EPC STORMWATER REVIEW COMMENTS ARE SHOWN IN ORANGE BOXES WITH BLACK TEXT

FINAL DRAINAGE REPORT
FOR
A-1 CHIPSEAL
LOT 36 AND 37 CLAREMONT BUSINESS PARK FIL NO 2
7245 COLE VIEW
COLORADO SPRINGS, COLORADO

MAY 2022

Prepared For:
A-1 CHIPSEAL
7245 Cole View
Colorado Springs, CO 80915
720.540.8264
Contact: Stephanie Wallis

Prepared By:

TERRA NOVA ENGINEERING, INC.
721 S. 23RD Street
Colorado Springs, CO 80904
719.635.6422
Contact: Dane Frank

TNE Job No. 2173.00
County Job No. ####

"PCD File No. COM-22-014"

FINAL DRAINAGE REPORT
FOR
A-1 CHIPSEAL
LOT 36 AND 37 CLAREMONT BUSINESS PARK FIL NO 2
7245 COLE VIEW
COLORADO SPRINGS, COLORADO

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APPENDICIES

FINAL DRAINAGE REPORT
FOR
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LOT 36 AND 37 CLAREMONT BUSINESS PARK FIL NO 2
7245 COLE VIEW
COLORADO SPRINGS, COLORADO

DESIGN ENGINEER'S STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____ _____
Dane Frank, P.E. 50207 Date
On behalf of Terra Nova Engineering, Inc.

OWNER/DEVELOPER'S STATEMENT:

I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

_____ _____
Authorized Signature Date

_____
Printed Name, Title

_____
Business Name

_____
Address

EL PASO COUNTY:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

_____ _____
Jennifer Irvine, P.E. Date
County Engineer / ECM Administrator

Conditions: Please change to: Josh Palmer, P.E., Interim County Engineer

FINAL DRAINAGE REPORT
FOR
A-1 CHIPSEAL
LOT 36 AND 37 CLAREMONT BUSINESS PARK FIL NO 2
7245 COLE VIEW
COLORADO SPRINGS, COLORADO

PURPOSE

The purpose of this Final Drainage Report is to identify and analyze the proposed drainage patterns, determine proposed runoff quantities, size drainage structures for conveyance of developed runoff, and present solutions to drainage impacts on-site and off-site resulting from this development. The site has previously been platted and has previously been studied in:

"Final Drainage Report for Claremont Business Park Filing No. 2", dated November 2006, prepared by Matrix Design Group.

include 7231 Cole View; both parcels combined approx. equal 1.36 acres.

GENERAL DESCRIPTION

This Final Drainage Report (FDR) is an analysis of approximately 1.36 acres of developed land located at 7245 Cole View. This site is currently in use as a paving business. The site is in the northeast quarter of Section 8, Township 14 South, Range 65 West of the 6th Principal Meridian within El Paso County. The parcels are bounded to the north and west by Sand Creek, to the southwest by LOT 35 CLAREMONT BUSINESS PARK FIL NO 2, to the southeast by LOTS 13 AND 14 CLAREMONT BUSINESS PARK FIL NO 2, and to the north by LOT 39 CLAREMONT BUSINESS PARK FIL NO 2. (see vicinity map).

The site lies within the Sand Creek Basin, with storm runoff surface draining west across the site, then into a gutter that flows off the site to the south, eventually entering a storm inlet, which drains into the adjacent East Fork Sand Creek. There are also storm inlets in Marksheffel Road that flow into a storm sewer that flows south along Markcheffel to an unknown outfall, which presumably also drains into Sand Creek.

Please discuss why the final drainage report was required.

Please include a discussion comparing the subdivision's approved final drainage report's amount of imperviousness for the lots versus the proposed imperviousness.

Soils for this project are delineated by the map in the appendix as Ellicott loamy coarse sand, 0 to 5 percent slopes (28). Soils in the study area are shown as mapped by NRCS in the "Soils Survey of El Paso County Area" and contains soils of Hydrologic Group D.

Soils map states Hydrologic Group A; please revise for consistency.

The site is developed with mostly pavement and roof surfaces, and a small amount of landscaping. The site drains to the west, with an average slope of 3.7%.

Please add a Historical Conditions section. The section should describe the site's conditions before any work was completed.

EXISTING DRAINAGE CONDITIONS

The site is already developed with one building and outdoor parking and equipment storage. There are two drainage basins. See attached Existing Drainage Map (in appendix).

Basin EX-A is 1.01 acres that is mostly roof and parking area and drains to Design Point A and leaves the site in an existing carry curb. Basin EX-A has flows of Q_5 = 4.4 cfs and Q_{100} = 8.6 cfs.

Basin EX-B is 0.35 acres that is mostly landscaping and half a street and drains to Design Point B at the south corner of the site and flows offsite in the street gutter. Basin EX-B has flows of Q_5 = 1.2 cfs and Q_{100} = 2.7 cfs.

PROPOSED DRAINAGE CONDITIONS

The proposed drainage conditions are the same as the existing drainage conditions, with the addition of a full infiltration water quality sand filter in the west corner of the site. The County is requiring the addition of a water quality structure retroactively following paving of 0.38 acres on the south side of the site.

At the west corner of the site a full infiltration water quality sand filter will treat flow from Basin EX-A (Q_5=4.4 cfs and Q_{100}=8.6 cfs). Runoff entering the sand filter will flow in from gutters on two sides, and sheet flow in from the asphalt area. Runoff entering the sand filter will flow down a riprap rundown to the filter sand. After flowing through the filter sand, the runoff infiltrates into the ground. Any flow above the WQCV will enter the sand filter and flow out the existing curb chase in the corner of the sand filter / site if the water ponds high enough. The 1.01 acres tributary to the sand filter are 95% impervious. Based upon this we need a WQCV of 0.013 ac-ft. No

Please include the total height of the sand filter walls. A building permit is required for retaining walls over 4 feet from the Pikes Peak Regional Building Department.

detention volume is included in the sand filter. The top of the filter sand is at an elevation of 6333.6 feet and the top of the WQCV is at 6334.52 feet.

In an effort to protect receiving water and as part of the "four-step process to minimize adverse impacts of urbanization" this site was analyzed in the following manner:

1. Reduce Runoff- The only development included in this FDR is the addition of a water quality structure. There is no runoff reduction associated with the installation of a water quality structure.
2. Stabilize Drainageways- There are no existing or proposed drainageways onsite. The adjacent East Fork Sand Creek has previously been stabilized and runoff from the site currently flows to a storm sewer system that discharges into East Fork Sand Creek.
3. Provide Water Quality Capture Volume (WQCV)- The proposed sand filter has been sized and designed to sufficiently capture the required WQCV and infiltrate the entire volume, thereby allowing solids and contaminants to settle out.
4. Consider Need for Industrial and Commercial BMPs- A water quali tructure doesn't require any Industrial and Commercial BMPs. As the site is currently used for a paving business, there are likely existing industrial BMPs in place at the site.

I dont believe there are. No Industrial or Commercial BMPs are required for the Site.

HYDROLOGIC CALCULATIONS

Hydrologic calculations were performed using the El Paso County Storm Drainage Design Criteria Manual - Volumes 1 & 2, latest editions. The Rational Method was used to estimate storm water runoff anticipated from design storms with 5-year and 100-year recurrence intervals. The Urban Drainage Criteria Manual was used to calculate the detention and water quality volume.

Please add this manual to the bibliography.

HYDRAULIC CALCULATIONS

Hydraulic calculations were estimated using the Manning's Formula and the methods described in the El Paso County Storm Drainage Design Criteria Manual – Volumes 1 & 2, latest editions. The pertinent data sheets are included in the appendix of this report.

FLOODPLAIN STATEMENT

No portion of this site is within a designated F.E.M.A. floodplain, as determined by Flood Insurance Rate Map No. 08041C0752 G, dated December 7, 2018 (see appendix).

WATER QUALITY

The proposed full infiltration water quality sand filter provides water quality treatment for all of the recently added 0.38 acres of asphalt, as well as most of the remainder of the site.

There is no water quality treatment for existing basin EX-B. This basin is already fully developed and no changes to it are proposed.

For sites where full infiltration for WQ is proposed, an on-site infiltration test using double-ring infiltrometer is required (or approved equal). Infiltration tests should be performed or supervised by a licensed professional engineer and conducted at a minimum depth equal to the bottom of the sand filter. Underdrains are required for sand filters and should be provided if infiltration tests show rates slower than 2 times that required to drain the WQCV over 12 hours.

