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April 10, 2026

Town of Parker
Public Works Department
20120 E. Mainstreet
Parker, Colorado 80138

Subject: Horse Creek Commercial
Lot 10B, Douglas 234 Filing No. 6, Amendment 2
Drainage Conformance Letter

This letter and the attached drainage plan have been prepared for verification that the proposed improvements to the project site are in conformance with the approved drainage report for the original site development ("Final Drainage Report for Chambers and Hess Filing No. 1, Parker, Colorado", prepared by Rick Engineering Company on January 25, 2021).

The project site is platted as Lot 10B, Douglas 234 Filing No. 6, Amendment 2. It is located in the SE ¼, Section 29, Township 6 South, Range 66 West of the Sixth Principal Meridian in the Town of Parker, Douglas County, Colorado. According to FEMA Flood Insurance Rate Map 08035C0181G, dated March 16, 2016 this property is located in Zone X which is defined as "Area of Minimal Flood Hazard".

Proposed improvements consist of the construction of a 15,877 sf office building along with concrete walks, a paved parking lot and landscaped areas.

This project qualifies as a Tier 3 Development according to Section 8.3 of the Town of Parker Storm Drainage and Environmental Criteria Manual (SDECM). Therefore, a permanent BMP is required to provide WQCV designed and constructed to capture and treat, at a minimum, the 80th percentile runoff event, in accordance with the SDECM and Mile High Flood District criteria. Detention Pond "A", located in the northeast corner of Douglas 234 Filing 1 (approximately 1,200 feet to the east) meets this requirement. According to "Final Drainage Report for the Douglas 234 Subdivision Parker Colorado", prepared by CVL Consultants of Colorado, Inc. on April 29, 2003 this pond provides detention and water quality treatment for 44.42 acres of land in Douglas 234 Filing 1, including the project site. All runoff from the project site will be captured by private storm sewer and conveyed to Pond "A".

The project site has been divided into the following five basins for drainage analysis:

Basin A (0.36 acres, I=95%) contains the proposed building. All runoff from Basin A will be collected by a roof drain system at Design Point 1 and will be piped to the existing storm sewer on the east edge of the property. The 5-year and 100-year flowrates at Design Point 1 will be 1.4 cfs and 2.8 cfs, respectively. The overflow route is southerly to Basin C.

Basin B (0.18 acres, I=95%) contains pavement along the north edge of adjacent Lots 8A and 9A. Runoff will surface-drain to Basin C. The 5-year and 100-year flowrates at Design Point 2 will be 0.7 cfs and 1.4 cfs, respectively.

Basin C (0.72 acres, I=87%) contains the onsite parking lot, concrete walks and some small landscaped areas. Runoff from Basin C will also drain to a double Type 16 combination inlet in a 6" sump at Design Point 3. The cumulative 5-year and 100-year flowrates at Design Point 3 will be 3.1 cfs and 6.6 cfs, respectively.

Basin C also contains a single, on-grade Type 16 combination inlet a short distance uphill from the double inlets in the sump at Design Point 3. Only a small portion of Basin C is tributary to the single inlet, plus it is located on a 5% slope. Therefore, only a small amount of runoff will actually be collected by this inlet. Its main purpose is as a junction box to accept piped flows from the south and west, then pipe them out to the east to connect to an existing manhole. Therefore, it simplifies calculations to just assume that all flows bypass the single, on-grade inlet and continue downstream to the double Type 16 combination inlet at Design Point 3.

Basin D (0.32 acres, I=25%) contains landscaped areas on the west and east sides of the property. Runoff will drain to an existing Type D inlet in a 12" sump at Design Point 4. The 5-year and 100-year flowrates at Design Point 4 will be 0.3 cfs and 1.5 cfs, respectively.

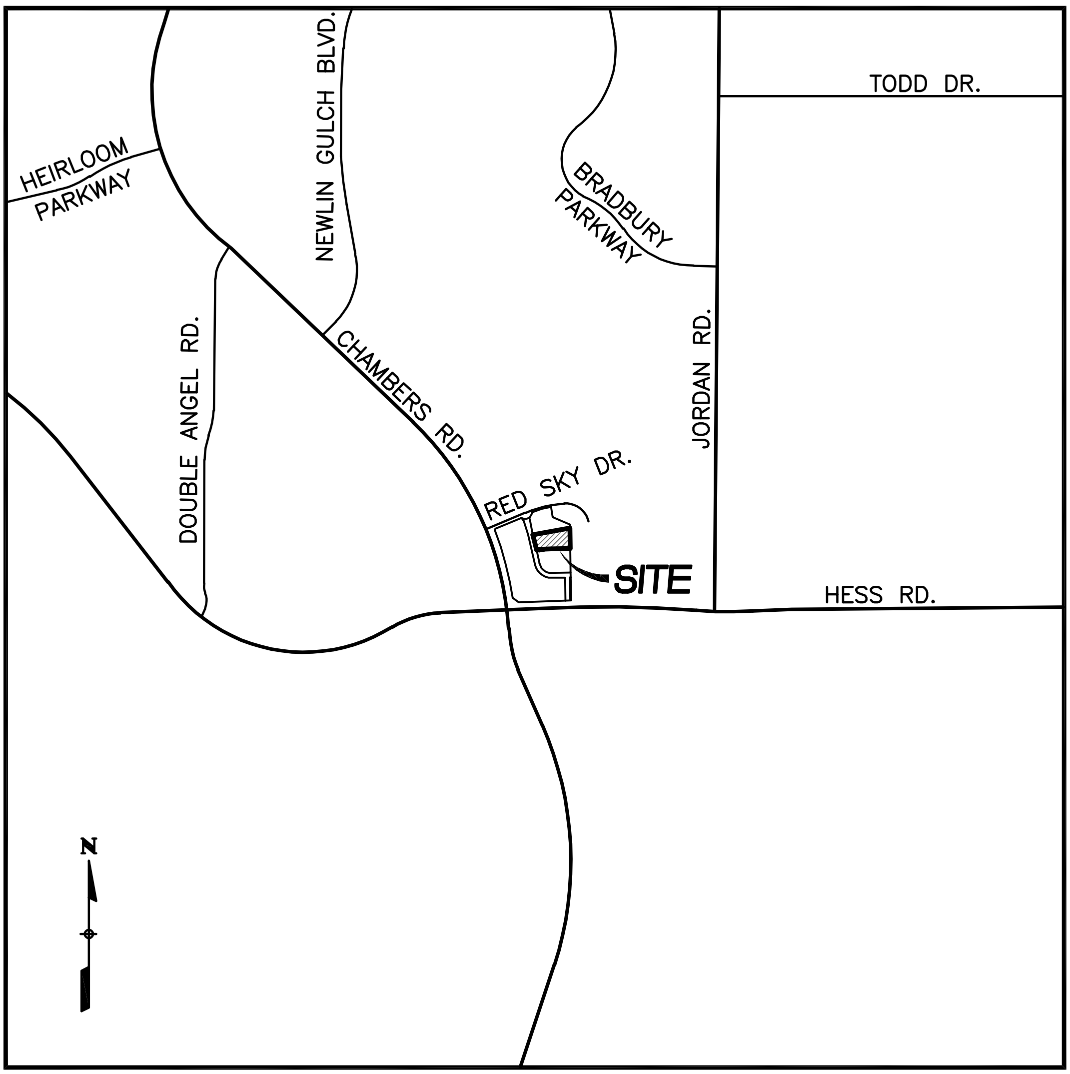
Basin E (0.16 acres, I=20%) contains a landscaped slope on the east edge of the property. This basin will not be disturbed by the proposed development. Runoff will continue to sheetflow easterly to the adjacent single-family development. The 5-year and 100-year flowrates at Design Point 5 are 0.1 cfs and 0.7 cfs, respectively.

According to the Rick Engineering Report the project site was analyzed as Basin A13. This basin had an assumed imperviousness of 75% with 5-year and 100-year runoff rates of 4.9 cfs and 11.1 cfs, respectively. We have calculated a composite site imperviousness of 72% and total site runoff rates (including offsite Basin B) of 3.5 cfs and 8.8 cfs. Therefore, we conclude that all downstream storm sewer has more than adequate capacity to accept the developed runoff from the project site.

Existing public storm sewer will convey collected flows easterly to the existing detention and water quality facility known as "Pond A" which is located approximately 1,200 feet to the east, in Tract G, Douglas 234 Filing 1, 1st Amendment. This detention facility was sized to serve all of Douglas 234 Filing 1, including the project site. Runoff is released at regulated rates to storm sewer which carries flows northerly to KOA Tributary, which flows approximately 1 mile northeast to Cherry Creek.

The proposed drainage patterns and peak flowrates for Lot 10B, Douglas 234 Filing No. 6, Amendment 2 are in substantial compliance with the previously approved drainage study. Therefore, no additional improvements to drainage infrastructure are required for the development of this site.

Vermilion Peak Engineering LLC
Brian Krombein, PE, PLS
Colorado PE No. 34294



VICINITY MAP

SCALE: 1"=2000'

National Flood Hazard Layer FIRMette

FEMA

104°48'19"W 39°29'55"N

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

1:6,000

104°47'42"W 39°29'27"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
- Area of Undetermined Flood Hazard *Zone D*

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

OTHER FEATURES
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 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 1/29/2025 at 10:53 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

Map Scale: 1:644 if printed on A landscape (11" x 8.5") sheet.

Meters: 0 5 10 20 30

Feet: 0 30 60 120 180

N

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 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 17, Aug 29, 2024

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
NsE	Newlin-Satanta complex, 5 to 20 percent slopes	1.5	100.0%
Totals for Area of Interest		**1.5**	**100.0%**

Castle Rock Area, Colorado

NsE—Newlin-Satanta complex, 5 to 20 percent slopes

Map Unit Setting

National map unit symbol: jqzh
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: 50 percent
Satanta and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Newlin

Setting

Landform: Knobs, drainageways
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
H3 - 17 to 22 inches: gravelly sandy loam
H4 - 22 to 60 inches: very gravelly sand

Properties and qualities

Slope: 5 to 20 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: R049XC202CO - Loamy Foothill Palmer Divide
Hydric soil rating: No

Description of Satanta

Setting

Landform: Knobs, drainageways
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from mixed

Typical profile

H1 - 0 to 9 inches: loam
H2 - 9 to 30 inches: clay loam
H3 - 30 to 60 inches: loam

Properties and qualities

Slope: 5 to 10 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 (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Bresser

Percent of map unit: 6 percent
Hydric soil rating: No

Buick

Percent of map unit: 6 percent
Hydric soil rating: No

Truckton

Percent of map unit: 6 percent
Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 2 percent
Landform: Swales

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Castle Rock Area, Colorado
Survey Area Data: Version 17, Aug 29, 2024

2.4.1 Initial or Overland Flow Time

The initial or overland flow time, t_i, may be calculated using Equation 6-3:

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_o^{0.33}}$$ Equation 6-3

Where:

t_i = overland (initial) flow time (minutes)
C_5 = runoff coefficient for 5-year frequency (from Table 6-4)
L_i = length of overland flow (ft)
S_o = average slope along the overland flow path (ft/ft).

