Acorn Mini Storage Addition & Remodel

9100 W Bloomington Freeway, Bloomington, Minnesota

Stormwater Narrative

Watershed Permit Application

ARC17008

April 18, 2018

Revised April 27, 2018

FOR:

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EXISTING SITE CONDITIONS

This report summarizes the stormwater management system (SWMS) for the proposed building additions to an existing single story flex office building and associated surface parking lot. The project includes conversion of the office into a cold and climate controlled storage facility in Bloomington, Minnesota. The project site is 3.981 acres and is bordered by single family homes on the north, Lithco Technical Services on the west, W 92nd Street to the south and West Bloomington Freeway on the east. The site is presently occupied by a 44,380 sf building and 74,957 sf of other impervious areas representing 69% of the site.

The site is located within the legal boundaries of the Nine Mile Creek Watershed District (NMCWD) as shown on Figure 1.

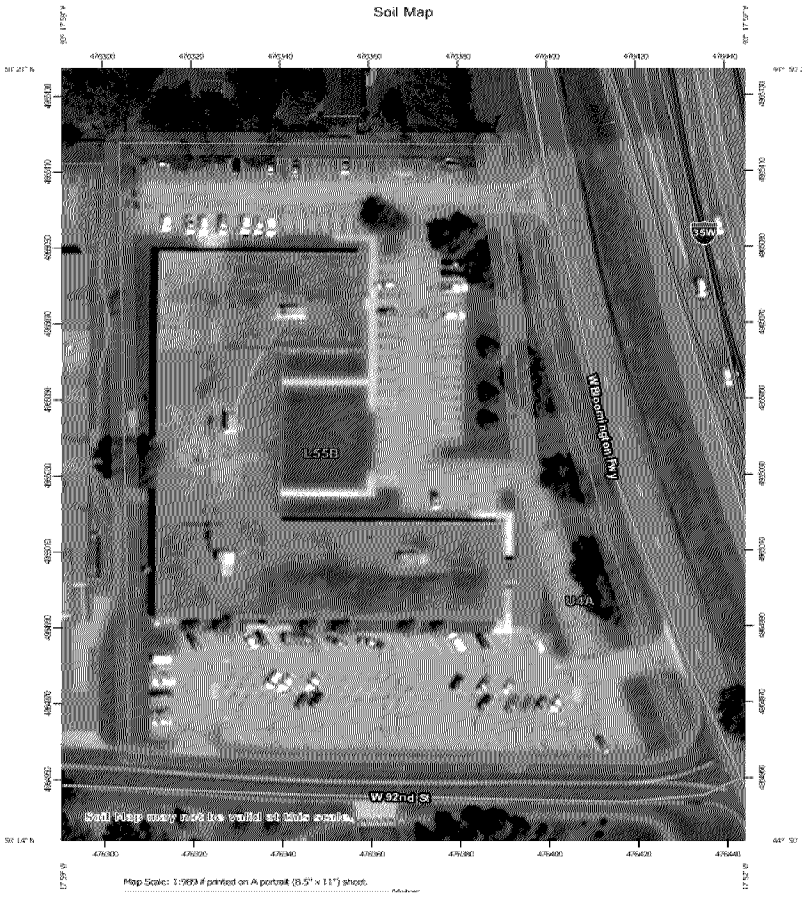
Figure 1: Location Map

Runoff from a majority of the site is collected by several sump grate inlets in the paved areas north, east, and south of the building. The underground system drains to the southwest corner of the site where it is collected by the public storm sewer in West 92nd Street. The public sewer drains west and eventually becomes tributary to Barthels Pond and Marsh Lake. The roof and lawn areas comprising Area A on both the proposed and existing drainage exhibits surface drain to a shallow swale that runs north to south to West 92nd Street. Area C drains to the right of way of West Bloomington Freeway.

Off-site areas D and E to the north and west drain onto the property and through Areas B and A, respectively. There will be no change to the drainage patterns for these areas following redevelopment of the site.

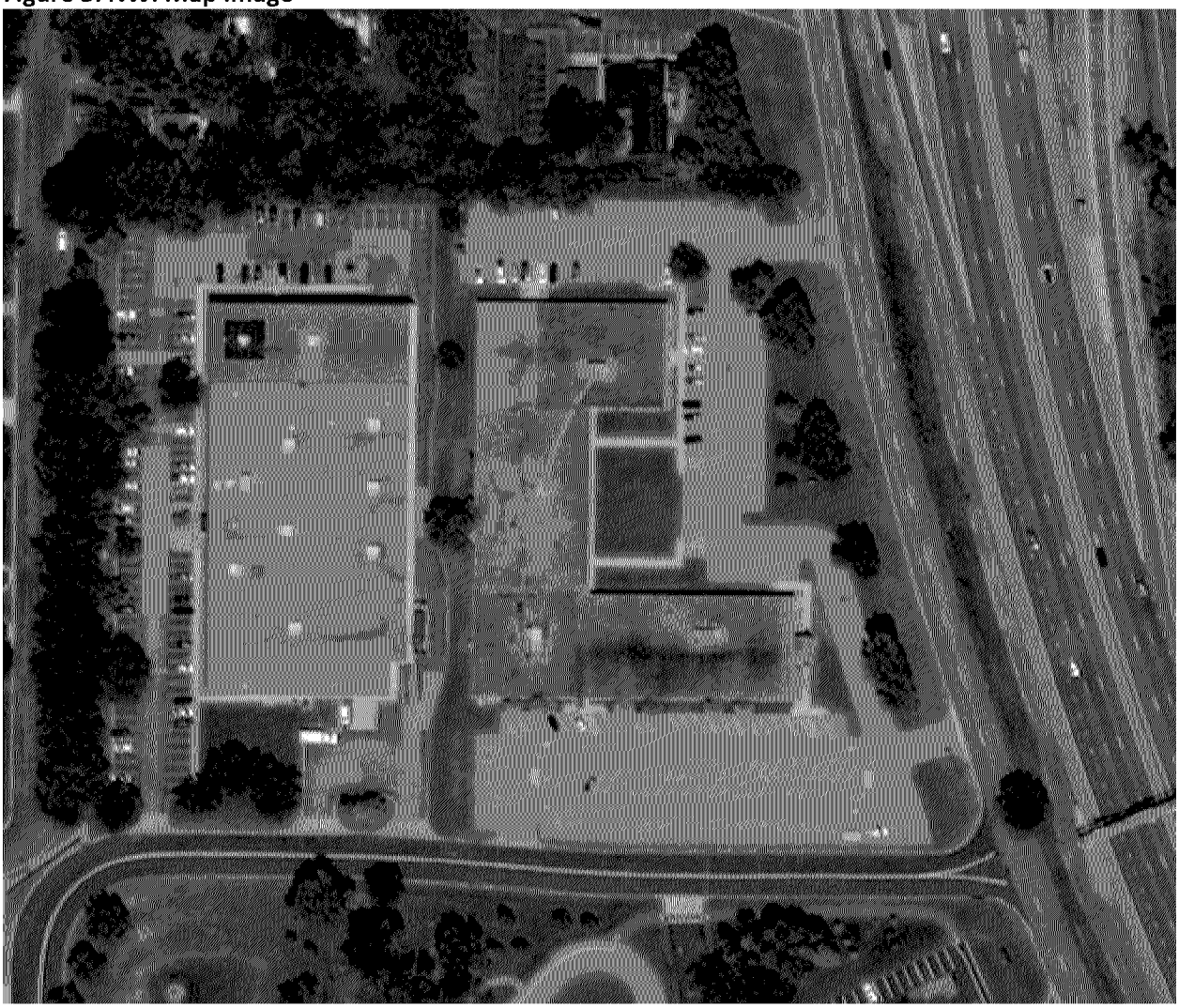
The NRCS Custom Soil Resource Report for Hennepin County identifies Urban Land –Malardi Complex (L55B) throughout most of the site with a narrow corridor of Urban Land-Udipsamments (U4A) along the right-of-way of Bloominton Freeway, as shown in Figure 2. The typical profile for Malardi Complex is a mix of sandy loam, loamy coarse sand, and gravelly sand with an infiltration rate of 2 to 6 inches per hour. Based on MPCA's definition of SP soils, an infiltration rate of 0.80 in/hour is used to model conductivity of the soil. The full soil resource report is attached.

Figure 2: Subsurface Profile Summary



The National Wetland Inventory (NWI) does not indicate the presence of wetlands on the site. No onsite wetland determination has been performed. An image from the NWI website is shown in Figure 3.

Figure 3: NWI Map Image



PROPOSED PROJECT

The proposed project consists of three building additions and modification of the parking and drive aisles. Following development, site imperviousness increases from 2.739 acres (68.8%) to 2.966 acres (74.5%) with less than 50% of the existing impervious being disturbed by construction. Some new and disturbed impervious surface (0.333 Acres) were unable to be routed through the proposed South and East infiltration basins. Therefore, a greater amount of undisturbed impervious surface (0.389 Acres) is treated to compensate. The attached Proposed Drainage Exhibit details where these instances occur.

DRAINAGE DESIGN CRITERIA

The project triggers two watershed rules; 4.0 Stormwater Management and 5.0 Erosion and Sediment Control. The stormwater rule is triggered by the land-disturbing activities of over 5,000 square feet and 50 cubic yards of earth under Section 4.3.1. Since this is a redevelopment there is a second set of triggers in Section 4.3.3:

> ***4.3.3 Redevelopment.*** *If a proposed activity will disturb more than 50 percent of the existing impervious surface on the parcel or will increase the imperviousness of the entire parcel by more than 50 percent, the criteria of section 4.3 will apply to the entire project parcel. Otherwise, the criteria of section 4.3 will apply only to the disturbed areas and additional impervious surface on the project parcel. For purposes of this paragraph, disturbed areas are those where underlying soils are exposed in the course of redevelopment.*

TREATMENT VOLUME

The project, as proposed, will disturb and convert 30.8% of the impervious surfaces on the site. Therefore, rule 4.0 only applies to the disturbed area.

Table 4: Summary of Existing and Proposed Imperviousness

Land Use	Existing Area (ft^2)	Proposed Area (ft^2)
Building		
Total	44,380	76,625
Undisturbed/Existing	44,380	44,380
New Building Addition		32,245*
Pavements		
Total	74,957	52,551
Disturbed and New		21,191*
Undisturbed/Existing		31,360
Total Impervious	119,337	129,176
Total Pervious	54,093	44,254

* Percent New/Disturbed Area = (32,245 sf + 21,191 sf)/173,430 sf = 30.8%

Section 4.4 of the NMCWD rules requires that the proposed system achieve 3 criteria:

4.4.1 An applicant for a permit under this rule must demonstrate, using a model acceptable to the District that the implementation of its stormwater management plan will:

a) Provide for the retention onsite of 1.1 inch of runoff from all impervious surface of the parcel;
   i. Where below-ground infiltration facilities, practices or systems are proposed, pretreatment of runoff must be provided.
b) Limit peak runoff flow rates to that from existing conditions for the 2-, 10- and 100-year storm events for all points where stormwater discharge leaves a parcel; and

c) *Provide for all runoff from the parcel from the 2.5-inch storm event to be treated, through onsite or offsite detention, to at least sixty percent (60%) annual removal efficiency for phosphorus, and at least ninety percent (90%) annual removal efficiency for total suspended solids. The onsite retention of runoff may be included in demonstrating compliance with the total suspended solids and phosphorus removal requirements.*

The proposed stormwater management system (SWMS) consists of the existing site and building drainage systems, combined with two infiltration basins designed to retain the required runoff, maintain the existing runoff rates and provide the necessary treatment. Redevelopment occurs at various locations around the site. It is impractical to manage each area individually. As a result, the proposed SWMP provides for treatment of equivalent impervious areas, rather than treating each new or disturbed impervious surfaces.