CONSTRUCTION COST OPINION

Public Reimbursable

None

Public Non-Reimbursable

None

Private Non-Reimbursable

1. Sand Filter	1 EA	$ 20,000	$ 20,000
		Total	**$ 20,000**

DRAINAGE FEES

This drainage report is part of a site development application; therefore, no drainage fees are due.

MAINTENANCE

The sand filter is private and will be maintained by the property owner.

SUMMARY

Development of this site will not adversely affect the surrounding development. This report is in general conformance with the previous reports which included this site. Site runoff and storm

drain appurtenances from the A-1 Chipseal development will not adversely affect the downstream and surrounding developments and will be safely routed to the proposed sand filter to slowly treat the water quality capture volume. Runoff leaving the site is routed to the existing public storm sewer system.

PREPARED BY:
TERRA NOVA ENGINEERING, INC.

Dane Frank, P.E.
Project Engineer

Jobs/2173.00/drainage/217300 FDR.doc

BIBLIOGRAPHY

El Paso County Drainage Criteria Manual-Volumes 1 & 2, latest edition

El Paso County Board Resolution No 15-042 (Adoption of Chapter 6 and Section 3.2.1 Chapter 13 of the City of Colorado Springs Drainage Criteria Manual dated May 2014, Hydrology and Full Spectrum Detention)

"Final Drainage Report for Claremont Business Park Filing No. 2", dated November 2006, prepared by Matrix Design Group.

VICINITY MAP

El Paso County - Community: Property Search

Schedule Number: 5408102040

A-1 Chipseal - Vicinity Map

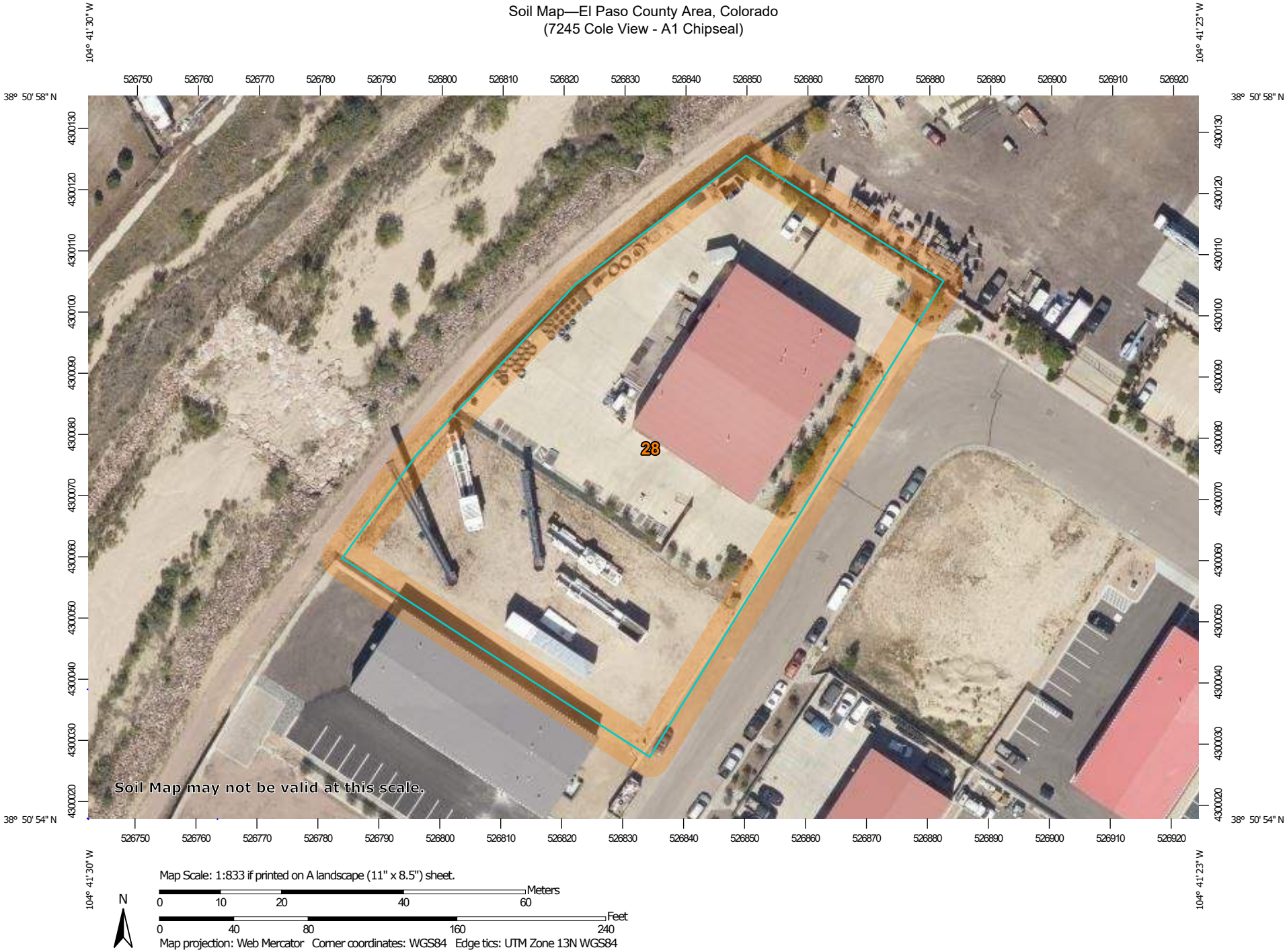
North is up ^

GENERAL LOCATION MAP


A-1 Chipseal - Location Map
Image Dated May 2020
SITE
EAST FORK SAND CREEK
Cole View
Google Earth
N
100 ft

NRCS SOILS MAP

Soil Map—El Paso County Area, Colorado
(7245 Cole View - A1 Chipseal)



Map Scale: 1:833 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 10 20 40 60

Feet
0 40 80 160 240

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 1:24,000.

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: El Paso County Area, Colorado
Survey Area Data: Version 19, 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: Aug 19, 2018—Sep 23, 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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	1.2	100.0%
Totals for Area of Interest		**1.2**	**100.0%**

El Paso County Area, Colorado

28—Ellicott loamy coarse sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 3680
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Ellicott and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ellicott

Setting

Landform: Flood plains, stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium

Typical profile

A - 0 to 4 inches: loamy coarse sand
C - 4 to 60 inches: stratified coarse sand to sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: R069XY031CO - Sandy Bottomland LRU's A and B
Other vegetative classification: SANDY BOTTOMLAND (069AY031CO)
Hydric soil rating: No

Discussion states soil group D please revise for consistency.

Minor Components

Fluvaquentic haplaquoll
Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Other soils
Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant
Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 19, Aug 31, 2021

FEMA FIRM MAP

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, City of Fountain, Bureau of Land Management, National Oceanic and Atmospheric Administration, United States Geological Survey, and Anderson Consulting Engineers, Inc. These data are current as of 2006.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

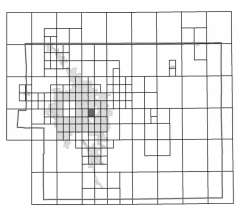
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