Equation 6-3 is adequate for distances up to 300 feet in urban areas and 500 feet in rural areas. Note that in a highly urbanized catchment, the overland flow length is typically shorter than 300 feet due to effective man-made drainage systems that collect and convey runoff.

2.4.2 Channelized Flow Time

The channelized flow time (travel time) is calculated using the hydraulic properties of the conveyance element. The channelized flow time, t_t, is estimated by dividing the length of conveyance by the velocity. The following equation, Equation 6-4 (Guo 2013), can be used to determine the flow velocity in conjunction with Table 6-2 for the conveyance factor.

$$t_t = \frac{L_t}{60K\sqrt{S_o}} = \frac{L_t}{60V_t}$$ Equation 6-4

Where:

t_t = channelized flow time (travel time, min)
L_t = waterway length (ft)
S_o = waterway slope (ft/ft)
V_t = travel time velocity (ft/sec) = $K\sqrt{S_o}$
K = NRCS conveyance factor (see Table 6-2).

Table 6-2. NRCS Conveyance factors, K

Type of Land Surface	Conveyance Factor, K
Heavy meadow	2.5
Tillage/field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

The time of concentration, t_c, is the sum of the initial (overland) flow time, t_i, and the channelized flow time, t_t, as per Equation 6-2.

2.4.3 First Design Point Time of Concentration in Urban Catchments

Equation 6-4 was solely determined by the waterway characteristics and using a set of empirical formulas. A calibration study between the Rational Method and the Colorado Urban Hydrograph Procedure (CUHP) suggests that the time of concentration shall be the lesser of the values calculated by Equation 6-2 and Equation 6-5 (Guo and Urbonas 2013).

$$t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$ Equation 6-5

Where:

t_c = minimum time of concentration for first design point when less than t_c from Equation 6-1.
L_t = length of channelized flow path (ft)
i = imperviousness (expressed as a decimal)
S_t = slope of the channelized flow path (ft/ft).

Equation 6-5 is the regional time of concentration that warrants the best agreement on peak flow predictions between the Rational Method and CUHP when the imperviousness of the tributary area is greater than 20 percent. It was developed using the UDFCD database that includes 295 sample urban catchments under 2-, 5-, 10-, 50, and 100-yr storm events (MacKenzie 2010). It suggests that both initial flow time and channelized flow velocity are directly related to the catchment's imperviousness (Guo and MacKenzie 2013).

The first design point is defined as a node where surface runoff enters the storm drain system. For example, all inlets are "first design points" because inlets are designed to accept flow into the storm drain.

Typically, but not always, Equation 6-5 will result in a lesser time of concentration at the first design point and will govern in an urbanized watershed. For subsequent design points, add the travel time for each relevant segment downstream.

2.4.4 Minimum Time of Concentration

Use a minimum t_c value of 5 minutes for urbanized areas and a minimum t_c value of 10 minutes for areas that are not considered urban. Use minimum values even when calculations result in a lesser time of concentration.

2.4.5 Common Errors in Calculating Time of Concentration

A common mistake in urbanized areas is to assume travel velocities that are too slow. Another common error is to not check the runoff peak resulting from only part of the catchment. Sometimes a lower portion of the catchment or a highly impervious area produces a larger peak than that computed for the whole catchment. This error is most often encountered when the catchment is long or the upper portion contains grassy open land and the lower portion is more developed.

Site-specific conditions may vary from the representative values presented in this chapter. The engineer is responsible for assuring that the selected imperviousness values represent the imperviousness of the catchment or the proposed development. During master planning or in early stages of design, select imperviousness values that are unlikely to be exceeded as final design plans are developed to avoid the need to increase the size of infrastructure during later design stages.

TABLE 6-2. RECOMMENDED IMPERVIOUSNESS BY LAND USE

LAND USE/DENSITY	IMPERVIOUSNESS
Residential	
Single-family Housing (SFH) – Rural (0 – 3 du/ac)	35%
SFH – Low & Medium-density (3 – 5 du/ac)	55%
SFH – High-density (5 - 20 du/ac)	65%
Manufactured Housing (>= 10 du/ac)	65%
Multi-family Housing (MFH) – Medium-density (5 – 20 du/ac)	65%
MFH – High-density MFH (>20 du/ac)	70%
Commercial	
Commercial – Low-density	65%
Commercial – Medium- to High-density	80%
Commercial – Urban Core	90%
Industrial/Institutional	
Schools	55%
Office/institutional	65%
Industrial Areas	75%
Solar Fields, Gravel Cover[1,2]	60%
Solar Fields, Grass Cover[1,2]	45%
Parks and Open Space	
Open Space, Undisturbed Native Grasses	5%
Community Parks	25%
Neighborhood Parks	15%
Golf Courses	30%
Cemeteries	25%

Note: Recommended imperviousness values shown in the table are the minimum imperviousness values for a specific land use. It is the engineer's responsibility to select imperviousness values that appropriately reflect the actual density of the proposed development.

[1] Use these values at the master planning scale or when the specific layout of panels is not known. Use values from the surface type (Table 6-3) at the site planning and design stage when panel width, panel spacing, and panel orientation relative to contours are known.

[2] Assumes 1:1 ratio of panels to aisles. See MHFD's technical memorandum regarding *Determination of Solar Panel Field Runoff Coefficients and Imperviousness Values* for additional information on procedures to reflect other impervious areas such as roads and pads that may be part of a solar field and layouts with wider inter-panel spacing.

TABLE 6-3. RECOMMENDED IMPERVIOUSNESS BY SURFACE TYPES

SURFACE TYPES		IMPERVIOUSNESS
Roadways and Paved Streets		95%
Concrete Driveways and Walks		95%
Roofs		95%
Gravel	No Traffic (Pedestrian Use)	40%
	Low-traffic Areas (Maintenance Paths and Substations)	60%
	High-traffic Areas (Roadways and Parking)	80%
Disturbed Soil (Including Lawns, Managed/Active Turf, Landscaped Areas with Water-Wise Vegetation, and Uncompacted Gravel/Mulch Planting Beds)		20%
Undisturbed or Decompacted Soil (Native Grasses and Open Space Areas)		5%
Artificial Turfs[1]	Landscape Applications (without Subgrade Drainage Layer)	25% – 45%
	Sport Fields (with Underdrain Pipe System)	60% – 80%
Water Surfaces (Lakes/Reservoirs/Irrigation Ponds)		100%
Solar Fields[2]	Grass Cover (Varies with Panel Orientation Relative to Ground Contours)	10% – 45%
	Gravel Cover (Varies with Panel Orientation Relative to Ground Contours)	50% – 75%
Historic Flow Analysis, Greenbelts, Agricultural		5%
Newly Graded Areas		65%
Stormwater Control Measures[3]	Retention Ponds & Constructed Wetland Ponds	100%
	Rooftop Systems – Blue Roofs	95%
	Rooftop Systems – Green Roofs (extensive)	65%
	Rooftop Systems – Green Roofs (intensive)	50%
	Permeable Pavement – CGP/PGP/RGP	55%
	Permeable Pavement – PICP	45%
	Extended Detention Basins	25%
	Receiving Pervious Areas (incl. Grass Buffers & Grass Swales)	20%
	Bioretention & Sand Filters	10%

[1] Consult with the manufacturer to get a recommended value.

[2] Assumes 1:1 ratio of panels to aisles. See MHFD's technical memorandum regarding *Determination of Solar Panel Field Runoff Coefficients and Imperviousness Values* for additional information on procedures for determining percent imperviousness based on panel width, panel spacing, and panel orientation relative to ground contours and how to reflect other impervious areas such as roads and pads that may be part of a solar field and layouts with wider inter-panel spacing.

[3] See MHFD's technical memorandum regarding *Evaluation of Percent Imperviousness for Stormwater Control Measures* for background information.

TABLE 6-7. RUNOFF COEFFICIENTS, *C*, NRCS HSG B

TOTAL OR EFFECTIVE % IMPERVIOUS	NRCS HSG B						
	WQE & 2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year
2%	0.01	0.01	0.07	0.26	0.34	0.44	0.54
5%	0.03	0.03	0.10	0.28	0.36	0.45	0.55
10%	0.06	0.07	0.14	0.31	0.38	0.47	0.57
15%	0.09	0.11	0.18	0.34	0.41	0.50	0.59
20%	0.13	0.15	0.22	0.37	0.44	0.52	0.61
25%	0.17	0.19	0.26	0.41	0.47	0.54	0.63
30%	0.20	0.23	0.30	0.44	0.50	0.57	0.65
35%	0.24	0.27	0.34	0.47	0.52	0.59	0.66
40%	0.29	0.32	0.38	0.50	0.55	0.61	0.68
45%	0.33	0.36	0.42	0.53	0.58	0.64	0.70
50%	0.37	0.40	0.46	0.56	0.61	0.66	0.72
55%	0.42	0.45	0.50	0.59	0.63	0.68	0.74
60%	0.46	0.49	0.54	0.63	0.66	0.71	0.76
65%	0.50	0.54	0.58	0.66	0.69	0.73	0.77
70%	0.55	0.58	0.62	0.69	0.72	0.75	0.79
75%	0.60	0.63	0.66	0.72	0.75	0.77	0.81
80%	0.64	0.67	0.70	0.75	0.77	0.80	0.83
85%	0.69	0.72	0.74	0.78	0.80	0.82	0.85
90%	0.74	0.76	0.78	0.81	0.83	0.84	0.87
95%	0.79	0.81	0.82	0.85	0.86	0.87	0.88
100%	0.84	0.86	0.86	0.88	0.89	0.89	0.90

TABLE 5.1
ONE-HOUR POINT RAINFALL

Frequency of Design Event (yr)	One-hour Point Rainfall, P_1 (in)
2	0.99
5	1.39
10	1.64
25	1.98
50	2.31
100	2.60

5.3 FLOOD HYDROLOGY OVERVIEW

Various methods exist to determine appropriate flood peaks or hydrographs for storm drainage planning and design. Methods for determining flood peaks or hydrographs are the Rational Method, the Colorado Urban Hydrograph Procedure (CUHP), and Urban Drainage Stormwater Management (UDSWM) model. The Town of Parker discourages the use of computer models other than CUHP and UDSWM since these programs are preferred, if not required, by UDFCD for studies involving major drainageways where UDFCD approval is sought or where maintenance eligibility is requested.

The three methods are briefly described in this section, and a discussion of their applicability to the Town of Parker is discussed. UDSWM is mostly used to combine and route the hydrographs generated using CUHP.

In general, the Rational Method is the most widely used and accepted technique for determining peak flows in urban areas for small basins. Within the constraints outlined in the MANUAL, use of the Rational Method provides a relatively simple but effective way to analyze storm runoff.

CUHP is somewhat more complicated than the Rational Method. It allows a manual computation of a runoff hydrograph which may be used for further hydraulic routing through channels and/or detention ponds. Historically, CUHP is best used in urban areas for which runoff coefficients have been derived. However, recent improvements by UDFCD include consideration for different soil types, thus CUHP is now more applicable to rural areas. The reader is referred to UDFCD for the latest version of CUHP.

UDSWM is a computer model that generates runoff hydrographs and routes and combines these hydrographs. UDSWM is a modified version of the Runoff Block of the Environmental Protection Agency's Storm Water Management Model (SWMM). It has been modified to be used in conjunction with CUHP. Table 5.2 herein provides guidance on selecting the appropriate method for a given project.

