STORMWATER MANAGEMENT PLAN

Eaton South Building Expansion
City of Waukesha, Waukesha County, Wisconsin
PEG Project Number: 203.00A-WI

WISCONSIN
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10/2/20

Prepared for:

EATON

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REVISION: 10/02/20

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TABLE OF CONTENTS

APPENDICES

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INTRODUCTION

The proposed Eaton development site is located in the City of Waukesha, Waukesha County, WI. It is located west of W St Paul Ave, north of W Sunset Dr, south of the Glacial Drumlin State Trail, and the access drive that circles the existing facility is an extension of Badger Dr. A vicinity map that illustrates the tract of land is included in **Appendix 1**.

This stormwater management plan has been designed to accommodate the proposed southwestern building expansion and the reconstruction of existing supporting infrastructure including parking lots & drive lanes. The site as a whole is approximately 71 acres, the total area modeled in this SWMP is approximately 38 acres, and the total disturbed area is approximately 11 acres.

DESIGN CRITERIA

Waukesha Municipal Code:.....Chapter 32: Stormwater Management and Erosion Control

Wisconsin Department of Natural Resources: .....NR 216 & NR 151.12

Water Quality: For a redevelopment site, removal of 40% of the annual total suspended solids (TSS) load for onsite areas will be achieved.

Water Quantity: The Waukesha Municipal Code dictates that the 1-yr, 2-yr, 10-yr & 100-yr, 24-hr post-development runoff rates shall not exceed the 1-yr, 2-yr, 10-yr & 100-yr, 24-hr pre-development runoff rate.

Infiltration: The project site has been deemed to be exempt from requirements as it is a redevelopment and there is a presence of high ground water throughout the site.

ANALYSIS METHODS

HydroCAD® (Version 10.00) software has been used to analyze stormwater characteristics for this stormwater management plan. HydroCAD uses the accepted TR-55 methodology for determining peak discharge runoff rates. Existing ground cover Curve Numbers were selected from the Waukesha Municipal Code, Section 32.11. The Code of Ordinances Performance Standards specifies a maximum grassland curve number of 61.

Stormwater modeling was conducted using 1-yr, 2-yr, 10-yr, and 100-year storm events with respective rainfall amounts of 2.40, 2.70, 3.81, and 6.18 inches in accordance with Chapter 32, Table 3 of the Waukesha Municipal Code.

TSS reduction characteristics for the proposed water quality facilities were determined using WinSLAMM® (Version 10.4) Source Loading and Management Model.

PRE-DEVELOPMENT CONDITIONS

The existing site comprises of a central existing facility with surrounding infrastructure elements including access drives, parking lots, stormwater Best Management Practices (BMPs), and utilities.

A previously approved Stormwater Management plan was completed for an expansion on this site in 2014. The plan included a parking lot addition and bioretention basin (1B) on the northeast of the building as well as a building expansion, parking lot addition, and two bioretention basins (2B & 3B) on the west side of the building. The resulting proposed HydroCAD model was employed as a baseline for the HydroCAD existing model that is used in this plan and analysis. A copy of this previously approved plan is available upon request. Please note that the design information, BMP specifications, and drainage areas in this current plan are consistent with the previously approved plan, but the peak discharge values are slightly different when comparing the 2014 proposed model to the existing model for this plan. This discrepancy is due to the revision of the design storm events as per the Waukesha Municipal Code.

The existing site generally slopes from north to south and ultimately leaves the site by an existing 36" culvert at the southwest corner of the site. A contributing watershed map and supporting hydrologic modeling output for the existing conditions is located in **Appendix 2**. The existing culvert is located at the end of an existing east-west swale along the southern edge of the site that receives flow from an existing southwest depression (2P) that in turn receives flow from an existing north-south swale on the west edge of the site. The existing bioretention basin 1B is conveyed by storm sewer to the southern swale and the existing bioretention basins 2B and 3B discharge into the southwest depression 2P. The existing southwest depression and the 3 bioretention basins are all accounted for in the existing HydroCAD model.

A geotechnical investigation and report was completed for the site by Giles Engineering Associates, Inc. in August of 2020. The narrative summary of this report can be found in **Appendix 1** and the entire report is available upon request. The narrative reports that the native soil mostly consists of sand but is underlain with sandy silt and there was silty clay encountered at deeper depths in some of the test borings. The previously approved Stormwater Management plan used hydrologic soil group B for the HydroCAD modeling, although group A would typically be used for sandy soils. This analysis will use hydrologic soil group B for modeling to be more conservative for the site as a whole, match what was done in the previous SWMP, and take into account the traces of native sandy silt and silty clay found in the geotechnical investigation.

Wetlands are present on the site, primarily located in the southwest corner of the site. The wetlands are contained in the existing swales and southwest depression and are expected to be deemed artificial due to their man-made nature. Appropriate permitting for any of these wetlands to be impacted by the proposed work will be completed through the WDNR and the ACOE. No floodplain is present on the site and the FEMA FIRM panel is included in **Appendix 1**.

Following the modeling in the previously approved SWMP, this analysis and design includes the overall development draining to the southwest ultimate discharge point to identify the water surface elevation resulting at the existing 36" culvert. The resulting 100-yr peak flow was input into Hydraflow culvert analysis to identify headwater characteristics and ensure that detrimental impacts from proposed improvements would be avoided. The culvert analysis is included in **Appendix 5**.

A floodplain study upstream of Badger Drive was completed by the City of Waukesha that reported a 100-yr floodplain elevation of 24.6 within the existing drainage swale along the south edge of the site. In order to accurately model for the tailwater condition caused by this floodplain elevation, a tailwater of 24.6 has been applied to all BMPs and features discharging to the existing south drainage swale, including existing Bioretention Basins 1B & 3B as well as existing depression 2P.

POST-DEVELOPMENT CONDITIONS

The proposed work on the site is located at the south of the subject property. The improvements center around a building expansion of approximately 200,000 SF to the northwest corner of the existing facility. Along with the expansion, truck docks will be added to the west building wall, parking lots and access drives will be reworked around the southeast of the expansion, and a wet detention pond (P1) to manage these improvements will be installed.

As part of the truck dock and wet detention pond installation, the existing southwest bioretention basin (3B) will be removed and the detention and water quality that was provided by it will be handled within P1. The existing southwest depression (2P) will be reduced in size due to the proposed building expansion and wet pond installation, but the flow entering the depression from the west swale and the existing culverts that convey water from it to the south swale will remain and be protected during construction.

Based on the previously mentioned floodplain study that was completed by the City of Waukesha, a tailwater of 24.6 has been applied to proposed Pond P1 to accurately model the tailwater characteristics due to the 100-yr floodplain elevation in the existing south swale.

SUMMARY OF RESULTS

Peak release rates for the existing and proposed conditions have been computed for the project site. Based on the design criteria set forth, the pre-development peak release rates will function as the allowable post-development release rates. Presentation of pertinent values from the modeling is contained within the following tables:

Pre-Development Conditions

Table 1: Existing Peak Discharge Flow Summary

Discharge Pt	Area (ac)	1-year (cfs)	2-year (cfs)	10-year (cfs)	100-year (cfs)
D-PT1	38.38	33.94	41.43	65.61	133.57

Details for existing condition results can be found in **Appendix 2**.

Post-Development Conditions

Table 2: Proposed Pond Summary

Pond	Inflow Area (ac)	Normal Water Level (NWL)	High Water Level (HWL)	Emergency Spillway Elev.	Peak Pond Discharge (cfs)			
					1-year	2-year	10-year	100-year
P1	15.40	25.00	28.90	29.00	8.66	11.70	22.65	45.55

Table 3: Proposed Peak Discharge Flow Summary

Discharge Pt	Area (ac)	1-year (cfs)	2-year (cfs)	10-year (cfs)	100-year (cfs)
D-PT1	38.38	25.19	32.61	59.57	118.56

Details for proposed condition results can be found in **Appendix 3**.

As can be seen by comparing the results within the provided tables, the post-development peak discharge values are maintained or reduced as compared to the corresponding pre-development peak discharge values for the project site, which meets the water quantity design criteria set forth by the City of Waukesha and the WDNR.

Runoff Water Quality

Post-development water quality will be obtained within the proposed wet detention basin. The outlet for the ponds incorporates a smaller dewatering orifice on the overall outlet control structure to facilitate improved settling and TSS removal. A minimum of 40% TSS removal is achieved for all onsite redevelopment areas.

To accurately model the magnitude of flow being routed through the pond, the offsite areas have been modeled in WinSLAMM even though it is not required to treat TSS from these areas. To only account for the TSS removal for onsite areas, "Other Devices" have been utilized within the model. The Other Devices are used to remove all the TSS loading from the offsite areas while maintaining the correct flow characteristics for the ponds. Only the removal achieved within the BMP for the onsite areas are included in the percent removal reflected in the WinSLAMM modeling and the summary table below.

Per the design criteria for water quality on a redevelopment site, only the TSS removal from the proposed parking and driveways should be accounted for while checking for compliance. To achieve this, Other Devices are utilized again to remove the TSS pollutant load from the proposed roof and grass areas. The following table summarizes the water quality results for the project site.

Table 4: Water Quality Summary

Area (ac)	Pounds of TSS Generated (No Controls)	Pounds of TSS Remaining (w/ Controls)	Percent Removal
38.38	1,150	443	61.51%

Refer to **Appendix 5** for the WinSLAMM modeling summary. A copy of the model data can be provided electronically upon request.

Stormwater Infiltration

Stormwater Infiltration has not been incorporated into this storm water management plan due to the site being classified as redevelopment, and redevelopment sites are exempt from NR 151 infiltration requirements. In addition to this, the Geotechnical Report shows clay soils and

evidence of high ground water present throughout the project site, which is also reasoning for the site to be exempt from infiltration requirements.

FAA Requirements

Due to the proximity of the proposed site to the Waukesha County Airport, coordination has been completed to ensure that all FAA Requirements are met for the proposed BMPs. In talks with officials at the Waukesha County Airport, it has been determined that the proposed wet pond on the site is acceptable because infiltration is not possible on the site due to clay soils and groundwater conditions and therefor the wet pond is the best way to meet water quality requirements. Further coordination will be completed, specifically a review of the landscaping elements that will be provided to deter waterfowl from landing on the water and bank of the pond

Downstream Conveyance Analysis

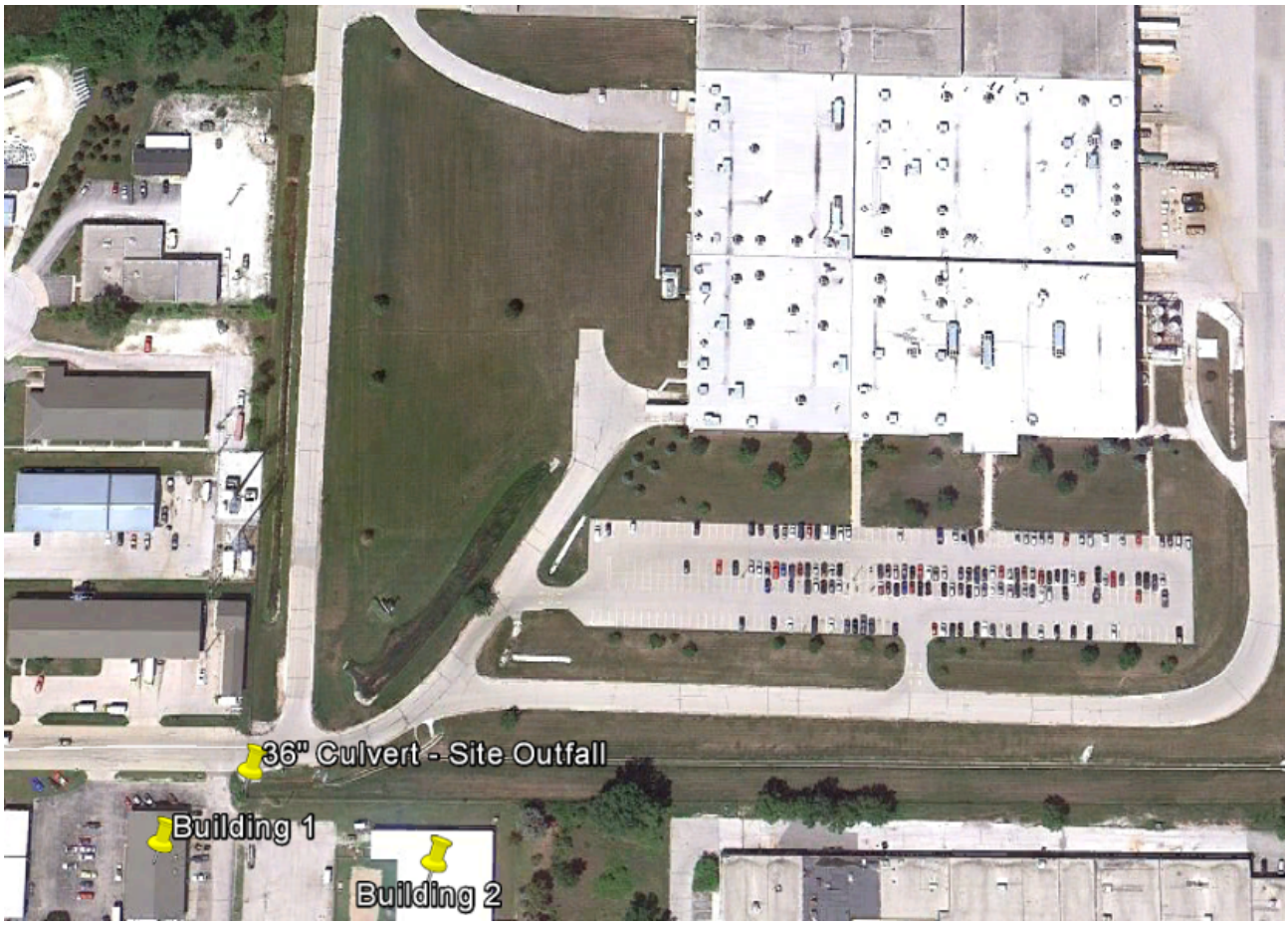
The HydroCAD analysis in the plan accounts for the overall project site and is used to identify the water surface elevation along the overall site outflow in a 100-year rainfall. This information was input into Hydraflow culvert analysis to identify headwater characteristics. The culvert was modeled without a static tailwater. The presence of downstream floodplain is not a factor on this analysis (~798 per FEMA FIRM map (-) 780.558 to a City Datum elevation of 17.44) given the culvert invert elevation on our site is at City Datum Elevation of 18.00 which is above the floodplain. The FIRM map for the site is included in **Appendix 1**. The Hydraflow culvert analysis is included in **Appendix 5** and the results are summarized below.

Table 5: Downstream Conveyance Analysis Summary

Overall Site Discharge	Area (ac)	Peak Flows 100-year (cfs)	Peak W.S.E.* 100-year
2014 Analysis	38.38	105.61**	24.44
Existing	38.38	133.57	24.66
Proposed	38.38	118.56	24.55

** - W.S.E. – WATER SURFACE ELEVATION*
*** - 2014 Analysis and Existing Peak Flow values vary due to updated design storm rainfall data*

The proposed BMP serves to reduce the peak flow from the overall development which directly correlates to a reduction in the calculated peak water surface elevations of the outfall culvert. To represent the culvert headwater as compared to the adjacent buildings, information on lowest finished floor elevations were collected and are represented in the following graphic.



Adjacent Building Finished Floor Elevations

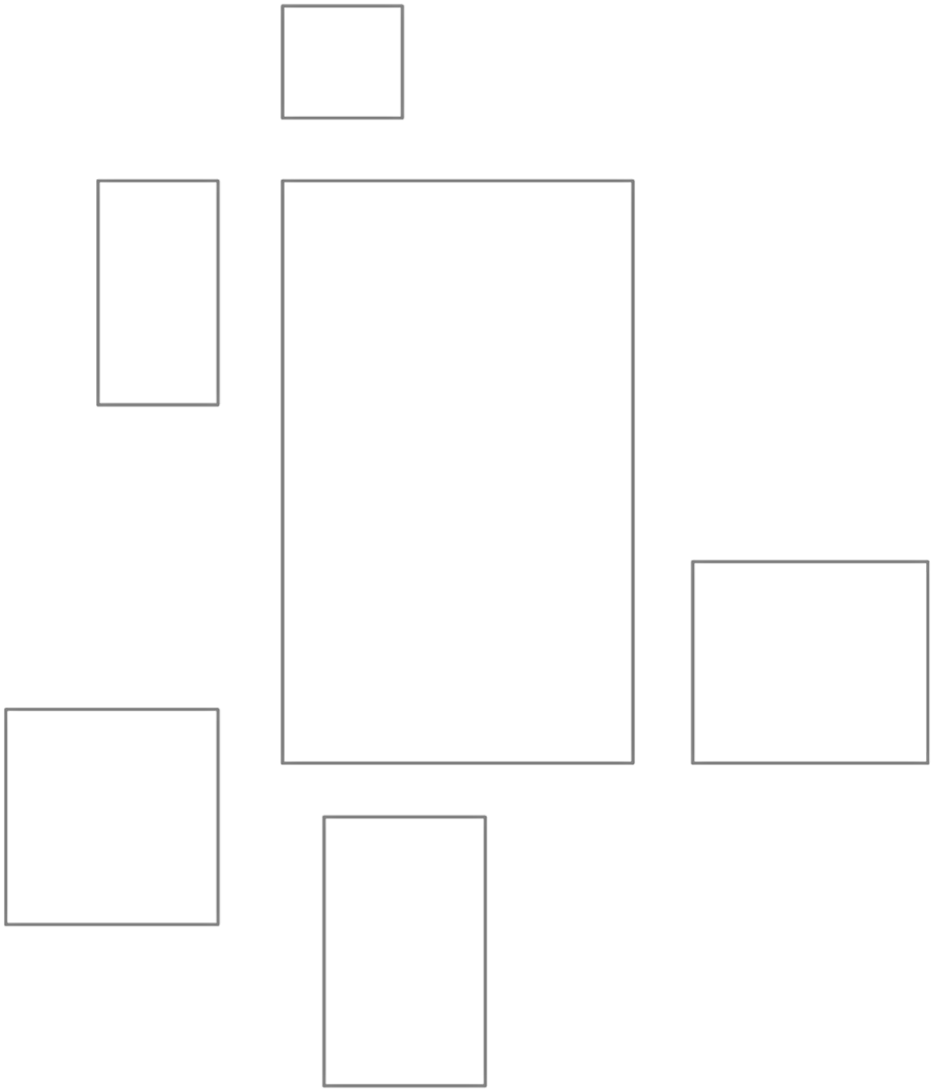
Area	Peak W.S.E.* 100-year	Building 1 F.F.E.*	Building 2 F.F.E.*
OVERALL SITE DISCHARGE	24.55	24.79	25.56

** - F.F.E. – FINISHED FLOOR ELEVATION (LOWEST OBSERVED)*

CONCLUSION

The stormwater management features for the proposed redevelopment have been designed to comply with Waukesha Municipal Code and WDNR technical standards NR151 and NR216. Proposed runoff rates will be reduced as required to ensure downstream conveyance capacity. Storm water runoff from the development site will be treated to remove required total suspended solids annually through the proposed BMPs. It is believed the site meets criteria set forth in WDNR NR 151 to be exempt from infiltration requirements; therefore, infiltration measures have not been included in this storm water management plan.

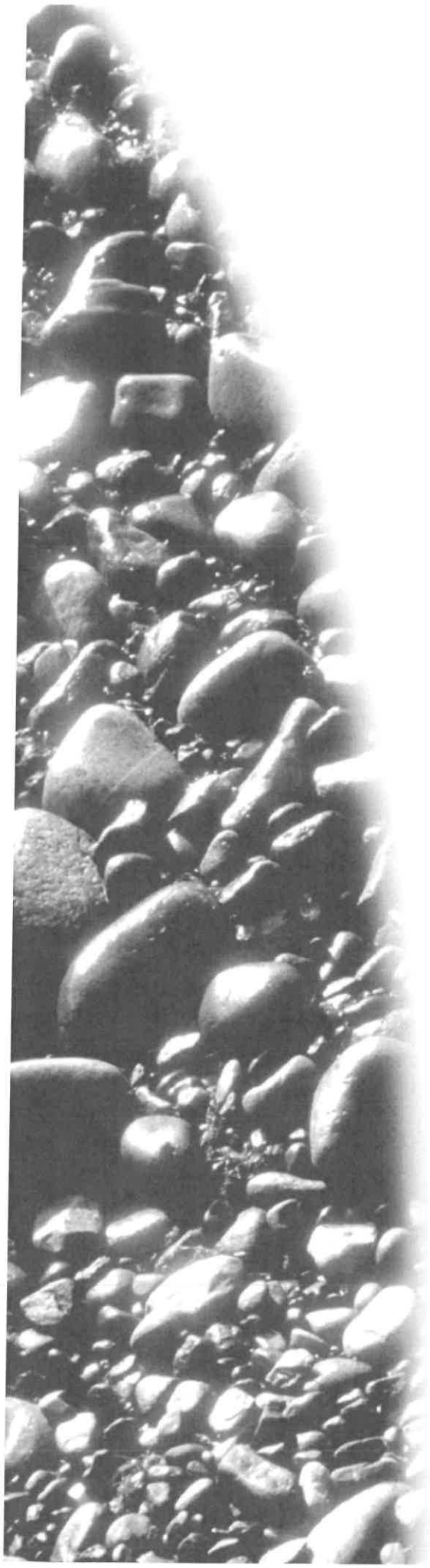
(Appendices Follow)



1	**Appendix**: PROPERTY INFORMATION

Google Maps Eaton - Vicinity Map

Imagery ©2020 Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency, Map data ©2020 200 ft



Geotechnical Engineering Exploration and Analysis

Proposed Building Addition
2300 Badger Drive
Waukesha, Wisconsin

Prepared for:

Berghammer Construction Corporation
Butler, Wisconsin

August 6, 2020
Giles Project No. 1G-2007023

GILES
ENGINEERING ASSOCIATES, INC.

GILES
ENGINEERING ASSOCIATES, INC.
GEOTECHNICAL, ENVIRONMENTAL & CONSTRUCTION MATERIALS CONSULTANTS

• Atlanta, GA
• Dallas, TX
• Los Angeles, CA
• Manassas, VA
• Milwaukee, WI

August 6, 2020

Berghammer Construction Corporation
4750 N. 132nd Street
Butler, WI 53007

Attention: Mr. Matthew L. Iwanski, PE, LEED AP
Sr. Vice President & Principal

Proposal for: Geotechnical Engineering Exploration and Analysis
Proposed Building Addition
2300 Badger Drive
Waukesha, Wisconsin
Giles Project No. 1G-2007023

Dear Mr. Iwanski:

As requested, Giles Engineering Associates, Inc. conducted a *Geotechnical Engineering Exploration and Analysis* for the proposed addition project. The accompanying report describes the services that were performed, and it provides geotechnical-related findings, conclusions, and recommendations that were derived from those services.

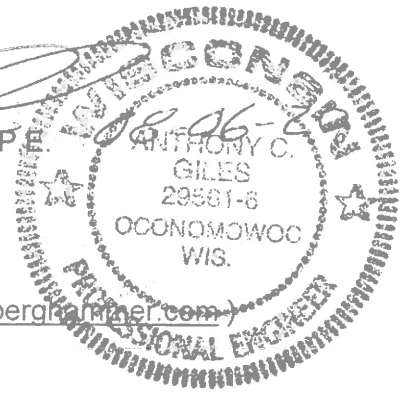
We sincerely appreciate the opportunity to provide geotechnical services for the proposed project. Please contact the undersigned if there are questions about the report, or if we may be of further service.

Very truly yours,

GILES ENGINEERING ASSOCIATES, INC.

Andrew J. Globig, E.I.T.
Staff Professional I

Anthony C. Giles, P.E.
Vice President



Distribution: Berghammer Construction Corporation
Attn: Mr. Matthew L. Iwanski (pdf via email: MattI@berghammer.com)

TABLE OF CONTENTS

GEOTECHNICAL ENGINEERING EXPLORATION AND ANALYSIS

PROPOSED BUILDING ADDITION
2300 BADGER DRIVE
WAUKESHA, WISCONSIN
GILES PROJECT NO. 1G-2007023

GEOTECHNICAL ENGINEERING EXPLORATION AND ANALYSIS

PROPOSED BUILDING ADDITION
2300 BADGER DRIVE
WAUKESHA, WISCONSIN
GILES PROJECT NO. 1G-2007023

1.0 SCOPE OF SERVICES

This report provides the results of the *Geotechnical Engineering Exploration and Analysis* that Giles Engineering Associates, Inc. ("Giles") conducted for the proposed addition project. The *Geotechnical Engineering Exploration and Analysis* included a geotechnical subsurface exploration program, geotechnical laboratory services, and geotechnical engineering. The scope of each service area was narrow and limited, as directed by our client, and based on our understanding and assumptions about the proposed project. Services are briefly described later. Environmental consulting services was beyond our authorized scope.

Geotechnical-related recommendations are provided in this report for design and construction of the foundations and at-grade floor for the proposed building addition. Recommendations are also provided for pavement within new parking lots and drives. Information is also given regarding the feasibility of infiltrating stormwater at the proposed locations of new stormwater basins. Site preparation recommendations are also included, but are only preliminary because the means and methods of site preparation will depend on factors that were unknown when this report was prepared. Those factors include, but are not limited to, the weather before and during construction, subsurface conditions that are exposed during construction, and final details of the proposed project.

2.0 SITE DESCRIPTION

The proposed improvements will be constructed in an area that is generally south and southeast of the existing building located at 2300 Badger Drive in Waukesha, Wisconsin. The improvements area is shown on the *Test Boring Location Plan*, enclosed as Figure 1 in Appendix A. When the test borings (described below) were performed, the improvements area was mostly grass-covered, but also included asphalt-concrete parking lots and drives. Topographically, the improvements area was somewhat flat to rolling, and included swales for drainage. Ground elevations at the test boring locations ranged between El. 23.76 and El. 42.63; those elevations were provided by Pinnacle Engineering Group. It is understood that underground utilities exist within the improvements area.

3.0 PROJECT DESCRIPTION

Proposed Building Addition

The addition footprint is shown on the *Test Boring Location Plan*. Details of the addition were not provided; therefore, this report assumes that it will be a single-story, steel-frame and masonry structure with a steel bar-joist and metal-deck roof. Structural support is expected to be from columns, along with some bearing walls. Maximum foundation loads were not provided,

but are assumed to be 300,000 pounds per column and 5,000 pounds per lineal foot (plf) from bearing walls. The addition will not have a basement; the at-grade floor is planned to be a ground-bearing concrete slab. The maximum floor load is unknown, but is expected to be relatively high, considering that the building will be used for industrial purposes. Loading docks will be at the northwest corner of the addition and are expected to be about four feet tall.

The addition floor will match the floor of the existing building, which is at about El. 39, based on the *Existing Conditions Map* (dated February 12, 2014), prepared by Pinnacle Engineering Group. Because ground elevations at the building-area test borings (Test Borings 1 through 11) varied between El. 26.25 and El. 42.63, it is expected that the addition area will be cut (lowered) at least ±4½ feet, and raised (filled) at least ±12 feet. Cut/fill estimates in the addition area are referenced to the floor slab subgrade (estimated to be at ±El. 38), and exclude cutting/filling that might be necessary for proper site preparation.

Based on the *Alteration Foundation Plan* (dated March 7, 2014), prepared by Pierce Engineers Inc, it is understood that the existing building (adjacent to the addition area) does not have a basement. The *Alteration Foundation Plan* also shows that the existing building is supported by a spread-footing foundation and has a ground-bearing floor slab.

Proposed Pavement Areas

The proposed project will include the construction of three parking lots: South Lot A, South Lot B, and South Lot C. Also, certain sections of existing drives will be reconstructed. Proposed pavement areas and proposed pavement grades are shown on the *Test Boring Location Plan*, which was prepared using the *South Expansion Concept Engineering* plan (dated July 1, 2020) prepared by Pinnacle Engineering Group.

Stormwater Basins

A stormwater basin is proposed to be constructed at the southwest corner of the improvements area, and a stormwater basin is planned to be constructed at the southeast corner. Proposed locations of the stormwater basins are shown on the *Test Boring Location Plan*, which also includes proposed elevations of the of the southwest stormwater basin. It is understood that the basins are intended to be used for stormwater infiltration.

4.0 GEOTECHNICAL SUBSURFACE EXPLORATION PROGRAM

To explore subsurface conditions, seventeen test borings were conducted in the improvements area, using a mechanical drill-rig. Test Borings 1 through 11 were in the proposed addition area and were ±26 feet deep. Test Borings 12, 13, and 14 were in new pavement areas and were ±11 feet deep. Test Borings 15, 16 and 17 were in proposed stormwater basin areas and were ±21 feet deep. Pinnacle Engineering Group staked the test boring locations on-site. Approximate locations of the test borings are shown on the *Test Boring Location Plan*.

Samples were collected from each test boring, at certain depths, using the Standard Penetration Test (SPT), conducted with the drill rig. A brief description of the SPT is given in Appendix B, along with descriptions of other field procedures. Immediately after sampling, select portions of the SPT samples were placed in containers that were labeled at the site for identification. A Standard Penetration Resistance value (N-value) was determined from each SPT. N-values are reported on the *Test Boring Logs*, which are records of the test borings.

The boreholes were backfilled, but backfill materials will likely settle and/or heave, creating a hazard that can injure people and animals. The borehole areas should, therefore, be carefully and routinely monitored by the property owner; settlement and/or heave of backfill materials should be repaired immediately. Giles will not monitor or repair boreholes, or the borehole areas.

Ground elevations at the test boring locations were provided by Pinnacle Engineering Group. The provided elevations are noted on the *Test Boring Logs*.

5.0 GEOTECHNICAL LABORATORY SERVICES

Soil samples that were retained from the test borings were transported to Giles' geotechnical laboratory, where they were classified using the descriptive terms and particle-size criteria shown on the *General Notes* in Appendix D, and by using the Unified Soil Classification System (ASTM D 2488) as a general guide. Classifications are shown on the *Test Boring Logs*, along with horizontal lines that show estimated depths of material change. Field-related information pertaining to the test borings is also on the *Test Boring Logs*. For simplicity and abbreviation, terms and symbols are used on the *Test Boring Logs;* the terms and symbols are defined on the *General Notes*.

Also, soil samples retained from Test Borings 15, 16, and 17 (conducted in the proposed stormwater basin areas) were visually classified using the USDA textural classification system, in general accordance with the guidelines provided in the *Field Book for Describing and Sampling Soils* (USDA, Sept. 2012). USDA classifications of the retained samples are shown on the Wisconsin DSPS *Soil Evaluation – Storm* logs, enclosed in Appendix A. Supplemental information regarding soil classifications, including the USDA and USCS soil classification systems, is included in the *Soil Classification Notes* enclosure within Appendix D.

Calibrated penetrometer resistance, unconfined compression (without controlled strain), and water content tests were performed on select SPT samples to evaluate their general engineering properties. Also, P270 tests were performed on select soil samples recovered from Test Borings 15, 16, and 17 to determine the percent passing the No. 270 sieve; the P270 tests were performed to assist in classification, and to provide additional soil characterization for stormwater management considerations. Results of the laboratory tests are shown on the *Test Boring Logs*. Because SPT samples were used, which are categorized as

being disturbed samples, results of the unconfined compression and calibrated penetrometer tests are considered to be approximate.

6.0 GEOTECHNICAL LABORATORY SERVICES

Because material sampling at the test borings was discontinuous, it was necessary for Giles to estimate conditions between sample intervals. Estimated conditions at the test borings are briefly discussed in this section, and are described in more detail on the *Test Boring Logs*. The conclusions and recommendations in this report are based only on the estimated conditions.

6.1. Surface Materials

About 4 inches of asphalt-concrete pavement was at the surface of Test Borings 1, 7, 10, 11, and 13; aggregate base material that was about 6 to 12 inches thick was beneath the pavement. Topsoil, classified as fill, was at the ground surface at the other test borings. The topsoil was between ±4 and ±24 inches thick, and mostly consisted of silty fine sand, but also included sandy clay. The topsoil included an estimated trace to little amount of organic matter.

6.2. Fill Material

Soil classified as fill was beneath the surface materials, except at Test Borings 7, 9, 12, 16, and 17. The fill material typically extended to depths between ±2 and ±6½ feet below-ground, but the fill at Test Borings 1, 5, and 6 was about 9 feet deep, and the fill at Test Boring 15 was about 11 feet deep. As shown on the *Test Boring Location Plan*, Test Borings 1, 5, and 6 were in the proposed addition area, and Test Boring 15 was in the southeast stormwater basin area. Fill material mostly consisted of sand (variable gradations with variable amounts of silt), but sandy clay was also encountered. Based on SPT N-values, the sand fill had loose to firm relatively densities. The strength characteristics of the sandy clay fill were generally more variable, with comparative consistencies ranging between medium stiff and very stiff, based on laboratory testing.

6.3. Native Soil

Native soil was below the materials described above, and was present to the ±11- to ±26-foot termination depths at the test borings. In general, native soil mostly consisted of sand (variable gradations with variable amounts of silt) underlain by sandy silt with lenses of silty fine sand. However, native silty clay was at deeper depths at Test Borings 4, 6, 8, 9, 10, and 11, which were in the proposed addition area. Based on SPT N-values, native granular soil (sand and sandy silt) had relative densities of loose and firm, whereas native cohesive soil (silty clay) had comparative consistencies of medium stiff to very stiff, based on laboratory testing.

7.0 GROUNDWATER CONDITIONS

Based the colors and moisture conditions of the retained soil samples, and the depth that groundwater was identified within the test borings, it is estimated that the water table varied between about 2 and 11 feet below-ground at the test boring locations, when the test borings were conducted. In general, the water table was shallower in lower areas and deeper in areas of higher elevation. Using the test boring elevations provided by Pinnacle Engineering Group, it is estimated that the water table was between ±El. 28 and ±El. 32. Also, the site is likely subject to perched-groundwater conditions, where groundwater perches above the water table, such as within existing fill.

The estimated water table depth/elevation is only an approximation. The water table could be higher or lower than estimated. If a more precise determination of the water table depth/elevation is needed, groundwater observation wells are recommended to be installed and monitored at the site. Giles can install and monitor observation wells, if it is decided that a more detailed determination of the water table depth/elevation is needed.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1. Recommended 21-Day Waiting Period

Fill materials that were encountered at the test borings had strength characteristics that were relatively low and variable. Therefore, after the addition area is raised to the final grade with engineered fill, at least 21 days should be allowed to pass before proceeding with construction of the addition. The intent of the recommended 21-day waiting period is allow a portion of the expected settlement (caused by the weight of new fill material) to occur prior to starting construction of the addition. If construction of the addition is started before the recommended 21-day waiting period expires, there is a risk of excessive post-construction settlement (of the addition), which could cause structural damage to the addition and to the existing building. This report assumes that the minimum 21-day waiting period will be followed. Recommendations regarding preparation of the addition area are provided later.

8.2. Seismic Design Considerations

A soil Site Class D is recommended for seismic design. By definition, Site Class is based on the average properties of subsurface materials to 100 feet below-ground. Because 100-foot test borings were not requested or authorized, Site Class was estimated based on the test borings, presumed area geology, and the International Building Code.

8.3. Addition Foundation Recommendations

A spread-footing foundation is recommended for the proposed building addition, assuming that the recommended 21-day waiting period (discussed in Section 8.1) will be adhered to. The foundations are recommended to be directly supported by suitable existing soil (including existing fill) and/or by new engineered fill or lean-concrete backfill (both discussed below) placed on suitable existing soil. Because the existing fill has relatively low and variable strength characteristics, the foundations are recommended to be designed using a 1,500 psf maximum, net, allowable soil bearing capacity. For geotechnical considerations, and regardless of the calculated foundation-bearing stress, strip footing pads are recommended to be at least 24 inches wide and isolated column pads are recommended to be at least 30 inches wide/long. **Also, because of the existing fill, the foundation system is recommended to be relatively rigid to account for differing support conditions. Therefore, footing pads and foundation walls should contain additional reinforcing. Also, foundation walls are recommended to be constructed of cast-in-place concrete, rather than concrete masonry units (CMU). Furthermore, above-grade CMU walls (if any) are also recommended to be relatively rigid, possibly through the use of additional bond beams and closer spacing of grouted cores within the CMU walls. Control joints within above-grade CMU walls are also recommended to be closely spacing.** It is recommended and assumed that a structural engineer will provide specific details regarding the rigid foundation system, including footing dimensions, reinforcing sizes and locations, concrete strength, etc.

The building code requires a minimum 48-inch foundation embedment depth for frost protection. It is, therefore, recommended that footings for perimeter walls (and all other exterior elements) of the proposed addition bear at least 48 inches below the adjacent (finished) exterior grade. **Also, because of the existing fill, it is recommended that interior foundations bear at least 48 inches below the floor surface**. Therefore, assuming that the floor of the addition will be at El. 39 (matching the floor of the existing building), it is assumed that the planned bearing grade of perimeter and interior footings will be at El. 35. However, it is assumed that the perimeter foundation at loading docks will step down about 4 feet, to El. 31.

Foundation excavations are recommended to be excavated with a smooth-edge backhoe bucket to develop a relatively undisturbed bearing grade. A toothed bucket will likely disturb foundation-bearing soil more than a smooth-edge bucket, thereby making soil at the excavation base more susceptible to saturation and instability, especially during adverse weather. It is critical that contractors protect foundation support soil and foundation construction materials (concrete, reinforcing, etc.). Furthermore, engineered fill is recommended to be placed and compacted in benched excavations along foundation walls immediately after the foundation walls are capable of supporting lateral pressures from backfill, compaction, and compaction equipment. Trench-footing construction methods will likely not be feasible due to caving of granular soil.

Foundation Support Soil Requirements

Assuming that the recommended 21-day waiting period (discussed in Section 8.1) will be adhered to, the foundations are recommended to be directly supported by suitable existing soil (including existing fill) and/or by new engineered fill or lean-concrete backfill (both discussed below) placed on suitable existing soil. Based on the recommended 1,500 psf maximum, net, allowable soil bearing capacity, the in-situ unconfined compressive strength of existing cohesive soil, such as silty clay and sandy clay, within foundation influence zones is recommended to be at least 1.25 ton per square foot (tsf). Existing granular soil, such as sand and sandy silt, within foundation influence zones is recommended to have a corrected N-value (determined from SPTs and correlated from other in-situ tests) of at least 7, based on the recommended bearing capacity. It is further recommended that the strength characteristics of soil within all foundation influence zones (determined by a geotechnical engineer during construction) meet or exceed the recommended values, unless Giles approves lower values during construction.

