



**LOT 1, BLOCK 1, ~~THE POINT AT~~
~~MEADOW PEAK SUBDIVISION, FILING~~
~~NO. 1~~**

CITY OF AURORA, COUNTY OF ARAPAHOE, STATE OF COLORADO
SITUATED IN THE W1/2 OF SECTION 9, TOWNSHIP 5 SOUTH
RANGE 66 WEST OF THE 6TH PRINCIPAL MERIDIAN

"Lakeview Terrace
Subdivision Filing #1" per
plat
Subdivision
information updated

PRELIMINARY DRAINAGE REPORT

ESC JN: **1010.04**
Original Report Date: **July 6, 2020**
Revision (1):

Prepared for:

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Green comments provided
by COA Public Works
Reviewer Jared Coleman
(jcoleman@auroragov.org)

**This PDR approval
required prior to
Civil Plan approval**

Acknowledged

Prepared by:



David R. Addor, PE
Vice President | Project Manager

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APPROVED FOR ONE YEAR FROM THIS DATE	
<hr/>	
City Engineer	Date
<hr/>	<hr/>
Water Department	Date
<hr/>	<hr/>

Informational note: Section / Chapter references marked as X.XX.X.XX.X refer to COA Roadway Design and Construction Specifications and Errata, most current edition. All other call outs should be called out directly: COA Storm Drain Design and Technical Criteria (SDDTC) and Urban Drainage and Flood Control District's Drainage Criteria Manual (UDFCD / USDCM). All comments are typical to all sheets/pages where applicable.

A comment response plan set with Engineer responses placed next to City responses on the PDF is highly encouraged to expedite reviews, but is optional. This can be submitted as misc. documents with a title of "Civil Plan/Review Response" for example. Without a comment response to reference, comments may be duplicated and treated as unresolved. This could hold up approvals.

Please also refer to returned "Checklist" in submittal portal for additional items looked for during reviews by Public Works. Please address unmarked or insufficient items as applicable.

Acknowledged

General note: License Agreements are required for any private infrastructure in public easements or ROW or when connecting private utilities to public infrastructure unless otherwise addressed, excluding private structures within a pond's drainage easement. LAs are submitted through a separate document. Please contact Grace Gray at 303-739-7277 to begin the LA process if not done so already.

Please contact Andy Niquette (303) 739-7325 to start the process for all proposed easements by separate documents.

LAs and Easement are to be completed prior to Civil Plan approval. It is highly recommended that these processes are begun at the Preliminary Drainage stage. Easements are approximately an 8 week process

Easements include but are not limited to:
Drainage easement for pond and access to pond

License include but are not limited to:
Portions of walls within existing utility easement

Acknowledged

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HELP SAVE PAPER!

THIS DOCUMENT WAS PRINTED TWO-SIDED.

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A. INTRODUCTION

1. Location

- a. Adjacent streets, subdivision name, lot and block, site plan name (if any)

The proposed project is a 0.92± acre site located on the east side of S. Pitkin Street in the West 1/2 of Section 9, Township 5 South, Range 66 West of the 6th Principal Meridian (City of Aurora, County of Adams, State of Colorado).

It is further defined as Lot 1, Block 1, The Peak at Meadow Point Subdivision Filing No. 1.

- b. Vicinity map



Provide cross streets for locating site. Include vicinity map scale, minimum 1"=2000'

Streets in this vicinity now shown more clearly. A scale is shown

- c. Surrounding developments

The subject property is part of the Meadow Point Condominium site with three of the 4 planned buildings having been constructed in 1984. The existing buildings lie to the west and north of the proposed 4th building. To the west side of S. Pitkin Street are single family homes. To the south and east of the Meadow Point property are multifamily townhome developments.

2. Proposed Development

- a. Property description - soils, topography, hydrologic soil groups, etc.

The subject property has been developed with the driveway and parking that is associated with the proposed building. The building site is open with a heavy covering of grasses and weeds. The site sloped primarily from west to east at moderate cross slopes with steeper slopes along the existing parking.

According to the Natural Resources Conservation Service: Web Soil Survey, soils are Bresser-Truckton sandy loams, 3 to 5 percent slopes. This is a hydrologic group B soil with moderate infiltration rates and moderate runoff potential when thoroughly wetted.

- b. Type of development: Use, proposed density, composite percent of impervious area

This will be a 2-1/2 story condominium building similar to the three existing buildings.

Post construction, the composite percent impervious area will be 64.4%

- c. Requested variances from this Storm Drainage and Technical Criteria Manual, which may include exemption requests for stormwater detention or the use of stormwater BMPs onsite.

