Exhibit A.30

STORMWATER DRAINAGE CONTROL CERTIFICATE

Land Use Planning Division

Multnomah County

www.multco.us/landuse ▪ Email: land.use.planning@multco.us ▪ Phone: (503) 988-3043

> 500 SQUARE FEET OF NEW / REPLACED IMPERVIOUS SURFACES

NOTE TO PROPERTY OWNER/APPLICANT: Please have an Oregon Licensed Professional Engineer fill out this Certificate and attach a signed site plan, stamped and signed storm water system details, and stamped and signed storm water calculations used to support the conclusion. Please note that replacement of existing structures does not provide a credit to the square footage threshold.

Property Address or Legal Description: 3010 SE Oxbow Park Road (Oxbow Regional Park)

Description of Project: New water source, treatment and distribution system - less than 500 SF added impervious surfaces

The following stormwater drainage control system will be required:

- [x] Use of Gutter, downspout, and splash block drainage control system;
- [ ] Natural Infiltration Process; or
- [ ] Construction of an on-site storm water drainage control system.

The rate of stormwater runoff attributed to the new/replaced development for a 10-year/24-hour storm event will be no greater than that which existed prior to any development as measured from the property line or from the point of discharge into a water body with the use of the designated system [MCC 39.6235].

I certify the attached signed site plan showing the areas needed for the chosen system type, stamped and signed storm water system design details, and stamped and signed calculations dated 12/19/2023 **will meet the requirements listed above.**

Signature: _____

Print Name: Jane Vail

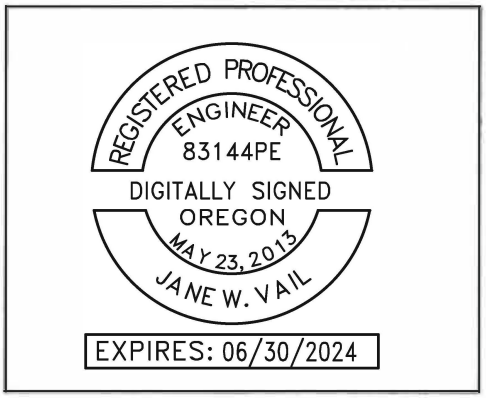
Business Name: Wallis Engineering

Address: 215 W 4th Street, Suite 200

Phone #: (360) 852-9158

Email: jane.vail@walliseng.net

Date: 12/19/2023



NOTE TO ENGINEER: Please check one box above. Multnomah County does not use the City of Portland's storm water ordinance. As part of your review, MCC 39.6235 requires that you must consider all new, replaced, and existing structures and impervious areas and determine that the newly generated stormwater from the new or replaced impervious surfaces is in compliance with Multnomah County Code for a 10-year/24-hour storm event. This Storm Water Drainage Control Certificate does not apply to shingle or roof replacement on lawfully established structures.

§ 39.6235 STORMWATER DRAINAGE CONTROL.

(A) Persons creating new or replacing existing impervious surfaces exceeding 500 square feet shall install a stormwater drainage system as provided in this section. This subsection (A) does not apply to shingle or roof replacement on lawful structures.

(B) The provisions of this section are in addition to and not in lieu of any other provision of the code regulating stormwater or its drainage and other impacts and effects, including but not limited to regulation thereof in the SEC overlay.

(C) The provisions of this section are in addition to and not in lieu of stormwater and drainage requirements in the Multnomah County Road Rules and Design and Construction Manual, including those requirements relating to impervious surfaces and proposals to discharge stormwater onto a county right-of-way.

(D) The stormwater drainage system required in subsection (A) shall be designed to ensure that the rate of runoff for the 10-year 24-hour storm event is no greater than that which existed prior to development at the property line or point of discharge into a water body.

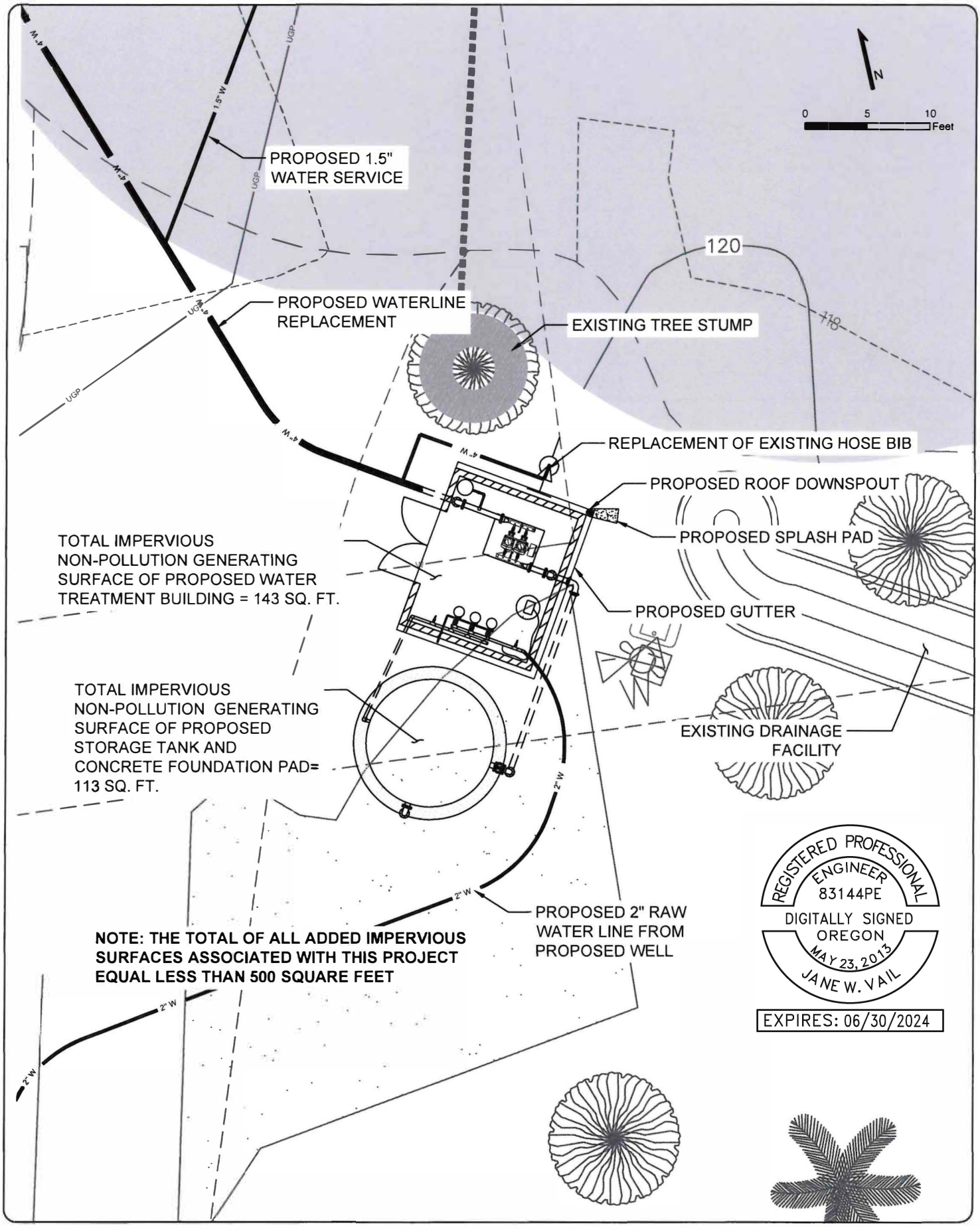
(E) At a minimum, to establish satisfaction of the standards in this section and all other applicable stormwater-related regulations in this code, the following information must be provided to the planning director:

(1) A site plan drawn to scale, showing the property line locations, ground topography (contours), boundaries of all ground disturbing activities, roads and driveways, existing and proposed structures and buildings, existing and proposed sanitary tank and drainfields (primary and reserve), location of stormwater disposal, trees and vegetation proposed for both removal and planting and an outline of wooded areas, water bodies and existing drywells;

(2) Documentation establishing approval of any new stormwater surcharges to a sanitary drainfield by the City of Portland Sanitarian and/or any other agency authorized to review waste disposal systems;

(3) Certified statement, and supporting information and documentation, by an Oregon licensed Professional Engineer that the proposed or existing stormwater drainage system satisfies all standards set forth in this section and all other stormwater drainage system standards in this code; and

(4) Any other report, information, plan, certification or documentation necessary to establish satisfaction of all standards set forth in this section and all other applicable stormwater-related regulations in this code, such as, but not limited to, analyses and explanations of soil characteristics, engineering solutions, and proposed stream and upland environmental protection measures.



