

FINAL DRAINAGE REPORT
for
OWL MARKETPLACE FILNG NO. 1

Falcon, Colorado

August 2023

Prepared for:

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Add text:

EPC's EDARP File
Number: VR2321

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1.0 CERTIFICATION STATEMENTS

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 El Paso County for drainage reports, and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omission on my part in preparing this report.

Katherine G. Varnum, P.E.
Colorado P.E. License No. 53459
For and on Behalf of Drexel, Barrell & Co.

Date

DEVELOPER'S STATEMENT

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

Business Name: BH RE Investments, LLC.

By:

Brian Zurek
450 N McClintock Drive
Chandler, AZ 85226

Date

EL PASO COUNTY

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

For the County Engineer
CONDITIONS:

Date

FINAL DRAINAGE REPORT
for
OWL MARKETPLACE FILING NO. 1
Falcon, Colorado

2.0 PURPOSE

This report is prepared by Drexel, Barrel & Co in support of the Owl Marketplace Filing No. 1 project. The purpose of this report is to identify onsite and offsite drainage patterns, storm sewer, inlet locations, and areas tributary to the site, and to safely route developed storm water runoff to adequate outfall facilities.

3.0 GENERAL SITE DESCRIPTION

Location and Existing Site Conditions

The site is located at the southwest corner of Owl Place and Meridian Road at 11745 Owl Pl. Lot 15 Falcon Ranchettes – SE ¼ of the SE ¼ of Section 1, Township 13S, Range 65W of the 6th P.M., El Paso County, Colorado.

There is one small home on the property as well as a few minor out buildings. The site is bounded to the south by the Falcon Marketplace development, to the east by Meridian Road, and to the north and west by large-lot residential Falcon Ranchettes Subdivision. The lots immediately adjacent have recently been rezoned to commercial service(CS) for future development. The existing house is served by well and septic, that are to be removed/abandoned in accordance with CDPHE regulations. There are no existing irrigation facilities on the project site.

The site is approximately 4.6 acres in size and is currently generally covered by native grass and vegetation. The site gently slopes from the northeast to the southwest corner of the site. The East Branch of the Upper Black Squirrel Creek Tributary currently discharges flows from the roadside ditch along Meridian Road to the north, southwest across the property before discharging into the sub-regional detention facility SR4 to the south. A CLOMR to contain the floodplain across the property within a 10'x6' concrete box culvert, has been approved by FEMA (Case No. 22-08-0669R, December 21, 2022).

Proposed Site Conditions

Owl Marketplace is a proposed commercial development replatted to provide for four individual pad sites, serviced by an adjacent collector roadway – Meridian Park Drive. Meridian Park Drive is proposed to be extended from the Eastonville roundabout on the Falcon Marketplace property to Owl Place where future extension to the Bent Grass subdivision will take place by others. Dedication of right-of-way for Meridian Park Drive is proposed to straddle the current property line, by agreement with the adjacent landowner.

Soils

According to the Soil Survey of El Paso County Area, Colorado, prepared by the U.S. Department of Agriculture Soil Conservation Service, the site is completely underlain by Columbine Gravelly Sandy Loam (Soil No. 19) All soils are type 'A' hydrologic soil group. See appendix for map.

Climate

This area of El Paso County can be described as the foothills, with total precipitation amounts typical of a semi-arid region. Winters are generally cold and dry, and summers relatively warm and dry. Precipitation ranges from 12 to 14 inches per year, with the majority of this moisture occurring in the spring and summer in the form of rainfall. Thunderstorms are common during the summer months.

Floodplain Statement

The effective floodplain, Zone A limits, for the Unnamed Tributary to Black Squirrel Creek (UTBSC), in the vicinity of the Owl Marketplace project, are defined on the FIRM for El Paso County, Colorado and Unincorporated Areas, Map Number 8041CO553G, Effective Date December 7, 2018.

A CLOMR to modify the effective floodplain was approved by FEMA, Case No. 22-08-0669R (December 21, 2022).

Previous Drainage Studies

The site is located within the Middle Tributary Basin of the Falcon Drainage Basin, as studied in the Falcon Drainage Basin Planning Study, prepared by Matrix Design Group, September, 2015.

4.0 DRAINAGE CRITERIA

This drainage analysis has been prepared in accordance with the current El Paso County Drainage Criteria Manual. Calculations were performed to determine runoff quantities during the 5-year and 100-year frequency storms for historic and developed conditions using the Rational Method as required for basins containing less than 100-acres.

Hydraflow was utilized to determine the hydraulic capacity of the proposed storm system and the MHFD UD-Inlet v.4.06 worksheet was utilized to size the proposed inlet structures.

5.0 EXISTING CLOMR ANALYSIS

The East Branch of the UTBSC is currently conveyed under Owl Place via two 36" CMP near the northeast corner of the site. The 2-36" CMP culverts are severely undersized and partially filled with sediment. The culverts only convey 86-95 cfs, depending on tailwater depth. The remaining flow (approximately 825-834 cfs) in the 100-year event overtops Owl Place. See excerpts in the appendix.

Under existing and proposed conditions, the East Branch of the UTBSC leaving the Owl Marketplace site discharges to Pond SR4 on the Falcon Marketplace development to the south. The pond was designed for a 100-year discharge of 1,016 cfs, which includes both West and East branches of the UTBSC.

6.0 EXISTING ONSITE CONDITION

Missing basins
and DPs for Lot
#14

Rational Method Existing Runoff Summary

EXISTING				
BASIN	DP	Area (Ac.)	Q ₅ (CFS)	Q ₁₀₀ (CFS)
OSE1	E1	1.26	0.9	3.1
E2		1.95	0.5	3.7
	E2	3.21	1.4	6.9
E3	E3	2.34	0.6	4.4
E4	E4	0.33	0.1	0.7

Basin OSE1 represents an offsite 1.26-acre basins to the north of Owl Place. Runoff rates of Q₅=0.9 cfs and Q₁₀₀=3.1 cfs are generated by this basin, and generally travel to the south towards the low point in Owl Place (**Design Point E1**) before discharging on to the Owl Marketplace property.

Basin E2 represents a 1.95 acre basin on the north side of the Owl Marketplace property to the south of Owl Place. This basin contains the Upper Black Squirrel Creek Tributary and as such flow generated by this basin (Q₅=0.5 cfs and Q₁₀₀=3.7 cfs) combine with those from offsite basin OSE1 and travel towards the center of the basin before following the tributary and discharging out the southwest property line at **Design Point E2**.

Basin E3 represents 3.21-acres at the south of the Owl Marketplace property. Runoff rates of Q₅=0.6 cfs and Q₁₀₀=4.4 cfs are generated by this basin, and generally travel to the southwest towards the property corner at **Design Point E3** before discharging into the adjacent subregional pond SR4 on the Falcon Marketplace property.

Basin E4 covers 0.33-acres along Meridian Road at the eastern boundary of the Owl Marketplace property. Runoff rates of Q₅=0.1 cfs and Q₁₀₀=0.7 cfs are generated by this basin, and generally travel to the east and south towards Meridian Road and **Design Point E4**.

7.0 PROPOSED CONDITION CLOMR ANALYSIS

The East Branch of the UTBSC flows southwest across the property and is proposed to be contained within a 10'x6' box culvert that will discharge into the Subregional Pond SR4 recently constructed on the Falcon Marketplace property.

Pond SR4 was designed for a 100-year discharge of 1,016 cfs, which includes both West and East branches of the UTBSC. The 100-year water surface elevation upstream of the pond as shown in the LOMR is 6902.5 (NAVD88), or 6898.7 (NGVD29). The starting HGL for the box culvert analysis was conservatively placed at the top of pipe elevation of 6895.84

feet (NGVD29) for analyzing flows to the East branch only. However, an additional analysis was performed with a starting HGL of 6898.7, to evaluate the backwater effects from the pond.

The proposed box culvert will convey the entire 100-year event (920 cfs) with an HGL of 6911.31 at the proposed headwall upstream of Owl Place, which is more than one foot below Owl Place and contained within the existing and proposed channel upstream. Channel grading will be required for approximately 30 feet to tie into the existing creek profile upstream. The channel side slopes will be reduced from approximately 5.5H:1V to 1.8H:1V and protected with riprap. A proposed Type VI stilling basin and additional riprap slope protection is proposed at the outfall into Pond SR4. An extension of the existing trickle channel will provide connection to the existing low flow path through the facility.

8.0 PROPOSED ONSITE CONDITION

Rational Method Runoff Summary

DEVELOPED				
BASIN	DP	Area (Ac.)	Q ₅ (CFS)	Q ₁₀₀ (CFS)
A	1	0.99	4.1	7.4
B		0.71	2.9	5.3
	2	1.70	6.9	12.6
C		0.96	4.0	7.2
	3	2.66	10.7	19.5
D	4	0.93	3.8	7.0
E	5	0.91	3.7	6.8
F		0.90	4.0	7.1
	6	1.81	7.5	13.6
	7	2.74	11.2	20.3
G	8	0.63	2.9	5.2
	9	6.02	24.7	44.9
H	10	0.33	0.1	0.7
I	11	0.84	3.5	6.3

Basins A through D represent each of the 4 commercial pad sites within the Owl Marketplace property. For this initial stage of overlot development, each lot/pad site will be graded to direct flows towards its southwest corner, where runoff will be intercepted by a temporary sediment basins, before discharging into the proposed private 18" RCP storm sewer stubs provided to each lot.

Design Point 2 is located at the manhole where Basin B combines with **Design Point DP1** (Basin A). Flows continue south from this manhole via proposed public 24" RCP storm sewer.

Design Point 3 is located at the manhole where Basin C combines with Design Point DP2. Flows continue south from this manhole via proposed public 24" RCP storm sewer.

Design Point 4 is located at the proposed temporary sediment basin and subsequent private 18" RCP storm sewer stub for the southernmost basin D.

Clarify what will happen with the TSB and stubs after the overlot grading. Will they stay in place until each lot is developed?

indicate whether this inlet accounted for the overflow and whether this existing system has the capacity for the overflow. Please also address the developed flow at the existing inlet from basin I

And then what? Is there an existing or proposed culvert there?

Basin I is an offsite basin located to the north of Owl Place, that is 0.91 acres of primarily undeveloped site with existing vegetation in its current condition. Given the imminent potential of development to the north of Owl Place, this basin has been considered as a commercial development that will generate flows of $Q_5=3.7$ cfs and $Q_{100}=6.8$ cfs, that will flow directly south towards a low point in Owl Place at **Design Point 5**.

Basin F covers 0.90-acres and includes Owl Place along the property boundary to the north, as well as the eastern half of the proposed Meridian Park Drive. Within the basin, flows will travel west along proposed curb and gutter on Owl Place, before combining with those flows from Design Point 5, turning south and traveling along the proposed easterly curb and gutter of Meridian Park Drive. Flows will be captured in their entirety by a proposed public 10' Type R sump inlet located at **Design Point 6**. Emergency overflow for this inlet is to the east behind the curb, and south to the existing inlet on Eastonville Road.

Design Point 7 represents the piped flows captured by the proposed 18" stub from Design Point 4 and the proposed sump inlet at Design Point 6. Flows continue to the west from this inlet via proposed public 18" RCP storm sewer.

24" shown on the drainage plan. Revise accordingly

Basin G represents the western half of Meridian Park Drive and a small portion of the southwestern part of Owl Place. This basin, which totals 0.63 acres in size, will travel to the south along the westerly curb line of Meridian Park Drive towards a proposed low point and public 10' Type R curb inlet located at **Design Point 8**. Emergency overflow for this inlet is to the west behind the curb.

The drainage plan indicates a double type 16 combo inlet. Revise accordingly.

Design Point 9 represents the piped flows captured by the proposed sump inlet at Design Point 8 and piped flows from Design Point 3 and Design Point 7. Flows continue to the south from this manhole via proposed public 30" RCP storm sewer. Flows will ultimately discharge into the easterly modified forebay of the existing Pond SR4 to the southwest.

Basin H is 0.33 acres located to the west of Meridian Park Drive. Flows within this basin will travel overland towards **Design Point 10** and discharge directly into the subregional detention facility SR4 to the southwest.

