FINAL DRAINAGE REPORT for

Falcon Marketplace, Lot 4 Discount Tire

Falcon, Colorado

Prepared for:

Halle Properties, LLC

20225 N. Scottsdale Road

Scottsdale, AZ 85255

Prepared by:

Kimley-Horn and Associates, Inc.

2 North Nevada Avenue, Suite 300

Colorado Springs, Colorado 80903

Prepared: June 1, 2021

Kimley»Horn

PCD Filing No.: PPR-21-012

Project #: 096010025

CERTIFICATION

ENGINEERS STATEMENT

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

SIGNATURE (Affix Seal): _____

Mitchell Hess, Colorado P.E. No. 53916 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.

Halle Properties, L.L.C.
Name of Developer

6.24.2021
Authorized Signature Date

Matthew Johnson
Printed Name

Agent
Title

20225 N Scottsdale Road, Scottsdale, AZ 85255
Address:

EL PASO COUNTY

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

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

Date

Approved
by Jeff Rice
El Paso County Planning and Community Development
on behalf of Elizabeth Nijkamp, Engineering Review Manager
10/01/2021 12:39:31 PM

Conditions:

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INTRODUCTION

PURPOSE AND SCOPE OF STUDY

The purpose of this final drainage report is to outline the private stormwater drainage facilities for the Discount Tire at Falcon Marketplace, Lot 4 (the "Property"), El Paso County, Colorado (the "County"). This final drainage report identifies drainage patterns, storm sewer and inlet locations, and areas tributary to the site and proposes to safely route storm water to adequate outfalls. The Property is 1.172 acres in size.

The Property is located within the Middle Tributary Basin of the Falcon Drainage Basin and is part of the subject area of the *Final Drainage Report for Falcon Marketplace* dated November 4, 2019 prepared by Drexel, Barrell & Co. (the "Master Plan").

GENERAL PROJECT DESCRIPTION

The proposed improvements consist of the construction of an approximately 7,444 square-foot Discount Tire Store with a parking lot, sidewalks and landscaping (the "Project") within the Property (the "site"). The Project will be processed through El Paso County.

The Project is located in the southeast ¼ of Section 1, Township 13 South, Range 65 West, of the Sixth Principal Meridian, County of El Paso, State of Colorado (see Vicinity Map in Appendix A). The Property is bounded by Lot 3 of Falcon Marketplace to the north, an unnamed road to the south, Falcon Market Place to the west, and Meridian Road to the east. The property is currently vacant and consists of undeveloped land that has been over-lot graded as part of the Master Development. Stormwater will ultimately outfall to a proposed privately owned and maintained water quality and detention basin (herein the "regional detention pond") to the south of the property.

An ALTA and topographic field survey was completed by Barron Land, LLC, dated December 10, 2020, and is the basis for design for the drainage improvements.

PROJECT CHARACTERISTICS

The Project Site is 1.172 acres in size. The Project involves the construction of a Discount Tire Store, parking, and landscaping. The proposed disturbed area consists of 1.13 acres. The resulting changes in the site will increase the imperviousness of the site but the proposed development will be in compliance with the Master Plan.

The existing Project Site generally slopes from north to south at grades of approximately 2%. The existing drainage patterns proposed by the Master Plan will be generally maintained. The Site consists of a vacant lot and does not have any existing stormwater infrastructure with the exception of an 18" RCP stub.

MASTER DEVELOPMENT INFRASTRUCTURE AND ANALYSIS

The Project Site is a part of a larger master development (Falcon Marketplace) to be completed by LG HI FALCON, LLC. The master development will include construction of several public roads and shared utility mains as well as a private storm drain system with regional detention. The private off-site extended detention basin and the associated off-site private storm drain facilities

will be constructed prior to the construction of the onsite storm drainage facilities for the Discount Tire store.

SOILS CONDITIONS

NRCS soil data is available for this Site and it has been noted that onsite soils are primarily USCS Type A. The NRSC Soils map has been provided in Appendix B.

DRAINAGE DESIGN CRITERIA

REGULATIONS

The proposed development does not propose any deviations from The City of Colorado Springs/El Paso County Drainage Criteria Manual, dated October 12, 1994 or any subsequent revisions.

DEVELOPMENT DESIGN CRITERIA REFERENCE AND CONSTRAINTS

The Flood Insurance Rate Map (FIRM) panel listed in Appendix B shows the Site to be outside of any known 100-year flood plain. The proposed private storm facilities follow The City of Colorado Springs/El Paso County Drainage Criteria Manual (the "CRITERIA"), El Paso County Engineering Criteria Manual (the "ECM), and the Urban Storm Drainage Criteria Manual (the "MANUAL"). Site drainage is not significantly impacted by constraints such as utilities or existing development. Further detail regarding onsite drainage patterns has been provided in the Proposed Drainage Conditions Section.

HYDROLOGIC CRITERIA

The 5-year and 100-year design storm events were used in determining rainfall and runoff for the proposed drainage system per Chapter 6 of the CRITERIA. Table 6-2 of the CRITERIA is the source for rainfall data for the 5-year and 100-year design storm events. Design runoff was calculated using the Rational Method for developed conditions as established in the CRITERIA and MANUAL. Runoff coefficients for the proposed development were determined using Table 6-6 of the CRITERIA by calculating weighted impervious values for each specific site sub-basin.

HYDRAULIC CRITERIA

The proposed drainage facilities are designed in accordance with the CRITERIA and MANUAL. Floodplain identification was determined using a FIRM panel by FEMA and information provided in the CRITERIA. Hydraulic calculations were computed using StormCAD for the proposed storm sewer system. Results of the hydraulic calculations are summarized in Appendix D.

VARIANCES FROM CRITERIA

No variances from the CRITERIA have been proposed for this development.

EXISTING DRAINAGE CONDITIONS

The Master Plan defines 33 sub-basins within the master development. The proposed Project is within Sub-basins B4 and B20. Basin B4 is 2.35 acres with an anticipated basin impervious value of 81% and 5-year and 100-year storm event direct runoff values of 7.5 and 14.6 cubic

feet per second (cfs) respectively. The proposed Discount Tire Store (Lot 4) only resides on approximately 47% of this basin's total area, making expected flows generated from the Site 3.5 and 6.9 cfs for the 5-year and 100-year storms. Basin B20 primarily resides off-site, but is anticipated to accept flows leaving the site along the eastern property line. These flows are within a landscape area and cannot be captured due to the tie-in grades on the eastern side of the Site.

PROPOSED DRAINAGE CONDITIONS

The developed runoff from the Project will generally be collected by means of private storm sewer inlets located in the paved driveways within each delineated basin area. The runoff collected from each basin will be conveyed to an existing private 18" RCP storm sewer stub on the southwest corner of the site and will ultimately discharge into the proposed (by others) regional detention pond to the south of the site. The Property has been divided into 6 sub-basins, A1-A4, R1, and OS1. The proposed conditions map is provided in Appendix F.

COMPLIANCE WITH OFF-SITE RUNOFF

The runoff generated from Lot 3 to the north of the site will be conveyed via private storm sewer collected at a proposed (by others) 10' Type R Inlet located near the southwest corner of Lot 3. The private storm sewer system continues south through the Public Drainage Easement (Rec. No. 219714441) in Lot 4 before joining with the flows from Lot 4 on route to the Regional Pond. The combined flows from Lots 3 & 4 equal 14.06 cfs, which is less than the 14.5 accounted for the two lots by the Master Report. Portions of the Drainage Conformance Letter for Lot 3 are included in Appendix F2 for reference.