REGISTERED PROFESSIONAL ENGINEER
83144PE
DIGITALLY SIGNED
OREGON
MAY 23, 2013
JANE W. VAIL

EXPIRES: 06/30/2024

wallis engineering

Metro

Welcome Center Stormwater Plan

1544C - Oxbow Welcome Center Water System

December 19, 2023

MULTNOMAH COUNTY OREGON
LAND USE AND TRANSPORTATION PROGRAM
1600 SE 190TH Avenue Portland, OR 97233
PH: 503-988-3043 FAX: 503-988-3389
http://www.co.multnomah.or.us/dbcs/LUT/land_use

MULTNOMAH COUNTY

STORM WATER CERTIFICATE
(Required when >500 Square Feet of Impervious Surface Created)

Please have an Oregon Licensed Professional Engineer fill out the property and project description and check one of the boxes below:

Property Address or Legal Description: 3010 SE Oxbow Parkway

Description of Project: This project replaces the existing office building; reorganizes existing visitor and staff parking; improves traffic flow at the entry area near the office; addresses accessibility and universal accessibility shortcomings; reorganizes the existing maintenance operations areas; and replaces signage, utilities, and stormwater facilities to support the building replacement and parking reorganization.

[x] Construction of an on-site storm water drainage control system **is not required**. The rate of storm water runoff attributed to the development (during the 10-year/24-hour storm) will be no greater than that which existed prior to development as measured from the property line or from the point of discharge into a watercourse (MCC 29.333(C), or MCC 29.353(C)).

[ ] Construction of an on-site storm water drainage control system **is required**. After installation of the drainage control system, the rate of storm water runoff attributed to the development (during the 10-year/24-hour storm) will be no greater than that which existed prior to development as measured from the property line or from the point of discharge into a watercourse (MCC 29.333(C), or MCC 29.353(C)). **I certify the attached site plan and on-site storm water control design dated_____ will meet the requirements listed above. Please attach associated plans, designs and calculations.**

Signature [signature]

Print Name Kelli A. Grover

Address 39065 Pioneer Blvd. Ste 104 SANDY, OR 97055

Phone 503-668-3737 Fax 503-668-3788

Date 11-19-14

Provide Stamp Below:

REGISTERED PROFESSIONAL ENGINEER
67149PE
OREGON
JULY 14, 2006
KELLI A. GROVER
EXPIRES: 6-30-15

EXHIBIT 3b
Page 1 of 1

Land Use Planning Division
1600 SE 190th Ave.
Portland OR 97233
Phone: 503land.use.planning@multco.us-988-3043

https://multco.us/landuse/

STORMWATER DRAINAGE CONTROL CERTIFICATE
>500 SQUARE FEET OF NEW / REPLACED IMPERVIOUS SURFACES

NOTE TO PROPERTY OWNER/APPLICANT: Please have an Oregon Licensed Professional Engineer fill out this Certificate and attach a signed site plan, stamped and signed storm water system details, and stamped and signed storm water calculations used to support the conclusion. Please note that replacement of existing structures does not provide a credit to the square footage threshold.

Property Address or Legal Description: _____Oxbow Regional Park _____

Description of Project: _____**Operation Area Renovations** _____

The following stormwater drainage control system will be required:

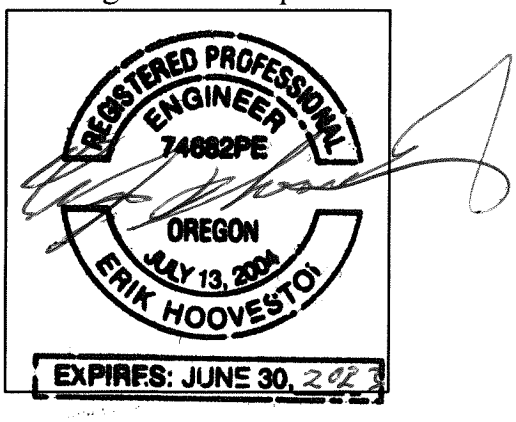
- ☐ **Use of Gutter, downspout, and splash block drainage control system;**
- ☒ **Natural Infiltration Process; or**
- ☐ **Construction of an on-site storm water drainage control system.**

The rate of stormwater runoff attributed to the new/replaced development for a 10-year/24-hour storm event will be no greater than that which existed prior to any development as measured from the property line or from the point of discharge into a water body with the use of the designated system [MCC 39.6235].

I certify the attached signed site plan showing the areas needed for the chosen system type, stamped and signed storm water system design details, and stamped and signed calculations dated __March 19, 2021__ will meet the requirements listed above.

Signature: _____

Engineer's Stamp Below:



Print Name: ___Erik Hoovestol_____

Business Name: _Firwood Design Group_____

Address: ___359 E. Historic Columbia River Hwy
Troutdale, OR 97060_____

Phone #: __503-668-3737_____

Date: 12/15/2021

NOTE TO ENGINEER: Please check one box above. Multnomah County does not use the City of Portland's storm water ordinance. As part of your review, MCC 39.6235 requires that you must consider all new, replaced, and existing structures and impervious areas and determine that the newly generated stormwater from the new or replaced impervious surfaces is in compliance with Multnomah County Code for a 10-year/24-hour storm event. This Storm Water Drainage Control Certificate does not apply to shingle or roof replacement on lawfully established structures.

FIRWOOD DESIGN GROUP, LLC

STORMWATER CERTIFICATE REPORT

Oxbow Welcome Center-Phase 2

December 15th, 2021
FDG Project # E21-042

Prepared for:
Metro
600 NE Grand Ave
Portland, OR 97232-2736

Prepared by:

359 E. Historic Columbia River Highway
Troutdale, OR 97060
503.668.3737- fax 503.668.3788

OBJECTIVE

Per Multnomah County development code, any new or replaced impervious surfaces of over 500 square feet require a stormwater drainage control system to ensure stormwater runoff from a 10-year/24-hour storm will be no greater than that which existed prior to proposed development. The vehicle area for the Oxbow Park Operations Area in unincorporated Gresham, OR, is proposed to pave existing gravel area. The proposed stormwater swales and existing soil conditions will fully infiltrate runoff up to the 10-year design storm. The peak flows from the new impervious areas will not result in a negative impact to downstream neighboring property.

METHODOLOGY

The Santa Barbara Urban Hydrograph Method (calculated with HydroCAD with SCS Type 1A rainfall distribution) was used to create the hydrographs and to estimate the peak flows for the design storm. A curve number (CN) of 98 was assigned to the impervious asphalt and a CN of 76 was assigned to the impervious gravel. The site existing soil infiltration rate was based off hydrologic soils data from the USDA Soil Survey of the area.

Site slope data was determined from a topographic survey of the area.

SITE DESCRIPTION

The following describes collected site information from available topographic survey, and site visits.

The site is Phase 2 of a larger approximate 1.67-acre project area. The existing site is accessed from the north via an asphalt driveway connecting to SE Oxbow Regional Parkway. The site contains an existing gravel vehicle area which services two existing Oxbow Park offices. The gravel drive continues to the southwest were it services a wood shed before terminating near the property line. There is an existing strip of asphalt just south of the gravel vehicle area which runs east to west. The existing gravel and buildings are surrounded by heavily forested areas. The total site is flat with <3% slopes. Runoff from the site generally heads to the northwest where it is infiltrated into the existing soils.

The proposed vehicle drive areas will resurface 11069 SF of new asphalt over existing gravel. 11907 SF of new gravel will resurface the existing gravel road on the site. 3955 SF of new gravel parking area will be added to the forested area west of the existing vehicle drive area.

