

AdventHealth Castle Rock Hospital – Cancer Center Radiation Oncology



January 21, 2026

Town of Castle Rock
Engineering Development Review
100 North Wilcox Street
Castle Rock, CO 80104

Denver

Cairo

Civil
Structural

RE: AdventHealth Castle Rock Hospital – Cancer Center Radiation Oncology
Town of Castle Rock Project Number: CD26-0001

Certification Statement:

I affirm that this report and plan for the Drainage Conformance Letter of AdventHealth Castle Rock Hospital – Cancer Center Radiation Oncology, was prepared by me (or under my direct supervision) in accordance with the provisions of the Town of Castle Rock Drainage Design and Technical Criteria for the owners thereof. I understand that the Town of Castle Rock does not and will not assume liability for drainage facilities designed by others.

Registered Professional Engineer
State Of Colorado No. 33854
Ryan J. Humphrey, P.E.

AdventHealth hereby certifies that the drainage facilities for Castle Rock Medical Office Building III shall be constructed according to the design presented in this report. I understand that the Town of Castle Rock does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that the Town of Castle Rock reviews drainage plans pursuant to the Municipal Code; but cannot, on behalf of Castle Rock Medical Office Building III, guarantee that final drainage design review will absolve PorterCare Adventist Health System and/or their successors and/or assigns of future liability for improper design.

AdventHealth
Name of Developer

Authorized Signature

AdventHealth Castle Rock Hospital – Cancer Center Radiation Oncology

To whom it may concern,

This letter serves as a Drainage Conformance Letter for the AdventHealth Castle Rock Hospital - Cancer Center Radiation Oncology addition. This letter references the “Drainage Conformance Letter for the Castle Rock Adventist Hospital – Medical Office Building III”, prepared by S.A. Miro Inc., dated December 3, 2021 and the “Phase III Drainage Report for the Castle Rock Adventist Medical Center – Phase 2a”, prepared by S.A. Miro, dated May 9, 2011.

The purpose of this letter is to demonstrate the existing and proposed storm sewer facilities serving the improvements for the AdventHealth Castle Rock Hospital can convey the runoff generated by the proposed Cancer Center Radiation Oncology building expansion project. All tributary drainage from the medical office building is routed through existing and proposed storm sewer facilities to the regional detention and water quality pond.

I. PROJECT DESCRIPTION

Improvements that impact the storm sewer facilities are as follows:

- The construction of the Cancer Center building expansion, located northwest of the main hospital and recently construction MOB III, with a footprint of 1,605 sq. ft.
- Added sidewalk and concrete band to the proposed Cancer Center building expansion, with an added impervious area of 178 sq. ft.
- The addition of approximately 80 LF of storm sewer pipe (65 LF of perforated foundation drain piping and 15 LF of solid pipe) and 1 roof drain connection serving the expansion.

The sub-basins that have been modified for these additions are the following: 1.11-L and 1.11-D. The following tables outlines the changes in imperviousness from the basins established in the most recently approved Drainage Conformance Letter for the MOB III.

Table 1: Proposed Basin Imperviousness

Basin Designation	Area (Acres)	Imperviousness (%)
1.11-L-R	0.04	95%
1.11-D-L	0.03	59%
Total	0.07	79.4%

Table 2: Existing Basin Imperviousness from MOB III

Basin Designation	Area (Acres)	Imperviousness (%)
1.10	0.60	80%
1.10-A	0.18	68%
1.10-B	0.04	24%
1.10-R	0.04	90%
1.11-A	0.86	43%
1.11-B	0.12	95%
1.11-C	0.35	94%
1.11-D	0.58	69%
1.11-E	1.25	33%
1.11-F	1.32	88%
1.11-R1	0.29	90%
1.11-R2	0.23	90%
1.11-L	0.03	2%
Total	5.89	66%

The Castle Rock Adventist Hospital campus was master planned with the anticipation of the entire campus to be fully developed. While the proposed development is increasing imperviousness, it is still

within the planned overall imperviousness of 85% based on the master drainage report. The existing storm infrastructure was sized with future development in mind, outlined in the MOB III Drainage Conformance Letter, and can convey increased flows to the regional detention and water quality pond. See the appendix for further information regarding storm sewer conveyance and the referenced drainage reports.

The proposed basins are intended to match existing drainage patterns. The grading is intended to direct overflow back on-site. Additionally overflow and runoff is conveyed from the regional detention facility to the nearest major drainageway via the existing storm sewer infrastructure.

The existing street inlets will remain in their entirety along with most of the existing pipes. A single area inlet will be removed as it falls within the proposed building expansion's footprint. The outfall pipe serving this inlet to be removed will be cut and connected to the proposed roof drain connection's outfall pipe. The proposed storm sewer infrastructure will be connected at the cut location and outfall into the existing storm infrastructure. See the proposed drainage plan Figure. 1 in the appendix of this report for reference.

No additional offsite improvements are required as the site adheres to the Master Plan Drainage Report's allowable percentage impervious.

Storm sewer maintenance is expected to be minimal due to the fact the detention facility is located off site. All storm sewers are private; the owner will be responsible for operation and maintenance.

Sub-Basin Overflow Path Description:

Existing Basin 1.11-D – Is a modified portion of the Phase 2A's sub-basin 1.11. Flow is collected in the 5' Type R Inlet 1.11-D. In the event this inlet is inoperable the overflow path will be the next downstream inlet, 1.11-F a 15' Type R.

Proposed Basin 1.11-D-L – Is a modified portion of the MOB III's sub-basin 1.11-D comprised of a majority landscape area (hence the L suffix is used after matching the existing basins name). It will follow the existing sub-basin's overflow path, noted above.

Existing Basin 1.11-L - Is a modified portion of the Phase 2A's sub-basin 1.11. Flow is collected in the 8" Area Inlet 1.11-L. In the event this inlet is inoperable the overflow path will be the next downstream inlet, 1.11-D a 5' Type R.

Proposed Basin 1.11-L-R – Is a modified portion of the MOB III's sub-basin 1.11-L comprised of entirely roof area (hence the R suffix is used after matching the existing basins name). It will follow the existing sub-basin's overflow path, noted above.

II. DRAINAGE FACILITY DESIGN

Detention/Water Quality

Since the proposed site adheres to the MOB III's drainage conformance letter which adhered to the Phase 2a drainage report, which adhered to the master drainage report, no additional stormwater facilities are required. The regional water quality and detention pond is off site as such storm maintenance is expected to be minimal. The existing regional detention pond is sufficient and provides water quality as well as 100-year detention for the site. Per the master drainage report, the water quality volume provided at the regional pond is 1.56 acre-feet, the 10-year plus water quality volume is 5.3 acre-feet and the 100-year plus water quality is 9.9 acre-feet. The off-site regional detention pond is owned and maintained by the Town of Castle Rock.

AdventHealth Castle Rock Hospital – Cancer Center Radiation Oncology

The four-step process for stormwater quality is described below, however due to water quality and detention occurring off-site it is not wholly applicable to this phase of the project.

1. No runoff volume reduction is planned for the site.
2. The existing regional detention pond is sufficient and provides water quality as well as 100-year detention for the site.
3. No open channels or streams are planned for this project.
4. There are no known sources of potential pollutants (chemicals, oils, fertilizers, etc.) to enter the stormwater system.

There are no planned outdoor uses or activities which would create illicit discharges; therefore, no special source control measures are being proposed. Proper sanitary sewer connections, waste receptacles, and good housekeeping practices; including but not limited to proper material storage, spill prevention and response, and clean work areas shall be implemented during and post construction. The owner will be responsible for operation and maintenance of the private storm sewer system. It is assumed that proper waste receptacles and recycling will be implemented within the building.

Due to no changes to the streets, parking spaces, curbs, or landscape islands the previous snow storage areas are anticipated to be adequate. The previous conformance letter noted “The landscape islands and open area to the north of the proposed parking lot can be utilized as snow storage.”

Per the master drainage report, the water quality volume provided at the regional pond is 1.56 acre-feet, the 10-year plus water quality volume is 5.3 acre-feet, and the 100-year plus water quality is 9.9 acre-feet.

Storm Sewer Layout

The proposed storm sewer system will tie into the existing infrastructure at one location with a single storm alignment. The storm alignment is located around the proposed expansions footprint and is comprised of a majority of perforated pipe serving the foundation drain. It will connect the proposed roof drain to the west side of the expansion. The foundation drain outfall and the roof drain connection will exit into a proposed rigid pipe which connects to the existing 6” PVC previously serving the landscape inlet. The Phase 2a drainage report has evaluated anticipated flows for the future development and the existing main has been sized accordingly. Below is a table comparing the 5-year and 100-year anticipated peak flows to the regional detention and water quality pond from the master drainage report to the proposed site.

