DUNKIN BENT GRASS

Lot 1A of Bent Grass East Commercial Filing No. 2A
8035 Meridian Park Drive, Peyton, CO 80831

FINAL DRAINAGE REPORT

Prepared By:
WC Civil, Inc.
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303-390-0172

Prepared For:
CD Bent Grass, LLC
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Chandler, AZ 85226
Contact: Bert Hayenga

Submitted To:
El Paso County

WCC Project No.: 322002
County Project No.:
PCD File # PPR-22-027

October 5, 2022

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 omissions on my part in preparing this report.

Eric McKnight, PE, QSD
Project Manager
Registered Professional Engineer State of Colorado No. 55261

Developer's Statement:

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

Business Name

By: _____

Title: _____

Address: _____

El Paso County:

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

Joshua Palmer, Interim County Engineer / ECM Administrator _____ Date

Conditions:

Table of Contents

General Location

The Dunkin Bent Grass project (Site) is located at 8035 Meridian Park Drive in Peyton, CO. The Site is located in a parcel of land situated in the Northeast Quarter of the Section 1, Township 13 South, Range 65 West of the Sixth Principal Meridian in El Paso County, Colorado. The site is bound on the north by Lot 1 of the Bent Grass East Commercial Development (a 7-Eleven gas station), to the west by Meridian Park Road right-of-way, to the east by Meridian Road right-of-way, and to the south by Lot 3 of the Bent Grass East Commercial Development (a dental office).

Description of Property

The Dunkin Bent Grass site, which will consist of a new Dunkin restaurant, parking lot, drive thru-aisle, and associated walks and landscaped areas, is comprised of 1.46 acres in area.

Existing Topography

The site is currently undeveloped and covered with natural grasses. The site generally slopes from north to south, with an existing drainage ditch that runs along the eastern edge of the property. Existing slopes on the majority site range from 1% to 3%, while the eastern edge that slopes down to the ditch slopes up to 25%.

Existing Soils

Existing soils on the site are 100% gravelly sandy loam, designated as NRCS hydrologic group A soils. Additional soils information has been provided in **Appendix B** of this report.

Existing Utilities

There are existing water and sanitary sewer stubouts for use on site, as well as existing electrical and communications equipment located at the southwest and southeast corners of the site. There is a public utility and drainage easement (width varies between 10 and 20 feet) that encircles the entirety of the site. There are no existing irrigation facilities present on site.

Drainage Design Criteria

All drainage calculations were performed in accordance with the El Paso County Drainage Criteria Manual (updated October 31, 2018, referred to as the DCM). Per Section 5.1 of the El Paso County DCM, the 5-Year and 100-Year storm frequencies were selected for analysis. Additionally, because the site is under 100 acres in area, the Rational Method has been selected as the runoff methodology for this analysis. The Mile High Flood District (MHFD) Drainage Criteria Manual was also consulted for additional hydrologic methodology further outlined in this report.

Major Drainageways & Master Drainage Plans

The site lies within the Middle Tributary Basin within the Falcon Drainage Basin. This site has been previously studied as part of the "Master Development Drainage Plan and Preliminary Drainage Plan for the Bent Grass Subdivision," prepared by Kiowa Engineering Corporation, approved in September 2007. More recently, the site was analyzed as part of "Preliminary Drainage Report for Bent Grass East Commercial – Phase 1 (Preliminary Plan) and Final Drainage Report for Bent Grass East Commercial Filing No. 1 – Lot 1 (Final Plat)," prepared by Classic Consulting Engineers & Surveyors, approved March 15, 2013 (referred to as the Phase 1 PDR), as well as "Final Drainage Report, Bent Grass Commercial Filing No. 2" dated July 2014 (refer to PCD File No. #SF1411).

Floodplain Statement

The Flood Insurance Rate Maps (FIRM) for El Paso County Flood Insurance Study (FIS) panel number 08041C0553G dated December 7, 2018 was reviewed to determine if any regulatory floodplains pass through the property. No portion of this proposed development is within a floodplain. A copy of the FIRM Map for this site has been included in **Appendix C** of this report.

Drainage Facility Design

General Concept

The proposed Dunkin Bent Grass site will consist of a new Dunkin restaurant, parking lot, drive thru-aisle, and associated walks and landscaped areas. All runoff is proposed to leave the site via surface flows (e.g.: sheet flow, curb and gutter), and no inlets or associated piping are proposed as part of the design. Existing drainage patterns (i.e.: some of the flow will make its way into the existing detention facility to the southwest of the site, while the remainder of the flow will travel undetained into the existing channel to the east of the site) will be maintained with this development. Detention and water quality is not proposed as part of this development, as a detention facility exists to the southwest of the site, which was constructed to serve several lots in the Bent Grass Development (including residential subdivisions and other commercial properties) in their developed conditions.

Offsite Flow Patterns

No offsite flows are incorporated into the analysis of the development. Despite the existing flow patterns (flowing north to south), virtually no flows from the site to the north will make their way onto the Dunkin Bent Grass site due to the use of curb and gutter on the south end of the 7-Eleven development, which carries flow toward either the Meridian Park Drive flowline, or the existing channel to the east of the site.

Historic Drainage Patterns

The site generally slopes from north to south, with an existing drainage ditch that runs along the eastern edge of the property. Existing slopes on the majority site range from 1% to 3%, while the eastern edge that slopes down to the ditch slopes up to 25%. There is a ridgeline that effectively bisects the site, taking some of the flows to the east and into the existing channel, while the majority of runoff will flow onto the property to the south, and eventually into the existing detention facility (which also provides stormwater quality treatment).

The site, in its existing condition, has been divided into sub-basins and design points as described below:

- Basin EX1 (Q_5 = 0.04 cfs, Q_{100} = 0.90 cfs) represents the existing flows for the western portion of the site. Sheet flows travel in a southwesterly direction, eventually discharging into the Meridian Park Drive flowline and eventually into the existing detention facility. **Design Point 1 (Q_{10} = 0.04 cfs, Q_{100} = 0.90 cfs)** represents the concentration of these flows from Basin EX1.

- Basin EX2 (Q_5 = 0.04 cfs, Q_{100} = 0.81 cfs) represents the existing flows for the eastern portion of the site. Sheet flows travel in a southeasterly direction before eventually discharging into the existing channel along Meridian Road. **Design Point 2 (Q_{10} = 0.04 cfs, Q_{100} = 0.81 cfs)** represents the concentration of these flows from Basin EX2.