Three "Turret" Rain Guardians pretreat stormwater runoff by removing TSS and particulate phosphorus before it enters the infiltration basins.

The existing building has a flat roof, which is collected internally and piped to the exterior wall and daylighted to the surface. The Existing Drainage Exhibit shows the split and direction each portion of the roof drains. The balance of the roof drainage will not change following redevelopment. The east half of the south wing will be routed through the south infiltration basin to compensate for untreated new/disturbed areas, as shown on the Proposed Drainage Exhibit. In addition:

- Building Addition D, the south drive aisle, loading and parking will be directed to the south infiltration basin along with the aforementioned existing roof, which is used as compensation for the untreated new and disturbed impervious areas.
- Building Additions B and C on the east side along with the adjacent drive aisle, loading and parking are directed to the east infiltration basin. Some of the treated area is existing and is used to compensate for untreated new and disturbed areas.
- The northern parking lot will be expanded to facilitate RV and boat storage. This additional impervious is not treated. The balance of the parking lot may be overlaid but will not be disturbed. The runoff in this basin is directed to the existing storm sewer system.
- The sidewalk, drive aisle and parking east of the office directed to an existing catch basin. The new and disturbed impervious surfaces within this area are not treated.
- Off-site areas D and E remain undisturbed and continue to drain as they have in the past.
- All areas and storm sewer ultimately discharge to the southwest corner of the property. Therefore, both the existing and proposed sites have been modeled with a single discharge point.

Tables 5 summarize the required infiltration volumes based on a 1.1" rainfall event.

Table 5: Required Infiltration Volumes

	Total	East Basin	South Basin
Untreated New/Disturbed Impervious Area (Acres)	1.227		
Conversion from Impervious to Pervious	0.339		
Total Area Requiring Treatment	0.888		
Total Impervious Area to Basin (Acres)	1.282	0.497	0.785
Infiltration Volume Required (1.1" * Impervious Area, cf)	5,119	1,984	3,134
Infiltration Volume Provided (cf)	7,733	2,154	4,306

RATE CONTROL

Rate control is achieved through the infiltration basins. The results of the HydroCAD model are summarized below. Table 6 shows the existing and proposed peak runoff rates for the 2, 10 and 100 year events. The rates for all events are reduced post development, in both catchments.

Table 6: Runoff Rates

Catchment	2 year, 24 hour CFS	10 year, 24 hour CFS	100 year, 24 hour CFS
Existing	11.77	17.72	33.07
Proposed	7.35	12.19	31.16
Total Reduction	(4.42)	(5.53)	(1.91)

Table 7 shows the peak depth in the basin for each design storm. The time listed is the period in hours for the basin to drain dry after the end of the 24 hour event. Although the depth is greater than the recommended 1.5 feet for bio-filtration basins, the draw down time is fast enough to limit stress on plant materials.

Table 7: Infiltration Basin Peak Depths

Basin	1.1" Rainfall Depth/Time	2 yr, 24 hr Depth/Time	10 yr, 24 hr Depth/Time	100 yr, 24 hr Depth/Time
East-1P	0.80'/6.0	1.81'/21	2.02'/23.5	2.24'/26
South-2P	0.66'/3.5	1.66'/21	2.87'/23.5	2.25'/23.5

POLLUTANT REMOVAL

The MIDS calculator was used to estimate the Total Phosphorus (TP) & Total Suspended Solids (TSS) removal, based on a 1.1" storm event. Similar to treatment practices described above, the pollutant

removal criteria applies only to new and disturbed impervious surface and areas converted from impervious to pervious. As such, only Areas B2 (0.583 Ac) and B4 (0.975 Acres) draining through the infiltration basins were analyzed, not the entire site. The rain guardians are modeled using 34% particulate phosphorus and 75% TSS removal rates based on technical literature from the manufacturer. The basins are modeled using an infiltration rate of 0.8 in/hr, as mentioned above.

MIDS estimates 97% TSS and 96% TP removal efficiency between the two infiltration basins. A summary of the results is attached to this report.

Table 8: East Basin Summary

	Stage	Area
Bottom/Media Surface Area	834.75	816 sf
At 18" Depth	836.25	1,815 sf

Volume Provided at 18" Depth = 2,154 cf
Required Volume of 1,984 cf is achieved at 836.16'

Table 9: South Basin Summary

	Stage	Area
Bottom/Media Surface Area	833.50	1,781 sf
At 18" Depth	835.00	3,972 sf

Volume Provided at 18" Depth = 4,306 cf
Required Volume of 3,134 cf is achieved at 834.69'

SOIL EROSION AND SEDIMENTATION CONTROL

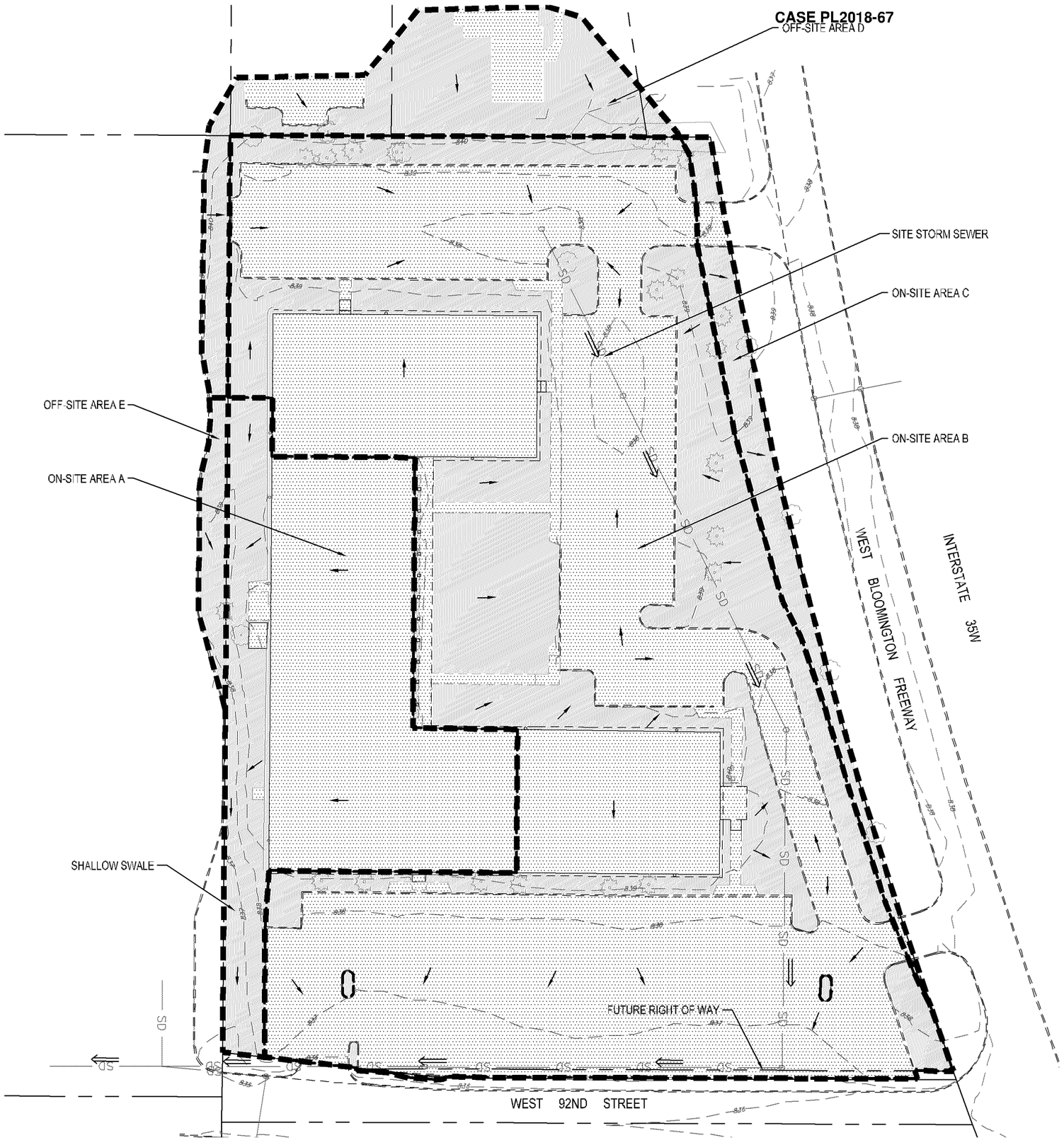
See plans.

CONCLUSION

To the best of our knowledge, the stormwater management described herein meets, or exceeds, all local, state, federal and NMCWD criteria. The proposed plan reduces runoff rates for all modeled storm events. Volume control and pollutant removal are provided in excess of that required for all new and disturbed impervious surfaces.

ATTACHMENTS

- Existing Drainage Diagram
- Proposed Drainage Diagram
- NRCS Soil Survey
- HydroCAD Report for 1.1", 2, 10 and 100-year storm events
- MIDS Calculator results



AREA SUMMARY

AREA	TOTAL AREA (Ac)	TOTAL IMPERVIOUS (Ac)	PERVIOUS (Ac)
A	0.741	0.544	0.197
B	3.105	2.184	0.921
C	0.135	0.012	0.124
D	0.337	0.078	0.259
E	0.048	0.000	0.048
TOTAL	4.366	2.817	1.549