Due to the existing fill, and because significant grade-change is expected in the addition area, full-time evaluation and approval of foundation-support soil by a geotechnical engineer during foundation excavation is critical. If a geotechnical engineer does not monitor foundation excavation on a full-time basis, there is a significant risk that the addition will be improperly supported, which could lead to excessive settlement and other structural problems, including structural damage. The purpose of the recommended evaluation is (1) to confirm that the foundations will be properly supported by suitable materials, (2) to determine over-excavation depths and locations, and (3) to confirm that the subsurface conditions are similar to those described on the *Test Boring Logs*. If another firm performs the recommended evaluation, Giles must be notified if the composition or strength characteristics of support soil differ from those shown on the *Test Boring Logs*, thereby allowing us the opportunity to revise this report, if needed.

Unsuitable granular soil beneath foundation areas could possibly be improved by scarification, moisture-conditioning, and compaction. Unsuitable soil beneath foundation areas could also be replaced with engineered fill consisting of properly compacted well-graded aggregate. Aggregate fill is recommended to consist of dense-graded crushed stone that meets the gradation requirements of *dense-graded base* (1¼-inch) in Section 305 of the Wisconsin Department of Transportation Standard Specifications (2019). Aggregate with other gradation characteristics could possibly be used, but should be approved by a geotechnical engineer before the material is placed. If engineered fill is used as backfill, lateral over-excavation of unsuitable materials will also be required, in addition to the required vertical over-excavation. The overall width of lateral over-excavation will depend on the vertical over-excavation depth. For estimating purposes, the minimum lateral over-excavation could be determined by extending an imaginary line outward and downward at a ratio of 1(horizontal):2(vertical) from the bottom edges of a footing pad, but the actual lateral extents of over-excavation are recommended to be approved by a geotechnical engineer during construction.

Lean Portland cement concrete (minimum 28-day compressive strength of 500 psi) could also be used to replace unsuitable materials beneath foundation areas, and is generally the preferred backfill material within deeper over-excavations. Where lean concrete is used as backfill, footing construction must not begin until the lean concrete has gained sufficient strength. Also, over-excavations that are filled with lean concrete are recommended to be at least as wide (on all sides) as the footing pad that will be supported by the concrete, and excavation sidewalls are recommended to be plumb and parallel. To help control sloughing and caving, lean-concrete backfill is recommended to be placed immediately after excavation. This trench-and-pour method requires close communication and scheduling between the general contractor, foundation contractor, concrete supply company, and geotechnical engineer. With a trench-and-pour method, a geotechnical engineer must observe excavations as they are made. Full-time observation by a geotechnical engineer is, therefore, recommended.

Existing Building Considerations

Precautions must be taken to protect the existing building during construction, and to ensure that excavations do not undermine or otherwise compromise the existing building or other existing site improvements. If a void develops below existing footings or floor slabs, a geotechnical engineer should immediately observe the conditions and provide repair recommendations. In general, voids should be immediately filled with a concrete dry-pack, or an expansive sand-and-cement slurry (non-shrink) should be injected into the void, under appropriate pressure, to redevelop contact between the foundation and supporting soils.

Within a close proximity of the existing building, it is recommended that foundations for the addition bear at the same elevation as the adjacent (existing) foundations, assuming that the required 48-inch embedment depth will be met, where required. If the new and existing footings will bear at different elevations, a structural engineer should evaluate the stresses to be imposed on the lower foundation, and confirm that the structural integrity of the existing building and addition will be maintained. Control joints should separate the existing building and the addition, since some differential movement is expected to occur at these junctures. Excavations must not be performed within the zone of influence (determined by a geotechnical engineer) of an existing footing; otherwise, existing footings could be undermined, possibly causing significant (and catastrophic) damage.

Where new foundations are perpendicular to the existing foundation, it may be necessary to cantilever new foundations a certain distance away from the existing building to help reduce potential settlement of the existing building due to overlapping stress from the new construction. When the existing and proposed foundation systems and depths can be confirmed, Giles should be contacted to evaluate whether our recommendations need to be updated. Care must be taken to protect the existing building during construction of the addition. The existing building should be underpinned and braced, where needed.

It is assumed that the proposed addition will be a self-supporting structure, and that no structural load will be imposed on the existing building due to the addition. If load is added to the existing building, it will likely undergo some settlement. The amount and location of settlement will partly depend on the magnitude and location of the load increase. Differential settlement should be expected between the existing building and the addition, even if additional load is not imposed on the existing building.

Estimated Foundation Settlement

The post-construction total and differential settlements of a spread-footing foundation designed and constructed based on this report are estimated to be less than about 1¼ inch and ⅝ inch, respectively. The post-construction angular distortion is estimated to be less than about 0.002 inch per inch across a distance of 20 feet or more. Estimated settlements assume that the site will be prepared in accordance with this report and that foundation support materials will be thoroughly tested and approved by a geotechnical engineer during construction. **If a geotechnical engineer does not monitor foundation excavation on a full-time basis, there is a significant risk that the addition will be improperly supported, which could lead to excessive settlement and other structural problems, including structural damage.**

8.4. At-Grade Floor Slab Recommendations

With proper subgrade preparation, and assuming that the recommended 21-day waiting period (discussed in Section 8.1) will be adhered to, existing soil (including existing fill) is expected to be suitable to support at-grade floor slabs for the proposed addition; new engineered fill that is placed on properly prepared existing soil is also expected to be suitable to support ground-bearing floor slabs,. However, subgrade improvement will likely be necessary to develop proper slab support, especially due to the existing fill. **Therefore, evaluation and approval of the floor slab subgrade by a geotechnical engineer during construction is critical. If the subgrade is not evaluated and approved by a geotechnical engineer, the floor slab could be improperly supported, which could lead to excessive settlement and other structural problems, including structural damage.** The floor slab may be designed using a *Modulus of Subgrade Reaction* (K_{v1}) value of 100 pounds per square inch per inch (psi/in). It is recommended and assumed that a structural engineer will design/specify the floor slab thicknesses, reinforcing, joint details, and other parameters.

A minimum 4-inch-thick base course is recommended to be below the floor slab to serve as a capillary break and for support considerations. It is recommended that the base course consist of free-draining aggregate that has been tested and approved by a geotechnical engineer. Depending on aggregate gradation, geotextile might need to be below the base course to serve as a separator. The need for geotextile should be determined during construction, with the assistance of a geotechnical engineer.

A minimum 10-mil vapor retarder is recommended to be directly above or below the base course throughout the entire floor area. The location (above or below the base course) of the vapor retarder should be specified by the project structural engineer or architect. Abutting vapor retarder sheets are recommended to be overlapped and taped, and must extend to all foundation walls. Vapor retarders are recommended to be in accordance with ASTM E 1745, entitled *Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs*, and other relevant documents. If the base-course material has sharp, angular aggregate, protecting the retarder with geotextile (or by other means) is recommended.

Due to the frost-susceptible site soil, areas of the floor slabs (such as near exterior doors and entrance/exit vestibules), could be susceptible to freeze-thaw related movement. Installation of insulation (or other protective measures against freeze-thaw movement) should be considered for these areas. Pavement and ground grades are recommended to be sloped away from the addition to reduce water infiltration and potential freeze-thaw problems.

Estimated Floor Slab Settlement

The post-construction total and differential settlements of an isolated floor slab constructed in accordance with this report are estimated to be less than about ⅝ inch and ⅓ inch, respectively, over a distance of about 20 feet. Estimated settlements assume that the addition area will be prepared per this report, and that floor slab support materials will be thoroughly tested and approved by a geotechnical engineer during construction.

8.5. Loading-Dock Foundation Wall Recommendations

Loading docks will be at the northwest corner of the addition and are expected to be about four feet tall. The loading-dock foundation walls will serve as retaining walls; therefore, loading-dock foundation walls are recommended to be designed to resist lateral pressures from adjacent materials, and from surface- and subsurface-surcharge loads within the influence zone of the walls.

Free-draining crushed stone meeting the gradation requirements of ASTM No. 57 aggregate is recommended to be placed along the inside of loading-dock foundation walls. The aggregate will serve as drainage media and will lessen lateral pressures against the walls, compared to site soil. The aggregate layer is recommended to be at least 3 feet wide, measured horizontally from the inside of the loading-dock foundation walls. And the aggregate layer is recommended to be continuous along the length and height of the walls. It is recommended that a geotechnical engineer approve aggregate backfill before it is placed.

Aggregate backfill is recommended to be compacted in maximum 8- to 12-inch-thick lifts (measured loose) using lightweight, hand-operated compaction equipment, such as walk-behind vibratory plates. Use of manual compaction equipment must be done in strict accordance with current OSHA excavation and trench safety standards, and other applicable requirements. Manual compaction equipment must not be used within spaces that do not meet OSHA requirements. Also, heavy compaction equipment, such as mechanical rollers, should be kept a lateral distance from the loading-dock foundation walls equal to the wall height, because high lateral pressures could develop, possibly causing the walls to move laterally and fail. Aggregate backfill should not be excessively compacted. Excavations for loading-dock foundation walls must be safely sloped, shored, and/or benched.

The following table provides geotechnical-related design recommendations for loading-dock foundation walls assuming that free-draining aggregate will be placed (and compacted) along the walls, as recommended. It is assumed that significant lateral movement of the walls will not be acceptable; therefore, loading-dock foundation walls are recommended to be designed using the *Lateral Equivalent "At-Rest" Fluid Pressure* in the following table. It is recommended that lateral pressures from surface- and subsurface-surcharge loads be added to the "at-rest" fluid pressure. Giles could provide supplemental recommendations regarding surcharge loads on a case-by-case basis. Walls that are not designed to resist the actual pressures will be prone to movement and potential distress.

TABLE 1
RECOMMENDED DESIGN PARAMETERS FOR LOADING-DOCK FOUNDATION WALLS

Internal Friction Angle of Aggregate Backfill:		34 Degrees
Unit Weight of Aggregate Backfill (Moist):		140 pcf
Required Aggregate Envelope Behind Wall:		Minimum 3 feet wide. Continuous along length and width of wall.
Earth Pressure Coefficients (Level Grade Behind Wall)	Active:	0.28
	At-Rest:	0.44
Lateral Equivalent Fluid Pressure (Level Grade Behind Wall)	Active:	40 psf/lineal foot
	At-Rest:	62 psf/lineal foot
Surface and Subsurface Surcharges:		As required, use surcharge pressure multiplied by appropriate earth pressure coefficient

- Parameters are for a maximum 4-foot-tall loading-dock foundation wall.

Loading-dock foundation walls are recommended to be braced during backfilling, compaction, and construction. Heavy construction equipment should not operate, travel, or park within a lateral distance equal to the height of the walls. Design of the walls should incorporate an adequate factor-of-safety against both overturning (minimum FS=2.0) and lateral movement (minimum FS=1.5).

A frictional coefficient of 0.29 is recommended to determine the ultimate lateral resistance of the foundations. The recommended frictional coefficient is only for concrete cast directly on suitable soil that has been tested and approved by a geotechnical engineer. Lateral resistance (due to friction) should be determined based on dead load only. Also, the ultimate lateral resistance determined from the frictional coefficient is recommended to be factored to determine an allowable value. Passive resistance is recommended to be neglected to at least the recommended 48-inch foundation-embedment depth, and due to the amount of lateral movement necessary to develop full passive pressure.

8.6. Pavement Recommendations

Giles was not given traffic conditions for proposed pavement areas; therefore, three alternate pavement sections are given below based on arbitrarily selected traffic conditions consisting of 5, 75, and 150 eighteen-kip equivalent single axle loads (ESALs) per day. The 5-ESAL pavement section is for light-duty areas, such as automobile parking lots. The 75- and 150-ESAL pavements sections are for heavier traffic loading. It is critical that the project owner, developer, civil engineer, and other design professionals involved with the project confirm that the arbitrarily selected traffic conditions are appropriate. If the traffic conditions are not appropriate, Giles must be notified; supplemental pavement recommendations will be provided based on other traffic conditions. If a pavement section is subject to a traffic condition greater than the design condition, increased maintenance and premature failure should be expected. Local codes may require specific testing to determine soil-support characteristics, and minimum pavement-section thicknesses might be required.

Based on the test borings, and because the characteristics of fill materials that will be used to raise the site are unknown, the recommended pavement sections were developed based on an assumed field CBR value of 4 and a *Modulus of Subgrade Reaction* (K_{V1}) of 100 psi/in. Engineered fill that is placed in proposed pavement areas is recommended to have a CBR value and a *Modulus of Subgrade Reaction* (K_{V1}) at least equal to the design values. Also, the fill is recommended to be placed and compacted per this report.

TABLE 2
RECOMMENDED ASPHALT-CONCRETE PAVEMENT SECTIONS

Material	Arbitrarily Selected Traffic Condition (Per Day)			Wisconsin DOT Standard Specifications
	5 ESALs	75 ESALs	150 ESALs	
Hot-Mix Asphalt Surface Course	1.5 inches	2.0 inches	2.0 inches	Section 460
Hot-Mix Asphalt Binder Course	2.5 inches	3.0 inches	3.5 inches	Section 460
Dense-Graded Aggregate Base Course	8.0 inches	10.0 inches	11.0 inches	Section 305 1¼-inch Crushed Stone
ESAL = 18-kip equivalent single axle loads (per day)				

Portland Cement Concrete (PCC) pavement could be used within the proposed pavement areas. Additionally, PCC pavement is recommended in all high-stress areas, such as the site-access (entrance/exit) aprons, where trucks will turn or will be parked, and in loading-dock areas. The following table provides the recommended PCC thicknesses for the traffic conditions given above. PCC pavement in loading-dock areas is recommended to be at least 8 inches thick, and might need to be thicker depending on the actual load conditions.

TABLE 3
RECOMMENDED PORTLAND CEMENT CONCRETE PAVEMENT SECTIONS

Material	Arbitrarily Selected Traffic Condition (Per Day)			Wisconsin DOT Standard Specifications
	5 ESALs	75 ESALs	150 ESALs	
Portland Cement Concrete	6.0 inches	7.0 inches	8.0 inches	Section 460
Dense-Graded Aggregate Base Course	4.0 inches	4.0 inches	4.0 inches	Section 305 1¼-inch Crushed Stone
ESAL = 18-kip equivalent single axle loads (per day)				

PCC pavement is recommended to be underlain by a minimum 4-inch-thick compacted aggregate base course. Base materials should be well-graded and are recommended to be approved by a geotechnical engineer before placement. Concrete should have a minimum 28-day compressive strength of 4,000 psi with 4 to 7 percent air entrainment. Control-joint spacing should be determined in accordance with the current ACI code. Expansion joints should be provided where pavement abuts fixed objects, such as the building and light poles. Load-transfer reinforcement is recommended, where applicable. Materials and construction procedures for concrete pavement and the aggregate base course are recommended to be in accordance with Wisconsin DOT Standard Specifications Section 415 and Section 305, respectively.

General Pavement Considerations

The pavement recommendations assume that the pavement subgrade will be prepared in accordance with this report, the base course will be properly drained, and a geotechnical engineer will observe and test pavement construction. Pavement was designed based on AASHTO design parameters for a twenty-year design period. Pavement maintenance along with a major rehabilitation after about 8 to 10 years should be expected. Local codes may require specific testing to determine soil support characteristics and/or minimum pavement section thickness might be required.

8.7. Initial Stormwater Infiltration Screening

A stormwater basin is proposed to be constructed at the southwest corner of the improvements area, and a stormwater basin is planned to be constructed at the southeast corner. Proposed locations of the stormwater basins are shown on the *Test Boring Location Plan*. It is understood

that the bottom of the southwest basin is planned to be at ±El. 21. The planned bottom elevation of the southeast basin is unknown, but is expected to be below ±El. 30. As described above, it is estimated that the water table was between ±El. 28 and ±El. 32 at the test boring locations, when the test borings were conducted. Therefore, because of shallow groundwater, the proposed stormwater basin locations are considered to be **unsuitable** for the infiltration of stormwater through the use of infiltration devices, such as stormwater basins. Giles considers the site to be exempt from stormwater infiltration requirements per section NR 151.12(5)(c)6.a of the Wisconsin Administrative Code and WDNR 1002 guidelines.

8.8. Improvements Area Preparation Recommendations

This section deals with preparation of the improvements area, including preparation of floor slab, pavement, and engineered fill areas. The means and methods of site preparation will greatly depend on the weather conditions before and during construction, the subsurface conditions that are exposed during earthwork operations, and the finalized details of the proposed development. Therefore, only generalized site preparation recommendations are given. In addition to being generalized, the following recommendations are abbreviated; the *Guide Specifications* in Appendix D gives further recommendations. The *Guide Specifications* should be read along with this section. Also, the *Guide Specifications* are recommended to be used as an aid to develop the project specifications.

Stripping and Removal

Existing pavement, surface vegetation, trees and bushes (including root-balls), topsoil with adverse organic content, and otherwise unsuitable materials are recommended to be removed from the proposed addition area, future pavement areas, other structural areas, and areas where engineered fill will be placed. Stripping and removal should extend at least several feet beyond proposed the improvements area, where feasible.

Benching, Proof-Rolling, and Fill Placement

Following the recommended stripping and removal, and once the improvements area is cut (lowered) as needed, the subgrade is recommended to be benched to develop proper support between existing soil and new engineered fill. Locations, heights, lengths, and widths of the benches are recommended to be approved by a geotechnical engineer prior to the benching operations. If the improvements area is not properly benched before placing engineered fill, the engineered fill could move laterally, causing damage to the proposed improvements, and possibly also to the existing construction.

After the subgrade is properly benched, the improvements area is recommended to be proof-rolled with a fully-loaded, tandem-axle dump truck (or other suitable construction equipment) to help locate unstable soil based on subgrade deflection caused by wheel loads of the proof-roll

equipment. The entire improvements area is recommended to be proof-rolled and, where feasible, proof-rolling should extend at least several feet beyond improvements area. However, proof-roll equipment must be kept a sufficient distance from the existing building and other existing construction, as existing construction could be damaged during proof-rolling. Also, for safety, proof-roll equipment must be kept a sufficient distance from earthwork benches and excavations. **Because of the existing fill, it is critical that a geotechnical engineer observe proof-roll operations and evaluate the subgrade stability based on those observations. Areas that are not accessible to proof-roll equipment are recommended to be evaluated by a geotechnical engineer using appropriate means and methods.**

Due to the existing fill and shallow groundwater, it is expected that unstable materials will be encountered during proof-rolling/testing. Subgrade improvement, including over-excavation, is expected to be necessary to develop a stable subgrade. Areas requiring improvement could be large and improvement methods might need to extend significantly below the planned subgrade. Areas requiring improvement should be defined during construction with the assistance of a geotechnical engineer. Also, specific improvement methods should be determined during construction on an area-by-area basis, depending on the site conditions and results of proof-rolling/testing. Where subgrade improvement is needed, it might be necessary/beneficial to construct "test strips" to determine the most cost-effective and appropriate means of developing a suitable subgrade.

The improvements area is recommended to be raised, where necessary, to the planned finished grade with engineered fill immediately after the subgrade is confirmed to be stable and suitable to support the proposed site improvements. Engineered fill is recommended to be placed in relatively thin layers (lifts) layers that are uniform in elevation. Each layer of engineered fill is recommended to be compacted to at least 95 percent of the fill material's maximum dry density determined from the Standard Proctor compaction test (ASTM D698). As an exception, the in-place dry density of engineered fill within one foot of the pavement subgrade is recommended to be compacted to at least 100 percent of the fill material's maximum dry density. The water content of fill material is recommended to be uniform and within a narrow range of the optimum moisture content, also determined by the Standard Proctor compaction test. Item Nos. 4 and 5 of the *Guide Specifications* give more information pertaining to selection and compaction of engineered fill.

Engineered fill that does not meet the density and water content requirements is recommended to be replaced with new fill material, or scarified to a sufficient depth (likely 6 to 12 inches, or more), moisture-conditioned, and compacted to the required density. A subsequent lift of fill should only be placed after a geotechnical engineer confirms that the previous lift was properly placed and compacted. Subgrade soil will likely need to be recompacted immediately before construction, since equipment traffic and adverse weather may reduce soil stability.

Because of the shallow water table, and sensitive site-soil, caution is recommended to be taken when using vibratory compaction equipment at the site. Vibratory compaction could cause soil to become unstable; therefore, it might be necessary to use static compaction equipment.

Use of Site Soil as Engineered Fill

Site soil that does not contain over-sized materials, adverse organic content, or other deleterious materials, could be used as engineered fill. However, due to the variability of the existing fill, it might not be possible to monitor the in-place compaction and moisture content of non-native site soil using a nuclear gauge or sand cone, since the maximum dry density and optimum moisture content of the soil would also be variable. Instead, a method specification might need to be developed for placement and compaction of non-native site soil used as fill. In general, a method specification should be based on the actual compaction equipment used, and should specify a maximum lift thickness, minimum number and orientation of passes with the compaction equipment, and minimum overlap of passes.

Site soil will likely need to be moisture conditioned (uniformly moistened or dried) prior to use as engineered fill. If construction is during adverse weather (discussed below), drying site soil will likely not be feasible. In that case, fill material might need to be imported to the site. Additional recommendations regarding fill selection, placement and compaction are given in the *Guide Specifications*.

8.9. Generalized Construction Considerations

Adverse Weather

Site soil is moisture sensitive and will become unstable when exposed to adverse weather, such as rain, snow, and freezing temperatures. Therefore, it might be necessary to remove or stabilize the upper 6 to 12 inches (or more) of soil due to adverse weather, which commonly occurs during late fall, winter, and early spring. At least some over-excavation and/or stabilization of unstable soil should be expected if construction is during or after adverse weather. Because site preparation is weather dependent, bids for site preparation, and other earthwork activities, should consider the time of year that construction will be conducted.

To protect soil from adverse weather, the site surface is recommended to be smoothly graded and contoured during construction to divert surface water away from construction areas. Contoured subgrades are recommended to be rolled with a smooth-drum compactor, before precipitation, to "seal" the surface. Furthermore, construction traffic should be restricted to certain aggregate-covered areas to limit traffic-related soil disturbance. Foundation, floor slab, and pavement construction should begin immediately after suitable support is confirmed.

Construction Dewatering

Filtered sump pumps drawing water from sump pits excavated in the bottom of construction trenches are expected to be adequate to remove water that collects in shallow excavations that are above, and possibly slightly below, the water table. However, multiple sump pumps might be necessary. Excavated sump pits should be fully lined with geotextile and filled with open-graded, free-draining aggregate. Specialized dewatering methods might be necessary to dewater deeper excavations. Improper dewatering could cause support-related problems at the site and in the surrounding area. Specialized dewatering should, therefore, be performed by a specialty contractor. It is recommended that a geotechnical engineer monitor and approve dewatering.

Excavation Stability

Caving and sloughing of excavations should be expected, unless the excavation walls are properly sloped, benched, and/or shored. Caving could be abrupt. Excavations are recommended to be made in accordance with current OSHA excavation and trench safety standards, and other applicable requirements. Excavation walls are recommended to be sloped, benched, and/or braced to develop and maintain a safe work environment. Temporary shoring must be designed according to applicable regulatory requirements. Contractors are responsible for excavation safety.

Questionable Materials

Questionable materials, where encountered, are recommended to be evaluated by a geotechnical engineer to determine if removal and replacement with engineered fill is necessary. Disposal of unsuitable material should be in accordance with local, state, and federal regulations for the material type. This report might need to be revised if conditions encountered during construction differ from those shown on the *Test Boring Logs*.

Existing Utilities

All existing utilities are recommended to be identified and located, and any planned to be maintained should be relocated outside the addition area. Utilities that are not reused should be capped-off and removed in accordance with local codes and ordinances. Excavations for the removal of utilities are recommended to be backfilled with engineered fill, placed under engineering-controlled conditions. Grading operations must be done carefully so that existing utilities are not damaged or disturbed. Utility elevations, locations, and types should be checked relative to the planned construction.

8.10. Recommended Construction Materials Testing Services

This report was prepared assuming that a geotechnical engineer will perform Construction Materials Testing ("CMT") services during construction of the proposed development. It might be necessary for Giles to provide supplemental geotechnical recommendations based on the results of CMT services and specific details of the project not known at this time.

9.0 BASIS OF REPORT

This report is strictly based on the project description given earlier in this report. Giles must be notified if any part of the project description, or our assumptions about the proposed project, are not accurate so that this report can be amended, if needed. This report is based on the assumption that the facility will be designed and constructed according to the codes that govern construction at the site.

The conclusions and recommendations in this report are based on estimated subsurface conditions as shown on the *Test Boring Logs*. Giles must be notified if the subsurface conditions that are encountered during construction of the proposed development differ from those shown on the *Test Boring Logs* because this report will likely need to be revised. General comments and limitations of this report are given in the appendix.

The conclusions and recommendations presented in this report have been promulgated in accordance with generally accepted professional engineering practices in the field of geotechnical engineering. No other warranty is either expressed or implied.

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 16N. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was provided by the Wisconsin Regional Orthophotography Consortium (WROC). The aerial photography was acquired in the spring of 2010 to create 1":1000' scale digital orthophotos with 18-inch resolution.

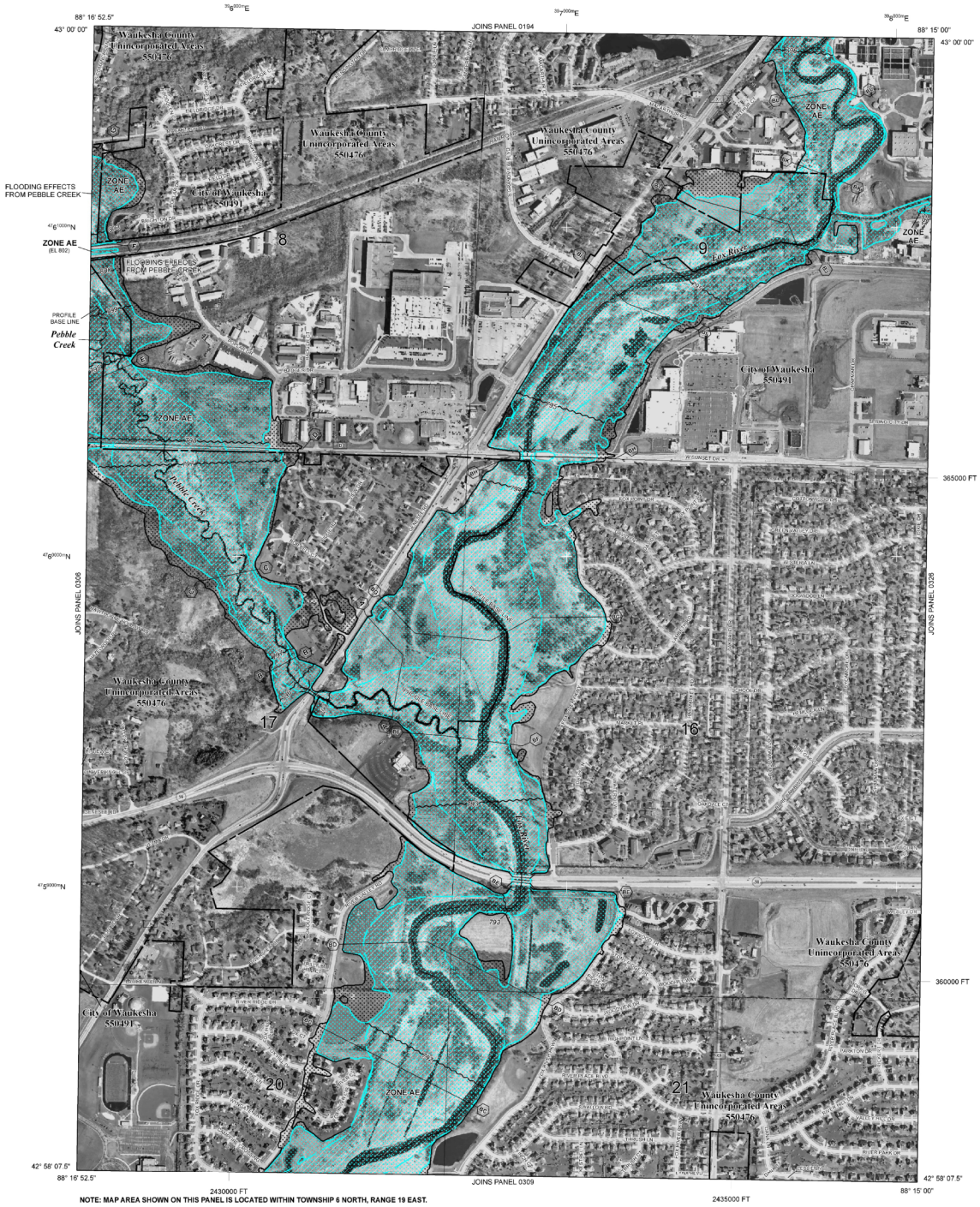
The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 6 NORTH, RANGE 19 EAST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A — Cross section line

23 — 23 — Transect line

Culvert

Bridge

45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere

3100000 FT — 5000-foot ticks: Wisconsin State Plane South Zone (FIPS Zone 4803), Lambert Conformal Conic projection

4869000m N — 1000-meter Universal Transverse Mercator grid values, zone 16N

DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
November 19, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

November 5, 2014 — to update the vertical datum, to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, to reflect updated topographic information, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0307G

FIRM

FLOOD INSURANCE RATE MAP

WAUKESHA COUNTY, WISCONSIN AND INCORPORATED AREAS

PANEL 307 OF 500

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

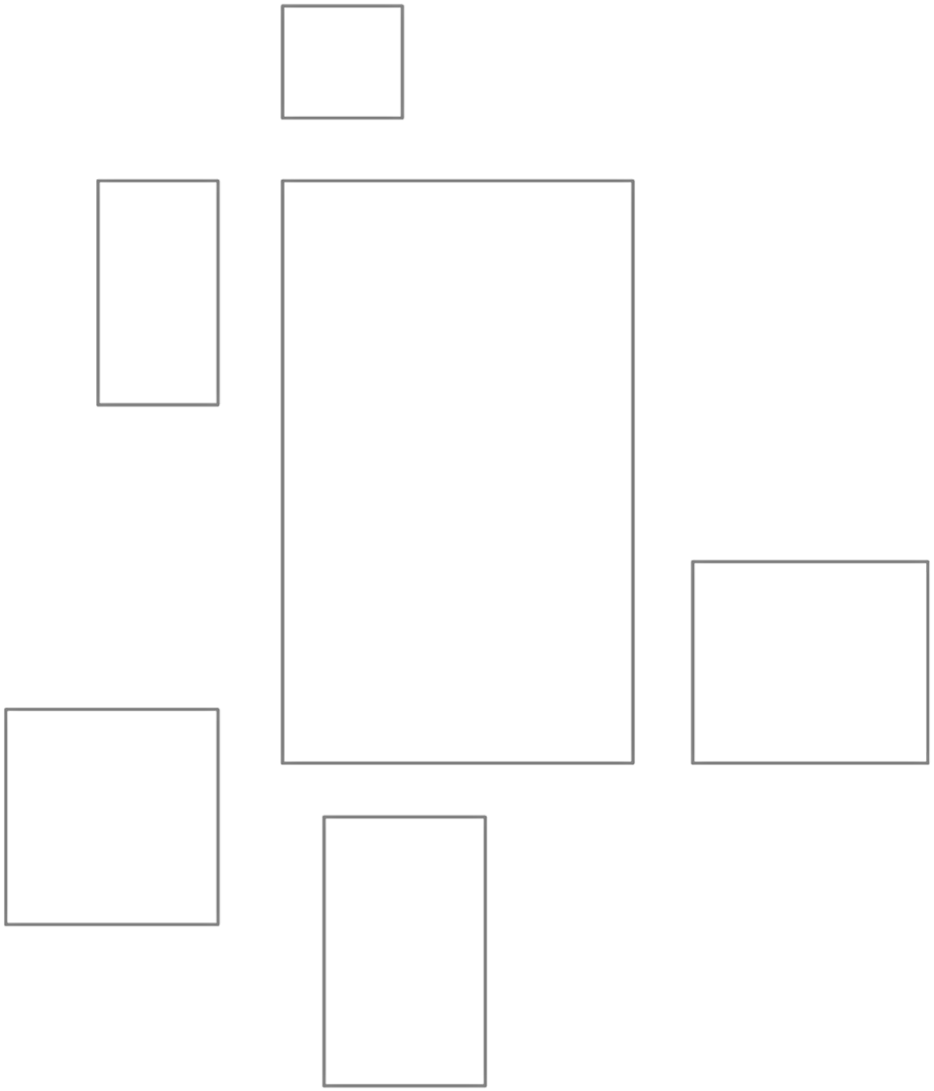
COMMUNITY	NUMBER	PANEL	SUFFIX
WAUKESHA, CITY OF	550491	0307	G
WAUKESHA COUNTY	550476	0307	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 55133C0307G

MAP REVISED NOVEMBER 5, 2014

Federal Emergency Management Agency



2	**Appendix**: PRE-DEV CONDITIONS

NORTH

GRAPHICAL SCALE (FEET)

0 1" = 150' 300'

AREA B-2
4.23 ACRES

AREA 1S
AREA 2S
3.05 ACRES

AREA 3S
0.41 ACRES

AREA A-1
AREA 4S
7.11 ACRES

BASIN 1B

BASIN 2B

AREA 5SA
1.75 ACRES

AREA 5SB
BASIN 3B
1.49 ACRES

AREA B-1
11.46 ACRES

AREA A-2
8.88 ACRES

BASIN 2P

BADGER COURT

BADGER DRIVE

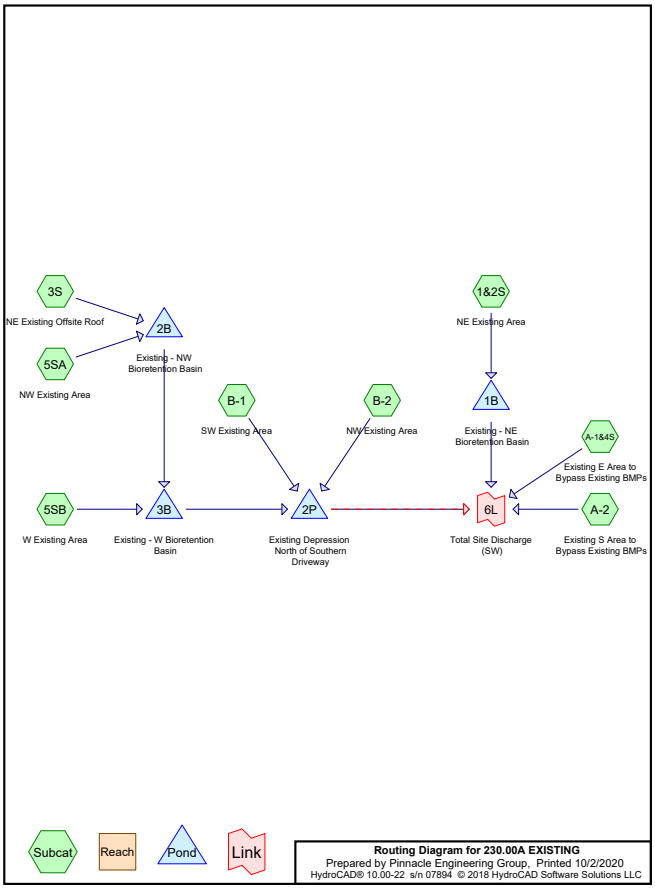
2:\PROJECTS\2013\230.00A-WI\CAD\EXHIBITS\203.00A SWMP - EX DRNG AREA EXHIBIT.DWG 8/20/2020 5:03 PM

SOUTH BLDG EXPANSION - SWMP EXISTING DRAINAGE AREA MAP

08/19/20

PINNACLE ENGINEERING GROUP
20725 WATERTOWN ROAD | SUITE 100 | BROOKFIELD, WI 53186 | WWW.PINNACLE-ENGR.COM |

PLAN | DESIGN | DELIVER **PEG JOB#** 203.00A



Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
14.937	61	>75% Grass cover, Good, HSG B (1&2S, 5SA, 5SB, A-1&4S, A-2, B-1, B-2)
12.520	98	Paved parking, HSG B (1&2S, 5SB, A-1&4S, A-2, B-1, B-2)
10.923	98	Roofs, HSG B (1&2S, 3S, 5SA, B-1, B-2)
38.380	**84**	**TOTAL AREA**

Time span=0.00-120.00 hrs, dt=0.10 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1&2S: NE Existing Area Runoff Area=3.050 ac 72.46% Impervious Runoff Depth=1.30"
Tc=6.0 min CN=88 Runoff=6.31 cfs 0.329 af

Subcatchment3S: NE Existing Offsite Runoff Area=0.410 ac 100.00% Impervious Runoff Depth=2.17"
Tc=6.0 min CN=98 Runoff=1.28 cfs 0.074 af

Subcatchment5SA: NW Existing Area Runoff Area=1.750 ac 67.43% Impervious Runoff Depth=1.16"
Tc=6.0 min CN=86 Runoff=3.24 cfs 0.170 af

Subcatchment5SB: W Existing Area Runoff Area=1.490 ac 35.44% Impervious Runoff Depth=0.55"
Tc=6.0 min CN=74 Runoff=1.17 cfs 0.069 af

SubcatchmentA-1&4S: Existing E Area to Runoff Area=7.110 ac 94.51% Impervious Runoff Depth=1.96"
Flow Length=535' Tc=29.6 min CN=96 Runoff=12.03 cfs 1.163 af

SubcatchmentA-2: Existing S Area to Runoff Area=8.880 ac 32.84% Impervious Runoff Depth=0.51"
Flow Length=535' Tc=29.6 min CN=73 Runoff=3.47 cfs 0.381 af

SubcatchmentB-1: SW Existing Area Runoff Area=11.460 ac 61.57% Impervious Runoff Depth=1.04"
Flow Length=535' Tc=29.6 min CN=84 Runoff=10.57 cfs 0.992 af

SubcatchmentB-2: NW Existing Area Runoff Area=4.230 ac 57.28% Impervious Runoff Depth=0.93"
Flow Length=535' Tc=29.6 min CN=82 Runoff=3.43 cfs 0.326 af

Pond 1B: Existing - NE Bioretention Basin Peak Elev=36.84' Storage=2,056 cf Inflow=6.31 cfs 0.329 af
Discarded=0.14 cfs 0.063 af Primary=4.67 cfs 0.266 af Outflow=4.81 cfs 0.329 af

Pond 2B: Existing - NW Bioretention Basin Peak Elev=33.23' Storage=2,870 cf Inflow=4.51 cfs 0.244 af
Discarded=0.12 cfs 0.074 af Primary=2.08 cfs 0.169 af Outflow=2.20 cfs 0.244 af

Pond 2P: Existing Depression North of Peak Elev=24.74' Storage=11,675 cf Inflow=16.00 cfs 1.495 af
Primary=15.66 cfs 1.258 af Secondary=0.00 cfs 0.000 af Outflow=15.66 cfs 1.258 af

Pond 3B: Existing - W Bioretention Basin Peak Elev=30.98' Storage=2,513 cf Inflow=3.04 cfs 0.238 af
Discarded=0.11 cfs 0.061 af Primary=2.01 cfs 0.177 af Outflow=2.13 cfs 0.238 af

