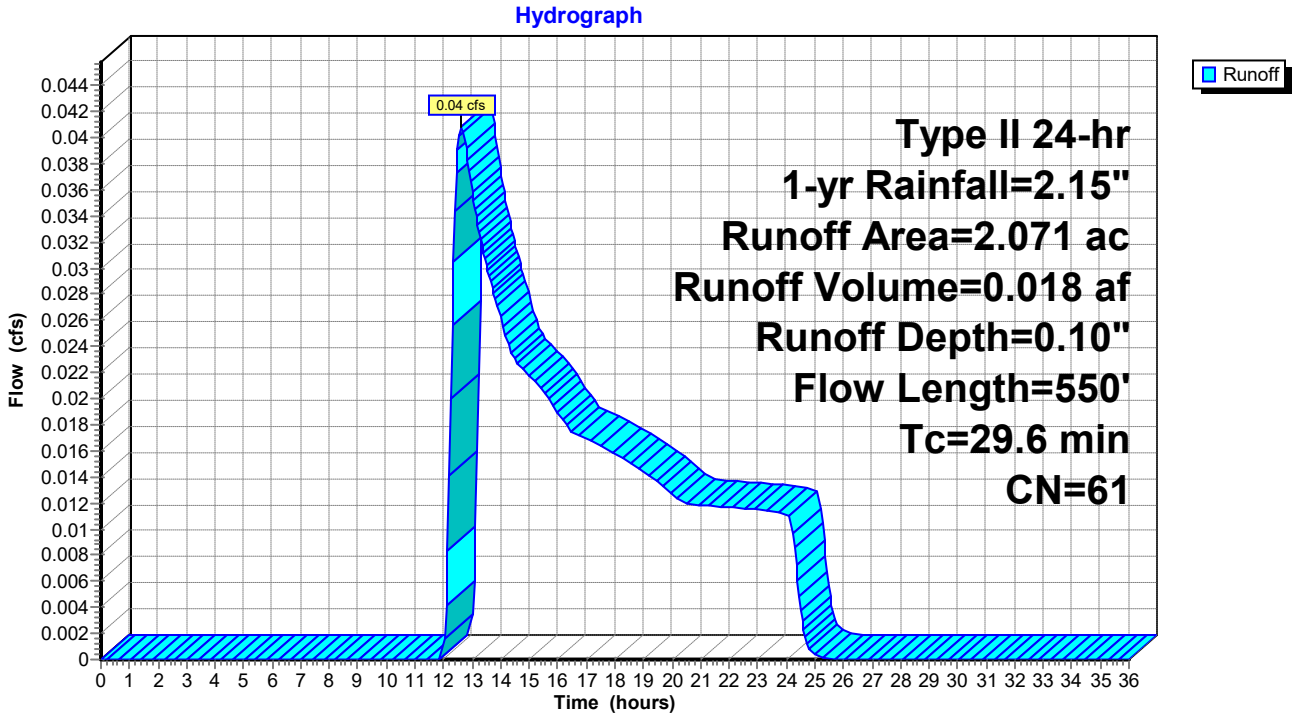
Runoff = 0.04 cfs @ 12.64 hrs, Volume= 0.018 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.15"

Area (ac)	CN	Description
2.071	61	>75% Grass cover, Good, HSG B
2.071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	300	0.0200	0.19		**Sheet Flow, Sheet flow across road** Grass: Short n= 0.150 P2= 2.52"
3.0	250	0.0400	1.40		**Shallow Concentrated Flow, Over field** Short Grass Pasture Kv= 7.0 fps
29.6	550	Total			

Subcatchment 3S: State Lands - Field



Summary for Subcatchment 4S: Residential tributary to Beach Rd CB

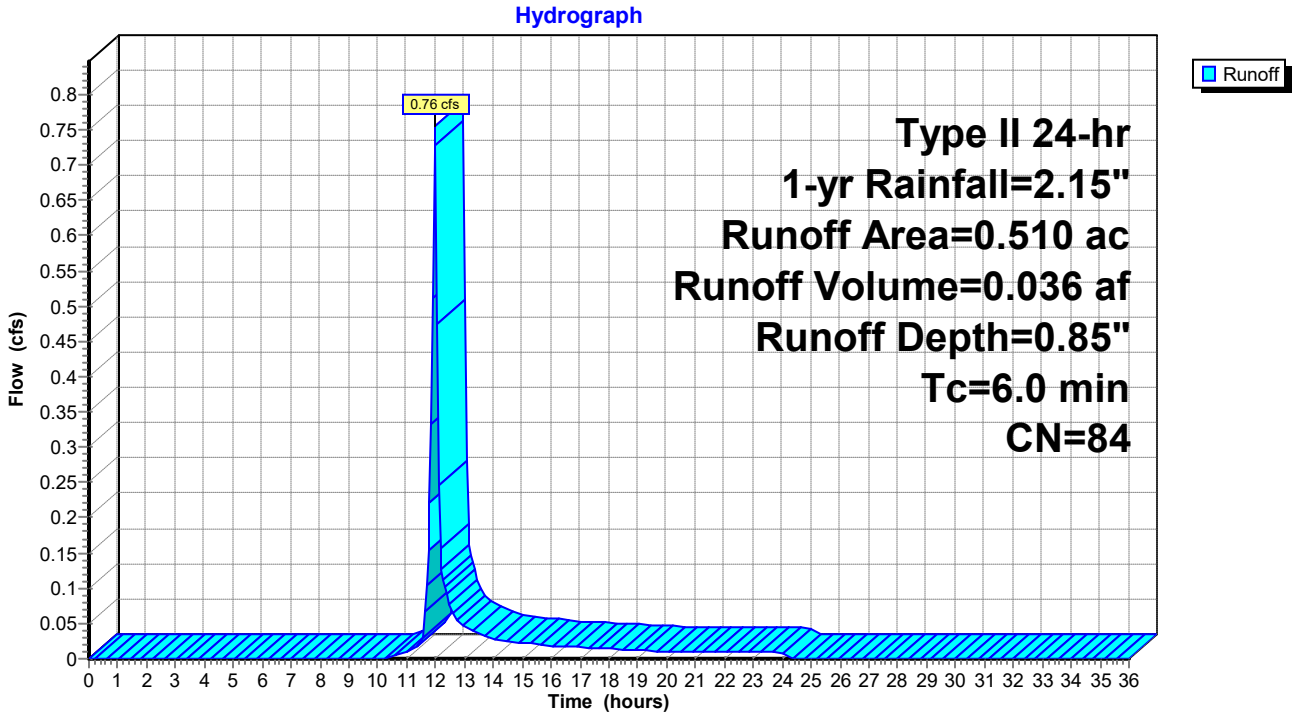
Runoff = 0.76 cfs @ 11.98 hrs, Volume= 0.036 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.15"

	Area (ac)	CN	Description
	0.255	69	50-75% Grass cover, Fair, HSG B
*	0.255	98	roofs, road, sidewalks, etc
	0.510	84	Weighted Average
	0.255		50.00% Pervious Area
	0.255		50.00% Impervious Area

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

Subcatchment 4S: Residential tributary to Beach Rd CB



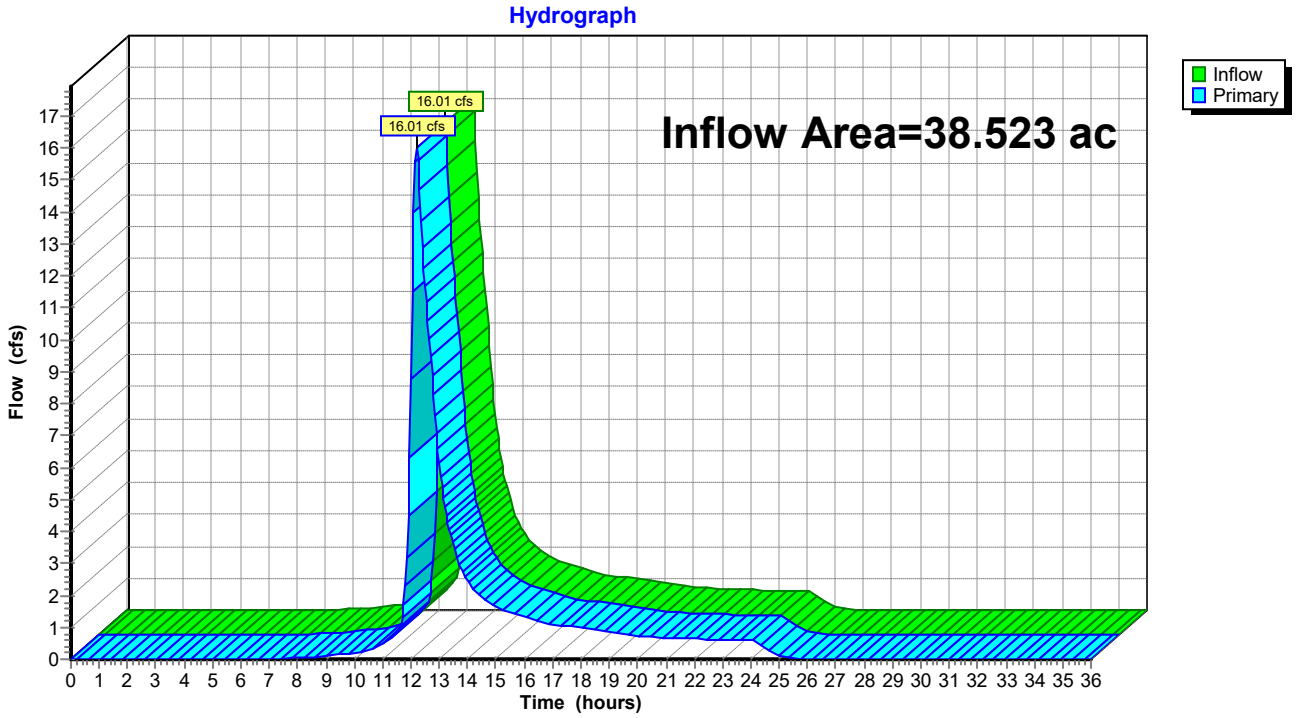
Summary for Link 1L: Wetland

Inflow Area = 38.523 ac, 53.71% Impervious, Inflow Depth = 0.71" for 1-yr event
Inflow = 16.01 cfs @ 12.20 hrs, Volume= 2.284 af
Primary = 16.01 cfs @ 12.20 hrs, Volume= 2.284 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Fixed water surface Elevation= 320.00'

Link 1L: Wetland

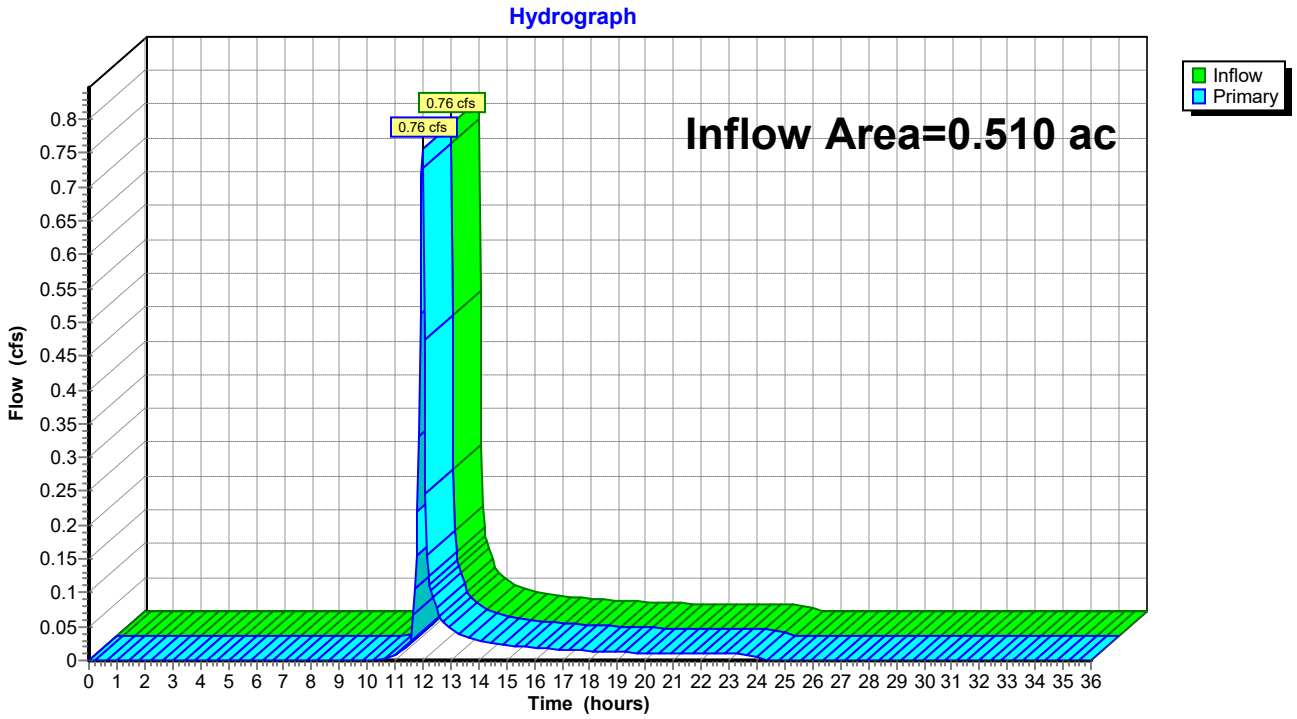


Summary for Link 2L: Beach Rd Catch Basin

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 0.85" for 1-yr event
Inflow = 0.76 cfs @ 11.98 hrs, Volume= 0.036 af
Primary = 0.76 cfs @ 11.98 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2L: Beach Rd Catch Basin



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Mockingbird Hill and Runoff Area=26.200 ac 49.62% Impervious Runoff Depth=1.46"
Flow Length=3,400' Tc=51.6 min CN=77 Runoff=22.01 cfs 3.188 af

Subcatchment 2S: Cedar and Beatty Runoff Area=10.252 ac 75.00% Impervious Runoff Depth=2.58"
Flow Length=1,380' Tc=23.2 min CN=91 Runoff=26.44 cfs 2.203 af

Subcatchment 3S: State Lands - Field Runoff Area=2.071 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=550' Tc=29.6 min CN=61 Runoff=0.76 cfs 0.102 af

Subcatchment 4S: Residential tributary to Runoff Area=0.510 ac 50.00% Impervious Runoff Depth=1.97"
Tc=6.0 min CN=84 Runoff=1.72 cfs 0.084 af

Link 1L: Wetland Inflow=38.02 cfs 5.494 af
Primary=38.02 cfs 5.494 af

Link 2L: Beach Rd Catch Basin Inflow=1.72 cfs 0.084 af
Primary=1.72 cfs 0.084 af

Total Runoff Area = 39.033 ac Runoff Volume = 5.577 af Average Runoff Depth = 1.71"
46.34% Pervious = 18.089 ac 53.66% Impervious = 20.944 ac

Summary for Subcatchment 1S: Mockingbird Hill and surrounding areas

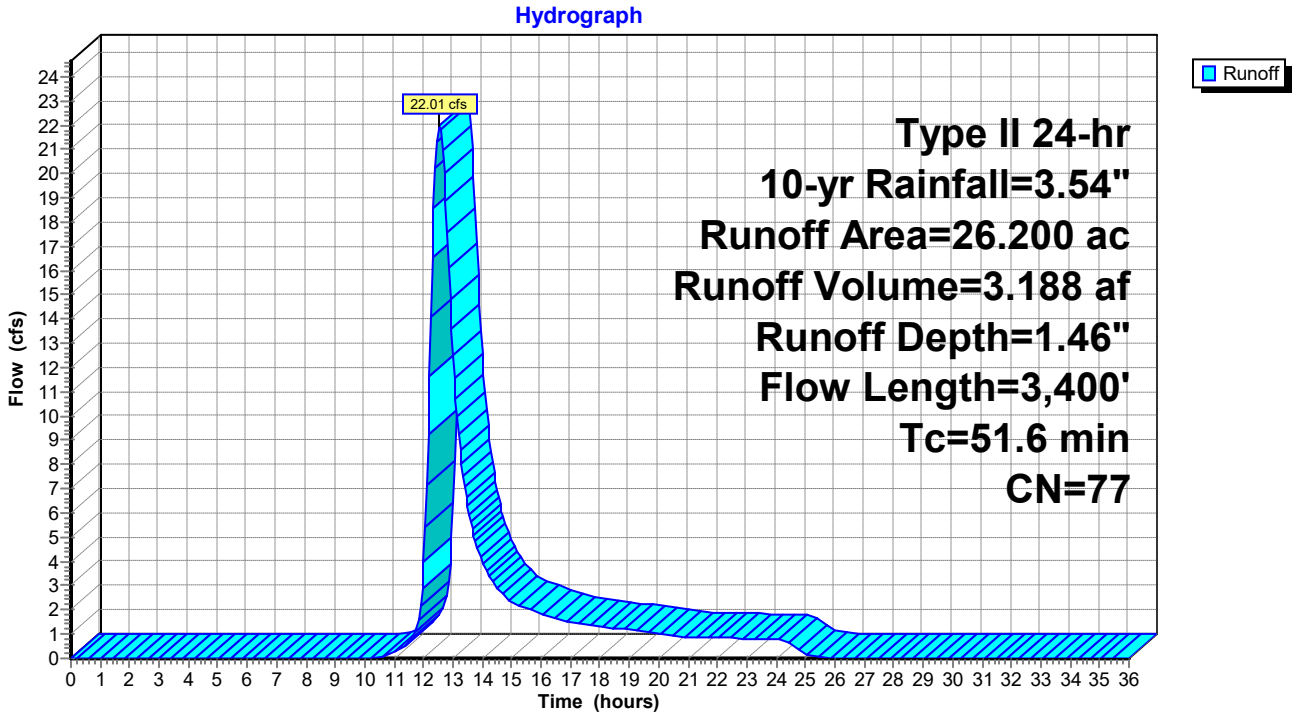
Runoff = 22.01 cfs @ 12.54 hrs, Volume= 3.188 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.54"

	Area (ac)	CN	Description
	11.500	55	Woods, Good, HSG B
*	13.000	98	Impervious areas, including roofs, driveways, and roads
	1.700	69	50-75% Grass cover, Fair, HSG B
	26.200	77	Weighted Average
	13.200		50.38% Pervious Area
	13.000		49.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.4	300	0.2000	0.12		**Sheet Flow, Through woods** Woods: Dense underbrush n= 0.800 P2= 2.52"
4.7	450	0.1000	1.58		**Shallow Concentrated Flow, Through backyard to road** Woodland Kv= 5.0 fps
2.6	1,000	0.1000	6.42		**Shallow Concentrated Flow, Flow down road** Paved Kv= 20.3 fps
1.3	650	0.0500	8.37	26.30	**Pipe Channel, Existing storm sewer along Bloody Pond Rd to Gar** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
0.9	370	0.0500	6.86	41.14	**Trap/Vee/Rect Channel Flow, Swale around Garrison parking lot** Bot.W=2.00' D=3.00' n= 0.040 Earth, cobble bottom, clean sides
0.1	90	0.0200	11.03	34.66	**Pipe Channel, Existing storm sewer, 24" RCP** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.9	180	0.0400	3.42	25.63	**Trap/Vee/Rect Channel Flow, Overgrown Swale** Bot.W=2.50' D=3.00' n= 0.080
0.7	360	0.0400	8.69	42.66	**Pipe Channel, Existing Storm Sewer, 30" CMP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.025
51.6	3,400	Total			

Subcatchment 1S: Mockingbird Hill and surrounding areas



Summary for Subcatchment 2S: Cedar and Beatty road/residential area

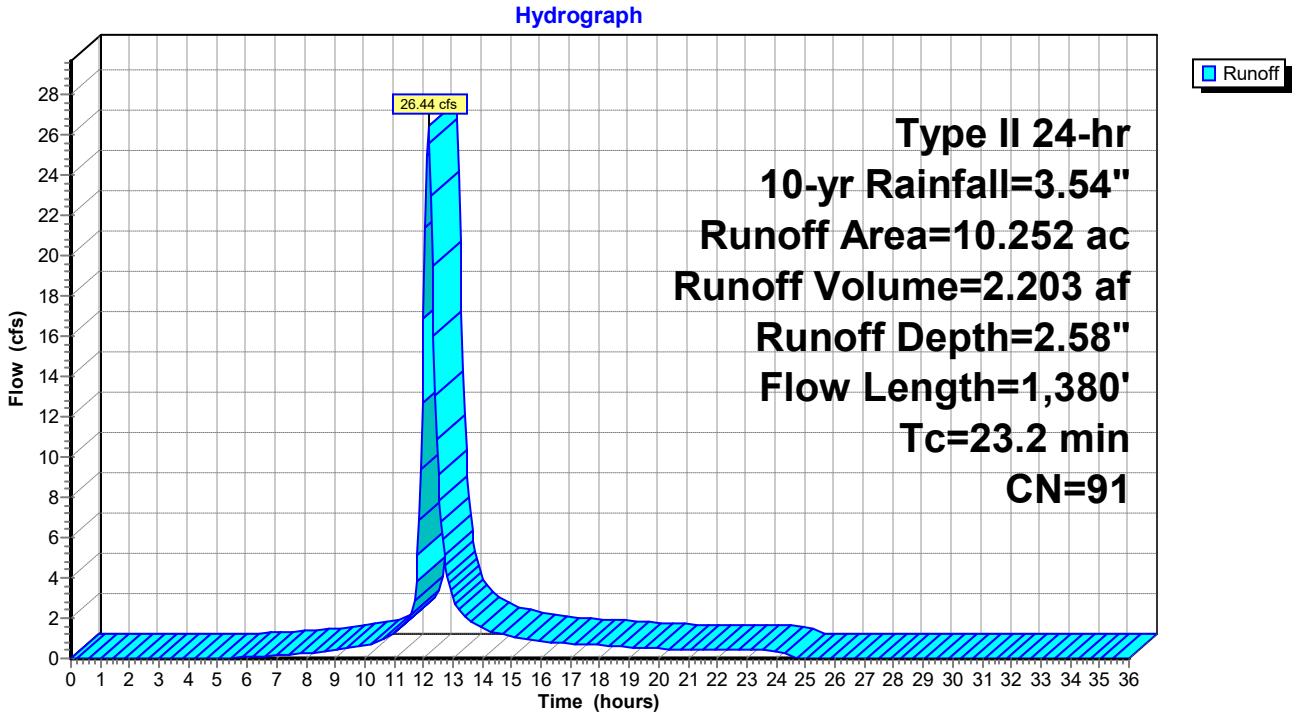
Runoff = 26.44 cfs @ 12.16 hrs, Volume= 2.203 af, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.54"

	Area (ac)	CN	Description
*	7.689	98	Impervious surfaces including, roofs, gravel roads, driveways, parking lots, etc.
	2.563	69	50-75% Grass cover, Fair, HSG B
	10.252	91	Weighted Average
	2.563		25.00% Pervious Area
	7.689		75.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.2	150	0.0800	0.13		**Sheet Flow, Sheet flow through woods** Woods: Light underbrush n= 0.400 P2= 2.52"
2.3	600	0.0700	4.26		**Shallow Concentrated Flow, Across driveway and gravel road** Unpaved Kv= 16.1 fps
0.1	90	0.0200	11.03	34.66	**Pipe Channel, Existing storm sewer, 24" RCP** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.9	180	0.0400	3.42	25.63	**Trap/Vee/Rect Channel Flow, Overgrown Swale** Bot.W=2.50' D=3.00' n= 0.080 Earth, long dense weeds
0.7	360	0.0400	8.69	42.66	**Pipe Channel, Existing storm sewer, 30" CMP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.025 Corrugated metal
23.2	1,380	Total			

Subcatchment 2S: Cedar and Beatty road/residential area



Summary for Subcatchment 3S: State Lands - Field

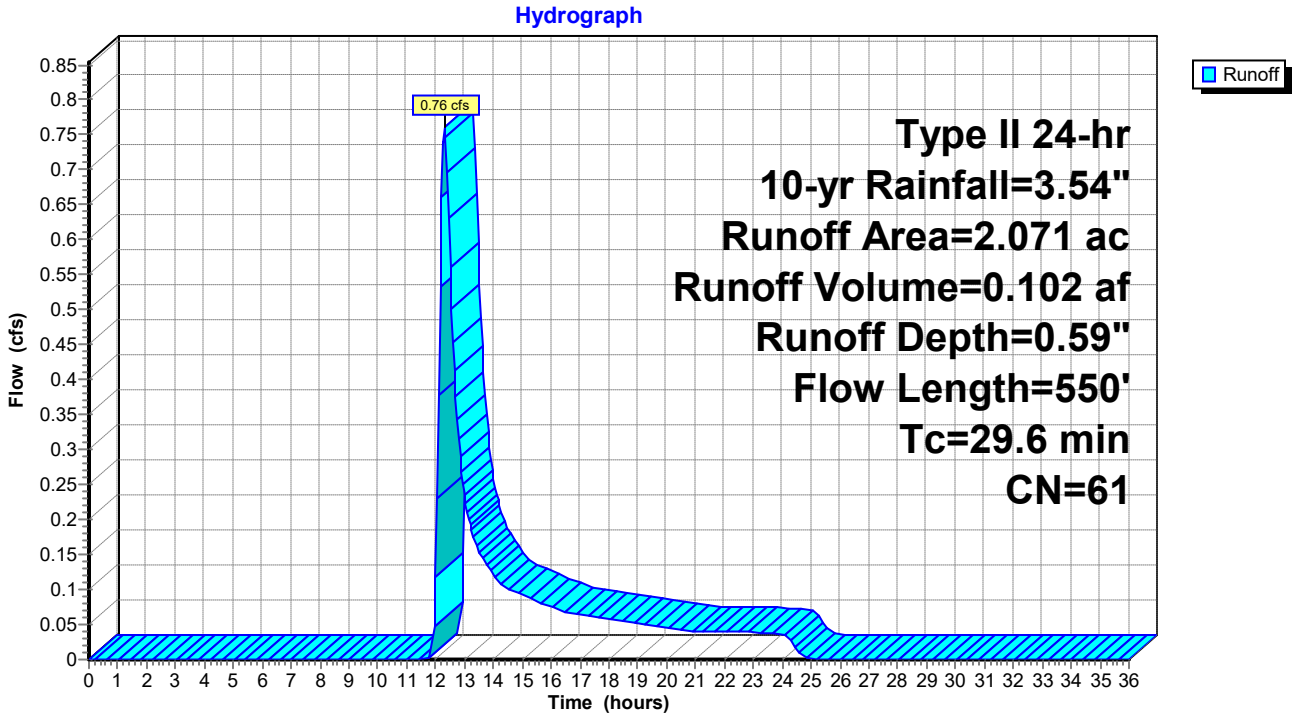
Runoff = 0.76 cfs @ 12.30 hrs, Volume= 0.102 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.54"

Area (ac)	CN	Description
2.071	61	>75% Grass cover, Good, HSG B
2.071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	300	0.0200	0.19		**Sheet Flow, Sheet flow across road** Grass: Short n= 0.150 P2= 2.52"
3.0	250	0.0400	1.40		**Shallow Concentrated Flow, Over field** Short Grass Pasture Kv= 7.0 fps
29.6	550	Total			

Subcatchment 3S: State Lands - Field



Summary for Subcatchment 4S: Residential tributary to Beach Rd CB

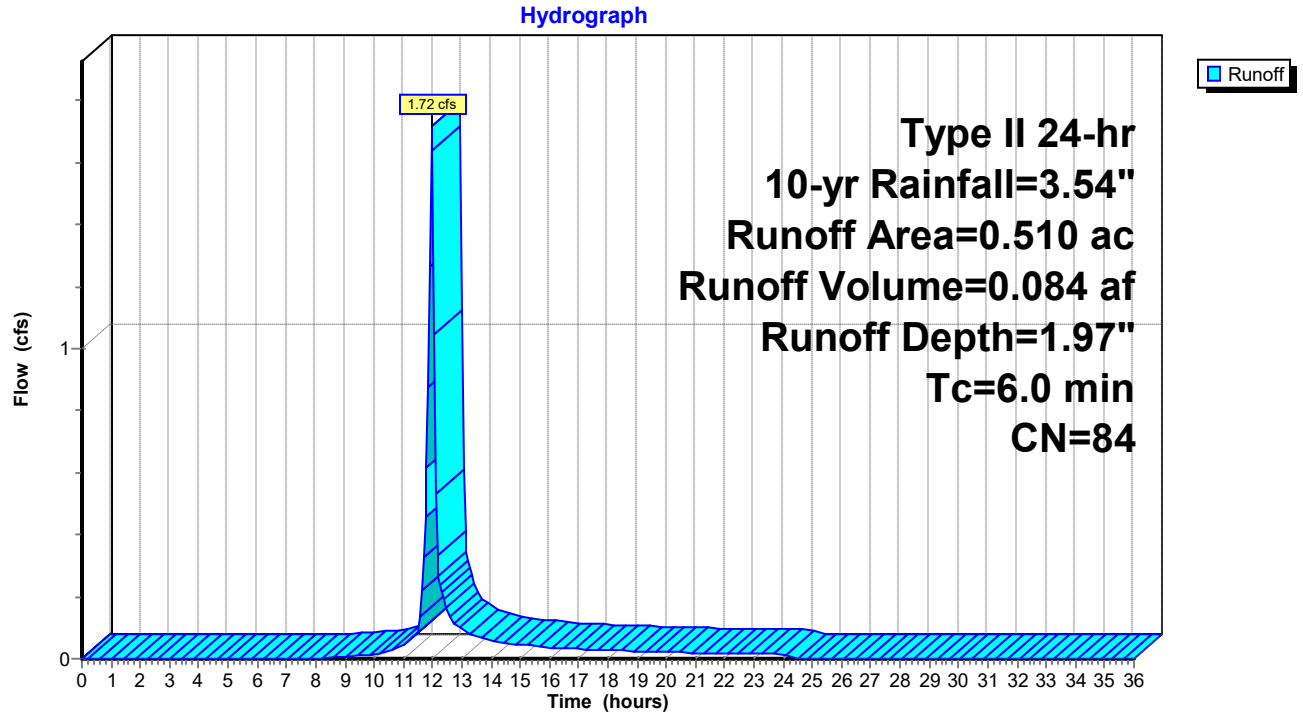
Runoff = 1.72 cfs @ 11.97 hrs, Volume= 0.084 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.54"

	Area (ac)	CN	Description
	0.255	69	50-75% Grass cover, Fair, HSG B
*	0.255	98	roofs, road, sidewalks, etc
	0.510	84	Weighted Average
	0.255		50.00% Pervious Area
	0.255		50.00% Impervious Area

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

Subcatchment 4S: Residential tributary to Beach Rd CB



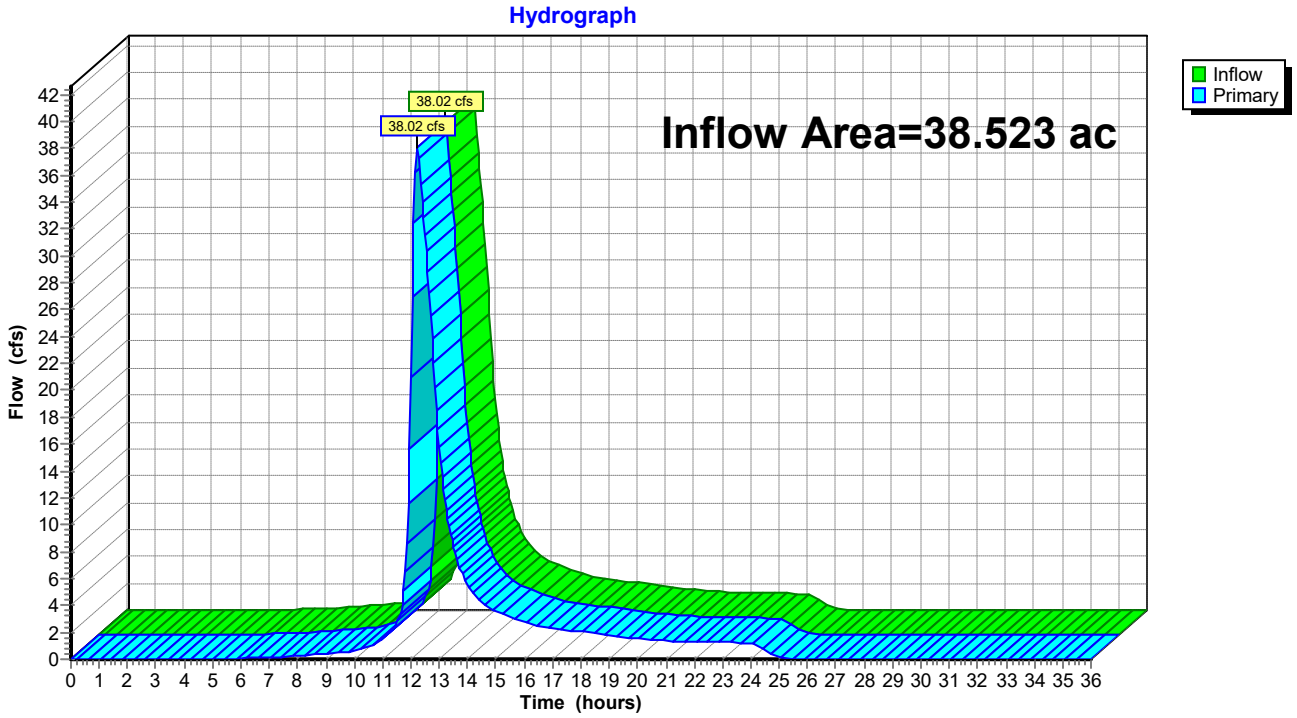
Summary for Link 1L: Wetland

Inflow Area = 38.523 ac, 53.71% Impervious, Inflow Depth = 1.71" for 10-yr event
Inflow = 38.02 cfs @ 12.22 hrs, Volume= 5.494 af
Primary = 38.02 cfs @ 12.22 hrs, Volume= 5.494 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Fixed water surface Elevation= 320.00'

Link 1L: Wetland

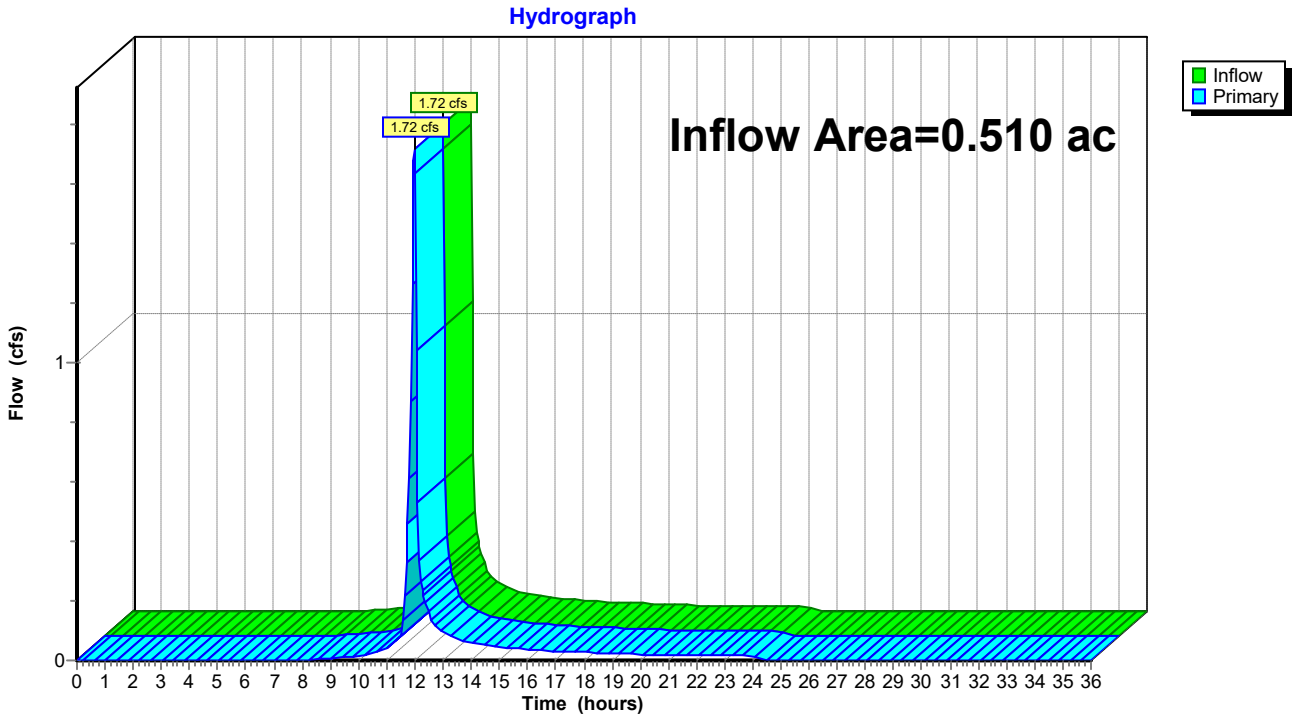


Summary for Link 2L: Beach Rd Catch Basin

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 1.97" for 10-yr event
Inflow = 1.72 cfs @ 11.97 hrs, Volume= 0.084 af
Primary = 1.72 cfs @ 11.97 hrs, Volume= 0.084 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2L: Beach Rd Catch Basin



