EES
ENTITLEMENT AND
ENGINEERING
SOLUTIONS, INC.

501 S Cherry St
Suite 300
Glendale, CO 80246
www.ees.us.com
303-572-7997

September 26, 2022

Castle Rock Water
ATTN: Stormwater
175 Kellogg Ct.
Castle Rock, CO 80109

**Re: Perry Street – South Street Social**
**Final Drainage Compliance Letter**

EES is pleased to provide a drainage letter of conformance for the proposed site layout for Lot 4A, Block 11 of the town of Castle Rock, more specifically located at 414 and 404 North Perry Street, and 411 4th Street, Castle Rock, Colorado. The proposed project site is approximately 0.40 acres and is located at the northeast corner of 4th Street and Perry Street intersection. The site is bound to the north by a residential single-family home, Perry Street to west, and 4th Street to the south and east. In the existing condition, the site has 3 main buildings, two commercial stores to the south (1,065-sf and 2,508-sf), and a two-story residence building (1,340-sf) to the north. Additionally, there is an approximate 5,521-sf overhead canopy with steel frames in the center of the property. The existing conditions also has associated sidewalks, underground utilities, step walls, rockscaping, and landscaping on site. The existing drainage patterns were analyzed as three (3) existing drainage basins herein referred to as H-1, H-2, and H-3.

Per the NRCS Soil Survey, the subsurface characteristics consist of Bresser-Truckton sandy loam at 5-25% slopes. The soils have a moderate infiltration rate and are defined as hydrological soil group B. Refer to the Appendix for the NRCS Soil Survey Map.

There are no recently reported cases of flooding within or around the development. The site is located within Zone "X", areas determined to be outside 0.2% annual chance floodplain, of the Flood Plain, as designated on the Flood Insurance Rate Map (FIRM) 08035C0301G, map last revised 03/16/2016. Refer to the Appendix for the FIRMette.

**BASIN H-1 –** Basin H-1 is the 0.14 acres on the eastern portion of the existing parcel. The impervious value for the basin is 87%. The 5-year and 100-year runoff coefficients are 0.74 and 0.83, respectively. The runoff for the 5-year and 100-year storm event are 0.49-cfs and 1.00-cfs, respectively. Historically, runoff sheet flows to the east into the 4th Street Right-Of-Way. Once in the Right-Of-Way the flow is captured by an existing public storm sewer infrastructure within the R.O.W.

**BASIN H-2 –** Basin H-2 is 0.16 acres on the western portion of the existing parcel. The impervious value for the basin is 60%. The 5-year and 100-year runoff coefficients are 0.50 and 0.66, respectively. The runoff for the 5-year and 100-year storm event are 0.40-cfs and 0.95-cfs, respectively. Historically, runoff sheet flows to west into the Perry Street Right-Of-Way. Once in the Right-Of-Way the flow is captured by an existing public storm sewer infrastructure within the R.O.W.

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**BASIN H-3 –** Basin H-3 is 0.10 acres on the southern portion of the existing parcel. The impervious value for the basin is 81%. The 5-year and 100-year runoff coefficients are 0.68 and 0.78, respectively. The runoff for the 5-year and 100-year storm event are 0.32-cfs and 0.68-cfs, respectively. Historically, runoff sheet flows to the south into the 4th Street Right-Of-Way. Once in the Right-Of-Way the flow is captured by an existing public storm sewer infrastructure within the R.O.W.

| EXISTING RUNOFF SUMMARY TABLE | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | COEFFICIENT | | TOTAL RUNOFF | |
| DESIGN POINT | TRIBUTARY BASIN | AREA (AC) | PERCENT IMPERVIOUS | C5 | C100 | Q5 (CFS) | Q100 (CFS) |
| 1 | H-1 | 0.14 | 87% | 0.74 | 0.83 | 0.49 | 1.00 |
| | H-2 | 0.16 | 60% | 0.50 | 0.66 | 0.40 | 0.95 |
| | H-3 | 0.10 | 81% | 0.68 | 0.78 | 0.32 | 0.68 |
| **Total Existing Parcel** | | **0.40** | **74%** | **0.62** | **0.73** | **1.21** | **2.62** |

The proposed redevelopment of the area will include the demolition of the northern residential building to construct a 2,696-sf restaurant and bar area with 800-sf basement. The southwestern commercial building will have the back portion of it demolished and an addition will be added to the building, resulting in a 1,387-sf restaurant and bar area. The southeast building will be redeveloped as a three level restaurant with a total square footage of 4,225-sf restaurant. Sidewalks and rockscape on site are to be removed and replaced with pavers and landscaping. Drainage patterns have been analyzed as three (3) proposed drainage basin for comparison to the existing conditions.

**BASIN P-1 –** Basin P-1 is 0.23 acres and consists of all proposed tap room and southeast restaurant as well as half the existing canopy on site, flowing to the east. The impervious value for the basin is 92%. The 5-year and 100-year runoff coefficients are 0.78 and 0.86, respectively. The runoff for the 5-year and 100-year storm event are 0.87-cfs and 1.74-cfs, respectively. Runoff on site will be picked up by both underground storm infrastructure and sheet flow to the east. Once in the Right-Of-Way the flow is captured by an existing public storm sewer infrastructure.

**BASIN P-2 –** Basin P-2 is 0.11 acres and consists of half the existing canopy as well as sheet flow from the western side of the site. The impervious value for the basin is 86%. The 5-year and 100-year runoff coefficients are 0.73 and 0.84, respectively. The runoff for the 5-year and 100-year storm event are 0.39-cfs and 0.81-cfs, respectively. Runoff on site will flow off site through sheet flow to the west of the property towards Perry Street R.O.W. Once in the Right-Of-Way the flow is captured by an existing public storm sewer infrastructure.

**BASIN P-3 –** Basin P-3 is 0.06 acres and consists the newly proposed Conservatory and Wine and Charcuterie restaurant. The impervious value for the basin is 62%. The 5-year and 100-year runoff coefficients are 0.53 and 0.72, respectively. The runoff for the 5-year and 100-year storm event are 0.15-cfs and 0.38-cfs, respectively. Runoff on site will flow south into the 4th Street R.O.W. Once in the Right-Of-Way the flow is captured by an existing public storm sewer infrastructure.

