DRAFT STORMWATER POLLUTION PREVENTION PLAN

(SWPPP)

DRAFT SWPPP PREPARATION DATE: 1 AUG 2022

PARKING LOT ALTERATIONS & RETAINING WALL

PREPARED FOR CONSTRUCTION ACTIVITIES AT:

Project Address:
Rolling Hills Condominiums
Buildings 8 & 9
Peddler Hill Road, Monroe, NY, 10950

SWPPP PREPARED FOR:

Rolling Hills Condominium Association
Mr. James Dietrich
23 Tanager Rd. Monroe NY, 10950

PREPARED BY:

Caesar Engineering D.P.C.
367 Windsor Highway #411
New Windsor, New York, 12553
845.391.0148
contact@caesarengineering.work
www.caesarengineering.work

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SECTION 1: INTRODUCTION & REQUIREMENTS:

The overall site of the Rolling Hills Condominium (RHC) Complex is approximately 19.45 acres in total area and consists of 9 separate buildings with associated parking facilities. The common areas of this property are owned and managed by the Rolling Hills Condominium (RHC) HomeOwners Association (HOA) The micro watershed that pertains to this particular redevelopment project, fits within the larger condominium complex, and is focused only on the parking facilities associated with building 8 & 9. The micro watershed area pertaining to this proposed project is approximately 2.66 acres. Within this micro watershed area, there is an approximate limit of disturbance area of 1.5 acres where all construction and development activities will occur. The remaining 1.16 acres of the micro watershed area are to remain as is and are not to be cleared or developed as part of this action. As such, the total project disturbance will be greater than one (1) acre; therefore the New York State Department of Environmental Conservation requires that a Stormwater Pollution Prevention Plan (SWPPP) be completed to fully mitigate the effects of the proposed development on the watershed. Potential impacts from this project include soil erosion during the site construction phase and the introduction of external pollutants to the local hydrological systems such as garbage, construction debris, chemicals, and sediments from constructed features both before and after construction. This SWPPP also aims to address the inferred downstream impacts of such a construction activity to mitigate against flooding & channel erosion which is caused by the conversion of previously natural areas to impervious surfaces which in turn increases the rate and the volume of stormwater runoff.

Stormwater quantity management, stormwater quality control measures, erosion control practices, and runoff-reduction practices have been designed and, if approved, will be implemented in accordance with the State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges during Construction GP 0-20-001, effective 29 January 2020 to 28 January 2025. The proposed project fits entirely within the municipal boundaries of the Village of South Blooming Grove. The specific stormwater best management practices proposed are based on the standardized criteria set forth in the New York State Stormwater Management Design Manual (Jan 2015 ed.), which will be referred to as SMDM, as well as the NYS Standards for Erosion & Sediment Control (Nov 2016 Ed.) which will be referred to as SESC. This plan aims to maintain water quality standards as applicable while limiting the risk of future flood events by controlling stormwater produced by the proposed actions.

SECTION 2: PROJECT SUMMARY & NARRATIVE

General Site Information:

- Project / Site Name: PARKING LOT ALTERATIONS & RETAINING WALLS
- Project Street/ Location: RHC Buildings 8 & 9 Peddler Hill Road, Monroe, NY, 10950
- Block(s) and Lot(s): 213-1-1.2
- Total lot size: 19.45 Acres
- DEC Region: 3 (ORANGE COUNTY)
- The site contains two existing multistory buildings that currently house 33 residential units with 42 parking spaces.

Project Latitude/ Longitude (GPS):

- In Vicinity of (IVO): Latitude: 41°22'3.42"N
- In Vicinity of (IVO): Longitude: 74°11'41.44"W
- Horizontal Reference Datum: WGS 84

A detailed map of the site can be found in Appendix F: Site plan

2.1: EXISTING SITE:

The existing site features include a northern two way paved entrance onto Peddler Hill Rd and the main parking lot to the west of Peddler Hill Rd allowing access to two existing buildings that house 33 condominium units and 42 parking spaces. The rear of the two existing buildings slopes down to tanager road and the remaining property of the Rolling Hills Condominium complex. Both buildings are serviced by municipal water and sewer systems. The site is mostly covered in impervious surfaces with the remaining site covered in grass and undisturbed forest undergrowth.

2.2: PROPOSED SITE:

The property owners, RHC HOA, wishes to improve the site in the following way:

- Adjust the existing parking lot system and traffic flow to a one-way direction of travel to accommodate both residential traffic, emergency vehicles, and expand the parking capacity.
  TOTAL LIMIT OF DISTURBANCE: 65,706 SF (1.5 Acres)
  - The creation of 11 additional parking spaces to accommodate 57 vehicles in total
  - Construction of two retaining wall systems to accommodate the proposed parking area
  - Adjust parking flow with the construction of an additional entrance route onto Peddler Hill Rd.
  - The creation of a flat grass area that can be used for snow storage in the winter
- Stormwater Management Practices as detailed in this report and within the engineering plan.

- Miscellaneous Landscaping Buffers

2.3: EXISTING SOILS:

The soil on the lot is generally composed of the following classifications. This information was resourced from the USDA Web Soil Survey. For the entire soils report captured from USDA please view APPENDIX A: SOILS REPORT

- Mardin gravelly silt loam (MdB)- Approximately 69.2% of the site includes this moderately well drained soil. This soil formed in glacial till deposits and is derived from sandstone, shale, and slate.
- Mardin gravelly silt loam (MdD)- Approximately 30.8% of the site includes this moderately well drained soil and has a slope of approximately 15 to 25 percent. It has similar characteristics to the MdB but typically occupies steeper slopes.

SECTION 3: EROSION & SEDIMENT CONTROL:

The erosion and sediment control practices that are proposed in this section have been prepared in accordance with the New York State Standards and Specifications for Erosion & Sediment Control (SESC) dated November 2016. The proposed Erosion & Sediment Control Practices are as follows:

1. Overall Objectives:
    a. The overall objective of this erosion and sediment control plan is to control erosion to the maximum extent practicable by means of limiting potential emissions from the source.
    b. Existing vegetative cover shall be maintained to the maximum extent practicable and site disturbance shall be controlled to prevent soil disturbance beyond the planned ‘limits of disturbance’ indicated on the site grading plans. The overall site plan and extent of the limit of disturbance can be seen in APPENDIX F: SITE PLAN.
    c. Where necessary, appropriate sediment control measures shall be installed at all existing project drainage ways or stormwater management structures prior to the installation of erosion control measures within the project site.
    d. All temporary erosion and sediment control measures shall be installed prior to any disturbance in any portion of the project. A list of the proposed temporary control measures can be referenced in paragraph 4 of this section.
    e. All permanent erosion and sediment control measures shall be installed as early as possible or as directed by the site engineer. The only permanent measure that is proposed during this project is permanent seeding in the locations shown in the site plan drawings.

f. Unless specified elsewhere in this report, during the duration of construction activities on the project site, the erosion and sediment control measures shall be inspected by an approved authority and maintained every week to ensure they are working per the design specifications.

2. Existing Stormwater Management Facilities: All existing stormwater management features and facilities on the larger project site/property that are to remain, are to be protected at all times. Maintenance of existing facilities is the responsibility of the owner of record. This is to include the remainder of the stormwater facilities that are located on the remainder of the RHC complex below building 8 & 9.
3. Limits of Disturbance and Tree Protection & Preservation:
    a. The site disturbance shall be limited to the 'Limits of Disturbance' as identified on the site plan included in APPENDIX F: SITE PLAN. This area is calculated at approximately 65706 SF.
    b. Any site conditions that are encountered during the construction activities that point toward a need to disturb areas beyond the 'Limits of Disturbance' shall be brought to the attention of the site engineer before being undertaken. The Engineer shall verify that the appropriate erosion & sediment control measures are in place prior to the initiation of the work.
4. Temporary Erosion & Sediment Control Measures:
    a. Filter Fabric Silt Fence (SESC Pg. 5.54):
        i. Standard Silt fences are to be installed prior to the disturbance of any upslope areas. Additionally, they will be installed around the entire perimeter of the stationary soil stockpile area to prevent sediment from entering the drainage courses while the stockpiles sit unmoved.
        ii. A Silt Fence may be used subject to the following conditions:
            1. Maximum allowable slope lengths contributing runoff to a silt fence at varying slopes are as follows in the table below:

		Slope Length/Fence Length (ft.)		
Slope	Steepness	Standard	Reinforced	Super
<2%	< 50:1	300/1500	N/A	N/A
2-10%	50:1 to 10:1	125/1000	250/2000	300/2500
10-20%	10:1 to 5:1	100/750	150/1000	200/1000
20-33%	5:1 to 3:1	60/500	80/750	100/1000
33-50%	3:1 to 2:1	40/250	70/350	100/500
>50%	> 2:1	20/125	30/175	50/250

2. Maximum ponding depth shall not exceed 1.5 feet behind the fence.
3. The fence is to be installed in areas where the erosion would occur in the form of sheet erosion
4. There is no concentration of water flowing into the barrier/fence
5. Inspection and maintenance shall be performed on a weekly basis and sediment material will be removed when 'bulges' are developed.
6. The silt fences shall be removed when they are no longer needed upon final site stabilization.
7. The location of the proposed silt fence can be seen and referenced in the proposed conditions portion of the site plan in APPENDIX F: SITE PLAN.

b. Dust Control (SESC Pg. 2.25):
   i. All actions at the site will be managed and controlled in order to limit the creation and movement of dust. The limiting of dust will occur in all disturbed areas within the boundaries of the 'limit of disturbance', the main construction entrance, and in areas where off-site damage may occur or create a nuisance condition if not controlled.
   ii. Construction operations will be scheduled to minimize the amount of area disturbed at one time.
   iii. Once construction has begun, effort will be made to limit driving areas and maximize non-driving areas so as to not create excessive dust.
   iv. Buffer areas of vegetation shall be left where practical.
   v. In areas where excessive dust is being generated, it will be controlled by the use of water sprinkling as needed.
   vi. Dust control measures shall continue through dry weather periods until all disturbed areas are stabilized.
c. Stabilized Construction Entrance (SESC Pg. 2.30-31):
   i. A stabilized construction entrance in accordance with the following specifications will be completed prior to the start of construction activities. This construction entrance will be installed as shown on the site plan in APPENDIX F: SITE PLAN with specific details provided in the construction details section of the proposed plan.
   ii. Installation criteria & specifications:
      1. Aggregate Stone Size: use 1-4 inch stone or reclaimed or recycled concrete equivalent.

2. Length- Not less than 50’
3. Thickness- Not less than six (6) inches)
4. Width- Twelve (12) foot minimum but not less than the full width at points where ingress or Egress Occurs. Twenty Four (24) feet for 12’ min in this case as this is the single access to the site.
5. Geotextile- stabilized geotextile woven fabric or burlap will be installed over the entire construction entrance prior to the placing of stone.
6. Surface Water- All surface water flowing or diverted towards the single construction access point on this site shall be piped beneath the entrance. If piping is impractical, a mountable berm with 5;1 slopes will be permitted as needed. The construction access point on this site is at almost the highest elevation so surface water infiltration will not be of a major concern.
7. Maintenance- The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-of-way, all sediment spilled, dropped, washed or tracked onto public rights of way must be removed immediately. When necessary, wheels must be cleaned to remove sediment prior to entrance onto public rights-of-way. Inspections of the construction entrance shall be made weekly and repairs made promptly upon identification of issues.
8. The stabilized construction entrance shall be removed when it is no longer needed or as directed by the site engineer.

iii. Diversion Swales: Not Used

iv. Check Dams: Not Used

v. Soil Stockpile Areas: r

1. Soil stockpile areas are to be located as laid out in the site plan. On site construction decisions that deviate from the proposed stockpile areas are to be approved by the site engineer prior to accumulation of soil stockpiles.
2. Silt fencing shall be installed in place around the entire perimeter of the soil stockpile area and is to remain in place at the conclusion of each workday.

vi. Temporary Stabilization of Disturbed Areas (SESC Pg. 4.58):

1. Intended for areas that are not at the finished grade that will be re-disturbed within one year must be stabilized in accordance with the temporary stabilization procedures outlined.
2. Temporary stabilization techniques are to be used when final grading is completed, when preparing for winter work shutdown, or to provide cover when permanent seedings are likely to fail due to mid-summer heat and drought. Depending on the time of year this shall include seeding and/or mulching applied to disturbed areas as soon as practicable or as directed by the site engineer.
3. The type of seed and the application rates for seeding shall be specified on the engineering plans but will adhere to the following:
    a. Spring, summer or early fall: Seed the area with ryegrass (annual or perennial) at 30 lbs per acre (1 lb / 1000 SF)
    b. Late fall or early winter: seed with certified “Aroostook” winter rye at 100 lbs per acre (2.5 lbs / 1000 SF)
    c. Mulch the area with hay or straw at 2 tons/acre (90 lbs/1000 SF)
4. Permanent stabilization seeding selection and installation should be undertaken from March to May and September to October 15; temporary stabilization can be utilized through November.

5. Permanent Erosion & Sediment Control Measures:
    a. Permanent Stabilization of Disturbed Areas:
        i. Intended for areas that have been disturbed and that are at the finished grade or will not be disturbed within one year must be stabilized in accordance with the permanent stabilization procedures outlined.
        ii. The focus of this project is to reconstruct the parking area. Due to the nature of this action, the majority of the disturbed areas will be compacted and re-converted back into the proposed parking areas. The only areas that are to be disturbed and in need of a permanent stabilization are the areas in the vicinity of the retaining walls, and the areas to the left and right of building 8 & 9. As such, near the retaining walls, grass and shrubs will be planted for stabilization. Seeding will occur to the left and right of the two proposed buildings (in the vicinity of the infiltration basin) to ensure erosion is controlled.
        iii. This shall include seeding and mulching, and may include soil augmentation and the application of fertilizer as directed by the site engineer.

iv. The type of seed and the application rates for seeding shall be specified on the engineering plans. Soil augmentation and the application rate of fertilizer shall be as directed by the site engineer.

v. Shall be completed as soon as possible after construction activities in an area have completed as per the construction schedule.

vi. Permanent stabilization seeding selection and installation should be undertaken from March to May and September to October 15; temporary stabilization can be utilized through November.

vii. Erosion Control Matting shall be used to stabilize areas sloped greater than 4% to augment the permanent stabilization of soils in those areas. Recommended techniques can be viewed in the engineer plans and specs detail 16 sheet B18.

viii. The installation of 15 trees as specified in the site plan around the proposed parking area shall be executed in accordance with the engineering plans and specifications. These trees are part of the SMP control measures and will significantly help with erosion control by stabilizing areas in which they are planted.

6. Soil Restoration: In accordance with New York State DEC Publication titled 'Deep-Ripping & Decompaction', the two phase practice of 1)"Deep Ripping" and 2) "Decompaction" (deep subsoiling), of the soil material as a step in the cleanup and restoration/landscaping of a construction site, helps mitigate the physically induced impacts of soil compression. These practices are key factors in restoring soil pore space and permeability for water infiltration. As such, Deep Ripping and Decompaction will be performed specifically in the construction staging area on the opposite side of Peddler Hill Road to restore the permeable nature of this area. Soil restoration is not required in areas of minimal soil disturbance such as clearing and grubbing, as per table 5.3 (pg. 5-19), NYSDEC Stormwater Design manual January 15.

SECTION 4: STORMWATER MANAGEMENT PLAN :

This Stormwater Management Plan will focus on maintaining pre-development peak flows during the required post-development storm events. The development of this project will address Water Quality Volume (WQv) as per section 4.2 of the Stormwater Management Design manual (SMDM). The development will also reduce the total volume of runoff compared to the pre-developed site, thus fulfilling the Runoff Reduction (RRv) requirements as per section 4.3 of the SMDM. A pre and post-development overview of the hydrology of the site is offered within this section.

4.1: PRE-DEVELOPMENT SUB BASINS

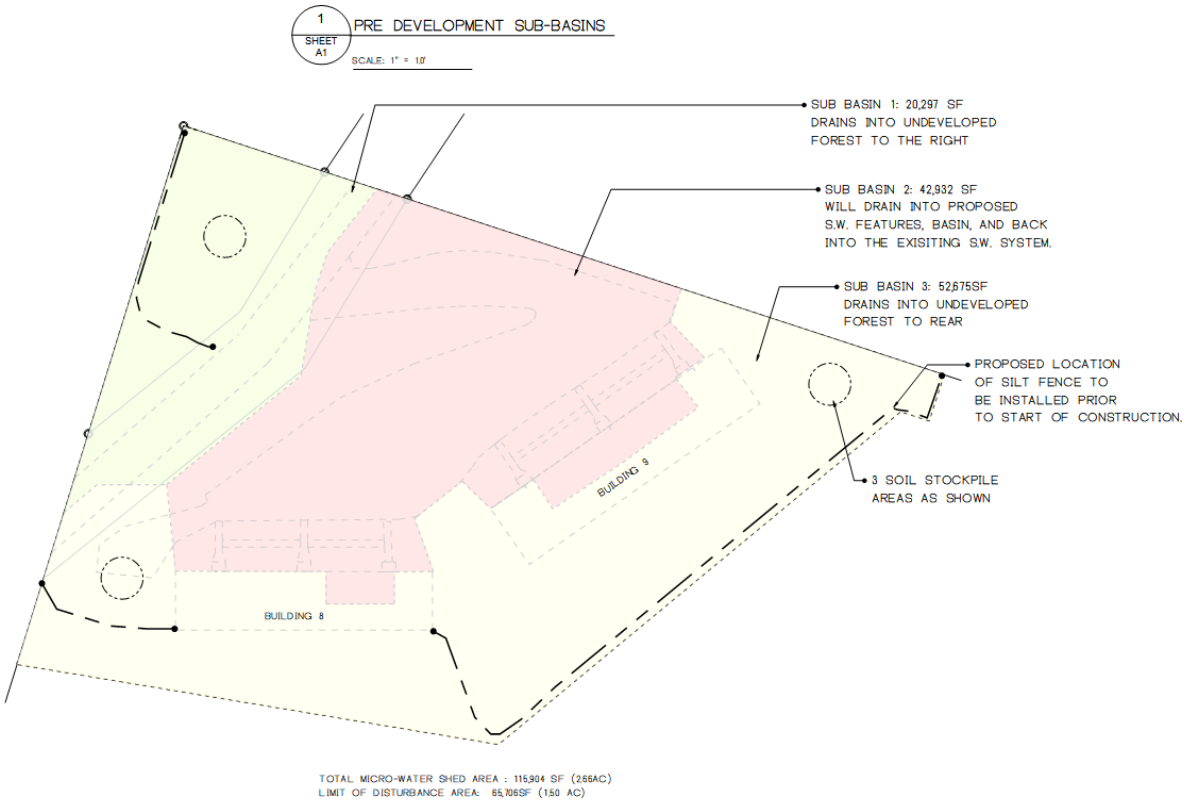
The micro watershed area pertaining to this proposed project is approximately 2.66 acres. Within this watershed, there are three (3) pre-development sub-basins as shown below in figure 1. These sub-basins contained within the micro watershed have virtually all contributing sources originating on site and virtually no off site contributing areas.

Sub Basin 1 (N-W): This sub-basin defined below in figure 2 is colored green and is approximately 20,297 SF (.46 Ac). This sub-basin consists mainly of Mardin gravelly silt loam (MdB) with undisturbed forest undergrowth as well as existing impervious surfaces. The existing impervious surfaces include sections of Peddler Hill Road which are paved with Asphalt. Stormwater from this sub-basin runs off-site to the south and is ultimately caught by Satterly Creek through surface conveyance.

Sub Basin 2 (Parking Lot): This sub-basin defined below in figure 2 is red and is approximately 42,932 SF (.98Ac). This sub-basin contains mainly impervious surface areas that consist of the main parking area, entrance road, sidewalks, and an eighth of the roof area of buildings 8 and 9. The entrance road and most of the parking area consist of asphalt pavement and the walking surfaces comprise concrete. The roofs of buildings 8 and 9 consist of asphalt shingles with gutter systems that convey the runoff to rain leaders which directly discharge into sub basin 2. The remainder of the site consists of Mardin gravelly silt loam (MdB) soils. All stormwater from this basin is directed and conveyed through 3 stormwater drains located in the sub-basin. This existing stormwater system conveys the flow to a central location and outlets down the hill which connects to another 15” CMP network of the stormwater system for the greater RHC HOA.

Sub Basin 3 (Behind Buildings 8 and 9): This sub-basin defined below in figure 2 is colored yellow and is approximately 52,675 SF (1.2 Ac). This sub-basin primarily contains more than half of the impervious roof surfaces of buildings 8 and 9, with the majority of the site comprised of moderately drained Mardin gravelly silt loam (MdD) covered in grass. The sub-basin slopes down to Tanager Road below. All storm water from this basin is drained naturally through infiltration into existing soils and overland flow down to Tanager Rd which ultimately conveys stormwater runoff to Satterly Creek which abuts the entire site.

FIGURE1: Pre Development Sub Basins



4.2: POST-DEVELOPMENT SUB BASINS

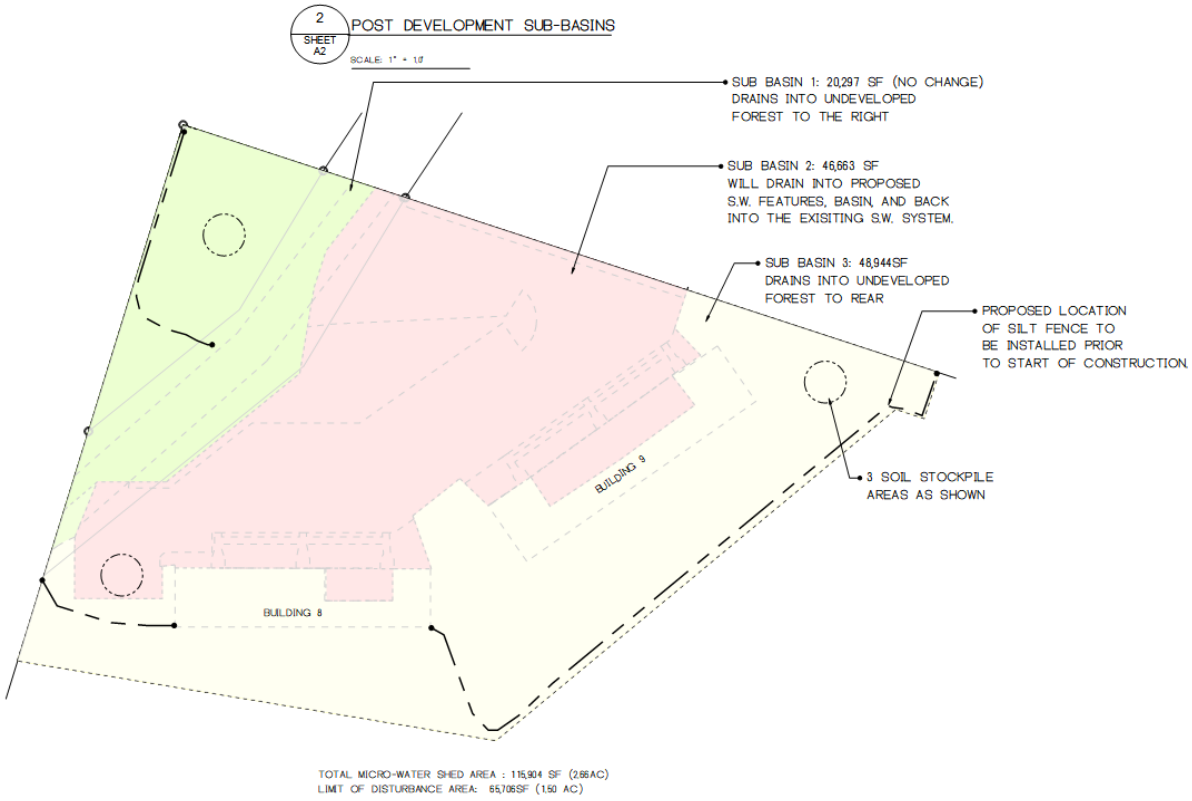
The micro watershed area will remain unchanged and is approximately 2.66 acres. Within this watershed, there are three (3) post-development sub-basins as shown in figure 2 below. Sub-basins 2 and 3 have changed slightly in both size and orientation. The project will occur within all sub-basins however, only subbasins 2 & 3 will have permanent construction features.

Sub Basin 1 (N-W): This sub-basin will experience a minor alteration during the construction effort and will serve as a construction staging area and a temporary parking lot for the existing residents. The existing forested area will be cleared and an un-improved construction staging area will be installed at approximately 7000 sf. This staging area will be graded and composed of compacted soil. At the conclusion of the construction effort, this staging area will be de-compacted and scarified, and seeded with grass, trees and shrubs planted to return it to a fully permeable surface.

Sub Basin 2 (Parking Lot): The boundaries of this sub-basin change slightly to include the proposed parking site layout. This sub-basin will include the majority of the construction effort to include the replacement of all of the existing stormwater features along with the expansion of the existing parking lot and an alteration to the traffic pattern. Two gravity retaining walls will be installed to accommodate the proposed parking lot alteration. Within this basin, the impervious surfaces will be increasing from pre to post-development by roughly 8716 SF. A major alteration to the existing stormwater system will be installed to include nine (7) catch basins conveying stormwater into sub-basin 3 for pre-treatment and storage, and the addition of 15 tree pits to treat required WQv from the expanded parking system.

Sub Basin 3 (Behind Buildings 8 and 9): This sub-basin will be slightly changed to accommodate the new exit entrance onto Peddler Hill Road. As shown in figure 2 below, the proposed one way entrance road replaces the gravel parking area and thus changes the grading of the site. The rear areas will be redeveloped to incorporate new stormwater treatment solutions outlined in this report. This includes the installation of a 750 SF pretreatment pea gravel filter channel, a 440 SF infiltration basin, and an additional two (2) catch basins. The overall area of this sub basin will be slightly reduced by approx 3,700 SF due to the change in the grading of the site needed to accommodate the proposed one way entrance from Peddler Hill Rd.

FIGURE 2: Post Development Sub Basins



4.3: WATER QUALITY VOLUME (WQv):

The stormwater management practices and associated proposed features of this SWPPP were prepared in accordance with the requirements and sizing criteria guidelines outlined in the SMDM Chapter 4.2 Water Quality Volume (WQv).

Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequent storm events that tend to contain higher pollutant levels. It is specifically defined as the volume of stormwater runoff generated from the entire 90th percentile rain event. Practices sized using the WQv will capture and treat 90% of all 24-hour rain events which is directly related to the amount of impervious cover constructed or existing at the site.

WQv is calculated using the following equation:

$$WQv = \frac{P * R_v * A}{12}$$

where:

WQ_v = water quality volume (in acre-feet)

P = 90% Rainfall Event Number (see Figure 4.1)

R_v = 0.05 + 0.009(I), where I is percent impervious cover

A = site area in acres (Contributing area)

The following tables list the water quality volume WQv calculations for sub-basin 1,2,3. These tables aim to showcase the Pre and Post Development WQv figures in relation to the impervious surfaces in their respective basins.

FIGURE 3: Pre Development WQv

SITE SUBBASIN: 1 (N-W - OPPOSITE SIDE OF PEDDLER ROAD)			
	Sub-Basin Total Area (Ac) =	0.4660	Ac
	Sub-Basin Total Area (sf) =	20,297	sf
	Onsite Contributing Area (sf)	20,297	SF
	Offsite Contributing Area (sf) =	0	SF
	Sub-Basin % of total Area =	17.51%	
EXISTING SITE			
Sub-basin Impervious Cover Area (Ac) =		0.1178	Ac
Sub-basin Impervious Cover Area (sf) =		5,133.0	sf
WQv CALCULATIONS			
90th Percentile Rainfall =	P =	1.4	in
Rv =	0.05+(0.009(I) =	0.278	
% Impervious Cover =	I =	25.289	%
Sub-Basin Area (Ac) =	A =	0.4660	Ac
Water Quality Volume =	WQv =	0.0151	Ac-Ft
WQv = ((P x Rv x A) / 12)		657.4	Cu-Ft
Existing SW Features contained within Sub-Basin			
NONE			

SITE SUBBASIN: 2 (PARKING LOT)			
	Sub-Basin Total Area (Ac) =	0.9856	Ac
	Sub-Basin Total Area (sf) =	42,932	sf
	Onsite Contributing Area (sf) =	42,932	SF
	Offsite Contributing Area (sf) =	0	SF
	Sub-Basin % of total Area =	37.04%	
EXISTING SITE			
Sub-basin Impervious Cover Area (Ac) =		0.5995	Ac
Sub-basin Impervious Cover Area (sf) =		26,115	sf
WQv CALCULATIONS			
90th Percentile Rainfall =	P =	1.4	in
Rv =	0.05+(0.009(I) =	0.597	
% Impervious Cover =	I =	60.828	%
Sub-Basin Area (Ac) =	A =	0.9856	Ac
Water Quality Volume =	WQv =	0.0687	Ac-Ft
WQv = ((P x Rv x A) / 12)		2,992	Cu-Ft
Existing SW Features contained within Sub-Basin			
3 catch basins convey stormwater to the southern portoin of the property / Satterly Creek. See Appendix F for details			

SITE SUBBASIN: 3 (S - BEHIND BUILDINGS)			
	Sub-Basin Total Area (Ac) =	1.2093	Ac
	Sub-Basin Total Area (sf) =	52,675	sf
	Onsite Contributing Area (sf) =	52,675	SF
	Offsite Contributing Area (sf) =	0	SF
	Sub-Basin % of total Area =	45.45%	
EXISTING SITE			
Sub-basin Impervious Cover Area (Ac) =		0.2432	Ac
Sub-basin Impervious Cover Area (sf) =		10,594	sf
WQv CALCULATIONS			
90th Percentile Rainfall =	P =	1.4	in
Rv =	0.05+(0.009(I) =	0.231	
% Impervious Cover =	I =	20.112	%
Sub-Basin Area (Ac) =	A =	1.2093	Ac
Water Quality Volume =	WQv =	0.0326	Ac-Ft
WQv = ((P x Rv x A) / 12)		1,420	Cu-Ft
Existing SW Features contained within Sub-Basin			
Overland flow to southern portion of property abutting Tanager Rd. See Appendix F for details			

FIGURE 4: Post Development WQv

SITE SUBBASIN: 1 (N-W - OPPOSITE SIDE OF PEDDLER ROAD)			
Sub-Basin Total Area (Ac) =		0.4655	Ac
Sub-Basin Total Area (sf) =		20,279	sf
Onsite Contributing Area (sf)		20,279	SF
Offsite Contributing Area (sf) =		0	SF
Sub-Basin % of total Area =		17.50%	
EXISTING SITE			
Sub-basin Impervious Cover Area (Ac) =		0.1178	Ac
Sub-basin Impervious Cover Area (sf) =		5,133.0	sf
WQv CALCULATIONS			
90th Percentile Rainfall =	P =	1.4	in
Rv =	0.05+(0.009(I) =	0.278	
% Impervious Cover =	I =	25.312	%
Sub-Basin Area (Ac) =	A =	0.4655	Ac
Water Quality Volume =	WQv =	0.0151	Ac-Ft
WQv = ((P x Rv x A) / 12)		657.3	Cu-Ft
Proposed SW Features contained within Sub-Basin			
This sub basin does not contain any SW features. The post development plan matches existing with no changes to impervious surfaces and continued natural conveyance through the undeveloped forest to the creek as is.			

SITE SUBBASIN: 2 (PARKING LOT)			
Sub-Basin Total Area (Ac) =		1.0712	Ac
Sub-Basin Total Area (sf) =		46,663	sf
Onsite Contributing Area (sf) =		46,663	SF
Offsite Contributing Area (sf) =		0	SF
Sub-Basin % of total Area =		40.26%	
EXISTING SITE			
Sub-basin Impervious Cover Area (Ac) =		0.8327	Ac
Sub-basin Impervious Cover Area (sf) =		36,274	sf
WQv CALCULATIONS			
90th Percentile Rainfall =	P =	1.4	in
Rv =	0.05+(0.009(I) =	0.750	
% Impervious Cover =	I =	77.736	%
Sub-Basin Area (Ac) =	A =	1.0712	Ac
Water Quality Volume =	WQv =	0.0937	Ac-Ft
WQv = ((P x Rv x A) / 12)		4,081	Cu-Ft
Proposed SW Features contained within Sub-Basin			
4 rain gardens, 15 tree pits, and 7 catch basins convey stormwater to the North Eastern portion of the property boundary via HDPE conveyance. This provides access to sub-basin 3 via the pea gravel filter and infiltration basin. All water from this area eventually ends up in the same conveyance system as the existing conditions, but this proposed plan provides full WQv and Storage for applicable stormwater volumes.			

SITE SUBBASIN: 3 (S - BEHIND BUILDINGS)			
Sub-Basin Total Area (Ac) =		1.1236	Ac
Sub-Basin Total Area (sf) =		48,944	sf
Onsite Contributing Area (sf) =		48,944	SF
Offsite Contributing Area (sf) =		0	SF
Sub-Basin % of total Area =		42.23%	
EXISTING SITE			
Sub-basin Impervious Cover Area (Ac) =		0.2109	Ac
Sub-basin Impervious Cover Area (sf) =		9,188	sf
WQv CALCULATIONS			
90th Percentile Rainfall =	P =	1.4	in
Rv =	0.05+(0.009(I) =	0.219	
% Impervious Cover =	I =	18.773	%
Sub-Basin Area (Ac) =	A =	1.1236	Ac
Water Quality Volume =	WQv =	0.0287	Ac-Ft
WQv = ((P x Rv x A) / 12)		1,250	Cu-Ft
Existing SW Features contained within Sub-Basin			
This sub basin does not contain any SW features. The post development plan matches existing with no significant changes to impervious surfaces and continued natural conveyance through the undeveloped forest to remainder of the site as is.			

FIGURE 5: WQv Summary Table

WQv Summary Pre & Post Development		
	Site Sub Basin	Cu-Ft
Pre-Development	1 (N-W)	657
	2 (Parking Lot)	2,992
	3 (Behind Buildings)	1,420
Post-Development	1 (N-W)	657
	2 (Parking Lot)	4,081
	3 (Behind Buildings)	1,250
Δ Post to Pre Development	1 (N-W)	0
	2 (Parking Lot)	1,088
	3 (Behind Buildings)	-169
Total WQv Change	Sum	919

WQv SUMMARY:

Sub Basin 1 (N-W):

Δ **Pre and Post Development WQv=** 0 Cu-Ft

With a total cumulative area of existing impervious cover equating to 5133 SF this results in a pre-development WQv of 657 Cu-Ft. This sub basin remains exactly the same from pre to post development. As such, there is a Δof 0 WQv between pre and post development resulting in NO CHANGE to water quality volume or stormwater runoff. As such, no runoff reduction is required because nothing was changed on this portion of the site.

Sub Basin 2 (Parking Lot):

Δ **Pre and Post Development WQv=** 1,088 Cu-Ft

The total cumulative area of existing impervious cover equates to 26,115 SF. This sub basin has two areas that will be redeveloped as described below. In total the new impervious surfaces will equate to an increase of 10,159 SF in impervious area which results in a net increase of 1,088 Cu-Ft. of WQv.

1. Existing and Proposed Parking Area: The existing parking area contains 21,863 SF of impervious surface area. The parking lot will be expanded to include 15 additional spaces and a new traffic pattern which will create a new entrance from Peddler Hill Rd. This will add approximately 8120 SF of impervious surface area to the subbasin and increase the attributable WQv as noted in the table.

2. Existing and Proposed Sidewalks: The existing sidewalk area represents 1775 SF of impervious surface area. The redeveloped sidewalk area will decrease to 1460 SF with the resulting effects on the WQv.

Sub Basin 3 (Behind Buildings 8 and 9):

Δ **Pre and Post Development WQv**= -169 Cu-Ft

With a total cumulative area of existing impervious cover equating to 10,10594 SF this results in a pre-development WQv of 1,420Cu-Ft. This sub basin will be reduced in size, which subsequently reduces the impervious surface area to 9,188 SF with a WQv of 1,250 Cu-Ft. As such, there is a Δ of -169 WQv between pre and post development . Though there is no dedicated stormwater treatment solution dedicated to this site, a portion of this pre-development site will now be routed to sub-basin 2 for additional treatment in the post development plan, thus the negative value.

4.4: RUNOFF REDUCTION VOLUME (RRv)

Runoff reduction is a component of water quality and it encourages the recharge of groundwater into the aquifer while reducing the volume of stormwater runoff to levels that are as close to pre-developed levels as practical. Runoff Reduction volumes will specifically address the changes between the pre and post-development WQv between the two sub-basins as required by the SMDM. The runoff reduction shall be achieved by the application of on-site green infrastructure techniques and standard stormwater management practices with individual runoff reduction capacity to replicate and equal the same or better pre-development hydrology conditions. As shown in the WQv summary table in figure 5, sub-basin 1 has no change and will require no runoff reduction techniques. Sub-basin 2 will require a WQv offset of greater than or equal to 1,088 Cu-Ft as calculated to equal pre-development hydrologic conditions. Sub-basin 3 will reduce its WQv by 169 Cu-Ft thus eliminating the need to offset. The net WQv offset value to be reduced by this plan is 919 Cu-Ft.

In accordance with the SMDM, this stormwater management plan aims to utilize three separate green infrastructure practices to provide the required runoff reduction volume. The following green infrastructure practices will be utilized and sized in accordance with the criteria set forth in section 5.3. Please view Appendix F for the site plan & placement of the following features.

1. **5.3.7 Rain Garden for Sidewalk Runoff:** Stormwater quantity and quality benefits can be achieved by routing runoff from impervious areas to areas such as rain gardens designed for detention & infiltration. The rain garden is suitable for treating small volumes of storm runoff from the sidewalk portion of this development plan. As shown below, a total of 180SF of rain gardens

will be installed as shown on the site plan. This will be split into 4 areas within sub-basin 2 that are each approx. 2.5'x18' in length between the sidewalks near the parking area. We incorporate this solution in the post-development subbasin 2.

FIGURE 6: RAIN GARDEN RRV

1. RAIN GARDEN STORAGE FOR SIDEWALK AREA			
Cumulatuive Impervious Building Side Walk Area	A =	1,460	sf
Net Impervious Area Reduction (sf) =		1,460	sf
Net Impervious Area Reduction (Ac) =		0.0335	Ac
RAIN GARDEN CALCULATIONS - IAW SMDM SEC. 5.3.7			
Rain Garden Surface Area (Arg) =		180	sf
Depth of Soil Media (Dsm) =		1.0	f
Porosity of Soil Media (Psm) =		0.20	
Volume of Soil Media (Vsm) = Arg x Dsm x Psm =		36	Cu-ft
Depth of Drainage Layer = Ddl =		0.50	ft
Porosity of Drainage Layer (Pdl) =		0.40	
Volume of Drainage Layer = Vdl = Arg x Ddl x Pdl =		36	Cu-ft
Depth of Ponding Surface (Dp)=		0.50	ft
WQv ≤ Vsm + Vdl + (Dp x Arg) =	RRv Capacity =	**162**	**Cu-ft**
CONTRIBUTING AREA WQv CALCULATIONS			
90th Percentile Rainfall =	P =	1.4	in
Rv =	0.05+(0.009(I) =	0.950	
% Impervious Cover =	I =	100.000	%
Impervious Contributing Area (Ac) =	A =	0.0335	Ac
Impervious Contributing Area (sf) =	A =	1,460.0000	sf
Water Quality Volume =	**WQv =**	**0.0037**	**Ac-Ft**
RRv reduction ->WQv = ((P x Rv x A) / 12)		**162**	**Cu-Ft**
Validation -> 162 Cu-ft WQv = 162 Cu-ft Rain Garden Storage			✓

2. **5.3.4 Tree Planting / Tree Pit:** Planting new trees on new development sites can reduce stormwater runoff, promote evapotranspiration, increase nutrient uptake, provide shading and thermal reductions, and encourage wildlife habitat as stated in section 5.3.4 of the SMDM. This section of the manual states that "A 100 square-foot directly connected impervious area reduction is permitted for each new tree". This credit may only be applied to the impervious area adjacent to the tree. We incorporate this solution in the post development subbasin 2 to address the WQv attributable to the redeveloped retaining walls and portions of the parking areas.

FIGURE 7: TREE PLANTING / TREE PITS

2. TREE PLANTING / TREE PITS			
Number of proposed trees planted		15	trees
Adjacent Impervious Area Reduction Per Tree (Pg. 5-61 SMSM)		100	sf
Net Impervious Area Reduction (sf) =		1,500	sf
Net Impervious Area Reduction (Ac) =		0.0344	Ac
Area Reduction WQv CALCULATIONS			
90th Percentile Rainfall =	P =	1.4	in
Rv =	0.05+(0.009(I) =	0.950	
% Impervious Cover =	I =	100.0	%
Impervious Contributing Area (Ac) =	A =	0.0344	Ac
Impervious Contributing Area (sf) =	A =	1,500	sf
Water Quality Volume =	**WQv =**	**0.0038**	**Ac-Ft**
RRv reduction ->WQv = ((P x Rv x A) / 12)		**166**	**Cu-Ft**

3. **6.3 Stormwater Infiltration Basin:** An undisturbed excavated trench or basin can be used to capture and allow infiltration of stormwater runoff into the surrounding soils from the bottom and sides of the basin or trench over a 2-day period as per section 6.3 of the SMDM . A minimum pretreatment volume of 25% of the WQv must be provided prior to entry to an infiltration facility and can be provided in the form of a sedimentation basin, sump pit, grass channel, pea gravel channel, plunge pool or other measure. Via an improved conveyance system underneath the parking area, our design incorporates a pea gravel filtering channel of 75 LF @ 10’ width (750 SF) to meet the pretreatment requirements of 25% of WQv. The remaining treatment is achieved using a 4409 SF basin that includes a bottom sand filter bed, underdrain pipe, and an outflow riser in the basin area To allow for overflow protection. Overflow and underdrain is connected and conveyed into the existing stormwater system via a newly installed 15” HDPE behind building 8. We incorporate this solution in the post-development subbasins 3 which conveys, stores, and treats stormwater from sub-basin 2.