Link 6L: Total Site Discharge (SW) Inflow=33.94 cfs 3.069 af
Primary=33.94 cfs 3.069 af

Total Runoff Area = 38.380 ac Runoff Volume = 3.504 af Average Runoff Depth = 1.10"
38.92% Pervious = 14.937 ac 61.08% Impervious = 23.443 ac

Summary for Subcatchment 1&2S: NE Existing Area

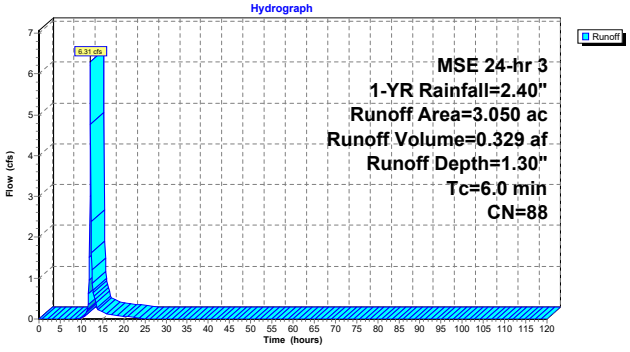
Runoff = 6.31 cfs @ 12.12 hrs, Volume= 0.329 af, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
0.820	98	Paved parking, HSG B
0.840	61	>75% Grass cover, Good, HSG B
1.390	98	Roofs, HSG B
3.050	88	Weighted Average
0.840		27.54% Pervious Area
2.210		72.46% Impervious Area

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

Subcatchment 1&2S: NE Existing Area



Summary for Subcatchment 3S: NE Existing Offsite Roof

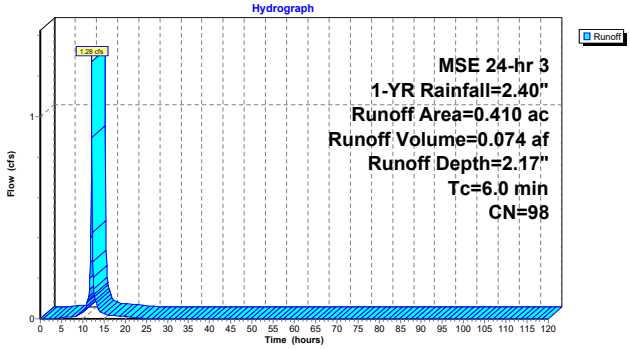
Runoff = 1.28 cfs @ 12.11 hrs, Volume= 0.074 af, Depth= 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
0.410	98	Roofs, HSG B
0.410		100.00% Impervious Area

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

Subcatchment 3S: NE Existing Offsite Roof



Summary for Subcatchment 5SA: NW Existing Area

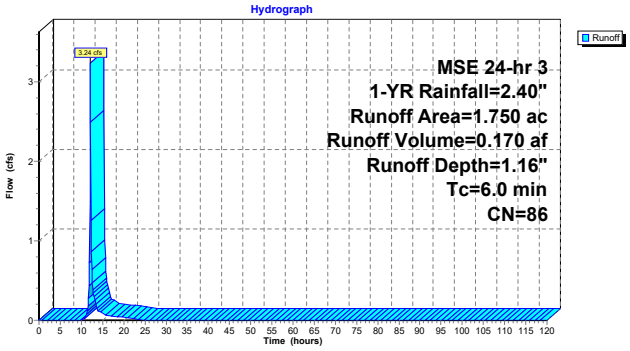
Runoff = 3.24 cfs @ 12.12 hrs, Volume= 0.170 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
0.570	61	>75% Grass cover, Good, HSG B
1.180	98	Roofs, HSG B
1.750	86	Weighted Average
0.570		32.57% Pervious Area
1.180		67.43% Impervious Area

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

Subcatchment 5SA: NW Existing Area



Summary for Subcatchment 5SB: W Existing Area

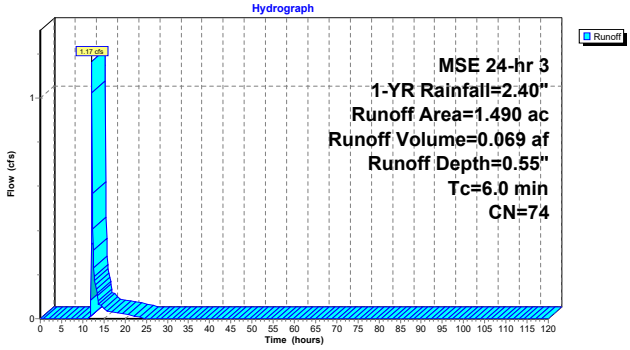
Runoff = 1.17 cfs @ 12.14 hrs, Volume= 0.069 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
0.528	98	Paved parking, HSG B
0.962	61	>75% Grass cover, Good, HSG B
1.490	74	Weighted Average
0.962		64.56% Pervious Area
0.528		35.44% Impervious Area

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

Subcatchment 5SB: W Existing Area



Summary for Subcatchment A-1&4S: Existing E Area to Bypass Existing BMPs

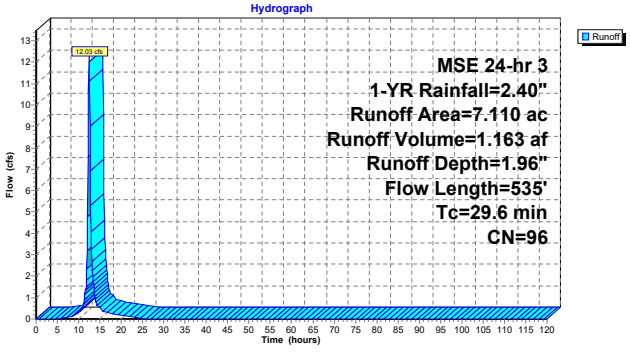
Runoff = 12.03 cfs @ 12.41 hrs, Volume= 1.163 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
6.720	98	Paved parking, HSG B
0.390	61	>75% Grass cover, Good, HSG B
7.110	96	Weighted Average
0.390		5.49% Pervious Area
6.720		94.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-1&4S: Existing E Area to Bypass Existing BMPs



Summary for Subcatchment A-2: Existing S Area to Bypass Existing BMPs

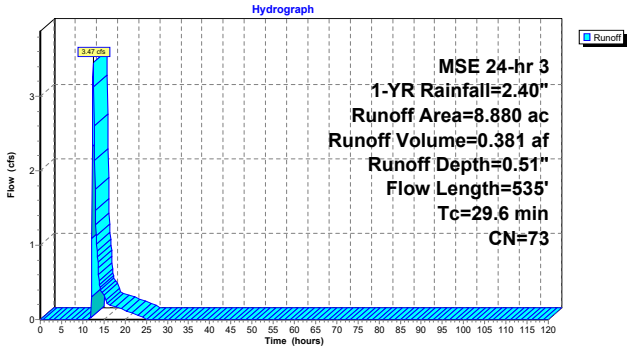
Runoff = 3.47 cfs @ 12.49 hrs, Volume= 0.381 af, Depth= 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
2.916	98	Paved parking, HSG B
5.964	61	>75% Grass cover, Good, HSG B
8.880	73	Weighted Average
5.964		67.16% Pervious Area
2.916		32.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-2: Existing S Area to Bypass Existing BMPs



Summary for Subcatchment B-1: SW Existing Area

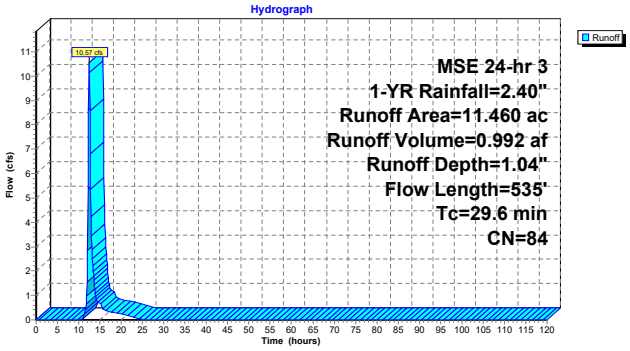
Runoff = 10.57 cfs @ 12.44 hrs, Volume= 0.992 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
0.850	98	Paved parking, HSG B
6.206	98	Roofs, HSG B
4.404	61	>75% Grass cover, Good, HSG B
11.460	84	Weighted Average
4.404		38.43% Pervious Area
7.056		61.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-1: SW Existing Area



Summary for Subcatchment B-2: NW Existing Area

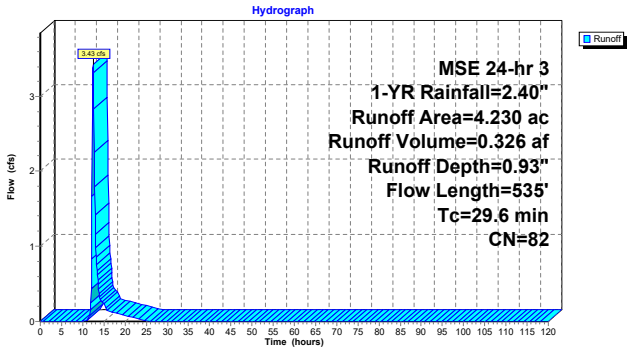
Runoff = 3.43 cfs @ 12.44 hrs, Volume= 0.326 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
0.686	98	Paved parking, HSG B
1.807	61	>75% Grass cover, Good, HSG B
0.658	98	Roofs, HSG B
1.079	98	Roofs, HSG B
4.230	82	Weighted Average
1.807		42.72% Pervious Area
2.423		57.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-2: NW Existing Area



Summary for Pond 1B: Existing - NE Bioretention Basin

Inflow Area = 3.050 ac, 72.46% Impervious, Inflow Depth = 1.30" for 1-YR event
Inflow = 6.31 cfs @ 12.12 hrs, Volume= 0.329 af
Outflow = 4.81 cfs @ 12.21 hrs, Volume= 0.329 af, Atten= 24%, Lag= 5.5 min
Discarded = 0.14 cfs @ 12.21 hrs, Volume= 0.063 af
Primary = 4.67 cfs @ 12.21 hrs, Volume= 0.266 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 36.84' @ 12.21 hrs Surf.Area= 3,757 sf Storage= 2,056 cf

Plug-Flow detention time= 10.7 min calculated for 0.329 af (100% of inflow)
Center-of-Mass det. time= 10.7 min (814.2 - 803.5)

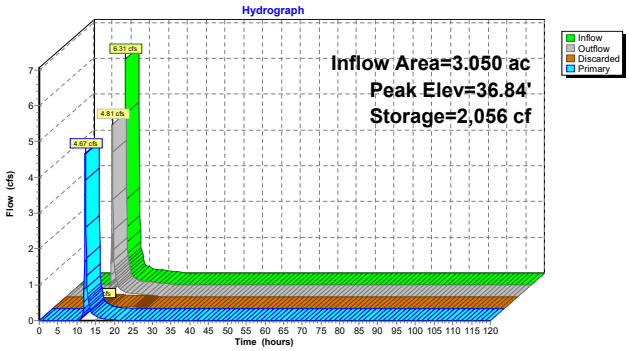
Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	18,126 cf	**5.00'W x 240.00'L x 3.00'H Prismatoid Z=6.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	36.00'	**24.0" W x 15.0" H, R=14.8"/33.1" Pipe Arch Culvert** L= 100.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 36.00' / 34.10' S= 0.0190 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.01 sf
#2	Primary	36.30'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	36.00'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.14 cfs @ 12.21 hrs HW=36.83' (Free Discharge)
└**3=Exfiltration** (Controls 0.14 cfs)

Primary OutFlow Max=4.57 cfs @ 12.21 hrs HW=36.83' TW=24.60' (Fixed TW Elev= 24.60')
├**1=Culvert** (Inlet Controls 4.08 cfs @ 2.79 fps)
└**2=Orifice/Grate** (Orifice Controls 0.50 cfs @ 2.53 fps)

Pond 1B: Existing - NE Bioretention Basin



Summary for Pond 2B: Existing - NW Bioretention Basin

Inflow Area = 2.160 ac, 73.61% Impervious, Inflow Depth = 1.35" for 1-YR event
Inflow = 4.51 cfs @ 12.12 hrs, Volume= 0.244 af
Outflow = 2.20 cfs @ 12.28 hrs, Volume= 0.244 af, Atten= 51%, Lag= 9.9 min
Discarded = 0.12 cfs @ 12.28 hrs, Volume= 0.074 af
Primary = 2.08 cfs @ 12.28 hrs, Volume= 0.169 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 33.23' @ 12.28 hrs Surf.Area= 2,713 sf Storage= 2,870 cf

Plug-Flow detention time= 42.1 min calculated for 0.243 af (100% of inflow)
Center-of-Mass det. time= 42.1 min (835.5 - 793.3)

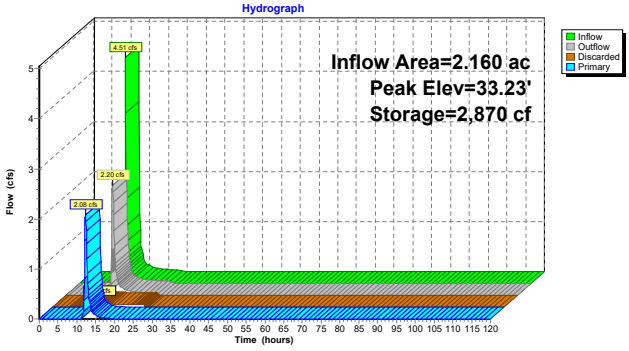
Volume	Invert	Avail.Storage	Storage Description
#1	31.70'	13,445 cf	**10.00'W x 110.00'L x 4.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	31.70'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 25.00'
#2	Primary	32.00'	**10.0" Round Culvert** L= 110.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 32.00' / 29.50' S= 0.0227 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.12 cfs @ 12.28 hrs HW=33.22' (Free Discharge)
└**1=Exfiltration** (Controls 0.12 cfs)

Primary OutFlow Max=2.07 cfs @ 12.28 hrs HW=33.21' (Free Discharge)
└**2=Culvert** (Inlet Controls 2.07 cfs @ 3.80 fps)

Pond 2B: Existing - NW Bioretention Basin



Summary for Pond 2P: Existing Depression North of Southern Driveway

Inflow Area = 19.340 ac, 59.96% Impervious, Inflow Depth = 0.93" for 1-YR event
Inflow = 16.00 cfs @ 12.44 hrs, Volume= 1.495 af
Outflow = 15.66 cfs @ 12.50 hrs, Volume= 1.258 af, Atten= 2%, Lag= 3.7 min
Primary = 15.66 cfs @ 12.50 hrs, Volume= 1.258 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 24.74' @ 12.50 hrs Surf.Area= 10,040 sf Storage= 11,675 cf

Plug-Flow detention time= 76.9 min calculated for 1.258 af (84% of inflow)
Center-of-Mass det. time= 20.4 min (851.6 - 831.2)

Volume	Invert	Avail.Storage	Storage Description
#1	20.81'	32,432 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

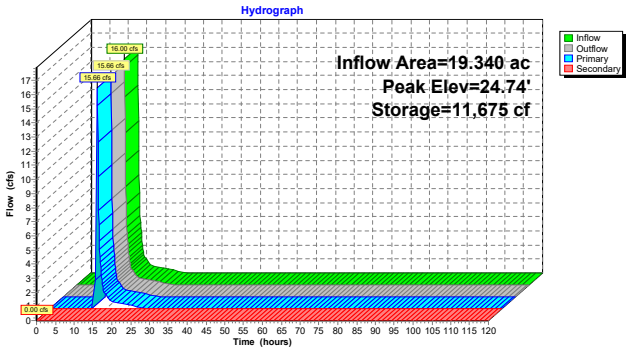
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.81	5	0	0
21.00	15	2	2
22.00	325	170	172
23.00	1,822	1,074	1,245
24.00	6,670	4,246	5,491
25.00	11,223	8,947	14,438
25.50	18,503	7,432	21,869
26.00	23,748	10,563	32,432

Device	Routing	Invert	Outlet Devices
#1	Primary	20.81'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 20.81' / 20.60' S= 0.0021 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#2	Primary	21.25'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 102.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 21.25' / 20.72' S= 0.0052 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#3	Secondary	25.50'	**100.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=15.68 cfs @ 12.50 hrs HW=24.74' TW=24.60' (Fixed TW Elev= 24.60')
└**1=Culvert** (Outlet Controls 7.87 cfs @ 1.34 fps)
└**2=Culvert** (Outlet Controls 7.82 cfs @ 1.34 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.81' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Existing Depression North of Southern Driveway



Summary for Pond 3B: Existing - W Bioretention Basin

Inflow Area = 3.650 ac, 58.03% Impervious, Inflow Depth = 0.78" for 1-YR event
Inflow = 3.04 cfs @ 12.20 hrs, Volume= 0.238 af
Outflow = 2.13 cfs @ 12.49 hrs, Volume= 0.238 af, Atten= 30%, Lag= 17.3 min
Discarded = 0.11 cfs @ 12.49 hrs, Volume= 0.061 af
Primary = 2.01 cfs @ 12.49 hrs, Volume= 0.177 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 30.98' @ 12.49 hrs Surf.Area= 2,443 sf Storage= 2,513 cf

Plug-Flow detention time= 48.5 min calculated for 0.238 af (100% of inflow)
Center-of-Mass det. time= 48.5 min (841.1 - 792.6)

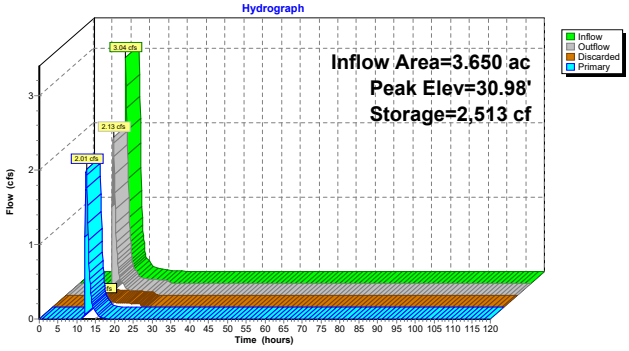
Volume	Invert	Avail.Storage	Storage Description
#1	29.50'	12,405 cf	**10.00'W x 100.00'L x 4.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	29.50'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 25.00'
#2	Primary	30.00'	**12.0" Round Culvert** L= 36.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 30.00' / 29.82' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Discarded OutFlow Max=0.11 cfs @ 12.49 hrs HW=30.98' (Free Discharge)
↑**1=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=2.01 cfs @ 12.49 hrs HW=30.98' TW=24.60' (Fixed TW Elev= 24.60')
↑**2=Culvert** (Barrel Controls 2.01 cfs @ 3.25 fps)

Pond 3B: Existing - W Bioretention Basin

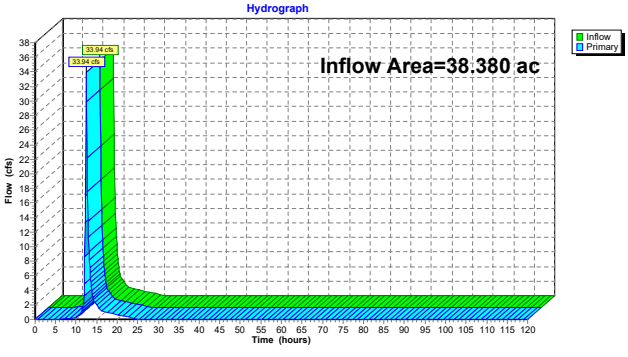


Summary for Link 6L: Total Site Discharge (SW)

Inflow Area = 38.380 ac, 61.08% Impervious, Inflow Depth = 0.96" for 1-YR event
Inflow = 33.94 cfs @ 12.45 hrs, Volume= 3.069 af
Primary = 33.94 cfs @ 12.45 hrs, Volume= 3.069 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs

Link 6L: Total Site Discharge (SW)



Time span=0.00-120.00 hrs, dt=0.10 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1&2S: NE Existing Area Runoff Area=3.050 ac 72.46% Impervious Runoff Depth=1.55"
Tc=6.0 min CN=88 Runoff=7.55 cfs 0.395 af

Subcatchment3S: NE Existing Offsite Runoff Area=0.410 ac 100.00% Impervious Runoff Depth=2.47"
Tc=6.0 min CN=98 Runoff=1.44 cfs 0.084 af

Subcatchment5SA: NW Existing Area Runoff Area=1.750 ac 67.43% Impervious Runoff Depth=1.41"
Tc=6.0 min CN=86 Runoff=3.93 cfs 0.205 af

Subcatchment5SB: W Existing Area Runoff Area=1.490 ac 35.44% Impervious Runoff Depth=0.72"
Tc=6.0 min CN=74 Runoff=1.59 cfs 0.090 af

SubcatchmentA-1&4S: Existing E Area to Runoff Area=7.110 ac 94.51% Impervious Runoff Depth=2.26"
Flow Length=535' Tc=29.6 min CN=96 Runoff=13.73 cfs 1.337 af

SubcatchmentA-2: Existing S Area to Runoff Area=8.880 ac 32.84% Impervious Runoff Depth=0.68"
Flow Length=535' Tc=29.6 min CN=73 Runoff=4.80 cfs 0.502 af

SubcatchmentB-1: SW Existing Area Runoff Area=11.460 ac 61.57% Impervious Runoff Depth=1.27"
Flow Length=535' Tc=29.6 min CN=84 Runoff=13.04 cfs 1.216 af

SubcatchmentB-2: NW Existing Area Runoff Area=4.230 ac 57.28% Impervious Runoff Depth=1.15"
Flow Length=535' Tc=29.6 min CN=82 Runoff=4.30 cfs 0.404 af

Pond 1B: Existing - NE Bioretention Basin Peak Elev=36.93' Storage=2,437 cf Inflow=7.55 cfs 0.395 af
Discarded=0.16 cfs 0.068 af Primary=5.54 cfs 0.327 af Outflow=5.70 cfs 0.395 af

Pond 2B: Existing - NW Bioretention Basin Peak Elev=33.44' Storage=3,465 cf Inflow=5.37 cfs 0.290 af
Discarded=0.13 cfs 0.080 af Primary=2.34 cfs 0.210 af Outflow=2.47 cfs 0.290 af

Pond 2P: Existing Depression North of Peak Elev=24.81' Storage=12,412 cf Inflow=19.76 cfs 1.853 af
Primary=19.35 cfs 1.616 af Secondary=0.00 cfs 0.000 af Outflow=19.35 cfs 1.616 af

Pond 3B: Existing - W Bioretention Basin Peak Elev=31.13' Storage=2,904 cf Inflow=3.62 cfs 0.300 af
Discarded=0.12 cfs 0.068 af Primary=2.43 cfs 0.232 af Outflow=2.55 cfs 0.300 af

Link 6L: Total Site Discharge (SW) Inflow=41.43 cfs 3.783 af
Primary=41.43 cfs 3.783 af

Total Runoff Area = 38.380 ac Runoff Volume = 4.235 af Average Runoff Depth = 1.32"
38.92% Pervious = 14.937 ac 61.08% Impervious = 23.443 ac

Summary for Subcatchment 1&2S: NE Existing Area

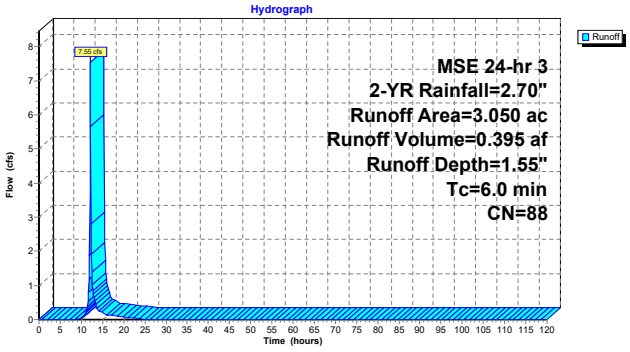
Runoff = 7.55 cfs @ 12.12 hrs, Volume= 0.395 af, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.820	98	Paved parking, HSG B
0.840	61	>75% Grass cover, Good, HSG B
1.390	98	Roofs, HSG B
3.050	88	Weighted Average
0.840		27.54% Pervious Area
2.210		72.46% Impervious Area

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

Subcatchment 1&2S: NE Existing Area



Summary for Subcatchment 3S: NE Existing Offsite Roof

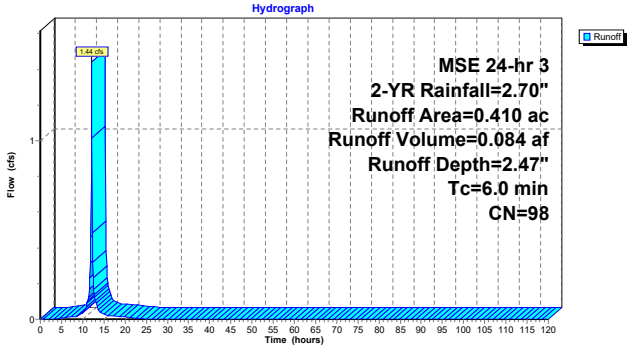
Runoff = 1.44 cfs @ 12.11 hrs, Volume= 0.084 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.410	98	Roofs, HSG B
0.410		100.00% Impervious Area

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

Subcatchment 3S: NE Existing Offsite Roof



Summary for Subcatchment 5SA: NW Existing Area

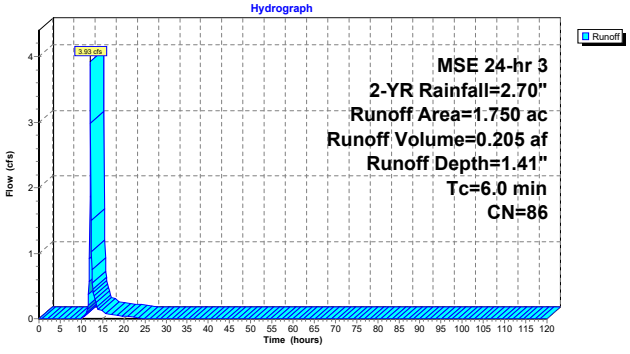
Runoff = 3.93 cfs @ 12.12 hrs, Volume= 0.205 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.570	61	>75% Grass cover, Good, HSG B
1.180	98	Roofs, HSG B
1.750	86	Weighted Average
0.570		32.57% Pervious Area
1.180		67.43% Impervious Area

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

Subcatchment 5SA: NW Existing Area



Summary for Subcatchment 5SB: W Existing Area

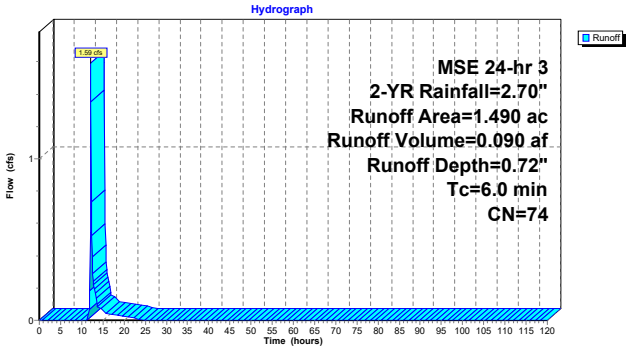
Runoff = 1.59 cfs @ 12.14 hrs, Volume= 0.090 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.528	98	Paved parking, HSG B
0.962	61	>75% Grass cover, Good, HSG B
1.490	74	Weighted Average
0.962		64.56% Pervious Area
0.528		35.44% Impervious Area

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

Subcatchment 5SB: W Existing Area



Summary for Subcatchment A-1&4S: Existing E Area to Bypass Existing BMPs

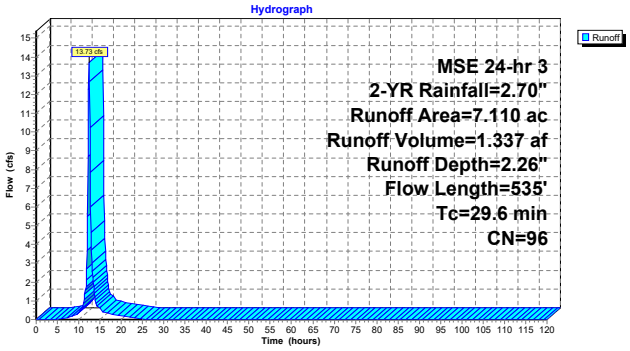
Runoff = 13.73 cfs @ 12.41 hrs, Volume= 1.337 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
6.720	98	Paved parking, HSG B
0.390	61	>75% Grass cover, Good, HSG B
7.110	96	Weighted Average
0.390		5.49% Pervious Area
6.720		94.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-1&4S: Existing E Area to Bypass Existing BMPs



Summary for Subcatchment A-2: Existing S Area to Bypass Existing BMPs

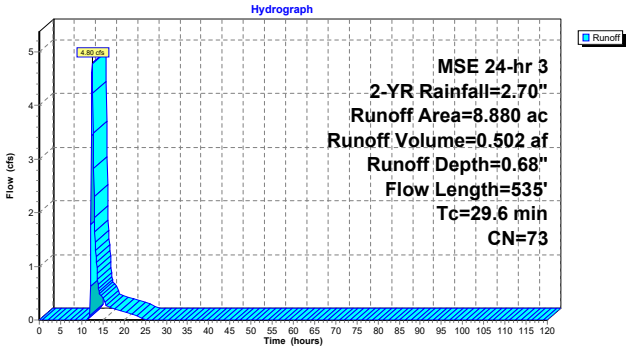
Runoff = 4.80 cfs @ 12.47 hrs, Volume= 0.502 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
2.916	98	Paved parking, HSG B
5.964	61	>75% Grass cover, Good, HSG B
8.880	73	Weighted Average
5.964		67.16% Pervious Area
2.916		32.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-2: Existing S Area to Bypass Existing BMPs



Summary for Subcatchment B-1: SW Existing Area

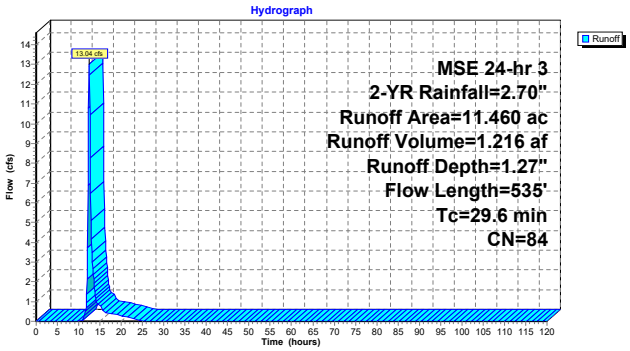
Runoff = 13.04 cfs @ 12.43 hrs, Volume= 1.216 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.850	98	Paved parking, HSG B
6.206	98	Roofs, HSG B
4.404	61	>75% Grass cover, Good, HSG B
11.460	84	Weighted Average
4.404		38.43% Pervious Area
7.056		61.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-1: SW Existing Area



Summary for Subcatchment B-2: NW Existing Area

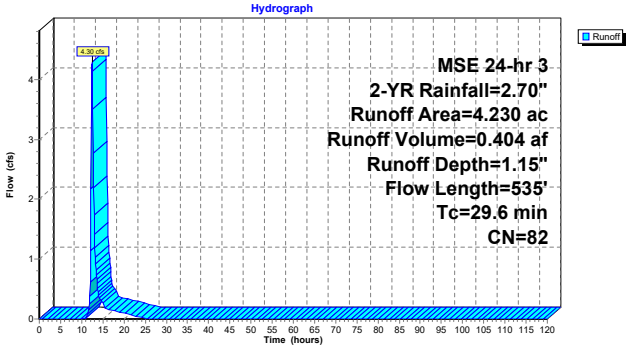
Runoff = 4.30 cfs @ 12.44 hrs, Volume= 0.404 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.686	98	Paved parking, HSG B
1.807	61	>75% Grass cover, Good, HSG B
0.658	98	Roofs, HSG B
1.079	98	Roofs, HSG B
4.230	82	Weighted Average
1.807		42.72% Pervious Area
2.423		57.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-2: NW Existing Area



Summary for Pond 1B: Existing - NE Bioretention Basin

Inflow Area = 3.050 ac, 72.46% Impervious, Inflow Depth = 1.55" for 2-YR event
Inflow = 7.55 cfs @ 12.12 hrs, Volume= 0.395 af
Outflow = 5.70 cfs @ 12.21 hrs, Volume= 0.395 af, Atten= 25%, Lag= 5.5 min
Discarded = 0.16 cfs @ 12.21 hrs, Volume= 0.068 af
Primary = 5.54 cfs @ 12.21 hrs, Volume= 0.327 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 36.93' @ 12.21 hrs Surf.Area= 4,067 sf Storage= 2,437 cf

Plug-Flow detention time= 10.5 min calculated for 0.395 af (100% of inflow)
Center-of-Mass det. time= 10.5 min (810.3 - 799.8)

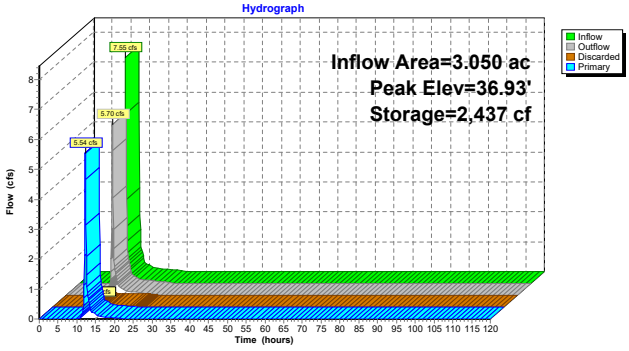
Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	18,126 cf	**5.00'W x 240.00'L x 3.00'H Prismatoid Z=6.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	36.00'	**24.0" W x 15.0" H, R=14.8"/33.1" Pipe Arch Culvert** L= 100.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 36.00' / 34.10' S= 0.0190 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.01 sf
#2	Primary	36.30'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	36.00'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.15 cfs @ 12.21 hrs HW=36.92' (Free Discharge)
└**3=Exfiltration** (Controls 0.15 cfs)

Primary OutFlow Max=5.45 cfs @ 12.21 hrs HW=36.92' TW=24.60' (Fixed TW Elev= 24.60')
├**1=Culvert** (Inlet Controls 4.87 cfs @ 2.99 fps)
└**2=Orifice/Grate** (Orifice Controls 0.58 cfs @ 2.94 fps)

Pond 1B: Existing - NE Bioretention Basin



Summary for Pond 2B: Existing - NW Bioretention Basin

Inflow Area = 2.160 ac, 73.61% Impervious, Inflow Depth = 1.61" for 2-YR event
Inflow = 5.37 cfs @ 12.12 hrs, Volume= 0.290 af
Outflow = 2.47 cfs @ 12.29 hrs, Volume= 0.290 af, Atten= 54%, Lag= 10.5 min
Discarded = 0.13 cfs @ 12.29 hrs, Volume= 0.080 af
Primary = 2.34 cfs @ 12.29 hrs, Volume= 0.210 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 33.44' @ 12.29 hrs Surf.Area= 2,958 sf Storage= 3,465 cf

Plug-Flow detention time= 40.4 min calculated for 0.290 af (100% of inflow)
Center-of-Mass det. time= 40.4 min (831.1 - 790.6)

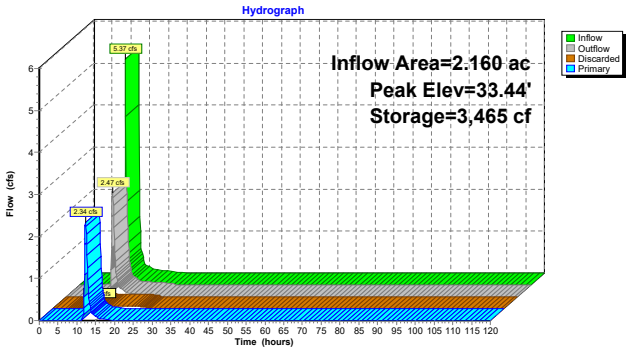
Volume	Invert	Avail.Storage	Storage Description
#1	31.70'	13,445 cf	**10.00'W x 110.00'L x 4.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	31.70'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 25.00'
#2	Primary	32.00'	**10.0" Round Culvert** L= 110.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 32.00' / 29.50' S= 0.0227 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.13 cfs @ 12.29 hrs HW=33.43' (Free Discharge)
└**1=Exfiltration** (Controls 0.13 cfs)

Primary OutFlow Max=2.33 cfs @ 12.29 hrs HW=33.43' (Free Discharge)
└**2=Culvert** (Inlet Controls 2.33 cfs @ 4.28 fps)

Pond 2B: Existing - NW Bioretention Basin



Summary for Pond 2P: Existing Depression North of Southern Driveway

Inflow Area = 19.340 ac, 59.96% Impervious, Inflow Depth = 1.15" for 2-YR event
Inflow = 19.76 cfs @ 12.44 hrs, Volume= 1.853 af
Outflow = 19.35 cfs @ 12.46 hrs, Volume= 1.616 af, Atten= 2%, Lag= 1.8 min
Primary = 19.35 cfs @ 12.46 hrs, Volume= 1.616 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 24.81' @ 12.47 hrs Surf.Area= 10,368 sf Storage= 12,412 cf

Plug-Flow detention time= 65.3 min calculated for 1.615 af (87% of inflow)
Center-of-Mass det. time= 16.5 min (843.7 - 827.2)

Volume	Invert	Avail.Storage	Storage Description
#1	20.81'	32,432 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

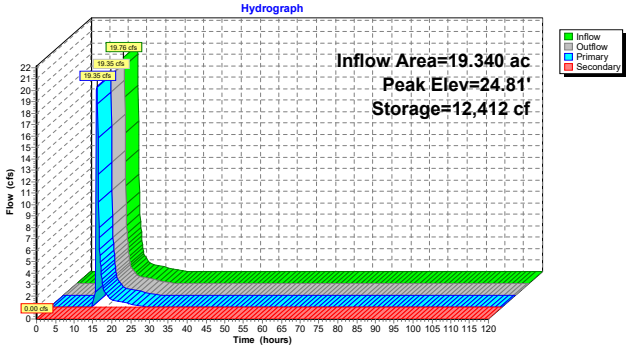
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.81	5	0	0
21.00	15	2	2
22.00	325	170	172
23.00	1,822	1,074	1,245
24.00	6,670	4,246	5,491
25.00	11,223	8,947	14,438
25.50	18,503	7,432	21,869
26.00	23,748	10,563	32,432

Device	Routing	Invert	Outlet Devices
#1	Primary	20.81'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 20.81' / 20.60' S= 0.0021 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#2	Primary	21.25'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 102.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 21.25' / 20.72' S= 0.0052 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#3	Secondary	25.50'	**100.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=19.16 cfs @ 12.46 hrs HW=24.81' TW=24.60' (Fixed TW Elev= 24.60')
└─**1=Culvert** (Outlet Controls 9.61 cfs @ 1.64 fps)
└─**2=Culvert** (Outlet Controls 9.55 cfs @ 1.63 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.81' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Existing Depression North of Southern Driveway