Basin I makes up 0.84 acres of primarily public right-of-way separating the commercial pad sites from both Meridian Rd and Eastonville Rd. Runoff travels as curb and gutter flow south along Meridian Road and west onto Eastonville Road before being captured by an existing inlet structure at rates of $Q_5=1.5$ cfs and $Q_{100}=3.6$ cfs at **Design Point 11**.

9.0 DETENTION & WATER QUALITY TREATMENT

The existing subregional detention facility Pond SR4 to the southwest was designed to detain for the upstream watershed, therefore there is no detention requirement for the Owl Marketplace property. Pond SR4 also provides water quality treatment for the same watershed through a modified outlet structure with orifice plate designed to release the WQCV over a 40-hour period. See appendix for applicable sections of the Falcon Marketplace FFD. The outlet structure is proposed for the Owl Marketplace property, as it is provided for immediately downstream.

Discuss the proposed modifications to Pond SR4 (ie: the new forebay and section of trickle channel). And include sizing calcs for both.

Trickle Channel: Per DCMv2 – Chap 4.2, trickle channel should at a minimum provide capacity equal to twice the release capacity at the upstream forebay outlet. Provide these calcs in the drainage report and revise plans as needed.

Forebay: Please provide forebay design calculations. The minimum forebay volumes are shown on MHFD T-5 Table EDB-4. The forebay outlet should be sized to release 1-3% of the undetained peak 100-year discharge, depending on the tributary impervious acreage.

Engineer must confirm in the Drainage Report that the existing offsite or onsite PBMPs that the site is tributary to are functioning as intended.

10.0 FOUR-STEP PROCESS

This project conforms to the El Paso County Four Step Process. The process for this site focuses on reducing runoff volumes, accounting for water quality capture volume treatment (WQCV), stabilizing drainage ways and implementing long-term source controls.

1. **Employ Runoff Reduction Practices:** Proposed impervious areas on this site (roofs, asphalt/sidewalk) will sheet flow across landscaped ground as much as possible to slow runoff and increase time of concentration prior to being conveyed to the proposed public streets and storm sewer system. This will minimize directly connected impervious areas within the project site.
2. **Implement BMP's that provide a Water Quality Capture Volume with slow release:** Runoff from this project will be routed through the sub-regional detention facility Pond SR4 immediately to the southwest of the Owl Marketplace property. Water quality treatment is provided for the upstream watershed as described above.
3. **Stabilize Drainage Ways:** The existing tributary that bisects the site and subsequent floodplain will be modified by installing a 10'x6' box culvert to intercept the upstream flows and direct towards the existing sub-regional detention facility SR4 to the southwest.
4. **Implement Site Specific and Other Source Control BMP's:** Standard commercial source control will be utilized in order to minimize potential pollutants entering the storm system. Example source control measures consist of: indoor storage of household chemicals; and trash receptacles in common areas.

11.0 CONDITIONAL LETTER OF MAP REVISION (CLOMR)

As mentioned above, a Conditional Letter of Map Revision (CLOMR) was approved by FEMA (Case No. 22-08-0669R) on December 21, 2022.

Referenced portions of the CLOMR are included in the appendix.

12.0 DRAINAGE/BRIDGE FEES

The project lies within the Falcon Drainage Basin. As the site has been previously platted drainage and bridge fees are not required.

13.0 CONCLUSIONS

The Owl Place project has been designed in accordance with El Paso County criteria. The water quality basins have been designed to limit the release of storm runoff to historic flows. This development will not negatively impact the downstream facilities.

No portion of the site will remain in the 100-year floodplain after grading is complete. A LOMR will be submitted to FEMA after construction to revise the FIRM map and remove the entirety of the site from the floodplain.

A DBPS amendment would be required for any proposed reimbursement.

Address both Lots #14 and #15 for commercial use and impervious value from current large lot

Address any DBPS reimbursable items

This project is increasing the imperviousness and if fees were not paid previously are due with this plat. (ECM 3.13a)

make sure they are reflected in the FAE

Provide Engineer Cost Estimate for major stormwater improvements.

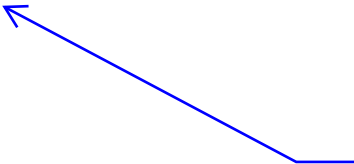
Discuss drainage requirements for Lot #14

14.0 REFERENCES

The sources of information used in the development of this study are listed below:

- 1. City of Colorado Springs/El Paso County Drainage Criteria Manual, May 2014.
- 2. Urban Storm Drainage Criteria Manuals, Urban Drainage and Flood Control District. June 2001, Revised April 2008.
- 3. Request for Conditional Letter of Map Revision, Unnamed Tributary to Black Squirrel Creek, Prepared by Drexel, Barrell & Co., October 25, 2022.
- 5. Natural Resources Conservation Service (NRCS) Web Soil Survey
- 7. EL Paso County Board Resolution No 15-042: El Paso County adoption of Chapter 6 and Section 3.2.1, Chapter 13 of the City of Colorado Springs Drainage Criteria Manual, May 2014.
- 8. Falcon Drainage Basin Planning Study. Prepared by Matrix Design Group, September 2015.
- 9. Final Drainage Report for Falcon Marketplace. Prepared by Drexel, Barrell & Co. November 2019.

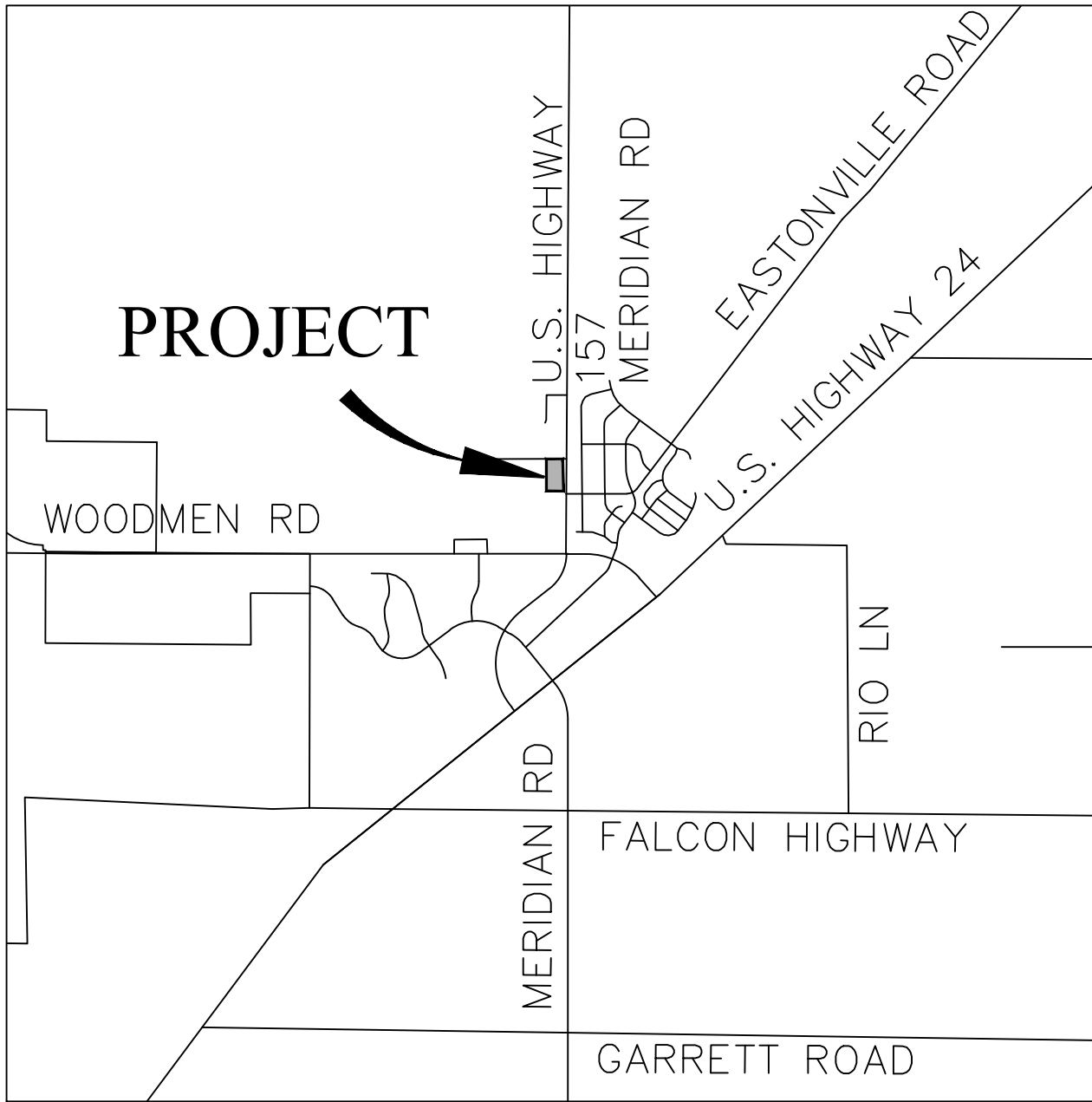
EPC Engineering Criteria Manual July 18, 2023



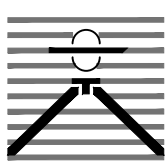
Add Bent Grass study that addressed diversion along Bent Grass Meadows Drive (MDP211) <https://epcdevplanreview.com/Public/ProjectDetails/172892>

Please address the Falcon DBPS and any changes that have been done by others (i.e Bent Grass Study). Identify whether the proposed design accounts for the changes by others and discuss whether the proposed design is in conformance with the DBPS. Identify whether the DBPS improvements are reimbursable and whether the applicant will be seeking reimbursement for improvements. Will the changes trigger any increases to the drainage basin fees?

APPENDIX



Vicinity Map
Not to scale



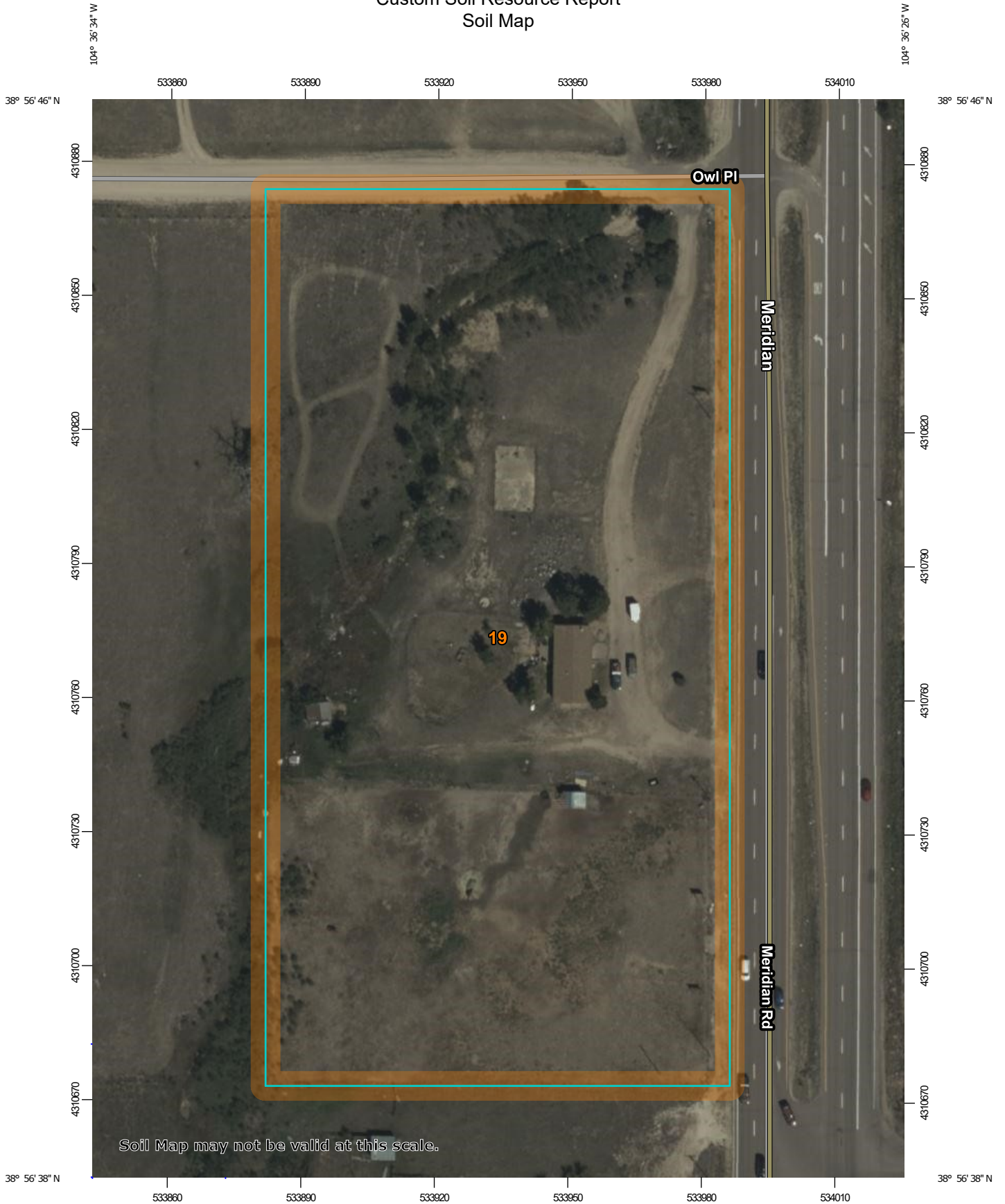
OWL PLACE
EL PASO COUNTY, CO
VICINITY MAP