None. The original drainage plan for the overall site has a surface detention pond in the parking/drive area offsite to this building site at the northeast corner of the overall Meadow Point Condominium site. No revision to this pond is required.

Note: Include Pond Certification approval number and include in references. If no Pond Certificate approved, then one will be required prior to Certificates of Occupancy.

B. HISTORIC DRAINAGE

1. Overall Basin Description

- a. Off-site basins

There is no off-site drainage tributary to the overall Meadow Point Condominium site. The proposed building site has flows from the east side of the existing building to the west and the parking/driveway collects all the drainage within the site to the west.

- b. Major drainage ways including whether there are FEMA regulated floodplains

The subject property does not have any major drainageways impacting it and is not subject to any FEMA regulated floodways or floodplains as shown on Flood Insurance Rate Map Panel Number 08005C0193K, Last Revised December 17, 2010, area of minimal flooding, zone X. A "Firmette" is provided in the Appendices of this REPORT.



2. Drainage Patterns Through Property

The existing drainage of the site generally flows west to east and is collected in the flowline in the center of the drive aisle.

3. Outfalls Downstream from Property

This won't be necessary with new configuration

Runoff for the overall Meadow Point Condominium site is directed to the drive aisles. The onsite drive aisles are graded with a central swale. The site for the new building drains to the drive aisle on the east side of the property. All of drainage is directed to the northeast corner of the site where there is an existing detention area within the parking lot. This detention area is drained by a curb open inlet set in the low **pint** at the extreme northeast corner of the drive.

Corrected

There is a overflow swale behind the inlet that carries any excess flow to the north and west into the Quincy Reservoir bypass channel. The storm sewer continues to the northwest and then west and daylights into the bypass channel at the low end of the Grandview Dog Park. This all discharges into West Toll Gate Creek.

C. DESIGN CRITERIA

1. List References

- a. Existing drainage reports for surrounding properties

Final Drainage Report for Meadow Point Condominiums, prepared for U. S. Homes by EMK Consultants, Inc., dated November, 1983, City of Aurora approval C8-2-1623.

- b. Manuals

City of Aurora, "Storm Drainage Design & Technical Criteria", latest edition

Urban Drainage & Flood Control District, "Criteria Manual: Volumes 1-3", latest edition

- c. City Master Plan and floodplain studies

None referenced.

2. Hydrologic Criteria

- a. Rainfall source and P1 identified

The source for rainfall data is per equation 5.5, section 5.22, Chapter 5 of the City of Aurora "Storm Drainage Design and Technical Criteria". One-hour rainfall depth was taken Figures RA-1 and RA-6 from the UDFCD Manual, 2-yr, 1-hr 0.95", and 100-yr, 1-hr 2.60".

- b. Calculation method

Rational Method. The rational method was used to calculate runoff from the proposed development since it is less than 160 acres.

The following formula was used to determine the runoff values:

$$Q_n = C_n i_n A$$

Where Q_n = Storm runoff, cubic feet per second (CFS) (n' storm frequency interval)

C_n = Runoff coefficient (n' storm frequency interval)

i_n = Storm intensity, inches per hour (n' storm frequency interval)

A = Drainage area, acres

- c. Detention volume computation method

No detention required for this new site. However, some detention is required for the existing building. See Report for the Meadow Point Condominiums.

Per the pre-app notes, detention IS required. Existing detention pond volumes and capacity will need to be verified.

Please discuss detention approach with the City prior to next review. See comments in plans

- d. Design frequencies

Design frequencies are given in the City of Aurora "Storm Drainage Design and Technical Criteria" for Minor and Major Storms. The design storm frequency for the minor storm is one hundred (100) years and the design storm frequency for the major storm is one hundred (100) years.

This comment is no longer relevant based on the **APPROVED** variance. Reference Appendix D of the updated Report.

3. Hydraulic Criteria

- a. Reference sources other than USDCM

See Reference section of this report for a full listing of all reference materials. The above mentioned design frequencies will be used to evaluate all drainage features.

- b. Water surface profile method

None used.

- c. Major drainageways

The site lies within the Toll Gate Creek drainage basin.

D. DRAINAGE PLAN

1. General Concept

- a. Conveyance of off-site drainage; proposed downstream outfall

Not applicable.

- b. Coordination with surrounding developments

Development of this site will have no impact to the surrounding property. The grading for the proposed building will be essentially the same as anticipated on the Final Grading Plan for the Meadow Point Condos construction plans prepared by EMK Consultants, Inc.

- c. Detention ponding/water quality BMP plan, identify ownership/maintenance responsibilities

There are two existing detention areas on the existing site. The proposed building is tributary to the primary detention pond at the northeast corner of the overall Meadow Point Condominium site. No additional detention is required.