Summary for Pond 3B: Existing - W Bioretention Basin

Inflow Area = 3.650 ac, 58.03% Impervious, Inflow Depth = 0.99" for 2-YR event
Inflow = 3.62 cfs @ 12.18 hrs, Volume= 0.300 af
Outflow = 2.55 cfs @ 12.47 hrs, Volume= 0.300 af, Atten= 30%, Lag= 17.3 min
Discarded = 0.12 cfs @ 12.47 hrs, Volume= 0.068 af
Primary = 2.43 cfs @ 12.47 hrs, Volume= 0.232 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 31.13' @ 12.47 hrs Surf.Area= 2,610 sf Storage= 2,904 cf

Plug-Flow detention time= 45.1 min calculated for 0.300 af (100% of inflow)
Center-of-Mass det. time= 45.1 min (838.6 - 793.6)

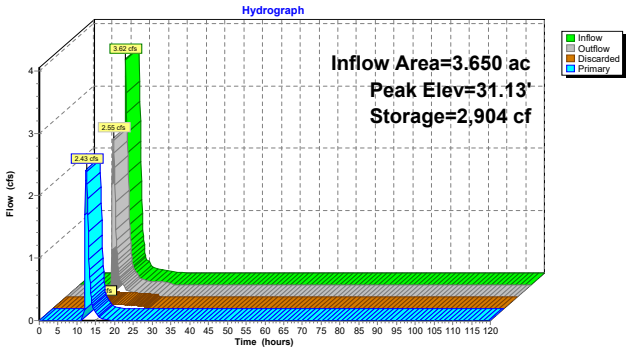
Volume	Invert	Avail.Storage	Storage Description
#1	29.50'	12,405 cf	**10.00'W x 100.00'L x 4.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	29.50'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 25.00'
#2	Primary	30.00'	**12.0" Round Culvert** L= 36.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 30.00' / 29.82' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Discarded OutFlow Max=0.12 cfs @ 12.47 hrs HW=31.13' (Free Discharge)
└─**1=Exfiltration** (Controls 0.12 cfs)

Primary OutFlow Max=2.42 cfs @ 12.47 hrs HW=31.13' TW=24.60' (Fixed TW Elev= 24.60')
└─**2=Culvert** (Barrel Controls 2.42 cfs @ 3.40 fps)

Pond 3B: Existing - W Bioretention Basin

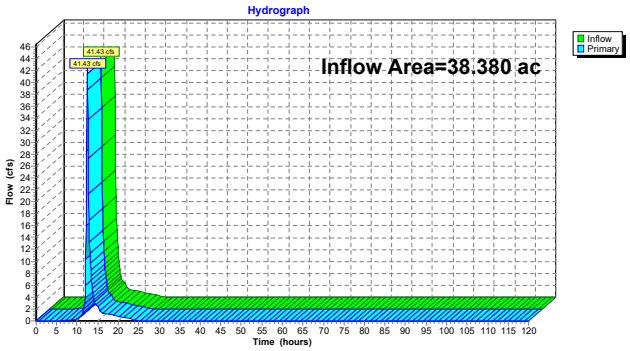


Summary for Link 6L: Total Site Discharge (SW)

Inflow Area = 38.380 ac, 61.08% Impervious, Inflow Depth = 1.18" for 2-YR event
Inflow = 41.43 cfs @ 12.44 hrs, Volume= 3.783 af
Primary = 41.43 cfs @ 12.44 hrs, Volume= 3.783 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs

Link 6L: Total Site Discharge (SW)



Time span=0.00-120.00 hrs, dt=0.10 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1&2S: NE Existing Area Runoff Area=3.050 ac 72.46% Impervious Runoff Depth=2.55"
Tc=6.0 min CN=88 Runoff=12.25 cfs 0.649 af

Subcatchment3S: NE Existing Offsite Runoff Area=0.410 ac 100.00% Impervious Runoff Depth=3.58"
Tc=6.0 min CN=98 Runoff=2.05 cfs 0.122 af

Subcatchment5SA: NW Existing Area Runoff Area=1.750 ac 67.43% Impervious Runoff Depth=2.37"
Tc=6.0 min CN=86 Runoff=6.59 cfs 0.346 af

Subcatchment5SB: W Existing Area Runoff Area=1.490 ac 35.44% Impervious Runoff Depth=1.46"
Tc=6.0 min CN=74 Runoff=3.41 cfs 0.181 af

SubcatchmentA-1&4S: Existing E Area to Runoff Area=7.110 ac 94.51% Impervious Runoff Depth=3.35"
Flow Length=535' Tc=29.6 min CN=96 Runoff=19.98 cfs 1.986 af

SubcatchmentA-2: Existing S Area to Runoff Area=8.880 ac 32.84% Impervious Runoff Depth=1.39"
Flow Length=535' Tc=29.6 min CN=73 Runoff=10.75 cfs 1.031 af

SubcatchmentB-1: SW Existing Area Runoff Area=11.460 ac 61.57% Impervious Runoff Depth=2.20"
Flow Length=535' Tc=29.6 min CN=84 Runoff=22.72 cfs 2.105 af

SubcatchmentB-2: NW Existing Area Runoff Area=4.230 ac 57.28% Impervious Runoff Depth=2.04"
Flow Length=535' Tc=29.6 min CN=82 Runoff=7.76 cfs 0.720 af

Pond 1B: Existing - NE Bioretention Basin Peak Elev=37.28' Storage=4,040 cf Inflow=12.25 cfs 0.649 af
Discarded=0.20 cfs 0.082 af Primary=8.53 cfs 0.567 af Outflow=8.73 cfs 0.649 af

Pond 2B: Existing - NW Bioretention Basin Peak Elev=34.18' Storage=6,005 cf Inflow=8.64 cfs 0.469 af
Discarded=0.18 cfs 0.096 af Primary=3.08 cfs 0.373 af Outflow=3.25 cfs 0.469 af

Pond 2P: Existing Depression North of Peak Elev=25.16' Storage=16,473 cf Inflow=34.09 cfs 3.291 af
Primary=31.54 cfs 3.054 af Secondary=0.00 cfs 0.000 af Outflow=31.54 cfs 3.054 af

Pond 3B: Existing - W Bioretention Basin Peak Elev=31.75' Storage=4,705 cf Inflow=6.07 cfs 0.554 af
Discarded=0.16 cfs 0.088 af Primary=3.60 cfs 0.466 af Outflow=3.76 cfs 0.554 af

Link 6L: Total Site Discharge (SW) Inflow=65.61 cfs 6.638 af
Primary=65.61 cfs 6.638 af

Total Runoff Area = 38.380 ac Runoff Volume = 7.140 af Average Runoff Depth = 2.23"
38.92% Pervious = 14.937 ac 61.08% Impervious = 23.443 ac

Summary for Subcatchment 1&2S: NE Existing Area

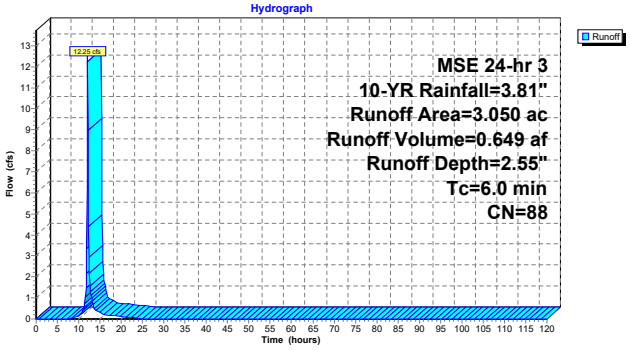
Runoff = 12.25 cfs @ 12.11 hrs, Volume= 0.649 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
0.820	98	Paved parking, HSG B
0.840	61	>75% Grass cover, Good, HSG B
1.390	98	Roofs, HSG B
3.050	88	Weighted Average
0.840		27.54% Pervious Area
2.210		72.46% Impervious Area

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

Subcatchment 1&2S: NE Existing Area



Summary for Subcatchment 3S: NE Existing Offsite Roof

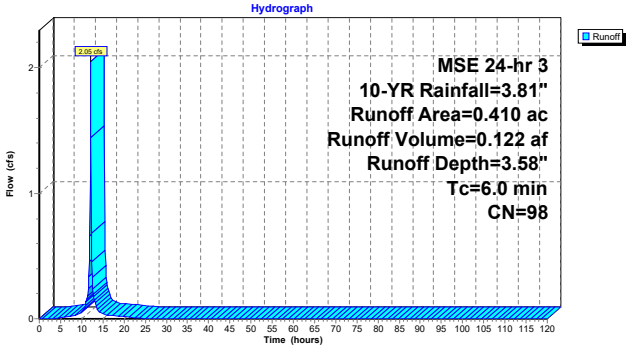
Runoff = 2.05 cfs @ 12.11 hrs, Volume= 0.122 af, Depth= 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
0.410	98	Roofs, HSG B
0.410		100.00% Impervious Area

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

Subcatchment 3S: NE Existing Offsite Roof



Summary for Subcatchment 5SA: NW Existing Area

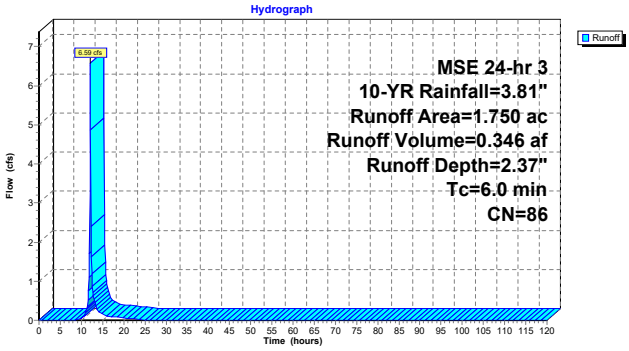
Runoff = 6.59 cfs @ 12.12 hrs, Volume= 0.346 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
0.570	61	>75% Grass cover, Good, HSG B
1.180	98	Roofs, HSG B
1.750	86	Weighted Average
0.570		32.57% Pervious Area
1.180		67.43% Impervious Area

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

Subcatchment 5SA: NW Existing Area



Summary for Subcatchment 5SB: W Existing Area

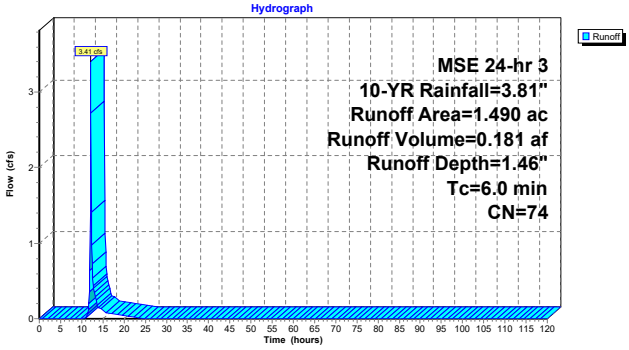
Runoff = 3.41 cfs @ 12.13 hrs, Volume= 0.181 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
0.528	98	Paved parking, HSG B
0.962	61	>75% Grass cover, Good, HSG B
1.490	74	Weighted Average
0.962		64.56% Pervious Area
0.528		35.44% Impervious Area

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

Subcatchment 5SB: W Existing Area



Summary for Subcatchment A-1&4S: Existing E Area to Bypass Existing BMPs

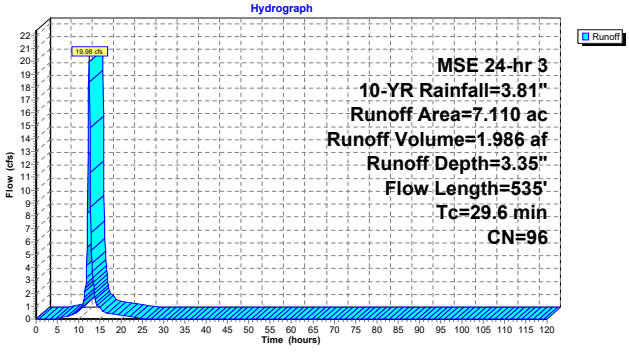
Runoff = 19.98 cfs @ 12.41 hrs, Volume= 1.986 af, Depth= 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
6.720	98	Paved parking, HSG B
0.390	61	>75% Grass cover, Good, HSG B
7.110	96	Weighted Average
0.390		5.49% Pervious Area
6.720		94.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-1&4S: Existing E Area to Bypass Existing BMPs



Summary for Subcatchment A-2: Existing S Area to Bypass Existing BMPs

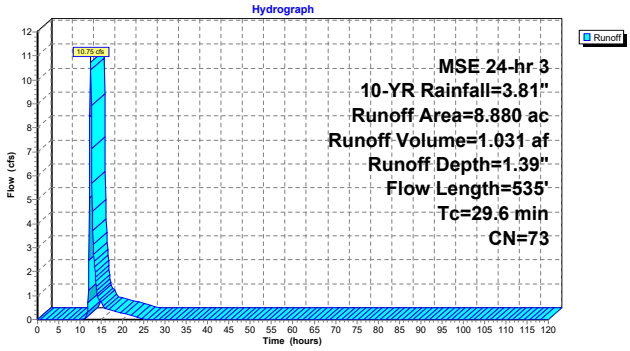
Runoff = 10.75 cfs @ 12.44 hrs, Volume= 1.031 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
2.916	98	Paved parking, HSG B
5.964	61	>75% Grass cover, Good, HSG B
8.880	73	Weighted Average
5.964		67.16% Pervious Area
2.916		32.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-2: Existing S Area to Bypass Existing BMPs



Summary for Subcatchment B-1: SW Existing Area

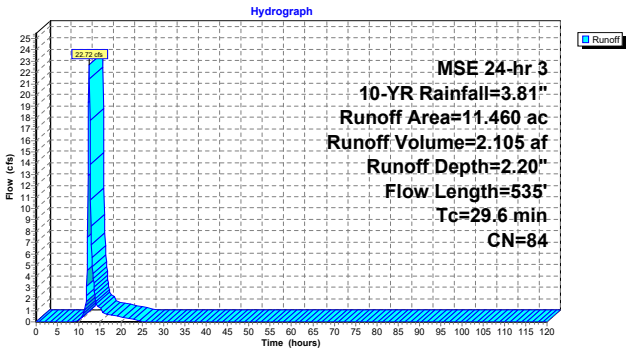
Runoff = 22.72 cfs @ 12.42 hrs, Volume= 2.105 af, Depth= 2.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
0.850	98	Paved parking, HSG B
6.206	98	Roofs, HSG B
4.404	61	>75% Grass cover, Good, HSG B
11.460	84	Weighted Average
4.404		38.43% Pervious Area
7.056		61.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-1: SW Existing Area



Summary for Subcatchment B-2: NW Existing Area

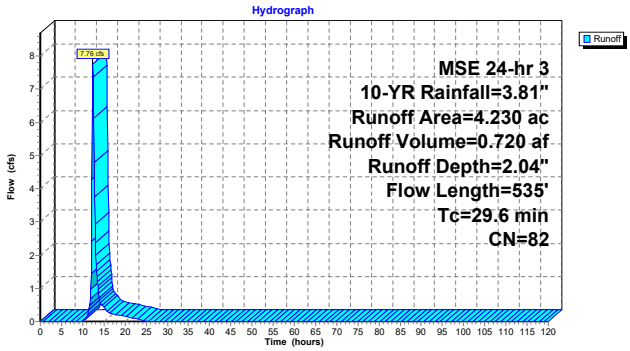
Runoff = 7.76 cfs @ 12.43 hrs, Volume= 0.720 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
0.686	98	Paved parking, HSG B
1.807	61	>75% Grass cover, Good, HSG B
0.658	98	Roofs, HSG B
1.079	98	Roofs, HSG B
4.230	82	Weighted Average
1.807		42.72% Pervious Area
2.423		57.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-2: NW Existing Area



Summary for Pond 1B: Existing - NE Bioretention Basin

Inflow Area = 3.050 ac, 72.46% Impervious, Inflow Depth = 2.55" for 10-YR event
Inflow = 12.25 cfs @ 12.11 hrs, Volume= 0.649 af
Outflow = 8.73 cfs @ 12.21 hrs, Volume= 0.649 af, Atten= 29%, Lag= 6.0 min
Discarded = 0.20 cfs @ 12.21 hrs, Volume= 0.082 af
Primary = 8.53 cfs @ 12.21 hrs, Volume= 0.567 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 37.28' @ 12.21 hrs Surf.Area= 5,196 sf Storage= 4,040 cf

Plug-Flow detention time= 9.9 min calculated for 0.648 af (100% of inflow)
Center-of-Mass det. time= 9.9 min (799.8 - 789.9)

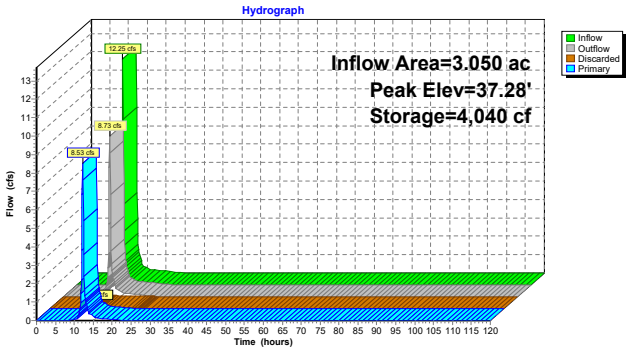
Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	18,126 cf	**5.00'W x 240.00'L x 3.00'H Prismatoid Z=6.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	36.00'	**24.0" W x 15.0" H, R=14.8"/33.1" Pipe Arch Culvert** L= 100.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 36.00' / 34.10' S= 0.0190 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.01 sf
#2	Primary	36.30'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	36.00'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.20 cfs @ 12.21 hrs HW=37.26' (Free Discharge)
└**3=Exfiltration** (Controls 0.20 cfs)

Primary OutFlow Max=8.38 cfs @ 12.21 hrs HW=37.26' TW=24.60' (Fixed TW Elev= 24.60')
├**1=Culvert** (Inlet Controls 7.58 cfs @ 3.78 fps)
└**2=Orifice/Grate** (Orifice Controls 0.80 cfs @ 4.05 fps)

Pond 1B: Existing - NE Bioretention Basin



Summary for Pond 2B: Existing - NW Bioretention Basin

Inflow Area = 2.160 ac, 73.61% Impervious, Inflow Depth = 2.60" for 10-YR event
Inflow = 8.64 cfs @ 12.11 hrs, Volume= 0.469 af
Outflow = 3.25 cfs @ 12.32 hrs, Volume= 0.469 af, Atten= 62%, Lag= 12.3 min
Discarded = 0.18 cfs @ 12.32 hrs, Volume= 0.096 af
Primary = 3.08 cfs @ 12.32 hrs, Volume= 0.373 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 34.18' @ 12.32 hrs Surf.Area= 3,874 sf Storage= 6,005 cf

Plug-Flow detention time= 37.3 min calculated for 0.468 af (100% of inflow)
Center-of-Mass det. time= 37.3 min (820.3 - 782.9)

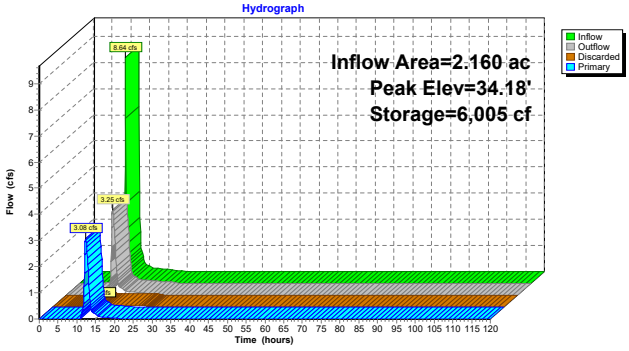
Volume	Invert	Avail.Storage	Storage Description
#1	31.70'	13,445 cf	**10.00'W x 110.00'L x 4.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	31.70'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 25.00'
#2	Primary	32.00'	**10.0" Round Culvert** L= 110.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 32.00' / 29.50' S= 0.0227 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.18 cfs @ 12.32 hrs HW=34.16' (Free Discharge)
└**1=Exfiltration** (Controls 0.18 cfs)

Primary OutFlow Max=3.06 cfs @ 12.32 hrs HW=34.16' (Free Discharge)
└**2=Culvert** (Inlet Controls 3.06 cfs @ 5.61 fps)

Pond 2B: Existing - NW Bioretention Basin



Summary for Pond 2P: Existing Depression North of Southern Driveway

Inflow Area = 19.340 ac, 59.96% Impervious, Inflow Depth = 2.04" for 10-YR event
Inflow = 34.09 cfs @ 12.43 hrs, Volume= 3.291 af
Outflow = 31.54 cfs @ 12.52 hrs, Volume= 3.054 af, Atten= 7%, Lag= 5.9 min
Primary = 31.54 cfs @ 12.52 hrs, Volume= 3.054 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 25.16' @ 12.52 hrs Surf.Area= 13,609 sf Storage= 16,473 cf

Plug-Flow detention time= 43.8 min calculated for 3.054 af (93% of inflow)
Center-of-Mass det. time= 11.4 min (829.5 - 818.1)

Volume	Invert	Avail.Storage	Storage Description
#1	20.81'	32,432 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

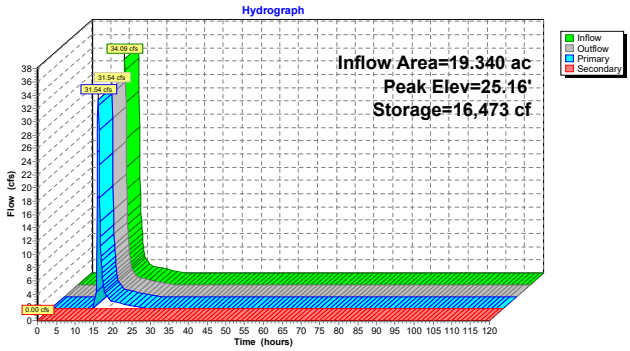
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.81	5	0	0
21.00	15	2	2
22.00	325	170	172
23.00	1,822	1,074	1,245
24.00	6,670	4,246	5,491
25.00	11,223	8,947	14,438
25.50	18,503	7,432	21,869
26.00	23,748	10,563	32,432

Device	Routing	Invert	Outlet Devices
#1	Primary	20.81'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 20.81' / 20.60' S= 0.0021 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#2	Primary	21.25'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 102.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 21.25' / 20.72' S= 0.0052 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#3	Secondary	25.50'	**100.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=31.26 cfs @ 12.52 hrs HW=25.15' TW=24.60' (Fixed TW Elev= 24.60')
└**1=Culvert** (Outlet Controls 15.68 cfs @ 2.68 fps)
└**2=Culvert** (Outlet Controls 15.58 cfs @ 2.66 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.81' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Existing Depression North of Southern Driveway



Summary for Pond 3B: Existing - W Bioretention Basin

Inflow Area = 3.650 ac, 58.03% Impervious, Inflow Depth = 1.82" for 10-YR event
Inflow = 6.07 cfs @ 12.15 hrs, Volume= 0.554 af
Outflow = 3.76 cfs @ 12.47 hrs, Volume= 0.554 af, Atten= 38%, Lag= 19.3 min
Discarded = 0.16 cfs @ 12.47 hrs, Volume= 0.088 af
Primary = 3.60 cfs @ 12.47 hrs, Volume= 0.466 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 31.75' @ 12.47 hrs Surf.Area= 3,299 sf Storage= 4,705 cf

Plug-Flow detention time= 37.4 min calculated for 0.553 af (100% of inflow)
Center-of-Mass det. time= 37.5 min (833.4 - 795.9)

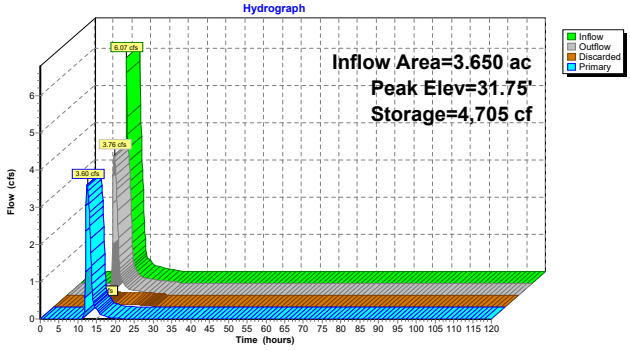
Volume	Invert	Avail.Storage	Storage Description
#1	29.50'	12,405 cf	**10.00'W x 100.00'L x 4.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	29.50'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 25.00'
#2	Primary	30.00'	**12.0" Round Culvert** L= 36.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 30.00' / 29.82' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Discarded OutFlow Max=0.16 cfs @ 12.47 hrs HW=31.74' (Free Discharge)
↑**1=Exfiltration** (Controls 0.16 cfs)

Primary OutFlow Max=3.60 cfs @ 12.47 hrs HW=31.74' TW=24.60' (Fixed TW Elev= 24.60')
↑**2=Culvert** (Barrel Controls 3.60 cfs @ 4.58 fps)

Pond 3B: Existing - W Bioretention Basin

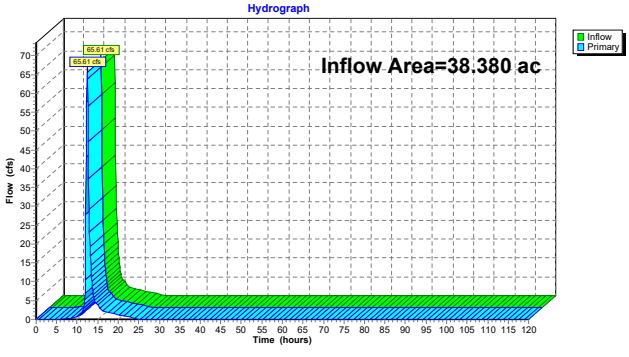


Summary for Link 6L: Total Site Discharge (SW)

Inflow Area = 38.380 ac, 61.08% Impervious, Inflow Depth = 2.08" for 10-YR event
Inflow = 65.61 cfs @ 12.44 hrs, Volume= 6.638 af
Primary = 65.61 cfs @ 12.44 hrs, Volume= 6.638 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs

Link 6L: Total Site Discharge (SW)



Time span=0.00-120.00 hrs, dt=0.10 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1&2S: NE Existing Area Runoff Area=3.050 ac 72.46% Impervious Runoff Depth=4.80"
Tc=6.0 min CN=88 Runoff=22.35 cfs 1.220 af

Subcatchment3S: NE Existing Offsite Runoff Area=0.410 ac 100.00% Impervious Runoff Depth=5.94"
Tc=6.0 min CN=98 Runoff=3.35 cfs 0.203 af

Subcatchment5SA: NW Existing Area Runoff Area=1.750 ac 67.43% Impervious Runoff Depth=4.58"
Tc=6.0 min CN=86 Runoff=12.39 cfs 0.668 af

Subcatchment5SB: W Existing Area Runoff Area=1.490 ac 35.44% Impervious Runoff Depth=3.34"
Tc=6.0 min CN=74 Runoff=7.93 cfs 0.414 af

SubcatchmentA-1&4S: Existing E Area to Runoff Area=7.110 ac 94.51% Impervious Runoff Depth=5.71"
Flow Length=535' Tc=29.6 min CN=96 Runoff=33.16 cfs 3.381 af

SubcatchmentA-2: Existing S Area to Runoff Area=8.880 ac 32.84% Impervious Runoff Depth=3.24"
Flow Length=535' Tc=29.6 min CN=73 Runoff=25.83 cfs 2.397 af

SubcatchmentB-1: SW Existing Area Runoff Area=11.460 ac 61.57% Impervious Runoff Depth=4.37"
Flow Length=535' Tc=29.6 min CN=84 Runoff=44.44 cfs 4.169 af

SubcatchmentB-2: NW Existing Area Runoff Area=4.230 ac 57.28% Impervious Runoff Depth=4.15"
Flow Length=535' Tc=29.6 min CN=82 Runoff=15.69 cfs 1.464 af

Pond 1B: Existing - NE Bioretention Basin Peak Elev=38.14' Storage=9,758 cf Inflow=22.35 cfs 1.220 af
Discarded=0.32 cfs 0.108 af Primary=10.65 cfs 1.112 af Outflow=10.97 cfs 1.220 af

Pond 2B: Existing - NW Bioretention Basin Peak Elev=35.53' Storage=12,463 cf Inflow=15.73 cfs 0.871 af
Discarded=0.28 cfs 0.126 af Primary=4.09 cfs 0.745 af Outflow=4.37 cfs 0.871 af

Pond 2P: Existing Depression North of Peak Elev=25.68' Storage=25,371 cf Inflow=65.30 cfs 6.670 af
Primary=43.64 cfs 5.987 af Secondary=20.53 cfs 0.446 af Outflow=64.17 cfs 6.433 af

Pond 3B: Existing - W Bioretention Basin Peak Elev=32.93' Storage=9,447 cf Inflow=11.45 cfs 1.159 af
Discarded=0.25 cfs 0.122 af Primary=5.20 cfs 1.037 af Outflow=5.45 cfs 1.159 af

Link 6L: Total Site Discharge (SW) Inflow=133.57 cfs 13.322 af
Primary=133.57 cfs 13.322 af

Total Runoff Area = 38.380 ac Runoff Volume = 13.916 af Average Runoff Depth = 4.35"
38.92% Pervious = 14.937 ac 61.08% Impervious = 23.443 ac

Summary for Subcatchment 1&2S: NE Existing Area

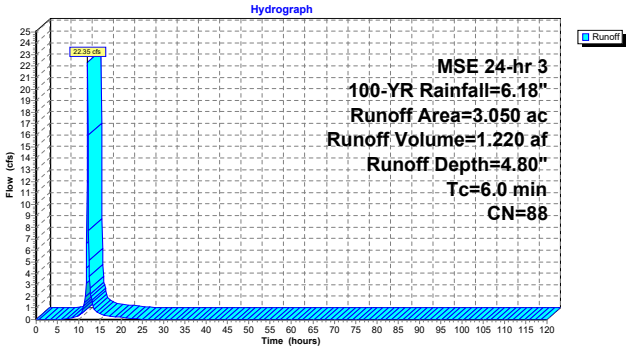
Runoff = 22.35 cfs @ 12.11 hrs, Volume= 1.220 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
0.820	98	Paved parking, HSG B
0.840	61	>75% Grass cover, Good, HSG B
1.390	98	Roofs, HSG B
3.050	88	Weighted Average
0.840		27.54% Pervious Area
2.210		72.46% Impervious Area

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

Subcatchment 1&2S: NE Existing Area



Summary for Subcatchment 3S: NE Existing Offsite Roof

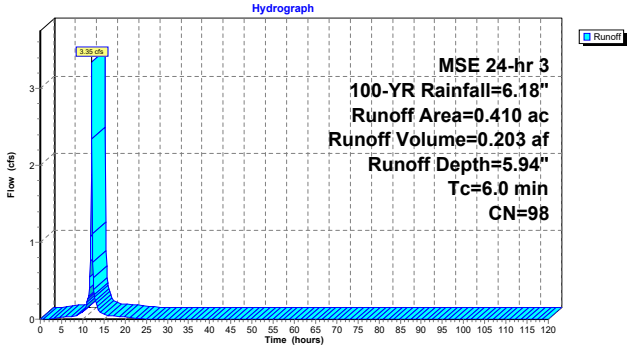
Runoff = 3.35 cfs @ 12.11 hrs, Volume= 0.203 af, Depth= 5.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
0.410	98	Roofs, HSG B
0.410		100.00% Impervious Area

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

Subcatchment 3S: NE Existing Offsite Roof



Summary for Subcatchment 5SA: NW Existing Area

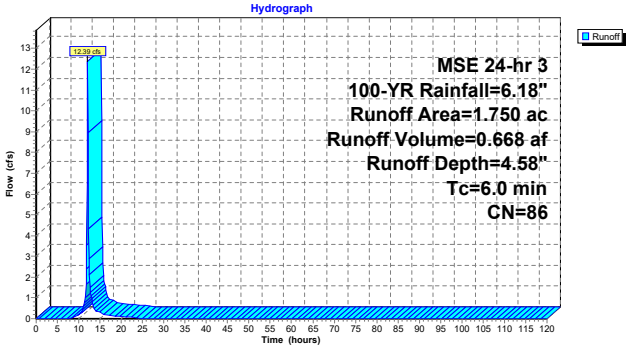
Runoff = 12.39 cfs @ 12.11 hrs, Volume= 0.668 af, Depth= 4.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
0.570	61	>75% Grass cover, Good, HSG B
1.180	98	Roofs, HSG B
1.750	86	Weighted Average
0.570		32.57% Pervious Area
1.180		67.43% Impervious Area

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

Subcatchment 5SA: NW Existing Area



Summary for Subcatchment 5SB: W Existing Area

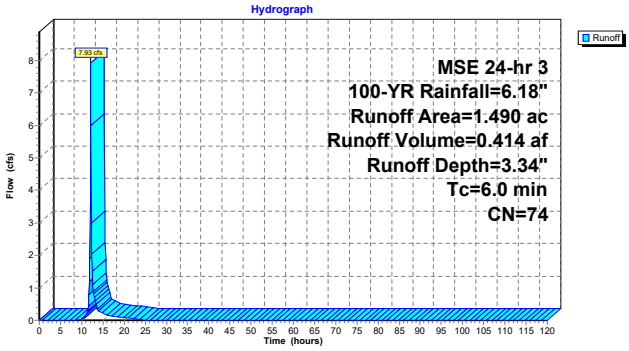
Runoff = 7.93 cfs @ 12.12 hrs, Volume= 0.414 af, Depth= 3.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
0.528	98	Paved parking, HSG B
0.962	61	>75% Grass cover, Good, HSG B
1.490	74	Weighted Average
0.962		64.56% Pervious Area
0.528		35.44% Impervious Area

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

Subcatchment 5SB: W Existing Area



Summary for Subcatchment A-1&4S: Existing E Area to Bypass Existing BMPs

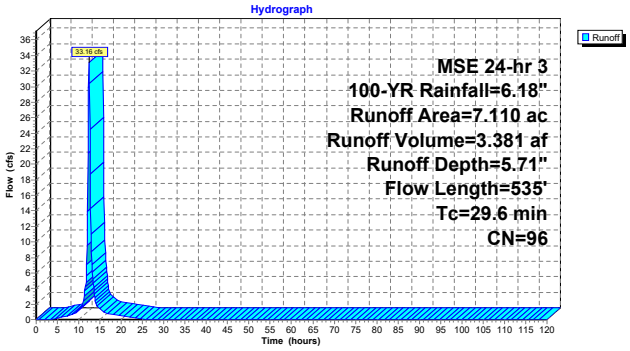
Runoff = 33.16 cfs @ 12.40 hrs, Volume= 3.381 af, Depth= 5.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
6.720	98	Paved parking, HSG B
0.390	61	>75% Grass cover, Good, HSG B
7.110	96	Weighted Average
0.390		5.49% Pervious Area
6.720		94.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-1&4S: Existing E Area to Bypass Existing BMPs



Summary for Subcatchment A-2: Existing S Area to Bypass Existing BMPs

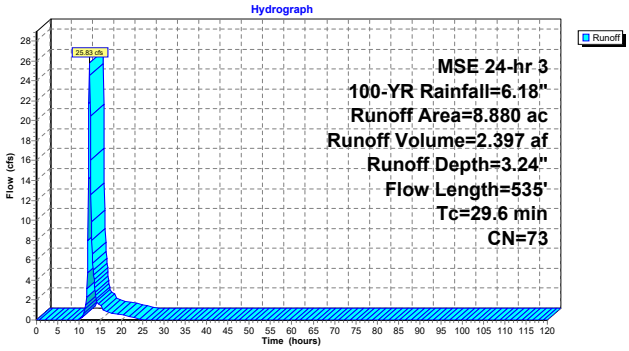
Runoff = 25.83 cfs @ 12.43 hrs, Volume= 2.397 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
2.916	98	Paved parking, HSG B
5.964	61	>75% Grass cover, Good, HSG B
8.880	73	Weighted Average
5.964		67.16% Pervious Area
2.916		32.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-2: Existing S Area to Bypass Existing BMPs



Summary for Subcatchment B-1: SW Existing Area

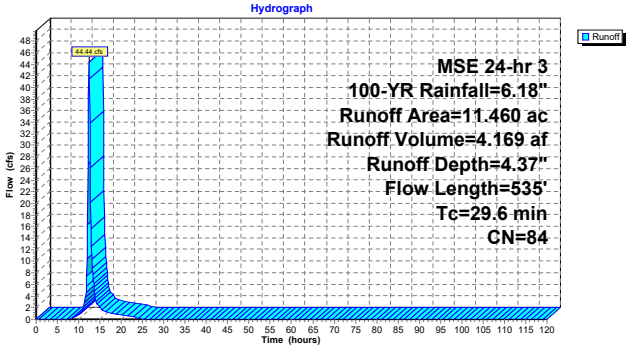
Runoff = 44.44 cfs @ 12.42 hrs, Volume= 4.169 af, Depth= 4.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
0.850	98	Paved parking, HSG B
6.206	98	Roofs, HSG B
4.404	61	>75% Grass cover, Good, HSG B
11.460	84	Weighted Average
4.404		38.43% Pervious Area
7.056		61.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-1: SW Existing Area



Summary for Subcatchment B-2: NW Existing Area

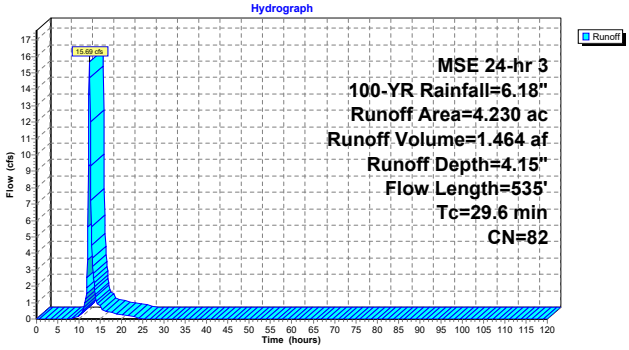
Runoff = 15.69 cfs @ 12.42 hrs, Volume= 1.464 af, Depth= 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
0.686	98	Paved parking, HSG B
1.807	61	>75% Grass cover, Good, HSG B
0.658	98	Roofs, HSG B
1.079	98	Roofs, HSG B
4.230	82	Weighted Average
1.807		42.72% Pervious Area
2.423		57.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-2: NW Existing Area



Summary for Pond 1B: Existing - NE Bioretention Basin

Inflow Area = 3.050 ac, 72.46% Impervious, Inflow Depth = 4.80" for 100-YR event
Inflow = 22.35 cfs @ 12.11 hrs, Volume= 1.220 af
Outflow = 10.97 cfs @ 12.27 hrs, Volume= 1.220 af, Atten= 51%, Lag= 9.3 min
Discarded = 0.32 cfs @ 12.27 hrs, Volume= 0.108 af
Primary = 10.65 cfs @ 12.27 hrs, Volume= 1.112 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 38.14' @ 12.27 hrs Surf.Area= 8,146 sf Storage= 9,758 cf

Plug-Flow detention time= 11.0 min calculated for 1.219 af (100% of inflow)
Center-of-Mass det. time= 11.0 min (788.4 - 777.4)