Drexel, Barrell & Co.
Engineers • Surveyors

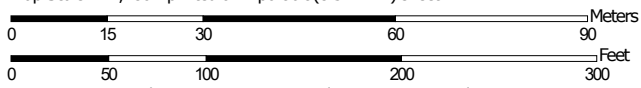
DATE:
JOB NO:
21611-00CSCV

DWG. NO.
VMAP
SHEET 1 OF 1

Custom Soil Resource Report Soil Map




Map Scale: 1:1,180 if printed on A portrait (8.5" x 11") sheet.



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 20, Sep 2, 2022

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

Date(s) aerial images were photographed: Sep 11, 2018—Oct 20, 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
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	5.2	100.0%
Totals for Area of Interest		5.2	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Custom Soil Resource Report

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

El Paso County Area, Colorado

19—Columbine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367p
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Columbine

Setting

Landform: Fans, fan terraces, flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 14 inches: gravelly sandy loam
C - 14 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well 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: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

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

Custom Soil Resource Report

Other soils

Percent of map unit: 1 percent

Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent

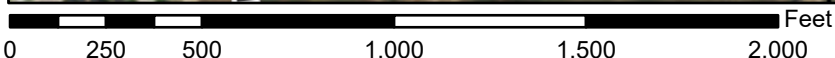
Landform: Depressions

Hydric soil rating: Yes

National Flood Hazard Layer FIRMette



104°36'50"W 38°56'57"N



1:6,000 104°36'12"W 38°56'29"N

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

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) Zone A, V, A99	With BFE or Depth Zone AE, AO, AH, VE, AR	Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X	Future Conditions 1% Annual Chance Flood Hazard Zone X	Area with Reduced Flood Risk due to Levee. See Notes. Zone X	Area with Flood Risk due to Levee Zone D

OTHER AREAS	NO SCREEN Area of Minimal Flood Hazard Zone X	Effective LOMRs	Area of Undetermined Flood Hazard Zone D

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

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

MAP PANELS	Digital Data Available	No Digital Data Available	Unmapped



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 **1/25/2023 at 12:53 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.

PROJECT INFORMATION

PROJECT: Owl Marketplace
PROJECT NO: 21611-01CSCV
DESIGN BY: KGV
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 8/15/2023



Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Business - Commercial Area		0.81		0.88	95
Pasture/Meadow/Lawn		0.08		0.35	0
Streets - Gravel		0.90		0.96	100
Streets - Paved		0.90		0.96	100

*C-Values and Basin Imperviousness based on Table 6-6, City of Colorado Springs Drainage Criteria Manual

SUB-BASIN	SURFACE DESIGNATION	AREA ACRE	COMPOSITE RUNOFF COEFFICIENTS				% IMPERV
			C2	C5	C10	C100	
EXISTING							
OSE1	Business - Commercial Area	0.00		0.81		0.88	95
	Pasture/Meadow/Lawn	0.94		0.08		0.35	0
	Streets - Gravel	0.20		0.90		0.96	100
	Streets - Paved	0.12		0.90		0.96	100
OSE1 TOTAL	<i>WEIGHTED AVERAGE</i>	1.26		0.20		0.41	16
E2	Business - Commercial Area	0.00		0.81		0.88	95
	Pasture/Meadow/Lawn	1.95		0.08		0.35	0
	Streets - Paved	0.00		0.90		0.96	100
E2 TOTAL	<i>WEIGHTED AVERAGE</i>	1.95		0.08		0.35	0
E3	Business - Commercial Area	0.00		0.81		0.88	95
	Pasture/Meadow/Lawn	2.34		0.08		0.35	0
	Streets - Paved	0.00		0.90		0.96	100
E3 TOTAL	<i>WEIGHTED AVERAGE</i>	2.34		0.08		0.35	0
E4	Business - Commercial Area	0.00		0.81		0.88	95
	Pasture/Meadow/Lawn	0.33		0.08		0.35	0
	Streets - Paved	0.00		0.90		0.96	100
E4 TOTAL	<i>WEIGHTED AVERAGE</i>	0.33		0.08		0.35	0
DEVELOPED							
A	Business - Commercial Area	0.99		0.81		0.88	95
	Pasture/Meadow/Lawn	0.00		0.08		0.35	0
	Streets - Paved	0.00		0.90		0.96	100
A TOTAL	<i>WEIGHTED AVERAGE</i>	0.99		0.81		0.88	95
B	Business - Commercial Area	0.71		0.81		0.88	95
	Pasture/Meadow/Lawn	0.00		0.08		0.35	0
	Streets - Paved	0.00		0.90		0.96	100
B TOTAL	<i>WEIGHTED AVERAGE</i>	0.71		0.81		0.88	95

PROJECT INFORMATION

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Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Business - Commercial Area		0.81		0.88	95
Pasture/Meadow/Lawn		0.08		0.35	0
Streets - Gravel		0.90		0.96	100
Streets - Paved		0.90		0.96	100

*C-Values and Basin Imperviousness based on Table 6-6, City of Colorado Springs Drainage Criteria Manual

C	Business - Commercial Area	0.96		0.81		0.88	95
	Pasture/Meadow/Lawn	0.00		0.08		0.35	0
	Streets - Paved	0.00		0.90		0.96	100
C TOTAL	<i>WEIGHTED AVERAGE</i>	0.96		0.81		0.88	95
D	Business - Commercial Area	0.93		0.81		0.88	95
	Pasture/Meadow/Lawn	0.00		0.08		0.35	0
	Streets - Paved	0.00		0.90		0.96	100
D TOTAL	<i>WEIGHTED AVERAGE</i>	0.93		0.81		0.88	95
E	Business - Commercial Area	0.91		0.81		0.88	95
	Pasture/Meadow/Lawn	0.00		0.08		0.35	0
	Streets - Paved	0.00		0.90		0.96	100
E TOTAL	<i>WEIGHTED AVERAGE</i>	0.91		0.81		0.88	95
F	Business - Commercial Area	0.00		0.81		0.88	95
	Pasture/Meadow/Lawn	0.00		0.08		0.35	0
	Streets - Paved	0.90		0.90		0.96	100
F TOTAL	<i>WEIGHTED AVERAGE</i>	0.90		0.90		0.96	100
G	Business - Commercial Area	0.00		0.81		0.88	95
	Pasture/Meadow/Lawn	0.00		0.08		0.35	0
	Streets - Paved	0.63		0.90		0.96	100
G TOTAL	<i>WEIGHTED AVERAGE</i>	0.63		0.90		0.96	100
H	Business - Commercial Area	0.00		0.81		0.88	95
	Pasture/Meadow/Lawn	0.33		0.08		0.35	0
	Streets - Paved	0.00		0.90		0.96	100
H TOTAL	<i>WEIGHTED AVERAGE</i>	0.33		0.08		0.35	0
I	Business - Commercial Area	0.42		0.81		0.88	95
	Pasture/Meadow/Lawn	0.00		0.08		0.35	0
	Streets - Paved	0.42		0.90		0.96	100
I TOTAL	<i>WEIGHTED AVERAGE</i>	0.84		0.86		0.92	98

PROJECT INFORMATION

PROJECT: Owl Marketplace
 PROJECT NO: 21611-01CSCV
 DESIGN BY: KGV
 REV. BY: TDM
 AGENCY: El Paso County
 REPORT TYPE: Final
 DATE: 8/15/2023



RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

DEVELOPED TIME OF CONCENTRATION STANDARD FORM SF-2

SUB-BASIN DATA					CA		INITIAL/OVERLAND TIME (t _i)			TRAVEL TIME (t _t)				TIME OF CONC. t _c		FINAL t _c
BASIN	DESIGN PT.	C ₅	C ₁₀₀	AREA	5	100	LENGTH	SLOPE	t _i	LENGTH	SLOPE	VEL.	t _t	COMP.	MINIMUM	
				Ac			Ft	%	Min	Ft	%	FPS	Min	t _c	t _c	Min
EXISTING																
OSE1	E1	0.20	0.41	1.26	0.25	0.52	100	3.0	11.7	150	1.0	1.5	1.7	13.3	5.0	13.3
E2		0.08	0.35	1.95	0.16	0.68	100	2.0	15.1	340	3.0	4.3	1.3	16.5	5.0	16.5
OS1+E2	E2	0.13	0.37	3.21	0.41	1.20	From OSE1			350	3.0	4.3	1.4	14.7	5.0	14.7
E3	E3	0.08	0.35	2.34	0.19	0.82	100	2.0	15.1	410	3.0	4.3	1.6	16.7	5.0	16.7
E4	E4	0.08	0.35	0.33	0.03	0.12	50	2.0	10.7	550	2.0	3.8	2.4	13.1	5.0	13.1
DEVELOPED																
A	1	0.81	0.88	0.99	0.80	0.87	50	3.0	2.7	230	3.0	4.3	0.9	3.6	5.0	5.0
B		0.81	0.88	0.71	0.57	0.62	50	3.0	2.7	210	3.0	4.3	0.8	3.5	5.0	5.0
DP1+B	2	0.81	0.88	1.70	1.37	1.49	From DP1			122	1.5	11.3	0.2	5.2	5.0	5.2
C		0.81	0.88	0.96	0.78	0.84	50	3.0	2.7	230	3.0	4.3	0.9	3.6	5.0	5.0
DP2+C	3	0.81	0.88	2.66	2.15	2.34	From DP2			165	1.5	11.3	0.2	5.4	5.0	5.4
D	4	0.81	0.88	0.93	0.75	0.81	50	3.0	2.7	170	3.0	4.3	0.7	3.3	5.0	5.0
E	5	0.81	0.88	0.91	0.73	0.80	50	2.0	3.0	120	2.0	3.8	0.5	3.6	5.0	5.0
F		0.90	0.96	0.90	0.81	0.87	50	2.0	2.1	850	2.0	3.8	3.7	5.8	5.0	5.8
DP5+F	6	0.85	0.92	1.81	1.55	1.66	From Basin F							5.8	5.0	5.8
DP4+DP6	7	0.84	0.91	2.74	2.30	2.48	From DP6							5.8	5.0	5.8
G	8	0.90	0.96	0.63	0.57	0.60	50	20.0	1.0	550	2.0	3.8	2.4	3.4	5.0	5.0
DP3+DP7+DP8	9	0.83	0.90	6.02	5.01	5.42	From DP3			135	1.5	11.3	0.2	5.6	5.0	5.6
H	10	0.08	0.35	0.33	0.03	0.12	50	2.0	10.7	450	2.0	3.8	2.0	12.7	5.0	12.7
I	11	0.86	0.92	0.84	0.71	0.77	50	2.0	2.6	750	2.0	3.8	3.3	5.9	5.0	5.9