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| DEVELOPED RUNOFF SUMMARY TABLE | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | COEFFICIENT | | TOTAL RUNOFF | |
| DESIGN POINT | TRIBUTARY BASIN | AREA (AC) | PERCENT IMPERVIOUS | C5 | C100 | Q5 (CFS) | Q100 (CFS) |
| 1 | P-1 | 0.23 | 92% | 0.78 | 0.86 | 0.87 | 1.74 |
| | P-2 | 0.11 | 86% | 0.73 | 0.84 | 0.39 | 0.81 |
| | P-3 | 0.06 | 62% | 0.53 | 0.72 | 0.15 | 0.38 |
| **Total Proposed Parcel** | | **0.40** | **86%** | **0.73** | **0.83** | **1.41** | **2.94** |

As described above, in the existing condition the 0.40-acre parcel is 74% impervious and produces 1.21 cfs and 2.62 cfs in the 5-year and 100-year storm events respectively. In the developed condition, the 0.40-acre project site is 86% impervious and produces 1.41 cfs and 2.94 cfs in the 5-year and 100-year storm events respectively. Although there is a slight increase of both imperviousness and resultant flow from the redevelopment, due to reseeding and updating the existing conditions to newer landscape standards, the amount of flow off-site will be negligible. Additionally, a majority of flows on-site will be directly piped into existing infrastructure, reducing the total sheet flow coming off site. All the main walks through the site have been proposed as pavers to allow additional infiltration in order the soil below instead of running off-site. Therefore, compared to the existing conditions of poorly maintained paver walks and rockscape areas have been improved and no negative effects will result downstream of the existing conditions.

**Stormwater Quality Design Four Step Process**

The proposed development and subsequent lot developments will follow the "Four Step Process" as mandated by the Drainage Criteria Manual as follows:

Step 1: Reduce Runoff Volume to the Maximum Extent Practicable

Runoff has been limited to the maximum extent practicable by utilizing a paver system and roof drain connections to underground storm sewer and reduce the amount of runoff.

Step 2: Provide Water Quality Capture Volume and Flood Control Detention Via Full-Spectrum Detention

Due to existing site size and minimal increase to the developed runoff water quality and detention modifications are not required. Additionally, a majority of flows on-site will be directly piped into existing infrastructure, reducing the total sheet flow coming off site. All the main walks through the site have been proposed as pavers to allow additional infiltration in order the soil below instead of running off-site.

Step 3: Utilize Stream Channel Stabilization Techniques

There are no drainageways adjacent to this project site or onsite.

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Step 4: Undertake Source Control

During initial construction, erosion control measures (CCMs) including vehicle tracking control, stabilized staging area, construction fence, and silt fence will be in place to provide source control of sediment within the site. During interim conditions, inlet protection and rock socks will be installed at proposed inlets and along the proposed curb and gutter within the site. The final condition will provide permanent seeding of all disturbed areas provided per permanent CCM requirements. No other potential pollutants are anticipated with this site post- construction

In addition to the source control measures associated with construction, there are additional measures to be in place with the developed condition. The trash enclosure located at 411 4th Street will be below the 2nd level limiting any runoff from reaching the trash area. In addition, trench drains will be utilized throughout the site that will have grates that will limit large debris from entering the storm system. The site will also utilize general good housekeeping practices and preventative maintenance.

Respectfully submitted,
**Entitlement and Engineering Solutions, Inc**

Krysta Houtchens

Krysta Houtchens, P.E.
Project Manager

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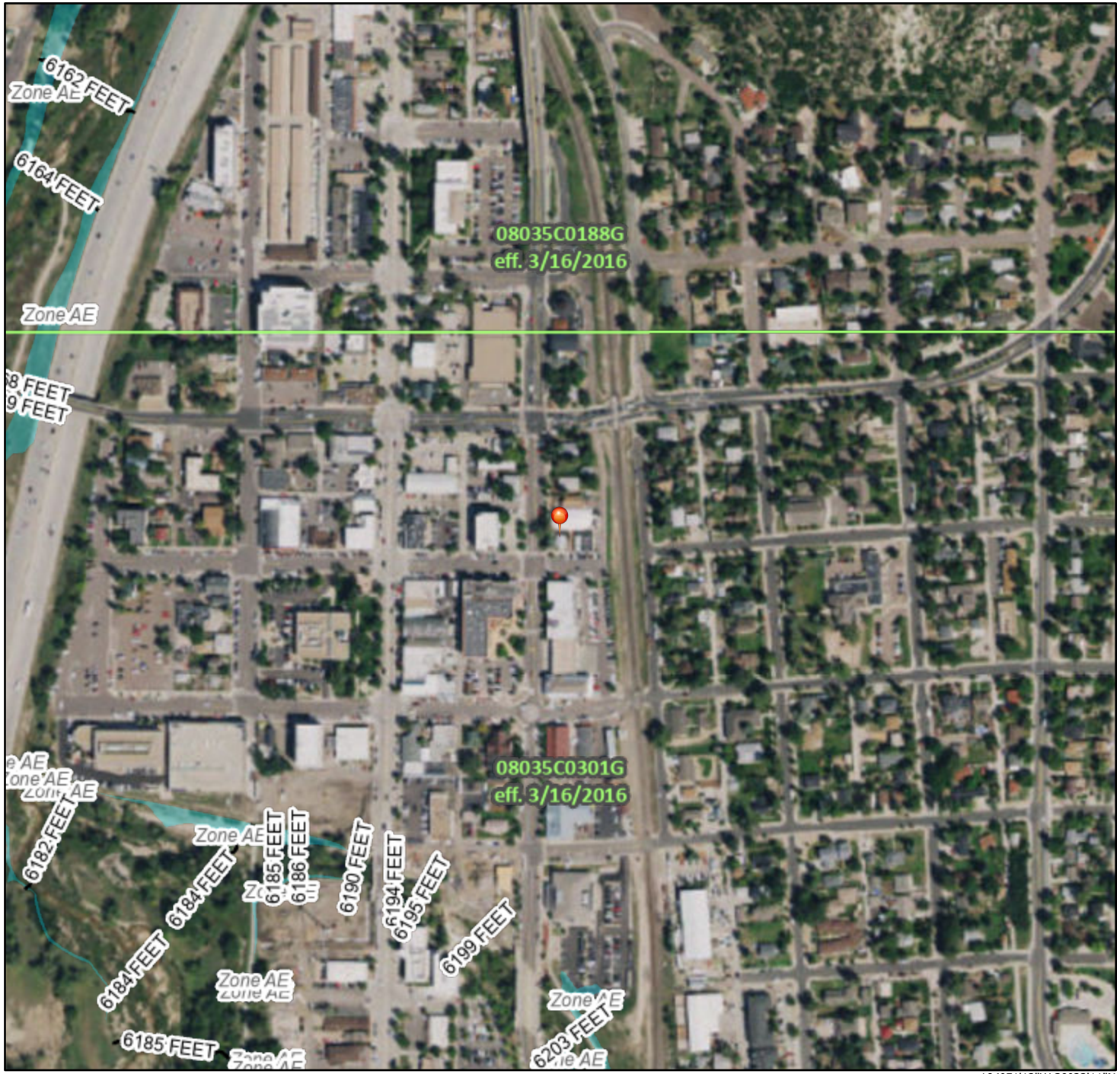
# APPENDIX A