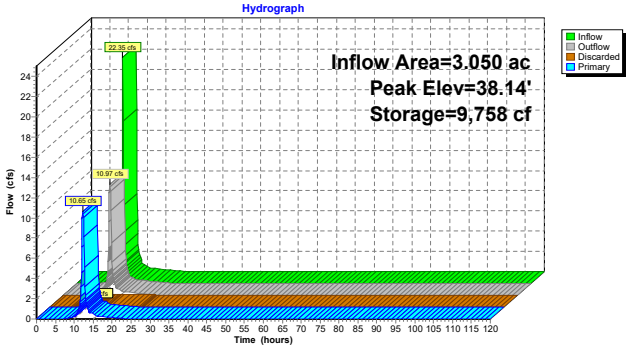
Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	18,126 cf	**5.00'W x 240.00'L x 3.00'H Prismatoid Z=6.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	36.00'	**24.0" W x 15.0" H, R=14.8"/33.1" Pipe Arch Culvert** L= 100.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 36.00' / 34.10' S= 0.0190 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.01 sf
#2	Primary	36.30'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	36.00'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.31 cfs @ 12.27 hrs HW=38.11' (Free Discharge)
└**3=Exfiltration** (Controls 0.31 cfs)

Primary OutFlow Max=10.60 cfs @ 12.27 hrs HW=38.11' TW=24.60' (Fixed TW Elev= 24.60')
└**1=Culvert** (Barrel Controls 9.42 cfs @ 4.69 fps)
└**2=Orifice/Grate** (Orifice Controls 1.18 cfs @ 6.02 fps)

Pond 1B: Existing - NE Bioretention Basin



Summary for Pond 2B: Existing - NW Bioretention Basin

Inflow Area = 2.160 ac, 73.61% Impervious, Inflow Depth = 4.84" for 100-YR event
Inflow = 15.73 cfs @ 12.11 hrs, Volume= 0.871 af
Outflow = 4.37 cfs @ 12.36 hrs, Volume= 0.871 af, Atten= 72%, Lag= 15.0 min
Discarded = 0.28 cfs @ 12.36 hrs, Volume= 0.126 af
Primary = 4.09 cfs @ 12.36 hrs, Volume= 0.745 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 35.53' @ 12.36 hrs Surf.Area= 5,718 sf Storage= 12,463 cf

Plug-Flow detention time= 38.7 min calculated for 0.870 af (100% of inflow)
Center-of-Mass det. time= 38.8 min (811.5 - 772.6)

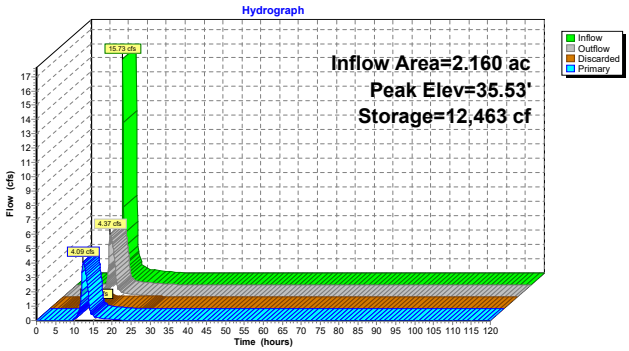
Volume	Invert	Avail.Storage	Storage Description
#1	31.70'	13,445 cf	**10.00'W x 110.00'L x 4.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	31.70'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 25.00'
#2	Primary	32.00'	**10.0" Round Culvert** L= 110.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 32.00' / 29.50' S= 0.0227 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.28 cfs @ 12.36 hrs HW=35.52' (Free Discharge)
└**1=Exfiltration** (Controls 0.28 cfs)

Primary OutFlow Max=4.08 cfs @ 12.36 hrs HW=35.52' (Free Discharge)
└**2=Culvert** (Inlet Controls 4.08 cfs @ 7.49 fps)

Pond 2B: Existing - NW Bioretention Basin



Summary for Pond 2P: Existing Depression North of Southern Driveway

Inflow Area = 19.340 ac, 59.96% Impervious, Inflow Depth = 4.14" for 100-YR event
Inflow = 65.30 cfs @ 12.42 hrs, Volume= 6.670 af
Outflow = 64.17 cfs @ 12.47 hrs, Volume= 6.433 af, Atten= 2%, Lag= 3.1 min
Primary = 43.64 cfs @ 12.47 hrs, Volume= 5.987 af
Secondary = 20.53 cfs @ 12.47 hrs, Volume= 0.446 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 25.68' @ 12.47 hrs Surf.Area= 20,392 sf Storage= 25,371 cf

Plug-Flow detention time= 27.8 min calculated for 6.428 af (96% of inflow)
Center-of-Mass det. time= 9.7 min (818.2 - 808.6)

Volume	Invert	Avail.Storage	Storage Description
#1	20.81'	32,432 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

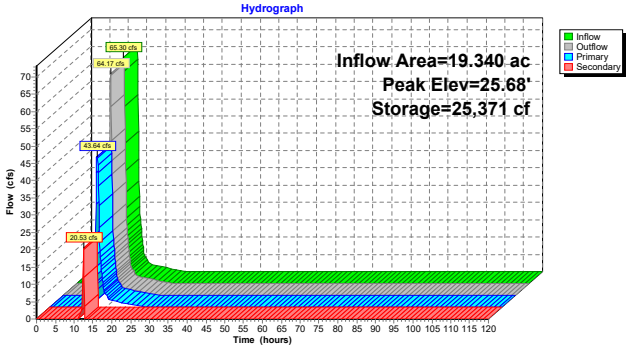
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.81	5	0	0
21.00	15	2	2
22.00	325	170	172
23.00	1,822	1,074	1,245
24.00	6,670	4,246	5,491
25.00	11,223	8,947	14,438
25.50	18,503	7,432	21,869
26.00	23,748	10,563	32,432

Device	Routing	Invert	Outlet Devices
#1	Primary	20.81'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 20.81' / 20.60' S= 0.0021 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#2	Primary	21.25'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 102.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 21.25' / 20.72' S= 0.0052 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#3	Secondary	25.50'	**100.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=43.51 cfs @ 12.47 hrs HW=25.67' TW=24.60' (Fixed TW Elev= 24.60')
└**1=Culvert** (Outlet Controls 21.82 cfs @ 3.73 fps)
└**2=Culvert** (Outlet Controls 21.69 cfs @ 3.71 fps)

Secondary OutFlow Max=19.33 cfs @ 12.47 hrs HW=25.67' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 19.33 cfs @ 1.12 fps)

Pond 2P: Existing Depression North of Southern Driveway



Summary for Pond 3B: Existing - W Bioretention Basin

Inflow Area = 3.650 ac, 58.03% Impervious, Inflow Depth = 3.81" for 100-YR event
Inflow = 11.45 cfs @ 12.13 hrs, Volume= 1.159 af
Outflow = 5.45 cfs @ 12.52 hrs, Volume= 1.159 af, Atten= 52%, Lag= 23.7 min
Discarded = 0.25 cfs @ 12.52 hrs, Volume= 0.122 af
Primary = 5.20 cfs @ 12.52 hrs, Volume= 1.037 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 32.93' @ 12.52 hrs Surf.Area= 4,766 sf Storage= 9,447 cf

Plug-Flow detention time= 33.3 min calculated for 1.159 af (100% of inflow)
Center-of-Mass det. time= 33.1 min (830.6 - 797.5)

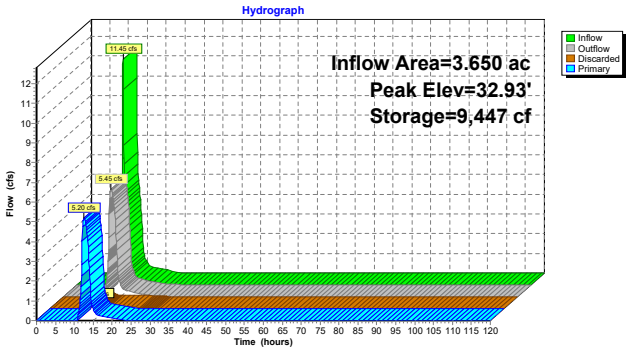
Volume	Invert	Avail.Storage	Storage Description
#1	29.50'	12,405 cf	**10.00'W x 100.00'L x 4.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	29.50'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 25.00'
#2	Primary	30.00'	**12.0" Round Culvert** L= 36.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 30.00' / 29.82' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Discarded OutFlow Max=0.25 cfs @ 12.52 hrs HW=32.92' (Free Discharge)
└**1=Exfiltration** (Controls 0.25 cfs)

Primary OutFlow Max=5.19 cfs @ 12.52 hrs HW=32.92' TW=24.60' (Fixed TW Elev= 24.60')
└**2=Culvert** (Inlet Controls 5.19 cfs @ 6.61 fps)

Pond 3B: Existing - W Bioretention Basin

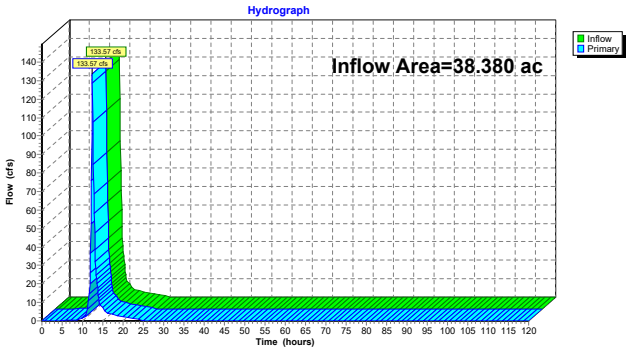


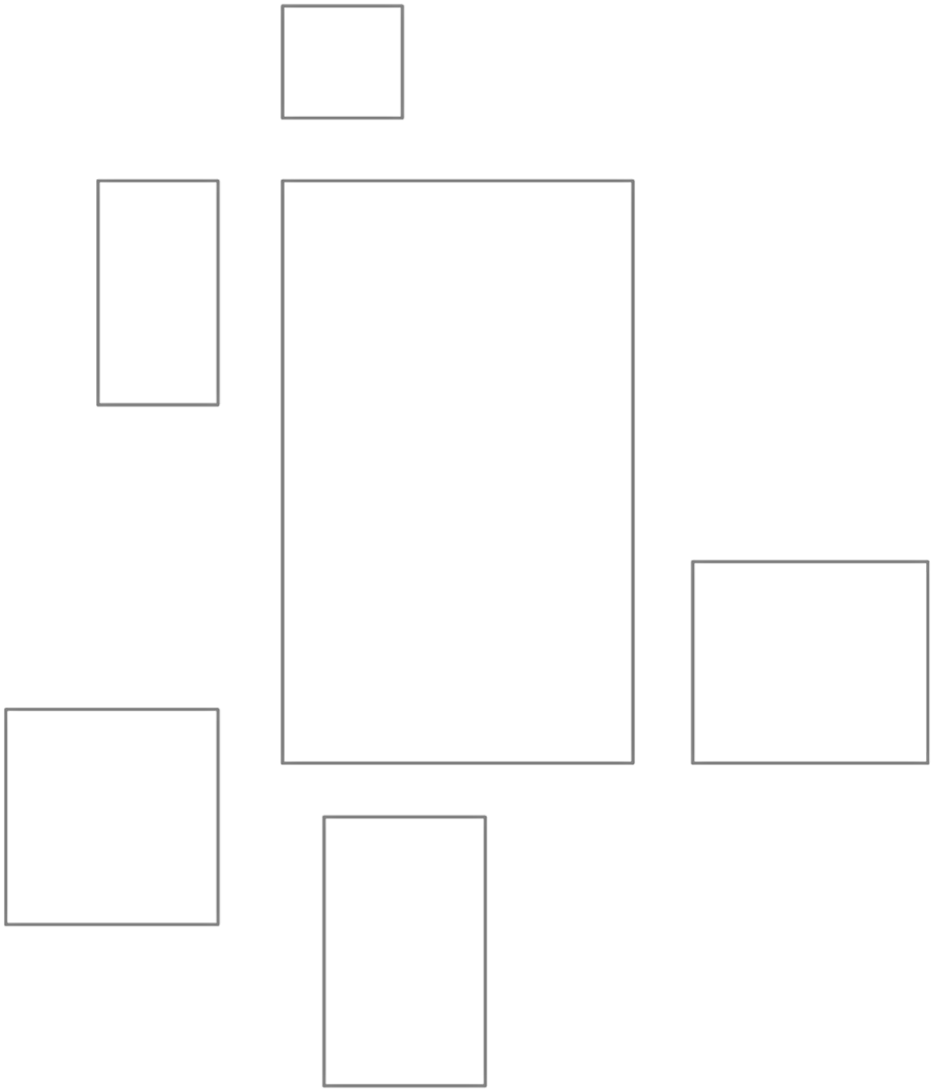
Summary for Link 6L: Total Site Discharge (SW)

Inflow Area = 38.380 ac, 61.08% Impervious, Inflow Depth = 4.17" for 100-YR event
Inflow = 133.57 cfs @ 12.44 hrs, Volume= 13.322 af
Primary = 133.57 cfs @ 12.44 hrs, Volume= 13.322 af, Atten= 0%, Lag= 0.0 min

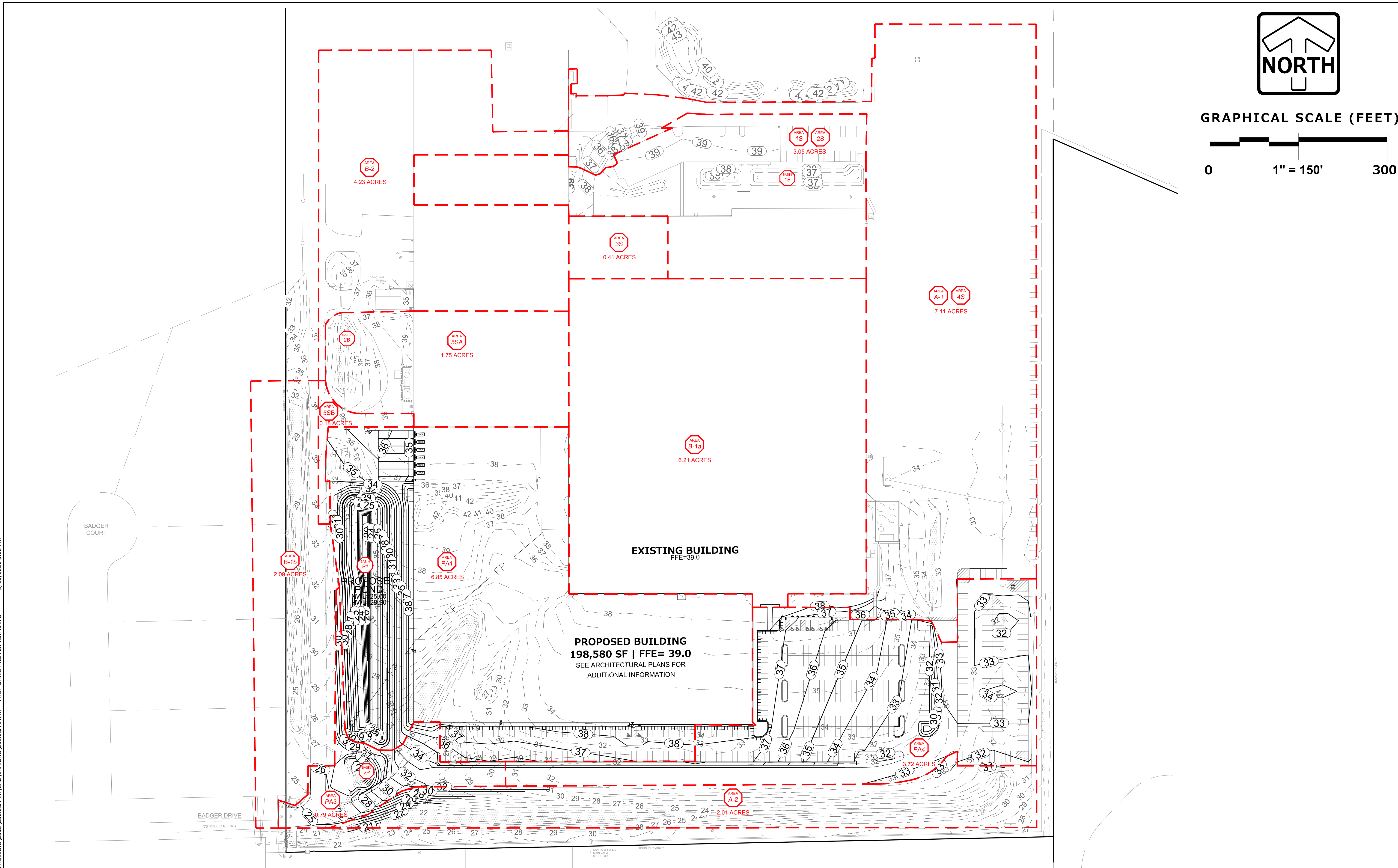
Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs

Link 6L: Total Site Discharge (SW)





3	**Appendix**: POST-DEV CONDITIONS (WATER QUANTITY)



Z:\PROJECTS\2013\230.00A-WI\CAD\EXHIBITS\203.00A SWMP - PROP DRNG AREA EXHIBIT.DWG 9/10/2020 5:00 PM

SOUTH BLDG EXPANSION - SWMP PROPOSED DRAINAGE AREA MAP

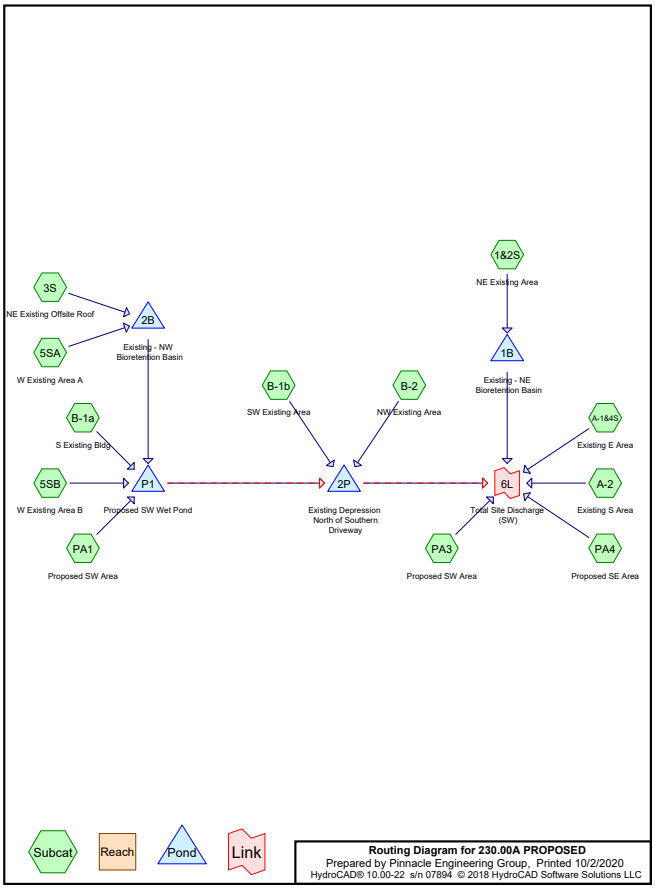
09/10/20

PINNACLE ENGINEERING GROUP

20725 WATERTOWN ROAD | SUITE 100 | BROOKFIELD, WI 53186 | WWW.PINNACLE-ENGR.COM |

PLAN | DESIGN | DELIVER

PEG JOB# 203.00A



Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
9.443	61	>75% Grass cover, Good, HSG B (1&2S, 5SA, 5SB, A-1&4S, A-2, B-1b, B-2, PA1, PA3, PA4)
13.116	98	Paved parking, HSG B (1&2S, 5SB, A-1&4S, B-1b, B-2, PA1, PA3, PA4)
15.486	98	Roofs, HSG B (1&2S, 3S, 5SA, B-1a, B-2, PA1)
0.339	98	Water Surface, HSG B (PA1)
38.384	**89**	**TOTAL AREA**

Time span=0.00-120.00 hrs, dt=0.10 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1&2S: NE Existing Area Runoff Area=3.050 ac 72.46% Impervious Runoff Depth=1.30"
Tc=6.0 min CN=88 Runoff=6.31 cfs 0.329 af

Subcatchment3S: NE Existing Offsite Runoff Area=0.410 ac 100.00% Impervious Runoff Depth=2.17"
Tc=6.0 min CN=98 Runoff=1.28 cfs 0.074 af

Subcatchment5SA: W Existing Area A Runoff Area=1.750 ac 67.43% Impervious Runoff Depth=1.16"
Tc=6.0 min CN=86 Runoff=3.24 cfs 0.170 af

Subcatchment5SB: W Existing Area B Runoff Area=0.180 ac 93.89% Impervious Runoff Depth=1.96"
Tc=6.0 min CN=96 Runoff=0.53 cfs 0.029 af

SubcatchmentA-1&4S: Existing E Area Runoff Area=7.110 ac 94.51% Impervious Runoff Depth=1.96"
Flow Length=535' Tc=29.6 min CN=96 Runoff=12.03 cfs 1.163 af

SubcatchmentA-2: Existing S Area Runoff Area=2.006 ac 0.00% Impervious Runoff Depth=0.17"
Flow Length=535' Tc=29.6 min CN=61 Runoff=0.14 cfs 0.028 af

SubcatchmentB-1a: S Existing Bldg Runoff Area=6.210 ac 100.00% Impervious Runoff Depth=2.17"
Flow Length=535' Tc=29.6 min CN=98 Runoff=11.15 cfs 1.124 af

SubcatchmentB-1b: SW Existing Area Runoff Area=2.090 ac 14.50% Impervious Runoff Depth=0.29"
Flow Length=535' Tc=29.6 min CN=66 Runoff=0.35 cfs 0.050 af

SubcatchmentB-2: NW Existing Area Runoff Area=4.230 ac 57.28% Impervious Runoff Depth=0.93"
Flow Length=535' Tc=29.6 min CN=82 Runoff=3.43 cfs 0.326 af

SubcatchmentPA1: Proposed SW Area Runoff Area=6.846 ac 85.04% Impervious Runoff Depth=1.60"
Tc=6.0 min CN=92 Runoff=17.25 cfs 0.913 af

SubcatchmentPA3: Proposed SW Area Runoff Area=0.786 ac 41.73% Impervious Runoff Depth=0.63"
Tc=6.0 min CN=76 Runoff=0.73 cfs 0.042 af

SubcatchmentPA4: Proposed SE Area Runoff Area=3.716 ac 85.20% Impervious Runoff Depth=1.69"
Tc=6.0 min CN=93 Runoff=9.78 cfs 0.522 af

Pond 1B: Existing - NE Bioretention Basin Peak Elev=36.84' Storage=2,056 cf Inflow=6.31 cfs 0.329 af
Discarded=0.14 cfs 0.063 af Primary=4.67 cfs 0.266 af Outflow=4.81 cfs 0.329 af

Pond 2B: Existing - NW Bioretention Basin Peak Elev=33.23' Storage=2,870 cf Inflow=4.51 cfs 0.244 af
Discarded=0.12 cfs 0.074 af Primary=2.08 cfs 0.169 af Outflow=2.20 cfs 0.244 af

Pond 2P: Existing Depression North of Peak Elev=24.67' Storage=0.086 af Inflow=11.23 cfs 2.612 af
Primary=11.38 cfs 2.529 af Secondary=0.00 cfs 0.000 af Outflow=11.38 cfs 2.529 af

Pond P1: Proposed SW Wet Pond Peak Elev=27.45' Storage=1.073 af Inflow=24.70 cfs 2.236 af
Primary=8.66 cfs 2.235 af Secondary=0.00 cfs 0.000 af Outflow=8.66 cfs 2.235 af

Link 6L: Total Site Discharge (SW) Inflow=25.19 cfs 4.550 af
Primary=25.19 cfs 4.550 af

Total Runoff Area = 38.384 ac Runoff Volume = 4.771 af Average Runoff Depth = 1.49"
24.60% Pervious = 9.443 ac 75.40% Impervious = 28.941 ac

Summary for Subcatchment 1&2S: NE Existing Area

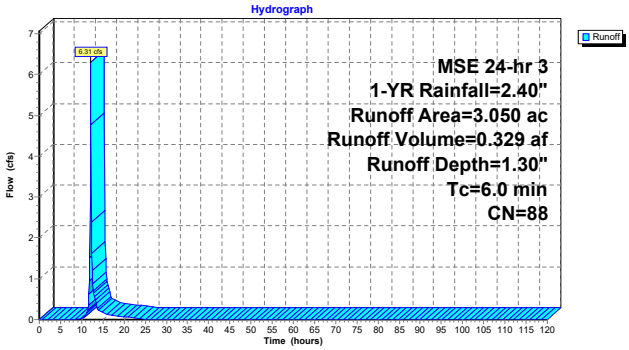
Runoff = 6.31 cfs @ 12.12 hrs, Volume= 0.329 af, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
0.820	98	Paved parking, HSG B
0.840	61	>75% Grass cover, Good, HSG B
1.390	98	Roofs, HSG B
3.050	88	Weighted Average
0.840		27.54% Pervious Area
2.210		72.46% Impervious Area

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

Subcatchment 1&2S: NE Existing Area



Summary for Subcatchment 3S: NE Existing Offsite Roof

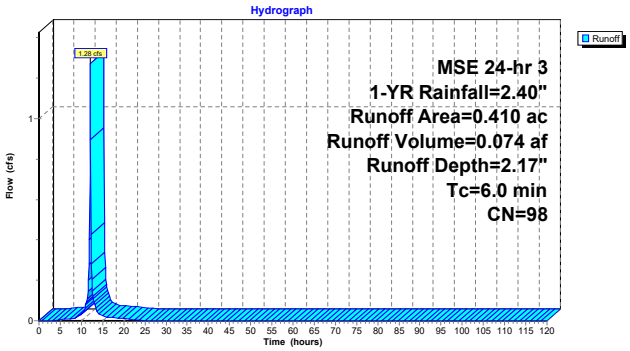
Runoff = 1.28 cfs @ 12.11 hrs, Volume= 0.074 af, Depth= 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
0.410	98	Roofs, HSG B
0.410		100.00% Impervious Area

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

Subcatchment 3S: NE Existing Offsite Roof



Summary for Subcatchment 5SA: W Existing Area A

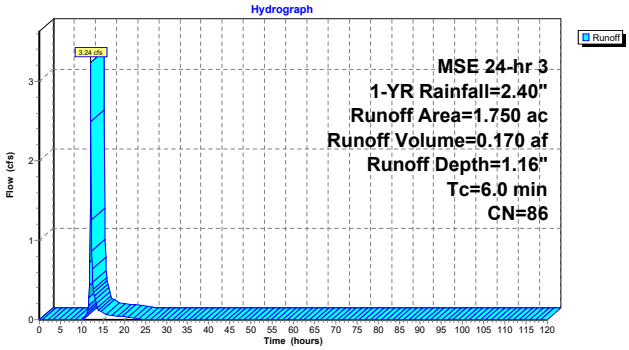
Runoff = 3.24 cfs @ 12.12 hrs, Volume= 0.170 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
0.570	61	>75% Grass cover, Good, HSG B
1.180	98	Roofs, HSG B
1.750	86	Weighted Average
0.570		32.57% Pervious Area
1.180		67.43% Impervious Area

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

Subcatchment 5SA: W Existing Area A



Summary for Subcatchment 5SB: W Existing Area B

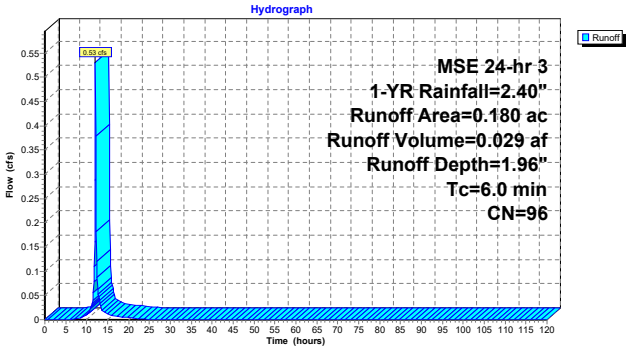
Runoff = 0.53 cfs @ 12.11 hrs, Volume= 0.029 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
0.169	98	Paved parking, HSG B
0.011	61	>75% Grass cover, Good, HSG B
0.180	96	Weighted Average
0.011		6.11% Pervious Area
0.169		93.89% Impervious Area

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

Subcatchment 5SB: W Existing Area B



Summary for Subcatchment A-1&4S: Existing E Area

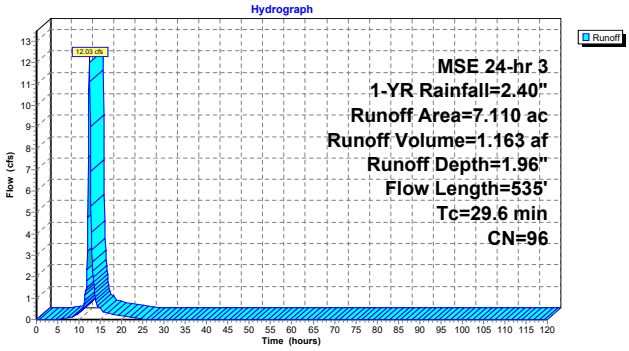
Runoff = 12.03 cfs @ 12.41 hrs, Volume= 1.163 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
6.720	98	Paved parking, HSG B
0.390	61	>75% Grass cover, Good, HSG B
7.110	96	Weighted Average
0.390		5.49% Pervious Area
6.720		94.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-1&4S: Existing E Area



Summary for Subcatchment A-2: Existing S Area

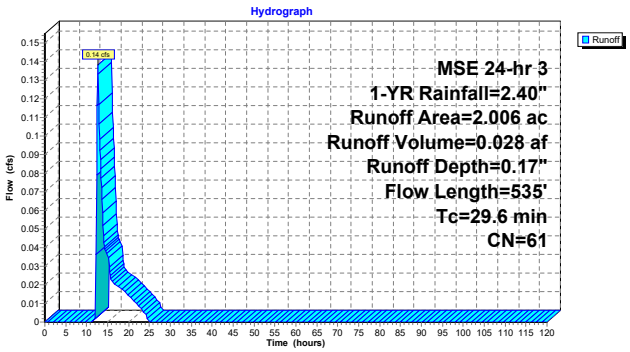
Runoff = 0.14 cfs @ 12.66 hrs, Volume= 0.028 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
2.006	61	>75% Grass cover, Good, HSG B
2.006		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-2: Existing S Area



Summary for Subcatchment B-1a: S Existing Bldg

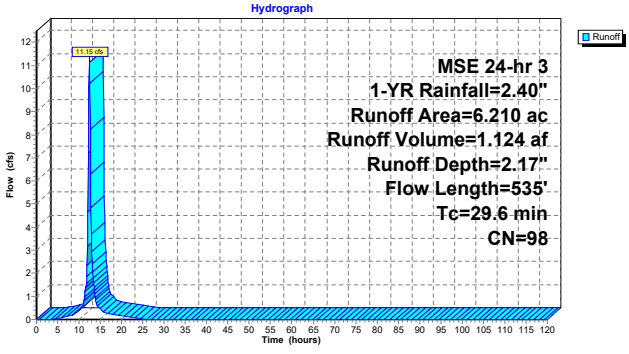
Runoff = 11.15 cfs @ 12.41 hrs, Volume= 1.124 af, Depth= 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
6.210	98	Roofs, HSG B
6.210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-1a: S Existing Bldg



Summary for Subcatchment B-1b: SW Existing Area

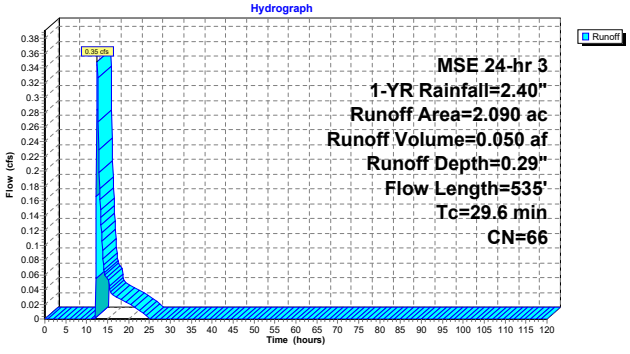
Runoff = 0.35 cfs @ 12.55 hrs, Volume= 0.050 af, Depth= 0.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
0.303	98	Paved parking, HSG B
1.787	61	>75% Grass cover, Good, HSG B
2.090	66	Weighted Average
1.787		85.50% Pervious Area
0.303		14.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-1b: SW Existing Area



Summary for Subcatchment B-2: NW Existing Area

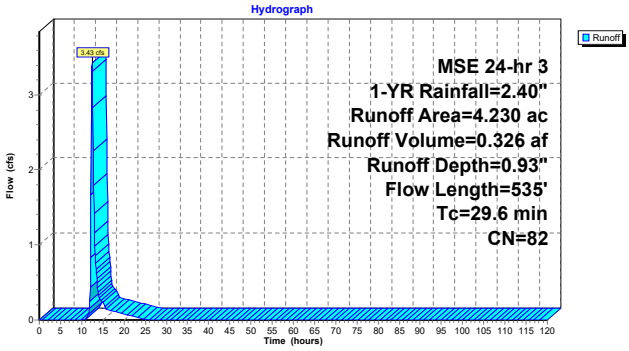
Runoff = 3.43 cfs @ 12.44 hrs, Volume= 0.326 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
0.686	98	Paved parking, HSG B
1.807	61	>75% Grass cover, Good, HSG B
0.658	98	Roofs, HSG B
1.079	98	Roofs, HSG B
4.230	82	Weighted Average
1.807		42.72% Pervious Area
2.423		57.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-2: NW Existing Area



Summary for Subcatchment PA1: Proposed SW Area

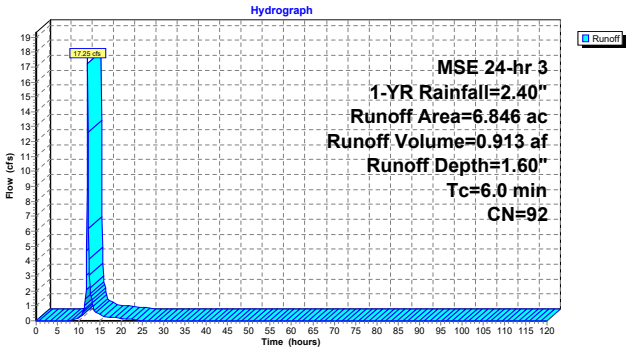
Runoff = 17.25 cfs @ 12.12 hrs, Volume= 0.913 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
0.313	98	Paved parking, HSG B
0.611	98	Paved parking, HSG B
1.024	61	>75% Grass cover, Good, HSG B
4.559	98	Roofs, HSG B
0.339	98	Water Surface, HSG B
6.846	92	Weighted Average
1.024		14.96% Pervious Area
5.822		85.04% Impervious Area

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

Subcatchment PA1: Proposed SW Area



Summary for Subcatchment PA3: Proposed SW Area

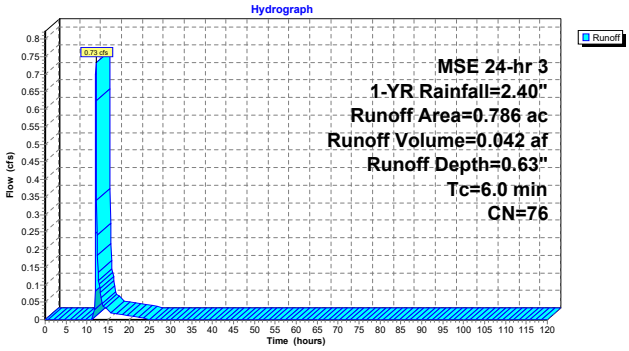
Runoff = 0.73 cfs @ 12.14 hrs, Volume= 0.042 af, Depth= 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
0.328	98	Paved parking, HSG B
0.458	61	>75% Grass cover, Good, HSG B
0.786	76	Weighted Average
0.458		58.27% Pervious Area
0.328		41.73% Impervious Area

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

Subcatchment PA3: Proposed SW Area



Summary for Subcatchment PA4: Proposed SE Area

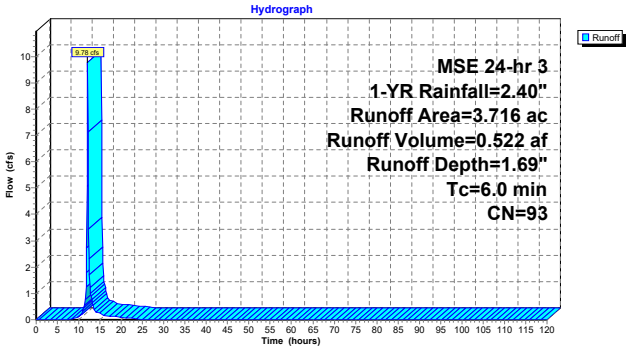
Runoff = 9.78 cfs @ 12.11 hrs, Volume= 0.522 af, Depth= 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-YR Rainfall=2.40"

Area (ac)	CN	Description
3.166	98	Paved parking, HSG B
0.550	61	>75% Grass cover, Good, HSG B
3.716	93	Weighted Average
0.550		14.80% Pervious Area
3.166		85.20% Impervious Area

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

Subcatchment PA4: Proposed SE Area



Summary for Pond 1B: Existing - NE Bioretention Basin

Inflow Area = 3.050 ac, 72.46% Impervious, Inflow Depth = 1.30" for 1-YR event
Inflow = 6.31 cfs @ 12.12 hrs, Volume= 0.329 af
Outflow = 4.81 cfs @ 12.21 hrs, Volume= 0.329 af, Atten= 24%, Lag= 5.5 min
Discarded = 0.14 cfs @ 12.21 hrs, Volume= 0.063 af
Primary = 4.67 cfs @ 12.21 hrs, Volume= 0.266 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 36.84' @ 12.21 hrs Surf.Area= 3,757 sf Storage= 2,056 cf

Plug-Flow detention time= 10.7 min calculated for 0.329 af (100% of inflow)
Center-of-Mass det. time= 10.7 min (814.2 - 803.5)

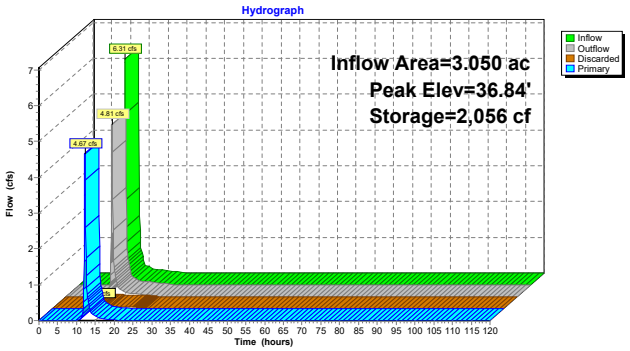
Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	18,126 cf	**5.00'W x 240.00'L x 3.00'H Prismatoid Z=6.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	36.00'	**24.0" W x 15.0" H, R=14.8"/33.1" Pipe Arch Culvert** L= 100.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 36.00' / 34.10' S= 0.0190 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.01 sf
#2	Primary	36.30'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	36.00'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.14 cfs @ 12.21 hrs HW=36.83' (Free Discharge)
└**3=Exfiltration** (Controls 0.14 cfs)