FIGURE 8: INFILTRATION BASIN & SAND FILTER

3. INFILTRATION BASIN WITH SAND FILTRATION			
Remaining to be treated Impervious Area (Parking Lot and Roof Area)	**WQv =**	**650**	**Cu-Ft**
Pretreatment w/ 2" Pea Gravel Filter Strip in Triangular Channel			
Required Pre Treatment -> 25% of WQv	Wqv * .25 =	162	**Cu-Ft**
Proposed Pea Gravel Channel Length	Lp =	75	ft
Proposed BASE (BOTTOM) Pea Gravel Channel Width	A =	0	ft
Proposed BASE (TOP) Pea Gravel Channel Width	B =	10	ft
Proposed Pea Gravel Channel height	H =	1	ft
Channel Sectional Area	As =	5	sf
Pea Gravel Thickness (in)	Pth =	9.00	in
Pea Gravel Thickness (ft)	Pth =	0.75	ft
Pea Gravel Porosity	Pg =	0.32	
RRv Pretreatment Volume	Pvfilter =	180.00	Cu-ft ✓
Required Sand Filter Surface Area Calculations (pg. 6-51 SMDM)			
Required Surface Area of filter bed (sf)	Af =	64.97080333	sf
Design Volume	WQv =	650	**Cu-ft**
Filter Bed Depth	dF =	2	ft
Coefficient of Permeability of filter media	K =	2	ft / day
Average Height of water above	Hf =	3	ft
Design Filter Bed Drain Time	Tf =	2	days
Treatment System Trapazoidal infiltration Basin Storage Area			
Required Surface Area of sand filter (sf)	Af =	64.97080333	sf
Proposed Sand Filter Surface Area	Ssa =	200	sf ✓
Proposed BASE (BOTTOM) Basin Width	A =	10	ft
Proposed BASE (TOP) Basin Width	B =	22	ft
Proposed Basin height	H =	4	ft
Proposed Basin Length	L =	20	ft
Proposed Trapazoidal Basin Volumetric storage below overflow	Vb=	1280	Cu-Ft
Proposed Sand Filter Storage Area			
Sand Filter Length	Ls =	10	ft
Sand Filter Width	Ws =	20	ft
Sand Filter Depth	Ds =	2	ft
Proposed Sand Filter Surface Area	Ssa =	200	sf
Depth of Sand Media	Dsm =	2.0	f
Porosity of Sand Media	Psm =	0.33	
Volume of Sand Media (Vsm) = Arg x Dsm x Psm	Vsm =	132	Cu-ft
Summary			
Total RRv Treated	RRv Capacity =	**1,412**	**Cu-ft**
Treatment System Required Storage % of WQv	75% Required	217.33%	Provided ✓

4.5: SUMMARY:

In summary, the change in WQv from pre and post-development conditions as required by the SMDM results in 919 Cu-Ft of runoff that needs to be treated and reduced. The three proposed stormwater management techniques will provide 1,740 Cu-Ft of treated storage which is 189% of the required, thus satiating the runoff reduction requirement and providing excess flood attenuation protection for future site improvements, and future storms.

FIGURE 9: SUMMARY RRV TABLE

Summary of RRv offset WQv for New Development			
Δ from Pre Development WQv =		919	Cu-Ft
1. RAIN GARDEN STORAGE FOR SIDEWALK AREA			
	RRv Capacity =	162	Cu-ft
2. TREE PLANTING / TREE PITS			
	RRv Capacity =	166	Cu-ft
#REF!			
	RRv Capacity =	1,412	Cu-ft
TOTAL RRV Capacity =		1,740	Cu-ft
Validate that New Development RRv ≥ WQv ->			
1,740	Cu-ft RRv	919	Cu-ft WQv ✓
		189.35%	of required RRv

SECTION 5: PEAK RUNOFF SUMMARY

An integral part of the SWPPP process and planning calls for the attenuation of peak runoff flow rates to pre-developed levels. In doing this, mitigation is provided against the potential impacts caused by the increased speed at which rainwater sheds in newly developed areas and creates unanticipated future flood stage events. Attenuation of the peak flow rates is accomplished by detaining or providing storage for a portion of the anticipated stormwater run-off and providing the ability to control and slowly release the stormwater over an extended period of time.

A hydraulic analysis has been performed on this site using the HydroCAD stormwater modeling software. This system is based on the NRCS TR-20 watershed analysis model. To compute the analysis, the amount of rainfall that can be expected for a given storm event, together with the distribution of that rainfall over a given time interval must be determined. The Northeast Regional Climate Center (NRCC), in collaboration with Cornell University and the NRCS publishes an interactive web tool for extreme precipitation analysis. The NYS DEC encourages the use of NRCC data when possible. The rainfall data & values for the project site that were used for subsequent calculations were captured using this web tool and are shown below:

FIGURE 10: Peak Runoff Summary

24 Hour Rainfall Values	
Storm Frequency	Rainfall (in)
1 Year	2.65
2 Year	3.19
10 Year	4.74
25 Year	5.94
100 Year	8.39

Source: NRCC - precip.eas.cornell.edu

Utilizing the pre-developed drainage basin areas identified in Figures 2 and 3 of this report, a pre-development hydrologic model was developed. In this model, two basins were modeled with the in-situ site materials as they currently exist. The model utilizes three analysis points to visualize and interpret stormwater runoff that ultimately flows to the southern portion of the property and into Satterly Creek. The first analysis point for Sub-Basin 1 assumes no stormwater conveyance and is a function of the absorption capacity of the underlying soils. The second analysis point focuses on a 15” diameter pipe that conveys stormwater into the property’s existing stormwater system that outputs to Satterly Creek. This is both the furthest point on the analysis from a time of concentration perspective as well as the most likely

point that all stormwater from subbasin 2 will exit the micro watershed as it is approximately the lowest elevation (530'). The third analysis point assumes no stormwater conveyance and is a function of the absorption capacity of the underlying soils. This area is sloped and utilizes soil absorption and overland flow. These three points at which stormwater either is absorbed or leaves the property were taken to be the points used for comparison of the pre and post-developed conditions. The computed pre-developed flow rates for the associated year storm events are summarized below as follows:

FIGURE 11: PEAK FLOW PRE DEVELOPMENT CONDITIONS

PEAK FLOW PRE-DEVELOPMENT CONDITIONS				
	Precipitation (in) Type III Rainfall	Sub Basin 1 (Left of Road) TO Analysis Point 1	Sub Basin 2 (Parking Lot) TO Analysis Point 2	Sub Basin 3 (Behind Buildings) TO Analysis Point 3
Area (sf)		20,297.00	42,955.00	52,673.00
Composite Curve Number (CN)		82.00	89.00	79.00
Time of Concentration (Tc - min)		24.90	1.80	13.10
Q Peak 1 Yr (cfs)	2.65	0.36	1.98	1.01
Q Peak 2 Yr (cfs)	3.19	0.51	2.57	1.46
Q Peak 10 Yr (cfs)	4.74	0.95	4.27	2.88
Q Peak 25 Yr (cfs)	5.94	1.31	5.58	4.05
Q Peak 100 Yr (cfs)	8.39	2.04	5.38	6.48

With the above data in place, the post-developed site conditions were modeled in accordance with the sub-basins area and composition discussed in this report . The proposed buildout of the project includes an existing portion of the site that remained unchanged and a redeveloped portion mostly in subbasin 2; all of which were captured in this post-development hydrologic model. The redevelopment portion was modeled utilizing rain gardens with 180SF of surface area and 162 CF of storage, tree plantings, and an infiltration basin at the north end of the microsite that provides 1280 CF of storage to capture parking lot runoff. These detention systems aim to slow the peak flow rates of all storm events from the pre-development analysis, this was achieved and the results of the peak flow for the post-development conditions are shown below:

FIGURE 12: PEAK FLOW POST DEVELOPMENT CONDITIONS

PEAK FLOW POST-DEVELOPMENT CONDITIONS				
	Precipitation (in) Type III Rainfall	Sub Basin 1 (Left of Road) TO Analysis Point 1	Sub Basin 2 (Parking Lot) TO Analysis Point 2	Sub Basin 3 (Behind Buildings) TO Analysis Point 3
Area (sf)		20,297.00	46,781.00	52,673.00
Curve Number (CN)		82.00	93.00	79.00
Time of Concentration (Tc - m)		24.90	4.40	13.10
Q Peak 1 Yr (cfs)	2.65	0.33	1.22	0.81
Q Peak 2 Yr (cfs)	3.19	0.46	1.53	1.17
Q Peak 10 Yr (cfs)	4.74	0.85	2.41	2.33
Q Peak 25 Yr (cfs)	5.94	1.16	3.30	3.28
Q Peak 100 Yr (cfs)	8.39	1.81	4.94	5.26

To accurately analyze the impacts of the proposed development, a comparison of pre and post-developed peak flow rates at the three respective analysis points (1,2,3) is shown below. Additionally, it can be seen that all peak flow rates in sub-basin 1, 2, & 3 have been lowered thus showing a negative comparison value which is expressed with parentheses.

FIGURE 13: COMPARISON OF PRE & POST DEVELOPMENT CONDITIONS.

PEAK FLOW - PRE vs POST DEVELOPMENT (reduction in parentheses)				
	Pre / Post	Sub Basin 1 (Left of Road) TO Analysis Point 1	Sub Basin 2 (Parking Lot) TO Analysis Point 2	Sub Basin 3 (Behind Buildings) TO Analysis Point 3
Q Peak 1 Yr (cfs)	Pre-Developed	0.36	1.98	1.01
	Post-Developed	0.33	1.22	0.81
	Difference	(0.03)	(0.76)	(0.20)
Q Peak 2 Yr (cfs)	Pre-Developed	0.51	2.57	1.46
	Post-Developed	0.46	1.53	1.17
	Difference	(0.05)	(1.04)	(0.29)
Q Peak 10 Yr (cfs)	Pre-Developed	0.95	4.27	2.88
	Post-Developed	0.85	2.41	2.33
	Difference	(0.10)	(1.86)	(0.55)
Q Peak 25 Yr (cfs)	Pre-Developed	1.31	5.58	4.05
	Post-Developed	1.16	3.30	3.28
	Difference	(0.15)	(2.28)	(0.77)
Q Peak 100 Yr (cfs)	Pre-Developed	2.04	5.38	6.48
	Post-Developed	1.81	4.94	5.26
	Difference	(0.23)	(0.44)	(1.22)

It can be seen in the table above that the post-developed flow rates are below the pre-developed levels for all storm events modeled at both analysis points. This attenuation of these peak discharge rates at lower levels post development satisfies the SPDES permit requirement for Channel Protection (CPv), Overbank Flood Control (Qp), and Extreme Flood Control (Qf). All of the pre and post-development HydroCad models and calculations involved for all storm events can be found in Appendix E: HYDROCAD PRE AND POST DEVELOPMENT.

SECTION 6: CONSTRUCTION SCHEDULE:

A general overview of the construction schedule is listed below:

1. Obtain all municipal construction plan approvalS and applicable permits through the required means of applications and planning or zoning boards required.
2. Once approval has been provided in writing, the project manager should hold a pre-construction meeting at least once before the start of a major milestone action prior to the start of the next construction activity which is to be attended by the property owner, the owners contractors representatives, and the designated project manager. Engineering consultations shall be provided as needed.
3. The copy of the approved SWPPP will remain on site with applicable drawing and inspection reports as needed.
4. 811 will be notified prior to the beginning of earth disturbance activities. The 'dig safely New York' ticket number and location confirmation request will be maintained on site with other pertinent documents.
5. The stabilized construction entrance is installed as specified in the engineering plans in accordance with Section 4, Paragraph 4, C, of this report.
6. Sediment control measures shall be installed at all existing project area drainage ways or existing stormwater management structures prior to the installation of erosion control measures within the project site.
7. The limits of disturbance will be flagged with an appropriate offset measure as well as the vegetation to be preserved and protected and the general boundaries of the riparian buffer to the rear of the site.
8. Install silt fencing in accordance with the engineering plans and specifications.
9. Tree clearing & grubbing as required in close coordination with the time of year so as to not infringe on the native endangered species of Indiana bat (Myotis sodalis) - no trees will be downed between the months of November 1st to March 31 of the following year. The location of the proposed pole barn buildings is absent of existing vegetation so not a large amount of removal of natural features will occur.
10. Rough grading of site, milling and initial compaction of the parking areas, & stockpile of the topsoil, temporary stabilization as needed.
11. Soil remediation as per NYSDEC guidelines in the proposed areas of redevelopment.
12. Complete initial finish grading as soon as rough grading is complete. Leave the surface slightly roughened, temporary stabilization & vegetation as needed.

13. Construction of proposed stormwater features to include the stormtech detention basin, rain garden with leaders, building, site features, & utilities.
14. Inspections as per schedule
15. Pave access drives and parking areas
16. Complete final grading
17. Complete final grading of grounds not to be disturbed by additional construction activities, topsoil critical areas and permanently vegetate, landscape and mulch to achieve permanent stabilization.
18. After site is stabilized to 80%, remove all temporary measures
19. Estimated time before final stabilization- 3-7 months after construction begins.

The contractor or equipment operators that will be performing the site work will adhere to the following stipulations in accordance with this plan. Those executing the work will ensure that the approved stormwater management plan is completely implemented in accordance with this report. All of the construction vehicles will enter and exit from the one approved construction entrance on the site at the proposed location of the new entrance from Peddler Hill road or directly into the construction staging area. Measures will be taken to prevent soil and sediment from any construction vehicle's tires from being transferred to the public roads on either Locust Street or Hallock Drive. The operator is directly responsible for coordinating with 'Dig Safely New York' to mark out underground utilities. Immediately after earth disturbance activities are completed, within 14 days, the operator/contractor shall ensure that all areas disturbed are stabilized with temporary or permanent techniques as stated in this report. During non-germinating periods, temporary mulch is applied at the rates required for stabilization. Any disturbed areas that are not at the finished grade that will be re-disturbed within one year must be stabilized in accordance with the temporary stabilization procedures outlined. Disturbed areas that are at the finished grade or will not be disturbed within one year must be stabilized in accordance with the permanent stabilization procedures outlined. The operators shall remove from the site, recycle, or dispose of all building materials and waste in accordance with all applicable state and local codes and laws. The contractor shall not illegally bury, dump, or discharge any building material or wastes on the site unless approved by the municipality.

SECTION 7: STORMWATER MAINTENANCE AGREEMENT:

A stormwater maintenance agreement shall be executed between the applicant and the Village of South Blooming Grove prior to the final approval of the plans. Below is a proposed draft of such an agreement for the village to review and modify as needed.

STORMWATER CONTROL MAINTENANCE AGREEMENT:

1. STORMWATER MANAGEMENT FACILITIES SHALL BE REGULARLY MAINTAINED TO ENSURE THEY FUNCTION AT DESIGN CAPACITY AND TO PREVENT HEALTH HAZARDS ASSOCIATED WITH DEBRIS AND STAGNANT WATER. THE PRIVATELY OWNED PORTION OF THE SYSTEM MUST BE MAINTAINED PRIVATELY.
2. RESPONSIBILITY FOR THE OPERATION AND MAINTENANCE OF THE STORMWATER FACILITIES, INCLUDING PERIODIC REMOVAL AND DISPOSAL OF ACCUMULATED PARTICULATE MATERIAL AND DEBRIS, BUT NOT LIMITED TO THE FOLLOWING: VISUAL INSPECTION OF ALL SYSTEM COMPONENTS AT LEAST TWICE A YEAR, VACUUMING OF ALL STORM SEWER INLETS AND ISOLATION ROWS EVERY SIX MONTHS (FREQUENCY MAY BE ADJUSTED TO ONCE A YEAR IF FIRST YEAR MAINTENANCE RECORDS INDICATE THAT SEDIMENT AND DEBRIS ACCUMULATION IS INSIGNIFICANT; REVERSE FLUSHING AND VACUUMING IF SYSTEM INSPECTION INDICATES SIGNIFICANT ACCUMULATION OF SEDIMENT IN THE PIPES OR CONVEYANCE SYSTEMS; AND PERIODIC REMOVAL AND DISPOSAL OF OTHER MATERIAL AND DEBRIS OR TRASH, SHALL REMAIN WITHIN THE OWNER OF OWNERS OF THE PROPERTY, WITH PERMANENT ARRANGEMENTS THAT SHALL PASS TO ANY SUCCESSIVE OWNER, UNLESS ASSUMED BY A GOVERNMENTAL AGENCY.
3. IN THE EVENT THAT THE FACILITY BECOMES A DANGER TO PUBLIC SAFETY OR PUBLIC HEALTH, OR IT IS IN NEED OF MAINTENANCE, THE OWNER SHALL EFFECT SUCH MAINTENANCE AND REPAIR OF THE FACILITY IN A MANNER THAT IS APPROVED BY THE TOWN ENGINEER OR HIS DESIGNEE, IF THE OWNER FAILS TO PERFORM SUCH REQUIRED MAINTENANCE AND REPAIR OF THESE STORMWATER SYSTEMS, THE MUNICIPALITY, AFTER FULL AND TRANSPARENT NOTIFICATIONS TO THE OWNER OF RECORD, MAY PROCEED TO DO SO AND SHALL BILL THE COST TO THE OWNER.

_____ _____

REPRESENTATIVE: REPRESENTATIVE:

ROLLING HILLS CONDOMINIUM ASSOCIATION VILLAGE OF SOUTH BLOOMING GROVE

APPENDIX A: USDA WEB SOIL SURVEY

APPENDIX B: CONSTRUCTION SITE LOG BOOK & OPERATIONS/MAINTENANCE

APPENDIX C: [OMITTED]

APPENDIX D: NYSDEC MS4 SWPPP ACCEPTANCE FORM

APPENDIX E: HYDROCAD PRE AND POST DEVELOPMENT

APPENDIX F: SITE PLAN

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 Orange County, New York

July 7, 2022

Preface

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

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

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

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

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

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

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Contents

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.

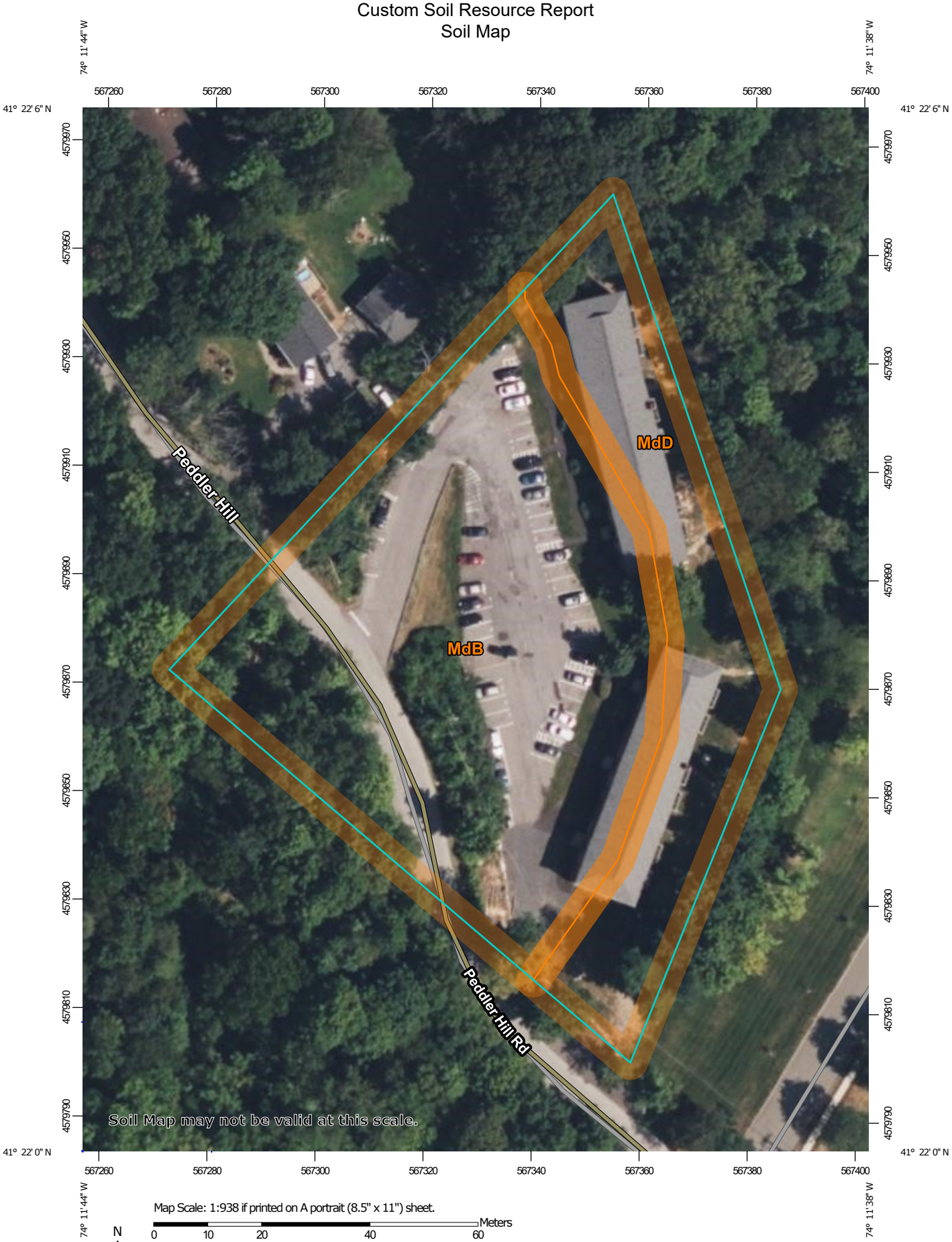
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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: 1:938 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 45 90 180 270

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: Orange County, New York
Survey Area Data: Version 22, Aug 29, 2021

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

Date(s) aerial images were photographed: Aug 13, 2021—Aug 15, 2021

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
MdB	Mardin gravelly silt loam, 3 to 8 percent slopes	1.6	69.2%
MdD	Mardin gravelly silt loam, 15 to 25 percent slopes	0.7	30.8%
Totals for Area of Interest		**2.2**	**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.

Orange County, New York

MdB—Mardin gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2v30j
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Mardin

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till

Typical profile

Ap - 0 to 8 inches: gravelly silt loam
Bw - 8 to 15 inches: gravelly silt loam
E - 15 to 20 inches: gravelly silt loam
Bx - 20 to 72 inches: gravelly silt loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 14 to 26 inches to fragipan
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 13 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Volusia

Percent of map unit: 5 percent

Landform: Hills, mountains
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Interfluve, base slope, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Lordstown

Percent of map unit: 5 percent
Landform: Mountains, hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Mountaintop, interfluve, crest
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Bath

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

MdD—Mardin gravelly silt loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2v30p
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Mardin

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till

Typical profile

Ap - 0 to 8 inches: gravelly silt loam
Bw - 8 to 15 inches: gravelly silt loam
E - 15 to 20 inches: gravelly silt loam
Bx - 20 to 72 inches: gravelly silt loam

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 14 to 26 inches to fragipan
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 13 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Bath

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, nose slope, side slope
Down-slope shape: Concave, linear
Across-slope shape: Linear
Hydric soil rating: No

Lordstown

Percent of map unit: 5 percent
Landform: Mountains, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, nose slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Volusia

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

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Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the following National Soil Survey Handbook link: “National Soil Survey Handbook.”

ABC soil

A soil having an A, a B, and a C horizon.

Ablation till

Loose, relatively permeable earthy material deposited during the downwasting of nearly static glacial ice, either contained within or accumulated on the surface of the glacier.

AC soil

A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil

The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil

Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil

A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial cone

A semiconical type of alluvial fan having very steep slopes. It is higher, narrower, and steeper than a fan and is composed of coarser and thicker layers of material deposited by a combination of alluvial episodes and (to a much lesser degree) landslides (debris flow). The coarsest materials tend to be concentrated at the apex of the cone.

Alluvial fan

A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

Alluvium

Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Alpha,alpha-dipyridyl

A compound that when dissolved in ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction implies reducing conditions and the likely presence of redoximorphic features.

Animal unit month (AUM)

The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions

Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon

A subsoil horizon characterized by an accumulation of illuvial clay.

Arroyo

The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in unconsolidated material. It is usually dry but can be transformed into a temporary watercourse or short-lived torrent after heavy rain within the watershed.

Aspect

The direction toward which a slope faces. Also called slope aspect.

Association, soil

A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity)

The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low: 0 to 3
Low: 3 to 6
Moderate: 6 to 9
High: 9 to 12
Very high: More than 12

Backslope

The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Backswamp

A flood-plain landform. Extensive, marshy or swampy, depressed areas of flood plains between natural levees and valley sides or terraces.

Badland

A landscape that is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, steep slopes and narrow interfluves. Badlands develop on surfaces that have little or no vegetative cover overlying unconsolidated or poorly cemented materials (clays, silts, or sandstones) with, in some cases, soluble minerals, such as gypsum or halite.

Bajada

A broad, gently inclined alluvial piedmont slope extending from the base of a mountain range out into a basin and formed by the lateral coalescence of a series of alluvial fans. Typically, it has a broadly undulating transverse profile, parallel to the mountain front, resulting from the convexities of component fans. The term is generally restricted to constructional slopes of intermontane basins.

Basal area

The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation

The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope (geomorphology)

A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding plane

A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology)

from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

Bedding system

A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock

The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography

A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace

A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum

Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout (map symbol)

A saucer-, cup-, or trough-shaped depression formed by wind erosion on a preexisting dune or other sand deposit, especially in an area of shifting sand or loose soil or where protective vegetation is disturbed or destroyed. The adjoining accumulation of sand derived from the depression, where recognizable, is commonly included. Blowouts are commonly small.

Borrow pit (map symbol)

An open excavation from which soil and underlying material have been removed, usually for construction purposes.

Bottom land

An informal term loosely applied to various portions of a flood plain.

Boulders

Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks

A landscape or tract of steep, rough or broken land dissected by ravines and gullies and marking a sudden change in topography.

Breast height

An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management

Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte

An isolated, generally flat-topped hill or mountain with relatively steep slopes and talus or precipitous cliffs and characterized by summit width that is less than the height of bounding escarpments; commonly topped by a caprock of resistant material and representing an erosion remnant carved from flat-lying rocks.

Cable yarding

A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil

A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche

A general term for a prominent zone of secondary carbonate accumulation in surficial materials in warm, subhumid to arid areas. Caliche is formed by both geologic and pedologic processes. Finely crystalline calcium carbonate forms a nearly continuous surface-coating and void-filling medium in geologic (parent) materials. Cementation ranges from weak in nonindurated forms to very strong in indurated forms. Other minerals (e.g., carbonates, silicate, and sulfate) may occur as accessory cements. Most petrocalcic horizons and some calcic horizons are caliche.

California bearing ratio (CBR)

The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy

The leafy crown of trees or shrubs. (See Crown.)

Canyon

A long, deep, narrow valley with high, precipitous walls in an area of high local relief.

Capillary water

Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena

A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.

Cation

An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity

The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps

See Terracettes.

Cement rock

Shaly limestone used in the manufacture of cement.

Channery soil material

Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment

Control of unwanted vegetation through the use of chemicals.

Chiseling

Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Cirque

A steep-walled, semicircular or crescent-shaped, half-bowl-like recess or hollow, commonly situated at the head of a glaciated mountain valley or high on the side of a mountain. It was produced by the erosive activity of a mountain glacier. It commonly contains a small round lake (tarn).

Clay

As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions

See Redoximorphic features.

Clay film

A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Clay spot (map symbol)

A spot where the surface texture is silty clay or clay in areas where the surface layer of the soils in the surrounding map unit is sandy loam, loam, silt loam, or coarser.

Claypan

A dense, compact subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. The layer restricts the downward movement of water through the soil. A claypan is commonly hard when dry and plastic and sticky when wet.

Climax plant community

The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil

Sand or loamy sand.

Cobble (or cobblestone)

A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material

Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility)

See Linear extensibility.

Colluvium

Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.

Complex slope

Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil

A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions

See Redoximorphic features.

Conglomerate

A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system

Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage

A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil

Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Contour stripcropping

Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section

The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat)

A type of limnic layer composed predominantly of fecal material derived from aquatic animals.

Corrosion (geomorphology)

A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

Corrosion (soil survey interpretations)

Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop

A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management

Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system

Growing crops according to a planned system of rotation and management practices.

Cross-slope farming

Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown

The upper part of a tree or shrub, including the living branches and their foliage.

Cryoturbate

A mass of soil or other unconsolidated earthy material moved or disturbed by frost action. It is typically coarser than the underlying material.

Cuesta

An asymmetric ridge capped by resistant rock layers of slight or moderate dip (commonly less than 15 percent slopes); a type of homocline produced by differential erosion of interbedded resistant and weak rocks. A cuesta has a long, gentle slope on one side (dip slope) that roughly parallels the inclined beds; on the other side, it has a relatively short and steep or clifflike slope (scarp) that cuts through the tilted rocks.

Culmination of the mean annual increment (CMAI)

The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave

The walls of excavations tend to cave in or slough.

Decreasers

The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing

Postponing grazing or resting grazing land for a prescribed period.

Delta

A body of alluvium having a surface that is fan shaped and nearly flat; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer

A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depression, closed (map symbol)

A shallow, saucer-shaped area that is slightly lower on the landscape than the surrounding area and that does not have a natural outlet for surface drainage.

Depth, soil

Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Desert pavement

A natural, residual concentration or layer of wind-polished, closely packed gravel, boulders, and other rock fragments mantling a desert surface. It forms where wind action and sheetwash have removed all smaller particles or where rock fragments have migrated upward through sediments to the surface. It typically protects the finer grained underlying material from further erosion.

Diatomaceous earth

A geologic deposit of fine, grayish siliceous material composed chiefly or entirely of the remains of diatoms.

Dip slope

A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace)

A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming

A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural)

Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface

Runoff, or surface flow of water, from an area.

Drainageway

A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

Draw

A small stream valley that generally is shallower and more open than a ravine or gulch and that has a broader bottom. The present stream channel may appear inadequate to have cut the drainageway that it occupies.

Drift

A general term applied to all mineral material (clay, silt, sand, gravel, and boulders) transported by a glacier and deposited directly by or from the ice or transported by running water emanating from a glacier. Drift includes unstratified material (till) that forms moraines and stratified deposits that form outwash plains, eskers, kames, varves, and glaciofluvial sediments. The term is generally applied to Pleistocene glacial deposits in areas that no longer contain glaciers.

Drumlin

A low, smooth, elongated oval hill, mound, or ridge of compact till that has a core of bedrock or drift. It commonly has a blunt nose facing the direction from which the ice approached and a gentler slope tapering in the other direction. The longer axis is parallel to the general direction of glacier flow. Drumlins are products of streamline (laminar) flow of glaciers, which molded the subglacial floor through a combination of erosion and deposition.

Duff

A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune

A low mound, ridge, bank, or hill of loose, windblown granular material (generally sand), either barren and capable of movement from place to place or covered and stabilized with vegetation but retaining its characteristic shape.

Earthy fill

See Mine spoil.

Ecological site

An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation

The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation

A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian deposit

Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

Ephemeral stream

A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation

A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion

The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (accelerated)

Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion (geologic)

Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion pavement

A surficial lag concentration or layer of gravel and other rock fragments that remains on the soil surface after sheet or rill erosion or wind has removed the finer soil particles and that tends to protect the underlying soil from further erosion.

Erosion surface

A land surface shaped by the action of erosion, especially by running water.

Escarpment

A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

Escarpment, bedrock (map symbol)

A relatively continuous and steep slope or cliff, produced by erosion or faulting, that breaks the general continuity of more gently sloping land surfaces. Exposed material is hard or soft bedrock.

Escarpment, nonbedrock (map symbol)

A relatively continuous and steep slope or cliff, generally produced by erosion but in some places produced by faulting, that breaks the continuity of more gently sloping land surfaces. Exposed earthy material is nonsoil or very shallow soil.

Esker

A long, narrow, sinuous, steep-sided ridge of stratified sand and gravel deposited as the bed of a stream flowing in an ice tunnel within or below the ice (subglacial) or between ice walls on top of the ice of a wasting glacier and left

behind as high ground when the ice melted. Eskers range in length from less than a kilometer to more than 160 kilometers and in height from 3 to 30 meters.

Extrusive rock

Igneous rock derived from deep-seated molten matter (magma) deposited and cooled on the earth's surface.

Fallow

Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan remnant

A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.

Fertility, soil

The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat)

The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity

The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope

A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil

Sandy clay, silty clay, or clay.

Firebreak

An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom

An obsolete, informal term loosely applied to the lowest flood-plain steps that are subject to regular flooding.

Flaggy soil material

Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone

A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain

The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

Flood-plain landforms

A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.

Flood-plain splay

A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

Flood-plain step

An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

Fluvial

Of or pertaining to rivers or streams; produced by stream or river action.

Foothills

A region of steeply sloping hills that fringes a mountain range or high-plateau escarpment. The hills have relief of as much as 1,000 feet (300 meters).

Footslope

The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb

Any herbaceous plant not a grass or a sedge.

Forest cover

All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type

A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan

A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil

The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai

Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Glaciofluvial deposits

Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur in the form of outwash plains, valley trains, deltas, kames, eskers, and kame terraces.

Glaciolacustrine deposits

Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are bedded or laminated.

Gleyed soil

Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping

Growing crops in strips that grade toward a protected waterway.

Grassed waterway

A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel

Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravel pit (map symbol)

An open excavation from which soil and underlying material have been removed and used, without crushing, as a source of sand or gravel.

Gravelly soil material

Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Gravelly spot (map symbol)

A spot where the surface layer has more than 35 percent, by volume, rock fragments that are mostly less than 3 inches in diameter in an area that has less than 15 percent rock fragments.

Green manure crop (agronomy)

A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water

Water filling all the unblocked pores of the material below the water table.

Gully (map symbol)

A small, steep-sided channel caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage whereas a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock

Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hard to reclaim

Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Hardpan

A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope (geomorphology)

A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hemic soil material (mucky peat)

Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops

Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill

A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

Hillslope

A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

Horizon, soil

A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon: An organic layer of fresh and decaying plant residue.

L horizon: A layer of organic and mineral limnic materials, including coprogenous earth (sedimentary peat), diatomaceous earth, and marl.

A horizon: The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon: The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon: The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon: The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon: Soft, consolidated bedrock beneath the soil.

R layer: Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

M layer: A root-limiting subsoil layer consisting of nearly continuous, horizontally oriented, human-manufactured materials.

W layer: A layer of water within or beneath the soil.

Humus

The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups

Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties include depth to a seasonal high water table, the infiltration rate, and depth to a layer that significantly restricts the downward movement of water. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock

Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation. Major varieties include plutonic and volcanic rock (e.g., andesite, basalt, and granite).

Illuviation

The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil

A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers

Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration

The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity

The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate

The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate

The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Very low: Less than 0.2
Low: 0.2 to 0.4
Moderately low: 0.4 to 0.75
Moderate: 0.75 to 1.25
Moderately high: 1.25 to 1.75
High: 1.75 to 2.5
Very high: More than 2.5

Interfluve

A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

Interfluve (geomorphology)

A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill; shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

Intermittent stream

A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders

On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions

See Redoximorphic features.

Irrigation

Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin: Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border: Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding: Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation: Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle): Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow: Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler: Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation: Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding: Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame

A low mound, knob, hummock, or short irregular ridge composed of stratified sand and gravel deposited by a subglacial stream as a fan or delta at the margin of a melting glacier; by a supraglacial stream in a low place or hole on the surface of the glacier; or as a ponded deposit on the surface or at the margin of stagnant ice.

Karst (topography)

A kind of topography that formed in limestone, gypsum, or other soluble rocks by dissolution and that is characterized by closed depressions, sinkholes, caves, and underground drainage.

Knoll

A small, low, rounded hill rising above adjacent landforms.

Ksat

See Saturated hydraulic conductivity.

Lacustrine deposit

Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain

A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

Lake terrace

A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

Landfill (map symbol)

An area of accumulated waste products of human habitation, either above or below natural ground level.

Landslide

A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones

Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lava flow (map symbol)

A solidified, commonly lobate body of rock formed through lateral, surface outpouring of molten lava from a vent or fissure.

Leaching

The removal of soluble material from soil or other material by percolating water.

Levee (map symbol)

An embankment that confines or controls water, especially one built along the banks of a river to prevent overflow onto lowlands.

Linear extensibility

Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^{1}/_{3}$- or $^{1}/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit

The moisture content at which the soil passes from a plastic to a liquid state.

Loam

Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess

Material transported and deposited by wind and consisting dominantly of silt-sized particles.

Low strength

The soil is not strong enough to support loads.

Low-residue crops

Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Marl

An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions but also formed in more saline environments.

Marsh or swamp (map symbol)

A water-saturated, very poorly drained area that is intermittently or permanently covered by water. Sedges, cattails, and rushes are the dominant vegetation in marshes, and trees or shrubs are the dominant vegetation in swamps. Not used in map units where the named soils are poorly drained or very poorly drained.

Mass movement

A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.

Masses

See Redoximorphic features.

Meander belt

The zone within which migration of a meandering channel occurs; the flood-plain area included between two imaginary lines drawn tangential to the outer bends of active channel loops.

Meander scar

A crescent-shaped, concave or linear mark on the face of a bluff or valley wall, produced by the lateral erosion of a meandering stream that impinged upon and undercut the bluff.

Meander scroll

One of a series of long, parallel, close-fitting, crescent-shaped ridges and troughs formed along the inner bank of a stream meander as the channel migrated laterally down-valley and toward the outer bank.

Mechanical treatment

Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil

Very fine sandy loam, loam, silt loam, or silt.

Mesa

A broad, nearly flat topped and commonly isolated landmass bounded by steep slopes or precipitous cliffs and capped by layers of resistant, nearly horizontal rocky material. The summit width is characteristically greater than the height of the bounding escarpments.

Metamorphic rock

Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth’s crust. Nearly all such rocks are crystalline.

Mine or quarry (map symbol)

An open excavation from which soil and underlying material have been removed and in which bedrock is exposed. Also denotes surface openings to underground mines.

Mine spoil

An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

Mineral soil

Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage

Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area

A kind of map unit that has little or no natural soil and supports little or no vegetation.

Miscellaneous water (map symbol)

Small, constructed bodies of water that are used for industrial, sanitary, or mining applications and that contain water most of the year.

Moderately coarse textured soil

Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil

Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon

A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine

In terms of glacial geology, a mound, ridge, or other topographically distinct accumulation of unsorted, unstratified drift, predominantly till, deposited primarily by the direct action of glacial ice in a variety of landforms. Also, a general term for a landform composed mainly of till (except for kame moraines, which are composed mainly of stratified outwash) that has been deposited by a glacier. Some types of moraines are disintegration, end, ground, kame, lateral, recessional, and terminal.

Morphology, soil

The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil

Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain

A generic term for an elevated area of the land surface, rising more than 1,000 feet (300 meters) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can

occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

Muck

Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mucky peat

See Hemic soil material.

Mudstone

A blocky or massive, fine grained sedimentary rock in which the proportions of clay and silt are approximately equal. Also, a general term for such material as clay, silt, claystone, siltstone, shale, and argillite and that should be used only when the amounts of clay and silt are not known or cannot be precisely identified.

Munsell notation

A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon

A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil

A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules

See Redoximorphic features.

Nose slope (geomorphology)

A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

Nutrient, plant

Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter

Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low: Less than 0.5 percent
Low: 0.5 to 1.0 percent
Moderately low: 1.0 to 2.0 percent
Moderate: 2.0 to 4.0 percent
High: 4.0 to 8.0 percent
Very high: More than 8.0 percent

Outwash

Stratified and sorted sediments (chiefly sand and gravel) removed or “washed out” from a glacier by meltwater streams and deposited in front of or beyond the end moraine or the margin of a glacier. The coarser material is deposited nearer to the ice.

Outwash plain

An extensive lowland area of coarse textured glaciofluvial material. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Paleoterrace

An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

Pan

A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material

The unconsolidated organic and mineral material in which soil forms.

Peat

Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped

An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment

A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.

Pedon

The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation

The movement of water through the soil.

Perennial water (map symbol)

Small, natural or constructed lakes, ponds, or pits that contain water most of the year.

Permafrost

Ground, soil, or rock that remains at or below 0 degrees C for at least 2 years. It is defined on the basis of temperature and is not necessarily frozen.

pH value

A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil

A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping

Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting

Pits caused by melting around ice. They form on the soil after plant cover is removed.

Plastic limit

The moisture content at which a soil changes from semisolid to plastic.

Plasticity index

The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plateau (geomorphology)

A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

Playa

The generally dry and nearly level lake plain that occupies the lowest parts of closed depressions, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff. Playa deposits are fine grained and may or may not have a high water table and saline conditions.

Plinthite

The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan

A compacted layer formed in the soil directly below the plowed layer.

Ponding

Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded

Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Pore linings

See Redoximorphic features.

Potential native plant community

See Climax plant community.

Potential rooting depth (effective rooting depth)

Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning

Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil

The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil

A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use

Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and

promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland

Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil

A measure of acidity or alkalinity of a soil, expressed as pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid: Less than 3.5
Extremely acid: 3.5 to 4.4
Very strongly acid: 4.5 to 5.0
Strongly acid: 5.1 to 5.5
Moderately acid: 5.6 to 6.0
Slightly acid: 6.1 to 6.5
Neutral: 6.6 to 7.3
Slightly alkaline: 7.4 to 7.8
Moderately alkaline: 7.9 to 8.4
Strongly alkaline: 8.5 to 9.0
Very strongly alkaline: 9.1 and higher

Red beds

Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations

See Redoximorphic features.

Redoximorphic depletions

See Redoximorphic features.

Redoximorphic features

Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
   A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*
   B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*
   C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
   A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*
   B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).
3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix

See Redoximorphic features.

Regolith

All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

Relief

The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Residuum (residual soil material)

Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

Rill

A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

Riser

The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

Road cut

A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments

Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop (map symbol)

An exposure of bedrock at the surface of the earth. Not used where the named soils of the surrounding map unit are shallow over bedrock or where “Rock outcrop” is a named component of the map unit.

Root zone

The part of the soil that can be penetrated by plant roots.

Runoff

The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil

A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Saline spot (map symbol)

An area where the surface layer has an electrical conductivity of 8 mmhos/cm more than the surface layer of the named soils in the surrounding map unit. The surface layer of the surrounding soils has an electrical conductivity of 2 mmhos/cm or less.

Sand

As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone

Sedimentary rock containing dominantly sand-sized particles.

Sandy spot (map symbol)

A spot where the surface layer is loamy fine sand or coarser in areas where the surface layer of the named soils in the surrounding map unit is very fine sandy loam or finer.

Sapric soil material (muck)

The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturated hydraulic conductivity (Ksat)

The ease with which pores of a saturated soil transmit water. Formally, the proportionality coefficient that expresses the relationship of the rate of water movement to hydraulic gradient in Darcy's Law, a law that describes the rate of water movement through porous media. Commonly abbreviated as "Ksat." Terms describing saturated hydraulic conductivity are:

Very high: 100 or more micrometers per second (14.17 or more inches per hour)

High: 10 to 100 micrometers per second (1.417 to 14.17 inches per hour)

Moderately high: 1 to 10 micrometers per second (0.1417 inch to 1.417 inches per hour)

Moderately low: 0.1 to 1 micrometer per second (0.01417 to 0.1417 inch per hour)

Low: 0.01 to 0.1 micrometer per second (0.001417 to 0.01417 inch per hour)

Very low: Less than 0.01 micrometer per second (less than 0.001417 inch per hour).

To convert inches per hour to micrometers per second, multiply inches per hour by 7.0572. To convert micrometers per second to inches per hour, multiply micrometers per second by 0.1417.

Saturation

Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification

The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Sedimentary rock

A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Sequum

A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil

A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Severely eroded spot (map symbol)

An area where, on the average, 75 percent or more of the original surface layer has been lost because of accelerated erosion. Not used in map units in which “severely eroded,” “very severely eroded,” or “gullied” is part of the map unit name.

Shale

Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

Sheet erosion

The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Short, steep slope (map symbol)

A narrow area of soil having slopes that are at least two slope classes steeper than the slope class of the surrounding map unit.

Shoulder

The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

Shrink-swell

The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Shrub-coppice dune

A small, streamlined dune that forms around brush and clump vegetation.

Side slope (geomorphology)

A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

Silica

A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio

The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt

As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone

An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

Similar soils

Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole (map symbol)

A closed, circular or elliptical depression, commonly funnel shaped, characterized by subsurface drainage and formed either by dissolution of the surface of underlying bedrock (e.g., limestone, gypsum, or salt) or by collapse of underlying caves within bedrock. Complexes of sinkholes in carbonate-rock terrain are the main components of karst topography.

Site index

A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides (pedogenic)

Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

Slide or slip (map symbol)

A prominent landform scar or ridge caused by fairly recent mass movement or descent of earthy material resulting from failure of earth or rock under shear stress along one or several surfaces.