A summary of the existing flows can be found in the table below:

Basin	Total Area (sf)	% Impervious	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
EX1	33,381	0.0%	0.01	0.13	0.04	0.90
EX2	30,085	0.0%	0.01	0.13	0.04	0.81
Total/Overall	**63,480**	**0.0%**	**0.01**	**0.13**	**0.07**	**1.72**

An Existing Drainage Plan (**Appendix D**) and runoff calculations (**Appendix E**) have been included with this report to better illustrate the pre-development hydrologic conditions.

Proposed Drainage Patterns

The proposed development aims to maintain the existing drainage patterns of the site, in that some of the flow will make its way into the existing detention facility to the southwest of the site, while the remainder of the flow will travel undetained into the existing channel to the east of the site.

The site, in its proposed condition, has been divided into sub-basins and design points as described below:

- Basin A1 (Q_5 = 1.51 cfs, Q_{100} = 4.44 cfs) represents the developed flows for the western portion of the site. Sheet flows travel in a southwesterly direction, eventually discharging into the Meridian Park Drive flowline and eventually into the existing detention facility. **Design Point 1 (Q_5 = 1.51 cfs, Q_{100} = 4.44 cfs)** represents the concentration of these flows from Basin A1.

- Basin U1 (Q_5 = 0.01 cfs, Q_{100} = 0.20 cfs) represents the developed flows for the eastern portion of the site. Sheet flows travel in a southeasterly direction before eventually discharging into the existing channel along Meridian Road. **Design Point 2 (Q_5 = 0.01 cfs, Q_{100} = 0.20 cfs)** represents the concentration of these flows from Basin U2.

A summary of the proposed flows can be found in the table below:

Basin	Total Area (sf)	% Impervious	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
A1	56,111	31.3%	0.23	0.38	1.51	4.44
U1	7,369	0.0%	0.01	0.13	0.01	0.20
Total/Overall	**63,480**	**31.3%**	**0.20**	**0.35**	**1.52**	**4.64**

A Proposed Drainage Plan (**Appendix D**) and runoff calculations (**Appendix E**) have been included with this report to better illustrate the post-development hydrologic conditions.

A summary of the development's disturbed area and increase in overall runoff can be found in the table below:

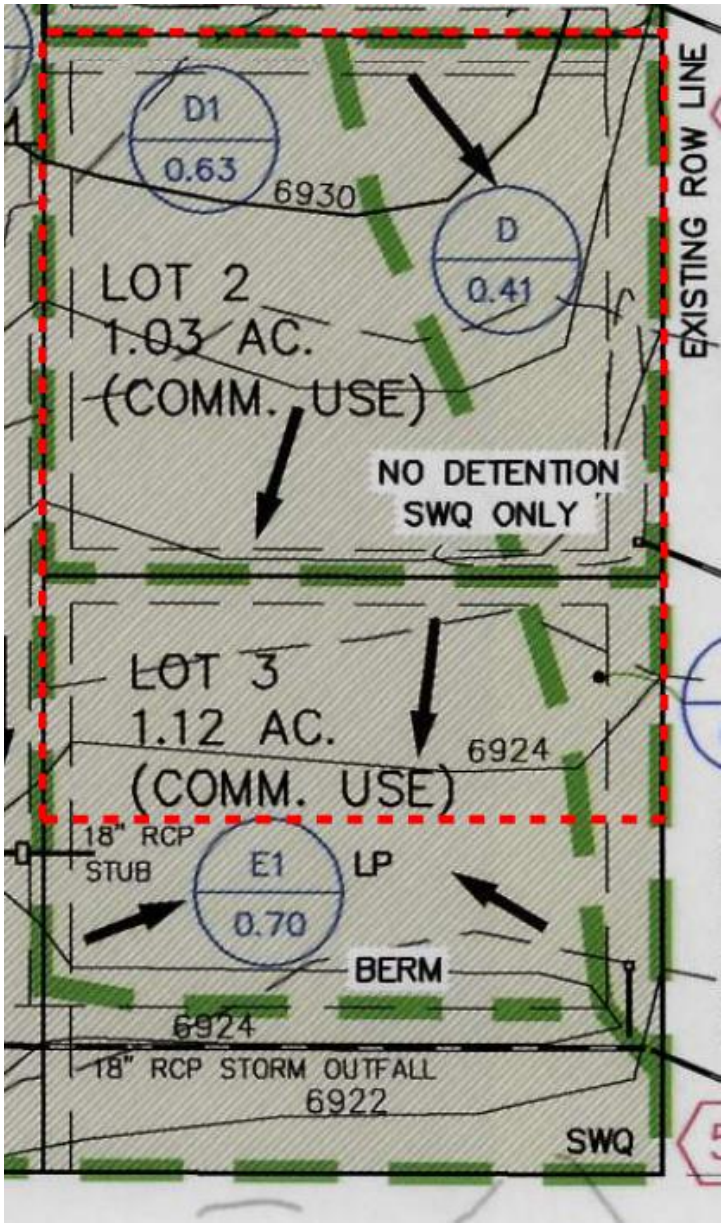
	Total Area (sf)	% Impervious	Q_{10} (cfs)	Q_{100} (cfs)
Existing	63,480	0.0%	0.07	1.72
Proposed	63,480	31.3%	1.52	4.64
Change	**-**	**+31.3%**	**+1.45**	**+2.92**

With this increase in runoff and impervious area, detention and water quality treatment are required to mitigate these impacts.

Detention Facility Capacity Analysis

As mentioned earlier in this report, the storage and water quality treatment have been provided for the site (and several others in the Bent Grass development) in their developed conditions in the existing detention facility located to the southwest of the site. As outlined in the Phase 1 PDR by Classic Consulting, the detention facility collects tributary flows from the surrounding Bent Grass sites before storing, treating, and eventually discharging them via controlled release into the existing channel to the east of the site. The existing detention facility appears to be in good condition and is functioning as intended.

