COMPREHENSIVE DRAINAGE ANALYSIS

Lot 2 Latigo Business Center Filing No. 1
(School District 49 Central Office Grounds)

10850 East Woodmen Road, Falcon, Colorado 80831

Prepared for:
DLR Group, Inc.
523 South Cascade Avenue, Suite 100
Colorado Springs, Colorado 80903
(719) 624-0205

Prepared by:

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Kiowa Project No. 23051

January 15, 2025

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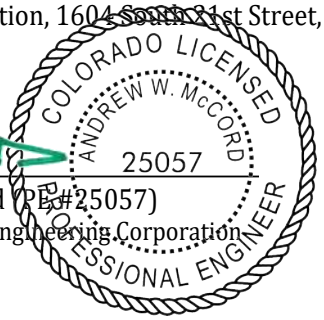
List of Figures and Tables (Refer to the Appendix Table of Contents)

STATEMENTS AND APPROVALS

ENGINEER'S STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the 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.

Kiowa Engineering Corporation, 1604 South 21st Street, Colorado Springs, Colorado 80904



Andrew W. McCord (PE#25057) — Jan. 21, 2025
For and on Behalf of Kiowa Engineering Corporation — Date

DEVELOPER'S STATEMENT:

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

School District 49
Name of Developer

Bruce Brown — 1-21-25
Authorized Signature — Date

Printed Name: Bruce Brown

Title: Facility Project Manager

Address: 10850 E. Woodmen Rd. Peyton, Co. 80831

School District 49:

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

Bruce Brown — 1-21-25
School District 49 — Date

I. PURPOSE

This report is a Comprehensive Drainage Analysis for Lot 2 Latigo Business Center Filing No. 1, located at 10850 East Woodmen Road, Falcon, Colorado 80831, for the redevelopment of the existing School District 49 Central Office Grounds.

The purpose of this report is to identify site drainage patterns and evaluate the site to meet water quality requirements per the runoff reduction standard.

II. GENERAL LOCATION AND DESCRIPTION

A. LOCATION

This proposed redevelopment is located on the School District 49 Central Office Grounds in El Paso County (Falcon, Colorado) within Lot 2 Latigo Business Center Filing No. 1 Subdivision. The parcel schedule number is 53010-02-006 and the legal description is Lot 2 Latigo Business Center Filing No 1. The parcel is located to the north of East Woodmen Road, west of Bent Grass Meadows Drive, east of Falcon Meadows Boulevard, and south of Kittrick Place. The parcel is addressed as 10850 East Woodmen Road.

The surrounding parcels are as follows:

7630 Bent Grass Meadow Drive, Schedule No. 53010-02-005, Zoning I-2, Plat No. R12007, Lot 1 Latigo Business Park Filing No. 1

7675 Falcon Meadow Boulevard, Schedule No. 53020-01-023, Zoning RR-5, Plat No. R05746, Lot 4 The Meadows Filing No. 1

7625 Falcon Meadow Boulevard, Schedule No. 53020-01-015, Zoning RR-5, Plat No. R05746, Lot 3 The Meadows Filing No. 1

7565 Falcon Meadow Boulevard, Schedule No. 53020-01-016, Zoning RR-5, Plat No. R05746, Lot 2 The Meadows Filing No. 1

7525 Falcon Meadow Boulevard, Schedule No. 53020-01-017, Zoning RR-5, Plat No. R05746, Lot 1 The Meadows Filing No. 1

B. DESCRIPTION OF PROPERTY – EXISTING CONDITIONS

Lot 2 Latigo Business Park Filing No. 1 Subdivision is approximately 443,715 square feet (10.19 acres) and is located on the north side of East Woodmen Road, west side of Bent Grass Meadow Drive, east of Falcon Meadows Boulevard, and south of Kittrick Place. The parcels fall within the Southwest Quarter of Section 1, Township 13 South, Range 65 West of the 6th Principal Meridian of El Paso County, Colorado.

The property currently consists of two buildings and unpaved parking lots in the northern portion of the site. There is existing curb and gutter along Bent Grass Meadow Drive and newly installed curb and gutter along East Woodmen Road.

The existing topography consists of grades between 2 and 25 percent and generally slopes from the north to south across the parcel.

C. EXISTING SOILS

The soils indicative to the site are classified as Columbine gravelly sandy loam and Blakeland loamy sand by the USDA Soil Conservation Service and are listed as National Resources Conservation Service (NRCS) Hydrologic Soil Group A. Group A soils have high

infiltration rates and low runoff potential when thoroughly wetted. A United States Department of Agriculture (USDA) Soil Map is provided in the Appendix.

D. EXISTING DRAINAGE

The existing topography consists of grades between 2 and 25 percent and generally slopes from north to south across the parcel. Existing vegetation is limited to landscaped areas around the perimeter of the existing buildings.

Existing drainage patterns are generally characterized as overland flow. Site flows are directed southeast or southwest to minor swales along the western and eastern boundaries that release to landscape islands along the northside of East Woodmen Road. Flows are then directed east to existing curb and gutter along the west side of Bent Grass Meadow Drive. Runoff then flows north to an existing public 15' CDoT Type R Curb Inlet located at the northwest corner of the intersection of East Woodmen Road and Bent Grass Meadow Drive. This public storm inlet releases east to an open channel on the opposite (east) side of Bent Grass Meadow Drive. Flows continue east and ultimately outfall into Unnamed Tributary to Black Squirrel Creek approximately one thousand feet east of the site.

Lot 2 Latigo Business Center Filing No. 1 does not lie within a designated floodplain according to information published in the Federal Emergency Management Agency (FEMA) Floodplain Map No. 08041C0535G, dated December 7, 2018. The FEMA Floodplain map is provided in Appendix A showing it lies within Zone X, a minimal flood hazard zone.

There are no known non-stormwater discharges that contribute to the storm water systems on site and downstream, both private and public. There are no known drainage reports that impact the site's drainage design.

E. DESCRIPTION OF PROPERTY – PROPOSED CONDITIONS

The proposed development consists of an addition to the existing warehouse, overlot grading to raise the northern portion of the site for construction of two new buildings, proposed new paved areas and concrete vee-pans, and new landscape areas for water quality treatment.

Planned access points to the site are unchanged at East Woodmen Road. No site access is planned for the east margin of the property from Bent Grass Meadow Drive.