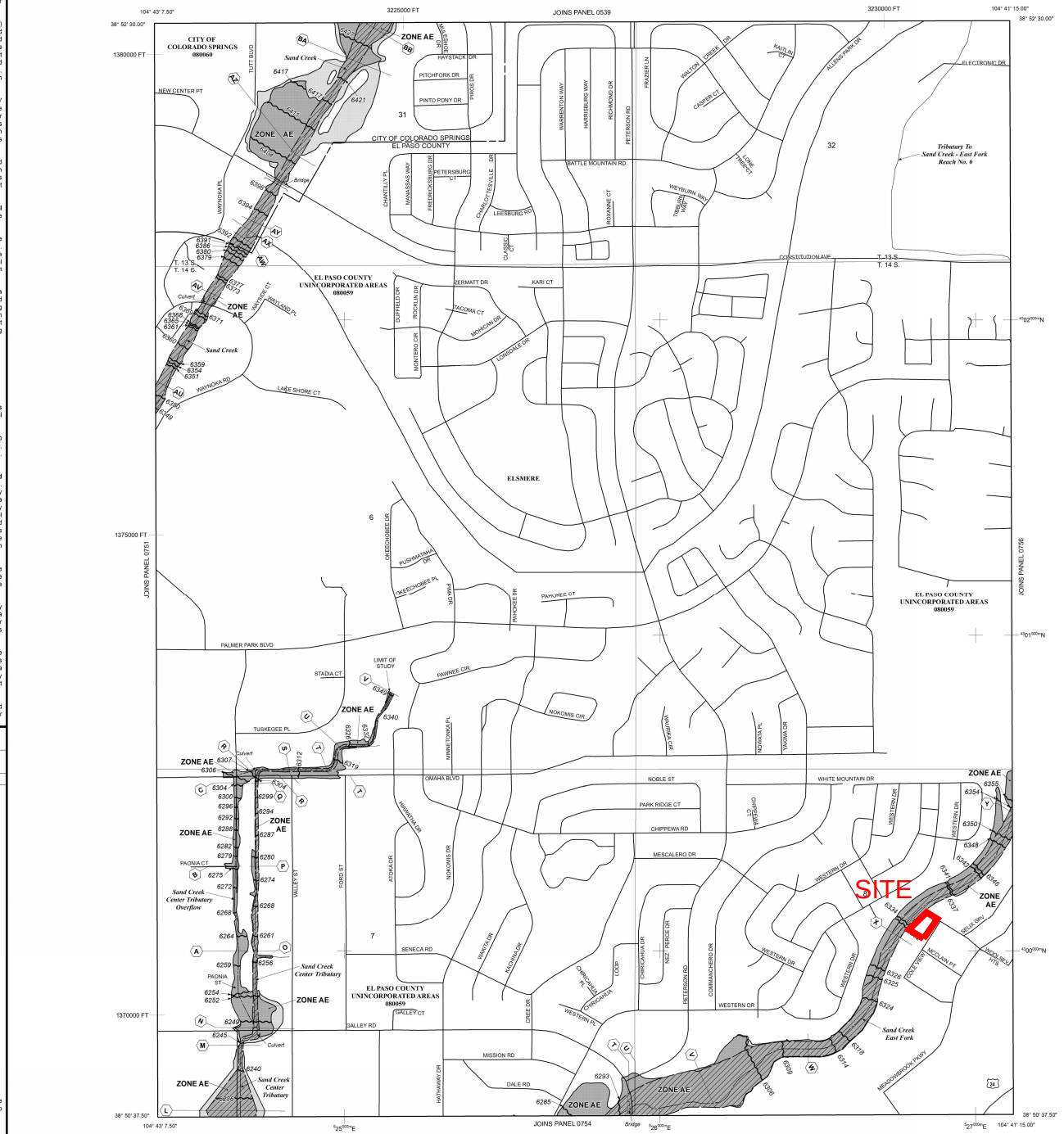
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.
ZONE AE Base Flood Elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary
Floodway boundary
Zone D Boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 Base Flood Elevation line and value; elevation in feet*
(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A—A Cross section line
23—23 Transect line
97° 07' 30.00" 32° 22' 30.00" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4279000mN 1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-0620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0752G

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 752 OF 1300
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0752	G
EL PASO COUNTY	080059	0752	G

Notice: This map was reissued on 05/15/2020 to make a correction. This version replaces any previous versions. See the Notice-to-User Letter that accompanied this correction for details.

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08041C0752G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

HYDROLOGIC CALCULATIONS

A-1 CHIPSEAL
(Area Runoff Coefficient Summary)

EXISTING CONDITIONS

		STREETS / DEVELOPED			*OVERLAND / UNDEVELOPED*			*WEIGHTED*	
BASIN	**TOTAL AREA**	**AREA**	**C_5**	**C_{100}**	**AREA**	**C_5**	**C_{100}**	**C_5**	**C_{100}**
	(Acres)	*(Acres)*			*(Acres)*				
EX-A	1.01	0.96	0.90	0.96	0.05	0.16	0.51	0.86	0.94
EX-B	0.35	0.26	0.90	0.96	0.09	0.16	0.51	0.71	0.84

Calculated by: DLF
Date: 8/5/2020
Checked by: LD

DEVELOPED CONDITIONS

		STREETS / DEVELOPED			*OVERLAND / UNDEVELOPED*			*WEIGHTED*	
BASIN	**TOTAL AREA**	**AREA**	**C_5**	**C_{100}**	**AREA**	**C_5**	**C_{100}**	**C_5**	**C_{100}**
	(Acres)	*(Acres)*			*(Acres)*				
EX-A	1.01	0.96	0.90	0.96	0.05	0.16	0.51	0.86	0.94
EX-B	0.35	0.26	0.90	0.96	0.09	0.16	0.51	0.71	0.84

Calculated by: DLF
Date: 4/4/2022
Checked by: LD

A-1 CHIPSEAL
AREA DRAINAGE SUMMARY

EXISTING CONDITIONS

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				T_t	*INTENSITY*		*TOTAL FLOWS*	
BASIN	**AREA TOTAL** *(Acres)*	C_5	C_{100}	C_5	**Length** *(ft)*	**Slope** *(ft/ft)*	T_C *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	T_t *(min)*	**TOTAL** *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
		** For Calcs See Runoff Summary*														
EX-A	1.01	0.86	0.94	0.86	100	0.03	3.0	300	3%	3.5	1.4	5.0	5.0	9.1	**4.4**	**8.6**
EX-B	0.35	0.71	0.84	0.71	30	0.03	2.7	150	3%	3.5	0.7	5.0	5.0	9.1	**1.2**	**2.7**

DEVELOPED CONDITIONS

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				T_t	*INTENSITY*		*TOTAL FLOWS*	
BASIN	**AREA TOTAL** *(Acres)*	C_5	C_{100}	C_5	**Length** *(ft)*	**Slope** *(ft/ft)*	T_C *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	T_t *(min)*	**TOTAL** *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
		** For Calcs See Runoff Summary*														
EX-A	1.01	0.86	0.94	0.86	100	0.03	3.0	300	3%	3.5	1.4	5.0	5.0	9.1	**4.4**	**8.6**
EX-B	0.35	0.71	0.84	0.71	30	0.03	2.7	150	3%	3.5	0.7	5.0	5.0	9.1	**1.2**	**2.7**

Calculated by: DLF

Date: 4/4/2022

Checked by: LD

A-1 CHIPSEAL
PROPOSED SURFACE ROUTING SUMMARY

Design Point(s)	*Contributing Basins*	*Area Ac*	*Flow*	
			Q_5	Q_{100}
A	**EX-A**	1.01	**4.4**	**8.6**
B	**EX-B**	0.35	***1.2***	***2.7***

Calculated by: DLF
Date: 4/4/2022
Checked by: LD

HYDRAULIC CALCULATIONS

GEOQUEST, LLC
6825 Silver Ponds Heights #101
Colorado Springs, CO 80908
(719) 481-4560

PERCOLATION TEST

FOR

HAMMERS CONSTRUCTION

JOB #16-0787

This percolation test is for Lot 11. Lots 36 and 37 are discussed in this report. Please revise or remove report. Additionally, discuss in the narrative why the percolation test is included.

Lot 11, Filing 2,
Claremont Business Park Subdivision,
7176 Cole View,
El Paso County,
Colorado

Respectfully submitted,

Charles E. Milligan, P.E.
Civil Engineer

COLORADO REGISTERED
CHARLES E. MILLIGAN
34608
PROFESSIONAL ENGINEER
13 OCT 16

PERCOLATION TEST FINDINGS

Enclosed are the results of the percolation test for the retention pond to be installed at **Lot 11, Filing 2, Claremont Business Park Subdivision, 7176 Cole View, El Paso County, Colorado.** The locations of the percolation test borings were determined by Hammers Construction. The commercial structure will not be on a public water system. Due to the natural slope of the property, the entire system will feed to the west to northwest at 2% approximately 50 feet. All applicable regulations of the El Paso County Health Department ISDS Regulations must be complied with for the installation of the disposal system.

The percolation test was performed on October 6, 2016, in accordance with **E.P.C.P.H. OWS Regulations.** The field data and results of the percolation test are as follows:

PERC. TEST @ TIME	PERC HOLE #1 @ 34" DEPTH DROP (IN INCHES)	PERC HOLE #2 @ 34" DEPTH DROP (IN INCHES)	PERC HOLE #3 @ 34" DEPTH DROP (IN INCHES)
12:24	1-3/4	4-1/4	2
12:34	3/4	1-7/8	5/8
12:44	3/4	1	5/8
12:54	11/16	13/16	9/16
1:04	5/8	5/8	9/16
1:14	5/8	5/8	1/2
Rate/Hole	16.0	16.0	20.0

The average of the test holes is 17.3 minutes per inch.