PROJECT INFORMATION

PROJECT: Owl Marketplace
 PROJECT NO: 21611-01CSCV
 DESIGN BY: KGV
 REV. BY: TDM
 AGENCY: El Paso County
 REPORT TYPE: Final
 DATE: 8/15/2023



RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

DEVELOPED **RUNOFF** **5 YR STORM** **P1= 1.50**

BASIN (S)	DIRECT RUNOFF						
	DESIGN POINT	AREA (AC)	RUNOFF COEFF	t _c (MIN)	C * A	I (IN/HR)	Q (CFS)
EXISTING							
OSE1	E1	1.26	0.20	13.3	0.25	3.60	0.9
E2		1.95	0.08	16.5	0.16	3.26	0.5
OS1+E2	E2	3.21	0.13	14.7	0.41	3.44	1.4
E3	E3	2.34	0.08	16.7	0.19	3.23	0.6
E4	E4	0.33	0.08	13.1	0.03	3.62	0.1
DEVELOPED							
A	1	0.99	0.81	5.0	0.80	5.09	4.1
B		0.71	0.81	5.0	0.57	5.09	2.9
DP1+B	2	1.70	0.81	5.2	1.37	5.04	6.9
C		0.96	0.81	5.0	0.78	5.09	4.0
DP2+C	3	2.66	0.81	5.4	2.15	4.98	10.7
D	4	0.93	0.81	5.0	0.75	5.09	3.8
E	5	0.91	0.81	5.0	0.73	5.09	3.7
F		0.90	0.90	5.8	0.81	4.88	4.0
DP5+F	6	1.81	0.85	5.8	1.55	4.88	7.5
DP4+DP6	7	2.74	0.84	5.8	2.30	4.88	11.2
G	8	0.63	0.90	5.0	0.57	5.09	2.9
DP3+DP7+DP8	9	6.02	0.83	5.6	5.01	4.93	24.7
H	10	0.33	0.08	12.7	0.03	3.68	0.1
I	11	0.84	0.86	5.9	0.71	4.87	3.5

PROJECT INFORMATION

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RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

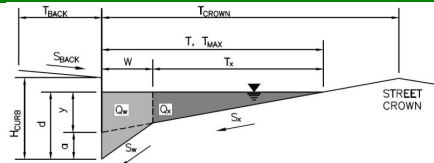
DEVELOPED RUNOFF 100 YR STORM P1= **2.52**

BASIN (S)	DIRECT RUNOFF						
	DESIGN POINT	AREA (AC)	RUNOFF COEFF	t _c (MIN)	C * A	I (IN/HR)	Q (CFS)
EXISTING							
OSE1	E1	1.26	0.41	13.3	0.52	6.04	3.1
E2		1.95	0.35	16.5	0.68	5.47	3.7
OS1+E2	E2	3.21	0.37	14.7	1.20	5.78	6.9
E3	E3	2.34	0.35	16.7	0.82	5.43	4.4
E4	E4	0.33	0.35	13.1	0.12	6.08	0.7
DEVELOPED							
A	1	0.99	0.88	5.0	0.87	8.55	7.4
B		0.71	0.88	5.0	0.62	8.55	5.3
DP1+B	2	1.70	0.88	5.2	1.49	8.47	12.6
C		0.96	0.88	5.0	0.84	8.55	7.2
DP2+C	3	2.66	0.88	5.4	2.34	8.36	19.5
D	4	0.93	0.88	5.0	0.81	8.55	7.0
E	5	0.91	0.88	5.0	0.80	8.55	6.8
F		0.90	0.96	5.8	0.87	8.19	7.1
DP5+F	6	1.81	0.92	5.8	1.66	8.19	13.6
DP4+DP6	7	2.74	0.91	5.8	2.48	8.19	20.3
G	8	0.63	0.96	5.0	0.60	8.55	5.2
DP3+DP7+DP8	9	6.02	0.90	5.6	5.42	8.28	44.9
H	10	0.33	0.35	12.7	0.12	6.18	0.7
I	11	0.84	0.92	5.9	0.77	8.18	6.3

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

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

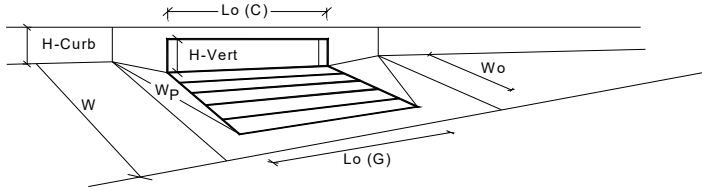
Project: _____
 Inlet ID: _____ **Owl Marketplace**
 _____ **DP6**



Gutter Geometry (Enter data in the blue cells)																	
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="2.5"/> ft																
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft																
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/>																
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches																
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="24.0"/> ft																
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft																
Street Transverse Slope	$S_X = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft																
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft																
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = $ <input style="width: 50px;" type="text" value="0.000"/> ft/ft																
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.012"/>																
Max. Allowable Spread for Minor & Major Storm	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"></th> <th style="width: 25%; text-align: center;">Minor Storm</th> <th style="width: 25%; text-align: center;">Major Storm</th> <th style="width: 10%;"></th> </tr> </thead> <tbody> <tr> <td>$T_{MAX} =$</td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="24.0"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="24.0"/></td> <td style="text-align: right;">ft</td> </tr> <tr> <td>$d_{MAX} =$</td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="6.0"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="8.0"/></td> <td style="text-align: right;">inches</td> </tr> <tr> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> </tbody> </table>		Minor Storm	Major Storm		$T_{MAX} = $	<input style="width: 40px;" type="text" value="24.0"/>	<input style="width: 40px;" type="text" value="24.0"/>	ft	$d_{MAX} = $	<input style="width: 40px;" type="text" value="6.0"/>	<input style="width: 40px;" type="text" value="8.0"/>	inches		<input type="checkbox"/>	<input type="checkbox"/>	
	Minor Storm	Major Storm															
$T_{MAX} = $	<input style="width: 40px;" type="text" value="24.0"/>	<input style="width: 40px;" type="text" value="24.0"/>	ft														
$d_{MAX} = $	<input style="width: 40px;" type="text" value="6.0"/>	<input style="width: 40px;" type="text" value="8.0"/>	inches														
	<input type="checkbox"/>	<input type="checkbox"/>															
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm																	
Check boxes are not applicable in SUMP conditions																	
MINOR STORM Allowable Capacity is based on Depth Criterion																	
MAJOR STORM Allowable Capacity is based on Depth Criterion																	
$Q_{allow} = $	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"></th> <th style="width: 25%; text-align: center;">Minor Storm</th> <th style="width: 25%; text-align: center;">Major Storm</th> <th style="width: 10%;"></th> </tr> </thead> <tbody> <tr> <td></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="SUMP"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="SUMP"/></td> <td style="text-align: right;">cfs</td> </tr> </tbody> </table>		Minor Storm	Major Storm			<input style="width: 40px;" type="text" value="SUMP"/>	<input style="width: 40px;" type="text" value="SUMP"/>	cfs								
	Minor Storm	Major Storm															
	<input style="width: 40px;" type="text" value="SUMP"/>	<input style="width: 40px;" type="text" value="SUMP"/>	cfs														

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	6.0	8.0	inches
Grate Information	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
Curb Opening Information	MINOR	MAJOR	
Length of a Unit Curb Opening	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
Low Head Performance Reduction (Calculated)	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.33	0.50	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.57	0.75	
Curb Opening Performance Reduction Factor for Long Inlets	0.93	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)	MINOR	MAJOR	
Q_a	8.3	16.3	cfs
Q_{PEAK REQUIRED}	7.5	13.6	cfs

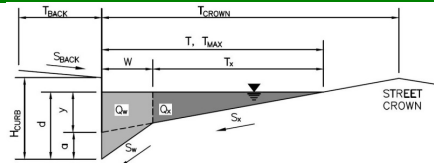
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)

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

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

Project: _____
 Inlet ID: _____

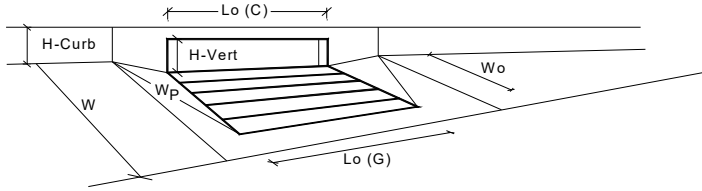
Owl Marketplace
 DP8



Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 2.5$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.020$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 24.0$ 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)	$n_{STREET} = 0.012$						
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> </thead> <tbody> <tr> <td>$T_{MAX} = 24.0$</td> <td>$T_{MAX} = 24.0$</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	ft	$T_{MAX} = 24.0$	$T_{MAX} = 24.0$	
Minor Storm	Major Storm	ft					
$T_{MAX} = 24.0$	$T_{MAX} = 24.0$						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> </thead> <tbody> <tr> <td>$d_{MAX} = 6.0$</td> <td>$d_{MAX} = 8.0$</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	inches	$d_{MAX} = 6.0$	$d_{MAX} = 8.0$	
Minor Storm	Major Storm	inches					
$d_{MAX} = 6.0$	$d_{MAX} = 8.0$						
Check boxes are not applicable in SUMP conditions	<input type="checkbox"/> <input type="checkbox"/>						
MINOR STORM Allowable Capacity is based on Depth Criterion							
MAJOR STORM Allowable Capacity is based on Depth Criterion							
	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> </thead> <tbody> <tr> <td>$Q_{allow} = \text{SUMP}$</td> <td>$Q_{allow} = \text{SUMP}$</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	cfs	$Q_{allow} = \text{SUMP}$	$Q_{allow} = \text{SUMP}$	
Minor Storm	Major Storm	cfs					
$Q_{allow} = \text{SUMP}$	$Q_{allow} = \text{SUMP}$						

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	6.0	7.3	inches
Grate Information	MINOR	MAJOR	<input type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
Curb Opening Information	MINOR	MAJOR	
Length of a Unit Curb Opening	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
Low Head Performance Reduction (Calculated)	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.33	0.44	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.57	0.69	
Curb Opening Performance Reduction Factor for Long Inlets	0.93	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)	MINOR	MAJOR	
Q_a	8.3	13.4	cfs
Q_{PEAK REQUIRED}	2.9	5.2	cfs

Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)

provide hydraulic design of the proposed storm pipes conveying the developments flow to the pond.

PROJECT INFORMATION

PROJECT: Owl Marketplace
PROJECT NO: 21611-01CSCV
DESIGN BY: KGV
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 9/28/2023



STILLING BASIN

mannings, n	0.013	
Culvert width, W	10	ft
Culvert height, H	6	ft
Culvert slope	1.00	%
Q ₁₀₀	920	cfs
Depth of flow	4.5	ft
Velocity	15.33	fps
Froude	1.28	
<i>Reference MHFD Figure 9-45 in appendix</i>		
D	6.71	ft
W	20.22	ft
H	15.17	ft
L	26.97	ft
a	10.11	ft
b	7.58	ft
c	10.11	ft
d	3.37	ft
e	1.69	ft
f	2.53	ft
t	1.69	ft

Provide complete design for the inlet structure to the box culvert, including safety features.