III. DRAINAGE BASINS AND SUBBASINS

A. EXISTING BASINS AND SUB-BASINS

The parcel is delineated into two basins, West and East, according to the existing and proposed grading for the existing and developed conditions. Basins are delineated for the purpose of analyzing water quality treatment per the runoff reduction standard. Basin surface areas are identified as either Receiving Pervious Areas (RPA), Unconnected Impervious Areas (UIA), Directly Connected Impervious Areas (DCIA), or Separated Pervious Areas (SPA).

B. ON-SITE BASINS – DEVELOPED CONDITION

Basin W1 contains 1.05 acres of roof, paved, and lawn area. Runoff surface flows to a pervious area with a swale for water quality treatment. The swale releases south to Basin W2. Runoff reduction values for this basin are UIA=35,059 sf with the corresponding RPA=4,775 sf. The UIA/RPA interface width is 204 lf. There is also 3,253 sf of SPA.

Basin W2 contains 0.53 acres of roof, paved, and lawn area. Runoff surface flows to a pervious landscape island with a meandering swale for water quality treatment. Flows release south to Basin W4a. Runoff reduction values for this basin are UIA=18,415 sf with the corresponding RPA=4,564 sf. The UIA/RPA interface width is 176 lf.

Basin W3 contains 0.29 acres of paved and lawn area. Runoff surface flows to a pervious landscape island for water quality treatment. Flows are then conveyed west by a concrete vee-pan to Basin W2. Runoff reduction values for this basin are UIA=9,371 sf with the corresponding RPA=2,216 sf. The UIA/RPA interface width is 174 lf.

Basins W4a, W4f, and W6 contain 0.99 acres of roof, paved and lawn area. Runoff from Basin W4a surface flows to a concrete vee-pan that conveys flows south to Basin W4f. Runoff from Basin W4f surface flows to concrete vee-pan and is conveyed south to Basin W6. Basin W6 is a pervious landscape island that treats flows from Basins W4a and W4f. Basin W6 runoff is self-tributary to a meandering swale that releases south to the East Woodmen Road Right of Way. Runoff reduction values for these basins are UIA=24,086 sf with the corresponding RPA=5,918 sf. The UIA/RPA interface width is 85 lf. There is also 11,507 sf of SPA.

Basin W4b contains 0.13 acres of paved and lawn area. Runoff surface flows to a pervious area for water quality treatment. Flows then release to the south to Basin W4a. Runoff reduction values for this basin are UIA=4,201 sf with the corresponding RPA=1,040 sf. The UIA/RPA interface width is 72 lf. There is also 400 sf of SPA.

Basin W4c contains 0.22 acres of paved and lawn area. Runoff surface flows to a pervious area for water quality treatment. Flows then release south to Basin W4d. Runoff reduction values for this basin are UIA=7,741 sf with the corresponding RPA=1,017 sf. The UIA/RPA interface width is 72 lf. There is also 1,024 sf of SPA.

Basin W4d contains 0.19 acres of paved and lawn area. Runoff surface flows to a pervious area for water quality treatment. Flows then release south to Basin W4f. Runoff reduction values for this basin are UIA=6,027 sf with the corresponding RPA=956 sf. The UIA/RPA interface width is 112 lf.

Basin W4e contains 0.58 acres of roof, paved, and lawn area. Runoff surface flows to a pervious area for water quality treatment. Flows then release south to Basin W4f. Runoff reduction values for this basin are UIA=8,326 sf with the corresponding RPA=1,110 sf. The UIA/RPA interface width is 112 lf.

Basin W5 contains 0.19 acres of paved and lawn area. Runoff surface flows to a pervious landscape island for water quality treatment. Flows then release south to Basin W8. Runoff reduction values for this basin are UIA=7,428 sf with the corresponding RPA=1,063 sf. The UIA/RPA interface width is 130 lf.

Basin W7 contains 0.23 acres of paved and lawn area. Runoff surface flows to a pervious landscape island for water quality treatment. Flows then release south to Basin W8. Runoff reduction values for this basin are UIA=8,227 sf with the corresponding RPA=1,944 sf. The UIA/RPA interface width is 130 lf.

Basin W8 contains 1.95 acres of roof, paved, and lawn area. Runoff flows to pervious areas around the existing buildings for water quality treatment and parking runoff surface flows to existing pervious landscape islands along the north side of East Woodmen Road for water quality treatment. Flows are then conveyed east to the existing inlet along the west side of Bent Grass Meadow Drive. Runoff reduction values for this basin are UIA=59,245 sf with the corresponding RPA=15,337 sf. The UIA/RPA interface width is 300 lf.

Basin E1 contains 0.11 acres of roof, paved, and lawn area. Runoff surface flows to a pervious landscape island and area for water quality treatment. Flows then release south to Basins E2 and E3.

Runoff reduction values for this basin are UIA=3,375 sf with the corresponding RPA=459 sf. The UIA/RPA interface width is 40 lf. There is also 851 sf of SPA.

Basin E2 contains 0.13 acres of paved and lawn area. Runoff surface flows to a pervious area for water quality treatment. Flows then release south to Basins E3 and E4. Runoff reduction values for this basin are UIA=3,915 sf with the corresponding RPA=736 sf. The UIA/RPA interface width is 30 lf. There is also 891 sf of SPA.

Basin E3 contains 0.79 acres of roof, paved, and lawn area. Runoff surface flows to a pervious area for water quality treatment. Flows then release east to Basin E4. Runoff reduction values for this basin are UIA=27,948 sf with the corresponding RPA=3,684 sf. The UIA/RPA interface width is 256 lf.

Basin E4 contains 0.38 acres of roof, paved, and lawn area. Runoff surface flows to a pervious landscape island and area for water quality treatment. Flows then release south to Basin E7. Runoff reduction values for this basin are UIA=11,023 sf with the corresponding RPA=4,720 sf. The UIA/RPA interface width is 74 lf. There is also 583 sf of SPA.

Basin E5 contains 0.18 acres of paved and lawn area. Runoff surface flows to a pervious landscape island and area for water quality treatment. Flows then release south to Basin E6. Runoff reduction values for this basin are UIA=5,888 sf with the corresponding RPA=635 sf. The UIA/RPA interface width is 45 lf. There is also 1,098 sf of SPA.