LEGEND

- PERVIOUS AREA
- IMPERVIOUS AREA
- DRAINAGE ARROW
- STORM SEWER FLOW DIRECTION

60 180
SCALE IN FEET

ACORN MINI-STORAGE
BLOOMINTON, MINNESOTA
ARC17008

EXISTING DRAINAGE EXHIBIT

04/18/2018
REVISED 04/27/2018

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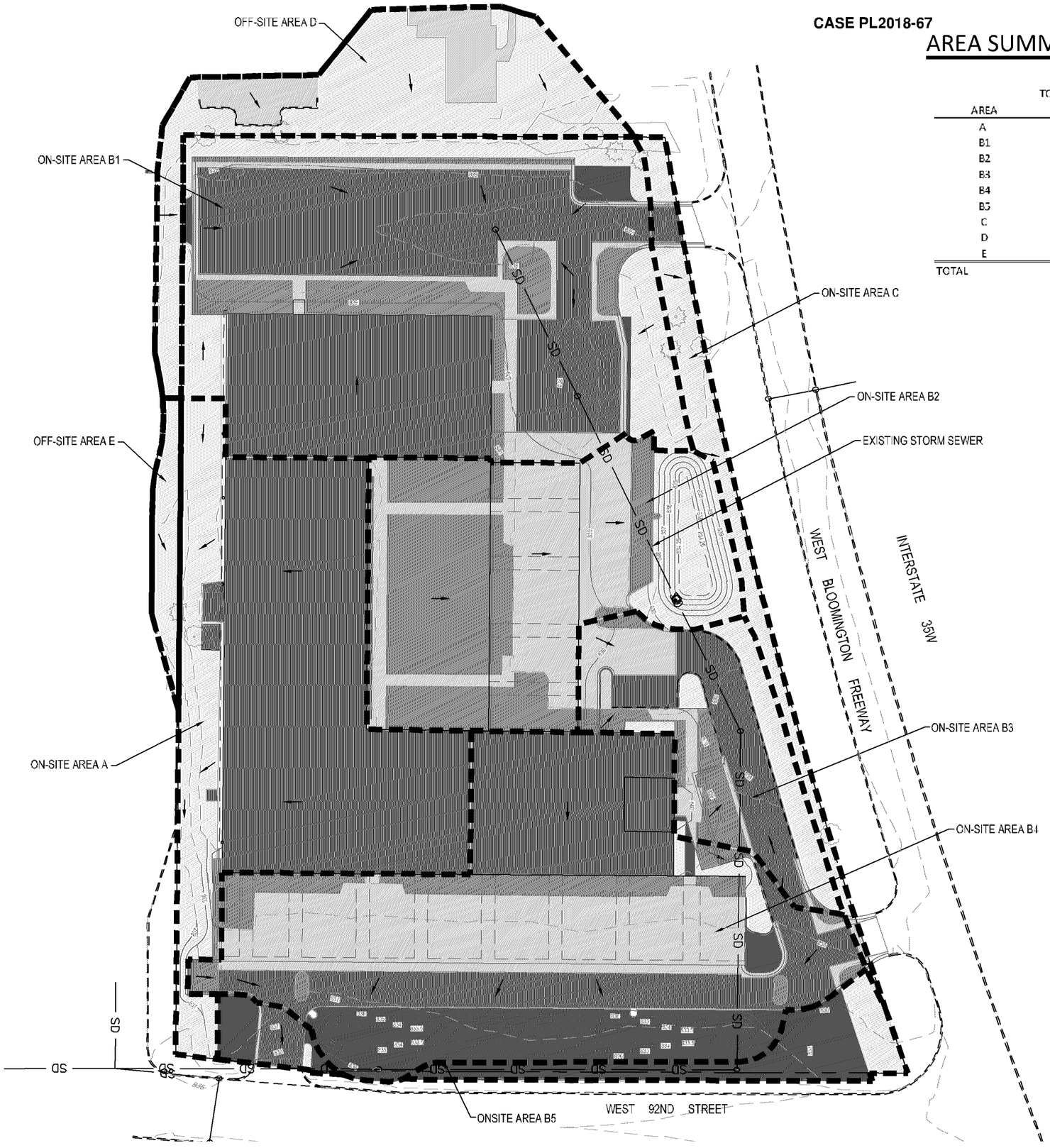
CASE PL2018-67



AREA SUMMARY

AREA	TOTAL AREA (Ac)	RECONSTRUCTED IMPERVIOUS (Ac)	NEW IMPERVIOUS (Ac)	UNDISTURBED IMPERVIOUS (Ac)	IMPERVIOUS TO PERVIOUS (Ac)	EXISTING PERVIOUS (Ac)	TOTAL PERVIOUS (Ac)
A	0.735	0.000	0.007	0.544	0.000	0.185	0.185
B1	1.083	0.090	0.119	0.678	0.022	0.174	0.196
B2	0.597	0.216	0.281	0.000	0.000	0.099	0.099
B3	0.281	0.060	0.053	0.101	0.001	0.066	0.067
B4	1.004	0.294	0.102	0.389	0.201	0.018	0.219
B5	0.160	0.001	0.000	0.018	0.116	0.025	0.141
C	0.122	0.002	0.001	0.009	0.000	0.122	0.122
D	0.337	0.000	0.000	0.078	0.000	0.259	0.259
E	0.048	0.000	0.000	0.000	0.000	0.048	0.048
TOTAL	4.366	0.664	0.563	1.817	0.339	0.997	1.336

LEGEND

- RECONSTRUCTED IMPERVIOUS
- NEW IMPVERIOUS
- UNDISTURBED IMPERVIOUS
- IMPERVIOUS TO PERVIOUS CONVERSION
- EXISTING PERVIOUS

60 180

SCALE IN FEET

ACORN MINI-STORAGE
BLOOMINTON, MINNESOTA
ARC17008

PROPOSED DRAINAGE EXHIBIT

04/18/2018
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CASE PL2018-67

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Hennepin County, Minnesota

Acorn Bloomington

February 28, 2018

Preface

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

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

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

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

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

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

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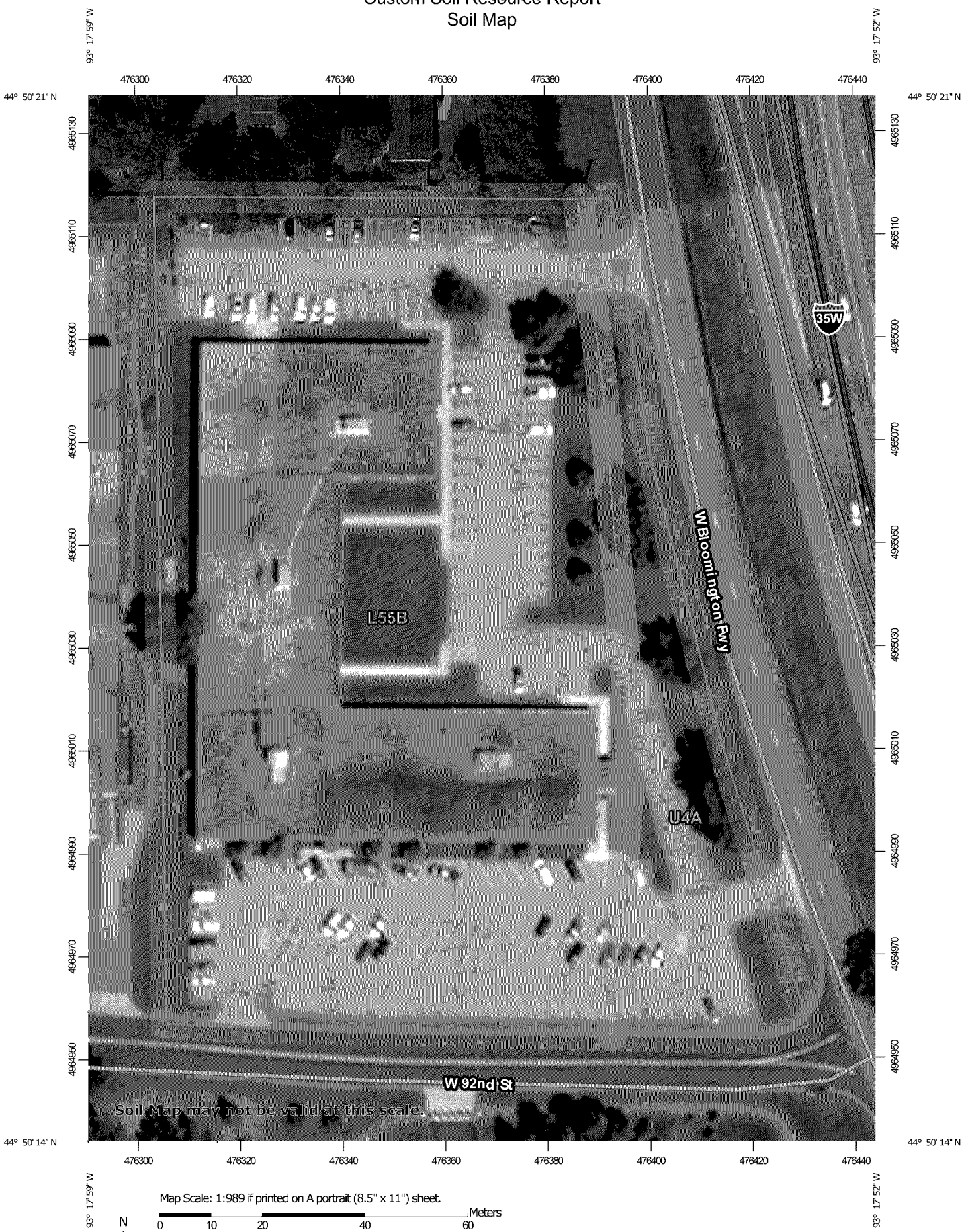
Contents

Soil Map

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

Custom Soil Resource Report

Soil Map



Map Scale: 1:989 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 45 90 180 270

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Hennepin County, Minnesota
Survey Area Data: Version 13, Oct 4, 2017

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

Date(s) aerial images were photographed: Mar 16, 2012—Sep 13, 2016

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
L55B	Urban land-Malardi complex, 0 to 8 percent slopes	3.5	84.2%
U4A	Urban land-Udipsamments (cut and fill land) complex, 0 to 2 percent slopes	0.7	15.8%
Totals for Area of Interest		**4.2**	**100.0%**

Map Unit Descriptions

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

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

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the

development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

Hennepin County, Minnesota

L55B—Urban land-Malardi complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: gj4t
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 124 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 70 percent
Malardi and similar soils: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Outwash plains, stream terraces
Parent material: Sandy and gravelly outwash

Description of Malardi

Setting

Landform: Hills on outwash plains, hills on stream terraces
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Typical profile

Ap - 0 to 10 inches: sandy loam
Bt - 10 to 15 inches: sandy loam
2Bt - 15 to 29 inches: loamy coarse sand
2C - 29 to 80 inches: gravelly sand

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Available water storage in profile: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: Sandy Upland Savannas (R103XY019MN)
Other vegetative classification: Sandy (G103XS022MN)

Hydric soil rating: No

Minor Components

Rasset

Percent of map unit: 5 percent
Landform: Swales on outwash plains, swales on stream terraces
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Eden prairie

Percent of map unit: 5 percent
Landform: Hills on outwash plains, hills on stream terraces
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy (G103XS022MN)
Hydric soil rating: No

U4A—Urban land-Udipsamments (cut and fill land) complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: glwk
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 70 percent
Udipsamments, cut and fill land, and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Outwash plains, stream terraces

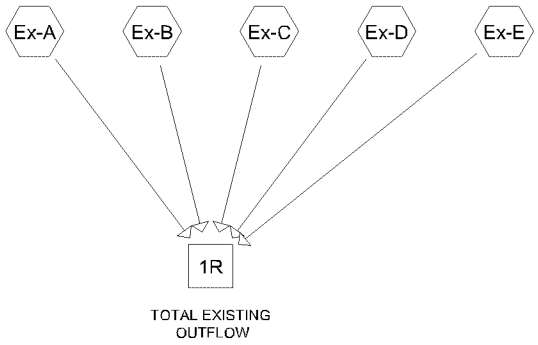
Description of Udipsamments, Cut And Fill Land

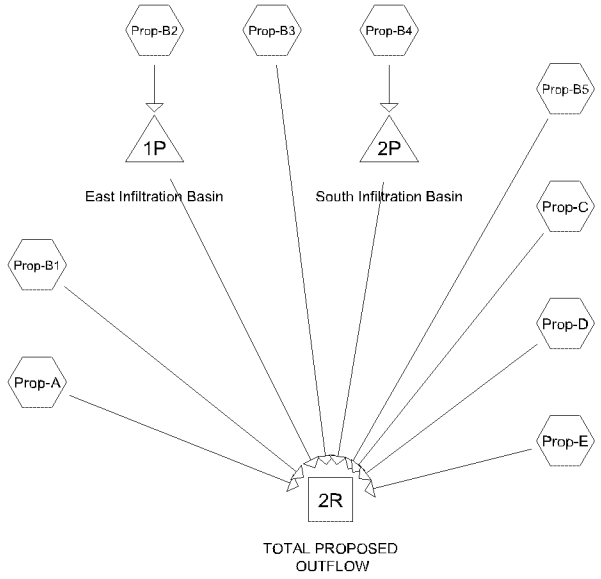
Setting

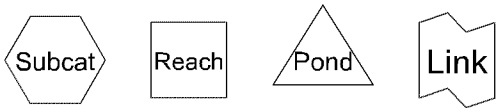
Landform: Outwash plains, stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Variable sandy material