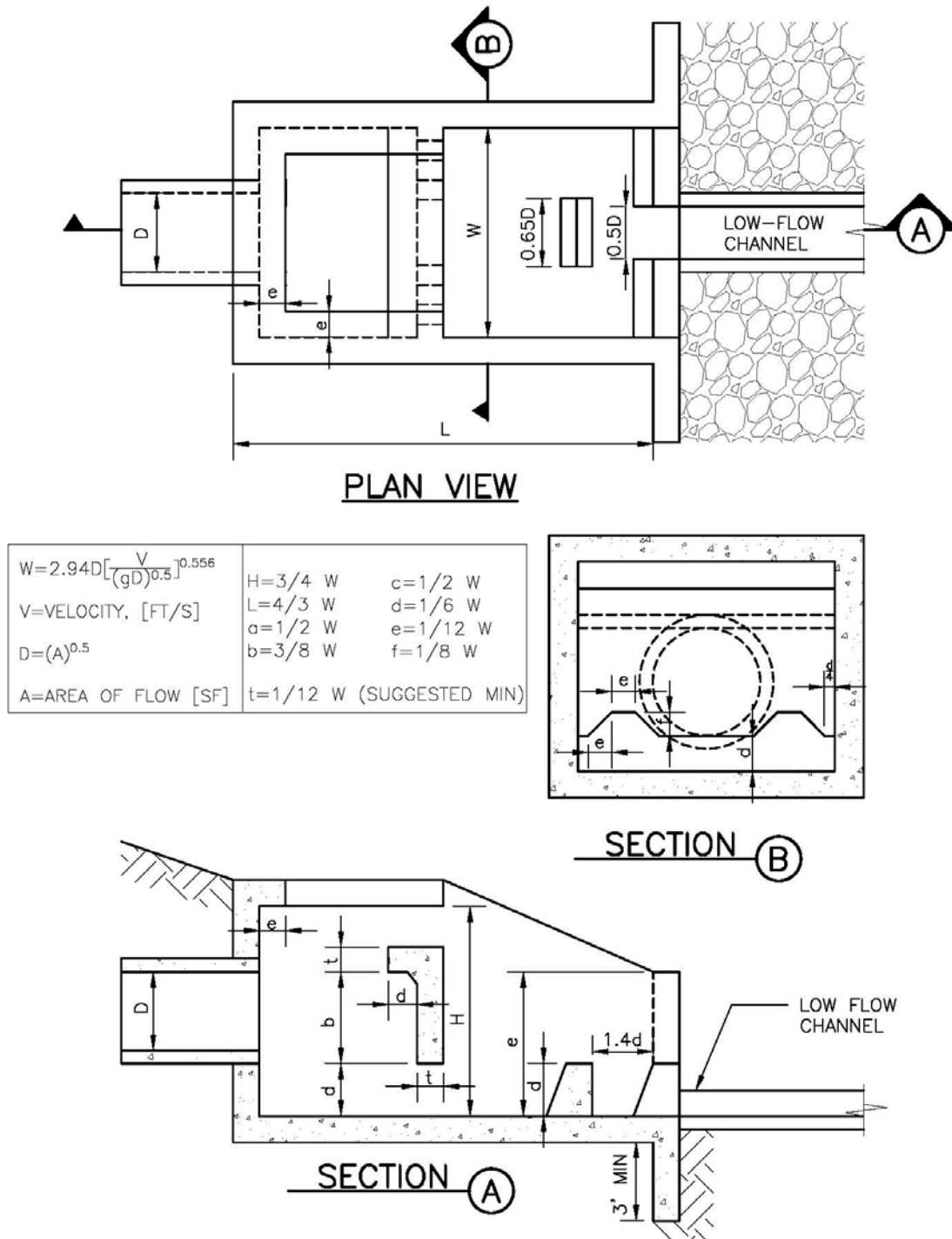
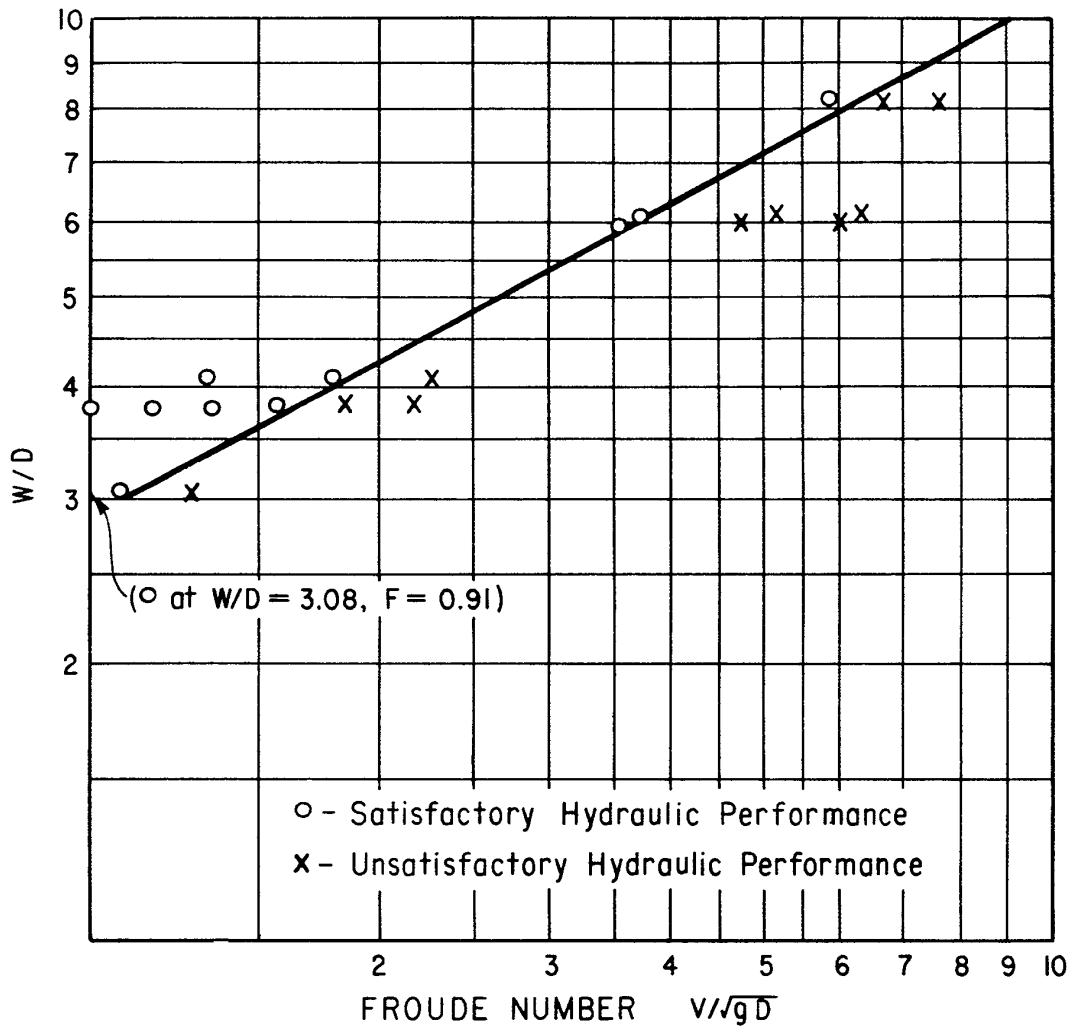


Figure 9-45. UDFCD modified USBR type VI impacts stilling basin (general design dimensions)



"W" is the inside width of the basin.
 "D" represents the depth of flow entering the basin and is the square root of the flow area at the conduit outlet.
 "V" is the velocity of the incoming flow.
 The tailwater depth is uncontrolled.

Figure 9-46. Basin width diagram for the USBR type VI impact stilling basin



Federal Emergency Management Agency
Washington, D.C. 20472

**CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT**

COMMUNITY INFORMATION		PROPOSED PROJECT DESCRIPTION	BASIS OF CONDITIONAL REQUEST
COMMUNITY	El Paso County Colorado (Unincorporated Areas)	CULVERT FILL	1D HYDRAULIC ANALYSIS UPDATED TOPOGRAPHIC DATA HYDROLOGIC ANALYSIS
	COMMUNITY NO.: 080059		
IDENTIFIER	Falcon Owl Place	APPROXIMATE LATITUDE AND LONGITUDE: 38.946, -104.609 SOURCE: OTHER DATUM: NAD 83	
AFFECTED MAP PANELS			
TYPE: FIRM*	NO.: 08041C0553G DATE: December 7, 2018	*FIRM - Flood Insurance Rate Map	

FLOODING SOURCE AND REACH DESCRIPTION

Unnamed Tributary to Black Squirrel Creek (East Branch) – From approximately 890 feet downstream of Owl Place to just upstream of Owl Place

PROPOSED PROJECT DESCRIPTION

Flooding Source	Proposed Project	Location of Proposed Project
Unnamed Tributary to Black Squirrel Creek (East Branch)	Two New 10' x 6' Box Culverts	From approximately 890 feet downstream of Owl Place to just upstream of Owl Place

SUMMARY OF IMPACTS TO FLOOD HAZARD DATA

Flooding Source	Effective Flooding	Proposed Flooding	Increases	Decreases
Unnamed Tributary to Black Squirrel Creek (East Branch)	Zone A	Contained	None	Yes

COMMENT

This document provides the Federal Emergency Management Agency's (FEMA's) comment regarding a request for a CLOMR for the project described above. This document is not a final determination; it only provides our comment on the proposed project in relation to the flood hazard information shown on the effective National Flood Insurance Program (NFIP) map. We reviewed the submitted data and the data used to prepare the effective flood hazard information for your community and determined that the proposed project meets the minimum floodplain management criteria of the NFIP. Your community is responsible for approving all floodplain development and for ensuring that all permits required by Federal or State/Commonwealth law have been received. State/Commonwealth, county, and community officials, based on their knowledge of local conditions and in the interest of safety, may set higher standards for construction in the Special Flood Hazard Area (SFHA), the area subject to inundation by the base flood. If the State/Commonwealth, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304. Additional Information about the NFIP is available on the FEMA website at <https://www.fema.gov/flood-insurance>.

Patrick "Rick" F. Sacbbit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

**CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT (CONTINUED)**

COMMUNITY INFORMATION

To determine the changes in flood hazards that will be caused by the proposed project, we compared the hydraulic modeling reflecting the proposed project (referred to as the proposed conditions model) to the hydraulic modeling reflecting the existing conditions.

The table below shows the changes in the base flood water-surface elevations (WSELs).

Base Flood WSEL Comparison Table

Flooding Source: Unnamed Tributary to Black Squirrel Creek (East Branch)		Base Flood WSEL Change (feet)	Location of maximum change
Proposed vs.	Maximum increase	None	Not Applicable
Existing	Maximum decrease	None	Not Applicable

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304. Additional Information about the NFIP is available on the FEMA website at <https://www.fema.gov/flood-insurance>.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency

Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

DATA REQUIRED FOR FOLLOW-UP LOMR

Upon completion of the project, your community must submit the data listed below and request that we make a final determination on revising the effective FIRM. If the project is built as proposed and the data below are received, a revision to the FIRM would be warranted.

- Detailed application and certification forms must be used for requesting final revisions to the maps. Therefore, when the map revision request for the area covered by this letter is submitted, Form 1, entitled "Overview and Concurrence Form," must be included. A copy of this form may be accessed at <https://www.fema.gov/flood-maps/change-your-flood-zone/paper-application-forms/mt-2>.

- The detailed application and certification forms listed below may be required if as-built conditions differ from the proposed plans. If required, please submit new forms, which may be accessed at <https://www.fema.gov/flood-maps/change-your-flood-zone/paper-application-forms/mt-2>, or annotated copies of the previously submitted forms showing the revised information.

Form 2, entitled "Riverine Hydrology and Hydraulics Form." Hydraulic analyses for as-built conditions of the base flood must be submitted with Form 2.

Form 3, entitled "Riverine Structures Form."

- A certified topographic work map showing the revised and effective base floodplain boundaries. Please ensure that the revised information ties-in with the current effective information at the downstream and upstream ends of the revised reach.

- An annotated copy of the FIRM, at the scale of the effective FIRM, that shows the revised base floodplain boundary delineations shown on the submitted work map and how they tie-in to the base floodplain boundary delineations shown on the current effective FIRM at the downstream and upstream ends of the revised reach.

- As-built plans, certified by a registered Professional Engineer, of all proposed project elements.

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304. Additional Information about the NFIP is available on the FEMA website at <https://www.fema.gov/flood-insurance>.

A handwritten signature in black ink, appearing to read "Rick F. Sacbbit".