More specifically, the Phase 1 PDR shows drainage basins drawn and sized to correspond to the existing lots at the time. As part of the Bent Grass East Commercial development, the drainage divides and hydrologic calculations were drawn prior to a lot line shift, which increased the size of the Dunkin Bent Grass lot. In the figure below, two lots in the Bent Grass East Commercial Development are shown prior to this shift. The southern lot line for the parcel described as "Lot 2" was shifted approximately 90 feet south, creating the newly re-platted Lot 1A (project, boundary approximately shown below in a dashed red line) and Lot 2A to the south (now an existing dental clinic office with parking lot).



A complete Developed Drainage Map from the Phase 1 PDR has been included with **Appendix F** of this report to better illustrate the hydrologic conditions of the design.

In the Phase 1 PDR, Lot 2's flows were quantified in terms of two conditions: the runoff eventually leading to the existing detention facility for storage and treatment **(Basin D1)**, and the flows leaving the site undetained and entering the existing channel to the east of the site **(Basin D)**. These runoff patterns are consistent with the analysis performed on the existing and proposed layouts of the site outlined earlier in this report, though it should be noted with updated topography and survey information, as well as the increased size of the parcel in question, the basin geometry has changed. Further analysis has been performed below to better compare the conceptual design proposed in the Phase 1 PDR and the existing and proposed drainage conditions as analyzed earlier in this report.

Lot 2 was previously designed as a 1.03-acre parcel with 95% imperviousness in a built-out condition. A summary of the conceptual flows per the Phase 1 PDR can be found in the table below:

Basin	Total Area (sf)	% Impervious	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
D1	27,443	95.0%	0.54	0.86	1.74	4.90
D	17,860	95.0%	0.54	0.86	1.13	3.19
Total/Overall	**45,303**	**95.0%**	**0.54**	**0.86**	**2.86**	**8.08**

To more consistently compare the existing drainage analysis in the Phase 1 PDR with the proposed design, the flows were recalculated with runoff coefficients per Table 6-5 in the MHFD Drainage Criteria Manual, Volume 1. A summary of these recalculated conceptual flows can be found in the table below:

Basin	Total Area (sf)	% Impervious	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
D1	27,443	95.0%	0.81	0.89	2.60	5.09
D	17,860	95.0%	0.81	0.89	1.69	3.31
Total/Overall	**45,303**	**95.0%**	**0.81**	**0.89**	**4.30**	**8.40**

With the Phase 1 PDR's **Basin D1** being the only area planned to discharge into the existing detention basin to the southwest of the site, even with the lot line shift making this a conservative estimate, the flow values can be compared to **Basin A1** of the proposed design.

Basin	Total Area (sf)	% Impervious	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
D1	27,443	95.0%	0.81	0.89	2.60	5.09
A1	56,111	31.3%	0.23	0.38	1.51	4.44
Change	**+28,668**	**(-63.7%)**	**(-0.58)**	**(-0.51)**	**(-1.09)**	**(-0.65)**

The overall flow being routed to the detention facility for the proposed development (Basin A1) is less than the planned value for the site in the Phase 1 PDR (Basin D1), despite the area for Basin A1 being much larger after the lot line shift. If flows for future development on the lot exceed the planned values, on-site detention will be provided at that time.

Drainage and Bridge Fees

As part of a Site Development Plan, no fees are due with this submittal. The bridge fees have been previously paid, and the drainage basin fees were credited at the time of the plat (per BoCC Approval for Filing No. 2). Refer to PCD File No. #SF1411, Plat No. #13515.

Summary

The Dunkin Bent Grass development will create a new drive-thru restaurant with associated parking lot and drive aisles, but only develops the southern portion of the site, leaving the northern portion undeveloped. Developed flows for the Dunkin Bent Grass development will not negatively impact downstream facilities. No on-site detention or water quality treatment is proposed as the existing detention facility to the southwest of the site has been sized to accept flows from future development, and the flows created by this development do not exceed planned flows in previous studies conducted on the Bent Grass East Commercial Development. In the event future development on the northern portion of the Dunkin Bent Grass site causes runoff routed to the detention facility to exceed capacity, on-site detention and water quality treatment will be provided at that point.

All erosion control measures will be handed on-site to minimize any downstream impacts on existing facilities. All drainage calculations were performed sing the current El Paso County Drainage Criteria Manual and will safely discharge stormwater runoff to existing facilities.

Appendix A
Vicinity Map

Appendix A – Vicinity Map

Appendix B
Soils Map (NRCS Soils Study)

Soil Map—El Paso County Area, Colorado
(Bent Grass East Commercial)

Map Scale: 1:3,270 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 45 90 180 270

Feet
0 150 300 600 900

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

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

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

Date(s) aerial images were photographed: 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	54.9	100.0%
Totals for Area of Interest		**54.9**	**100.0%**

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: Flood plains, fan terraces, fans
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

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

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

Data Source Information

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

Appendix C

FEMA Flood Insurance Rate Map

NOTES TO USERS

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

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

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

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

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

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

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

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

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

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

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

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

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

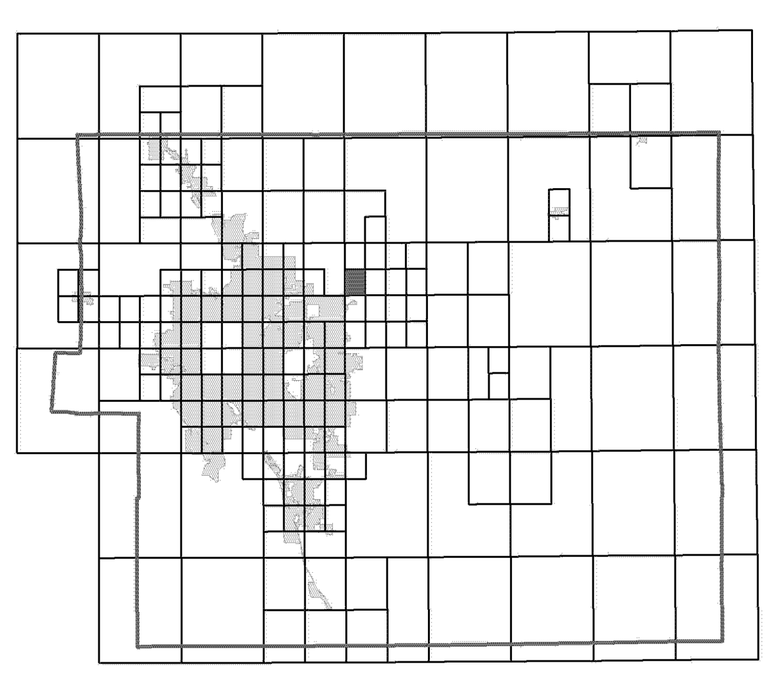
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this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