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None







Routing Diagram for 20180426_ARC08_HydroCAD Model
Prepared by Elan Design Lab, Printed 4/27/2018

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentEx-A: Runoff Area=0.741 ac 73.41% Impervious Runoff Depth=0.65"
Tc=5.0 min CN=39/98 Runoff=0.83 cfs 0.040 af

SubcatchmentEx-B: Runoff Area=3.105 ac 70.34% Impervious Runoff Depth=0.62"
Tc=5.0 min CN=39/98 Runoff=3.31 cfs 0.162 af

SubcatchmentEx-C: Runoff Area=0.136 ac 8.82% Impervious Runoff Depth=0.08"
Tc=5.0 min CN=39/98 Runoff=0.02 cfs 0.001 af

SubcatchmentEx-D: Runoff Area=0.337 ac 23.15% Impervious Runoff Depth=0.21"
Tc=5.0 min CN=39/98 Runoff=0.12 cfs 0.006 af

SubcatchmentEx-E: Runoff Area=0.048 ac 0.00% Impervious Runoff Depth=0.00"
Tc=0.0 min CN=39/0 Runoff=0.00 cfs 0.000 af

SubcatchmentProp-A: Runoff Area=0.734 ac 74.93% Impervious Runoff Depth=0.67"
Tc=5.0 min CN=39/98 Runoff=0.83 cfs 0.041 af

SubcatchmentProp-B1: Runoff Area=1.083 ac 81.90% Impervious Runoff Depth=0.73"
Tc=5.0 min CN=39/98 Runoff=1.35 cfs 0.066 af

SubcatchmentProp-B2: Runoff Area=0.596 ac 83.39% Impervious Runoff Depth=0.74"
Tc=5.0 min CN=39/98 Runoff=0.75 cfs 0.037 af

SubcatchmentProp-B3: Runoff Area=0.281 ac 76.16% Impervious Runoff Depth=0.68"
Tc=5.0 min CN=39/98 Runoff=0.32 cfs 0.016 af

SubcatchmentProp-B4: Runoff Area=1.004 ac 78.19% Impervious Runoff Depth=0.69"
Tc=5.0 min CN=39/98 Runoff=1.19 cfs 0.058 af

SubcatchmentProp-B5: Runoff Area=0.160 ac 11.87% Impervious Runoff Depth=0.11"
Tc=5.0 min CN=39/98 Runoff=0.03 cfs 0.001 af

SubcatchmentProp-C: Runoff Area=0.134 ac 8.96% Impervious Runoff Depth=0.08"
Tc=5.0 min CN=39/98 Runoff=0.02 cfs 0.001 af

SubcatchmentProp-D: Runoff Area=0.337 ac 23.15% Impervious Runoff Depth=0.21"
Tc=5.0 min CN=39/98 Runoff=0.12 cfs 0.006 af

SubcatchmentProp-E: Runoff Area=0.048 ac 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39/0 Runoff=0.00 cfs 0.000 af

Reach 1R: TOTAL EXISTING OUTFLOW Inflow=4.27 cfs 0.209 af
Outflow=4.27 cfs 0.209 af

Reach 2R: TOTAL PROPOSED OUTFLOW Inflow=2.67 cfs 0.130 af
Outflow=2.67 cfs 0.130 af

Pond 1P: East Infiltration Basin Peak Elev=835.55' Storage=984 cf Inflow=0.75 cfs 0.037 af
Discarded=0.03 cfs 0.037 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.037 af

Pond 2P: South Infiltration Basin Peak Elev=834.16' Storage=1,486 cf Inflow=1.19 cfs 0.058 af
Discarded=0.05 cfs 0.058 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.058 af

Summary for Subcatchment Ex-A:

Runoff = 0.83 cfs @ 12.11 hrs, Volume= 0.040 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-HR 3 1.1" Rainfall=1.10"

Area (ac)	CN	Description
0.544	98	Paved parking, HSG A
0.197	39	>75% Grass cover, Good, HSG A
0.741	82	Weighted Average
0.197	39	26.59% Pervious Area
0.544	98	73.41% Impervious Area

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

Summary for Subcatchment Ex-B:

Runoff = 3.31 cfs @ 12.11 hrs, Volume= 0.162 af, Depth= 0.62"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-HR 3 1.1" Rainfall=1.10"

Area (ac)	CN	Description
0.921	39	>75% Grass cover, Good, HSG A
2.184	98	Paved parking, HSG A
3.105	80	Weighted Average
0.921	39	29.66% Pervious Area
2.184	98	70.34% Impervious Area

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

Summary for Subcatchment Ex-C:

Runoff = 0.02 cfs @ 12.11 hrs, Volume= 0.001 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-HR 3 1.1" Rainfall=1.10"

Area (ac)	CN	Description
0.124	39	>75% Grass cover, Good, HSG A
0.012	98	Paved parking, HSG A
0.136	44	Weighted Average
0.124	39	91.18% Pervious Area
0.012	98	8.82% Impervious Area

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

Summary for Subcatchment Ex-D:

Runoff = 0.12 cfs @ 12.11 hrs, Volume= 0.006 af, Depth= 0.21"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-HR 3 1.1" Rainfall=1.10"

Area (ac)	CN	Description
0.259	39	>75% Grass cover, Good, HSG A
0.078	98	Paved parking, HSG A
0.337	53	Weighted Average
0.259	39	76.85% Pervious Area
0.078	98	23.15% Impervious Area

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

Summary for Subcatchment Ex-E:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-HR 3 1.1" Rainfall=1.10"

Area (ac)	CN	Description
0.048	39	>75% Grass cover, Good, HSG A
0.048	39	100.00% Pervious Area

Summary for Subcatchment Prop-A:

Runoff = 0.83 cfs @ 12.11 hrs, Volume= 0.041 af, Depth= 0.67"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-HR 3 1.1" Rainfall=1.10"

Area (ac)	CN	Description
0.184	39	>75% Grass cover, Good, HSG A
0.550	98	Paved parking, HSG A
0.734	83	Weighted Average
0.184	39	25.07% Pervious Area
0.550	98	74.93% Impervious Area

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

Summary for Subcatchment Prop-B1:

Runoff = 1.35 cfs @ 12.11 hrs, Volume= 0.066 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-HR 3 1.1" Rainfall=1.10"

Area (ac)	CN	Description
0.196	39	>75% Grass cover, Good, HSG A
0.887	98	Paved parking, HSG A
1.083	87	Weighted Average
0.196	39	18.10% Pervious Area
0.887	98	81.90% Impervious Area

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

Summary for Subcatchment Prop-B2:

Runoff = 0.75 cfs @ 12.11 hrs, Volume= 0.037 af, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-HR 3 1.1" Rainfall=1.10"

Area (ac)	CN	Description
0.099	39	>75% Grass cover, Good, HSG A
0.497	98	Paved parking, HSG A
0.596	88	Weighted Average
0.099	39	16.61% Pervious Area
0.497	98	83.39% Impervious Area

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

Summary for Subcatchment Prop-B3:

Runoff = 0.32 cfs @ 12.11 hrs, Volume= 0.016 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-HR 3 1.1" Rainfall=1.10"

Area (ac)	CN	Description
0.067	39	>75% Grass cover, Good, HSG A
0.214	98	Paved parking, HSG A
0.281	84	Weighted Average
0.067	39	23.84% Pervious Area
0.214	98	76.16% Impervious Area

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

Summary for Subcatchment Prop-B4:

Runoff = 1.19 cfs @ 12.11 hrs, Volume= 0.058 af, Depth= 0.69"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-HR 3 1.1" Rainfall=1.10"

Area (ac)	CN	Description
0.219	39	>75% Grass cover, Good, HSG A
0.785	98	Paved parking, HSG A
1.004	85	Weighted Average
0.219	39	21.81% Pervious Area
0.785	98	78.19% Impervious Area

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

Summary for Subcatchment Prop-B5:

Runoff = 0.03 cfs @ 12.11 hrs, Volume= 0.001 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-HR 3 1.1" Rainfall=1.10"

Area (ac)	CN	Description
0.141	39	>75% Grass cover, Good, HSG A
0.019	98	Paved parking, HSG A
0.160	46	Weighted Average
0.141	39	88.12% Pervious Area
0.019	98	11.87% Impervious Area

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

Summary for Subcatchment Prop-C:

Runoff = 0.02 cfs @ 12.11 hrs, Volume= 0.001 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-HR 3 1.1" Rainfall=1.10"

Area (ac)	CN	Description
0.122	39	>75% Grass cover, Good, HSG A
0.012	98	Paved parking, HSG A
0.134	44	Weighted Average
0.122	39	91.04% Pervious Area
0.012	98	8.96% Impervious Area

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

Summary for Subcatchment Prop-D:

Runoff = 0.12 cfs @ 12.11 hrs, Volume= 0.006 af, Depth= 0.21"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-HR 3 1.1" Rainfall=1.10"

Area (ac)	CN	Description
0.259	39	>75% Grass cover, Good, HSG A
0.078	98	Paved parking, HSG A
0.337	53	Weighted Average
0.259	39	76.85% Pervious Area
0.078	98	23.15% Impervious Area

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

Summary for Subcatchment Prop-E:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-HR 3 1.1" Rainfall=1.10"

Area (ac)	CN	Description
0.048	39	>75% Grass cover, Good, HSG A
0.048	39	100.00% Pervious Area

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

Summary for Reach 1R: TOTAL EXISTING OUTFLOW

Inflow Area = 4.367 ac, 64.53% Impervious, Inflow Depth = 0.57" for 1.1" event
Inflow = 4.27 cfs @ 12.11 hrs, Volume= 0.209 af
Outflow = 4.27 cfs @ 12.11 hrs, Volume= 0.209 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach 2R: TOTAL PROPOSED OUTFLOW

Inflow Area = 4.377 ac, 69.50% Impervious, Inflow Depth = 0.36" for 1.1" event
Inflow = 2.67 cfs @ 12.11 hrs, Volume= 0.130 af
Outflow = 2.67 cfs @ 12.11 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: East Infiltration Basin

Inflow Area = 0.596 ac, 83.39% Impervious, Inflow Depth = 0.74" for 1.1" event
Inflow = 0.75 cfs @ 12.11 hrs, Volume= 0.037 af
Outflow = 0.03 cfs @ 13.55 hrs, Volume= 0.037 af, Atten= 96%, Lag= 86.1 min
Discarded = 0.03 cfs @ 13.55 hrs, Volume= 0.037 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 835.55' @ 13.55 hrs Surf.Area= 1,482 sf Storage= 984 cf

Plug-Flow detention time= 351.8 min calculated for 0.037 af (100% of inflow)
Center-of-Mass det. time= 351.8 min (1,124.1 - 772.3)