FIRM Map, Hydrologic Soil Map

# National Flood Hazard Layer FIRMette

FEMA

104°51'49"W 39°22'39"N




104°51'12"W 39°22'11"N

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

1:6,000

*Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020*

## 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
- Area of Undetermined Flood Hazard *Zone D*

**GENERAL STRUCTURES**
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

**OTHER FEATURES**
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

**MAP PANELS**
- Digital Data Available
- No Digital Data Available
- Unmapped

N

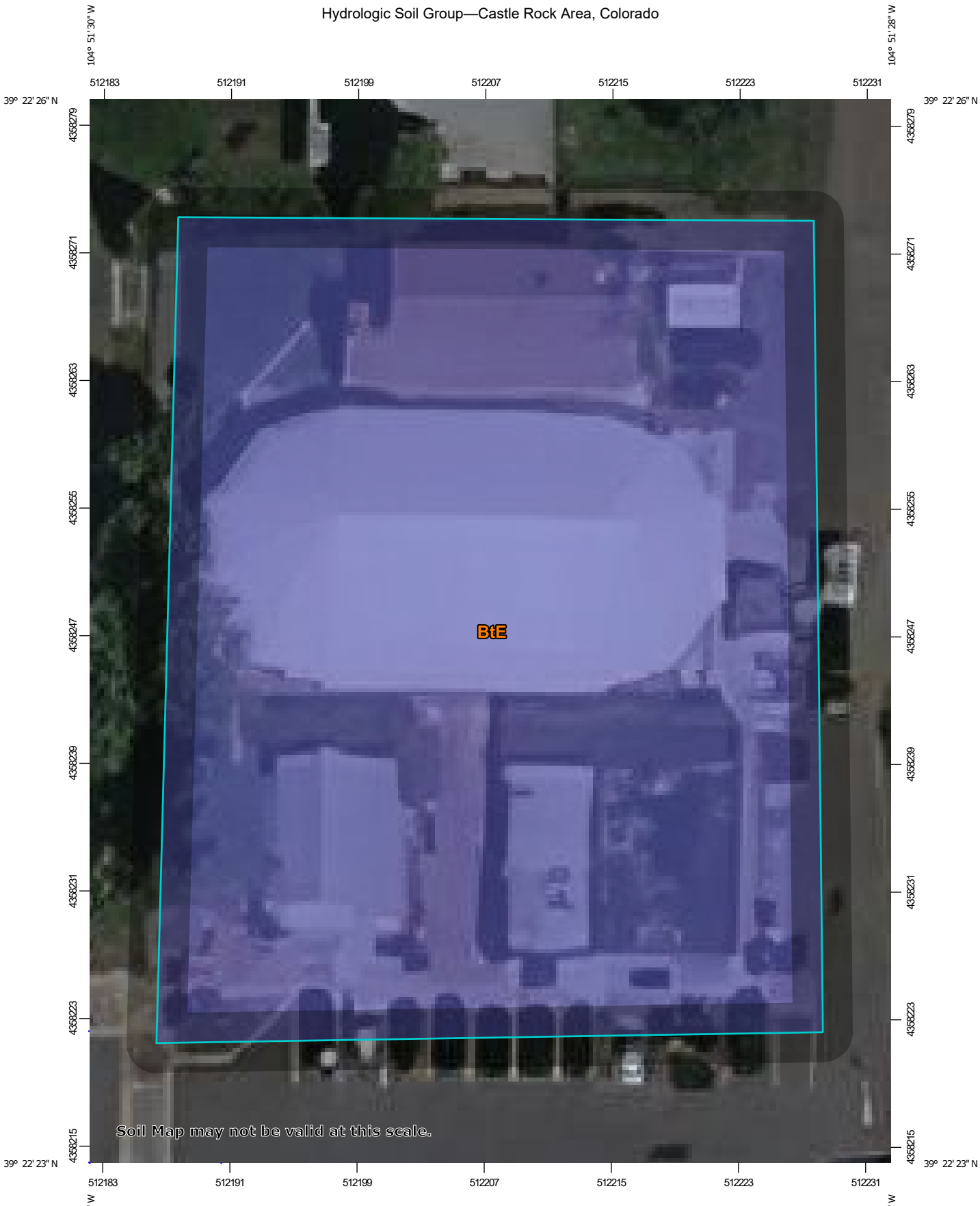
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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 4/12/2022 at 3:07 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.

# Hydrologic Soil Group—Castle Rock Area, Colorado




Map Scale: 1:325 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 4 9 18 27

Feet: 0 15 30 60 90

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

## 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: Castle Rock Area, Colorado
Survey Area Data: Version 14, Aug 31, 2021

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

Date(s) aerial images were photographed: Jul 24, 2018—Nov 19, 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 |
|---|---|---|---|---|
| BtE | Bresser-Truckton sandy loams, 5 to 25 percent slopes | B | 0.5 | 100.0% |
| **Totals for Area of Interest** | | | **0.5** | **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.