Sub-Basin 1

Sub-basin 1 is 0.14 acres located on the northwest portion of the property and consists of proposed pavement and minimal landscaping. The runoff developed within this sub-basin will be collected within a proposed private Type 13 area inlet, Inlet B1. This inlet will discharge into a proposed private 18" RCP storm sewer, then into the existing 18" RCP storm sewer in-route to the regional detention pond. Developed runoff during the 5-year and 100-year storm events will be 0.40 and 0.91 cfs respectively.

Sub-Basin 2

Sub-basin 2 is 0.10 acres located on the west side of the property and consists of proposed pavement. The runoff developed within this sub-basin will be collected within a proposed private Type 13 area inlet, Inlet B2. This inlet will discharge into a proposed private 18" RCP storm sewer, then into the existing 18" RCP storm sewer in-route to the regional detention pond. Developed runoff during the 5-year and 100-year storm events will be 0.32 and 0.70 cfs respectively.

Sub-Basin 3

Sub-basin 3 is 0.18 acres located on the southwest side of the property and consists of proposed sidewalk and pavement. The runoff developed within this sub-basin will be collected within a proposed private Type 13 area inlet, Inlet C. This inlet will discharge into a proposed private 18" RCP storm sewer, then into the existing 18" RCP storm sewer in-route to the regional detention pond. Developed runoff during the 5-year and 100-year storm events will be 0.56 and 1.23 cfs respectively.

Sub-Basin 4

Sub-basin 4 is 0.35 acres located on the east side of the property and consists of proposed pavement and landscaping. The runoff developed within this sub-basin will be collected within a proposed private Type 13 area inlet, Inlet A. This inlet will discharge into a proposed private 18" RCP storm sewer, then into the existing 18" RCP storm sewer in-route to the regional detention pond. Developed runoff during the 5-year and 100-year storm events will be 0.62 and 1.52 cfs respectively.

Sub-Basin R1

Sub-basin R1 is 0.17 acres and consists of the Discount Tire building rooftop. The runoff developed within this sub-basin is piped directly into the private RCP storm sewer within the site via a 6" PVC roof drain. Developed runoff during the 5-year and 100-year storm events will be 0.43 and 0.99 cfs respectively.

Sub-Basin OS1

Sub-basin OS1 is 0.23 acres and consists of the areas along the east, south and west property lines. This sub-basin consists of existing and proposed landscaping along the perimeter of the site as well as proposed public sidewalks. Flows within this basin flow directly off-site into roadways on the east, south, or western sides of the property. Because the majority of this sub-basin is landscape area, the flows within this sub-basin to the adjacent roadways will be minimal. Developed runoff during the 5-year and 100-year storm events will be 0.15 and 0.61 cfs respectively. Ultimately, any flows that reach the adjacent roadways from these perimeter landscape areas will be routed to the regional detention pond.

CONFORMANCE WITH THE MASTER PLAN

The proposed Discount Tire Development will have a total site impervious value of 77%. The 5-year and 100-year storm event direct runoff for the site will be 2.48 and 5.96 cfs respectively. The Master Plan anticipated a site impervious value of 81% and 5-year and 100-year storm event direct runoff values of 3.5 and 6.9 cfs. Because the proposed Discount Tire Development will generate less stormwater runoff than anticipated by the Master Plan, this proposed development is in general conformance with the Master Plan and will not negatively affect downstream drainage.

Reference Appendix G for the applicable Master Plan sections.

EMERGENCY OVERFLOW ROUTING

Stormwater overflow will be routed either to Falcon Market Place on the west side of the Site and will ultimately discharge into private offsite inlets within Falcon Market Place that connect with the regional detention pond or will be routed to the east into Meridian Road before exiting the road through a curb cut and traveling via a riprap lined swale to the regional detention facility. Approximately 50% of the site will overflow to the west and 50% will overflow to the east.

HYDRAULIC ANALYSIS METHODOLOGY

The proposed drainage facilities were designed in accordance with the CRITERIA and MANUAL. Floodplain identification was determined using a FIRM panel by FEMA and information provided in the CRITERIA. Hydraulic calculations were computed using STORMCAD, which makes use of the Standard Step method to compute the hydraulic profile. There are no proposed variances from the City of Colorado Springs/El Paso County Criteria for the proposed development.

Inlet capacity calculations have been provided in Appendix D for the calculated 5-year and 100-year storm event flows routed to each of the Type 13 Inlets on-site. The capacity of each private inlet is adequate for the 100 year developed flows for each sub-basin. Inlets were sized using UD-Inlet v4.06 and all private inlets have sufficient capacity to capture the 5-year and 100-year flows.

Storm Sewer Requirements

Calculations which determine the private storm sewer capacity, type of flow, pipe losses, and hydraulic grade line calculations were included in Appendix D. The calculations meet City of Colorado Springs/El Paso County requirements as outlined in the CRITERIA.

Four-Step Process

The Site was designed in accordance with the four-step process to minimize adverse impacts of urbanization, as outlined in Section I.7.2 BMP Selection of the CRITERIA. The four-step process per the CRITERIA provides guidance and requirements for the selection of siting of structural Best Management Practices (BMPs) for new development and significant redevelopment.

Step 1: Employ Runoff Reduction Practices
Currently the site is vacant land. Development of the site will increase current runoff conditions due to increased imperviousness values. However, implementation of landscaping throughout the site and the proposed private storm sewer infrastructure will help slow runoff and encourage infiltration. The Site was designed to conserve as much of the existing vegetation as possible and to minimize the extent of paved areas.

Step 2: Stabilize Drainageways
The Project is not proposing new outfall connections to any existing major drainageways. The drainageways downstream of the existing regional detention pond have been stabilized as part of the construction of the pond. The Project is not increasing the flow at this location from what was planned for in the Master Plan, therefore additional downstream stabilization measures are not required as part of the Project. Additional information related to the slope stability for the regional pond or any related channels can be found within the Master Plan.

Step 3: Provide Water Quality Capture Volume (WQCV)
The water quality capture volume will be detained within the private regional detention pond. Control structures within the regional pond will release the WQCV at the rates required by the CRITERIA.

Step 4: Consider Need for Industrial and Commercial BMPs
Site operations and material storage for the proposed project will be internal to the building, therefore site specific and other source control BMPs will not be required for outdoor material storage. Additionally, specific permanent BMPs for spill prevention exterior to the building are not anticipated to be required as all operations will be internal to the building. A sand/oil separator will be installed that will be connected to the sanitary system. This separator will treat chemical or oil spills internal to the building. A spill prevention, containment and control plan will be developed and implemented by the property owner.

DETENTION AND WATER QUALITY REQUIREMENTS

All water quality, detention, and outlet standards established by Vol 2 of the MANUAL in chapter 12 section 5.5 are met by the regional detention pond proposed in the Master Plan. The calculations for the pond design can also be found in the appendix of the Master Plan.

EROSION CONTROL PLAN

Erosion Control Plans will be submitted separately as a standalone construction document.

FLOODPLAIN STATEMENT

No portion of the site is located within a 100-year floodplain as determined by the FIRM Panel 08041C0553G, effective date December 7, 2018, by FEMA. This panel is included in Appendix B.