Table 3: Peak Discharge Comparison

	5-Year Peak Discharge (cfs)	100-Year Peak Discharge (cfs)
Master Drainage Report (Capacity)	71.3	140.6
Cancer Center Rad Onc (Additional Flow)*	0.12	0.11
Existing Flows (Per the MOB III Drainage Letter)	14.43	69.57
Cancer Center Rad Onc + Existing Flows	14.55 (5-YR FLOW NOT SHOWN ON MASTER REPORT)	69.68

*Total flow based on applied time of concentrations to each sub-basin.

III. CONCLUSIONS

Compliance with Standards

The proposed development's drainage system was designed to comply with the Town of Castle Rock Storm Drainage Design and Technical Criteria Manual, Mile High Flood District Criteria, the Phase 2a drainage report for the site, and the master drainage report for the site.

Please call us if you have any questions.

IV. APPENDICES

- a. FEMA FIRM MAP
- b. NRCS SOIL MAP
- c. PROPOSED DRAINAGE PLAN
- d. REFERENCED DRAINAGE REPORT MATERIAL
- e. PERMANENT WATER QUALITY DETERMINATION WORKSHEET
- f. SUMMARY OF WATER QUALITY CONFORMANCE TO MS4 PERMIT

APPENDIX A
FEMA FIRM MAP

National Flood Hazard Layer FIRMMette



104°53'27"W 39°24'35"N



0 250 500 1,000 1,500 2,000 Feet

1:6,000

104°52'49"W 39°24'7"N

Basemap Imagery Source: USGS National Map 2023

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 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
MAP PANELS		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		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 **1/22/2026 at 1:57 AM** 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.

APPENDIX B
NRCS SOIL MAP



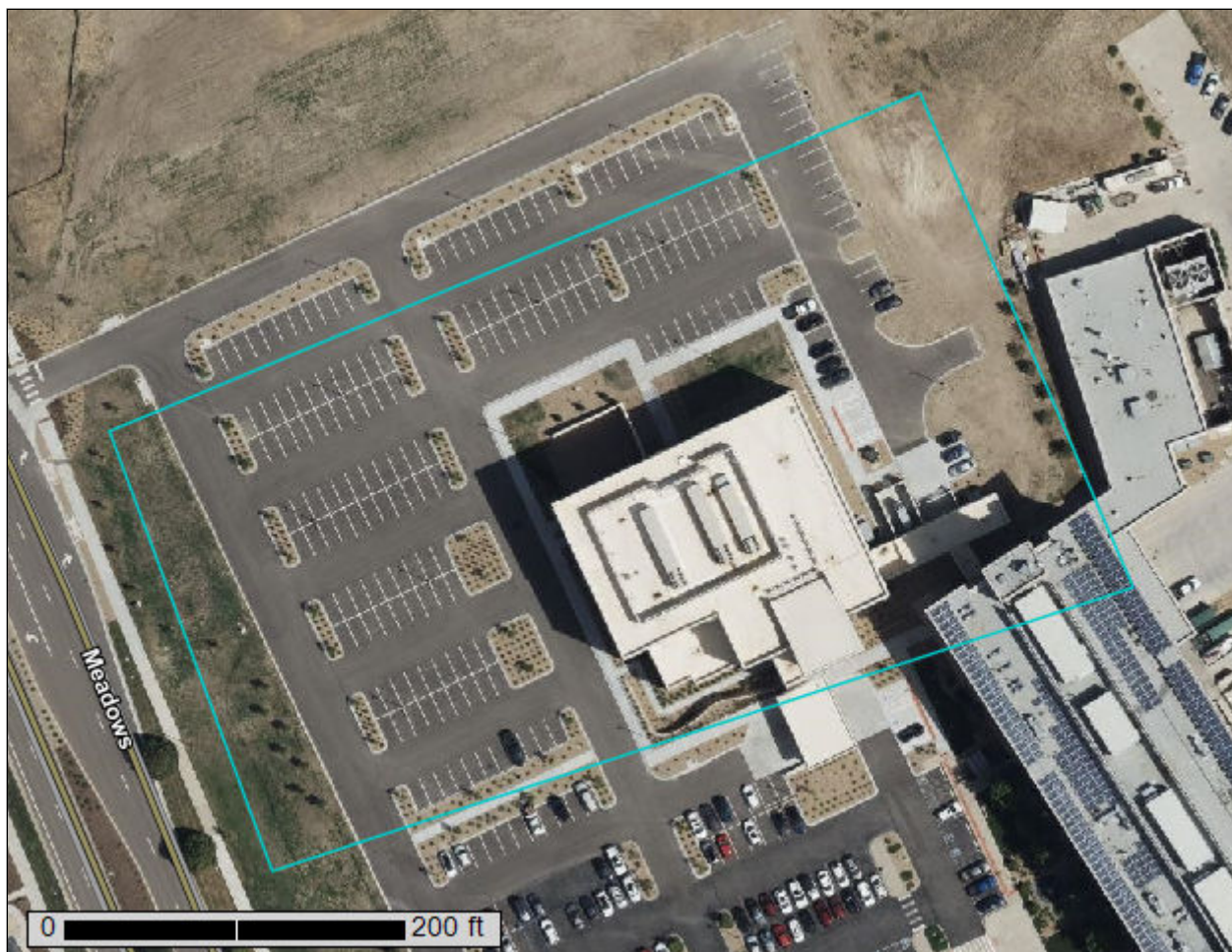
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

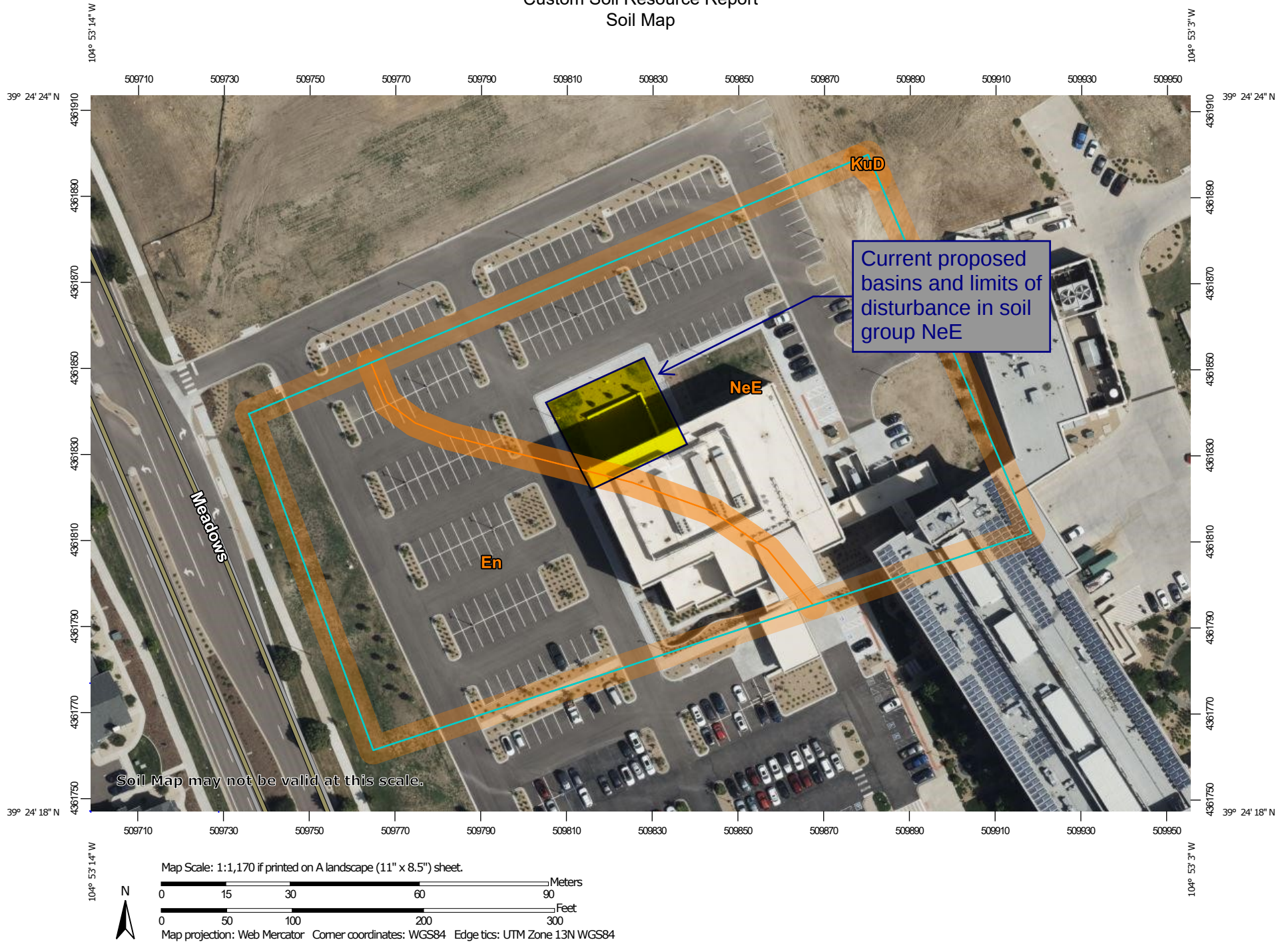
A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Castle Rock Area, Colorado**