IDF Curve Data

5-Year Storm
i = 1 hour point rainfall = 1.39 inches

Duration	Rainfall Intensity = $(28.5 * i/(10+d)^{0.786}$
5	4.7
6	4.5
7	4.3
8	4.1
9	3.9
10	3.8

100-Year Storm
i = 1 hour point rainfall = 2.60 inches

Duration	Rainfall Intensity = $(28.5 * i/(10+d)^{0.786}$
5	8.8
6	8.4
7	8.0
8	7.6
9	7.3
10	7.0

Note: 1-hour point rainfall depths were obtained from Table 5-1 of the Town of Parker Storm Drainage and Environmental Criteria Manual. These values originally came from NOAA Atlas 2, Precipitation-Frequency Atlas of the Western United States, volume III - Colorado.

COMPOSITE BASIN COEFFICIENTS

Subdivision Lot 10B, Douglas 234 Filing No. 6, Amendment 2
Location

Project Name: Horse Creek Office Building
Project No. 24020
Calculated By: BK
Checked By: BK
Date: 1/30/25

Total Area Basin A: 0.36 acres

Land Use	Imp.	Area	% Imp.	C_5	C_{100}
Parking Lot/Roadway	95	0.00	0	* use Table 6-7 to obtain coeffecient values.	
Rooftop	95	0.36	95		
Landscape/Open Space	20	0.00	0		
TOTAL		**0.36**	**95**	**0.81**	**0.87**

Total Area Basin B: 0.18 acres

Land Use	Imp.	Area	% Imp.	C_5	C_{100}
Parking Lot/Roadway	95	0.18	95	* use Table 6-7 to obtain coeffecient values.	
Rooftop	95	0.00	0		
Landscape/Open Space	20	0.00	0		
TOTAL		**0.18**	**95**	**0.81**	**0.87**

Total Area Basin C: 0.72 acres

Land Use	Imp.	Area	% Imp.	C_5	C_{100}
Parking Lot/Roadway	95	0.64	84	* use Table 6-7 to obtain coeffecient values.	
Rooftop	95	0.00	0		
Landscape/Open Space	20	0.08	2		
TOTAL		**0.72**	**87**	**0.74**	**0.83**

Note: Impervious values were obtained from Table 6-7 (MHFD Manual)

Total Area Basin D: 0.32 acres

Land Use	Imp.	Area	% Imp.	C_5	C_{100}
Parking Lot/Roadway	95	0.02	6	* use Table 6-7 to obtain coeffecient values.	
Rooftop	95	0.00	0		
Landscape/Open Space	20	0.30	19		
TOTAL		**0.32**	**25**	**0.19**	**0.54**

Total Area Basin E: 0.16 acres

Land Use	Imp.	Area	% Imp.	C_5	C_{100}
Parking Lot/Roadway	95	0.00	0	* use Table 6-7 to obtain coeffecient values.	
Rooftop	95	0.00	0		
Landscape/Open Space	20	0.16	20		
TOTAL		**0.16**	**20**	**0.15**	**0.52**

Entire Property 1.74 acres

Land Use	Imp.	Area	% Imp.
Parking Lot/Roadway	95	0.84	46
Rooftop	95	0.36	20
Landscape/Open Space	20	0.54	6
TOTAL		**1.74**	**72**

STANDARD FORM SF-2
TIME OF CONCENTRATION

Subdivision Lot 10B, Douglas 234 Filing No. 6, Amendment 2
Location

Project Name: Horse Creek Office Building
Project No. 24020
Calculated By: BK
Checked By: BK
Date: 1/30/25

SUB-BASIN DATA			INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)				Tc CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	C_5	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH(FT)	MIN. T_c (MIN)	T_c (MIN)
A	0.36	0.81	50	2.0	3.0	150	1.0	2.0	1.3	4.2	200.0	10.4	5.0
B	0.18	0.81	30	4.0	1.8	120	2.0	2.8	0.7	2.5	150.0	9.0	5.0
C	0.72	0.74	60	5.0	3.0	375	2.4	3.1	2.0	5.0	435.0	9.1	5.0
D	0.32	0.19	10	2.0	4.2	360	2.8	3.2	1.9	6.1	370.0	9.2	6.1
E	0.16	0.15	45	25.0	4.0	130	1.5	2.5	0.9	4.9	175.0	9.0	5.0

NOTES:

$T_i = (.395*(1.1 - C_5)*(L)^{0.5})/(S^{0.33})$

$T_t = L/60V$ (Velocity From Fig. 6-4)

Tc Check = (26-17i) + L/{60(14i + 9)√S}

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Project Name: Horse Creek Office Building
Subdivision Lot 10B, Douglas 234 Filing No. 6, Amendment 2
Project No. 24020
Location
Calculated By: BK
Design Storm 5 Year
Checked By: BK
Date: 10/1/25

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Area Desig.	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	COMMENTS
Building	1	A	0.36	0.81	5.0	0.29	4.7	1.4							1.4						Roof drain to storm sewer
North edge of Lots 9A and 9B	2	B	0.18	0.81	5.0	0.15	4.7	0.7						0.7				64	2.8	0.4	Surface drains to Basin C
Parking lot	3	C	0.72	0.74	5.0	0.53	4.7	2.5	5.4	0.68	4.5	3.1			3.1						Double Type 16 combination inlet in 6" sump
North & east landscaped areas	4	D	0.32	0.19	6.1	0.06	4.5	0.3							0.3						Existing Type D inlet in 12" sump
East edge of property	5	E	0.16	0.15	5.0	0.02	4.7	0.1						0.1							Undisturbed - sheetflows easterly

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Project Name: Horse Creek Office Building
Subdivision Lot 10B, Douglas 234 Filing No. 6, Amendment 2 **Project No.** 24020
Location **Calculated By:** BK
Design Storm 100 Year **Checked By:** BK
Date: 10/1/25

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Area Desig.	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	COMMENTS
Building	1	A	0.36	0.87	5.0	0.31	8.8	2.8							2.8						Roof drain to storm sewer
North edge of Lots 9A and 9B	2	B	0.18	0.87	5.0	0.16	8.8	1.4						1.4				64	2.8	0.4	Surface drains to Basin C
Parking lot	3	C	0.72	0.83	5.0	0.60	8.8	5.3	5.4	0.75	8.7	6.6			6.6						Double Type 16 combination inlet in 6" sump
North & east landscaped areas	4	D	0.32	0.54	6.1	0.17	8.4	1.5							1.5						Existing Type D inlet in 12" sump
East edge of property	5	E	0.16	0.52	5.0	0.08	8.8	0.7						0.7							Undisturbed - sheetflows easterly

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP 3
Site Type (Urban or Rural)	URBAN
Inlet Application (Street or Area)	STREET
Hydraulic Condition	In Sump
Inlet Type	Denver No. 16 Combination

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	3.1
Major Q_{Known} (cfs)	6.6

Bypass (Carry-Over) Flow from Upstream Inlets must be organized from upstream (le

Receive Bypass Flow from:	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0

Watershed Characteristics

Subcatchment Area (acres)	
Percent Impervious	
NRCS Soil Type	

Watershed Profile

Overland Slope (ft/ft)	
Overland Length (ft)	
Channel Slope (ft/ft)	
Channel Length (ft)	

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)	
One-Hour Precipitation, P_1 (inches)	

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)	
One-Hour Precipitation, P_1 (inches)	

CALCULATED OUTPUT

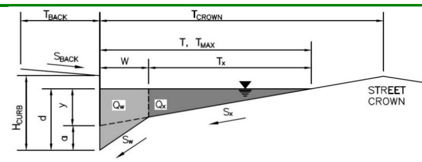
Minor Total Design Peak Flow, Q (cfs)	**3.1**
Major Total Design Peak Flow, Q (cfs)	**6.6**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A

MHFD-Inlet, Version 5.03 (August 2023)

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

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

Project: Horse Creek Office Building
Inlet ID: DP 3

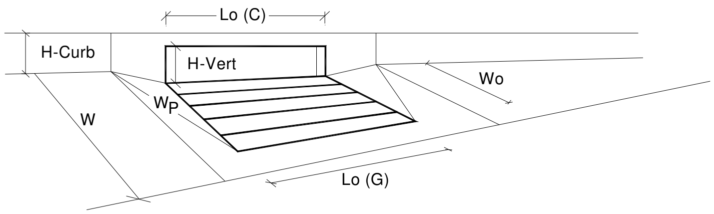


Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =			ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =			
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	42.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	42.0	42.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition MAJOR STORM Allowable Capacity is not applicable to Sump Condition	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

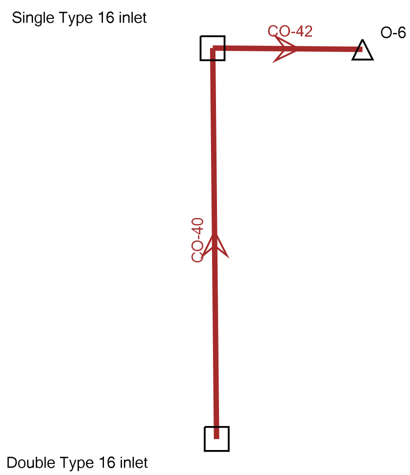


Design Information (Input)		MINOR	MAJOR	
Type of Inlet: Denver No. 16 Combination	Type =	Denver No. 16 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	3.00	3.00	feet
Width of a Unit Grate	W_o =	1.73	1.73	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	0.31	0.31	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	3.60	3.60	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	0.60	0.60	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	3.00	3.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.50	6.50	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	5.25	5.25	inches
Angle of Throat	Theta =	0.00	0.00	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	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) =	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.66	0.66	