FEES DEVELOPMENT

APPLICABLE FEES

All fees have been paid by the developer of Falcon Marketplace at the time of final plat recording.

CONSTRUCTION COST OPINION

An opinion of probable construction cost for the construction of the private drainage facilities for the Project has been included in Appendix E. There are no public drainage facilities proposed as part of the Project.

MAINTENANCE AND OPERATIONS

Maintenance of the regional detention pond is provided by the master developer. Additional information regarding the maintenance and operations of the regional detention pond can be found in the Master Plan.

GROUNDWATER CONSIDERATIONS

Groundwater dewatering is not anticipated per the Geotechnical Evaluation by CTL Thompson, Inc. dated 2/3/2021. According to the Geotechnical Evaluation, “Groundwater was encountered in three of our exploratory borings at depths between 17 and 19 feet.” It is not anticipated that groundwater will adversely affect construction.

SUMMARY

COMPLIANCE WITH STANDARDS

The drainage design presented within this report for the Discount Tire at Lot 4, Falcon Marketplace conforms to the City of Colorado Springs/El Paso County Storm Drainage Criteria and the Urban Drainage and Flood Control District Manual. Additionally, the Site runoff and private storm sewer facilities will not adversely affect the downstream and surrounding developments or waterways. This report and its findings are consistent with the drainage requirements documented in the Master Plan.

REFERENCES

1. The City of Colorado Springs Drainage Criteria Manual, May 2014

2. El Paso County Drainage Criteria Manual, Vol. 1 and 2, October 1994

3. Urban Drainage and Flood Control District Drainage Criteria Manual (UDFCDCM), Vol. 1, prepared by Wright-McLaughlin Engineers, June 2001, with latest revisions.

4. Flood Insurance Rate Map, El Paso County, Colorado and Incorporated Areas, Map Number 08041C0553G, Effective Date December 7, 2018, prepared by the Federal Emergency Management Agency (FEMA).

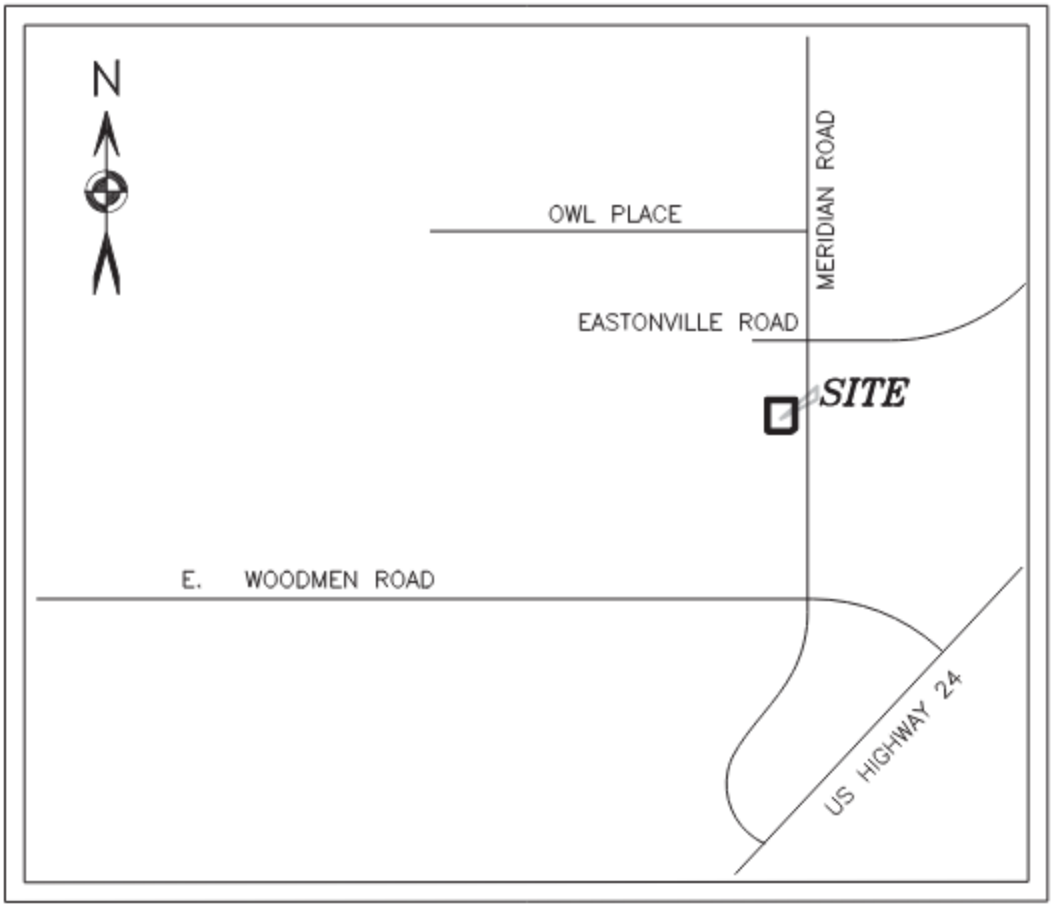
5. Final Drainage Report for Falcon Marketplace, El Paso County, Colorado. Prepared by Drexel, Barrell & Co. Inc., November 2019. (“The Master Plan”)

6. Geotechnical Evaluation prepared by CTL Thompson, Inc. February 3, 2021

7. Preliminary Drainage Conformance Letter for Kind Soopers #147 on Lot 2 & 3 – Flacon Marketplace Subdivision Filing No. 1, El Paso County, Colorado. Prepared by Galloway & Company, Inc., March 23, 2020

APPENDIX

APPENDIX A - VICINITY MAP



VICINITY MAP
(NOT TO SCALE)

APPENDIX B - SOILS MAP AND FEMA FIRM PANEL

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for El Paso County Area, Colorado

January 28, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

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 18, Jun 5, 2020

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
9	Blakeland-Fluvaquentic Haplaquolls	0.8	16.6%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	4.1	83.4%
Totals for Area of Interest		**4.9**	**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.

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

9—Blakeland-Fluvaquentic Haplaquolls

Map Unit Setting

National map unit symbol: 36b6
Elevation: 3,500 to 5,800 feet
Mean annual precipitation: 13 to 17 inches
Mean annual air temperature: 46 to 55 degrees F
Frost-free period: 110 to 165 days
Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 60 percent
Fluvaquentic haplaquolls and similar soils: 38 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blakeland

Setting

Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from arkose and/or eolian deposits derived from arkose

Typical profile

A - 0 to 11 inches: loamy sand
AC - 11 to 27 inches: loamy sand
C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: 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
Calcium carbonate, maximum content: 5 percent
Available water capacity: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Description of Fluvaquentic Haplaquolls

Setting

Landform: Swales
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 12 inches: variable

Properties and qualities

Slope: 1 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Interpretive groups

Land capability classification (irrigated): 6w
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

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

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, flood plains, fan terraces
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 capacity: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB215CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Pleasant