Slope

The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope alluvium

Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

Slow refill

The slow filling of ponds, resulting from restricted water transmission in the soil.

Slow water movement

Restricted downward movement of water through the soil. See Saturated hydraulic conductivity.

Sodic (alkali) soil

A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodic spot (map symbol)

An area where the surface layer has a sodium adsorption ratio that is at least 10 more than that of the surface layer of the named soils in the surrounding map unit. The surface layer of the surrounding soils has a sodium adsorption ratio of 5 or less.

Sodicity

The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight: Less than 13:1
Moderate: 13-30:1
Strong: More than 30:1

Sodium adsorption ratio (SAR)

A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock

Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil

A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

Soil separates

Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand: 2.0 to 1.0
Coarse sand: 1.0 to 0.5
Medium sand: 0.5 to 0.25
Fine sand: 0.25 to 0.10
Very fine sand: 0.10 to 0.05
Silt: 0.05 to 0.002
Clay: Less than 0.002

Solum

The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Spoil area (map symbol)

A pile of earthy materials, either smoothed or uneven, resulting from human activity.

Stone line

In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel- or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

Stones

Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony

Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stony spot (map symbol)

A spot where 0.01 to 0.1 percent of the soil surface is covered by rock fragments that are more than 10 inches in diameter in areas where the surrounding soil has no surface stones.

Strath terrace

A type of stream terrace; formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

Stream terrace

One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

Stripcropping

Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil

The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are:

Platy: Flat and laminated

Prismatic: Vertically elongated and having flat tops

Columnar: Vertically elongated and having rounded tops

Angular blocky: Having faces that intersect at sharp angles (planes)

Subangular blocky: Having subrounded and planar faces (no sharp angles)

Granular: Small structural units with curved or very irregular faces

Structureless soil horizons are defined as follows:

Single grained: Entirely noncoherent (each grain by itself), as in loose sand

Massive: Occurring as a coherent mass

Stubble mulch

Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil

Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling

Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum

The part of the soil below the solum.

Subsurface layer

Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow

The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit

The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer

The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil

The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus

Rock fragments of any size or shape (commonly coarse and angular) derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts

Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terminal moraine

An end moraine that marks the farthest advance of a glacier. It typically has the form of a massive arcuate or concentric ridge, or complex of ridges, and is underlain by till and other types of drift.

Terrace (conservation)

An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field

generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geomorphology)

A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

Terracettes

Small, irregular steplike forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may be induced or enhanced by trampling of livestock, such as sheep or cattle.

Texture, soil

The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer

Otherwise suitable soil material that is too thin for the specified use.

Till

Dominantly unsorted and nonstratified drift, generally unconsolidated and deposited directly by a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders; rock fragments of various lithologies are embedded within a finer matrix that can range from clay to sandy loam.

Till plain

An extensive area of level to gently undulating soils underlain predominantly by till and bounded at the distal end by subordinate recessional or end moraines.

Tilth, soil

The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope

The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil

The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements

Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread

The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

Tuff

A generic term for any consolidated or cemented deposit that is 50 percent or more volcanic ash.

Upland

An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Valley fill

The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) so as to fill or partly fill a valley.

Variegation

Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve

A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very stony spot (map symbol)

A spot where 0.1 to 3.0 percent of the soil surface is covered by rock fragments that are more than 10 inches in diameter in areas where the surface of the surrounding soil is covered by less than 0.01 percent stones.

Water bars

Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

CONSTRUCTION SITE INSPECTION AND MAINTENANCE LOG BOOK

STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM FOR CONSTRUCTION ACTIVITIES

SAMPLE CONSTRUCTION SITE LOG BOOK

Table of Contents

I. **PRE-CONSTRUCTION MEETING DOCUMENTS**

Project Name _____

Permit No. _____ **Date of Authorization** _____

Name of Operator _____

Prime Contractor _____

a. **Preamble to Site Assessment and Inspections**

The Following Information To Be Read By All Person's Involved in The Construction of Stormwater Related Activities:

The Operator agrees to have a qualified inspector[1] conduct an assessment of the site prior to the commencement of construction[2] and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Operator shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements. A preconstruction meeting should be held to review all of the SWPPP requirements with construction personnel.

When construction starts, site inspections shall be conducted by the qualified inspector at least every 7 calendar days. The Operator shall maintain a record of all inspection reports in this site logbook. The site logbook shall be maintained on site and be made available to the permitting authorities upon request.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified inspector perform a final site inspection. The qualified inspector shall certify that the site has undergone final stabilization[3] using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, the Operator must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

1 Refer to "Qualified Inspector" inspection requirements in the current SPDES General Permit for Stormwater Discharges from Construction Activity for complete list of inspection requirements.

2 "Commencement of construction" means the initial removal of vegetation and disturbance of soils associated with clearing, grading or excavating activities or other construction activities.

3 "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

b. Pre-construction Site Assessment Checklist
(NOTE: Provide comments below as necessary)

1. Notice of Intent, SWPPP, and Contractors Certification:

Yes No NA

[ ] [ ] [ ] Has a Notice of Intent been filed with the NYS Department of Conservation?
[ ] [ ] [ ] Is the SWPPP on-site? Where?_____
[ ] [ ] [ ] Is the Plan current? What is the latest revision date?_____
[ ] [ ] [ ] Is a copy of the NOI (with brief description) onsite? Where?_____
[ ] [ ] [ ] Have all contractors involved with stormwater related activities signed a contractor's certification?

2. Resource Protection

Yes No NA

[ ] [ ] [ ] Are construction limits clearly flagged or fenced?
[ ] [ ] [ ] Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.
[ ] [ ] [ ] Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection

Yes No NA

[ ] [ ] [ ] Clean stormwater runoff has been diverted from areas to be disturbed.
[ ] [ ] [ ] Bodies of water located either on site or in the vicinity of the site have been identified and protected.
[ ] [ ] [ ] Appropriate practices to protect on-site or downstream surface water are installed.
[ ] [ ] [ ] Are clearing and grading operations divided into areas <5 acres?

4. Stabilized Construction Access

Yes No NA

[ ] [ ] [ ] A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.
[ ] [ ] [ ] Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.
[ ] [ ] [ ] Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Sediment Controls

Yes No NA

[ ] [ ] [ ] Silt fence material and installation comply with the standard drawing and specifications.
[ ] [ ] [ ] Silt fences are installed at appropriate spacing intervals
[ ] [ ] [ ] Sediment/detention basin was installed as first land disturbing activity.
[ ] [ ] [ ] Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials

Yes No NA

[ ] [ ] [ ] The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.
[ ] [ ] [ ] The plan is contained in the SWPPP on page _____
[ ] [ ] [ ] Appropriate materials to control spills are onsite. Where? _____

II. **CONSTRUCTION DURATION INSPECTIONS**

a. **Directions:**

Inspection Forms will be filled out during the entire construction phase of the project.

Required Elements:

1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;

2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;

3) Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;

4) Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);

5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and

6) Immediately report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

SITE PLAN/SKETCH

Inspector (print name)	**Date of Inspection**
Qualified Inspector (print name)	**Qualified Inspector Signature**

The above signed acknowledges that, to the best of his/her knowledge, all information provided on the forms is accurate and complete.

Maintaining Water Quality

Yes No NA
[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions at the outfalls?
[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease at the outfalls?
[ ] [ ] [ ] All disturbance is within the limits of the approved plans.
[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

Housekeeping

1. General Site Conditions

Yes No NA
[ ] [ ] [ ] Is construction site litter, debris and spoils appropriately managed?
[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?
[ ] [ ] [ ] Is construction impacting the adjacent property?
[ ] [ ] [ ] Is dust adequately controlled?

2. Temporary Stream Crossing

Yes No NA
[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.
[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.
[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?
[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

3. Stabilized Construction Access

Yes No NA
[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

Runoff Control Practices

1. Excavation Dewatering

Yes No NA
[ ] [ ] [ ] Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.
[ ] [ ] [ ] Clean water from upstream pool is being pumped to the downstream pool.
[ ] [ ] [ ] Sediment laden water from work area is being discharged to a silt-trapping device.
[ ] [ ] [ ] Constructed upstream berm with one-foot minimum freeboard.

Runoff Control Practices (continued)

2. Flow Spreader

Yes No NA

[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.
[ ] [ ] [ ] Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales

Yes No NA

[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.
[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.
[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

4. Stone Check Dam

Yes No NA

[ ] [ ] [ ] Is channel stable? (flow is not eroding soil underneath or around the structure).
[ ] [ ] [ ] Check is in good condition (rocks in place and no permanent pools behind the structure).
[ ] [ ] [ ] Has accumulated sediment been removed?.

5. Rock Outlet Protection

Yes No NA

[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles

Yes No NA

[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.
[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation

Yes No NA

[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.
[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

Sediment Control Practices

1. Silt Fence and Linear Barriers

Yes No NA

[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
Sediment accumulation is ___% of design capacity.

Sediment Control Practices (continued)

2. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated; Filter Sock or Manufactured practices)

Yes No NA

[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2" x 4" frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
[ ] [ ] [ ] Manufactured insert fabric is free of tears and punctures.
[ ] [ ] [ ] Filter Sock is not torn or flattened and fill material is contained within the mesh sock.

Sediment accumulation ___% of design capacity.

3. Temporary Sediment Trap

Yes No NA

[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.
[ ] [ ] [ ] Sediment trap slopes and disturbed areas are stabilized.

Sediment accumulation is ___% of design capacity.

4. Temporary Sediment Basin

Yes No NA

[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch.
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.
[ ] [ ] [ ] Sediment basin dewatering pool is dewatering at appropriate rate.

Sediment accumulation is ___% of design capacity.

Note: Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design. All practices shall be maintained in accordance with their respective standards.

Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.

CONSTRUCTION DURATION INSPECTIONS

b. Modifications to the SWPPP (To be completed as described below)

The Operator shall amend the SWPPP whenever:

1. There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not otherwise been addressed in the SWPPP; or
2. The SWPPP proves to be ineffective in:
   a. Eliminating or significantly minimizing pollutants from sources identified in the SWPPP and as required by this permit; or
   b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

Modification & Reason:

Open Channel System Construction Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Pre-Construction		
Pre-construction meeting		
Runoff diverted		
Facility location staked out		
2. Excavation		
Size and location		
Side slope stable		
Soil permeability		
Groundwater / bedrock		
Lateral slopes completely level		
Longitudinal slopes within design range		
Excavation does not compact subsoils		
3. Check dams		
Dimensions		
Spacing		
Materials		

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
4. Structural Components		
Underdrain installed correctly		
Inflow installed correctly		
Pretreatment devices installed		
5. Vegetation		
Complies with planting specifications		
Topsoil adequate in composition and placement		
Adequate erosion control measures in place		
6. Final inspection		
Dimensions		
Check dams		
Proper outlet		
Effective stand of vegetation and stabilization		
Contributing watershed stabilized before flow is routed to the factility		

Comments:

Actions to be Taken:

Bioretention Operation, Maintenance and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Bioretention and contributing areas clean of debris		
No dumping of yard wastes into practice		
Litter (branches, etc.) have been removed		
2. Vegetation (Monthly)		
Plant height not less than design water depth		
Fertilized per specifications		
Plant composition according to approved plans		
No placement of inappropriate plants		
Grass height not greater than 6 inches		
No evidence of erosion		
3. Check Dams/Energy Dissipaters/Sumps (Annual, After Major Storms)		
No evidence of sediment buildup		

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
Sumps should not be more than 50% full of sediment		
No evidence of erosion at downstream toe of drop structure		
4. Dewatering (Monthly)		
Dewaters between storms		
No evidence of standing water		
5. Sediment Deposition (Annual)		
Swale clean of sediments		
Sediments should not be > 20% of swale design depth		
6. Outlet/Overflow Spillway (Annual, After Major Storms)		
Good condition, no need for repair		
No evidence of erosion		
No evidence of any blockages		
7. Integrity of Filter Bed (Annual)		
Filter bed has not been blocked or filled inappropriately		

Comments:

Actions to be Taken:

Open Channel Operation, Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY/ UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Contributing areas clean of debris		
2. Check Dams or Energy Dissipators (Annual, After Major Storms)		
No evidence of flow going around structures		
No evidence of erosion at downstream toe		
Soil permeability		
Groundwater / bedrock		
3. Vegetation (Monthly)		
Mowing done when needed		
Minimum mowing depth not exceeded		
No evidence of erosion		
Fertilized per specification		
4. Dewatering (Monthly)		
Dewaters between storms		

MAINTENANCE ITEM	SATISFACTORY/ UNSATISFACTORY	COMMENTS
5. Sediment deposition (Annual)		
Clean of sediment		
6. Outlet/Overflow Spillway (Annual)		
Good condition, no need for repairs		
No evidence of erosion		

Comments:

Actions to be Taken:

NYS Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

for

Construction Activities Seeking Authorization Under SPDES General Permit

*(NOTE: Attach Completed Form to Notice Of Intent and Submit to Address Above)

I. Project Owner/Operator Information
1. Owner/Operator Name:
2. Contact Person:
3. Street Address:
4. City/State/Zip:
II. Project Site Information
5. Project/Site Name:
6. Street Address:
7. City/State/Zip:
III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information
8. SWPPP Reviewed by:
9. Title/Position:
10. Date Final SWPPP Reviewed and Accepted:
IV. Regulated MS4 Information
11. Name of MS4:
12. MS4 SPDES Permit Identification Number: NYR20A
13. Contact Person:
14. Street Address:
15. City/State/Zip:
16. Telephone Number:

MS4 SWPPP Acceptance Form - continued

V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative

I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in question 5 has been reviewed and meets the substantive requirements in the SPDES General Permit For Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s). Note: The MS4, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.

Printed Name:

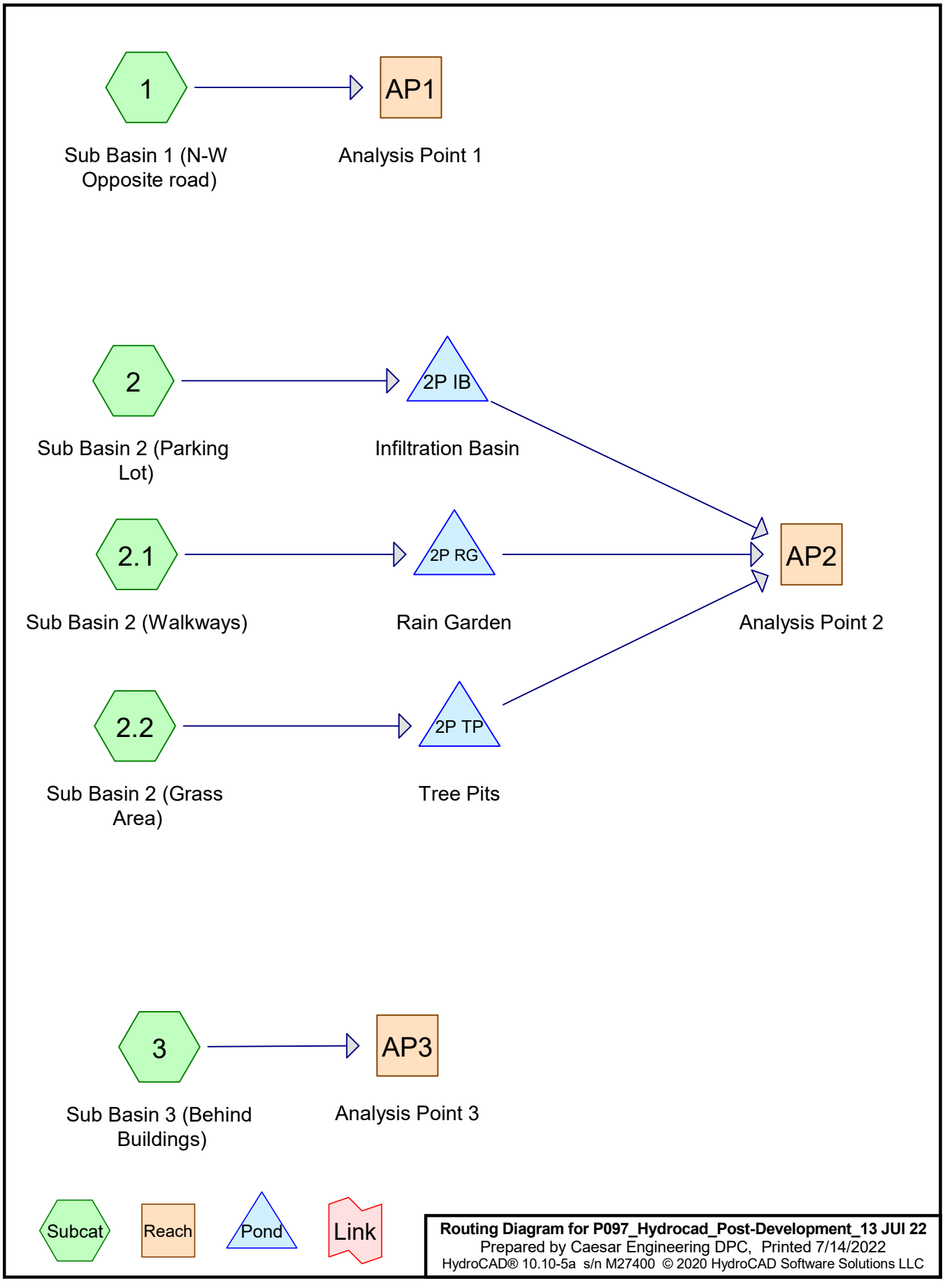
Title/Position:

Signature:

Date:

VI. Additional Information

(NYS DEC - MS4 SWPPP Acceptance Form - January 2015)



Routing Diagram for P097_Hydrocad_Post-Development_13 JUl 22
Prepared by Caesar Engineering DPC, Printed 7/14/2022

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-yr	Type III 24-hr		Default	24.00	1	2.65	2
2	2-yr	Type III 24-hr		Default	24.00	1	3.19	2
3	10-yr	Type III 24-hr		Default	24.00	1	4.74	2
4	25-yr	Type III 24-hr		Default	24.00	1	5.94	2
5	100-yr	Type III 24-hr		Default	24.00	1	8.39	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.220	74	>75% Grass cover, Good, HSG C (2, 2.2, 3)
0.049	73	Brush, Good, HSG D (1)
0.908	98	Paved parking, HSG B (1, 2, 2.1, 3)
0.273	98	Roofs, HSG B (2, 3)
0.299	77	Woods, Good, HSG D (1)
2.749	**85**	**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	1.220	0.000	0.000	1.220	>75% Grass cover, Good	2, 2.2, 3
0.000	0.000	0.000	0.049	0.000	0.049	Brush, Good	1
0.000	0.908	0.000	0.000	0.000	0.908	Paved parking	1, 2, 2.1, 3
0.000	0.273	0.000	0.000	0.000	0.273	Roofs	2, 3
0.000	0.000	0.000	0.299	0.000	0.299	Woods, Good	1
0.000	**1.181**	**1.220**	**0.348**	**0.000**	**2.749**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.40 hrs, 91 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Reach AP1: Analysis Point 1 Inflow=0.33 cfs 0.043 af
Outflow=0.33 cfs 0.043 af

Reach AP2: Analysis Point 2 Avg. Flow Depth=0.24' Max Vel=5.12 fps Inflow=1.26 cfs 0.137 af
15.0" Round Pipe w/ 2.0" inside fill n=0.009 L=293.0' S=0.0102 '/' Capacity=8.35 cfs Outflow=1.22 cfs 0.137 af

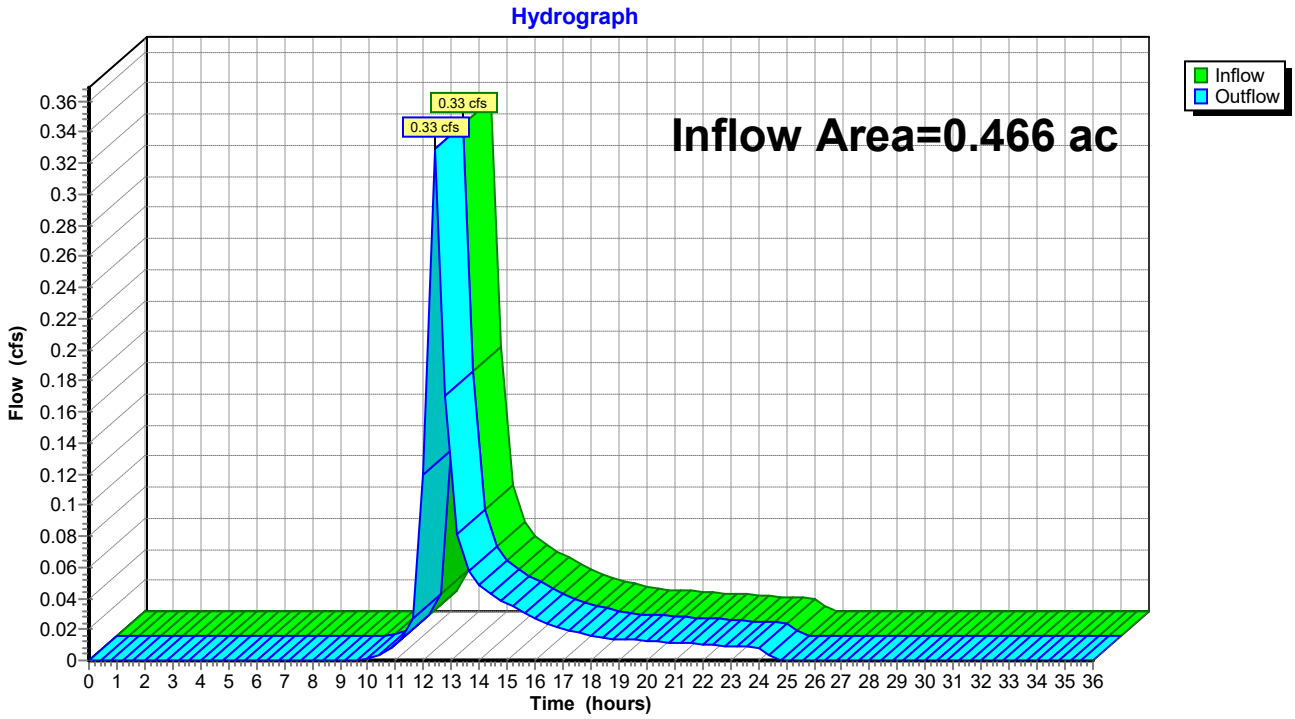
Reach AP3: Analysis Point 3 Inflow=0.81 cfs 0.095 af
Outflow=0.81 cfs 0.095 af

Summary for Reach AP1: Analysis Point 1

Inflow Area = 0.466 ac, 25.29% Impervious, Inflow Depth = 1.11" for 1-yr event
Inflow = 0.33 cfs @ 12.43 hrs, Volume= 0.043 af
Outflow = 0.33 cfs @ 12.43 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs

Reach AP1: Analysis Point 1



Hydrograph for Reach AP1: Analysis Point 1

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
0.40	0.00		0.00
0.80	0.00		0.00
1.20	0.00		0.00
1.60	0.00		0.00
2.00	0.00		0.00
2.40	0.00		0.00
2.80	0.00		0.00
3.20	0.00		0.00
3.60	0.00		0.00
4.00	0.00		0.00
4.40	0.00		0.00
4.80	0.00		0.00
5.20	0.00		0.00
5.60	0.00		0.00
6.00	0.00		0.00
6.40	0.00		0.00
6.80	0.00		0.00
7.20	0.00		0.00
7.60	0.00		0.00
8.00	0.00		0.00
8.40	0.00		0.00
8.80	0.00		0.00
9.20	0.00		0.00
9.60	0.00		0.00
10.00	0.00		0.00
10.40	0.00		0.00
10.80	0.01		0.01
11.20	0.01		0.01
11.60	0.03		0.03
12.00	0.12		0.12
12.40	**0.33**		**0.33**
12.80	0.17		0.17
13.20	0.08		0.08
13.60	0.06		0.06
14.00	0.05		0.05
14.40	0.04		0.04
14.80	0.04		0.04
15.20	0.03		0.03
15.60	0.03		0.03
16.00	0.03		0.03
16.40	0.02		0.02
16.80	0.02		0.02
17.20	0.02		0.02
17.60	0.02		0.02
18.00	0.02		0.02
18.40	0.01		0.01
18.80	0.01		0.01
19.20	0.01		0.01
19.60	0.01		0.01
20.00	0.01		0.01
20.40	0.01		0.01
20.80	0.01		0.01
21.20	0.01		0.01
21.60	0.01		0.01
22.00	0.01		0.01
22.40	0.01		0.01
22.80	0.01		0.01
23.20	0.01		0.01
23.60	0.01		0.01
24.00	0.01		0.01
24.40	0.00		0.00
24.80	0.00		0.00
25.20	0.00		0.00
25.60	0.00		0.00
26.00	0.00		0.00
26.40	0.00		0.00
26.80	0.00		0.00
27.20	0.00		0.00
27.60	0.00		0.00
28.00	0.00		0.00
28.40	0.00		0.00
28.80	0.00		0.00
29.20	0.00		0.00
29.60	0.00		0.00
30.00	0.00		0.00
30.40	0.00		0.00
30.80	0.00		0.00
31.20	0.00		0.00
31.60	0.00		0.00
32.00	0.00		0.00
32.40	0.00		0.00
32.80	0.00		0.00
33.20	0.00		0.00
33.60	0.00		0.00
34.00	0.00		0.00
34.40	0.00		0.00
34.80	0.00		0.00
35.20	0.00		0.00
35.60	0.00		0.00
36.00	0.00		0.00

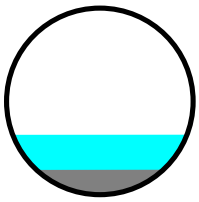
Summary for Reach AP2: Analysis Point 2

Inflow Area = 1.074 ac, 77.50% Impervious, Inflow Depth = 1.54" for 1-yr event
Inflow = 1.26 cfs @ 12.06 hrs, Volume= 0.137 af
Outflow = 1.22 cfs @ 12.08 hrs, Volume= 0.137 af, Atten= 4%, Lag= 1.4 min

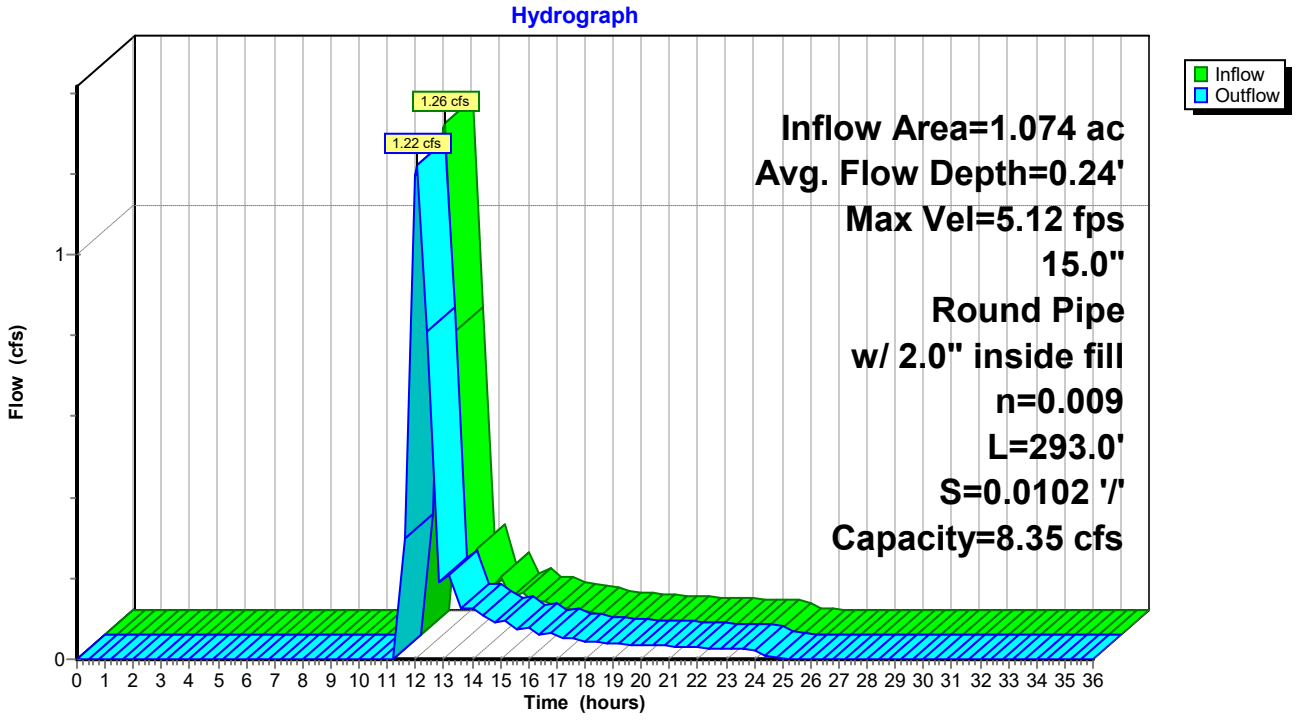
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs
Max. Velocity= 5.12 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.75 fps, Avg. Travel Time= 2.8 min

Peak Storage= 72 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.40' above invert (0.24' above fill) , Surface Width= 1.17'
Bank-Full Depth= 1.25' above invert (1.08' above fill) Flow Area= 1.1 sf, Capacity= 8.35 cfs

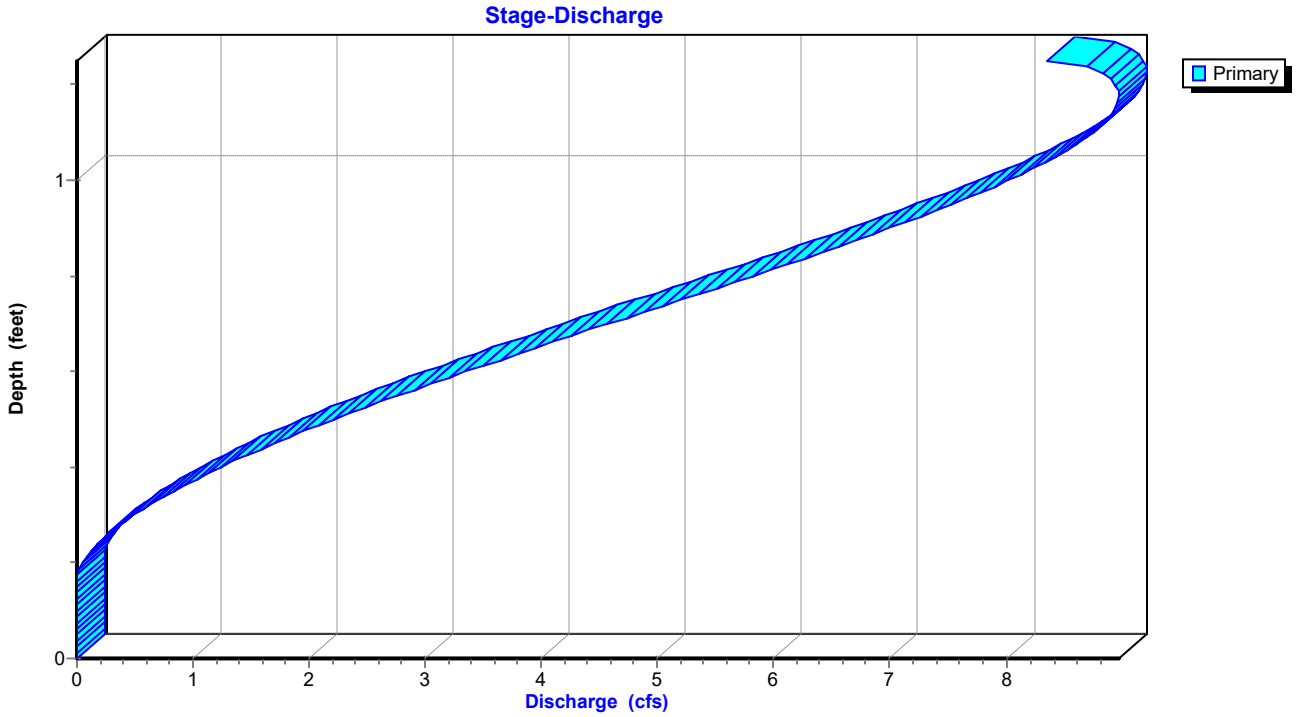
15.0" Round Pipe w/ 2.0" inside fill
n= 0.009 PVC, smooth interior
Length= 293.0' Slope= 0.0102 '/'
Inlet Invert= 540.00', Outlet Invert= 537.00'



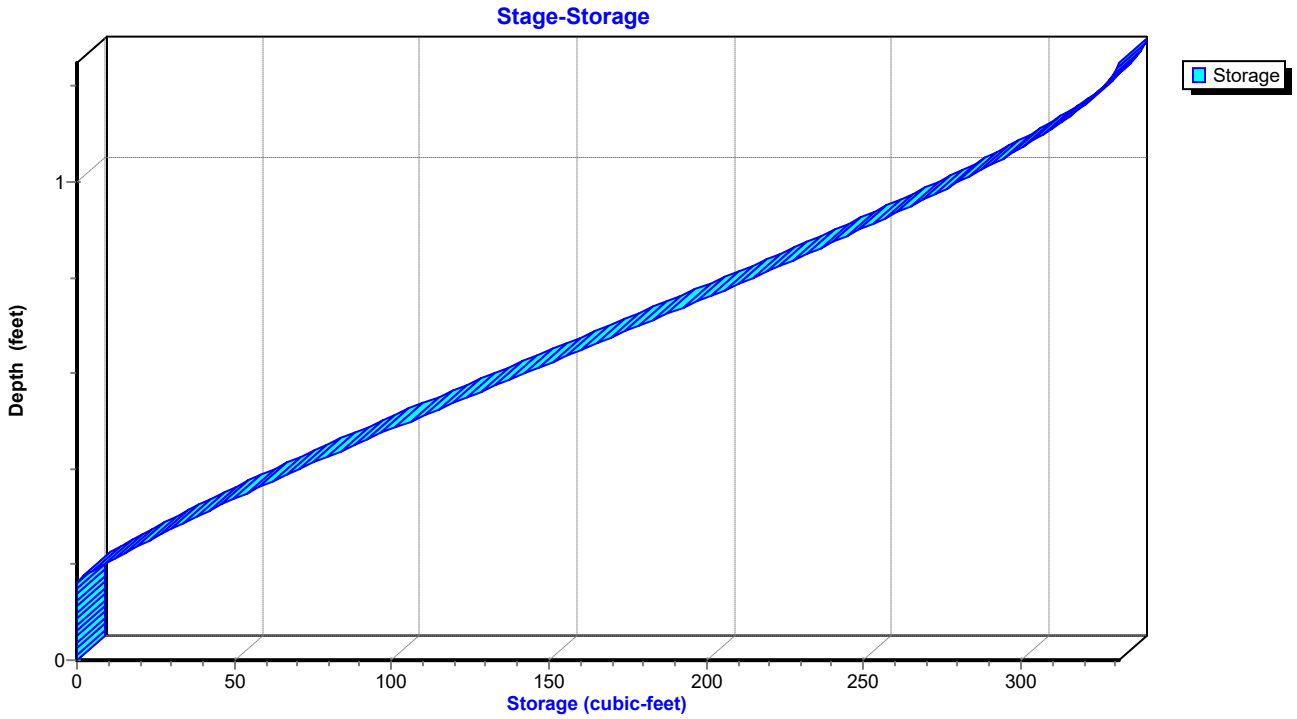
Reach AP2: Analysis Point 2



Reach AP2: Analysis Point 2



Reach AP2: Analysis Point 2



Hydrograph for Reach AP2: Analysis Point 2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0	540.17	0.00
0.80	0.00	0	540.17	0.00
1.60	0.00	0	540.17	0.00
2.40	0.00	0	540.17	0.00
3.20	0.00	0	540.17	0.00
4.00	0.00	0	540.17	0.00
4.80	0.00	0	540.17	0.00
5.60	0.00	0	540.17	0.00
6.40	0.00	0	540.17	0.00
7.20	0.00	0	540.17	0.00
8.00	0.00	0	540.17	0.00
8.80	0.00	0	540.17	0.00
9.60	0.00	0	540.17	0.00
10.40	0.00	0	540.17	0.00
11.20	0.00	0	540.17	0.00
12.00	**1.25**	**70**	**540.40**	**1.19**
12.80	0.16	19	540.24	0.19
13.60	0.11	15	540.22	0.13
14.40	0.09	14	540.22	0.11
15.20	0.08	13	540.22	0.10
16.00	0.07	12	540.21	0.08
16.80	0.06	10	540.21	0.06
17.60	0.05	9	540.20	0.05
18.40	0.04	8	540.20	0.04
19.20	0.04	7	540.20	0.04
20.00	0.03	7	540.19	0.04
20.80	0.03	7	540.19	0.03
21.60	0.03	6	540.19	0.03
22.40	0.03	6	540.19	0.03
23.20	0.03	6	540.19	0.03
24.00	0.02	5	540.19	0.02
24.80	0.00	1	540.17	0.00
25.60	0.00	0	540.17	0.00
26.40	0.00	0	540.17	0.00
27.20	0.00	0	540.17	0.00
28.00	0.00	0	540.17	0.00
28.80	0.00	0	540.17	0.00
29.60	0.00	0	540.17	0.00
30.40	0.00	0	540.17	0.00
31.20	0.00	0	540.17	0.00
32.00	0.00	0	540.17	0.00
32.80	0.00	0	540.17	0.00
33.60	0.00	0	540.17	0.00
34.40	0.00	0	540.17	0.00
35.20	0.00	0	540.17	0.00
36.00	0.00	0	540.17	0.00

Stage-Discharge for Reach AP2: Analysis Point 2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
540.00	0.00	0.00
540.01	0.00	0.00
540.02	0.00	0.00
540.03	0.00	0.00
540.04	0.00	0.00
540.05	0.00	0.00
540.06	0.00	0.00
540.07	0.00	0.00
540.08	0.00	0.00
540.09	0.00	0.00
540.10	0.00	0.00
540.11	0.00	0.00
540.12	0.00	0.00
540.13	0.00	0.00
540.14	0.00	0.00
540.15	0.00	0.00
540.16	0.00	0.00
540.17	0.41	0.00
540.18	0.90	0.01
540.19	1.31	0.03
540.20	1.66	0.05
540.21	1.95	0.08
540.22	2.21	0.11
540.23	2.45	0.14
540.24	2.68	0.18
540.25	2.89	0.22
540.26	3.09	0.27
540.27	3.28	0.32
540.28	3.46	0.37
540.29	3.63	0.43
540.30	3.79	0.49
540.31	3.95	0.55
540.32	4.10	0.62
540.33	4.24	0.69
540.34	4.38	0.76
540.35	4.52	0.83
540.36	4.65	0.91
540.37	4.77	0.99
540.38	4.89	1.07
540.39	5.01	1.15
540.40	5.13	1.24
540.41	5.24	1.33
540.42	5.35	1.42
540.43	5.46	1.51
540.44	5.56	1.60
540.45	5.66	1.70
540.46	5.76	1.80
540.47	5.85	1.90
540.48	5.94	2.00
540.49	6.04	2.11
540.50	6.12	2.21
540.51	6.21	2.32
540.52	6.29	2.43
540.53	6.38	2.54
540.54	6.46	2.65
540.55	6.53	2.76
540.56	6.61	2.88
540.57	6.68	2.99
540.58	6.76	3.11
540.59	6.83	3.23
540.60	6.90	3.35
540.61	6.96	3.47
540.62	7.03	3.59
540.63	7.09	3.71
540.64	7.16	3.83
540.65	7.22	3.95
540.66	7.28	4.07
540.67	7.33	4.20
540.68	7.39	4.32
540.69	7.44	4.45
540.70	7.50	4.57
540.71	7.55	4.70
540.72	7.60	4.82
540.73	7.65	4.95
540.74	7.69	5.07
540.75	7.74	5.20
540.76	7.78	5.32
540.77	7.82	5.45
540.78	7.86	5.57
540.79	7.90	5.69
540.80	7.94	5.82
540.81	7.98	5.94
540.82	8.01	6.06
540.83	8.05	6.18
540.84	8.08	6.30
540.85	8.11	6.42
540.86	8.14	6.54
540.87	8.17	6.65
540.88	8.20	6.77
540.89	8.22	6.88
540.90	8.24	7.00
540.91	8.27	7.11
540.92	8.29	7.22
540.93	8.30	7.32
540.94	8.32	7.43
540.95	8.34	7.53
540.96	8.35	7.63
540.97	8.36	7.73
540.98	8.38	7.83
540.99	8.38	7.92
541.00	8.39	8.02
541.01	8.40	8.10
541.02	8.40	8.19
541.03	8.40	8.27
541.04	**8.40**	8.35
541.05	8.40	8.43
541.06	8.40	8.50
541.07	8.39	8.57
541.08	8.38	8.63
541.09	8.37	8.69
541.10	8.36	8.75
541.11	8.34	8.80
541.12	8.32	8.84
541.13	8.30	8.88
541.14	8.28	8.91
541.15	8.25	8.94
541.16	8.21	8.96
541.17	8.18	8.97
541.18	8.13	**8.97**
541.19	8.09	8.96
541.20	8.03	8.95
541.21	7.97	8.91
541.22	7.89	8.86
541.23	7.80	8.78
541.24	7.65	8.63
541.25	7.39	8.35