See site plan for a more detailed layout of the site's existing conditions and proposed improvements.

DESIGN PARAMETERS

Soil Type
Using the USDA Web Soil Survey, the soil for the site was determined to be predominantly Dabney loamy sand. This is a very high well drained soil (Ksat=19.98 in/hr) belonging to Hydraulic Soil Group A.

Runoff Curve Numbers
A CN of

- 98 was used to model the post-construction asphalt areas
- 76 was used to model the post construction gravel areas

Design Infiltration Rate
For the infiltration swales an infiltration rate of 2.0in/hr was used for modeling. This is the City of Portland standard rate for growing media in vegetated facilities.

Precipitation
Per Multnomah County development code, the applicable design storm for this location is a 10-yr, 24-hr, Type 1A event = 3.9 inches.

Time of Concentration
To model the collection of stormwater runoff from the impervious areas to their respective discharge point for post-construction conditions, a minimum time of concentration of 6 minutes was used.

SITE INFILTRATION

The first proposed swale will infiltrate storm runoff for a 5219 sf section of the asphalt area and will be of size 73' length x 3' width x 0.83' height. It is designed to fully infiltrate the 10-year design storm. Below is the result of this swale design for the design storm. See attached HydroCAD report for detailed calculations.

Peak Runoff (Inflow) = 0.011 cfs
Peak Outflow = 0.03 cfs (discarded through exfiltration)
Peak Outflow = 0.00 cfs (discarded via overflow discharge)

Available Storage = 346 cf
Peak Storage = 342 cf
Peak Elevation = 0.82’

The second proposed swale will infiltrate storm runoff for a 2466 sf southern section of the proposed asphalt area and will be of size 35’ length x 3’ width x 0.83’ height. It is designed to fully infiltrate the 10-year design storm. Below is the result of this swale design for the design storm. See attached HydroCAD report for detailed calculations.

Peak Runoff (Inflow) = 0.05 cfs
Peak Outflow = 0.01 cfs (discarded through exfiltration)
Peak Outflow = 0.00 cfs (discarded via overflow discharge)

Available Storage = 157 cf
Peak Storage = 173 cf
Peak Elevation = 0.78’

The remaining 3384 sf of proposed asphalt and 15862 sf of gravel asphalt will be graded to drain to the heavily forested areas to the north and south. Due the existing soils high infiltration conducive rate it is purposed that all stormwater will shed into the surrounding ground.

CONCLUSION

For the proposed new impervious areas, construction of an on-site storm water drainage control is not required. This is due to the very high infiltration rate (Ksat= 19.98in/hr) of the existing on site soil.

The proposed addition of two infiltration swales sized 73’ length x 3’ width x 0.83’ height and size 35’ length x 3’ width x 0.83’ height, which will both fully infiltrate runoff from the 10-year design storm, will further ensure stormwater runoff from the newly created impervious area will not negatively impact downstream and neighboring properties.

Supporting calculations are enclosed along with the site plans reviewed and referenced for this report.

REFERENCES

- USDA Web Soil Survey for Multnomah County, Oregon
- Portland Stormwater Management Manual
- Site Plans

APPENDIX

- USDA Soil Report
- HydroCAD Output Data
- Site Plans

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 Multnomah County Area, Oregon

September 25, 2014

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 (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

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

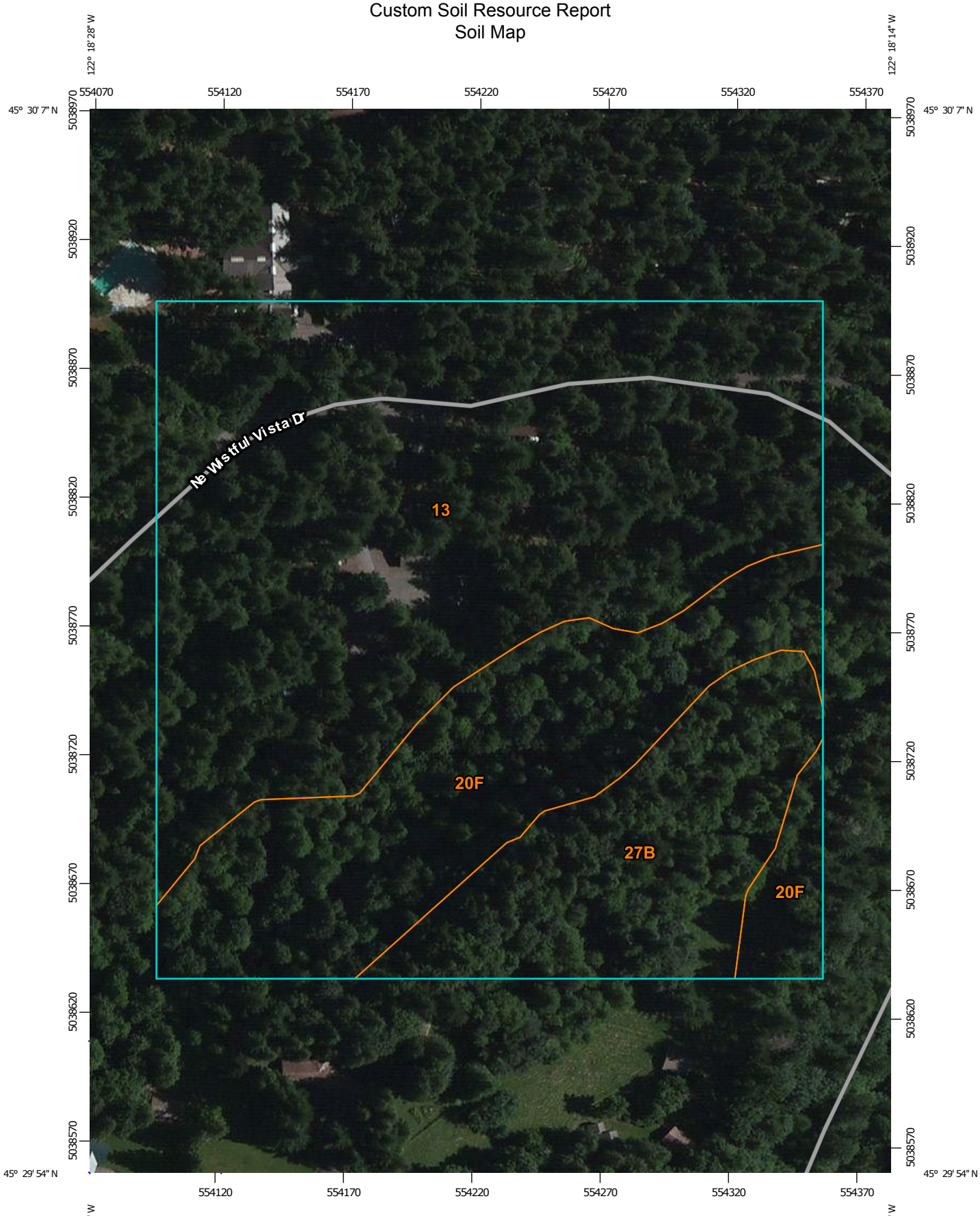
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,010 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 25 50 100 150

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N 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 1:20,000.

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: http://websoilsurvey.nrcs.usda.gov
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: Multnomah County Area, Oregon
Survey Area Data: Version 11, Dec 4, 2013

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

Date(s) aerial images were photographed: Jul 8, 2010—Sep 4, 2011

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

Multnomah County Area, Oregon (OR051)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
13	Dabney loamy sand	9.8	57.9%
20F	Haplumbrepts, very steep	4.3	25.6%
27B	Mershon silt loam, 0 to 8 percent slopes	2.8	16.5%
Totals for Area of Interest		**16.9**	**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.