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

Other soils

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

Fluvaquentic haplaquolls

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

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Erosion Factors

Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

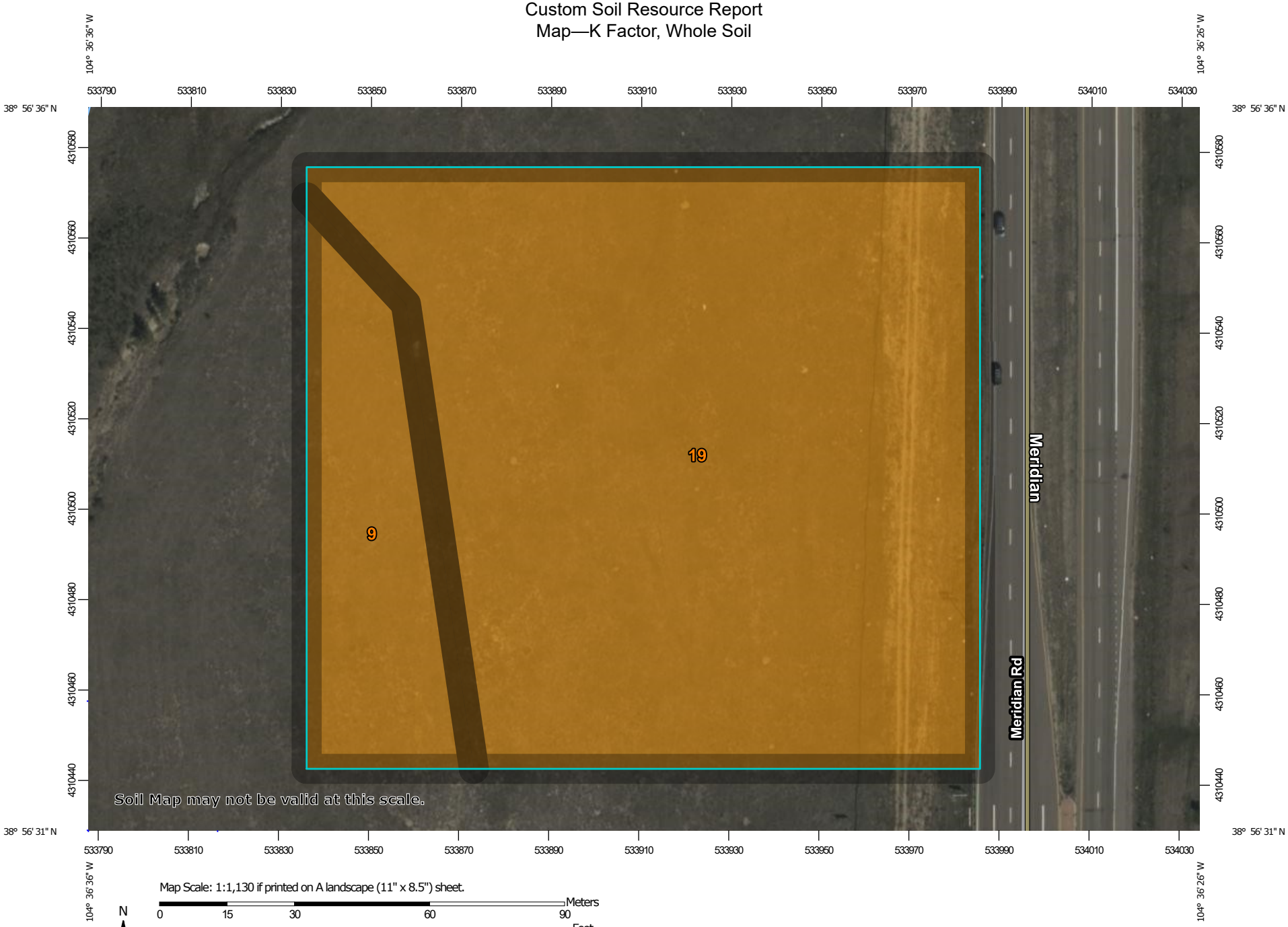
K Factor, Whole Soil

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Factor K does not apply to organic horizons and is not reported for those layers.

Custom Soil Resource Report
Map—K Factor, Whole Soil



Map Scale: 1:1,130 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

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

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Lines

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Points

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
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 18, Jun 5, 2020

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.

Table—K Factor, Whole Soil

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
9	Blakeland-Fluvaquentic Haplaquolls	.10	0.8	16.6%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	.10	4.1	83.4%
Totals for Area of Interest			**4.9**	**100.0%**

Rating Options—K Factor, Whole Soil

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

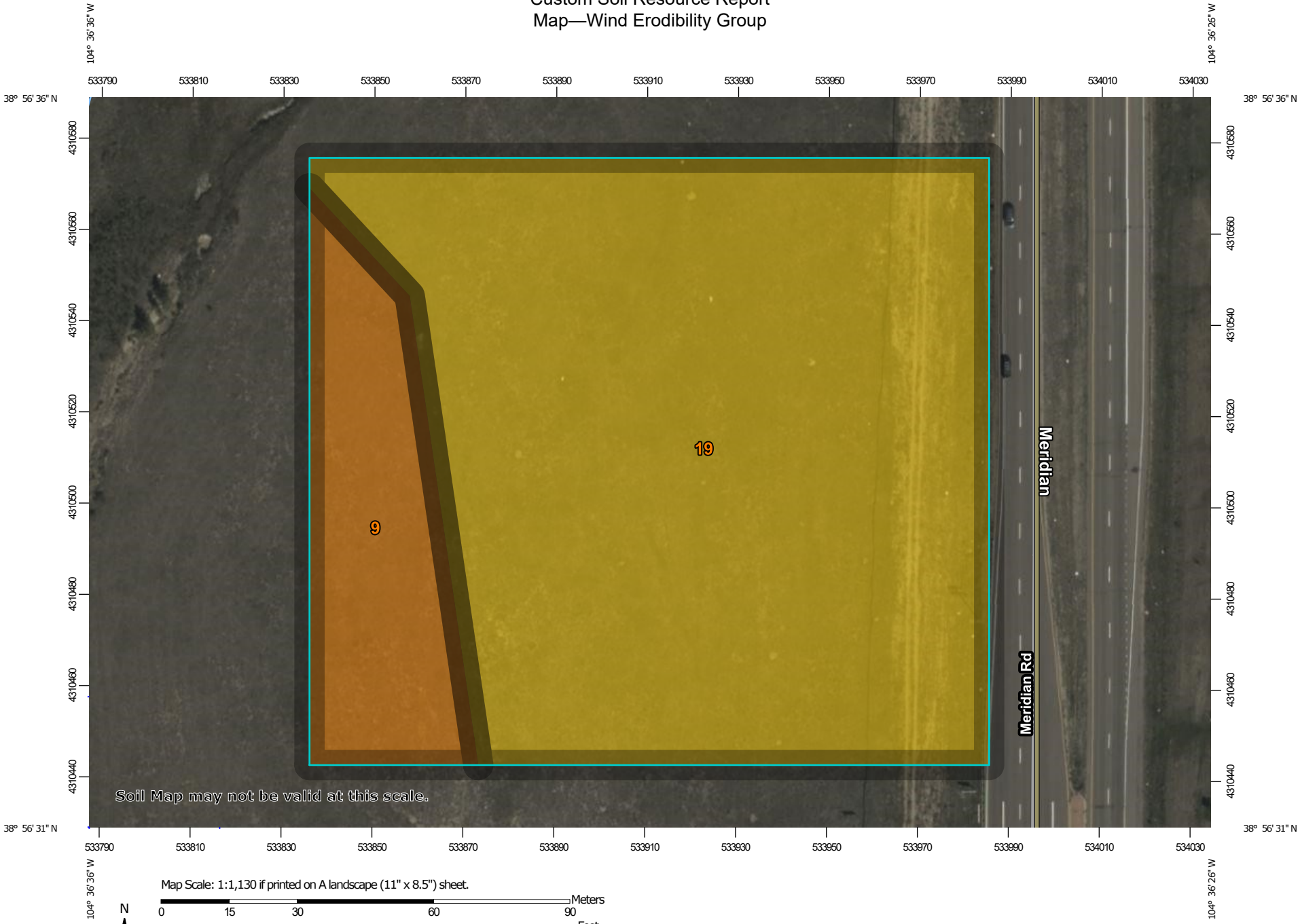
Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

Wind Erodibility Group

A wind erodibility group (WEG) consists of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

Custom Soil Resource Report
Map—Wind Erodibility Group



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

1
2
3
4
4L
5
6
7
8
Not rated or not available

Soil Rating Lines

1
2
3
4
4L
5
6
7
8
Not rated or not available

Soil Rating Points

1
2
3
4
4L
5
6
7
8
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)

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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.