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

El Paso County Vertical Datum Offset Table

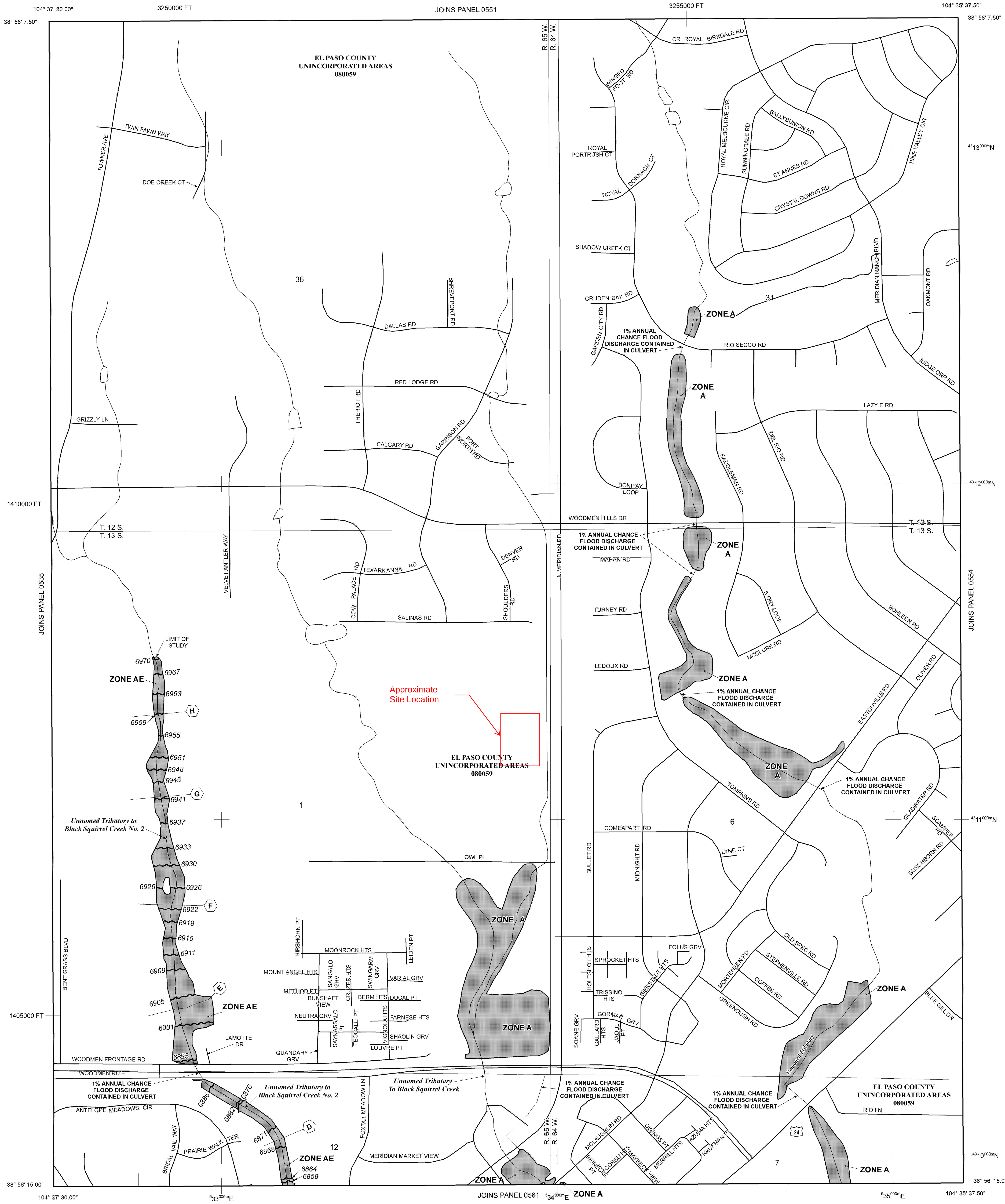
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



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

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



LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

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

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

A——A Cross section line
23- - - -23 Transect line
97° 07' 30.00" 32° 22' 30.00" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT — 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510× — Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