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Higher

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# APPENDIX B

Hydrology Calculations (Existing & Developed)

**Runoff Coefficients**

Corridor / Design Package: South Street Social
System Name: Existing and Developed Condition

Computed: KMH Date: 4/12/2022
Checked: KMH Date:

| Sub-Basin Data | | | Composite C | | | Sub Area (Pavement) | | | | Sub Area (Roof) | | | | Sub Area(Lawns B Group soils) 2-7%,>7% | | | | Sub Area(Gravel) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basin ID | Description | Total Area (ac) | $C_5$ | $C_{100}$ | i | $C_5$ | $C_{100}$ | i | Area (ac) | $C_5$ | $C_{100}$ | i | Area (ac) | $C_5$ | $C_{100}$ | i | Area (ac) | $C_5$ | $C_{100}$ | i | Area (ac) |
| H-1 | East | 0.14 | 0.74 | 0.83 | 87 | 0.86 | 0.89 | 100 | 0.04 | 0.76 | 0.84 | 90 | 0.09 | 0.01 | 0.44 | 2 | 0.00 | 0.32 | 0.61 | 40 | 0.01 |
| H2 | West | 0.16 | 0.50 | 0.66 | 60 | 0.86 | 0.89 | 100 | 0.02 | 0.76 | 0.84 | 90 | 0.08 | 0.01 | 0.44 | 2 | 0.04 | 0.32 | 0.61 | 40 | 0.02 |
| H-3 | South | 0.10 | 0.68 | 0.78 | 81 | 0.86 | 0.89 | 100 | 0.02 | 0.76 | 0.84 | 90 | 0.07 | 0.01 | 0.44 | 2 | 0.01 | 0.32 | 0.61 | 40 | 0.00 |
| E-Total | Total Site | 0.40 | 0.62 | 0.73 | 74.3 | 0.86 | 0.89 | 100 | 0.07 | 0.76 | 0.84 | 90 | 0.24 | 0.01 | 0.44 | 2 | 0.05 | 0.32 | 0.61 | 40 | 0.03 |
| | | | | | | | | | | | | | | | | | | | | | |
| P-1 | East | 0.23 | 0.78 | 0.86 | 92.2 | 0.86 | 0.93 | 100 | 0.05 | 0.76 | 0.84 | 90 | 0.18 | 0.01 | 0.44 | 2 | 0.00 | 0.32 | 0.61 | 40 | 0.00 |
| P-2 | West | 0.11 | 0.73 | 0.84 | 85.6 | 0.86 | 0.93 | 100 | 0.04 | 0.76 | 0.84 | 90 | 0.06 | 0.01 | 0.44 | 2 | 0.01 | 0.32 | 0.61 | 40 | 0.00 |
| P-3 | South | 0.06 | 0.53 | 0.72 | 62.3 | 0.86 | 0.93 | 100 | 0.01 | 0.76 | 0.84 | 90 | 0.03 | 0.01 | 0.44 | 2 | 0.02 | 0.32 | 0.61 | 40 | 0.00 |
| P-Total | Total Site | 0.40 | 0.73 | 0.83 | 85.9 | 0.86 | 0.93 | 100 | 0.10 | 0.76 | 0.84 | 90 | 0.27 | 0.01 | 0.44 | 2 | 0.03 | 0.32 | 0.61 | 40 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | | |

C and I values taken from Table 63 of the UDFCD

**Standard Form SF-1 . Time of Concentration**

Corridor / Design Package: South Street Social
System Name: Existing and Developed Condition

Computed: MRD Date: 6/18/2021
Checked: KMH Date:

Urban TOC $_{min}$ = 5 min
Rural TOC $_{min}$ = 10 min

| | SUB-BASIN DATA | | | INITIAL/OVERLAND FLOW ($t_o$) | | | TRAVEL TIME ($t_t$) | | | | | | | | Tc CHECK (Urbanized basins) | | | | FINAL Tc (min) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Type of Land Surface | | | | | TOTAL | | | | | |
| Basin ID | Description | Area (ac) | $C_5$ | Length (ft) | Slope (ft/ft) | $t_o$ (min) | Length (ft) | $S_w$ (ft/ft) | Code | Description | Convey Coef ($C_v$) | Velocity (ft/s) | $t_t$ Travel Time (min) | $t_c = t_i + t_t$ (min) | Urban (Yes /No) | Length (ft) | $T_{c\,max}$ (min) | $Tc_{max} > t_c$ | |
| H-1 | | 0.14 | 0.74 | 20 | 0.022 | 2.24 | 0 | 0 | 6 | Paved areas and shallow paved swales | 20.00 | 0.00 | 0.00 | 2.24 | YES | 20.00 | 0.17 | Regional Tc | 5.00 |
| H2 | | 0.16 | 0.50 | 20 | 0.020 | 3.83 | 0 | 0 | 6 | Paved areas and shallow paved swales | 20.00 | 0.00 | 0.00 | 3.83 | YES | 20.00 | 0.17 | Regional Tc | 5.00 |
| H-3 | | 0.10 | 0.68 | 20 | 0.020 | 2.68 | 0 | 0 | 6 | Paved areas and shallow paved swales | 20.00 | 0.00 | 0.00 | 2.68 | YES | 20.00 | 0.17 | Regional Tc | 5.00 |
| EX-Total | | 0.40 | 0.62 | | 0.020 | 0.00 | 0 | 0 | 6 | Paved areas and shallow paved swales | 20.00 | 0.00 | 0.00 | 0.00 | YES | 0.00 | 0.06 | Check | 5.00 |
| P-1 | | 0.23 | 0.78 | 20 | 0.013 | 2.39 | 0 | 0 | 5 | Grassed waterway | 15.00 | 0.00 | 0.00 | 2.39 | YES | 20.00 | 0.17 | Regional Tc | 5.00 |
| P-2 | | 0.11 | 0.73 | 20 | 0.025 | 2.22 | 0 | 0 | 6 | Paved areas and shallow paved swales | 20.00 | 0.00 | 0.00 | 2.22 | YES | 20.00 | 0.17 | Regional Tc | 5.00 |
| P-3 | | 0.06 | 0.53 | 20 | 0.023 | 3.52 | 0 | 0 | 6 | Paved areas and shallow paved swales | 20.00 | 0.00 | 0.00 | 3.52 | YES | 20.00 | 0.17 | Regional Tc | 5.00 |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |

Velocity from $V = C_v * S_w^{0.5}$, from MHFD Eqn RO-4, $C_v$ from Table 6-5 (See Sheet Design Info)
$t_t = L/60V$, from MHFD Eqn 6-4
tc max = 10+L/180, from MHFD Eqn 6-5
Final Tc > 10 min for nonurban watersheds

| Code | Description |
|---|---|
| 1 | Heavy meadow |
| 2 | Tillage/field |
| 3 | Short pasture and lawns |
| 4 | Nearly bare ground |
| 5 | Grassed waterway |
| 6 | Paved areas and shallow paved swales |
| 7 | Rail Ballast |