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Mockingbird Hill and Runoff Area=26.200 ac 49.62% Impervious Runoff Depth=2.05"
Flow Length=3,400' Tc=51.6 min CN=77 Runoff=31.50 cfs 4.474 af

Subcatchment 2S: Cedar and Beatty Runoff Area=10.252 ac 75.00% Impervious Runoff Depth=3.31"
Flow Length=1,380' Tc=23.2 min CN=91 Runoff=33.54 cfs 2.824 af

Subcatchment 3S: State Lands - Field Runoff Area=2.071 ac 0.00% Impervious Runoff Depth=0.97"
Flow Length=550' Tc=29.6 min CN=61 Runoff=1.45 cfs 0.167 af

Subcatchment 4S: Residential tributary to Runoff Area=0.510 ac 50.00% Impervious Runoff Depth=2.64"
Tc=6.0 min CN=84 Runoff=2.28 cfs 0.112 af

Link 1L: Wetland Inflow=51.43 cfs 7.466 af
Primary=51.43 cfs 7.466 af

Link 2L: Beach Rd Catch Basin Inflow=2.28 cfs 0.112 af
Primary=2.28 cfs 0.112 af

Total Runoff Area = 39.033 ac Runoff Volume = 7.578 af Average Runoff Depth = 2.33"
46.34% Pervious = 18.089 ac 53.66% Impervious = 20.944 ac

Summary for Subcatchment 1S: Mockingbird Hill and surrounding areas

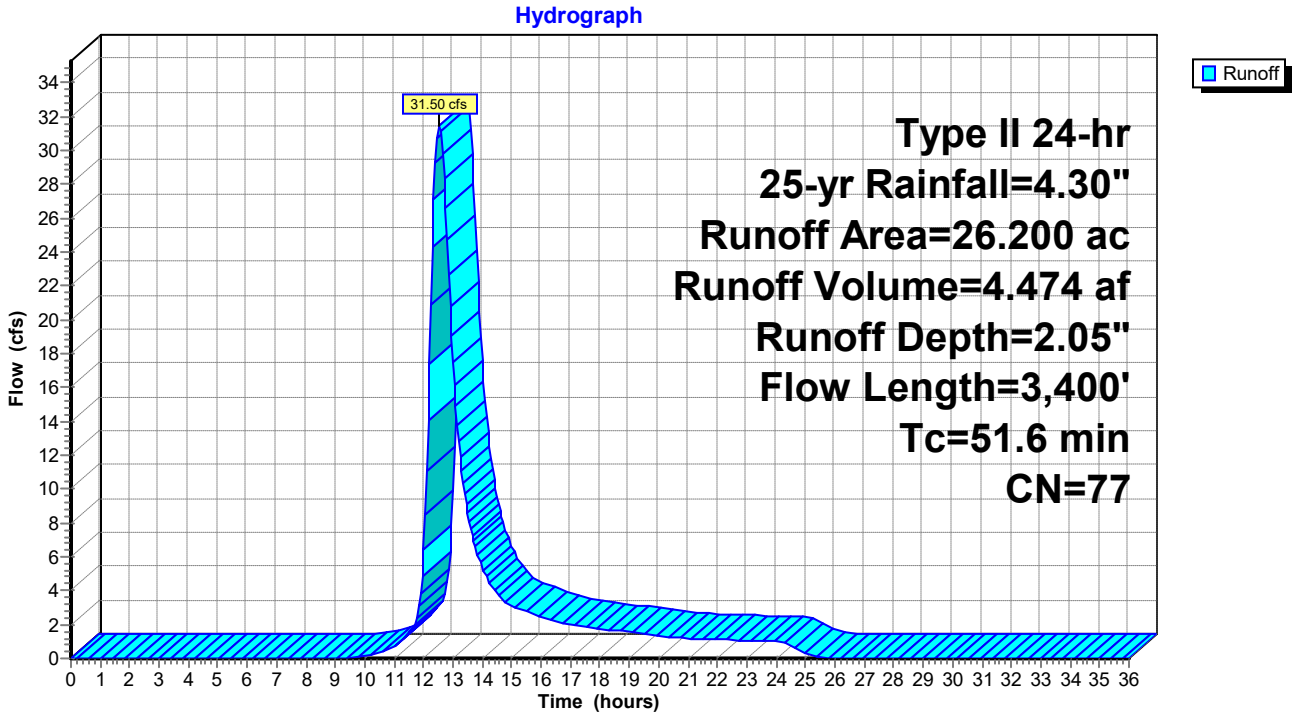
Runoff = 31.50 cfs @ 12.53 hrs, Volume= 4.474 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.30"

	Area (ac)	CN	Description
	11.500	55	Woods, Good, HSG B
*	13.000	98	Impervious areas, including roofs, driveways, and roads
	1.700	69	50-75% Grass cover, Fair, HSG B
	26.200	77	Weighted Average
	13.200		50.38% Pervious Area
	13.000		49.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.4	300	0.2000	0.12		**Sheet Flow, Through woods** Woods: Dense underbrush n= 0.800 P2= 2.52"
4.7	450	0.1000	1.58		**Shallow Concentrated Flow, Through backyard to road** Woodland Kv= 5.0 fps
2.6	1,000	0.1000	6.42		**Shallow Concentrated Flow, Flow down road** Paved Kv= 20.3 fps
1.3	650	0.0500	8.37	26.30	**Pipe Channel, Existing storm sewer along Bloody Pond Rd to Gar** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
0.9	370	0.0500	6.86	41.14	**Trap/Vee/Rect Channel Flow, Swale around Garrison parking lot** Bot.W=2.00' D=3.00' n= 0.040 Earth, cobble bottom, clean sides
0.1	90	0.0200	11.03	34.66	**Pipe Channel, Existing storm sewer, 24" RCP** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.9	180	0.0400	3.42	25.63	**Trap/Vee/Rect Channel Flow, Overgrown Swale** Bot.W=2.50' D=3.00' n= 0.080
0.7	360	0.0400	8.69	42.66	**Pipe Channel, Existing Storm Sewer, 30" CMP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.025
51.6	3,400	Total			

Subcatchment 1S: Mockingbird Hill and surrounding areas



Summary for Subcatchment 2S: Cedar and Beatty road/residential area

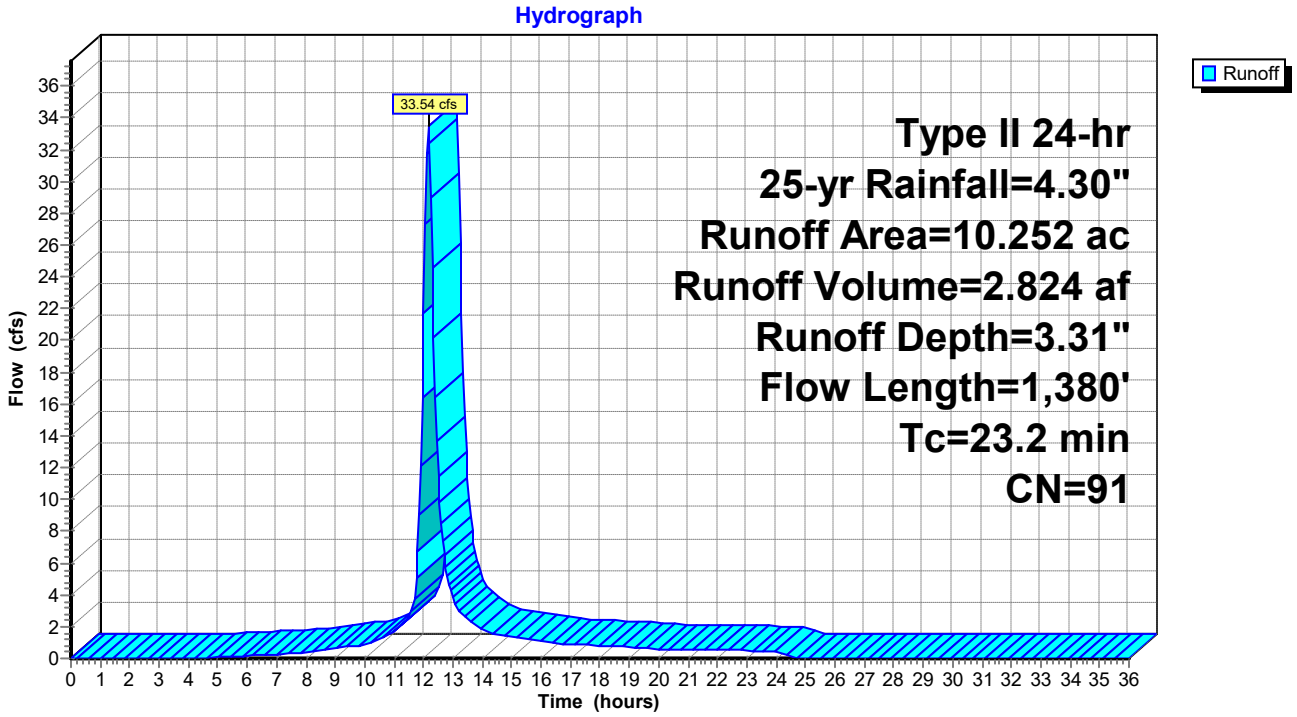
Runoff = 33.54 cfs @ 12.16 hrs, Volume= 2.824 af, Depth= 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.30"

	Area (ac)	CN	Description
*	7.689	98	Impervious surfaces including, roofs, gravel roads, driveways, parking lots, etc.
	2.563	69	50-75% Grass cover, Fair, HSG B
	10.252	91	Weighted Average
	2.563		25.00% Pervious Area
	7.689		75.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.2	150	0.0800	0.13		**Sheet Flow, Sheet flow through woods** Woods: Light underbrush n= 0.400 P2= 2.52"
2.3	600	0.0700	4.26		**Shallow Concentrated Flow, Across driveway and gravel road** Unpaved Kv= 16.1 fps
0.1	90	0.0200	11.03	34.66	**Pipe Channel, Existing storm sewer, 24" RCP** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.9	180	0.0400	3.42	25.63	**Trap/Vee/Rect Channel Flow, Overgrown Swale** Bot.W=2.50' D=3.00' n= 0.080 Earth, long dense weeds
0.7	360	0.0400	8.69	42.66	**Pipe Channel, Existing storm sewer, 30" CMP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.025 Corrugated metal
23.2	1,380	Total			

Subcatchment 2S: Cedar and Beatty road/residential area



Summary for Subcatchment 3S: State Lands - Field

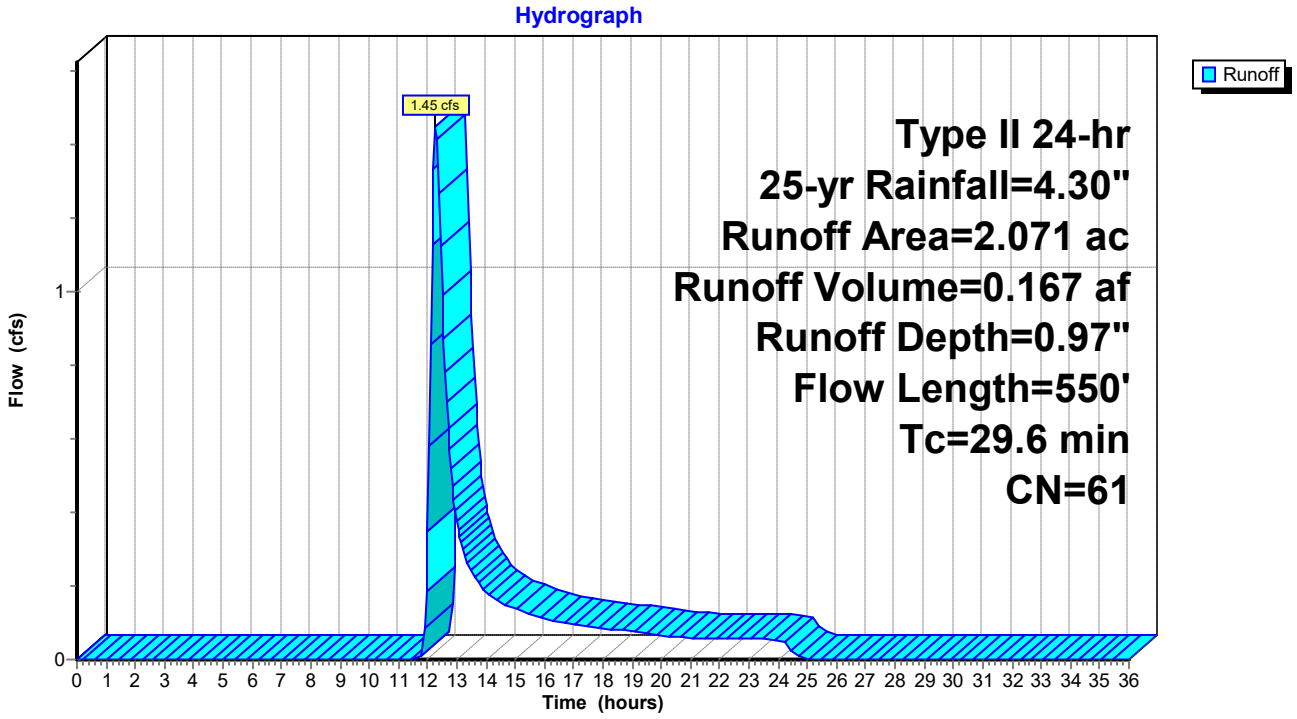
Runoff = 1.45 cfs @ 12.28 hrs, Volume= 0.167 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.30"

Area (ac)	CN	Description
2.071	61	>75% Grass cover, Good, HSG B
2.071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	300	0.0200	0.19		**Sheet Flow, Sheet flow across road** Grass: Short n= 0.150 P2= 2.52"
3.0	250	0.0400	1.40		**Shallow Concentrated Flow, Over field** Short Grass Pasture Kv= 7.0 fps
29.6	550	Total			

Subcatchment 3S: State Lands - Field



Summary for Subcatchment 4S: Residential tributary to Beach Rd CB

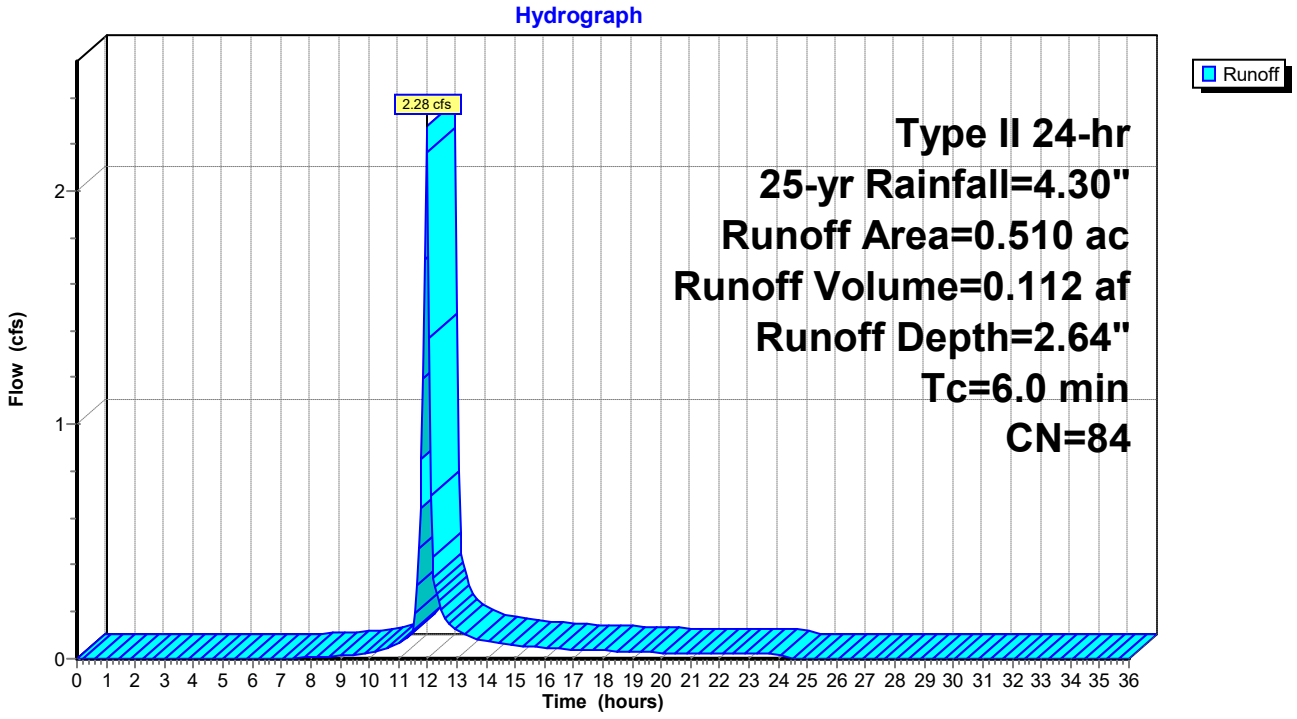
Runoff = 2.28 cfs @ 11.97 hrs, Volume= 0.112 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.30"

	Area (ac)	CN	Description
	0.255	69	50-75% Grass cover, Fair, HSG B
*	0.255	98	roofs, road, sidewalks, etc
	0.510	84	Weighted Average
	0.255		50.00% Pervious Area
	0.255		50.00% Impervious Area

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

Subcatchment 4S: Residential tributary to Beach Rd CB



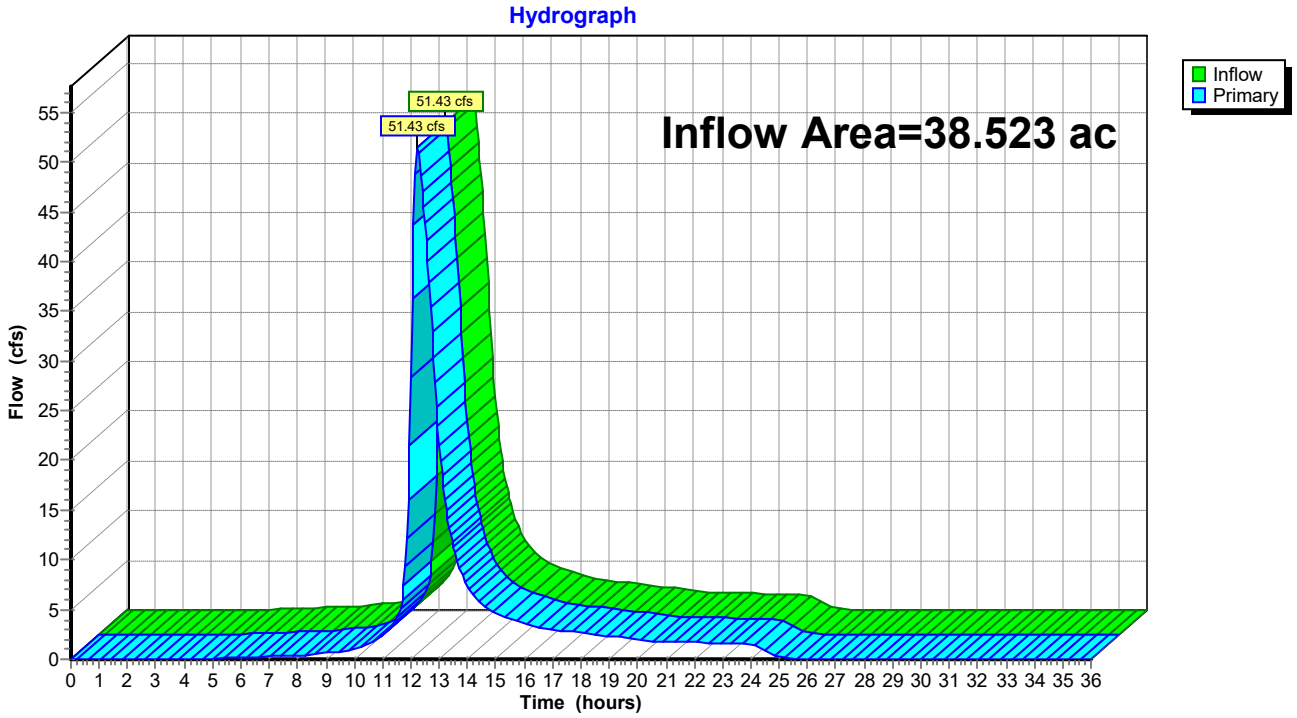
Summary for Link 1L: Wetland

Inflow Area = 38.523 ac, 53.71% Impervious, Inflow Depth = 2.33" for 25-yr event
Inflow = 51.43 cfs @ 12.23 hrs, Volume= 7.466 af
Primary = 51.43 cfs @ 12.23 hrs, Volume= 7.466 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Fixed water surface Elevation= 320.00'

Link 1L: Wetland

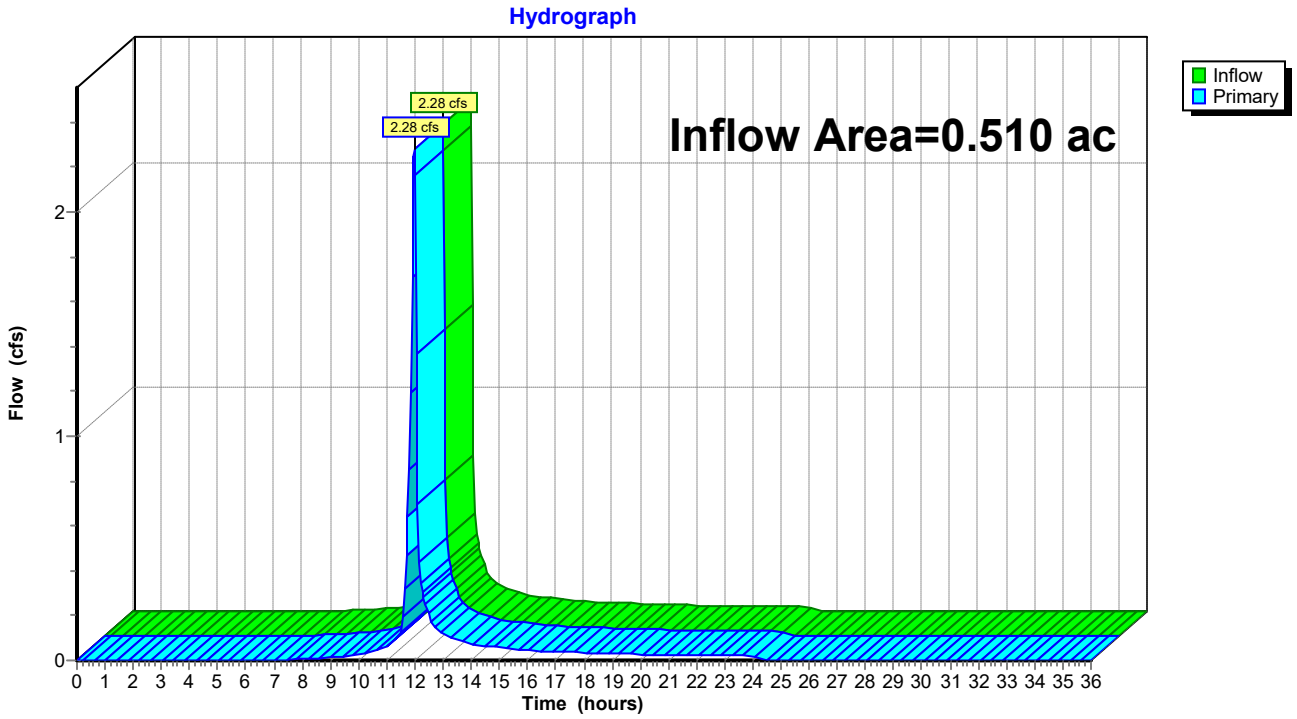


Summary for Link 2L: Beach Rd Catch Basin

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 2.64" for 25-yr event
Inflow = 2.28 cfs @ 11.97 hrs, Volume= 0.112 af
Primary = 2.28 cfs @ 11.97 hrs, Volume= 0.112 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2L: Beach Rd Catch Basin



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Mockingbird Hill and Runoff Area=26.200 ac 49.62% Impervious Runoff Depth=3.29"
Flow Length=3,400' Tc=51.6 min CN=77 Runoff=51.19 cfs 7.178 af

Subcatchment 2S: Cedar and Beatty Runoff Area=10.252 ac 75.00% Impervious Runoff Depth=4.74"
Flow Length=1,380' Tc=23.2 min CN=91 Runoff=47.30 cfs 4.051 af

Subcatchment 3S: State Lands - Field Runoff Area=2.071 ac 0.00% Impervious Runoff Depth=1.86"
Flow Length=550' Tc=29.6 min CN=61 Runoff=3.13 cfs 0.321 af

Subcatchment 4S: Residential tributary to Runoff Area=0.510 ac 50.00% Impervious Runoff Depth=3.99"
Tc=6.0 min CN=84 Runoff=3.39 cfs 0.170 af

Link 1L: Wetland Inflow=79.18 cfs 11.550 af
Primary=79.18 cfs 11.550 af

Link 2L: Beach Rd Catch Basin Inflow=3.39 cfs 0.170 af
Primary=3.39 cfs 0.170 af

Total Runoff Area = 39.033 ac Runoff Volume = 11.720 af Average Runoff Depth = 3.60"
46.34% Pervious = 18.089 ac 53.66% Impervious = 20.944 ac

Summary for Subcatchment 1S: Mockingbird Hill and surrounding areas

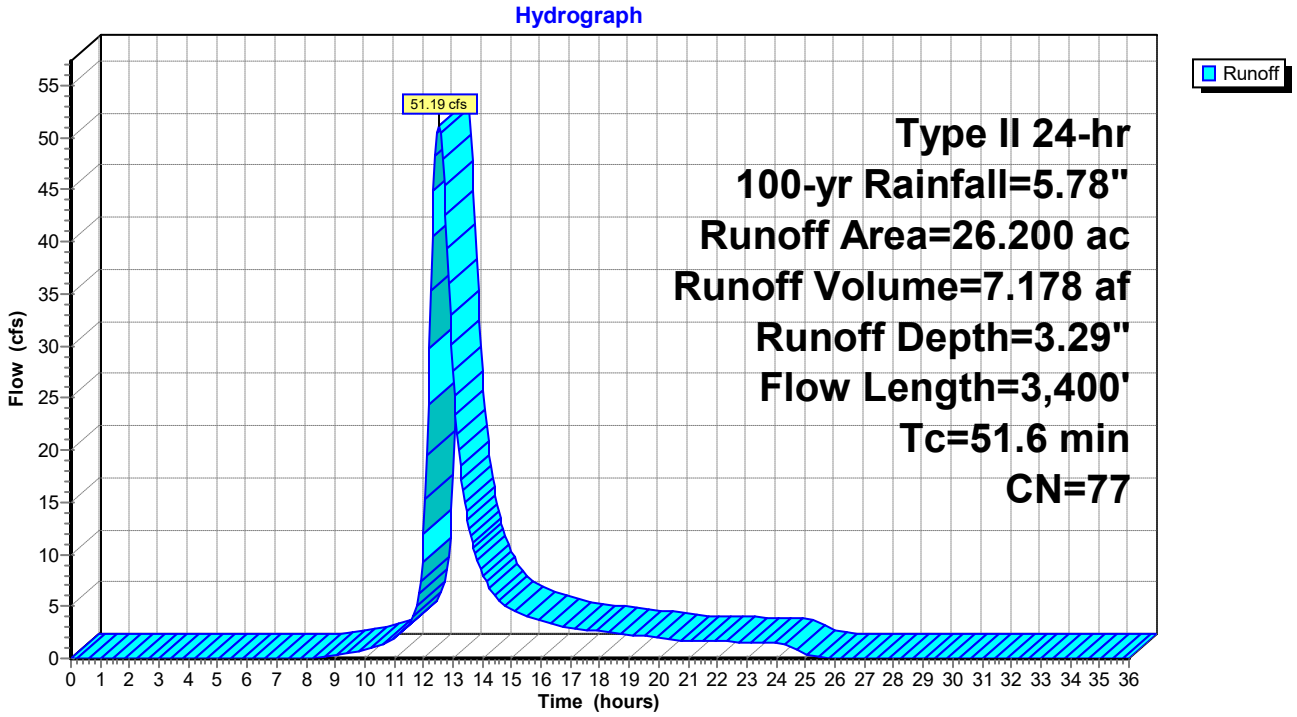
Runoff = 51.19 cfs @ 12.52 hrs, Volume= 7.178 af, Depth= 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.78"

	Area (ac)	CN	Description
	11.500	55	Woods, Good, HSG B
*	13.000	98	Impervious areas, including roofs, driveways, and roads
	1.700	69	50-75% Grass cover, Fair, HSG B
	26.200	77	Weighted Average
	13.200		50.38% Pervious Area
	13.000		49.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.4	300	0.2000	0.12		**Sheet Flow, Through woods** Woods: Dense underbrush n= 0.800 P2= 2.52"
4.7	450	0.1000	1.58		**Shallow Concentrated Flow, Through backyard to road** Woodland Kv= 5.0 fps
2.6	1,000	0.1000	6.42		**Shallow Concentrated Flow, Flow down road** Paved Kv= 20.3 fps
1.3	650	0.0500	8.37	26.30	**Pipe Channel, Existing storm sewer along Bloody Pond Rd to Gar** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
0.9	370	0.0500	6.86	41.14	**Trap/Vee/Rect Channel Flow, Swale around Garrison parking lot** Bot.W=2.00' D=3.00' n= 0.040 Earth, cobble bottom, clean sides
0.1	90	0.0200	11.03	34.66	**Pipe Channel, Existing storm sewer, 24" RCP** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.9	180	0.0400	3.42	25.63	**Trap/Vee/Rect Channel Flow, Overgrown Swale** Bot.W=2.50' D=3.00' n= 0.080
0.7	360	0.0400	8.69	42.66	**Pipe Channel, Existing Storm Sewer, 30" CMP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.025
51.6	3,400	Total			

Subcatchment 1S: Mockingbird Hill and surrounding areas



Summary for Subcatchment 2S: Cedar and Beatty road/residential area

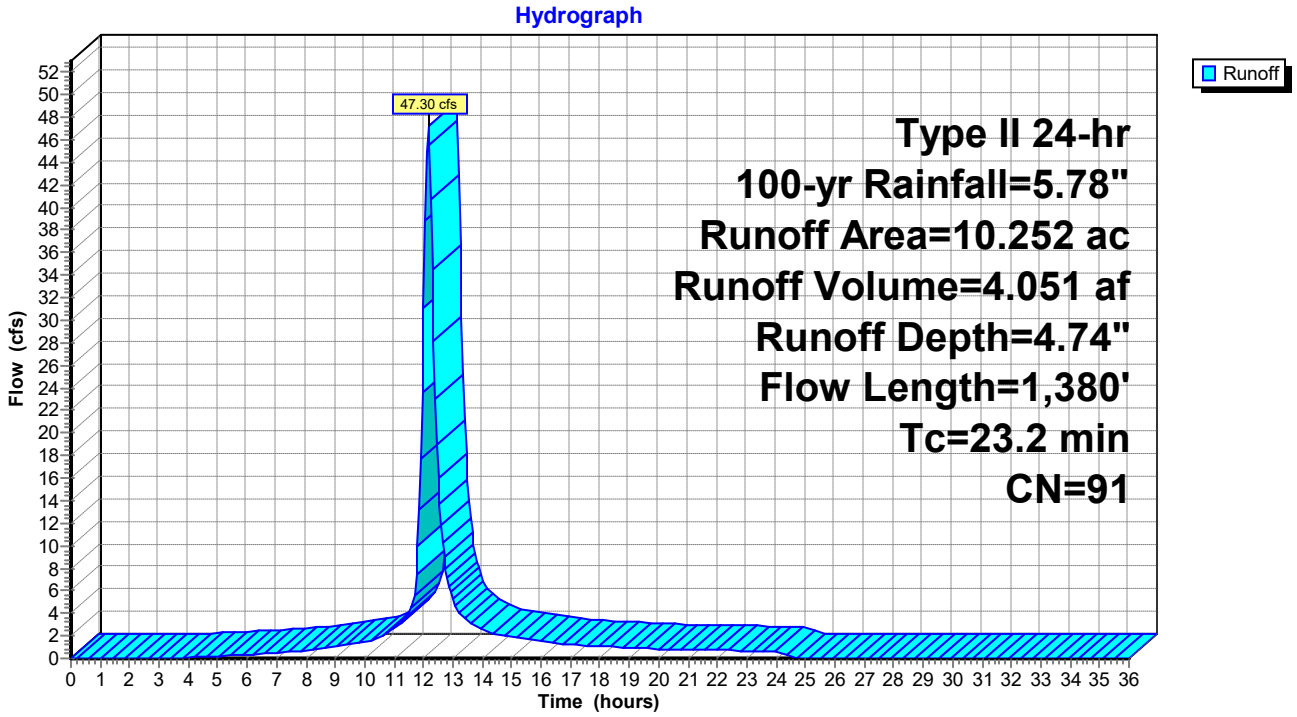
Runoff = 47.30 cfs @ 12.15 hrs, Volume= 4.051 af, Depth= 4.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.78"

	Area (ac)	CN	Description
*	7.689	98	Impervious surfaces including, roofs, gravel roads, driveways, parking lots, etc.
	2.563	69	50-75% Grass cover, Fair, HSG B
	10.252	91	Weighted Average
	2.563		25.00% Pervious Area
	7.689		75.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.2	150	0.0800	0.13		**Sheet Flow, Sheet flow through woods** Woods: Light underbrush n= 0.400 P2= 2.52"
2.3	600	0.0700	4.26		**Shallow Concentrated Flow, Across driveway and gravel road** Unpaved Kv= 16.1 fps
0.1	90	0.0200	11.03	34.66	**Pipe Channel, Existing storm sewer, 24" RCP** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.9	180	0.0400	3.42	25.63	**Trap/Vee/Rect Channel Flow, Overgrown Swale** Bot.W=2.50' D=3.00' n= 0.080 Earth, long dense weeds
0.7	360	0.0400	8.69	42.66	**Pipe Channel, Existing storm sewer, 30" CMP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.025 Corrugated metal
23.2	1,380	Total			

Subcatchment 2S: Cedar and Beatty road/residential area



Summary for Subcatchment 3S: State Lands - Field

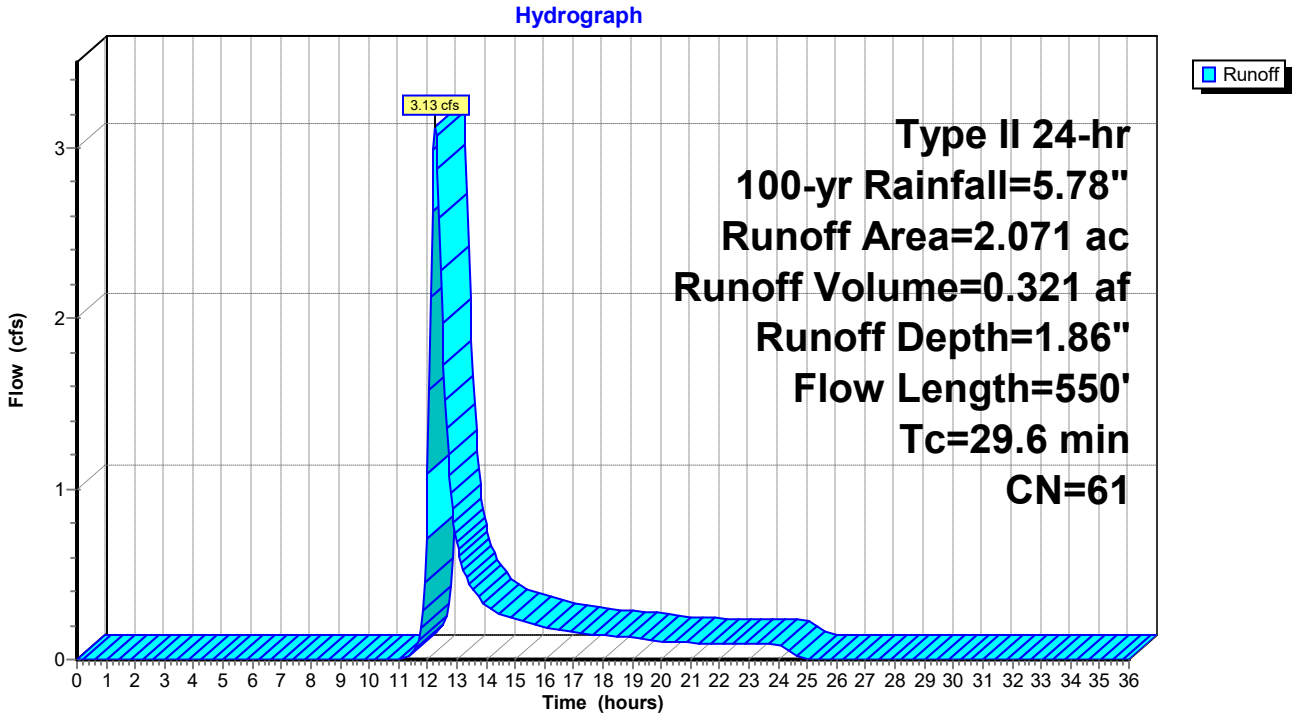
Runoff = 3.13 cfs @ 12.26 hrs, Volume= 0.321 af, Depth= 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.78"