January 16, 2026

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

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:
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: Castle Rock Area, Colorado
Survey Area Data: Version 18, Aug 29, 2025

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

Date(s) aerial images were photographed: Mar 1, 2023—Sep 1, 2023

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
En	Englewood clay loam	1.5	42.4%
KuD	Kutch clay loam, 4 to 8 percent slopes	0.0	0.1%
NeE	Newlin gravelly sandy loam, 8 to 30 percent slopes	2.0	57.6%
Totals for Area of Interest		3.5	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.

Castle Rock Area, Colorado

En—Englewood clay loam

Map Unit Setting

National map unit symbol: jqym

Elevation: 5,500 to 6,600 feet

Mean annual precipitation: 15 to 19 inches

Mean annual air temperature: 47 to 52 degrees F

Frost-free period: 120 to 135 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Englewood and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Englewood

Setting

Landform: Terraces, swales

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Weathered from alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 10 inches: clay loam

H2 - 10 to 29 inches: clay

H3 - 29 to 60 inches: clay

Properties and qualities

Slope: 1 to 4 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 15 percent

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C

Ecological site: R049XB208CO - Clayey Foothill

Hydric soil rating: No

Minor Components

Sampson

Percent of map unit: 10 percent

Hydric soil rating: No

Satanta

Percent of map unit: 9 percent

Hydric soil rating: No

Fluvaquentic haplustolls

Percent of map unit: 1 percent

Landform: Terraces

Hydric soil rating: Yes

KuD—Kutch clay loam, 4 to 8 percent slopes

Map Unit Setting

National map unit symbol: jqz6

Elevation: 5,500 to 6,800 feet

Mean annual precipitation: 15 to 19 inches

Mean annual air temperature: 47 to 50 degrees F

Frost-free period: 120 to 135 days

Farmland classification: Not prime farmland

Map Unit Composition

Kutch and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kutch

Setting

Landform: Hills, mesas, erosion remnants

Landform position (three-dimensional): Crest

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Calcareous fine-loamy clayey shale

Typical profile

H1 - 0 to 6 inches: clay loam

H2 - 6 to 32 inches: clay

H3 - 32 to 36 inches: weathered bedrock

Properties and qualities

Slope: 4 to 8 percent

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock

Drainage class: Well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 15 percent

Gypsum, maximum content: 2 percent

Custom Soil Resource Report

Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: D

Ecological site: R049XB208CO - Clayey Foothill

Hydric soil rating: No

Minor Components

Fondis

Percent of map unit: 7 percent

Hydric soil rating: No

Loamy alluvial land

Percent of map unit: 7 percent

Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 1 percent

Landform: Swales

Hydric soil rating: Yes

NeE—Newlin gravelly sandy loam, 8 to 30 percent slopes

Map Unit Setting

National map unit symbol: jqzg

Elevation: 5,500 to 6,600 feet

Mean annual precipitation: 15 to 19 inches

Mean annual air temperature: 49 to 51 degrees F

Frost-free period: 120 to 135 days

Farmland classification: Not prime farmland

Map Unit Composition

Newlin and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Newlin

Setting

Landform: Terraces, mesas, plateaus

Landform position (three-dimensional): Riser

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Unconformable sandy and gravelly and/or mixed source alluvium

Typical profile

H1 - 0 to 8 inches: gravelly sandy loam

H2 - 8 to 17 inches: gravelly sandy clay loam

Custom Soil Resource Report

H3 - 17 to 22 inches: gravelly sandy loam

H4 - 22 to 60 inches: very gravelly sand

Properties and qualities

Slope: 8 to 30 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 2.00 in/hr)*

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: B

Ecological site: R049XY214CO - Gravelly Foothill

Hydric soil rating: No

Minor Components

Bresser

Percent of map unit: 5 percent

Hydric soil rating: No

Stapleton

Percent of map unit: 4 percent

Hydric soil rating: No

Satanta

Percent of map unit: 4 percent

Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 2 percent

Landform: Swales

Hydric soil rating: Yes

References

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- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

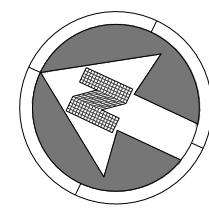
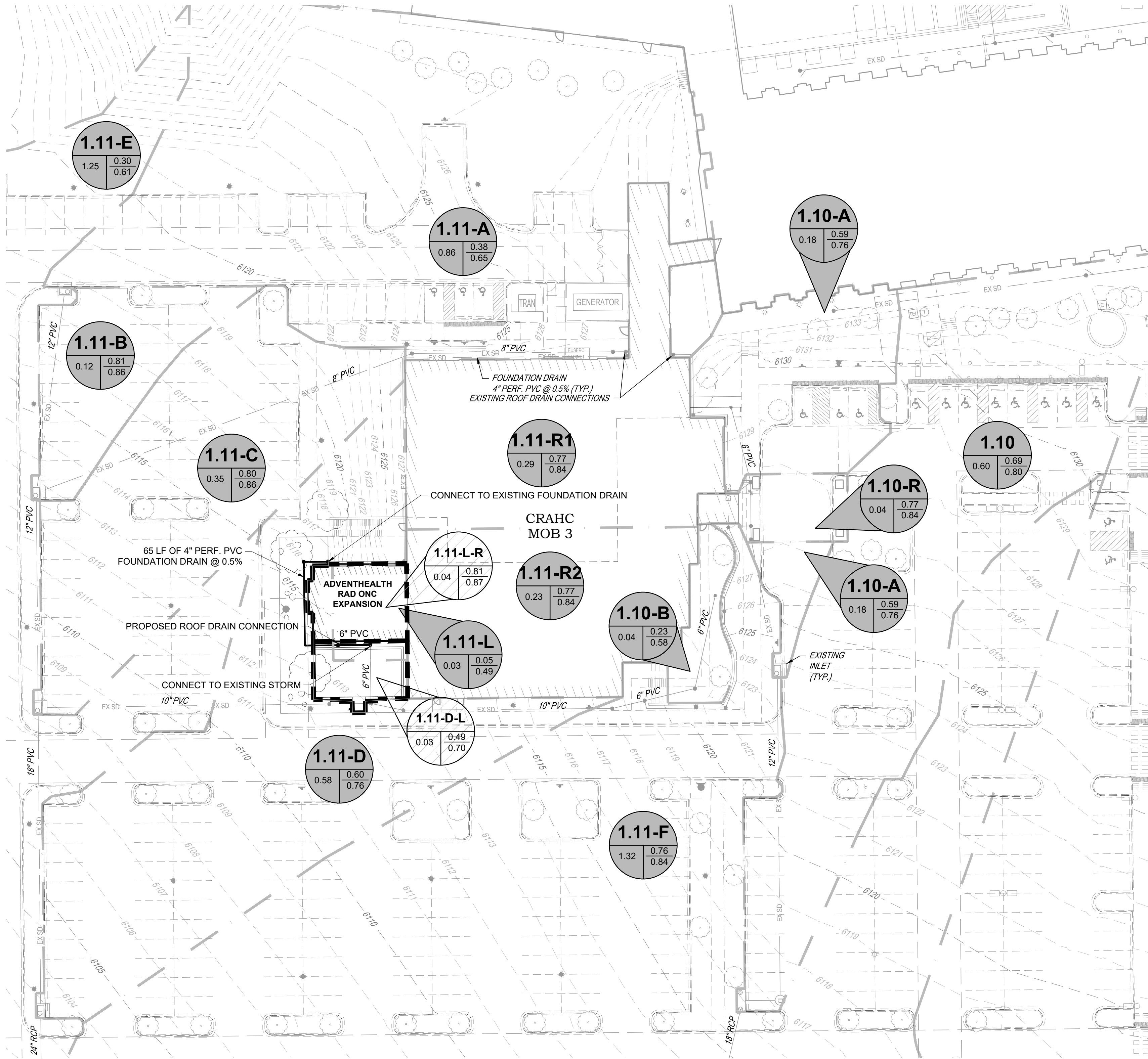
Custom Soil Resource Report