**Standard Form SF-2 . Storm Drainage System Design (Rational Method Procedure)**

Corridor / Design Package: South Street Social
System Name: Existing and Developed Condition

Computed: KMH Date: 4/12/2022
Checked: KMH Date:

Design Storm: Proposed 5-yr P = 1.43 in

| LOCATION | | DESIGN POINT | DIRECT RUNOFF | | | | | | | TOTAL RUNOFF | | | | STREET | | PIPE | | | TRAVEL TIME | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AREA DESIGN | AREA (AC) | RUNOFF COEFF | $t_c$ (MIN) | C.A. (AC) | IIN / HR | Q (CFS) | $t_c$ (MIN) | SUM (C*A)(AC) | I(IN / HR) | Q(CFS) | SLOPE(%) | STREETFLOW (Q | DESIGNFLOW (C | SLOPE(%) | PIPE SIZE(in) | LENGTH(FT) | VELOCITY(FPS) | $t_t$ (MIN | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) | (21) | (22) |
| H-1 | East | | H-1 | 0.14 | 0.74 | 5.00 | 0.101 | 4.85 | 0.49 | | | | | -- | -- | -- | -- | -- | -- | -- | | |
| H2 | West | | H2 | 0.16 | 0.50 | 5.00 | 0.082 | 4.85 | 0.40 | | | | | -- | -- | -- | -- | -- | -- | -- | | |
| H-3 | South | | H-3 | 0.10 | 0.68 | 5.00 | 0.067 | 4.85 | 0.32 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| E-Total | Total Site | 1 | E-Total | 0.40 | | | | | | 5.00 | 0.250 | 4.85 | 1.21 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| P-1 | East | | P-1 | 0.23 | 0.78 | 5.00 | 0.180 | 4.85 | 0.87 | | | | | -- | -- | -- | -- | -- | -- | -- | | |
| P-2 | West | | P-2 | 0.11 | 0.73 | 5.00 | 0.080 | 4.85 | 0.39 | | | | | | | | | | | | | |
| P-3 | South | | P-3 | 0.06 | 0.53 | 5.00 | 0.032 | 4.85 | 0.15 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| P-Total | Total Site | | P-Total | 0.40 | | | | | | 5.00 | 0.292 | 4.85 | 1.41 | | | | | | | | | |

Proposed 100-yr P = 2.60 in

| LOCATION | | DESIGN POINT | DIRECT RUNOFF | | | | | | | TOTAL RUNOFF | | | | STREET | | PIPE | | | TRAVEL TIME | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AREA DESIGN | AREA (AC) | RUNOFF COEFF | $t_c$ (MIN) | C.A. (AC) | IIN / HR | Q (CFS) | $t_c$ (MIN) | SUM (C*A)(AC) | I(IN / HR) | Q(CFS) | SLOPE(%) | STREETFLOW (Q | DESIGNFLOW (C | SLOPE(%) | PIPE SIZE(in) | LENGTH(FT) | VELOCITY(FPS) | $t_t$ (MIN | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) | (21) | (22) |
| H-1 | East | | H-1 | 0.14 | 0.83 | 5.00 | 0.114 | 8.82 | 1.00 | | | | | -- | -- | -- | -- | -- | -- | -- | | |
| H2 | West | | H2 | 0.16 | 0.66 | 5.00 | 0.107 | 8.82 | 0.95 | | | | | -- | -- | -- | -- | -- | -- | -- | | |
| H-3 | South | 2 | H-3 | 0.10 | 0.78 | 5.00 | 0.077 | 8.82 | 0.68 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| E-Total | Total Site | 2 | E-Total | 0.40 | | | | | | 5.00 | 0.298 | 8.82 | 2.62 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| P-1 | East | | P-1 | 0.23 | 0.86 | 5.00 | 0.198 | 8.82 | 1.74 | | | | | -- | -- | -- | -- | -- | -- | -- | | |
| P-2 | West | | P-2 | 0.11 | 0.84 | 5.00 | 0.092 | 8.82 | 0.81 | | | | | | | | | | | | | |
| P-3 | South | | P-3 | 0.06 | 0.72 | 5.00 | 0.043 | 8.82 | 0.38 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| P-Total | Total Site | | P-Total | 0.40 | | | | | | 5.00 | 0.333 | 8.82 | 2.94 | | | | | | | | | |

(1) Basin Description linked to C-Value Sheet
(2) Basin Design Point
(3) Enter the Basin Name from C Value Sheet
(4) Basin Area linked to C-Value Sheet
(5) Composite C linked to C-Value Sheet
(6) Time of Concentration linked to C-Value Sheet
(7) =Area x Runoff Coeff
(8) =28.5*P/(10+$t_c$)^0.786
(9) =C.A. x IN/HR
(10) =Column 6 + Column 21
(11) Add the Basin Areas (7) to get the combined basin AC
(12) =28.5*P/(10+Column 10)^0.786
(13) Sum of Qs
(14) Additonal Street Overland Flow
(15) Additonal Street Overland Flow
(16) Design Pipe Flow
(17) Pipe Slope
(18) Pipe Size
(19) Additional Flow Length
(20) Velocity
(21) =Column 19 / Column 20 / 60