Multnomah County Area, Oregon

13—Dabney loamy sand

Map Unit Setting

National map unit symbol: 228k
Elevation: 30 to 400 feet
Mean annual precipitation: 60 to 70 inches
Mean annual air temperature: 50 to 52 degrees F
Frost-free period: 100 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Dabney and similar soils: 85 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dabney

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave
Across-slope shape: Linear
Parent material: Sandy alluvium

Typical profile

H1 - 0 to 15 inches: loamy sand
H2 - 15 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 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 to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A

Minor Components

Riverwash

Percent of map unit: 10 percent
Landform: Flood plains

20F—Haplumbrepts, very steep

Map Unit Setting

National map unit symbol: 228z
Mean annual precipitation: 60 to 90 inches
Mean annual air temperature: 50 to 52 degrees F
Frost-free period: 60 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Haplumbrepts and similar soils: 80 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Haplumbrepts

Setting

Landform: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Colluvium from basalt and andesite mixed with loess, volcanic ash and old alluvium

Typical profile

H1 - 0 to 14 inches: silt loam
H2 - 14 to 60 inches: gravelly clay loam

Properties and qualities

Slope: 30 to 90 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B

Minor Components

Aquepts, seeps

Percent of map unit: 1 percent
Landform: Depressions

27B—Mershon silt loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 229d
Elevation: 450 to 1,300 feet
Mean annual precipitation: 60 to 70 inches
Mean annual air temperature: 50 to 52 degrees F
Frost-free period: 165 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Mershon and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mershon

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess and medium textured old alluvium

Typical profile

H1 - 0 to 15 inches: silt loam
H2 - 15 to 56 inches: silt loam
H3 - 56 to 60 inches: loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 36 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C

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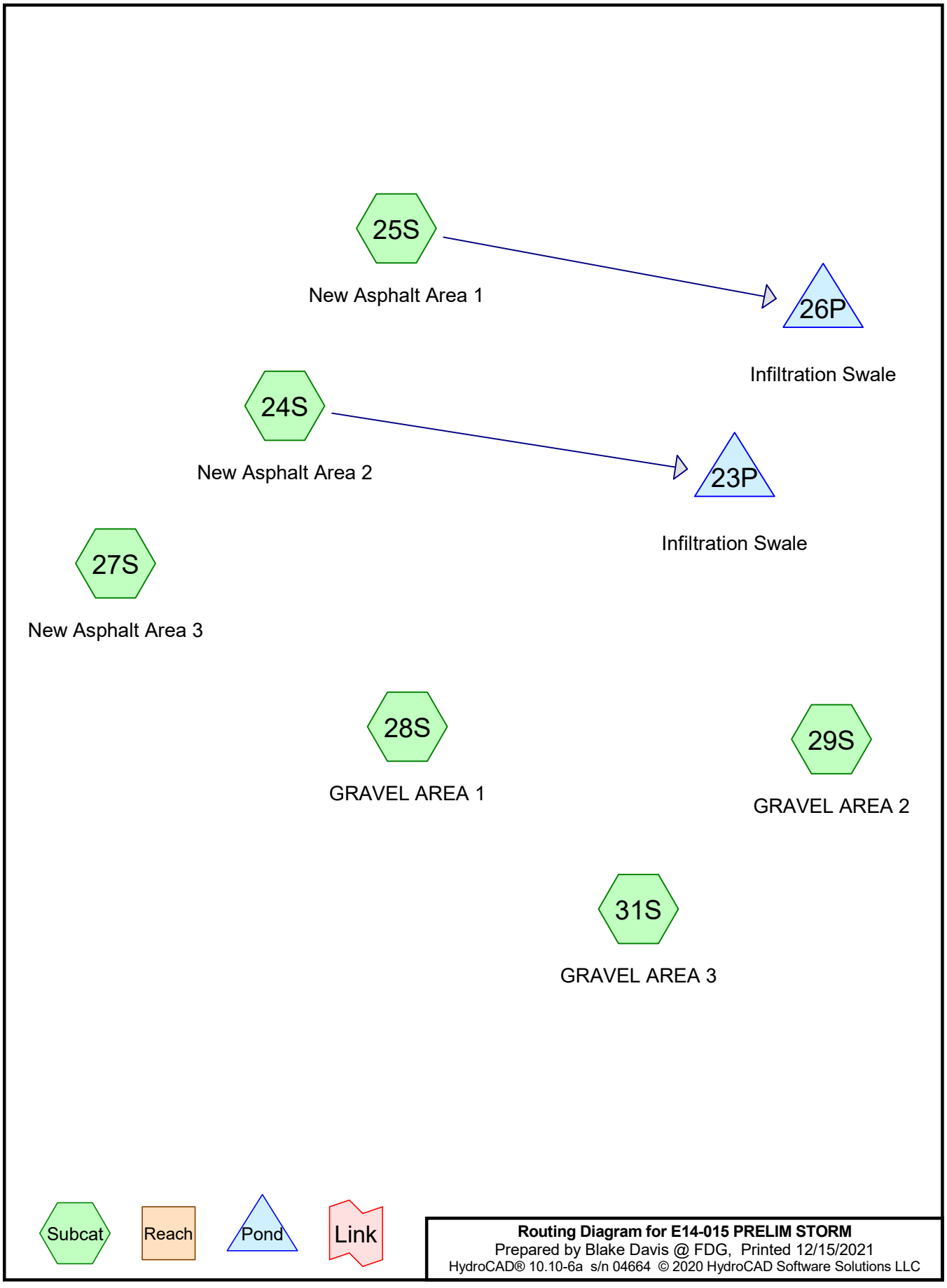


Routing Diagram for E14-015 PRELIM STORM
Prepared by Blake Davis @ FDG, Printed 12/15/2021
HydroCAD® 10.10-6a s/n 04664 © 2020 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	10yr	Type IA 24-hr		Default	24.00	1	3.90	2

Summary for Subcatchment 24S: New Asphalt Area 2

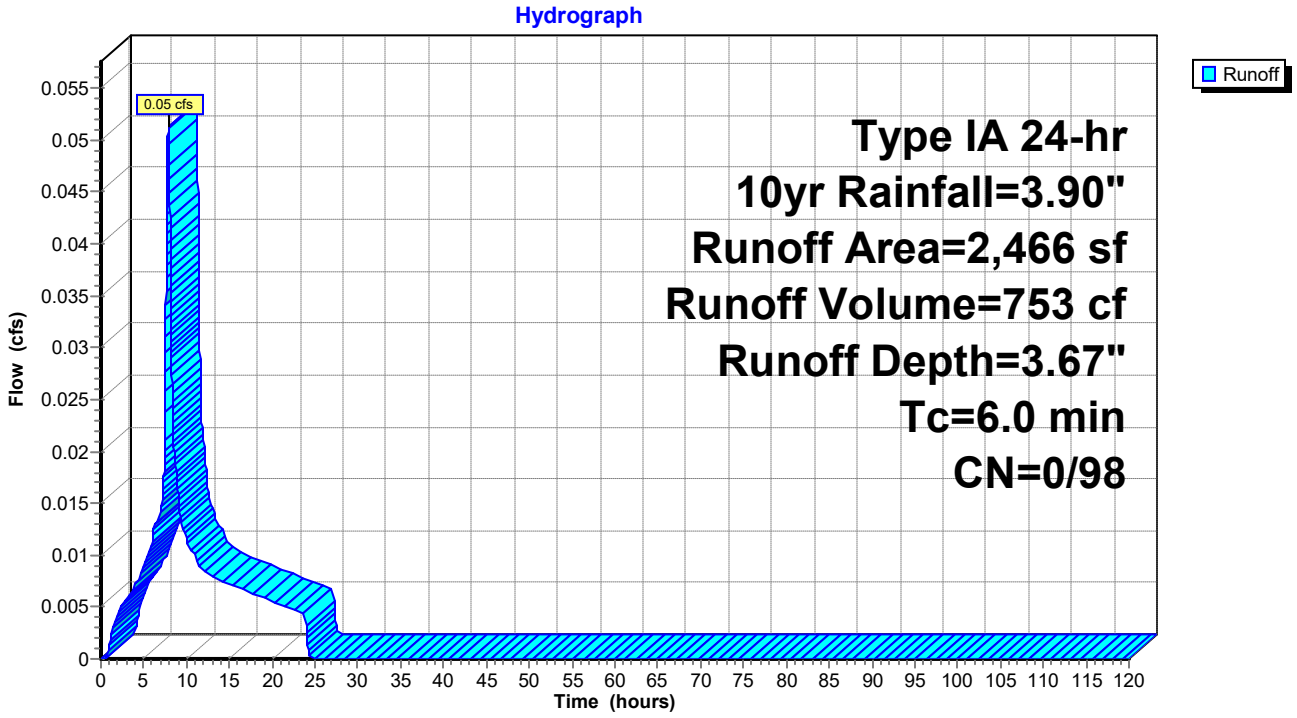
Runoff = 0.05 cfs @ 7.90 hrs, Volume= 753 cf, Depth= 3.67"
Routed to Pond 23P : Infiltration Swale

