

# DRAINAGE REPORT

FOR

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## 1215 CHAMBERS AVENUE

Eagle, Colorado

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April 2025



# **DRAINAGE REPORT**

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Eagle, Colorado

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April 2025

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- Appendix B – USDA-NRCS Soil Hydrologic Soil Group Survey
- Appendix C- Manning’s Equation for Offsite Volume

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- Sheet 1 – Drainage Area Map 1”=400’
- Sheet 2 – Vegetative Cover Drainage Area Map 1”=400’
- Sheet 3 – Soils Drainage Area Map 1”=400’
- Preliminary Grading Plan 1”=30’

## **II. INTRODUCTION**

The purpose of this Drainage Report is to summarize the existing hydrologic conditions found at the 1215 Chambers Avenue development site and to evaluate the off-site and developed for the proposed project. This report contains calculations for off-site drainage and developed conditions including detention, and a description of anticipated Colorado Department of Public Health and Environment permits that will be acquired for the project. This report was completed in general conformance with the January 2018 Town of Eagle, Public Works Manual, Section 4.00, Drainage Analysis and Systems Design Criteria.

## **III. SITE DESCRIPTION**

The proposed 1215 Chambers Avenue Parcel is located near the east end of Chambers Avenue between Interstate 70 and Chambers Avenue. The site contains 5.38 acres (Lot C-13) and an adjacent 0.98 acres (Lot C 12B) which will be absorbed into this development through lot line vacation / replat. This report addresses drainage for off-site areas north of Interstate 70 that outfalls onto this site.

Most of the existing parcel is currently a grassed field. It is Lot C-13, Kemp Subdivision of the Eagle Valley Commercial Park. The off-site area is made up of pinyon and juniper and some grass and gravel roads.

## **IV. DRAINAGE BASINS**

The drainage on the 1215 Chambers Avenue site flows predominately from north to south through some inlets and storm pipes and to the Eagle River. There is a 184.2 acre drainage basin north of Interstate 70 that outfalls through a 42" CMP culvert onto the site. Refer to the Drainage Area Maps in this report.

## **V. PEAK FLOW DETERMINATION**

Overall site peak flows have been calculated using TR55, "Urban Hydrology for Small Watersheds", June 1986 as prepared by the U.S. Soil Conservation Service (SCS). The 24-hr precipitation values for various frequency storms were input into WIN TR55 based upon the 24-hour precipitation (P) values taken from the NOAA Atlas 2, Volume III, Isopluvials of 24-hour precipitation maps and were found to be 1.4-, 2.0-, 2.4-, and 2.9- inches for the 2-, 10-, 25-, and 100-year storms. TR55 calculations may be found in Appendix A. The off-site drainage area map using the USGS quad sheet for topography may be found on Sheet 1 of the map section of this report.

The vegetative cover for the off-site tributary drainage area may be found on Sheet 2 of the map section of this report.

The actual hydrologic soils group has been input based on the USDA NRCS Web Soil Survey of Hydrologic Soils Group and Soils Map on Sheet 3 of the map section of this report in Appendix B and is summarized in Exhibit B.

## **VI. DETENTION AND WATER QUALITY**

The detention volume has been calculated based upon an analysis performed in a Preliminary Drainage Study named Eagle Valley Commercial Park, A Resubdivision of Tract A, Eagle Valley Commercial Park, dated December 1, 1995 by Johnson & Kunkel Associates of Eagle Colorado. In it, it explains that some regional detention has been provided for the subdivision but each development lot will also need to provide 218 cu. ft. per acre of storage. This calculates to 5.38 acres (lot area) x 218 cu. ft. per acre = 1,173 cu. ft. Table 1 shows the

pond storage shown preliminarily on the plan will provide the required storage at approximately elevation 6663 feet.

Initial water quality treatment will be provided by a concrete settling basin at the outfall of the existing 42" Interstate culvert. Any mud or sediment from large storm events will deposit in the basin and be cleaned out after storm events. Additional water quality treatment will be provided by hydrodynamic separator water quality vaults and through settlement and infiltration in the proposed grass lined detention facility.

## **VII. FLOODPLAIN**

There is no FEMA 100-year floodplain that is impacted by the development of this site.