Stage-Area-Storage for Reach AP2: Analysis Point 2

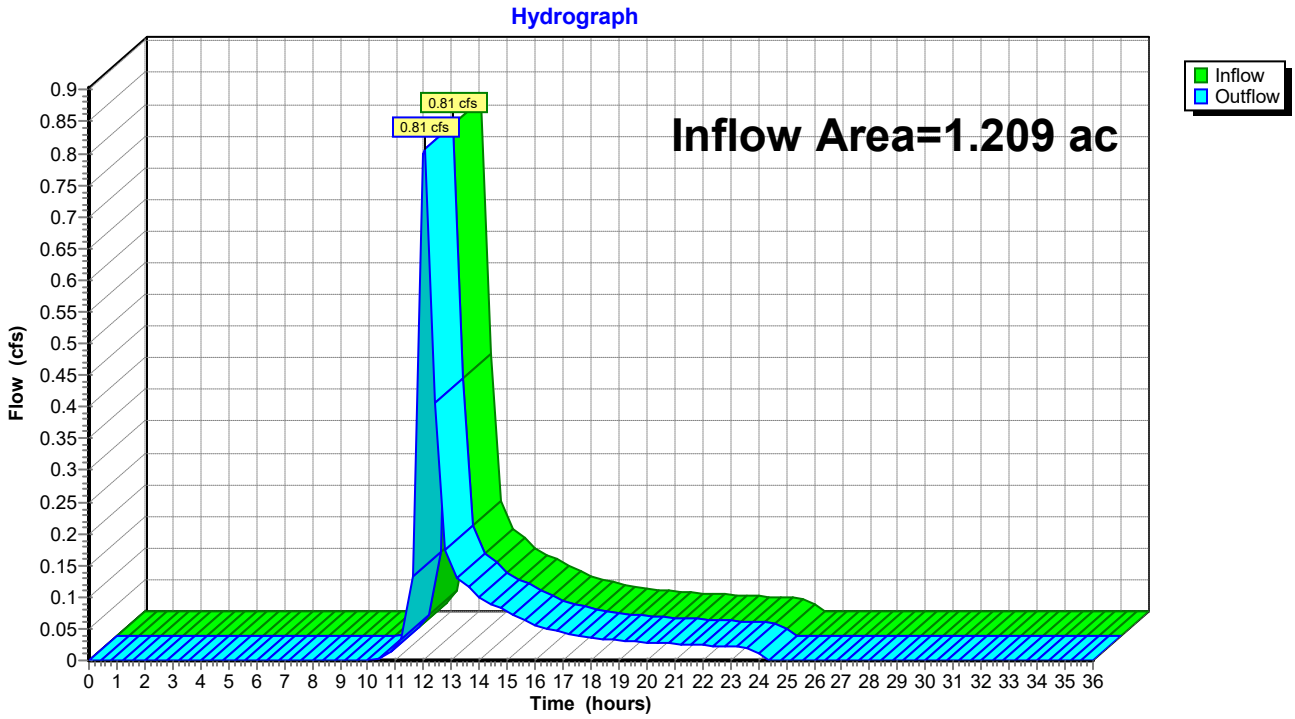
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
540.00	0.0	0
540.02	0.0	0
540.04	0.0	0
540.06	0.0	0
540.08	0.0	0
540.10	0.0	0
540.12	0.0	0
540.14	0.0	0
540.16	0.0	0
540.18	0.0	3
540.20	0.0	9
540.22	0.0	14
540.24	0.1	20
540.26	0.1	26
540.28	0.1	32
540.30	0.1	38
540.32	0.2	44
540.34	0.2	51
540.36	0.2	57
540.38	0.2	64
540.40	0.2	71
540.42	0.3	78
540.44	0.3	85
540.46	0.3	92
540.48	0.3	99
540.50	0.4	106
540.52	0.4	113
540.54	0.4	120
540.56	0.4	128
540.58	0.5	135
540.60	0.5	142
540.62	0.5	149
540.64	0.5	157
540.66	0.6	164
540.68	0.6	171
540.70	0.6	179
540.72	0.6	186
540.74	0.7	193
540.76	0.7	200
540.78	0.7	207
540.80	0.7	215
540.82	0.8	222
540.84	0.8	228
540.86	0.8	235
540.88	0.8	242
540.90	0.8	249
540.92	0.9	255
540.94	0.9	262
540.96	0.9	268
540.98	0.9	274
541.00	1.0	280
541.02	1.0	286
541.04	1.0	291
541.06	1.0	297
541.08	1.0	302
541.10	1.0	307
541.12	1.1	311
541.14	1.1	316
541.16	1.1	320
541.18	1.1	323
541.20	1.1	326
541.22	1.1	329
541.24	**1.1**	**331**

Summary for Reach AP3: Analysis Point 3

Inflow Area = 1.209 ac, 19.07% Impervious, Inflow Depth = 0.94" for 1-yr event
Inflow = 0.81 cfs @ 12.05 hrs, Volume= 0.095 af
Outflow = 0.81 cfs @ 12.05 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs

Reach AP3: Analysis Point 3



Hydrograph for Reach AP3: Analysis Point 3

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
0.40	0.00		0.00
0.80	0.00		0.00
1.20	0.00		0.00
1.60	0.00		0.00
2.00	0.00		0.00
2.40	0.00		0.00
2.80	0.00		0.00
3.20	0.00		0.00
3.60	0.00		0.00
4.00	0.00		0.00
4.40	0.00		0.00
4.80	0.00		0.00
5.20	0.00		0.00
5.60	0.00		0.00
6.00	0.00		0.00
6.40	0.00		0.00
6.80	0.00		0.00
7.20	0.00		0.00
7.60	0.00		0.00
8.00	0.00		0.00
8.40	0.00		0.00
8.80	0.00		0.00
9.20	0.00		0.00
9.60	0.00		0.00
10.00	0.00		0.00
10.40	0.00		0.00
10.80	0.01		0.01
11.20	0.03		0.03
11.60	0.13		0.13
12.00	**0.80**		**0.80**
12.40	0.41		0.41
12.80	0.17		0.17
13.20	0.13		0.13
13.60	0.12		0.12
14.00	0.10		0.10
14.40	0.09		0.09
14.80	0.08		0.08
15.20	0.07		0.07
15.60	0.06		0.06
16.00	0.06		0.06
16.40	0.05		0.05
16.80	0.05		0.05
17.20	0.04		0.04
17.60	0.04		0.04
18.00	0.03		0.03
18.40	0.03		0.03
18.80	0.03		0.03
19.20	0.03		0.03
19.60	0.03		0.03
20.00	0.03		0.03
20.40	0.03		0.03
20.80	0.03		0.03
21.20	0.03		0.03
21.60	0.02		0.02
22.00	0.02		0.02
22.40	0.02		0.02
22.80	0.02		0.02
23.20	0.02		0.02
23.60	0.02		0.02
24.00	0.01		0.01
24.40	0.00		0.00
24.80	0.00		0.00
25.20	0.00		0.00
25.60	0.00		0.00
26.00	0.00		0.00
26.40	0.00		0.00
26.80	0.00		0.00
27.20	0.00		0.00
27.60	0.00		0.00
28.00	0.00		0.00
28.40	0.00		0.00
28.80	0.00		0.00
29.20	0.00		0.00
29.60	0.00		0.00
30.00	0.00		0.00
30.40	0.00		0.00
30.80	0.00		0.00
31.20	0.00		0.00
31.60	0.00		0.00
32.00	0.00		0.00
32.40	0.00		0.00
32.80	0.00		0.00
33.20	0.00		0.00
33.60	0.00		0.00
34.00	0.00		0.00
34.40	0.00		0.00
34.80	0.00		0.00
35.20	0.00		0.00
35.60	0.00		0.00
36.00	0.00		0.00

Time span=0.00-36.00 hrs, dt=0.40 hrs, 91 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Reach AP1: Analysis Point 1 Inflow=0.46 cfs 0.059 af
Outflow=0.46 cfs 0.059 af

Reach AP2: Analysis Point 2 Avg. Flow Depth=0.27' Max Vel=5.49 fps Inflow=1.63 cfs 0.182 af
15.0" Round Pipe w/ 2.0" inside fill n=0.009 L=293.0' S=0.0102 '/' Capacity=8.35 cfs Outflow=1.53 cfs 0.182 af

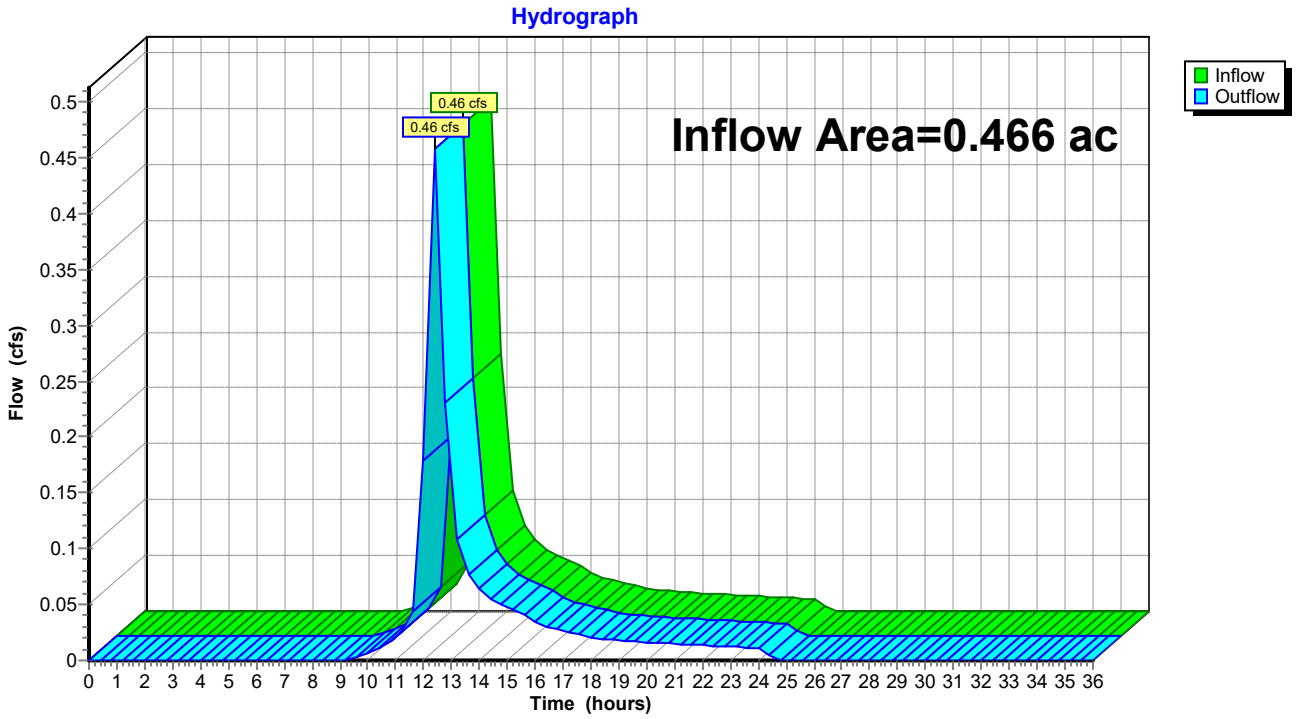
Reach AP3: Analysis Point 3 Inflow=1.17 cfs 0.134 af
Outflow=1.17 cfs 0.134 af

Summary for Reach AP1: Analysis Point 1

Inflow Area = 0.466 ac, 25.29% Impervious, Inflow Depth = 1.53" for 2-yr event
Inflow = 0.46 cfs @ 12.42 hrs, Volume= 0.059 af
Outflow = 0.46 cfs @ 12.42 hrs, Volume= 0.059 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs

Reach AP1: Analysis Point 1



Hydrograph for Reach AP1: Analysis Point 1

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
0.40	0.00		0.00
0.80	0.00		0.00
1.20	0.00		0.00
1.60	0.00		0.00
2.00	0.00		0.00
2.40	0.00		0.00
2.80	0.00		0.00
3.20	0.00		0.00
3.60	0.00		0.00
4.00	0.00		0.00
4.40	0.00		0.00
4.80	0.00		0.00
5.20	0.00		0.00
5.60	0.00		0.00
6.00	0.00		0.00
6.40	0.00		0.00
6.80	0.00		0.00
7.20	0.00		0.00
7.60	0.00		0.00
8.00	0.00		0.00
8.40	0.00		0.00
8.80	0.00		0.00
9.20	0.00		0.00
9.60	0.00		0.00
10.00	0.01		0.01
10.40	0.01		0.01
10.80	0.02		0.02
11.20	0.03		0.03
11.60	0.04		0.04
12.00	0.18		0.18
12.40	**0.46**		**0.46**
12.80	0.23		0.23
13.20	0.11		0.11
13.60	0.08		0.08
14.00	0.06		0.06
14.40	0.06		0.06
14.80	0.05		0.05
15.20	0.04		0.04
15.60	0.04		0.04
16.00	0.03		0.03
16.40	0.03		0.03
16.80	0.03		0.03
17.20	0.03		0.03
17.60	0.02		0.02
18.00	0.02		0.02
18.40	0.02		0.02
18.80	0.02		0.02
19.20	0.02		0.02
19.60	0.02		0.02
20.00	0.02		0.02
20.40	0.02		0.02
20.80	0.01		0.01
21.20	0.01		0.01
21.60	0.01		0.01
22.00	0.01		0.01
22.40	0.01		0.01
22.80	0.01		0.01
23.20	0.01		0.01
23.60	0.01		0.01
24.00	0.01		0.01
24.40	0.00		0.00
24.80	0.00		0.00
25.20	0.00		0.00
25.60	0.00		0.00
26.00	0.00		0.00
26.40	0.00		0.00
26.80	0.00		0.00
27.20	0.00		0.00
27.60	0.00		0.00
28.00	0.00		0.00
28.40	0.00		0.00
28.80	0.00		0.00
29.20	0.00		0.00
29.60	0.00		0.00
30.00	0.00		0.00
30.40	0.00		0.00
30.80	0.00		0.00
31.20	0.00		0.00
31.60	0.00		0.00
32.00	0.00		0.00
32.40	0.00		0.00
32.80	0.00		0.00
33.20	0.00		0.00
33.60	0.00		0.00
34.00	0.00		0.00
34.40	0.00		0.00
34.80	0.00		0.00
35.20	0.00		0.00
35.60	0.00		0.00
36.00	0.00		0.00

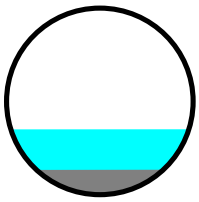
Summary for Reach AP2: Analysis Point 2

Inflow Area = 1.074 ac, 77.50% Impervious, Inflow Depth = 2.04" for 2-yr event
Inflow = 1.63 cfs @ 12.05 hrs, Volume= 0.182 af
Outflow = 1.53 cfs @ 12.07 hrs, Volume= 0.182 af, Atten= 6%, Lag= 1.6 min

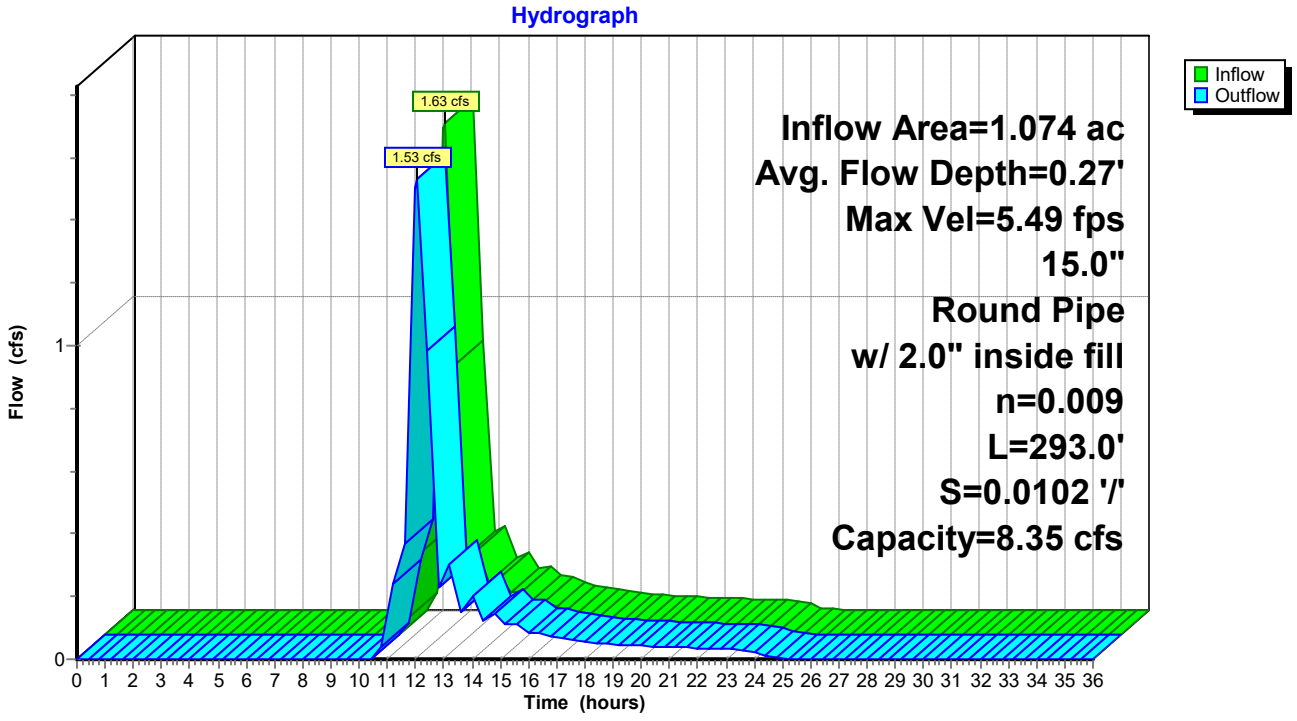
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs
Max. Velocity= 5.49 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.91 fps, Avg. Travel Time= 2.6 min

Peak Storage= 84 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.44' above invert (0.27' above fill) , Surface Width= 1.19'
Bank-Full Depth= 1.25' above invert (1.08' above fill) Flow Area= 1.1 sf, Capacity= 8.35 cfs

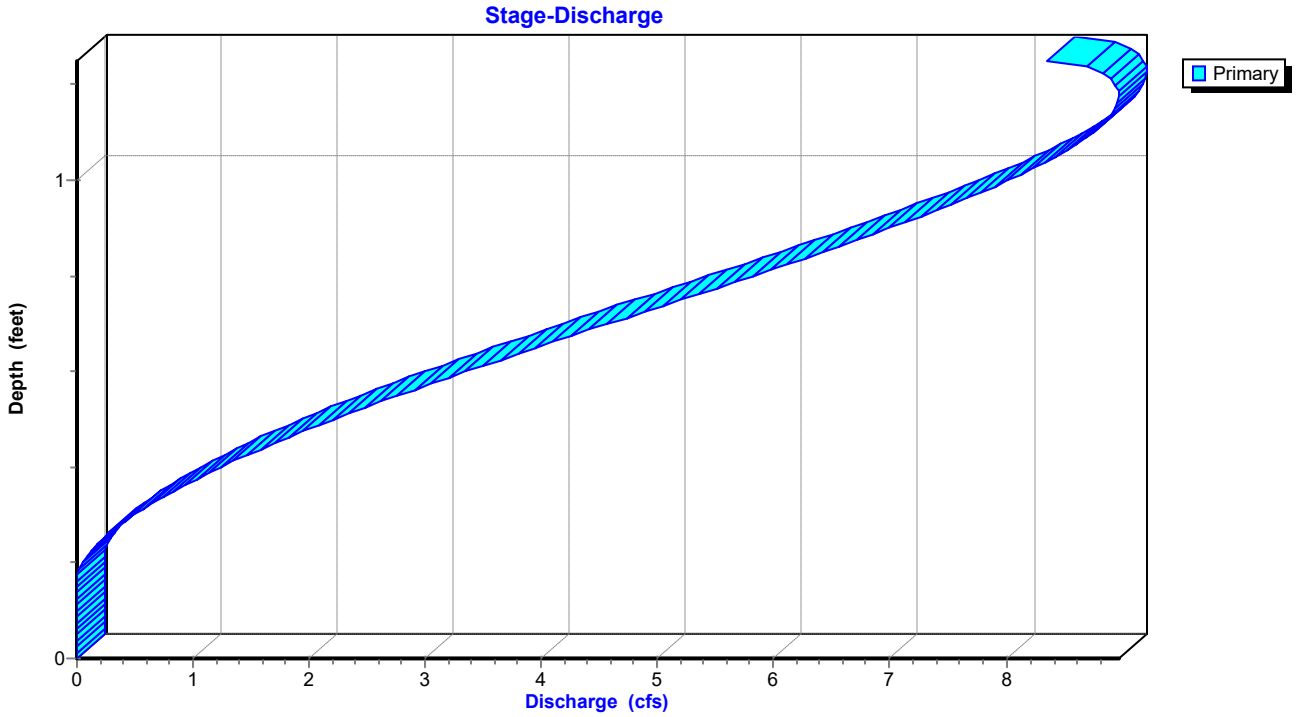
15.0" Round Pipe w/ 2.0" inside fill
n= 0.009 PVC, smooth interior
Length= 293.0' Slope= 0.0102 '/'
Inlet Invert= 540.00', Outlet Invert= 537.00'



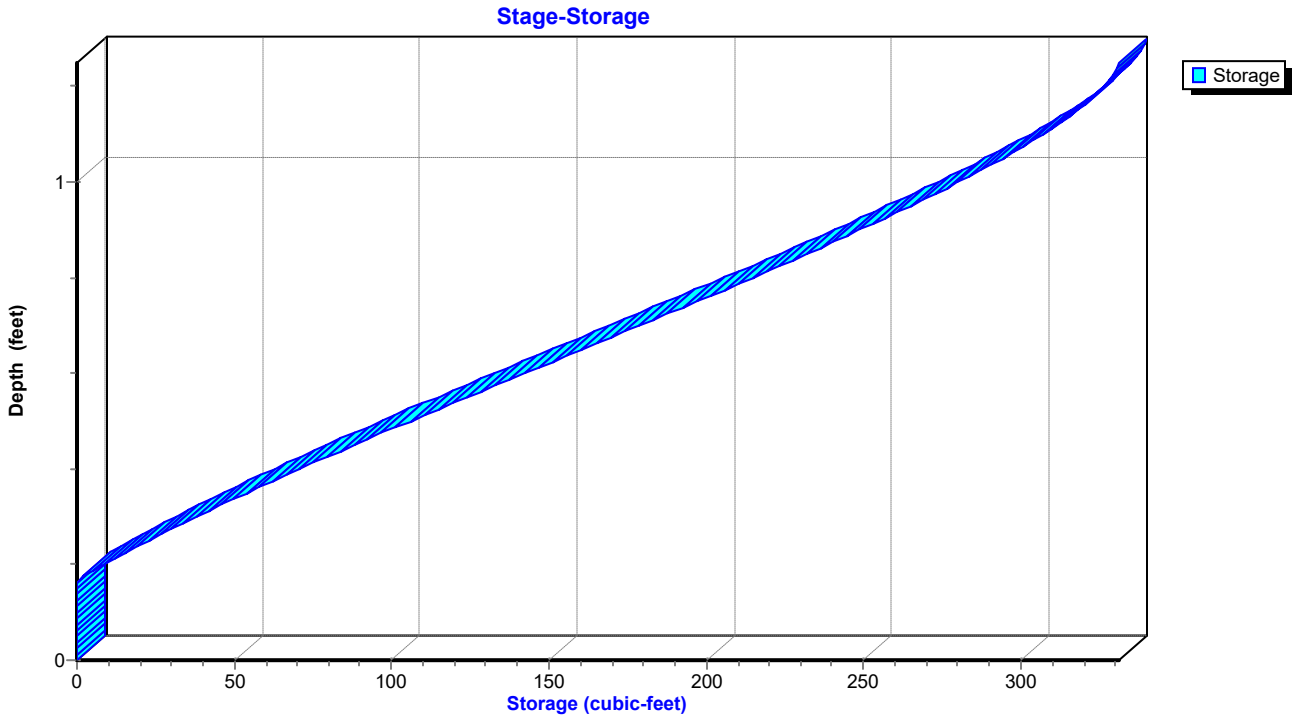
Reach AP2: Analysis Point 2



Reach AP2: Analysis Point 2



Reach AP2: Analysis Point 2



Hydrograph for Reach AP2: Analysis Point 2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0	540.17	0.00
0.80	0.00	0	540.17	0.00
1.60	0.00	0	540.17	0.00
2.40	0.00	0	540.17	0.00
3.20	0.00	0	540.17	0.00
4.00	0.00	0	540.17	0.00
4.80	0.00	0	540.17	0.00
5.60	0.00	0	540.17	0.00
6.40	0.00	0	540.17	0.00
7.20	0.00	0	540.17	0.00
8.00	0.00	0	540.17	0.00
8.80	0.00	0	540.17	0.00
9.60	0.00	0	540.17	0.00
10.40	0.00	0	540.17	0.00
11.20	0.26	24	540.26	0.24
12.00	**1.61**	**82**	**540.43**	**1.50**
12.80	0.25	21	540.24	0.23
13.60	0.17	17	540.23	0.15
14.40	0.13	15	540.22	0.13
15.20	0.11	14	540.22	0.11
16.00	0.09	12	540.21	0.09
16.80	0.07	11	540.21	0.07
17.60	0.06	10	540.20	0.06
18.40	0.05	9	540.20	0.05
19.20	0.05	8	540.20	0.05
20.00	0.04	8	540.20	0.04
20.80	0.04	8	540.20	0.04
21.60	0.04	7	540.19	0.04
22.40	0.03	7	540.19	0.03
23.20	0.03	6	540.19	0.03
24.00	0.02	5	540.19	0.02
24.80	0.00	1	540.17	0.00
25.60	0.00	0	540.17	0.00
26.40	0.00	0	540.17	0.00
27.20	0.00	0	540.17	0.00
28.00	0.00	0	540.17	0.00
28.80	0.00	0	540.17	0.00
29.60	0.00	0	540.17	0.00
30.40	0.00	0	540.17	0.00
31.20	0.00	0	540.17	0.00
32.00	0.00	0	540.17	0.00
32.80	0.00	0	540.17	0.00
33.60	0.00	0	540.17	0.00
34.40	0.00	0	540.17	0.00
35.20	0.00	0	540.17	0.00
36.00	0.00	0	540.17	0.00

Stage-Discharge for Reach AP2: Analysis Point 2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
540.00	0.00	0.00
540.01	0.00	0.00
540.02	0.00	0.00
540.03	0.00	0.00
540.04	0.00	0.00
540.05	0.00	0.00
540.06	0.00	0.00
540.07	0.00	0.00
540.08	0.00	0.00
540.09	0.00	0.00
540.10	0.00	0.00
540.11	0.00	0.00
540.12	0.00	0.00
540.13	0.00	0.00
540.14	0.00	0.00
540.15	0.00	0.00
540.16	0.00	0.00
540.17	0.41	0.00
540.18	0.90	0.01
540.19	1.31	0.03
540.20	1.66	0.05
540.21	1.95	0.08
540.22	2.21	0.11
540.23	2.45	0.14
540.24	2.68	0.18
540.25	2.89	0.22
540.26	3.09	0.27
540.27	3.28	0.32
540.28	3.46	0.37
540.29	3.63	0.43
540.30	3.79	0.49
540.31	3.95	0.55
540.32	4.10	0.62
540.33	4.24	0.69
540.34	4.38	0.76
540.35	4.52	0.83
540.36	4.65	0.91
540.37	4.77	0.99
540.38	4.89	1.07
540.39	5.01	1.15
540.40	5.13	1.24
540.41	5.24	1.33
540.42	5.35	1.42
540.43	5.46	1.51
540.44	5.56	1.60
540.45	5.66	1.70
540.46	5.76	1.80
540.47	5.85	1.90
540.48	5.94	2.00
540.49	6.04	2.11
540.50	6.12	2.21
540.51	6.21	2.32
540.52	6.29	2.43
540.53	6.38	2.54
540.54	6.46	2.65
540.55	6.53	2.76
540.56	6.61	2.88
540.57	6.68	2.99
540.58	6.76	3.11
540.59	6.83	3.23
540.60	6.90	3.35
540.61	6.96	3.47
540.62	7.03	3.59
540.63	7.09	3.71
540.64	7.16	3.83
540.65	7.22	3.95
540.66	7.28	4.07
540.67	7.33	4.20
540.68	7.39	4.32
540.69	7.44	4.45
540.70	7.50	4.57
540.71	7.55	4.70
540.72	7.60	4.82
540.73	7.65	4.95
540.74	7.69	5.07
540.75	7.74	5.20
540.76	7.78	5.32
540.77	7.82	5.45
540.78	7.86	5.57
540.79	7.90	5.69
540.80	7.94	5.82
540.81	7.98	5.94
540.82	8.01	6.06
540.83	8.05	6.18
540.84	8.08	6.30
540.85	8.11	6.42
540.86	8.14	6.54
540.87	8.17	6.65
540.88	8.20	6.77
540.89	8.22	6.88
540.90	8.24	7.00
540.91	8.27	7.11
540.92	8.29	7.22
540.93	8.30	7.32
540.94	8.32	7.43
540.95	8.34	7.53
540.96	8.35	7.63
540.97	8.36	7.73
540.98	8.38	7.83
540.99	8.38	7.92
541.00	8.39	8.02
541.01	8.40	8.10
541.02	8.40	8.19
541.03	8.40	8.27
541.04	**8.40**	8.35
541.05	8.40	8.43
541.06	8.40	8.50
541.07	8.39	8.57
541.08	8.38	8.63
541.09	8.37	8.69
541.10	8.36	8.75
541.11	8.34	8.80
541.12	8.32	8.84
541.13	8.30	8.88
541.14	8.28	8.91
541.15	8.25	8.94
541.16	8.21	8.96
541.17	8.18	8.97
541.18	8.13	**8.97**
541.19	8.09	8.96
541.20	8.03	8.95
541.21	7.97	8.91
541.22	7.89	8.86
541.23	7.80	8.78
541.24	7.65	8.63
541.25	7.39	8.35

Stage-Area-Storage for Reach AP2: Analysis Point 2

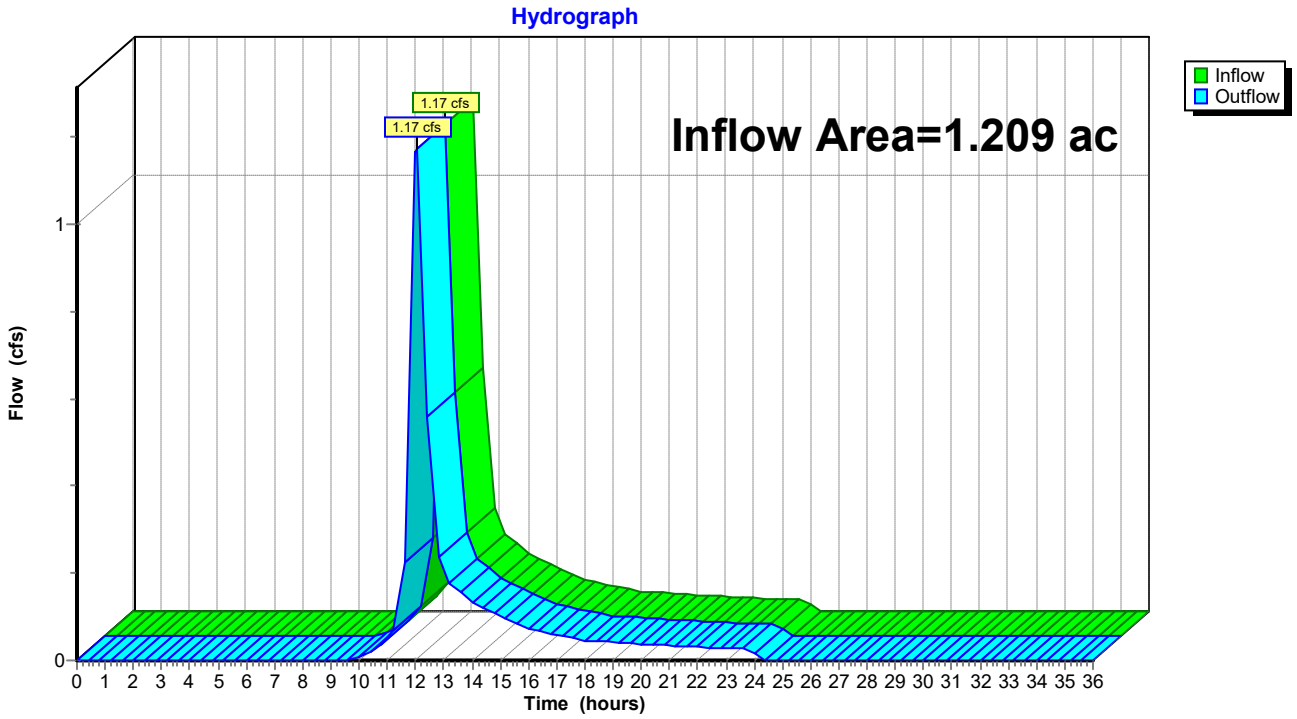
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
540.00	0.0	0
540.02	0.0	0
540.04	0.0	0
540.06	0.0	0
540.08	0.0	0
540.10	0.0	0
540.12	0.0	0
540.14	0.0	0
540.16	0.0	0
540.18	0.0	3
540.20	0.0	9
540.22	0.0	14
540.24	0.1	20
540.26	0.1	26
540.28	0.1	32
540.30	0.1	38
540.32	0.2	44
540.34	0.2	51
540.36	0.2	57
540.38	0.2	64
540.40	0.2	71
540.42	0.3	78
540.44	0.3	85
540.46	0.3	92
540.48	0.3	99
540.50	0.4	106
540.52	0.4	113
540.54	0.4	120
540.56	0.4	128
540.58	0.5	135
540.60	0.5	142
540.62	0.5	149
540.64	0.5	157
540.66	0.6	164
540.68	0.6	171
540.70	0.6	179
540.72	0.6	186
540.74	0.7	193
540.76	0.7	200
540.78	0.7	207
540.80	0.7	215
540.82	0.8	222
540.84	0.8	228
540.86	0.8	235
540.88	0.8	242
540.90	0.8	249
540.92	0.9	255
540.94	0.9	262
540.96	0.9	268
540.98	0.9	274
541.00	1.0	280
541.02	1.0	286
541.04	1.0	291
541.06	1.0	297
541.08	1.0	302
541.10	1.0	307
541.12	1.1	311
541.14	1.1	316
541.16	1.1	320
541.18	1.1	323
541.20	1.1	326
541.22	1.1	329
541.24	**1.1**	**331**

Summary for Reach AP3: Analysis Point 3

Inflow Area = 1.209 ac, 19.07% Impervious, Inflow Depth = 1.33" for 2-yr event
Inflow = 1.17 cfs @ 12.04 hrs, Volume= 0.134 af
Outflow = 1.17 cfs @ 12.04 hrs, Volume= 0.134 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs

Reach AP3: Analysis Point 3



Hydrograph for Reach AP3: Analysis Point 3

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
0.40	0.00		0.00
0.80	0.00		0.00
1.20	0.00		0.00
1.60	0.00		0.00
2.00	0.00		0.00
2.40	0.00		0.00
2.80	0.00		0.00
3.20	0.00		0.00
3.60	0.00		0.00
4.00	0.00		0.00
4.40	0.00		0.00
4.80	0.00		0.00
5.20	0.00		0.00
5.60	0.00		0.00
6.00	0.00		0.00
6.40	0.00		0.00
6.80	0.00		0.00
7.20	0.00		0.00
7.60	0.00		0.00
8.00	0.00		0.00
8.40	0.00		0.00
8.80	0.00		0.00
9.20	0.00		0.00
9.60	0.00		0.00
10.00	0.01		0.01
10.40	0.02		0.02
10.80	0.04		0.04
11.20	0.07		0.07
11.60	0.22		0.22
12.00	**1.16**		**1.16**
12.40	0.56		0.56
12.80	0.24		0.24
13.20	0.18		0.18
13.60	0.15		0.15
14.00	0.13		0.13
14.40	0.12		0.12
14.80	0.11		0.11
15.20	0.10		0.10
15.60	0.09		0.09
16.00	0.07		0.07
16.40	0.07		0.07
16.80	0.06		0.06
17.20	0.06		0.06
17.60	0.05		0.05
18.00	0.05		0.05
18.40	0.04		0.04
18.80	0.04		0.04
19.20	0.04		0.04
19.60	0.04		0.04
20.00	0.04		0.04
20.40	0.04		0.04
20.80	0.03		0.03
21.20	0.03		0.03
21.60	0.03		0.03
22.00	0.03		0.03
22.40	0.03		0.03
22.80	0.03		0.03
23.20	0.03		0.03
23.60	0.03		0.03
24.00	0.01		0.01
24.40	0.00		0.00
24.80	0.00		0.00
25.20	0.00		0.00
25.60	0.00		0.00
26.00	0.00		0.00
26.40	0.00		0.00
26.80	0.00		0.00
27.20	0.00		0.00
27.60	0.00		0.00
28.00	0.00		0.00
28.40	0.00		0.00
28.80	0.00		0.00
29.20	0.00		0.00
29.60	0.00		0.00
30.00	0.00		0.00
30.40	0.00		0.00
30.80	0.00		0.00
31.20	0.00		0.00
31.60	0.00		0.00
32.00	0.00		0.00
32.40	0.00		0.00
32.80	0.00		0.00
33.20	0.00		0.00
33.60	0.00		0.00
34.00	0.00		0.00
34.40	0.00		0.00
34.80	0.00		0.00
35.20	0.00		0.00
35.60	0.00		0.00
36.00	0.00		0.00

Time span=0.00-36.00 hrs, dt=0.40 hrs, 91 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Reach AP1: Analysis Point 1 Inflow=0.85 cfs 0.111 af
Outflow=0.85 cfs 0.111 af

Reach AP2: Analysis Point 2 Avg. Flow Depth=0.36' Max Vel=6.26 fps Inflow=2.54 cfs 0.316 af
15.0" Round Pipe w/ 2.0" inside fill n=0.009 L=293.0' S=0.0102 '/' Capacity=8.35 cfs Outflow=2.41 cfs 0.316 af

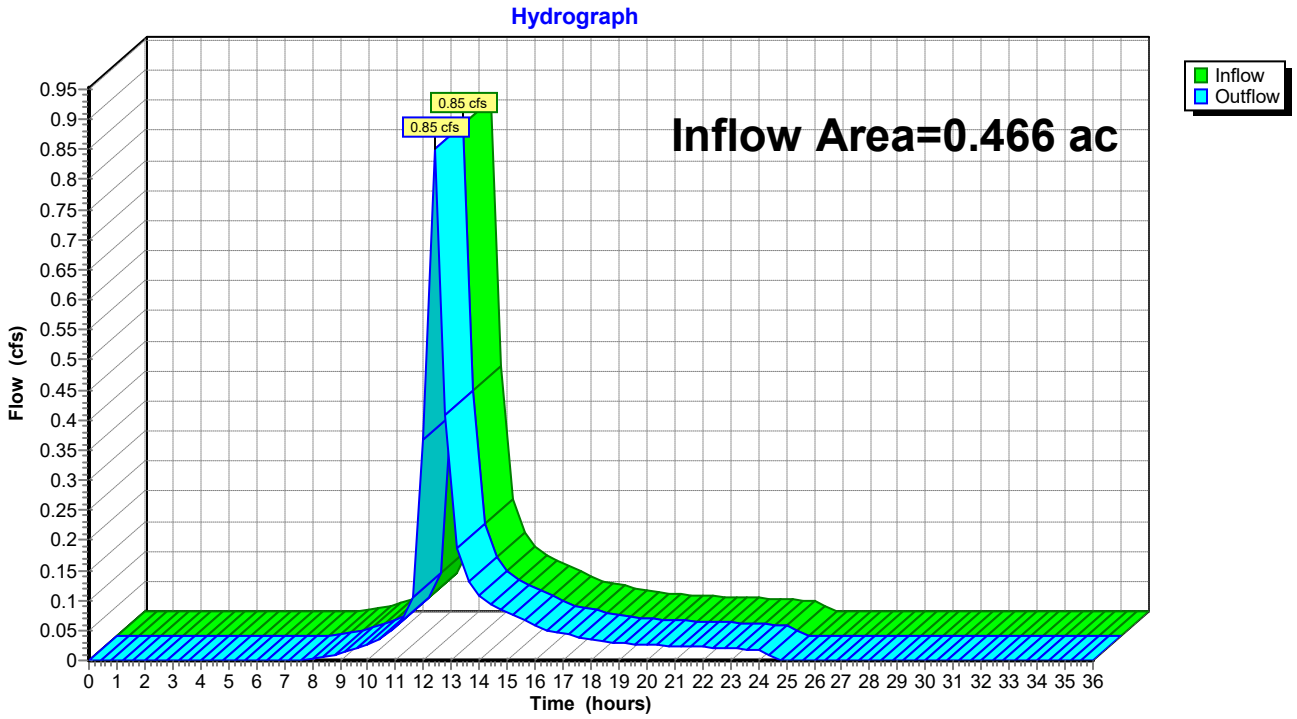
Reach AP3: Analysis Point 3 Inflow=2.33 cfs 0.260 af
Outflow=2.33 cfs 0.260 af

Summary for Reach AP1: Analysis Point 1

Inflow Area = 0.466 ac, 25.29% Impervious, Inflow Depth = 2.85" for 10-yr event
Inflow = 0.85 cfs @ 12.41 hrs, Volume= 0.111 af
Outflow = 0.85 cfs @ 12.41 hrs, Volume= 0.111 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs

Reach AP1: Analysis Point 1



Hydrograph for Reach AP1: Analysis Point 1

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
0.40	0.00		0.00
0.80	0.00		0.00
1.20	0.00		0.00
1.60	0.00		0.00
2.00	0.00		0.00
2.40	0.00		0.00
2.80	0.00		0.00
3.20	0.00		0.00
3.60	0.00		0.00
4.00	0.00		0.00
4.40	0.00		0.00
4.80	0.00		0.00
5.20	0.00		0.00
5.60	0.00		0.00
6.00	0.00		0.00
6.40	0.00		0.00
6.80	0.00		0.00
7.20	0.00		0.00
7.60	0.00		0.00
8.00	0.00		0.00
8.40	0.01		0.01
8.80	0.01		0.01
9.20	0.01		0.01
9.60	0.02		0.02
10.00	0.03		0.03
10.40	0.04		0.04
10.80	0.05		0.05
11.20	0.07		0.07
11.60	0.11		0.11
12.00	0.37		0.37
12.40	**0.85**		**0.85**
12.80	0.41		0.41
13.20	0.19		0.19
13.60	0.13		0.13
14.00	0.11		0.11
14.40	0.09		0.09
14.80	0.08		0.08
15.20	0.08		0.08
15.60	0.07		0.07
16.00	0.06		0.06
16.40	0.05		0.05
16.80	0.05		0.05
17.20	0.04		0.04
17.60	0.04		0.04
18.00	0.03		0.03
18.40	0.03		0.03
18.80	0.03		0.03
19.20	0.03		0.03
19.60	0.03		0.03
20.00	0.03		0.03
20.40	0.03		0.03
20.80	0.02		0.02
21.20	0.02		0.02
21.60	0.02		0.02
22.00	0.02		0.02
22.40	0.02		0.02
22.80	0.02		0.02
23.20	0.02		0.02
23.60	0.02		0.02
24.00	0.02		0.02
24.40	0.01		0.01
24.80	0.00		0.00
25.20	0.00		0.00
25.60	0.00		0.00
26.00	0.00		0.00
26.40	0.00		0.00
26.80	0.00		0.00
27.20	0.00		0.00
27.60	0.00		0.00
28.00	0.00		0.00
28.40	0.00		0.00
28.80	0.00		0.00
29.20	0.00		0.00
29.60	0.00		0.00
30.00	0.00		0.00
30.40	0.00		0.00
30.80	0.00		0.00
31.20	0.00		0.00
31.60	0.00		0.00
32.00	0.00		0.00
32.40	0.00		0.00
32.80	0.00		0.00
33.20	0.00		0.00
33.60	0.00		0.00
34.00	0.00		0.00
34.40	0.00		0.00
34.80	0.00		0.00
35.20	0.00		0.00
35.60	0.00		0.00
36.00	0.00		0.00

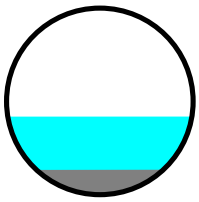
Summary for Reach AP2: Analysis Point 2

Inflow Area = 1.074 ac, 77.50% Impervious, Inflow Depth = 3.53" for 10-yr event
Inflow = 2.54 cfs @ 12.08 hrs, Volume= 0.316 af
Outflow = 2.41 cfs @ 12.11 hrs, Volume= 0.316 af, Atten= 5%, Lag= 1.8 min