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10yr Rainfall=3.90"

	Area (sf)	CN	Description
*	2,466	98	ASPHALT
	2,466		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Minimum**

Subcatchment 24S: New Asphalt Area 2



Summary for Subcatchment 25S: New Asphalt Area 1

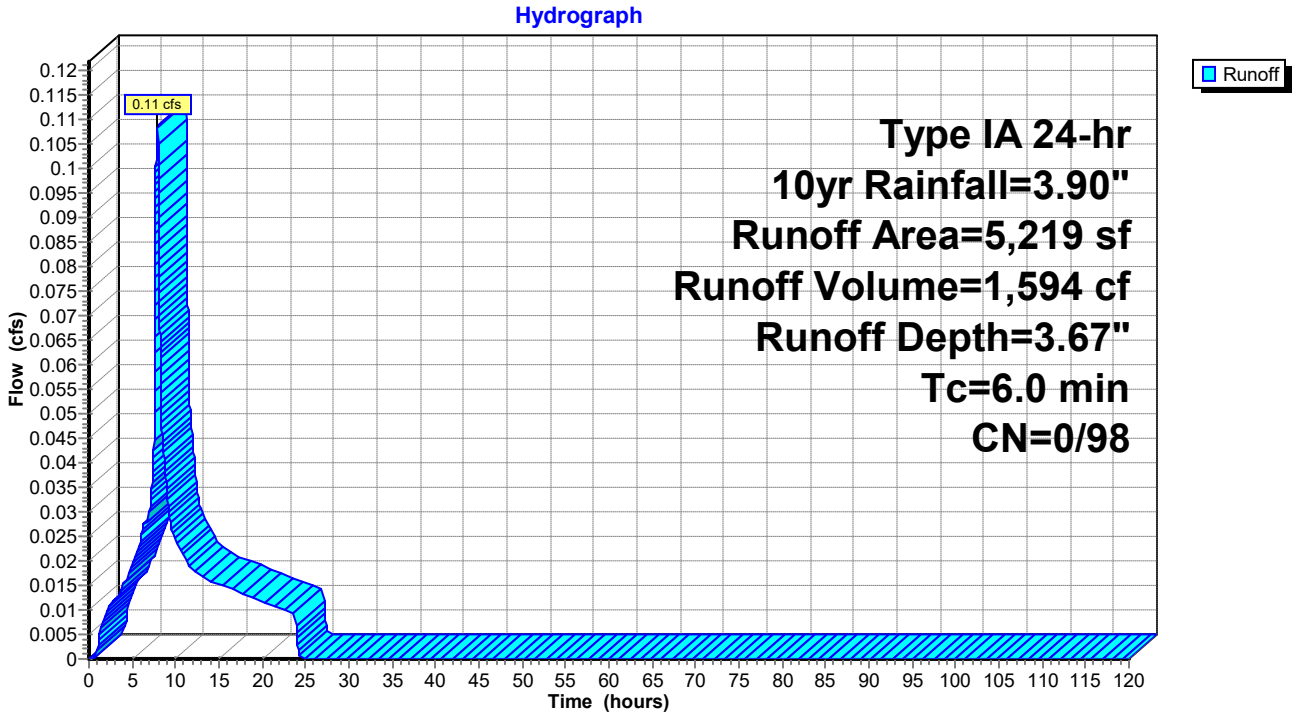
Runoff = 0.11 cfs @ 7.90 hrs, Volume= 1,594 cf, Depth= 3.67"
Routed to Pond 26P : Infiltration Swale

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10yr Rainfall=3.90"

	Area (sf)	CN	Description
*	5,219	98	ASPHALT
	5,219		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Minimum**

Subcatchment 25S: New Asphalt Area 1



Summary for Subcatchment 27S: New Asphalt Area 3

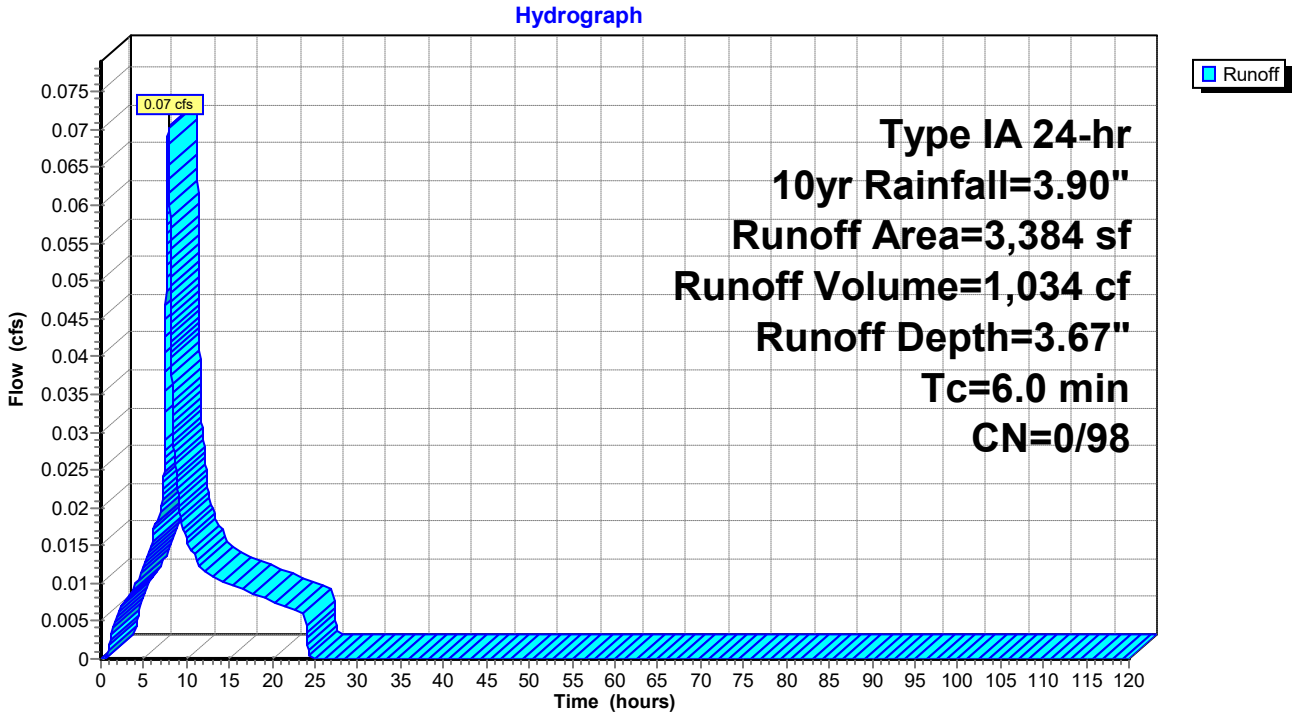
Runoff = 0.07 cfs @ 7.90 hrs, Volume= 1,034 cf, Depth= 3.67"
Routed to nonexistent node 30P

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10yr Rainfall=3.90"

	Area (sf)	CN	Description
*	3,384	98	ASPHALT
	3,384		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Minimum**