The west and north sides of the building will be drained by a combination of concrete and grass swales. The outfall for all this drainage will be in a grass swale along the north side of the new building. This swale also collects drainage from the parking area to the west between the front two existing buildings. This swale will provide primary stormwater quality enhancement for much of the area covered by the new building as well as a portion of the existing developed site.

The existing detention area as well as the grass swale are part of the limited common area and is owned and maintained by the Homeowners Association.

2. Specific Details

- a. Discuss each basin or sub-basin including land use and minor and major storm flow patterns through the basin. When there is a minor storm sewer system available/proposed it must be considered plugged for the major storm. Therefore, the report must present the minor and major flow routing.

The new building is part of Basin B within the Final Drainage Report for the Meadow Point Condominiums. It will continue to drain similarly to the original Final Drainage Study. The runoff calculations in the original report assumed a 2-yr coefficient of runoff of 0.67 for multifamily property with a multiplier of 1.25 for the 100-yr storm. This is quite conservative. A calculation is included in the appendix for the overall site for this new building. This shows a 2-yr coefficient of 0.58 and 100-yr coefficient of 0.64. Actual runoff from the site will be slightly less than under the original report.

There is only one sub-basin identified for this site. The surface flows from the west side of the building are directed to the north in a concrete pan. This pan discharges into the grass swale along the north side of the new building. The discharge of runoff from the building on the west. This basin is shown in order to insure sufficient discharge capacity. Flows are minor with the 2-yr discharge of only 0.26 cfs and 1.04 cfs for the 100-yr storm.

This sentence may need to be reworded a bit. I believe what you're trying to say is that trying to get flows from the west side of the building was difficult due to the existing building and grading

New language

- b. Detention pond location and outfall.

The existing detention pond is located off-site to the new building site. It falls within the parking and drive area at the northeast corner of the overall Meadow Point property.

- c. Emergency overflow paths for sump inlets and detention ponds. Sump inlet emergency overflow paths may be done with the individual basin/sub-basin discussion above.

Emergency overflow is at the swale behind the inlet at the low end of the detention pond. This swale carries the flow to the northeast and off site into the Quincy Reservoir bypass channel.

- d. Solutions to problems encountered. New language

The key difficulty for this building was to provide adequate drainage from the west side of the building where is was confirmed between the proposed building and the existing retaining wall and grading to the west.

- e. Discuss the proposed permanent BMPs.

Water quality will be provided in the grass swale along the north side of the building and some other minor grass swales on this site. Each grass swale used for WQ will need its own easement. Show these easements in the PD

- f. Phasing of construction and provisions for drainage during phasing. Acknowledged

It is the intent of the developer to construct all improvements associated with this project in a single phase.

- g. Discuss open channel concepts, whether they preserve an undisturbed cross-section or are an improved channel.

Not applicable.

- h. Discuss stabilization requirements for any roadside ditches.

Not applicable.

- i. Discuss how the requirements set forth in the approved Outfall Systems Plan have been met, if applicable.

Not applicable.

- j. Any other information deemed necessary to the project.

The proposed grading is shown on the Drainage and Grading Plan.

E. CONCLUSIONS

1. Compliance with Standards

The drainage for this site complies with all City of Aurora Standards.

2. Summary of Concept

- a. Degree of protection to existing site

The proposed site will be protected from drainage related damage during both the initial and major storm events. Runoff will continue along historic routes and will be released in a controlled manner at the natural discharge locations.

- b. Measures taken to provide adequate on-site drainage and enhancement to stormwater quality

On-site drainage has been controlled in the proposed concrete drainage pans. Stormwater quality has been addressed with the grass swale along the north side of the site.

- c. Effect of proposed development on adjacent, upstream, and downstream sites under both existing and future buildout conditions

There are no indications that this proposed development will have an adverse impact to either existing or future buildout conditions adjacent to, upstream of, or downstream of the subject property.

F. LIST OF REFERENCES

"[Storm Drainage Design and Technical Criteria](#)", City of Aurora, Colorado. Revised October 2010.

"[Urban Storm Drainage Criteria Manual - Volumes 1, 2, and 3](#)", Urban Drainage and Flood Control District, Denver, Colorado. Published June 2016, latest edition.

"[Soil Map – Adams County, Colorado](#)", United States Department of Agriculture, Natural Resources Conservation Service, Web Soil Survey v2.2.

"[Flood Insurance Rate Map](#)", Federal Emergency Management Agency: National Flood Insurance Program, Map Number 08005C0193K, Last Revised December 17, 2010.