Basin E6 contains 0.28 acres of roof, paved, and lawn area. Runoff surface flows to a pervious landscape island for water quality treatment. Flows then release south to Basin E7. Runoff reduction values for this basin are UIA=9,895 sf with the corresponding RPA=2,024 sf. The UIA/RPA interface width is 210 lf.

Basin E7 contains 0.24 acres of paved and lawn area. Runoff surface flows to a pervious landscape island for water quality treatment. Flows then release east to Basin E8. Runoff reduction values for this basin are UIA=8,323 sf with the corresponding RPA=1,188 sf. The UIA/RPA interface width is 101 lf.

Basin E8 contains 0.32 acres of paved and lawn area. Runoff surface flows to a pervious landscape island water quality treatment. Flows are conveyed south and release east to Bent Grass Meadow Drive via curb chases or level spreader. Flows continue south in existing curb and gutter to the existing inlet at the intersection with East Woodmen Road. Runoff reduction values for this basin are UIA=8,743 sf with the corresponding RPA=5,010 sf. The UIA/RPA interface width is 415 lf.

Basin E9 contains 0.24 acres of roof, paved, and lawn area. Runoff surface flows to a pervious area for water quality treatment. Flows then release east to Basin E10. Runoff reduction values for this basin are UIA=7,274 sf with the corresponding RPA=1,203 sf. The UIA/RPA interface width is 130 lf. There is also 1,957 sf of SPA.

Basin E10 contains 0.70 acres of roof, paved, and lawn area. Roof runoff discharges via downspouts to pervious areas for water quality treatment. Flows then converge with the remaining basin flows and are conveyed south by a concrete vee-pan to Basins E11 and E12. Runoff reduction values for this basin are UIA=28,551 sf with the corresponding RPA=1,147 sf. The UIA/RPA interface width is 50 lf. There is also 107 sf of SPA. To lessen potential icing along the eastern edge of the existing building, an alternative water quality treatment method would be to extend the existing downspouts to a manifold system that connects to a Stormcepter system that then discharges to an area inlet. Flows would ultimately release by ponding up through the inlet to the concrete vee-pan.

Basin E11 contains 0.18 acres of paved and lawn area. Runoff surface flows to a concrete vee-pan and is conveyed south to Basin E12. The runoff reduction value for this basin is 7,021 sf of SPA.

Please address need for detention and current and proposed flows from the property.

Basin E12 contains 0.22 acres of roof, paved, and lawn area. Runoff flows to pervious areas around the existing buildings for water quality treatment. Flows then continue to a concrete vee-pan that conveys flows south to a proposed area inlet that connects via an 18" Reinforced Concrete Pipe (RCP) to the existing inlet at the intersection of Bent Grass Meadow Drive and East Woodmen Road. Runoff reduction values for this basin are UIA=4,986 sf with the corresponding RPA=4,130 sf. The UIA/RPA interface width is 120 lf.

IV. DRAINAGE DESIGN CRITERIA

A. REGULATIONS

Permanent Control Measures (PCMs) must be provided to achieve Water Quality Treatment. Refer to Green Infrastructure Exhibits in the Appendix for locations of treatment areas.

B. DEVELOPMENT CRITERIA REFERENCE AND CONSTRAINTS

The parcel falls within the Falcon Area Drainage Basin designated by El Paso County Engineering Division with the ultimate receiving waters being the Arkansas River by way of Black Squirrel and Fountain Creeks.

Water Quality Capture Volume (WQCV) runoff reduction was evaluated utilizing the Mile High Flood District (MHFD) spreadsheet UD-BMP v3.07.

Under developed conditions, the drainage on this parcel will have no effect on downstream infrastructure or facilities, streets, utilities, transit, or further development of adjacent lots.

C. HYDROLOGICAL CRITERIA

Runoff reduction and RPA and SPAs are applaned to achieve WQ treatment, correct?

Rational Method runoff calculations have not been performed for existing or developed conditions. The site has solely been analyzed to meet the water quality runoff reduction standard.

Potential Best Management Practices (PBMPs) in the form of Planned Infiltration Areas (PIAs) are planned to achieve Water Quality Treatment.

D. FOUR-STEP PROCESS

The selection of appropriate control measures is based on the characteristics of the site and potential pollutants. The Four-Step Process provides a method of going through the selection process. The following applies the Four-Step Process to the development of Lot 2 Latigo Business Center.

Step 1: Employ Runoff Reduction Practices

The site strategically locates pervious landscape islands and areas to treat unconnected impervious areas. Given the proposed land use, the majority of the site consists of roof or paved surface. The UD-BMP spreadsheet was utilized to quantify the WQCV reduction percentage. The site globally achieves a WQCV reduction percentage of 60%. Runoff Reduction for the whole site is summarized in the table on the following page below:

Please provide maintenance agreement for the maintenance of the RPAs/other treatment facilities. Maintenance agreement templates can be found on the County website here: https://publicworks.elpasoco.com/department-public-works/county-engineer/

Water Quality Treatment Credit Value Summary				
Desig.	**S.F.**	**Credit**	**Acres**	**% Site**
E1-E8	100988	77	2.318365	25.15
E9-12	56376	49	1.294215	14.04
W1-W4	151007	83	3.466644	37.60
W5-W8	93244	96	2.140588	23.22
Total sf:	**401615**	**60**	**9.219812**	**100.00**

Step 2: Provide Water Quality Capture Volume

Volume water quality treatment is not required for the site, based on the site globally achieving the minimum WQCV reduction of 60% by the runoff reduction standard.

Step 3: Stabilize Drainageways

The drainage within the site is stabilized with features such as grassed swales, valley pans, an area inlet, and sloped pavement to direct storm water through the site to East Woodmen Road and Bent Grass Meadow Drive Rights of Ways and ultimately to the public curb inlet at the intersection. There are no unstabilized drainageways on this site.

Step 4: Implement Site Specific and Other Source Control BMPs

Site specific Potential Best Management Practices, pervious landscape islands and areas, are utilized to maximize opportunities for infiltration on-site.

V. CONCLUSIONS

The comprehensive drainage analysis for the redevelopment of Lot 2 Latigo Business Park has been evaluated to meet the water quality runoff reduction standard (minimum 60% reduction of the required WQCV) per MHFD Manual Volume 3 and corresponding spreadsheet. The design presented in this report reduces the required WQCV by 60%.