## **VIII. SEDIMENT AND EROSION CONTROL**

A sediment and erosion control plan has been developed for the project to limit the transport of sediments and contaminants off-site during construction. Devices to be used during construction to prevent sediment laden runoff from leaving the site include stabilized construction entrances, silt fence, wattles, straw bales, perimeter ditches, stone outlet structures and inlet protection.

## **IX. CDPHE PERMITS**

The Colorado Department of Public Health and Environment (CDPHE) requires that proposed developments disturbing more than 1 acre of ground obtain a Colorado NPDES Stormwater Discharge Associated with Construction Activity permit from them. It is anticipated that a Stormwater Management/Best Management Practices (SWM/BMP) plan and permit application will be prepared for the development.

## **X. SUMMARY**

The 1215 Chambers Avenue project will have off-site stormwater passed through the site in a storm sewer pipe that will connect to an existing storm sewer inlet in Chambers Avenue. The 100 year flowrate for the offsite basin was found to be 10.64 cfs (Appendix A). The 100 year volume will be piped through the project in a 24" HDPE storm culvert to the proposed detention facility. Calculations for the offsite pipe sizing can be found in Appendix C. The drive aisle between all buildings has a reverse "crown" and drain to a centerline pan. The reverse crown of the drive and parking areas provides storage volume in the event that all stormwater inlets become clogged. The drive and parking cross-section can contain an average of 16 cfs, larger than the 100 year storm volume of the offsite drainage. Detention will be provided by a combination of regional stormwater management and some on-site detention.

A Concrete settling basin, hydrodynamic separator water quality vaults and grass lined detention pond with a riser inlet and orifice will provide water quality treatment of stormwater.

Sediment and erosion control will be addressed by the Stormwater Management/Best Management Practices Plan and permit application prepared for the site.

# TABLES



TABLE 1

**1215 Chambers****DETENTION POND - DETENTION STORAGE VOLUME****POND 1**

Elevation	Area	Avg. Area	Depth	Volume	Cumulative Volume	Cumulative Volume	Cumulative Volume
	(ft <sup>2</sup> )	(ft <sup>2</sup> )	(ft)	(ft <sup>3</sup> )	(ft <sup>3</sup> )	(Ac-ft)	(Gallons)
6661	26	0	0	0	0	0.000	0
6662	581	304	1	304	304	0.007	2,270
6663	1,298	940	1	940	1,243	0.029	9,298
6664	2,071	1,685	1	1,685	2,928	0.067	21,898

**APPENDIX A**  
**TR55 Drainage Basin Calculations**

# WinTR-55 Current Data Description

## --- Identification Data ---

User: HM Date: 8/19/2021  
 Project: 1215 Chambers Units: English  
 SubTitle: Flow to existing I-70 42'' Culvert Areal Units: Acres  
 State: Colorado  
 County: Eagle  
 Filename: O:\Eagle\1215 Chambers Storage-2021\dwg\Drainage\TR55\1215 Chambers-fair-good.w55

## --- Sub-Area Data ---

Name	Description	Reach	Area (ac)	RCN	Tc
1A	1a	Outlet	184.2	56	0.453

Total area: 184.20 (ac)

## --- Storm Data ---

### Rainfall Depth by Rainfall Return Period

100-Yr (in)	50-Yr (in)	25-Yr (in)	10-Yr (in)	5-Yr (in)	2-Yr (in)	0-Yr (in)
2.9	2.8	2.4	2.0	1.8	1.4	.0

Storm Data Source: User-provided custom storm data  
 Rainfall Distribution Type: Type II  
 Dimensionless Unit Hydrograph: <standard>

=====

HM 1215 Chambers  
 Flow to existing I-70 42'' Culvert  
 Eagle County, Colorado

### Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period				
	100-Yr (cfs)	50-Yr (cfs)	25-Yr (cfs)	10-Yr (cfs)	2-Yr (cfs)
SUBAREAS					
1A	10.64	7.95	1.90	0.44	.00
REACHES					
OUTLET	10.64	7.95	1.90	0.44	.00

=====

HM 1215 Chambers  
 Flow to existing I-70 42'' Culvert

Eagle County, Colorado

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
1A	184.20	0.453	56	Outlet	1a
-----					
Total Area:	184.20 (ac)				