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

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

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

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0553G

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

PANEL 553 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0553	G

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

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

MAP NUMBER
08041C0553G

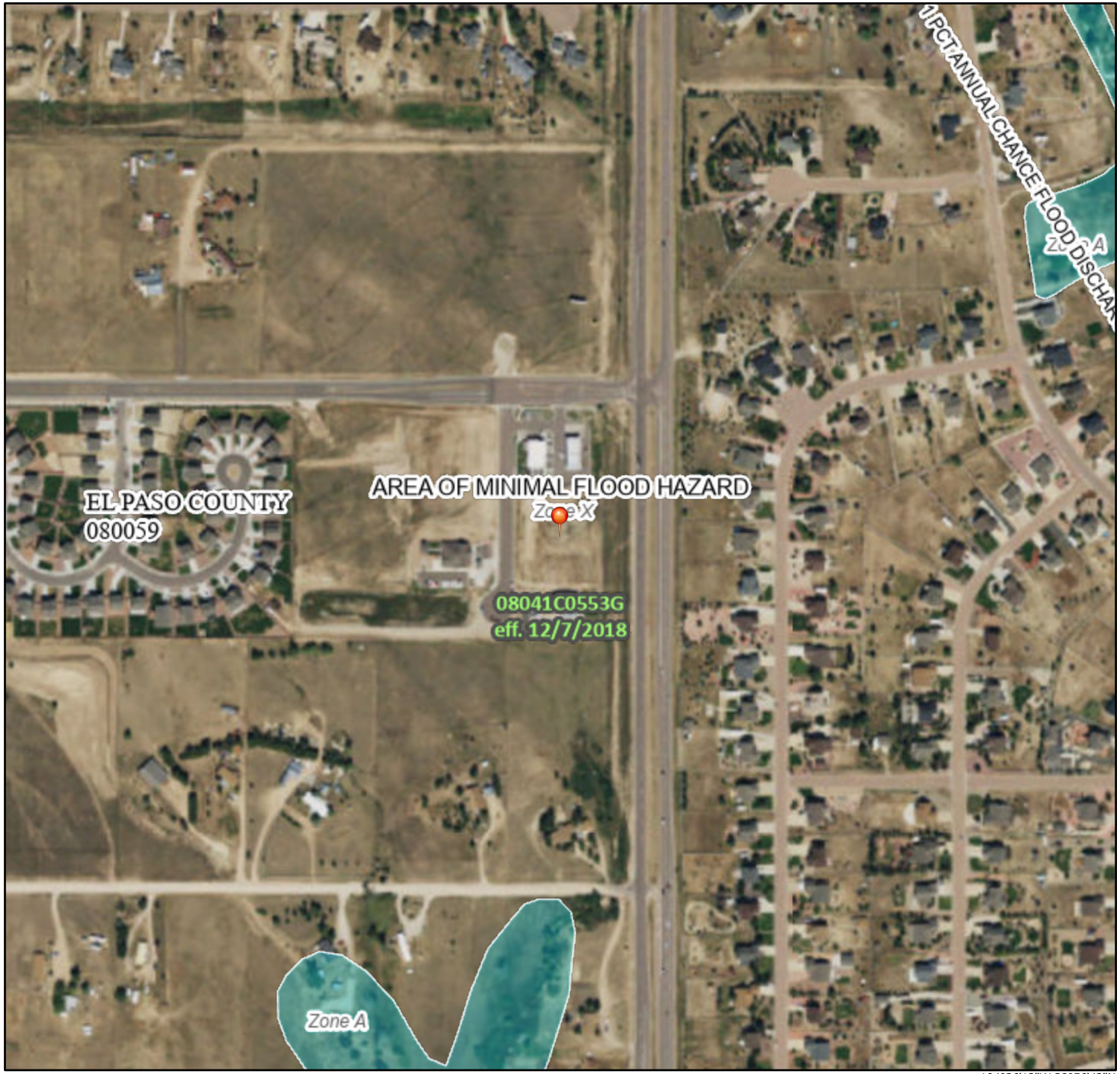
MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

National Flood Hazard Layer FIRMette

FEMA

104°36'49"W 38°57'9"N



104°36'12"W 38°56'42"N

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

1:6,000

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

Legend

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

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

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

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

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

OTHER FEATURES
- 20.2 / 17.5 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

N

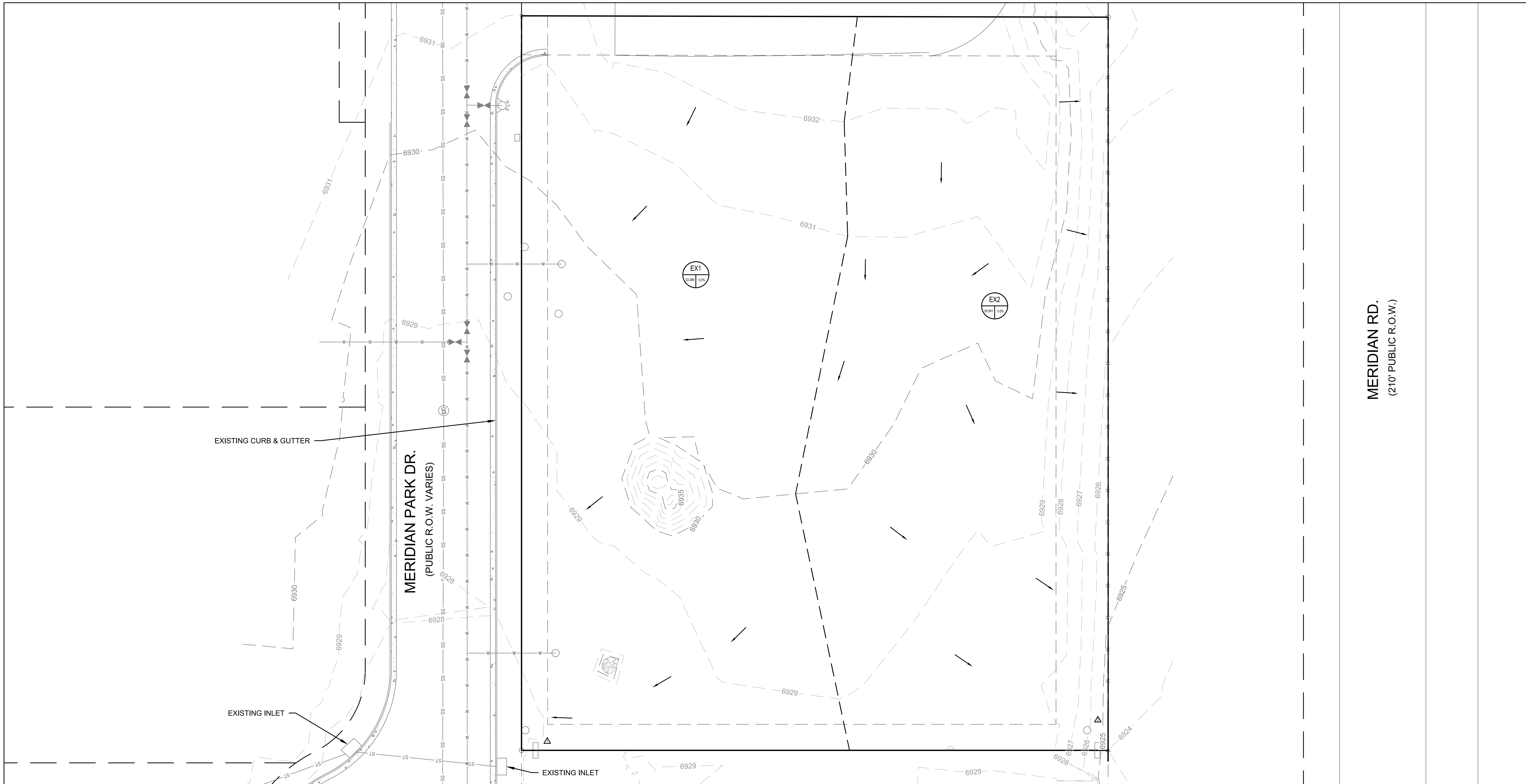
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