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APPENDIX C
PROPOSED DRAINAGE PLAN



30 0 30
SCALE: 1" = 30'

NOTES:

- BASIN DESIGNATION NAMING CORRESPONDS TO THE EXISTING BASIN NAME ENDING WITH THE LAND USE TYPE SUCH AS R FOR ROOF OR L FOR LANDSCAPE.
- CHANGE IN IMPERVIOUSNESS & RUNOFF (MINIMUM TIME OF CONCENTRATION USED FOR REVISED BASIN CALC FOR CONSERVATIVE DELTA ESTIMATE):
 - 1.11-L: 1,248 SQ. FT. OF 95% IMPERVIOUSNESS (ROOF AND CONCRETE BAND) ADDED TO EXISTING BASIN.
 - 0.08 CFS - Q5 INCREASE
 - 0.07 CFS - Q100 INCREASE
 - 1.11-D: 535 ST. FT. OF 95% IMPERVIOUSNESS (ROOF, CONCRETE BAND AND SIDEWALK) ADDED TO EXISTING BASIN.
 - 0.04 CFS - Q5 INCREASE
 - 0.04 CFS - Q100 INCREASE

LEGEND:

- 43 EXISTING MINOR CONTOURS
- 45 EXISTING MAJOR CONTOUR
- 43 PROPOSED MINOR CONTOURS
- 45 PROPOSED MAJOR CONTOURS
- PROPOSED STORM SEWER
- EX SD EXISTING STORM SEWER
- PROPOSED BASIN BOUNDARY
- EXISTING BASIN BOUNDARY
- EXISTING MANHOLE
- EXISTING INLETS
- PROPOSED MANHOLE
- PROPOSED INLETS
- B** PREVIOUS BASIN DESIGNATION
0.52 0.73 0.82
5 YEAR COMPOSITE C
100 YEAR COMPOSITE C
BASIN AREA (ACRES)
- B** REVISED BASIN DESIGNATION
0.52 0.73 0.82
5 YEAR COMPOSITE C
100 YEAR COMPOSITE C
BASIN AREA (ACRES)
- XX DESIGN POINT DESIGNATION

I HEREBY AFFIRM THAT THESE FINAL CONSTRUCTION PLANS WERE PREPARED UNDER MY DIRECT SUPERVISION, IN ACCORDANCE WITH ALL APPLICABLE TOWN OF CASTLE ROCK AND STATE OF COLORADO STANDARDS AND STATUTES, RESPECTIVELY, AND THAT I AM FULLY RESPONSIBLE FOR ALL DESIGN AND REVISIONS RELATIVE TO SAID PLANS.

RYAN J. HUMPHREY, PE
CO# 64927

TOWN OF CASTLE ROCK APPROVAL
PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM
DATE OF DEVELOPMENT SERVICES APPROVAL

APPROVED BY:

DEVELOPMENT SERVICES DATE



Know what's below.
Call before you dig.

DATE	01/23/2026
DESCRIPTION	1ST TOWN SUBMITTAL
NO.	1
PROJECT:	ADVENTHEALTH CAST ROCK CANCER CENTER 2350 MEADOWS BLVD., CASTLE ROCK, CO 80109
DRAWING TITLE:	
FILE PATH:	

THIS DOCUMENT IS
SUBJECT TO CHANGE AS A
RESULT OF JURISDICTIONAL
APPROVALS. CONSTRUCTION
DOCUMENTS SHALL CONTAIN
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OF THE REVIEWING ENTITIES.
THIS DOCUMENT IS NOT
FOR CONSTRUCTION.

DESIGNED BY:	RJH
DRAWN BY:	RJH
CHECKED BY:	JDC
MIRO JOB NO.	24-026

DRAWING NUMBER:

Calculation of Peak Runoff using Rational Method

Designer: Ryan Humphrey

Company: S. A. Miro Inc.,

Date: 1/23/2026

Project: AH CR Rad Onc Expansion

Location: Castle Rock

MHFD-Rational, Version 3.00 (August 2025)

Cells of this color are for required user-input

Cells of this color are for optional override values

Provide input for area, soil type, and imperviousness on the Runoff Coeffs worksheet.

Subcatchment Name	Area (ac)	NRCS Hydrologic Soil Group(s)	Imperviousness	Runoff Coefficient, C						
				WQE & 2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
1.11-L-R	0.04	B	95.0%	0.79	0.81	0.82	0.85	0.86	0.87	0.88
1.11-D-L	0.03	B	59.0%	0.46	0.49	0.53	0.62	0.66	0.70	0.75
Total	0.07	B	79.4%	0.64	0.67	0.70	0.75	0.77	0.80	0.83

Calculation of Peak Runoff using Rational Method

Designer:
Company:
Date:
Project:
Location:

$$t_i = \frac{0.395(1.1 - C_s)\sqrt{L_i}}{S_i^{0.33}}$$

$$\text{Computed } t_c = t_i + t_t$$

$$t_{c \text{ minimum}} = 5 \text{ (urban)}$$

$$t_{c \text{ minimum}} = 10 \text{ (non-urban)}$$

$$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$$

$$\text{Regional } t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

$$\text{Selected } t_c = \max\{t_{\text{minimum}}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$$

[Select MHFD location for NOAA](#)

1-hour rainfall depth, P1 (in) =

Rainfall Intensity Equation Coe

Subcatchment Name	Overland (Initial) Flow Time					Channelized (Travel) Flow Time							Time of Concentration			
	Overland Flow Length L_i (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Overland Flow Slope S_i (ft/ft)	Overland Flow Time t_i (min)	Channelized Flow Length L_t (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Channelized Flow Slope S_t (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V_t (ft/sec)	Channelized Flow Time t_t (min)	Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	(Optional) Override t_c (min)
1.11-L-R	48.00			0.020	2.88	10.00			0.020	20	2.83	0.06	2.94	9.90	5.00	
1.11-D-L	40.00	6113.50	6112.74	0.019	5.68	0.00			0.020	7	0.99	0.00	5.68	15.97	5.68	

Rainfall data per
ToCR SDD TCM

Calculation of Peak Runoff using Rational Method

Designer: \ Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website (click this link)

Company: WQE 2-yr 5-yr 10-yr 25-yr 50-yr 100-yr 500-yr

Date: 0.60 1.06 1.43 1.66 1.72 2.26 2.60 3.07

Project: a b c

Location: fficients = 28.50 10.00 0.786

$$I(in/hr) = \frac{a * P_1}{(b + t_c)^c}$$

$$Q(cfs) = CIA$$

Subcatchment Name	Rainfall Intensity, I (in/hr)								Peak Flow, Q (cfs)							
	WQE	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	WQE	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
1.11-L-R	2.04	3.60	4.85	5.63	5.83	7.67	8.82	10.41	0.06	0.10	0.14	0.17	0.18	0.24	0.28	0.34
1.11-D-L	1.97	3.47	4.69	5.44	5.64	7.40	8.52	10.06	0.03	0.04	0.06	0.08	0.10	0.14	0.17	0.21

Highlights indicate flow rates for new basins.

1.11-D-L flow accounted for in Rad Onc revised basin 1.11D. See modified runoff spreadsheet from MOB III.

1.11-L-R flow used for new roof drain connection for expansion footprint. Existing area inlet for previous 1.11-L basin is being removed with this project.