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# APPENDIX C

MS4 Compliance Summary

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

**Project:** **CRW#** **Applicant:**

| Section | Questions | Response | Check those that apply | Instructions |
|---|---|---|---|---|
| **1** | **Non-applicable Sites** | | | |
| | Will the project result in a temporary disturbance of greater than one acre? | No | X | Proceed to next line. |
| | | Yes | ☐ | Proceed to section 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 | X | Proceed to next line. |
| | | Yes | ☐ | Proceed to section 2. |
| | Is the project within the Cherry Creek Watershed? | Yes | ☐ | Exclusions do not apply. Permanent water quality is required per Control Regulation 72.7. |
| | | No | X | Permanent water quality is not required. No further action is required. |
| **2** | **Applicable Site Types and Exclusions by Variance** | | | |
| | Does the project have more than 35% impervious area on the existing site? | No | ☐ | Project is an applicable Development Site. Proceed to section 3. |
| | | Yes | ☐ | Proceed to next line. |
| | Does the project have greater than 75% impervious area on the existing site? | No | ☐ | Project is an applicable Redevelopment Site. Proceed to section 3. |
| | | Yes | ☐ | Proceed to next line. |
| | Will 100% of the runoff from the existing and proposed site be captured and treated for permanent water quality? | Yes | ☐ | Document in drainage report. No further action required. |
| | | No | ☐ | Proceed to next line. |
| | Do any other water quality exclusions apply to the site? | No | ☐ | Portions of the project are excluded. Proceed with design in accordance with Constrained Redevelopment standards and apply for **variance** for Constrained Redevelopment Sites. |
| | | Yes | ☐ | Proceed to next section. Following approval of other variances, design remaining site in accordance with Constrained Redevelopment standards and apply for **variance** for Constrained Redevelopment Sites. |
| **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 | ☐ | Proceed to next line. |
| | | No | ☐ | Proceed to 3.1.2. |
| | Is the trail for a roadway? | Yes | ☐ | Proceed to 3.1.2. |
| | | No | ☐ | Project is excluded. Submit **variance** for Trails Excluded from Permanent Water Quality Requirements. |
| 3.1.2 | Is the project primarily used for parking or access to parking? | Yes | ☐ | This exclusion does not apply. Permanent water quality is required. |
| | | No | ☐ | Proceed to 3.1.3. |
| 3.1.3 | Does the project add impervious area? | No | ☐ | Project is excluded. Submit **variance** for Pavement Management Sites Excluded from Permanent Water Quality Requirements. |
| | | Yes | ☐ | Proceed to 3.1.4. |

| | | | | |
|---|---|---|---|---|
| 3.1.4 | Does the project add more than 8.25 feet of paved width at any location to the existing roadway? | No | □ | Project is excluded. Submit **variance** for Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements. |
| | | Yes | □ | Proceed to next line. |
| | Does the project add more than one acre of paved area per mile to an existing roadway? | No | □ | Project is excluded. Submit **variance** for Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements. |
| | | Yes | □ | Proceed to next line. |
| | Does the project increase the width by two times or more, on average, of the original roadway area? | No | □ | Existing areas of site are excluded only. Submit **variance** for Existing Roadway Surfaces Only Excluded from Permanent Water Quality Requirements. |
| | | Yes | □ | 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 | □ | Project is excluded. Submit **variance** for Oil and Gas Exploration Sites Excluded from Permanent Water Quality Requirements. |
| | | No | □ | Proceed to 3.2.2. |
| 3.2.2 | Is the project for stream stabilization? | Yes | □ | Project is excluded. Submit **variance** for Stream Stabilization Sites Excluded from Permanent Water Quality Requirements. |
| | | No | □ | Proceed to 3.2.3. |
| 3.2.3 | Is the project for installation or maintenance of 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 | □ | Project is excluded. Submit **variance** for Aboveground and Underground Utilities Excluded from Permanent Water Quality Requirements. |
| | | No | □ | 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 | □ | Project is excluded. Submit **variance** for Sites with Land Disturbances to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements. |
| | | No | □ | 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 | □ | Project is excluded. Submit **study** along with **variance** for Non-residential and Non-commercial Infiltration Conditions Excluded from Permanent Water Quality Requirements. |
| | | Yes | □ | This exclusion does not apply. Permanent water quality is required. |
| **3.3** | **Category 3: Residential 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 | □ | Proceed to next line. |
| | | No | □ | Proceed to 3.3.2. |
| | Is the project site greater than 10% impervious? | No | □ | Project is excluded. Submit **variance** for Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements. |
| | | Yes | □ | Proceed to next line. |
| | Is the project site greater than 20% impervious? | Yes | □ | This exclusion does not apply. Permanent water quality is required. |
| | | No | □ | Proceed to next line. |
| | Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event? | No | □ | Project is excluded. Submit **study** along with **variance** for Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements. |
| | | Yes | □ | This exclusion does not apply. Permanent water quality is required. |

| | | | | |
|---|---|---|---|---|
| 3.3.2 | Will 100% of the runoff from the residential or commercial site be captured? | Yes | □ | This exclusion does not apply. Permanent water quality is required. |
| | | No | □ | Proceed to next line. |
| | Is all or a portion of the site undeveloped or will it remain undeveloped after construction? | Yes | □ | This portion of the project is excluded. Submit **variance** for Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements. Proceed to next line. |
| | | No | □ | Proceed to next line. |
| | Is the remaining untreated impervious area greater than 20% of the site? | Yes | □ | This exclusion does not apply. Permanent water quality is required. |
| | | No | □ | Proceed to next line. |
| | Is the remaining untreated impervious area greater than one acre? | Yes | □ | This exclusion does not apply. Permanent water quality is required. |
| | | No | □ | Proceed to next line. |
| | Is it practicable to capture runoff from portions of the site that will not drain to a control measure? | No | □ | 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. |
| | | Yes | □ | This exclusion does not apply. Permanent water quality is required. |

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# APPENDIX D

Permanent Water Quality Certification

# 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** Perry Street Social

**Project Owner** Perry Street Collective LLC

**Project Location** NEC of 4th Street and Perry Street

**ToCR Project Number** SDP21-0046

**Total Site Area** 0.40 acres **acres**

**Total Size of Common Plan of Development** 0.40 Acres **acres**

**Check all that apply:**

- ☑ **Project within Plum Creek Basin**
- ☐ **Project within Cherry Creek Basin**

**Estimated construction completion date** September 2022

---

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 0.32 / 0.40 (Imp. Ac/Site Ac) = 74.3 %
     - 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

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# APPENDIX E

Drainage Maps

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# PERRY STREET SOCIAL DISTRICT - SITE DEVELOPMENT PLAN
# LOT 4A, BLOCK 11 OF THE TOWN OF CASTLE ROCK