Primary OutFlow Max=4.57 cfs @ 12.21 hrs HW=36.83' TW=24.60' (Fixed TW Elev= 24.60')
├**1=Culvert** (Inlet Controls 4.08 cfs @ 2.79 fps)
└**2=Orifice/Grate** (Orifice Controls 0.50 cfs @ 2.53 fps)

Pond 1B: Existing - NE Bioretention Basin



Summary for Pond 2B: Existing - NW Bioretention Basin

Inflow Area = 2.160 ac, 73.61% Impervious, Inflow Depth = 1.35" for 1-YR event
Inflow = 4.51 cfs @ 12.12 hrs, Volume= 0.244 af
Outflow = 2.20 cfs @ 12.28 hrs, Volume= 0.244 af, Atten= 51%, Lag= 9.9 min
Discarded = 0.12 cfs @ 12.28 hrs, Volume= 0.074 af
Primary = 2.08 cfs @ 12.28 hrs, Volume= 0.169 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 33.23' @ 12.28 hrs Surf.Area= 2,713 sf Storage= 2,870 cf

Plug-Flow detention time= 42.1 min calculated for 0.243 af (100% of inflow)
Center-of-Mass det. time= 42.1 min (835.5 - 793.3)

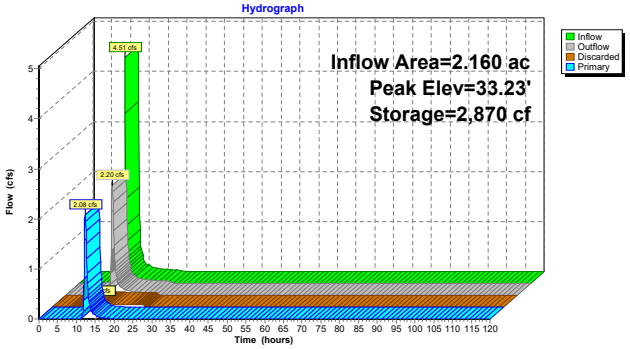
Volume	Invert	Avail.Storage	Storage Description
#1	31.70'	13,445 cf	**10.00'W x 110.00'L x 4.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	31.70'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 25.00'
#2	Primary	32.00'	**10.0" Round Culvert** L= 177.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 32.00' / 28.00' S= 0.0226 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.12 cfs @ 12.28 hrs HW=33.22' (Free Discharge)
└**1=Exfiltration** (Controls 0.12 cfs)

Primary OutFlow Max=2.07 cfs @ 12.28 hrs HW=33.21' (Free Discharge)
└**2=Culvert** (Inlet Controls 2.07 cfs @ 3.80 fps)

Pond 2B: Existing - NW Bioretention Basin



Summary for Pond 2P: Existing Depression North of Southern Driveway

Inflow Area = 21.716 ac, 76.06% Impervious, Inflow Depth = 1.44" for 1-YR event
Inflow = 11.23 cfs @ 12.65 hrs, Volume= 2.612 af
Outflow = 11.38 cfs @ 12.69 hrs, Volume= 2.529 af, Atten= 0%, Lag= 2.1 min
Primary = 11.38 cfs @ 12.69 hrs, Volume= 2.529 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 24.67' @ 12.69 hrs Surf.Area= 0.000 ac Storage= 0.086 af

Plug-Flow detention time= 47.6 min calculated for 2.529 af (97% of inflow)
Center-of-Mass det. time= 9.5 min (944.1 - 934.5)

Volume	Invert	Avail.Storage	Storage Description
#1	20.81'	0.301 af	**Custom Stage Data**Listed below

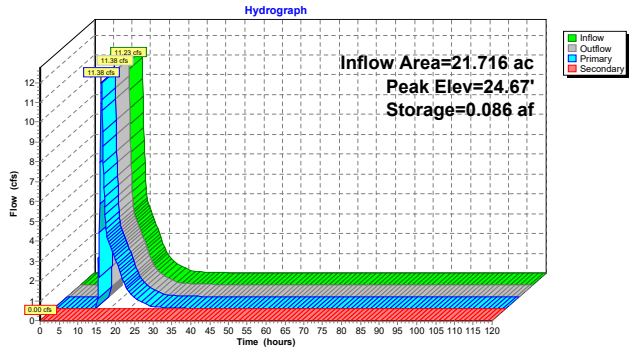
Elevation (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
20.81	0.000	0.000
21.00	0.001	0.001
22.00	0.004	0.005
23.00	0.013	0.018
24.00	0.032	0.050
25.00	0.054	0.104
26.00	0.093	0.197
26.50	0.104	0.301

Device	Routing	Invert	Outlet Devices
#1	Primary	20.81'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 20.81' / 20.60' S= 0.0021 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#2	Primary	21.25'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 102.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 21.25' / 20.72' S= 0.0052 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#3	Secondary	26.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=11.42 cfs @ 12.69 hrs HW=24.67' TW=24.60' (Fixed TW Elev= 24.60')
└─**1=Culvert** (Outlet Controls 5.73 cfs @ 0.98 fps)
└─**2=Culvert** (Outlet Controls 5.69 cfs @ 0.97 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.81' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Existing Depression North of Southern Driveway



Summary for Pond P1: Proposed SW Wet Pond

Inflow Area = 15.396 ac, 89.58% Impervious, Inflow Depth = 1.74" for 1-YR event
Inflow = 24.70 cfs @ 12.14 hrs, Volume= 2.236 af
Outflow = 8.66 cfs @ 12.74 hrs, Volume= 2.235 af, Atten= 65%, Lag= 36.4 min
Primary = 8.66 cfs @ 12.74 hrs, Volume= 2.235 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 27.45' @ 12.74 hrs Surf.Area= 0.537 ac Storage= 1.073 af

Plug-Flow detention time= 166.4 min calculated for 2.235 af (100% of inflow)
Center-of-Mass det. time= 166.0 min (948.8 - 782.8)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	2.665 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

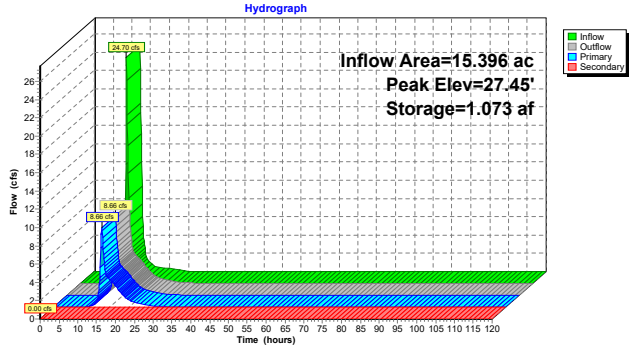
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
25.00	0.339	0.000	0.000
26.00	0.418	0.378	0.378
28.00	0.582	1.000	1.378
30.00	0.705	1.287	2.665

Device	Routing	Invert	Outlet Devices
#1	Primary	24.00'	**36.0" Round Culvert** L= 58.7' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 24.00' / 23.00' S= 0.0170 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#2	Device 1	25.00'	**10.0" Vert. Dewater - Orifice/Grate** C= 0.600
#3	Device 1	27.00'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 1	28.80'	**60.0" Horiz. Open Top - Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	29.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=8.58 cfs @ 12.74 hrs HW=27.45' TW=24.60' (Fixed TW Elev= 24.60')
└─**1=Culvert** (Passes 8.58 cfs of 43.02 cfs potential flow)
└─**2=Dewater - Orifice/Grate** (Orifice Controls 3.74 cfs @ 6.86 fps)
└─**3=Sharp-Crested Rectangular Weir** (Weir Controls 4.84 cfs @ 2.19 fps)
└─**4=Open Top - Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: Proposed SW Wet Pond

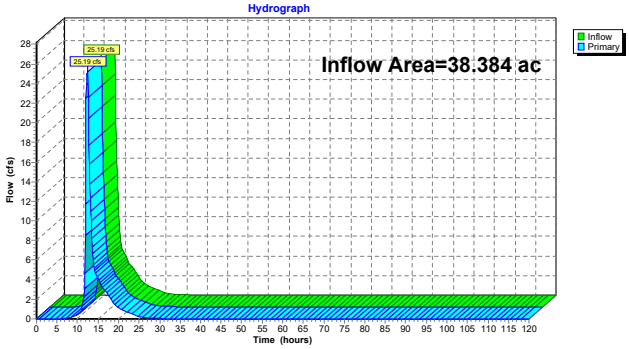


Summary for Link 6L: Total Site Discharge (SW)

Inflow Area = 38.384 ac, 75.40% Impervious, Inflow Depth = 1.42" for 1-YR event
Inflow = 25.19 cfs @ 12.50 hrs, Volume= 4.550 af
Primary = 25.19 cfs @ 12.50 hrs, Volume= 4.550 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs

Link 6L: Total Site Discharge (SW)



Time span=0.00-120.00 hrs, dt=0.10 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1&2S: NE Existing Area Runoff Area=3.050 ac 72.46% Impervious Runoff Depth=1.55"
Tc=6.0 min CN=88 Runoff=7.55 cfs 0.395 af

Subcatchment3S: NE Existing Offsite Runoff Area=0.410 ac 100.00% Impervious Runoff Depth=2.47"
Tc=6.0 min CN=98 Runoff=1.44 cfs 0.084 af

Subcatchment5SA: W Existing Area A Runoff Area=1.750 ac 67.43% Impervious Runoff Depth=1.41"
Tc=6.0 min CN=86 Runoff=3.93 cfs 0.205 af

Subcatchment5SB: W Existing Area B Runoff Area=0.180 ac 93.89% Impervious Runoff Depth=2.26"
Tc=6.0 min CN=96 Runoff=0.61 cfs 0.034 af

SubcatchmentA-1&4S: Existing E Area Runoff Area=7.110 ac 94.51% Impervious Runoff Depth=2.26"
Flow Length=535' Tc=29.6 min CN=96 Runoff=13.73 cfs 1.337 af

SubcatchmentA-2: Existing S Area Runoff Area=2.006 ac 0.00% Impervious Runoff Depth=0.26"
Flow Length=535' Tc=29.6 min CN=61 Runoff=0.26 cfs 0.043 af

SubcatchmentB-1a: S Existing Bldg Runoff Area=6.210 ac 100.00% Impervious Runoff Depth=2.47"
Flow Length=535' Tc=29.6 min CN=98 Runoff=12.60 cfs 1.278 af

SubcatchmentB-1b: SW Existing Area Runoff Area=2.090 ac 14.50% Impervious Runoff Depth=0.41"
Flow Length=535' Tc=29.6 min CN=66 Runoff=0.56 cfs 0.071 af

SubcatchmentB-2: NW Existing Area Runoff Area=4.230 ac 57.28% Impervious Runoff Depth=1.15"
Flow Length=535' Tc=29.6 min CN=82 Runoff=4.30 cfs 0.404 af

SubcatchmentPA1: Proposed SW Area Runoff Area=6.846 ac 85.04% Impervious Runoff Depth=1.88"
Tc=6.0 min CN=92 Runoff=20.12 cfs 1.072 af

SubcatchmentPA3: Proposed SW Area Runoff Area=0.786 ac 41.73% Impervious Runoff Depth=0.82"
Tc=6.0 min CN=76 Runoff=0.97 cfs 0.054 af

SubcatchmentPA4: Proposed SE Area Runoff Area=3.716 ac 85.20% Impervious Runoff Depth=1.97"
Tc=6.0 min CN=93 Runoff=11.34 cfs 0.610 af

Pond 1B: Existing - NE Bioretention Basin Peak Elev=36.93' Storage=2,437 cf Inflow=7.55 cfs 0.395 af
Discarded=0.16 cfs 0.068 af Primary=5.54 cfs 0.327 af Outflow=5.70 cfs 0.395 af

Pond 2B: Existing - NW Bioretention Basin Peak Elev=33.44' Storage=3,465 cf Inflow=5.37 cfs 0.290 af
Discarded=0.13 cfs 0.080 af Primary=2.34 cfs 0.210 af Outflow=2.47 cfs 0.290 af

Pond 2P: Existing Depression North of Peak Elev=24.74' Storage=0.090 af Inflow=15.52 cfs 3.069 af
Primary=15.70 cfs 2.987 af Secondary=0.00 cfs 0.000 af Outflow=15.70 cfs 2.987 af

Pond P1: Proposed SW Wet Pond Peak Elev=27.62' Storage=1.164 af Inflow=28.54 cfs 2.594 af
Primary=11.70 cfs 2.594 af Secondary=0.00 cfs 0.000 af Outflow=11.70 cfs 2.594 af

Link 6L: Total Site Discharge (SW) Inflow=32.61 cfs 5.358 af
Primary=32.61 cfs 5.358 af

Total Runoff Area = 38.384 ac Runoff Volume = 5.588 af Average Runoff Depth = 1.75"
24.60% Pervious = 9.443 ac 75.40% Impervious = 28.941 ac

Summary for Subcatchment 1&2S: NE Existing Area

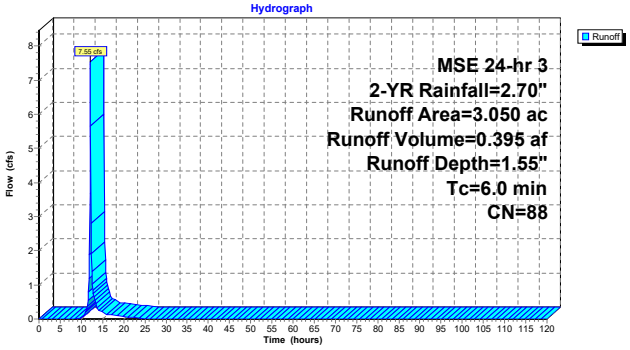
Runoff = 7.55 cfs @ 12.12 hrs, Volume= 0.395 af, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.820	98	Paved parking, HSG B
0.840	61	>75% Grass cover, Good, HSG B
1.390	98	Roofs, HSG B
3.050	88	Weighted Average
0.840		27.54% Pervious Area
2.210		72.46% Impervious Area

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

Subcatchment 1&2S: NE Existing Area



Summary for Subcatchment 3S: NE Existing Offsite Roof

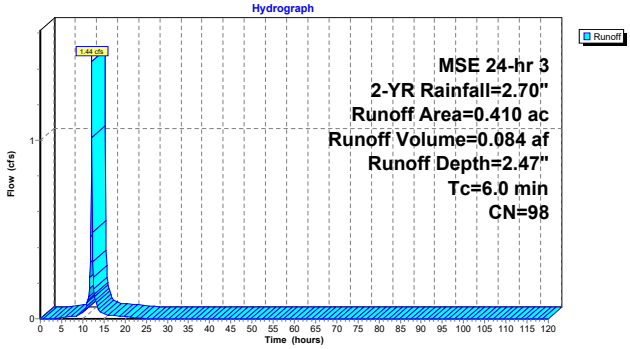
Runoff = 1.44 cfs @ 12.11 hrs, Volume= 0.084 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.410	98	Roofs, HSG B
0.410		100.00% Impervious Area

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

Subcatchment 3S: NE Existing Offsite Roof



Summary for Subcatchment 5SA: W Existing Area A

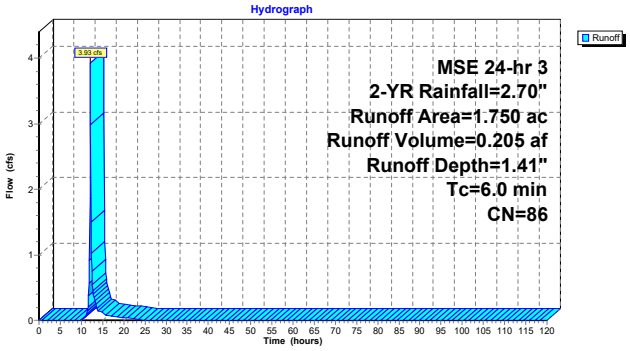
Runoff = 3.93 cfs @ 12.12 hrs, Volume= 0.205 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.570	61	>75% Grass cover, Good, HSG B
1.180	98	Roofs, HSG B
1.750	86	Weighted Average
0.570		32.57% Pervious Area
1.180		67.43% Impervious Area

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

Subcatchment 5SA: W Existing Area A



Summary for Subcatchment 5SB: W Existing Area B

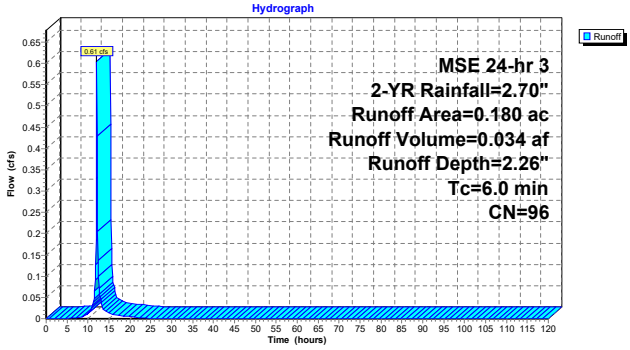
Runoff = 0.61 cfs @ 12.11 hrs, Volume= 0.034 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.169	98	Paved parking, HSG B
0.011	61	>75% Grass cover, Good, HSG B
0.180	96	Weighted Average
0.011		6.11% Pervious Area
0.169		93.89% Impervious Area

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

Subcatchment 5SB: W Existing Area B



Summary for Subcatchment A-1&4S: Existing E Area

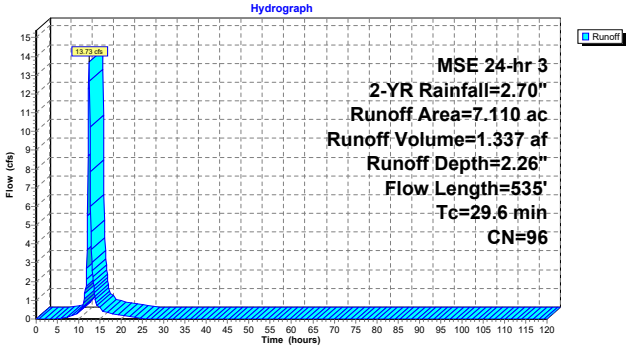
Runoff = 13.73 cfs @ 12.41 hrs, Volume= 1.337 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
6.720	98	Paved parking, HSG B
0.390	61	>75% Grass cover, Good, HSG B
7.110	96	Weighted Average
0.390		5.49% Pervious Area
6.720		94.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-1&4S: Existing E Area



Summary for Subcatchment A-2: Existing S Area

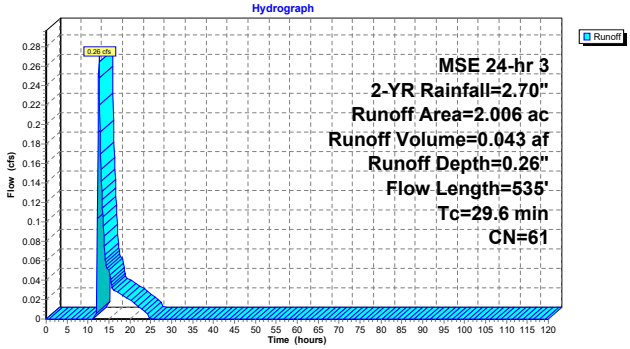
Runoff = 0.26 cfs @ 12.60 hrs, Volume= 0.043 af, Depth= 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
2.006	61	>75% Grass cover, Good, HSG B
2.006		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-2: Existing S Area



Summary for Subcatchment B-1a: S Existing Bldg

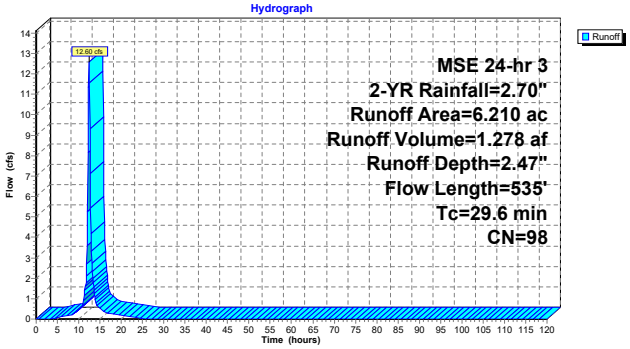
Runoff = 12.60 cfs @ 12.40 hrs, Volume= 1.278 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
6.210	98	Roofs, HSG B
6.210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-1a: S Existing Bldg



Summary for Subcatchment B-1b: SW Existing Area

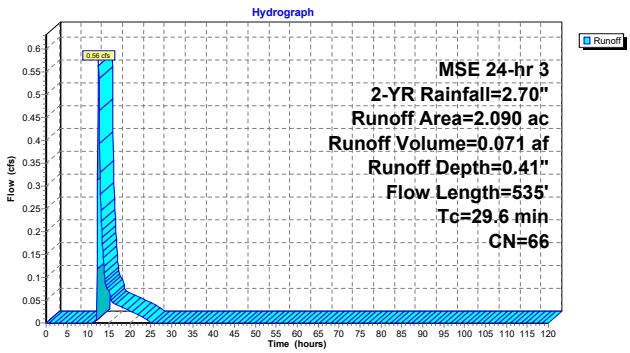
Runoff = 0.56 cfs @ 12.52 hrs, Volume= 0.071 af, Depth= 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.303	98	Paved parking, HSG B
1.787	61	>75% Grass cover, Good, HSG B
2.090	66	Weighted Average
1.787		85.50% Pervious Area
0.303		14.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-1b: SW Existing Area



Summary for Subcatchment B-2: NW Existing Area

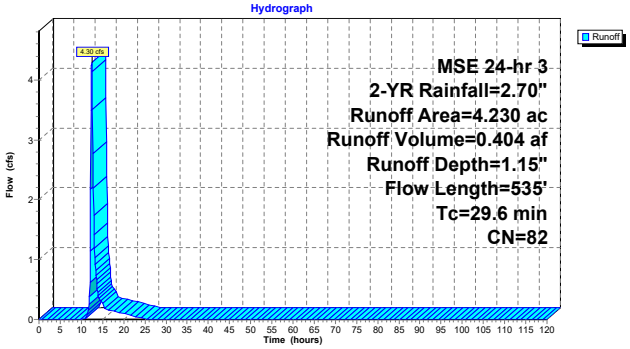
Runoff = 4.30 cfs @ 12.44 hrs, Volume= 0.404 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.686	98	Paved parking, HSG B
1.807	61	>75% Grass cover, Good, HSG B
0.658	98	Roofs, HSG B
1.079	98	Roofs, HSG B
4.230	82	Weighted Average
1.807		42.72% Pervious Area
2.423		57.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-2: NW Existing Area



Summary for Subcatchment PA1: Proposed SW Area

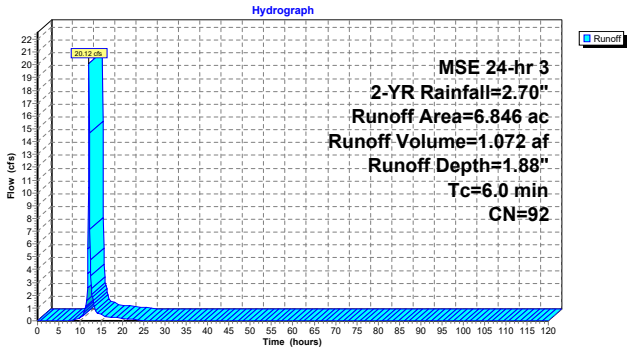
Runoff = 20.12 cfs @ 12.11 hrs, Volume= 1.072 af, Depth= 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.313	98	Paved parking, HSG B
0.611	98	Paved parking, HSG B
1.024	61	>75% Grass cover, Good, HSG B
4.559	98	Roofs, HSG B
0.339	98	Water Surface, HSG B
6.846	92	Weighted Average
1.024		14.96% Pervious Area
5.822		85.04% Impervious Area

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

Subcatchment PA1: Proposed SW Area



Summary for Subcatchment PA3: Proposed SW Area

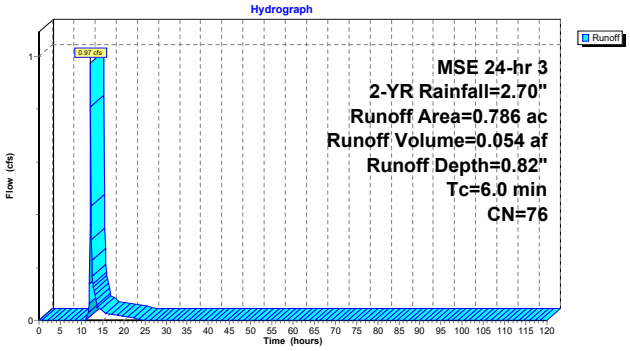
Runoff = 0.97 cfs @ 12.13 hrs, Volume= 0.054 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.328	98	Paved parking, HSG B
0.458	61	>75% Grass cover, Good, HSG B
0.786	76	Weighted Average
0.458		58.27% Pervious Area
0.328		41.73% Impervious Area

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

Subcatchment PA3: Proposed SW Area



Summary for Subcatchment PA4: Proposed SE Area

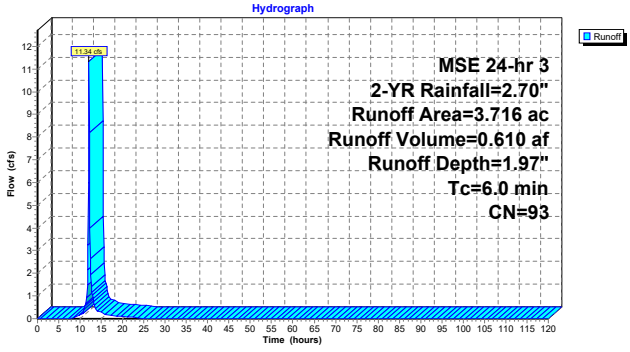
Runoff = 11.34 cfs @ 12.11 hrs, Volume= 0.610 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-YR Rainfall=2.70"

Area (ac)	CN	Description
3.166	98	Paved parking, HSG B
0.550	61	>75% Grass cover, Good, HSG B
3.716	93	Weighted Average
0.550		14.80% Pervious Area
3.166		85.20% Impervious Area

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

Subcatchment PA4: Proposed SE Area



Summary for Pond 1B: Existing - NE Bioretention Basin

Inflow Area = 3.050 ac, 72.46% Impervious, Inflow Depth = 1.55" for 2-YR event
Inflow = 7.55 cfs @ 12.12 hrs, Volume= 0.395 af
Outflow = 5.70 cfs @ 12.21 hrs, Volume= 0.395 af, Atten= 25%, Lag= 5.5 min
Discarded = 0.16 cfs @ 12.21 hrs, Volume= 0.068 af
Primary = 5.54 cfs @ 12.21 hrs, Volume= 0.327 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 36.93' @ 12.21 hrs Surf.Area= 4,067 sf Storage= 2,437 cf

Plug-Flow detention time= 10.5 min calculated for 0.395 af (100% of inflow)
Center-of-Mass det. time= 10.5 min (810.3 - 799.8)

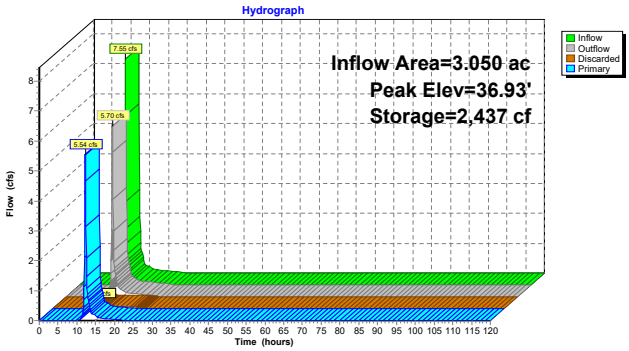
Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	18,126 cf	**5.00'W x 240.00'L x 3.00'H Prismatoid Z=6.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	36.00'	**24.0" W x 15.0" H, R=14.8"/33.1" Pipe Arch Culvert** L= 100.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 36.00' / 34.10' S= 0.0190 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.01 sf
#2	Primary	36.30'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	36.00'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.15 cfs @ 12.21 hrs HW=36.92' (Free Discharge)
└**3=Exfiltration** (Controls 0.15 cfs)

Primary OutFlow Max=5.45 cfs @ 12.21 hrs HW=36.92' TW=24.60' (Fixed TW Elev= 24.60')
├**1=Culvert** (Inlet Controls 4.87 cfs @ 2.99 fps)
└**2=Orifice/Grate** (Orifice Controls 0.58 cfs @ 2.94 fps)

Pond 1B: Existing - NE Bioretention Basin



Summary for Pond 2B: Existing - NW Bioretention Basin

Inflow Area = 2.160 ac, 73.61% Impervious, Inflow Depth = 1.61" for 2-YR event
Inflow = 5.37 cfs @ 12.12 hrs, Volume= 0.290 af
Outflow = 2.47 cfs @ 12.29 hrs, Volume= 0.290 af, Atten= 54%, Lag= 10.5 min
Discarded = 0.13 cfs @ 12.29 hrs, Volume= 0.080 af
Primary = 2.34 cfs @ 12.29 hrs, Volume= 0.210 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 33.44' @ 12.29 hrs Surf.Area= 2,958 sf Storage= 3,465 cf

Plug-Flow detention time= 40.4 min calculated for 0.290 af (100% of inflow)
Center-of-Mass det. time= 40.4 min (831.1 - 790.6)

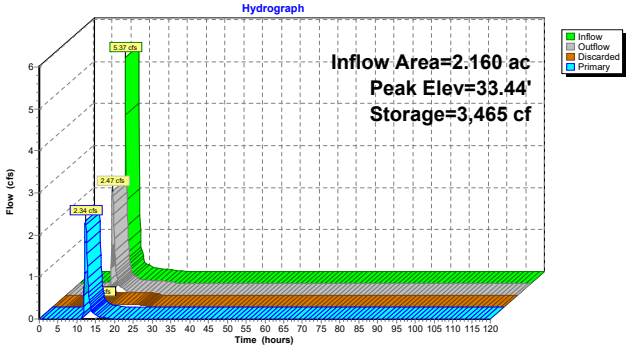
Volume	Invert	Avail.Storage	Storage Description
#1	31.70'	13,445 cf	**10.00'W x 110.00'L x 4.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	31.70'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 25.00'
#2	Primary	32.00'	**10.0" Round Culvert** L= 177.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 32.00' / 28.00' S= 0.0226 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.13 cfs @ 12.29 hrs HW=33.43' (Free Discharge)
└**1=Exfiltration** (Controls 0.13 cfs)

Primary OutFlow Max=2.33 cfs @ 12.29 hrs HW=33.43' (Free Discharge)
└**2=Culvert** (Inlet Controls 2.33 cfs @ 4.28 fps)

Pond 2B: Existing - NW Bioretention Basin



Summary for Pond 2P: Existing Depression North of Southern Driveway

Inflow Area = 21.716 ac, 76.06% Impervious, Inflow Depth = 1.70" for 2-YR event
Inflow = 15.52 cfs @ 12.60 hrs, Volume= 3.069 af
Outflow = 15.70 cfs @ 12.61 hrs, Volume= 2.987 af, Atten= 0%, Lag= 0.6 min
Primary = 15.70 cfs @ 12.61 hrs, Volume= 2.987 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 24.74' @ 12.61 hrs Surf.Area= 0.000 ac Storage= 0.090 af

Plug-Flow detention time= 37.8 min calculated for 2.985 af (97% of inflow)
Center-of-Mass det. time= 8.4 min (928.3 - 920.0)

Volume	Invert	Avail.Storage	Storage Description
#1	20.81'	0.301 af	**Custom Stage Data**Listed below

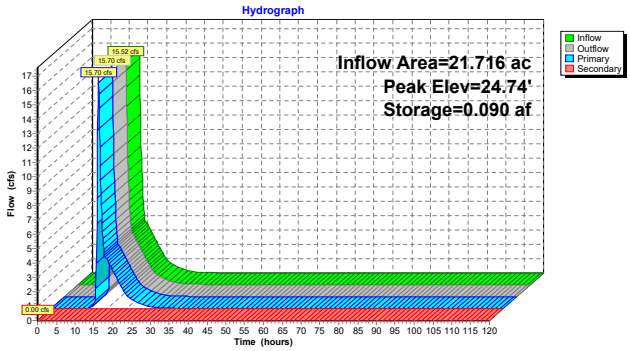
Elevation (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
20.81	0.000	0.000
21.00	0.001	0.001
22.00	0.004	0.005
23.00	0.013	0.018
24.00	0.032	0.050
25.00	0.054	0.104
26.00	0.093	0.197
26.50	0.104	0.301

Device	Routing	Invert	Outlet Devices
#1	Primary	20.81'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 20.81' / 20.60' S= 0.0021 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#2	Primary	21.25'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 102.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 21.25' / 20.72' S= 0.0052 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#3	Secondary	26.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=15.62 cfs @ 12.61 hrs HW=24.74' TW=24.60' (Fixed TW Elev= 24.60')
└**1=Culvert** (Outlet Controls 7.83 cfs @ 1.34 fps)
└**2=Culvert** (Outlet Controls 7.79 cfs @ 1.33 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.81' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Existing Depression North of Southern Driveway



Summary for Pond P1: Proposed SW Wet Pond

Inflow Area = 15.396 ac, 89.58% Impervious, Inflow Depth = 2.02" for 2-YR event
Inflow = 28.54 cfs @ 12.14 hrs, Volume= 2.594 af
Outflow = 11.70 cfs @ 12.68 hrs, Volume= 2.594 af, Atten= 59%, Lag= 32.6 min
Primary = 11.70 cfs @ 12.68 hrs, Volume= 2.594 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 27.62' @ 12.68 hrs Surf.Area= 0.551 ac Storage= 1.164 af

Plug-Flow detention time= 149.8 min calculated for 2.592 af (100% of inflow)
Center-of-Mass det. time= 153.0 min (933.7 - 780.7)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	2.665 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

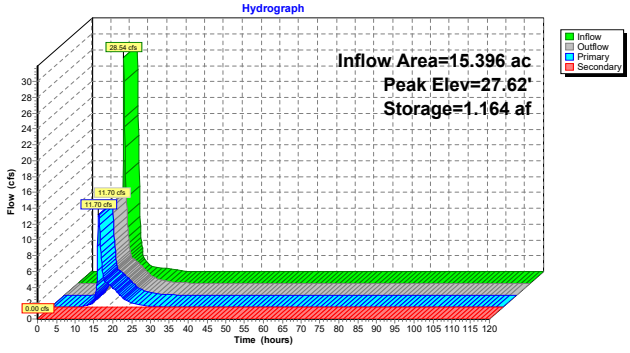
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
25.00	0.339	0.000	0.000
26.00	0.418	0.378	0.378
28.00	0.582	1.000	1.378
30.00	0.705	1.287	2.665

Device	Routing	Invert	Outlet Devices
#1	Primary	24.00'	**36.0" Round Culvert** L= 58.7' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 24.00' / 23.00' S= 0.0170 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#2	Device 1	25.00'	**10.0" Vert. Dewater - Orifice/Grate** C= 0.600
#3	Device 1	27.00'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 1	28.80'	**60.0" Horiz. Open Top - Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	29.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=11.64 cfs @ 12.68 hrs HW=27.62' TW=24.60' (Fixed TW Elev= 24.60')
↑ **1=Culvert** (Passes 11.64 cfs of 44.90 cfs potential flow)
↑ **2=Dewater - Orifice/Grate** (Orifice Controls 3.90 cfs @ 7.14 fps)
↑ **3=Sharp-Crested Rectangular Weir** (Weir Controls 7.74 cfs @ 2.57 fps)
↑ **4=Open Top - Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
↑ **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: Proposed SW Wet Pond

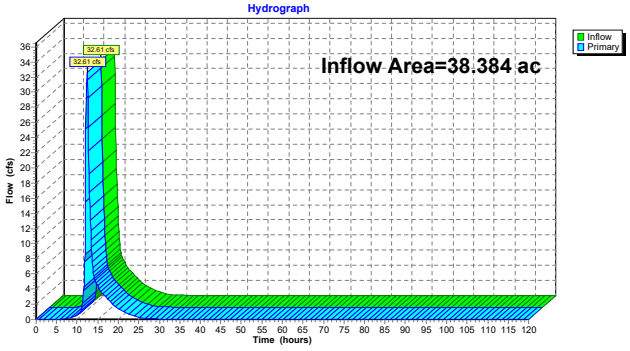


Summary for Link 6L: Total Site Discharge (SW)

Inflow Area = 38.384 ac, 75.40% Impervious, Inflow Depth = 1.68" for 2-YR event
Inflow = 32.61 cfs @ 12.43 hrs, Volume= 5.358 af
Primary = 32.61 cfs @ 12.43 hrs, Volume= 5.358 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs

Link 6L: Total Site Discharge (SW)



Time span=0.00-120.00 hrs, dt=0.10 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1&2S: NE Existing Area Runoff Area=3.050 ac 72.46% Impervious Runoff Depth=2.55"
Tc=6.0 min CN=88 Runoff=12.25 cfs 0.649 af

Subcatchment3S: NE Existing Offsite Runoff Area=0.410 ac 100.00% Impervious Runoff Depth=3.58"
Tc=6.0 min CN=98 Runoff=2.05 cfs 0.122 af

Subcatchment5SA: W Existing Area A Runoff Area=1.750 ac 67.43% Impervious Runoff Depth=2.37"
Tc=6.0 min CN=86 Runoff=6.59 cfs 0.346 af

Subcatchment5SB: W Existing Area B Runoff Area=0.180 ac 93.89% Impervious Runoff Depth=3.35"
Tc=6.0 min CN=96 Runoff=0.88 cfs 0.050 af

SubcatchmentA-1&4S: Existing E Area Runoff Area=7.110 ac 94.51% Impervious Runoff Depth=3.35"
Flow Length=535' Tc=29.6 min CN=96 Runoff=19.98 cfs 1.986 af

SubcatchmentA-2: Existing S Area Runoff Area=2.006 ac 0.00% Impervious Runoff Depth=0.72"
Flow Length=535' Tc=29.6 min CN=61 Runoff=1.04 cfs 0.120 af

SubcatchmentB-1a: S Existing Bldg Runoff Area=6.210 ac 100.00% Impervious Runoff Depth=3.58"
Flow Length=535' Tc=29.6 min CN=98 Runoff=17.96 cfs 1.850 af

SubcatchmentB-1b: SW Existing Area Runoff Area=2.090 ac 14.50% Impervious Runoff Depth=0.97"
Flow Length=535' Tc=29.6 min CN=66 Runoff=1.63 cfs 0.170 af

SubcatchmentB-2: NW Existing Area Runoff Area=4.230 ac 57.28% Impervious Runoff Depth=2.04"
Flow Length=535' Tc=29.6 min CN=82 Runoff=7.76 cfs 0.720 af