Composite C Calculations

Project Information

Project Name:	AH CR Rad Onc (Prev. CRAH MOB III)
Miro Project No:	24026 (Prev. 21-027)
Revised Date:	1/23/2026
Calculated By:	RJH

Jurisdiction Impervious Value

Pond Area	100%
Landscape Area	2%
Paved Area	100%
Roof Area	90%

Coefficient Equations

$C_{CD(2)} = 0.83I^{1.122}$	$C_{CD(10)} = 0.74i + 0.132$
$C_{CD(5)} = 0.82i + 0.035$	$C_{CD(100)} = 0.4i + 0.484$

Previous basins

*NOTE: C_{CD} Equations from UDFCD Criteria Manual updated March 2017

Basin Designation	A _{pond} (ft ²)	A _{landscape} (ft ²)	A _{paved} (ft ²)	A _{roof} (ft ²)	A _{total} (acres)	Impervious- ness	C _{CD} 02 yr	C _{CD} 05 yr	C _{CD} 10 yr	C _{CD} 100 yr
1.11-D	0	7,911	17,355	0	0.58	69%	0.55	0.60	0.64	0.76
1.11-L	0	1,516	0	0	0.03	2%	0.01	0.05	0.15	0.49
1.11-L (Rad Onc Rev)	0	268	38	1,210	0.03	75%	0.60	0.65	0.68	0.78
1.11-D (Rad Onc Rev)	0	7,376	17,495	395	0.58	71%	0.57	0.62	0.66	0.77
1.11-D Delta		-535	140	395	0.00	2%	0.01	0.05	0.15	0.49
1.11-L Delta		-1,248	38	1,210	0.00	73%	0.58	0.63	0.67	0.77

Additional impervious areas to previous basins

Additional paved area for sidewalk connection to new amenity area and concrete band
178 SF total

New expansion building footprint
1,605 SF total

2% and 73% increases in imperviousness to these existing sub-basins with proposed project.



Runoff Calculations (Rational Method)

Project Information

Project Name: AH CR Rad Onc(Prev. CR
S.A. Project No: 24026(Prev. 21-027)
Revised Date: 1/23/2026
Calculated By: RJH

Intensity Equation

$$I = 28.5 (P_1) / (10 + T_c)^{0.786}$$

*NOTE: P & Intensity Equation from UDFCD Criteria Manual

Existing basins

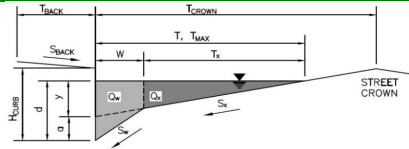
Basin Designation	Area (ac.)	'c'	cA	t _c (min)	P ₁	intensity (in/hr)	Q (cfs)
1.11-D	0.58	0.55	0.32	8.00	1.06	3.11	0.99 02 YR
		0.60	0.35		1.43	4.20	1.47 05 YR
		0.64	0.37		1.66	4.88	1.82 10 YR
		0.76	0.44		2.60	7.64	3.37 100 YR
1.11-L	0.03	0.01	0.00	10.17	1.06	2.85	0.00 02 YR
		0.05	0.00		1.43	3.84	0.01 05 YR
		0.15	0.01		1.66	4.46	0.02 10 YR
		0.49	0.02		2.60	6.99	0.12 100 YR
1.11-L (Rad Onc Rev)	0.03	0.60	0.02	10.17	1.06	2.85	0.06 02 YR
		0.65	0.02		1.43	3.84	0.09 05 YR
		0.68	0.02		1.66	4.46	0.11 10 YR
		0.78	0.03		2.60	6.99	0.19 100 YR
1.11-D (Rad Onc Rev)	0.58	0.57	0.33	8.00	1.06	3.12	1.03 02 YR
		0.62	0.36		1.43	4.20	1.51 05 YR
		0.66	0.38		1.66	4.88	1.87 10 YR
		0.77	0.45		2.60	7.64	3.41 100 YR
1.11-D Delta	0.00	0.01	0.00	#DIV/0!	1.06	#DIV/0!	#DIV/0! 02 YR
		0.05	0.00		1.43	#DIV/0!	0.04 05 YR
		0.15	0.00		1.66	#DIV/0!	#DIV/0! 10 YR
		0.49	0.00		2.60	#DIV/0!	0.04 100 YR
1.11-L Delta	0.00	0.58	0.00	#DIV/0!	1.06	#DIV/0!	#DIV/0! 02 YR
		0.63	0.00		1.43	#DIV/0!	0.08 05 YR
		0.67	0.00		1.66	#DIV/0!	#DIV/0! 10 YR
		0.77	0.00		2.60	#DIV/0!	0.07 100 YR

New tributary flow to Existing inlet 1.11-D

Change in flow based on impervious changes. For existing basins.

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **AH CRH - Cancer Center Rad Onc**Inlet ID: **Inlet 1.11-D****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

T_{BACK}	=	5.0	ft
S_{BACK}	=	0.020	ft/ft
n_{BACK}	=	0.020	

H_{CURB}	=	6.00	inches
T_{CROWN}	=	30.0	ft
W	=	2.00	ft
S_X	=	0.033	ft/ft
S_W	=	0.083	ft/ft
S_D	=	0.000	ft/ft
n_{STREET}	=	0.016	

Max. Allowable Spread for Minor & Major Storm

Max. Allowable Depth at Gutter Flowline for Minor & Major Storm

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
T_{MAX}	5.0	10.0	ft
d_{MAX}	6.0	6.0	inches

☐ ☐

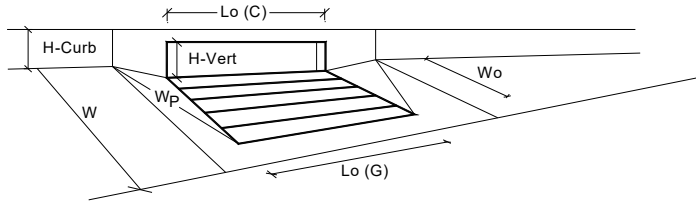
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow}	SUMP	SUMP	cfs

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	3.8	5.0	inches
Grate Information		MINOR		MAJOR	
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR		MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_o =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR		MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.15	0.25	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)		MINOR		MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q_a =	1.6	3.5	cfs
		$Q_{PEAK REQUIRED}$ =	1.5	3.4	cfs

Worksheet for 6" PVC for Roof Drain

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.010
Channel Slope	0.005 ft/ft
Diameter	6.0 in
Discharge	0.28 cfs
Results	
Normal Depth	3.2 in
Flow Area	0.1 ft ²
Wetted Perimeter	0.8 ft
Hydraulic Radius	1.5 in
Top Width	0.50 ft
Critical Depth	3.2 in
Percent Full	52.5 %
Critical Slope	0.005 ft/ft
Velocity	2.68 ft/s
Velocity Head	0.11 ft
Specific Energy	0.37 ft
Froude Number	1.033
Maximum Discharge	0.55 cfs
Discharge Full	0.52 cfs
Slope Full	0.001 ft/ft
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	52.5 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	3.2 in
Critical Depth	3.2 in
Channel Slope	0.005 ft/ft
Critical Slope	0.005 ft/ft

Flow from bldg
expansion's roof

Capacity > Estimated Flow

APPENDIX D
REFERENCED DRAINAGE REPORT MATERIAL

Castle Rock Adventist Hospital Medical Office Building III



Denver

Cairo

Civil

Structural

Integrated Services

December 3, 2021

Town of Castle Rock
Engineering Development Review
100 North Wilcox Street
Castle Rock, CO 80104

RE: Castle Rock Adventist Hospital – Medical Office Building III
Town of Castle Rock Project Number: CD21-0019

Certification Statement:

I affirm that this report and plan for the Phase II drainage design of CRAHC Medical Office Building III, was prepared by me (or under my direct supervision) in accordance with the provisions of the Town of Castle Rock Drainage Design and Technical Criteria for the owners thereof. I understand that the Town of Castle Rock does not and will not assume liability for drainage facilities designed by others.



Registered Professional Engineer
State Of Colorado No. 33854
Jason D. Carr, P.E.

Portercare Adventist Health System hereby certifies that the drainage facilities for Castle Rock Medical Office Building III shall be constructed according to the design presented in this report. I understand that the Town of Castle Rock does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that the Town of Castle Rock reviews drainage plans pursuant to the Municipal Code; but cannot, on behalf of Castle Rock Medical Office Building III, guarantee that final drainage design review will absolve Portercare Adventist Health System and/or their successors and/or assigns of future liability for improper design.