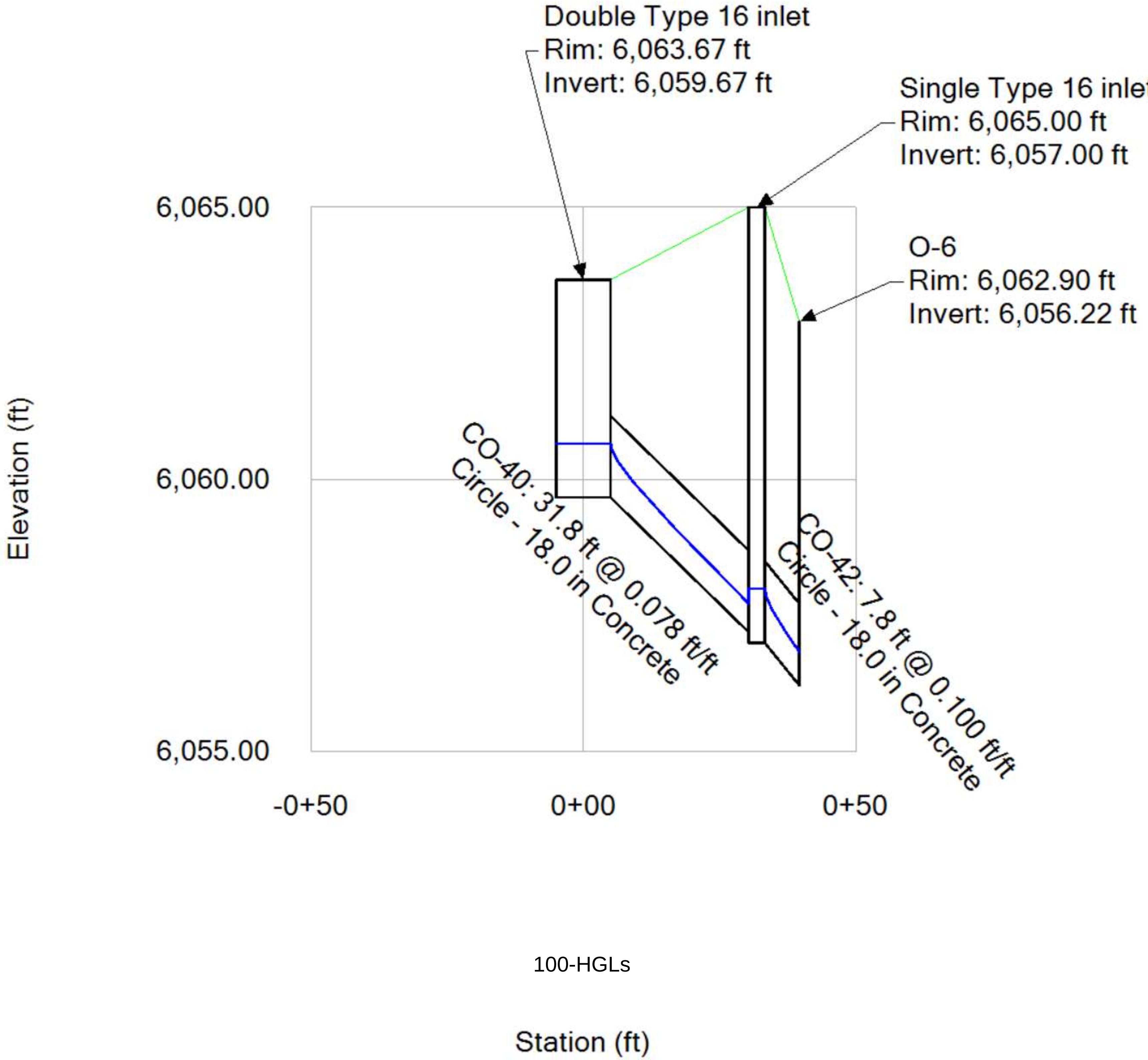
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	0.52	0.52	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.33	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	0.71	0.71	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	N/A	N/A	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.71	0.71	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**7.7**	**7.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	3.1	6.6	cfs

Scenario: Base



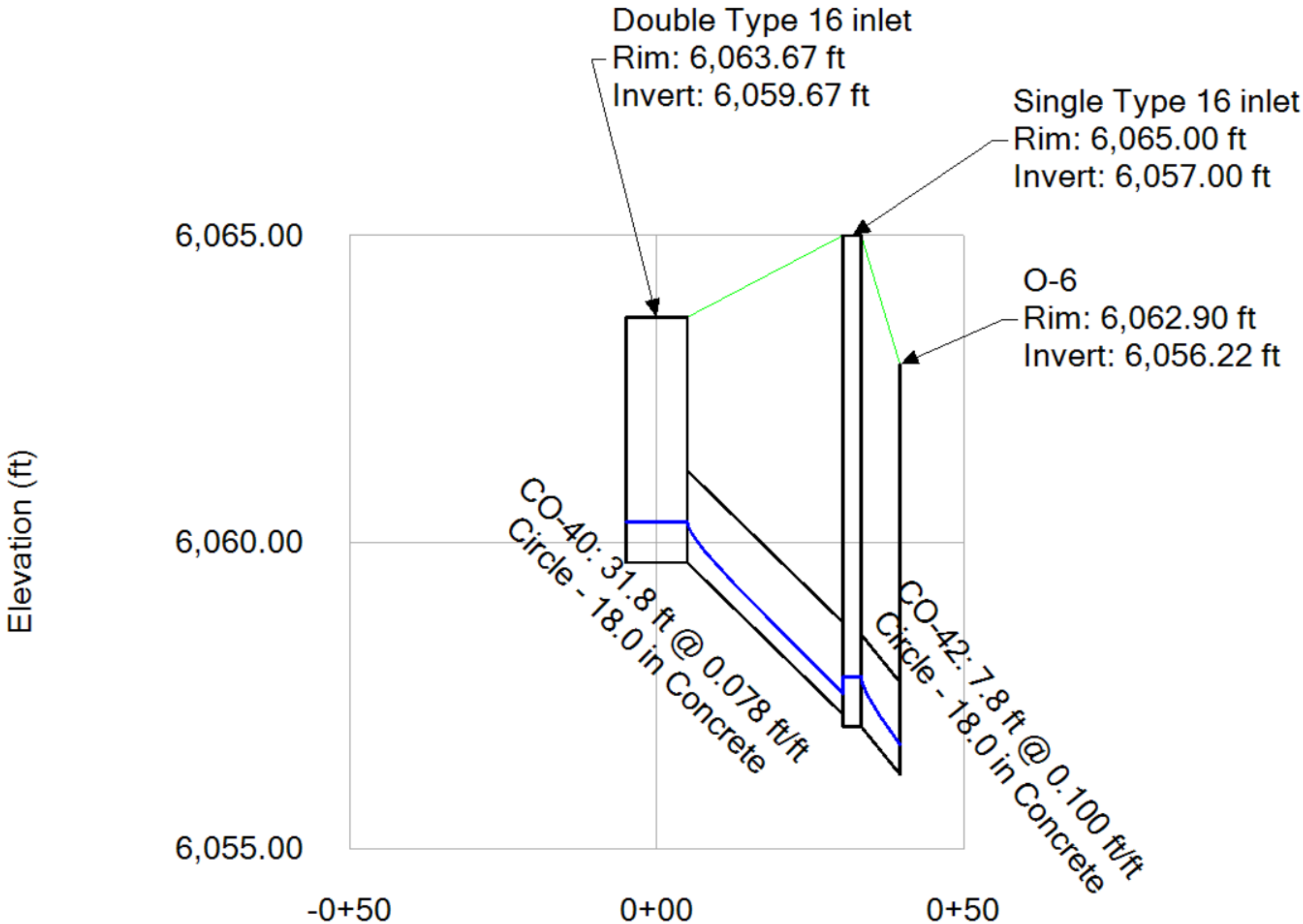
HGL Calculations


Double Type 16 inlet
Rim: 6,063.67 ft
Invert: 6,059.67 ft
Single Type 16 inlet
Rim: 6,065.00 ft
Invert: 6,057.00 ft
O-6
Rim: 6,062.90 ft
Invert: 6,056.22 ft
6,065.00
6,060.00
6,055.00
Elevation (ft)
CO-40: 31.8 ft @ 0.078 ft/ft
Circle - 18.0 in Concrete
CO-42: 7.8 ft @ 0.100 ft/ft
Circle - 18.0 in Concrete
-0+50
0+00
0+50
100-HGLs
Station (ft)

Network Elements FlexTable: HGL table

Label	Flow (cfs)	Diameter (in)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Velocity (ft/s)	Time (Pipe Flow) (hours)	Hydraulic Grade Line (In) (ft)	Elevation Ground (Start) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Stop) (ft)
Double Type 16 inlet							6,060.66		6,060.66	
Single Type 16 inlet							6,058.19		6,058.19	
O-6										
CO-40	6.60	18.0	31.8	0.078	13.37	0.001	6,060.66	6,063.67	6,057.73	6,065.00
CO-42	9.40	18.0	7.8	0.100	16.15	0.000	6,058.19	6,065.00	6,056.99	6,062.90

100-yr HGLs



5-yr HGLs

Station (ft)

Network Elements FlexTable: HGL table

Label	Flow (cfs)	Diameter (in)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Velocity (ft/s)	Time (Pipe Flow) (hours)	Hydraulic Grade Line (In) (ft)	Elevation Ground (Start) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Stop) (ft)
Double Type 16 inlet							6,060.34		6,060.34	
Single Type 16 inlet							6,057.81		6,057.81	
O-6										
CO-40	3.10	18.0	31.8	0.078	10.77	0.001	6,060.34	6,063.67	6,057.54	6,065.00
CO-42	4.50	18.0	7.8	0.100	13.12	0.000	6,057.81	6,065.00	6,056.71	6,062.90

5-yr HGLs

Excerpts from “Final Drainage Report for the Douglas 234 Subdivision Parker Colorado”, prepared by CVL Consultants of Colorado, Inc. on April 29, 2003:

storm event flow. Emergency overflow spillways are designed for each of the ponds. They are sized to pass the developed 100-year flow, with one foot (1') of freeboard.

The developed site can be divided into four (4) major basins, being Basins A, B, C and D. Each of these major basins contains a proposed water quality/ detention pond area.

Basin A

Basin A is comprised of most of the eastern portion of the project, including the proposed commercial site, and contributes runoff to Pond A. The proposed detention pond for Basin A serves both the residential and commercial portions of the filing. This facility is located in the northeasterly corner of the site, adjacent to and immediately west of the southerly extension of Jordan Rd. Pond A will discharge easterly, under Jordan Road, to the existing drainageway to Cherry Creek. Basin A is subdivided into thirteen sub-basins, and generally corresponds to historic basins C-3, C-4, C-5 and a portion of historic basin C-2. Runoff within Basin A flows overland to the internal storm drainage system, and ultimately in Pond A.

Pond A is located in Tract F. Storm water will be directed to this pond via overland flow and Storm Drain Lines B and W. The pond is sized to hold the required volume for 100-year detention and water quality per the Town of Parker and UDFCD requirements. This needed 100 year volume is 4.38 Ac. Ft. The water quality volume required is 1.07 Ac.ft. The total volume, including 100-year detention and WQCV, is accumulated by elevation 5992.1. The weir structure will have a top elevation at 5995.0 and a bottom equal to the 100-year water surface elevation, 5991.2. A 1.61' diameter orifice plate will be installed on the outlet pipe to control to pond's allowable release rate, 37.76 cfs. The 10-year allowable release 10.22 cfs, will be controlled by a rectangular notch weir, cut into the face of the outlet box structure. Storm events that exceed the volume provided in Pond A will be routed through the pond by the emergency overflow spillway. Both pond exits, the spillway and the storm drain, will be protected by riprap.

During initial and interim construction phases, Pond A will have a temporary riser pipe, rather than the permanent outlet structure to allow it to function as a sediment control pond. Also, the spillway will not be cut out of the earth berm that surrounds the pond, so that the pond can have additional volume, which may be needed during the construction operations that typically produce additional sediment. During the final stages of construction, the pond will be modified to include the earth-weir. The perforated outlet pipe will be replaced by the concrete outlet structure.

Basin B

Basin B includes the north-central portion of the project, and directs runoff to detention Pond B. This facility is located adjacent to and immediately southwesterly of the proposed alignment of Chambers Road. Discharge of the computed release rate from Pond B will travel under Chambers Road via a 30' RCP (Storm Drain Line U), into the existing natural drainage-way at that location. The Antelope Heights project, immediately downstream from this discharge point, is coordinating engineering design to accommodate this historic runoff rate. Eventually, this pipe will be connected to the

CVL CONSULTANTS, INC.
CIVIL ENGINEERING
LAND SURVEYING
LAND PLANNING

Project Name/Number Parker 234 / 01804102
Date: 2-3-03
Sheet 2 of 5

Telephone Log ☐
Meeting Record ☐
Calculations ☒
Other ☐

POND A

Area = 44.42 Ac.