SubcatchmentPA1: Proposed SW Area Runoff Area=6.846 ac 85.04% Impervious Runoff Depth=2.93"
Tc=6.0 min CN=92 Runoff=30.75 cfs 1.674 af

SubcatchmentPA3: Proposed SW Area Runoff Area=0.786 ac 41.73% Impervious Runoff Depth=1.59"
Tc=6.0 min CN=76 Runoff=1.98 cfs 0.104 af

SubcatchmentPA4: Proposed SE Area Runoff Area=3.716 ac 85.20% Impervious Runoff Depth=3.04"
Tc=6.0 min CN=93 Runoff=17.09 cfs 0.940 af

Pond 1B: Existing - NE Bioretention Basin Peak Elev=37.28' Storage=4,040 cf Inflow=12.25 cfs 0.649 af
Discarded=0.20 cfs 0.082 af Primary=8.53 cfs 0.567 af Outflow=8.73 cfs 0.649 af

Pond 2B: Existing - NW Bioretention Basin Peak Elev=34.18' Storage=6,005 cf Inflow=8.64 cfs 0.469 af
Discarded=0.18 cfs 0.096 af Primary=3.08 cfs 0.373 af Outflow=3.25 cfs 0.469 af

Pond 2P: Existing Depression North of Peak Elev=25.15' Storage=0.118 af Inflow=31.45 cfs 4.836 af
Primary=31.20 cfs 4.754 af Secondary=0.00 cfs 0.000 af Outflow=31.20 cfs 4.754 af

Pond P1: Proposed SW Wet Pond Peak Elev=28.11' Storage=1.445 af Inflow=42.53 cfs 3.947 af
Primary=22.65 cfs 3.947 af Secondary=0.00 cfs 0.000 af Outflow=22.65 cfs 3.947 af

Link 6L: Total Site Discharge (SW) Inflow=59.57 cfs 8.471 af
Primary=59.57 cfs 8.471 af

Total Runoff Area = 38.384 ac Runoff Volume = 8.732 af Average Runoff Depth = 2.73"
24.60% Pervious = 9.443 ac 75.40% Impervious = 28.941 ac

Summary for Subcatchment 1&2S: NE Existing Area

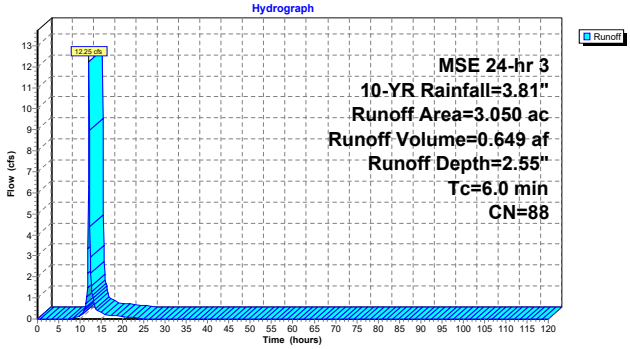
Runoff = 12.25 cfs @ 12.11 hrs, Volume= 0.649 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
0.820	98	Paved parking, HSG B
0.840	61	>75% Grass cover, Good, HSG B
1.390	98	Roofs, HSG B
3.050	88	Weighted Average
0.840		27.54% Pervious Area
2.210		72.46% Impervious Area

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

Subcatchment 1&2S: NE Existing Area



Summary for Subcatchment 3S: NE Existing Offsite Roof

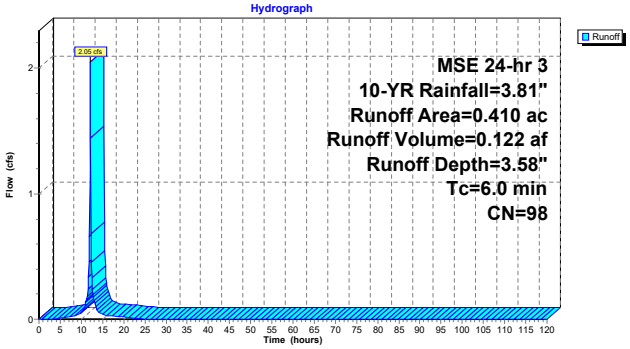
Runoff = 2.05 cfs @ 12.11 hrs, Volume= 0.122 af, Depth= 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
0.410	98	Roofs, HSG B
0.410		100.00% Impervious Area

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

Subcatchment 3S: NE Existing Offsite Roof



Summary for Subcatchment 5SA: W Existing Area A

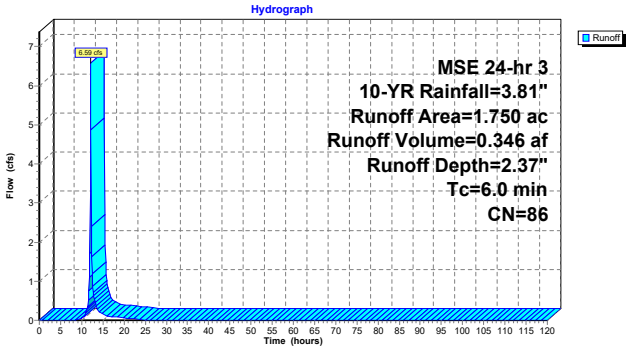
Runoff = 6.59 cfs @ 12.12 hrs, Volume= 0.346 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
0.570	61	>75% Grass cover, Good, HSG B
1.180	98	Roofs, HSG B
1.750	86	Weighted Average
0.570		32.57% Pervious Area
1.180		67.43% Impervious Area

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

Subcatchment 5SA: W Existing Area A



Summary for Subcatchment 5SB: W Existing Area B

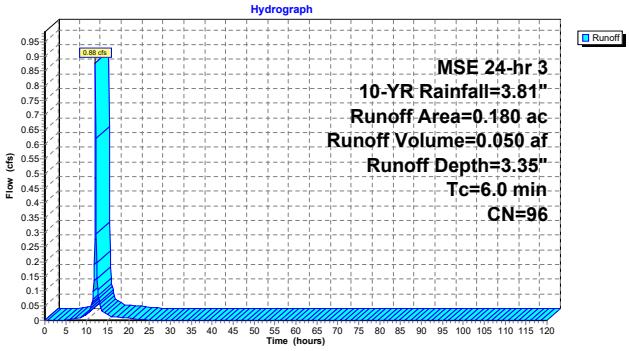
Runoff = 0.88 cfs @ 12.11 hrs, Volume= 0.050 af, Depth= 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
0.169	98	Paved parking, HSG B
0.011	61	>75% Grass cover, Good, HSG B
0.180	96	Weighted Average
0.011		6.11% Pervious Area
0.169		93.89% Impervious Area

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

Subcatchment 5SB: W Existing Area B



Summary for Subcatchment A-1&4S: Existing E Area

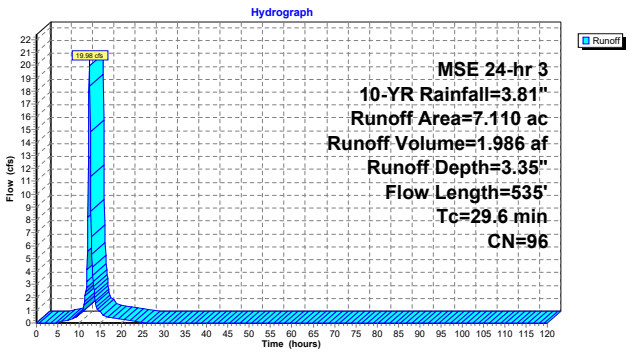
Runoff = 19.98 cfs @ 12.41 hrs, Volume= 1.986 af, Depth= 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
6.720	98	Paved parking, HSG B
0.390	61	>75% Grass cover, Good, HSG B
7.110	96	Weighted Average
0.390		5.49% Pervious Area
6.720		94.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-1&4S: Existing E Area



Summary for Subcatchment A-2: Existing S Area

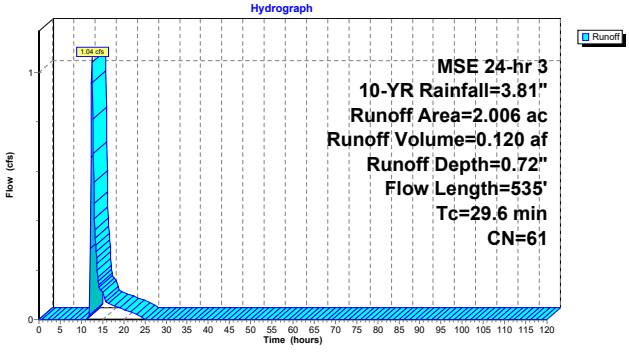
Runoff = 1.04 cfs @ 12.50 hrs, Volume= 0.120 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
2.006	61	>75% Grass cover, Good, HSG B
2.006		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-2: Existing S Area



Summary for Subcatchment B-1a: S Existing Bldg

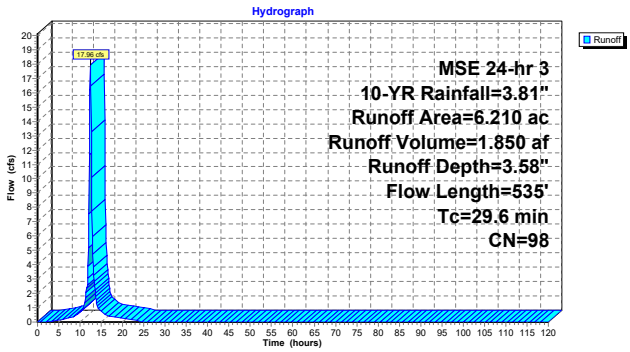
Runoff = 17.96 cfs @ 12.40 hrs, Volume= 1.850 af, Depth= 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
6.210	98	Roofs, HSG B
6.210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-1a: S Existing Bldg



Summary for Subcatchment B-1b: SW Existing Area

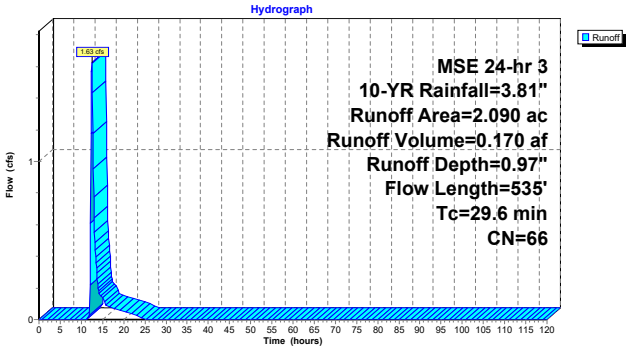
Runoff = 1.63 cfs @ 12.47 hrs, Volume= 0.170 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
0.303	98	Paved parking, HSG B
1.787	61	>75% Grass cover, Good, HSG B
2.090	66	Weighted Average
1.787		85.50% Pervious Area
0.303		14.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-1b: SW Existing Area



Summary for Subcatchment B-2: NW Existing Area

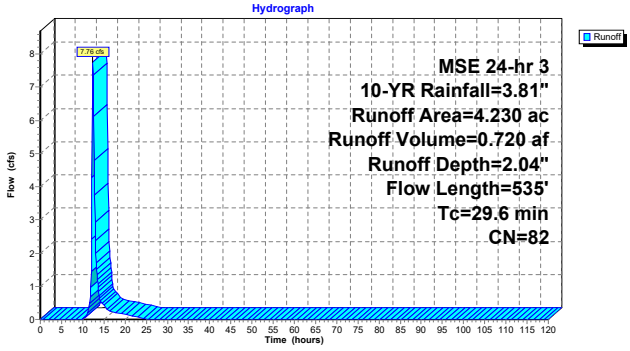
Runoff = 7.76 cfs @ 12.43 hrs, Volume= 0.720 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
0.686	98	Paved parking, HSG B
1.807	61	>75% Grass cover, Good, HSG B
0.658	98	Roofs, HSG B
1.079	98	Roofs, HSG B
4.230	82	Weighted Average
1.807		42.72% Pervious Area
2.423		57.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-2: NW Existing Area



Summary for Subcatchment PA1: Proposed SW Area

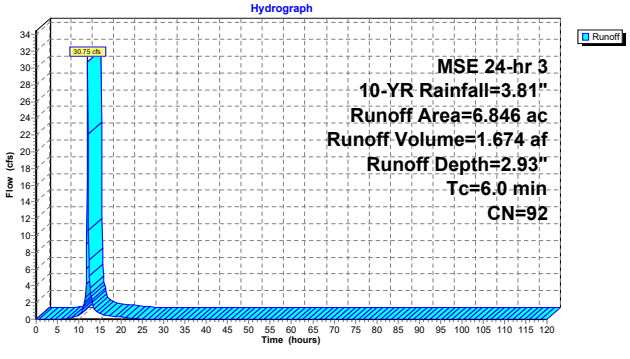
Runoff = 30.75 cfs @ 12.11 hrs, Volume= 1.674 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
0.313	98	Paved parking, HSG B
0.611	98	Paved parking, HSG B
1.024	61	>75% Grass cover, Good, HSG B
4.559	98	Roofs, HSG B
0.339	98	Water Surface, HSG B
6.846	92	Weighted Average
1.024		14.96% Pervious Area
5.822		85.04% Impervious Area

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

Subcatchment PA1: Proposed SW Area



Summary for Subcatchment PA3: Proposed SW Area

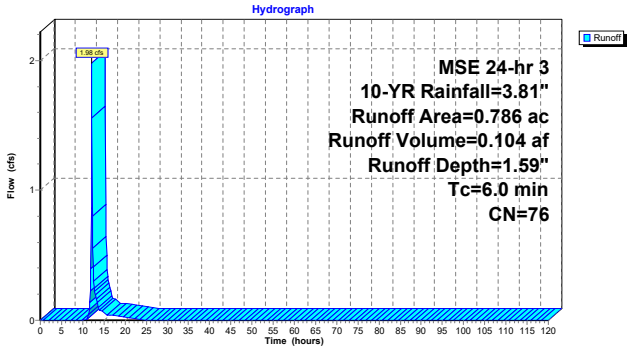
Runoff = 1.98 cfs @ 12.12 hrs, Volume= 0.104 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
0.328	98	Paved parking, HSG B
0.458	61	>75% Grass cover, Good, HSG B
0.786	76	Weighted Average
0.458		58.27% Pervious Area
0.328		41.73% Impervious Area

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

Subcatchment PA3: Proposed SW Area



Summary for Subcatchment PA4: Proposed SE Area

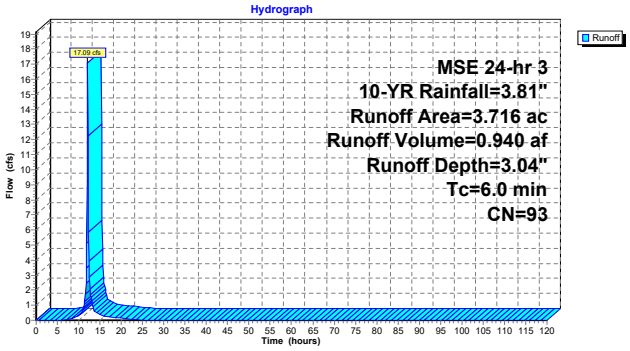
Runoff = 17.09 cfs @ 12.11 hrs, Volume= 0.940 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-YR Rainfall=3.81"

Area (ac)	CN	Description
3.166	98	Paved parking, HSG B
0.550	61	>75% Grass cover, Good, HSG B
3.716	93	Weighted Average
0.550		14.80% Pervious Area
3.166		85.20% Impervious Area

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

Subcatchment PA4: Proposed SE Area



Summary for Pond 1B: Existing - NE Bioretention Basin

Inflow Area = 3.050 ac, 72.46% Impervious, Inflow Depth = 2.55" for 10-YR event
Inflow = 12.25 cfs @ 12.11 hrs, Volume= 0.649 af
Outflow = 8.73 cfs @ 12.21 hrs, Volume= 0.649 af, Atten= 29%, Lag= 6.0 min
Discarded = 0.20 cfs @ 12.21 hrs, Volume= 0.082 af
Primary = 8.53 cfs @ 12.21 hrs, Volume= 0.567 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 37.28' @ 12.21 hrs Surf.Area= 5,196 sf Storage= 4,040 cf

Plug-Flow detention time= 9.9 min calculated for 0.648 af (100% of inflow)
Center-of-Mass det. time= 9.9 min (799.8 - 789.9)

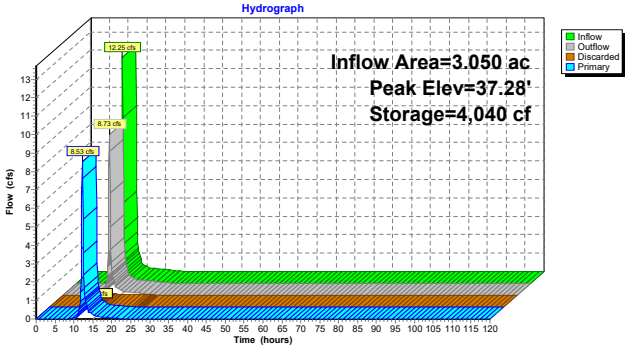
Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	18,126 cf	**5.00'W x 240.00'L x 3.00'H Prismatoid Z=6.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	36.00'	**24.0" W x 15.0" H, R=14.8"/33.1" Pipe Arch Culvert** L= 100.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 36.00' / 34.10' S= 0.0190 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.01 sf
#2	Primary	36.30'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	36.00'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.20 cfs @ 12.21 hrs HW=37.26' (Free Discharge)
└**3=Exfiltration** (Controls 0.20 cfs)

Primary OutFlow Max=8.38 cfs @ 12.21 hrs HW=37.26' TW=24.60' (Fixed TW Elev= 24.60')
├**1=Culvert** (Inlet Controls 7.58 cfs @ 3.78 fps)
└**2=Orifice/Grate** (Orifice Controls 0.80 cfs @ 4.05 fps)

Pond 1B: Existing - NE Bioretention Basin



Summary for Pond 2B: Existing - NW Bioretention Basin

Inflow Area = 2.160 ac, 73.61% Impervious, Inflow Depth = 2.60" for 10-YR event
Inflow = 8.64 cfs @ 12.11 hrs, Volume= 0.469 af
Outflow = 3.25 cfs @ 12.32 hrs, Volume= 0.469 af, Atten= 62%, Lag= 12.3 min
Discarded = 0.18 cfs @ 12.32 hrs, Volume= 0.096 af
Primary = 3.08 cfs @ 12.32 hrs, Volume= 0.373 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 34.18' @ 12.32 hrs Surf.Area= 3,874 sf Storage= 6,005 cf

Plug-Flow detention time= 37.3 min calculated for 0.468 af (100% of inflow)
Center-of-Mass det. time= 37.3 min (820.3 - 782.9)

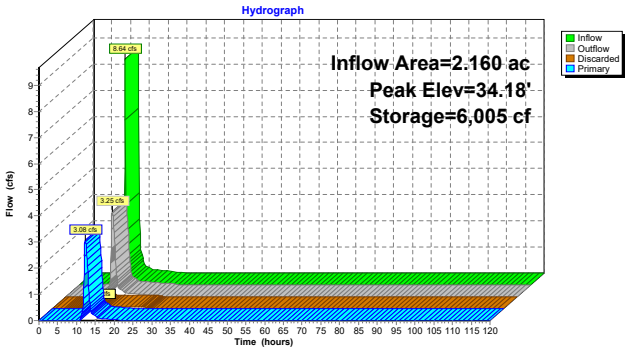
Volume	Invert	Avail.Storage	Storage Description
#1	31.70'	13,445 cf	**10.00'W x 110.00'L x 4.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	31.70'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 25.00'
#2	Primary	32.00'	**10.0" Round Culvert** L= 177.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 32.00' / 28.00' S= 0.0226 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.18 cfs @ 12.32 hrs HW=34.16' (Free Discharge)
└**1=Exfiltration** (Controls 0.18 cfs)

Primary OutFlow Max=3.06 cfs @ 12.32 hrs HW=34.16' (Free Discharge)
└**2=Culvert** (Inlet Controls 3.06 cfs @ 5.61 fps)

Pond 2B: Existing - NW Bioretention Basin



Summary for Pond 2P: Existing Depression North of Southern Driveway

Inflow Area = 21.716 ac, 76.06% Impervious, Inflow Depth = 2.67" for 10-YR event
Inflow = 31.45 cfs @ 12.50 hrs, Volume= 4.836 af
Outflow = 31.20 cfs @ 12.54 hrs, Volume= 4.754 af, Atten= 1%, Lag= 2.3 min
Primary = 31.20 cfs @ 12.54 hrs, Volume= 4.754 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 25.15' @ 12.54 hrs Surf.Area= 0.000 ac Storage= 0.118 af

Plug-Flow detention time= 28.6 min calculated for 4.754 af (98% of inflow)
Center-of-Mass det. time= 6.3 min (891.6 - 885.3)

Volume	Invert	Avail.Storage	Storage Description
#1	20.81'	0.301 af	**Custom Stage Data**Listed below

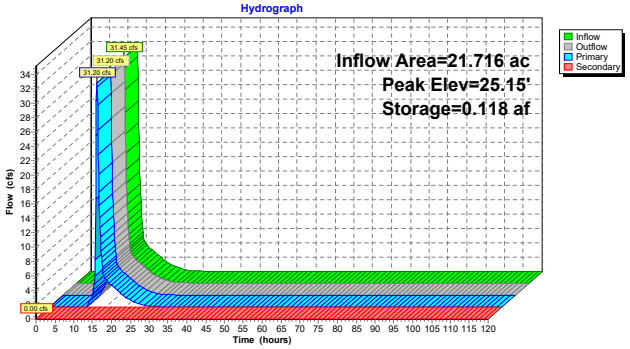
Elevation (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
20.81	0.000	0.000
21.00	0.001	0.001
22.00	0.004	0.005
23.00	0.013	0.018
24.00	0.032	0.050
25.00	0.054	0.104
26.00	0.093	0.197
26.50	0.104	0.301

Device	Routing	Invert	Outlet Devices
#1	Primary	20.81'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 20.81' / 20.60' S= 0.0021 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#2	Primary	21.25'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 102.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 21.25' / 20.72' S= 0.0052 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#3	Secondary	26.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=30.90 cfs @ 12.54 hrs HW=25.14' TW=24.60' (Fixed TW Elev= 24.60')
└**1=Culvert** (Outlet Controls 15.50 cfs @ 2.65 fps)
└**2=Culvert** (Outlet Controls 15.40 cfs @ 2.63 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.81' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Existing Depression North of Southern Driveway



Summary for Pond P1: Proposed SW Wet Pond

Inflow Area = 15.396 ac, 89.58% Impervious, Inflow Depth = 3.08" for 10-YR event
Inflow = 42.53 cfs @ 12.13 hrs, Volume= 3.947 af
Outflow = 22.65 cfs @ 12.55 hrs, Volume= 3.947 af, Atten= 47%, Lag= 24.9 min
Primary = 22.65 cfs @ 12.55 hrs, Volume= 3.947 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 28.11' @ 12.55 hrs Surf.Area= 0.589 ac Storage= 1.445 af

Plug-Flow detention time= 122.6 min calculated for 3.947 af (100% of inflow)
Center-of-Mass det. time= 122.1 min (897.2 - 775.1)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	2.665 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

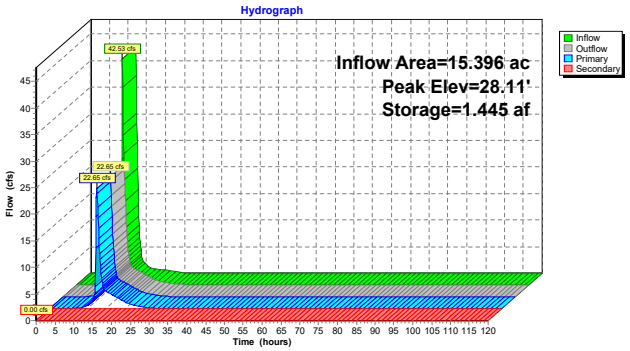
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
25.00	0.339	0.000	0.000
26.00	0.418	0.378	0.378
28.00	0.582	1.000	1.378
30.00	0.705	1.287	2.665

Device	Routing	Invert	Outlet Devices
#1	Primary	24.00'	**36.0" Round Culvert** L= 58.7' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 24.00' / 23.00' S= 0.0170 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#2	Device 1	25.00'	**10.0" Vert. Dewater - Orifice/Grate** C= 0.600
#3	Device 1	27.00'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 1	28.80'	**60.0" Horiz. Open Top - Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	29.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=22.43 cfs @ 12.55 hrs HW=28.10' TW=24.60' (Fixed TW Elev= 24.60')
↑**1=Culvert** (Passes 22.43 cfs of 46.91 cfs potential flow)
↑**2=Dewater - Orifice/Grate** (Orifice Controls 4.31 cfs @ 7.89 fps)
↑**3=Sharp-Crested Rectangular Weir** (Weir Controls 18.13 cfs @ 3.44 fps)
↑**4=Open Top - Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
↑**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: Proposed SW Wet Pond

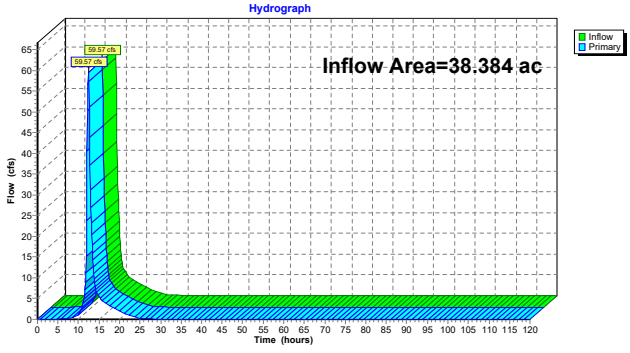


Summary for Link 6L: Total Site Discharge (SW)

Inflow Area = 38.384 ac, 75.40% Impervious, Inflow Depth = 2.65" for 10-YR event
Inflow = 59.57 cfs @ 12.41 hrs, Volume= 8.471 af
Primary = 59.57 cfs @ 12.41 hrs, Volume= 8.471 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs

Link 6L: Total Site Discharge (SW)



Time span=0.00-120.00 hrs, dt=0.10 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1&2S: NE Existing Area Runoff Area=3.050 ac 72.46% Impervious Runoff Depth=4.80"
Tc=6.0 min CN=88 Runoff=22.35 cfs 1.220 af

Subcatchment3S: NE Existing Offsite Runoff Area=0.410 ac 100.00% Impervious Runoff Depth=5.94"
Tc=6.0 min CN=98 Runoff=3.35 cfs 0.203 af

Subcatchment5SA: W Existing Area A Runoff Area=1.750 ac 67.43% Impervious Runoff Depth=4.58"
Tc=6.0 min CN=86 Runoff=12.39 cfs 0.668 af

Subcatchment5SB: W Existing Area B Runoff Area=0.180 ac 93.89% Impervious Runoff Depth=5.71"
Tc=6.0 min CN=96 Runoff=1.45 cfs 0.086 af

SubcatchmentA-1&4S: Existing E Area Runoff Area=7.110 ac 94.51% Impervious Runoff Depth=5.71"
Flow Length=535' Tc=29.6 min CN=96 Runoff=33.16 cfs 3.381 af

SubcatchmentA-2: Existing S Area Runoff Area=2.006 ac 0.00% Impervious Runoff Depth=2.13"
Flow Length=535' Tc=29.6 min CN=61 Runoff=3.67 cfs 0.356 af

SubcatchmentB-1a: S Existing Bldg Runoff Area=6.210 ac 100.00% Impervious Runoff Depth=5.94"
Flow Length=535' Tc=29.6 min CN=98 Runoff=29.33 cfs 3.075 af

SubcatchmentB-1b: SW Existing Area Runoff Area=2.090 ac 14.50% Impervious Runoff Depth=2.57"
Flow Length=535' Tc=29.6 min CN=66 Runoff=4.76 cfs 0.448 af

SubcatchmentB-2: NW Existing Area Runoff Area=4.230 ac 57.28% Impervious Runoff Depth=4.15"
Flow Length=535' Tc=29.6 min CN=82 Runoff=15.69 cfs 1.464 af

SubcatchmentPA1: Proposed SW Area Runoff Area=6.846 ac 85.04% Impervious Runoff Depth=5.25"
Tc=6.0 min CN=92 Runoff=53.17 cfs 2.993 af

SubcatchmentPA3: Proposed SW Area Runoff Area=0.786 ac 41.73% Impervious Runoff Depth=3.54"
Tc=6.0 min CN=76 Runoff=4.43 cfs 0.232 af

SubcatchmentPA4: Proposed SE Area Runoff Area=3.716 ac 85.20% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=93 Runoff=29.20 cfs 1.660 af

Pond 1B: Existing - NE Bioretention Basin Peak Elev=38.14' Storage=9,758 cf Inflow=22.35 cfs 1.220 af
Discarded=0.32 cfs 0.108 af Primary=10.65 cfs 1.112 af Outflow=10.97 cfs 1.220 af

Pond 2B: Existing - NW Bioretention Basin Peak Elev=35.53' Storage=12,463 cf Inflow=15.73 cfs 0.871 af
Discarded=0.28 cfs 0.126 af Primary=4.09 cfs 0.745 af Outflow=4.37 cfs 0.871 af

Pond 2P: Existing Depression North of Peak Elev=26.33' Storage=0.266 af Inflow=65.96 cfs 8.810 af
Primary=55.29 cfs 8.498 af Secondary=9.74 cfs 0.230 af Outflow=65.03 cfs 8.728 af

Pond P1: Proposed SW Wet Pond Peak Elev=28.89' Storage=1.920 af Inflow=71.62 cfs 6.898 af
Primary=45.55 cfs 6.898 af Secondary=0.00 cfs 0.000 af Outflow=45.55 cfs 6.898 af

Link 6L: Total Site Discharge (SW) Inflow=118.56 cfs 15.468 af
Primary=118.56 cfs 15.468 af

Total Runoff Area = 38.384 ac Runoff Volume = 15.785 af Average Runoff Depth = 4.93"
24.60% Pervious = 9.443 ac 75.40% Impervious = 28.941 ac

Summary for Subcatchment 1&2S: NE Existing Area

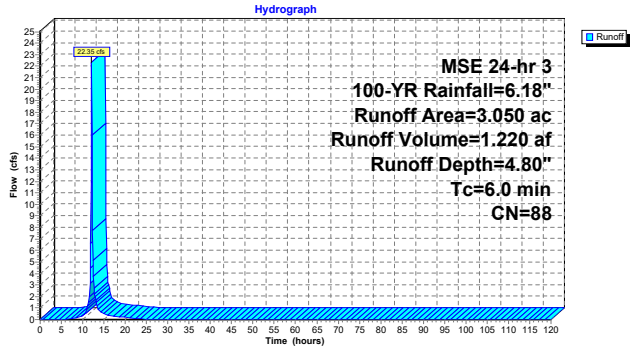
Runoff = 22.35 cfs @ 12.11 hrs, Volume= 1.220 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
0.820	98	Paved parking, HSG B
0.840	61	>75% Grass cover, Good, HSG B
1.390	98	Roofs, HSG B
3.050	88	Weighted Average
0.840		27.54% Pervious Area
2.210		72.46% Impervious Area

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

Subcatchment 1&2S: NE Existing Area



Summary for Subcatchment 3S: NE Existing Offsite Roof

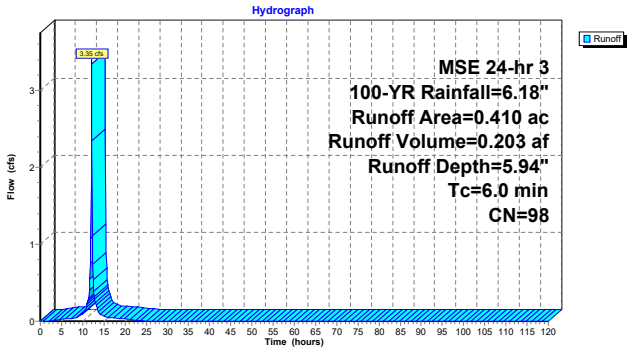
Runoff = 3.35 cfs @ 12.11 hrs, Volume= 0.203 af, Depth= 5.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
0.410	98	Roofs, HSG B
0.410		100.00% Impervious Area

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

Subcatchment 3S: NE Existing Offsite Roof



Summary for Subcatchment 5SA: W Existing Area A

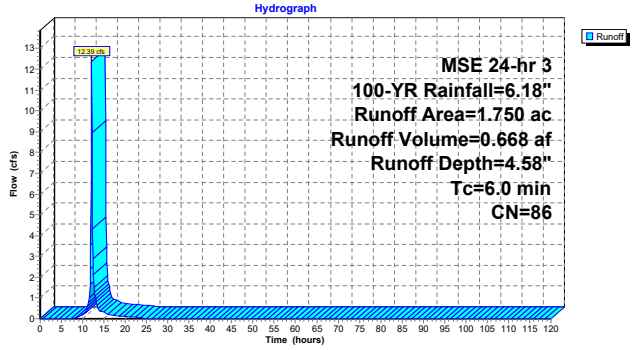
Runoff = 12.39 cfs @ 12.11 hrs, Volume= 0.668 af, Depth= 4.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
0.570	61	>75% Grass cover, Good, HSG B
1.180	98	Roofs, HSG B
1.750	86	Weighted Average
0.570		32.57% Pervious Area
1.180		67.43% Impervious Area

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

Subcatchment 5SA: W Existing Area A



Summary for Subcatchment 5SB: W Existing Area B

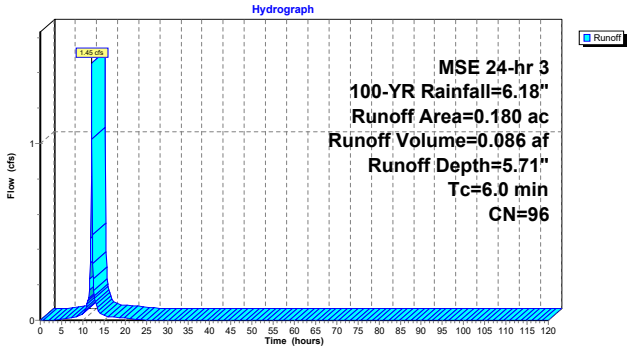
Runoff = 1.45 cfs @ 12.11 hrs, Volume= 0.086 af, Depth= 5.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
0.169	98	Paved parking, HSG B
0.011	61	>75% Grass cover, Good, HSG B
0.180	96	Weighted Average
0.011		6.11% Pervious Area
0.169		93.89% Impervious Area

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

Subcatchment 5SB: W Existing Area B



Summary for Subcatchment A-1&4S: Existing E Area

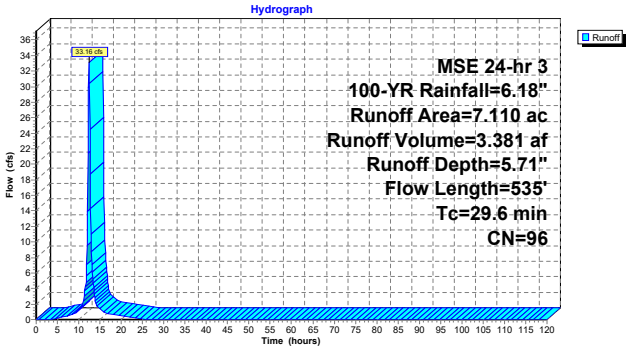
Runoff = 33.16 cfs @ 12.40 hrs, Volume= 3.381 af, Depth= 5.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
6.720	98	Paved parking, HSG B
0.390	61	>75% Grass cover, Good, HSG B
7.110	96	Weighted Average
0.390		5.49% Pervious Area
6.720		94.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-1&4S: Existing E Area



Summary for Subcatchment A-2: Existing S Area

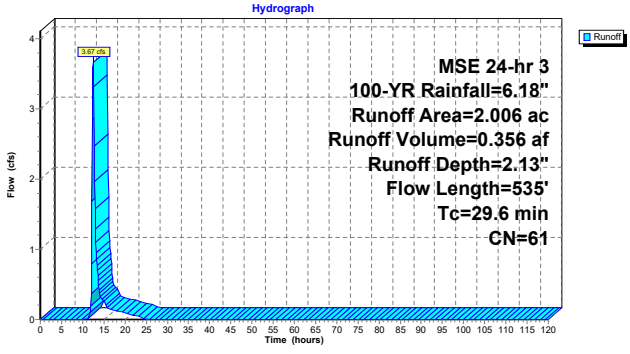
Runoff = 3.67 cfs @ 12.45 hrs, Volume= 0.356 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
2.006	61	>75% Grass cover, Good, HSG B
2.006		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment A-2: Existing S Area



Summary for Subcatchment B-1a: S Existing Bldg

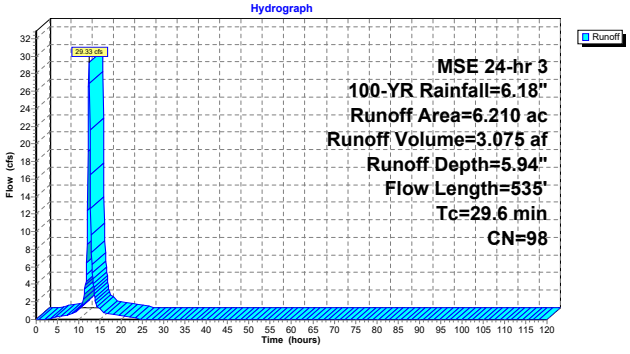
Runoff = 29.33 cfs @ 12.40 hrs, Volume= 3.075 af, Depth= 5.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
6.210	98	Roofs, HSG B
6.210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-1a: S Existing Bldg



Summary for Subcatchment B-1b: SW Existing Area

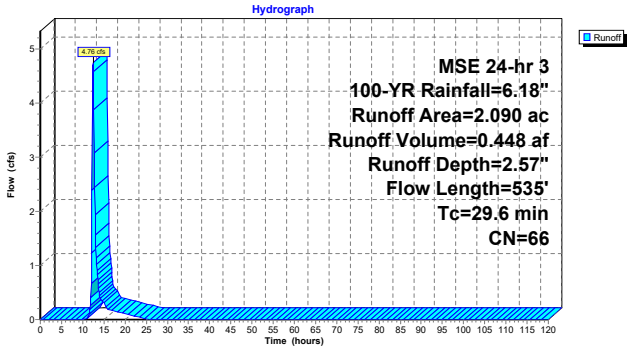
Runoff = 4.76 cfs @ 12.44 hrs, Volume= 0.448 af, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
0.303	98	Paved parking, HSG B
1.787	61	>75% Grass cover, Good, HSG B
2.090	66	Weighted Average
1.787		85.50% Pervious Area
0.303		14.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-1b: SW Existing Area