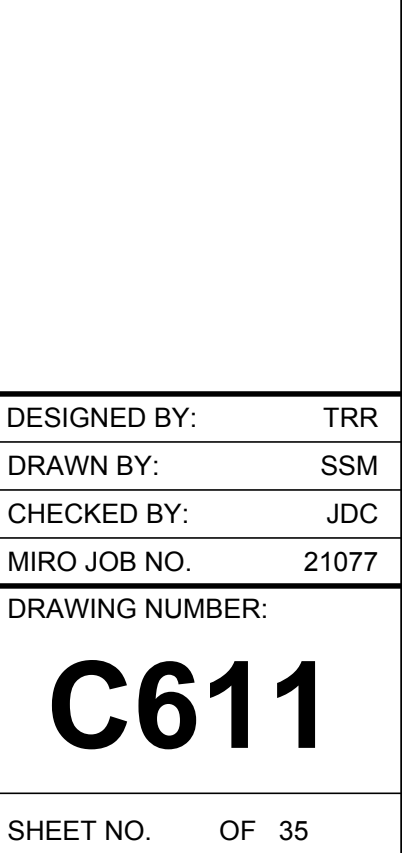
DEVELOPMENT SERVICES
APPROVED

by Larry Hearold
on 01/28/2022

Approved CD21-0019 Drainage Conformance
Letter.pdf
Record Document on File

Portercare Adventist Health System
Name of Developer

Authorized Signature
Sean Tracy





Composite C Calculations

Project Information

Project Name: CRAH MOB III
Miro Project No: 21-027
Revised Date: 11/30/2021
Calculated By: RJH

Jurisdiction Impervious Value

Pond Area 100%
Landscape Area 2%
Paved Area 100%
Roof Area 90%

Coefficient Equations

$C_{CD(2)} = 0.83i^{1.122}$ $C_{CD(10)} = 0.74i + 0.132$
 $C_{CD(5)} = 0.82i + 0.035$ $C_{CD(100)} = 0.4i + 0.484$

*NOTE: C_{CD} Equations from UDFCD Criteria Manual updated March 2017

Basin Designation	A _{pond} (ft ²)	A _{landscape} (ft ²)	A _{paved} (ft ²)	A _{roof} (ft ²)	A _{total} (acres)	Impervious-ness	C _{CD} 02 yr	C _{CD} 05 yr	C _{CD} 10 yr	C _{CD} 100 yr
1.10	0	5,342	20,988	0	0.60	80%	0.65	0.69	0.72	0.80
1.10-A	0	2,637	5,392	0	0.18	68%	0.54	0.59	0.63	0.76
1.10-B	0	1,272	364	0	0.04	24%	0.17	0.23	0.31	0.58
1.10-R	0	0	0	1,838	0.04	90%	0.74	0.77	0.80	0.84
1.11-A	0	21,964	15,520	0	0.86	43%	0.32	0.38	0.45	0.65
1.11-B	0	275	4,952	0	0.12	95%	0.78	0.81	0.83	0.86
1.11-C	0	952	14,190	0	0.35	94%	0.77	0.80	0.83	0.86
1.11-D	0	7,911	17,355	0	0.58	69%	0.55	0.60	0.64	0.76
1.11-E	0	37,382	16,897	0	1.25	33%	0.24	0.30	0.37	0.61
1.11-F	0	6,898	50,586	0	1.32	88%	0.72	0.76	0.78	0.84
1.11-R1	0	0	0	12,548	0.29	90%	0.74	0.77	0.80	0.84
1.11-R2	0	0	0	9,868	0.23	90%	0.74	0.77	0.80	0.84
1.11-L	0	1,516	0	0	0.03	2%	0.01	0.05	0.15	0.49
Total	0	86,149	146,244	24,254	5.89	66%	0.52	0.58	0.62	0.75
Off-site (Decel Lane)			2,112		0.05	100%	0.83	0.86	0.87	0.88
Regional Pond	0	86,149	148,356	24,254	5.94	66%	0.52	0.58	0.62	0.75



Runoff Calculations (Rational Method)

Project Information

Project Name: CRAH MOB III
S.A. Project No: 21-027
Revised Date: 11/30/2021
Calculated By: RJH

Intensity Equation

$$I = 28.5 (P_1) / (10 + T_c)^{0.786}$$

*NOTE: P & Intensity Equation from UDFCD Criteria Manual

Basin Designation	Area (ac.)	'c'	cA	t _c (min)	P ₁	intensity (in/hr)	Q (cfs)	
1.10	0.60	0.65	0.39	8.51	1.06	3.05	1.19	02 YR
		0.69	0.42		1.43	4.11	1.72	05 YR
		0.72	0.44		1.66	4.77	2.09	10 YR
		0.80	0.49		2.60	7.47	3.63	100 YR
1.10-A	0.18	0.54	0.10	6.80	1.06	3.29	0.33	02 YR
		0.59	0.11		1.43	4.44	0.48	05 YR
		0.63	0.12		1.66	5.15	0.60	10 YR
		0.76	0.14		2.60	8.07	1.12	100 YR
1.10-B	0.04	0.17	0.01	8.52	1.06	3.29	0.02	02 YR
		0.23	0.01		1.43	4.44	0.04	05 YR
		0.31	0.01		1.66	5.15	0.06	10 YR
		0.58	0.02		2.60	8.07	0.18	100 YR
1.10-R	0.04	0.74	0.03	5.00	1.06	3.60	0.11	02 YR
		0.77	0.03		1.43	4.85	0.16	05 YR
		0.80	0.03		1.66	5.63	0.19	10 YR
		0.84	0.04		2.60	8.82	0.31	100 YR
1.11-A	0.86	0.32	0.27	12.99	1.06	2.57	0.70	02 YR
		0.38	0.33		1.43	3.47	1.15	05 YR
		0.45	0.38		1.66	4.03	1.55	10 YR
		0.65	0.56		2.60	6.30	3.55	100 YR
1.11-B	0.12	0.78	0.09	5.00	1.06	3.60	0.34	02 YR
		0.81	0.10		1.43	4.85	0.47	05 YR
		0.83	0.10		1.66	5.63	0.56	10 YR
		0.86	0.10		2.60	8.82	0.91	100 YR
1.11-C	0.35	0.77	0.27	5.00	1.06	3.60	0.97	02 YR
		0.80	0.28		1.43	4.85	1.36	05 YR
		0.83	0.29		1.66	5.63	1.62	10 YR
		0.86	0.30		2.60	8.82	2.63	100 YR
1.11-D	0.58	0.55	0.32	8.00	1.06	3.11	0.99	02 YR
		0.60	0.35		1.43	4.20	1.47	05 YR
		0.64	0.37		1.66	4.88	1.82	10 YR
		0.76	0.44		2.60	7.64	3.37	100 YR
1.11-E	1.25	0.24	0.29	12.19	1.06	2.64	0.77	02 YR
		0.30	0.38		1.43	3.57	1.34	05 YR
		0.37	0.46		1.66	4.14	1.92	10 YR
		0.61	0.77		2.60	6.48	4.96	100 YR
1.11-F	1.32	0.72	0.95	7.99	1.06	3.12	2.97	02 YR
		0.76	1.00		1.43	4.20	4.21	05 YR
		0.78	1.04		1.66	4.88	5.06	10 YR
		0.84	1.10		2.60	7.64	8.44	100 YR
1.11-R1	0.29	0.74	0.21	6.04	1.06	3.41	0.72	02 YR
		0.77	0.22		1.43	4.60	1.02	05 YR
		0.80	0.23		1.66	5.34	1.23	10 YR
		0.84	0.24		2.60	8.36	2.03	100 YR



Runoff Calculations (Rational Method)

Project Information

Project Name: CRAH MOB III
S.A. Project No: 21-027
Revised Date: 11/30/2021
Calculated By: RJH

Intensity Equation

$$I = 28.5 (P_1) / (10 + T_c)^{0.786}$$

*NOTE: P & Intensity Equation from UDFCD Criteria Manual

Basin Designation	Area (ac.)	'c'	cA	t _c (min)	P ₁	intensity (in/hr)	Q (cfs)	
1.11-R2	0.23	0.74	0.17	6.00	1.06	3.42	0.57	02 YR
		0.77	0.18		1.43	4.61	0.81	05 YR
		0.80	0.18		1.66	5.35	0.97	10 YR
		0.84	0.19		2.60	8.38	1.60	100 YR
1.11-L	0.03	0.01	0.00	10.17	1.06	2.85	0.00	02 YR
		0.05	0.00		1.43	3.84	0.01	05 YR
		0.15	0.01		1.66	4.46	0.02	10 YR
		0.49	0.02		2.60	6.99	0.12	100 YR
Total	5.89	0.52	3.08	5.00	1.06	3.60	11.06	02 YR
		0.58	3.40		1.43	4.85	16.50	05 YR
		0.62	3.66		1.66	5.63	20.62	10 YR
		0.75	4.41		2.60	8.82	38.90	100 YR
Off-site (Decel Lane)	0.05	0.83	0.04	5.00	1.06	3.60	0.14	02 YR
		0.86	0.04		1.43	4.85	0.20	05 YR
		0.87	0.04		1.66	5.63	0.24	10 YR
		0.88	0.04		2.60	8.82	0.38	100 YR
Regional Pond	5.94	0.52	3.12	5.00	1.06	3.60	11.20	02 YR
		0.58	3.44		1.43	4.85	16.70	05 YR
		0.62	3.70		1.66	5.63	20.86	10 YR
		0.75	4.45		2.60	8.82	39.28	100 YR

BASINS "TOTAL" AND "REGIONAL POND" FLOW RATES ARE SET TO THE MINIMUM TIME OF CONCENTRATION AND REPRESENT A CONSERVATIVE OR HIGHER FLOW THAN ANTICIPATED BASED ON THE ACCUMULATIVE FLOW FROM EACH OF THE SUB-BASINS. THE TOTAL FLOW WITH TIME OF CONCENTRATION BEING CONSIDERED IS SHOWN ON THE DRAINAGE PLAN'S RUNOFF SUMMARY TABLE.