"Final Drainage Report for Meadow Point Condominiums, Lakeview Terrace Subdivision Filing No. 1, by EMK Consultants, Inc., dated November, 1983, COA #C8-2-1623.

APPENDIX A

DRAINAGE BASIN (DEVELOPMENT CONDITION)

Project: **The Peak at Meadow Point**
Location: 4470 S. Pitkin Street

Basin Designation: **0** Developed Whole Site
Basin Area: **40,215** Sq. Ft. **0.9232** Acres
Design Point: **1**

Composite Coefficient of Runoff: Hydrologic Soil Group: B

Surface	Area	% of Site	C ₂ value	C ₅ value	C ₁₀ value	C ₁₀₀ value	Imp.
Drives & Walks	15,610	38.82%	0.87	0.87	0.88	0.89	0.96
Building	10,625	26.42%	0.87	0.88	0.90	0.93	1.00
Landscaping	13,980	34.76%	0.05	0.06	0.08	0.17	0.02

Figures are from Table 1, City of Aurora Storm Drainage Design & Technical Criteria
Formula: (% of Site)(C Value)+(C Value)+(C Value)+(C Value) = CC

C₂: **0.58**
C₅: **0.59**
C₁₀: **0.61**
C₁₀₀: **0.65**

Developed Basin Imperviousness

I= **64.4** %

Existing?

"Developed" now
used and
western portion
designated

Note: C's and %imp
in this line are from
"asphalt" values
rather than building/
roof values. Can
keep if desired

Acknowledged

Please include
slopes range (i.e.
2% in this case)

Now showing 2%
lawn slope

0.1 per SDDTC
Table 1. Appears
this is from Type
"C" soils.

Updated

Include a existing drainage exhibit in this
PDR as an appendix. Size to 11x17
max.

NB: Proposed maps should be
separated out from the PDR, do not
include existing maps with the proposed
maps.

Existing Drainage Exhibit included in the
appendices. Proposed Drainage plan
attached separately

DRAINAGE BASIN (DEVELOPMENT CONDITIONS)

Project: **The Peak at Meadow Point**
Location: 4470 S. Pitkin Street

Basin Designation: **1** Developed
Basin Area: **12,700** Sq. Ft.
Design Point: **1**

0.2916 Acres

Composite Coefficient of Runoff:

Surface	#DIV/0!	% of Site	Use 6" weir	C _s value	5345.57	C ₁₀₀ value	Imp.
Drives & Walks	2,145	16.89%	0.50	0.75	0.77	0.81	0.90
Roof	3,900	30.71%	0.73	0.75	0.77	0.81	0.90
Landscaping	6,655	52.40%	0.01	0.01	0.01	0.13	0.02

Figures are from Table 1, City of Aurora Storm Drainage Design & Technical Criteria
Formula: (% of Site)(C Value)+(% of Site)(C Value)+(% of Site)(C Value) = CC

C₂: **0.31**
C₅: **0.36**
C₁₀: **0.37**
C₁₀₀: **0.45**

Developed Basin Imperviousness:

I= **43.9** %

Not really sure where these values are coming from. USDCM? Utilize SDDTC C and % imp values and update composite values

Updated

More basin detail is needed for this report. Basin 0 appears to be the entire site but doesn't appear comparable to what is show in the previous drainage report. Basin 0 is also not shown anywhere as far as I can tell. Basin 1 is portions of the proposed and existing site and seems only for WQ calculations but doesn't include the entire proposed site.

Basins for the the entire proposed site are required; it is recommended that they are relatable to approved basins. Also appears there are offsite basins that were not previously accounted for that must be now.

Any excerpts from previous studies should be included as an appendix with the pertinent information boxed/highlighted

The basin configuration including historic designations have been updated



TIME OF CONCENTRATION (T_c): DEVELOPED CONDITIONS

Project: **The Peak at Meadow Point**

Location: 4470 S. Pitkin St.