Table—Wind Erodibility Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
9	Blakeland-Fluvaquentic Haplaquolls	2	0.8	16.6%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	3	4.1	83.4%
Totals for Area of Interest			**4.9**	**100.0%**

Rating Options—Wind Erodibility Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

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.

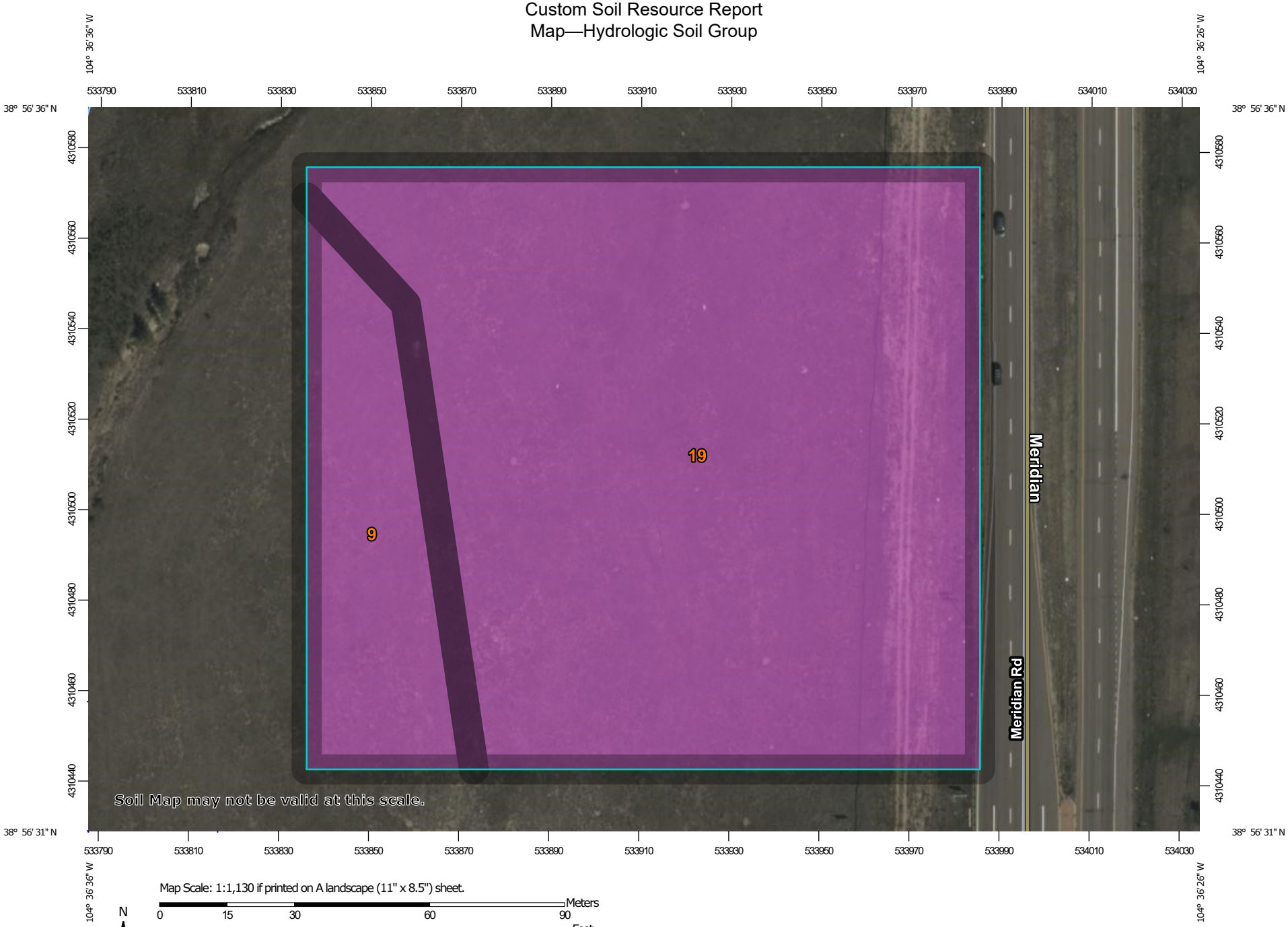
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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.

Custom Soil Resource Report
Map—Hydrologic Soil Group



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.

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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)

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Survey Area Data: Version 18, Jun 5, 2020

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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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
9	Blakeland-Fluvaquentic Haplaquolls	A	0.8	16.6%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	4.1	83.4%
Totals for Area of Interest			**4.9**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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National Flood Hazard Layer FIRMette

FEMA

104°36'47"W 38°56'57"N

104°36'10"W 38°56'29"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 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

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

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 2/2/2021 at 1:05 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 C - HYDROLOGIC CALCULATIONS

BASIN IMPERVIOUSNESS

		Runoff Coefficient		
Landuse	**I**	**2-YR**	**5-YR**	**100-YR**
Landscape	0%	0.02	0.08	0.35
Roof	90%	0.71	0.73	0.81
Drives&Walks	100%	0.89	0.90	0.96

Basin Designation	A_{TOTAL} (AC)	A_{TOTAL} (SF)	$A_{LANDSCAPE}$ (SF)	A_{ROOF} (SF)	$A_{/DRIVES\ \&\ WALKS}$ (SF)	$I_{WEIGHTED}$
1	0.14	6,244	516	0	5,728	92%
2	0.10	4,268	0	0	4,268	100%
3	0.18	7,705	153	0	7,552	98%
4	0.35	15,375	3,670	0	11,705	76%
R1	0.17	7,488	0	7,488	0	90%
Total On-Site	0.94	41,080	4,339	7,488	29,253	
Basins that Flow Off-site						
O1	0.23	9,950	7,030	0	2,920	29%
Total	**1.17**	**51,030**	**11,369**	**7,488**	**32,173**	**76%**

Calculation of Peak Runoff using Rational Method

Designer: Joseph Menke
Company: Kimley-Horn
Date: 4/6/2021
Project: Discount Tire - Falcon
Location: 7585 Falcon Market Place

Version 2.00 released May 2017

Cells of this color are for required user-input
Cells of this color are for optional override values
Cells of this color are for calculated results based on overrides

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$$

$$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$$

Computed $t_c = t_i + t_t$

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

$t_{minimum} = 5$ (urban)
$t_{minimum} = 10$ (non-urban)

Selected $t_c = \max\{t_{minimum}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$

Select UDFCD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website (click this link)

	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
1-hour rainfall depth, P1 (in) =	0.83	1.09	1.33	1.69	1.99	2.31	3.14
	a	b	c				
Rainfall Intensity Equation Coefficients =	28.50	10.00	0.786				