HM

1215 Chambers  
Flow to existing I-70 42'' Culvert  
Eagle County, Colorado

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
1A							
SHEET	100	0.3400	0.400				0.174
SHALLOW	1048	0.2600	0.050				0.035
CHANNEL	3977	0.0580	0.050	3.00	6.00	4.528	0.244
Time of Concentration							0.453
							=====

HM

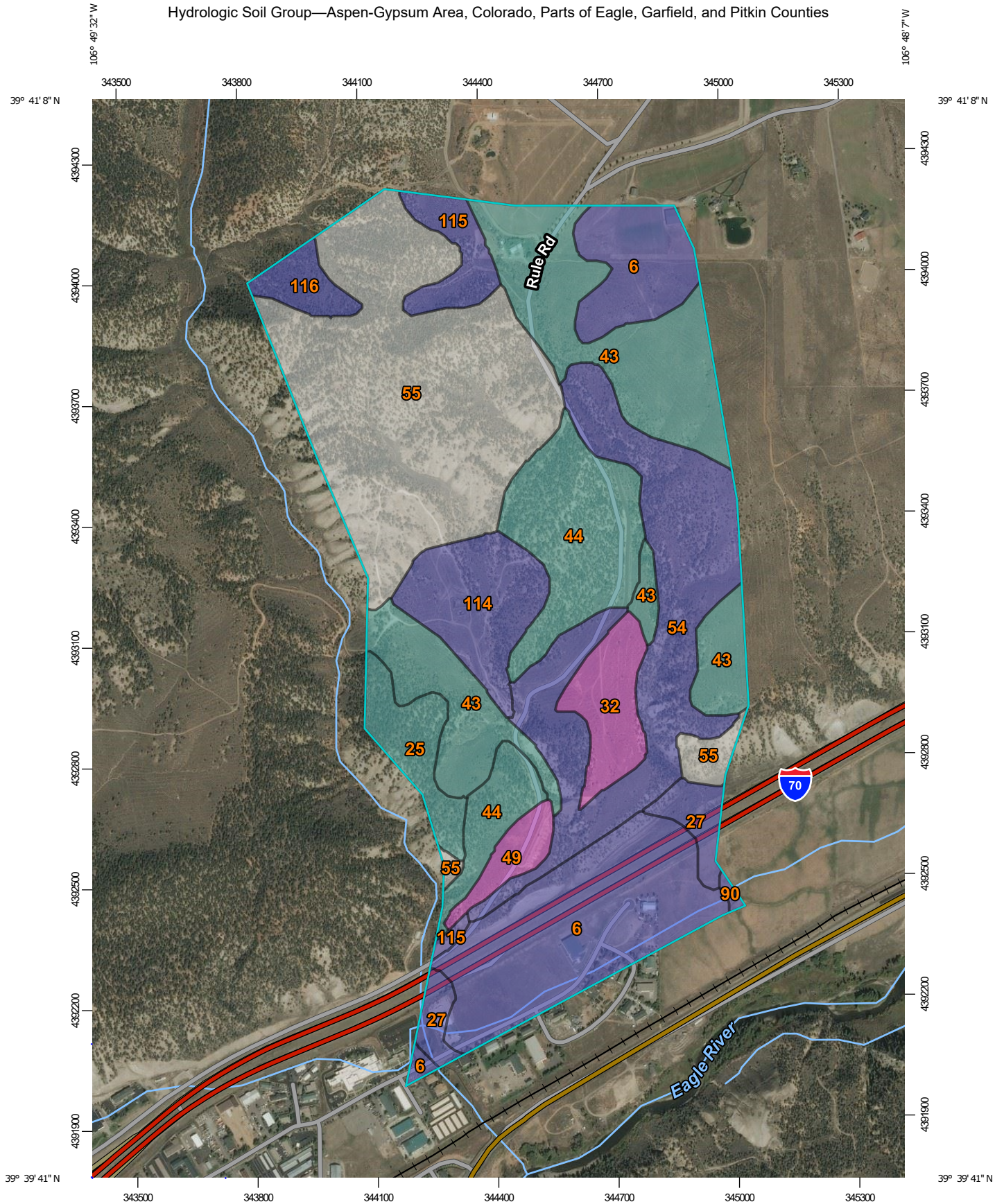
1215 Chambers  
Flow to existing I-70 42'' Culvert  
Eagle County, Colorado