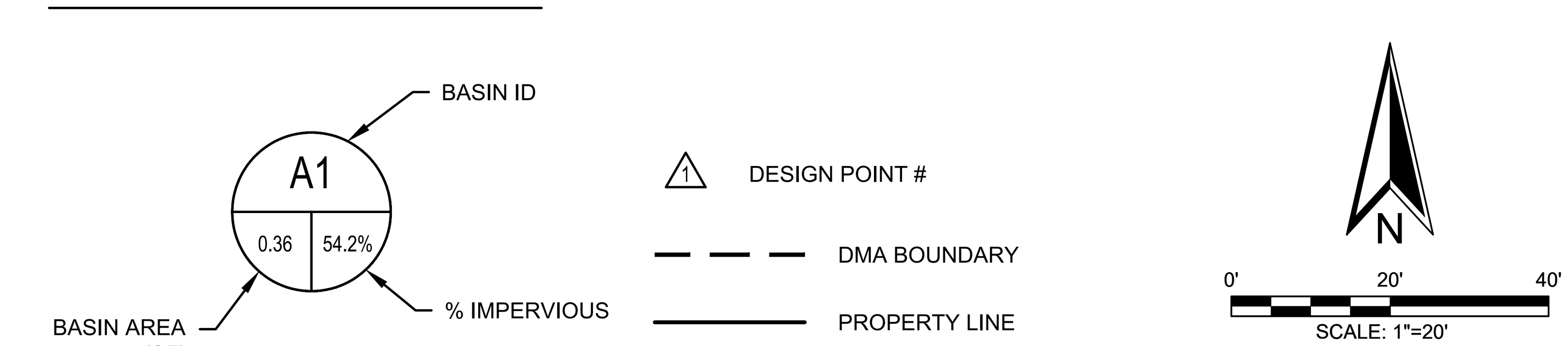
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/10/2022 at 5:03 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by 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.

Appendix D
Drainage Maps



HYDROLOGIC LEGEND



Sub-Basin ID	Total Area (SF)	Pavement Area	Roofs Area	Lawns Area	% imp	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
EX1	33389	0	0	33389	0.0%	0.01	0.13	0.04	0.90
EX2	30091	0	0	30091	0.0%	0.01	0.13	0.04	0.81
Composite	**63480**	**0**	**0**	**63480**	**0.0%**	**0.01**	**0.13**	**0.07**	**1.72**

PCD FILE NO.: PPR-22-027

Client:
CD BENT GRASS LLC
106 S. KYRENE RD.
CHANDLER, AZ 85226
PHONE:
ATTN: B. HAYENGA

NO.	DESCRIPTION	DATE
-	INITIAL SUBMITTAL	03/18/22
1	REVISED PER COUNTY COMMENTS	09/30/22

WC CIVIL
W.C. CIVIL
7220 W. JEFFERSON AVE
STE. 204
LAKEWOOD, CO 80235
PHONE: (303) 390-0172

Title:
EXISTING DRAINAGE PLAN

DUNKIN BENT GRASS
SITE DEVELOPMENT PLAN
LOT 1A, BENT GRASS EAST COMMERCIAL FILING NO. 2A,
LOCATED IN TOWN OF PEYTON,
COUNTY OF EL PASO, STATE OF COLORADO

WC Civil Team: TS, LP
Date: 2022/09/21
Engineering No.:
Scale: AS NOTED
Sheet No.: D1

HYDROLOGIC LEGEND

Sub-Basin ID	Total Area (SF)	Pavement Area	Roofs Area	Lawns Area	% imp	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
A1	56111	15656	1890	38565	31.3%	0.23	0.38	1.51	4.44
U1	7369	0	0	7369	0.0%	0.01	0.13	0.01	0.20
Composite	**63480**	**15656**	**1890**	**45934**	**27.6%**	**0.20**	**0.35**	**1.52**	**4.64**

PCD FILE NO.: PPR-22-027

W.C. CIVIL
7220 W. JEFFERSON AVE
STE. 204
LAKEWOOD, CO 80235
PHONE: (303) 390-0172

NO.	DESCRIPTION	DATE
-	INITIAL SUBMITTAL	03/18/22
1	REVISED PER COUNTY COMMENTS	09/30/22

Client:
CD BENT GRASS LLC
106 S. KYRENE RD.
CHANDLER, AZ 85226
PHONE:
ATTN: B. HAYENGA

PROPOSED DRAINAGE PLAN

DUNKIN BENT GRASS
SITE DEVELOPMENT PLAN
LOT 1A, BENT GRASS EAST COMMERCIAL FILING NO. 2A,
LOCATED IN TOWN OF PEYTON,
COUNTY OF EL PASO, STATE OF COLORADO

WC Civil Team: TS, LP
Date: 2022/09/21
Engineering No.:
Scale: AS NOTED
Sheet No.: D2

Appendix E
Hydrologic Calculations

Dunkin Bent Grass
Hydrology Calcs NRCS Soil Group A

Runoff coefficients per Phase 1 PDR (Basins D and D1, 95% Impervious)

C-values	C_5	C_{100}
Weighted C	0.54	0.857

PDR C-values used for comparative purposes ONLY.

Rainfall (in/hr)	i_5	i_{100}
	5.10	9.07

Rainfall values per Bent Grass East Commercial Phase 1 PDR (Basins D and D1)

Runoff coefficients per Table 6-5, MHFD Drainage Criteria Manual, Vol. 1

C-values	C_5	C_{100}
2% Impervious	0.010	0.130
35% Impervious	0.230	0.380
95% Impervious	0.810	0.890

Existing Drainage Basin Analysis (C values taken from Bent Grass East Commercial Phase 1 PDR)

Sub-Basin ID	Total Area (SF)	Pavement Area	Roofs Area	Lawns Area	% imp	C_5 (Weighted)	C_{100} (Weighted)	Q_5 (cfs)	Q_{100} (cfs)
D1	27443	26071	0	1372	95.0%	0.54	0.86	1.74	4.90
D	17860	16966	0	894	95.0%	0.54	0.86	1.13	3.19
Composite	**45303**	**43037**	**0**	**2266**	**95.0%**	**0.05**	**0.17**	**2.86**	**8.08**

Existing Drainage Basin Analysis (C values per Table 6-5, MHFD DCM, Vol. 1)