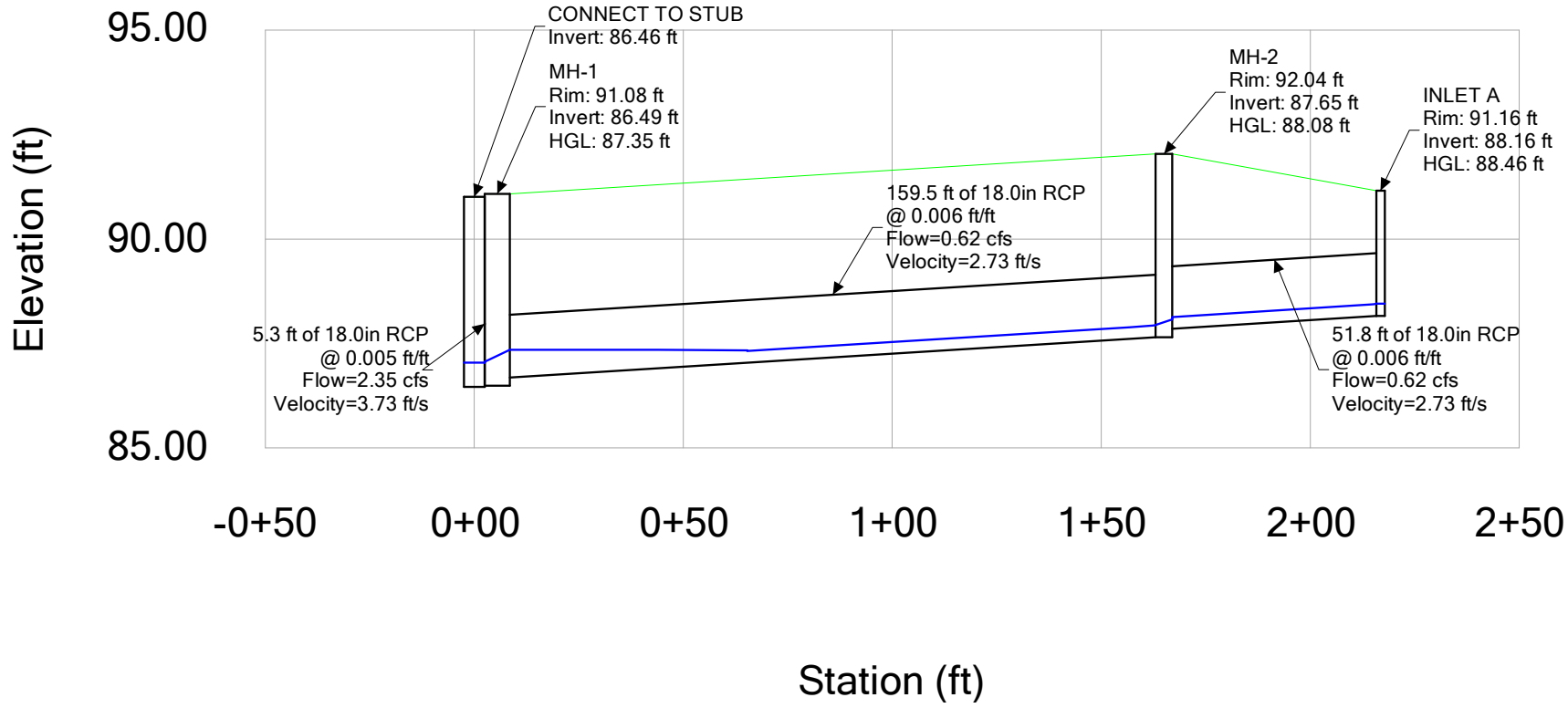
$$I(in/hr) = \frac{a * P_1}{(b + t_c)^c}$$

$$Q(cfs) = CIA$$

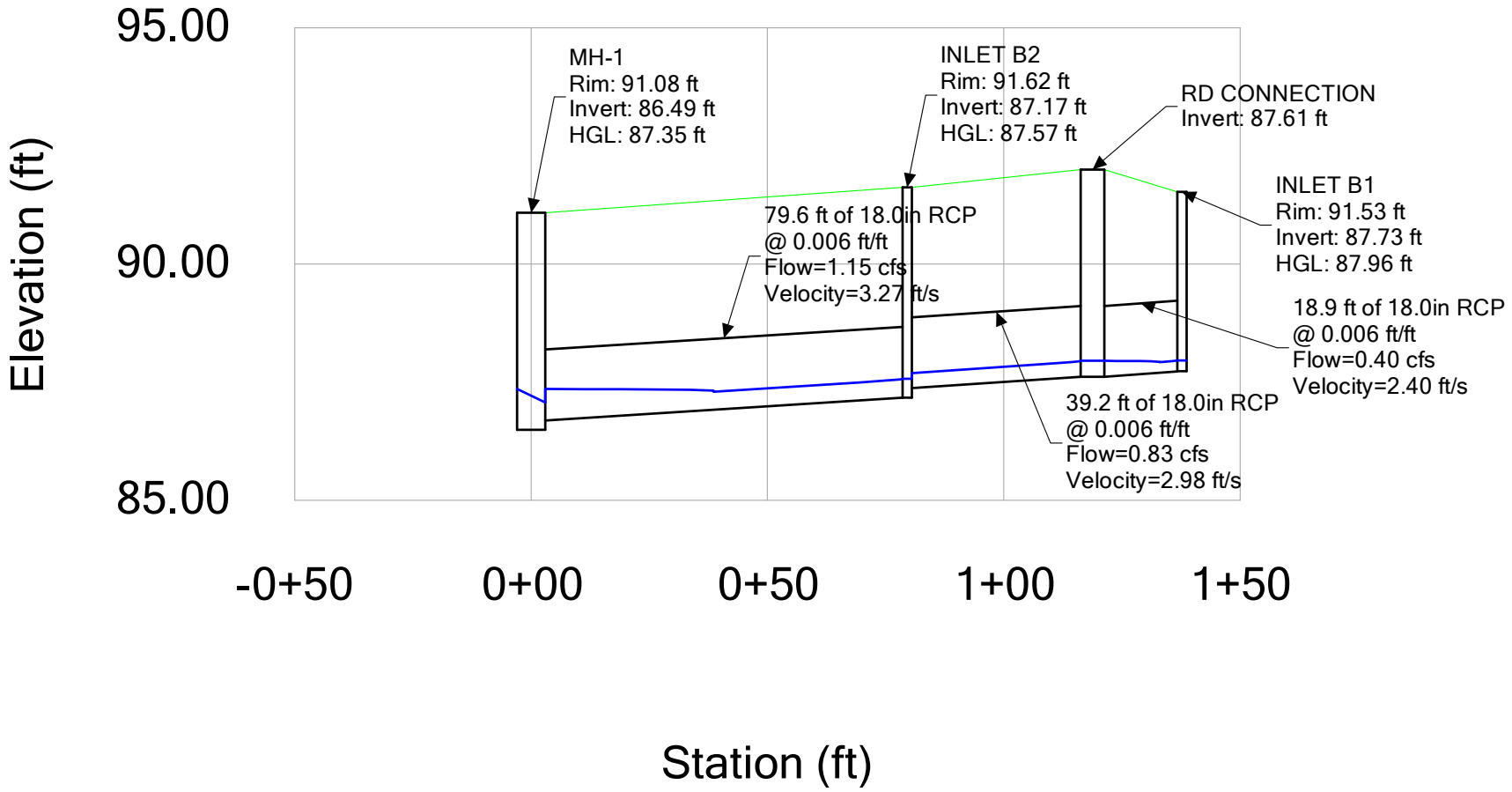
Subcatchment Name	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C							Overland (Initial) Flow Time					Channelized (Travel) Flow Time							Time of Concentration			Rainfall Intensity, I (in/hr)							Peak Flow, Q (cfs)						
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	Overland Flow Length L_i (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Overland Flow Slope S_i (ft/ft)	Overland Flow Time t_i (min)	Channelized Flow Length L_t (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Channelized Flow Slope S_t (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V_t (ft/sec)	Channelized Flow Time t_t (min)	Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
1	0.14	A	92	0.75	0.77	0.79	0.80	0.81	0.83	0.85	42.20	93.04	92.69	0.008	4.08	64.36	92.69	91.53	0.018	20	2.69	0.40	4.48	10.72	5.00	2.80	3.70	4.51	5.73	6.75	7.84	10.65	0.30	0.40	0.50	0.65	0.77	0.91	1.26
2	0.10	A	100	0.84	0.86	0.87	0.88	0.88	0.89	0.90	60.36	93.30	91.72	0.026	2.44	0.01			0.010	20	2.00	0.00	2.44	9.00	5.00	2.80	3.70	4.51	5.73	6.75	7.84	10.65	0.24	0.32	0.39	0.51	0.59	0.70	0.96
3	0.18	A	98	0.82	0.84	0.85	0.86	0.86	0.87	0.89	38.80	93.30	91.98	0.034	1.96	102.37	91.98	90.70	0.013	20	2.24	0.76	2.72	10.01	5.00	2.80	3.70	4.51	5.73	6.75	7.84	10.65	0.41	0.56	0.69	0.89	1.05	1.23	1.70
4	0.35	A	76	0.59	0.61	0.62	0.65	0.67	0.70	0.74	70.30	93.12	92.78	0.005	9.56	110.00	92.78	91.16	0.015	20	2.43	0.76	10.31	13.85	10.31	2.20	2.91	3.55	4.52	5.32	6.17	8.39	0.45	0.62	0.77	1.03	1.25	1.52	2.19
R1	0.17	A	90	0.73	0.75	0.77	0.79	0.79	0.81	0.83	116.00			0.010	6.75	0.01			0.010	20	2.00	0.00	6.75	10.70	6.75	2.57	3.39	4.14	5.26	6.19	7.18	9.76	0.32	0.43	0.54	0.70	0.83	0.99	1.39
OS1	0.23	A	29	0.17	0.18	0.19	0.22	0.27	0.34	0.44	29.00	92.29	89.63	0.092	4.32	0.01			0.010	7	0.70	0.00	4.32	21.07	5.00	2.80	3.70	4.51	5.73	6.75	7.84	10.65	0.11	0.15	0.20	0.29	0.42	0.61	1.08