Patrick "Rick" F. Sacbbit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency

Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

DATA REQUIRED FOR FOLLOW-UP LOMR (continued)

• FEMA's fee schedule for reviewing and processing requests for conditional and final modifications to published flood information and maps may be accessed at <https://www.fema.gov/flood-maps/change-your-flood-zone/status/flood-map-related-fees>. The fee at the time of the map revision submittal must be received before we can begin processing the request. Payment of this fee can be made through a check or money order, made payable in U.S. funds to the National Flood Insurance Program, or by credit card (Visa or MasterCard only). Please either forward the payment, along with the revision application, to the following address:

Colorado Water Conservation Board
Attention: Floodplain Mapping Program Manager
1313 Sherman Street, Rm 718
Denver, CO 80203

or submit the LOMR using the Online LOMC portal at: <https://hazards.fema.gov/femaportal/onlinelomc/signin>

After receiving appropriate documentation to show that the project has been completed, FEMA will initiate a revision to the FIRM. Because the flood hazard information (i.e., base flood elevations, base flood depths, SFHAs, zone designations, and/or regulatory floodways) will change as a result of the project, a 90-day appeal period will be initiated for the revision, during which community officials and interested persons may appeal the revised flood hazard information based on scientific or technical data.

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on the FEMA website at <https://www.fema.gov/flood-insurance>.

A handwritten signature in black ink, appearing to read "Rick F. Sacbbit".

Patrick "Rick" F. Sacbbit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

**CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT (CONTINUED)**

COMMUNITY INFORMATION (CONTINUED)

COMMUNITY REMINDERS

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Jeanine P. Petterson
Director, Mitigation Division
Federal Emergency Management Agency, Region VIII
Denver Federal Center, Building 710
P.O. Box 25267
Denver, CO 80225-0267
(303) 235-4830

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304. Additional Information about the NFIP is available on the FEMA website at <https://www.fema.gov/flood-insurance>.

A handwritten signature in black ink, appearing to read "Rick F. Sacibit".

Patrick "Rick" F. Sacibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

3.0 HYDROLOGIC ANALYSIS

3.1 Falcon DBPS

The Falcon DBPS completed hydrologic analysis for the Falcon Basin Watershed, using HEC-HMS v3.5 software, for historical, existing, and future land use conditions by applying a 24-hour storm event with 2-, 5-, 10-, 25-, 50-, and 100-year recurrence intervals and current drainage infrastructure. Chapter 3 and Appendix A of the Falcon DBPS include a detailed discussion of the hydrologic analysis. An electronic copy of the HEC-HMS model (File: Aug15_Working_Falcon_DBPS_S.hms) is also provided.

The Falcon DBPS identified Subregional Pond SR4 to be installed on the Falcon Marketplace property. Pond SR4 was constructed in early 2021 and the property floodplain mapping was updated in LOMR Case Number 21-08-0534P.

El Paso County requires regional drainage infrastructure to be sized for future land use conditions. Therefore, peak discharges with existing drainage infrastructure and future land use conditions near Owl Place are summarized in Table 3-1.

Table 3-1. Future Land Use Conditions Peak Discharges near Falcon Owl Place on the Middle Tributary, Falcon DBPS

Model Location	Physical Location	Branch	Proximity to Owl Place	Q100 (cfs)
JMT050	Bent Grass Meadows Drive	Only East Branch	Upstream of Site	850
JMT060	Eastonville Road (Pond SR4 inflow)	Both East and West Branches	Downstream of Site	1,000

3.2 Falcon Owl Place

The Falcon DBPS HEC-HMS model with existing drainage infrastructure and future land use (Existing Conditions) was used as the basis for the Falcon Owl Place hydrologic analysis. The Existing Conditions model was replicated in HEC-HMS version 4.7.1, due to instabilities and runtime issues with the prior, outdated model version (3.5). The Existing model produced 100-year peak flows of 859 and 1,023 cfs upstream (JMT050) and downstream (JMT060) of the site, which are comparable to and more conservative than the 850 and 1,000 cfs in the DBPS. It should be noted that in Existing Conditions, JMT050 is on the East Branch of the Middle Tributary, whereas JMT060 includes flows from both the West and East Branches, immediately upstream of Pond SR4.

The Falcon watershed did not include a design point on the East Branch immediately upstream of Pond SR4. Therefore, it was necessary to modify the HMS model to obtain a design flow for Owl Place. In the Proposed Conditions basin model, the junction JMT051 was created on the East Branch of the UTBSC at the southern boundary of the Falcon Owl Place property, immediately upstream of Pond SR4.

The lag time and drainage area for Basin MT060 were reduced to 0.077 square miles and 17 minutes, respectively. The length and slope of Routing RMT060 were also updated. The NRCS soils for the proposed basin are Columbine gravelly sandy loam with a Hydrologic Soil Group (HSG) A. The basin is zoned for a combination of 5-acre residential, commercial, and planned unit development (PUD). The nearby PUD (Bent Grass Meadows) is residential with an average lot size of 0.22 acres. Based on TR-55 Table 2-2a, areas with 0.22-acre lots and HSG A have a Curve Number (CN) of 65. However, it is unknown how and when this area will develop in the future. For example, the Owl Place site is currently being rezoned from RR-5 to CS, which would increase the CN from 46 to 89. The future conditions CN of 66 used in the Falcon DBPS is a reasonable representation of the future development potential in the basin and was used in the proposed conditions model.

The hydrologic parameter calculations, base mapping, and select output from the HEC-HMS model is included in **Appendix 4**, and the model files (HEC-HMS file: Falcon_OwlCLOMR.hms) are provided. Proposed peak discharges used for the Falcon Owl Place development are summarized in Table 3-2.

Table 3-2. Proposed Peak Discharges at Falcon Owl Place (East Branch of the UTBSC)

Recurrence Interval	Q100 (cfs)
100-year	920
5-year	288.5

4.0 HYDRAULIC ANALYSIS

4.1 General

The effective FIRM identifies an approximate Zone A floodplain across the Falcon Owl Place property with no flood profiles, discharges, or BFE's defined. The Falcon Owl Place development includes filling and regrading the site and rerouting the East Branch of the UTBSC through a box culvert across the site.

4.2 Vertical Datum

The effective FIRM is on the North American Vertical Datum of 1988 (NAVD88). The ALTA survey completed for the site (Olsson, 2021) and the design and construction

drawings are on the National Geodetic Vertical Datum of 1929 (NGVD29). The Falcon DBPS and the hydraulic analysis for this CLOMR were both completed on the NGVD29. The difference between the NGVD29 and NAVD88 is 3.8 feet on the Falcon Owl Place.

4.3 Horizontal Datum

The field survey, design, construction drawings and hydraulic modeling for the Falcon Owl Place project were completed on the North American Datum of 1983 (NAD83), Colorado State Plane coordinate system, Central Zone.

4.4 Box Culvert Hydraulic Analysis

Under existing and proposed conditions, the East Branch of the UTBSC leaving the Falcon Owl Place site discharges to Pond SR4 on the Falcon Marketplace. The pond was designed for a 100-year discharge of 1,016 cfs, which includes both West and East branches of the UTBSC. The 100-year water surface elevation upstream of the pond as shown in the LOMR is 6902.5 (NAVD88), or 6898.7 (NGVD29). The starting HGL for the box culvert analysis was conservatively placed at the top of pipe elevation of 6895.84 feet (NGVD29) for analyzing flows to the East branch only. However, an additional analysis was performed with a starting HGL of 6898.7, to evaluate the backwater effects from the pond.

StormCAD was used to evaluate the hydraulic performance of the 10'x6' box culvert. The profile and output for the 100-year storm event is included in **Appendix 5**, and the model files are provided.

4.5 Existing and Proposed Owl Place Culverts

The East Branch of the UTBSC is currently conveyed under Owl Place via two 36" CMP near the northeast corner of the site. The HY-8 software was used to analyze the existing culverts for the 100-year storm event.

The 2-36" CMP culverts are severely undersized and partially filled with sediment as shown in the photo below. The culverts only convey 86-95 cfs, depending on tailwater depth. The remaining flow (approximately 825-834 cfs) in the 100-year event overtops Owl Place. The proposed box culvert will convey the entire 100-year event (920 cfs) with an HGL of 6911.31 at the proposed headwall upstream of Owl Place, which is more than one foot below Owl Place and contained within the existing and proposed channel upstream. Channel grading will be required for approximately 30 feet to tie into the existing creek profile upstream. The channel side slopes will be reduced from approximately 5.5H:1V to 1.8H:1V and protected with riprap.

The HY-8 output is included in **Appendix 5** and the model file (Owl Place.hy8) is provided.

REQUEST FOR CONDITIONAL LETTER OF MAP REVISION
UNNAMED TRIBUTARY TO BLACK SQUIRREL CREEK,
FALCON OWL PLACE



Existing 2-36" CMP under Owl Place (Upstream Inlets)

5.0 NFIP REGULATION COMPLIANCE

5.1 Floodplain Work Map and Annotated FIRM

The effective Zone AE 100-year floodplain delineation for the UTBSC terminates at the boundary between the Falcon Marketplace and Falcon Owl Place properties and represents flows from both West and East branches. No changes are proposed to the Zone AE floodplain. The 100-year flood discharge for the East Branch is contained in the proposed culvert. Therefore, the Zone A floodplain for this branch has been removed, and the split between the Zone A floodplains for the West and East branches is denoted in the Annotated FIRM. The effective and proposed UTBSC floodplains are delineated on the Floodplain Work Map and Annotated FIRM in **Appendix 7**.

5.2 Forms and Notifications

The appropriate FEMA forms are located in **Appendix 6**. Modifications to 100-year floodplain elevations and delineations are limited to the Falcon Owl Place development. Furthermore, there are no proposed increases to the BFE's or floodplain extents. Therefore, individual legal notices are not required for this CLOMR submittal.

5.3 Compliance with Section 65.12

Although there are no increases to BFE's due to the proposed project, an alternatives evaluation was performed to evaluate options for closed conduit and open channel conveyance of the East Branch of the UTBSC. The alternatives evaluation can be provided upon request.

Furthermore, no structures are located in areas that would be impacted by the floodplain modifications proposed by this CLOMR.