There is no impact on major drainageway planning studies within the larger drainage basin. This development will not adversely affect downstream development.

VI. REFERENCES

El Paso County & Colorado Springs Drainage Manual Volumes I & II (May 2014)

El Paso County Engineering Criteria Manual, El Paso County, Colorado, (Rev. 12/16/2013)

Urban Storm Drainage Criteria Manual, Vol. 1, 2 and 3, and Spreadsheets, Mile High Flood District, latest revisions.

Soil Survey of El Paso County Area, Colorado, prepared by United States Department of Agriculture Soil Conservation Service, dated June 1981.

FEMA Flood Online Map Service Center

United States Department of Agriculture National Resources Conservation Service

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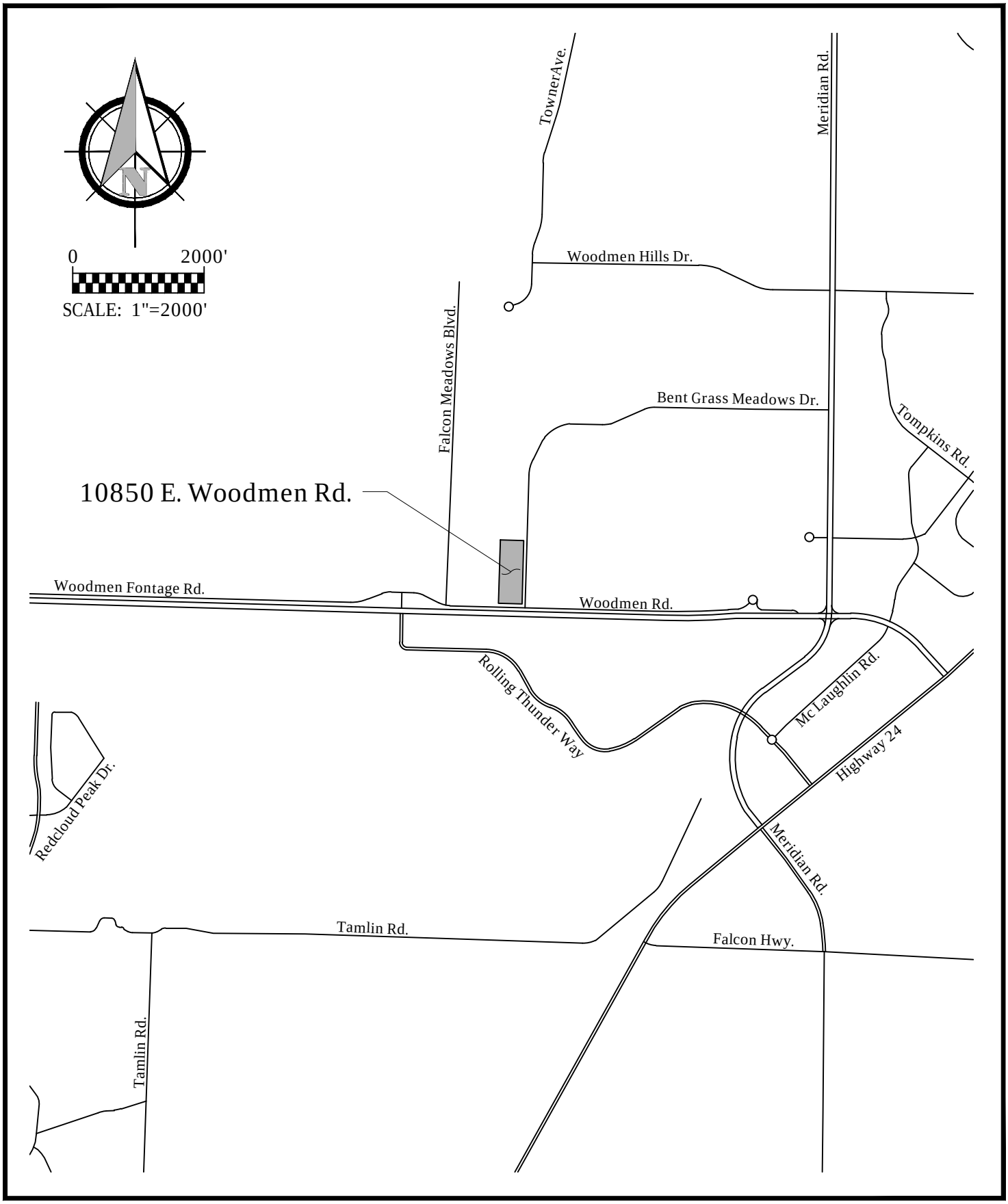
APPENDIX A

Figure 1: Vicinity Map

Figure 2: Soils Map

FEMA Flood Insurance Rate Map



Kiowa
Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

Vicinity Map
School District 49 - Grounds Expansion
10850 Woodmen Road - Colorado Springs, CO 80908

Map Scale: 1:2,000 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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 22, Sep 3, 2024

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	1.2	10.0%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	10.6	90.0%
Totals for Area of Interest			**11.8**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

National Flood Hazard Layer FIRMette

FEMA

104°37'50"W 38°56'43"N

104°37'13"W 38°56'15"N

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

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

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

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

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

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

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

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

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

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/2/2025 at 8:21 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 B
Water Quality Calculations and Exhibit

Use up to date MHFD-BMP spreadsheet for runoff reduction. Typical comment.