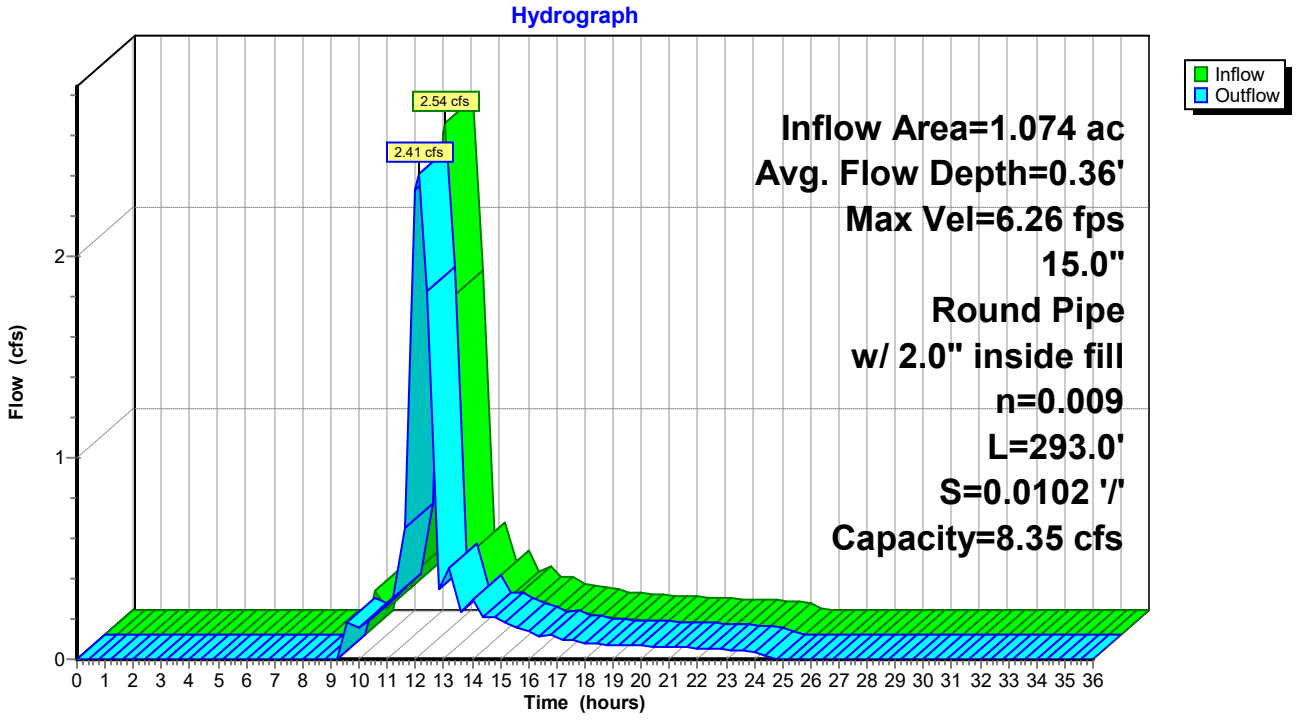
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs
Max. Velocity= 6.26 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 2.23 fps, Avg. Travel Time= 2.2 min

Peak Storage= 115 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.53' above invert (0.36' above fill) , Surface Width= 1.23'
Bank-Full Depth= 1.25' above invert (1.08' above fill) Flow Area= 1.1 sf, Capacity= 8.35 cfs

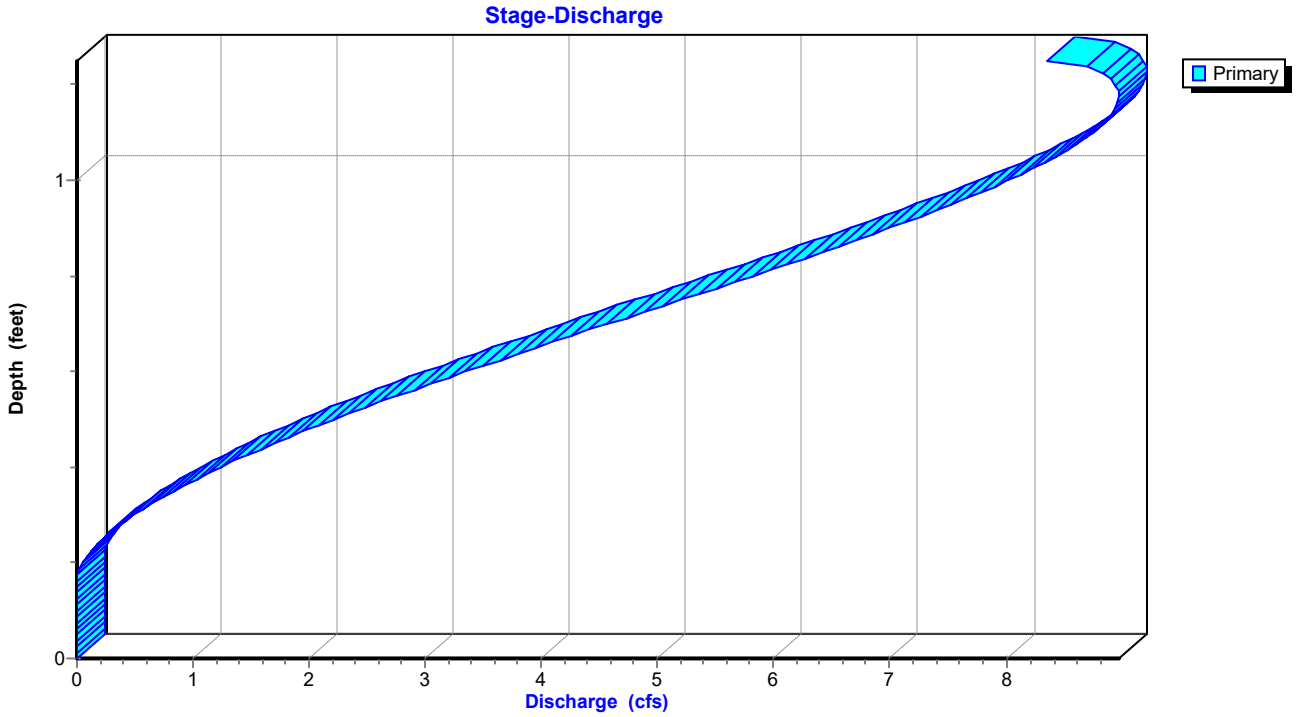
15.0" Round Pipe w/ 2.0" inside fill
n= 0.009 PVC, smooth interior
Length= 293.0' Slope= 0.0102 '/'
Inlet Invert= 540.00', Outlet Invert= 537.00'



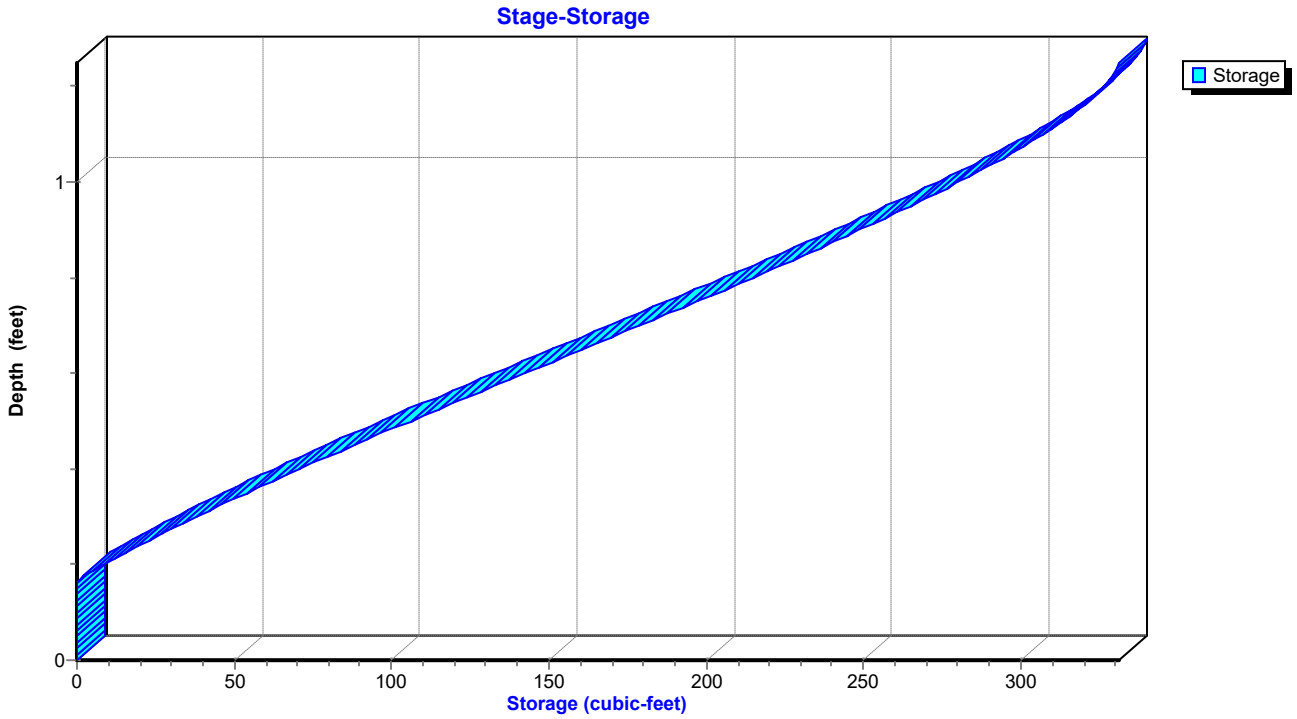
Reach AP2: Analysis Point 2



Reach AP2: Analysis Point 2



Reach AP2: Analysis Point 2



Hydrograph for Reach AP2: Analysis Point 2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0	540.17	0.00
0.80	0.00	0	540.17	0.00
1.60	0.00	0	540.17	0.00
2.40	0.00	0	540.17	0.00
3.20	0.00	0	540.17	0.00
4.00	0.00	0	540.17	0.00
4.80	0.00	0	540.17	0.00
5.60	0.00	0	540.17	0.00
6.40	0.00	0	540.17	0.00
7.20	0.00	0	540.17	0.00
8.00	0.00	0	540.17	0.00
8.80	0.00	0	540.17	0.00
9.60	0.22	20	540.24	0.18
10.40	0.24	21	540.25	0.20
11.20	0.34	28	540.27	0.31
12.00	**2.49**	**112**	**540.52**	**2.33**
12.80	0.33	27	540.26	0.34
13.60	0.23	23	540.25	0.24
14.40	0.19	21	540.24	0.20
15.20	0.16	20	540.24	0.18
16.00	0.13	17	540.23	0.14
16.80	0.11	15	540.22	0.12
17.60	0.09	13	540.22	0.10
18.40	0.08	12	540.21	0.08
19.20	0.07	11	540.21	0.07
20.00	0.07	10	540.21	0.07
20.80	0.06	10	540.20	0.06
21.60	0.06	9	540.20	0.06
22.40	0.05	9	540.20	0.05
23.20	0.05	8	540.20	0.05
24.00	0.03	7	540.19	0.04
24.80	0.00	1	540.17	0.00
25.60	0.00	0	540.17	0.00
26.40	0.00	0	540.17	0.00
27.20	0.00	0	540.17	0.00
28.00	0.00	0	540.17	0.00
28.80	0.00	0	540.17	0.00
29.60	0.00	0	540.17	0.00
30.40	0.00	0	540.17	0.00
31.20	0.00	0	540.17	0.00
32.00	0.00	0	540.17	0.00
32.80	0.00	0	540.17	0.00
33.60	0.00	0	540.17	0.00
34.40	0.00	0	540.17	0.00
35.20	0.00	0	540.17	0.00
36.00	0.00	0	540.17	0.00

Stage-Discharge for Reach AP2: Analysis Point 2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
540.00	0.00	0.00
540.01	0.00	0.00
540.02	0.00	0.00
540.03	0.00	0.00
540.04	0.00	0.00
540.05	0.00	0.00
540.06	0.00	0.00
540.07	0.00	0.00
540.08	0.00	0.00
540.09	0.00	0.00
540.10	0.00	0.00
540.11	0.00	0.00
540.12	0.00	0.00
540.13	0.00	0.00
540.14	0.00	0.00
540.15	0.00	0.00
540.16	0.00	0.00
540.17	0.41	0.00
540.18	0.90	0.01
540.19	1.31	0.03
540.20	1.66	0.05
540.21	1.95	0.08
540.22	2.21	0.11
540.23	2.45	0.14
540.24	2.68	0.18
540.25	2.89	0.22
540.26	3.09	0.27
540.27	3.28	0.32
540.28	3.46	0.37
540.29	3.63	0.43
540.30	3.79	0.49
540.31	3.95	0.55
540.32	4.10	0.62
540.33	4.24	0.69
540.34	4.38	0.76
540.35	4.52	0.83
540.36	4.65	0.91
540.37	4.77	0.99
540.38	4.89	1.07
540.39	5.01	1.15
540.40	5.13	1.24
540.41	5.24	1.33
540.42	5.35	1.42
540.43	5.46	1.51
540.44	5.56	1.60
540.45	5.66	1.70
540.46	5.76	1.80
540.47	5.85	1.90
540.48	5.94	2.00
540.49	6.04	2.11
540.50	6.12	2.21
540.51	6.21	2.32
540.52	6.29	2.43
540.53	6.38	2.54
540.54	6.46	2.65
540.55	6.53	2.76
540.56	6.61	2.88
540.57	6.68	2.99
540.58	6.76	3.11
540.59	6.83	3.23
540.60	6.90	3.35
540.61	6.96	3.47
540.62	7.03	3.59
540.63	7.09	3.71
540.64	7.16	3.83
540.65	7.22	3.95
540.66	7.28	4.07
540.67	7.33	4.20
540.68	7.39	4.32
540.69	7.44	4.45
540.70	7.50	4.57
540.71	7.55	4.70
540.72	7.60	4.82
540.73	7.65	4.95
540.74	7.69	5.07
540.75	7.74	5.20
540.76	7.78	5.32
540.77	7.82	5.45
540.78	7.86	5.57
540.79	7.90	5.69
540.80	7.94	5.82
540.81	7.98	5.94
540.82	8.01	6.06
540.83	8.05	6.18
540.84	8.08	6.30
540.85	8.11	6.42
540.86	8.14	6.54
540.87	8.17	6.65
540.88	8.20	6.77
540.89	8.22	6.88
540.90	8.24	7.00
540.91	8.27	7.11
540.92	8.29	7.22
540.93	8.30	7.32
540.94	8.32	7.43
540.95	8.34	7.53
540.96	8.35	7.63
540.97	8.36	7.73
540.98	8.38	7.83
540.99	8.38	7.92
541.00	8.39	8.02
541.01	8.40	8.10
541.02	8.40	8.19
541.03	8.40	8.27
541.04	**8.40**	8.35
541.05	8.40	8.43
541.06	8.40	8.50
541.07	8.39	8.57
541.08	8.38	8.63
541.09	8.37	8.69
541.10	8.36	8.75
541.11	8.34	8.80
541.12	8.32	8.84
541.13	8.30	8.88
541.14	8.28	8.91
541.15	8.25	8.94
541.16	8.21	8.96
541.17	8.18	8.97
541.18	8.13	**8.97**
541.19	8.09	8.96
541.20	8.03	8.95
541.21	7.97	8.91
541.22	7.89	8.86
541.23	7.80	8.78
541.24	7.65	8.63
541.25	7.39	8.35

Stage-Area-Storage for Reach AP2: Analysis Point 2

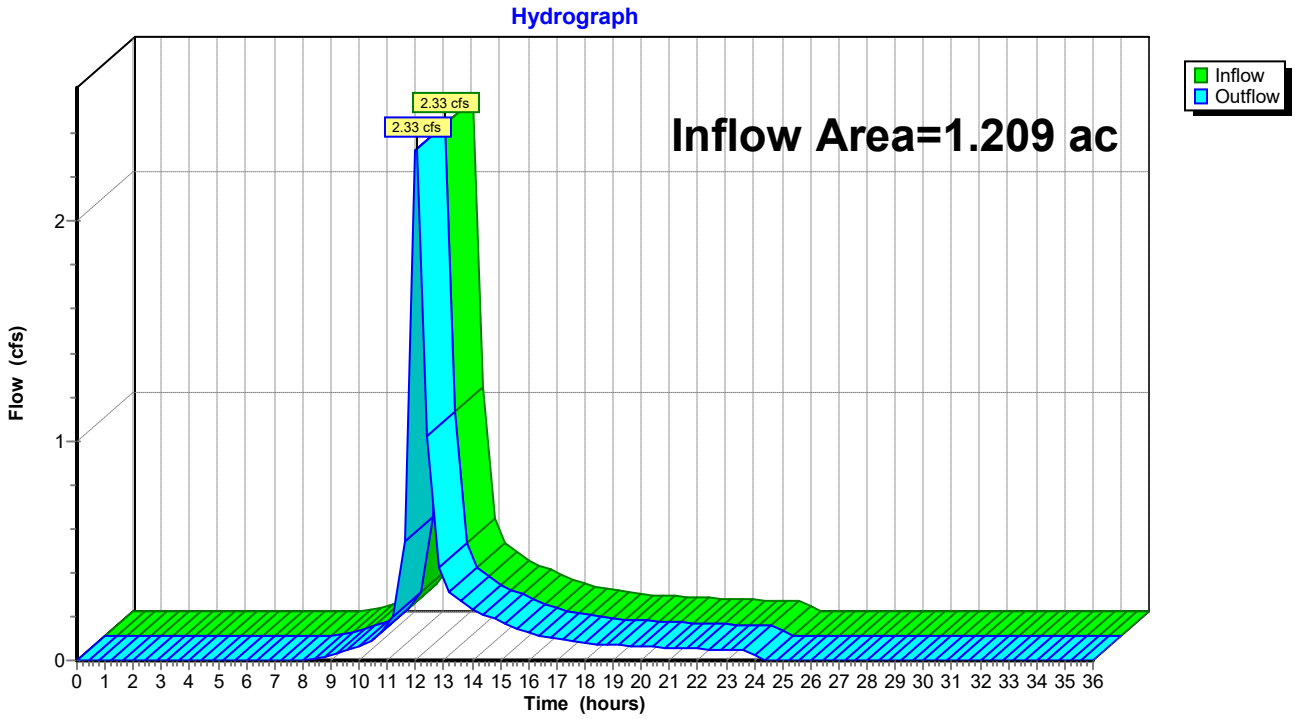
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
540.00	0.0	0
540.02	0.0	0
540.04	0.0	0
540.06	0.0	0
540.08	0.0	0
540.10	0.0	0
540.12	0.0	0
540.14	0.0	0
540.16	0.0	0
540.18	0.0	3
540.20	0.0	9
540.22	0.0	14
540.24	0.1	20
540.26	0.1	26
540.28	0.1	32
540.30	0.1	38
540.32	0.2	44
540.34	0.2	51
540.36	0.2	57
540.38	0.2	64
540.40	0.2	71
540.42	0.3	78
540.44	0.3	85
540.46	0.3	92
540.48	0.3	99
540.50	0.4	106
540.52	0.4	113
540.54	0.4	120
540.56	0.4	128
540.58	0.5	135
540.60	0.5	142
540.62	0.5	149
540.64	0.5	157
540.66	0.6	164
540.68	0.6	171
540.70	0.6	179
540.72	0.6	186
540.74	0.7	193
540.76	0.7	200
540.78	0.7	207
540.80	0.7	215
540.82	0.8	222
540.84	0.8	228
540.86	0.8	235
540.88	0.8	242
540.90	0.8	249
540.92	0.9	255
540.94	0.9	262
540.96	0.9	268
540.98	0.9	274
541.00	1.0	280
541.02	1.0	286
541.04	1.0	291
541.06	1.0	297
541.08	1.0	302
541.10	1.0	307
541.12	1.1	311
541.14	1.1	316
541.16	1.1	320
541.18	1.1	323
541.20	1.1	326
541.22	1.1	329
541.24	**1.1**	**331**

Summary for Reach AP3: Analysis Point 3

Inflow Area = 1.209 ac, 19.07% Impervious, Inflow Depth = 2.58" for 10-yr event
Inflow = 2.33 cfs @ 12.03 hrs, Volume= 0.260 af
Outflow = 2.33 cfs @ 12.03 hrs, Volume= 0.260 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs

Reach AP3: Analysis Point 3



Hydrograph for Reach AP3: Analysis Point 3

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
0.40	0.00		0.00
0.80	0.00		0.00
1.20	0.00		0.00
1.60	0.00		0.00
2.00	0.00		0.00
2.40	0.00		0.00
2.80	0.00		0.00
3.20	0.00		0.00
3.60	0.00		0.00
4.00	0.00		0.00
4.40	0.00		0.00
4.80	0.00		0.00
5.20	0.00		0.00
5.60	0.00		0.00
6.00	0.00		0.00
6.40	0.00		0.00
6.80	0.00		0.00
7.20	0.00		0.00
7.60	0.00		0.00
8.00	0.00		0.00
8.40	0.01		0.01
8.80	0.02		0.02
9.20	0.03		0.03
9.60	0.04		0.04
10.00	0.06		0.06
10.40	0.09		0.09
10.80	0.13		0.13
11.20	0.20		0.20
11.60	0.54		0.54
12.00	**2.32**		**2.32**
12.40	1.02		1.02
12.80	0.42		0.42
13.20	0.31		0.31
13.60	0.27		0.27
14.00	0.23		0.23
14.40	0.21		0.21
14.80	0.19		0.19
15.20	0.17		0.17
15.60	0.15		0.15
16.00	0.13		0.13
16.40	0.12		0.12
16.80	0.11		0.11
17.20	0.10		0.10
17.60	0.09		0.09
18.00	0.08		0.08
18.40	0.07		0.07
18.80	0.07		0.07
19.20	0.07		0.07
19.60	0.07		0.07
20.00	0.06		0.06
20.40	0.06		0.06
20.80	0.06		0.06
21.20	0.06		0.06
21.60	0.05		0.05
22.00	0.05		0.05
22.40	0.05		0.05
22.80	0.05		0.05
23.20	0.05		0.05
23.60	0.04		0.04
24.00	0.02		0.02
24.40	0.00		0.00
24.80	0.00		0.00
25.20	0.00		0.00
25.60	0.00		0.00
26.00	0.00		0.00
26.40	0.00		0.00
26.80	0.00		0.00
27.20	0.00		0.00
27.60	0.00		0.00
28.00	0.00		0.00
28.40	0.00		0.00
28.80	0.00		0.00
29.20	0.00		0.00
29.60	0.00		0.00
30.00	0.00		0.00
30.40	0.00		0.00
30.80	0.00		0.00
31.20	0.00		0.00
31.60	0.00		0.00
32.00	0.00		0.00
32.40	0.00		0.00
32.80	0.00		0.00
33.20	0.00		0.00
33.60	0.00		0.00
34.00	0.00		0.00
34.40	0.00		0.00
34.80	0.00		0.00
35.20	0.00		0.00
35.60	0.00		0.00
36.00	0.00		0.00

Time span=0.00-36.00 hrs, dt=0.40 hrs, 91 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Reach AP1: Analysis Point 1 Inflow=1.16 cfs 0.153 af
Outflow=1.16 cfs 0.153 af

Reach AP2: Analysis Point 2 Avg. Flow Depth=0.44' Max Vel=6.87 fps Inflow=3.46 cfs 0.419 af
15.0" Round Pipe w/ 2.0" inside fill n=0.009 L=293.0' S=0.0102 '/' Capacity=8.35 cfs Outflow=3.30 cfs 0.419 af

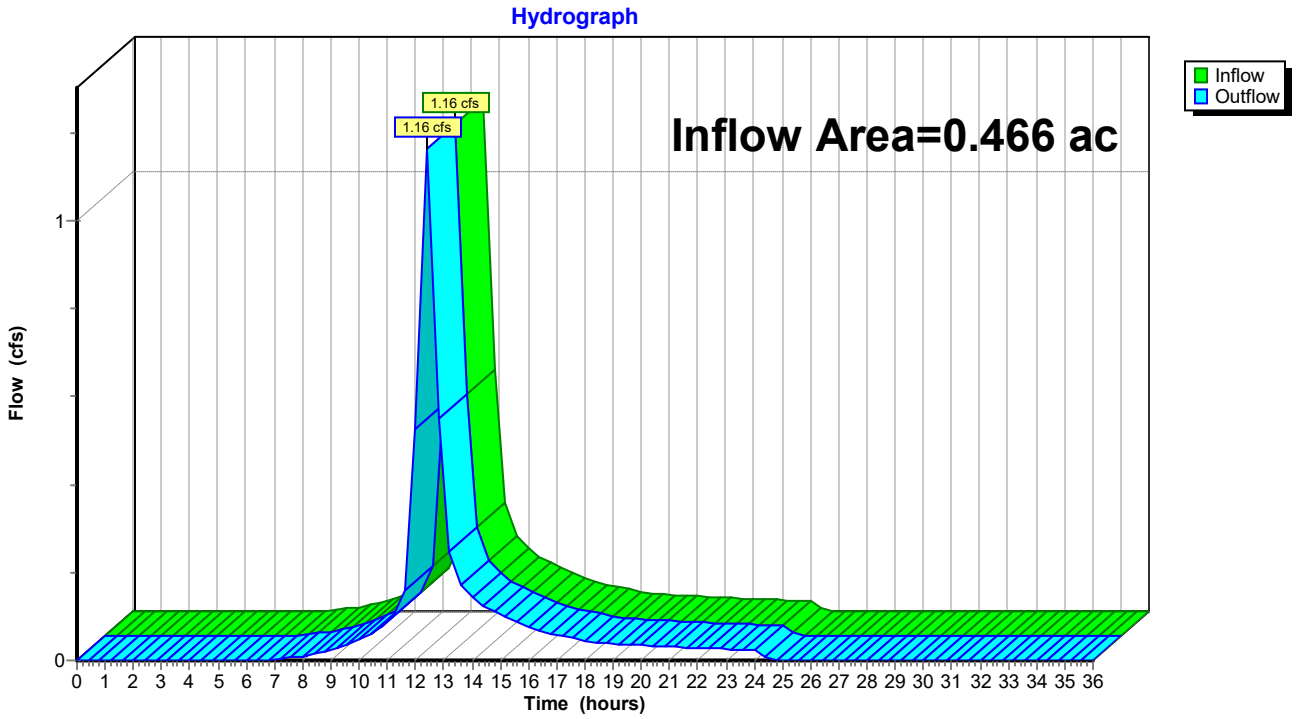
Reach AP3: Analysis Point 3 Inflow=3.28 cfs 0.365 af
Outflow=3.28 cfs 0.365 af

Summary for Reach AP1: Analysis Point 1

Inflow Area = 0.466 ac, 25.29% Impervious, Inflow Depth = 3.93" for 25-yr event
Inflow = 1.16 cfs @ 12.40 hrs, Volume= 0.153 af
Outflow = 1.16 cfs @ 12.40 hrs, Volume= 0.153 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs

Reach AP1: Analysis Point 1



Hydrograph for Reach AP1: Analysis Point 1

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
0.40	0.00		0.00
0.80	0.00		0.00
1.20	0.00		0.00
1.60	0.00		0.00
2.00	0.00		0.00
2.40	0.00		0.00
2.80	0.00		0.00
3.20	0.00		0.00
3.60	0.00		0.00
4.00	0.00		0.00
4.40	0.00		0.00
4.80	0.00		0.00
5.20	0.00		0.00
5.60	0.00		0.00
6.00	0.00		0.00
6.40	0.00		0.00
6.80	0.00		0.00
7.20	0.00		0.00
7.60	0.01		0.01
8.00	0.01		0.01
8.40	0.01		0.01
8.80	0.02		0.02
9.20	0.03		0.03
9.60	0.04		0.04
10.00	0.05		0.05
10.40	0.06		0.06
10.80	0.08		0.08
11.20	0.10		0.10
11.60	0.16		0.16
12.00	0.53		0.53
12.40	**1.16**		**1.16**
12.80	0.55		0.55
13.20	0.25		0.25
13.60	0.17		0.17
14.00	0.14		0.14
14.40	0.12		0.12
14.80	0.11		0.11
15.20	0.10		0.10
15.60	0.09		0.09
16.00	0.08		0.08
16.40	0.07		0.07
16.80	0.06		0.06
17.20	0.06		0.06
17.60	0.05		0.05
18.00	0.05		0.05
18.40	0.04		0.04
18.80	0.04		0.04
19.20	0.04		0.04
19.60	0.04		0.04
20.00	0.03		0.03
20.40	0.03		0.03
20.80	0.03		0.03
21.20	0.03		0.03
21.60	0.03		0.03
22.00	0.03		0.03
22.40	0.03		0.03
22.80	0.03		0.03
23.20	0.03		0.03
23.60	0.02		0.02
24.00	0.02		0.02
24.40	0.01		0.01
24.80	0.00		0.00
25.20	0.00		0.00
25.60	0.00		0.00
26.00	0.00		0.00
26.40	0.00		0.00
26.80	0.00		0.00
27.20	0.00		0.00
27.60	0.00		0.00
28.00	0.00		0.00
28.40	0.00		0.00
28.80	0.00		0.00
29.20	0.00		0.00
29.60	0.00		0.00
30.00	0.00		0.00
30.40	0.00		0.00
30.80	0.00		0.00
31.20	0.00		0.00
31.60	0.00		0.00
32.00	0.00		0.00
32.40	0.00		0.00
32.80	0.00		0.00
33.20	0.00		0.00
33.60	0.00		0.00
34.00	0.00		0.00
34.40	0.00		0.00
34.80	0.00		0.00
35.20	0.00		0.00
35.60	0.00		0.00
36.00	0.00		0.00

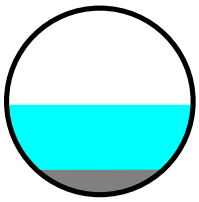
Summary for Reach AP2: Analysis Point 2

Inflow Area = 1.074 ac, 77.50% Impervious, Inflow Depth = 4.68" for 25-yr event
Inflow = 3.46 cfs @ 12.06 hrs, Volume= 0.419 af
Outflow = 3.30 cfs @ 12.08 hrs, Volume= 0.419 af, Atten= 5%, Lag= 1.3 min

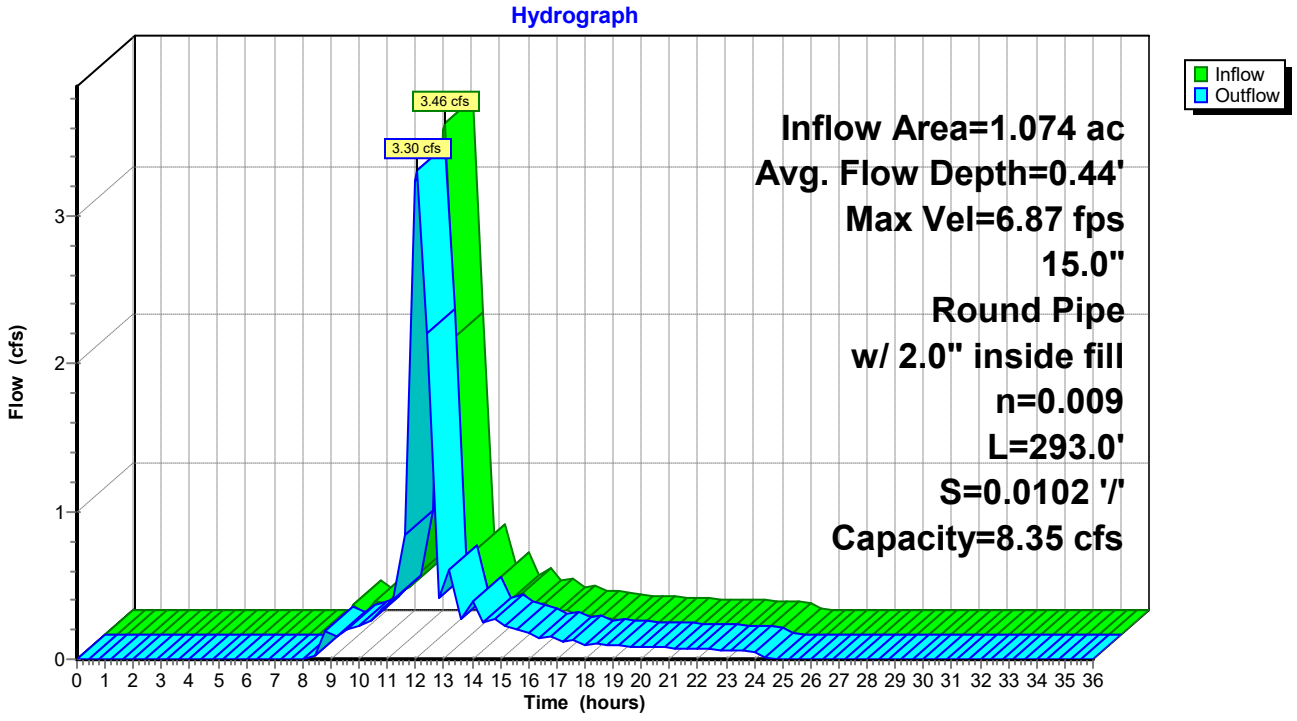
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs
Max. Velocity= 6.87 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 2.43 fps, Avg. Travel Time= 2.0 min

Peak Storage= 143 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.60' above invert (0.44' above fill) , Surface Width= 1.25'
Bank-Full Depth= 1.25' above invert (1.08' above fill) Flow Area= 1.1 sf, Capacity= 8.35 cfs

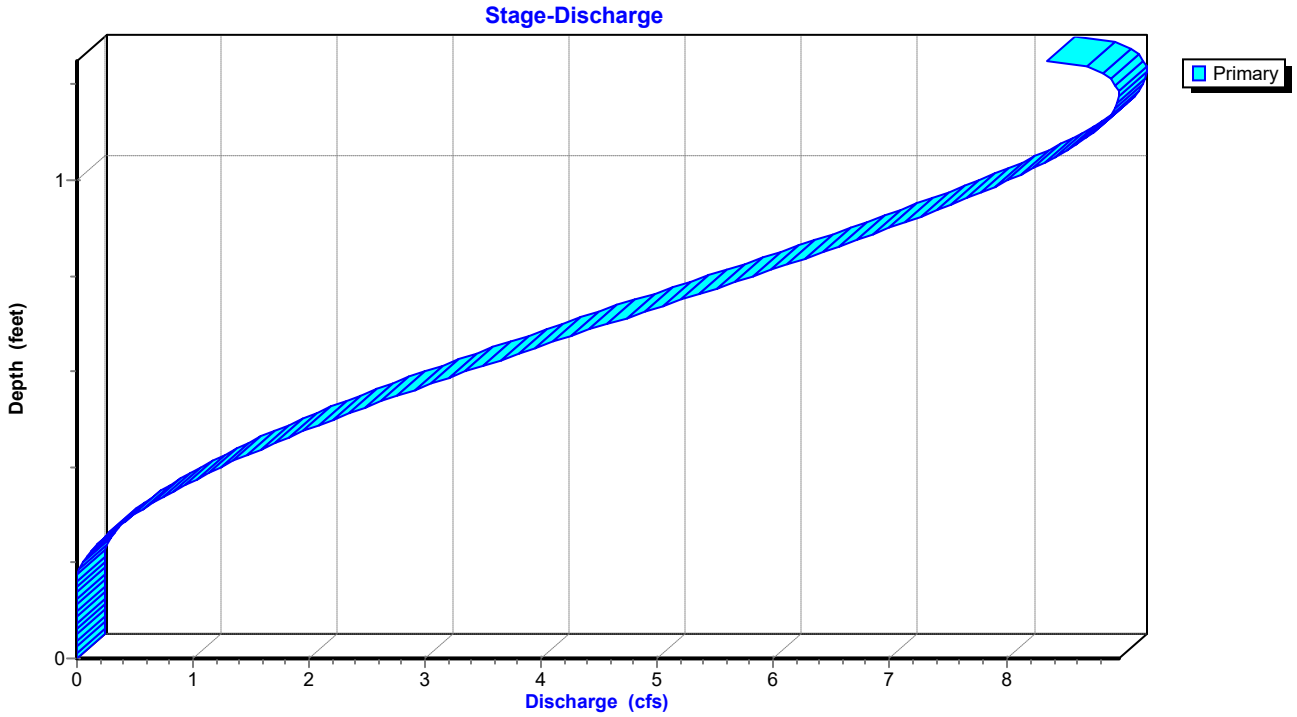
15.0" Round Pipe w/ 2.0" inside fill
n= 0.009 PVC, smooth interior
Length= 293.0' Slope= 0.0102 '/'
Inlet Invert= 540.00', Outlet Invert= 537.00'



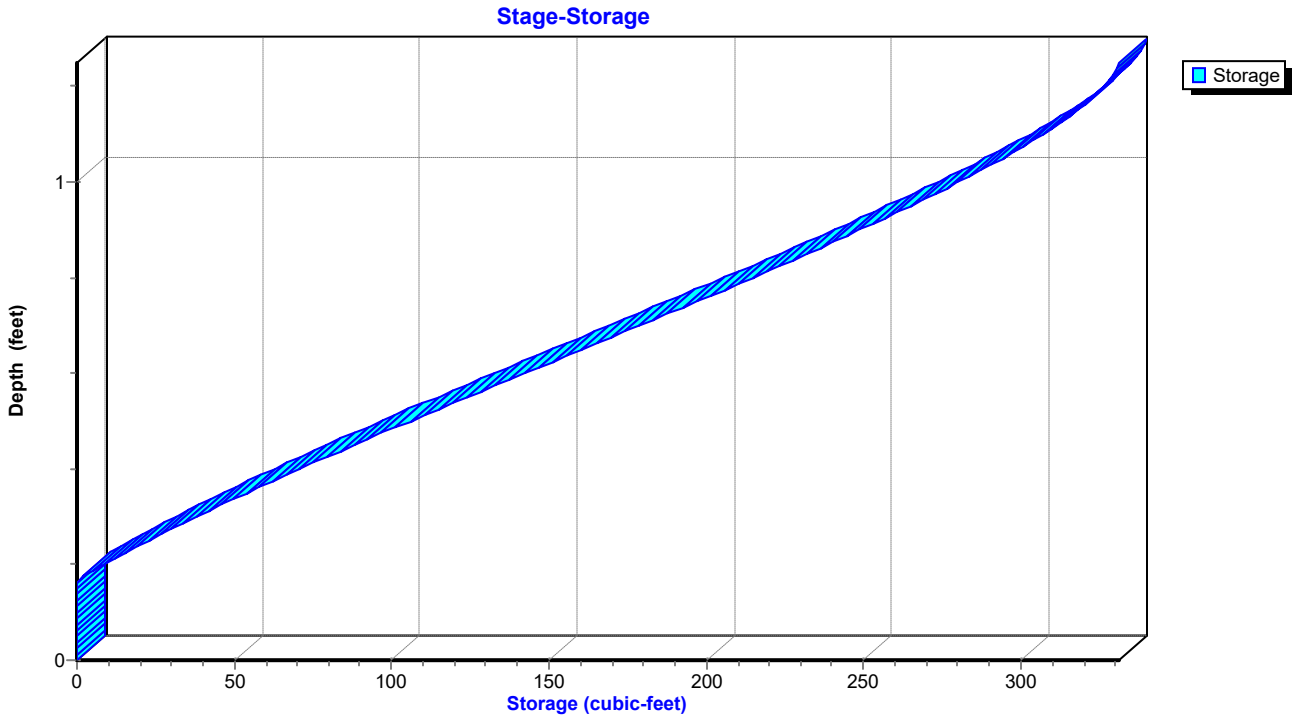
Reach AP2: Analysis Point 2



Reach AP2: Analysis Point 2



Reach AP2: Analysis Point 2



Hydrograph for Reach AP2: Analysis Point 2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0	540.17	0.00
0.80	0.00	0	540.17	0.00
1.60	0.00	0	540.17	0.00
2.40	0.00	0	540.17	0.00
3.20	0.00	0	540.17	0.00
4.00	0.00	0	540.17	0.00
4.80	0.00	0	540.17	0.00
5.60	0.00	0	540.17	0.00
6.40	0.00	0	540.17	0.00
7.20	0.00	0	540.17	0.00
8.00	0.00	0	540.17	0.00
8.80	0.20	20	540.24	0.19
9.60	0.23	21	540.25	0.20
10.40	0.29	25	540.26	0.26
11.20	0.43	33	540.29	0.40
12.00	**3.42**	**141**	**540.60**	**3.23**
12.80	0.42	31	540.28	0.41
13.60	0.28	25	540.26	0.28
14.40	0.23	24	540.25	0.25
15.20	0.20	22	540.25	0.22
16.00	0.16	19	540.24	0.18
16.80	0.14	17	540.23	0.15
17.60	0.11	16	540.23	0.12
18.40	0.10	14	540.22	0.10
19.20	0.09	13	540.22	0.09
20.00	0.08	12	540.21	0.09
20.80	0.08	12	540.21	0.08
21.60	0.07	11	540.21	0.07
22.40	0.07	10	540.21	0.07
23.20	0.06	10	540.20	0.06
24.00	0.04	8	540.20	0.04
24.80	0.00	1	540.17	0.00
25.60	0.00	0	540.17	0.00
26.40	0.00	0	540.17	0.00
27.20	0.00	0	540.17	0.00
28.00	0.00	0	540.17	0.00
28.80	0.00	0	540.17	0.00
29.60	0.00	0	540.17	0.00
30.40	0.00	0	540.17	0.00
31.20	0.00	0	540.17	0.00
32.00	0.00	0	540.17	0.00
32.80	0.00	0	540.17	0.00
33.60	0.00	0	540.17	0.00
34.40	0.00	0	540.17	0.00
35.20	0.00	0	540.17	0.00
36.00	0.00	0	540.17	0.00

Stage-Discharge for Reach AP2: Analysis Point 2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
540.00	0.00	0.00
540.01	0.00	0.00
540.02	0.00	0.00
540.03	0.00	0.00
540.04	0.00	0.00
540.05	0.00	0.00
540.06	0.00	0.00
540.07	0.00	0.00
540.08	0.00	0.00
540.09	0.00	0.00
540.10	0.00	0.00
540.11	0.00	0.00
540.12	0.00	0.00
540.13	0.00	0.00
540.14	0.00	0.00
540.15	0.00	0.00
540.16	0.00	0.00
540.17	0.41	0.00
540.18	0.90	0.01
540.19	1.31	0.03
540.20	1.66	0.05
540.21	1.95	0.08
540.22	2.21	0.11
540.23	2.45	0.14
540.24	2.68	0.18
540.25	2.89	0.22
540.26	3.09	0.27
540.27	3.28	0.32
540.28	3.46	0.37
540.29	3.63	0.43
540.30	3.79	0.49
540.31	3.95	0.55
540.32	4.10	0.62
540.33	4.24	0.69
540.34	4.38	0.76
540.35	4.52	0.83
540.36	4.65	0.91
540.37	4.77	0.99
540.38	4.89	1.07
540.39	5.01	1.15
540.40	5.13	1.24
540.41	5.24	1.33
540.42	5.35	1.42
540.43	5.46	1.51
540.44	5.56	1.60
540.45	5.66	1.70
540.46	5.76	1.80
540.47	5.85	1.90
540.48	5.94	2.00
540.49	6.04	2.11
540.50	6.12	2.21
540.51	6.21	2.32
540.52	6.29	2.43
540.53	6.38	2.54
540.54	6.46	2.65
540.55	6.53	2.76
540.56	6.61	2.88
540.57	6.68	2.99
540.58	6.76	3.11
540.59	6.83	3.23
540.60	6.90	3.35
540.61	6.96	3.47
540.62	7.03	3.59
540.63	7.09	3.71
540.64	7.16	3.83
540.65	7.22	3.95
540.66	7.28	4.07
540.67	7.33	4.20
540.68	7.39	4.32
540.69	7.44	4.45
540.70	7.50	4.57
540.71	7.55	4.70
540.72	7.60	4.82
540.73	7.65	4.95
540.74	7.69	5.07
540.75	7.74	5.20
540.76	7.78	5.32
540.77	7.82	5.45
540.78	7.86	5.57
540.79	7.90	5.69
540.80	7.94	5.82
540.81	7.98	5.94
540.82	8.01	6.06
540.83	8.05	6.18
540.84	8.08	6.30
540.85	8.11	6.42
540.86	8.14	6.54
540.87	8.17	6.65
540.88	8.20	6.77
540.89	8.22	6.88
540.90	8.24	7.00
540.91	8.27	7.11
540.92	8.29	7.22
540.93	8.30	7.32
540.94	8.32	7.43
540.95	8.34	7.53
540.96	8.35	7.63
540.97	8.36	7.73
540.98	8.38	7.83
540.99	8.38	7.92
541.00	8.39	8.02
541.01	8.40	8.10
541.02	8.40	8.19
541.03	8.40	8.27
541.04	**8.40**	8.35
541.05	8.40	8.43
541.06	8.40	8.50
541.07	8.39	8.57
541.08	8.38	8.63
541.09	8.37	8.69
541.10	8.36	8.75
541.11	8.34	8.80
541.12	8.32	8.84
541.13	8.30	8.88
541.14	8.28	8.91
541.15	8.25	8.94
541.16	8.21	8.96
541.17	8.18	8.97
541.18	8.13	**8.97**
541.19	8.09	8.96
541.20	8.03	8.95
541.21	7.97	8.91
541.22	7.89	8.86
541.23	7.80	8.78
541.24	7.65	8.63
541.25	7.39	8.35