APPENDIX D - HYDRAULIC CALCULATIONS

Falcon Marketplace, Lot 4
Profile Report
Engineering Profile - Storm A (DTC (Falcon).stsw)
Active Scenario: 5-year



Falcon Marketplace, Lot 4
Profile Report
Engineering Profile - Storm B (DTC (Falcon).stsw)
Active Scenario: 5-year

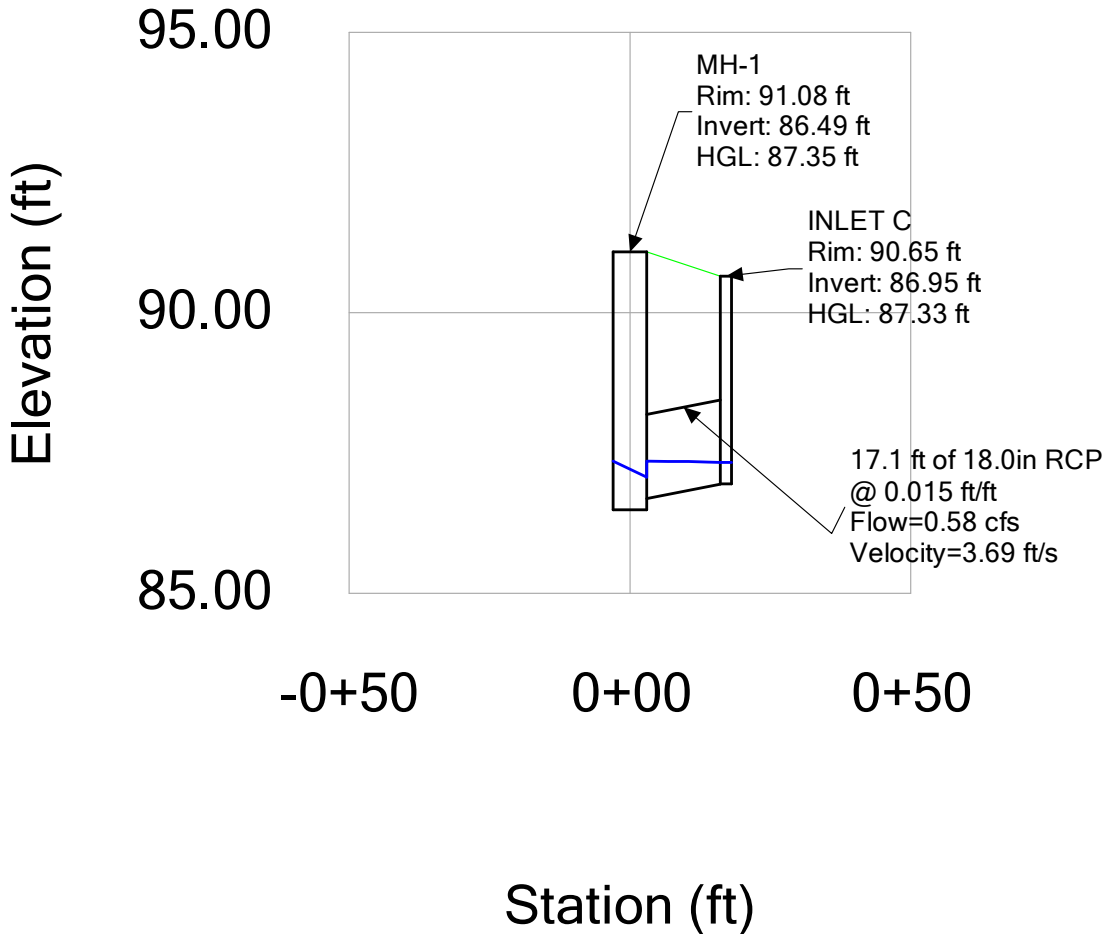


Falcon Marketplace, Lot 4

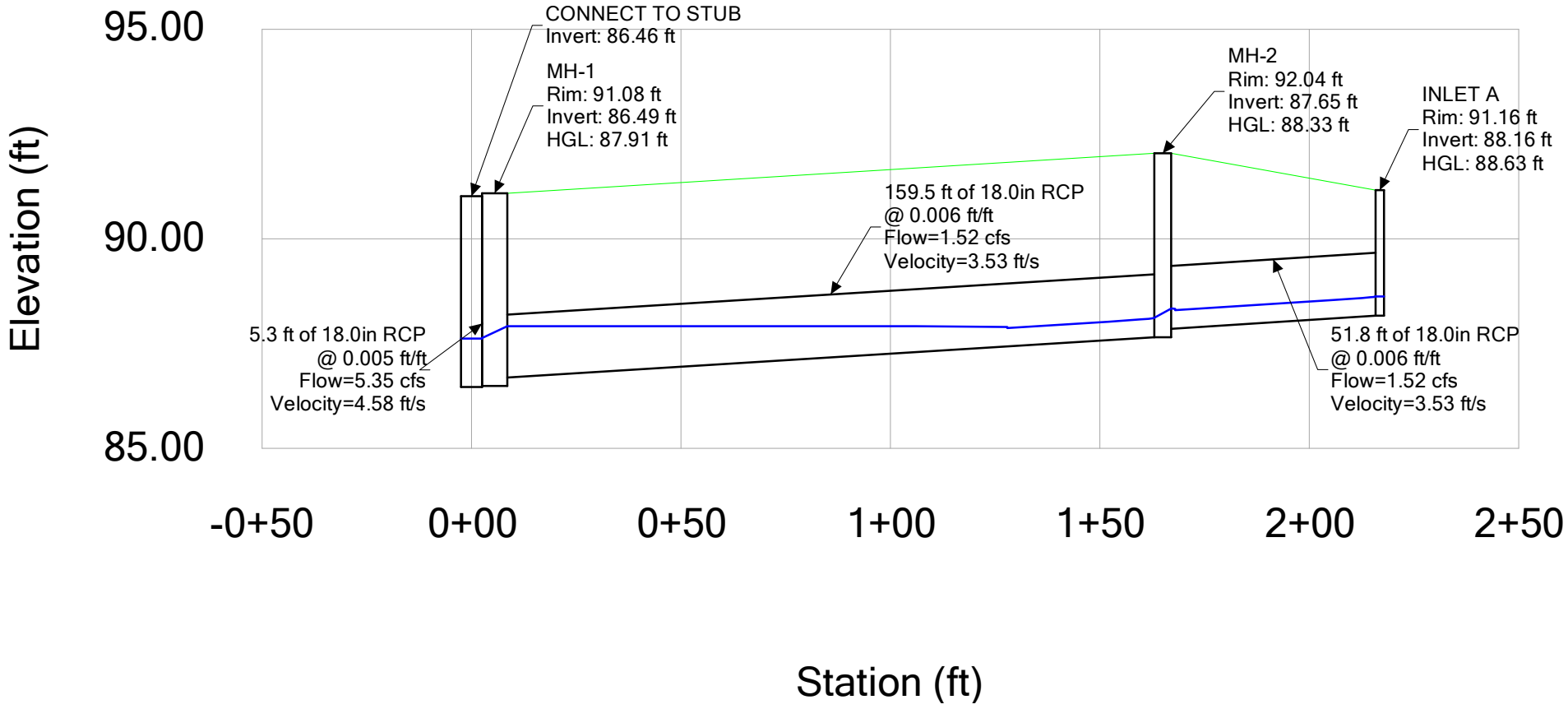