Sub-Area Land Use and Curve Number Details

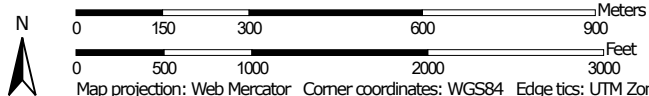
Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
1A	Open space; grass cover > 75%	(good) B	1.6	61
	Paved parking lots, roofs, driveways	B	2	98
	Gravel (w/ right-of-way)	A	1.09	76
	Gravel (w/ right-of-way)	B	.34	85
	Gravel (w/ right-of-way)	C	.06	89
	Gravel (w/ right-of-way)	D	.37	91
	Pinyon - juniper	(fair) D	34.74	80
	Pinyon - juniper	(good) B	19.3	41
	Pinyon - juniper	(good) C	41.74	61
	Sagebrush (w/ grass understory)	(fair) D	17.28	70
	Sagebrush (w/ grass understory)	(good) B	48.37	35
	Sagebrush (w/ grass understory)	(good) C	17.31	47
Total Area / Weighted Curve Number				184.2
				=====
				==

**APPENDIX B**  
**USDA-NRCS Soil Hydrologic Soil Group Survey**

# Hydrologic Soil Group—Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties



Map Scale: 1:13,100 if printed on A portrait (8.5" x 11") sheet.



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



**Natural Resources  
Conservation Service**

Web Soil Survey  
National Cooperative Soil Survey

7/20/2021  
Page 1 of 4

## 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 1:24,000.

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: Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties

Survey Area Data: Version 11, Jun 5, 2020

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

Date(s) aerial images were photographed: Aug 15, 2012—Sep 24, 2015

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
6	Almy loam, 1 to 12 percent slopes	B	72.3	16.1%
25	Cushool-Rentsac complex, 15 to 65 percent slopes	C	12.9	2.9%
27	Dahlquist-Southace complex, 12 to 25 percent slopes	B	10.1	2.2%
32	Dotsero sandy loam, 1 to 12 percent slopes	A	14.5	3.2%
43	Forelle-Brownsto complex, 6 to 12 percent slopes	C	73.5	16.4%
44	Forelle-Brownsto complex, 12 to 25 percent slopes	C	43.2	9.6%
49	Goslin fine sandy loam, 3 to 6 percent slopes	A	6.6	1.5%
54	Grotte gravelly loam, 25 to 65 percent slopes	B	66.4	14.8%
55	Gypsum land-Gypsiorthids complex, 12 to 65 percent slopes		107.7	24.0%
90	Mussel loam, 6 to 12 percent slopes	B	0.7	0.2%
114	Yamo loam, 1 to 6 percent slopes	B	23.6	5.3%
115	Yamo loam, 6 to 12 percent slopes	B	10.6	2.4%
116	Yamo loam, 12 to 25 percent slopes	B	6.7	1.5%
<b>Totals for Area of Interest</b>			<b>448.8</b>	<b>100.0%</b>



## 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.

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

## **APPENDIX C**

### **Manning's Equation Pipe Sizing**

**24" HDPE storm: 4% pipe slope = 6.5 inch full**

Manning Pipe Calculator

Given Input Data:

Shape .....	Circular
Solving for .....	Depth of Flow
Diameter .....	24.0000 in
Flowrate .....	10.6400 cfs
Slope .....	0.0400 ft/ft
Manning's n .....	0.0090

Computed Results:

Depth .....	6.5491 in
Area .....	3.1416 ft <sup>2</sup>
Wetted Area .....	0.6946 ft <sup>2</sup>
Wetted Perimeter .....	26.3826 in
Perimeter .....	75.3982 in
Velocity .....	15.3181 fps
Hydraulic Radius .....	3.7912 in
Percent Full .....	27.2879 %
Full flow Flowrate .....	65.3536 cfs
Full flow velocity .....	20.8027 fps

**24" HDPE storm: 2% pipe slope = 8 inch full**

Manning Pipe Calculator

Given Input Data:

Shape .....	Circular
Solving for .....	Depth of Flow
Diameter .....	24.0000 in
Flowrate .....	10.6400 cfs
Slope .....	0.0200 ft/ft
Manning's n .....	0.0090