Summary for Subcatchment B-2: NW Existing Area

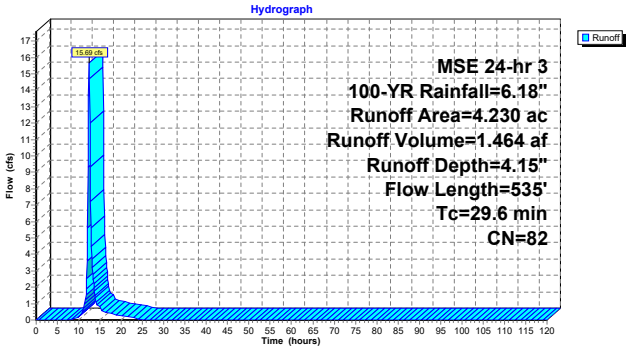
Runoff = 15.69 cfs @ 12.42 hrs, Volume= 1.464 af, Depth= 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
0.686	98	Paved parking, HSG B
1.807	61	>75% Grass cover, Good, HSG B
0.658	98	Roofs, HSG B
1.079	98	Roofs, HSG B
4.230	82	Weighted Average
1.807		42.72% Pervious Area
2.423		57.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	145	0.0110	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
3.0	390	0.0210	2.17		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
29.6	535	Total			

Subcatchment B-2: NW Existing Area



Summary for Subcatchment PA1: Proposed SW Area

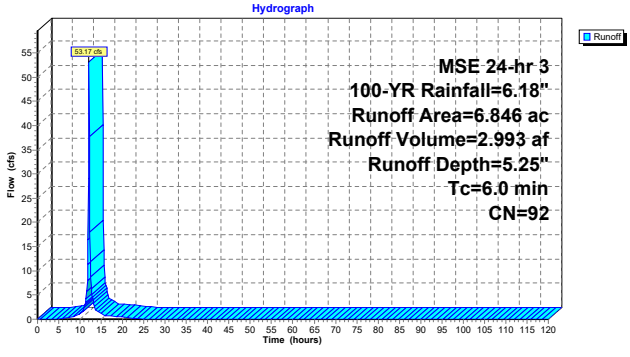
Runoff = 53.17 cfs @ 12.11 hrs, Volume= 2.993 af, Depth= 5.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
0.313	98	Paved parking, HSG B
0.611	98	Paved parking, HSG B
1.024	61	>75% Grass cover, Good, HSG B
4.559	98	Roofs, HSG B
0.339	98	Water Surface, HSG B
6.846	92	Weighted Average
1.024		14.96% Pervious Area
5.822		85.04% Impervious Area

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

Subcatchment PA1: Proposed SW Area



Summary for Subcatchment PA3: Proposed SW Area

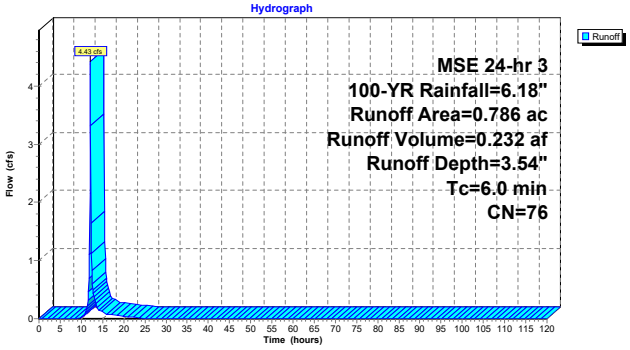
Runoff = 4.43 cfs @ 12.12 hrs, Volume= 0.232 af, Depth= 3.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
0.328	98	Paved parking, HSG B
0.458	61	>75% Grass cover, Good, HSG B
0.786	76	Weighted Average
0.458		58.27% Pervious Area
0.328		41.73% Impervious Area

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

Subcatchment PA3: Proposed SW Area



Summary for Subcatchment PA4: Proposed SE Area

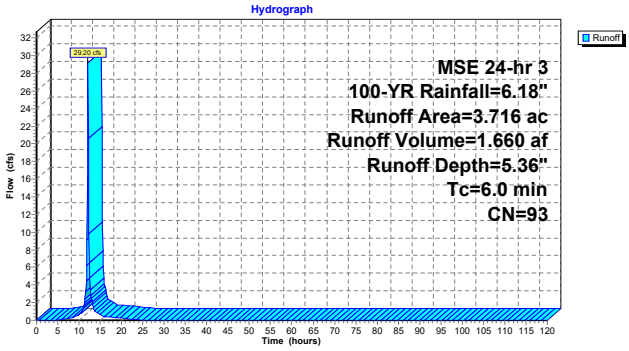
Runoff = 29.20 cfs @ 12.11 hrs, Volume= 1.660 af, Depth= 5.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-YR Rainfall=6.18"

Area (ac)	CN	Description
3.166	98	Paved parking, HSG B
0.550	61	>75% Grass cover, Good, HSG B
3.716	93	Weighted Average
0.550		14.80% Pervious Area
3.166		85.20% Impervious Area

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

Subcatchment PA4: Proposed SE Area



Summary for Pond 1B: Existing - NE Bioretention Basin

Inflow Area = 3.050 ac, 72.46% Impervious, Inflow Depth = 4.80" for 100-YR event
Inflow = 22.35 cfs @ 12.11 hrs, Volume= 1.220 af
Outflow = 10.97 cfs @ 12.27 hrs, Volume= 1.220 af, Atten= 51%, Lag= 9.3 min
Discarded = 0.32 cfs @ 12.27 hrs, Volume= 0.108 af
Primary = 10.65 cfs @ 12.27 hrs, Volume= 1.112 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 38.14' @ 12.27 hrs Surf.Area= 8,146 sf Storage= 9,758 cf

Plug-Flow detention time= 11.0 min calculated for 1.219 af (100% of inflow)
Center-of-Mass det. time= 11.0 min (788.4 - 777.4)

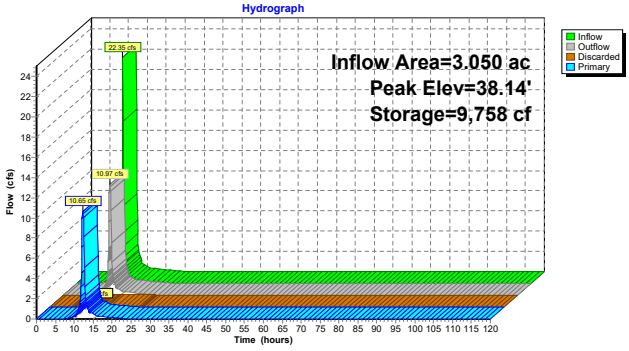
Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	18,126 cf	**5.00'W x 240.00'L x 3.00'H Prismatoid Z=6.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	36.00'	**24.0" W x 15.0" H, R=14.8"/33.1" Pipe Arch Culvert** L= 100.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 36.00' / 34.10' S= 0.0190 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.01 sf
#2	Primary	36.30'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	36.00'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.31 cfs @ 12.27 hrs HW=38.11' (Free Discharge)
└**3=Exfiltration** (Controls 0.31 cfs)

Primary OutFlow Max=10.60 cfs @ 12.27 hrs HW=38.11' TW=24.60' (Fixed TW Elev= 24.60')
├**1=Culvert** (Barrel Controls 9.42 cfs @ 4.69 fps)
└**2=Orifice/Grate** (Orifice Controls 1.18 cfs @ 6.02 fps)

Pond 1B: Existing - NE Bioretention Basin



Summary for Pond 2B: Existing - NW Bioretention Basin

Inflow Area = 2.160 ac, 73.61% Impervious, Inflow Depth = 4.84" for 100-YR event
Inflow = 15.73 cfs @ 12.11 hrs, Volume= 0.871 af
Outflow = 4.37 cfs @ 12.36 hrs, Volume= 0.871 af, Atten= 72%, Lag= 15.0 min
Discarded = 0.28 cfs @ 12.36 hrs, Volume= 0.126 af
Primary = 4.09 cfs @ 12.36 hrs, Volume= 0.745 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 35.53' @ 12.36 hrs Surf.Area= 5,718 sf Storage= 12,463 cf

Plug-Flow detention time= 38.7 min calculated for 0.870 af (100% of inflow)
Center-of-Mass det. time= 38.8 min (811.5 - 772.6)

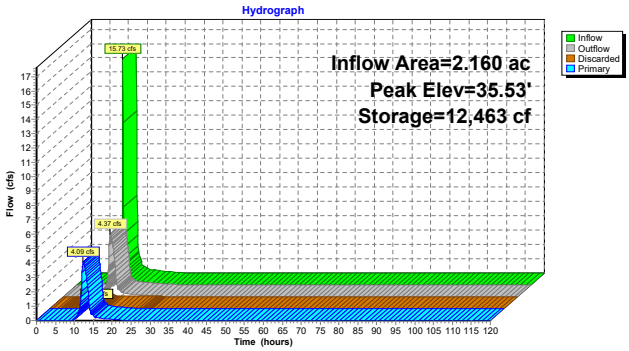
Volume	Invert	Avail.Storage	Storage Description
#1	31.70'	13,445 cf	**10.00'W x 110.00'L x 4.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	31.70'	**1.630 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 25.00'
#2	Primary	32.00'	**10.0" Round Culvert** L= 177.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 32.00' / 28.00' S= 0.0226 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.28 cfs @ 12.36 hrs HW=35.52' (Free Discharge)
└**1=Exfiltration** (Controls 0.28 cfs)

Primary OutFlow Max=4.08 cfs @ 12.36 hrs HW=35.52' (Free Discharge)
└**2=Culvert** (Inlet Controls 4.08 cfs @ 7.49 fps)

Pond 2B: Existing - NW Bioretention Basin



Summary for Pond 2P: Existing Depression North of Southern Driveway

Inflow Area = 21.716 ac, 76.06% Impervious, Inflow Depth = 4.87" for 100-YR event
Inflow = 65.96 cfs @ 12.42 hrs, Volume= 8.810 af
Outflow = 65.03 cfs @ 12.47 hrs, Volume= 8.728 af, Atten= 1%, Lag= 3.1 min
Primary = 55.29 cfs @ 12.47 hrs, Volume= 8.498 af
Secondary = 9.74 cfs @ 12.47 hrs, Volume= 0.230 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 26.33' @ 12.47 hrs Surf.Area= 0.000 ac Storage= 0.266 af

Plug-Flow detention time= 18.3 min calculated for 8.728 af (99% of inflow)
Center-of-Mass det. time= 4.9 min (857.1 - 852.2)

Volume	Invert	Avail.Storage	Storage Description
#1	20.81'	0.301 af	**Custom Stage Data** Listed below

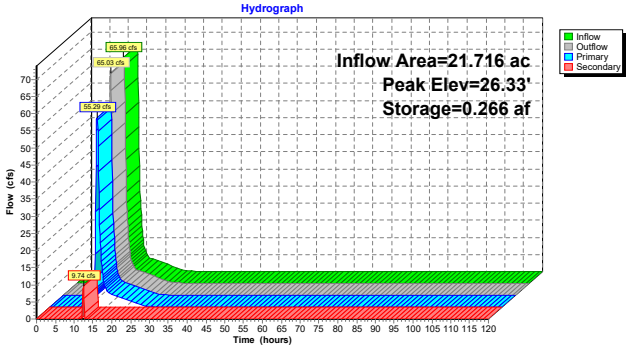
Elevation (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
20.81	0.000	0.000
21.00	0.001	0.001
22.00	0.004	0.005
23.00	0.013	0.018
24.00	0.032	0.050
25.00	0.054	0.104
26.00	0.093	0.197
26.50	0.104	0.301

Device	Routing	Invert	Outlet Devices
#1	Primary	20.81'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 20.81' / 20.60' S= 0.0021 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#2	Primary	21.25'	**36.0" W x 30.0" H, R=20.0" Elliptical Culvert** L= 102.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 21.25' / 20.72' S= 0.0052 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 5.85 sf
#3	Secondary	26.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=55.11 cfs @ 12.47 hrs HW=26.32' TW=24.60' (Fixed TW Elev= 24.60')
└─**1=Culvert** (Outlet Controls 27.64 cfs @ 4.72 fps)
└─**2=Culvert** (Outlet Controls 27.47 cfs @ 4.69 fps)

Secondary OutFlow Max=9.25 cfs @ 12.47 hrs HW=26.32' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 9.25 cfs @ 1.44 fps)

Pond 2P: Existing Depression North of Southern Driveway



Summary for Pond P1: Proposed SW Wet Pond

Inflow Area = 15.396 ac, 89.58% Impervious, Inflow Depth = 5.38" for 100-YR event
Inflow = 71.62 cfs @ 12.13 hrs, Volume= 6.898 af
Outflow = 45.55 cfs @ 12.41 hrs, Volume= 6.898 af, Atten= 36%, Lag= 16.7 min
Primary = 45.55 cfs @ 12.41 hrs, Volume= 6.898 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
Peak Elev= 28.89' @ 12.41 hrs Surf.Area= 0.637 ac Storage= 1.920 af

Plug-Flow detention time= 90.5 min calculated for 6.892 af (100% of inflow)
Center-of-Mass det. time= 93.2 min (861.7 - 768.6)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	2.665 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

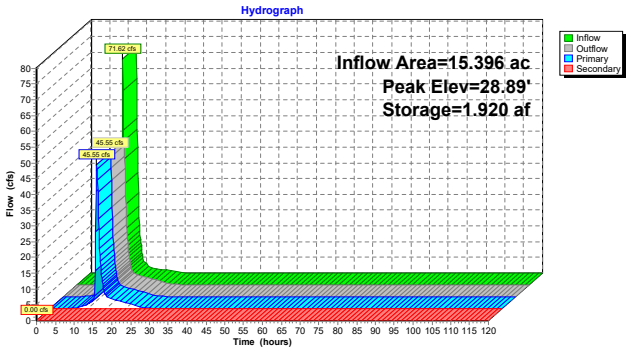
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
25.00	0.339	0.000	0.000
26.00	0.418	0.378	0.378
28.00	0.582	1.000	1.378
30.00	0.705	1.287	2.665

Device	Routing	Invert	Outlet Devices
#1	Primary	24.00'	**36.0" Round Culvert** L= 58.7' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 24.00' / 23.00' S= 0.0170 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#2	Device 1	25.00'	**10.0" Vert. Dewater - Orifice/Grate** C= 0.600
#3	Device 1	27.00'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 1	28.80'	**60.0" Horiz. Open Top - Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	29.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=45.42 cfs @ 12.41 hrs HW=28.89' TW=24.60' (Fixed TW Elev= 24.60')
└─**1=Culvert** (Passes 45.42 cfs of 54.96 cfs potential flow)
└─**2=Dewater - Orifice/Grate** (Orifice Controls 4.89 cfs @ 8.97 fps)
└─**3=Sharp-Crested Rectangular Weir** (Weir Controls 39.20 cfs @ 4.49 fps)
└─**4=Open Top - Orifice/Grate** (Weir Controls 1.33 cfs @ 0.97 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: Proposed SW Wet Pond

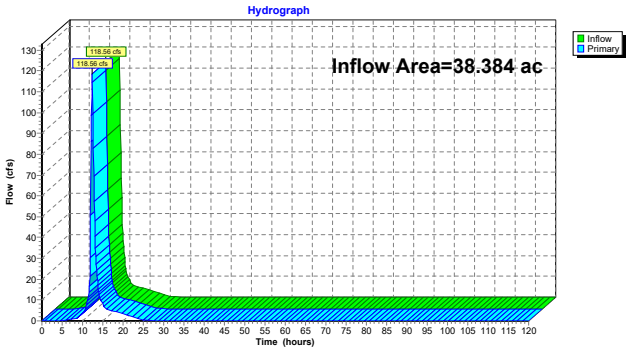


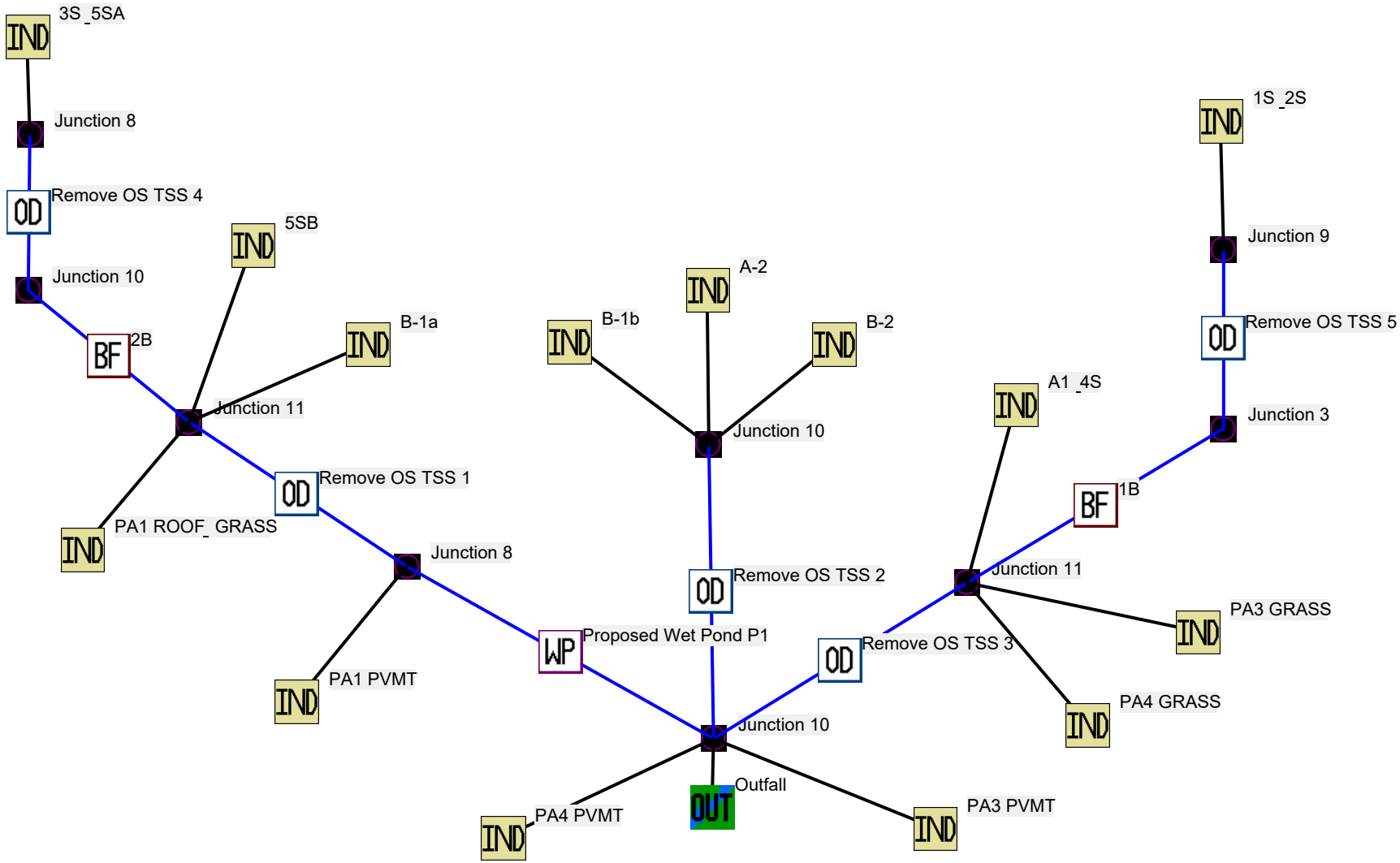
Summary for Link 6L: Total Site Discharge (SW)

Inflow Area = 38.384 ac, 75.40% Impervious, Inflow Depth = 4.84" for 100-YR event
Inflow = 118.56 cfs @ 12.42 hrs, Volume= 15.468 af
Primary = 118.56 cfs @ 12.42 hrs, Volume= 15.468 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs

Link 6L: Total Site Discharge (SW)




3S _5SA
IND
Junction 8
Remove OS TSS 4
OD
5SB
IND
Junction 10
B-1a
IND
BF
2B
Junction 11
PA1 ROOF_ GRASS
IND
Remove OS TSS 1
OD
Junction 8
PA1 PVMT
IND
Proposed Wet Pond P1
WP
A-2
IND
B-1b
IND
B-2
IND
Junction 10
Remove OS TSS 2
OD
Junction 10
PA4 PVMT
IND
Outfall
OUT
PA3 PVMT
IND
Remove OS TSS 3
OD
A1 _4S
IND
1B
BF
Junction 11
PA3 GRASS
IND
PA4 GRASS
IND
1S _2S
IND
Junction 9
Remove OS TSS 5
OD
Junction 3

Data file name: Z:\Projects\2013\230.00A-WI\DESIGN\SWMP\SLAMM\230.00A SWMP - REDEV.mdb
WinSLAMM Version 10.4.1
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/01/81 Study period ending date: 12/31/81
Start of Winter Season: 12/02 End of Winter Season: 03/12
Date: 09-10-2020 Time: 16:49:30
Site information:

LU# 1 - Industrial: 1S & 2S Total area (ac): 3.050
  1 - Roofs 1: 1.390 ac. Flat Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  13 - Paved Parking 1: 0.820 ac. Connected Source Area PSD File: C:\WinSLAMM Files\\NURP.cpz
  45 - Large Landscaped Areas 1: 0.840 ac. Normal Sandy Source Area PSD File: C:\WinSLAMM Files\\NURP.cpz

LU# 2 - Industrial: A1 & 4S Total area (ac): 7.110
  13 - Paved Parking 1: 6.720 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  45 - Large Landscaped Areas 1: 0.390 ac. Normal Sandy Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 3 - Industrial: B-2 Total area (ac): 4.230
  1 - Roofs 1: 0.658 ac. Flat Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  2 - Roofs 2: 1.079 ac. Flat Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  13 - Paved Parking 1: 0.686 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  45 - Large Landscaped Areas 1: 1.807 ac. Normal Sandy Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 4 - Industrial: A-2 Total area (ac): 2.006
  45 - Large Landscaped Areas 1: 2.006 ac. Normal Sandy Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 5 - Industrial: B-1b Total area (ac): 2.090
  13 - Paved Parking 1: 0.300 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

45 - Large Landscaped Areas 1: 1.790 ac.   Normal Sandy   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 6 - Industrial: 3S & 5SA   Total area (ac): 2.160
45 - Large Landscaped Areas 1: 0.570 ac.   Normal Sandy   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 7 - Industrial: B-1a   Total area (ac): 6.210
1 - Roofs 1: 6.210 ac.   Flat   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 8 - Industrial: PA4 PVMT   Total area (ac): 3.166
13 - Paved Parking 1: 3.166 ac.   Disconnected   Normal Sandy   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 9 - Industrial: PA3 PVMT   Total area (ac): 0.328
25 - Driveways 1: 0.328 ac.   Disconnected   Normal Sandy   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 10 - Industrial: 5SB   Total area (ac): 0.180
13 - Paved Parking 1: 0.169 ac.   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.011 ac.   Normal Sandy   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 11 - Industrial: PA1 PVMT   Total area (ac): 0.924
13 - Paved Parking 1: 0.313 ac.   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
14 - Paved Parking 2: 0.611 ac.   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 12 - Industrial: PA3 GRASS   Total area (ac): 0.458
45 - Large Landscaped Areas 1: 0.458 ac.   Normal Sandy   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 13 - Industrial: PA4 GRASS   Total area (ac): 0.550
45 - Large Landscaped Areas 1: 0.550 ac.   Normal Sandy   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 14 - Industrial: PA1 ROOF & GRASS   Total area (ac): 5.922
1 - Roofs 1: 4.559 ac.   Flat   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 1.024 ac.   Normal Sandy   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.339 ac.   Source Area PSD File:

Control Practice 1: Biofilter CP# 1 (DS) - 2B
1. Top area (square feet) = 5964
2. Bottom aea (square feet) = 1100
3. Depth (ft): 7
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 1.63
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 1
8. Infiltration rate fraction (bottom): 1
9. Depth of biofilter that is rock filled (ft) 0
10. Porosity of rock filled volume = 0
11. Engineered soil infiltration rate: 2.8
12. Engineered soil depth (ft) = 3
13. Engineered soil porosity = 0.25
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: Not needed - calculated by program
18. Initial water surface elevation (ft): 0

Soil Data	Soil Type Fraction in Eng. Soil
Sands	0.700
Compost as Amendment	0.300

Biofilter Outlet/Discharge Characteristics:
Outlet type: Broad Crested Weir
1. Weir crest length (ft): 10
2. Weir crest width (ft): 10
3. Height of datum to bottom of weir opening: 6.9

Outlet type: Vertical Stand Pipe
1. Stand pipe diameter (ft): 1
2. Stand pipe height above datum (ft): 3.3

Control Practice 2: Biofilter CP# 2 (DS) - 1B
1. Top area (square feet) = 12915
2. Bottom aea (square feet) = 5019
3. Depth (ft): 5
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 1.63
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 1
8. Infiltration rate fraction (bottom): 1
9. Depth of biofilter that is rock filled (ft) 0
10. Porosity of rock filled volume = 0
11. Engineered soil infiltration rate: 2.8
12. Engineered soil depth (ft) = 3
13. Engineered soil porosity = 0.25
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: Not needed - calculated by program
18. Initial water surface elevation (ft): 0

Soil Data	Soil Type Fraction in Eng. Soil
Sands	0.700
Compost as Amendment	0.300

Biofilter Outlet/Discharge Characteristics:
Outlet type: Broad Crested Weir

1. Weir crest length (ft): 10
2. Weir crest width (ft): 10
3. Height of datum to bottom of weir opening: 4.9

Outlet type: Vertical Stand Pipe
1. Stand pipe diameter (ft): 0.17
2. Stand pipe height above datum (ft): 3.3

Control Practice 3: Other Device CP# 1 (DS) - Remove OS TSS 1
Fraction of drainage area served by device (ac) = 1.00
Particulate Concentration reduction fraction = 1.00
Filterable Concentration reduction fraction = 0.00
Runoff volume reduction fraction = 0

Control Practice 4: Wet Detention Pond CP# 1 (DS) - Proposed Wet Pond P1
Particle Size Distribution file name: Not needed - calculated by program
Initial stage elevation (ft): 5
Peak to Average Flow Ratio: 3.8
Maximum flow allowed into pond (cfs): No maximum value entered
Outlet Characteristics:

Outlet type: Sharp Crested Weir
1. Sharp crested weir length (ft): 5
2. Sharp crested weir height from invert: 3
3. Sharp crested weir invert elevation above datum (ft): 7

Outlet type: Orifice 1
1. Orifice diameter (ft): 0.83
2. Number of orifices: 1
3. Invert elevation above datum (ft): 5

Outlet type: Broad Crested Weir
1. Weir crest length (ft): 20
2. Weir crest width (ft): 10
3. Height from datum to bottom of weir opening: 9

Outlet type: Vertical Stand Pipe
1. Stand pipe diameter (ft): 5
2. Stand pipe height above datum (ft): 8.8

Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.01	0.0277	0.00	0.00
2	2.00	0.0883	0.00	0.00
3	4.00	0.1562	0.00	0.00
4	5.00	0.3390	0.00	0.00
5	6.00	0.4180	0.00	0.00
6	8.00	0.5820	0.00	0.00
7	10.00	0.7050	0.00	0.00

Control Practice 5: Other Device CP# 2 (DS) - Remove OS TSS 2
Fraction of drainage area served by device (ac) = 1.00
Particulate Concentration reduction fraction = 1.00
Filterable Concentration reduction fraction = 0.00
Runoff volume reduction fraction = 0

Control Practice 6: Other Device CP# 3 (DS) - Remove OS TSS 3
Fraction of drainage area served by device (ac) = 1.00
Particulate Concentration reduction fraction = 1.00

Filterable Concentration reduction fraction = 0.00
Runoff volume reduction fraction = 0

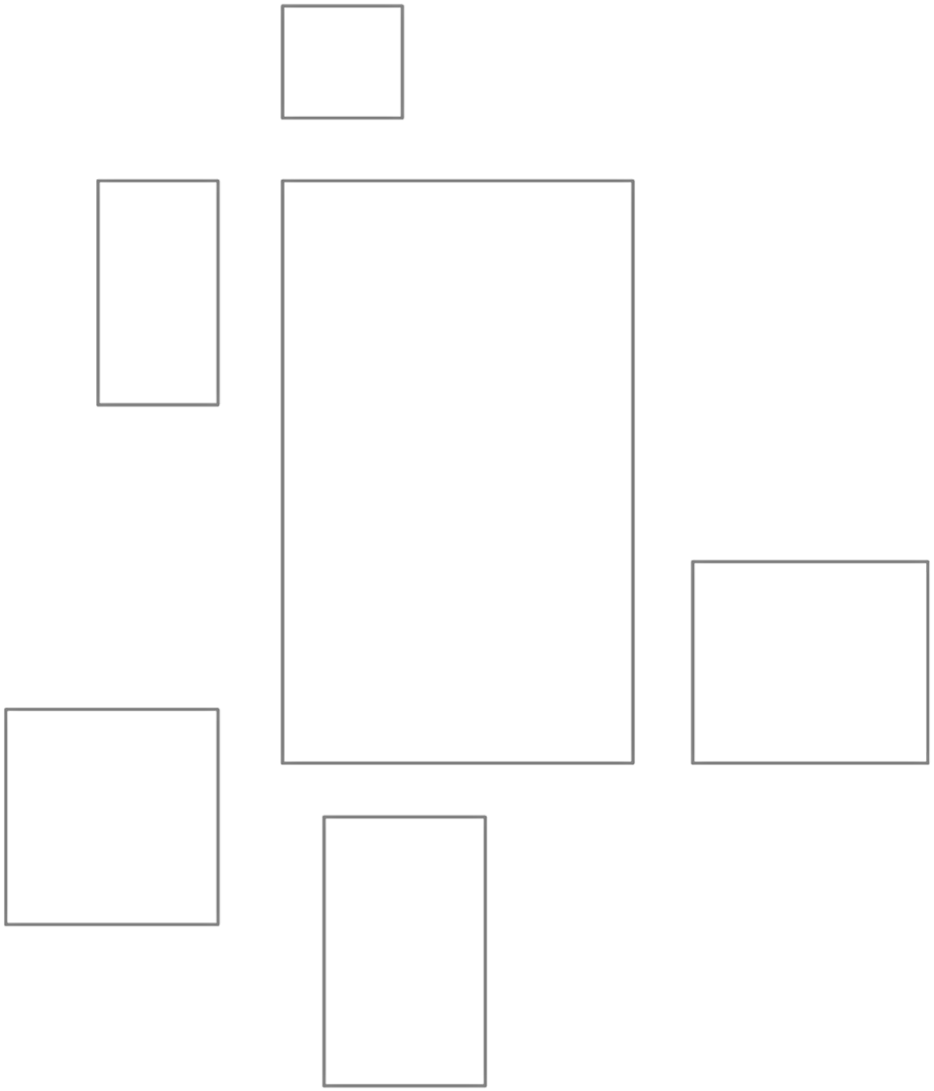
Control Practice 7: Other Device CP# 4 (DS) - Remove OS TSS 4
Fraction of drainage area served by device (ac) = 1.00
Particulate Concentration reduction fraction = 1.00
Filterable Concentration reduction fraction = 1.00
Runoff volume reduction fraction = 0

Control Practice 8: Other Device CP# 5 (DS) - Remove OS TSS 5
Fraction of drainage area served by device (ac) = 1.00
Particulate Concentration reduction fraction = 1.00
Filterable Concentration reduction fraction = 1.00
Runoff volume reduction fraction = 0

SLAMM for Windows Version 10.4.1

Data file name: Z:\Projects\2013\230.00A-WI\DESIGN\SWMP\SLAMM\230.00A SWMP - REDEV.mdb
WinSLAMM Version 10.4.1
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/01/81 Study period ending date: 12/31/81
Start of Winter Season: 12/02 End of Winter Season: 03/12
Model Run Start Date: 01/01/81 Model Run End Date: 12/31/81
Date of run: 09-10-2020 Time of run: 16:42:51
Total Area Modeled (acres): 38.384
Years in Model Run: 1.00

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	2.022E+06	-	9.112	1150	-
Outfall Total with Controls:	1.776E+06	12.17%	3.993	442.6	61.51%
Annualized Total After Outfall Controls:	1.781E+06			443.8	



5 **Appendix**: ULTIMATE DISCHARGE EX CULVERT ANALYSIS

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Aug 21 2020

2014 Analysis

Invert Elev Dn (ft)	=	18.00
Pipe Length (ft)	=	45.00
Slope (%)	=	0.91
Invert Elev Up (ft)	=	18.41
Rise (in)	=	36.0
Shape	=	Circular
Span (in)	=	36.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

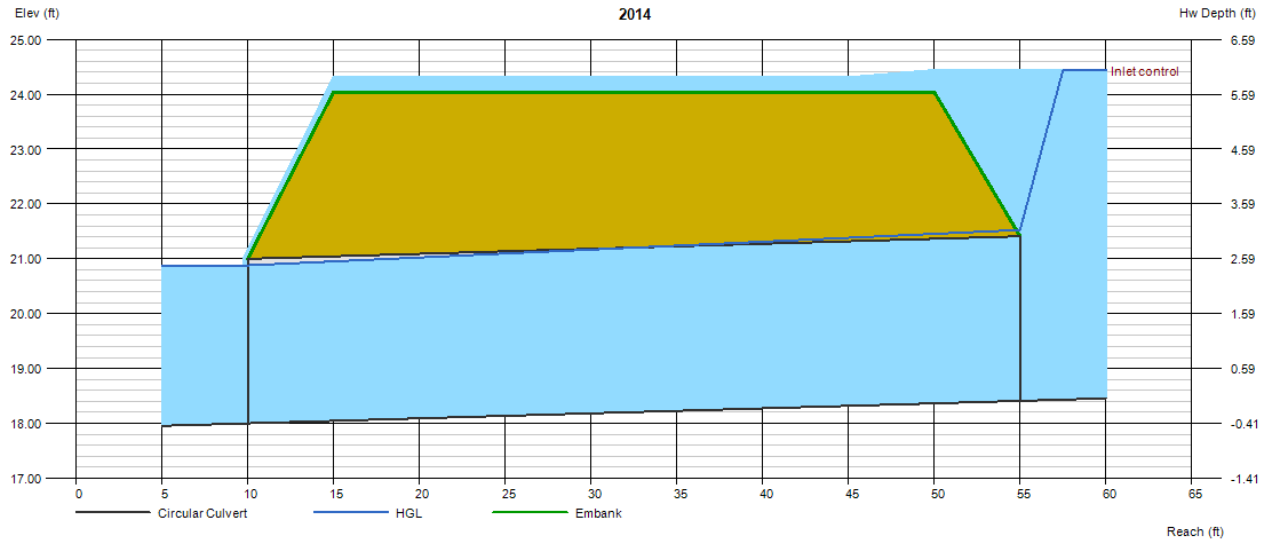
Top Elevation (ft)	=	24.04
Top Width (ft)	=	35.00
Crest Width (ft)	=	35.00

Calculations

Qmin (cfs)	=	105.51
Qmax (cfs)	=	105.51
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	105.51
Qpipe (cfs)	=	79.14
Qovertop (cfs)	=	26.37
Veloc Dn (ft/s)	=	11.35
Veloc Up (ft/s)	=	11.20
HGL Dn (ft)	=	20.88
HGL Up (ft)	=	21.53
Hw Elev (ft)	=	24.44
Hw/D (ft)	=	2.01
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Oct 2 2020

Existing

Invert Elev Dn (ft)	=	18.00
Pipe Length (ft)	=	45.00
Slope (%)	=	0.91
Invert Elev Up (ft)	=	18.41
Rise (in)	=	36.0
Shape	=	Circular
Span (in)	=	36.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

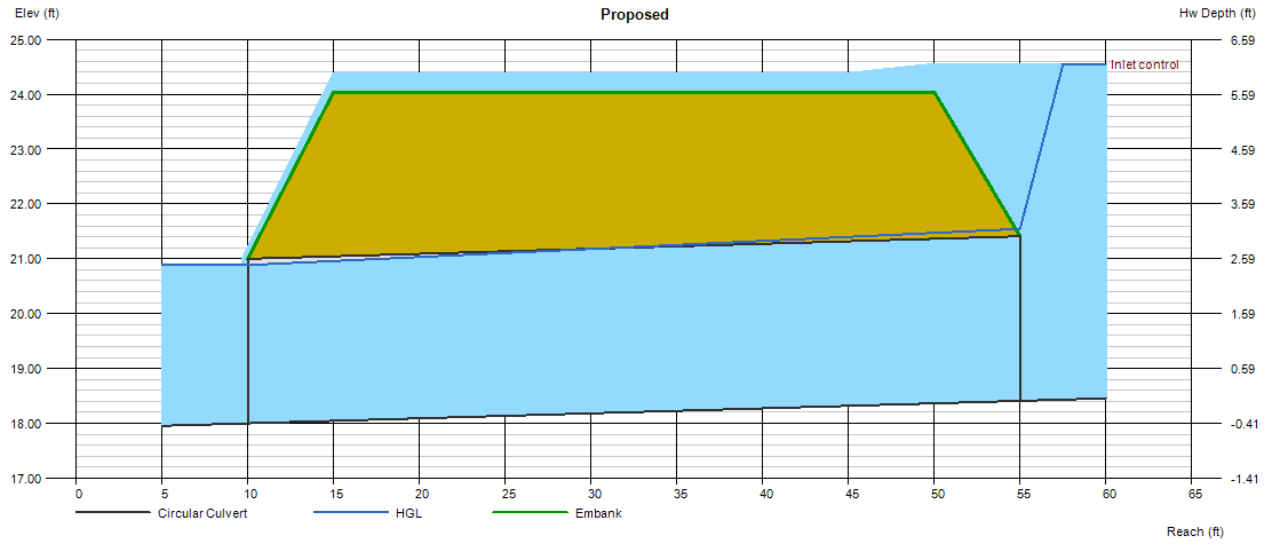
Top Elevation (ft)	=	24.04
Top Width (ft)	=	35.00
Crest Width (ft)	=	35.00

Calculations

Qmin (cfs)	=	133.57
Qmax (cfs)	=	133.57
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	133.57
Qpipe (cfs)	=	81.34
Qovertop (cfs)	=	52.23
Veloc Dn (ft/s)	=	11.64
Veloc Up (ft/s)	=	11.51
HGL Dn (ft)	=	20.89
HGL Up (ft)	=	21.57
Hw Elev (ft)	=	24.66
Hw/D (ft)	=	2.08
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Oct 2 2020

Proposed

Invert Elev Dn (ft)	=	18.00
Pipe Length (ft)	=	45.00
Slope (%)	=	0.91
Invert Elev Up (ft)	=	18.41
Rise (in)	=	36.0
Shape	=	Circular
Span (in)	=	36.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

Top Elevation (ft)	=	24.04
Top Width (ft)	=	35.00
Crest Width (ft)	=	35.00

Calculations

Qmin (cfs)	=	118.56
Qmax (cfs)	=	118.56
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	118.56
Qpipe (cfs)	=	80.23
Qovertop (cfs)	=	38.33
Veloc Dn (ft/s)	=	11.49
Veloc Up (ft/s)	=	11.35
HGL Dn (ft)	=	20.89
HGL Up (ft)	=	21.55
Hw Elev (ft)	=	24.55
Hw/D (ft)	=	2.05
Flow Regime	=	Inlet Control