Blow counts at the depth of 3 feet was 31/12.

The soil profile for the disposal system is as follows:

0 to 6" - Sand- fine to coarse grain, high density, low moisture content, low cohesion, low plasticity, brown in color.

6" to 8' - Sand- fine to coarse grain, moderate density, moderate moisture content, low clay content, low cohesion, low plasticity, brown in color.

No water was encountered during the drilling of all holes. Bedrock was not encountered during the drilling of the test borings. No known wells were observed within 100 feet of the proposed system. **All setbacks shall conform to county regulations.**

If during construction of the field itself, subsurface conditions change considerably or if the location of the proposed field changes, this office shall be notified to determine whether the conditions are adequate for the system as designed or whether a new system needs to be designed.

Weather conditions at the time of the test consisted of partly cloudy skies with cold temperatures.

GEOQUEST, INC 481-4560

DRILL LOGS

JOB #: 16-0787

TEST BORING NO.: TH-1

DATE: 10/6/2016

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
1					
2					
3			31 / 12"	7.0	SM
4					
5					
6					
7					
8			Bag / 2"	11.2	SC
9					
10					

0"-6' Sand (SM)

Fine-coarse grained
Moderate-high density
Moderate moisture content
Low-moderate clay content
Low plasticity
Light Brown color

6'- 8' Sand (SC)

Fine-coarse grained
Moderate-high moisture content
Low-moderate clay content
Low-moderate plasticity
Greyisih Brown color

JOB #:

TEST BORING NO.: TH-

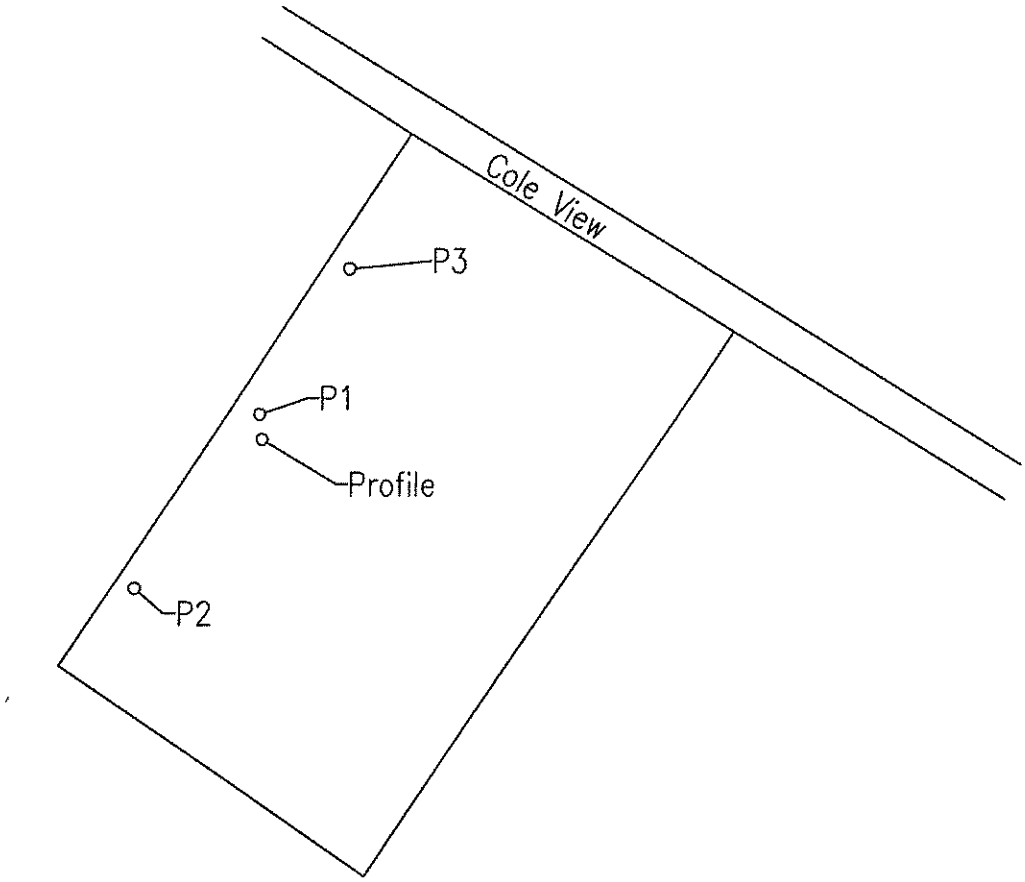
DATE:

DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

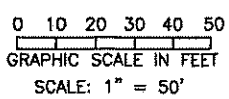
GEOQUEST LLC

SITE MAP

Lot 11, Filing 2
Claremont Business Park
7176 Cole View
El Paso County,
Colorado
Job #16-0787

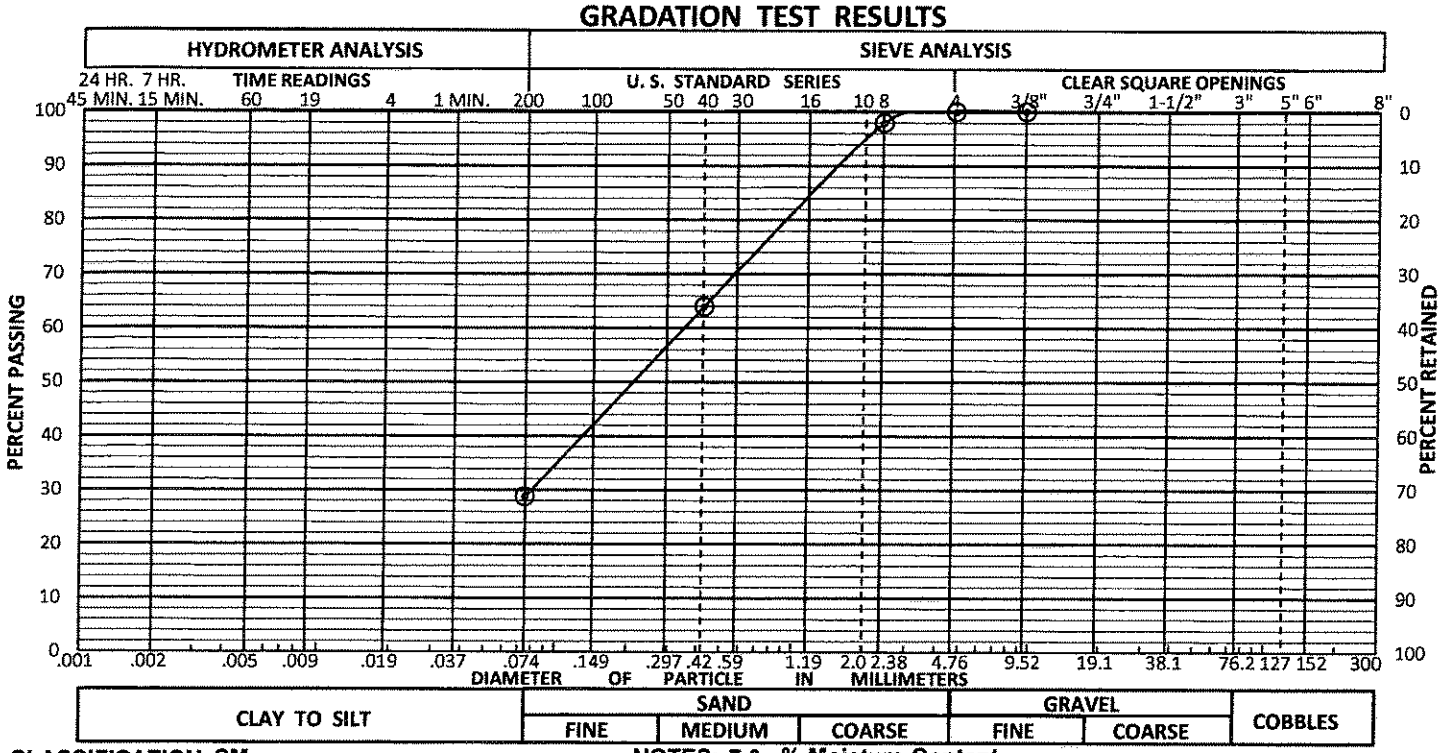


Location from Southwest Lot Corner to Profile:
N. 41° E. – 78'
Location from Profile to:
P1: S. 78° E. – 3'
P2: S. 32° W. – 54'
P3: N. 35° E. – 45'
GPS coordinates:
N. 38° 50' 55.05"
W. 104° 41' 22.66"



