

# Stormwater Drainage Report

## Palmer Courthouse Renovation & Expansion

02/17/2026



Prepared For  
Alaska Court System  
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## Acronyms

AC	Acre
SBUH	Santa Barbara Unit Hydrograph
SF	Square Feet
SSA	Storm and Sanitary Analysis



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## A. PROJECT OVERVIEW

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### A.1 SITE INFORMATION

#### A.1.1 Location of Site

The site is located at 515 E Dahlia Ave, Palmer, AK 99645.

#### A.1.2 Topography

The project site is in a Public zone according to the City of Palmer Zoning Districts Map. The site is occupied by Palmer Courthouse and the Palmer State Office Building. The site is flat with all slopes in the range of 0-5%.

#### A.1.3 Climate

The site is in the Matanuska-Susitna Borough approximately 40 miles inland from the Cook Inlet in the Gulf of Alaska. Average annual temperatures range from 32°F to 48°F and average annual rainfall recorded in this area is 16 inches.

#### A.1.4 Site Geology

The underlying soil types on-site, classified by the United States Department of Agriculture Soil Survey of Matanuska-Susitna Valley Area, Alaska, are identified in Table 1. See Appendix A: Hydrologic Soil Group.

*Table 1 Soil Characteristics*

Soil Type	Hydrologic Soil Group
Bodenburg Silt Loam	B

#### A.1.5 Groundwater

Data from the Alaska Department of Natural Resources Well Log Tracking System (WELTS) places the ground water depth at 32 to 57' below ground surface based on data from nearby wells. The Geotechnical Report from Shannon & Wilson dated 01/30/2026, in Appendix D, confirms this, placing groundwater at an estimated depth greater than 25' below ground surface. No groundwater was encountered during their subsurface investigation up to a depth of 10' below ground surface.

#### A.1.6 Proposed Improvements

##### A.1.6.1 On-Site Improvements

The proposed project will add approximately 2,082 sf of impervious roof area and 140 sf of impervious sidewalk area for a total of 2,222 sf of new impervious area.

Infiltration via drywell will be the proposed stormwater management method based on similar stormwater management systems currently implemented nearby. A design infiltration rate of 10 in/hr based on the unfactored infiltration rate from Shannon & Wilson's Geotechnical Report dated 01/30/2026, see Appendix D.

Autodesk Storm and Sanitary Analysis (SSA) was used to model the stormwater runoff. Stormwater retention will consist of one 60" diameter concrete drywell connected to the proposed building downspout by a 6" storm line. The drywell will provide the necessary volume to infiltrate runoff onsite up to the 25-year event.

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## A.2 Determination of Applicable Minimum Requirements:

The proposed project meets the criteria for a medium project with a total disturbance greater than 10,000 square feet and less than 0.75 acres. Compliance with applicable minimum requirements, as outlined in the Anchorage Stormwater Manual Volume 1, is addressed in the following section.

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## B. Minimum Requirements

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### B.1 Requirement #1 – Water Quality Treatment

Water quality treatment will be provided through the use of an infiltration drywell. Water quality facilities must be sized to treat runoff generated from the first 0.52 inches of rainfall from a 24-hour rainfall event preceded by 48-hours of no precipitation. The design water quality flow from this storm event is 0.01 cfs for this site, as shown in Table 2, below.

*Table 2 Design Water Quality Flow*

Design Water Quality Flow (cfs)
0.01

#### B.1.1.1 Drywell Characteristics

A drywell with an internal width of 60" is proposed. It will be surrounded by 3"-3/4" clean drain rock with 6" of compacted 3/4"-0" below the structure. It will have a minimum depth of 10', giving an effective total storage of 196 cubic feet. The SSA model shows that the drywells will infiltrate 100% of runoff up to the 25-year event, with drawdown peaking at approximately 35-hours. The system can handle larger storms with ponding above the manhole up to a volume of 4100 cubic feet. The 100-year event, for example, would generate 220-cf of water ponded above the manhole, or about 8-inches deep standing water. This ponding would infiltrate within 50-hours post event.

### B.2 Requirement #2 – Extended Detention

Because the project proposes infiltration of all stormwater up to the 25-year event, extended detention will be met with infiltration. The drawdown time for the 1-year 24-hour storm event will be approximately 5-hours.

### B.3 Requirement #3 – Conveyance

The project proposes to keep runoff onsite, so it will manage runoff off through infiltration up to the 25-year event. The SSA model shows sufficient capacity to retain all runoff up to the 25-year event with a design infiltration rate of 10 in/hr. At the 25-year event, ponding in the drywell will reach a depth of 8.37 feet and drawdown will take 35 hours.

#### B.3.1 Basin Areas

The proposed improvements will create a total disturbance area of approximately 0.35 acres. Developed surface types and areas are shown in the table below.

Table 3: Developed Basin Delineation Summary

Drywell Basin		
Surface Type	Area (sf)	Area (ac)
Lawn, Flat (0-5%)	13,376	0.308
Flat Sidewalk (0-5%)	140	0.004
Roof	2,082	0.048
<b>Total</b>	<b>15,598</b>	<b>0.358</b>

## B.4 Requirement #4 – Detention and Peak Flow Control

Because the project proposes infiltration of all stormwater onsite, there will be no water leaving the site and thus no peak flow control required.

### B.4.1 Stormwater Detention System Capacities

Stormwater quantity management for the proposed development will be provided by one 60” drywell with a depth of 10’. Table 4 summarizes required and provided detention capacities to infiltrate up to the full 25-year peak flow rate.

Table 4 Required Detention Capacities

Management Area	Retention Required		Retention Provided	
	Volume (ac-ft)	Volume (cf)	Volume (ac-ft)	Volume (cf)
On Site Improvements	0.038	165	0.0045	196

## B.5 Requirement #5 – Downstream Impact Analysis

Because the project proposes infiltration of all stormwater onsite, there will be no downstream impacts created and thus no analysis required.