# of homes = 126 avg. sq. footage = 1660 ft², 2 story

Area (park) = 1.88 Ac.

Area (lots) = 18.01 Ac.

Area (roads) = 8.96 Ac.

Area (open space) = 3.12 Ac.

Area (commercial) = 12.45 Ac.

126/1.88 = 7.00 dwellings/Ac. → 36% impervious per RO-5

$$\frac{1.88(5\%) + 18.01(36\%) + 8.96(100\%) + 3.12(0\%) + 12.45(95\%)}{44.42 Ac.}$$

= 61.6%

Design Procedure Form: Extended Detention Basin (EDB) - Sedimentation Facility

Designer:	MEF
Company:	CVL Consultants
Date:	March 31, 2003
Project:	Parker 234
Location:	Pond A

1. Basin Storage Volume	
A) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)	I_a = 61.60 % i = 0.62
B) Contributing Watershed Area (Area)	Area = 44.42 acres
C) Water Quality Capture Volume (WQCV) ($WQCV = 1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i)$)	WQCV = 0.24 watershed inches
D) Design Volume: Vol = (WQCV / 12) * Area * 1.2	Vol = 1.073 acre-feet
2. Outlet Works	
A) Outlet Type (Check One)	X Orifice Plate __ Perforated Riser Pipe __ Other:
B) Depth at Outlet Above Lowest Perforation (H)	H = 5.57 feet
C) Required Maximum Outlet Area per Row, (A_o)	A_o = 0.59 square inches
D) Perforation Dimensions **(enter one only)**: i) Circular Perforation Diameter **OR** ii) 2" Height Rectangular Perforation Width	D = 0.500 inches, **OR** W = __ inches
E) Number of Columns (nc, See Table 6a-1 For Maximum)	nc = 3 number
F) Actual Design Outlet Area per Row (A_o)	A_o = 0.59 square inches
G) Number of Rows (nr)	nr = 17 number
H) Total Outlet Area (A_{ot})	A_{ot} = 9.84 square inches
3. Trash Rack	
A) Needed Open Area: $A_t = 0.5 *$ (Figure 7 Value) $* A_{ot}$	A_t = 356 square inches
B) Type of Outlet Opening (Check One)	X ≤ 2" Diameter **Round** __ 2" High **Rectangular** __ Other:
C) For 2", or Smaller, **Round Opening** (Ref.: Figure 6a):	
i) Width of Trash Rack and Concrete Opening (W_{conc}) from Table 6a-1	W_{conc} = 9 inches
ii) Height of Trash Rack Screen (H_{TR})	H_{TR} = 97 inches

Design Procedure Form: Extended Detention Basin (EDB) - Sedimentation Facility

Designer:	MEF
Company:	CVL Consultants
Date:	March 31, 2003
Project:	Parker 234
Location:	Pond A

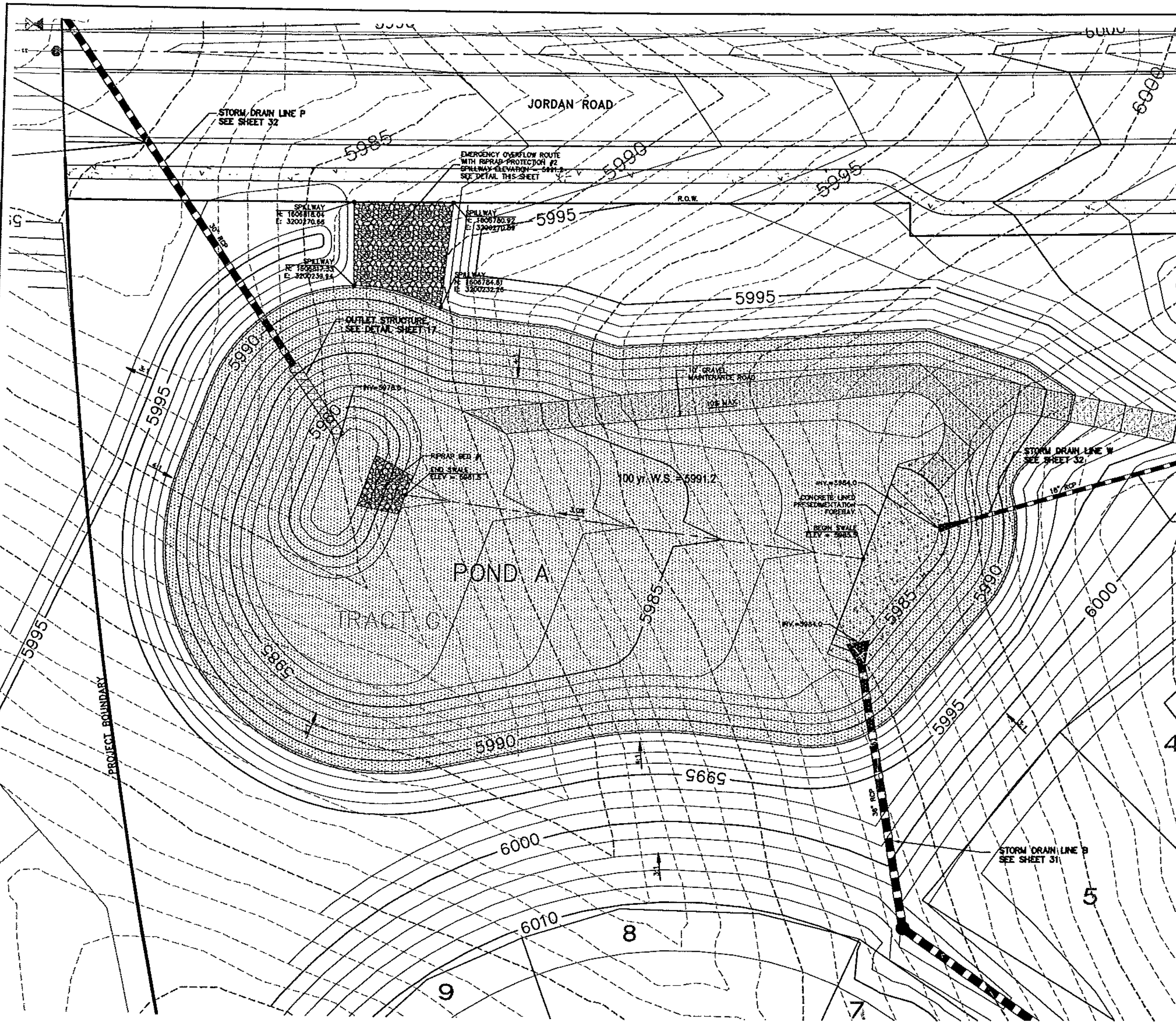
iii) Type of Screen (Based on Depth H), Describe if "Other"	x S.S. #93 VEE Wire (US Filter) Other:
iv) Screen Opening Slot Dimension, Describe if "Other"	X 0.139" (US Filter) Other:
v) Spacing of Support Rod (O.C.) Type and Size of Support Rod (Ref.: Table 6a-2)	0.75 inches **#156 VEE**
vi) Type and Size of Holding Frame (Ref.: Table 6a-2)	**3/8 in. x 1.0 in. flat bar**
D) For 2" High **Rectangular Opening** (Refer to Figure 6b):	
i) Width of Rectangular Opening (W)	W = inches
ii) Width of Perforated Plate Opening (W_{conc} = W + 12")	W_{conc} = inches
iii) Width of Trashrack Opening ($W_{opening}$) from Table 6b-1	$W_{opening}$ = inches
iv) Height of Trash Rack Screen (H_{TR})	H_{TR} = inches
v) Type of Screen (based on depth H) (Describe if "Other")	Klemp™ KPP Series Aluminum Other:
vi) Cross-bar Spacing (Based on Table 6b-1, Klemp™ KPP Grating). Describe if "Other"	inches Other:
vii) Minimum Bearing Bar Size (Klemp™ Series, Table 6b-2) (Based on depth of WQCV surcharge)	
4. Detention Basin length to width ratio	2.00 (L/W)
5 Pre-sedimentation Forebay Basin - Enter design values	
A) Volume (no less than 5% of Design Volume from 1D)	0.067 acre-feet
B) Surface Area	0.053 acres
C) Connector Pipe Diameter (Size to drain this volume in 5-minutes under inlet control)	6 inches
D) Paved/Hard Bottom and Sides	y yes/no

Design Procedure Form: Extended Detention Basin (EDB) - Sedimentation Facility

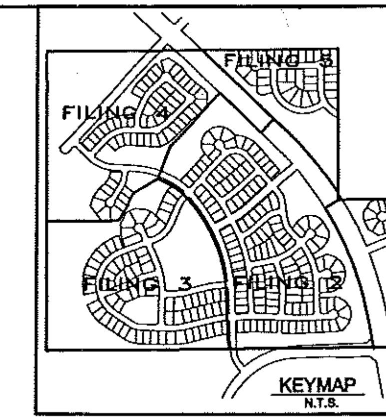
Designer: MEF
Company: CVL Consultants
Date: March 31, 2003
Project: Parker 234
Location: Pond A

6. Two-Stage Design - See Figure EDB-1	
A) Top Stage (Depth D_{WQ} = 2' Minimum)	D_{WQ} = 5.00 feet Storage= 1.570 acre-feet
B) Bottom Stage Depth (D_{BS} = 1.0' Minimum, 2.0' Maximum) Bottom Stage Storage (no less than 3% of Design Volume (0.0322003087988736 acre-fe	D_{BS} = 1.50 feet Storage= 0.082 acre-feet Surf. Area= 0.055 acres
C) Micro Pool (Minimum Depth = the Larger of 0.5 * Top Stage Depth (2.5 ') or 2.5 '	Depth= 2.50 feet Storage= 0.048 acre-feet Surf. Area= 0.019 acres
D) Total Volume: Vol_{tot} = Storage from 5A + 6A + 6B (Must be > Design Volume in 1D, or 1.07334362662912 acre-feet.)	Vol_{tot} = 1.719 acre-feet
7. Basin Side Slopes (Z, horizontal distance per unit vertical) Minimum Z = 4, Flatter Preferred	Z = 4.00 (horizontal/vertical)
8. Dam Embankment Side Slopes (Z, horizontal distance) per unit vertical) Minimum Z = 3, Flatter Preferred	Z = 4.00 (horizontal/vertical)
9. Vegetation (Check the method or describe "Other")	___ Native Grass x Irrigated Turf Grass ___ Other:

Notes:



POND A: PLAN
HORIZONTAL SCALE: 1" = 20'



SCALE: 1" = 20'

100 YR. WATER SURFACE

RIRAP SUMMARY TABLE

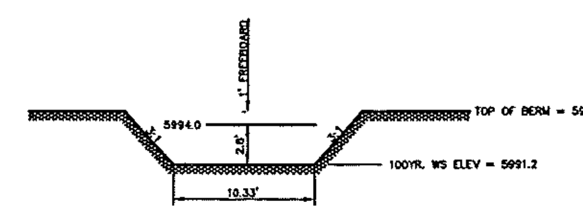
	RR#1	RR#2
LENGTH	16	33.1'
WIDTH	15, 20	40'
DEPTH	2.5'	1.5'
SIZE,d50	9"	12"
TYPE	L	M

* SEE DETAIL

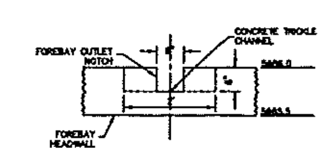
BURY TYPE L RIPRAP WITH 4" NATIVE TOPSOIL AND RESEED OR RESOD.