**Addendum to
Phase III Drainage Report
FOR**

**Castle Rock Adventist
Medical Center**

**Phase 2a
Lot No. 3, The Meadows Filing No. 18, area No. 1
CD 11-0015**

**May 9, 2011
July 8, 2011
Revised August 5, 2011**



S. A. Miro, Inc.

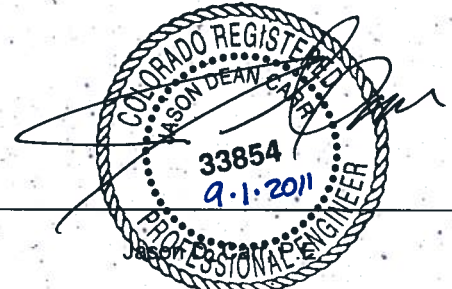
Prepared For:

Portercare Adventist Health System
2525 South Downing Street
Denver, Colorado 80237
(303) 269-4015
fax (303) 269-4019

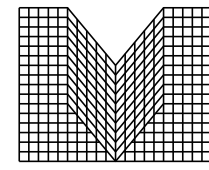
Prepared By:

S. A. Miro, Inc.
Consulting Engineers
4582 South Ulster St. Pkwy., Suite 300
Denver, Colorado 80237
(303) 741-3737
fax (303) 694-3134

S. A. Miro Job No. 10145



Registered Professional Engineer State of Colorado
No. CO33854



S.A. MIRO, INC.

CONSULTING ENGINEERS

4582 South Ulster Street Pkwy.

Suite 300 Denver, CO 80237

ph. 303 741 3737

fax 303 694 3134

DATE

DESCRIPTION

REV.

CLIENT NAME:

PROJECT NAME:

DESIGNED BY: CJB/JBW

DRAWN BY: CJB/JBW

CHECKED BY: JDC

DATE: 06/21/11

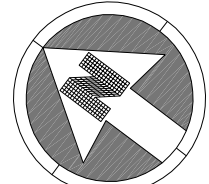
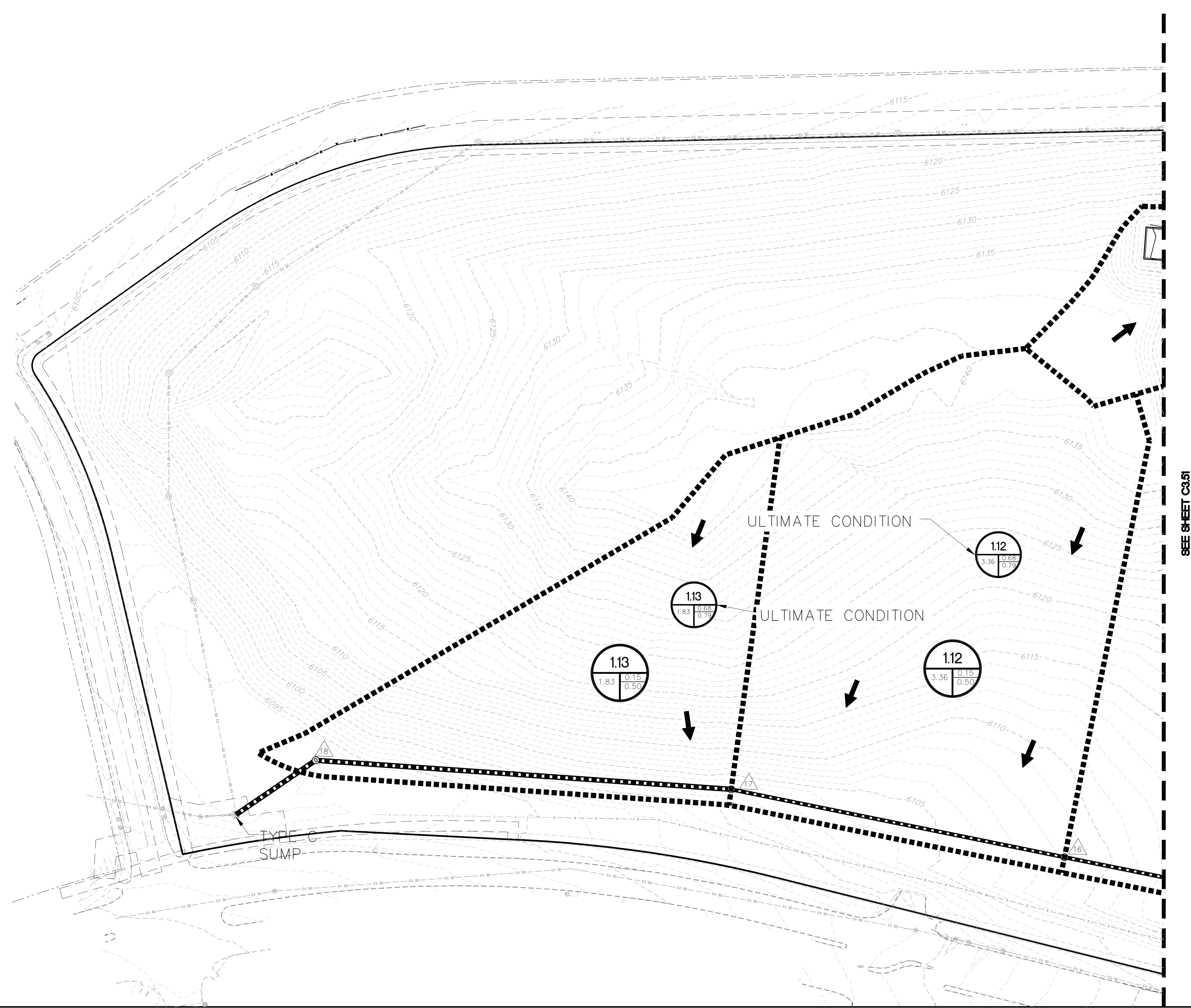
MIRO JOB NUMBER 10145

CLIENT JOB NUMBER

DRAWING NUMBER:

C3.52

SHEET NO.



SCALE: 1" = 50'

LEGEND:

- EXISTING MINOR CONTOURS
- EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOURS
- PROPOSED MAJOR CONTOURS
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- BASIN BOUNDARY
- PROPOSED MANHOLE
- PROPOSED INLETS
- FLOW DIRECTION ARROW
- DESIGN POINT DESIGNATION
- BASIN DESIGNATION
- 5 YEAR COMPOSITE C
- 100 YEAR COMPOSITE C
- BASIN AREA (ACRES)

I HEREBY AFFIRM THAT THESE FINAL CONSTRUCTION PLANS WERE PREPARED UNDER MY DIRECT SUPERVISION, IN ACCORDANCE WITH ALL APPLICABLE TOWN OF CASTLE ROCK AND STATE OF COLORADO STANDARDS AND STATUTES, RESPECTIVELY; AND THAT I AM FULLY RESPONSIBLE FOR ALL DESIGN AND REVISIONS RELATIVE TO SAID PLANS.