## B.6 Requirement #6 – Wetland Compliance

There will be no jurisdictional wetland disturbance occurring onsite and thus no wetland compliance required.

## B.7 Requirement #7 – Operation and Maintenance Plan

An Operations and Maintenance Manual for Drywells from the Alaska Department of Transportation of is provided in Appendix C.

## C. SSA Results

### C.1 Autodesk Storm and Sanitary Analysis (SSA)

Routing was conducted with SSA using the Santa Barbara Urban Hydrograph (SBUH) method. The SBUH method is based on the curve number (CN) approach and uses the Natural Resource Conservation Service's (NRCS) equations for computing soil absorption and precipitation excess. The SBUH method converts the incremental runoff depths into instantaneous hydrographs, which are then routed through an imaginary reservoir with a time delay equal to the basin time of concentration.

### C.2 Design Storms

The table below shows total precipitation depths for storm events which were used as a multiplier for the NRCS Type I distribution in SSA.

*Table 5 Design Storms*

Recurrence Interval (years)	Precipitation Depth (in)
1	1.05
25	2.24
100	2.80

The proposed system was designed for the 25-year storm.

### C.3 Model Results

The table below lists the runoff rates for the project site. Runoff rates were calculated using a pervious curve number of 61, an impervious curve number of 98, and a 5 minute Time of Concentration.

*Table 6 Runoff Rates*

Basin	Area (ac)	Impervious Area (%)	25-year (cfs)
Drywell	0.36	1%	0.06

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APPENDIX

A

HYDROLOGIC SOIL GROUP



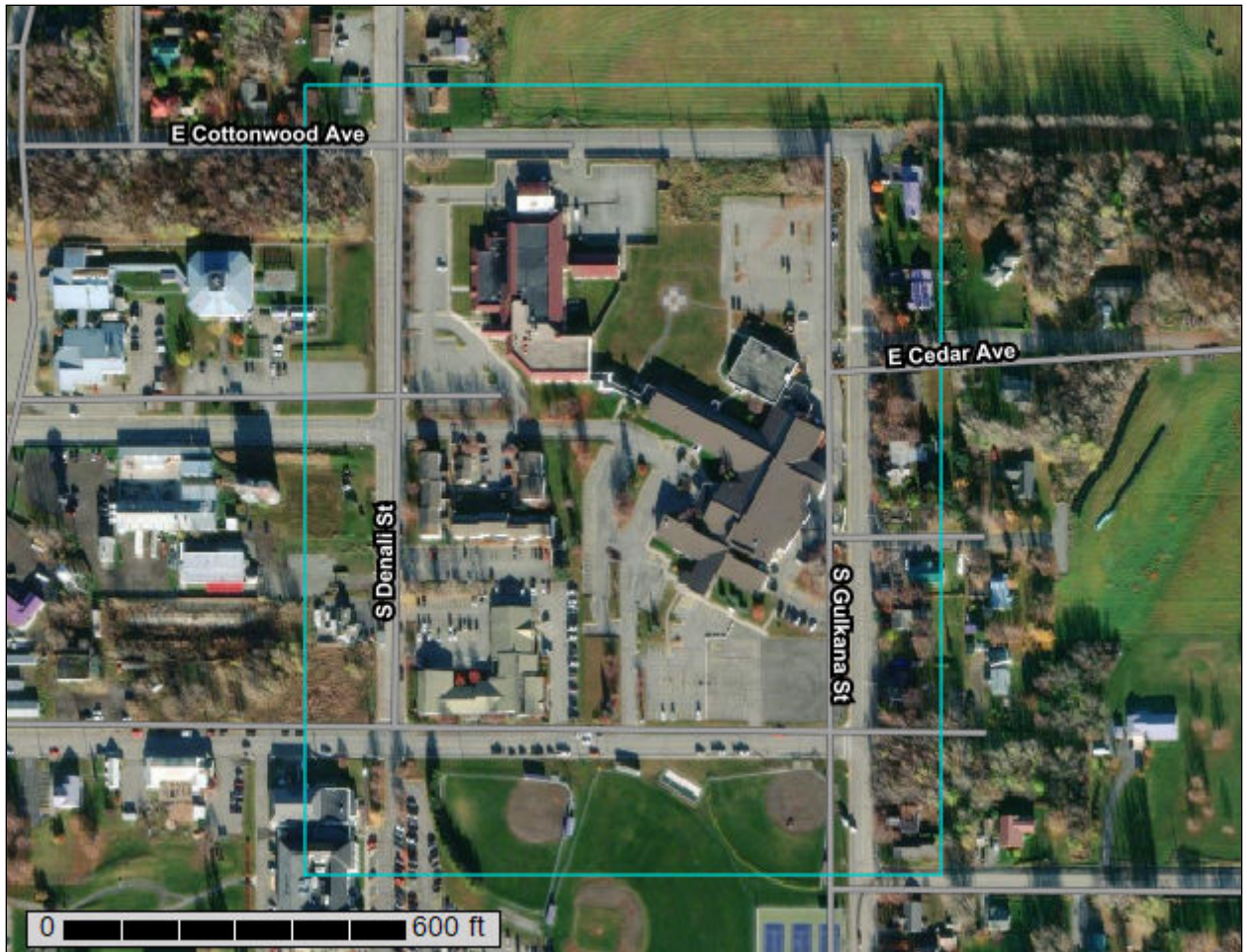
United States  
Department of  
Agriculture

**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 Matanuska-Susitna Valley Area, Alaska



# Preface

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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](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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# How Soil Surveys Are Made

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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

## Custom Soil Resource Report

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

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