Area (ac)	CN	Description
2.071	61	>75% Grass cover, Good, HSG B
2.071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	300	0.0200	0.19		**Sheet Flow, Sheet flow across road** Grass: Short n= 0.150 P2= 2.52"
3.0	250	0.0400	1.40		**Shallow Concentrated Flow, Over field** Short Grass Pasture Kv= 7.0 fps
29.6	550	Total			

Subcatchment 3S: State Lands - Field



Summary for Subcatchment 4S: Residential tributary to Beach Rd CB

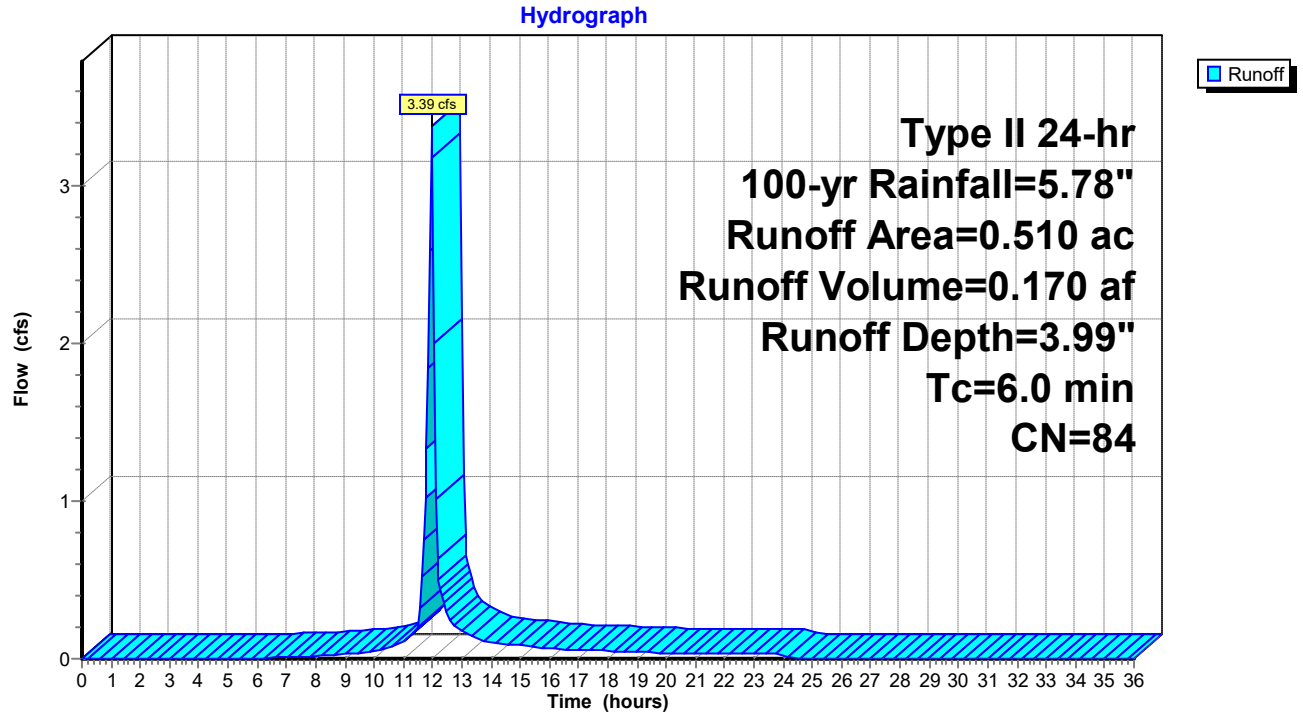
Runoff = 3.39 cfs @ 11.97 hrs, Volume= 0.170 af, Depth= 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.78"

	Area (ac)	CN	Description
	0.255	69	50-75% Grass cover, Fair, HSG B
*	0.255	98	roofs, road, sidewalks, etc
	0.510	84	Weighted Average
	0.255		50.00% Pervious Area
	0.255		50.00% Impervious Area

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

Subcatchment 4S: Residential tributary to Beach Rd CB



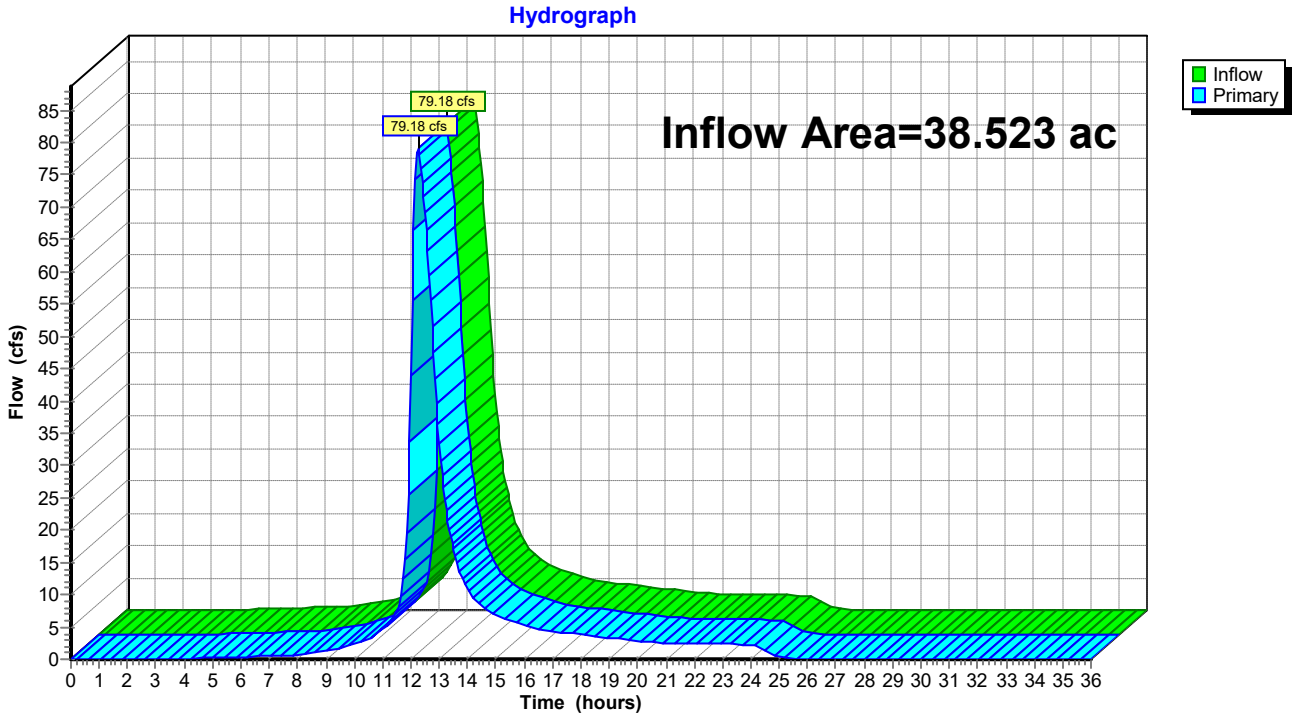
Summary for Link 1L: Wetland

Inflow Area = 38.523 ac, 53.71% Impervious, Inflow Depth = 3.60" for 100-yr event
Inflow = 79.18 cfs @ 12.25 hrs, Volume= 11.550 af
Primary = 79.18 cfs @ 12.25 hrs, Volume= 11.550 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Fixed water surface Elevation= 320.00'

Link 1L: Wetland

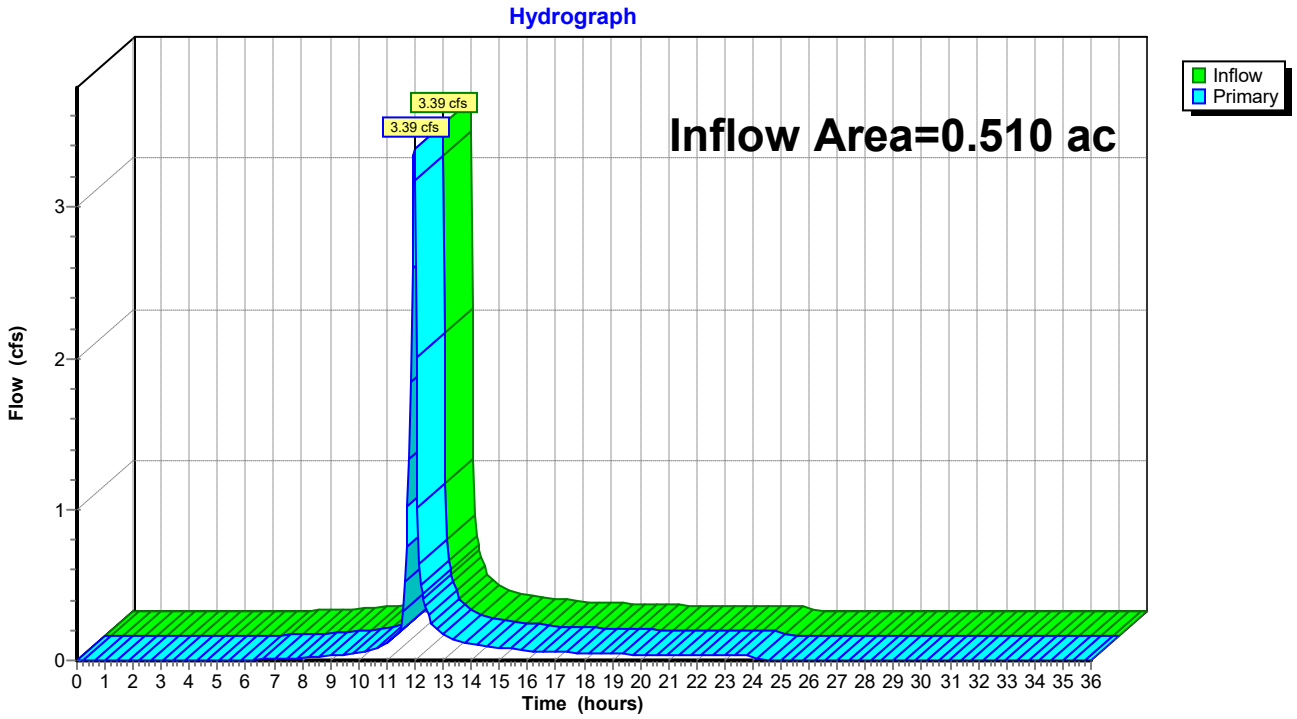


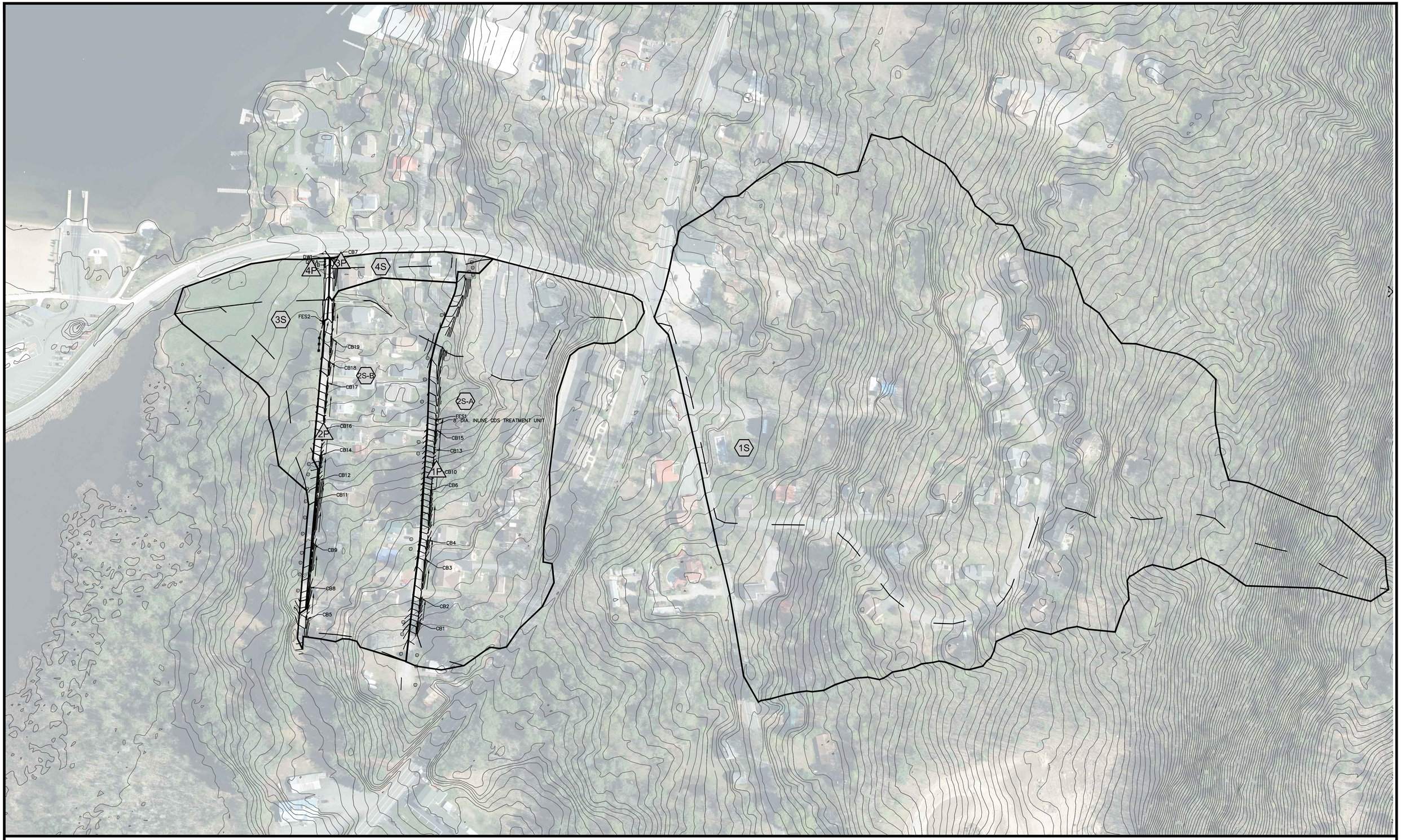
Summary for Link 2L: Beach Rd Catch Basin

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 3.99" for 100-yr event
Inflow = 3.39 cfs @ 11.97 hrs, Volume= 0.170 af
Primary = 3.39 cfs @ 11.97 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2L: Beach Rd Catch Basin





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CEDAR LANE & BEATTY ROAD GI FEASIBILITY STUDY

PROPOSED CONDITIONS

TOWN OF LAKE GEORGE, WARREN COUNTY, NEW YORK

designed	checked
AMH	RMA
date	scale
	1"=90'
project no.	
92001.06	
sheet no.	
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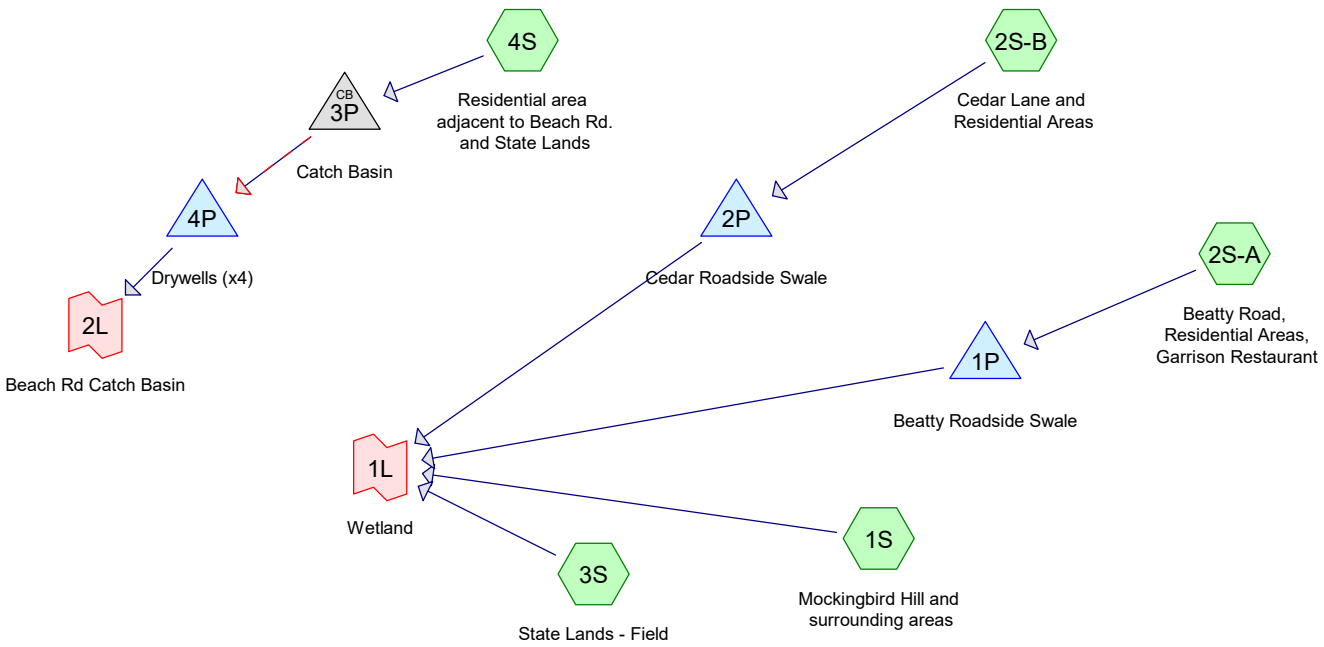


Subcat Reach Pond Link

Routing Diagram for Proposed Conditions
Prepared by {enter your company name here}, Printed 11/5/2020

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.882	69	50-75% Grass cover, Fair, HSG B (1S, 2S-A, 2S-B)
2.326	61	>75% Grass cover, Good, HSG B (3S, 4S)
13.000	98	Impervious areas, including roofs, driveways, and roads (1S)
0.255	98	Impervious areas, including roofs, driveways, road, etc. (4S)
3.618	98	Road, drives, house roofs (2S-A)
2.660	98	Road, driveways, house roofs (2S-B)
11.500	55	Woods, Good, HSG B (1S)
39.241	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
19.708	HSG B	1S, 2S-A, 2S-B, 3S, 4S
0.000	HSG C	
0.000	HSG D	
19.533	Other	1S, 2S-A, 2S-B, 4S
39.241		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover
0.000	5.882	0.000	0.000	0.000	5.882	50-75% Grass cover, Fair
0.000	2.326	0.000	0.000	0.000	2.326	>75% Grass cover, Good
0.000	0.000	0.000	0.000	13.000	13.000	Impervious areas, including roofs, driveways, and roads
0.000	0.000	0.000	0.000	0.255	0.255	Impervious areas, including roofs, driveways, road, etc.
0.000	0.000	0.000	0.000	3.618	3.618	Road, drives, house roofs
0.000	0.000	0.000	0.000	2.660	2.660	Road, driveways, house roofs
0.000	11.500	0.000	0.000	0.000	11.500	Woods, Good
0.000	**19.708**	**0.000**	**0.000**	**19.533**	**39.241**	**TOTAL AREA**

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1S	0.00	0.00	650.0	0.0500	0.025	24.0	0.0	0.0
2	1S	0.00	0.00	90.0	0.0200	0.012	24.0	0.0	0.0
3	1S	0.00	0.00	360.0	0.0400	0.025	30.0	0.0	0.0
4	3P	323.80	323.68	20.3	0.0059	0.020	12.0	0.0	0.0

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Mockingbird Hill and Runoff Area=26.200 ac 49.62% Impervious Runoff Depth=0.53"
Flow Length=3,400' Tc=51.6 min CN=77 Runoff=6.97 cfs 1.159 af

Subcatchment 2S-A: Beatty Road, Runoff Area=6.030 ac 60.00% Impervious Runoff Depth=0.96"
Flow Length=800' Tc=25.5 min CN=86 Runoff=5.50 cfs 0.484 af

Subcatchment 2S-B: Cedar Lane and Runoff Area=4.430 ac 60.05% Impervious Runoff Depth=0.96"
Flow Length=990' Tc=32.2 min CN=86 Runoff=3.46 cfs 0.356 af

Subcatchment 3S: State Lands - Field Runoff Area=2.071 ac 0.00% Impervious Runoff Depth=0.10"
Flow Length=550' Tc=29.6 min CN=61 Runoff=0.04 cfs 0.018 af

Subcatchment 4S: Residential area Runoff Area=0.510 ac 50.00% Impervious Runoff Depth=0.66"
Tc=6.0 min CN=80 Runoff=0.57 cfs 0.028 af

Pond 1P: Beatty Roadside Swale Peak Elev=333.90' Storage=0.035 af Inflow=5.50 cfs 0.484 af
Discarded=0.61 cfs 0.105 af Primary=4.57 cfs 0.380 af Outflow=5.18 cfs 0.484 af

Pond 2P: Cedar Roadside Swale Peak Elev=326.89' Storage=0.022 af Inflow=3.46 cfs 0.356 af
Discarded=1.01 cfs 0.167 af Primary=2.27 cfs 0.189 af Outflow=3.27 cfs 0.356 af

Pond 3P: Catch Basin Peak Elev=324.32' Inflow=0.57 cfs 0.028 af
Primary=0.57 cfs 0.028 af Secondary=0.00 cfs 0.000 af Outflow=0.57 cfs 0.028 af

Pond 4P: Drywells (x4) Peak Elev=321.38' Storage=0.005 af Inflow=0.57 cfs 0.028 af
Discarded=0.32 cfs 0.028 af Primary=0.00 cfs 0.000 af Outflow=0.32 cfs 0.028 af

Link 1L: Wetland Inflow=11.94 cfs 1.746 af
Primary=11.94 cfs 1.746 af

Link 2L: Beach Rd Catch Basin Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 39.241 ac Runoff Volume = 2.046 af Average Runoff Depth = 0.63"
50.22% Pervious = 19.708 ac 49.78% Impervious = 19.533 ac

Summary for Subcatchment 1S: Mockingbird Hill and surrounding areas

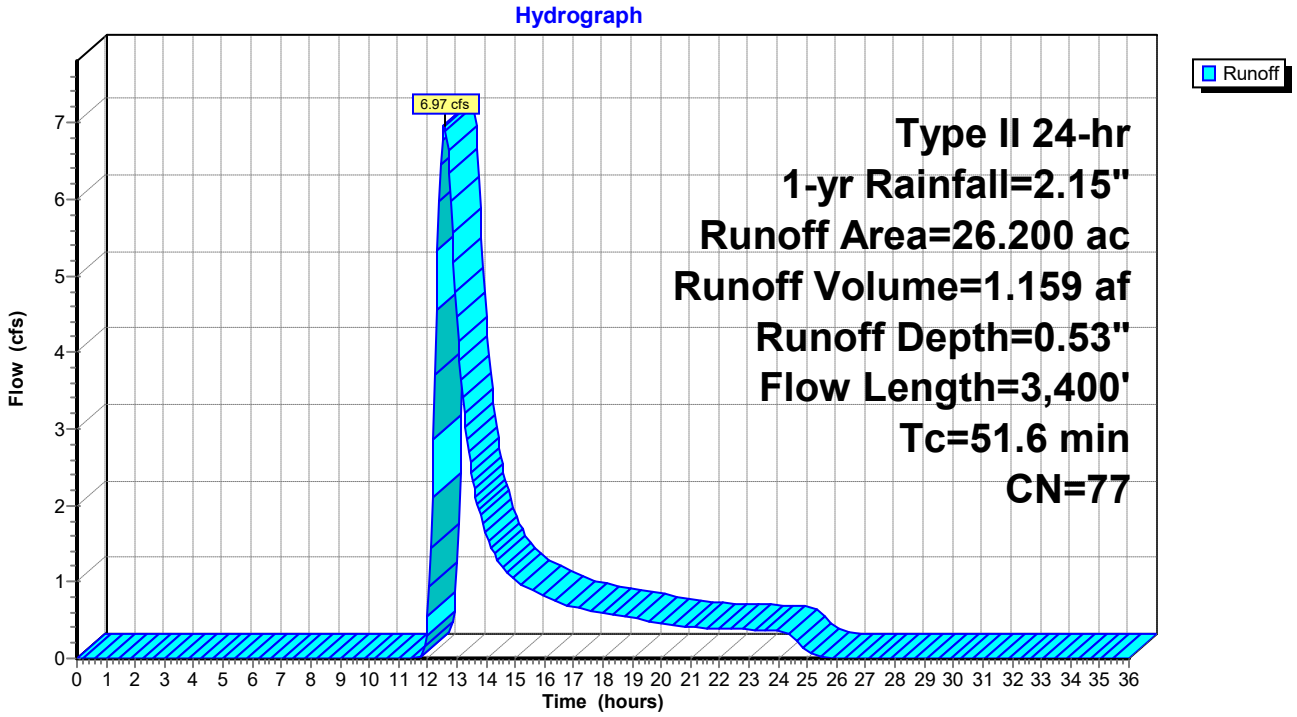
Runoff = 6.97 cfs @ 12.57 hrs, Volume= 1.159 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.15"

	Area (ac)	CN	Description
	11.500	55	Woods, Good, HSG B
*	13.000	98	Impervious areas, including roofs, driveways, and roads
	1.700	69	50-75% Grass cover, Fair, HSG B
	26.200	77	Weighted Average
	13.200		50.38% Pervious Area
	13.000		49.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.4	300	0.2000	0.12		**Sheet Flow, Through woods** Woods: Dense underbrush n= 0.800 P2= 2.52"
4.7	450	0.1000	1.58		**Shallow Concentrated Flow, Through backyard to road** Woodland Kv= 5.0 fps
2.6	1,000	0.1000	6.42		**Shallow Concentrated Flow, Flow down road** Paved Kv= 20.3 fps
1.3	650	0.0500	8.37	26.30	**Pipe Channel, Existing storm sewer along Bloody Pond Rd to Gar** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
0.9	370	0.0500	6.86	41.14	**Trap/Vee/Rect Channel Flow, Swale around Garrison parking lot** Bot.W=2.00' D=3.00' n= 0.040 Earth, cobble bottom, clean sides
0.1	90	0.0200	11.03	34.66	**Pipe Channel, Existing storm sewer, 24" RCP** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.9	180	0.0400	3.42	25.63	**Trap/Vee/Rect Channel Flow, Overgrown Swale** Bot.W=2.50' D=3.00' n= 0.080
0.7	360	0.0400	8.69	42.66	**Pipe Channel, Existing Storm Sewer, 30" CMP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.025
51.6	3,400	Total			

Subcatchment 1S: Mockingbird Hill and surrounding areas



Summary for Subcatchment 2S-A: Beatty Road, Residential Areas, Garrison Restaurant

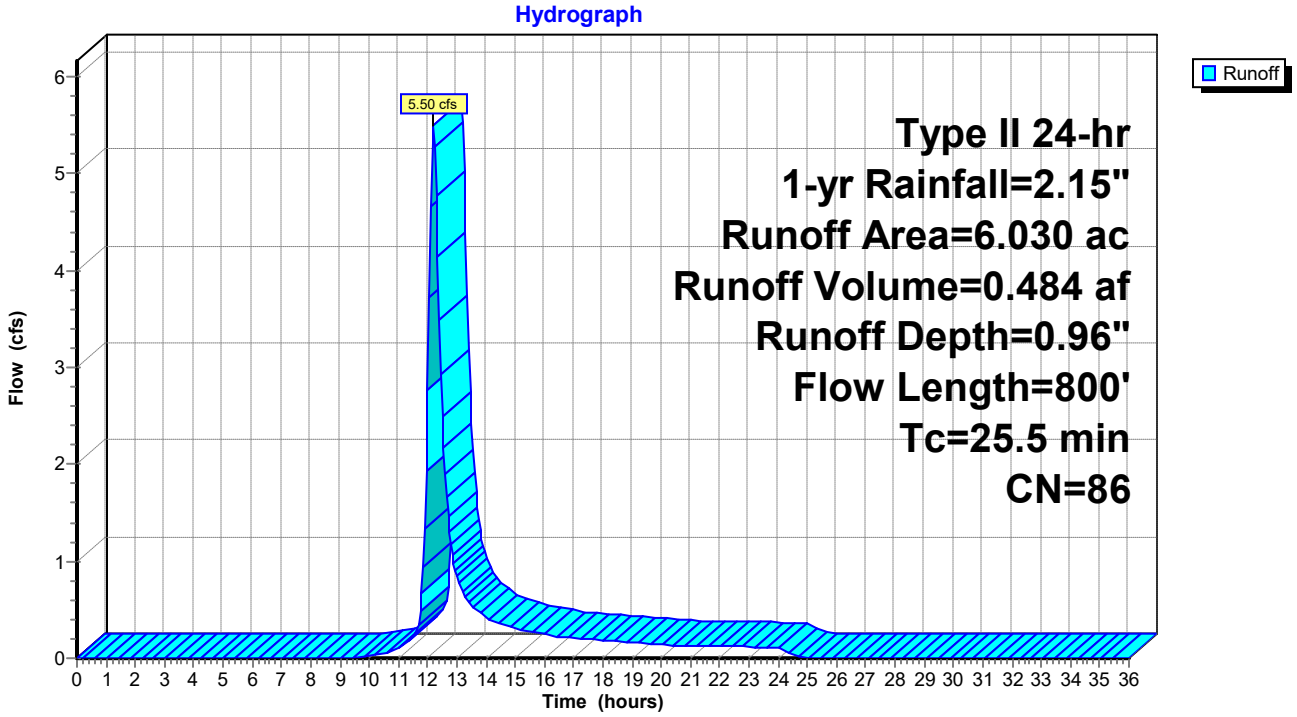
Runoff = 5.50 cfs @ 12.20 hrs, Volume= 0.484 af, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.15"

	Area (ac)	CN	Description
*	3.618	98	Road, drives, house roofs
	2.412	69	50-75% Grass cover, Fair, HSG B
	6.030	86	Weighted Average
	2.412		40.00% Pervious Area
	3.618		60.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	100	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.52"
0.3	50	0.0400	3.22		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.0	650	0.0700	10.72	24.65	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 0.3 '/' Top.W=2.60' n= 0.025
25.5	800	Total			

Subcatchment 2S-A: Beatty Road, Residential Areas, Garrison Restaurant



Summary for Subcatchment 2S-B: Cedar Lane and Residential Areas

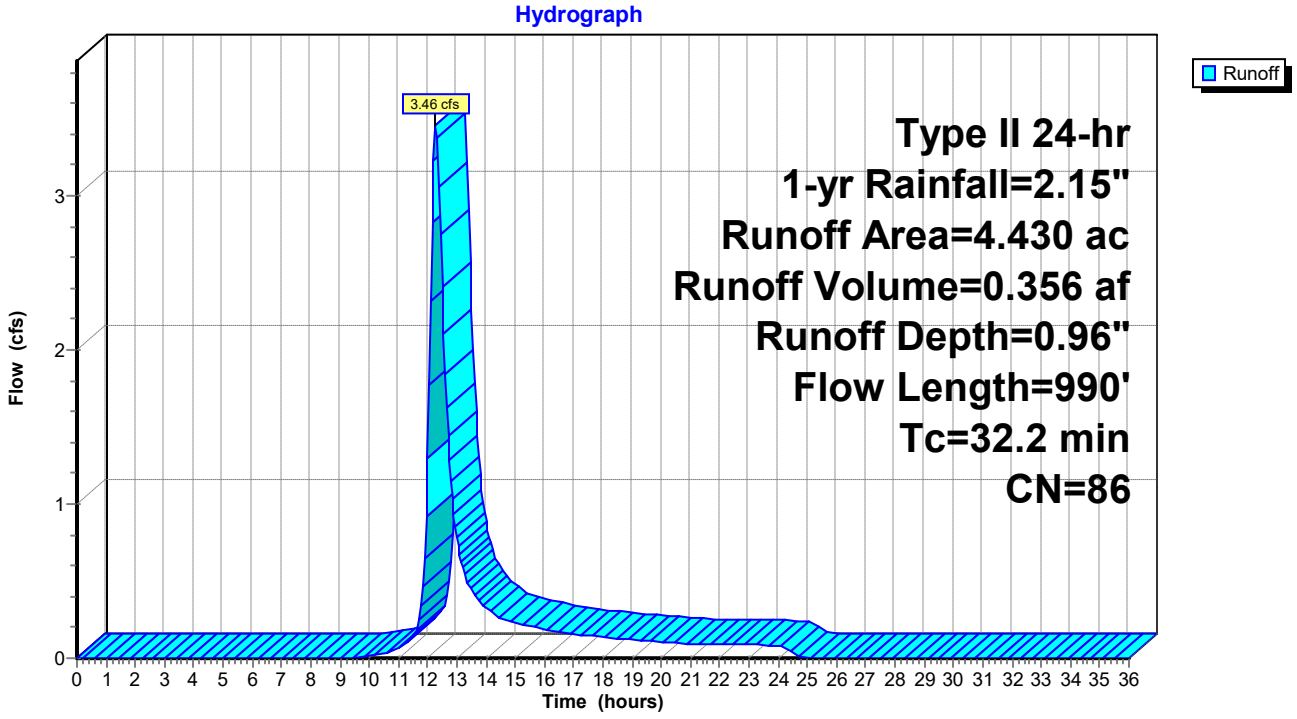
Runoff = 3.46 cfs @ 12.28 hrs, Volume= 0.356 af, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.15"

	Area (ac)	CN	Description
*	2.660	98	Road, driveways, house roofs
	1.770	69	50-75% Grass cover, Fair, HSG B
	4.430	86	Weighted Average
	1.770		39.95% Pervious Area
	2.660		60.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	130	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.52"
0.3	115	0.1300	7.32		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.1	745	0.0400	5.93	8.90	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=1.00' Z= 0.5 '/' Top.W=2.00' n= 0.030
32.2	990	Total			