GEOQUEST LLC

GRADATION TEST RESULTS



CLASSIFICATION SM

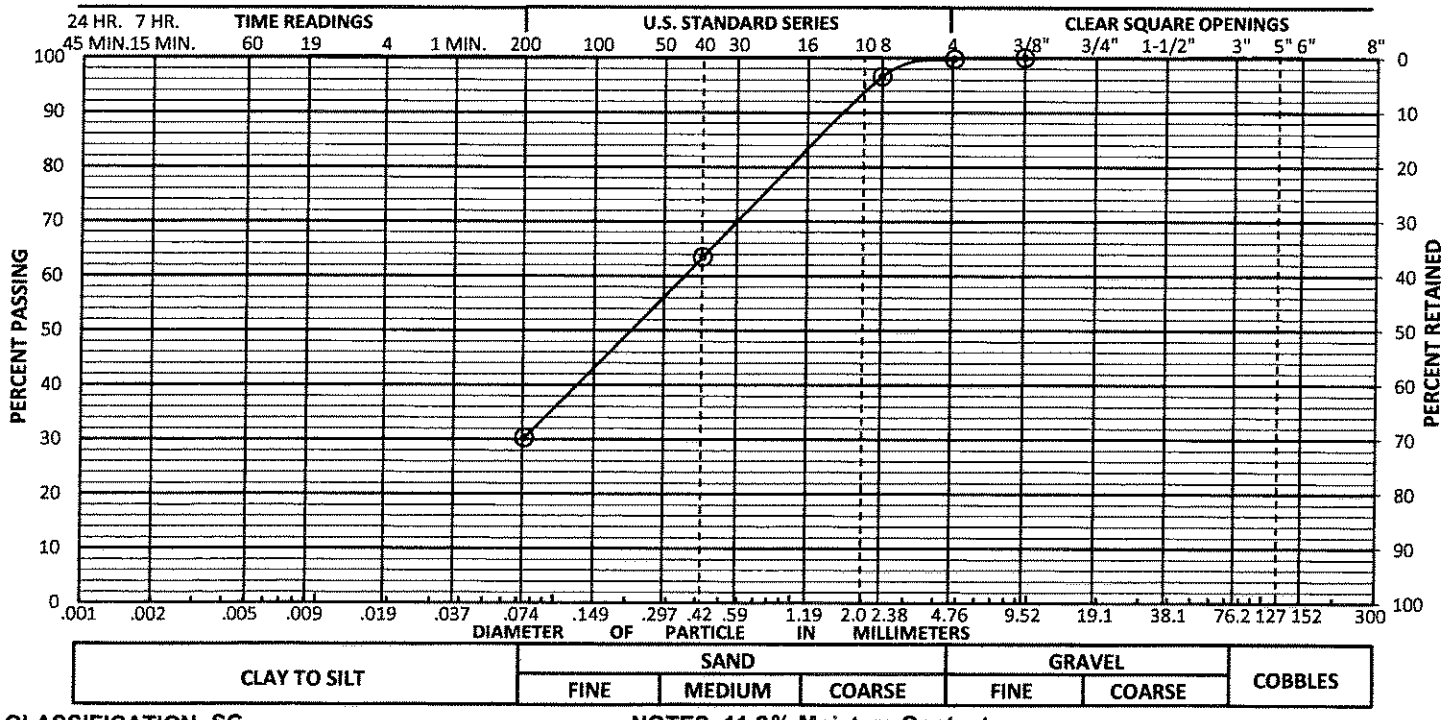
GRAVEL 0.0 %

SAND 71.2 %

FINES 28.8 %

SAMPLE # 1 HOLE # TH-1 DEPTH 3 FEET

NOTES: 7.0 % Moisture Content



CLASSIFICATION SC

GRAVEL 0.2 %

SAND 69.5 %

FINES 30.3 %

SAMPLE # 1 HOLE # TH- 1 DEPTH 8 FEET

NOTES: 11.2% Moisture Content

Job #: 16-0787 By: DM 10/6/2016

DETENTION BASIN DESIGN CALCULATIONS

Remove from drainage letter. SDI is not required for WQ SFB

Stormwater Detention and Infiltration Design Data Sheet

Workbook Protected Worksheet Protected

Stormwater Facility Name: A-1 Chipseal Sand Filter

Facility Location & Jurisdiction: 7245 Cole View, El Paso County

User Input: Watershed Characteristics

Watershed Slope =	0.035	ft/ft
Watershed Length =	300	ft
Watershed Area =	1.01	acres
Watershed Imperviousness =	95.0%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent

Location for 1-hr Rainfall Depths (use dropdown): Denver - Capitol Building

WQCV Treatment Method = Sand Filter

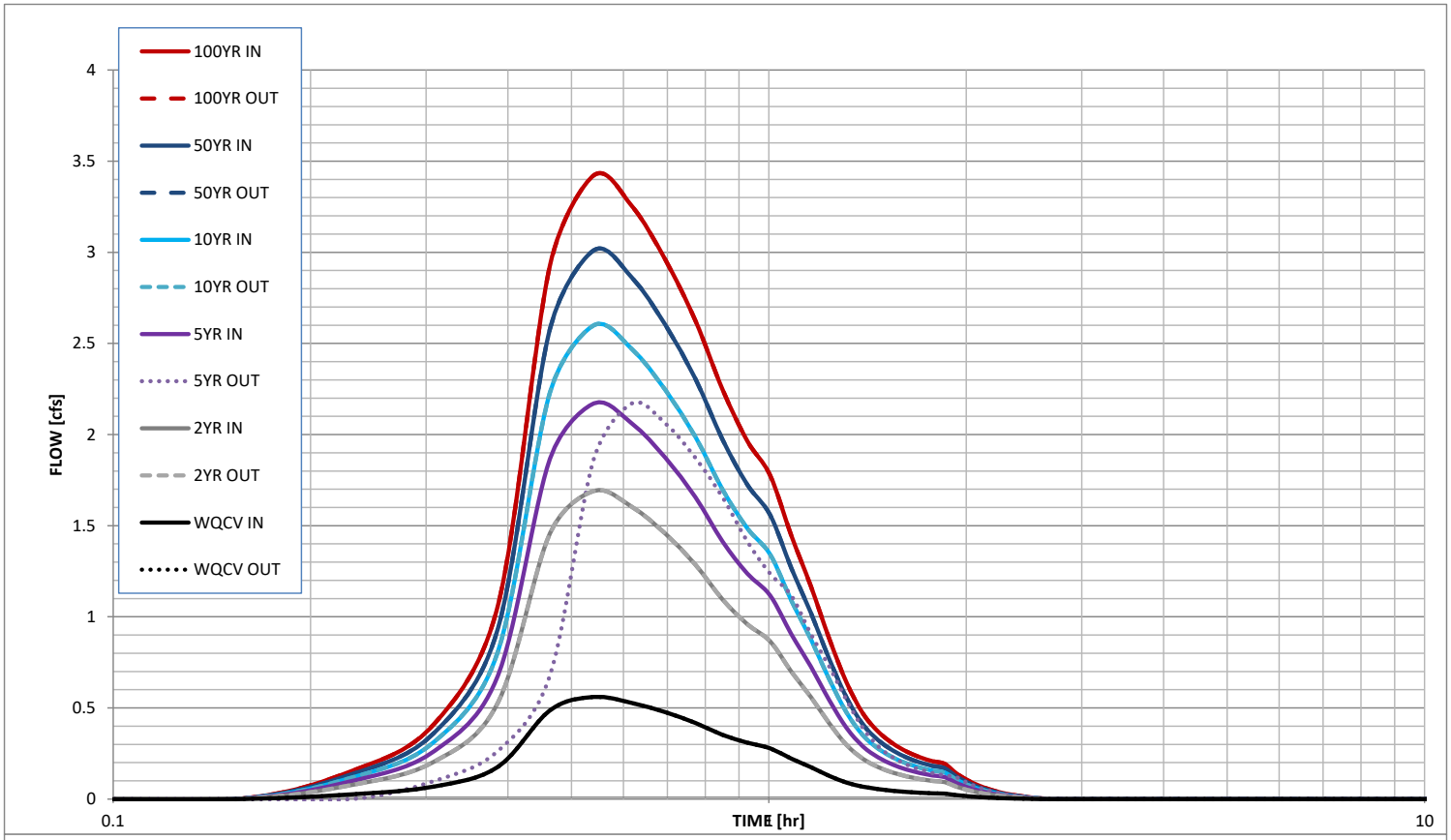
User Defined Stage [ft]	User Defined Area [ft^2]	User Defined Stage [ft]	User Defined Discharge [cfs]
0.00	1,431	0.00	7.50
0.25	1,431	0.25	7.50
0.50	1,431	0.50	7.50
0.75	1,431	0.75	7.50
1.00	1,431	1.00	7.50
1.25	1,431	1.25	7.50
1.50	1,431	1.50	7.50
1.75	1,431	1.75	7.50
2.00	1,431	2.00	7.50
2.25	1,431	2.25	7.50
2.50	1,431	2.50	7.50