Subcatchment 27S: New Asphalt Area 3



Summary for Subcatchment 28S: GRAVEL AREA 1

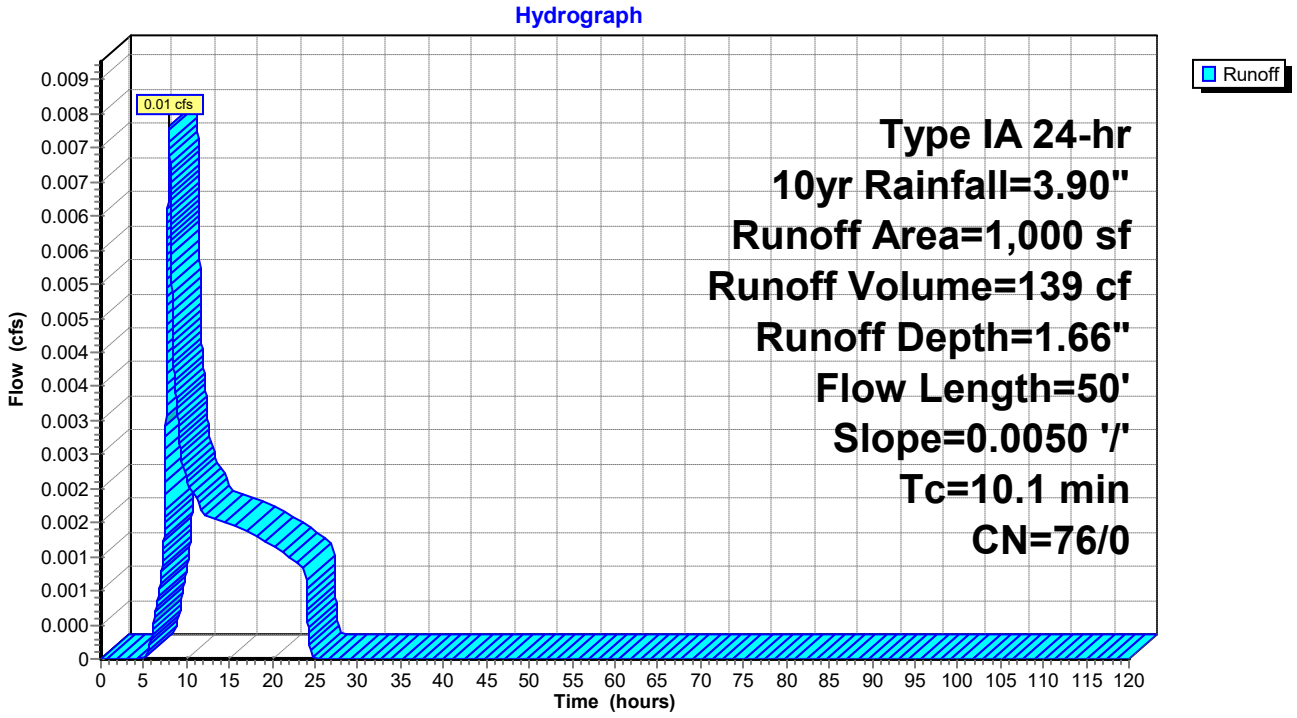
Runoff = 0.01 cfs @ 8.00 hrs, Volume= 139 cf, Depth= 1.66"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10yr Rainfall=3.90"

	Area (sf)	CN	Description
*	1,000	76	ASPHALT
	1,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	50	0.0050	0.08		**Sheet Flow,** Range n= 0.130 P2= 2.40"

Subcatchment 28S: GRAVEL AREA 1



Summary for Subcatchment 29S: GRAVEL AREA 2

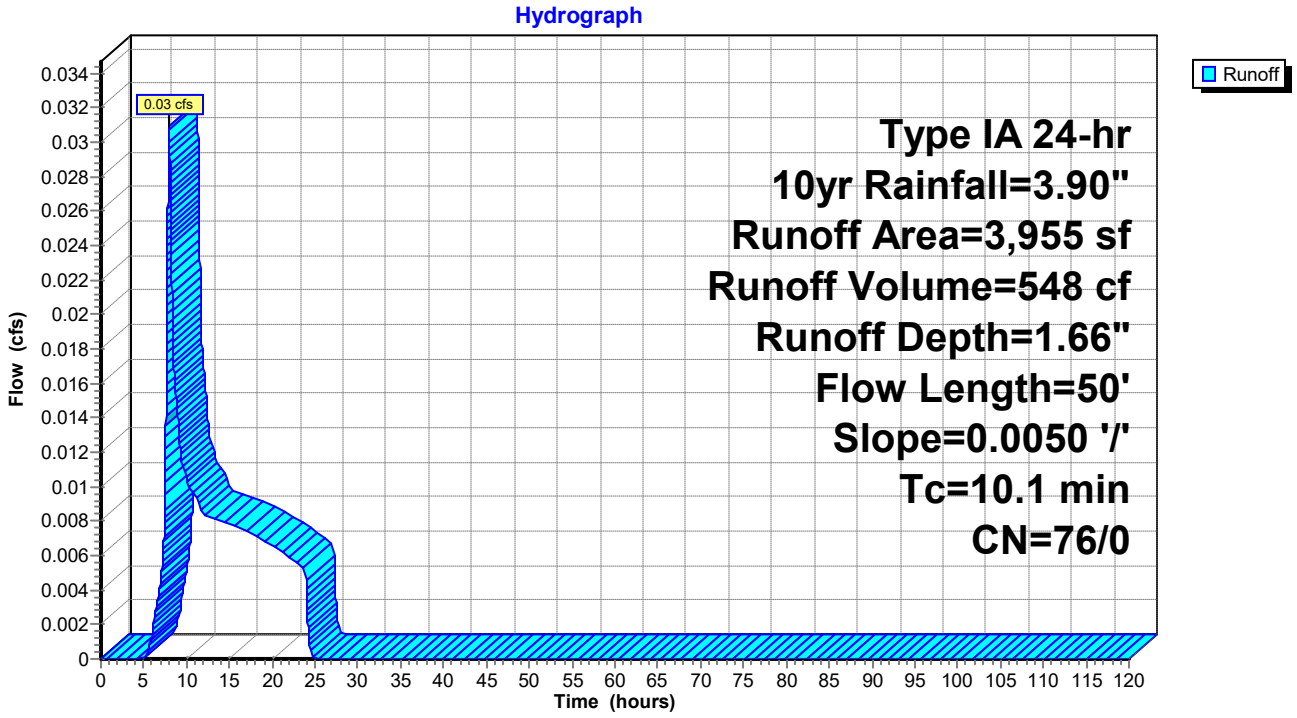
Runoff = 0.03 cfs @ 8.00 hrs, Volume= 548 cf, Depth= 1.66"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10yr Rainfall=3.90"

	Area (sf)	CN	Description
*	3,955	76	ASPHALT
	3,955		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	50	0.0050	0.08		**Sheet Flow,** Range n= 0.130 P2= 2.40"