Volume	Invert	Avail.Storage	Storage Description
#1	834.75'	5,716 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
834.75	816	0	0
835.00	1,184	250	250
836.00	1,725	1,455	1,705
837.00	2,323	2,024	3,729
837.75	2,977	1,988	5,716

Device	Routing	Invert	Outlet Devices
#1	Discarded	834.75'	**0.800 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 799.75'
#2	Device 3	836.50'	**24.0" Horiz. Orifice/Grate X 0.70** C= 0.600 Limited to weir flow at low heads

#3	Primary	832.27'	**12.0" Round Culvert** L= 82.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 832.27' / 832.00' S= 0.0033 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.03 cfs @ 13.55 hrs HW=835.55' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=834.75' (Free Discharge)
↑—**3=Culvert** (Passes 0.00 cfs of 4.35 cfs potential flow)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 2P: South Infiltration Basin

Inflow Area = 1.004 ac, 78.19% Impervious, Inflow Depth = 0.69" for 1.1" event
Inflow = 1.19 cfs @ 12.11 hrs, Volume= 0.058 af
Outflow = 0.05 cfs @ 13.48 hrs, Volume= 0.058 af, Atten= 96%, Lag= 81.9 min
Discarded = 0.05 cfs @ 13.48 hrs, Volume= 0.058 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 834.16' @ 13.48 hrs Surf.Area= 2,733 sf Storage= 1,486 cf

Plug-Flow detention time= 288.1 min calculated for 0.058 af (100% of inflow)
Center-of-Mass det. time= 287.9 min (1,060.2 - 772.3)

Volume	Invert	Avail.Storage	Storage Description
#1	833.50'	9,084 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
833.50	1,781	0	0
834.00	2,499	1,070	1,070
835.00	3,972	3,236	4,306
835.75	5,116	3,408	7,714
836.00	5,848	1,371	9,084

Device	Routing	Invert	Outlet Devices
#1	Discarded	833.50'	**0.800 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 799.00'
#2	Device 3	835.15'	**24.0" Horiz. Orifice/Grate X 0.70** C= 0.600 Limited to weir flow at low heads
#3	Primary	830.70'	**12.0" Round Culvert** L= 147.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 830.70' / 827.55' S= 0.0214 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.05 cfs @ 13.48 hrs HW=834.16' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=833.50' (Free Discharge)
↑—**3=Culvert** (Passes 0.00 cfs of 5.81 cfs potential flow)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentEx-A: Runoff Area=0.741 ac 73.41% Impervious Runoff Depth=1.92"
Tc=5.0 min CN=39/98 Runoff=2.27 cfs 0.118 af

SubcatchmentEx-B: Runoff Area=3.105 ac 70.34% Impervious Runoff Depth=1.84"
Tc=5.0 min CN=39/98 Runoff=9.12 cfs 0.475 af

SubcatchmentEx-C: Runoff Area=0.136 ac 8.82% Impervious Runoff Depth=0.23"
Tc=5.0 min CN=39/98 Runoff=0.05 cfs 0.003 af

SubcatchmentEx-D: Runoff Area=0.337 ac 23.15% Impervious Runoff Depth=0.60"
Tc=5.0 min CN=39/98 Runoff=0.33 cfs 0.017 af

SubcatchmentEx-E: Runoff Area=0.048 ac 0.00% Impervious Runoff Depth=0.00"
Tc=0.0 min CN=39/0 Runoff=0.00 cfs 0.000 af

SubcatchmentProp-A: Runoff Area=0.734 ac 74.93% Impervious Runoff Depth=1.95"
Tc=5.0 min CN=39/98 Runoff=2.30 cfs 0.120 af

SubcatchmentProp-B1: Runoff Area=1.083 ac 81.90% Impervious Runoff Depth=2.14"
Tc=5.0 min CN=39/98 Runoff=3.70 cfs 0.193 af

SubcatchmentProp-B2: Runoff Area=0.596 ac 83.39% Impervious Runoff Depth=2.18"
Tc=5.0 min CN=39/98 Runoff=2.08 cfs 0.108 af

SubcatchmentProp-B3: Runoff Area=0.281 ac 76.16% Impervious Runoff Depth=1.99"
Tc=5.0 min CN=39/98 Runoff=0.89 cfs 0.047 af

SubcatchmentProp-B4: Runoff Area=1.004 ac 78.19% Impervious Runoff Depth=2.04"
Tc=5.0 min CN=39/98 Runoff=3.28 cfs 0.171 af

SubcatchmentProp-B5: Runoff Area=0.160 ac 11.87% Impervious Runoff Depth=0.31"
Tc=5.0 min CN=39/98 Runoff=0.08 cfs 0.004 af

SubcatchmentProp-C: Runoff Area=0.134 ac 8.96% Impervious Runoff Depth=0.23"
Tc=5.0 min CN=39/98 Runoff=0.05 cfs 0.003 af

SubcatchmentProp-D: Runoff Area=0.337 ac 23.15% Impervious Runoff Depth=0.60"
Tc=5.0 min CN=39/98 Runoff=0.33 cfs 0.017 af

SubcatchmentProp-E: Runoff Area=0.048 ac 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39/0 Runoff=0.00 cfs 0.000 af

Reach 1R: TOTAL EXISTING OUTFLOW Inflow=11.77 cfs 0.613 af
Outflow=11.77 cfs 0.613 af

Reach 2R: TOTAL PROPOSED OUTFLOW Inflow=7.35 cfs 0.400 af
Outflow=7.35 cfs 0.400 af

Pond 1P: East Infiltration Basin Peak Elev=836.56' Storage=2,773 cf Inflow=2.08 cfs 0.108 af
Discarded=0.04 cfs 0.092 af Primary=0.24 cfs 0.016 af Outflow=0.28 cfs 0.108 af

Pond 2P: South Infiltration Basin Peak Elev=835.16' Storage=4,967 cf Inflow=3.28 cfs 0.171 af
Discarded=0.08 cfs 0.169 af Primary=0.03 cfs 0.002 af Outflow=0.11 cfs 0.171 af

Summary for Subcatchment Ex-A:

Runoff = 2.27 cfs @ 12.11 hrs, Volume= 0.118 af, Depth= 1.92"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.84"

Area (ac)	CN	Description
0.544	98	Paved parking, HSG A
0.197	39	>75% Grass cover, Good, HSG A
0.741	82	Weighted Average
0.197	39	26.59% Pervious Area
0.544	98	73.41% Impervious Area

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

Summary for Subcatchment Ex-B:

Runoff = 9.12 cfs @ 12.11 hrs, Volume= 0.475 af, Depth= 1.84"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.84"

Area (ac)	CN	Description
0.921	39	>75% Grass cover, Good, HSG A
2.184	98	Paved parking, HSG A
3.105	80	Weighted Average
0.921	39	29.66% Pervious Area
2.184	98	70.34% Impervious Area

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

Summary for Subcatchment Ex-C:

Runoff = 0.05 cfs @ 12.11 hrs, Volume= 0.003 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.84"

Area (ac)	CN	Description
0.124	39	>75% Grass cover, Good, HSG A
0.012	98	Paved parking, HSG A
0.136	44	Weighted Average
0.124	39	91.18% Pervious Area
0.012	98	8.82% Impervious Area

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

Summary for Subcatchment Ex-D:

Runoff = 0.33 cfs @ 12.11 hrs, Volume= 0.017 af, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.84"

Area (ac)	CN	Description
0.259	39	>75% Grass cover, Good, HSG A
0.078	98	Paved parking, HSG A
0.337	53	Weighted Average
0.259	39	76.85% Pervious Area
0.078	98	23.15% Impervious Area

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

Summary for Subcatchment Ex-E:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.84"

Area (ac)	CN	Description
0.048	39	>75% Grass cover, Good, HSG A
0.048	39	100.00% Pervious Area

Summary for Subcatchment Prop-A:

Runoff = 2.30 cfs @ 12.11 hrs, Volume= 0.120 af, Depth= 1.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.84"

Area (ac)	CN	Description
0.184	39	>75% Grass cover, Good, HSG A
0.550	98	Paved parking, HSG A
0.734	83	Weighted Average
0.184	39	25.07% Pervious Area
0.550	98	74.93% Impervious Area

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

Summary for Subcatchment Prop-B1:

Runoff = 3.70 cfs @ 12.11 hrs, Volume= 0.193 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.84"

Area (ac)	CN	Description
0.196	39	>75% Grass cover, Good, HSG A
0.887	98	Paved parking, HSG A
1.083	87	Weighted Average
0.196	39	18.10% Pervious Area
0.887	98	81.90% Impervious Area

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

Summary for Subcatchment Prop-B2:

Runoff = 2.08 cfs @ 12.11 hrs, Volume= 0.108 af, Depth= 2.18"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.84"

Area (ac)	CN	Description
0.099	39	>75% Grass cover, Good, HSG A
0.497	98	Paved parking, HSG A
0.596	88	Weighted Average
0.099	39	16.61% Pervious Area
0.497	98	83.39% Impervious Area

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

Summary for Subcatchment Prop-B3:

Runoff = 0.89 cfs @ 12.11 hrs, Volume= 0.047 af, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.84"

Area (ac)	CN	Description
0.067	39	>75% Grass cover, Good, HSG A
0.214	98	Paved parking, HSG A
0.281	84	Weighted Average
0.067	39	23.84% Pervious Area
0.214	98	76.16% Impervious Area

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

Summary for Subcatchment Prop-B4:

Runoff = 3.28 cfs @ 12.11 hrs, Volume= 0.171 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.84"

Area (ac)	CN	Description
0.219	39	>75% Grass cover, Good, HSG A
0.785	98	Paved parking, HSG A
1.004	85	Weighted Average
0.219	39	21.81% Pervious Area
0.785	98	78.19% Impervious Area

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

Summary for Subcatchment Prop-B5:

Runoff = 0.08 cfs @ 12.11 hrs, Volume= 0.004 af, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.84"

Area (ac)	CN	Description
0.141	39	>75% Grass cover, Good, HSG A
0.019	98	Paved parking, HSG A
0.160	46	Weighted Average
0.141	39	88.12% Pervious Area
0.019	98	11.87% Impervious Area

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

Summary for Subcatchment Prop-C:

Runoff = 0.05 cfs @ 12.11 hrs, Volume= 0.003 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.84"

Area (ac)	CN	Description
0.122	39	>75% Grass cover, Good, HSG A
0.012	98	Paved parking, HSG A
0.134	44	Weighted Average
0.122	39	91.04% Pervious Area
0.012	98	8.96% Impervious Area

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

Summary for Subcatchment Prop-D:

Runoff = 0.33 cfs @ 12.11 hrs, Volume= 0.017 af, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.84"

Area (ac)	CN	Description
0.259	39	>75% Grass cover, Good, HSG A
0.078	98	Paved parking, HSG A
0.337	53	Weighted Average
0.259	39	76.85% Pervious Area
0.078	98	23.15% Impervious Area

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

Summary for Subcatchment Prop-E:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.84"

Area (ac)	CN	Description
0.048	39	>75% Grass cover, Good, HSG A
0.048	39	100.00% Pervious Area

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

Summary for Reach 1R: TOTAL EXISTING OUTFLOW

Inflow Area = 4.367 ac, 64.53% Impervious, Inflow Depth = 1.68" for 2-year event
Inflow = 11.77 cfs @ 12.11 hrs, Volume= 0.613 af
Outflow = 11.77 cfs @ 12.11 hrs, Volume= 0.613 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach 2R: TOTAL PROPOSED OUTFLOW