Stage-Area-Storage for Reach AP2: Analysis Point 2

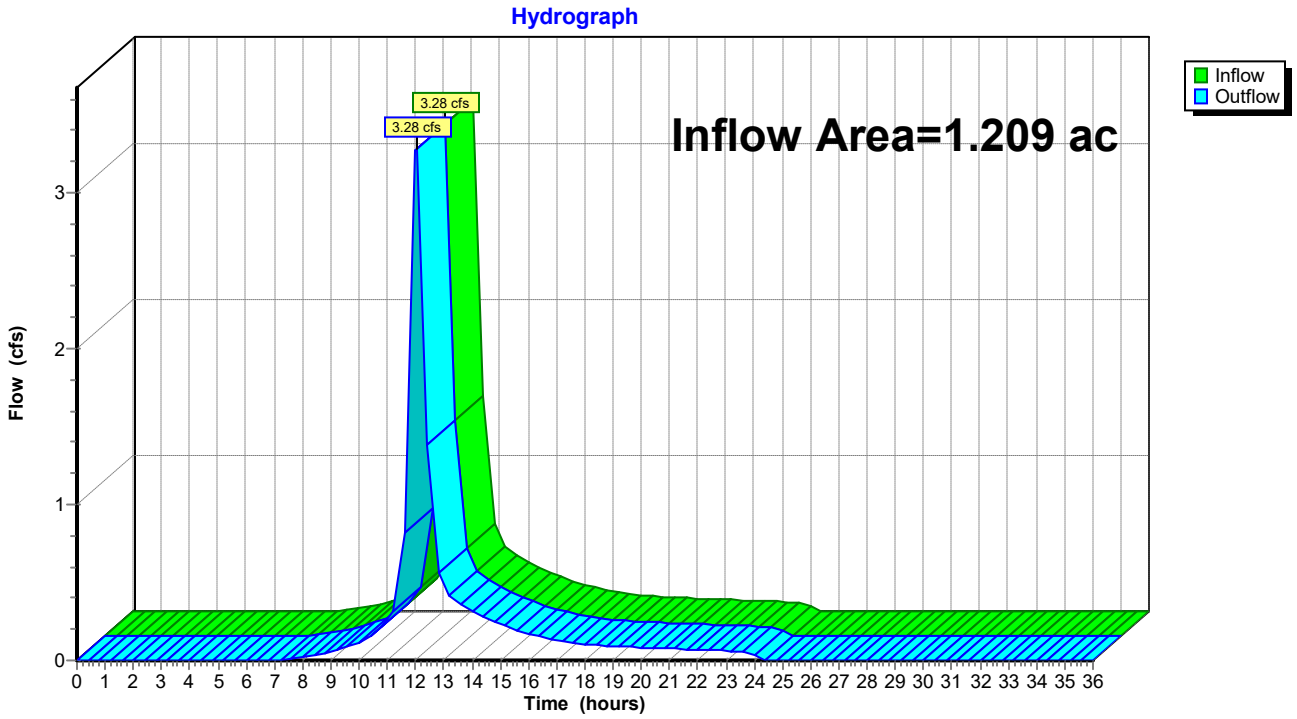
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
540.00	0.0	0
540.02	0.0	0
540.04	0.0	0
540.06	0.0	0
540.08	0.0	0
540.10	0.0	0
540.12	0.0	0
540.14	0.0	0
540.16	0.0	0
540.18	0.0	3
540.20	0.0	9
540.22	0.0	14
540.24	0.1	20
540.26	0.1	26
540.28	0.1	32
540.30	0.1	38
540.32	0.2	44
540.34	0.2	51
540.36	0.2	57
540.38	0.2	64
540.40	0.2	71
540.42	0.3	78
540.44	0.3	85
540.46	0.3	92
540.48	0.3	99
540.50	0.4	106
540.52	0.4	113
540.54	0.4	120
540.56	0.4	128
540.58	0.5	135
540.60	0.5	142
540.62	0.5	149
540.64	0.5	157
540.66	0.6	164
540.68	0.6	171
540.70	0.6	179
540.72	0.6	186
540.74	0.7	193
540.76	0.7	200
540.78	0.7	207
540.80	0.7	215
540.82	0.8	222
540.84	0.8	228
540.86	0.8	235
540.88	0.8	242
540.90	0.8	249
540.92	0.9	255
540.94	0.9	262
540.96	0.9	268
540.98	0.9	274
541.00	1.0	280
541.02	1.0	286
541.04	1.0	291
541.06	1.0	297
541.08	1.0	302
541.10	1.0	307
541.12	1.1	311
541.14	1.1	316
541.16	1.1	320
541.18	1.1	323
541.20	1.1	326
541.22	1.1	329
541.24	**1.1**	**331**

Summary for Reach AP3: Analysis Point 3

Inflow Area = 1.209 ac, 19.07% Impervious, Inflow Depth = 3.63" for 25-yr event
Inflow = 3.28 cfs @ 12.03 hrs, Volume= 0.365 af
Outflow = 3.28 cfs @ 12.03 hrs, Volume= 0.365 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs

Reach AP3: Analysis Point 3



Hydrograph for Reach AP3: Analysis Point 3

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
0.40	0.00		0.00
0.80	0.00		0.00
1.20	0.00		0.00
1.60	0.00		0.00
2.00	0.00		0.00
2.40	0.00		0.00
2.80	0.00		0.00
3.20	0.00		0.00
3.60	0.00		0.00
4.00	0.00		0.00
4.40	0.00		0.00
4.80	0.00		0.00
5.20	0.00		0.00
5.60	0.00		0.00
6.00	0.00		0.00
6.40	0.00		0.00
6.80	0.00		0.00
7.20	0.00		0.00
7.60	0.01		0.01
8.00	0.02		0.02
8.40	0.03		0.03
8.80	0.05		0.05
9.20	0.07		0.07
9.60	0.09		0.09
10.00	0.12		0.12
10.40	0.16		0.16
10.80	0.21		0.21
11.20	0.31		0.31
11.60	0.82		0.82
12.00	**3.27**		**3.27**
12.40	1.38		1.38
12.80	0.57		0.57
13.20	0.42		0.42
13.60	0.36		0.36
14.00	0.31		0.31
14.40	0.28		0.28
14.80	0.25		0.25
15.20	0.22		0.22
15.60	0.19		0.19
16.00	0.17		0.17
16.40	0.15		0.15
16.80	0.14		0.14
17.20	0.13		0.13
17.60	0.12		0.12
18.00	0.10		0.10
18.40	0.10		0.10
18.80	0.09		0.09
19.20	0.09		0.09
19.60	0.09		0.09
20.00	0.08		0.08
20.40	0.08		0.08
20.80	0.08		0.08
21.20	0.08		0.08
21.60	0.07		0.07
22.00	0.07		0.07
22.40	0.07		0.07
22.80	0.06		0.06
23.20	0.06		0.06
23.60	0.06		0.06
24.00	0.03		0.03
24.40	0.00		0.00
24.80	0.00		0.00
25.20	0.00		0.00
25.60	0.00		0.00
26.00	0.00		0.00
26.40	0.00		0.00
26.80	0.00		0.00
27.20	0.00		0.00
27.60	0.00		0.00
28.00	0.00		0.00
28.40	0.00		0.00
28.80	0.00		0.00
29.20	0.00		0.00
29.60	0.00		0.00
30.00	0.00		0.00
30.40	0.00		0.00
30.80	0.00		0.00
31.20	0.00		0.00
31.60	0.00		0.00
32.00	0.00		0.00
32.40	0.00		0.00
32.80	0.00		0.00
33.20	0.00		0.00
33.60	0.00		0.00
34.00	0.00		0.00
34.40	0.00		0.00
34.80	0.00		0.00
35.20	0.00		0.00
35.60	0.00		0.00
36.00	0.00		0.00

Time span=0.00-36.00 hrs, dt=0.40 hrs, 91 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Reach AP1: Analysis Point 1 Inflow=1.81 cfs 0.242 af
Outflow=1.81 cfs 0.242 af

Reach AP2: Analysis Point 2 Avg. Flow Depth=0.57' Max Vel=7.65 fps Inflow=5.14 cfs 0.633 af
15.0" Round Pipe w/ 2.0" inside fill n=0.009 L=293.0' S=0.0102 '/' Capacity=8.35 cfs Outflow=4.94 cfs 0.633 af

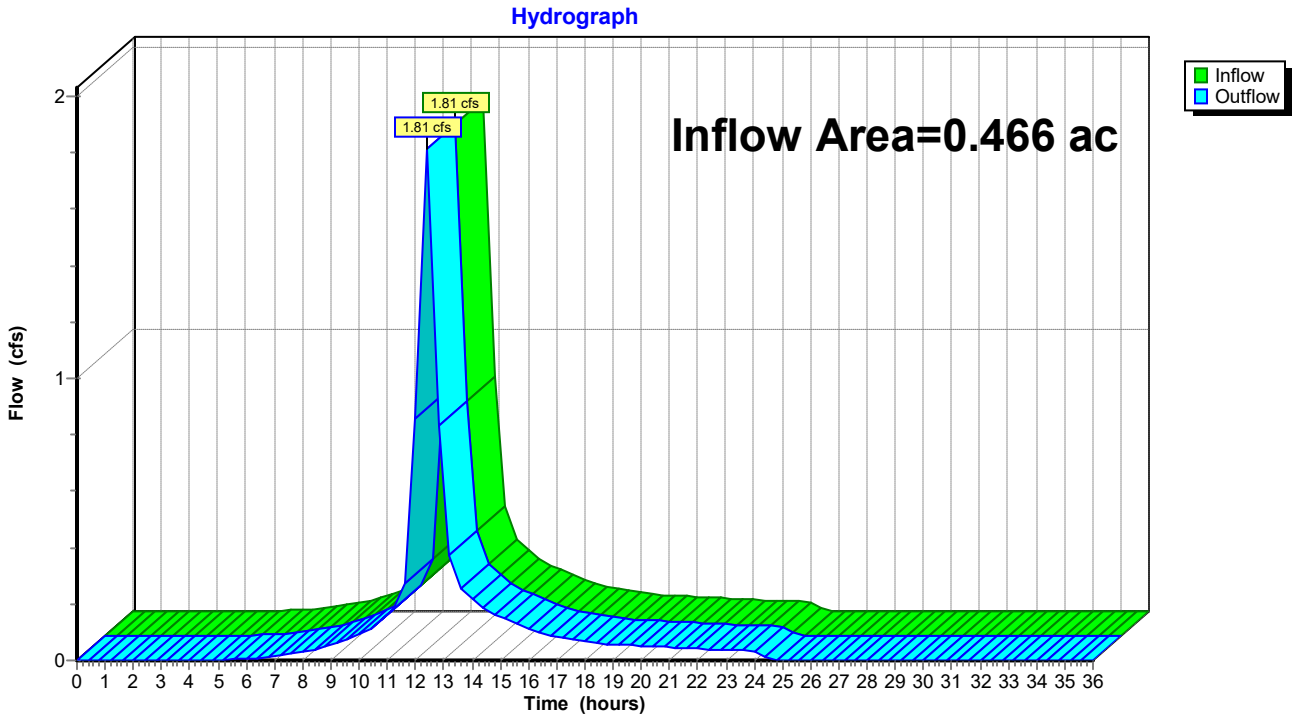
Reach AP3: Analysis Point 3 Inflow=5.26 cfs 0.592 af
Outflow=5.26 cfs 0.592 af

Summary for Reach AP1: Analysis Point 1

Inflow Area = 0.466 ac, 25.29% Impervious, Inflow Depth = 6.23" for 100-yr event
Inflow = 1.81 cfs @ 12.40 hrs, Volume= 0.242 af
Outflow = 1.81 cfs @ 12.40 hrs, Volume= 0.242 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs

Reach AP1: Analysis Point 1



Hydrograph for Reach AP1: Analysis Point 1

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
0.40	0.00		0.00
0.80	0.00		0.00
1.20	0.00		0.00
1.60	0.00		0.00
2.00	0.00		0.00
2.40	0.00		0.00
2.80	0.00		0.00
3.20	0.00		0.00
3.60	0.00		0.00
4.00	0.00		0.00
4.40	0.00		0.00
4.80	0.00		0.00
5.20	0.00		0.00
5.60	0.00		0.00
6.00	0.01		0.01
6.40	0.01		0.01
6.80	0.01		0.01
7.20	0.02		0.02
7.60	0.02		0.02
8.00	0.03		0.03
8.40	0.04		0.04
8.80	0.05		0.05
9.20	0.06		0.06
9.60	0.08		0.08
10.00	0.09		0.09
10.40	0.11		0.11
10.80	0.14		0.14
11.20	0.18		0.18
11.60	0.27		0.27
12.00	0.86		0.86
12.40	**1.81**		**1.81**
12.80	0.83		0.83
13.20	0.37		0.37
13.60	0.26		0.26
14.00	0.21		0.21
14.40	0.18		0.18
14.80	0.16		0.16
15.20	0.15		0.15
15.60	0.13		0.13
16.00	0.11		0.11
16.40	0.10		0.10
16.80	0.09		0.09
17.20	0.08		0.08
17.60	0.07		0.07
18.00	0.07		0.07
18.40	0.06		0.06
18.80	0.06		0.06
19.20	0.06		0.06
19.60	0.05		0.05
20.00	0.05		0.05
20.40	0.05		0.05
20.80	0.05		0.05
21.20	0.05		0.05
21.60	0.04		0.04
22.00	0.04		0.04
22.40	0.04		0.04
22.80	0.04		0.04
23.20	0.04		0.04
23.60	0.04		0.04
24.00	0.03		0.03
24.40	0.01		0.01
24.80	0.00		0.00
25.20	0.00		0.00
25.60	0.00		0.00
26.00	0.00		0.00
26.40	0.00		0.00
26.80	0.00		0.00
27.20	0.00		0.00
27.60	0.00		0.00
28.00	0.00		0.00
28.40	0.00		0.00
28.80	0.00		0.00
29.20	0.00		0.00
29.60	0.00		0.00
30.00	0.00		0.00
30.40	0.00		0.00
30.80	0.00		0.00
31.20	0.00		0.00
31.60	0.00		0.00
32.00	0.00		0.00
32.40	0.00		0.00
32.80	0.00		0.00
33.20	0.00		0.00
33.60	0.00		0.00
34.00	0.00		0.00
34.40	0.00		0.00
34.80	0.00		0.00
35.20	0.00		0.00
35.60	0.00		0.00
36.00	0.00		0.00

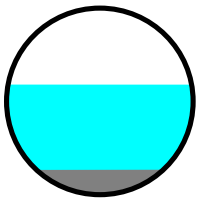
Summary for Reach AP2: Analysis Point 2

Inflow Area = 1.074 ac, 77.50% Impervious, Inflow Depth = 7.08" for 100-yr event
Inflow = 5.14 cfs @ 12.05 hrs, Volume= 0.633 af
Outflow = 4.94 cfs @ 12.07 hrs, Volume= 0.633 af, Atten= 4%, Lag= 1.1 min

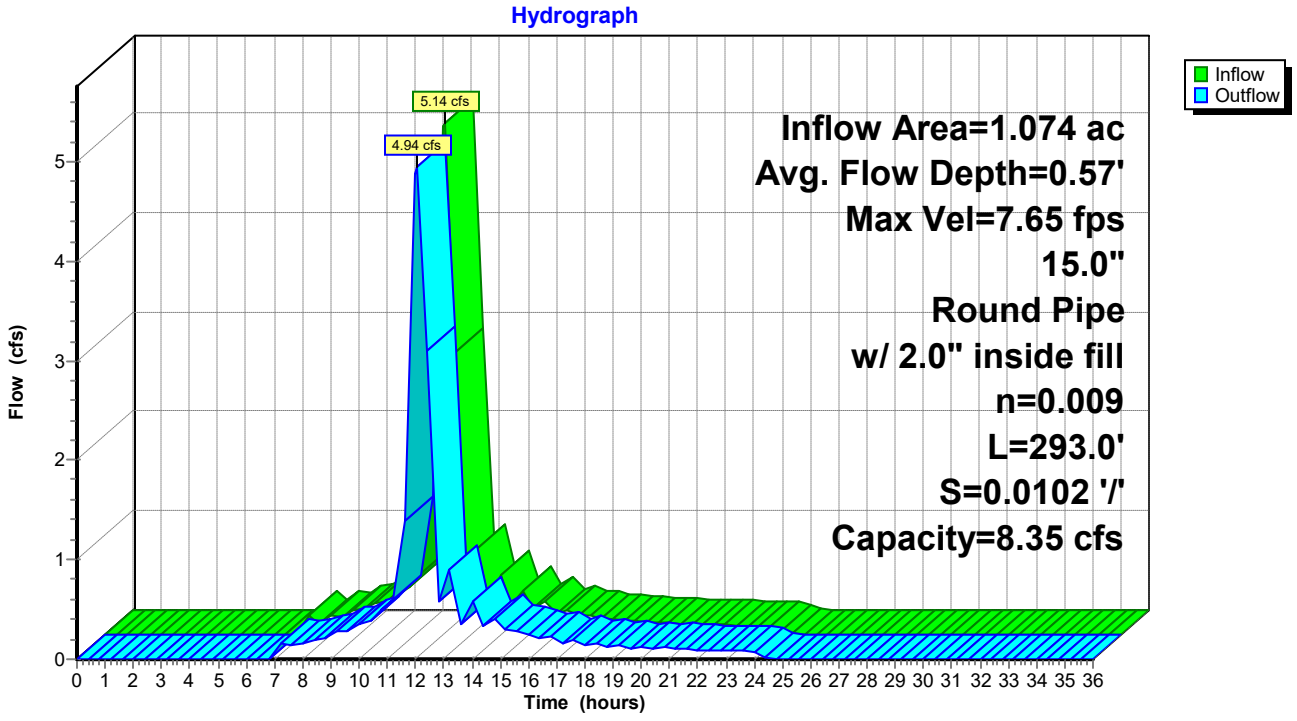
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs
Max. Velocity= 7.65 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 2.76 fps, Avg. Travel Time= 1.8 min

Peak Storage= 193 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.74' above invert (0.57' above fill) , Surface Width= 1.23'
Bank-Full Depth= 1.25' above invert (1.08' above fill) Flow Area= 1.1 sf, Capacity= 8.35 cfs

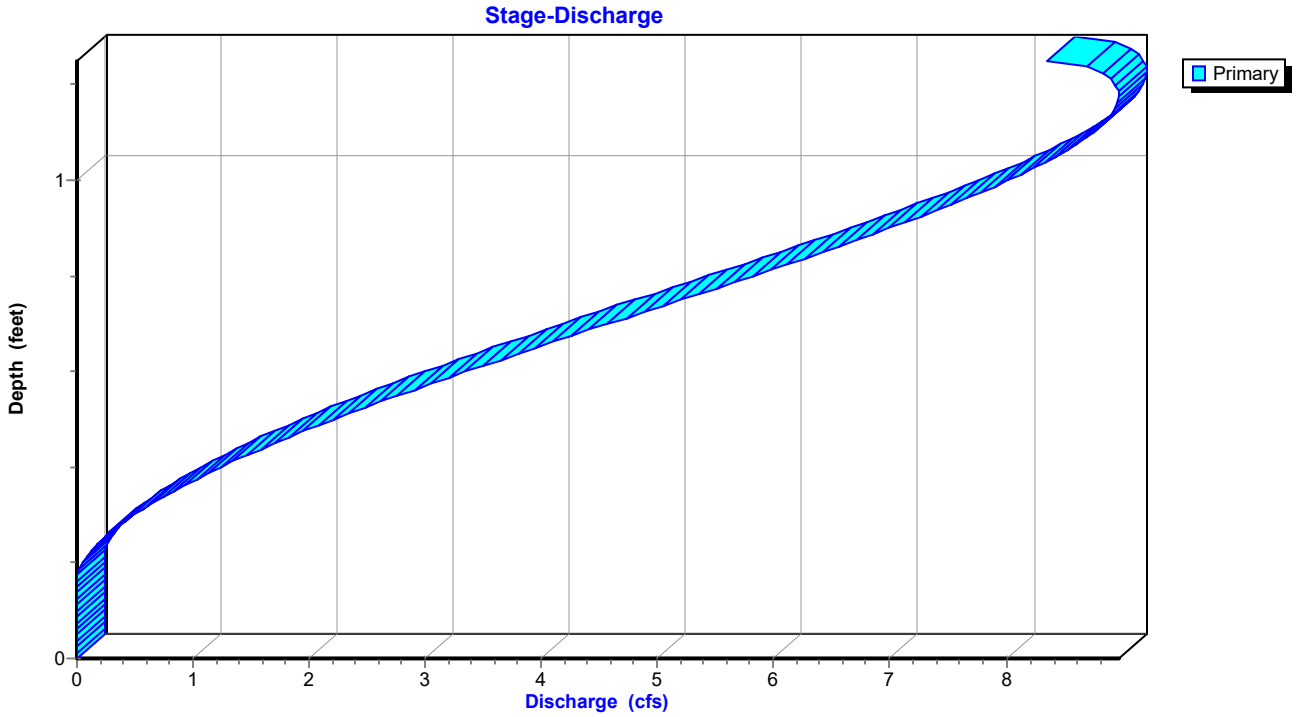
15.0" Round Pipe w/ 2.0" inside fill
n= 0.009 PVC, smooth interior
Length= 293.0' Slope= 0.0102 '/'
Inlet Invert= 540.00', Outlet Invert= 537.00'



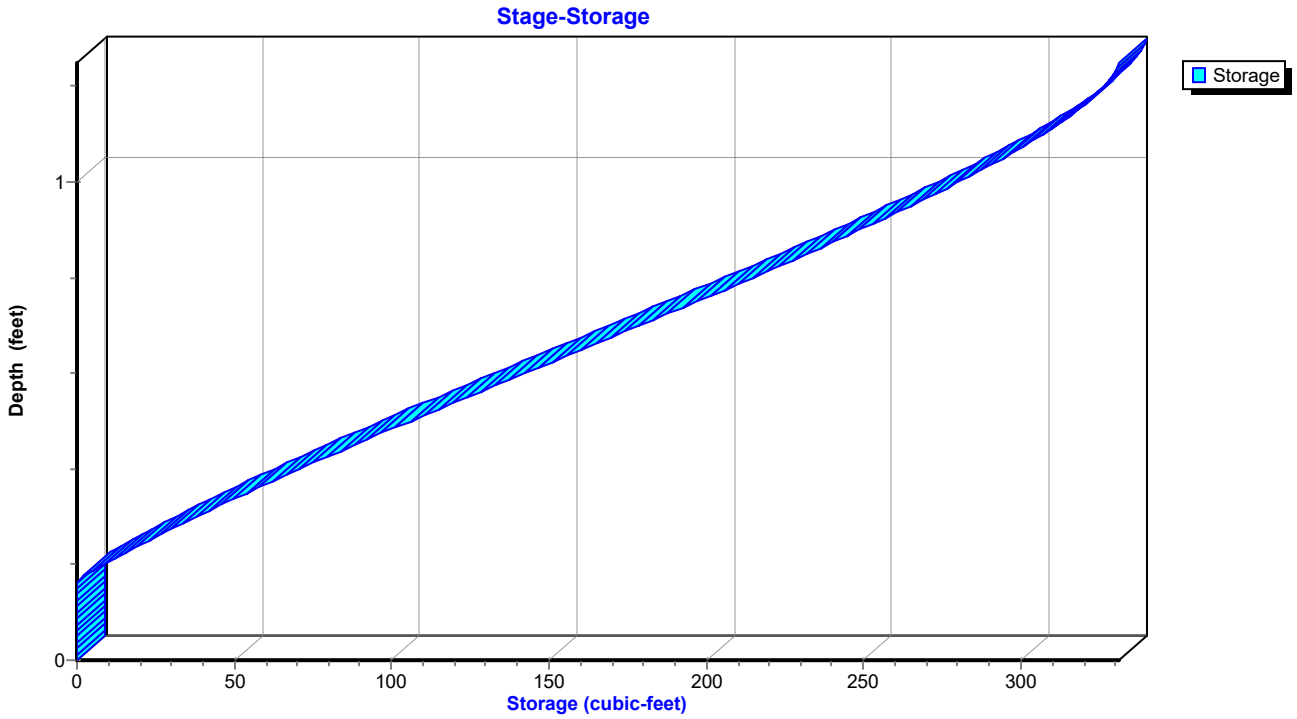
Reach AP2: Analysis Point 2



Reach AP2: Analysis Point 2



Reach AP2: Analysis Point 2



Hydrograph for Reach AP2: Analysis Point 2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0	540.17	0.00
0.80	0.00	0	540.17	0.00
1.60	0.00	0	540.17	0.00
2.40	0.00	0	540.17	0.00
3.20	0.00	0	540.17	0.00
4.00	0.00	0	540.17	0.00
4.80	0.00	0	540.17	0.00
5.60	0.00	0	540.17	0.00
6.40	0.00	0	540.17	0.00
7.20	0.18	18	540.23	0.16
8.00	0.19	18	540.23	0.16
8.80	0.24	22	540.25	0.22
9.60	0.31	27	540.26	0.29
10.40	0.41	32	540.28	0.39
11.20	0.62	43	540.32	0.60
12.00	**5.10**	**190**	**540.73**	**4.87**
12.80	0.58	39	540.30	0.57
13.60	0.36	30	540.27	0.36
14.40	0.30	29	540.27	0.33
15.20	0.26	28	540.27	0.31
16.00	0.21	25	540.26	0.25
16.80	0.19	23	540.25	0.22
17.60	0.16	20	540.24	0.19
18.40	0.14	18	540.23	0.15
19.20	0.13	17	540.23	0.14
20.00	0.12	16	540.23	0.13
20.80	0.11	15	540.22	0.11
21.60	0.10	14	540.22	0.10
22.40	0.09	13	540.22	0.10
23.20	0.09	12	540.21	0.09
24.00	0.06	10	540.20	0.06
24.80	0.00	1	540.17	0.00
25.60	0.00	0	540.17	0.00
26.40	0.00	0	540.17	0.00
27.20	0.00	0	540.17	0.00
28.00	0.00	0	540.17	0.00
28.80	0.00	0	540.17	0.00
29.60	0.00	0	540.17	0.00
30.40	0.00	0	540.17	0.00
31.20	0.00	0	540.17	0.00
32.00	0.00	0	540.17	0.00
32.80	0.00	0	540.17	0.00
33.60	0.00	0	540.17	0.00
34.40	0.00	0	540.17	0.00
35.20	0.00	0	540.17	0.00
36.00	0.00	0	540.17	0.00

Stage-Discharge for Reach AP2: Analysis Point 2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
540.00	0.00	0.00
540.01	0.00	0.00
540.02	0.00	0.00
540.03	0.00	0.00
540.04	0.00	0.00
540.05	0.00	0.00
540.06	0.00	0.00
540.07	0.00	0.00
540.08	0.00	0.00
540.09	0.00	0.00
540.10	0.00	0.00
540.11	0.00	0.00
540.12	0.00	0.00
540.13	0.00	0.00
540.14	0.00	0.00
540.15	0.00	0.00
540.16	0.00	0.00
540.17	0.41	0.00
540.18	0.90	0.01
540.19	1.31	0.03
540.20	1.66	0.05
540.21	1.95	0.08
540.22	2.21	0.11
540.23	2.45	0.14
540.24	2.68	0.18
540.25	2.89	0.22
540.26	3.09	0.27
540.27	3.28	0.32
540.28	3.46	0.37
540.29	3.63	0.43
540.30	3.79	0.49
540.31	3.95	0.55
540.32	4.10	0.62
540.33	4.24	0.69
540.34	4.38	0.76
540.35	4.52	0.83
540.36	4.65	0.91
540.37	4.77	0.99
540.38	4.89	1.07
540.39	5.01	1.15
540.40	5.13	1.24
540.41	5.24	1.33
540.42	5.35	1.42
540.43	5.46	1.51
540.44	5.56	1.60
540.45	5.66	1.70
540.46	5.76	1.80
540.47	5.85	1.90
540.48	5.94	2.00
540.49	6.04	2.11
540.50	6.12	2.21
540.51	6.21	2.32
540.52	6.29	2.43
540.53	6.38	2.54
540.54	6.46	2.65
540.55	6.53	2.76
540.56	6.61	2.88
540.57	6.68	2.99
540.58	6.76	3.11
540.59	6.83	3.23
540.60	6.90	3.35
540.61	6.96	3.47
540.62	7.03	3.59
540.63	7.09	3.71
540.64	7.16	3.83
540.65	7.22	3.95
540.66	7.28	4.07
540.67	7.33	4.20
540.68	7.39	4.32
540.69	7.44	4.45
540.70	7.50	4.57
540.71	7.55	4.70
540.72	7.60	4.82
540.73	7.65	4.95
540.74	7.69	5.07
540.75	7.74	5.20
540.76	7.78	5.32
540.77	7.82	5.45
540.78	7.86	5.57
540.79	7.90	5.69
540.80	7.94	5.82
540.81	7.98	5.94
540.82	8.01	6.06
540.83	8.05	6.18
540.84	8.08	6.30
540.85	8.11	6.42
540.86	8.14	6.54
540.87	8.17	6.65
540.88	8.20	6.77
540.89	8.22	6.88
540.90	8.24	7.00
540.91	8.27	7.11
540.92	8.29	7.22
540.93	8.30	7.32
540.94	8.32	7.43
540.95	8.34	7.53
540.96	8.35	7.63
540.97	8.36	7.73
540.98	8.38	7.83
540.99	8.38	7.92
541.00	8.39	8.02
541.01	8.40	8.10
541.02	8.40	8.19
541.03	8.40	8.27
541.04	**8.40**	8.35
541.05	8.40	8.43
541.06	8.40	8.50
541.07	8.39	8.57
541.08	8.38	8.63
541.09	8.37	8.69
541.10	8.36	8.75
541.11	8.34	8.80
541.12	8.32	8.84
541.13	8.30	8.88
541.14	8.28	8.91
541.15	8.25	8.94
541.16	8.21	8.96
541.17	8.18	8.97
541.18	8.13	**8.97**
541.19	8.09	8.96
541.20	8.03	8.95
541.21	7.97	8.91
541.22	7.89	8.86
541.23	7.80	8.78
541.24	7.65	8.63
541.25	7.39	8.35

Stage-Area-Storage for Reach AP2: Analysis Point 2

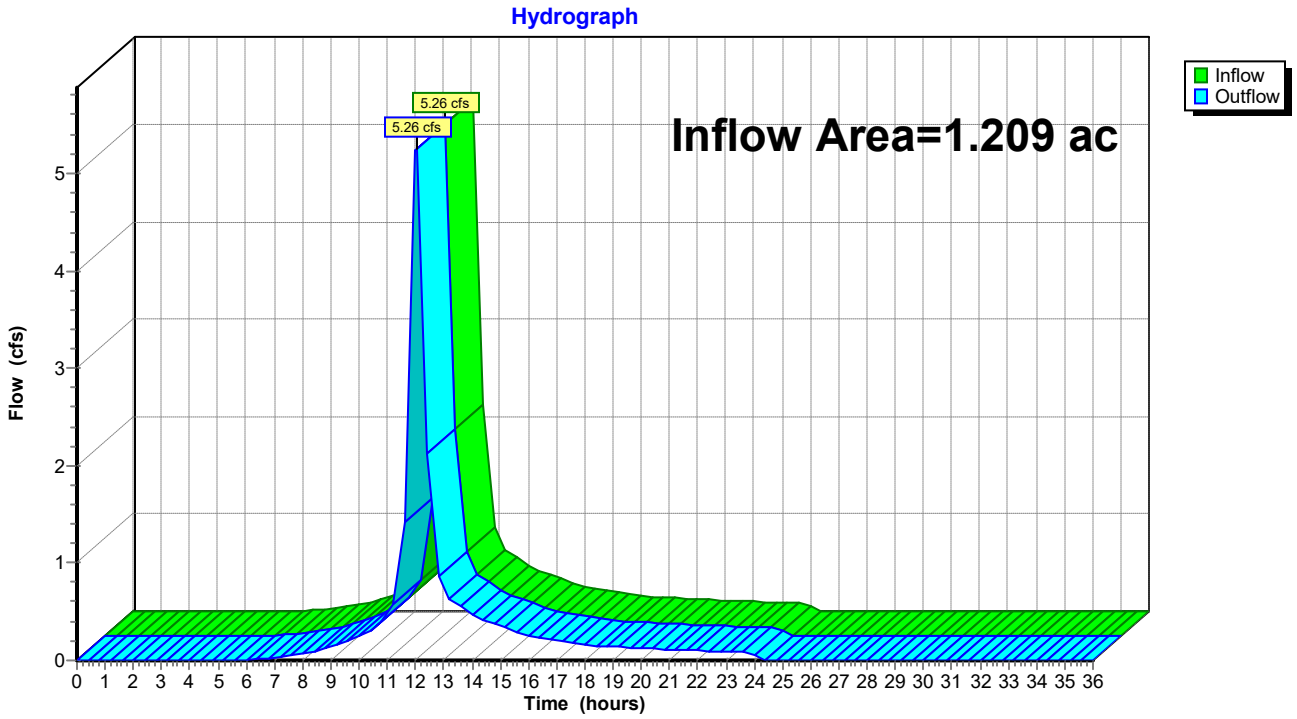
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
540.00	0.0	0
540.02	0.0	0
540.04	0.0	0
540.06	0.0	0
540.08	0.0	0
540.10	0.0	0
540.12	0.0	0
540.14	0.0	0
540.16	0.0	0
540.18	0.0	3
540.20	0.0	9
540.22	0.0	14
540.24	0.1	20
540.26	0.1	26
540.28	0.1	32
540.30	0.1	38
540.32	0.2	44
540.34	0.2	51
540.36	0.2	57
540.38	0.2	64
540.40	0.2	71
540.42	0.3	78
540.44	0.3	85
540.46	0.3	92
540.48	0.3	99
540.50	0.4	106
540.52	0.4	113
540.54	0.4	120
540.56	0.4	128
540.58	0.5	135
540.60	0.5	142
540.62	0.5	149
540.64	0.5	157
540.66	0.6	164
540.68	0.6	171
540.70	0.6	179
540.72	0.6	186
540.74	0.7	193
540.76	0.7	200
540.78	0.7	207
540.80	0.7	215
540.82	0.8	222
540.84	0.8	228
540.86	0.8	235
540.88	0.8	242
540.90	0.8	249
540.92	0.9	255
540.94	0.9	262
540.96	0.9	268
540.98	0.9	274
541.00	1.0	280
541.02	1.0	286
541.04	1.0	291
541.06	1.0	297
541.08	1.0	302
541.10	1.0	307
541.12	1.1	311
541.14	1.1	316
541.16	1.1	320
541.18	1.1	323
541.20	1.1	326
541.22	1.1	329
541.24	**1.1**	**331**

Summary for Reach AP3: Analysis Point 3

Inflow Area = 1.209 ac, 19.07% Impervious, Inflow Depth = 5.87" for 100-yr event
Inflow = 5.26 cfs @ 12.02 hrs, Volume= 0.592 af
Outflow = 5.26 cfs @ 12.02 hrs, Volume= 0.592 af, Atten= 0%, Lag= 0.0 min

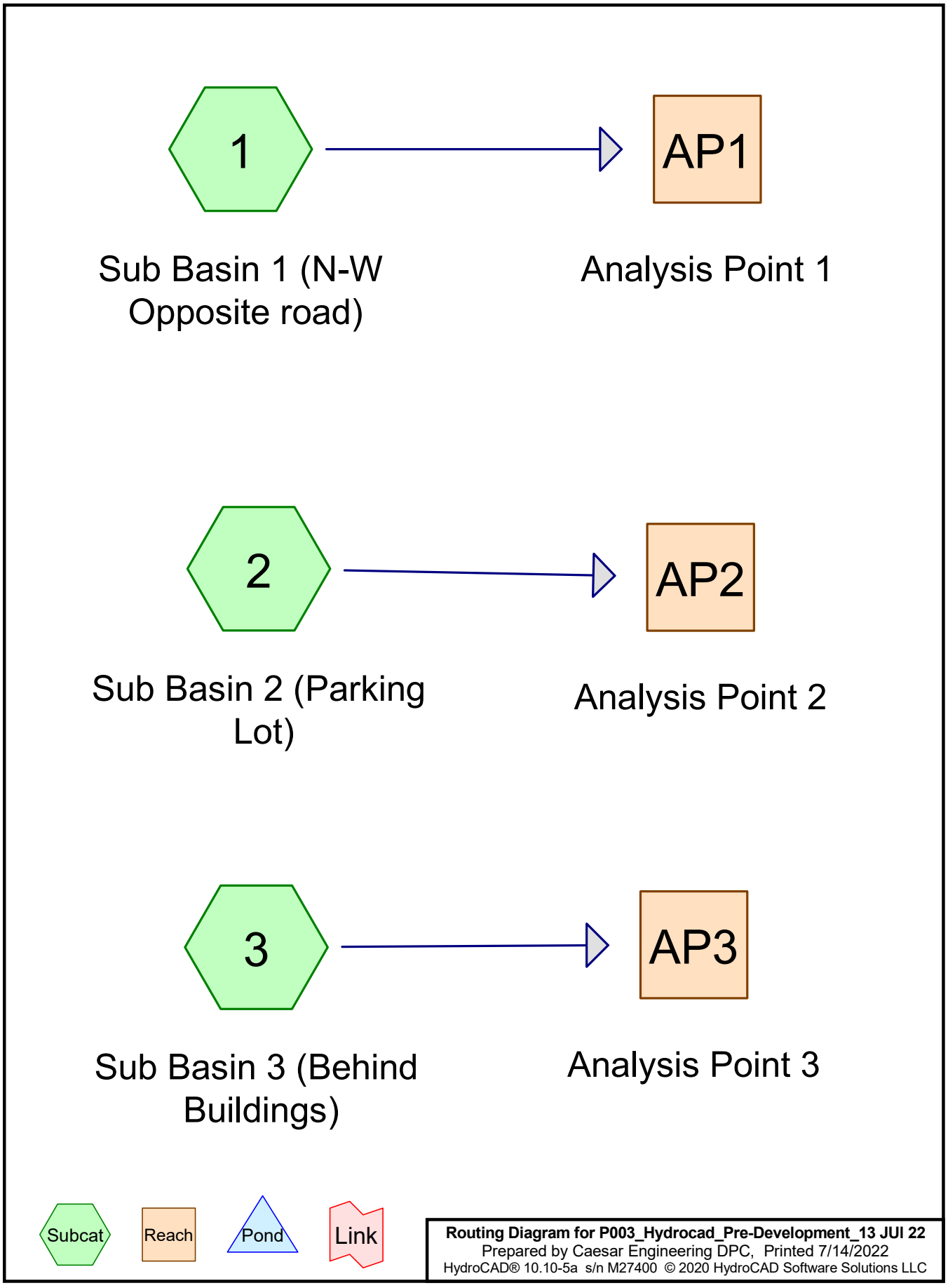
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.40 hrs

Reach AP3: Analysis Point 3



Hydrograph for Reach AP3: Analysis Point 3

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
0.40	0.00		0.00
0.80	0.00		0.00
1.20	0.00		0.00
1.60	0.00		0.00
2.00	0.00		0.00
2.40	0.00		0.00
2.80	0.00		0.00
3.20	0.00		0.00
3.60	0.00		0.00
4.00	0.00		0.00
4.40	0.00		0.00
4.80	0.00		0.00
5.20	0.00		0.00
5.60	0.00		0.00
6.00	0.01		0.01
6.40	0.02		0.02
6.80	0.03		0.03
7.20	0.04		0.04
7.60	0.05		0.05
8.00	0.07		0.07
8.40	0.09		0.09
8.80	0.12		0.12
9.20	0.16		0.16
9.60	0.20		0.20
10.00	0.24		0.24
10.40	0.31		0.31
10.80	0.40		0.40
11.20	0.57		0.57
11.60	1.42		1.42
12.00	**5.25**		**5.25**
12.40	2.13		2.13
12.80	0.86		0.86
13.20	0.64		0.64
13.60	0.55		0.55
14.00	0.47		0.47
14.40	0.42		0.42
14.80	0.38		0.38
15.20	0.33		0.33
15.60	0.29		0.29
16.00	0.25		0.25
16.40	0.23		0.23
16.80	0.21		0.21
17.20	0.19		0.19
17.60	0.17		0.17
18.00	0.15		0.15
18.40	0.15		0.15
18.80	0.14		0.14
19.20	0.14		0.14
19.60	0.13		0.13
20.00	0.12		0.12
20.40	0.12		0.12
20.80	0.12		0.12
21.20	0.11		0.11
21.60	0.11		0.11
22.00	0.10		0.10
22.40	0.10		0.10
22.80	0.09		0.09
23.20	0.09		0.09
23.60	0.09		0.09
24.00	0.05		0.05
24.40	0.00		0.00
24.80	0.00		0.00
25.20	0.00		0.00
25.60	0.00		0.00
26.00	0.00		0.00
26.40	0.00		0.00
26.80	0.00		0.00
27.20	0.00		0.00
27.60	0.00		0.00
28.00	0.00		0.00
28.40	0.00		0.00
28.80	0.00		0.00
29.20	0.00		0.00
29.60	0.00		0.00
30.00	0.00		0.00
30.40	0.00		0.00
30.80	0.00		0.00
31.20	0.00		0.00
31.60	0.00		0.00
32.00	0.00		0.00
32.40	0.00		0.00
32.80	0.00		0.00
33.20	0.00		0.00
33.60	0.00		0.00
34.00	0.00		0.00
34.40	0.00		0.00
34.80	0.00		0.00
35.20	0.00		0.00
35.60	0.00		0.00
36.00	0.00		0.00