Computed Results:

Depth .....	7.8323 in
Area .....	3.1416 ft <sup>2</sup>
Wetted Area .....	0.8904 ft <sup>2</sup>
Wetted Perimeter .....	29.1863 in
Perimeter .....	75.3982 in
Velocity .....	11.9496 fps
Hydraulic Radius .....	4.3931 in
Percent Full .....	32.6346 %
Full flow Flowrate .....	46.2120 cfs
Full flow velocity .....	14.7097 fps

## MAPS



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34510 HWY 6 UNIT A9 PO BOX 97  
EAGLE, COLORADO 81631  
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1215 CHAMBERS AVENUE  
STORAGE FACILITY - EAGLE, COLORADO  
DRAINAGE AREA MAP

DESIGNED	DRAWN	CHECKED	JOB NO.	DATE
MCW	MCW	MCW	-	07.20.2021

NO.	DATE	REVISIONS	BY

**SHEET**  
**1**



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1215 CHAMBERS AVENUE  
STORAGE FACILITY - EAGLE, COLORADO  
VEGETATIVE COVER DRAINAGE AREA MAP

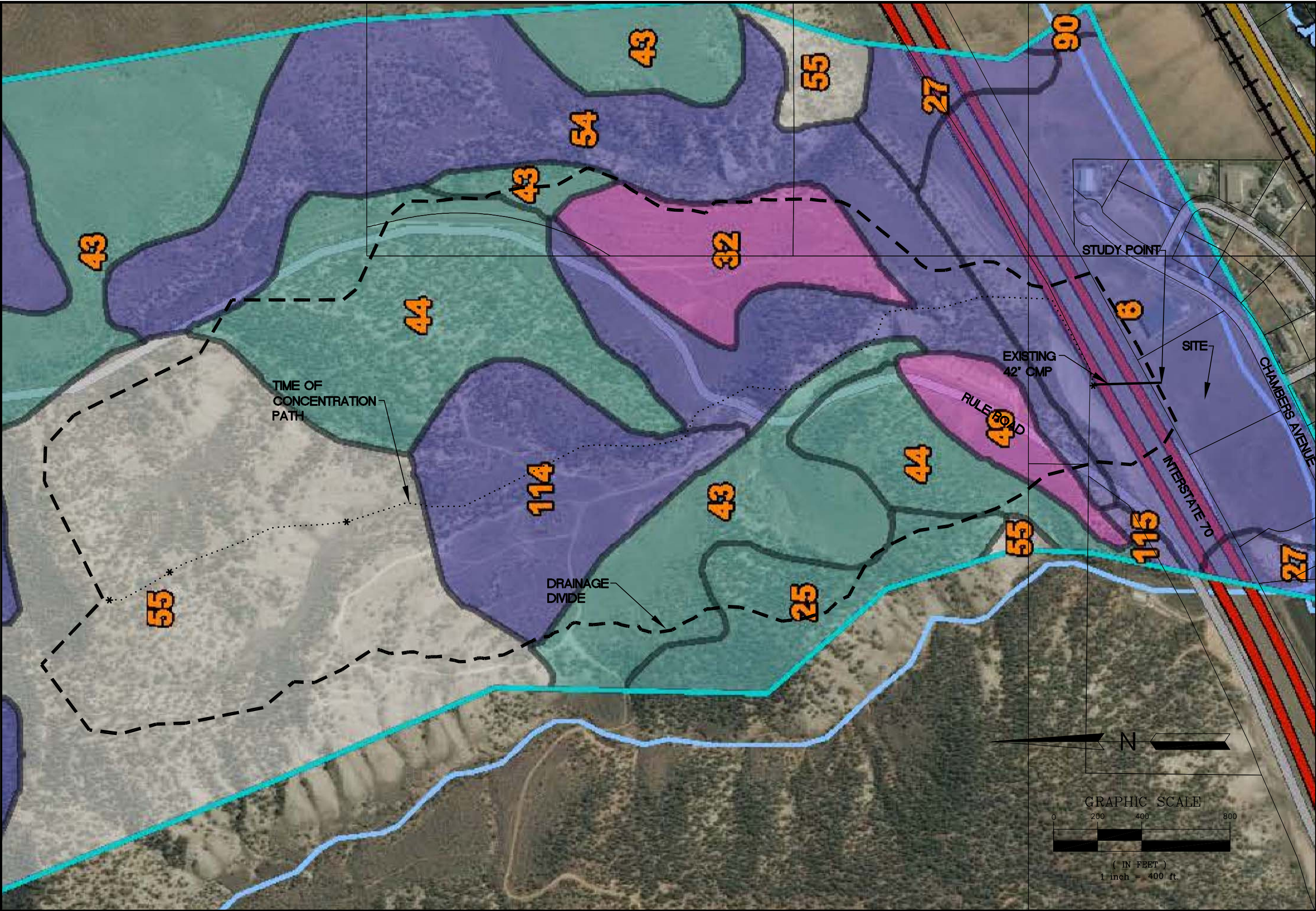
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							07.20.2021