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Designer: AWMc
Company: Kiowa Engineering Corporation
Date: January 8, 2025
Project: School District 49 Admin Campus
Location: 18650 E Woodmen Rd, El Paso County, Co (Falcon) Areas W1 thru W4

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth: 0.60 inches
Depth of Average Runoff Producing Storm, d_6 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA	SPA	UIA:RPA	UIA:RPA	UIA:RPA	SPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	SPA	SPA
Area ID	W1-RPA	W1-SPA	W2	W3	W4a,f+W6	W4a+W4f	W4b-RPA	W4c-RPA	W4d-RPA	W4e-RPA	W4b-SPA	W4c-SPA
Downstream Design Point ID	na	na	na	na	na	na	na	na	na	na	na	na
Downstream BMP Type	None	None	None	None	None	None	None	None	None	None	None	None
DCIA (ft^2)	--	--	--	--	--	--	--	--	--	--	--	--
UIA (ft^2)	35,059	--	18,415	9,371	24,086	--	4,201	7,741	6,027	8,326	--	--
RPA (ft^2)	4,775	--	4,564	2,216	5,918	--	1,040	1,017	956	1,110	--	--
SPA (ft^2)	--	3,253	--	--	--	11,507	--	--	--	--	400	1,024
HSG A (%)	100%		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
HSG B (%)	0%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
HSG C/D (%)	0%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Average Slope of RPA (ft/ft)	0.040	--	0.045	0.070	0.020	--	0.030	0.025	0.015	0.020	--	--
UIA:RPA Interface Width (ft)	204.00	--	176.00	174.00	85.00	--	72.00	72.00	112.00	112.00	--	--

CALCULATED RUNOFF RESULTS

Area ID	W1-RPA	W1-SPA	W2	W3	W4a,f+W6	W4a+W4f	W4b-RPA	W4c-RPA	W4d-RPA	W4e-RPA	W4b-SPA	W4c-SPA
UIA:RPA Area (ft^2)	39,834	--	22,979	11,587	30,004	--	5,241	8,758	6,983	9,437	--	--
L / W Ratio	0.96	--	0.74	0.38	4.15	--	1.01	1.69	0.56	0.75	--	--
UIA / Area	0.8801	--	0.8014	0.8088	0.8028	--	0.8016	0.8839	0.8631	0.8823	--	--
Runoff (in)	0.14	0.00	0.00	0.02	0.00	0.00	0.00	0.16	0.12	0.16	0.00	0.00
Runoff (ft^3)	480	0	0	17	0	0	1	117	69	125	0	0
Runoff Reduction (ft^3)	981	163	767	374	1004	575	174	205	182	222	20	51

CALCULATED WQCV RESULTS

Area ID	W1-RPA	W1-SPA	W2	W3	W4a,f+W6	W4a+W4f	W4b-RPA	W4c-RPA	W4d-RPA	W4e-RPA	W4b-SPA	W4c-SPA
WQCV (ft^3)	1461	0	767	390	1004	0	175	323	251	347	0	0
WQCV Reduction (ft^3)	981	0	767	374	1004	0	174	205	182	222	0	0
WQCV Reduction (%)	67%	0%	100%	96%	100%	0%	99%	64%	73%	64%	0%	0%
Untreated WQCV (ft^3)	480	0	0	17	0	0	1	117	69	125	0	0

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	na											
DCIA (ft^2)	0											
UIA (ft^2)	113,226											
RPA (ft^2)	21,596											
SPA (ft^2)	16,185											
Total Area (ft^2)	151,007											
Total Impervious Area (ft^2)	113,226											
WQCV (ft^3)	4,718											
WQCV Reduction (ft^3)	3,909											
WQCV Reduction (%)	83%											
Untreated WQCV (ft^3)	808											

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft^2)	151,007
Total Impervious Area (ft^2)	113,226
WQCV (ft^3)	4,718
WQCV Reduction (ft^3)	3,909
WQCV Reduction (%)	83%
Untreated WQCV (ft^3)	808

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Designer: AWMc
Company: Kiowa Engineering Corporation
Date: January 8, 2025
Project: School District 49 Admin Campus
Location: 18650 E Woodmen Rd, El Paso County, Co (Falcon) Areas W5, W7 and W8 (W6 Omitted as it is used elsewhere in calculation)

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth: 0.60 inches
Depth of Average Runoff Producing Storm, d_6 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA	UIA:RPA	UIA:RPA									
Area ID	W5-RPA	W7-RPA	W8-RPA									
Downstream Design Point ID	na	na	na									
Downstream BMP Type	None	None	None									
DCIA (ft^2)	--	--	--									
UIA (ft^2)	7,428	8,227	59,245									
RPA (ft^2)	1,063	1,944	15,337									
SPA (ft^2)	--	--	--									
HSG A (%)	100%	100%	100%									
HSG B (%)	0%	0%	0%									
HSG C/D (%)	0%	0%	0%									
Average Slope of RPA (ft/ft)	0.055	0.070	0.040									
UIA:RPA Interface Width (ft)	130.00	130.00	300.00									

CALCULATED RUNOFF RESULTS

Area ID	W5-RPA	W7-RPA	W8-RPA									
UIA:RPA Area (ft^2)	8,491	10,171	74,582									
L / W Ratio	0.50	0.60	0.83									
UIA / Area	0.8748	0.8089	0.7944									
Runoff (in)	0.15	0.02	0.00									
Runoff (ft^3)	103	15	0									
Runoff Reduction (ft^3)	207	328	2469									

CALCULATED WQCV RESULTS

Area ID	W5-RPA	W7-RPA	W8-RPA									
WQCV (ft^3)	310	343	2469									
WQCV Reduction (ft^3)	207	328	2469									
WQCV Reduction (%)	67%	96%	100%									
Untreated WQCV (ft^3)	103	15	0									

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	na											
DCIA (ft^2)	0											
UIA (ft^2)	74,900											
RPA (ft^2)	18,344											
SPA (ft^2)	0											
Total Area (ft^2)	93,244											
Total Impervious Area (ft^2)	74,900											
WQCV (ft^3)	3,121											
WQCV Reduction (ft^3)	3,003											
WQCV Reduction (%)	96%											
Untreated WQCV (ft^3)	118											

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft^2)	93,244
Total Impervious Area (ft^2)	74,900
WQCV (ft^3)	3,121
WQCV Reduction (ft^3)	3,003
WQCV Reduction (%)	96%
Untreated WQCV (ft^3)	118

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Designer: AWMc
Company: Kiowa Engineering Corporation
Date: January 8, 2025
Project: School District 49 Admin Campus
Location: 18650 E Woodmen Rd, El Paso County, Co (Falcon) Areas E1 thru E8