Routing Diagram for P003_Hydrocad_Pre-Development_13 JUI 22
Prepared by Caesar Engineering DPC, Printed 7/14/2022
HydroCAD® 10.10-5a s/n M27400 © 2020 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-yr	Type III 24-hr		Default	24.00	1	2.65	2
2	2-yr	Type III 24-hr		Default	24.00	1	3.19	2
3	10-yr	Type III 24-hr		Default	24.00	1	4.74	2
4	25-yr	Type III 24-hr		Default	24.00	1	5.94	2
5	100-yr	Type III 24-hr		Default	24.00	1	8.39	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.290	74	>75% Grass cover, Good, HSG C (2, 3)
0.049	73	Brush, Good, HSG D (1)
0.675	98	Paved parking, HSG B (1, 2, 3)
0.274	98	Roofs, HSG B (2, 3)
0.299	77	Woods, Good, HSG D (1)
0.075	82	Woods/grass comb., Fair, HSG D (2)
2.661	**83**	**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	1.290	0.000	0.000	1.290	>75% Grass cover, Good	2, 3
0.000	0.000	0.000	0.049	0.000	0.049	Brush, Good	1
0.000	0.675	0.000	0.000	0.000	0.675	Paved parking	1, 2, 3
0.000	0.274	0.000	0.000	0.000	0.274	Roofs	2, 3
0.000	0.000	0.000	0.299	0.000	0.299	Woods, Good	1
0.000	0.000	0.000	0.075	0.000	0.075	Woods/grass comb., Fair	2
0.000	**0.949**	**1.290**	**0.423**	**0.000**	**2.661**	**TOTAL AREA**	

Time span=1.00-36.00 hrs, dt=0.05 hrs, 701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Reach AP1: Analysis Point 1 Inflow=0.36 cfs 0.043 af
Outflow=0.36 cfs 0.043 af

Reach AP2: Analysis Point 2 Avg. Flow Depth=0.53' Max Vel=4.06 fps Inflow=2.00 cfs 0.130 af
15.0" Round Pipe n=0.025 L=78.0' S=0.0256 '/' Capacity=5.38 cfs Outflow=1.98 cfs 0.130 af

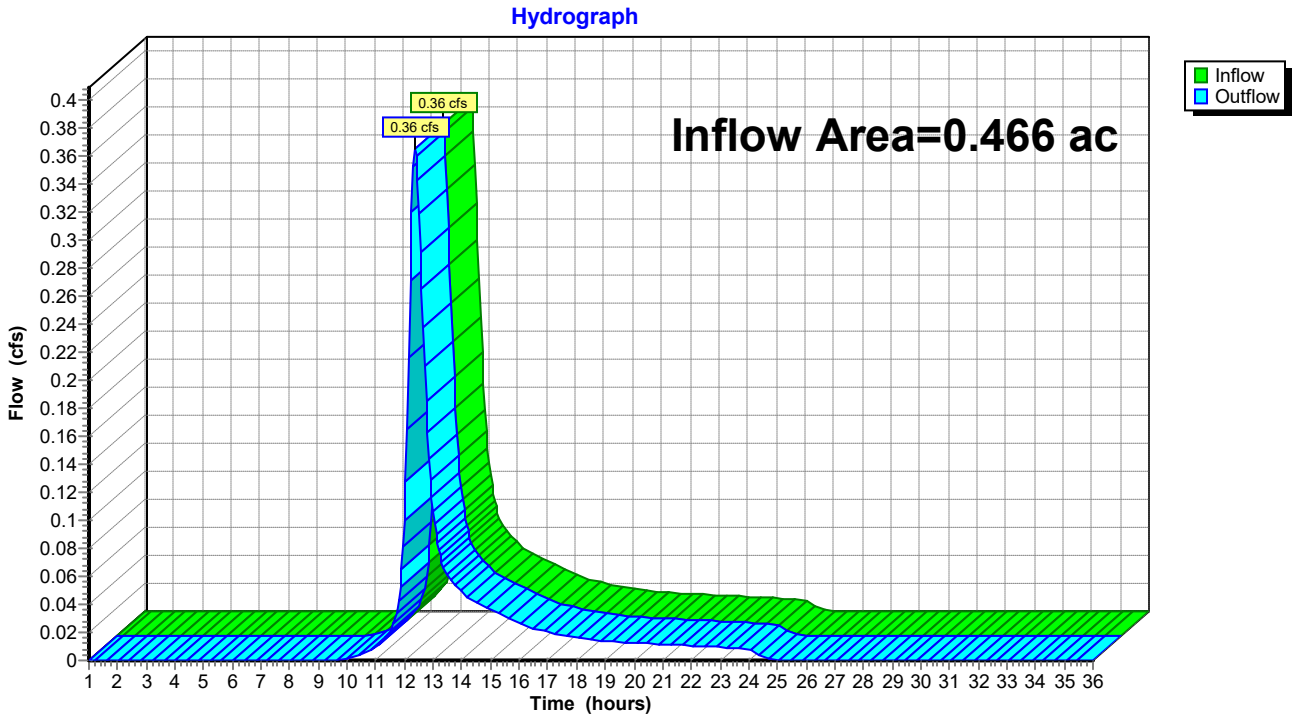
Reach AP3: Analysis Point 3 Inflow=1.01 cfs 0.095 af
Outflow=1.01 cfs 0.095 af

Summary for Reach AP1: Analysis Point 1

Inflow Area = 0.466 ac, 25.29% Impervious, Inflow Depth = 1.11" for 1-yr event
Inflow = 0.36 cfs @ 12.36 hrs, Volume= 0.043 af
Outflow = 0.36 cfs @ 12.36 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Reach AP1: Analysis Point 1



Hydrograph for Reach AP1: Analysis Point 1

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
1.00	0.00		0.00
1.50	0.00		0.00
2.00	0.00		0.00
2.50	0.00		0.00
3.00	0.00		0.00
3.50	0.00		0.00
4.00	0.00		0.00
4.50	0.00		0.00
5.00	0.00		0.00
5.50	0.00		0.00
6.00	0.00		0.00
6.50	0.00		0.00
7.00	0.00		0.00
7.50	0.00		0.00
8.00	0.00		0.00
8.50	0.00		0.00
9.00	0.00		0.00
9.50	0.00		0.00
10.00	0.00		0.00
10.50	0.00		0.00
11.00	0.01		0.01
11.50	0.02		0.02
12.00	**0.10**		**0.10**
12.50	**0.32**		**0.32**
13.00	0.11		0.11
13.50	0.06		0.06
14.00	0.05		0.05
14.50	0.04		0.04
15.00	0.04		0.04
15.50	0.03		0.03
16.00	0.03		0.03
16.50	0.02		0.02
17.00	0.02		0.02
17.50	0.02		0.02
18.00	0.02		0.02
18.50	0.01		0.01
19.00	0.01		0.01
19.50	0.01		0.01
20.00	0.01		0.01
20.50	0.01		0.01
21.00	0.01		0.01
21.50	0.01		0.01
22.00	0.01		0.01
22.50	0.01		0.01
23.00	0.01		0.01
23.50	0.01		0.01
24.00	0.01		0.01
24.50	0.00		0.00
25.00	0.00		0.00
25.50	0.00		0.00
26.00	0.00		0.00
26.50	0.00		0.00
27.00	0.00		0.00
27.50	0.00		0.00
28.00	0.00		0.00
28.50	0.00		0.00
29.00	0.00		0.00
29.50	0.00		0.00
30.00	0.00		0.00
30.50	0.00		0.00
31.00	0.00		0.00
31.50	0.00		0.00
32.00	0.00		0.00
32.50	0.00		0.00
33.00	0.00		0.00
33.50	0.00		0.00
34.00	0.00		0.00
34.50	0.00		0.00
35.00	0.00		0.00
35.50	0.00		0.00
36.00	0.00		0.00

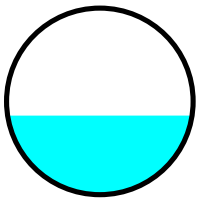
Summary for Reach AP2: Analysis Point 2

Inflow Area = 0.986 ac, 60.85% Impervious, Inflow Depth = 1.59" for 1-yr event
Inflow = 2.00 cfs @ 12.03 hrs, Volume= 0.130 af
Outflow = 1.98 cfs @ 12.04 hrs, Volume= 0.130 af, Atten= 1%, Lag= 0.5 min

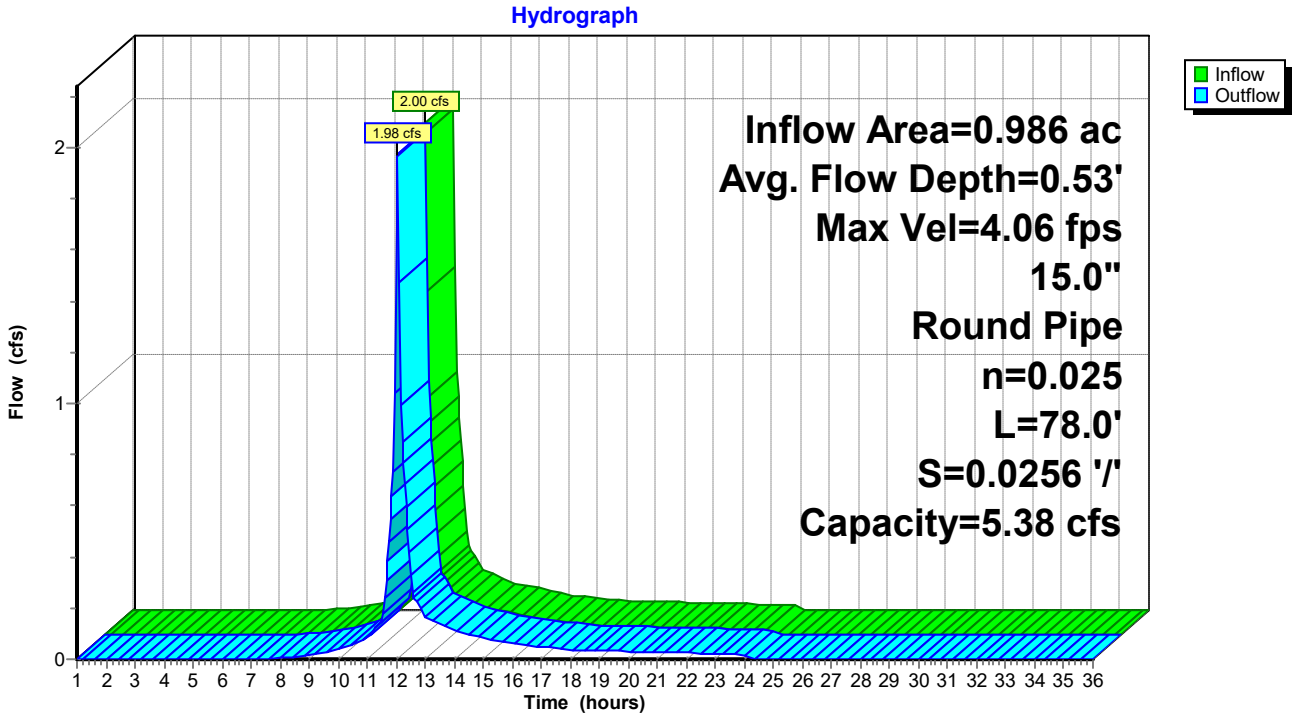
Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.06 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.39 fps, Avg. Travel Time= 0.9 min

Peak Storage= 39 cf @ 12.04 hrs
Average Depth at Peak Storage= 0.53' , Surface Width= 1.24'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 5.38 cfs

15.0" Round Pipe
n= 0.025 Earth, grassed & winding
Length= 78.0' Slope= 0.0256 '/'
Inlet Invert= 556.00', Outlet Invert= 554.00'



Reach AP2: Analysis Point 2



Hydrograph for Reach AP2: Analysis Point 2

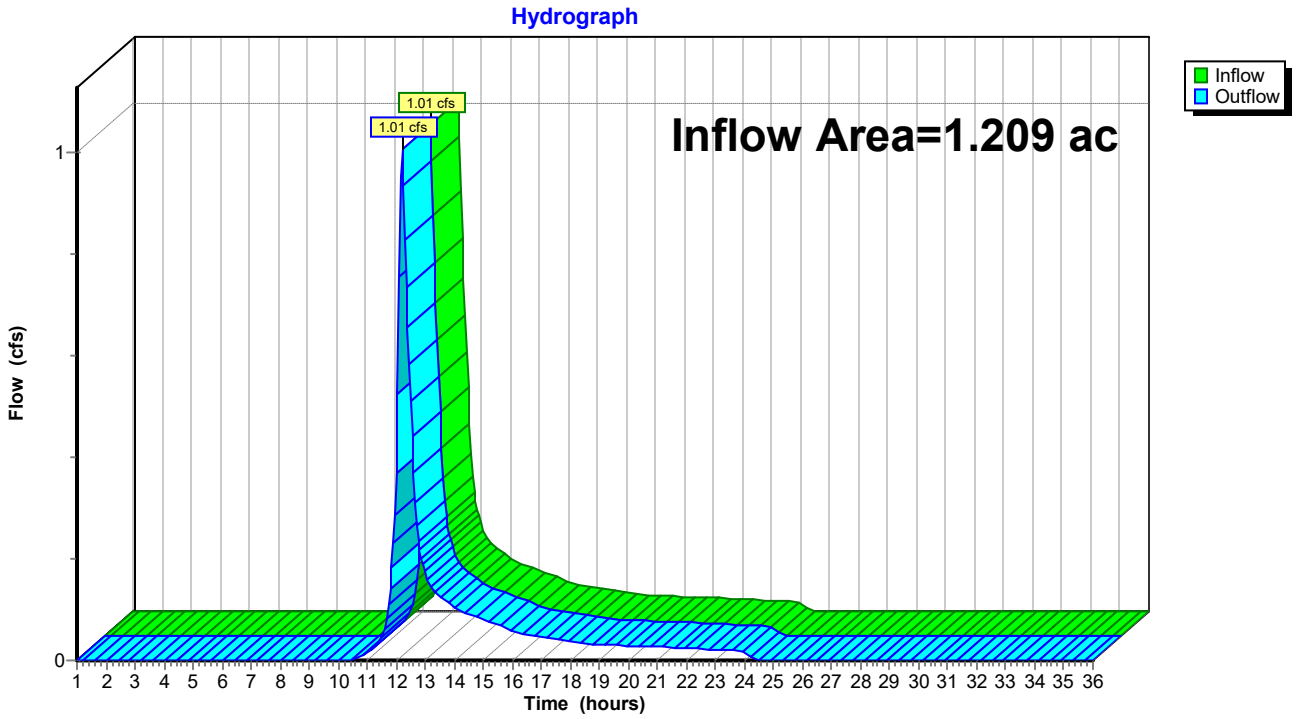
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
1.00	0.00	0	556.00	0.00
2.00	0.00	0	556.00	0.00
3.00	0.00	0	556.00	0.00
4.00	0.00	0	556.00	0.00
5.00	0.00	0	556.00	0.00
6.00	0.00	0	556.00	0.00
7.00	0.00	0	556.00	0.00
8.00	0.01	1	556.03	0.01
9.00	0.02	1	556.05	0.02
10.00	0.04	2	556.08	0.04
11.00	0.08	4	556.11	0.08
12.00	**1.83**	**35**	**556.49**	**1.69**
13.00	**0.16**	**7**	**556.15**	**0.17**
14.00	0.11	5	556.12	0.11
15.00	0.09	4	556.11	0.09
16.00	0.06	3	556.09	0.06
17.00	0.05	3	556.08	0.05
18.00	0.04	2	556.07	0.04
19.00	0.03	2	556.07	0.03
20.00	0.03	2	556.07	0.03
21.00	0.03	2	556.06	0.03
22.00	0.03	2	556.06	0.03
23.00	0.02	2	556.06	0.02
24.00	0.02	1	556.05	0.02
25.00	0.00	0	556.00	0.00
26.00	0.00	0	556.00	0.00
27.00	0.00	0	556.00	0.00
28.00	0.00	0	556.00	0.00
29.00	0.00	0	556.00	0.00
30.00	0.00	0	556.00	0.00
31.00	0.00	0	556.00	0.00
32.00	0.00	0	556.00	0.00
33.00	0.00	0	556.00	0.00
34.00	0.00	0	556.00	0.00
35.00	0.00	0	556.00	0.00
36.00	0.00	0	556.00	0.00

Summary for Reach AP3: Analysis Point 3

Inflow Area = 1.209 ac, 19.07% Impervious, Inflow Depth = 0.94" for 1-yr event
Inflow = 1.01 cfs @ 12.20 hrs, Volume= 0.095 af
Outflow = 1.01 cfs @ 12.20 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Reach AP3: Analysis Point 3



Hydrograph for Reach AP3: Analysis Point 3

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
1.00	0.00		0.00
1.50	0.00		0.00
2.00	0.00		0.00
2.50	0.00		0.00
3.00	0.00		0.00
3.50	0.00		0.00
4.00	0.00		0.00
4.50	0.00		0.00
5.00	0.00		0.00
5.50	0.00		0.00
6.00	0.00		0.00
6.50	0.00		0.00
7.00	0.00		0.00
7.50	0.00		0.00
8.00	0.00		0.00
8.50	0.00		0.00
9.00	0.00		0.00
9.50	0.00		0.00
10.00	0.00		0.00
10.50	0.00		0.00
11.00	0.01		0.01
11.50	0.04		0.04
12.00	**0.37**		**0.37**
12.50	**0.51**		**0.51**
13.00	0.17		0.17
13.50	0.13		0.13
14.00	0.11		0.11
14.50	0.09		0.09
15.00	0.08		0.08
15.50	0.07		0.07
16.00	0.06		0.06
16.50	0.05		0.05
17.00	0.05		0.05
17.50	0.04		0.04
18.00	0.04		0.04
18.50	0.03		0.03
19.00	0.03		0.03
19.50	0.03		0.03
20.00	0.03		0.03
20.50	0.03		0.03
21.00	0.03		0.03
21.50	0.03		0.03
22.00	0.02		0.02
22.50	0.02		0.02
23.00	0.02		0.02
23.50	0.02		0.02
24.00	0.02		0.02
24.50	0.00		0.00
25.00	0.00		0.00
25.50	0.00		0.00
26.00	0.00		0.00
26.50	0.00		0.00
27.00	0.00		0.00
27.50	0.00		0.00
28.00	0.00		0.00
28.50	0.00		0.00
29.00	0.00		0.00
29.50	0.00		0.00
30.00	0.00		0.00
30.50	0.00		0.00
31.00	0.00		0.00
31.50	0.00		0.00
32.00	0.00		0.00
32.50	0.00		0.00
33.00	0.00		0.00
33.50	0.00		0.00
34.00	0.00		0.00
34.50	0.00		0.00
35.00	0.00		0.00
35.50	0.00		0.00
36.00	0.00		0.00

Time span=1.00-36.00 hrs, dt=0.05 hrs, 701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Reach AP1: Analysis Point 1 Inflow=0.51 cfs 0.059 af
Outflow=0.51 cfs 0.059 af

Reach AP2: Analysis Point 2 Avg. Flow Depth=0.61' Max Vel=4.34 fps Inflow=2.60 cfs 0.170 af
15.0" Round Pipe n=0.025 L=78.0' S=0.0256 '/' Capacity=5.38 cfs Outflow=2.57 cfs 0.170 af

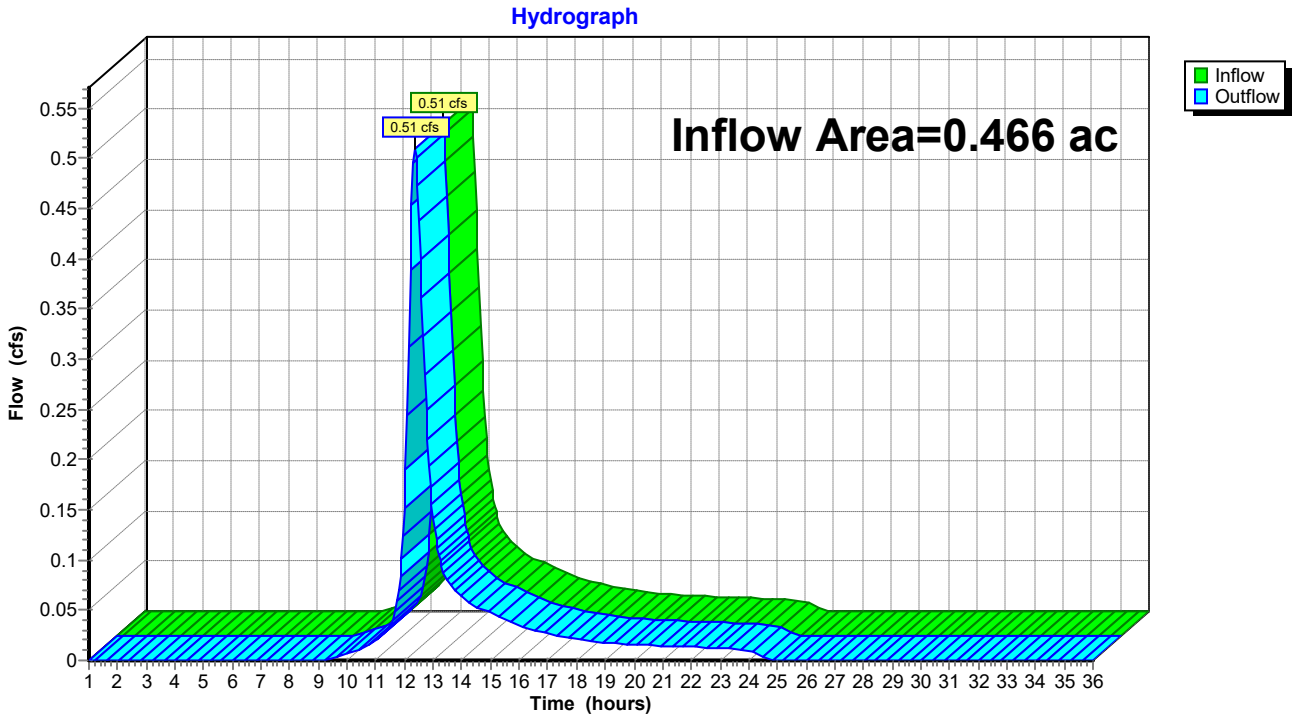
Reach AP3: Analysis Point 3 Inflow=1.46 cfs 0.134 af
Outflow=1.46 cfs 0.134 af

Summary for Reach AP1: Analysis Point 1

Inflow Area = 0.466 ac, 25.29% Impervious, Inflow Depth = 1.53" for 2-yr event
Inflow = 0.51 cfs @ 12.36 hrs, Volume= 0.059 af
Outflow = 0.51 cfs @ 12.36 hrs, Volume= 0.059 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Reach AP1: Analysis Point 1



Hydrograph for Reach AP1: Analysis Point 1

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
1.00	0.00		0.00
1.50	0.00		0.00
2.00	0.00		0.00
2.50	0.00		0.00
3.00	0.00		0.00
3.50	0.00		0.00
4.00	0.00		0.00
4.50	0.00		0.00
5.00	0.00		0.00
5.50	0.00		0.00
6.00	0.00		0.00
6.50	0.00		0.00
7.00	0.00		0.00
7.50	0.00		0.00
8.00	0.00		0.00
8.50	0.00		0.00
9.00	0.00		0.00
9.50	0.00		0.00
10.00	0.01		0.01
10.50	0.01		0.01
11.00	0.02		0.02
11.50	0.04		0.04
12.00	**0.15**		**0.15**
12.50	**0.44**		**0.44**
13.00	0.14		0.14
13.50	0.08		0.08
14.00	0.06		0.06
14.50	0.05		0.05
15.00	0.05		0.05
15.50	0.04		0.04
16.00	0.03		0.03
16.50	0.03		0.03
17.00	0.03		0.03
17.50	0.02		0.02
18.00	0.02		0.02
18.50	0.02		0.02
19.00	0.02		0.02
19.50	0.02		0.02
20.00	0.02		0.02
20.50	0.02		0.02
21.00	0.01		0.01
21.50	0.01		0.01
22.00	0.01		0.01
22.50	0.01		0.01
23.00	0.01		0.01
23.50	0.01		0.01
24.00	0.01		0.01
24.50	0.00		0.00
25.00	0.00		0.00
25.50	0.00		0.00
26.00	0.00		0.00
26.50	0.00		0.00
27.00	0.00		0.00
27.50	0.00		0.00
28.00	0.00		0.00
28.50	0.00		0.00
29.00	0.00		0.00
29.50	0.00		0.00
30.00	0.00		0.00
30.50	0.00		0.00
31.00	0.00		0.00
31.50	0.00		0.00
32.00	0.00		0.00
32.50	0.00		0.00
33.00	0.00		0.00
33.50	0.00		0.00
34.00	0.00		0.00
34.50	0.00		0.00
35.00	0.00		0.00
35.50	0.00		0.00
36.00	0.00		0.00

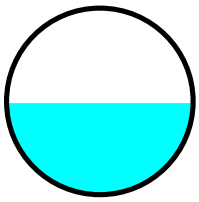
Summary for Reach AP2: Analysis Point 2

Inflow Area = 0.986 ac, 60.85% Impervious, Inflow Depth = 2.07" for 2-yr event
Inflow = 2.60 cfs @ 12.03 hrs, Volume= 0.170 af
Outflow = 2.57 cfs @ 12.04 hrs, Volume= 0.170 af, Atten= 1%, Lag= 0.5 min

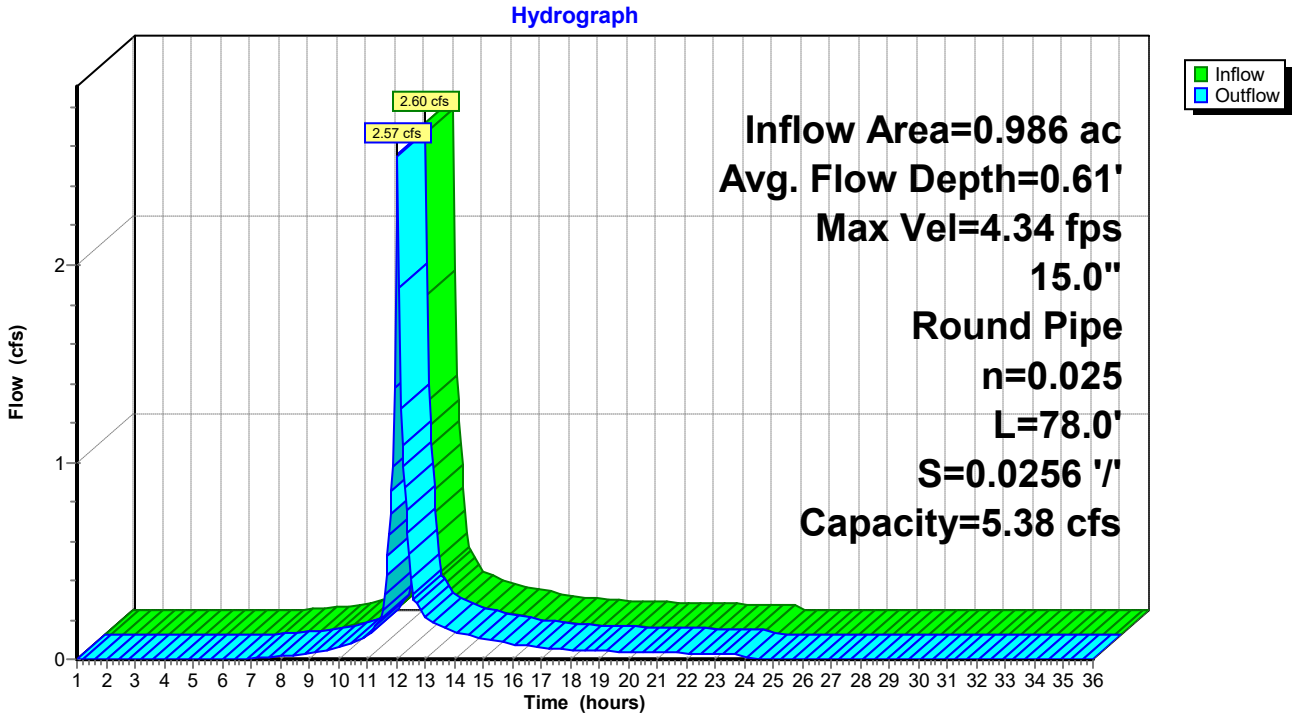
Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.34 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.47 fps, Avg. Travel Time= 0.9 min

Peak Storage= 47 cf @ 12.04 hrs
Average Depth at Peak Storage= 0.61' , Surface Width= 1.25'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 5.38 cfs

15.0" Round Pipe
n= 0.025 Earth, grassed & winding
Length= 78.0' Slope= 0.0256 '/'
Inlet Invert= 556.00', Outlet Invert= 554.00'



Reach AP2: Analysis Point 2



Hydrograph for Reach AP2: Analysis Point 2

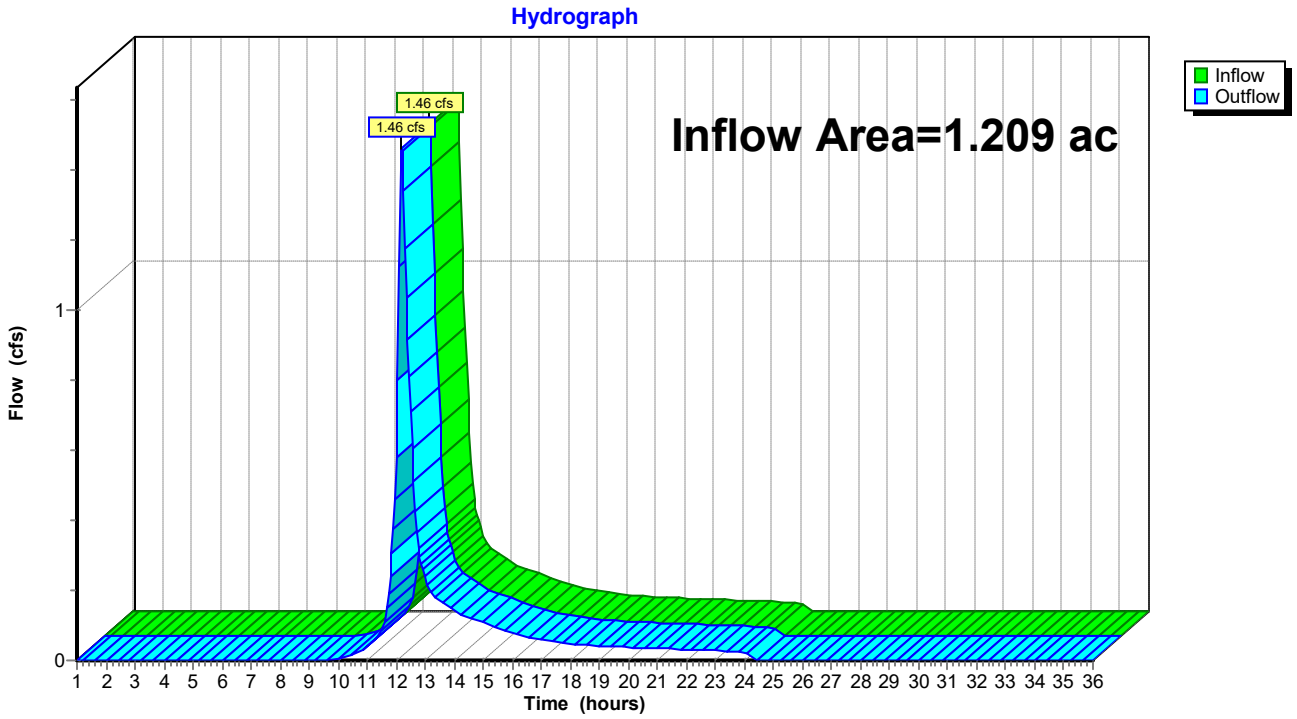
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
1.00	0.00	0	556.00	0.00
2.00	0.00	0	556.00	0.00
3.00	0.00	0	556.00	0.00
4.00	0.00	0	556.00	0.00
5.00	0.00	0	556.00	0.00
6.00	0.00	0	556.00	0.00
7.00	0.00	0	556.03	0.00
8.00	0.01	1	556.05	0.01
9.00	0.03	2	556.07	0.03
10.00	0.06	3	556.09	0.06
11.00	0.12	5	556.13	0.12
12.00	**2.39**	**43**	**556.57**	**2.22**
13.00	**0.21**	**8**	**556.17**	**0.21**
14.00	0.14	6	556.14	0.14
15.00	0.11	5	556.12	0.11
16.00	0.07	4	556.10	0.08
17.00	0.06	3	556.09	0.06
18.00	0.05	3	556.08	0.05
19.00	0.04	2	556.08	0.04
20.00	0.04	2	556.07	0.04
21.00	0.03	2	556.07	0.03
22.00	0.03	2	556.07	0.03
23.00	0.03	2	556.06	0.03
24.00	0.02	2	556.06	0.02
25.00	0.00	0	556.00	0.00
26.00	0.00	0	556.00	0.00
27.00	0.00	0	556.00	0.00
28.00	0.00	0	556.00	0.00
29.00	0.00	0	556.00	0.00
30.00	0.00	0	556.00	0.00
31.00	0.00	0	556.00	0.00
32.00	0.00	0	556.00	0.00
33.00	0.00	0	556.00	0.00
34.00	0.00	0	556.00	0.00
35.00	0.00	0	556.00	0.00
36.00	0.00	0	556.00	0.00

Summary for Reach AP3: Analysis Point 3

Inflow Area = 1.209 ac, 19.07% Impervious, Inflow Depth = 1.33" for 2-yr event
Inflow = 1.46 cfs @ 12.19 hrs, Volume= 0.134 af
Outflow = 1.46 cfs @ 12.19 hrs, Volume= 0.134 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Reach AP3: Analysis Point 3



Hydrograph for Reach AP3: Analysis Point 3

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
1.00	0.00		0.00
1.50	0.00		0.00
2.00	0.00		0.00
2.50	0.00		0.00
3.00	0.00		0.00
3.50	0.00		0.00
4.00	0.00		0.00
4.50	0.00		0.00
5.00	0.00		0.00
5.50	0.00		0.00
6.00	0.00		0.00
6.50	0.00		0.00
7.00	0.00		0.00
7.50	0.00		0.00
8.00	0.00		0.00
8.50	0.00		0.00
9.00	0.00		0.00
9.50	0.00		0.00
10.00	0.01		0.01
10.50	0.02		0.02
11.00	0.04		0.04
11.50	0.09		0.09
12.00	**0.58**		**0.58**
12.50	**0.71**		**0.71**
13.00	0.23		0.23
13.50	0.17		0.17
14.00	0.14		0.14
14.50	0.12		0.12
15.00	0.11		0.11
15.50	0.09		0.09
16.00	0.08		0.08
16.50	0.07		0.07
17.00	0.06		0.06
17.50	0.05		0.05
18.00	0.05		0.05
18.50	0.04		0.04
19.00	0.04		0.04
19.50	0.04		0.04
20.00	0.04		0.04
20.50	0.04		0.04
21.00	0.03		0.03
21.50	0.03		0.03
22.00	0.03		0.03
22.50	0.03		0.03
23.00	0.03		0.03
23.50	0.03		0.03
24.00	0.03		0.03
24.50	0.00		0.00
25.00	0.00		0.00
25.50	0.00		0.00
26.00	0.00		0.00
26.50	0.00		0.00
27.00	0.00		0.00
27.50	0.00		0.00
28.00	0.00		0.00
28.50	0.00		0.00
29.00	0.00		0.00
29.50	0.00		0.00
30.00	0.00		0.00
30.50	0.00		0.00
31.00	0.00		0.00
31.50	0.00		0.00
32.00	0.00		0.00
32.50	0.00		0.00
33.00	0.00		0.00
33.50	0.00		0.00
34.00	0.00		0.00
34.50	0.00		0.00
35.00	0.00		0.00
35.50	0.00		0.00
36.00	0.00		0.00

Time span=1.00-36.00 hrs, dt=0.05 hrs, 701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Reach AP1: Analysis Point 1 Inflow=0.95 cfs 0.111 af
Outflow=0.95 cfs 0.111 af

Reach AP2: Analysis Point 2 Avg. Flow Depth=0.85' Max Vel=4.86 fps Inflow=4.32 cfs 0.290 af
15.0" Round Pipe n=0.025 L=78.0' S=0.0256 '/' Capacity=5.38 cfs Outflow=4.27 cfs 0.290 af

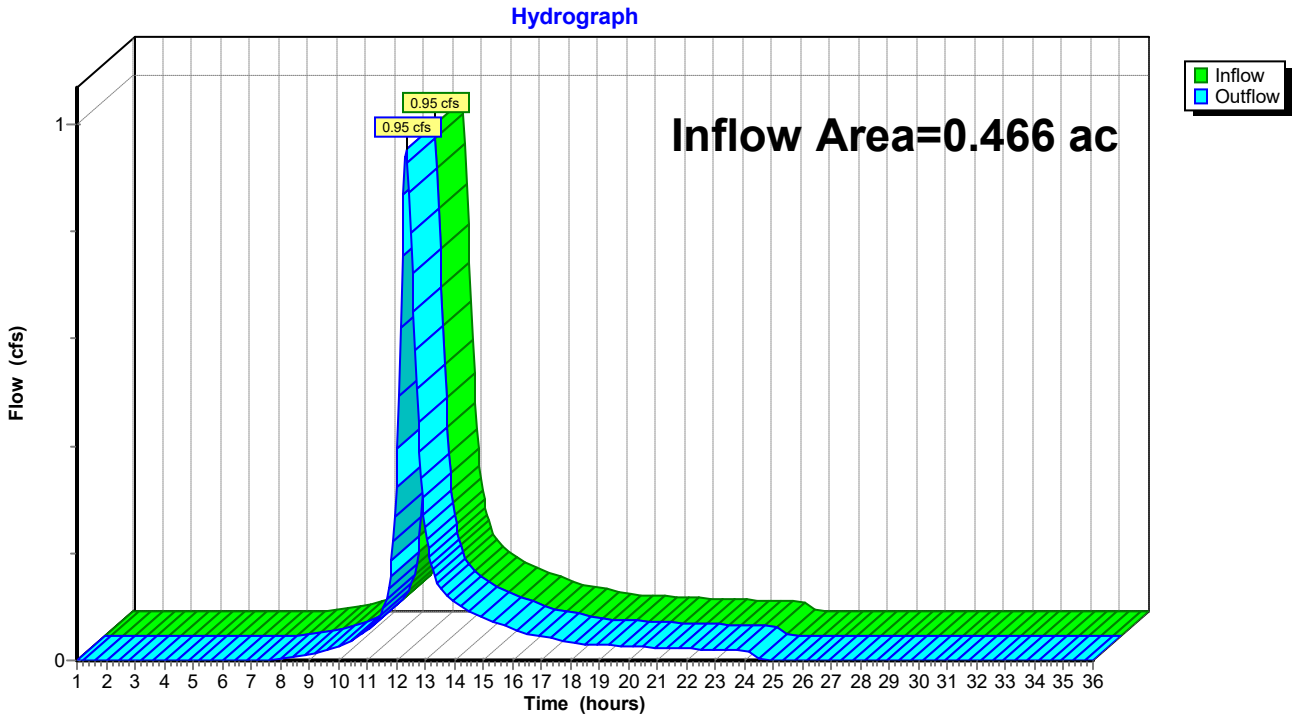
Reach AP3: Analysis Point 3 Inflow=2.88 cfs 0.260 af
Outflow=2.88 cfs 0.260 af

Summary for Reach AP1: Analysis Point 1

Inflow Area = 0.466 ac, 25.29% Impervious, Inflow Depth = 2.85" for 10-yr event
Inflow = 0.95 cfs @ 12.34 hrs, Volume= 0.111 af
Outflow = 0.95 cfs @ 12.34 hrs, Volume= 0.111 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Reach AP1: Analysis Point 1



Hydrograph for Reach AP1: Analysis Point 1

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
1.00	0.00		0.00
1.50	0.00		0.00
2.00	0.00		0.00
2.50	0.00		0.00
3.00	0.00		0.00
3.50	0.00		0.00
4.00	0.00		0.00
4.50	0.00		0.00
5.00	0.00		0.00
5.50	0.00		0.00
6.00	0.00		0.00
6.50	0.00		0.00
7.00	0.00		0.00
7.50	0.00		0.00
8.00	0.00		0.00
8.50	0.01		0.01
9.00	0.01		0.01
9.50	0.02		0.02
10.00	0.03		0.03
10.50	0.04		0.04
11.00	0.06		0.06
11.50	0.09		0.09
12.00	**0.32**		**0.32**
12.50	**0.80**		**0.80**
13.00	0.25		0.25
13.50	0.14		0.14
14.00	0.11		0.11
14.50	0.09		0.09
15.00	0.08		0.08
15.50	0.07		0.07
16.00	0.06		0.06
16.50	0.05		0.05
17.00	0.04		0.04
17.50	0.04		0.04
18.00	0.03		0.03
18.50	0.03		0.03
19.00	0.03		0.03
19.50	0.03		0.03
20.00	0.03		0.03
20.50	0.03		0.03
21.00	0.02		0.02
21.50	0.02		0.02
22.00	0.02		0.02
22.50	0.02		0.02
23.00	0.02		0.02
23.50	0.02		0.02
24.00	0.02		0.02
24.50	0.00		0.00
25.00	0.00		0.00
25.50	0.00		0.00
26.00	0.00		0.00
26.50	0.00		0.00
27.00	0.00		0.00
27.50	0.00		0.00
28.00	0.00		0.00
28.50	0.00		0.00
29.00	0.00		0.00
29.50	0.00		0.00
30.00	0.00		0.00
30.50	0.00		0.00
31.00	0.00		0.00
31.50	0.00		0.00
32.00	0.00		0.00
32.50	0.00		0.00
33.00	0.00		0.00
33.50	0.00		0.00
34.00	0.00		0.00
34.50	0.00		0.00
35.00	0.00		0.00
35.50	0.00		0.00
36.00	0.00		0.00

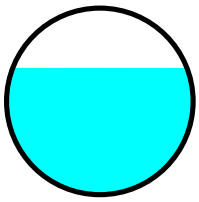
Summary for Reach AP2: Analysis Point 2

Inflow Area = 0.986 ac, 60.85% Impervious, Inflow Depth = 3.52" for 10-yr event
Inflow = 4.32 cfs @ 12.03 hrs, Volume= 0.290 af
Outflow = 4.27 cfs @ 12.04 hrs, Volume= 0.290 af, Atten= 1%, Lag= 0.5 min