5.4 Endangered Species Act (ESA)

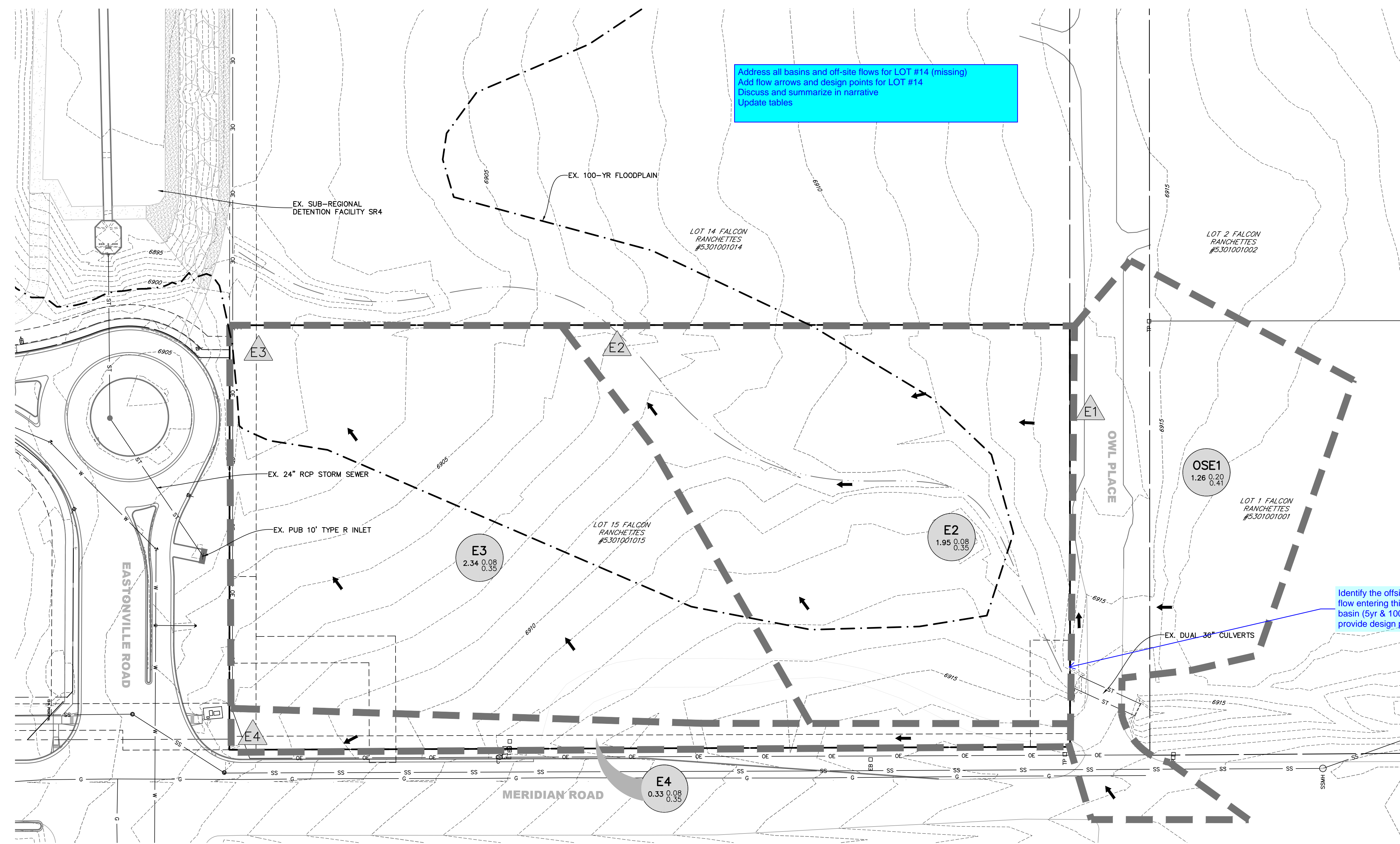
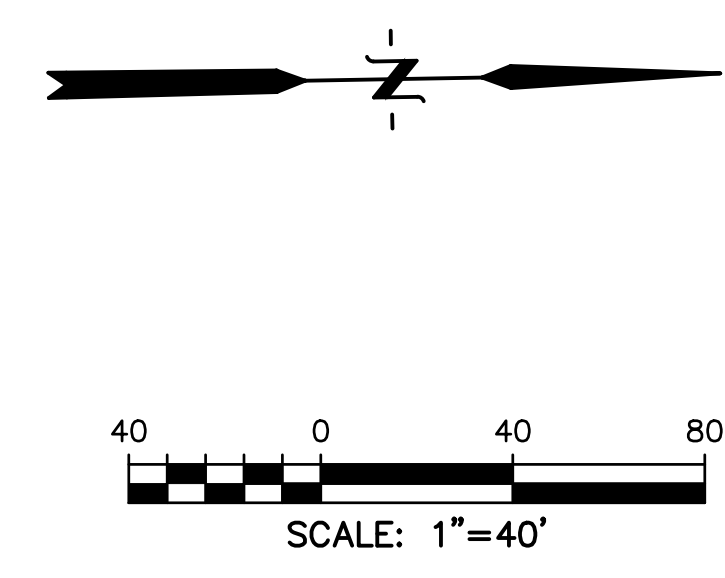
ESA Compliance information is provided in **Appendix 8**.

6.0 CONCLUSIONS

The Falcon Owl Place development will relocate a portion of the East Branch of an Unnamed Tributary of Black Squirrel Creek (Middle Tributary). This report and supporting documentation are being submitted to FEMA for the purpose of requesting a CLOMR to conditionally change the floodplain in accordance with NFIP regulations.

- LEGEND**
- - - - - EX. MINOR CONTOUR
 - - - - - 6800 EX. MAJOR CONTOUR
 - — — — PR. MINOR CONTOUR
 - — — — 6800 PR. MAJOR CONTOUR
 - ST — EX. STORM DRAIN
 - - - - - FLOODPLAIN BOUNDARY
 - - - - - BASIN BOUNDARY
 - ← FLOW DIRECTION
 - △ DESIGN POINT
 - BASIN
 - OS-1 AREA (ACRE)
 - C5
 - C100

EXISTING				
BASIN	DP	Area (Ac.)	Q ₅ (CFS)	Q ₁₀₀ (CFS)
OSE1	E1	1.26	0.9	3.1
E2		1.95	0.5	3.7
	E2	3.21	1.4	6.9
E3	E3	2.34	0.6	4.4
E4	E4	0.33	0.1	0.7



Address all basins and off-site flows for LOT #14 (missing)
 Add flow arrows and design points for LOT #14
 Discuss and summarize in narrative
 Update tables

Identify the offsite flow entering this basin (5yr & 100yr). provide design pt.

PREPARED BY:

 DREXEL, BARRELL & CO.
 Engineers • Surveyors
 101 S SAWATCH ST. #100
 COLORADO SPGS, COLORADO 80905
 CONTACT: TIM D. MCCONNELL, P.E.
 (719)260-0887
 COLORADO SPRINGS • LAFAYETTE

CLIENT:
 BH RE INVESTMENTS, LLC
 450 N MCCLINTOCK DRIVE
 CHANDLER, AZ 85226
 (480) 313-2724

DRAINAGE PLANS FOR:
OWL MARKETPLACE
 FALCON, COLORADO

ISSUE	DATE
INITIAL ISSUE	9-29-2023
DESIGNED BY:	KGV
DRAWN BY:	CGH
CHECKED BY:	TDM
FILE NAME:	21611-DRN-EX

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF DREXEL, BARRELL & CO.
 DRAWING SCALE:
 HORIZONTAL: 1" = 40"
 VERTICAL: N/A

EXISTING DRAINAGE MAP
 PROJECT NO. 21611-01CSCV
 DRAWING NO.

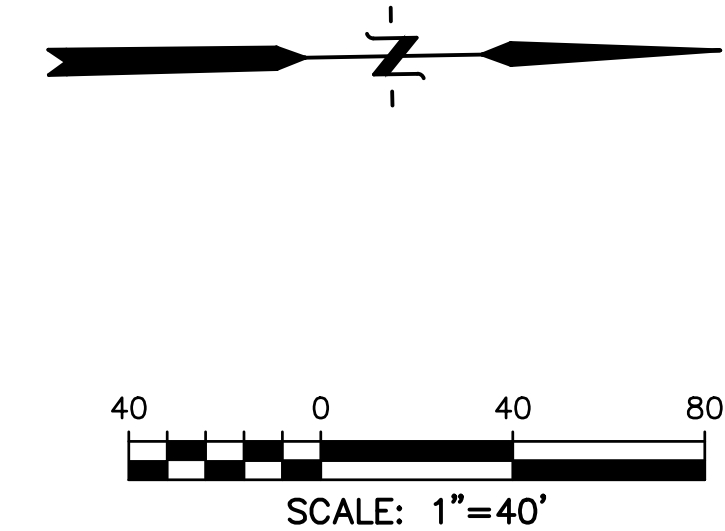
DRN
 SHEET: 1 OF 2

LEGEND

---	EX. MINOR CONTOUR	---	FLOODPLAIN BOUNDARY
- - - 6800 - - -	EX. MAJOR CONTOUR	---	BASIN BOUNDARY
---	PR. MINOR CONTOUR	←	FLOW DIRECTION
- - - 6800 - - -	PR. MAJOR CONTOUR	△	DESIGN POINT
---	STORM DRAIN	○	BASIN
---	EX. STORM DRAIN	○	AREA (ACRE)

DEVELOPED

BASIN	DP	Area (Ac.)	Q _s (CFS)	Q ₁₀₀ (CFS)
A	1	0.99	4.1	7.4
B	2	0.71	2.9	5.3
C	3	1.70	6.9	12.6
D	4	0.93	3.8	7.0
E	5	0.91	3.7	6.8
F	6	0.90	4.0	7.1
G	7	1.81	7.5	13.6
H	8	2.74	11.2	20.3
I	9	0.63	2.9	5.2
J	10	6.02	24.7	44.9
K	11	0.33	0.1	0.7
L	11	0.84	3.5	6.3



Regarding the drainage maps:
 We need to know how much of the proposed area of disturbance (not just the impervious surfaces) is treated vs untreated and if there are any exclusions that apply to the untreated areas. So please create a basic overview map (or modify an existing drainage map) with color shading/hatching that shows areas tributary to each PBMP (pond, runoff reduction, etc.) and those disturbed areas that are not treated by a PBMP, with the applicable exclusion labeled (ex: 20% up to 1ac of development can be excluded per ECM App 1.7.1.C.1 and exclusions listed in ECM App 1.7.1.B.#). An accompanying summary table on this map would also be very helpful (example provided):

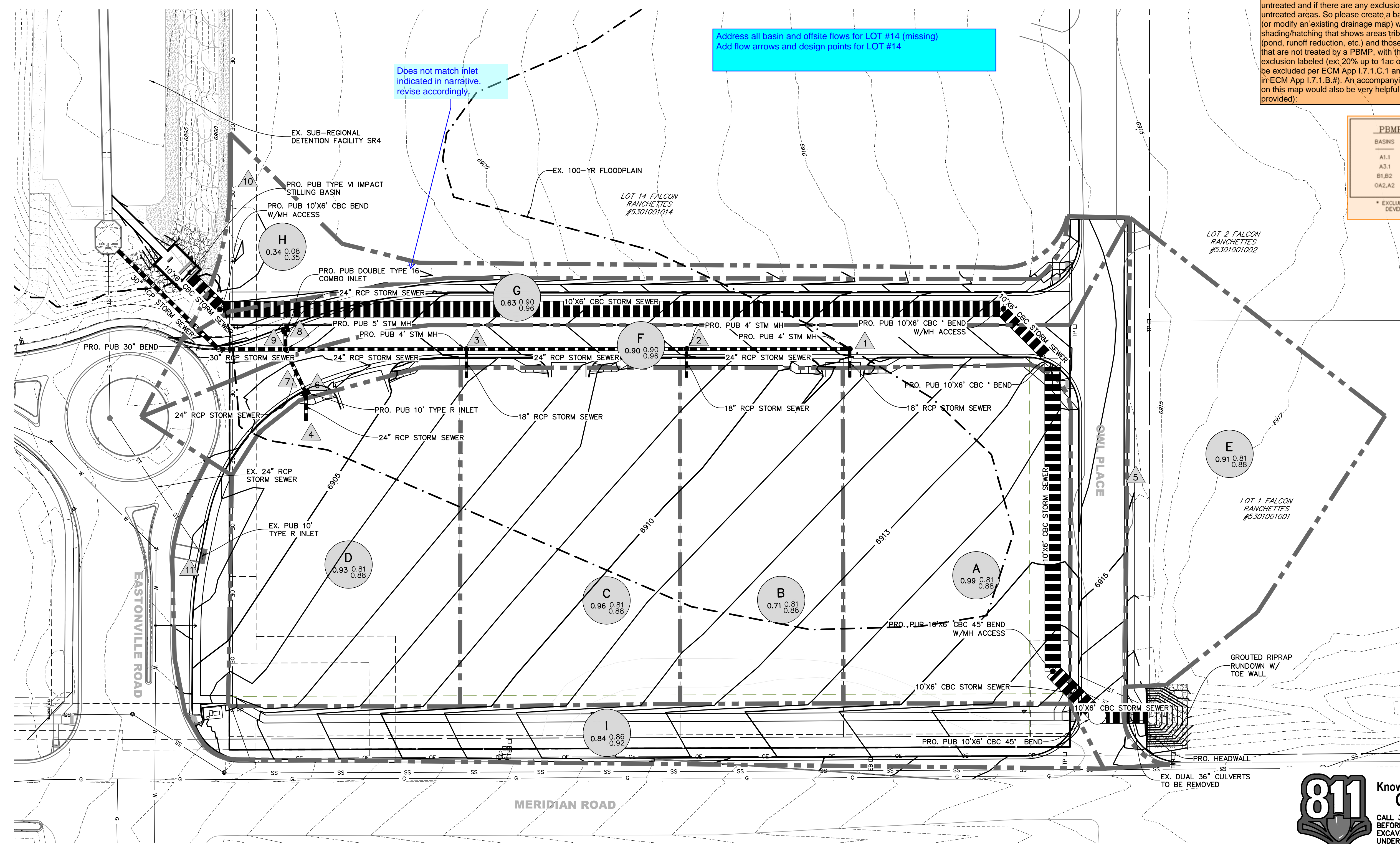
PBMP SUMMARY TABLE

BASINS	PBMP TRIBUTARY AREA (AC)	PBMP
A1.1	1.43	RG-A1.1
A3.1	1.87	RG-A3.1
B1.B2	8.60	EDB-B
OA2.A2	0.95	EXCLUDED*

* EXCLUDED BASED ON < 1-ACRE OF DEVELOPED ROADWAY AREA PER ECM APP. 1.7.C.1.G

Address all basin and offsite flows for LOT #14 (missing)
 Add flow arrows and design points for LOT #14

Does not match inlet indicated in narrative.
 revise accordingly.