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth: 0.60 inches
Depth of Average Runoff Producing Storm, d_6 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA	SPA	UIA:RPA	SPA	UIA:RPA	UIA:RPA	SPA	UIA:RPA	SPA	UIA:RPA	UIA:RPA	UIA:RPA
Area ID	E1-RPA	E1-SPA	E2-RPA	E2-SPA	E3-RPA	E4-RPA	E4-SPA	E5-RPA	E5-SPA	E6	E7	E8
Downstream Design Point ID	na	na	na	na	na	na	na	na	na	na	na	na
Downstream BMP Type	None	None	None	None	None	None	None	None	None	None	None	None
DCIA (ft^2)	--	--	--	--	--	--	--	--	--	--	--	--
UIA (ft^2)	3,375	--	3,915	--	27,948	11,023	--	5,888	--	9,895	8,323	8,743
RPA (ft^2)	459	--	736	--	3,684	4,720	--	635	--	2,024	1,188	5,010
SPA (ft^2)	--	851	--	891	--	--	583	--	1,098	--	--	--
HSG A (%)	100%		100%	100%	100%	100%		100%		100%	100%	100%
HSG B (%)	0%		0%	0%	0%	0%		0%		0%	0%	0%
HSG C/D (%)	0%		0%	0%	0%	0%		0%		0%	0%	0%
Average Slope of RPA (ft/ft)	0.050	--	0.045	--	0.042	0.044	--	0.048	--	0.016	0.050	0.050
UIA:RPA Interface Width (ft)	40.00	--	30.00	--	256.00	74.00	--	45.00	--	210.00	101.00	415.00

CALCULATED RUNOFF RESULTS

Area ID	E1-RPA	E1-SPA	E2-RPA	E2-SPA	E3-RPA	E4-RPA	E4-SPA	E5-RPA	E5-SPA	E6	E7	E8
UIA:RPA Area (ft^2)	3,834	--	4,651	--	31,632	15,743	--	6,523	--	11,919	9,511	13,753
L / W Ratio	2.40	--	5.17	--	0.48	2.87	--	3.22	--	0.27	0.93	0.08
UIA / Area	0.8802	--	0.8418	--	0.8835	0.7002	--	0.9026	--	0.8302	0.8751	0.6357
Runoff (in)	0.15	0.00	0.07	0.00	0.16	0.00	0.00	0.20	0.00	0.05	0.14	0.00
Runoff (ft^3)	49	0	27	0	410	0	0	110	0	52	115	0
Runoff Reduction (ft^3)	91	43	136	45	754	459	29	136	55	360	232	364

CALCULATED WQCV RESULTS

Area ID	E1-RPA	E1-SPA	E2-RPA	E2-SPA	E3-RPA	E4-RPA	E4-SPA	E5-RPA	E5-SPA	E6	E7	E8
WQCV (ft^3)	141	0	163	0	1164	459	0	245	0	412	347	364
WQCV Reduction (ft^3)	91	0	136	0	754	459	0	136	0	360	232	364
WQCV Reduction (%)	65%	0%	83%	0%	65%	100%	0%	55%	0%	87%	67%	100%
Untreated WQCV (ft^3)	49	0	27	0	410	0	0	110	0	52	115	0

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	na
DCIA (ft^2)	0
UIA (ft^2)	79,110
RPA (ft^2)	18,456
SPA (ft^2)	3,422
Total Area (ft^2)	100,988
Total Impervious Area (ft^2)	79,110
WQCV (ft^3)	3,296
WQCV Reduction (ft^3)	2,533
WQCV Reduction (%)	77%
Untreated WQCV (ft^3)	763

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft^2)	100,988
Total Impervious Area (ft^2)	79,110
WQCV (ft^3)	3,296
WQCV Reduction (ft^3)	2,533
WQCV Reduction (%)	77%
Untreated WQCV (ft^3)	763

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Designer: AWMc
Company: Kiowa Engineering Corporation
Date: January 8, 2025
Project: School District 49 Admin Campus
Location: 18650 E Woodmen Rd, El Paso County, Co (Falcon) Areas E9 thru E12

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth: 0.60 inches
Depth of Average Runoff Producing Storm, d_6 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA	SPA	UIA:RPA	SPA	SPA	UIA:RPA						
Area ID	E9-RPA	E9-SPA	E10-RPA	E10-SPA	E11-SPA	E12-RPA						
Downstream Design Point ID	na	na	na	na	na	na						
Downstream BMP Type	None	None	None	None	None	None						
DCIA (ft^2)	--	--	--	--	--	--						
UIA (ft^2)	7,274	--	28,551	--	--	4,986						
RPA (ft^2)	1,203	--	1,147	--	--	4,130						
SPA (ft^2)	--	1,957	--	107	7,021	--						
HSG A (%)	100%	100%	100%		100%	100%						
HSG B (%)	0%	0%	0%		0%	0%						
HSG C/D (%)	0%	0%	0%		0%	0%						
Average Slope of RPA (ft/ft)	0.055	--	0.010	--	--	0.020						
UIA:RPA Interface Width (ft)	130.00	--	50.00	--	--	120.00						

CALCULATED RUNOFF RESULTS

Area ID	E9-RPA	E9-SPA	E10-RPA	E10-SPA	E11-SPA	E12-RPA						
UIA:RPA Area (ft^2)	8,477	--	29,698	--	--	9,116						
L / W Ratio	0.50	--	11.88	--	--	0.63						
UIA / Area	0.8581	--	0.9614	--	--	0.5470						
Runoff (in)	0.11	0.00	0.32	0.00	0.00	0.00						
Runoff (ft^3)	78	0	783	0	0	0						
Runoff Reduction (ft^3)	225	98	406	5	351	208						

CALCULATED WQCV RESULTS

Area ID	E9-RPA	E9-SPA	E10-RPA	E10-SPA	E11-SPA	E12-RPA						
WQCV (ft^3)	303	0	1190	0	0	208						
WQCV Reduction (ft^3)	225	0	406	0	0	208						
WQCV Reduction (%)	74%	0%	34%	0%	0%	100%						
Untreated WQCV (ft^3)	78	0	783	0	0	0						