Inflow Area = 4.377 ac, 69.50% Impervious, Inflow Depth = 1.10" for 2-year event
Inflow = 7.35 cfs @ 12.11 hrs, Volume= 0.400 af
Outflow = 7.35 cfs @ 12.11 hrs, Volume= 0.400 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: East Infiltration Basin

Inflow Area = 0.596 ac, 83.39% Impervious, Inflow Depth = 2.18" for 2-year event
Inflow = 2.08 cfs @ 12.11 hrs, Volume= 0.108 af
Outflow = 0.28 cfs @ 12.51 hrs, Volume= 0.108 af, Atten= 87%, Lag= 23.9 min
Discarded = 0.04 cfs @ 12.51 hrs, Volume= 0.092 af
Primary = 0.24 cfs @ 12.51 hrs, Volume= 0.016 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 836.56' @ 12.51 hrs Surf.Area= 2,062 sf Storage= 2,773 cf

Plug-Flow detention time= 617.0 min calculated for 0.108 af (100% of inflow)
Center-of-Mass det. time= 617.5 min (1,370.4 - 752.9)

Volume	Invert	Avail.Storage	Storage Description
#1	834.75'	5,716 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
834.75	816	0	0
835.00	1,184	250	250
836.00	1,725	1,455	1,705
837.00	2,323	2,024	3,729
837.75	2,977	1,988	5,716

Device	Routing	Invert	Outlet Devices
#1	Discarded	834.75'	**0.800 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 799.75'
#2	Device 3	836.50'	**24.0" Horiz. Orifice/Grate X 0.70** C= 0.600 Limited to weir flow at low heads

#3	Primary	832.27'	**12.0" Round Culvert** L= 82.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 832.27' / 832.00' S= 0.0033 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.04 cfs @ 12.51 hrs HW=836.56' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.04 cfs)

Primary OutFlow Max=0.23 cfs @ 12.51 hrs HW=836.56' (Free Discharge)
↑—**3=Culvert** (Passes 0.23 cfs of 6.21 cfs potential flow)
↑—**2=Orifice/Grate** (Weir Controls 0.23 cfs @ 0.58 fps)

Summary for Pond 2P: South Infiltration Basin

Inflow Area = 1.004 ac, 78.19% Impervious, Inflow Depth = 2.04" for 2-year event
Inflow = 3.28 cfs @ 12.11 hrs, Volume= 0.171 af
Outflow = 0.11 cfs @ 13.58 hrs, Volume= 0.171 af, Atten= 97%, Lag= 88.0 min
Discarded = 0.08 cfs @ 13.58 hrs, Volume= 0.169 af
Primary = 0.03 cfs @ 13.58 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 835.16' @ 13.58 hrs Surf.Area= 4,218 sf Storage= 4,967 cf

Plug-Flow detention time= 646.2 min calculated for 0.171 af (100% of inflow)
Center-of-Mass det. time= 646.6 min (1,399.5 - 752.9)

Volume	Invert	Avail.Storage	Storage Description
#1	833.50'	9,084 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
833.50	1,781	0	0
834.00	2,499	1,070	1,070
835.00	3,972	3,236	4,306
835.75	5,116	3,408	7,714
836.00	5,848	1,371	9,084

Device	Routing	Invert	Outlet Devices
#1	Discarded	833.50'	**0.800 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 799.00'
#2	Device 3	835.15'	**24.0" Horiz. Orifice/Grate X 0.70** C= 0.600 Limited to weir flow at low heads
#3	Primary	830.70'	**12.0" Round Culvert** L= 147.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 830.70' / 827.55' S= 0.0214 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.08 cfs @ 13.58 hrs HW=835.16' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=0.02 cfs @ 13.58 hrs HW=835.16' (Free Discharge)
↑—**3=Culvert** (Passes 0.02 cfs of 6.72 cfs potential flow)
↑—**2=Orifice/Grate** (Weir Controls 0.02 cfs @ 0.25 fps)

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentEx-A: Runoff Area=0.741 ac 73.41% Impervious Runoff Depth=2.96"
Tc=5.0 min CN=39/98 Runoff=3.42 cfs 0.183 af

SubcatchmentEx-B: Runoff Area=3.105 ac 70.34% Impervious Runoff Depth=2.84"
Tc=5.0 min CN=39/98 Runoff=13.73 cfs 0.734 af

SubcatchmentEx-C: Runoff Area=0.136 ac 8.82% Impervious Runoff Depth=0.42"
Tc=5.0 min CN=39/98 Runoff=0.08 cfs 0.005 af

SubcatchmentEx-D: Runoff Area=0.337 ac 23.15% Impervious Runoff Depth=0.98"
Tc=5.0 min CN=39/98 Runoff=0.49 cfs 0.028 af

SubcatchmentEx-E: Runoff Area=0.048 ac 0.00% Impervious Runoff Depth=0.07"
Tc=0.0 min CN=39/0 Runoff=0.00 cfs 0.000 af

SubcatchmentProp-A: Runoff Area=0.734 ac 74.93% Impervious Runoff Depth=3.02"
Tc=5.0 min CN=39/98 Runoff=3.46 cfs 0.185 af

SubcatchmentProp-B1: Runoff Area=1.083 ac 81.90% Impervious Runoff Depth=3.29"
Tc=5.0 min CN=39/98 Runoff=5.58 cfs 0.297 af

SubcatchmentProp-B2: Runoff Area=0.596 ac 83.39% Impervious Runoff Depth=3.35"
Tc=5.0 min CN=39/98 Runoff=3.12 cfs 0.166 af

SubcatchmentProp-B3: Runoff Area=0.281 ac 76.16% Impervious Runoff Depth=3.07"
Tc=5.0 min CN=39/98 Runoff=1.35 cfs 0.072 af

SubcatchmentProp-B4: Runoff Area=1.004 ac 78.19% Impervious Runoff Depth=3.15"
Tc=5.0 min CN=39/98 Runoff=4.93 cfs 0.263 af

SubcatchmentProp-B5: Runoff Area=0.160 ac 11.87% Impervious Runoff Depth=0.54"
Tc=5.0 min CN=39/98 Runoff=0.12 cfs 0.007 af

SubcatchmentProp-C: Runoff Area=0.134 ac 8.96% Impervious Runoff Depth=0.43"
Tc=5.0 min CN=39/98 Runoff=0.08 cfs 0.005 af

SubcatchmentProp-D: Runoff Area=0.337 ac 23.15% Impervious Runoff Depth=0.98"
Tc=5.0 min CN=39/98 Runoff=0.49 cfs 0.028 af

SubcatchmentProp-E: Runoff Area=0.048 ac 0.00% Impervious Runoff Depth=0.07"
Tc=5.0 min CN=39/0 Runoff=0.00 cfs 0.000 af

Reach 1R: TOTAL EXISTING OUTFLOW Inflow=17.72 cfs 0.950 af
Outflow=17.72 cfs 0.950 af

Reach 2R: TOTAL PROPOSED OUTFLOW Inflow=12.19 cfs 0.734 af
Outflow=12.19 cfs 0.734 af

Pond 1P: East Infiltration Basin Peak Elev=836.77' Storage=3,210 cf Inflow=3.12 cfs 0.166 af
Discarded=0.04 cfs 0.102 af Primary=2.02 cfs 0.065 af Outflow=2.06 cfs 0.166 af

Pond 2P: South Infiltration Basin Peak Elev=835.37' Storage=5,857 cf Inflow=4.93 cfs 0.263 af
Discarded=0.09 cfs 0.187 af Primary=1.44 cfs 0.076 af Outflow=1.52 cfs 0.263 af

Summary for Subcatchment Ex-A:

Runoff = 3.42 cfs @ 12.11 hrs, Volume= 0.183 af, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (ac)	CN	Description
0.544	98	Paved parking, HSG A
0.197	39	>75% Grass cover, Good, HSG A
0.741	82	Weighted Average
0.197	39	26.59% Pervious Area
0.544	98	73.41% Impervious Area

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

Summary for Subcatchment Ex-B:

Runoff = 13.73 cfs @ 12.11 hrs, Volume= 0.734 af, Depth= 2.84"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (ac)	CN	Description
0.921	39	>75% Grass cover, Good, HSG A
2.184	98	Paved parking, HSG A
3.105	80	Weighted Average
0.921	39	29.66% Pervious Area
2.184	98	70.34% Impervious Area

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

Summary for Subcatchment Ex-C:

Runoff = 0.08 cfs @ 12.11 hrs, Volume= 0.005 af, Depth= 0.42"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (ac)	CN	Description
0.124	39	>75% Grass cover, Good, HSG A
0.012	98	Paved parking, HSG A
0.136	44	Weighted Average
0.124	39	91.18% Pervious Area
0.012	98	8.82% Impervious Area

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

Summary for Subcatchment Ex-D:

Runoff = 0.49 cfs @ 12.11 hrs, Volume= 0.028 af, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (ac)	CN	Description
0.259	39	>75% Grass cover, Good, HSG A
0.078	98	Paved parking, HSG A
0.337	53	Weighted Average
0.259	39	76.85% Pervious Area
0.078	98	23.15% Impervious Area

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

Summary for Subcatchment Ex-E:

Runoff = 0.00 cfs @ 13.15 hrs, Volume= 0.000 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (ac)	CN	Description
0.048	39	>75% Grass cover, Good, HSG A
0.048	39	100.00% Pervious Area

Summary for Subcatchment Prop-A:

Runoff = 3.46 cfs @ 12.11 hrs, Volume= 0.185 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (ac)	CN	Description
0.184	39	>75% Grass cover, Good, HSG A
0.550	98	Paved parking, HSG A
0.734	83	Weighted Average
0.184	39	25.07% Pervious Area
0.550	98	74.93% Impervious Area

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

Summary for Subcatchment Prop-B1:

Runoff = 5.58 cfs @ 12.11 hrs, Volume= 0.297 af, Depth= 3.29"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (ac)	CN	Description
0.196	39	>75% Grass cover, Good, HSG A
0.887	98	Paved parking, HSG A
1.083	87	Weighted Average
0.196	39	18.10% Pervious Area
0.887	98	81.90% Impervious Area

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

Summary for Subcatchment Prop-B2:

Runoff = 3.12 cfs @ 12.11 hrs, Volume= 0.166 af, Depth= 3.35"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (ac)	CN	Description
0.099	39	>75% Grass cover, Good, HSG A
0.497	98	Paved parking, HSG A
0.596	88	Weighted Average
0.099	39	16.61% Pervious Area
0.497	98	83.39% Impervious Area

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

Summary for Subcatchment Prop-B3:

Runoff = 1.35 cfs @ 12.11 hrs, Volume= 0.072 af, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (ac)	CN	Description
0.067	39	>75% Grass cover, Good, HSG A
0.214	98	Paved parking, HSG A
0.281	84	Weighted Average
0.067	39	23.84% Pervious Area
0.214	98	76.16% Impervious Area

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

Summary for Subcatchment Prop-B4:

Runoff = 4.93 cfs @ 12.11 hrs, Volume= 0.263 af, Depth= 3.15"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (ac)	CN	Description
0.219	39	>75% Grass cover, Good, HSG A
0.785	98	Paved parking, HSG A
1.004	85	Weighted Average
0.219	39	21.81% Pervious Area
0.785	98	78.19% Impervious Area

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

Summary for Subcatchment Prop-B5:

Runoff = 0.12 cfs @ 12.11 hrs, Volume= 0.007 af, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (ac)	CN	Description
0.141	39	>75% Grass cover, Good, HSG A
0.019	98	Paved parking, HSG A
0.160	46	Weighted Average
0.141	39	88.12% Pervious Area
0.019	98	11.87% Impervious Area

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

Summary for Subcatchment Prop-C:

Runoff = 0.08 cfs @ 12.11 hrs, Volume= 0.005 af, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (ac)	CN	Description
0.122	39	>75% Grass cover, Good, HSG A
0.012	98	Paved parking, HSG A
0.134	44	Weighted Average
0.122	39	91.04% Pervious Area
0.012	98	8.96% Impervious Area

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

Summary for Subcatchment Prop-D:

Runoff = 0.49 cfs @ 12.11 hrs, Volume= 0.028 af, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (ac)	CN	Description
0.259	39	>75% Grass cover, Good, HSG A
0.078	98	Paved parking, HSG A
0.337	53	Weighted Average
0.259	39	76.85% Pervious Area
0.078	98	23.15% Impervious Area

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

Summary for Subcatchment Prop-E:

Runoff = 0.00 cfs @ 13.24 hrs, Volume= 0.000 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (ac)	CN	Description
0.048	39	>75% Grass cover, Good, HSG A
0.048	39	100.00% Pervious Area

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

Summary for Reach 1R: TOTAL EXISTING OUTFLOW

Inflow Area = 4.367 ac, 64.53% Impervious, Inflow Depth = 2.61" for 10-year event
Inflow = 17.72 cfs @ 12.11 hrs, Volume= 0.950 af
Outflow = 17.72 cfs @ 12.11 hrs, Volume= 0.950 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach 2R: TOTAL PROPOSED OUTFLOW

Inflow Area = 4.377 ac, 69.50% Impervious, Inflow Depth = 2.01" for 10-year event
Inflow = 12.19 cfs @ 12.13 hrs, Volume= 0.734 af
Outflow = 12.19 cfs @ 12.13 hrs, Volume= 0.734 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: East Infiltration Basin

Inflow Area = 0.596 ac, 83.39% Impervious, Inflow Depth = 3.35" for 10-year event
Inflow = 3.12 cfs @ 12.11 hrs, Volume= 0.166 af
Outflow = 2.06 cfs @ 12.19 hrs, Volume= 0.166 af, Atten= 34%, Lag= 4.7 min
Discarded = 0.04 cfs @ 12.19 hrs, Volume= 0.102 af
Primary = 2.02 cfs @ 12.19 hrs, Volume= 0.065 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 836.77' @ 12.19 hrs Surf.Area= 2,186 sf Storage= 3,210 cf

Plug-Flow detention time= 454.7 min calculated for 0.166 af (100% of inflow)
Center-of-Mass det. time= 455.4 min (1,202.9 - 747.5)

Volume	Invert	Avail.Storage	Storage Description
#1	834.75'	5,716 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
834.75	816	0	0
835.00	1,184	250	250
836.00	1,725	1,455	1,705
837.00	2,323	2,024	3,729
837.75	2,977	1,988	5,716

Device	Routing	Invert	Outlet Devices
#1	Discarded	834.75'	**0.800 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 799.75'
#2	Device 3	836.50'	**24.0" Horiz. Orifice/Grate X 0.70** C= 0.600 Limited to weir flow at low heads

#3	Primary	832.27'	**12.0" Round Culvert** L= 82.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 832.27' / 832.00' S= 0.0033 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.04 cfs @ 12.19 hrs HW=836.77' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.04 cfs)

Primary OutFlow Max=1.97 cfs @ 12.19 hrs HW=836.77' (Free Discharge)
↑—**3=Culvert** (Passes 1.97 cfs of 6.38 cfs potential flow)
↑—**2=Orifice/Grate** (Weir Controls 1.97 cfs @ 1.18 fps)

Summary for Pond 2P: South Infiltration Basin

Inflow Area = 1.004 ac, 78.19% Impervious, Inflow Depth = 3.15" for 10-year event
Inflow = 4.93 cfs @ 12.11 hrs, Volume= 0.263 af
Outflow = 1.52 cfs @ 12.27 hrs, Volume= 0.263 af, Atten= 69%, Lag= 9.8 min
Discarded = 0.09 cfs @ 12.27 hrs, Volume= 0.187 af
Primary = 1.44 cfs @ 12.27 hrs, Volume= 0.076 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 835.37' @ 12.27 hrs Surf.Area= 4,529 sf Storage= 5,857 cf

Plug-Flow detention time= 478.3 min calculated for 0.263 af (100% of inflow)
Center-of-Mass det. time= 478.8 min (1,226.7 - 747.9)

Volume	Invert	Avail.Storage	Storage Description
#1	833.50'	9,084 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
833.50	1,781	0	0
834.00	2,499	1,070	1,070
835.00	3,972	3,236	4,306
835.75	5,116	3,408	7,714
836.00	5,848	1,371	9,084

Device	Routing	Invert	Outlet Devices
#1	Discarded	833.50'	**0.800 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 799.00'
#2	Device 3	835.15'	**24.0" Horiz. Orifice/Grate X 0.70** C= 0.600 Limited to weir flow at low heads
#3	Primary	830.70'	**12.0" Round Culvert** L= 147.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 830.70' / 827.55' S= 0.0214 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.09 cfs @ 12.27 hrs HW=835.36' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.09 cfs)

Primary OutFlow Max=1.40 cfs @ 12.27 hrs HW=835.36' (Free Discharge)
↑—**3=Culvert** (Passes 1.40 cfs of 6.82 cfs potential flow)
↑—**2=Orifice/Grate** (Weir Controls 1.40 cfs @ 1.05 fps)

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentEx-A: Runoff Area=0.741 ac 73.41% Impervious Runoff Depth=5.57"
Tc=5.0 min CN=39/98 Runoff=6.27 cfs 0.344 af

SubcatchmentEx-B: Runoff Area=3.105 ac 70.34% Impervious Runoff Depth=5.37"
Tc=5.0 min CN=39/98 Runoff=25.32 cfs 1.390 af

SubcatchmentEx-C: Runoff Area=0.136 ac 8.82% Impervious Runoff Depth=1.50"
Tc=5.0 min CN=39/98 Runoff=0.28 cfs 0.017 af

SubcatchmentEx-D: Runoff Area=0.337 ac 23.15% Impervious Runoff Depth=2.40"
Tc=5.0 min CN=39/98 Runoff=1.16 cfs 0.068 af

SubcatchmentEx-E: Runoff Area=0.048 ac 0.00% Impervious Runoff Depth=0.95"
Tc=0.0 min CN=39/0 Runoff=0.07 cfs 0.004 af

SubcatchmentProp-A: Runoff Area=0.734 ac 74.93% Impervious Runoff Depth=5.66"
Tc=5.0 min CN=39/98 Runoff=6.33 cfs 0.346 af

SubcatchmentProp-B1: Runoff Area=1.083 ac 81.90% Impervious Runoff Depth=6.10"
Tc=5.0 min CN=39/98 Runoff=10.09 cfs 0.551 af

SubcatchmentProp-B2: Runoff Area=0.596 ac 83.39% Impervious Runoff Depth=6.20"
Tc=5.0 min CN=39/98 Runoff=5.64 cfs 0.308 af

SubcatchmentProp-B3: Runoff Area=0.281 ac 76.16% Impervious Runoff Depth=5.74"
Tc=5.0 min CN=39/98 Runoff=2.46 cfs 0.134 af

SubcatchmentProp-B4: Runoff Area=1.004 ac 78.19% Impervious Runoff Depth=5.87"
Tc=5.0 min CN=39/98 Runoff=8.98 cfs 0.491 af

SubcatchmentProp-B5: Runoff Area=0.160 ac 11.87% Impervious Runoff Depth=1.69"
Tc=5.0 min CN=39/98 Runoff=0.38 cfs 0.023 af

SubcatchmentProp-C: Runoff Area=0.134 ac 8.96% Impervious Runoff Depth=1.51"
Tc=5.0 min CN=39/98 Runoff=0.28 cfs 0.017 af

SubcatchmentProp-D: Runoff Area=0.337 ac 23.15% Impervious Runoff Depth=2.40"
Tc=5.0 min CN=39/98 Runoff=1.16 cfs 0.068 af

SubcatchmentProp-E: Runoff Area=0.048 ac 0.00% Impervious Runoff Depth=0.95"
Tc=5.0 min CN=39/0 Runoff=0.06 cfs 0.004 af

Reach 1R: TOTAL EXISTING OUTFLOW Inflow=33.07 cfs 1.823 af
Outflow=33.07 cfs 1.823 af

Reach 2R: TOTAL PROPOSED OUTFLOW Inflow=31.16 cfs 1.613 af
Outflow=31.16 cfs 1.613 af

Pond 1P: East Infiltration Basin Peak Elev=836.99' Storage=3,715 cf Inflow=5.64 cfs 0.308 af
Discarded=0.04 cfs 0.113 af Primary=5.00 cfs 0.194 af Outflow=5.04 cfs 0.308 af

Pond 2P: South Infiltration Basin Peak Elev=835.75' Storage=7,702 cf Inflow=8.98 cfs 0.491 af
Discarded=0.10 cfs 0.214 af Primary=6.64 cfs 0.277 af Outflow=6.74 cfs 0.491 af

Summary for Subcatchment Ex-A:

Runoff = 6.27 cfs @ 12.11 hrs, Volume= 0.344 af, Depth= 5.57"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.48"

Area (ac)	CN	Description
0.544	98	Paved parking, HSG A
0.197	39	>75% Grass cover, Good, HSG A
0.741	82	Weighted Average
0.197	39	26.59% Pervious Area
0.544	98	73.41% Impervious Area

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

Summary for Subcatchment Ex-B:

Runoff = 25.32 cfs @ 12.11 hrs, Volume= 1.390 af, Depth= 5.37"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.48"

Area (ac)	CN	Description
0.921	39	>75% Grass cover, Good, HSG A
2.184	98	Paved parking, HSG A
3.105	80	Weighted Average
0.921	39	29.66% Pervious Area
2.184	98	70.34% Impervious Area

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

Summary for Subcatchment Ex-C:

Runoff = 0.28 cfs @ 12.14 hrs, Volume= 0.017 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.48"

Area (ac)	CN	Description
0.124	39	>75% Grass cover, Good, HSG A
0.012	98	Paved parking, HSG A
0.136	44	Weighted Average
0.124	39	91.18% Pervious Area
0.012	98	8.82% Impervious Area

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

Summary for Subcatchment Ex-D:

Runoff = 1.16 cfs @ 12.13 hrs, Volume= 0.068 af, Depth= 2.40"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.48"

Area (ac)	CN	Description
0.259	39	>75% Grass cover, Good, HSG A
0.078	98	Paved parking, HSG A
0.337	53	Weighted Average
0.259	39	76.85% Pervious Area
0.078	98	23.15% Impervious Area

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

Summary for Subcatchment Ex-E:

Runoff = 0.07 cfs @ 12.07 hrs, Volume= 0.004 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.48"

Area (ac)	CN	Description
0.048	39	>75% Grass cover, Good, HSG A
0.048	39	100.00% Pervious Area

Summary for Subcatchment Prop-A:

Runoff = 6.33 cfs @ 12.11 hrs, Volume= 0.346 af, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.48"