POND SUMMARY TABLE

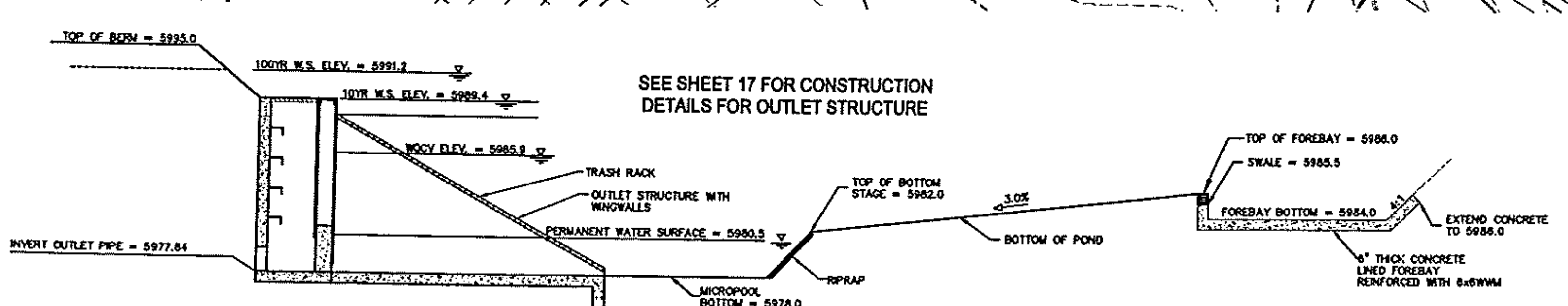
	Q 10yr.	Q 100yr.
PEAK INFLOW (cfs)	127.4	163.0
PEAK OUTFLOW (cfs)	10.2	37.8
WQCV (Ac.Ft.)	1.07	
10 yr. REQUIRED VOL. (Ac.Ft.)	2.52	
100 yr. REQUIRED VOL. (Ac.Ft.)	4.38	
DETENTION CAPACITY (Ac.Ft.)	5.50	
AVAILABLE FREEBOARD (ft.)	1.0	



EMERGENCY SPILLWAY DETAIL



FOREBAY OUTLET NOTCH



SEE SHEET 17 FOR CONSTRUCTION DETAILS FOR OUTLET STRUCTURE

POND A: CROSS SECTION
NOT TO SCALE

CALL UNCC
TWO WORKING DAYS
BEFORE YOU DIG
1-800-922-1987
534-6700 METRO DENVER AREA
UTILITY NOTIFICATION CENTER OF COLORADO

No.	Revisions	Date	Init.	Appr.	Date

CVL CONSULTANTS OF COLORADO, INC.
CIVIL ENGINEERING · LAND SURVEYING · LAND PLANNING
7901 E. Belleview Avenue Suite 150
Englewood, CO 80111
Tel: (720) 482-9526
Fax: (720) 482-9546

Continental Homes
7600 East Orchard Road, Ste. 165-S
Greenwood Village, CO 80111

DOUGLAS 234
FILING 1
STREET AND DRAINAGE IMPROVEMENTS
POND A

SCALE: AS SHOWN
FILE NO: 01804102
DRAWN BY: JAM
CHECKED BY: KAL
DATE: APRIL 29, 2003
SHEET NUMBER 16

Excerpts from previous drainage study:

FINAL DRAINAGE REPORT

FOR

CHAMBERS AND HESS FILING NO. 1

PARKER, COLORADO

Job Number: D-1173

Owner:
FIRST GUARDIAN GROUP, INC.
2025 Gateway Place, Suite 485
San Jose, CA 95110

Applicant/Developer:
REPUBLIC INVESTMENT GROUP
5750 DTC Parkway, Suite 160
Greenwood Village, CO 80111

Engineer:
RICK ENGINEERING COMPANY
9801 East Easter Avenue
Centennial, CO 80112
(303) 537-8020

January 25, 2021

IV. DRAINAGE FACILITY DESIGN

A. General Concept

Chambers and Hess Filing No. 1 eleven proposed commercial lots. The specific developments within the commercial lots are unknown currently. This report will quantify the runoff tributary from each commercial lot in sizing the storm drainage infrastructure. The proposed storm sewer system will provide a stub to each lot so that when the lot is developed, they can utilize the connection to the storm sewer system to convey runoff from each commercial lot. The commercial lots are designated to be a maximum of 75% impervious.

The drive and commercial lots will convey runoff to proposed storm inlets and ultimately to the existing storm sewer stub constructed in Tract B of Douglas 234 subdivision. There is no offsite runoff draining on the Chambers and Hess Filing No. 1. Runoff from Chambers and Hess Filing No. 1 is designated to be collected and conveyed by the proposed storm sewer system. Existing Pond “A” will ultimately receive the developed runoff from Chambers and Hess Filing No. 1.

The appendix contains design charts utilized to quantify developed runoff.

B. Specific Details

The site is 13.80 acres and subdivided into 15 sub-basins to quantify developed storm runoff at various design points. Each sub-basin is evaluated for the proposed impervious improvements. Areas within the sub-basins are assigned land uses, Concrete or Asphalt Pavement, Drives and Walks, Landscape or lawns and Commercial areas. The Proposed Impervious calculation in the Appendix summarizes the percent impervious of each sub basin. Times of Concentrations are either calculated or assumed to be the minimum of 5 minutes. Design points are located to calculate runoff to determine if the drive has the capacity to convey runoff. Design points are also located at proposed inlets and manholes to calculate the cumulative effect of runoff as the runoff conveys downstream.

As previously discussed, each commercial lot will capture developed runoff that is conveyed to the storm sewer system constructed by this proposal. The proposed storm system will convey the major storm from each commercial lot to the existing storm sewer connection.

Referring to the proposed drainage map, sump inlets are located in Sliceroo Drive, near Hess Road at Design Points 9 and 10. The sump inlets are designed to provide 100% capture of the major storm. At no point does runoff ever exceed available street capacities for the minor or major storm.

C. Discussion of Detention Storage Required for Full-Spectrum Detention

As previously discussed, Chambers and Hess Filing No. 1 is not required to have on site detention because the property was included in the tributary area to the existing detention Pond “A”, about 1200 feet east of Chambers and Hess Filing No. 1. The appendices contain original design calculations for Pond “A”. When Pond “A” was designed, the Chambers and Hess Filing No. 1 property was assigned a percent impervious of 95%. The proposed site impervious for Chambers and Hess Filing No. 1 is 68%. There is no additional drainage area tributary to Pond “A”. Therefore, the detention volume requirements for Pond “A” are not adversely impacted by a

PROJECT: CHAMBERS AND HESS FILING NO. 1
SUBJECT: Proposed Impervious

JOB #: D01173
DATE: 1/25/2021
BY: BHE

Basin Name	Square Footage	Acres	Lawns/ Native Area (sf)	Lawns/ Native Area (Acres)	Asphalt/ Concrete (sf)	Asphalt/ Concrete (Acres)	Drives and Walks (sf)	Drives and Walks (Acres)	Surburban Commercial (sf)	Surburban Commercial (Acres)	Soil Type "C/D" Composite Runoff Factors			
											C_2	C_5	C_{100}	I %
A1	39,679	0.91	0	0.00	0	0.00	0	0.00	39,679	0.91	0.60	0.65	0.79	75.0
A2	28,457	0.65	0	0.00	0	0.00	0	0.00	28,457	0.65	0.60	0.65	0.79	75.0
A3	51,364	1.18	0	0.00	0	0.00	0	0.00	51,364	1.18	0.60	0.65	0.79	75.0
A4	38,474	0.88	0	0.00	0	0.00	0	0.00	38,474	0.88	0.60	0.65	0.79	75.0
A5	35,369	0.81	0	0.00	0	0.00	0	0.00	35,369	0.81	0.60	0.65	0.79	75.0
A6	75,090	1.72	0	0.00	0	0.00	0	0.00	75,090	1.72	0.60	0.65	0.79	75.0
A7	34,360	0.79	0	0.00	0	0.00	0	0.00	34,360	0.79	0.60	0.65	0.79	75.0
A8	26,401	0.61	0	0.00	0	0.00	0	0.00	26,401	0.61	0.60	0.65	0.79	75.0
A9	41,603	0.96	19,881	0.46	16,022	0.37	5,700	0.13	0	0.00	0.40	0.46	0.70	51.8
A10	36,711	0.84	15,322	0.35	15,602	0.36	5,787	0.13	0	0.00	0.45	0.51	0.72	57.5
A11	31,512	0.72	0	0.00	0	0.00	0	0.00	31,512	0.72	0.60	0.65	0.79	75.0
A12	60,015	1.38	0	0.00	0	0.00	0	0.00	60,015	1.38	0.60	0.65	0.79	75.0
A13	69,307	1.59	0	0.00	0	0.00	0	0.00	69,307	1.59	0.60	0.65	0.79	75.0
A14	17,850	0.41	17,850	0.41	0	0.00	0	0.00	0	0.00	0.01	0.05	0.49	2.0
OS1	14,396	0.33	14,396	0.33	0	0.00	0	0.00	0	0.00	0.01	0.05	0.49	2.0
HESS1	56,658	1.30	12,553	0.29	39,461	0.91	4,644	0.11	0	0.00	0.62	0.67	0.80	77.5
HESS2	2,683	0.06	363	0.01	2,014	0.05	306	0.01	0	0.00	0.70	0.74	0.83	85.6
RSD1	11,469	0.26	1,583	0.04	7,920	0.18	1,966	0.05	0	0.00	0.69	0.73	0.83	84.8
Totals:	**600,588**	**13.79**	**67,450**	**1.55**	**31,624**	**0.73**	**11,486**	**0.26**	**490,028**	**11.25**	**0.54**	**0.60**	**0.76**	**68.4**

Land Use	Imp., I %
Lawns/Native Area	2%
Asphalt/Concrete	100%
Drives and Walks	90%
Surburban Commercial	75%

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: BHE
DATE: 1/25/21 **P1=** 1.39
CHECKED BY:

JOB NO: D01173
PROJECT: CHAMBERS AND HESS FILING NO. 1
DESIGN STORM: 5 Year

BASIN	DESIGN POINT	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		AREA DESIG.	AREA (Acres)	RUNOFF COEFF	Tc (min)	C A (Acres)	I (in/hour)	Q (cfs)	Tc (min)	(C A) (Acres)	I (in/hour)	Q (cfs)	SLOPE (%)	STREET FLOW (cfs)	DESIGN FLOW (cfs)	SLOPE (%)	PIPE SIZE (in)	LENGTH (ft)	VELOCITY (fps)	Tt (min)	
A1	1	A1	0.91	0.65	5.0	0.59	4.71	**2.8**							2.8	1.7	18	102	6.1	0.3	INL-10 TO INL-09
A2	2	A2	0.65	0.65	5.0	0.42	4.71	**2.0**													
	2	A1+A2							5.3	1.02	4.65	**4.7**			4.7	1.4	18	178	6.5	0.5	INL-09 TO INL-08
A3	3	A3	1.18	0.65	5.0	0.77	4.71	**3.6**													
	3	A1-A3							5.7	1.78	4.54	**8.1**			8.1	2.8	24	125	9.5	0.2	INL-08 TO INL-07
A4	4	A4	0.88	0.65	5.0	0.57	4.71	**2.7**													
	4	A1-A4							6.0	2.36	4.49	**10.6**			10.6	1.8	24	228	8.7	0.4	INL-07 TO INL-05
A5			0.81	0.65	5.0	0.53	4.71	**2.5**													
	5	A1-A5							6.4	2.89	4.40	**12.7**			12.7	7.3	24	132	15.2	0.1	INL-05 TO SDMH-01
A6	6	A6	1.72	0.65	5.0	1.12	4.71	**5.3**							5.3	3.0	18	142	8.8	0.3	INL-14 TO INL-13
A7	7	A6-A7	0.79	0.65	5.0	0.51	4.71	**2.4**	5.3	1.63	4.65	**7.6**			7.6	6.3	24	111	12.3	0.2	INL-13 TO INL-12
A8	8	A6-A8	0.61	0.65	5.0	0.39	4.71	**1.9**	5.4	2.03	4.61	**9.4**			9.4	4.6	24	72	11.8	0.1	INL-12 TO INL-11
RSD1			0.26	0.73	5.0	0.19	4.71	**0.9**					2.3	0.9				1096	2.9	6.2	TO INL-11
HESS2	9		0.06	0.74	5.0	0.05	4.71	**0.2**													TO INL-11
A9	9	A9+HESS2+RSD1	0.96	0.46	10.0	0.44	3.76	**1.7**	11.2	0.68	3.59	**2.4**									INL-11 DESIGN Q
	9	A6-A9+HESS2+RSD1							11.2	2.70	3.59	**9.7**			9.7	0.5	24	6	5.3	0.0	DP9: RUNOFF LEAVING INL-11 TO SDMH-02
A10	10	A10	0.84	0.51	9.8	0.43	3.79	**1.6**							1.6	0.5	18	19	3.3	0.1	INL-16 TO SDMH-02
	11	A6-A10+HESS2+RSD1							11.2	3.13	3.59	**11.2**			11.2	0.5	30	290	5.5	0.9	SDMH-02 TO SDMH-01
	12	A1-A10+HESS2+RSD1							12.1	6.02	3.48	**20.9**			20.9	0.5	36	194	6.5	0.5	SDMH-01 TO INL-04
A11	13	A1-A11+HESS2+RSD1	0.72	0.65	5.0	0.47	4.71	**2.2**	12.6	6.49	3.41	**22.1**			22.1	2.7	36	83	12.1	0.1	INL-04 TO INL-02
A12	14	A12	1.38	0.65	5.0	0.90	4.71	**4.2**							4.2	8.8	18	174	11.9	0.2	INL-03 TO INL-02
A13	15	A13	1.59	0.65	5.0	1.03	4.71	**4.9**													
	15	A1-A13+HESS2+RSD1							12.7	8.42	3.40	**28.6**			28.6	4.3	36	33	15.2	0.0	INL-02 TO INL-01

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: BHE | **JOB NO:** D01173
DATE: 1/25/21 | **P1=** 2.60 | **PROJECT:** CHAMBERS AND HESS FILING NO. 1
CHECKED BY: | **DESIGN STORM:** 100 YEAR

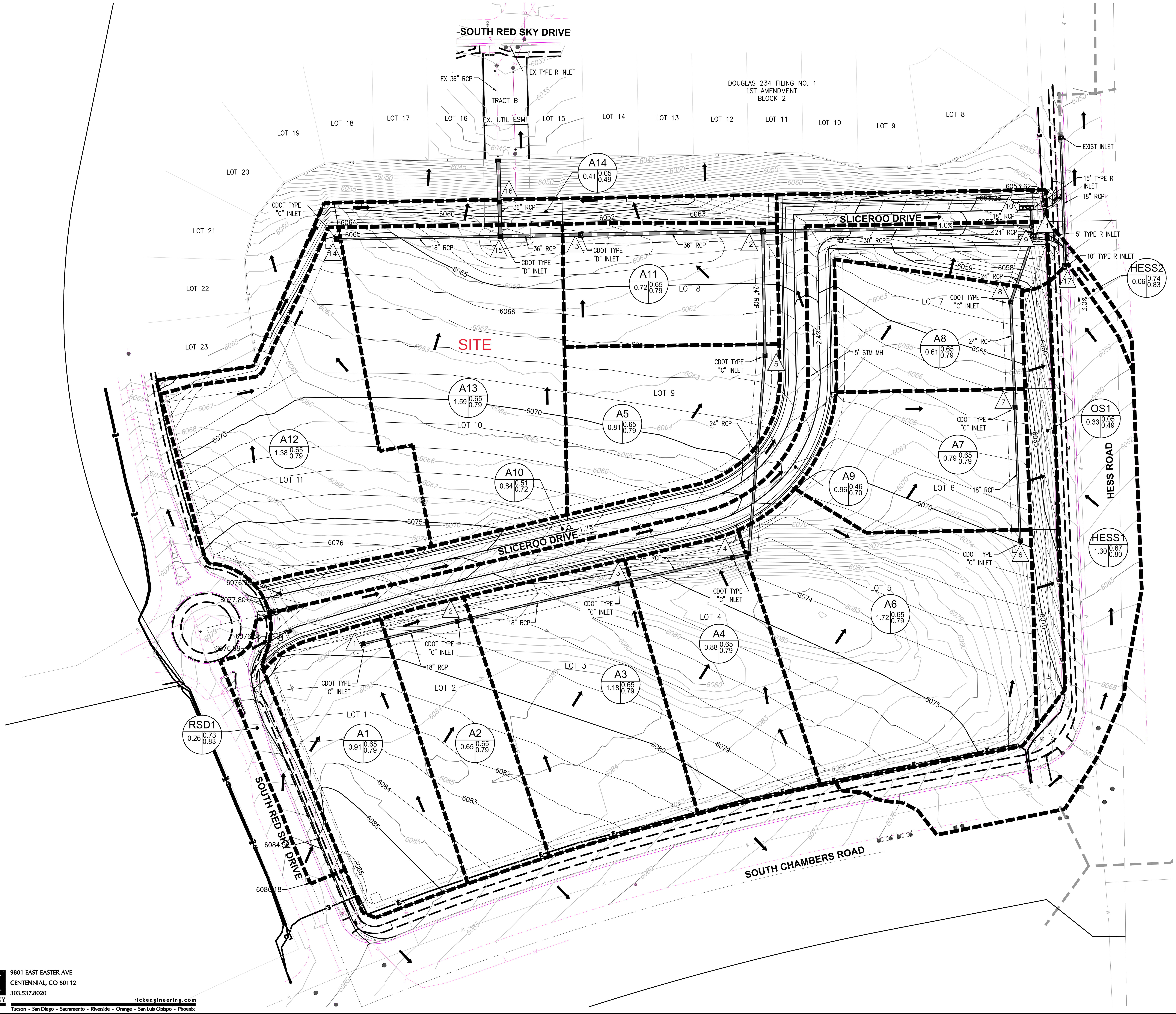
BASIN	DESIGN POINT	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		AREA DESIG.	AREA (Acres)	RUNOFF COEFF	Tc (min)	C A (Acres)	I (in/hour)	Q (cfs)		Tc (min)	(C A) (Acres)	I (in/hour)	Q (cfs)	SLOPE (%)	STREET FLOW (cfs)	DESIGN FLOW (cfs)	SLOPE (%)	PIPE SIZE (in)	LENGTH (ft)	VELOCITY (fps)	Tt (min)	
A12	14	A12	1.38	0.79	5.0	1.09	8.82	**9.6**								9.6	8.8	18	174	15.2	0.2	INL-03 TO INL-02
A13	15	A13	1.59	0.79	5.0	1.26	8.82	**11.1**														
	15	A1-A13+HESS1+ HESS2+RSD1								12.2	10.73	6.47	**69.5**			69.5	4.3	36	33	27.4	0.0	INL-02 TO INL-01
A14	16	A1-A14+HESS1+ HESS2+RSD1	0.41	0.49	5.0	0.20	8.82	**1.8**		12.2	10.94	6.47	**70.8**			70.8	4.3	36	42	18.7	0.0	TOTAL RUNOFF INTO EXISTING DOUGLAS 234 STORM SYSTEM

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: BHE
DATE: 1/25/21 **P1=** 1.39
CHECKED BY:

JOB NO: D01173
PROJECT: CHAMBERS AND HESS FILING NO. 1
DESIGN STORM: 5 Year

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
BASIN	DESIGN POINT	AREA DESIG.	AREA (Acres)	RUNOFF COEFF	Tc (min)	C A (Acres)	I (in/hour)	Q (cfs)	Tc (min)	(C A) (Acres)	I (in/hour)	Q (cfs)	SLOPE (%)	STREET FLOW (cfs)	DESIGN FLOW (cfs)	SLOPE (%)	PIPE SIZE (in)	LENGTH (ft)	VELOCITY (fps)	Tt (min)	REMARKS
A1	1	A1	0.91	0.65	5.0	0.59	4.71	**2.8**							2.8	1.7	18	102	6.1	0.3	INL-10 TO INL-09
A2	2	A2	0.65	0.65	5.0	0.42	4.71	**2.0**													
	2	A1+A2							5.3	1.02	4.65	**4.7**			4.7	1.4	18	178	6.5	0.5	INL-09 TO INL-08
A3	3	A3	1.18	0.65	5.0	0.77	4.71	**3.6**													
	3	A1-A3							5.7	1.78	4.54	**8.1**			8.1	2.8	24	125	9.5	0.2	INL-08 TO INL-07
A4	4	A4	0.88	0.65	5.0	0.57	4.71	**2.7**													
	4	A1-A4							6.0	2.36	4.49	**10.6**			10.6	1.8	24	228	8.7	0.4	INL-07 TO INL-05
A5			0.81	0.65	5.0	0.53	4.71	**2.5**													
	5	A1-A5							6.4	2.89	4.40	**12.7**			12.7	7.3	24	132	15.2	0.1	INL-05 TO SDMH-01
A6	6	A6	1.72	0.65	5.0	1.12	4.71	**5.3**							5.3	3.0	18	142	8.8	0.3	INL-14 TO INL-13
A7	7	A6-A7	0.79	0.65	5.0	0.51	4.71	**2.4**	5.3	1.63	4.65	**7.6**			7.6	6.3	24	111	12.3	0.2	INL-13 TO INL-12
A8	8	A6-A8	0.61	0.65	5.0	0.39	4.71	**1.9**	5.4	2.03	4.61	**9.4**			9.4	4.6	24	72	11.8	0.1	INL-12 TO INL-11
RSD1			0.26	0.73	5.0	0.19	4.71	**0.9**					2.3	0.9				1096	2.9	6.2	TO INL-11
HESS2	9		0.06	0.74	5.0	0.05	4.71	**0.2**													TO INL-11
A9	9	A9+HESS2+RSD1	0.96	0.46	10.0	0.44	3.76	**1.7**	11.2	0.68	3.59	**2.4**									INL-11 DESIGN Q
	9	A6-A9+HESS2+RSD1							11.2	2.70	3.59	**9.7**			9.7	0.5	24	6	5.3	0.0	DP9: RUNOFF LEAVING INL-11 TO SDMH-02
A10	10	A10	0.84	0.51	9.8	0.43	3.79	**1.6**							1.6	0.5	18	19	3.3	0.1	INL-16 TO SDMH-02
	11	A6-A10+HESS2+RSD1							11.2	3.13	3.59	**11.2**			11.2	0.5	30	290	5.5	0.9	SDMH-02 TO SDMH-01
	12	A1-A10+HESS2+RSD1							12.1	6.02	3.48	**20.9**			20.9	0.5	36	194	6.5	0.5	SDMH-01 TO INL-04
A11	13	A1-A11+HESS2+RSD1	0.72	0.65	5.0	0.47	4.71	**2.2**	12.6	6.49	3.41	**22.1**			22.1	2.7	36	83	12.1	0.1	INL-04 TO INL-02
A12	14	A12	1.38	0.65	5.0	0.90	4.71	**4.2**							4.2	8.8	18	174	11.9	0.2	INL-03 TO INL-02
A13	15	A13	1.59	0.65	5.0	1.03	4.71	**4.9**													
	15	A1-A13+HESS2+RSD1							12.7	8.42	3.40	**28.6**			28.6	4.3	36	33	15.2	0.0	INL-02 TO INL-01