Land Surface	Conveyance Coefficient, C _v *
Heavy Meadow	2.5
Tillage/Field	8
Short Pasture	7
Nearly Bare Ground	10
Grassed Waterway	15
Paved Area	20

NRCS Hydrologic Soil Grp:

B

* Values taken from Urban Drainage and Flood Control District "Drainage Criteria Manual Volume 1"

Basin	Area	Overland Sheet Flow		Shallow Concentrated Flow						CK		FINAL
		Length	Slope	Lenth	Slope	Cv	C5	Ti ¹	Tt ²	Tt ³	Tc	Tc
1	0.29	40	3.0%	190	1.0%	20	0.36	5.9	1.6	11.1	7.4	7.4

$$^1Ti = (0.395 * (1.1 - C5) * L^{0.50}) / S^{0.33} \text{ (Eq. 5.3)}$$

$$^2Tt = L / (C_v * S_w^{0.50}) * (1/60) \text{ (Eq. 6-4)}$$

$$^3Tt = (L/180) + 10 \text{ (Eq. 5.4)}$$

Max Length of Overland Sheet Flow: 500'

Minor note: 300' in urbanized basins such as this one

Noted and changed

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Tab: TimeConc in File: N:\Projects\Justin & Dylan, LLC\Aurora - 4470 S. Pitkin Street\ENGR-ENT\3 Design\3.1 Drainage\Meadow Point Final Drainage



14



15

TABLE 1
RUNOFF COEFFICIENTS AND PERCENTS IMPERVIOUS

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	FREQUENCY			
		2	5	10	100
<u>Business:</u>					
Commercial Areas	95	.87	.87	.88	.89
Neighborhood Areas	85	.60	.65	.70	.80
<u>Residential:</u>					
Single-Family (**)	(*)	.40	.45	.50	.60
Multi-Unit (detached)	60	.45	.50	.60	.70
Multi-Unit (attached)	75	.60	.65	.70	.80
1/2 Acre Lot or Larger	(*)	.30	.35	.40	.60
Apartments	80	.65	.70	.70	.80
<u>Industrial:</u>					
Light Areas	80	.71	.72	.76	.82
Heavy Areas	90	.80	.80	.85	.90
<u>Parks, Cemeteries</u>	5	.10	.10	.35	.60
<u>Playgrounds</u>	10	.15	.25	.35	.65
<u>Schools</u>	50	.45	.50	.60	.70
<u>Railroad Yard Areas</u>	15	.40	.45	.50	.60
<u>Undeveloped Areas:</u>					
Historic Flow Analysis, Greenbelts, Agricultural	2	(See "Lawns")			
Off-Site Flow Analysis (when land use not defined)	45	.43	.47	.55	.65

TABLE 1 (continued)

RUNOFF COEFFICIENTS AND PERCENTS IMPERVIOUS

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	FREQUENCY			
		2	5	10	100
<u>Streets:</u>					
Paved	100	.87	.88	.90	.93
Gravel	40	.15	.25	.35	.65
<u>Concrete Drive and Walks</u>	96	.87	.87	.88	.89
<u>Roofs</u>	90	.80	.85	.90	.90
<u>Lawns, Sandy Soil (A and B Soils):</u>	2				
2% Slope		.05	.06	.08	.10
2-7% Slope		.10	.11	.13	.15
>7% Slope		.15	.16	.18	.20
<u>Lawns, Clay Soil (C and D Soils):</u>	5				
2% Slope		.13	.14	.15	.17
2-7% Slope		.18	.19	.20	.22
>7% Slope		.25	.27	.30	.35

NOTE: These Rational Formula coefficients may not be valid for large basins

(*)See Figures RO-3 through RO-5 of USDCM Volume 1 for percent impervious.

(**)Up to 5 units per acre. Single-family with more than 5 units per acre, use values for multi-unit/detached