Sub-Basin ID	Total Area (SF)	Pavement Area	Roofs Area	Lawns Area	% imp	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
D1	27443	26071	0	1372	95.0%	0.81	0.89	2.60	5.09
D	17860	16966	0	894	95.0%	0.81	0.89	1.69	3.31
Composite	**45303**	**43037**	**0**	**2266**	**95.0%**	**0.81**	**0.89**	**4.30**	**8.40**

Existing Drainage Basin Analysis (C values per Table 6-5, MHFD DCM, Vol. 1), 95% Imperviousness per Phase 1 PDR, Revised Lot Area

Sub-Basin ID	Total Area (SF)	Pavement Area	Roofs Area	Lawns Area	% imp	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
EX1	33389	31720	0	1669	95.0%	0.81	0.85	3.17	5.91
EX2	30091	28586	0	1505	95.0%	0.81	0.85	2.85	5.33
Composite	**63480**	**60306**	**0**	**3174**	**95.0%**	**0.05**	**0.17**	**6.02**	**11.24**

WCC Existing Drainage Plan

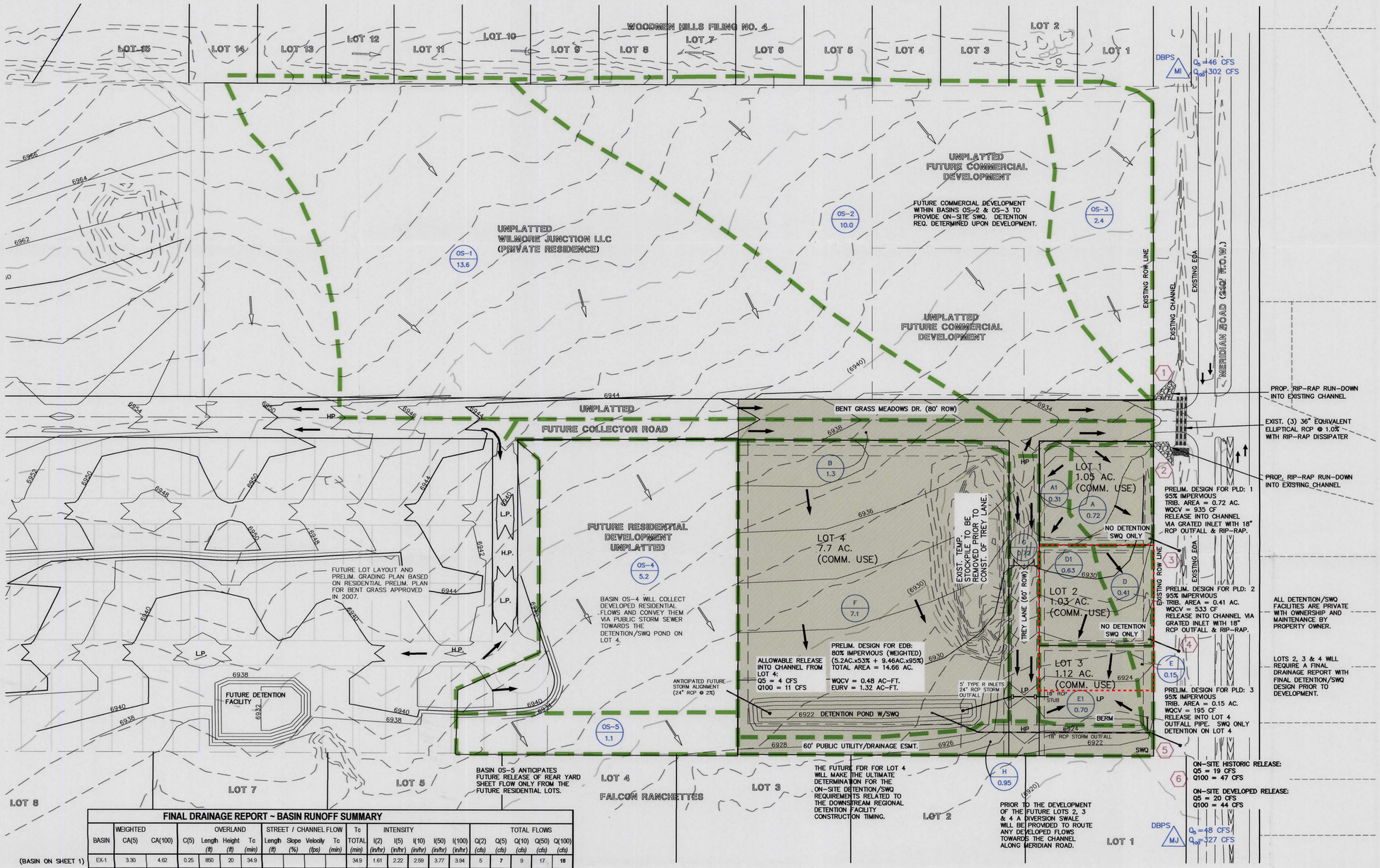
Sub-Basin ID	Total Area (SF)	Pavement Area	Roofs Area	Lawns Area	% imp	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
EX1	33389	0	0	33389	0.0%	0.01	0.13	0.04	0.90
EX2	30091	0	0	30091	0.0%	0.01	0.13	0.04	0.81
Composite	**63480**	**0**	**0**	**63480**	**0.0%**	**0.01**	**0.13**	**0.07**	**1.72**

WCC Proposed Drainage Plan

Sub-Basin ID	Total Area (SF)	Pavement Area	Roofs Area	Lawns Area	% imp	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
A1	56111	15656	1890	38565	31.3%	0.23	0.38	1.51	4.44
U1	7369	0	0	7369	0.0%	0.01	0.13	0.01	0.20
Composite	**63480**	**15656**	**1890**	**45934**	**27.6%**	**0.20**	**0.35**	**1.52**	**4.64**

Appendix F

Phase 1 PDR Developed Drainage Map (Preliminary Plan)
By Classic Consulting Engineers & Surveyors (1/31/2013)



FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

	BASIN	WEIGHTED CA(5)	WEIGHTED CA(100)	OVERLAND C(5)	OVERLAND Length (ft)	OVERLAND Height (ft)	OVERLAND Tc (min)	STREET / CHANNEL FLOW Length (ft)	STREET / CHANNEL FLOW Slope (%)	STREET / CHANNEL FLOW Velocity (fps)	STREET / CHANNEL FLOW Tc (min)	Tc TOTAL (min)	INTENSITY I(2) (in/hr)	INTENSITY I(5) (in/hr)	INTENSITY I(10) (in/hr)	INTENSITY I(50) (in/hr)	INTENSITY I(100) (in/hr)	TOTAL FLOWS Q(2) (cfs)	TOTAL FLOWS Q(5) (cfs)	TOTAL FLOWS Q(10) (cfs)	TOTAL FLOWS Q(50) (cfs)	TOTAL FLOWS Q(100) (cfs)
(BASIN ON SHEET 1)	EX-1	3.30	4.62	0.25	850	20	34.9					34.9	1.61	2.22	2.69	3.77	3.94	5	**7**	9	17	**18**
(BASIN ON SHEET 1)	EX-2	6.33	8.86	0.25	1000	23	38.2					38.2	1.53	2.10	2.45	3.57	3.74	10	**13**	16	32	**33**
(BASIN ON SHEET 1)	EX-3	0.60	0.84	0.25	500	12	26.6					26.6	1.88	2.59	3.02	4.40	4.60	1	**2**	2	4	**4**
	OS-1	4.38	5.66	0.25	1000	22	38.7					38.7	1.51	2.08	2.43	3.54	3.71	7	**9**	11	20	**21**
	OS-2	2.70	3.68	0.25	700	16	32.0					32.0	1.70	2.33	2.72	3.97	4.15	5	**6**	7	15	**15**
	OS-3	0.60	0.84	0.25	500	12	26.6					26.6	1.88	2.59	3.02	4.40	4.60	1	**2**	2	4	**4**
	OS-4	2.86	3.38	0.25	100	2	12.6	600	2.0%	4.9	2.0	14.7	2.54	3.50	4.08	5.95	6.22	7	**10**	12	20	**21**
	OS-5	0.44	0.55	0.25	75	4	7.9					7.9	3.24	4.46	5.20	7.58	7.93	1	**2**	2	4	**4**
	A	0.58	0.59	0.25								5.0	3.71	5.10	5.96	8.68	9.07	2	**3**	3	5	**5**
	A1	0.25	0.25	0.25								5.0	3.71	5.10	5.96	8.68	9.07	0.9	**1.3**	1.5	2.2	**2.3**
	B	1.04	1.06	0.25	10	0.3	3.5	1200	1.5%	4.3	4.7	8.2	3.21	4.41	5.15	7.50	7.85	3	**5**	5	8	**8**
(BASIN ON SHEET 3)	C	0.27	0.27	0.25								5.0	3.71	5.10	5.96	8.68	9.07	1.0	**1.4**	1.6	2.3	**2.5**
	D	0.34	0.34	0.25								5.0	3.71	5.10	5.96	8.68	9.07	1	**2**	2	3	**3**
	D1	0.53	0.54	0.25								5.0	3.71	5.10	5.96	8.68	9.07	2	**3**	3	5	**5**
	E	0.08	0.09	0.25								5.0	3.71	5.10	5.96	8.68	9.07	0.3	**0.4**	0.5	0.7	**0.8**
	E1	0.60	0.60	0.25								5.0	3.71	5.10	5.96	8.68	9.07	2	**3**	4	5	**5**
	F	6.39	6.39	0.25	20	0.4	5.7	800	2.0%	4.9	2.7	8.3	3.18	4.36	5.11	7.45	7.79	20	**28**	33	48	**50**
	G	0.65	0.65	0.25								5.0	3.71	5.10	5.96	8.68	9.07	2	**3**	4	6	**6**
	H	0.30	0.39	0.25	60	5	6.1					6.1	3.51	4.83	5.64	8.22	8.59	1.1	**1.5**	1.7	3.2	**3.3**

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity I(5)	Intensity I(100)	Flow Q(5)	Flow Q(100)	Facility Size
A	EX-1, EX-2	9.63	13.48	42.2	1.98	3.52	19	47	**Total Site (Historic Release)**
B	EX-3	0.60	0.84	26.6	2.59	4.60	2	4	Historic Release
1	OS-1 & OS-2	7.07	9.34	39.7	2.05	3.65	15	34	Rip-Rap Pad
2	B	1.04	1.06	8.2	4.41	7.85	5	8	Rip-Rap Pad
3	A	0.58	0.59	5.0	5.10	9.07	3	5	Rip-Rap Pad
3A	A1, C	0.52	0.52	6.9	4.66	8.29	2	4	Rip-Rap Pad
3B	DP1, DP2, DP3, DP3A	9.21	11.51	39.9	2.05	3.64	19	42	**Total Developed Site Release (Interim)**
4	D	0.34	0.34	5.0	5.10	9.07	2	3	Rip-Rap Pad
5	E & Release of Lot 4 Pond	See Pond Pack Data	See Pond Pack Data	See Pond Pack Data	See Pond Pack Data	See Pond Pack Data	3	6	Rip-Rap Pad
6	All Basins	See Pond Pack Data	See Pond Pack Data	See Pond Pack Data	See Pond Pack Data	See Pond Pack Data	20	44	**Total Developed Site Release (Ultimate)**

LEGEND

- EXISTING GROUND CONTOUR — 5910
- SUBDIVISION BOUNDARY
- LOT LINE
- PROPOSED BASIN BOUNDARY
- DIRECTION OF DRAINAGE
- EXISTING STORM SEWER
- LOW POINT/HIGH POINT — LP/HP
- BASIN IDENTIFIER / AREA IN ACRES — D / 1.41
- DESIGN POINT — 1
- PRELIMINARY PLAN AREA

N

100 50 0 100 200

SCALE: 1" = 100'

CLASSIC CONSULTING ENGINEERS & SURVEYORS SM
6385 Corporate Drive, Suite 101 (719)785-0790
Colorado Springs, Colorado 80919 (719)785-0799 (Fax)

BENT GRASS EAST COMMERCIAL
PHASE 1
PRELIMINARY / FINAL DRAINAGE REPORT
DEVELOPED DRAINAGE MAP (PRELIMINARY PLAN)

CLASSIC CONSULTING ENGINEERS & SURVEYORS

DESIGNED BY	MAW	SCALE		DATE	1-31-13
DRAWN BY	MAW	(H) 1" = 100'		SHEET	2 OF 3
CHECKED BY		(V) 1" = N/A		JOB NO.	2177.50