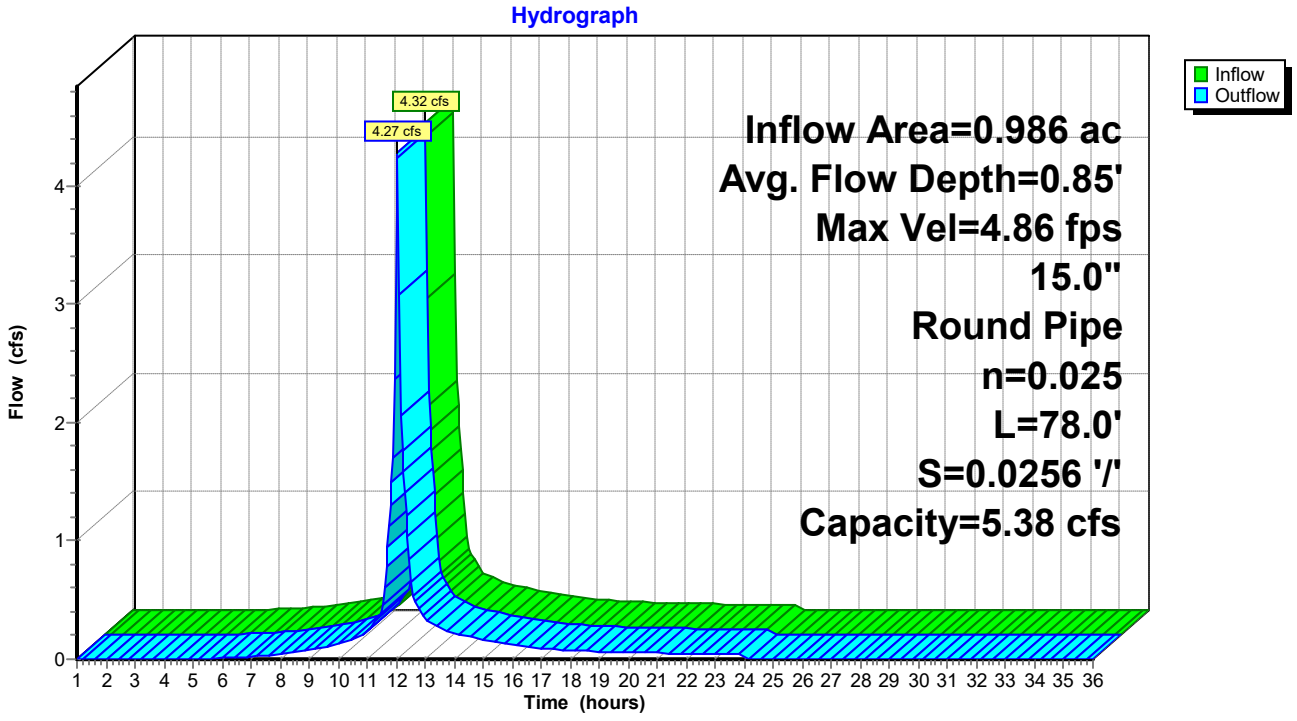
Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.86 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.66 fps, Avg. Travel Time= 0.8 min

Peak Storage= 69 cf @ 12.04 hrs
Average Depth at Peak Storage= 0.85' , Surface Width= 1.17'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 5.38 cfs

15.0" Round Pipe
n= 0.025 Earth, grassed & winding
Length= 78.0' Slope= 0.0256 '/'
Inlet Invert= 556.00', Outlet Invert= 554.00'



Reach AP2: Analysis Point 2



Hydrograph for Reach AP2: Analysis Point 2

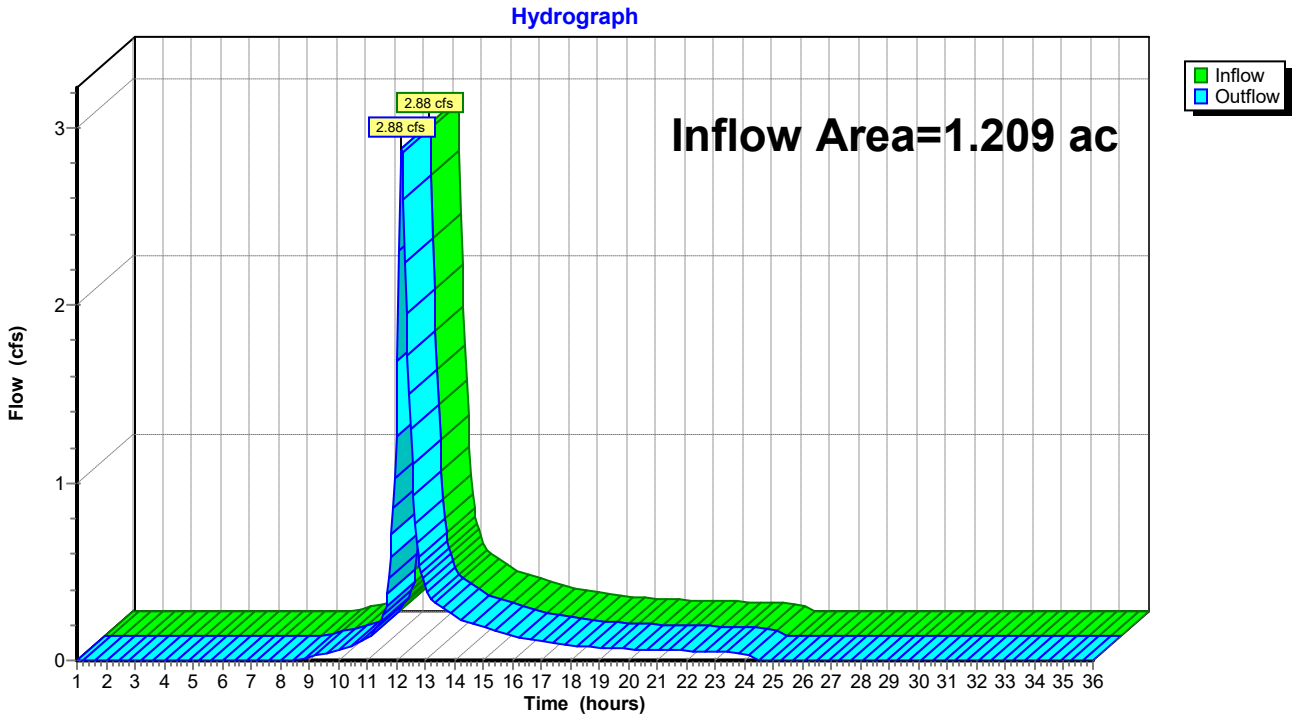
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
1.00	0.00	0	556.00	0.00
2.00	0.00	0	556.00	0.00
3.00	0.00	0	556.00	0.00
4.00	0.00	0	556.00	0.00
5.00	0.00	0	556.02	0.00
6.00	0.01	1	556.04	0.01
7.00	0.02	2	556.06	0.02
8.00	0.04	2	556.08	0.04
9.00	0.08	4	556.11	0.08
10.00	0.13	6	556.13	0.13
11.00	0.23	8	556.18	0.23
12.00	**4.02**	**64**	**556.79**	**3.77**
13.00	**0.33**	**11**	**556.21**	**0.33**
14.00	0.22	8	556.17	0.22
15.00	0.17	7	556.15	0.17
16.00	0.12	5	556.13	0.12
17.00	0.09	4	556.11	0.09
18.00	0.07	4	556.10	0.07
19.00	0.07	3	556.10	0.07
20.00	0.06	3	556.09	0.06
21.00	0.05	3	556.09	0.05
22.00	0.05	3	556.08	0.05
23.00	0.04	3	556.08	0.04
24.00	0.04	2	556.07	0.04
25.00	0.00	0	556.00	0.00
26.00	0.00	0	556.00	0.00
27.00	0.00	0	556.00	0.00
28.00	0.00	0	556.00	0.00
29.00	0.00	0	556.00	0.00
30.00	0.00	0	556.00	0.00
31.00	0.00	0	556.00	0.00
32.00	0.00	0	556.00	0.00
33.00	0.00	0	556.00	0.00
34.00	0.00	0	556.00	0.00
35.00	0.00	0	556.00	0.00
36.00	0.00	0	556.00	0.00

Summary for Reach AP3: Analysis Point 3

Inflow Area = 1.209 ac, 19.07% Impervious, Inflow Depth = 2.58" for 10-yr event
Inflow = 2.88 cfs @ 12.18 hrs, Volume= 0.260 af
Outflow = 2.88 cfs @ 12.18 hrs, Volume= 0.260 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Reach AP3: Analysis Point 3



Hydrograph for Reach AP3: Analysis Point 3

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
1.00	0.00		0.00
1.50	0.00		0.00
2.00	0.00		0.00
2.50	0.00		0.00
3.00	0.00		0.00
3.50	0.00		0.00
4.00	0.00		0.00
4.50	0.00		0.00
5.00	0.00		0.00
5.50	0.00		0.00
6.00	0.00		0.00
6.50	0.00		0.00
7.00	0.00		0.00
7.50	0.00		0.00
8.00	0.00		0.00
8.50	0.01		0.01
9.00	0.02		0.02
9.50	0.03		0.03
10.00	0.05		0.05
10.50	0.09		0.09
11.00	0.13		0.13
11.50	0.23		0.23
12.00	**1.26**		**1.26**
12.50	**1.30**		**1.30**
13.00	0.41		0.41
13.50	0.30		0.30
14.00	0.25		0.25
14.50	0.21		0.21
15.00	0.19		0.19
15.50	0.16		0.16
16.00	0.13		0.13
16.50	0.12		0.12
17.00	0.11		0.11
17.50	0.09		0.09
18.00	0.08		0.08
18.50	0.08		0.08
19.00	0.07		0.07
19.50	0.07		0.07
20.00	0.06		0.06
20.50	0.06		0.06
21.00	0.06		0.06
21.50	0.06		0.06
22.00	0.05		0.05
22.50	0.05		0.05
23.00	0.05		0.05
23.50	0.05		0.05
24.00	0.04		0.04
24.50	0.00		0.00
25.00	0.00		0.00
25.50	0.00		0.00
26.00	0.00		0.00
26.50	0.00		0.00
27.00	0.00		0.00
27.50	0.00		0.00
28.00	0.00		0.00
28.50	0.00		0.00
29.00	0.00		0.00
29.50	0.00		0.00
30.00	0.00		0.00
30.50	0.00		0.00
31.00	0.00		0.00
31.50	0.00		0.00
32.00	0.00		0.00
32.50	0.00		0.00
33.00	0.00		0.00
33.50	0.00		0.00
34.00	0.00		0.00
34.50	0.00		0.00
35.00	0.00		0.00
35.50	0.00		0.00
36.00	0.00		0.00

Time span=1.00-36.00 hrs, dt=0.05 hrs, 701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Reach AP1: Analysis Point 1 Inflow=1.31 cfs 0.153 af
Outflow=1.31 cfs 0.153 af

Reach AP2: Analysis Point 2 Avg. Flow Depth=1.08' Max Vel=4.99 fps Inflow=5.65 cfs 0.384 af
15.0" Round Pipe n=0.025 L=78.0' S=0.0256 '/' Capacity=5.38 cfs Outflow=5.58 cfs 0.384 af

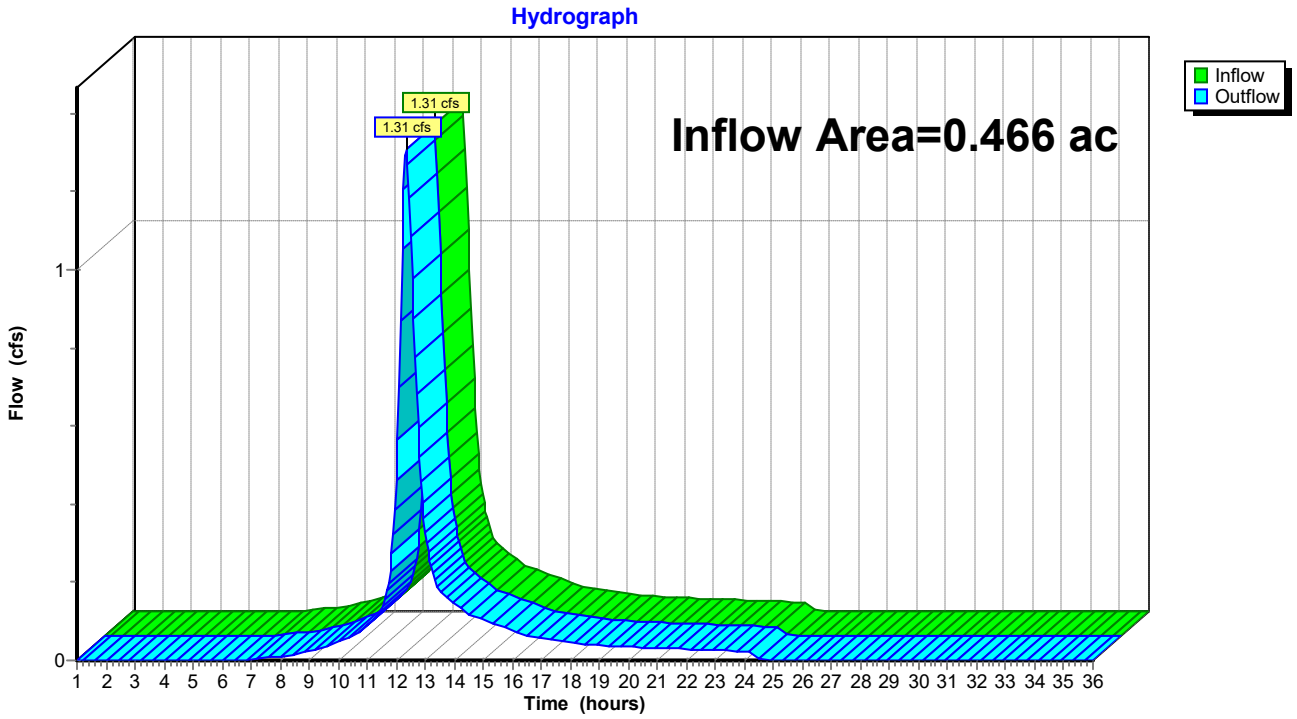
Reach AP3: Analysis Point 3 Inflow=4.05 cfs 0.365 af
Outflow=4.05 cfs 0.365 af

Summary for Reach AP1: Analysis Point 1

Inflow Area = 0.466 ac, 25.29% Impervious, Inflow Depth = 3.93" for 25-yr event
Inflow = 1.31 cfs @ 12.34 hrs, Volume= 0.153 af
Outflow = 1.31 cfs @ 12.34 hrs, Volume= 0.153 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Reach AP1: Analysis Point 1



Hydrograph for Reach AP1: Analysis Point 1

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
1.00	0.00		0.00
1.50	0.00		0.00
2.00	0.00		0.00
2.50	0.00		0.00
3.00	0.00		0.00
3.50	0.00		0.00
4.00	0.00		0.00
4.50	0.00		0.00
5.00	0.00		0.00
5.50	0.00		0.00
6.00	0.00		0.00
6.50	0.00		0.00
7.00	0.00		0.00
7.50	0.01		0.01
8.00	0.01		0.01
8.50	0.02		0.02
9.00	0.02		0.02
9.50	0.03		0.03
10.00	0.05		0.05
10.50	0.06		0.06
11.00	0.09		0.09
11.50	0.13		0.13
12.00	**0.46**		**0.46**
12.50	**1.08**		**1.08**
13.00	0.33		0.33
13.50	0.18		0.18
14.00	0.14		0.14
14.50	0.12		0.12
15.00	0.10		0.10
15.50	0.09		0.09
16.00	0.08		0.08
16.50	0.06		0.06
17.00	0.06		0.06
17.50	0.05		0.05
18.00	0.05		0.05
18.50	0.04		0.04
19.00	0.04		0.04
19.50	0.04		0.04
20.00	0.03		0.03
20.50	0.03		0.03
21.00	0.03		0.03
21.50	0.03		0.03
22.00	0.03		0.03
22.50	0.03		0.03
23.00	0.03		0.03
23.50	0.02		0.02
24.00	0.02		0.02
24.50	0.00		0.00
25.00	0.00		0.00
25.50	0.00		0.00
26.00	0.00		0.00
26.50	0.00		0.00
27.00	0.00		0.00
27.50	0.00		0.00
28.00	0.00		0.00
28.50	0.00		0.00
29.00	0.00		0.00
29.50	0.00		0.00
30.00	0.00		0.00
30.50	0.00		0.00
31.00	0.00		0.00
31.50	0.00		0.00
32.00	0.00		0.00
32.50	0.00		0.00
33.00	0.00		0.00
33.50	0.00		0.00
34.00	0.00		0.00
34.50	0.00		0.00
35.00	0.00		0.00
35.50	0.00		0.00
36.00	0.00		0.00

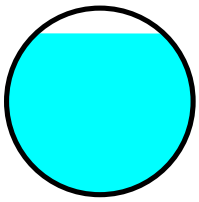
Summary for Reach AP2: Analysis Point 2

Inflow Area = 0.986 ac, 60.85% Impervious, Inflow Depth = 4.68" for 25-yr event
Inflow = 5.65 cfs @ 12.03 hrs, Volume= 0.384 af
Outflow = 5.58 cfs @ 12.04 hrs, Volume= 0.384 af, Atten= 1%, Lag= 0.5 min

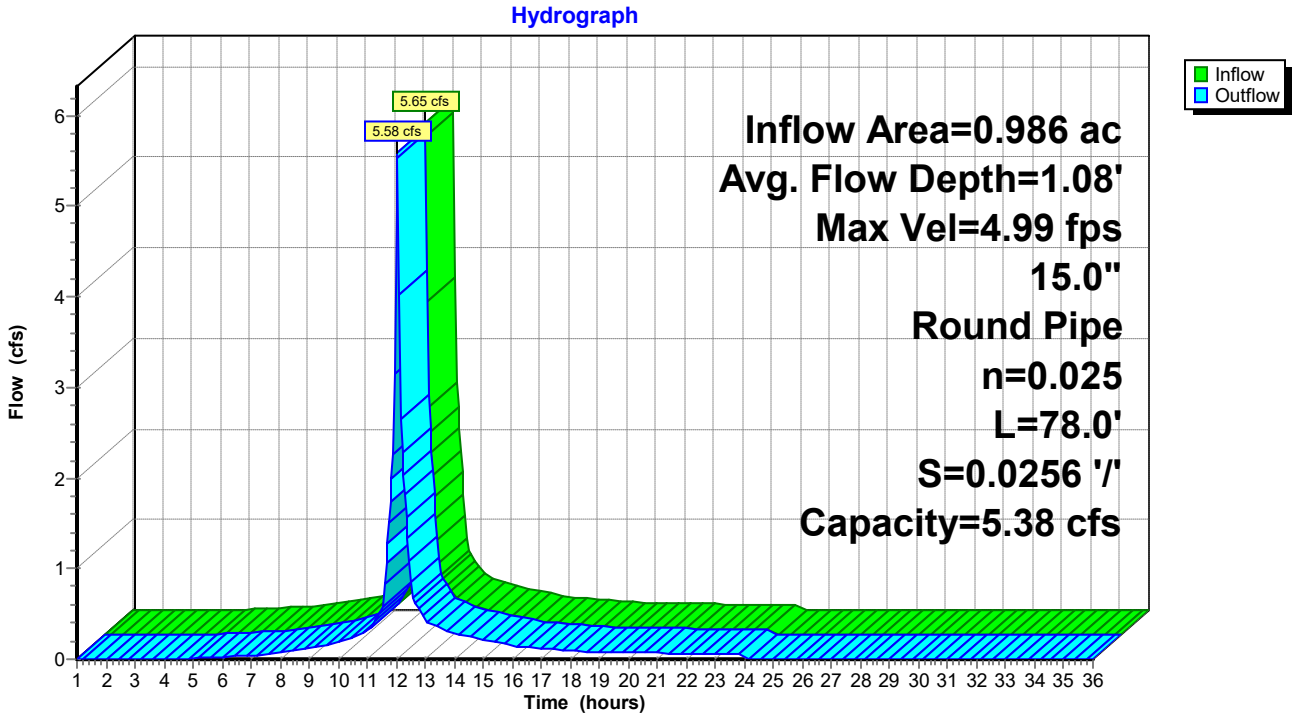
Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.99 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.78 fps, Avg. Travel Time= 0.7 min

Peak Storage= 88 cf @ 12.04 hrs
Average Depth at Peak Storage= 1.08' , Surface Width= 0.85'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 5.38 cfs

15.0" Round Pipe
n= 0.025 Earth, grassed & winding
Length= 78.0' Slope= 0.0256 '/'
Inlet Invert= 556.00', Outlet Invert= 554.00'



Reach AP2: Analysis Point 2



Hydrograph for Reach AP2: Analysis Point 2

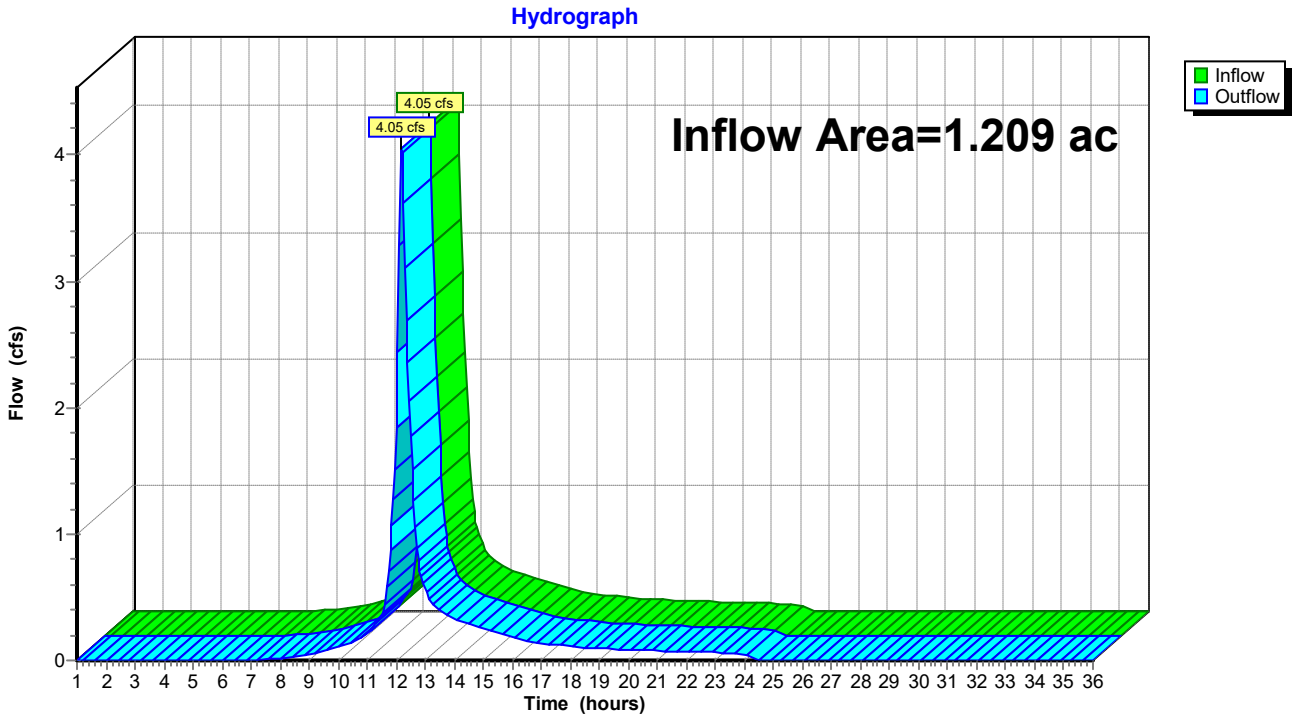
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
1.00	0.00	0	556.00	0.00
2.00	0.00	0	556.00	0.00
3.00	0.00	0	556.00	0.00
4.00	0.00	0	556.01	0.00
5.00	0.01	1	556.04	0.01
6.00	0.02	2	556.06	0.02
7.00	0.04	2	556.08	0.04
8.00	0.07	4	556.10	0.07
9.00	0.12	5	556.13	0.12
10.00	0.19	7	556.16	0.19
11.00	0.32	10	556.21	0.32
12.00	**5.27**	**80**	**556.97**	**4.95**
13.00	**0.42**	**13**	**556.24**	**0.43**
14.00	0.28	9	556.19	0.28
15.00	0.21	8	556.17	0.21
16.00	0.15	6	556.14	0.15
17.00	0.12	5	556.13	0.12
18.00	0.09	4	556.11	0.09
19.00	0.08	4	556.11	0.08
20.00	0.07	4	556.10	0.07
21.00	0.07	4	556.10	0.07
22.00	0.06	3	556.09	0.06
23.00	0.06	3	556.09	0.06
24.00	0.05	3	556.08	0.05
25.00	0.00	0	556.00	0.00
26.00	0.00	0	556.00	0.00
27.00	0.00	0	556.00	0.00
28.00	0.00	0	556.00	0.00
29.00	0.00	0	556.00	0.00
30.00	0.00	0	556.00	0.00
31.00	0.00	0	556.00	0.00
32.00	0.00	0	556.00	0.00
33.00	0.00	0	556.00	0.00
34.00	0.00	0	556.00	0.00
35.00	0.00	0	556.00	0.00
36.00	0.00	0	556.00	0.00

Summary for Reach AP3: Analysis Point 3

Inflow Area = 1.209 ac, 19.07% Impervious, Inflow Depth = 3.63" for 25-yr event
Inflow = 4.05 cfs @ 12.18 hrs, Volume= 0.365 af
Outflow = 4.05 cfs @ 12.18 hrs, Volume= 0.365 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Reach AP3: Analysis Point 3



Hydrograph for Reach AP3: Analysis Point 3

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
1.00	0.00		0.00
1.50	0.00		0.00
2.00	0.00		0.00
2.50	0.00		0.00
3.00	0.00		0.00
3.50	0.00		0.00
4.00	0.00		0.00
4.50	0.00		0.00
5.00	0.00		0.00
5.50	0.00		0.00
6.00	0.00		0.00
6.50	0.00		0.00
7.00	0.00		0.00
7.50	0.01		0.01
8.00	0.01		0.01
8.50	0.03		0.03
9.00	0.05		0.05
9.50	0.07		0.07
10.00	0.10		0.10
10.50	0.15		0.15
11.00	0.21		0.21
11.50	0.37		0.37
12.00	**1.84**		**1.84**
12.50	**1.78**		**1.78**
13.00	0.56		0.56
13.50	0.40		0.40
14.00	0.33		0.33
14.50	0.28		0.28
15.00	0.25		0.25
15.50	0.21		0.21
16.00	0.18		0.18
16.50	0.15		0.15
17.00	0.14		0.14
17.50	0.12		0.12
18.00	0.11		0.11
18.50	0.10		0.10
19.00	0.09		0.09
19.50	0.09		0.09
20.00	0.09		0.09
20.50	0.08		0.08
21.00	0.08		0.08
21.50	0.07		0.07
22.00	0.07		0.07
22.50	0.07		0.07
23.00	0.06		0.06
23.50	0.06		0.06
24.00	0.06		0.06
24.50	0.00		0.00
25.00	0.00		0.00
25.50	0.00		0.00
26.00	0.00		0.00
26.50	0.00		0.00
27.00	0.00		0.00
27.50	0.00		0.00
28.00	0.00		0.00
28.50	0.00		0.00
29.00	0.00		0.00
29.50	0.00		0.00
30.00	0.00		0.00
30.50	0.00		0.00
31.00	0.00		0.00
31.50	0.00		0.00
32.00	0.00		0.00
32.50	0.00		0.00
33.00	0.00		0.00
33.50	0.00		0.00
34.00	0.00		0.00
34.50	0.00		0.00
35.00	0.00		0.00
35.50	0.00		0.00
36.00	0.00		0.00

Time span=1.00-36.00 hrs, dt=0.05 hrs, 701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Reach AP1: Analysis Point 1 Inflow=2.04 cfs 0.242 af
Outflow=2.04 cfs 0.242 af

Reach AP2: Analysis Point 2 Avg. Flow Depth=1.25' Max Vel=4.96 fps Inflow=8.33 cfs 0.581 af
15.0" Round Pipe n=0.025 L=78.0' S=0.0256 '/' Capacity=5.38 cfs Outflow=5.38 cfs 0.581 af

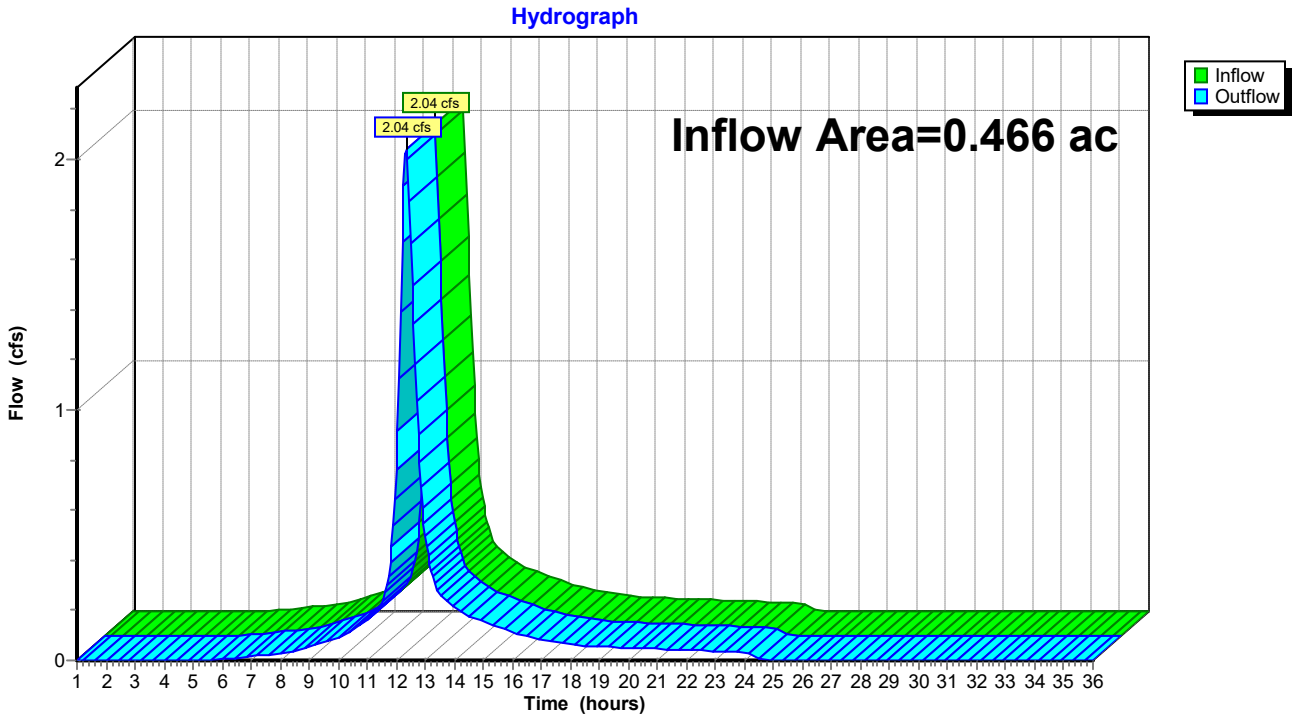
Reach AP3: Analysis Point 3 Inflow=6.48 cfs 0.592 af
Outflow=6.48 cfs 0.592 af

Summary for Reach AP1: Analysis Point 1

Inflow Area = 0.466 ac, 25.29% Impervious, Inflow Depth = 6.23" for 100-yr event
Inflow = 2.04 cfs @ 12.33 hrs, Volume= 0.242 af
Outflow = 2.04 cfs @ 12.33 hrs, Volume= 0.242 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Reach AP1: Analysis Point 1



Hydrograph for Reach AP1: Analysis Point 1

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
1.00	0.00		0.00
1.50	0.00		0.00
2.00	0.00		0.00
2.50	0.00		0.00
3.00	0.00		0.00
3.50	0.00		0.00
4.00	0.00		0.00
4.50	0.00		0.00
5.00	0.00		0.00
5.50	0.00		0.00
6.00	0.01		0.01
6.50	0.01		0.01
7.00	0.01		0.01
7.50	0.02		0.02
8.00	0.03		0.03
8.50	0.04		0.04
9.00	0.05		0.05
9.50	0.07		0.07
10.00	0.09		0.09
10.50	0.12		0.12
11.00	0.16		0.16
11.50	0.23		0.23
12.00	**0.76**		**0.76**
12.50	**1.67**		**1.67**
13.00	0.50		0.50
13.50	0.27		0.27
14.00	0.21		0.21
14.50	0.18		0.18
15.00	0.16		0.16
15.50	0.13		0.13
16.00	0.11		0.11
16.50	0.10		0.10
17.00	0.09		0.09
17.50	0.08		0.08
18.00	0.07		0.07
18.50	0.06		0.06
19.00	0.06		0.06
19.50	0.05		0.05
20.00	0.05		0.05
20.50	0.05		0.05
21.00	0.05		0.05
21.50	0.04		0.04
22.00	0.04		0.04
22.50	0.04		0.04
23.00	0.04		0.04
23.50	0.04		0.04
24.00	0.03		0.03
24.50	0.01		0.01
25.00	0.00		0.00
25.50	0.00		0.00
26.00	0.00		0.00
26.50	0.00		0.00
27.00	0.00		0.00
27.50	0.00		0.00
28.00	0.00		0.00
28.50	0.00		0.00
29.00	0.00		0.00
29.50	0.00		0.00
30.00	0.00		0.00
30.50	0.00		0.00
31.00	0.00		0.00
31.50	0.00		0.00
32.00	0.00		0.00
32.50	0.00		0.00
33.00	0.00		0.00
33.50	0.00		0.00
34.00	0.00		0.00
34.50	0.00		0.00
35.00	0.00		0.00
35.50	0.00		0.00
36.00	0.00		0.00

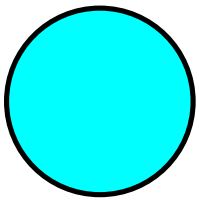
Summary for Reach AP2: Analysis Point 2

Inflow Area = 0.986 ac, 60.85% Impervious, Inflow Depth = 7.07" for 100-yr event
Inflow = 8.33 cfs @ 12.03 hrs, Volume= 0.581 af
Outflow = 5.38 cfs @ 12.05 hrs, Volume= 0.581 af, Atten= 35%, Lag= 1.2 min

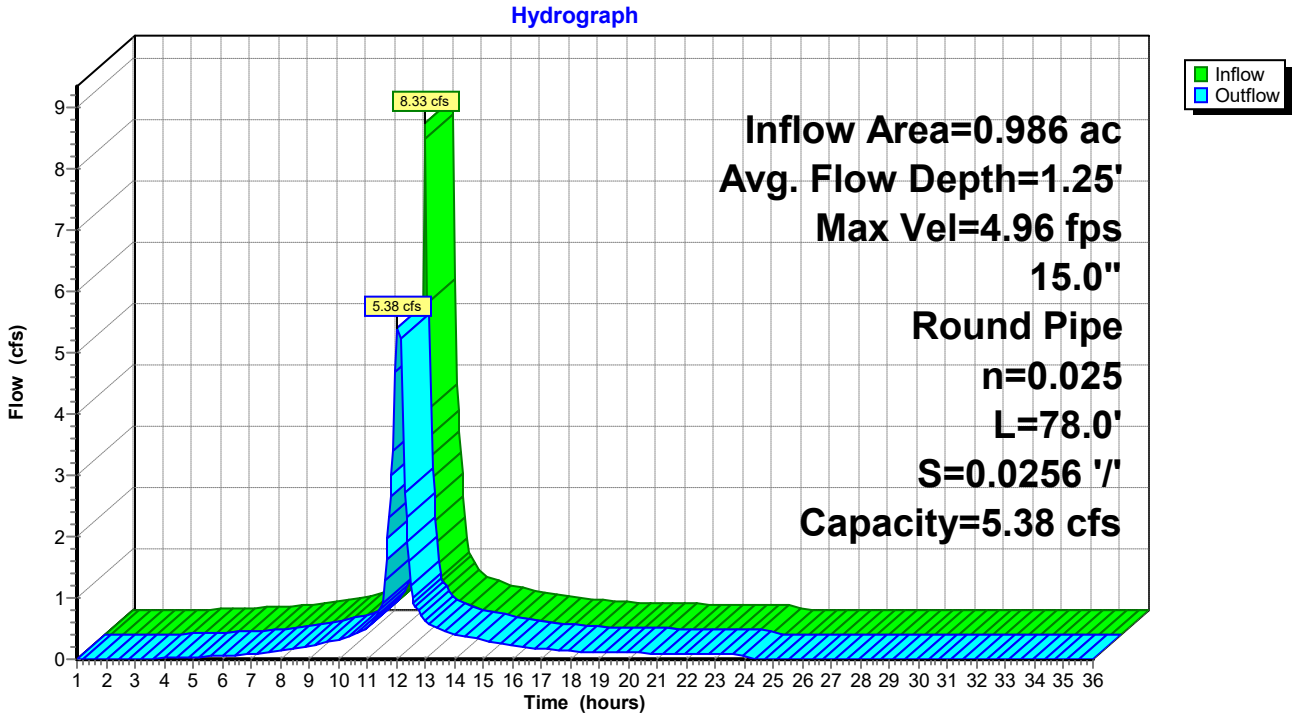
Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.96 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.98 fps, Avg. Travel Time= 0.7 min

Peak Storage= 96 cf @ 12.00 hrs
Average Depth at Peak Storage= 1.25'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 5.38 cfs

15.0" Round Pipe
n= 0.025 Earth, grassed & winding
Length= 78.0' Slope= 0.0256 '/'
Inlet Invert= 556.00', Outlet Invert= 554.00'



Reach AP2: Analysis Point 2



Hydrograph for Reach AP2: Analysis Point 2

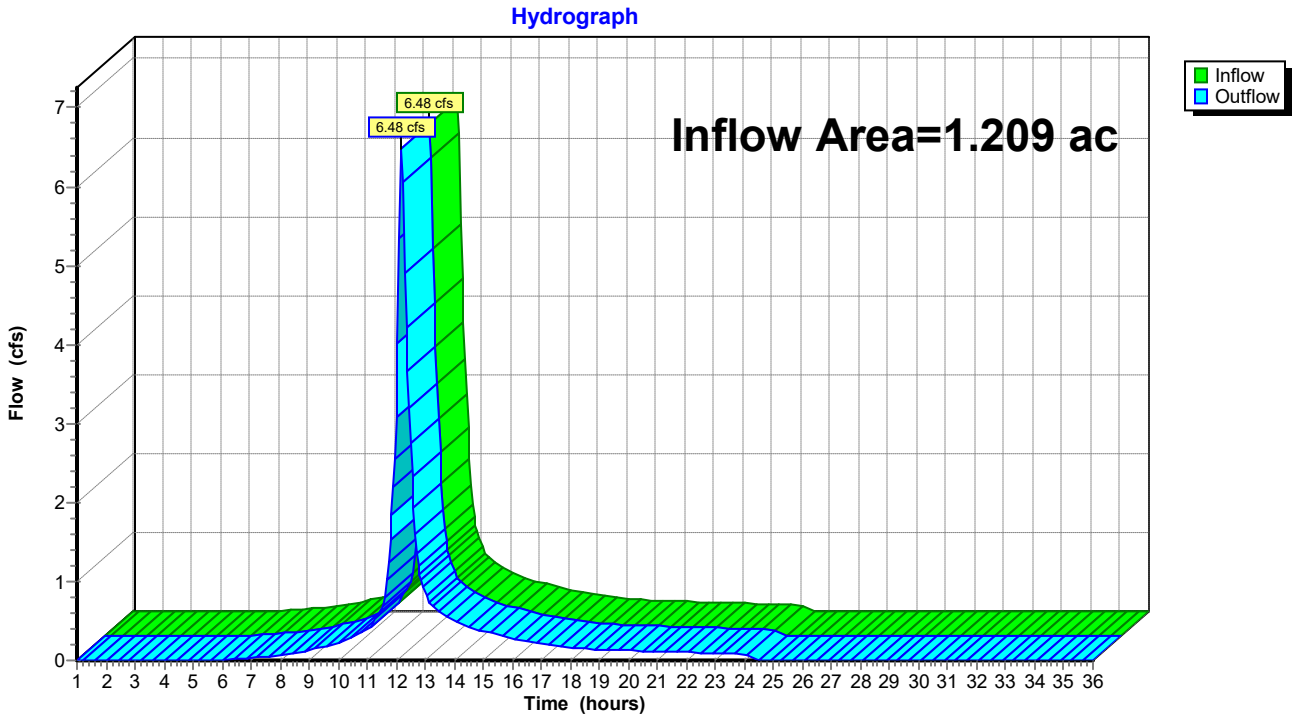
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
1.00	0.00	0	556.00	0.00
2.00	0.00	0	556.00	0.00
3.00	0.00	0	556.01	0.00
4.00	0.02	1	556.05	0.02
5.00	0.03	2	556.07	0.03
6.00	0.05	3	556.09	0.05
7.00	0.09	4	556.11	0.09
8.00	0.13	5	556.13	0.13
9.00	0.21	8	556.17	0.21
10.00	0.31	10	556.20	0.31
11.00	0.51	14	556.26	0.50
12.00	**7.81**	**96**	**557.25**	**5.33**
13.00	**0.61**	16	556.29	**0.62**
14.00	0.40	12	556.23	0.41
15.00	0.31	10	556.20	0.31
16.00	0.21	8	556.17	0.22
17.00	0.17	7	556.15	0.17
18.00	0.13	6	556.14	0.13
19.00	0.12	5	556.13	0.12
20.00	0.11	5	556.12	0.11
21.00	0.10	5	556.12	0.10
22.00	0.09	4	556.11	0.09
23.00	0.08	4	556.11	0.08
24.00	0.07	3	556.10	0.07
25.00	0.00	0	556.00	0.00
26.00	0.00	0	556.00	0.00
27.00	0.00	0	556.00	0.00
28.00	0.00	0	556.00	0.00
29.00	0.00	0	556.00	0.00
30.00	0.00	0	556.00	0.00
31.00	0.00	0	556.00	0.00
32.00	0.00	0	556.00	0.00
33.00	0.00	0	556.00	0.00
34.00	0.00	0	556.00	0.00
35.00	0.00	0	556.00	0.00
36.00	0.00	0	556.00	0.00

Summary for Reach AP3: Analysis Point 3

Inflow Area = 1.209 ac, 19.07% Impervious, Inflow Depth = 5.87" for 100-yr event
Inflow = 6.48 cfs @ 12.18 hrs, Volume= 0.592 af
Outflow = 6.48 cfs @ 12.18 hrs, Volume= 0.592 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Reach AP3: Analysis Point 3



Hydrograph for Reach AP3: Analysis Point 3

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
1.00	0.00		0.00
1.50	0.00		0.00
2.00	0.00		0.00
2.50	0.00		0.00
3.00	0.00		0.00
3.50	0.00		0.00
4.00	0.00		0.00
4.50	0.00		0.00
5.00	0.00		0.00
5.50	0.00		0.00
6.00	0.01		0.01
6.50	0.01		0.01
7.00	0.03		0.03
7.50	0.04		0.04
8.00	0.06		0.06
8.50	0.09		0.09
9.00	0.12		0.12
9.50	0.17		0.17
10.00	0.22		0.22
10.50	0.30		0.30
11.00	0.40		0.40
11.50	0.66		0.66
12.00	**3.08**		**3.08**
12.50	**2.75**		**2.75**
13.00	0.85		0.85
13.50	0.61		0.61
14.00	0.50		0.50
14.50	0.43		0.43
15.00	0.37		0.37
15.50	0.32		0.32
16.00	0.27		0.27
16.50	0.23		0.23
17.00	0.21		0.21
17.50	0.18		0.18
18.00	0.16		0.16
18.50	0.15		0.15
19.00	0.14		0.14
19.50	0.13		0.13
20.00	0.13		0.13
20.50	0.12		0.12
21.00	0.12		0.12
21.50	0.11		0.11
22.00	0.10		0.10
22.50	0.10		0.10
23.00	0.09		0.09
23.50	0.09		0.09
24.00	0.08		0.08
24.50	0.00		0.00
25.00	0.00		0.00
25.50	0.00		0.00
26.00	0.00		0.00
26.50	0.00		0.00
27.00	0.00		0.00
27.50	0.00		0.00
28.00	0.00		0.00
28.50	0.00		0.00
29.00	0.00		0.00
29.50	0.00		0.00
30.00	0.00		0.00
30.50	0.00		0.00
31.00	0.00		0.00
31.50	0.00		0.00
32.00	0.00		0.00
32.50	0.00		0.00
33.00	0.00		0.00
33.50	0.00		0.00
34.00	0.00		0.00
34.50	0.00		0.00
35.00	0.00		0.00
35.50	0.00		0.00
36.00	0.00		0.00