Subcatchment 2S-B: Cedar Lane and Residential Areas



Summary for Subcatchment 3S: State Lands - Field

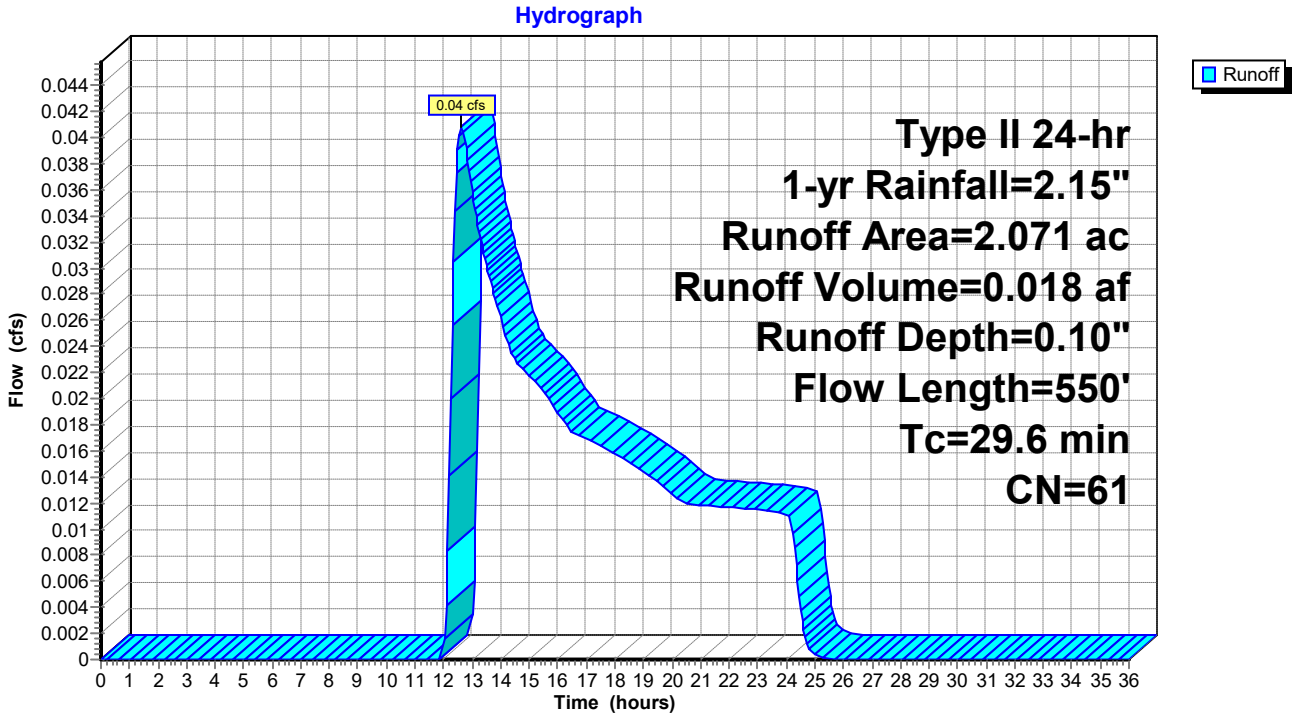
Runoff = 0.04 cfs @ 12.64 hrs, Volume= 0.018 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.15"

Area (ac)	CN	Description
2.071	61	>75% Grass cover, Good, HSG B
2.071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	300	0.0200	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.52"
3.0	250	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
29.6	550	Total			

Subcatchment 3S: State Lands - Field



Summary for Subcatchment 4S: Residential area adjacent to Beach Rd. and State Lands

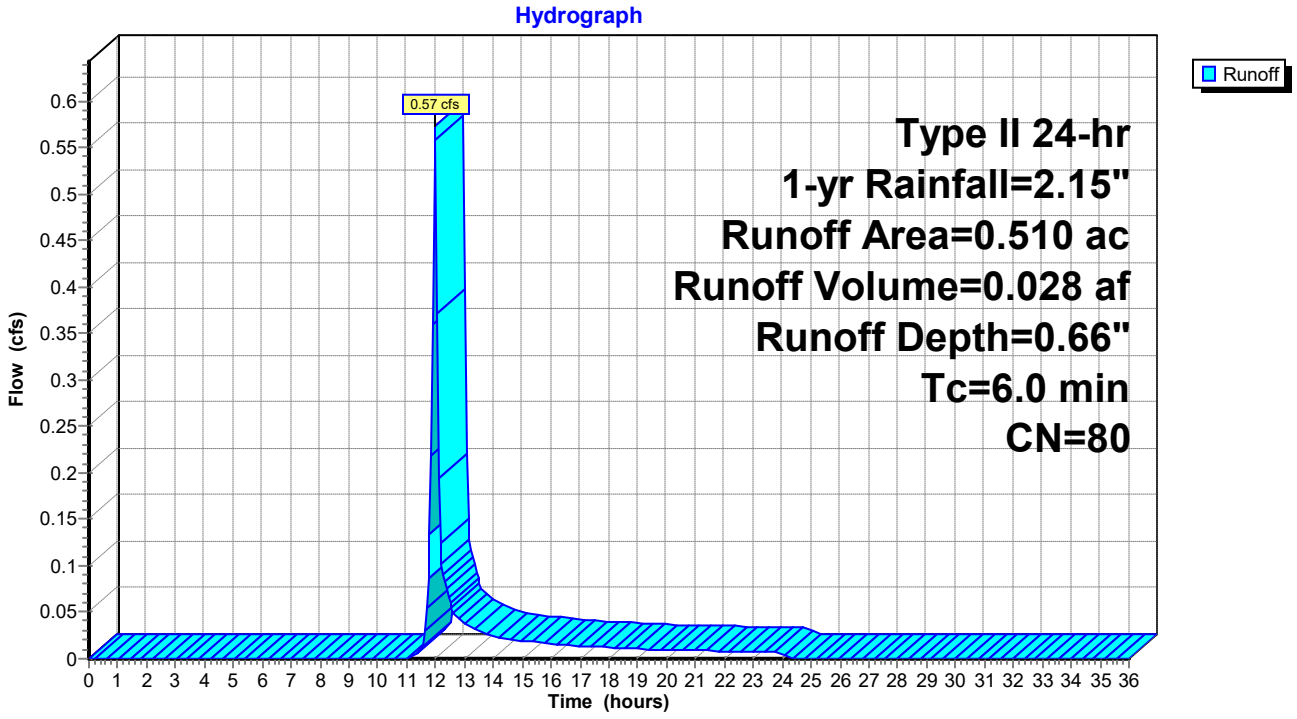
Runoff = 0.57 cfs @ 11.98 hrs, Volume= 0.028 af, Depth= 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.15"

	Area (ac)	CN	Description
	0.255	61	>75% Grass cover, Good, HSG B
*	0.255	98	Impervious areas, including roofs, driveways, road, etc.
	0.510	80	Weighted Average
	0.255		50.00% Pervious Area
	0.255		50.00% Impervious Area

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

Subcatchment 4S: Residential area adjacent to Beach Rd. and State Lands



Summary for Pond 1P: Beatty Roadside Swale

Inflow Area = 6.030 ac, 60.00% Impervious, Inflow Depth = 0.96" for 1-yr event
Inflow = 5.50 cfs @ 12.20 hrs, Volume= 0.484 af
Outflow = 5.18 cfs @ 12.26 hrs, Volume= 0.484 af, Atten= 6%, Lag= 3.9 min
Discarded = 0.61 cfs @ 12.26 hrs, Volume= 0.105 af
Primary = 4.57 cfs @ 12.26 hrs, Volume= 0.380 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 333.90' @ 12.26 hrs Surf.Area= 0.044 ac Storage= 0.035 af

Plug-Flow detention time= 8.3 min calculated for 0.484 af (100% of inflow)
Center-of-Mass det. time= 8.3 min (864.3 - 856.0)

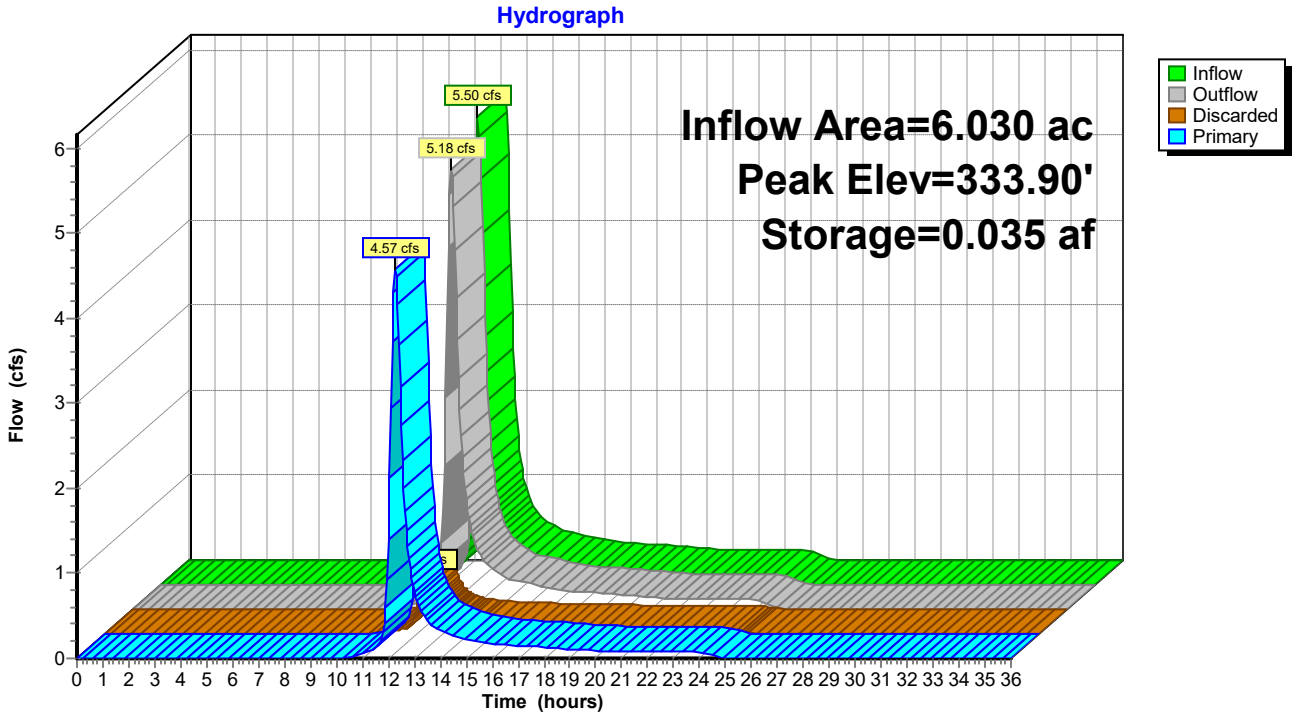
Volume	Invert	Avail.Storage	Storage Description
#1	333.00'	0.040 af	**2.00'W x 750.00'L x 1.00'H Prismatoid Z=0.3**

Device	Routing	Invert	Outlet Devices
#1	Primary	333.00'	**2.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	333.00'	**65.000 in/hr Exfiltration over Surface area above 333.00'** Excluded Surface area = 0.034 ac

Discarded OutFlow Max=0.61 cfs @ 12.26 hrs HW=333.89' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.61 cfs)

Primary OutFlow Max=4.54 cfs @ 12.26 hrs HW=333.89' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 4.54 cfs @ 2.54 fps)

Pond 1P: Beatty Roadside Swale



Summary for Pond 2P: Cedar Roadside Swale

Inflow Area = 4.430 ac, 60.05% Impervious, Inflow Depth = 0.96" for 1-yr event
Inflow = 3.46 cfs @ 12.28 hrs, Volume= 0.356 af
Outflow = 3.27 cfs @ 12.36 hrs, Volume= 0.356 af, Atten= 5%, Lag= 4.9 min
Discarded = 1.01 cfs @ 12.36 hrs, Volume= 0.167 af
Primary = 2.27 cfs @ 12.36 hrs, Volume= 0.189 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 326.89' @ 12.36 hrs Surf.Area= 0.032 ac Storage= 0.022 af

Plug-Flow detention time= 6.0 min calculated for 0.355 af (100% of inflow)
Center-of-Mass det. time= 6.0 min (868.2 - 862.2)

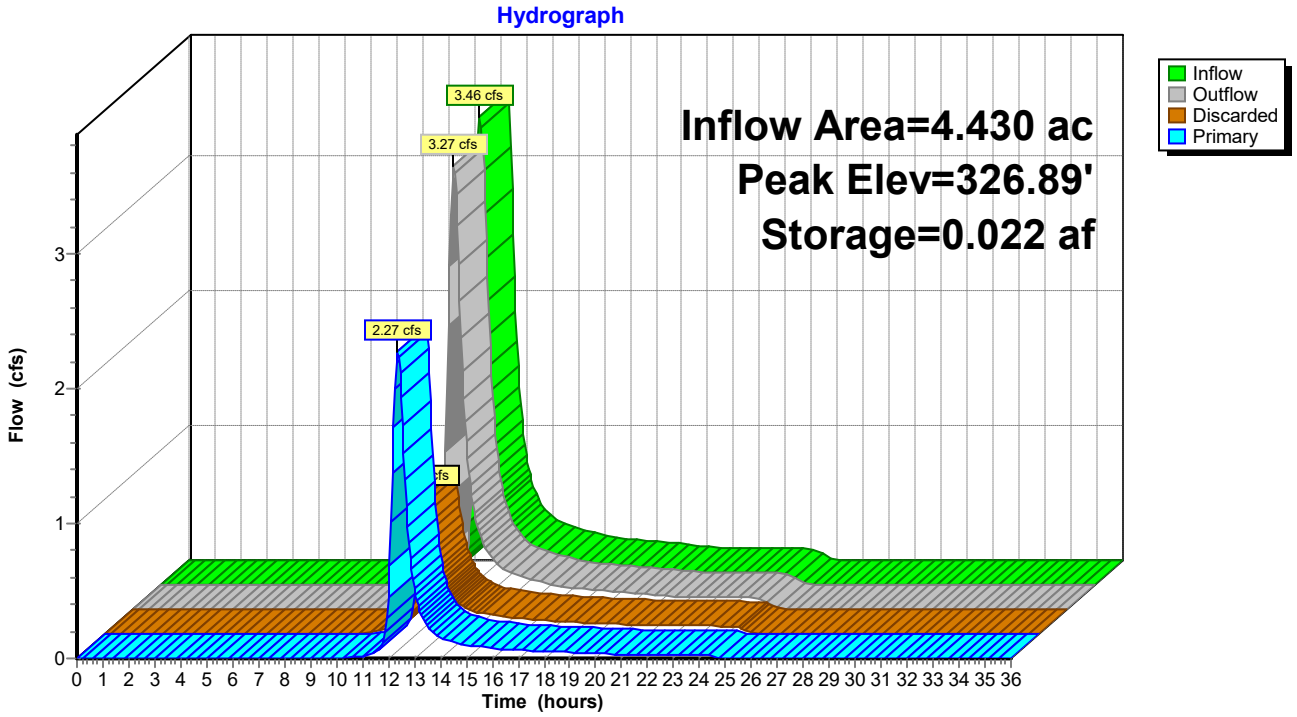
Volume	Invert	Avail.Storage	Storage Description
#1	326.00'	0.026 af	**1.00'W x 745.00'L x 1.00'H Prismatoid Z=0.5**

Device	Routing	Invert	Outlet Devices
#1	Primary	326.00'	**1.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	326.00'	**65.000 in/hr Exfiltration over Surface area above 326.00'** Excluded Surface area = 0.017 ac

Discarded OutFlow Max=1.00 cfs @ 12.36 hrs HW=326.89' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 1.00 cfs)

Primary OutFlow Max=2.26 cfs @ 12.36 hrs HW=326.89' TW=0.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 2.26 cfs @ 2.53 fps)

Pond 2P: Cedar Roadside Swale



Summary for Pond 3P: Catch Basin

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 0.66" for 1-yr event
Inflow = 0.57 cfs @ 11.98 hrs, Volume= 0.028 af
Outflow = 0.57 cfs @ 11.98 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min
Primary = 0.57 cfs @ 11.98 hrs, Volume= 0.028 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

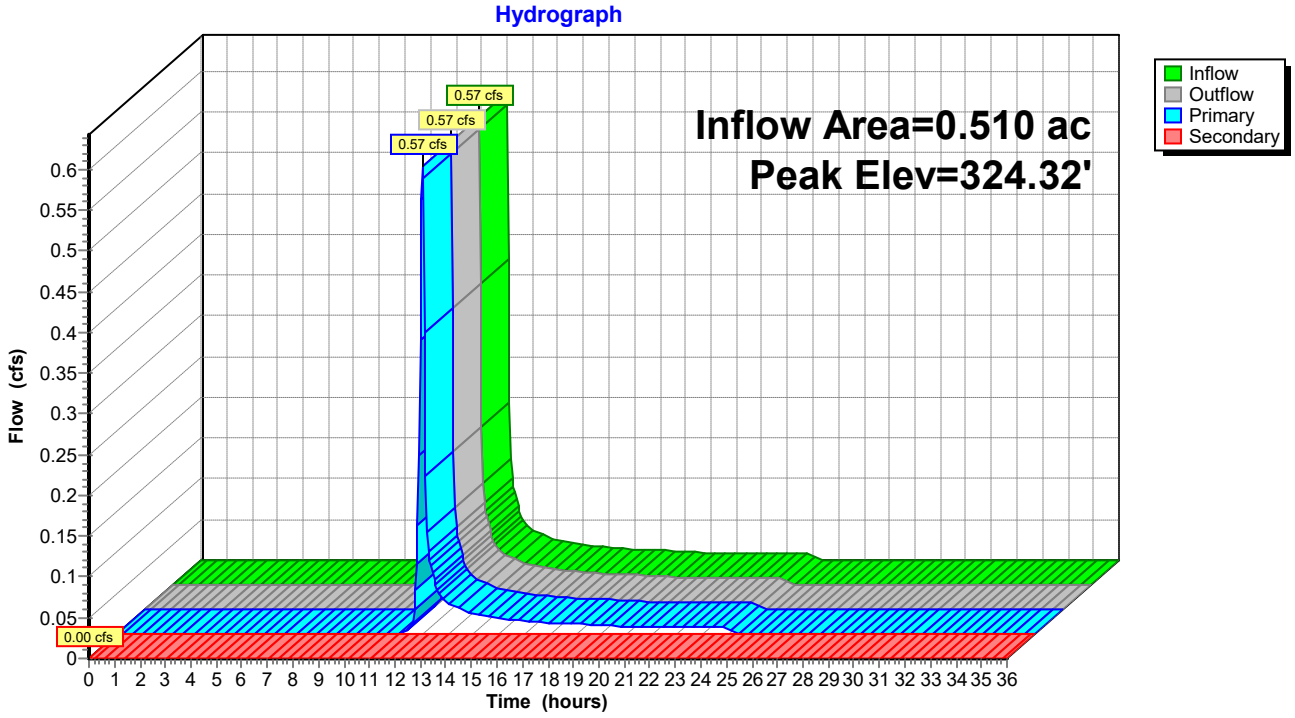
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 324.32' @ 11.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	326.41'	**1.0" x 1.2" Horiz. Orifice/Grate** X 10 rows C= 0.600 Limited to weir flow at low heads
#2	Primary	323.80'	**12.0" Round Culvert** L= 20.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 323.80' / 323.68' S= 0.0059 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.55 cfs @ 11.98 hrs HW=324.30' TW=321.03' (Dynamic Tailwater)
└**2=Culvert** (Barrel Controls 0.55 cfs @ 2.02 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=323.80' TW=319.29' (Dynamic Tailwater)
└**1=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P: Catch Basin



Summary for Pond 4P: Drywells (x4)

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 0.66" for 1-yr event
Inflow = 0.57 cfs @ 11.98 hrs, Volume= 0.028 af
Outflow = 0.32 cfs @ 12.07 hrs, Volume= 0.028 af, Atten= 44%, Lag= 5.2 min
Discarded = 0.32 cfs @ 12.07 hrs, Volume= 0.028 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 321.38' @ 12.07 hrs Surf.Area= 0.007 ac Storage= 0.005 af

Plug-Flow detention time= 8.0 min calculated for 0.028 af (100% of inflow)
Center-of-Mass det. time= 8.0 min (870.5 - 862.5)

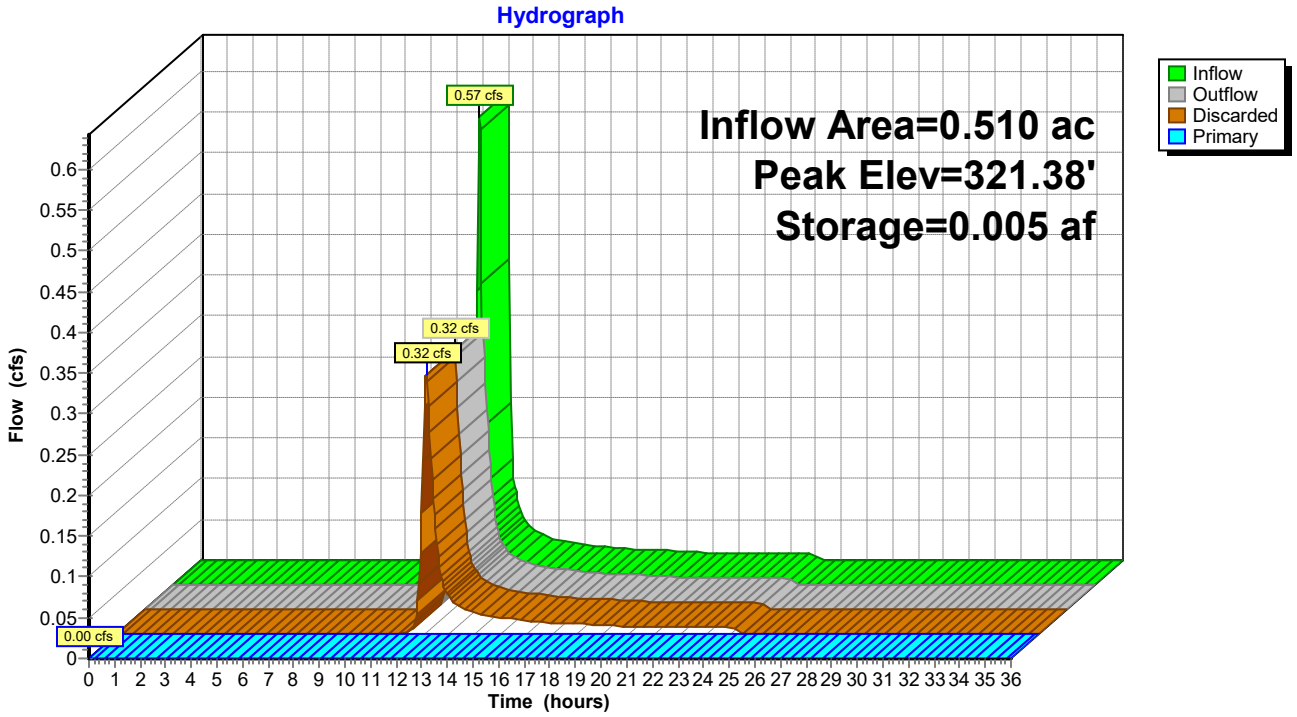
Volume	Invert	Avail.Storage	Storage Description
#1	320.29'	0.005 af	**4.00'D x 4.00'H Vertical Cone/Cylinder** x 4 Inside #2
#2	319.29'	0.017 af	**6.00'D x 5.00'H Vertical Cone/Cylinder Z=1.0** x 4 0.047 af Overall - 0.005 af Embedded = 0.042 af x 40.0% Voids
		0.021 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	325.29'	**1.0" x 2.0" Horiz. Orifice/Grate** X 15 rows C= 0.600 Limited to weir flow at low heads
#2	Discarded	319.29'	**65.000 in/hr Exfiltration over Surface area above 319.29'** Excluded Surface area = 0.003 ac

Discarded OutFlow Max=0.31 cfs @ 12.07 hrs HW=321.35' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.31 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=319.29' TW=0.00' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Controls 0.00 cfs)

Pond 4P: Drywells (x4)

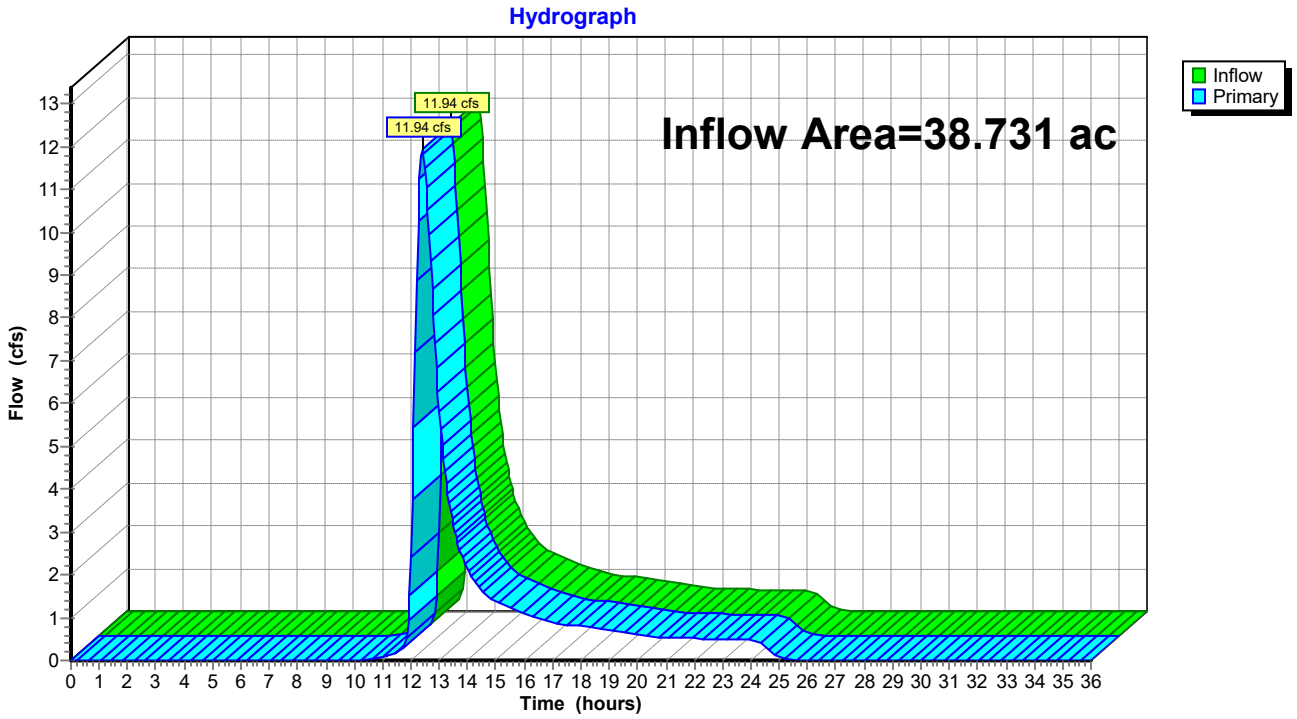


Summary for Link 1L: Wetland

Inflow Area = 38.731 ac, 49.77% Impervious, Inflow Depth = 0.54" for 1-yr event
Inflow = 11.94 cfs @ 12.40 hrs, Volume= 1.746 af
Primary = 11.94 cfs @ 12.40 hrs, Volume= 1.746 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 1L: Wetland

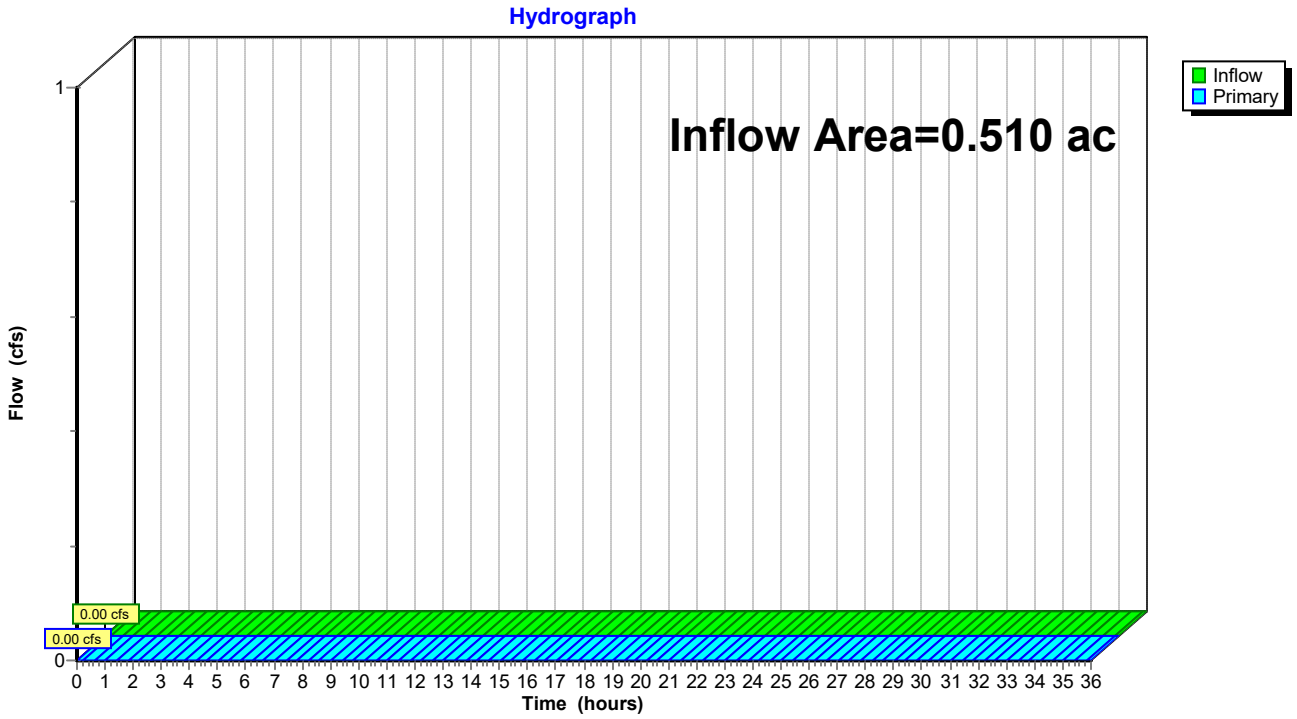


Summary for Link 2L: Beach Rd Catch Basin

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 0.00" for 1-yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2L: Beach Rd Catch Basin



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Mockingbird Hill and Runoff Area=26.200 ac 49.62% Impervious Runoff Depth=1.46"
Flow Length=3,400' Tc=51.6 min CN=77 Runoff=22.01 cfs 3.188 af

Subcatchment 2S-A: Beatty Road, Runoff Area=6.030 ac 60.00% Impervious Runoff Depth=2.13"
Flow Length=800' Tc=25.5 min CN=86 Runoff=12.33 cfs 1.072 af

Subcatchment 2S-B: Cedar Lane and Runoff Area=4.430 ac 60.05% Impervious Runoff Depth=2.13"
Flow Length=990' Tc=32.2 min CN=86 Runoff=7.81 cfs 0.788 af

Subcatchment 3S: State Lands - Field Runoff Area=2.071 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=550' Tc=29.6 min CN=61 Runoff=0.76 cfs 0.102 af

Subcatchment 4S: Residential area Runoff Area=0.510 ac 50.00% Impervious Runoff Depth=1.67"
Tc=6.0 min CN=80 Runoff=1.47 cfs 0.071 af

Pond 1P: Beatty Roadside Swale Peak Elev=334.80' Storage=0.040 af Inflow=12.33 cfs 1.072 af
Discarded=0.68 cfs 0.178 af Primary=12.79 cfs 0.894 af Outflow=13.46 cfs 1.072 af

Pond 2P: Cedar Roadside Swale Peak Elev=328.04' Storage=0.026 af Inflow=7.81 cfs 0.788 af
Discarded=1.12 cfs 0.292 af Primary=7.75 cfs 0.496 af Outflow=8.87 cfs 0.788 af

Pond 3P: Catch Basin Peak Elev=324.69' Inflow=1.47 cfs 0.071 af
Primary=1.47 cfs 0.071 af Secondary=0.00 cfs 0.000 af Outflow=1.47 cfs 0.071 af

Pond 4P: Drywells (x4) Peak Elev=323.37' Storage=0.015 af Inflow=1.47 cfs 0.071 af
Discarded=0.78 cfs 0.071 af Primary=0.00 cfs 0.000 af Outflow=0.78 cfs 0.071 af

Link 1L: Wetland Inflow=33.81 cfs 4.681 af
Primary=33.81 cfs 4.681 af

Link 2L: Beach Rd Catch Basin Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 39.241 ac Runoff Volume = 5.221 af Average Runoff Depth = 1.60"
50.22% Pervious = 19.708 ac 49.78% Impervious = 19.533 ac

Summary for Subcatchment 1S: Mockingbird Hill and surrounding areas

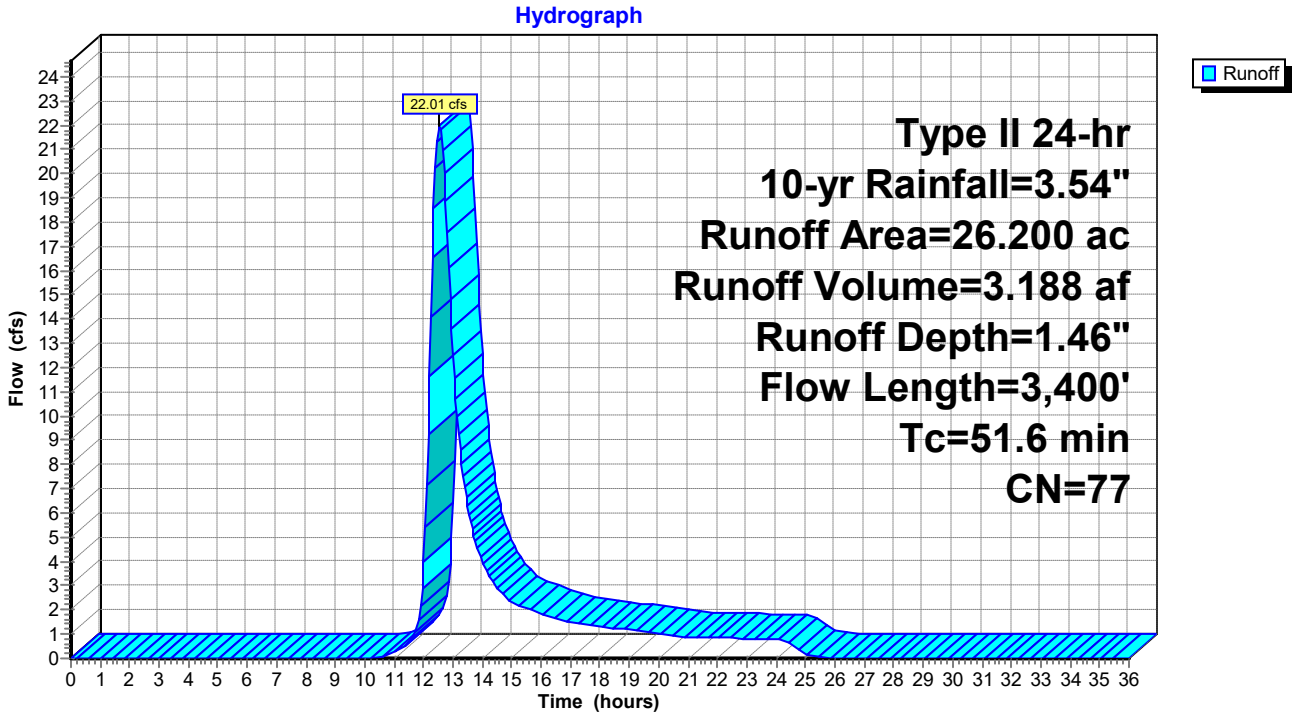
Runoff = 22.01 cfs @ 12.54 hrs, Volume= 3.188 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.54"

	Area (ac)	CN	Description
	11.500	55	Woods, Good, HSG B
*	13.000	98	Impervious areas, including roofs, driveways, and roads
	1.700	69	50-75% Grass cover, Fair, HSG B
	26.200	77	Weighted Average
	13.200		50.38% Pervious Area
	13.000		49.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.4	300	0.2000	0.12		**Sheet Flow, Through woods** Woods: Dense underbrush n= 0.800 P2= 2.52"
4.7	450	0.1000	1.58		**Shallow Concentrated Flow, Through backyard to road** Woodland Kv= 5.0 fps
2.6	1,000	0.1000	6.42		**Shallow Concentrated Flow, Flow down road** Paved Kv= 20.3 fps
1.3	650	0.0500	8.37	26.30	**Pipe Channel, Existing storm sewer along Bloody Pond Rd to Gar** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
0.9	370	0.0500	6.86	41.14	**Trap/Vee/Rect Channel Flow, Swale around Garrison parking lot** Bot.W=2.00' D=3.00' n= 0.040 Earth, cobble bottom, clean sides
0.1	90	0.0200	11.03	34.66	**Pipe Channel, Existing storm sewer, 24" RCP** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.9	180	0.0400	3.42	25.63	**Trap/Vee/Rect Channel Flow, Overgrown Swale** Bot.W=2.50' D=3.00' n= 0.080
0.7	360	0.0400	8.69	42.66	**Pipe Channel, Existing Storm Sewer, 30" CMP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.025
51.6	3,400	Total			

Subcatchment 1S: Mockingbird Hill and surrounding areas



Summary for Subcatchment 2S-A: Beatty Road, Residential Areas, Garrison Restaurant