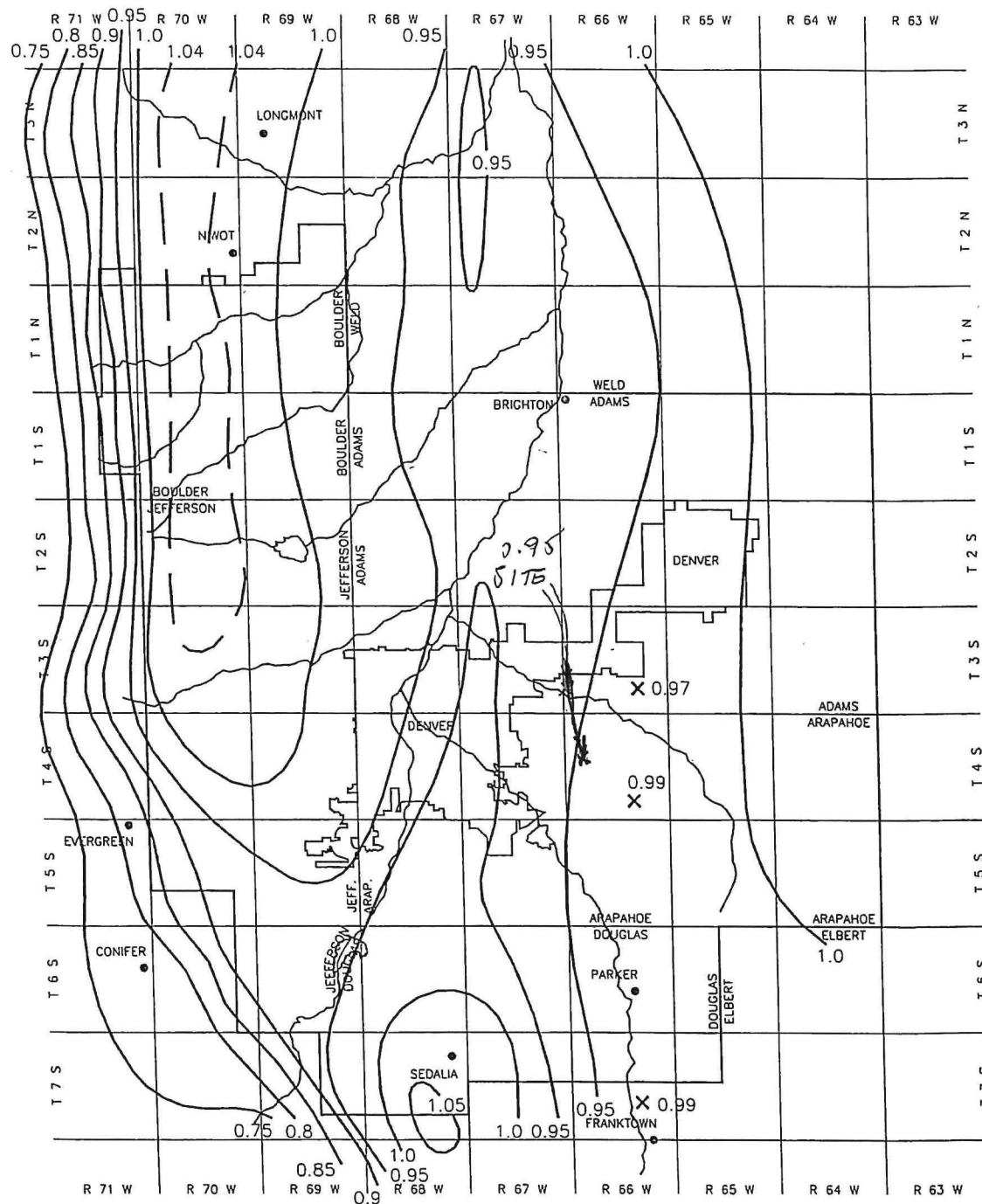


FIGURE RA-1

Rainfall Depth-Duration-Frequency: 2-Year, 1-Hour Rainfall

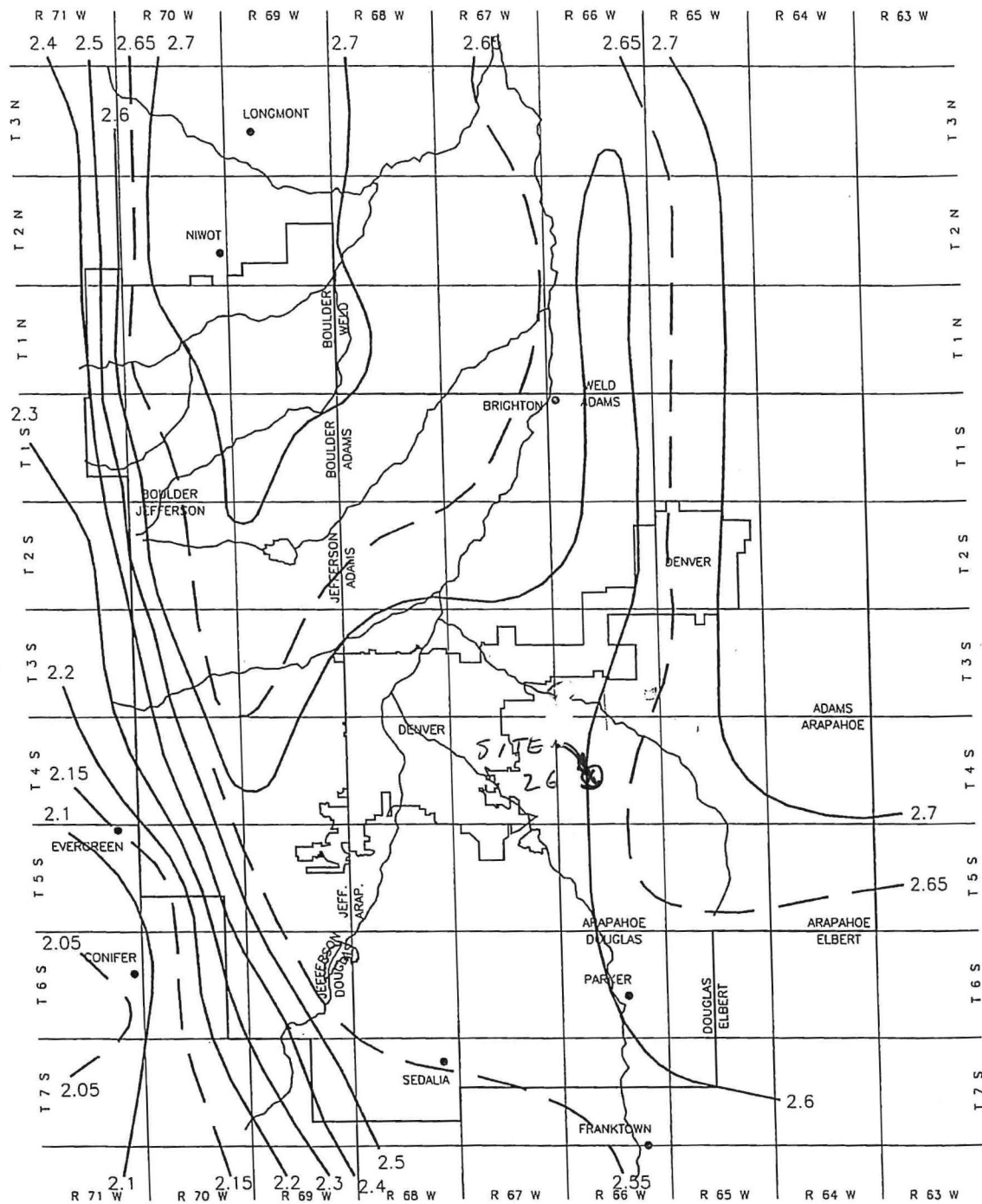


FIGURE RA-6

Rainfall Depth-Duration-Frequency: 100-Year, 1-Hour Rainfall

APPENDIX B

Remove. Will
be included in
the FDR

Noted

Grass Swale (GS)

Sheet 1 of 1

Designer: David Addor
Company: Engineering Service Co.
Date: June 25, 2020
Project: The Peak at Meadow Point
Location: 4470 S. Pitkin Street

1. Design Discharge for 2-Year Return Period	$Q_2 =$ <u>0.60</u> cfs
2. Hydraulic Residence Time A) : Length of Grass Swale B) Calculated Residence Time (based on design velocity below)	$L_S =$ <u>120.0</u> ft $T_{HR} =$ <u>4.8</u> minutes
3. Longitudinal Slope (vertical distance per unit horizontal) A) Available Slope (based on site constraints) B) Design Slope	$S_{avail} =$ <u>0.030</u> ft / ft $S_D =$ <u>0.023</u> ft / ft
4. Swale Geometry A) Channel Side Slopes ($Z = 4$ min., horiz. distance per unit vertical) B) Bottom Width of Swale (enter 0 for triangular section)	$Z =$ <u>6.00</u> ft / ft $W_B =$ <u>3.00</u> ft