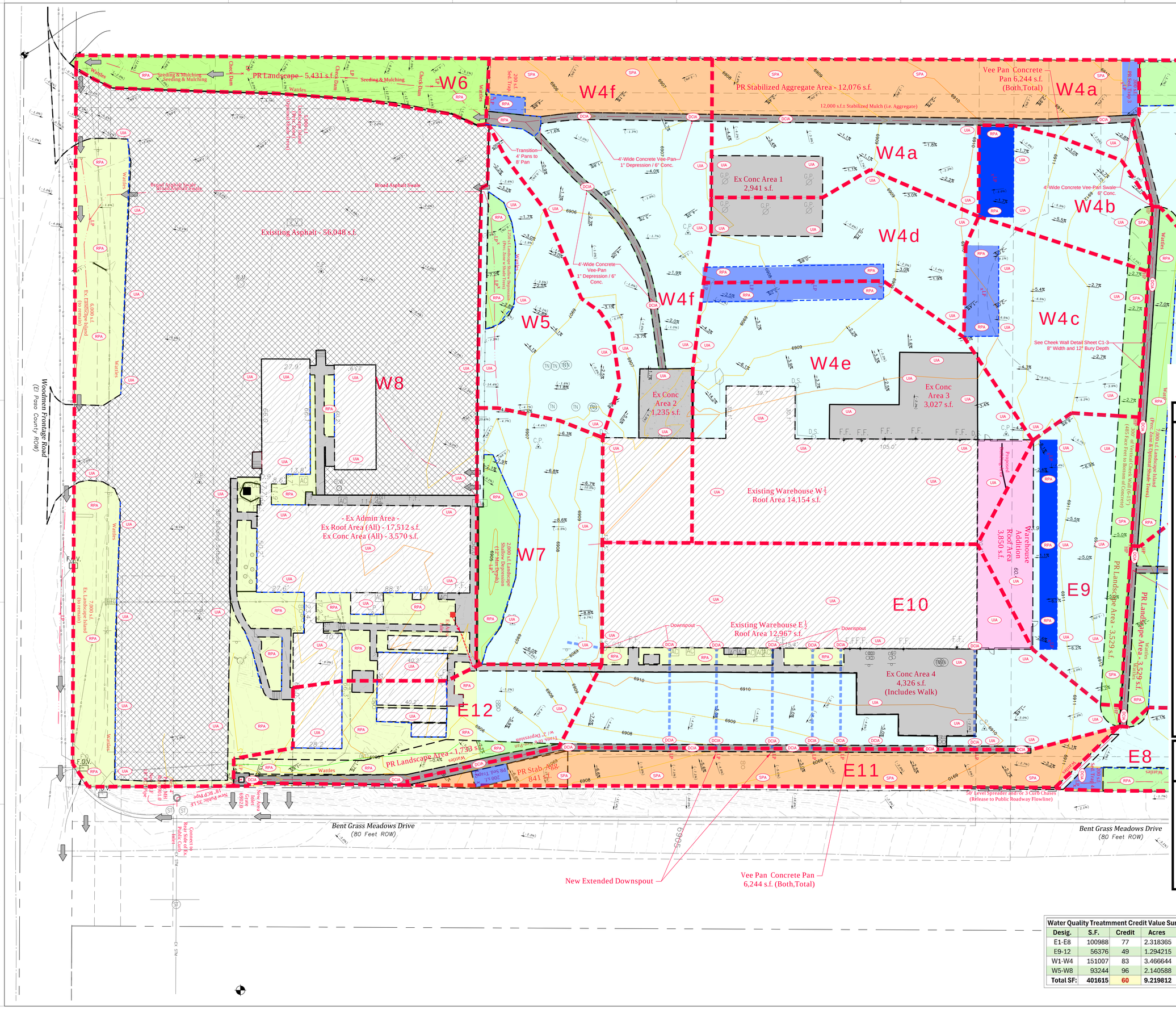
CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	na											
DCIA (ft^2)	0											
UIA (ft^2)	40,811											
RPA (ft^2)	6,480											
SPA (ft^2)	9,085											
Total Area (ft^2)	56,376											
Total Impervious Area (ft^2)	40,811											
WQCV (ft^3)	1,700											
WQCV Reduction (ft^3)	839											
WQCV Reduction (%)	49%											
Untreated WQCV (ft^3)	862											

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft^2)	56,376
Total Impervious Area (ft^2)	40,811
WQCV (ft^3)	1,700
WQCV Reduction (ft^3)	839
WQCV Reduction (%)	49%
Untreated WQCV (ft^3)	862

Water Quality Treatmment Credit Value Summary				
Desig.	**S.F.**	**Credit**	**Acres**	**% Site**
E1-E8	100988	77	2.318365	25.15
E9-12	56376	49	1.294215	14.04
W1-W4	151007	83	3.466644	37.60
W5-W8	93244	96	2.140588	23.22
Total SF:	**401615**	**60**	**9.219812**	**100.00**



DRAINAGE LEGEND

- E(n) — East Side or West Side of Site, Area 'n' see report for discussion of UIA/RPA Exchanges (WQTC).
- Subbasin Boundary
- Time of Concentration Flowpath
- Emergency Overflow Path
- 2.2% — Ex. or Proposed Flow Direction
- HP_x — Spot Elev. High Point
- LP_x — Spot Elev. Low Point
- 15" CMP — Existing or Proposed Storm Pipe
- Lot or Property Boundary
- Existing Intermediate Contour
- (6220) — Existing Index Contour
- 6219 — Existing Intermediate Contour
- 6220 — Existing Index Contour
- Existing 6" Vertical Curb & Gutter
- Ex. or Proposed Paving
- Ex. or Proposed Roof
- Ex. or Proposed Concrete
- Ex. or Proposed Landscape
- New Sediment Trap Location
- New Pervious Surface
- Pervious Surface Aggregate Rock Mulch

Color Legend for IRF Calculation

- New P.I.A. — Pervious Surface: Landscape Swale or Shallow Depression (Seed & Mulch)
- P.I.A. — Pervious Surface: Landscape Swale or Shallow Depression (Seed & Mulch)
- DCIA — Directly Connected Impervious Area
- SPA — Separate Pervious Area
- UIA — Upstream Impervious Area w Interface Location
- RPA — Receiving Pervious Area

Water Quality Treatmment Credit Value Summary

Desig.	S.F.	Credit	Acres	% Site
E1-E8	100988	77	2.318365	25.15
E9-12	56376	49	1.294215	14.04
W1-W4	151007	83	3.466644	37.60
W5-W8	93244	96	2.140588	23.22
Total SF:	**401615**	**60**	**9.219812**	**100.00**

0 20' 40'
SCALE: 1"=20'

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Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719)630-7342