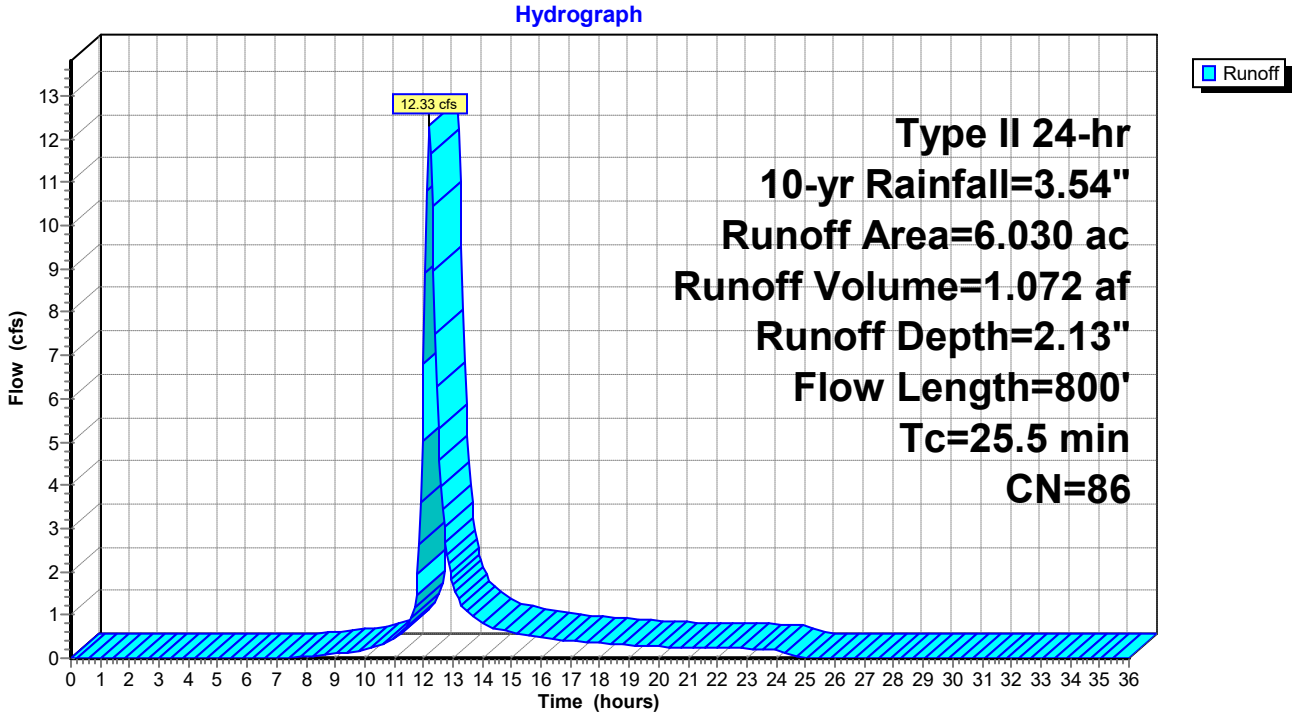
Runoff = 12.33 cfs @ 12.19 hrs, Volume= 1.072 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.54"

	Area (ac)	CN	Description
*	3.618	98	Road, drives, house roofs
	2.412	69	50-75% Grass cover, Fair, HSG B
	6.030	86	Weighted Average
	2.412		40.00% Pervious Area
	3.618		60.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	100	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.52"
0.3	50	0.0400	3.22		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.0	650	0.0700	10.72	24.65	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 0.3 '/' Top.W=2.60' n= 0.025
25.5	800	Total			

Subcatchment 2S-A: Beatty Road, Residential Areas, Garrison Restaurant



Summary for Subcatchment 2S-B: Cedar Lane and Residential Areas

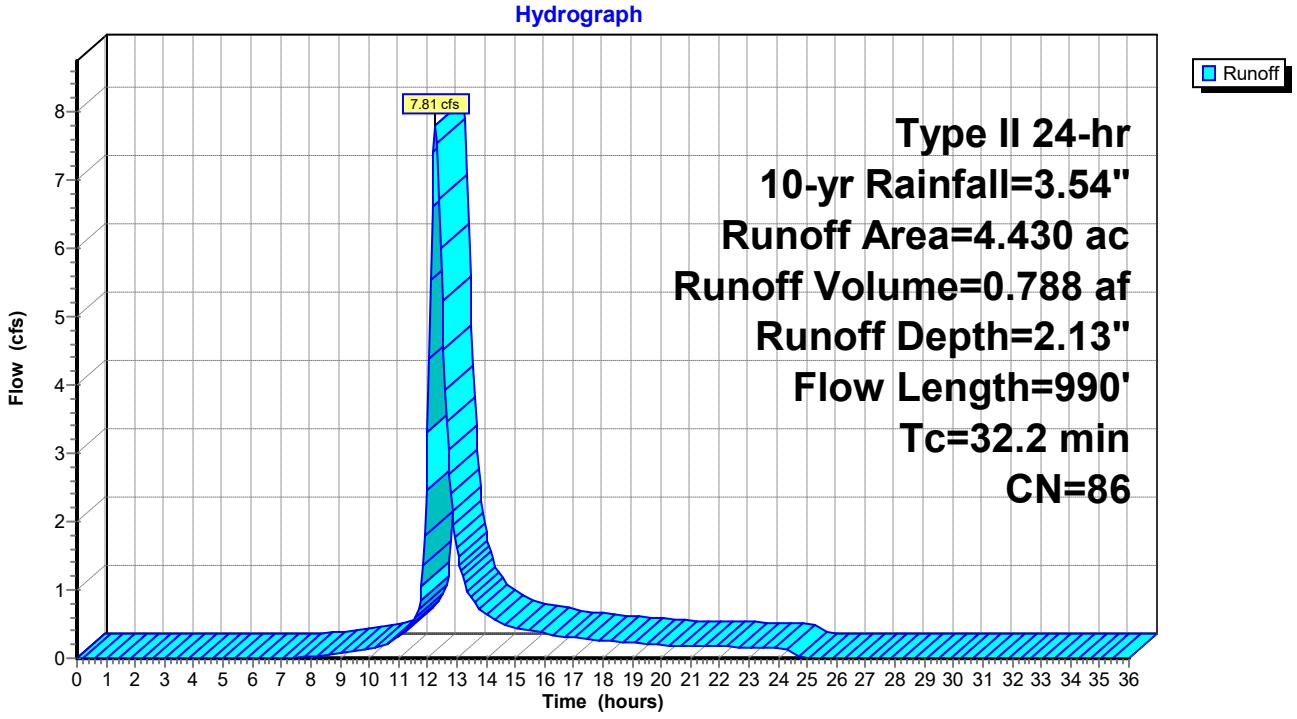
Runoff = 7.81 cfs @ 12.27 hrs, Volume= 0.788 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.54"

	Area (ac)	CN	Description
*	2.660	98	Road, driveways, house roofs
	1.770	69	50-75% Grass cover, Fair, HSG B
	4.430	86	Weighted Average
	1.770		39.95% Pervious Area
	2.660		60.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	130	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.52"
0.3	115	0.1300	7.32		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.1	745	0.0400	5.93	8.90	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=1.00' Z= 0.5 '/' Top.W=2.00' n= 0.030
32.2	990	Total			

Subcatchment 2S-B: Cedar Lane and Residential Areas



Summary for Subcatchment 3S: State Lands - Field

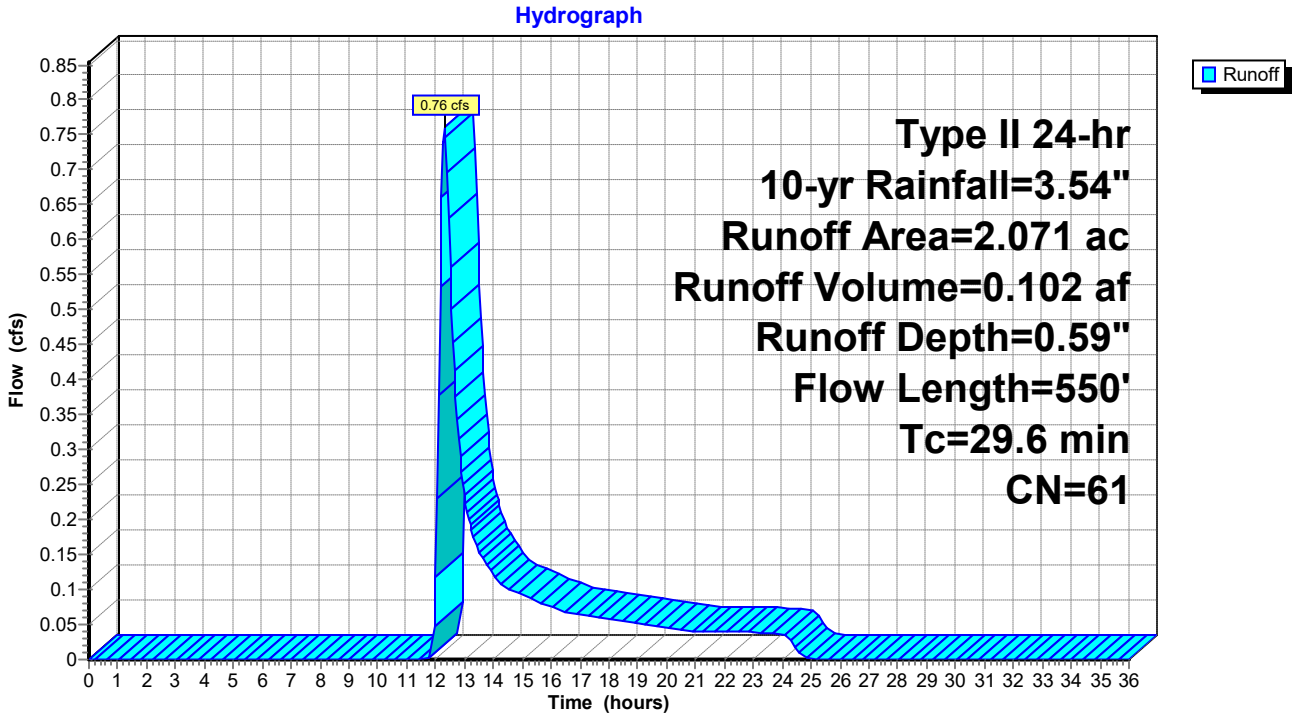
Runoff = 0.76 cfs @ 12.30 hrs, Volume= 0.102 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.54"

Area (ac)	CN	Description
2.071	61	>75% Grass cover, Good, HSG B
2.071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	300	0.0200	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.52"
3.0	250	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
29.6	550	Total			

Subcatchment 3S: State Lands - Field



Summary for Subcatchment 4S: Residential area adjacent to Beach Rd. and State Lands

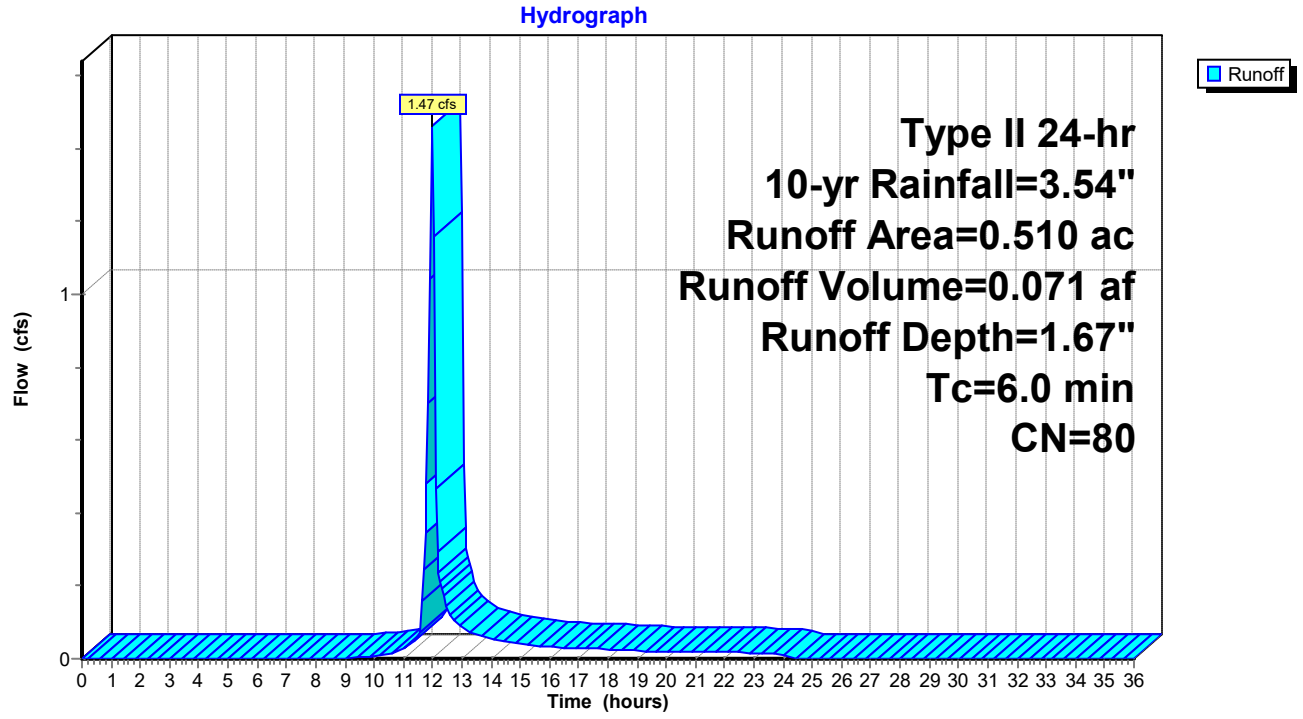
Runoff = 1.47 cfs @ 11.97 hrs, Volume= 0.071 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.54"

	Area (ac)	CN	Description
	0.255	61	>75% Grass cover, Good, HSG B
*	0.255	98	Impervious areas, including roofs, driveways, road, etc.
	0.510	80	Weighted Average
	0.255		50.00% Pervious Area
	0.255		50.00% Impervious Area

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

Subcatchment 4S: Residential area adjacent to Beach Rd. and State Lands



Summary for Pond 1P: Beatty Roadside Swale

Inflow Area = 6.030 ac, 60.00% Impervious, Inflow Depth = 2.13" for 10-yr event
Inflow = 12.33 cfs @ 12.19 hrs, Volume= 1.072 af
Outflow = 13.46 cfs @ 12.20 hrs, Volume= 1.072 af, Atten= 0%, Lag= 0.5 min
Discarded = 0.68 cfs @ 12.05 hrs, Volume= 0.178 af
Primary = 12.79 cfs @ 12.20 hrs, Volume= 0.894 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 334.80' @ 12.20 hrs Surf.Area= 0.045 ac Storage= 0.040 af

Plug-Flow detention time= 6.4 min calculated for 1.071 af (100% of inflow)
Center-of-Mass det. time= 6.5 min (839.7 - 833.2)

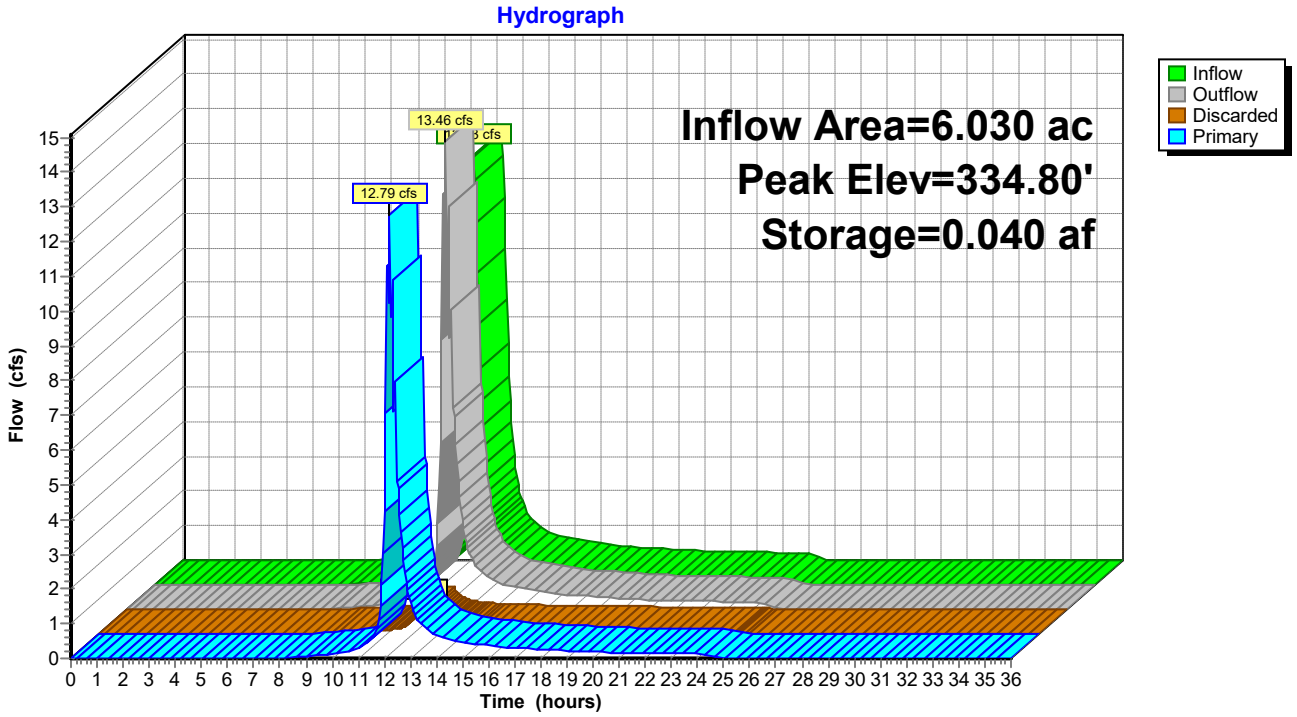
Volume	Invert	Avail.Storage	Storage Description
#1	333.00'	0.040 af	**2.00'W x 750.00'L x 1.00'H Prismatoid Z=0.3**

Device	Routing	Invert	Outlet Devices
#1	Primary	333.00'	**2.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	333.00'	**65.000 in/hr Exfiltration over Surface area above 333.00'** Excluded Surface area = 0.034 ac

Discarded OutFlow Max=0.68 cfs @ 12.05 hrs HW=334.20' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.68 cfs)

Primary OutFlow Max=12.69 cfs @ 12.20 hrs HW=334.79' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 12.69 cfs @ 3.54 fps)

Pond 1P: Beatty Roadside Swale



Summary for Pond 2P: Cedar Roadside Swale

Inflow Area = 4.430 ac, 60.05% Impervious, Inflow Depth = 2.13" for 10-yr event
Inflow = 7.81 cfs @ 12.27 hrs, Volume= 0.788 af
Outflow = 8.87 cfs @ 12.25 hrs, Volume= 0.788 af, Atten= 0%, Lag= 0.0 min
Discarded = 1.12 cfs @ 12.10 hrs, Volume= 0.292 af
Primary = 7.75 cfs @ 12.25 hrs, Volume= 0.496 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 328.04' @ 12.25 hrs Surf.Area= 0.034 ac Storage= 0.026 af

Plug-Flow detention time= 4.9 min calculated for 0.787 af (100% of inflow)
Center-of-Mass det. time= 4.9 min (844.4 - 839.4)

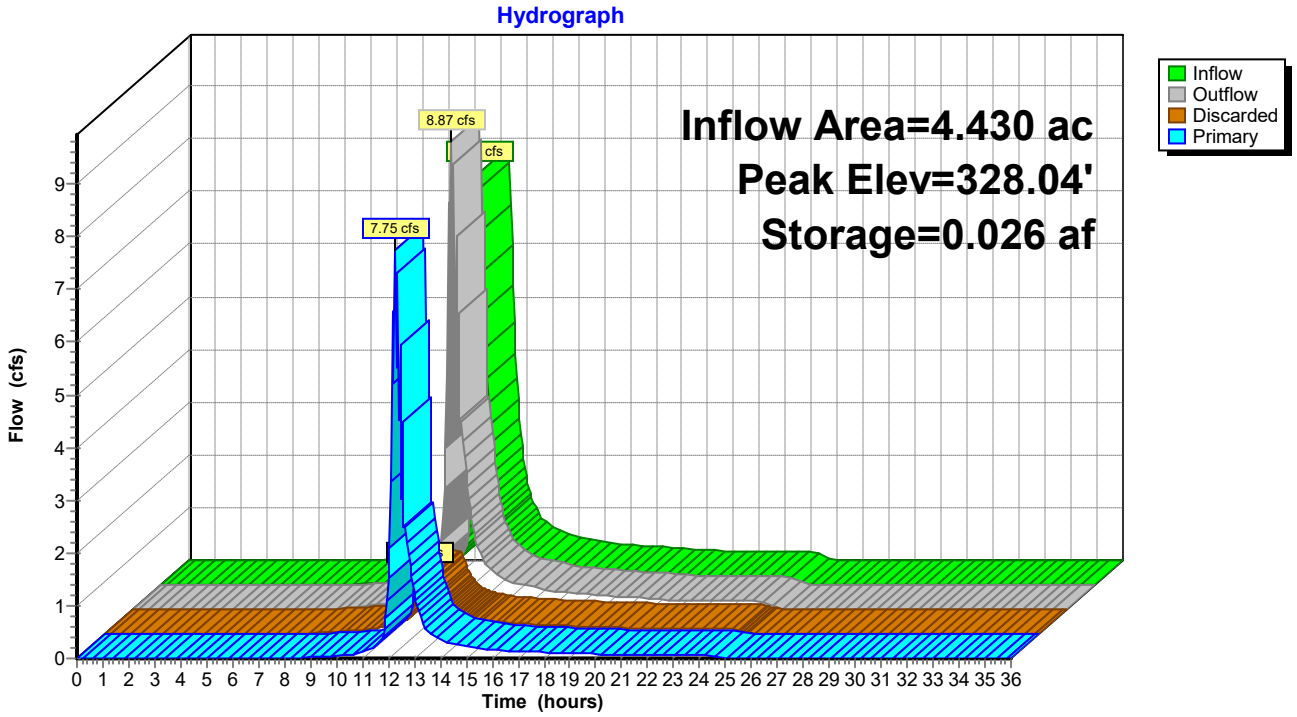
Volume	Invert	Avail.Storage	Storage Description
#1	326.00'	0.026 af	**1.00'W x 745.00'L x 1.00'H Prismatoid Z=0.5**

Device	Routing	Invert	Outlet Devices
#1	Primary	326.00'	**1.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	326.00'	**65.000 in/hr Exfiltration over Surface area above 326.00'** Excluded Surface area = 0.017 ac

Discarded OutFlow Max=1.12 cfs @ 12.10 hrs HW=327.16' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 1.12 cfs)

Primary OutFlow Max=7.67 cfs @ 12.25 hrs HW=328.03' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 7.67 cfs @ 3.78 fps)

Pond 2P: Cedar Roadside Swale



Summary for Pond 3P: Catch Basin

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 1.67" for 10-yr event
Inflow = 1.47 cfs @ 11.97 hrs, Volume= 0.071 af
Outflow = 1.47 cfs @ 11.97 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min
Primary = 1.47 cfs @ 11.97 hrs, Volume= 0.071 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

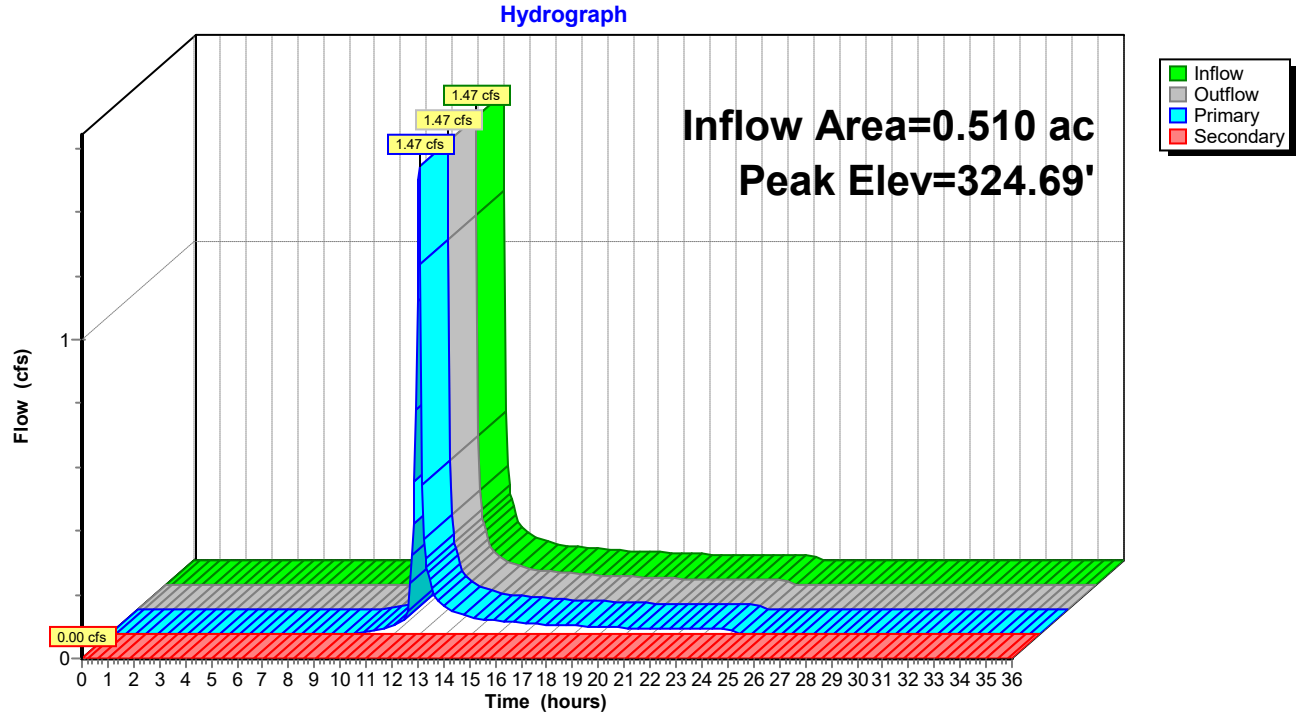
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 324.69' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	326.41'	**1.0" x 1.2" Horiz. Orifice/Grate** X 10 rows C= 0.600 Limited to weir flow at low heads
#2	Primary	323.80'	**12.0" Round Culvert** L= 20.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 323.80' / 323.68' S= 0.0059 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.42 cfs @ 11.97 hrs HW=324.67' TW=322.75' (Dynamic Tailwater)
└**2=Culvert** (Barrel Controls 1.42 cfs @ 2.62 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=323.80' TW=319.29' (Dynamic Tailwater)
└**1=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P: Catch Basin



Summary for Pond 4P: Drywells (x4)

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 1.67" for 10-yr event
Inflow = 1.47 cfs @ 11.97 hrs, Volume= 0.071 af
Outflow = 0.78 cfs @ 12.07 hrs, Volume= 0.071 af, Atten= 47%, Lag= 5.6 min
Discarded = 0.78 cfs @ 12.07 hrs, Volume= 0.071 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 323.37' @ 12.07 hrs Surf.Area= 0.014 ac Storage= 0.015 af

Plug-Flow detention time= 9.7 min calculated for 0.071 af (100% of inflow)
Center-of-Mass det. time= 9.7 min (844.1 - 834.4)

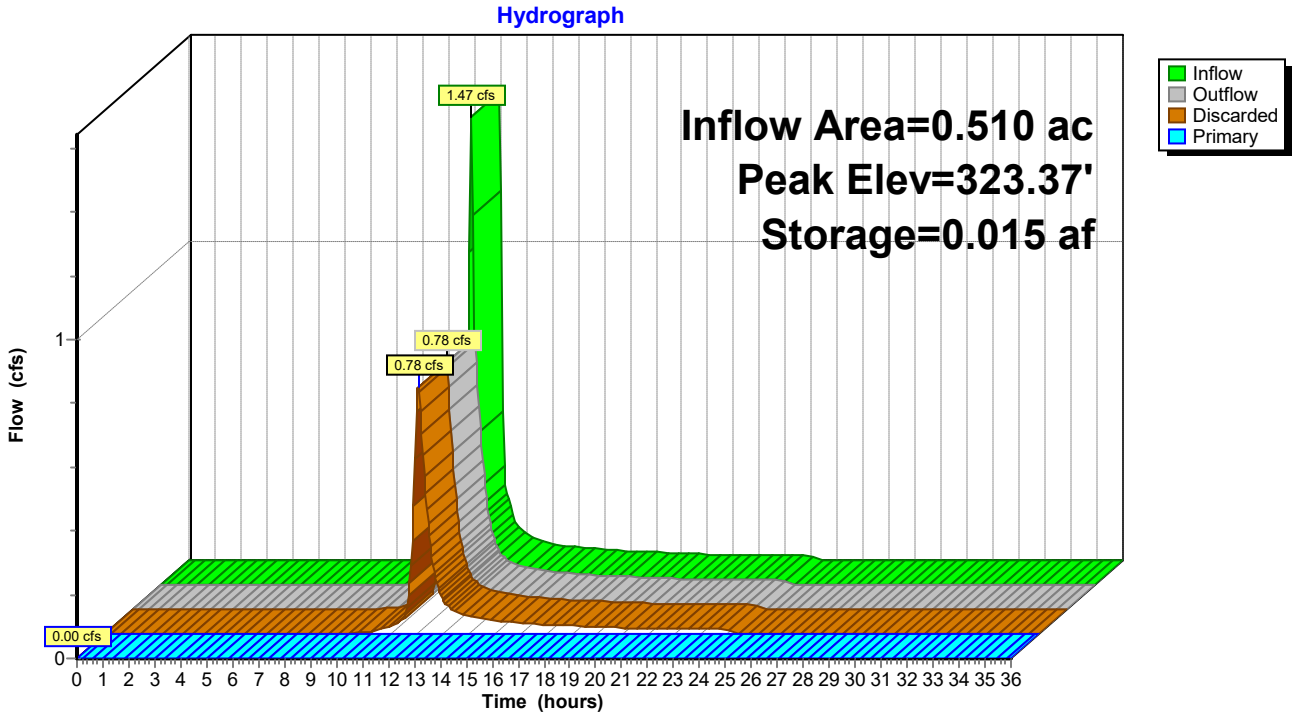
Volume	Invert	Avail.Storage	Storage Description
#1	320.29'	0.005 af	**4.00'D x 4.00'H Vertical Cone/Cylinder** x 4 Inside #2
#2	319.29'	0.017 af	**6.00'D x 5.00'H Vertical Cone/Cylinder Z=1.0** x 4 0.047 af Overall - 0.005 af Embedded = 0.042 af x 40.0% Voids
		0.021 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	325.29'	**1.0" x 2.0" Horiz. Orifice/Grate** X 15 rows C= 0.600 Limited to weir flow at low heads
#2	Discarded	319.29'	**65.000 in/hr Exfiltration over Surface area above 319.29'** Excluded Surface area = 0.003 ac

Discarded OutFlow Max=0.77 cfs @ 12.07 hrs HW=323.33' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.77 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=319.29' TW=0.00' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Controls 0.00 cfs)

Pond 4P: Drywells (x4)

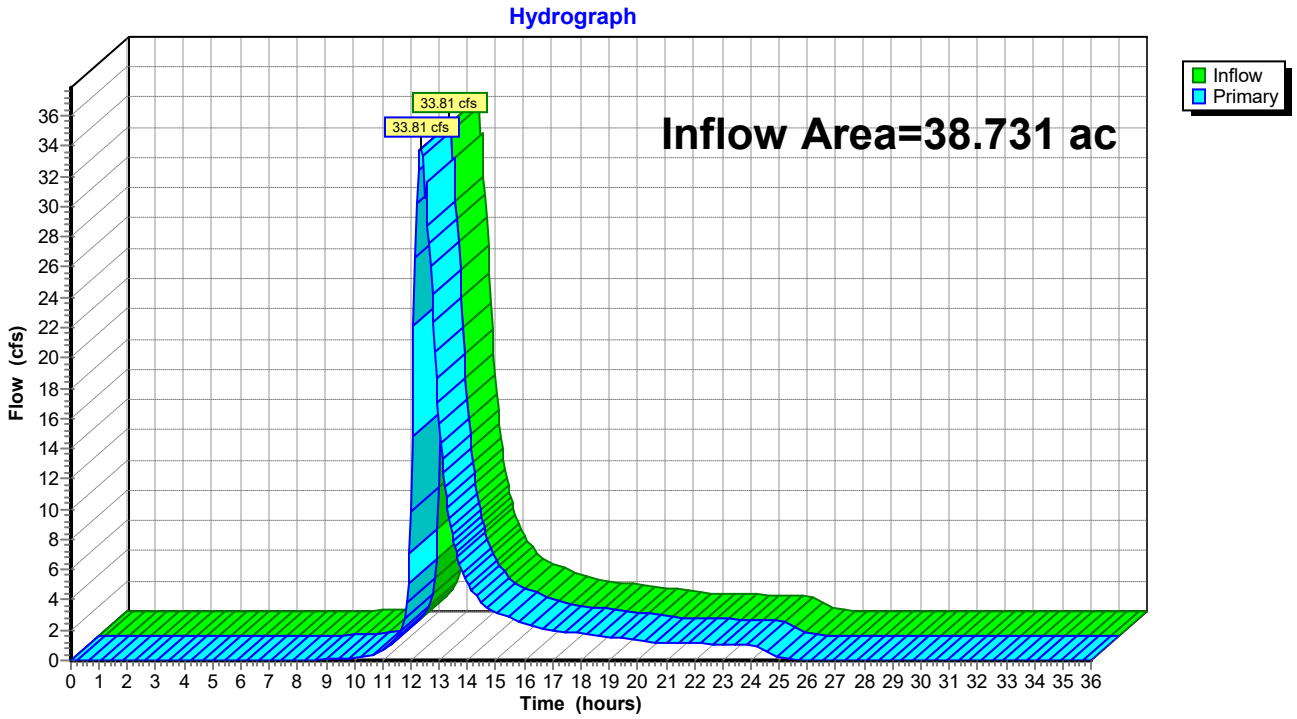


Summary for Link 1L: Wetland

Inflow Area = 38.731 ac, 49.77% Impervious, Inflow Depth = 1.45" for 10-yr event
Inflow = 33.81 cfs @ 12.33 hrs, Volume= 4.681 af
Primary = 33.81 cfs @ 12.33 hrs, Volume= 4.681 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 1L: Wetland

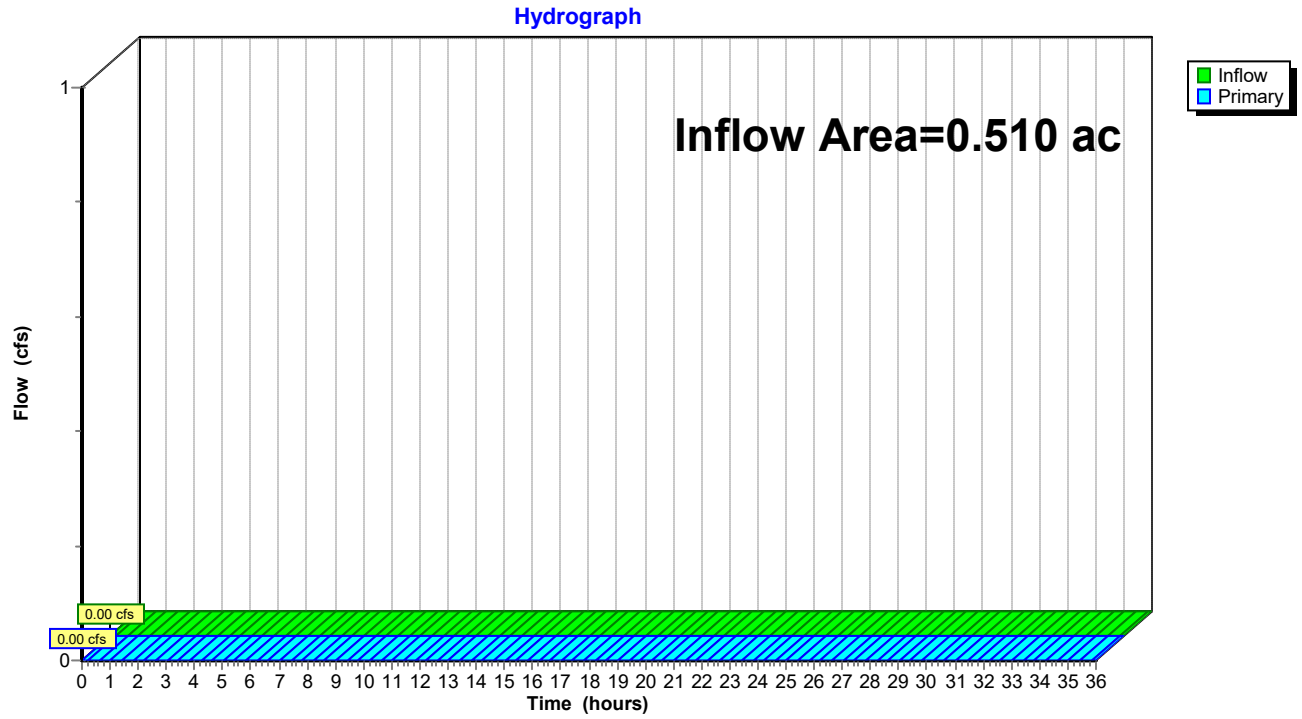


Summary for Link 2L: Beach Rd Catch Basin

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 0.00" for 10-yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2L: Beach Rd Catch Basin