5. Vegetation A) Type of Planting (seed vs. sod, affects vegetal retardance factor)	Choose One <input type="radio"/> Grass From Seed <input checked="" type="radio"/> Grass From Sod
6. Design Velocity (0.4 ft / s maximum for desirable 5-minute residence time)	$V_2 =$ <u>0.42</u> ft / s
7. Design Flow Depth (1 foot maximum) A) Flow Area B) Top Width of Swale C) Froude Number (0.50 maximum) D) Hydraulic Radius E) Velocity-Hydraulic Radius Product for Vegetal Retardance F) Manning's n (based on SCS vegetal retardance curve D for sodded grass) G) Cumulative Height of Grade Control Structures Required	$D_2 =$ <u>0.30</u> ft $A_2 =$ <u>1.4</u> sq ft $W_T =$ <u>6.6</u> ft $F =$ <u>0.16</u> $R_H =$ <u>0.22</u> $VR =$ <u>0.09</u> $n =$ <u>0.200</u> $H_D =$ <u>0.80</u> ft
8. Underdrain (Is an underdrain necessary?)	Choose One <input type="radio"/> YES <input checked="" type="radio"/> NO
9. Soil Preparation (Describe soil amendment)	
10. Irrigation	Choose One <input type="radio"/> Temporary <input checked="" type="radio"/> Permanent

Notes:

APPENDIX C

National Flood Hazard Layer FIRMette



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
MAP PANELS		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