D49 CENTRAL OFFICE GROUNDS

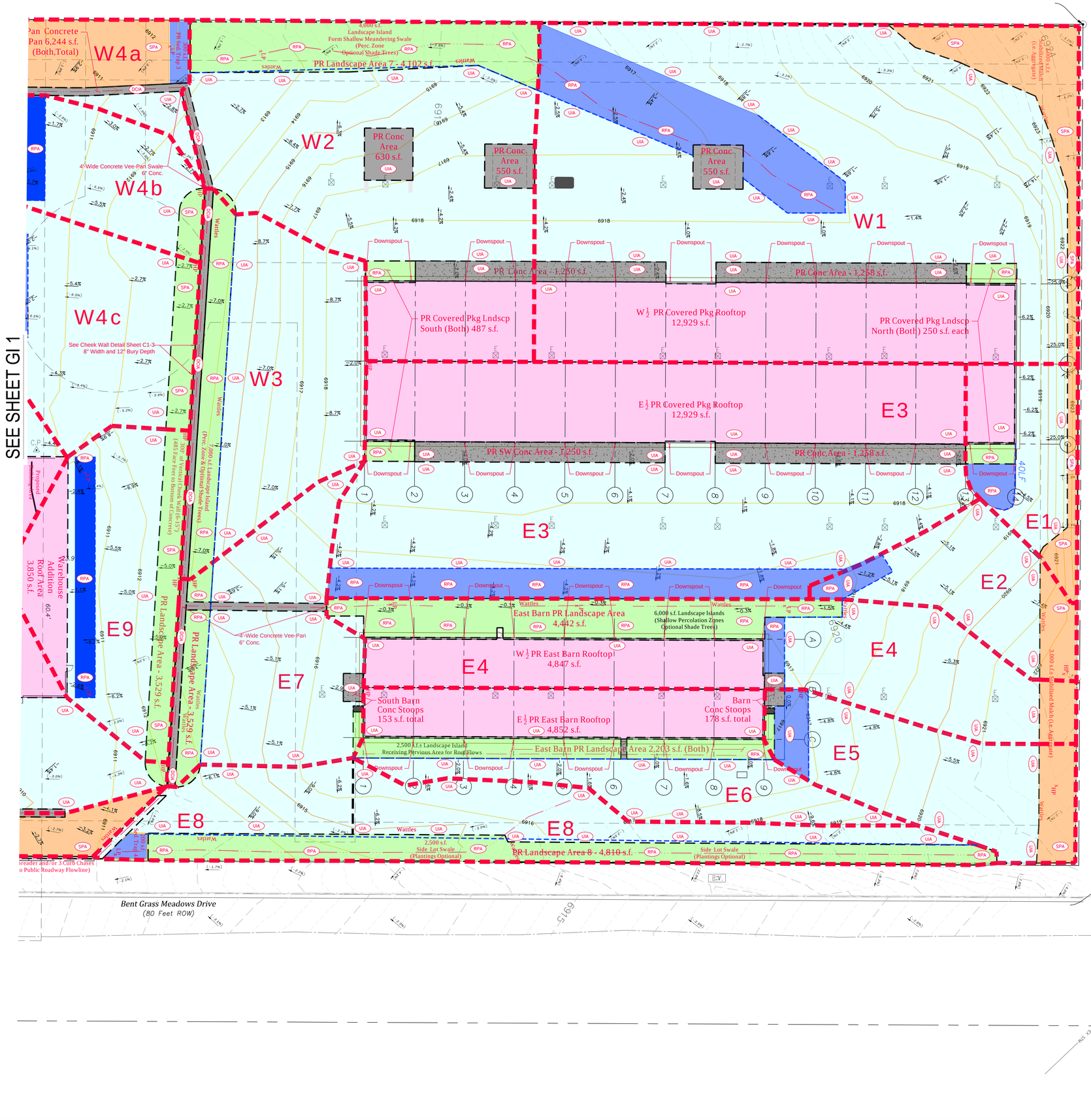
GRADING & EROSION CONTROL PLAN
(South Half)
10850 E WOODMEN RD.
FALCON, CO 80831

CONSTRUCTION DOCUMENTS
09.04.2024
REVISIONS
11.25.2024 Clarifications

Kiowa: 23051
37-24108-00

GREEN INFRASTRUCTURE PLAN

GI 1



Water Quality Treatmment Credit Value Summary				
Desig.	S.F.	Credit	Acres	% Site
E1-E8	100988	77	2.318365	25.15
E9-12	56376	49	1.294215	14.04
W1-W4	151007	83	3.466644	37.60
W5-W8	93244	96	2.140588	23.22
Total SF:	**401615**	**60**	**9.219812**	**100.00**

DRAINAGE LEGEND

- E(n) — East Side or West Side of Site. Area 'n' see report for discussion of UIA/RPA Exchanges (WQTC).
- Subbasin Boundary
- Time of Concentration Flowpath
- Emergency Overflow Path
- ~2.2% — Ex. or Proposed Flow Direction
- HP_X — Spot Elev. High Point
- LP_X — Spot Elev. Low Point
- 15" CMP — Existing or Proposed Storm Pipe
- Lot or Property Boundary
- Existing Intermediate Contour
- (6220) — Existing Index Contour
- 6219 — Existing Intermediate Contour
- 6220 — Existing Index Contour
- Existing 6" Vertical Curb & Gutter
- Ex. or Proposed Paving
- Ex. or Proposed Roof
- Ex. or Proposed Concrete
- Ex. or Proposed Landscape
- New Sediment Trap Location
- New Pervious Surface
- Pervious Surface Aggregate Rock Mulch

Color Legend for IRF Calculation

- New P.I.A. — Pervious Surface: Landscape Swale or Shallow Depression (Seed & Mulch)
- P.I.A. — Pervious Surface: Landscape Swale or Shallow Depression (Seed & Mulch)
- DCIA — Directly Connected Impervious Area
- SPA — Separate Pervious Area
- UIA — Upstream Impervious Area w Interface Location
- RPA — Receiving Pervious Area

0 20' 40'
SCALE: 1"=20'

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Kiowa Engineering Corporation
1604 South 21st Street
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D49 CENTRAL OFFICE GROUNDS

GRADING & EROSION CONTROL PLAN
(North Half)
10850 E WOODMEN RD.
FALCON, CO 80831

CONSTRUCTION DOCUMENTS
09.04.2024
REVISIONS
11.25.2024 Clarifications

Kiowa: 23051
37-24108-00

GREEN INFRASTRUCTURE PLAN

GI 2