Subcatchment 29S: GRAVEL AREA 2



Summary for Subcatchment 31S: GRAVEL AREA 3

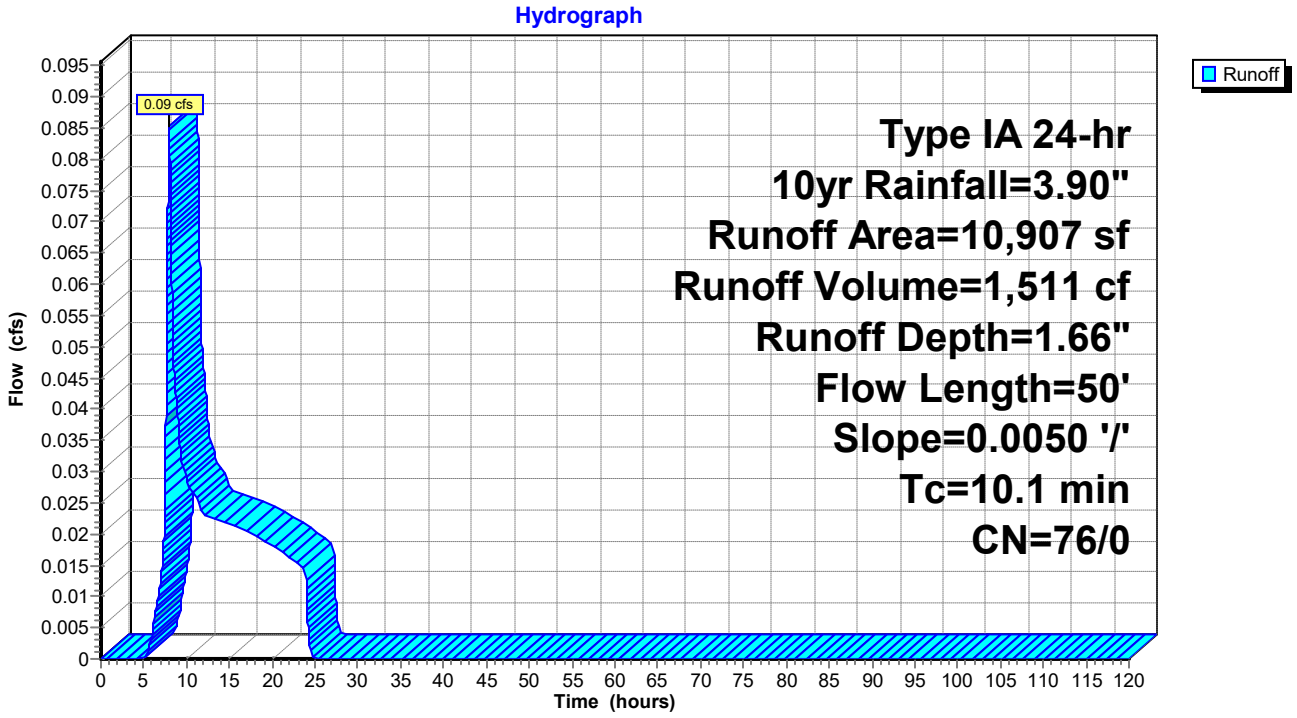
Runoff = 0.09 cfs @ 8.00 hrs, Volume= 1,511 cf, Depth= 1.66"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10yr Rainfall=3.90"

	Area (sf)	CN	Description
*	10,907	76	ASPHALT
	10,907		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	50	0.0050	0.08		**Sheet Flow,** Range n= 0.130 P2= 2.40"

Subcatchment 31S: GRAVEL AREA 3



Summary for Pond 23P: Infiltration Swale

Inflow Area = 2,466 sf,100.00% Impervious, Inflow Depth = 3.67" for 10yr event
Inflow = 0.05 cfs @ 7.90 hrs, Volume= 753 cf
Outflow = 0.01 cfs @ 9.15 hrs, Volume= 753 cf, Atten= 72%, Lag= 75.5 min
Discarded = 0.01 cfs @ 9.15 hrs, Volume= 753 cf

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 0.78' @ 9.15 hrs Surf.Area= 305 sf Storage= 157 cf

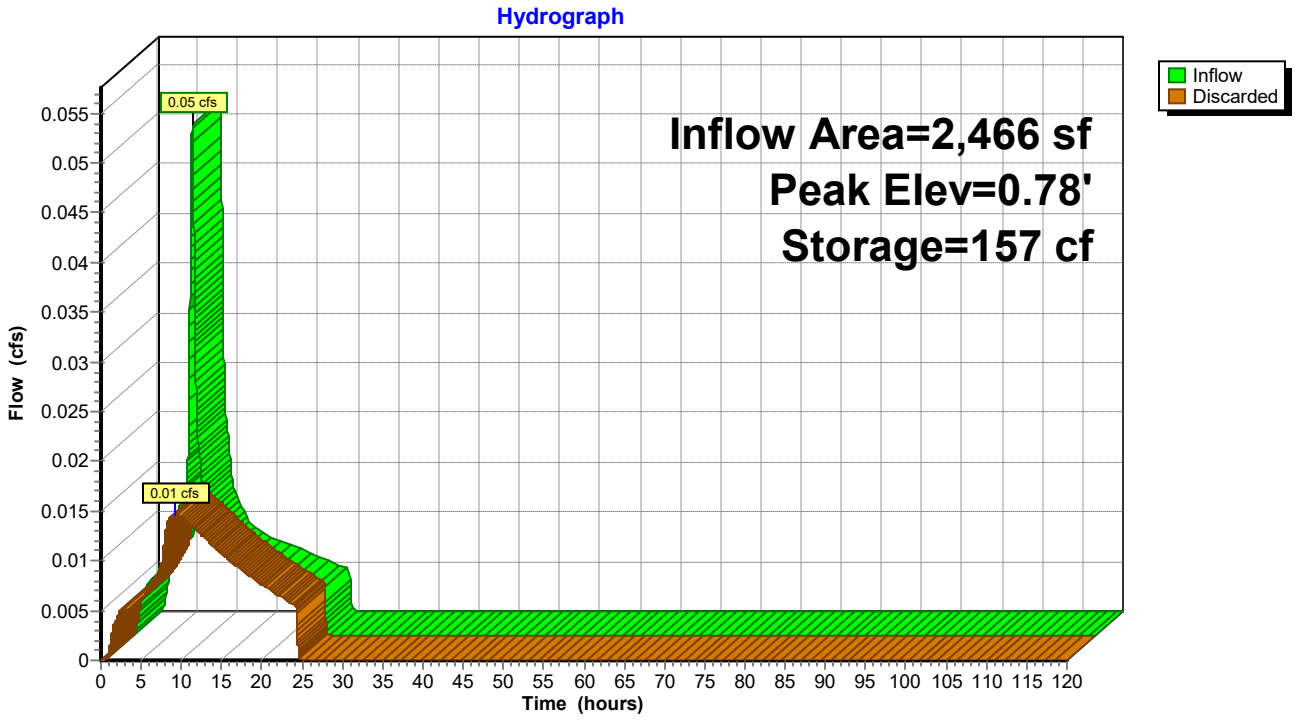
Plug-Flow detention time= 108.3 min calculated for 753 cf (100% of inflow)
Center-of-Mass det. time= 108.3 min (769.4 - 661.1)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	173 cf	**3.00'W x 35.00'L x 0.83'H Prismatoid Z=3.0**

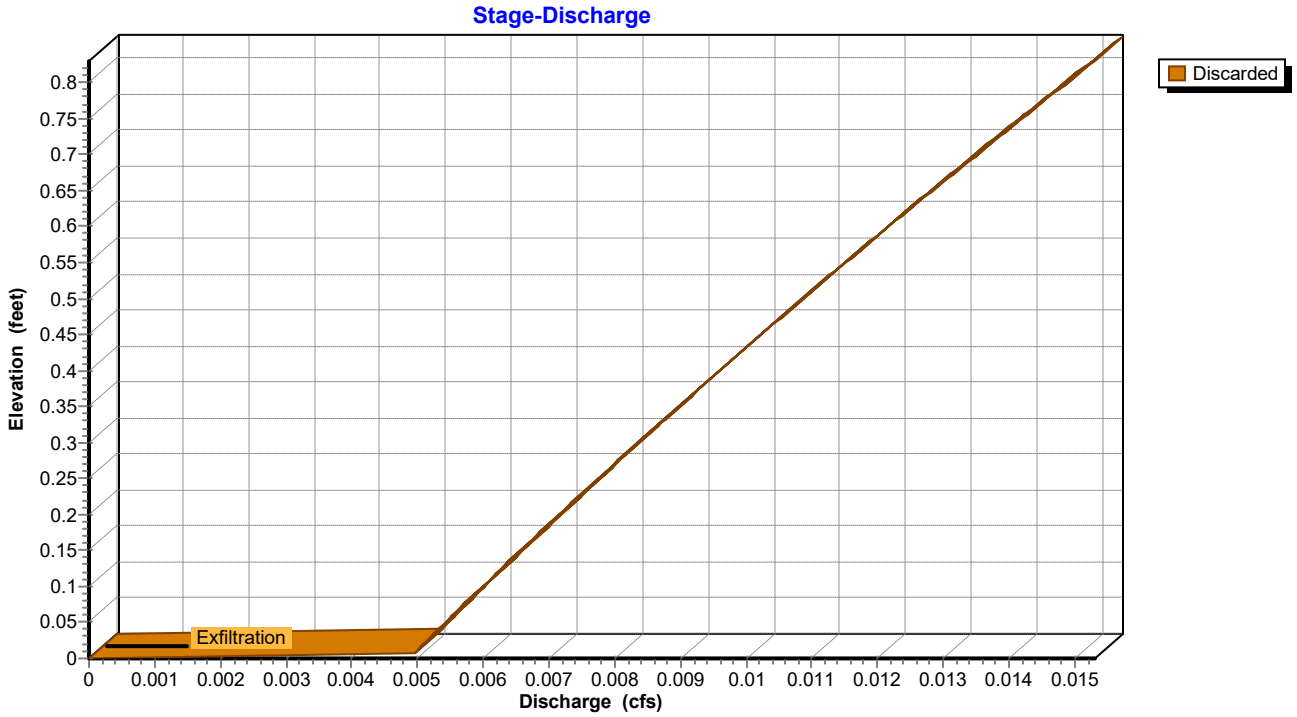
Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 9.15 hrs HW=0.78' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.01 cfs)