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Mockingbird Hill and Runoff Area=26.200 ac 49.62% Impervious Runoff Depth=2.05"
Flow Length=3,400' Tc=51.6 min CN=77 Runoff=31.50 cfs 4.474 af

Subcatchment 2S-A: Beatty Road, Runoff Area=6.030 ac 60.00% Impervious Runoff Depth=2.82"
Flow Length=800' Tc=25.5 min CN=86 Runoff=16.24 cfs 1.417 af

Subcatchment 2S-B: Cedar Lane and Runoff Area=4.430 ac 60.05% Impervious Runoff Depth=2.82"
Flow Length=990' Tc=32.2 min CN=86 Runoff=10.30 cfs 1.041 af

Subcatchment 3S: State Lands - Field Runoff Area=2.071 ac 0.00% Impervious Runoff Depth=0.97"
Flow Length=550' Tc=29.6 min CN=61 Runoff=1.45 cfs 0.167 af

Subcatchment 4S: Residential area Runoff Area=0.510 ac 50.00% Impervious Runoff Depth=2.29"
Tc=6.0 min CN=80 Runoff=2.01 cfs 0.097 af

Pond 1P: Beatty Roadside Swale Peak Elev=335.13' Storage=0.040 af Inflow=16.24 cfs 1.417 af
Discarded=0.68 cfs 0.212 af Primary=16.42 cfs 1.205 af Outflow=17.10 cfs 1.417 af

Pond 2P: Cedar Roadside Swale Peak Elev=328.39' Storage=0.026 af Inflow=10.30 cfs 1.041 af
Discarded=1.12 cfs 0.350 af Primary=9.82 cfs 0.691 af Outflow=10.94 cfs 1.041 af

Pond 3P: Catch Basin Peak Elev=324.90' Inflow=2.01 cfs 0.097 af
Primary=2.01 cfs 0.097 af Secondary=0.00 cfs 0.000 af Outflow=2.01 cfs 0.097 af

Pond 4P: Drywells (x4) Peak Elev=324.26' Storage=0.021 af Inflow=2.01 cfs 0.097 af
Discarded=1.03 cfs 0.097 af Primary=0.00 cfs 0.000 af Outflow=1.03 cfs 0.097 af

Link 1L: Wetland Inflow=48.36 cfs 6.537 af
Primary=48.36 cfs 6.537 af

Link 2L: Beach Rd Catch Basin Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 39.241 ac Runoff Volume = 7.197 af Average Runoff Depth = 2.20"
50.22% Pervious = 19.708 ac 49.78% Impervious = 19.533 ac

Summary for Subcatchment 1S: Mockingbird Hill and surrounding areas

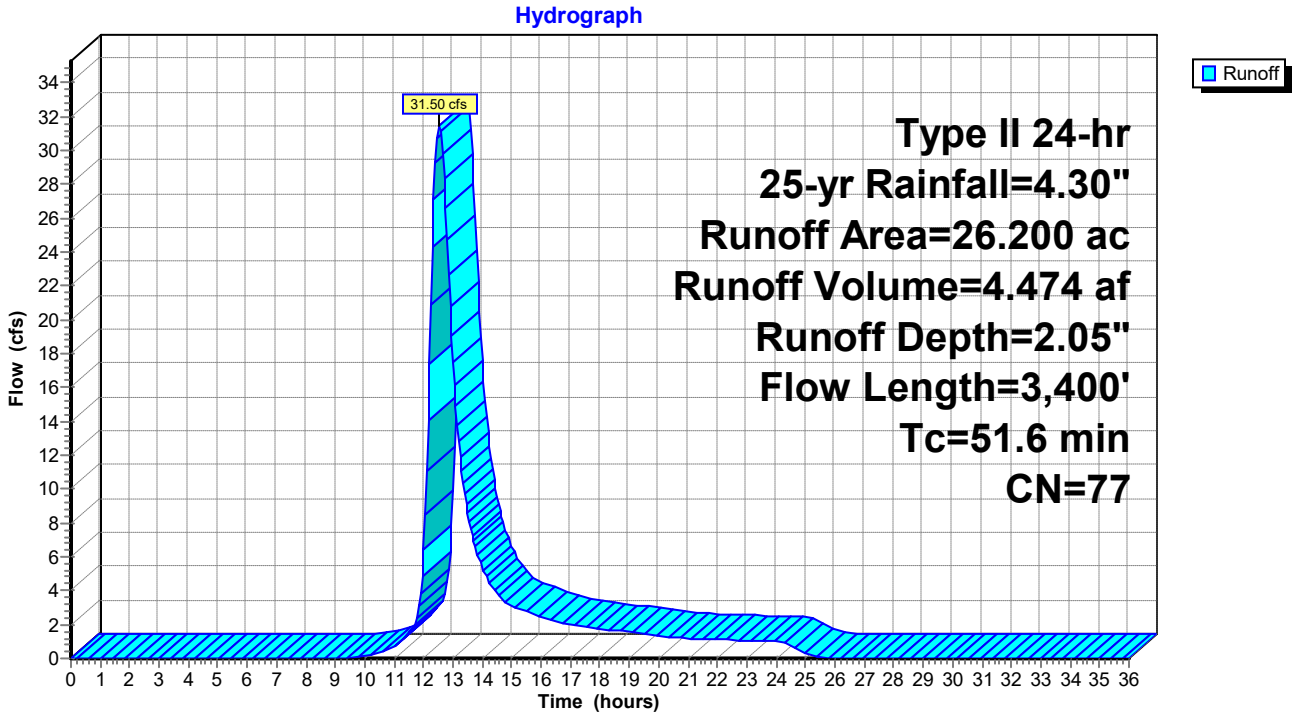
Runoff = 31.50 cfs @ 12.53 hrs, Volume= 4.474 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.30"

	Area (ac)	CN	Description
	11.500	55	Woods, Good, HSG B
*	13.000	98	Impervious areas, including roofs, driveways, and roads
	1.700	69	50-75% Grass cover, Fair, HSG B
	26.200	77	Weighted Average
	13.200		50.38% Pervious Area
	13.000		49.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.4	300	0.2000	0.12		**Sheet Flow, Through woods** Woods: Dense underbrush n= 0.800 P2= 2.52"
4.7	450	0.1000	1.58		**Shallow Concentrated Flow, Through backyard to road** Woodland Kv= 5.0 fps
2.6	1,000	0.1000	6.42		**Shallow Concentrated Flow, Flow down road** Paved Kv= 20.3 fps
1.3	650	0.0500	8.37	26.30	**Pipe Channel, Existing storm sewer along Bloody Pond Rd to Gar** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
0.9	370	0.0500	6.86	41.14	**Trap/Vee/Rect Channel Flow, Swale around Garrison parking lot** Bot.W=2.00' D=3.00' n= 0.040 Earth, cobble bottom, clean sides
0.1	90	0.0200	11.03	34.66	**Pipe Channel, Existing storm sewer, 24" RCP** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.9	180	0.0400	3.42	25.63	**Trap/Vee/Rect Channel Flow, Overgrown Swale** Bot.W=2.50' D=3.00' n= 0.080
0.7	360	0.0400	8.69	42.66	**Pipe Channel, Existing Storm Sewer, 30" CMP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.025
51.6	3,400	Total			

Subcatchment 1S: Mockingbird Hill and surrounding areas



Summary for Subcatchment 2S-A: Beatty Road, Residential Areas, Garrison Restaurant

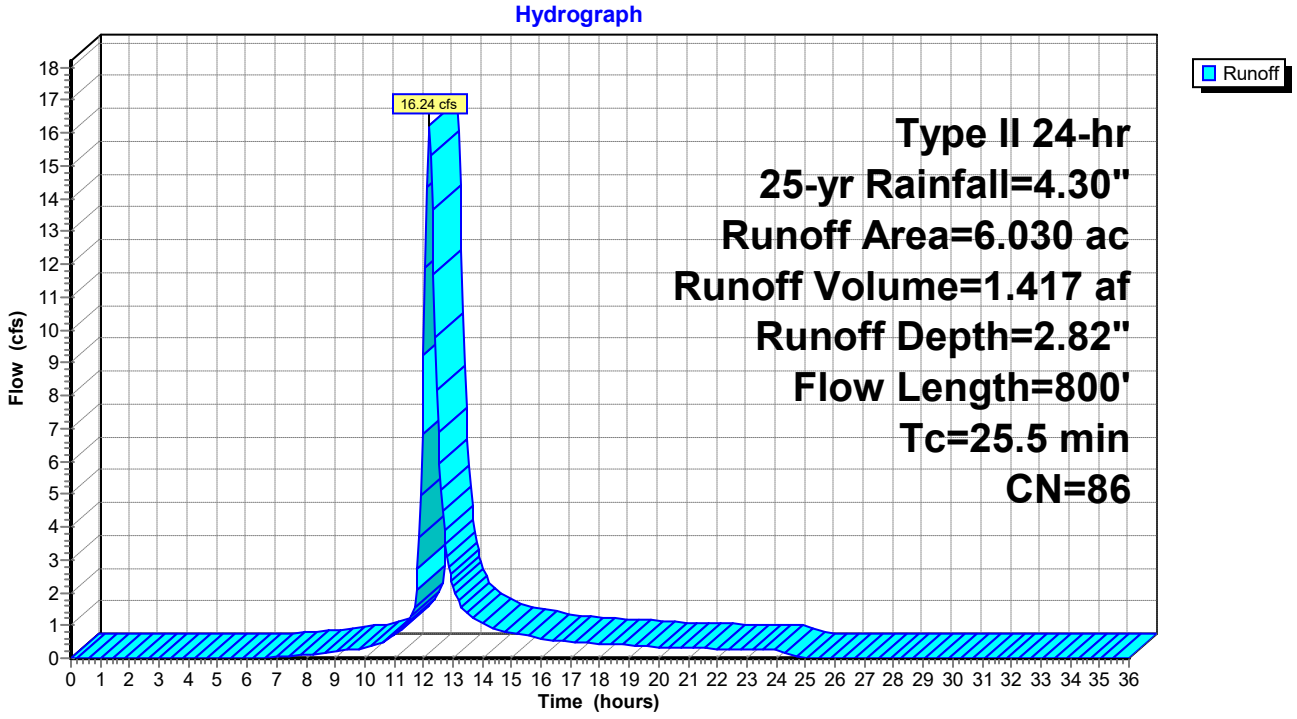
Runoff = 16.24 cfs @ 12.19 hrs, Volume= 1.417 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.30"

	Area (ac)	CN	Description
*	3.618	98	Road, drives, house roofs
	2.412	69	50-75% Grass cover, Fair, HSG B
	6.030	86	Weighted Average
	2.412		40.00% Pervious Area
	3.618		60.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	100	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.52"
0.3	50	0.0400	3.22		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.0	650	0.0700	10.72	24.65	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 0.3 '/' Top.W=2.60' n= 0.025
25.5	800	Total			

Subcatchment 2S-A: Beatty Road, Residential Areas, Garrison Restaurant



Summary for Subcatchment 2S-B: Cedar Lane and Residential Areas

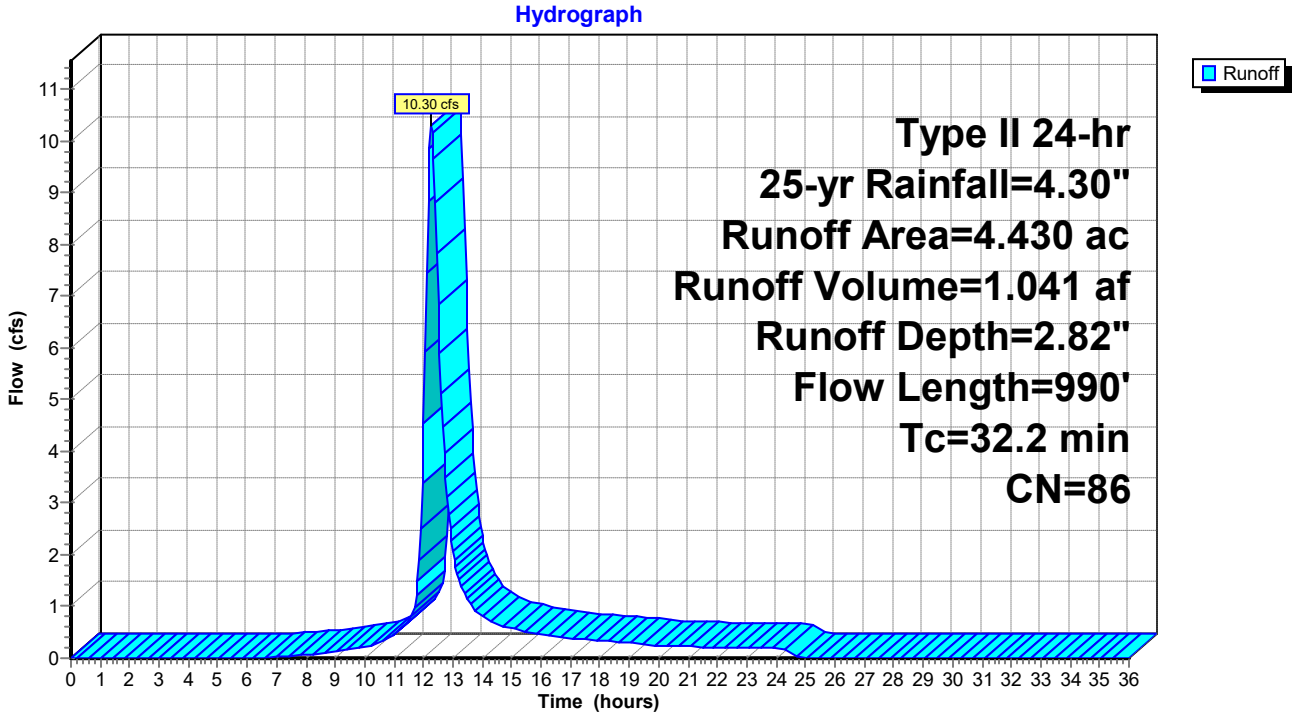
Runoff = 10.30 cfs @ 12.26 hrs, Volume= 1.041 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.30"

	Area (ac)	CN	Description
*	2.660	98	Road, driveways, house roofs
	1.770	69	50-75% Grass cover, Fair, HSG B
	4.430	86	Weighted Average
	1.770		39.95% Pervious Area
	2.660		60.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	130	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.52"
0.3	115	0.1300	7.32		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.1	745	0.0400	5.93	8.90	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=1.00' Z= 0.5 '/' Top.W=2.00' n= 0.030
32.2	990	Total			

Subcatchment 2S-B: Cedar Lane and Residential Areas



Summary for Subcatchment 3S: State Lands - Field

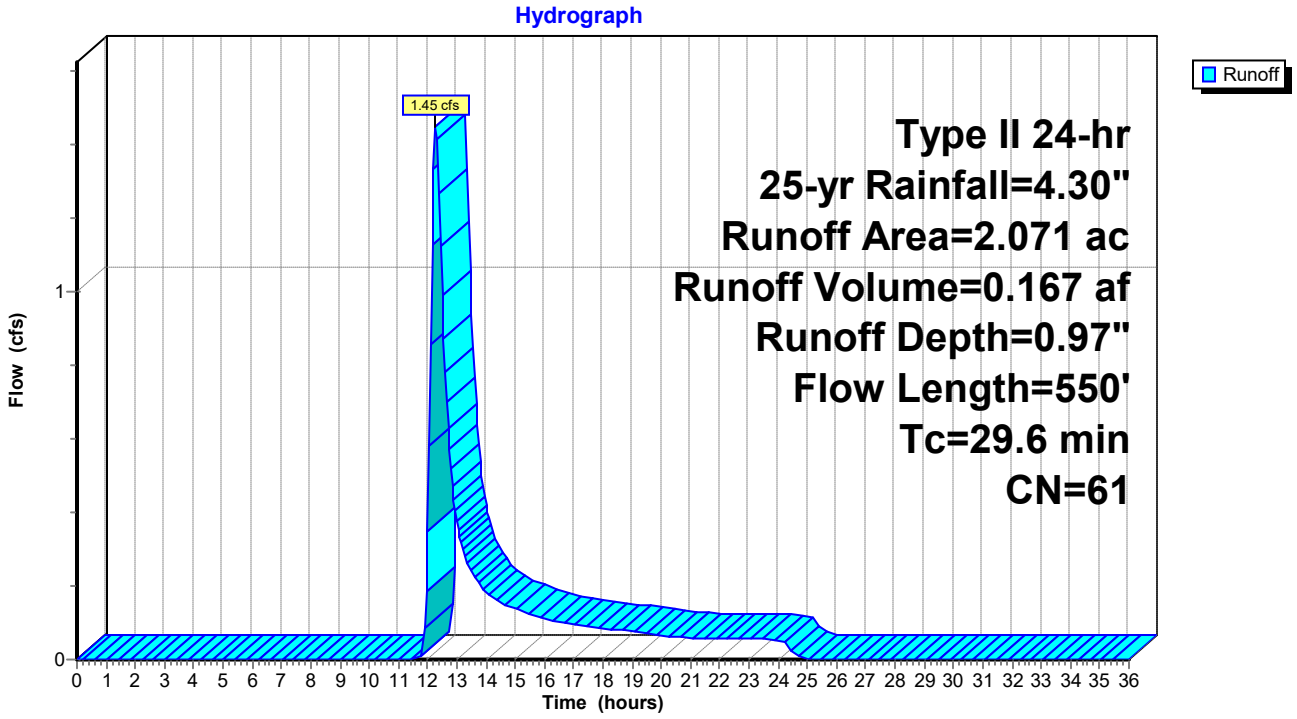
Runoff = 1.45 cfs @ 12.28 hrs, Volume= 0.167 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.30"

Area (ac)	CN	Description
2.071	61	>75% Grass cover, Good, HSG B
2.071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	300	0.0200	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.52"
3.0	250	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
29.6	550	Total			

Subcatchment 3S: State Lands - Field



Summary for Subcatchment 4S: Residential area adjacent to Beach Rd. and State Lands

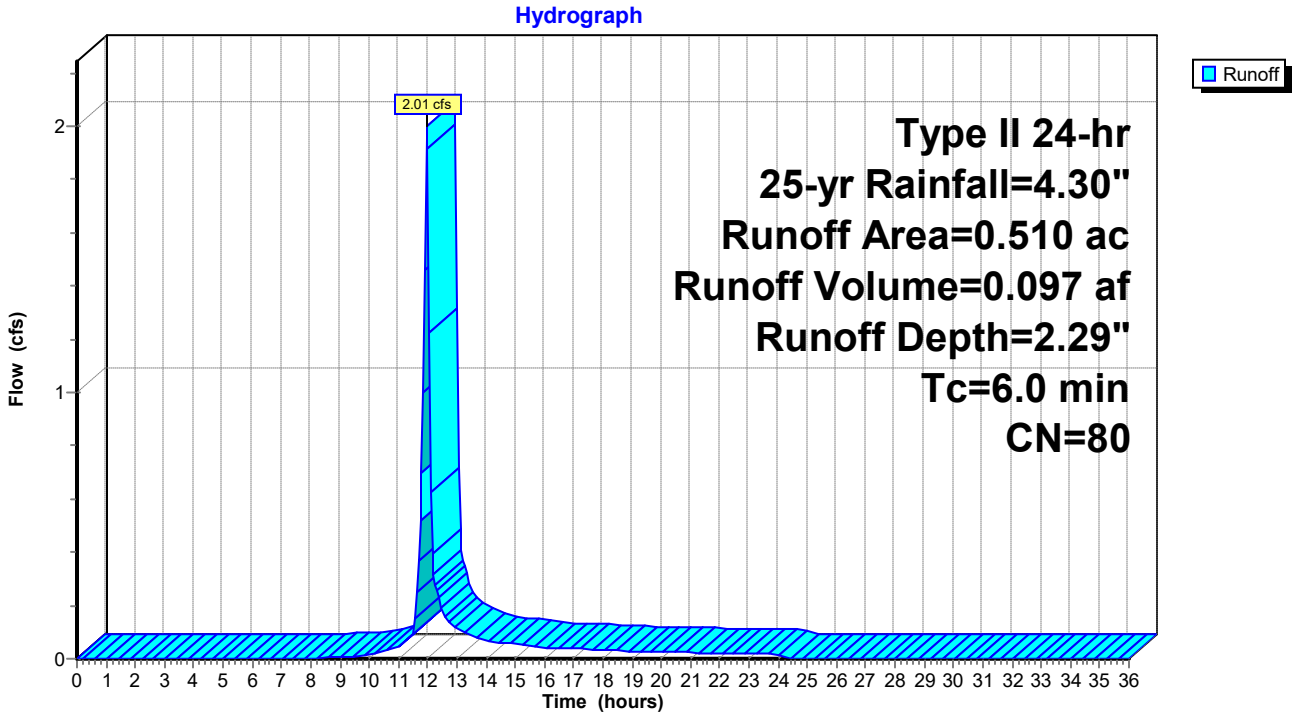
Runoff = 2.01 cfs @ 11.97 hrs, Volume= 0.097 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.30"

	Area (ac)	CN	Description
	0.255	61	>75% Grass cover, Good, HSG B
*	0.255	98	Impervious areas, including roofs, driveways, road, etc.
	0.510	80	Weighted Average
	0.255		50.00% Pervious Area
	0.255		50.00% Impervious Area

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

Subcatchment 4S: Residential area adjacent to Beach Rd. and State Lands



Summary for Pond 1P: Beatty Roadside Swale

Inflow Area = 6.030 ac, 60.00% Impervious, Inflow Depth = 2.82" for 25-yr event
Inflow = 16.24 cfs @ 12.19 hrs, Volume= 1.417 af
Outflow = 17.10 cfs @ 12.16 hrs, Volume= 1.417 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.68 cfs @ 12.00 hrs, Volume= 0.212 af
Primary = 16.42 cfs @ 12.16 hrs, Volume= 1.205 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 335.13' @ 12.16 hrs Surf.Area= 0.045 ac Storage= 0.040 af

Plug-Flow detention time= 6.2 min calculated for 1.417 af (100% of inflow)
Center-of-Mass det. time= 5.8 min (831.1 - 825.3)

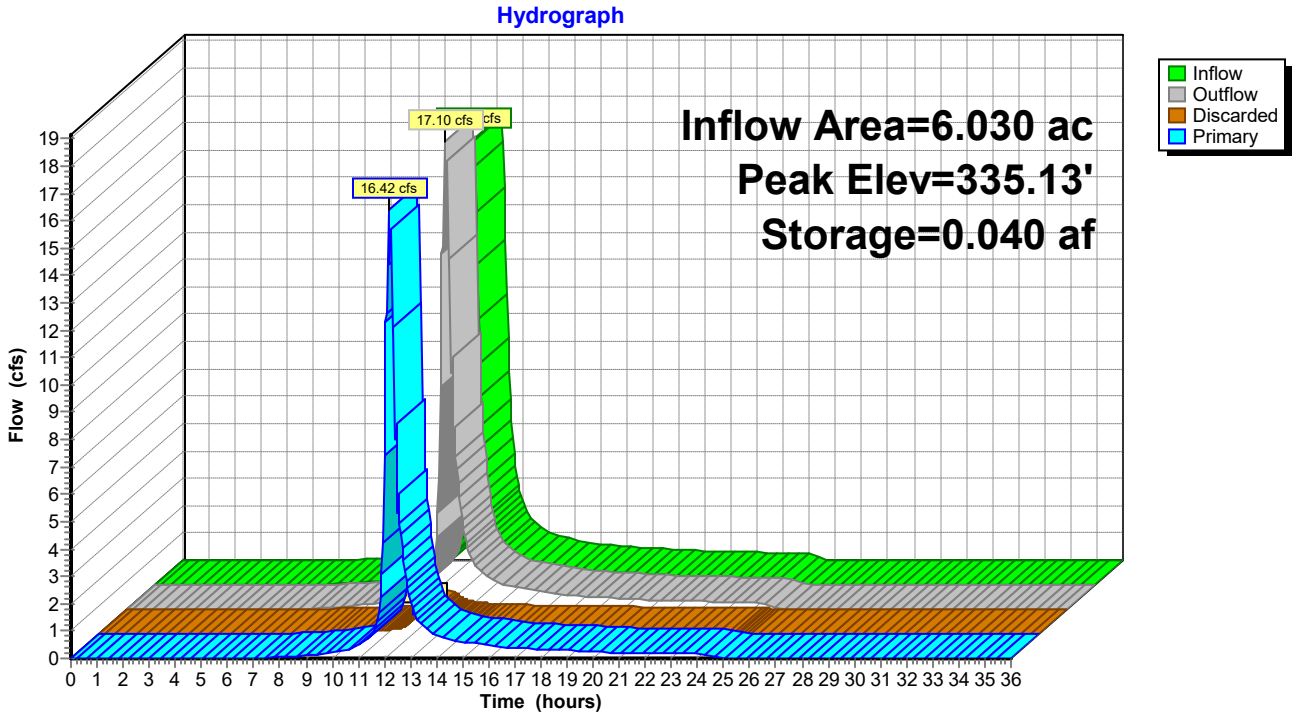
Volume	Invert	Avail.Storage	Storage Description
#1	333.00'	0.040 af	**2.00'W x 750.00'L x 1.00'H Prismatoid Z=0.3**

Device	Routing	Invert	Outlet Devices
#1	Primary	333.00'	**2.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	333.00'	**65.000 in/hr Exfiltration over Surface area above 333.00'** Excluded Surface area = 0.034 ac

Discarded OutFlow Max=0.68 cfs @ 12.00 hrs HW=334.25' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.68 cfs)

Primary OutFlow Max=16.03 cfs @ 12.16 hrs HW=335.10' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 16.03 cfs @ 3.82 fps)

Pond 1P: Beatty Roadside Swale



Summary for Pond 2P: Cedar Roadside Swale

Inflow Area = 4.430 ac, 60.05% Impervious, Inflow Depth = 2.82" for 25-yr event
Inflow = 10.30 cfs @ 12.26 hrs, Volume= 1.041 af
Outflow = 10.94 cfs @ 12.30 hrs, Volume= 1.041 af, Atten= 0%, Lag= 1.8 min
Discarded = 1.12 cfs @ 12.05 hrs, Volume= 0.350 af
Primary = 9.82 cfs @ 12.30 hrs, Volume= 0.691 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 328.39' @ 12.30 hrs Surf.Area= 0.034 ac Storage= 0.026 af

Plug-Flow detention time= 4.5 min calculated for 1.039 af (100% of inflow)
Center-of-Mass det. time= 4.5 min (836.0 - 831.5)

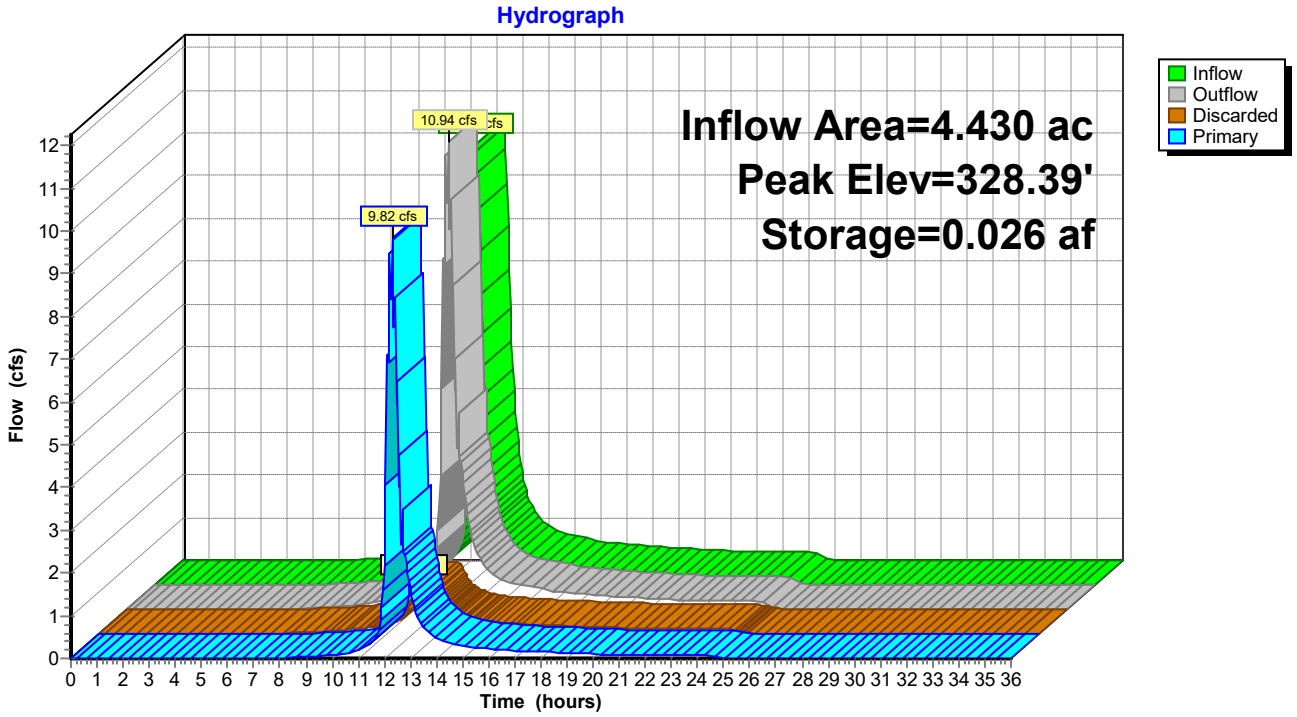
Volume	Invert	Avail.Storage	Storage Description
#1	326.00'	0.026 af	**1.00'W x 745.00'L x 1.00'H Prismatoid Z=0.5**

Device	Routing	Invert	Outlet Devices
#1	Primary	326.00'	**1.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	326.00'	**65.000 in/hr Exfiltration over Surface area above 326.00'** Excluded Surface area = 0.017 ac

Discarded OutFlow Max=1.12 cfs @ 12.05 hrs HW=327.32' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 1.12 cfs)

Primary OutFlow Max=9.67 cfs @ 12.30 hrs HW=328.36' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 9.67 cfs @ 4.09 fps)

Pond 2P: Cedar Roadside Swale



Summary for Pond 3P: Catch Basin

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 2.29" for 25-yr event
Inflow = 2.01 cfs @ 11.97 hrs, Volume= 0.097 af
Outflow = 2.01 cfs @ 11.97 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.0 min
Primary = 2.01 cfs @ 11.97 hrs, Volume= 0.097 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

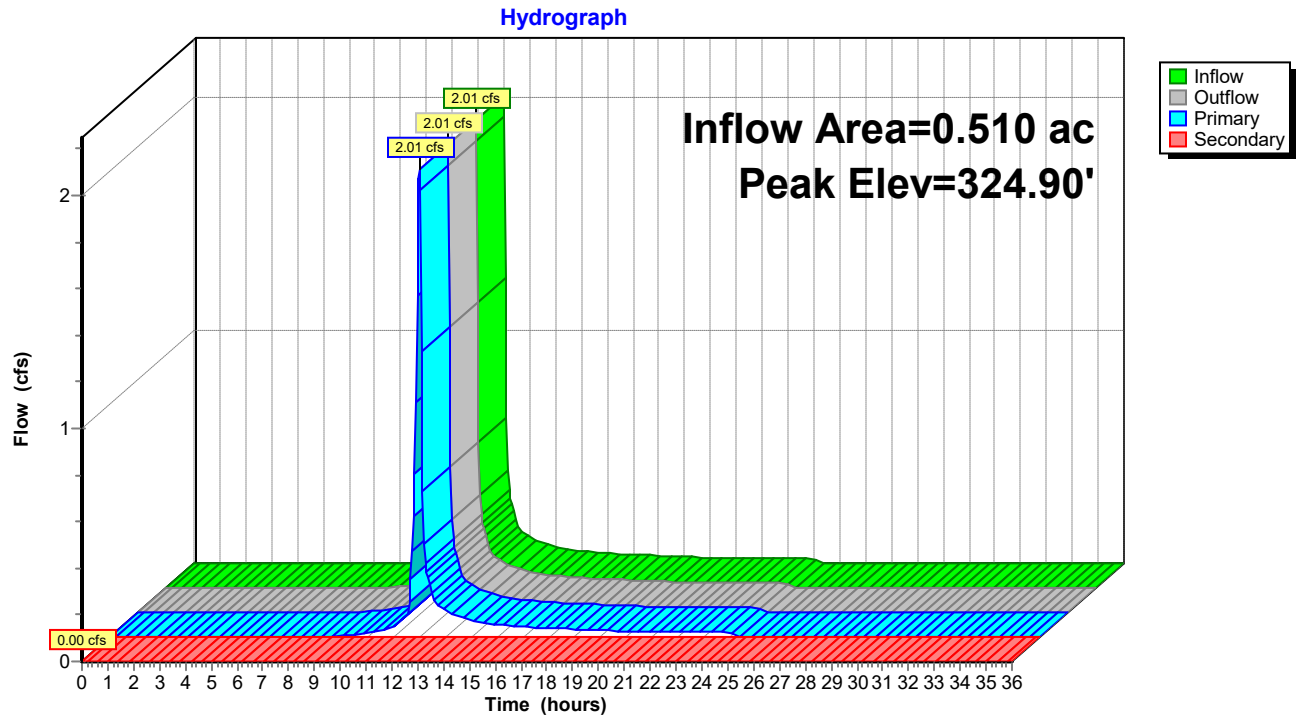
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 324.90' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	326.41'	**1.0" x 1.2" Horiz. Orifice/Grate** X 10 rows C= 0.600 Limited to weir flow at low heads
#2	Primary	323.80'	**12.0" Round Culvert** L= 20.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 323.80' / 323.68' S= 0.0059 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.94 cfs @ 11.97 hrs HW=324.88' TW=323.54' (Dynamic Tailwater)
└**2=Culvert** (Barrel Controls 1.94 cfs @ 2.86 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=323.80' TW=319.29' (Dynamic Tailwater)
└**1=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P: Catch Basin



Summary for Pond 4P: Drywells (x4)

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 2.29" for 25-yr event
Inflow = 2.01 cfs @ 11.97 hrs, Volume= 0.097 af
Outflow = 1.03 cfs @ 12.07 hrs, Volume= 0.097 af, Atten= 49%, Lag= 5.8 min
Discarded = 1.03 cfs @ 12.07 hrs, Volume= 0.097 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 324.26' @ 12.07 hrs Surf.Area= 0.018 ac Storage= 0.021 af

Plug-Flow detention time= 10.3 min calculated for 0.097 af (100% of inflow)
Center-of-Mass det. time= 10.3 min (835.6 - 825.3)