PREPARED BY:

 DREXEL, BARRELL & CO.
 Engineers • Surveyors
 101 S SAHAWATCH ST., #100
 COLORADO SPGS, COLORADO 80905
 CONTACT: TIM D. MCCONNELL, P.E.
 (719)260-0887
 COLORADO SPRINGS • LAFAYETTE

CLIENT:
 BH RE INVESTMENTS, LLC
 450 N MCCLINTOCK DRIVE
 CHANDLER, AZ 85226
 (480) 313-2724

DRAINAGE PLANS FOR:
OWL MARKETPLACE
 FALCON, COLORADO

ISSUE	DATE
INITIAL ISSUE	9-29-2023
DESIGNED BY:	KGV
DRAWN BY:	CGH
CHECKED BY:	TDM
FILE NAME:	21611-DRN-PP

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF DREXEL, BARRELL & CO.
 DRAWING SCALE:
 HORIZONTAL: 1" = 40"
 VERTICAL: N/A

PROPOSED DRAINAGE MAP
 PROJECT NO. 21611-01CSCV
 DRAWING NO.

DRN
 SHEET: 2 OF 2



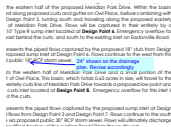
V1_FDR.pdf Markup Summary

Daniel Torres (9)



Subject: Callout
Page Label: 8
Author: Daniel Torres
Date: 11/27/2023 8:30:02 AM
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Color: ■
Layer:
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indicate whether this inlet accounted for the overflow and whether this existing system has the capacity for the overflow. Please also address the developed flow at the existing inlet from basin I



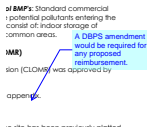
Subject: Callout
Page Label: 8
Author: Daniel Torres
Date: 11/27/2023 8:19:46 AM
Status:
Color: ■
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24" shown on the drainage plan. Revise accordingly



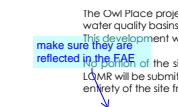
Subject: Callout
Page Label: 8
Author: Daniel Torres
Date: 11/27/2023 8:21:34 AM
Status:
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The drainage plan indicates a double type 16 combo inlet. Revise accordingly.



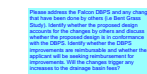
Subject: Callout
Page Label: 9
Author: Daniel Torres
Date: 11/27/2023 9:46:27 AM
Status:
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A DBPS amendment would be required for any proposed reimbursement.



Subject: Callout
Page Label: 9
Author: Daniel Torres
Date: 11/27/2023 1:22:45 PM
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make sure they are reflected in the FAE



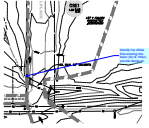
Subject: Text Box
Page Label: 10
Author: Daniel Torres
Date: 11/27/2023 10:32:00 AM
Status:
Color: ■
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Space:

Please address the Falcon DBPS and any changes that have been done by others (i.e Bent Grass Study). Identify whether the proposed design accounts for the changes by others and discuss whether the proposed design is in conformance with the DBPS. Identify whether the DBPS improvements are reimbursable and whether the applicant will be seeking reimbursement for improvements. Will the changes trigger any increases to the drainage basin fees?

provide hydraulic design of the proposed storm pipes conveying the developments flow to the pond.

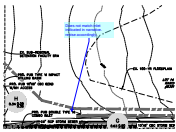
Subject: Text Box
Page Label: 28
Author: Daniel Torres
Date: 11/27/2023 10:53:12 AM
Status:
Color: ■
Layer:
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provide hydraulic design of the proposed storm pipes conveying the developments flow to the pond.



Subject: Callout
Page Label: 42
Author: Daniel Torres
Date: 11/27/2023 10:49:10 AM
Status:
Color: ■
Layer:
Space:

Identify the offsite flow entering this basin (5yr & 100yr). provide design pt.



Subject: Callout
Page Label: 43
Author: Daniel Torres
Date: 11/27/2023 8:27:08 AM
Status:
Color: ■
Layer:
Space:

Does not match inlet indicated in narrative. revise accordingly.

eschoenheit (7)

Missing basins and DPs for Lot #14



Subject: Text Box
Page Label: 6
Author: eschoenheit
Date: 11/22/2023 9:47:27 AM
Status:
Color: ■
Layer:
Space:

Missing basins and DPs for Lot #14

The development will not negatively impact the downstream floodplain after grading is complete. A FEMA Flood Hazard Study will be submitted to FEMA after construction to verify the site from the floodplain.

Provide Engineer Cost Estimate for major stormwater improvements.

Subject: Text Box
Page Label: 9
Author: eschoenheit
Date: 11/21/2023 5:49:10 PM
Status:
Color: ■
Layer:
Space:

Provide Engineer Cost Estimate for major stormwater improvements.

the downstream floodplain.
year floodplain after grading is complete. A FEMA Flood Hazard Study will be submitted to FEMA after construction to verify the site from the floodplain.

Discuss drainage requirements for Lot #14

Subject: Text Box
Page Label: 9
Author: eschoenheit
Date: 11/22/2023 9:22:41 AM
Status:
Color: ■
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Discuss drainage requirements for Lot #14

was approved by

Address both Lots #14 and #15 for commercial use and impervious value from current large lot

on previously platted

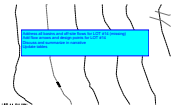
Subject: Text Box
Page Label: 9
Author: eschoenheit
Date: 11/22/2023 9:27:25 AM
Status:
Color: ■
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Address both Lots #14 and #15 for commercial use and impervious value from current large lot

1. An order issued under the authority of the Council of the County of San Diego and Section 5.0.2, Chapter 13 of the City of Carlsbad San Manual, May 2014.
2. Fabian Garza/Geo Basin Planning Study. Prepared by 1st September 2012.
3. Final Drainage Report for Fabian Masterplan. Prepared by November 2012.
EPC's EDARP File Number: VR2321

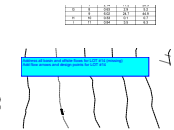
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Page Label: 10
Author: eschoenheit
Date: 11/21/2023 4:55:49 PM
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EPC Engineering Criteria Manual July 18, 2023



Subject: Text Box
Page Label: 42
Author: eschoenheit
Date: 11/22/2023 9:41:03 AM
Status:
Color: ■
Layer:
Space:

Address all basins and off-site flows for LOT #14 (missing)
Add flow arrows and design points for LOT #14
Discuss and summarize in narrative
Update tables



Subject: Text Box
Page Label: 43
Author: eschoenheit
Date: 11/22/2023 9:32:32 AM
Status:
Color: ■
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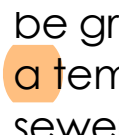
Address all basin and offsite flows for LOT #14 (missing)
Add flow arrows and design points for LOT #14

Glenn Reese - EPC Stormwater (8)

Add text:
EPC's EDARP File Number: VR2321

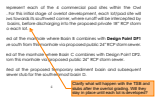
Subject: SW - Textbox
Page Label: 1
Author: Glenn Reese - EPC Stormwater
Date: 11/16/2023 1:24:19 PM
Status:
Color: ■
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Add text:
EPC's EDARP File Number: VR2321



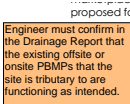
Subject: SW - Highlight
Page Label: 7
Author: Glenn Reese - EPC Stormwater
Date: 11/16/2023 1:29:22 PM
Status:
Color: ■
Layer:
Space:

a



Subject: SW - Textbox with Arrow
Page Label: 7
Author: Glenn Reese - EPC Stormwater
Date: 11/16/2023 1:30:17 PM
Status:
Color: ■
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Space:

Clarify what will happen with the TSB and stubs after the overlot grading. Will they stay in place until each lot is developed?



Subject: SW - Textbox
Page Label: 8
Author: Glenn Reese - EPC Stormwater
Date: 11/16/2023 1:25:17 PM
Status:
Color: ■
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Engineer must confirm in the Drainage Report that the existing offsite or onsite PBMPs that the site is tributary to are functioning as intended.

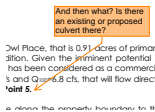


Subject: SW - Textbox
Page Label: 8
Author: Glenn Reese - EPC Stormwater
Date: 11/16/2023 1:25:17 PM
Status:
Color: ■
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Space:

Discuss the proposed modifications to Pond SR4 (ie: the new forebay and section of trickle channel). And include sizing calcs for both.

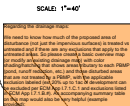
Trickle Channel: Per DCMv2 – Chap 4.2, trickle channel should at a minimum provide capacity equal to twice the release capacity at the upstream forebay outlet. Provide these calcs in the drainage report and revise plans as needed.

Forebay: Please provide forebay design calculations. The minimum forebay volumes are shown on MHFD T-5 Table EDB-4. The forebay outlet should be sized to release 1-3% of the undetained peak 100-year discharge, depending on the tributary impervious acreage.



Subject: SW - Textbox with Arrow
Page Label: 8
Author: Glenn Reese - EPC Stormwater
Date: 11/16/2023 1:31:25 PM
Status:
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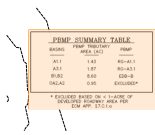
And then what? Is there an existing or proposed culvert there?



Subject: SW - Textbox
Page Label: 43
Author: Glenn Reese - EPC Stormwater
Date: 11/16/2023 1:25:36 PM
Status:
Color: ■
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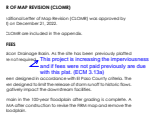
Regarding the drainage maps:

We need to know how much of the proposed area of disturbance (not just the impervious surfaces) is treated vs untreated and if there are any exclusions that apply to the untreated areas. So please create a basic overview map (or modify an existing drainage map) with color shading/hatching that shows areas tributary to each PBMP (pond, runoff reduction, etc.) and those disturbed areas that are not treated by a PBMP, with the applicable exclusion labeled (ex: 20% up to 1ac of development can be excluded per ECM App I.7.1.C.1 and exclusions listed in ECM App I.7.1.B.#). An accompanying summary table on this map would also be very helpful (example provided):



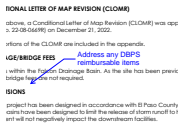
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Page Label: 43
Author: Glenn Reese - EPC Stormwater
Date: 11/16/2023 1:25:36 PM
Status:
Color: ■
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Jeff Rice - EPC Engineering Review (5)



Subject: Callout
Page Label: 9
Author: Jeff Rice - EPC Engineering Review
Date: 11/20/2023 9:24:44 AM
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This project is increasing the imperviousness and if fees were not paid previously are due with this plat. (ECM 3.13a)



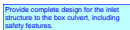
Subject: Callout
Page Label: 9
Author: Jeff Rice - EPC Engineering Review
Date: 11/27/2023 9:30:02 AM
Status:
Color: ■
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Space:

Address any DBPS reimbursable items



Subject: Callout
Page Label: 10
Author: Jeff Rice - EPC Engineering Review
Date: 11/27/2023 9:01:50 AM
Status:
Color: ■
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Add Bent Grass study that addressed diversion along Bent Grass Meadows Drive (MDP211) <https://epcdevplanreview.com/Public/ProjectDetails/172892>



Subject: Text Box
Page Label: 29
Author: Jeff Rice - EPC Engineering Review
Date: 11/20/2023 9:26:34 AM
Status:
Color: ■
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Provide complete design for the inlet structure to the box culvert, including safety features.



Subject: Text Box
Page Label: 32
Author: Jeff Rice - EPC Engineering Review
Date: 11/20/2023 9:52:39 AM
Status:
Color: ■
Layer:
Space:

Provide complete design and modeling of the box culvert with developed conditions for review in this report. See cursory comments on CLOMR report.