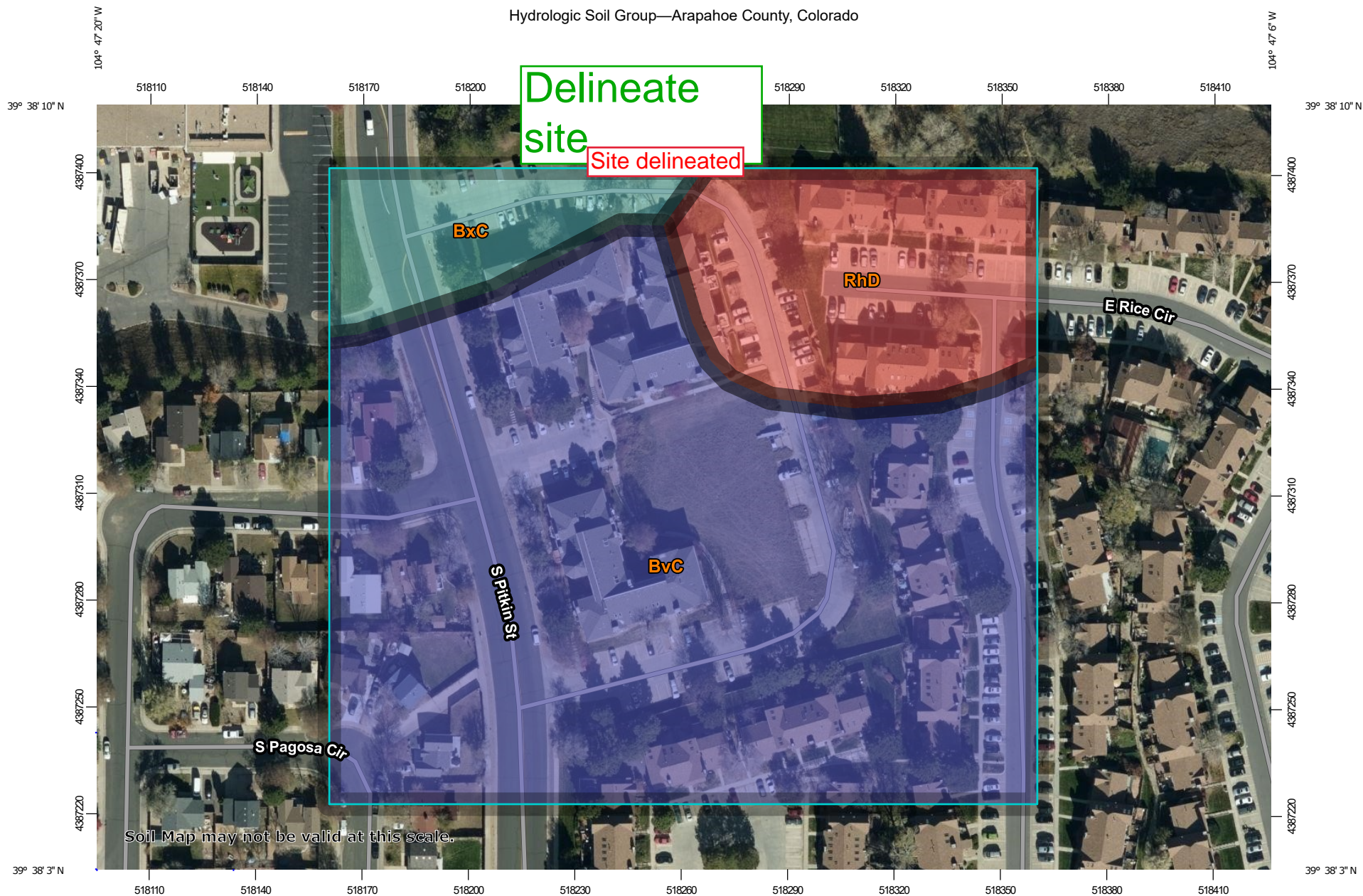
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/10/2020 at 6:26:24 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.





Map Scale: 1:1,510 if printed on A landscape (11" x 8.5") sheet.

0 20 40 80 120 Meters

0 50 100 200 300 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons





 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

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:
 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: Arapahoe County, Colorado
 Survey Area Data: Version 15, Sep 12, 2019

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

Date(s) aerial images were photographed: Oct 3, 2018—Dec 4, 2018

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BvC	Bresser-Truckton sandy loams, 3 to 5 percent slopes	B	6.5	73.7%
BxC	Buick loam, 3 to 5 percent slopes	C	0.8	8.8%
RhD	Renohill-Buick loams, 3 to 9 percent slopes	D	1.6	17.6%
Totals for Area of Interest			8.8	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