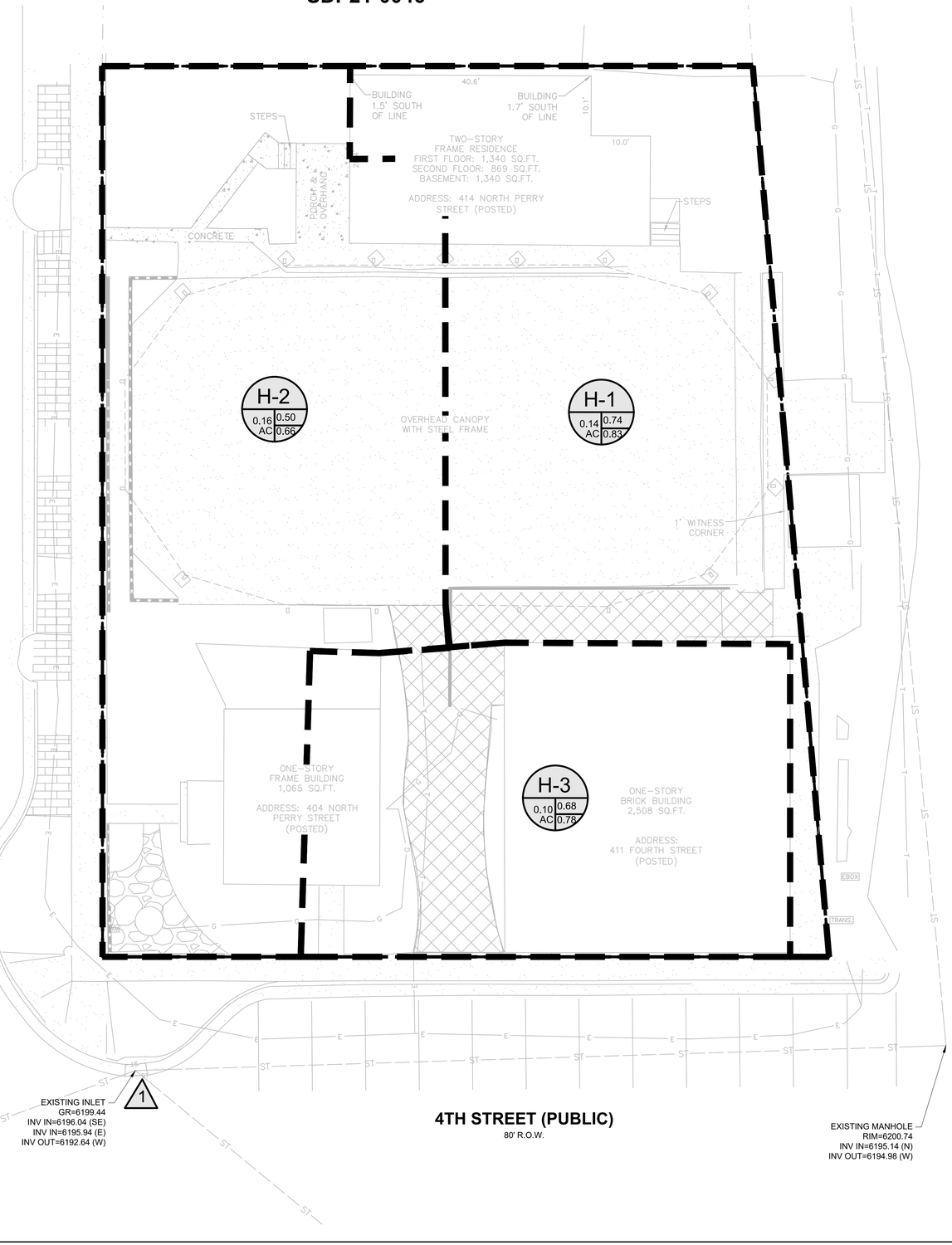
**LOCATED IN THE NORTHEAST QUARTER OF SECTION 11,**
**TOWNSHIP 8 SOUTH, RANGE 67 WEST OF THE 6TH P.M.**
**TOWN OF CASTLE ROCK, COUNTY OF DOUGLAS, STATE OF COLORADO**

## SDP21-0046

N

0 10 20

1 INCH = 10 FT.




## HISTORIC DRAINAGE LEGEND

- PROPERTY BOUNDARY
- EXISTING EASEMENT
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- HISTORIC BASIN DELINEATION
- EXISTING SANITARY SEWER
- EXISTING WATER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND COMMUNICATION
- EXISTING GAS
- EXISTING STORM INLET AND MANHOLE
- HISTORIC DRAINAGE FLOW ARROWS
- DESIGN POINT
- BASIN DESIGNATION
- 5-YEAR RUNOFF COEFFICIENT
- 100-YEAR RUNOFF COEFFICIENT
- BASIN AREA IN ACRES

H-1 | 0.94 AC | 0.68 | 0.81

| HISTORIC RUNOFF SUMMARY TABLE | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | COEFFICIENT | | TOTAL RUNOFF | |
| DESIGN POINT | TRIBUTARY BASIN | AREA (AC) | PERCENT IMPERVIOUS | C5 | C100 | Q5 (CFS) | Q100 (CFS) |
| 1 | H-1 | 0.14 | 87% | 0.74 | 0.83 | 0.49 | 1.00 |
| | H-2 | 0.16 | 60% | 0.50 | 0.66 | 0.40 | 0.95 |
| | H-3 | 0.10 | 81% | 0.68 | 0.78 | 0.32 | 0.68 |
| **Total Existing Parcel** | | **0.40** | **74%** | **0.62** | **0.73** | **1.21** | **2.62** |

Know what's below. Call before you dig.

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987 or 811
CALL 3-BUSINESS DAYS (NOT INCLUDING INITIAL DAY OF CONTACT) IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

SITE DEVELOPMENT PLAN
LOT 4A BLOCK 11 TOWN OF CASTLE ROCK
TOWN OF CASTLE ROCK PROJECT NO. SDP21-0046

| No. | REVISION | BY | DATE |
|---|---|---|---|

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SITE DEVELOPMENT PLAN
PERRY STREET SOCIAL DISTRICT
410 PERRY STREET, CASTLE ROCK, CO 80104
**EXISTING DRAINAGE MAP**

| | |
|---|---|
| PROJECT NO: | PER001.01 |
| DESIGNED BY: | MRD |
| DRAWN BY: | MRD |
| DATE: | 08/27/2021 |

**DR-01**

4/12/2022 3:01 PM P:\PERRY STREET SOCIAL DISTRICT\CO, CASTLE ROCK - PERRY STREET SOCIAL (4TH & PERRY)\08 CAD\EXHIBIT SHEETS\EXISTING DRAINAGE MAP.DWG