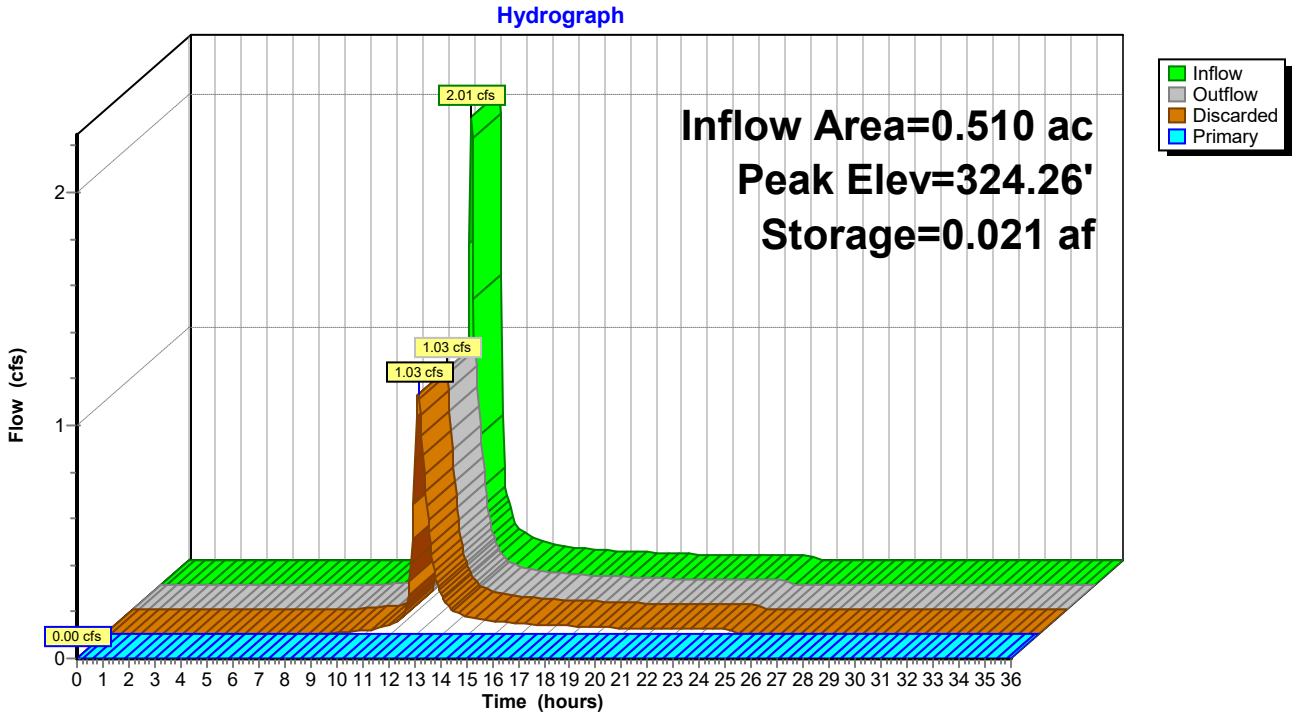
Volume	Invert	Avail.Storage	Storage Description
#1	320.29'	0.005 af	**4.00'D x 4.00'H Vertical Cone/Cylinder** x 4 Inside #2
#2	319.29'	0.017 af	**6.00'D x 5.00'H Vertical Cone/Cylinder Z=1.0** x 4 0.047 af Overall - 0.005 af Embedded = 0.042 af x 40.0% Voids
		0.021 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	325.29'	**1.0" x 2.0" Horiz. Orifice/Grate** X 15 rows C= 0.600 Limited to weir flow at low heads
#2	Discarded	319.29'	**65.000 in/hr Exfiltration over Surface area above 319.29'** Excluded Surface area = 0.003 ac

Discarded OutFlow Max=1.02 cfs @ 12.07 hrs HW=324.22' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 1.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=319.29' TW=0.00' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Controls 0.00 cfs)

Pond 4P: Drywells (x4)

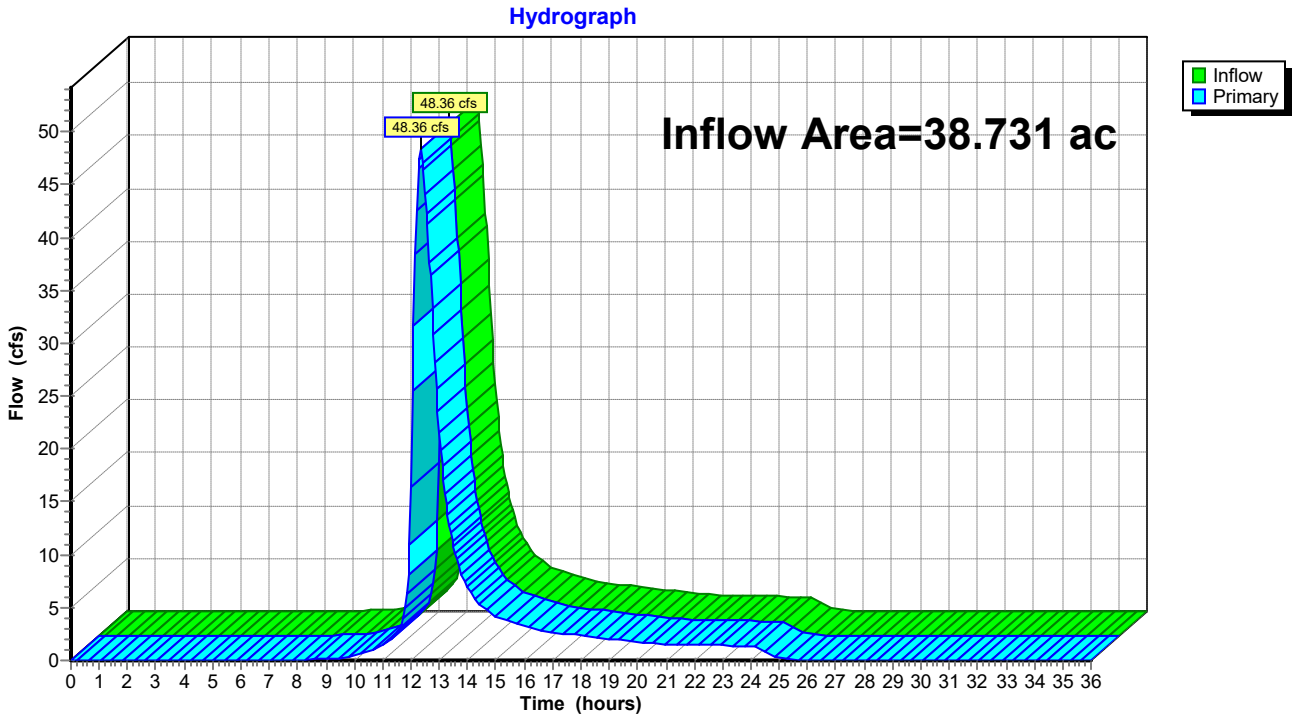


Summary for Link 1L: Wetland

Inflow Area = 38.731 ac, 49.77% Impervious, Inflow Depth = 2.03" for 25-yr event
Inflow = 48.36 cfs @ 12.35 hrs, Volume= 6.537 af
Primary = 48.36 cfs @ 12.35 hrs, Volume= 6.537 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 1L: Wetland

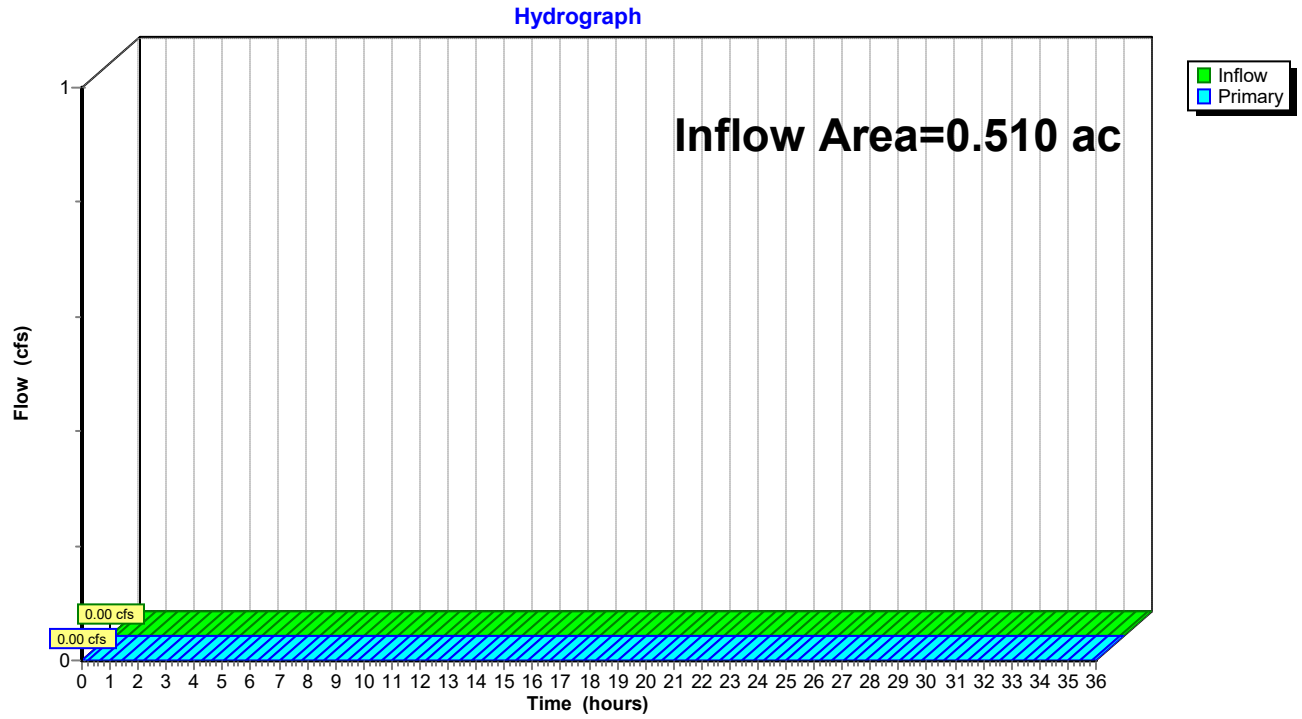


Summary for Link 2L: Beach Rd Catch Basin

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 0.00" for 25-yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2L: Beach Rd Catch Basin



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Mockingbird Hill and Runoff Area=26.200 ac 49.62% Impervious Runoff Depth=3.29"
Flow Length=3,400' Tc=51.6 min CN=77 Runoff=51.19 cfs 7.178 af

Subcatchment 2S-A: Beatty Road, Runoff Area=6.030 ac 60.00% Impervious Runoff Depth=4.20"
Flow Length=800' Tc=25.5 min CN=86 Runoff=23.93 cfs 2.111 af

Subcatchment 2S-B: Cedar Lane and Runoff Area=4.430 ac 60.05% Impervious Runoff Depth=4.20"
Flow Length=990' Tc=32.2 min CN=86 Runoff=15.21 cfs 1.551 af

Subcatchment 3S: State Lands - Field Runoff Area=2.071 ac 0.00% Impervious Runoff Depth=1.86"
Flow Length=550' Tc=29.6 min CN=61 Runoff=3.13 cfs 0.321 af

Subcatchment 4S: Residential area Runoff Area=0.510 ac 50.00% Impervious Runoff Depth=3.58"
Tc=6.0 min CN=80 Runoff=3.09 cfs 0.152 af

Pond 1P: Beatty Roadside Swale Peak Elev=335.74' Storage=0.040 af Inflow=23.93 cfs 2.111 af
Discarded=0.68 cfs 0.273 af Primary=24.09 cfs 1.838 af Outflow=24.77 cfs 2.111 af

Pond 2P: Cedar Roadside Swale Peak Elev=329.17' Storage=0.026 af Inflow=15.21 cfs 1.551 af
Discarded=1.12 cfs 0.455 af Primary=15.05 cfs 1.096 af Outflow=16.17 cfs 1.551 af

Pond 3P: Catch Basin Peak Elev=333.01' Inflow=3.09 cfs 0.152 af
Primary=3.04 cfs 0.150 af Secondary=0.36 cfs 0.002 af Outflow=3.09 cfs 0.152 af

Pond 4P: Drywells (x4) Peak Elev=332.69' Storage=0.021 af Inflow=3.09 cfs 0.152 af
Discarded=1.04 cfs 0.133 af Primary=2.76 cfs 0.019 af Outflow=3.80 cfs 0.152 af

Link 1L: Wetland Inflow=77.20 cfs 10.433 af
Primary=77.20 cfs 10.433 af

Link 2L: Beach Rd Catch Basin Inflow=2.76 cfs 0.019 af
Primary=2.76 cfs 0.019 af

Total Runoff Area = 39.241 ac Runoff Volume = 11.313 af Average Runoff Depth = 3.46"
50.22% Pervious = 19.708 ac 49.78% Impervious = 19.533 ac

Summary for Subcatchment 1S: Mockingbird Hill and surrounding areas

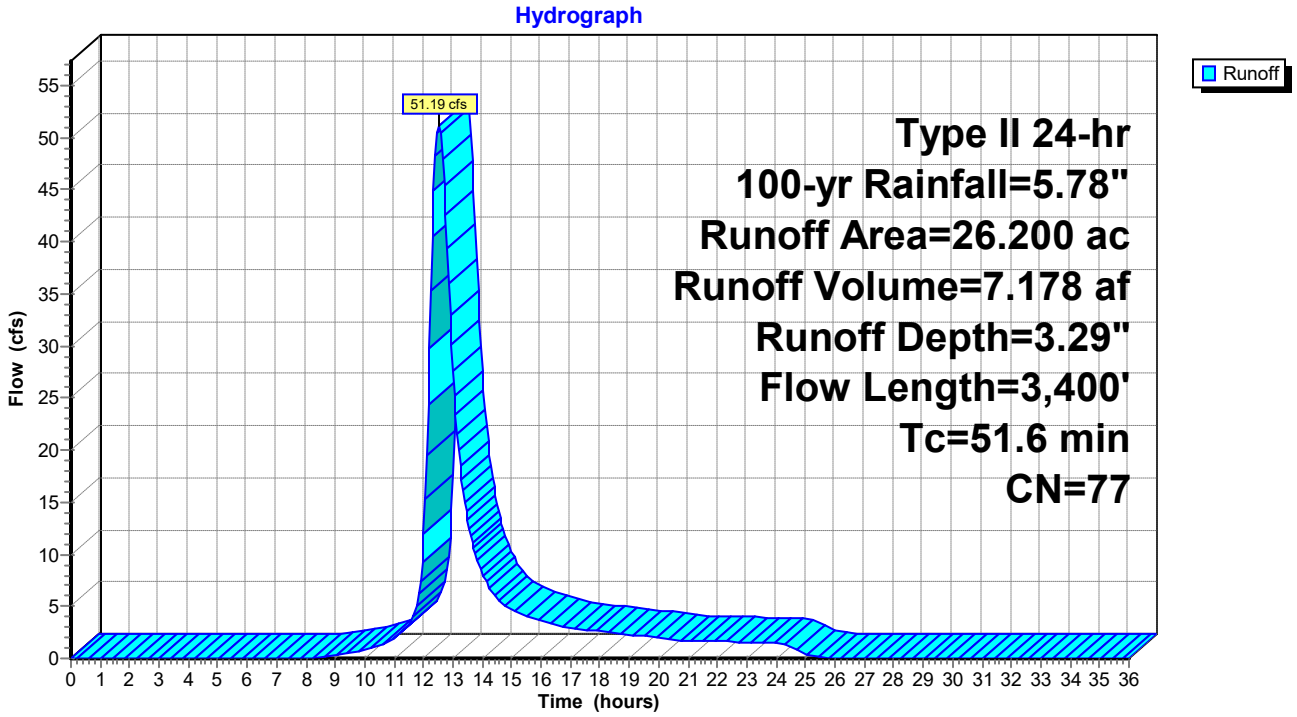
Runoff = 51.19 cfs @ 12.52 hrs, Volume= 7.178 af, Depth= 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.78"

	Area (ac)	CN	Description
	11.500	55	Woods, Good, HSG B
*	13.000	98	Impervious areas, including roofs, driveways, and roads
	1.700	69	50-75% Grass cover, Fair, HSG B
	26.200	77	Weighted Average
	13.200		50.38% Pervious Area
	13.000		49.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.4	300	0.2000	0.12		**Sheet Flow, Through woods** Woods: Dense underbrush n= 0.800 P2= 2.52"
4.7	450	0.1000	1.58		**Shallow Concentrated Flow, Through backyard to road** Woodland Kv= 5.0 fps
2.6	1,000	0.1000	6.42		**Shallow Concentrated Flow, Flow down road** Paved Kv= 20.3 fps
1.3	650	0.0500	8.37	26.30	**Pipe Channel, Existing storm sewer along Bloody Pond Rd to Gar** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
0.9	370	0.0500	6.86	41.14	**Trap/Vee/Rect Channel Flow, Swale around Garrison parking lot** Bot.W=2.00' D=3.00' n= 0.040 Earth, cobble bottom, clean sides
0.1	90	0.0200	11.03	34.66	**Pipe Channel, Existing storm sewer, 24" RCP** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.9	180	0.0400	3.42	25.63	**Trap/Vee/Rect Channel Flow, Overgrown Swale** Bot.W=2.50' D=3.00' n= 0.080
0.7	360	0.0400	8.69	42.66	**Pipe Channel, Existing Storm Sewer, 30" CMP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.025
51.6	3,400	Total			

Subcatchment 1S: Mockingbird Hill and surrounding areas



Summary for Subcatchment 2S-A: Beatty Road, Residential Areas, Garrison Restaurant

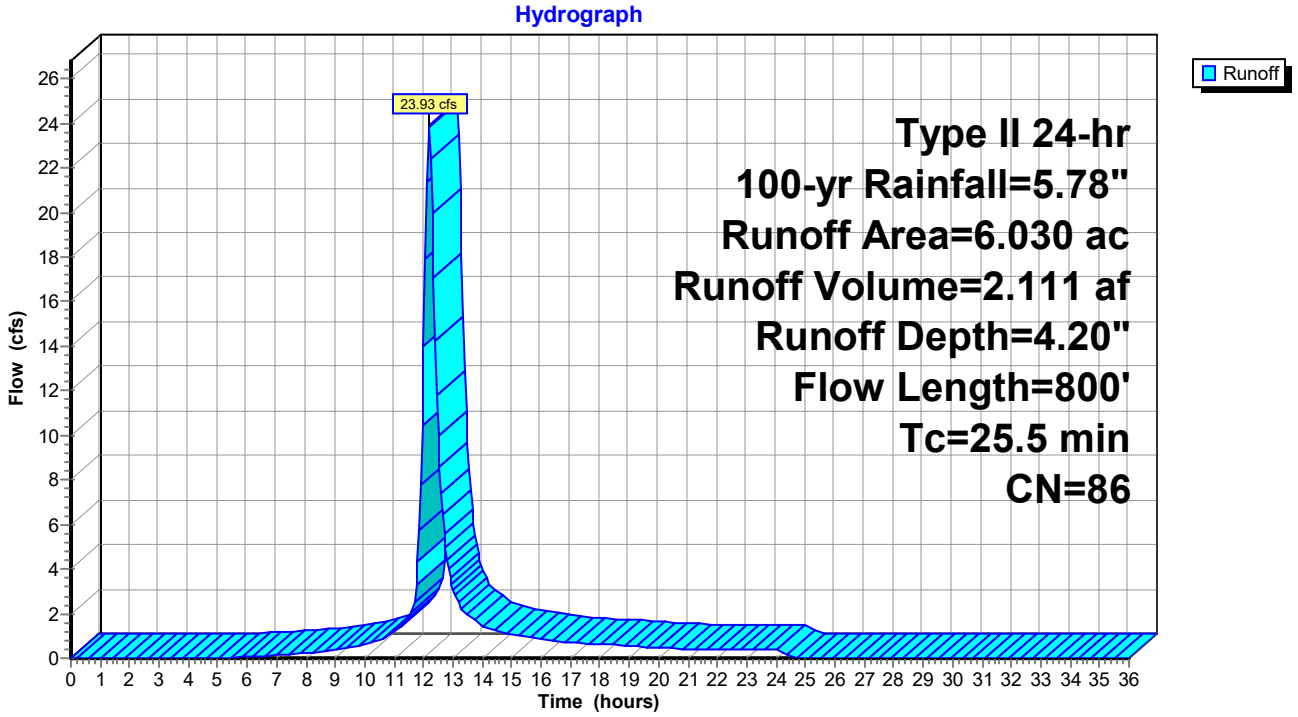
Runoff = 23.93 cfs @ 12.18 hrs, Volume= 2.111 af, Depth= 4.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.78"

	Area (ac)	CN	Description
*	3.618	98	Road, drives, house roofs
	2.412	69	50-75% Grass cover, Fair, HSG B
	6.030	86	Weighted Average
	2.412		40.00% Pervious Area
	3.618		60.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	100	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.52"
0.3	50	0.0400	3.22		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.0	650	0.0700	10.72	24.65	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 0.3 '/' Top.W=2.60' n= 0.025
25.5	800	Total			

Subcatchment 2S-A: Beatty Road, Residential Areas, Garrison Restaurant



Summary for Subcatchment 2S-B: Cedar Lane and Residential Areas

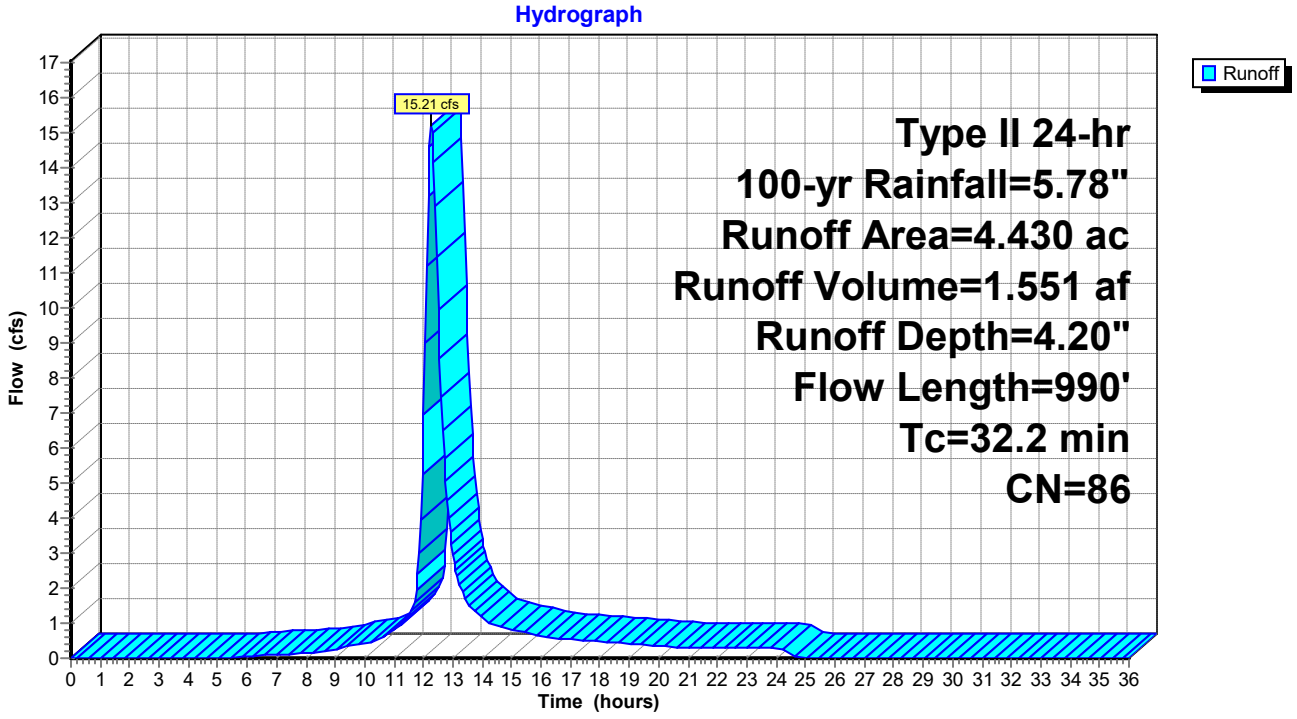
Runoff = 15.21 cfs @ 12.26 hrs, Volume= 1.551 af, Depth= 4.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.78"

	Area (ac)	CN	Description
*	2.660	98	Road, driveways, house roofs
	1.770	69	50-75% Grass cover, Fair, HSG B
	4.430	86	Weighted Average
	1.770		39.95% Pervious Area
	2.660		60.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	130	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.52"
0.3	115	0.1300	7.32		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.1	745	0.0400	5.93	8.90	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=1.00' Z= 0.5 '/' Top.W=2.00' n= 0.030
32.2	990	Total			

Subcatchment 2S-B: Cedar Lane and Residential Areas



Summary for Subcatchment 3S: State Lands - Field

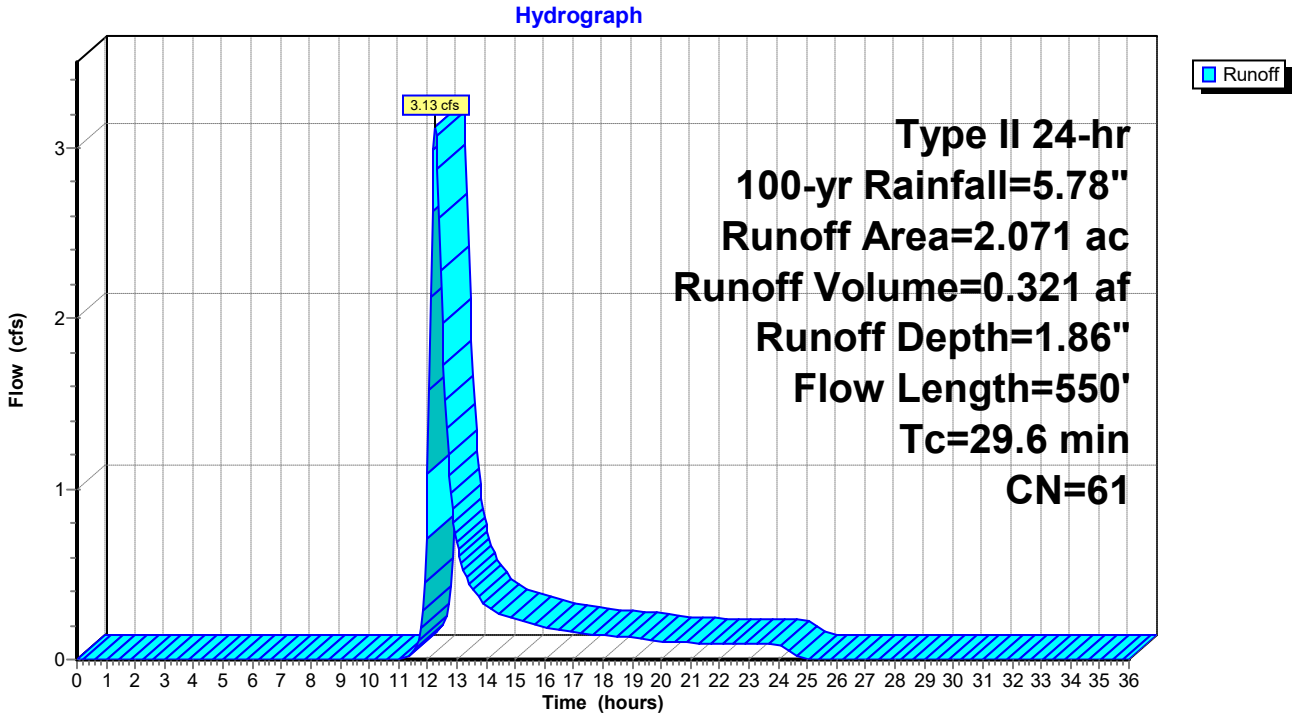
Runoff = 3.13 cfs @ 12.26 hrs, Volume= 0.321 af, Depth= 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.78"

Area (ac)	CN	Description
2.071	61	>75% Grass cover, Good, HSG B
2.071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	300	0.0200	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.52"
3.0	250	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
29.6	550	Total			

Subcatchment 3S: State Lands - Field



Summary for Subcatchment 4S: Residential area adjacent to Beach Rd. and State Lands

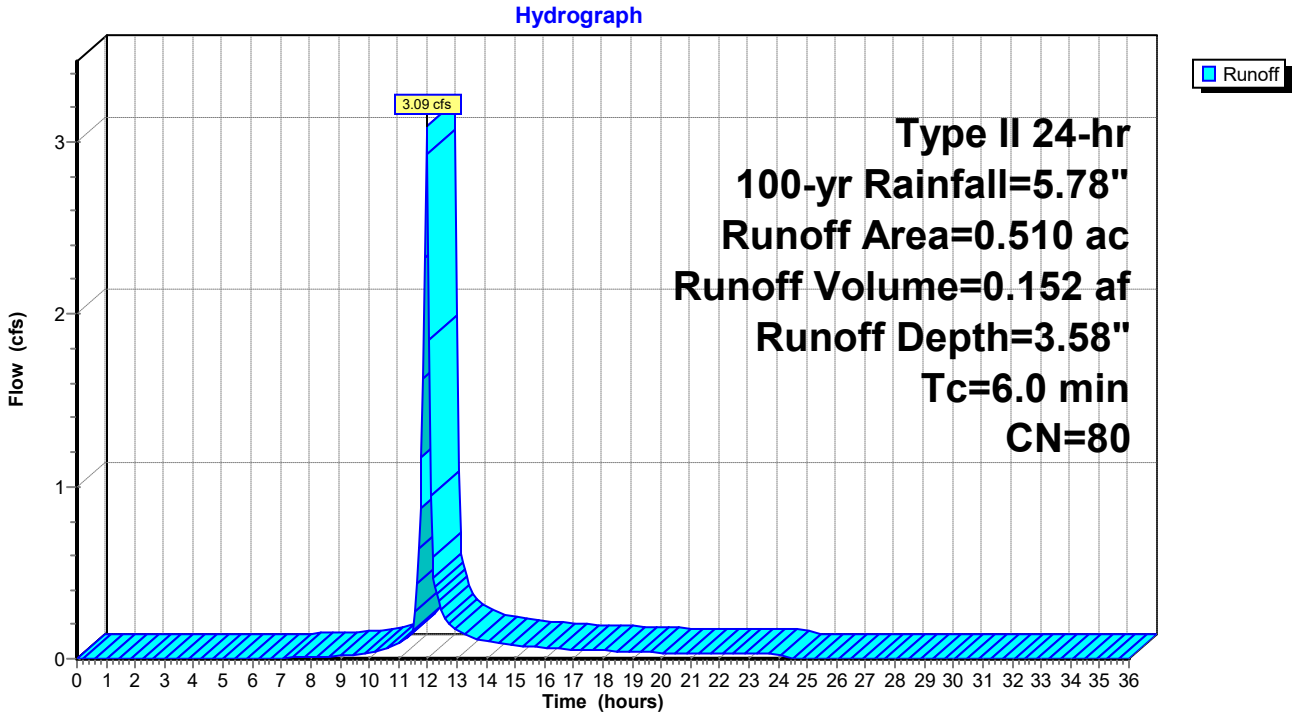
Runoff = 3.09 cfs @ 11.97 hrs, Volume= 0.152 af, Depth= 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.78"

	Area (ac)	CN	Description
	0.255	61	>75% Grass cover, Good, HSG B
*	0.255	98	Impervious areas, including roofs, driveways, road, etc.
	0.510	80	Weighted Average
	0.255		50.00% Pervious Area
	0.255		50.00% Impervious Area

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

Subcatchment 4S: Residential area adjacent to Beach Rd. and State Lands



Summary for Pond 1P: Beatty Roadside Swale

Inflow Area = 6.030 ac, 60.00% Impervious, Inflow Depth = 4.20" for 100-yr event
Inflow = 23.93 cfs @ 12.18 hrs, Volume= 2.111 af
Outflow = 24.77 cfs @ 12.16 hrs, Volume= 2.111 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.68 cfs @ 11.95 hrs, Volume= 0.273 af
Primary = 24.09 cfs @ 12.16 hrs, Volume= 1.838 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 335.74' @ 12.16 hrs Surf.Area= 0.045 ac Storage= 0.040 af

Plug-Flow detention time= 5.5 min calculated for 2.111 af (100% of inflow)
Center-of-Mass det. time= 5.1 min (819.1 - 814.0)

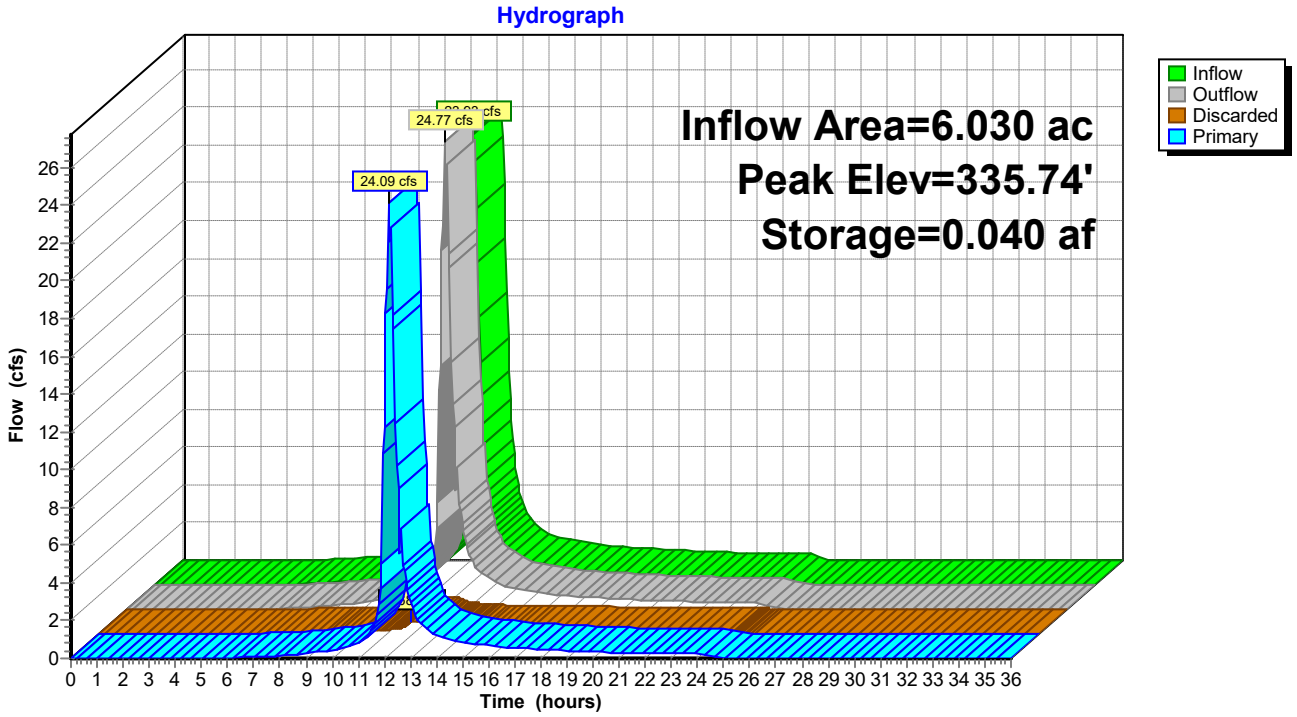
Volume	Invert	Avail.Storage	Storage Description
#1	333.00'	0.040 af	**2.00'W x 750.00'L x 1.00'H Prismatoid Z=0.3**

Device	Routing	Invert	Outlet Devices
#1	Primary	333.00'	**2.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	333.00'	**65.000 in/hr Exfiltration over Surface area above 333.00'** Excluded Surface area = 0.034 ac

Discarded OutFlow Max=0.68 cfs @ 11.95 hrs HW=334.62' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.68 cfs)

Primary OutFlow Max=23.60 cfs @ 12.16 hrs HW=335.71' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 23.60 cfs @ 4.36 fps)

Pond 1P: Beatty Roadside Swale



Summary for Pond 2P: Cedar Roadside Swale

Inflow Area = 4.430 ac, 60.05% Impervious, Inflow Depth = 4.20" for 100-yr event
Inflow = 15.21 cfs @ 12.26 hrs, Volume= 1.551 af
Outflow = 16.17 cfs @ 12.30 hrs, Volume= 1.551 af, Atten= 0%, Lag= 2.0 min
Discarded = 1.12 cfs @ 12.00 hrs, Volume= 0.455 af
Primary = 15.05 cfs @ 12.30 hrs, Volume= 1.096 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 329.17' @ 12.29 hrs Surf.Area= 0.034 ac Storage= 0.026 af

Plug-Flow detention time= 4.0 min calculated for 1.549 af (100% of inflow)
Center-of-Mass det. time= 4.0 min (824.2 - 820.2)