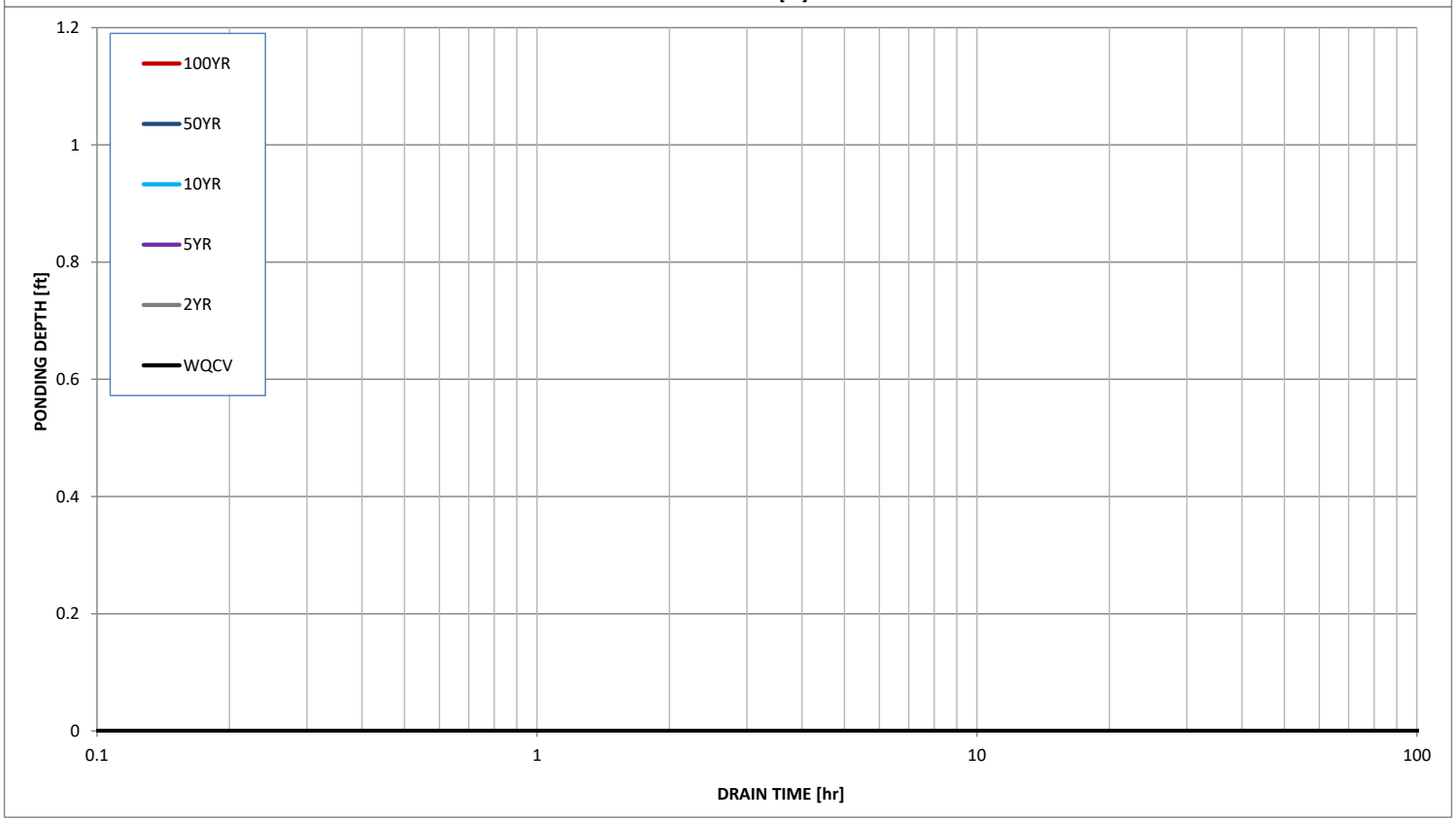
After completing and printing this worksheet to a pdf, go to:
https://maperture.digitaldataservices.com/gvh/?viewer=cswdif
create a new stormwater facility, and
attach the pdf of this worksheet to that record.

Routed Hydrograph Results

Design Storm Return Period =	WQCV	2 Year	5 Year	10 Year	50 Year	100 Year	
One-Hour Rainfall Depth =	0.53	1.19	1.50	1.75	2.00	2.25	in
Calculated Runoff Volume =	0.030	0.092	0.119	0.143	0.165	0.189	acre-ft
OPTIONAL Override Runoff Volume =							acre-ft
Inflow Hydrograph Volume =	0.030	0.092	0.119	0.142	0.165	0.188	acre-ft
Time to Drain 97% of Inflow Volume =	0.5	0.5	**0.5**	0.5	0.5	0.5	hours
Time to Drain 99% of Inflow Volume =	0.5	0.5	0.5	0.5	0.5	**0.5**	hours
Maximum Ponding Depth =	0.00	0.00	0.00	0.00	0.00	0.00	ft
Maximum Ponded Area =	0.03	0.03	0.03	0.03	0.03	**0.03**	acres
Maximum Volume Stored =	0.000	0.000	0.000	0.000	0.000	0.000	acre-ft

Stormwater Detention and Infiltration Design Data Sheet



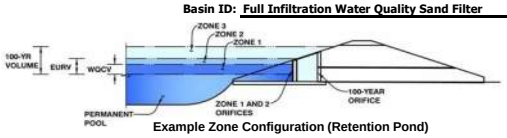


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.05 (January 2022)

Project: 7245 Cole View - A1 Chipseal

Basin ID: Full Infiltration Water Quality Sand Filter



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	SF	
Watershed Area =	1.01	acres
Watershed Length =	300	ft
Watershed Length to Centroid =	150	ft
Watershed Slope =	0.035	ft/ft
Watershed Imperviousness =	95.00%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	12.0	hours
Location for 1-hr Rainfall Depths =	Denver - Capitol Building	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.030	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.132	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.086	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.111	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.131	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	0.152	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	0.172	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	0.195	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3 in.) =	0.234	acre-feet	3.00	inches
Approximate 2-yr Detention Volume =	0.088	acre-feet		
Approximate 5-yr Detention Volume =	0.113	acre-feet		
Approximate 10-yr Detention Volume =	0.134	acre-feet		
Approximate 25-yr Detention Volume =	0.158	acre-feet		
Approximate 50-yr Detention Volume =	0.171	acre-feet		
Approximate 100-yr Detention Volume =	0.183	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.030	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.030	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	N/A	ft
Slope of Trickle Channel (S_{TC}) =	N/A	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

Total detention volume is less than 100-year volume.

Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

Please use UD-BMP calculation spreadsheet for sand filter basin design

Depth Increment = 0.10 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Media Surface	--	0.00	--	--	--	1,431	0.033		
	--	0.25	--	--	--	1,431	0.033	358	0.008
	--	0.50	--	--	--	1,431	0.033	716	0.016
	--	0.75	--	--	--	1,431	0.033	1,073	0.025
6334.6	--	1.00	--	--	--	1,431	0.033	1,431	0.033
	--	1.25	--	--	--	1,431	0.033	1,789	0.041
	--	1.50	--	--	--	1,431	0.033	2,147	0.049
	--	1.75	--	--	--	1,431	0.033	2,504	0.057
6335.6	--	2.00	--	--	--	1,431	0.033	2,862	0.066
	--	2.25	--	--	--	1,431	0.033	3,220	0.074
	--	2.50	--	--	--	1,431	0.033	3,577	0.082

INFILTRATION RATE TO VOLUME REQUIRED CONVERSION

2173.00 A-1 Chipseal
Sand Filter - Full Infiltration Design Calcs
Dane Frank, 2022/04/05

Avg Infiltration Rate = **16.0 min / in** = **0.0625 in / min**
(per Geoquest Percolation Test)

Conversion to in/hr

$$\frac{0.0625 \text{ in}}{\text{min}} \times \frac{60 \text{ min}}{1 \text{ hr}} = \mathbf{3.75 \text{ in / hr}}$$

Sand Filter Surface Area = **1441 sq ft**

Infiltration Rate of Sand Filter =

$$\frac{3.75 \text{ in}}{\text{hr}} \times \frac{1 \text{ ft}}{12 \text{ in}} \times \frac{1441 \text{ sq ft}}{} = \mathbf{450 \text{ cf / hr}}$$

Volume Afer 12 Hours of Flow =

$$\frac{450 \text{ cf}}{\text{hr}} \times \frac{12 \text{ hr}}{} \times \frac{1 \text{ ac}}{43560 \text{ sq ft}} = \mathbf{0.124 \text{ ac-ft}}$$

Required WQCV = **0.033 ac-ft**
(per UD-Detention Spreadsheet)

Required volume exceeded by 3.8 times

provide SFB riprap calculations

DRAINAGE MAPS

A-1 CHIPSEAL
COLORADO SPRINGS
EXISTING DRAINAGE MAP
MAY 2022

BASIN SUMMARY

DESIGN POINT	BASIN	AREA (ACRES)	FLOW 5 YR (cfs)	FLOW 100 YR (cfs)
A	EX–A	1.01	4.4	8.6
B	EX–B	0.35	1.2	2.7

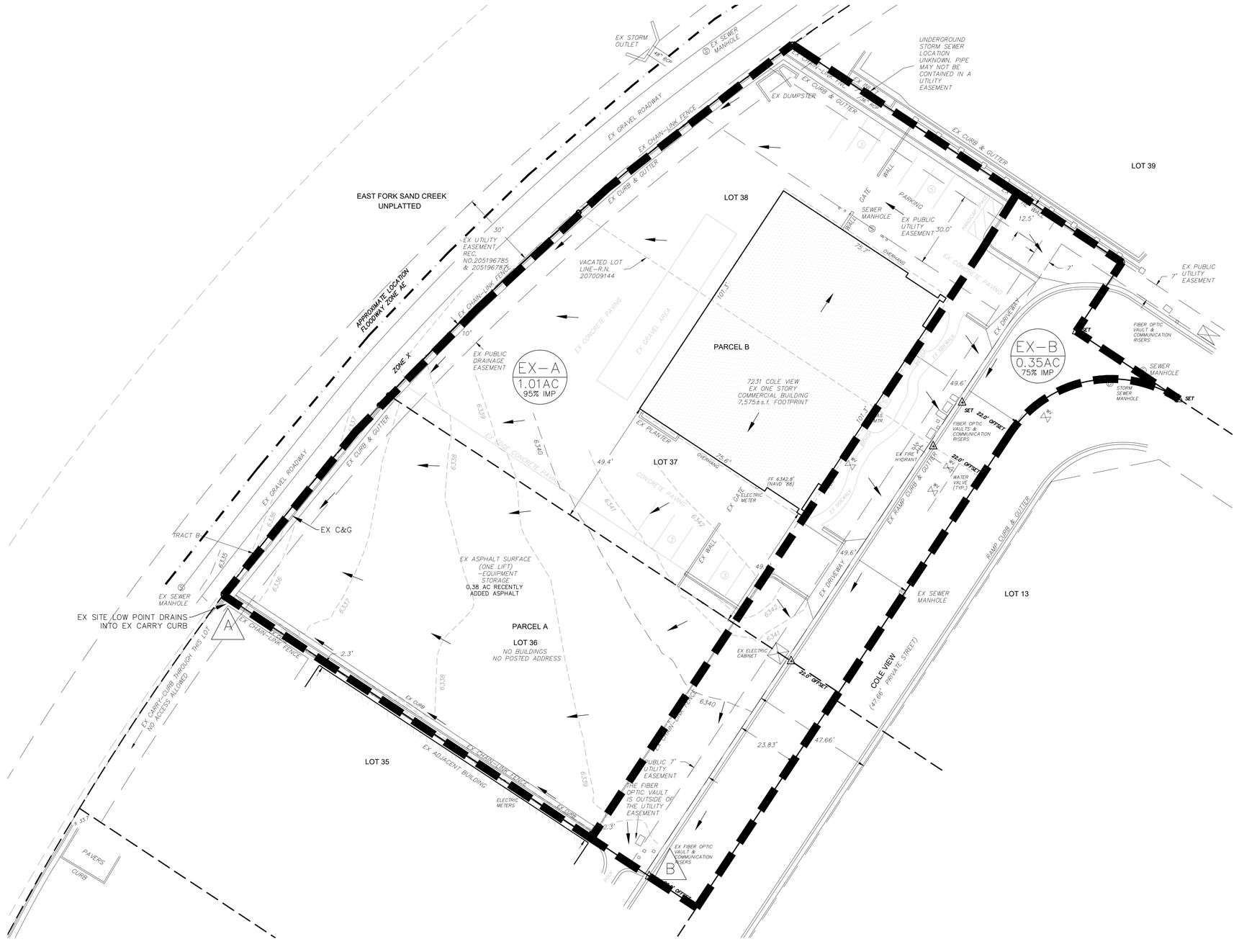
Please show the time of concentration path and update the legend.

LEGEND

- P–7 / T2.22 / 95 IMP — BASIN DESIGNATION, AREA IN BASIN (AC), PERCENT IMPERVIOUS
- D — DESIGN POINT
- BASIN BOUNDARY
- EXISTING 1' CONTOUR
- EXISTING 10' CONTOUR
- GROUND SURFACE FLOW DIRECTION
- ROAD AND DITCH FLOW DIRECTION
- CHAIN–LINK FENCE

NOTES

1. ALL FEATURE SHOWN ARE EXISTING.



REVISIONS

NO.	DESCRIPTION	DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR:
A–1 CHIPSEAL
ATTN: STEPHANE WALLIS
2505 E 74TH AVE
DENVER, CO 80229
720.540.8264

Terra Nova Engineering, Inc. — Creative Civil Engineering Solutions
721 S. 23RD STREET
COLORADO SPRINGS, CO 80904
OFFICE: 719–635–6422
FAX: 719–635–6426
www.tnesinc.com

A–1 CHIPSEAL

EXISTING DRAINAGE MAP

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY LD
H–SCALE AS SHOWN
V–SCALE N/A
JOB NO. 2173.00
DATE ISSUED 05/02/22
SHEET NO. 1 OF 3