**SHEET**  
**2**



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1215 CHAMBERS AVENUE  
STORAGE FACILITY - EAGLE, COLORADO  
SOILS DRAINAGE AREA MAP

NO.	DATE	REVISIONS	BY

DESIGNED	MCW	DRAWN	MCW	CHECKED	MCW	JOB NO.	DATE
							07.20.2021

**SHEET**  
**3**



$\frac{1}{2}$   $\frac{1}{3}$   $\frac{1}{4}$   $\frac{1}{5}$   $\frac{1}{6}$   $\frac{1}{7}$   $\frac{1}{8}$   $\frac{1}{9}$   $\frac{1}{10}$   $\frac{1}{11}$   $\frac{1}{12}$   $\frac{1}{13}$   $\frac{1}{14}$   $\frac{1}{15}$   $\frac{1}{16}$   $\frac{1}{17}$   $\frac{1}{18}$   $\frac{1}{19}$   $\frac{1}{20}$   $\frac{1}{21}$   $\frac{1}{22}$   $\frac{1}{23}$   $\frac{1}{24}$   $\frac{1}{25}$   $\frac{1}{26}$   $\frac{1}{27}$   $\frac{1}{28}$   $\frac{1}{29}$   $\frac{1}{30}$   $\frac{1}{31}$   $\frac{1}{32}$   $\frac{1}{33}$   $\frac{1}{34}$   $\frac{1}{35}$   $\frac{1}{36}$   $\frac{1}{37}$   $\frac{1}{38}$   $\frac{1}{39}$   $\frac{1}{40}$   $\frac{1}{41}$   $\frac{1}{42}$   $\frac{1}{43}$   $\frac{1}{44}$   $\frac{1}{45}$   $\frac{1}{46}$   $\frac{1}{47}$   $\frac{1}{48}$   $\frac{1}{49}$   $\frac{1}{50}$   $\frac{1}{51}$   $\frac{1}{52}$   $\frac{1}{53}$   $\frac{1}{54}$   $\frac{1}{55}$   $\frac{1}{56}$   $\frac{1}{57}$   $\frac{1}{58}$   $\frac{1}{59}$   $\frac{1}{60}$   $\frac{1}{61}$   $\frac{1}{62}$   $\frac{1}{63}$   $\frac{1}{64}$   $\frac{1}{65}$   $\frac{1}{66}$   $\frac{1}{67}$   $\frac{1}{68}$   $\frac{1}{69}$   $\frac{1}{70}$   $\frac{1}{71}$   $\frac{1}{72}$   $\frac{1}{73}$   $\frac{1}{74}$   $\frac{1}{75}$   $\frac{1}{76}$   $\frac{1}{77}$   $\frac{1}{78}$   $\frac{1}{79}$   $\frac{1}{80}$   $\frac{1}{81}$   $\frac{1}{82}$   $\frac{1}{83}$   $\frac{1}{84}$   $\frac{1}{85}$   $\frac{1}{86}$   $\frac{1}{87}$   $\frac{1}{88}$   $\frac{1}{89}$   $\frac{1}{90}$   $\frac{1}{91}$   $\frac{1}{92}$   $\frac{1}{93}$   $\frac{1}{94}$   $\frac{1}{95}$   $\frac{1}{96}$   $\frac{1}{97}$   $\frac{1}{98}$   $\frac{1}{99}$   $\frac{1}{100}$

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DRAWN	MW
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JOB NO.	-
DATE	02-11-2025

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C3.0