JASON D. CARR, PE.
CO# 33854

TOWN OF CASTLE ROCK APPROVALS
THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM DATE OF PUBLIC WORKS DIRECTOR APPROVAL

RECOMMENDED APPROVAL BY:

ENGINEERING DIVISION DATE

APPROVED BY:

DEVELOPMENT SERVICES DIRECTOR DATE

APPENDIX E

PERMANENT WATER QUALITY DETERMINATION WORKSHEET

Permanent Water Quality Determination Worksheet (Taken from 2019 SDDTCM Sections 13.1.4 and 13.1.5)

Project:		Project#		Applicant:
Section	Questions	Response	Check those that apply	Instructions
1	Non-applicable Sites			
1.1	Will the project result in a temporary disturbance of greater than one acre?	No Yes	☐ ☒	Proceed to section 1.2. Proceed to section 2.
1.2	Is the project part of a larger common plan of development or sale where multiple separate and distinct construction activities may be taking place at different times on different schedules, but remain related and are within 1/4 mile of each other? (A common plan of development will generally be documented on a site development plan, master plan, or equivalent, for the property/project)	No Yes	☐ ☒	Proceed to section 1.3. Proceed to section 2.
1.3	Is the project within the Cherry Creek Watershed?	Yes No	☐ ☐	Permanent water quality control measures may be required. Refer to Water Quality Control Regulation 72.7 for details and allowable exclusions. Permanent water quality control measures are not required.
2	Applicable Site Types and Exclusions by Variance			
2.1	Does the project have more than 35% impervious area on the existing site?	No Yes	☐ ☒	Project is an applicable Development Site. Proceed to section 3. Proceed to 2.2.
2.2	Does the project have greater than 75% impervious area on the existing site?	No Yes	☐ ☒	Project is an applicable Redevelopment Site. Proceed to section 3. Project is an applicable Constrained Redevelopment Site. Proceed to 2.3.
2.3	Will 100% of the runoff from the existing and proposed site be captured and treated using one or more of the allowable design standards for permanent water quality?	Yes No	☒ ☐	No further action required. Proceed to 2.4.
2.4	Do any other water quality exclusions apply to the site?	No Yes	☐ ☐	Portions of the project are excluded. Proceed with design in accordance with Constrained Redevelopment standards and apply for variance for <u>Constrained Redevelopment Sites</u> . Proceed to section 3. Following approval of other exclusions, design remaining site in accordance with Constrained Redevelopment standards and apply for variance for <u>Constrained Redevelopment Sites</u> .
3	Applicable Sites with Other Exclusions by Variance			
3.1	Category 1: Roadways, bridges and trails only			
3.1.1	Is the project a bike or pedestrian trail?	Yes No	☐ ☐	Proceed to next line. Proceed to 3.1.2.
	Is the trail for a roadway?	Yes No	☐ ☐	Proceed to 3.1.2. Project is excluded. Submit variance for <u>Trails Excluded from Permanent Water Quality Requirements</u> .
3.1.2	Is the project primarily used for parking or access to parking?	Yes No	☐ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to 3.1.3.
3.1.3	Does the project add impervious area?	No Yes	☐ ☐	Project is excluded. Submit variance for <u>Pavement Management Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.1.4.

Section	Questions	Response	Check those that apply	Instructions
3.1.4	Does the project add more than 8.25 feet of paved width at any location to the existing roadway?	No Yes	☐ ☐	Project is excluded. Submit variance for <u>Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
	Does the project add more than one acre of paved area per mile to an existing roadway?	No Yes	☐ ☐	Project is excluded. Submit variance for <u>Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
	Does the project increase the width by two times or more, on average, of the original roadway area?	No Yes	☐ ☐	Existing areas of site are excluded only. Submit variance for <u>Existing Roadway Surfaces Only Excluded from Permanent Water Quality Requirements</u> . This exclusion does not apply. Permanent water quality is required.
3.2	Category 2: Non-residential and non-commercial projects only			
3.2.1	Is the project associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities, including activities necessary to prepare a site for drilling and the movement and placement of drilling equipment?	Yes No	☐ ☐	Project is excluded. Submit variance for <u>Oil and Gas Exploration Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.2.
3.2.2	Is the project for stream stabilization?	Yes No	☐ ☐	Project is excluded. Submit variance for <u>Stream Stabilization Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.3.
3.2.3	Is the project for installation or maintenance of aboveground or underground utilities or infrastructure that does not permanently alter the terrain, ground cover, or drainage patterns from those present prior to the construction activity including activities to install, replace or maintain utilities under roadways or other paved areas that return the surface to the same condition?	Yes No	☐ ☐	Project is excluded. Submit variance for <u>Aboveground and Underground Utilities Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.4.
3.2.4	Is the project on undeveloped land (land with no human-made structures such as buildings or pavement) that will remain undeveloped after the project?	Yes No	☐ ☐	Project is excluded. Submit variance for <u>Sites with Land Disturbances to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.5.
3.2.5	Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event?	No Yes	☐ ☐	Project is excluded. Submit study along with variance for <u>Non-residential and Non-commercial Infiltration Conditions Excluded from Permanent Water Quality Requirements</u> . This exclusion does not apply. Permanent water quality is required.
3.3	Category 3: Residential, Agricultural and Commercial projects			
3.3.1	Is the project a single-family residential lot, or agricultural zoned lands, greater than or equal to 2.5 acres in size per dwelling unit?	Yes No	☐ ☐	Proceed to next line. Proceed to 3.3.2.
	Is the project site greater than 10% impervious?	No Yes	☐ ☐	Project is excluded. Submit variance for <u>Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
	Is the project site greater than 20% impervious?	Yes No	☐ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event?	No Yes	☐ ☐	Project is excluded. Submit study along with variance for <u>Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements</u> . This exclusion does not apply. Permanent water quality is required.

Section	Questions	Response	Check those that apply	Instructions
3.3.2	Will 100% of the runoff from the residential or commercial site be captured?	Yes No	☐ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Is all or a portion of the site undeveloped or will it remain undeveloped after construction?	Yes No	☐ ☐	This portion of the project is excluded. Submit variance for <u>Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements</u> . Proceed to next line. Proceed to next line.
	Is the remaining untreated impervious area greater than 20% of the site?	Yes No	☐ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Is the remaining untreated impervious area greater than one acre?	Yes No	☐ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Is it practicable to capture runoff from portions of the site that will not drain to a control measure?	No Yes	☐ ☐	Document justification demonstrating that it is not practicable to capture runoff from this portion of the site in the drainage report . No further action is needed. This exclusion does not apply. Permanent water quality is required.

APPENDIX F

SUMMARY OF WATER QUALITY CONFORMANCE TO MS4 PERMIT



Summary of Water Quality Conformance to MS4 Permit

The purpose of this worksheet is to document conformance with the Town of Castle Rock's MS4 permit with regard to permanent water quality on land disturbance projects.

Project Name _____

Project Owner _____

Project Location _____

ToCR Project Number _____

Total Site Area _____ acres

Total Size of Common Plan of Development _____ acres

Check all that apply:

☐ **Project within Plum Creek Basin**

☐ **Project within Cherry Creek Basin**

Estimated construction completion date _____

1. The water quality control measure(s) for applicable development sites shall meet one of the following base design standards as per the SDDTCM Section 14.4. Please select all design standards that were applied to meet conformance with the MS4 on this site.

- ☐ WQCV standard
- ☐ Pollutant removal standard
- ☐ Runoff reduction standard
- ☐ Applicable site draining to regional WQVC control measure (accepts drainage prior to discharging to WOTS)
- ☐ Applicable site draining to regional WQVC control facility (with receiving pervious area control measure upstream of WOTS)
- ☐ Constrained redevelopment sites standard
 - Imperviousness of existing site _____/_____ (Imp. Ac/Site Ac) = ____%
 - Variance required TCV No. _____
- ☐ Existing control measure with WQCV per previous criteria standards
 - Reference Construction Permit No. _____
- ☐ Cherry Creek Basin only, choose one: ☐ Tier 1 ☐ Tier 2 ☐ Tier 3
- ☐ No control measures provided (See Permanent WQ Worksheet for applicability)

Summary of Water Quality Conformance to MS4 Permit

2. Was an exclusion to water quality applied as per SDDTCM Section 13.1.5? ☐ Yes ☒ No

i. If yes, please select all that apply, provide total excluded impervious area(s) and submit variance, as applicable: TCV No. _____

- ☐ Pavement management site
Excluded impervious area: _____ acres
- ☐ Excluded roadway redevelopment
Excluded impervious area: _____ acres
- ☐ Excluded existing roadway areas
Excluded impervious area: _____ acres
- ☐ Above ground and below ground utilities
- ☐ Large lot single family home
- ☐ Non-residential and non-commercial infiltration
Excluded impervious area: _____ acres
- ☐ Land disturbance for land to remain undeveloped
Excluded impervious area: _____ acres
- ☐ Stream Stabilization Sites
Excluded impervious area: _____ acres
- ☐ Trails
Excluded impervious area: _____ acres
- ☐ Oil and Gas Exploration

3. For Development and Redevelopment sites, following any exclusions claimed above, was any portion of the site excluded up to 20% of the site and not to exceed one acre? ☐ Yes ☒ No

If yes, complete the following:

Excluded area: _____ acres
Total Site area: _____ acres, _____ % site excluded

4. For Constrained sites, was any portion of the site excluded up to 50% of the site and not to exceed 50% of the impervious area? ☐ Yes ☒ No

If yes, complete the following:

Excluded area: _____ acres
Excluded impervious area: _____ acres
Total Site area: _____ acres, _____ % site excluded
Total Impervious area: _____ acres, _____ % impervious excluded