Pond 23P: Infiltration Swale



Pond 23P: Infiltration Swale



Summary for Pond 26P: Infiltration Swale

Inflow Area = 5,219 sf,100.00% Impervious, Inflow Depth = 3.67" for 10yr event
Inflow = 0.11 cfs @ 7.90 hrs, Volume= 1,594 cf
Outflow = 0.03 cfs @ 9.23 hrs, Volume= 1,594 cf, Atten= 73%, Lag= 79.9 min
Discarded = 0.03 cfs @ 9.23 hrs, Volume= 1,594 cf

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 0.82' @ 9.23 hrs Surf.Area= 620 sf Storage= 342 cf

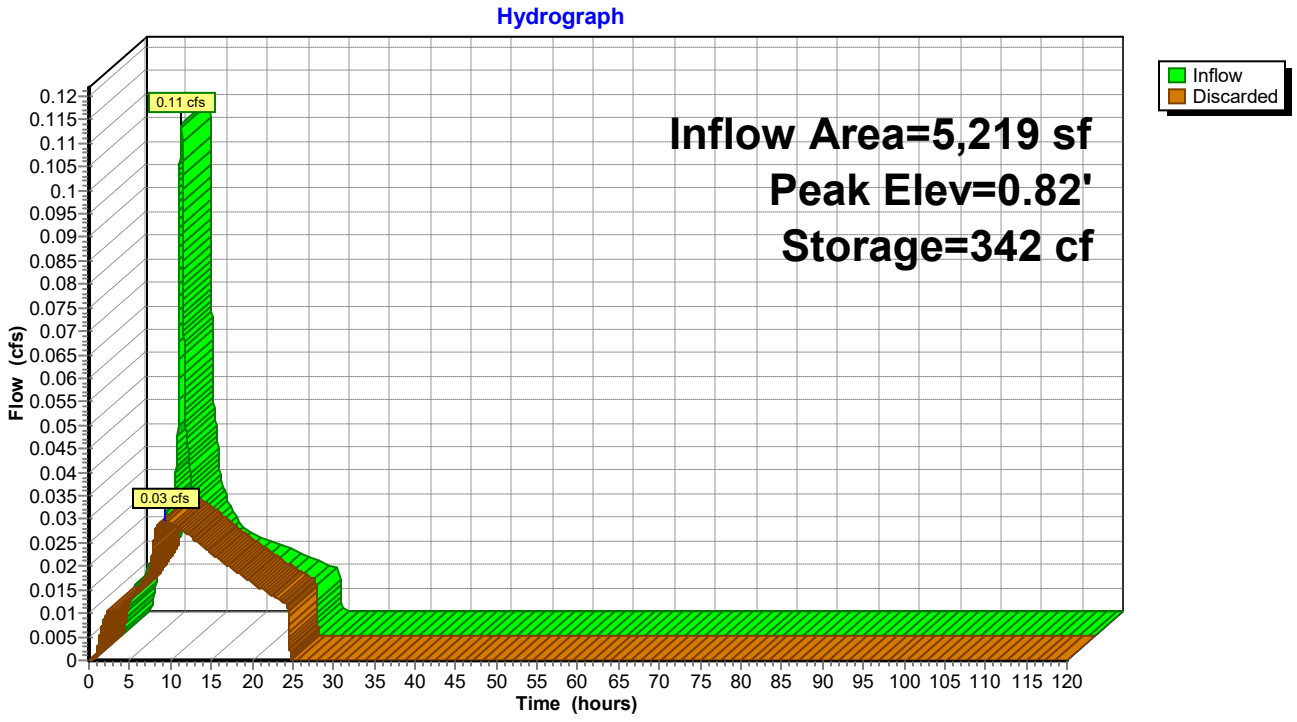
Plug-Flow detention time= 118.0 min calculated for 1,594 cf (100% of inflow)
Center-of-Mass det. time= 118.0 min (779.2 - 661.1)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	346 cf	**3.00'W x 73.00'L x 0.83'H Prismatoid Z=3.0**

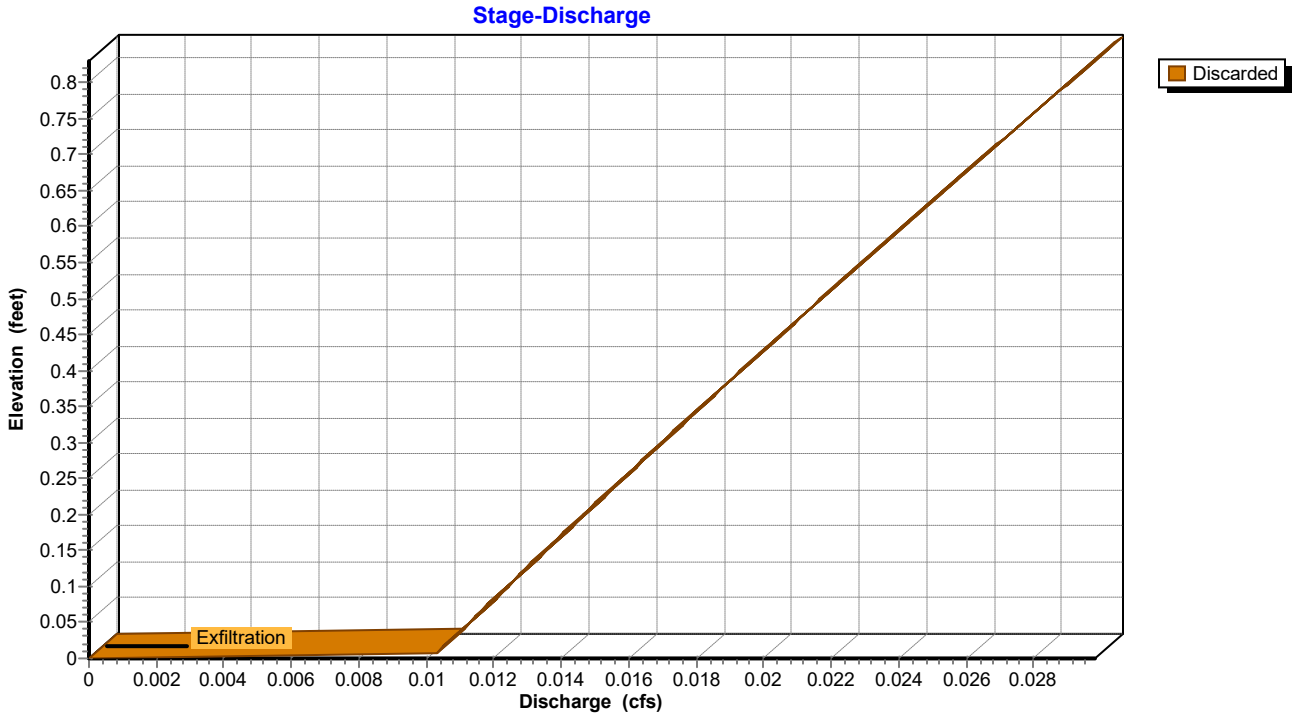
Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.03 cfs @ 9.23 hrs HW=0.82' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Pond 26P: Infiltration Swale



Pond 26P: Infiltration Swale



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