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# SITE DEVELOPMENT PLAN
# PERRY STREET SOCIAL DISTRICT

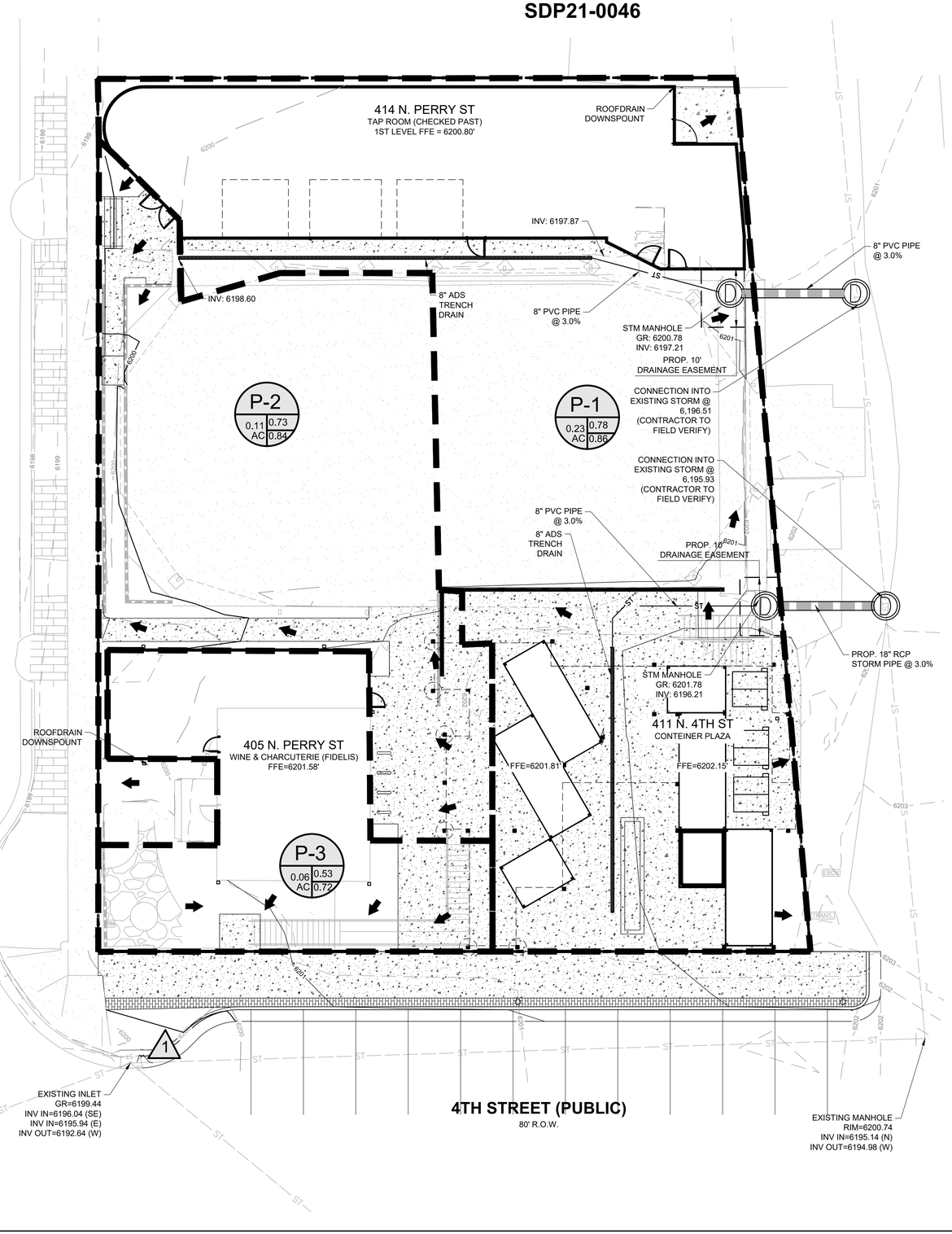
**LOT 4A, BLOCK 11 OF THE TOWN OF CASTLE ROCK**
**LOCATED IN THE NORTHEAST QUARTER OF SECTION 11,TOWNSHIP 8 SOUTH, RANGE 67 WEST OF THE 6TH P.M.**
**TOWN OF CASTLE ROCK, COUNTY OF DOUGLAS, STATE OF COLORADO**

## SDP21-0046

N

0 10 20

1 INCH = 10 FT.




## HISTORIC DRAINAGE LEGEND

- PROPERTY BOUNDARY
- EXISTING EASEMENT
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- HISTORIC BASIN DELINEATION
- EXISTING SANITARY SEWER
- EXISTING WATER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND COMMUNICATION
- EXISTING GAS
- EXISTING STORM INLET AND MANHOLE
- HISTORIC DRAINAGE FLOW ARROWS
- 1 — DESIGN POINT
- P-1 (0.94 AC, 0.68, 0.81) — BASIN DESIGNATION; 5-YEAR RUNOFF COEFFICIENT; 100-YEAR RUNOFF COEFFICIENT; BASIN AREA IN ACRES

**PROPOSED RUNOFF SUMMARY TABLE**

| DESIGN POINT | TRIBUTARY BASIN | AREA (AC) | PERCENT IMPERVIOUS | COEFFICIENT C5 | COEFFICIENT C100 | TOTAL RUNOFF Q5 (CFS) | TOTAL RUNOFF Q100 (CFS) |
|---|---|---|---|---|---|---|---|
| 1 | P-1 | 0.23 | 92% | 0.78 | 0.86 | 0.87 | 1.74 |
| | P-2 | 0.11 | 86% | 0.73 | 0.84 | 0.39 | 0.81 |
| | P-3 | 0.06 | 62% | 0.53 | 0.72 | 0.15 | 0.38 |
| **Total Proposed Parcel** | | **0.40** | **86%** | **0.73** | **0.83** | **1.41** | **2.94** |

811 Know what's below. Call before you dig.

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987 or 811
CALL 3-BUSINESS DAYS (NOT INCLUDING INITIAL DAY OF CONTACT) IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

SITE DEVELOPMENT PLAN
LOT 4A BLOCK 11 TOWN OF CASTLE ROCK
TOWN OF CASTLE ROCK PROJECT NO. SDP21-0046

| No. | REVISION | BY | DATE |
|---|---|---|---|
| | | | |

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SITE DEVELOPMENT PLAN
PERRY STREET SOCIAL DISTRICT
410 PERRY STREET, CASTLE ROCK, CO 80104
**PROPOSED DRAINAGE MAP**

| | |
|---|---|
| PROJECT NO: | PER001.01 |
| DESIGNED BY: | KMH |
| DRAWN BY: | KMH |
| DATE: | 08/27/2021 |

**DR-02**

8/9/2022 5:13 PM P:\PERRY STREET SOCIAL DISTRICT\CO, CASTLE ROCK - PERRY STREET SOCIAL (4TH & PERRY)\08 CAD\EXHIBITS\PROPOSED DRAINAGE MAP.DWG