N:\jobs\2173.00\Drawings\217300 FDM.dwg, 5/2/2022 11:21:50 AM

A-1 CHIPSEAL
COLORADO SPRINGS
PROPOSED DRAINAGE MAP
MAY 2022

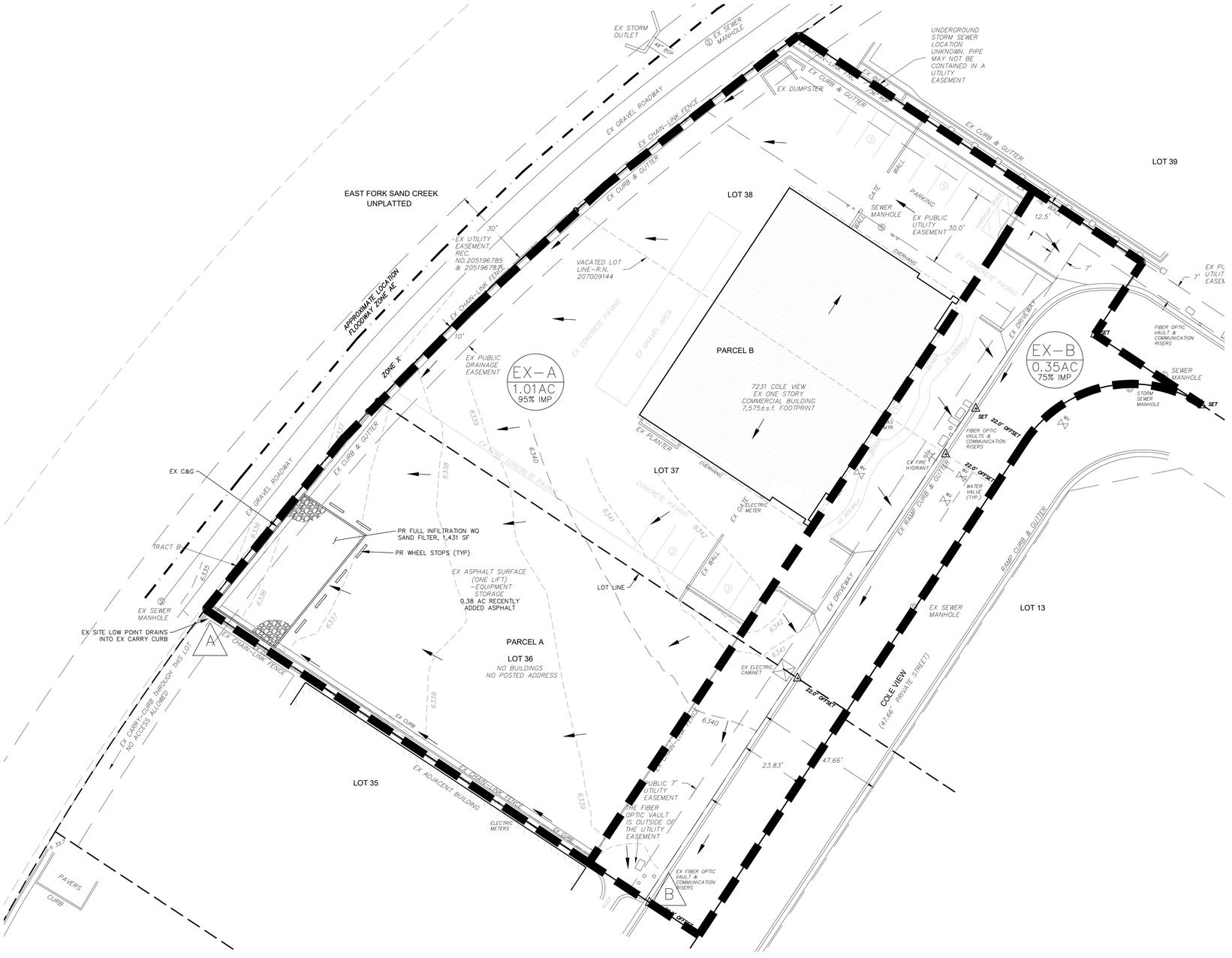
BASIN SUMMARY

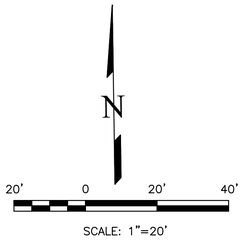
DESIGN POINT	BASIN	AREA (ACRES)	FLOW 5 YR (cfs)	FLOW 100 YR (cfs)
A	EX-A	1.01	4.4	8.6
B	EX-B	0.35	1.2	2.7

Please show the time of concentration path and update the legend.

LEGEND

- P-7 / 12.22 / 95 % IMP — BASIN DESIGNATION, AREA IN BASIN (AC), PERCENT IMPERVIOUS
- D — DESIGN POINT
- BASIN BOUNDARY
- EXISTING 1' CONTOUR
- EXISTING 10' CONTOUR
- GROUND SURFACE FLOW DIRECTION
- ROAD AND DITCH FLOW DIRECTION
- CHAIN-LINK FENCE





REVISIONS

NO.	DESCRIPTION	DATE

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A-1 CHIPSEAL

PROPOSED DRAINAGE MAP

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY LD
H-SCALE AS SHOWN
V-SCALE N/A
JOB NO. 2173.00
DATE ISSUED 05/02/22
SHEET NO. 2 OF 3

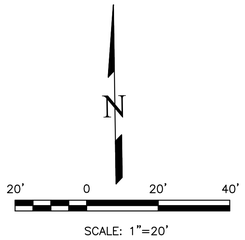
N:\jobs\2173.00\Drawings\217300 FDM.dwg, 5/2/2022 11:21:51 AM

A-1 CHIPSEAL
SITE DEVELOPMENT PLAN
PROPOSED SAND FILTER
MAY 2022

FOR REFERENCE ONLY
NOT FOR CONSTRUCTION

LEGEND

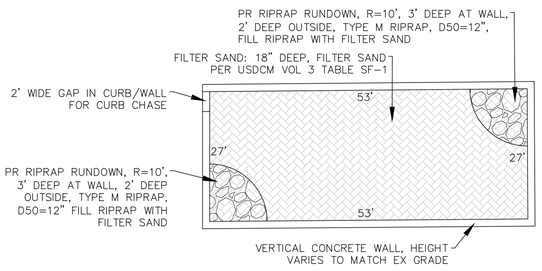
- P-7 / 12.22 — BASIN DESIGNATION / AREA IN BASIN (AC)
- D — DESIGN POINT
- BASIN BOUNDARY
- EXISTING 1' CONTOUR
- EXISTING 10' CONTOUR
- GROUND SURFACE FLOW DIRECTION
- ROAD AND DITCH FLOW DIRECTION
- CHAIN-LINK FENCE



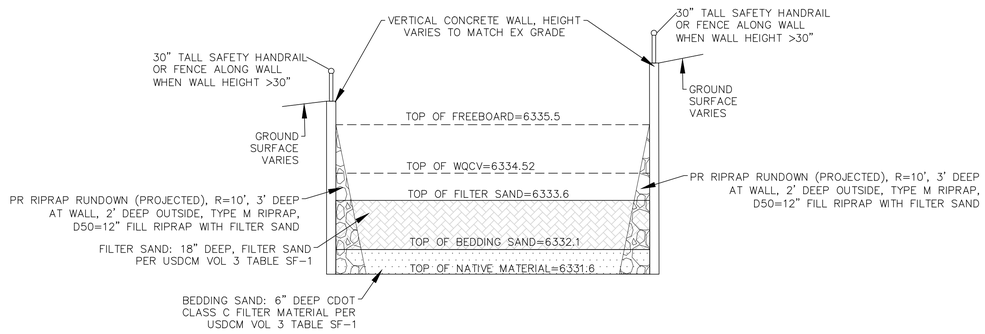
SCALE: 1"=20'

NOTES

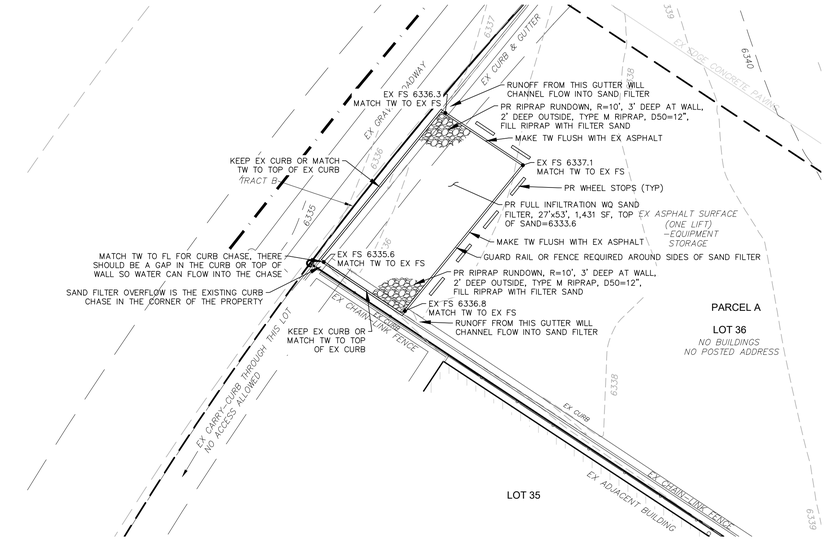
1. THE SAND FILTER IS BEING BUILT INTO AN EXISTING PARKING LOT AND ALIGNS WITH THE EXISTING CURB AND GUTTER. THERE IS NO VEGETATION OR SEEDING INVOLVED WITH THIS SAND FILTER.
2. FOR MAINTENANCE ACCESS: THE SAND FILTER HAS PARKING LOT ON TWO SIDES AND THE INTERIOR DEPTH IS 2' AT THE LOW POINT.



SAND FILTER DESIGN – PLAN VIEW
N.T.S.



SAND FILTER DESIGN – PROFILE VIEW
N.T.S.



REVISIONS

NO.	DESCRIPTION	DATE

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A-1 CHIPSEAL

PROPOSED SAND FILTER

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY LD
H-SCALE AS SHOWN
V-SCALE N/A
JOB NO. 2173.00
DATE ISSUED 05/02/22
SHEET NO. 3 OF 3

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