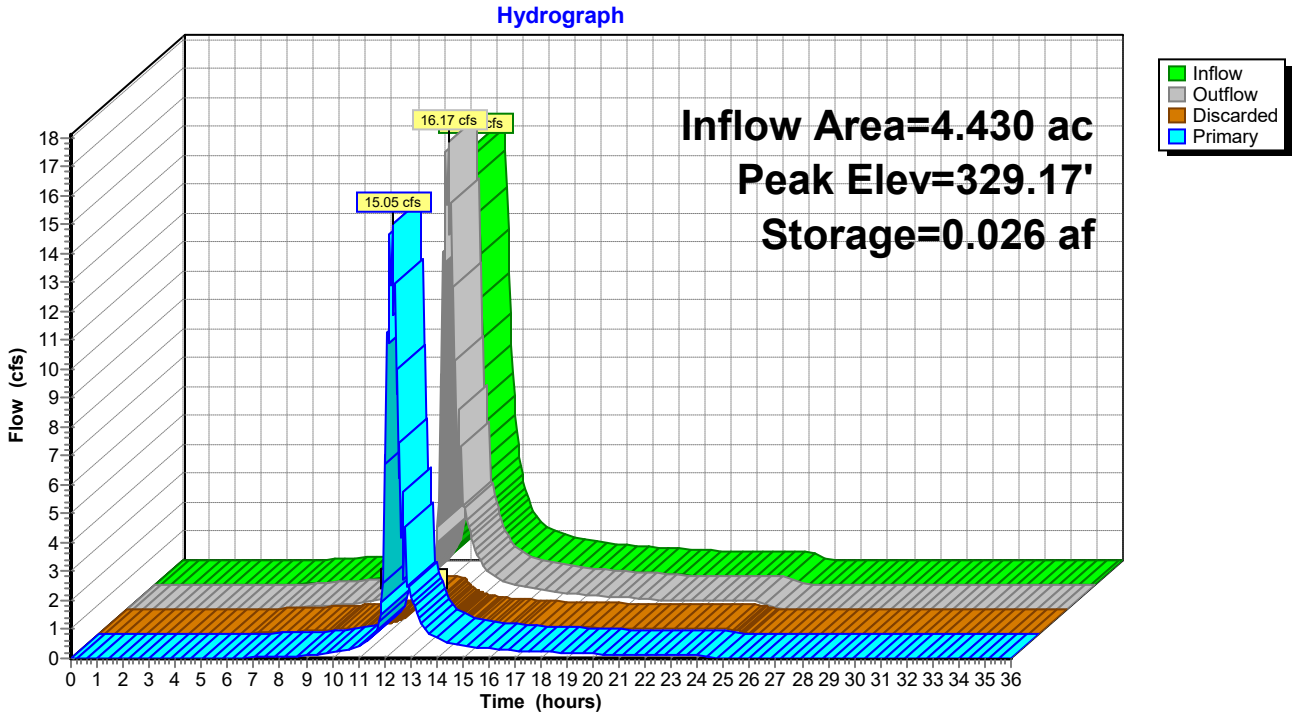
Volume	Invert	Avail.Storage	Storage Description
#1	326.00'	0.026 af	**1.00'W x 745.00'L x 1.00'H Prismatoid Z=0.5**

Device	Routing	Invert	Outlet Devices
#1	Primary	326.00'	**1.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	326.00'	**65.000 in/hr Exfiltration over Surface area above 326.00'** Excluded Surface area = 0.017 ac

Discarded OutFlow Max=1.12 cfs @ 12.00 hrs HW=327.91' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 1.12 cfs)

Primary OutFlow Max=14.80 cfs @ 12.30 hrs HW=329.14' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 14.80 cfs @ 4.72 fps)

Pond 2P: Cedar Roadside Swale



Summary for Pond 3P: Catch Basin

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 3.58" for 100-yr event
Inflow = 3.09 cfs @ 11.97 hrs, Volume= 0.152 af
Outflow = 3.09 cfs @ 11.97 hrs, Volume= 0.152 af, Atten= 0%, Lag= 0.0 min
Primary = 3.04 cfs @ 11.96 hrs, Volume= 0.150 af
Secondary = 0.36 cfs @ 12.01 hrs, Volume= 0.002 af

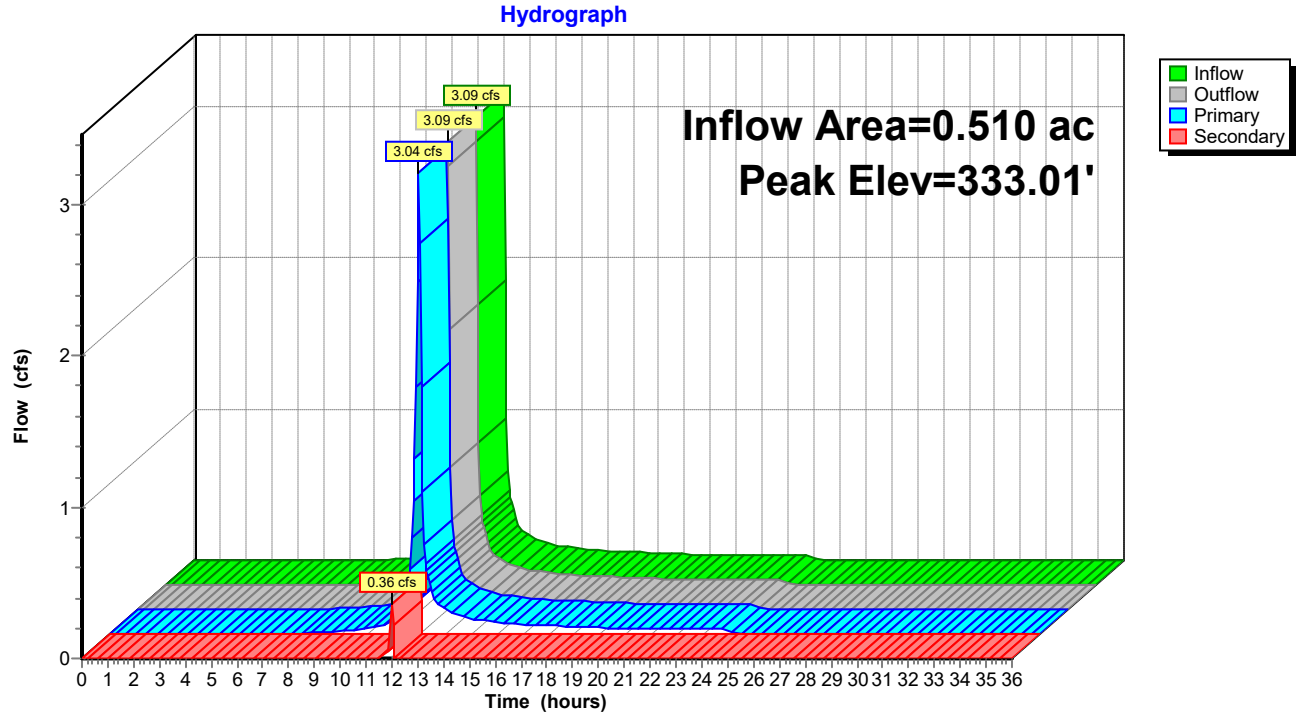
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 333.01' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	326.41'	**1.0" x 1.2" Horiz. Orifice/Grate** X 10 rows C= 0.600 Limited to weir flow at low heads
#2	Primary	323.80'	**12.0" Round Culvert** L= 20.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 323.80' / 323.68' S= 0.0059 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 11.96 hrs HW=325.68' TW=327.31' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 12.01 hrs HW=328.68' TW=330.71' (Dynamic Tailwater)
└**1=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P: Catch Basin



Summary for Pond 4P: Drywells (x4)

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 3.58" for 100-yr event
Inflow = 3.09 cfs @ 11.97 hrs, Volume= 0.152 af
Outflow = 3.80 cfs @ 11.99 hrs, Volume= 0.152 af, Atten= 0%, Lag= 1.5 min
Discarded = 1.04 cfs @ 11.95 hrs, Volume= 0.133 af
Primary = 2.76 cfs @ 11.99 hrs, Volume= 0.019 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 332.69' @ 12.00 hrs Surf.Area= 0.018 ac Storage= 0.021 af

Plug-Flow detention time= 9.0 min calculated for 0.152 af (100% of inflow)
Center-of-Mass det. time= 9.1 min (821.7 - 812.6)

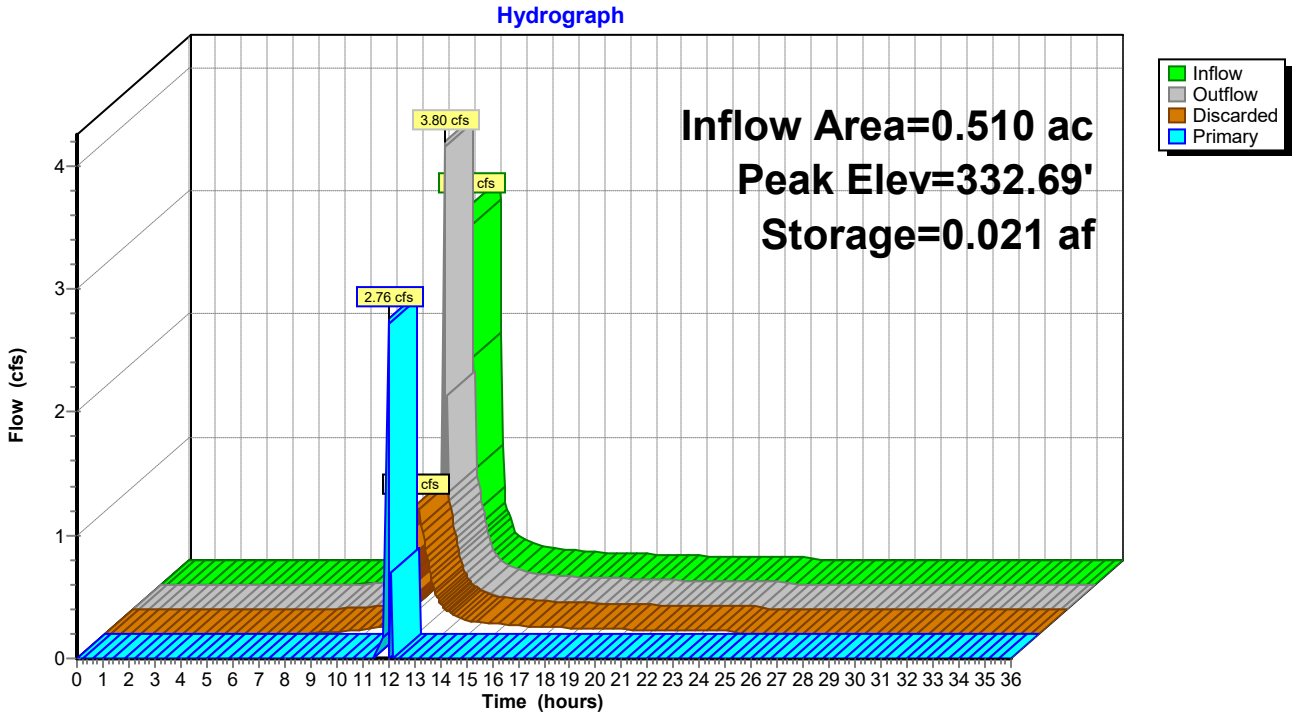
Volume	Invert	Avail.Storage	Storage Description
#1	320.29'	0.005 af	**4.00'D x 4.00'H Vertical Cone/Cylinder** x 4 Inside #2
#2	319.29'	0.017 af	**6.00'D x 5.00'H Vertical Cone/Cylinder Z=1.0** x 4 0.047 af Overall - 0.005 af Embedded = 0.042 af x 40.0% Voids
		0.021 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	325.29'	**1.0" x 2.0" Horiz. Orifice/Grate** X 15 rows C= 0.600 Limited to weir flow at low heads
#2	Discarded	319.29'	**65.000 in/hr Exfiltration over Surface area above 319.29'** Excluded Surface area = 0.003 ac

Discarded OutFlow Max=1.04 cfs @ 11.95 hrs HW=326.65' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 1.04 cfs)

Primary OutFlow Max=2.56 cfs @ 11.99 hrs HW=331.82' TW=0.00' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Orifice Controls 2.56 cfs @ 12.30 fps)

Pond 4P: Drywells (x4)

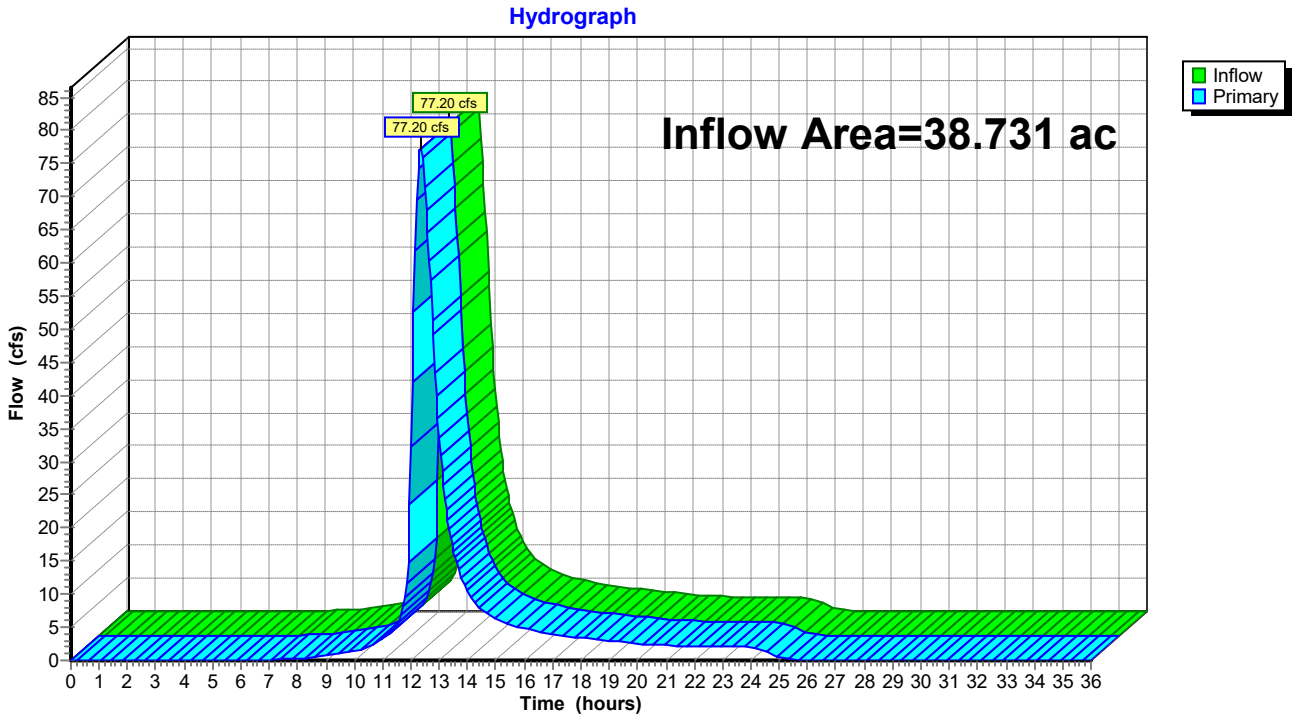


Summary for Link 1L: Wetland

Inflow Area = 38.731 ac, 49.77% Impervious, Inflow Depth = 3.23" for 100-yr event
Inflow = 77.20 cfs @ 12.34 hrs, Volume= 10.433 af
Primary = 77.20 cfs @ 12.34 hrs, Volume= 10.433 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 1L: Wetland

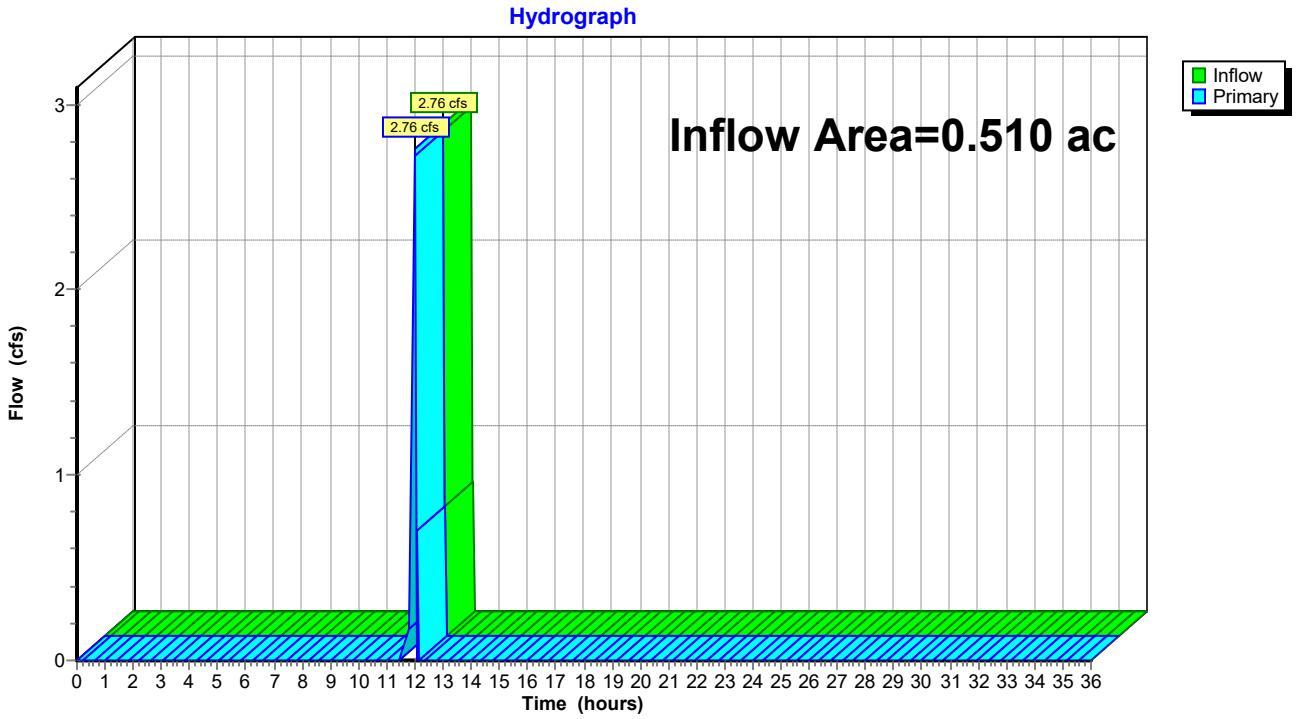


Summary for Link 2L: Beach Rd Catch Basin

Inflow Area = 0.510 ac, 50.00% Impervious, Inflow Depth = 0.45" for 100-yr event
Inflow = 2.76 cfs @ 11.99 hrs, Volume= 0.019 af
Primary = 2.76 cfs @ 11.99 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2L: Beach Rd Catch Basin



Appendix G:
Water Quality Volume and Pollutant Load Reduction Estimates

The Chazen Companies
First Draft: November 6, 2020

Water Quality Volume - Cedar Lane & Beatty Road Green Infrastructure Feasibility Study

Dry Wells

Study Area = 0.51 acres

P=90% Rainfall Event Number (inches)	1.2
I%	50
Rv=0.05+0.009(I)	0.5
A=Area of Watershed (Acres)	0.51
Water Quality Volume (ac-ft)=[(P)(Rv)(A)]/12)	0.0255

Rain Gardens

Study Area = 0.08 acres

P=90% Rainfall Event Number (inches)	1.2
I%	10
Rv=0.05+0.009(I)	0.14
A=Area of Watershed (Acres)	0.08
Water Quality Volume (ac-ft)=[(P)(Rv)(A)]/12)	0.00112

Vegetated Swales

Study Area = 10.43 acres

P=90% Rainfall Event Number (inches)	1.2
I%	60
Rv=0.05+0.009(I)	0.59
A=Area of Watershed (Acres)	10.43
Water Quality Volume (ac-ft)=[(P)(Rv)(A)]/12)	0.6154

Tree Pits/ Plantings

Study Area = 0.08 acres

P=90% Rainfall Event Number (inches)	1.2
I%	0
Rv=0.05+0.009(I)	0.05
A=Area of Watershed (Acres)	0.08
Water Quality Volume (ac-ft)=[(P)(Rv)(A)]/12)	0.0004

Total Water Quality Volume managed by Drywells, Swales, Rain Gardens, Tree Pits/ Plantings (ac-ft) 0.642

Pollutant Loading Reductions - Cedar Lane & Beatty Road Green Infrastructure Feasibility Study

Dry Wells

Study Area = 0.51 acres

Total Phosphorus (TP)		**Total Nitrogen (TN)**		**Total Suspended Solids (TSS)**	
P=Average Annual Rainfall Depth Inches	53.5	P=Average Annual Rainfall Depth Inches	53.5	P=Average Annual Rainfall Depth Inches	53.5
Pj=Runoff Frequency Factor	0.9	Pj=Runoff Frequency Factor	0.9	Pj=Runoff Frequency Factor	0.9
C=Pollutant Concentration (mg/l)	0.26	C=Pollutant Concentration (mg/l)	2	C=Pollutant Concentration (mg/l)	54.5
A=Area of Watershed (Acres)	0.51	A=Area of Watershed (Acres)	0.51	A=Area of Watershed (Acres)	0.51
I%	50	I%	50	I%	50
Rv=0.05+0.009(I)	0.5	Rv=0.05+0.009(I)	0.5	Rv=0.05+0.009(I)	0.5
Vegetated Swales					
Loading=[(P)(Pj)(Rv/12)]CA(2.72)	0.724	Loading=[(P)(Pj)(Rv/12)]CA(2.72)	5.566	Loading=[(P)(Pj)(Rv/12)]CA(2.72)	151.677
Loading Total (lbs/year)	**0.724**	**Loading Total (lbs/year)**	**5.566**	**Loading Total (lbs/year)**	**151.677**
Minimum Removal Efficiency from Pratice	0.700	Minimum Removal Efficiency from Pratice	0.500	Minimum Removal Efficiency from Pratice	0.900
Removal Rate from Pratice (lbs/year)	**10.430**	**Removal Rate from Pratice (lbs/year)**	**2.783**	**Removal Rate from Pratice (lbs/year)**	**136.510**

Vegetated Swales

Study Area = 10.43 acres

Total Phosphorus (TP)		**Total Nitrogen (TN)**		**Total Suspended Solids (TSS)**	
P=Average Annual Rainfall Depth Inches	53.5	P=Average Annual Rainfall Depth Inches	53.5	P=Average Annual Rainfall Depth Inches	53.5
Pj=Runoff Frequency Factor	0.9	Pj=Runoff Frequency Factor	0.9	Pj=Runoff Frequency Factor	0.9
C=Pollutant Concentration (mg/l)	0.26	C=Pollutant Concentration (mg/l)	2	C=Pollutant Concentration (mg/l)	54.5
A=Area of Watershed (Acres)	10.43	A=Area of Watershed (Acres)	10.43	A=Area of Watershed (Acres)	10.43
I%	60	I%	60	I%	60
Rv=0.05+0.009(I)	0.59	Rv=0.05+0.009(I)	0.59	Rv=0.05+0.009(I)	0.59
Loading=[(P)(Pj)(Rv/12)]CA(2.72)	17.462	Loading=[(P)(Pj)(Rv/12)]CA(2.72)	134.323	Loading=[(P)(Pj)(Rv/12)]CA(2.72)	3660.301
Loading Total (lbs/year)	**17.462**	**Loading Total (lbs/year)**	**134.323**	**Loading Total (lbs/year)**	**3660.301**
Minimum Removal Efficiency from Pratice	0.600	Minimum Removal Efficiency from Pratice	0.400	Minimum Removal Efficiency from Pratice	0.850
Removal Rate from Pratice (lbs/year)	**10.477**	**Removal Rate from Pratice (lbs/year)**	**53.729**	**Removal Rate from Pratice (lbs/year)**	**3111.256**

Rain Gardens

Study Area = 0.08 acres

Total Phosphorus (TP)		**Total Nitrogen (TN)**		**Total Suspended Solids (TSS)**	
P=Average Annual Rainfall Depth Inches	53.5	P=Average Annual Rainfall Depth Inches	53.5	P=Average Annual Rainfall Depth Inches	53.5
Pj=Runoff Frequency Factor	0.9	Pj=Runoff Frequency Factor	0.9	Pj=Runoff Frequency Factor	0.9
C=Pollutant Concentration (mg/l)	0.26	C=Pollutant Concentration (mg/l)	2	C=Pollutant Concentration (mg/l)	54.5
A=Area of Watershed (Acres)	0.08	A=Area of Watershed (Acres)	0.08	A=Area of Watershed (Acres)	0.08
I%	10	I%	10	I%	10
Rv=0.05+0.009(I)	0.14	Rv=0.05+0.009(I)	0.14	Rv=0.05+0.009(I)	0.14
Loading=[(P)(Pj)(Rv/12)]CA(2.72)	0.032	Loading=[(P)(Pj)(Rv/12)]CA(2.72)	0.244	Loading=[(P)(Pj)(Rv/12)]CA(2.72)	6.662
Loading Total (lbs/year)	**0.032**	**Loading Total (lbs/year)**	**0.244**	**Loading Total (lbs/year)**	**6.662**
Minimum Removal Efficiency from Pratice	0.600	Minimum Removal Efficiency from Pratice	0.400	Minimum Removal Efficiency from Pratice	0.850
Removal Rate from Pratice (lbs/year)	**0.019**	**Removal Rate from Pratice (lbs/year)**	**0.098**	**Removal Rate from Pratice (lbs/year)**	**5.663**

Tree Pits/ Plantings

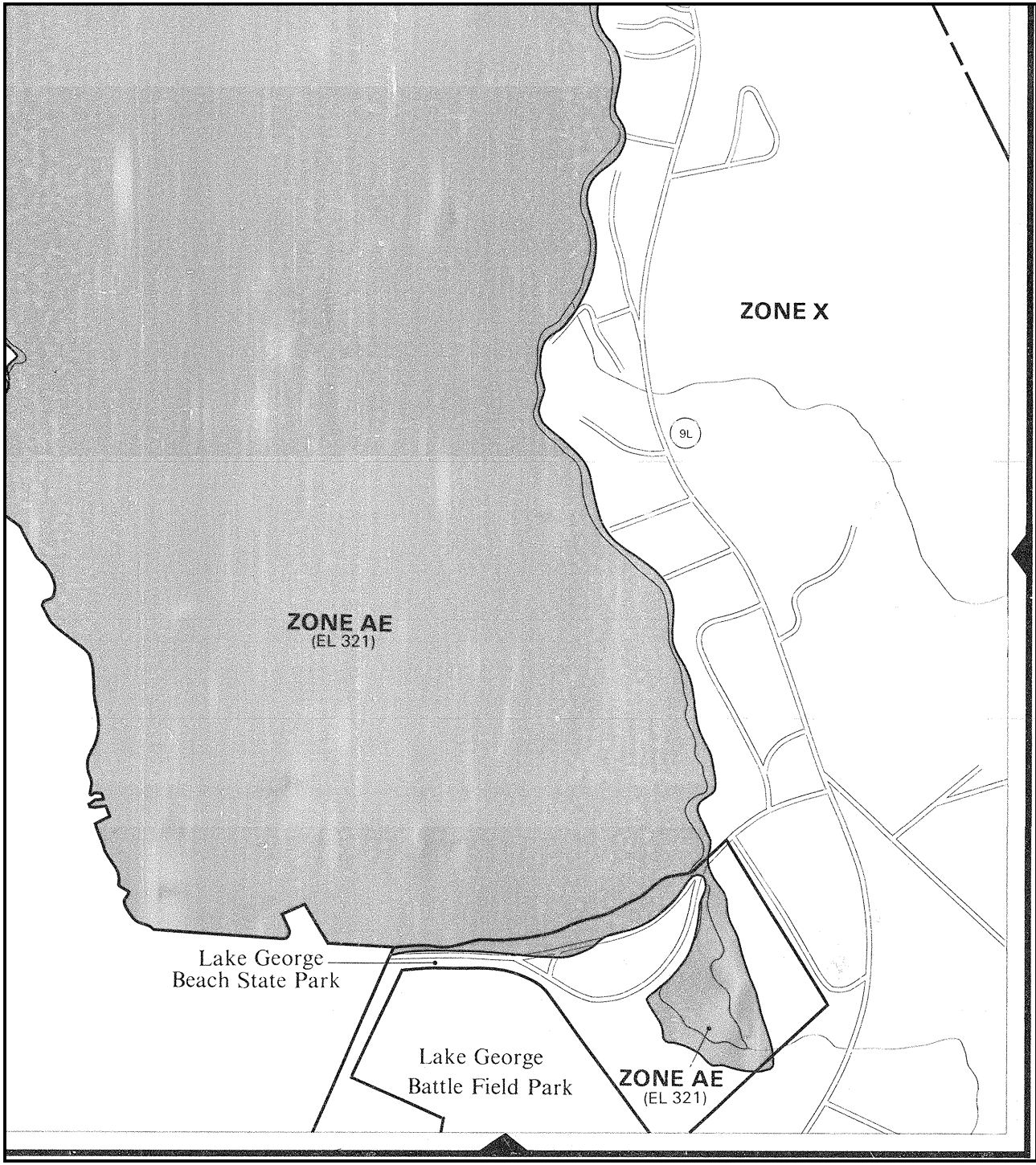
Study Area = 0.08

Total Phosphorus (TP)		**Total Nitrogen (TN)**		**Total Suspended Solids (TSS)**	
P=Average Annual Rainfall Depth Inches	53.5	P=Average Annual Rainfall Depth Inches	53.5	P=Average Annual Rainfall Depth Inches	53.5
Pj=Runoff Frequency Factor	0.9	Pj=Runoff Frequency Factor	0.9	Pj=Runoff Frequency Factor	0.9
C=Pollutant Concentration (mg/l)	0.26	C=Pollutant Concentration (mg/l)	2	C=Pollutant Concentration (mg/l)	54.5
A=Area of Watershed (Acres)	0.08	A=Area of Watershed (Acres)	0.08	A=Area of Watershed (Acres)	0.08
I%	0	I%	0	I%	0
Rv=0.05+0.009(I)	0.05	Rv=0.05+0.009(I)	0.05	Rv=0.05+0.009(I)	0.05
Loading=[(P)(Pj)(Rv/12)]CA(2.72)	0.011	Loading=[(P)(Pj)(Rv/12)]CA(2.72)	0.087	Loading=[(P)(Pj)(Rv/12)]CA(2.72)	2.379
Loading Total (lbs/year)	**0.011**	**Loading Total (lbs/year)**	**0.087**	**Loading Total (lbs/year)**	**2.379**
Minimum Removal Efficiency from Pratice	0.600	Minimum Removal Efficiency from Pratice	0.400	Minimum Removal Efficiency from Pratice	0.850
Removal Rate from Pratice (lbs/year)	**0.007**	**Removal Rate from Pratice (lbs/year)**	**0.035**	**Removal Rate from Pratice (lbs/year)**	**2.022**

Green Infrastructure Reduction in loading from Drywells, Swales, Rain Gardens, and Tree Pits/ Plantings (lbs/year)	**20.9**	**Green Infrastructure Reduction in loading from Drywells, Swales, Rain Gardens, and Tree Pits/ Plantings (lbs/year)**	**56.6**	**Green Infrastructure Reduction in loading from Drywells, Swales, Rain Gardens, and Tree Pits/ Plantings (lbs/year)**	**3255.5**

Appendix H:
Flood Zone, Wetlands, National Historic Site Figures

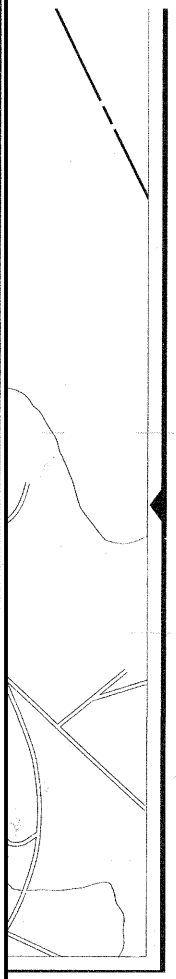
The Chazen Companies
First Draft: November 6, 2020



OTHER FLOOD AREAS

ZONE X Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS



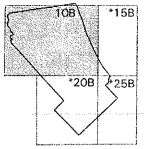
NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWN OF
LAKE GEORGE, NEW YORK
WARREN COUNTY

ONLY PANEL PRINTED

MAP LOCATOR DIAGRAM



*PANEL NOT PRINTED — NO SPECIAL FLOOD HAZARD AREAS

COMMUNITY-PANEL NUMBER
360876 0010 B

MAP REVISED:
AUGUST 16, 1996

Federal Emergency Management Agency

U.S. Fish and Wildlife Service
National Wetlands Inventory

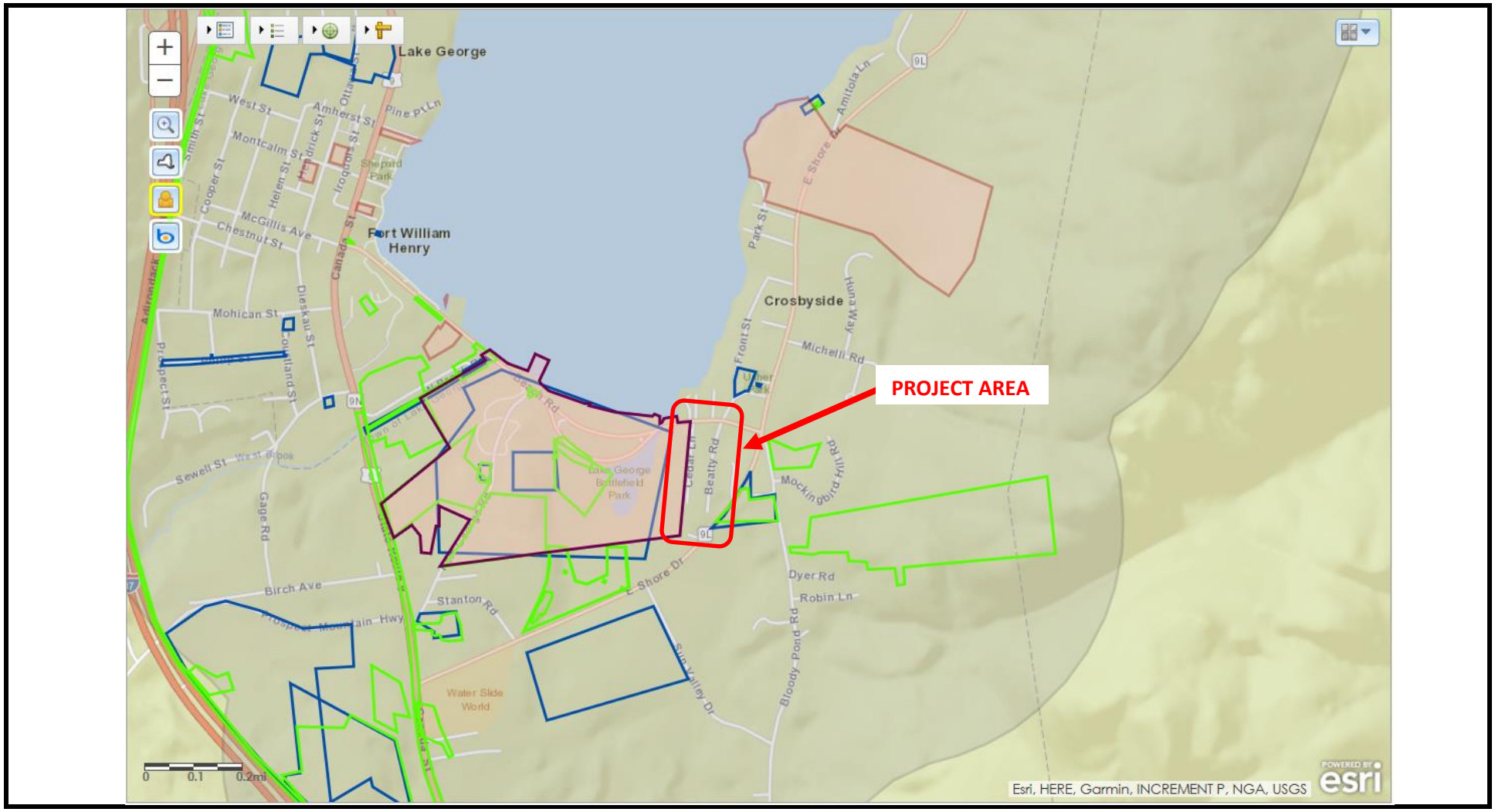
National Wetlands Inventory Map

March 3, 2020

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.



LEGEND

Consultation Projects (View)

Archeologically Sensitive Areas

Survey Building Areas (View)

LPC Historic Districts

LPC Landmarks

USN Building Points (View)

- Eligible
- Listed
- Not Eligible
- Not Eligible - Demolished
- Undetermined

Survey Archaeology Areas (View)

National Register Building Sites (View)

USN Building Districts (View)

Cemeteries