Area (ac)	CN	Description
0.184	39	>75% Grass cover, Good, HSG A
0.550	98	Paved parking, HSG A
0.734	83	Weighted Average
0.184	39	25.07% Pervious Area
0.550	98	74.93% Impervious Area

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

Summary for Subcatchment Prop-B1:

Runoff = 10.09 cfs @ 12.11 hrs, Volume= 0.551 af, Depth= 6.10"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.48"

Area (ac)	CN	Description
0.196	39	>75% Grass cover, Good, HSG A
0.887	98	Paved parking, HSG A
1.083	87	Weighted Average
0.196	39	18.10% Pervious Area
0.887	98	81.90% Impervious Area

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

Summary for Subcatchment Prop-B2:

Runoff = 5.64 cfs @ 12.11 hrs, Volume= 0.308 af, Depth= 6.20"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.48"

Area (ac)	CN	Description
0.099	39	>75% Grass cover, Good, HSG A
0.497	98	Paved parking, HSG A
0.596	88	Weighted Average
0.099	39	16.61% Pervious Area
0.497	98	83.39% Impervious Area

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

Summary for Subcatchment Prop-B3:

Runoff = 2.46 cfs @ 12.11 hrs, Volume= 0.134 af, Depth= 5.74"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.48"

Area (ac)	CN	Description
0.067	39	>75% Grass cover, Good, HSG A
0.214	98	Paved parking, HSG A
0.281	84	Weighted Average
0.067	39	23.84% Pervious Area
0.214	98	76.16% Impervious Area

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

Summary for Subcatchment Prop-B4:

Runoff = 8.98 cfs @ 12.11 hrs, Volume= 0.491 af, Depth= 5.87"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.48"

Area (ac)	CN	Description
0.219	39	>75% Grass cover, Good, HSG A
0.785	98	Paved parking, HSG A
1.004	85	Weighted Average
0.219	39	21.81% Pervious Area
0.785	98	78.19% Impervious Area

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

Summary for Subcatchment Prop-B5:

Runoff = 0.38 cfs @ 12.13 hrs, Volume= 0.023 af, Depth= 1.69"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.48"

Area (ac)	CN	Description
0.141	39	>75% Grass cover, Good, HSG A
0.019	98	Paved parking, HSG A
0.160	46	Weighted Average
0.141	39	88.12% Pervious Area
0.019	98	11.87% Impervious Area

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

Summary for Subcatchment Prop-C:

Runoff = 0.28 cfs @ 12.14 hrs, Volume= 0.017 af, Depth= 1.51"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.48"

Area (ac)	CN	Description
0.122	39	>75% Grass cover, Good, HSG A
0.012	98	Paved parking, HSG A
0.134	44	Weighted Average
0.122	39	91.04% Pervious Area
0.012	98	8.96% Impervious Area

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

Summary for Subcatchment Prop-D:

Runoff = 1.16 cfs @ 12.13 hrs, Volume= 0.068 af, Depth= 2.40"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.48"

Area (ac)	CN	Description
0.259	39	>75% Grass cover, Good, HSG A
0.078	98	Paved parking, HSG A
0.337	53	Weighted Average
0.259	39	76.85% Pervious Area
0.078	98	23.15% Impervious Area

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

Summary for Subcatchment Prop-E:

Runoff = 0.06 cfs @ 12.15 hrs, Volume= 0.004 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.48"

Area (ac)	CN	Description
0.048	39	>75% Grass cover, Good, HSG A
0.048	39	100.00% Pervious Area

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

Summary for Reach 1R: TOTAL EXISTING OUTFLOW

Inflow Area = 4.367 ac, 64.53% Impervious, Inflow Depth = 5.01" for 100-year event
Inflow = 33.07 cfs @ 12.11 hrs, Volume= 1.823 af
Outflow = 33.07 cfs @ 12.11 hrs, Volume= 1.823 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach 2R: TOTAL PROPOSED OUTFLOW

Inflow Area = 4.377 ac, 69.50% Impervious, Inflow Depth = 4.42" for 100-year event
Inflow = 31.16 cfs @ 12.13 hrs, Volume= 1.613 af
Outflow = 31.16 cfs @ 12.13 hrs, Volume= 1.613 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: East Infiltration Basin

Inflow Area = 0.596 ac, 83.39% Impervious, Inflow Depth = 6.20" for 100-year event
Inflow = 5.64 cfs @ 12.11 hrs, Volume= 0.308 af
Outflow = 5.04 cfs @ 12.15 hrs, Volume= 0.308 af, Atten= 11%, Lag= 2.2 min
Discarded = 0.04 cfs @ 12.15 hrs, Volume= 0.113 af
Primary = 5.00 cfs @ 12.15 hrs, Volume= 0.194 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 836.99' @ 12.15 hrs Surf.Area= 2,319 sf Storage= 3,715 cf

Plug-Flow detention time= 287.2 min calculated for 0.307 af (100% of inflow)
Center-of-Mass det. time= 288.0 min (1,030.8 - 742.8)

Volume	Invert	Avail.Storage	Storage Description
#1	834.75'	5,716 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
834.75	816	0	0
835.00	1,184	250	250
836.00	1,725	1,455	1,705
837.00	2,323	2,024	3,729
837.75	2,977	1,988	5,716

Device	Routing	Invert	Outlet Devices
#1	Discarded	834.75'	**0.800 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 799.75'
#2	Device 3	836.50'	**24.0" Horiz. Orifice/Grate X 0.70** C= 0.600 Limited to weir flow at low heads

#3	Primary	832.27'	**12.0" Round Culvert** L= 82.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 832.27' / 832.00' S= 0.0033 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.04 cfs @ 12.15 hrs HW=836.99' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.04 cfs)

Primary OutFlow Max=4.99 cfs @ 12.15 hrs HW=836.99' (Free Discharge)
↑—**3=Culvert** (Passes 4.99 cfs of 6.57 cfs potential flow)
↑—**2=Orifice/Grate** (Weir Controls 4.99 cfs @ 1.61 fps)

Summary for Pond 2P: South Infiltration Basin

Inflow Area = 1.004 ac, 78.19% Impervious, Inflow Depth = 5.87" for 100-year event
Inflow = 8.98 cfs @ 12.11 hrs, Volume= 0.491 af
Outflow = 6.74 cfs @ 12.17 hrs, Volume= 0.491 af, Atten= 25%, Lag= 3.5 min
Discarded = 0.10 cfs @ 12.17 hrs, Volume= 0.214 af
Primary = 6.64 cfs @ 12.17 hrs, Volume= 0.277 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 835.75' @ 12.17 hrs Surf.Area= 5,113 sf Storage= 7,702 cf

Plug-Flow detention time= 311.9 min calculated for 0.491 af (100% of inflow)
Center-of-Mass det. time= 311.7 min (1,055.8 - 744.1)

Volume	Invert	Avail.Storage	Storage Description
#1	833.50'	9,084 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
833.50	1,781	0	0
834.00	2,499	1,070	1,070
835.00	3,972	3,236	4,306
835.75	5,116	3,408	7,714
836.00	5,848	1,371	9,084

Device	Routing	Invert	Outlet Devices
#1	Discarded	833.50'	**0.800 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 799.00'
#2	Device 3	835.15'	**24.0" Horiz. Orifice/Grate X 0.70** C= 0.600 Limited to weir flow at low heads
#3	Primary	830.70'	**12.0" Round Culvert** L= 147.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 830.70' / 827.55' S= 0.0214 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.10 cfs @ 12.17 hrs HW=835.74' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=6.44 cfs @ 12.17 hrs HW=835.74' (Free Discharge)
↑—**3=Culvert** (Passes 6.44 cfs of 7.01 cfs potential flow)
↑—**2=Orifice/Grate** (Weir Controls 6.44 cfs @ 1.75 fps)

Project Information

Calculator Version:	Version 2: June 2014
Project Name:	ARC17008 Acorn Ministorage, Bloomington
User Name / Company Name:	Elan Design Lab
Date:	04/27/2018
Project Description:	Drainage Areas B2 and B4 provide treatment for an equivalent area of all new and disturbed imperviousness, and therefore are the only areas analyzed in the MIDS report.

Site Information

Retention Requirement (inches):	1.1
Site's Zip Code:	55431
Annual Rainfall (inches):	31.3
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed	0.457				0.457
			Impervious Area (acres)		1.282
				Total Area (acres)	1.739

Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed	0.274				0.274
			Impervious Area (acres)		1.282
				Total Area (acres)	1.556

Summary Information

Performance Goal Requirement

Performance goal volume retention requirement:	5119	ft3
Volume removed by BMPs towards performance goal:	5119	ft3
Percent volume removed towards performance goal	**100**	**%**

Annual Volume and Pollutant Load Reductions

Post development annual runoff volume	3.0199	acre-ft
Annual runoff volume removed by BMPs:	0.0841	acre-ft
Percent annual runoff volume removed:	**3**	**%**
Post development annual particulate P load:	1.36	lbs
Annual particulate P removed by BMPs:	1.3	lbs
Post development annual dissolved P load:	1.11	lbs
Annual dissolved P removed by BMPs:	1.06	lbs
Percent annual total phosphorus removed:	**96**	**%**
Post development annual TSS load:	448	lbs
Annual TSS removed by BMPs:	434	lbs
Percent annual TSS removed:	**97**	**%**

BMP Summary

Performance Goal Summary

BMP Name	BMP Volume Capacity (ft3)	Volume Recieved (ft3)	Volume Retained (ft3)	Volume Outflow (ft3)	Percent Retained (%)
East Basin - Infiltration basin	2223	1985	1985	0	100
South Basin - Infiltration basin	5588	3134	3134	0	100
1 - "Turret" Rain Guardian	0	1985	0	1985	0
2 - "Turret" Rain Guardian	0	938	0	938	0
3 - "Turret" Rain Guardian	0	2196	0	2196	0

Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)
East Basin - Infiltration basin	0.0303	0	0.0289	0.0014	95
South Basin - Infiltration basin	0.056	0	0.0553	0.0006999999	99
1 - "Turret" Rain Guardian	1.1084	0	0	1.1084	0
2 - "Turret" Rain Guardian	0.5343	0	0	0.5343	0
3 - "Turret" Rain Guardian	1.2266	0	0	1.2266	0

Particulate Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
East Basin - Infiltration basin	0.01	0.33	0.32	0.02	95
South Basin - Infiltration basin	0.03	0.52	0.54	0.01	99
1 - "Turret" Rain Guardian	0.5	0	0.17	0.33	34
2 - "Turret" Rain Guardian	0.24	0	0.08	0.16	34
3 - "Turret" Rain Guardian	0.55	0	0.19	0.36	34

Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
East Basin - Infiltration basin	0.01	0.41	0.4	0.02	95
South Basin - Infiltration basin	0.02	0.65	0.66	0.01	99
1 - "Turret" Rain Guardian	0.41	0	0	0.41	0
2 - "Turret" Rain Guardian	0.2	0	0	0.2	0
3 - "Turret" Rain Guardian	0.45	0	0	0.45	0

TSS Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
East Basin - Infiltration basin	4	41	43	2	95
South Basin - Infiltration basin	8	65	72	1	99
1 - "Turret" Rain Guardian	164	0	123	41	75
2 - "Turret" Rain Guardian	79	0	59	20	75
3 - "Turret" Rain Guardian	182	0	137	45	75

BMP Schematic

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