LEGEND

- BASIN ID
- 5 YR. RUNOFF COEFFICIENT
- 100 YR. RUNOFF COEFFICIENT
- AREA IN ACRES
- DESIGN POINT
- DRAINAGE BASIN BOUNDARY
- FLOW ARROW
- 6058 EXISTING MINOR CONTOUR
- 6060 EXISTING MAJOR CONTOUR
- 6058 PROPOSED MINOR CONTOUR
- 6060 PROPOSED MAJOR CONTOUR
- PROPERTY BOUNDARY
- PROPOSED LOT LINE
- PROPOSED STORM SEWER

DESIGN POINT SUMMARY

DESIGN POINT	PEAK RUNOFF 5YR (CFS)	PEAK RUNOFF 100YR (CFS)
1	2.8	6.4
2	4.7	10.8
3	8.1	18.6
4	10.6	24.3
5	12.7	29.3
6	5.3	12.0
7	7.6	17.3
8	9.4	21.4
9	2.4	8.2
10	1.6	4.3
11	11.2	28.9
12	20.9	51.4
13	22.1	54.4
14	4.2	9.6
15	28.6	69.5
16	28.7	70.8
17	3.6	9.1

BASIN SUMMARY

BASIN	Q5 CFS	Q100 CFS
A1	2.8	6.4
A2	2.0	4.6
A3	3.6	8.2
A4	2.7	6.2
A5	2.5	5.7
A6	5.3	12.0
A7	2.4	5.5
A8	1.9	4.2
A9	1.7	4.7
A10	1.6	4.3
A11	2.2	5.0
A12	4.2	9.6
A13	4.9	11.1
A14	0.1	1.8
HESS1	3.5	7.8
HESS2	0.2	0.5
RSD1	0.9	1.9
OS1	0.1	1.4

POST-DEVELOPMENT DRAINAGE MAP FOR CHAMBERS & HESS FILING NO. 1

SHEET 2 OF 2

D-1173
DATE: JANUARY 25, 2021

RICK ENGINEERING COMPANY
9801 EAST EASTER AVE
CENTENNIAL, CO 80112
303.537.8020
rickengineering.com
Denver
Tucson - San Diego - Sacramento - Riverside - Orange - San Luis Obispo - Phoenix

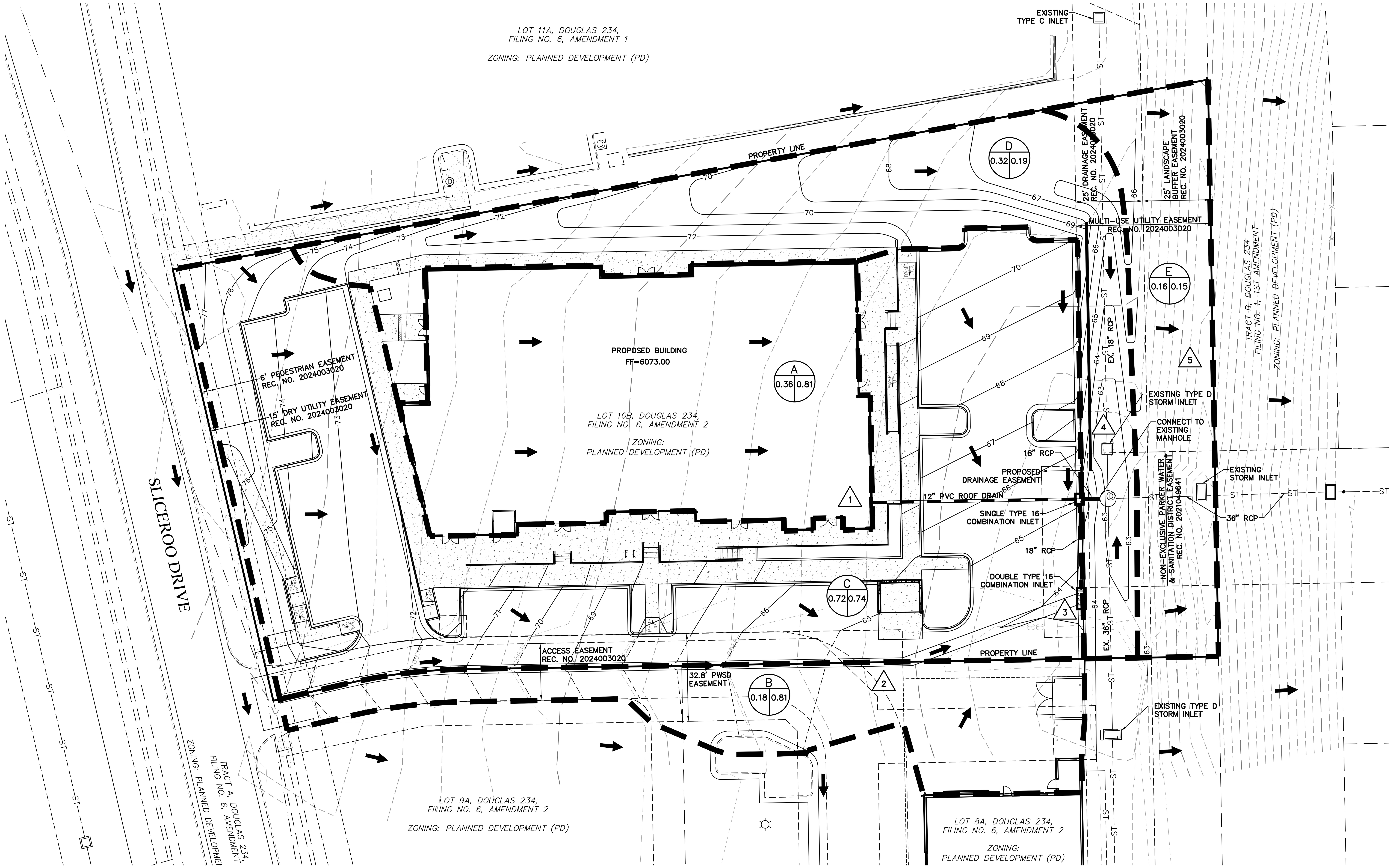
C:\RICK\Projects\D_CEN_L\1173_Chambers&Hess\WaterResources
REC_NCS.ctb

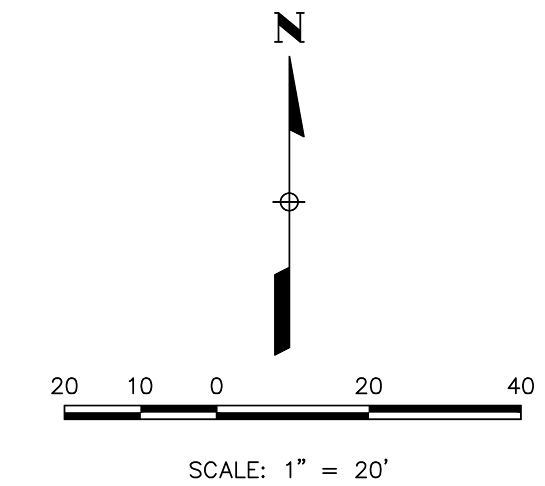
NOT FOR CONSTRUCTION – EXHIBIT FOR DRAINAGE STUDY REPORT ONLY

FINAL DRAINAGE PLAN

HORSE CREEK COMMERCIAL

LOT 10B, DOUGLAS 234 FILING NO. 6, AMENDMENT 2
A PORTION OF THE SW 1/4, SE 1/4, SECTION 29, T6S, R66W, 6TH P.M.
TOWN OF PARKER, COUNTY OF DOUGLAS, STATE OF COLORADO





LEGEND

- PROPERTY LINE
- EXISTING CONTOUR
- EXISTING EASEMENT
- PROPOSED CONTOUR
- DRAINAGE FLOW DIRECTION
- EXISTING CURB & GUTTER
- 1' SPILL CURB
- 2' CATCH CURB
- PROPOSED RETAINING WALL
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- CONCRETE PAVEMENT
- SUB-BASIN BOUNDARY
- DESIGN POINT
- A = BASIN DESIGNATION
  B = AREA IN ACRES
  C = 5 YEAR RUNOFF COEFFICIENT

BENCHMARK

BENCHMARK IS BY GPS OBSERVATION NAVD 88. SITE BENCHMARK AT NORTHWEST CORNER OF INLET ON CHAMBERS RD. APROXIMATELY 200' +/- NORTH OF HESS RD.

ENGINEER'S STATEMENT

PREPARED UNDER MY SUPERVISION

4/10/26

BRIAN KROMBEIN, PE, PLS DATE
COLORADO PE NO. 34294
FOR AND ON BEHALF OF
VERMILION PEAK ENGINEERING LLC

COLORADO REGISTERED BRIAN KROMBEIN 34294 P.E. & P.L.S.

RUNOFF TABLE

DRAINAGE BASIN	DESIGN POINT	CUMULATIVE CONTRIBUTING BASIN (ACRES)	CUMULATIVE Q_5 cfs	CUMULATIVE Q_{100} cfs
A	1	0.36	1.4	2.8
B	2	0.18	0.7	1.4
C	3	0.72	3.1	6.6
D	4	0.32	0.3	1.5
E	5	0.16	0.1	0.7

FINAL DRAINAGE PLAN
DOUGAS 234 FILING NO. 6, AMD. 2
JOB NO. 24020
DATE: APRIL 10, 2026
SHEET 1 OF 1

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