Profile Report

Engineering Profile - Storm C (DTC (Falcon).stsw)

Active Scenario: 5-year



Falcon Marketplace, Lot 4
Profile Report
Engineering Profile - Storm A (DTC (Falcon).stsw)
Active Scenario: 100-year

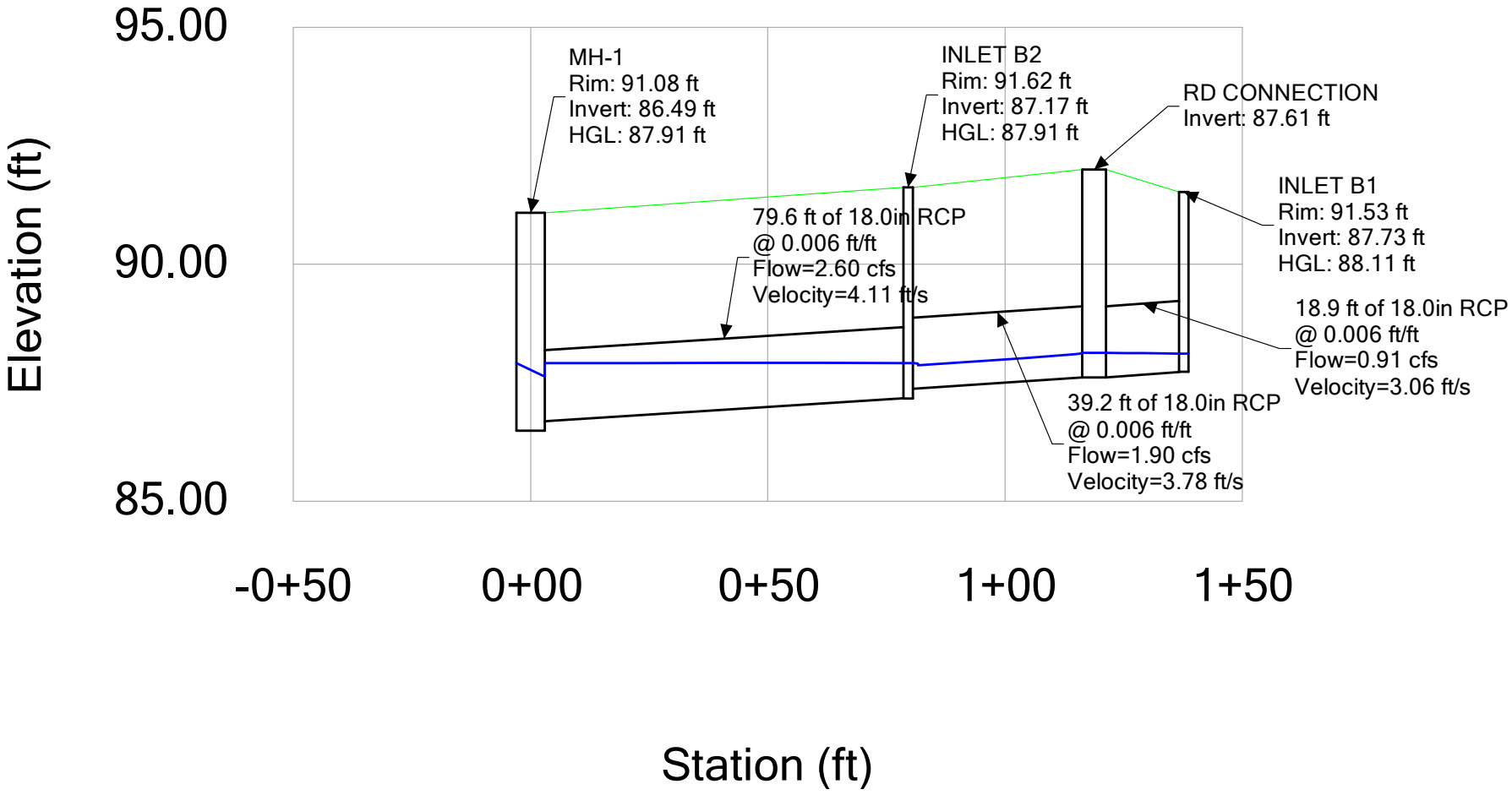


Falcon Marketplace, Lot 4

Profile Report

Engineering Profile - Storm B (DTC (Falcon).stsw)

Active Scenario: 100-year

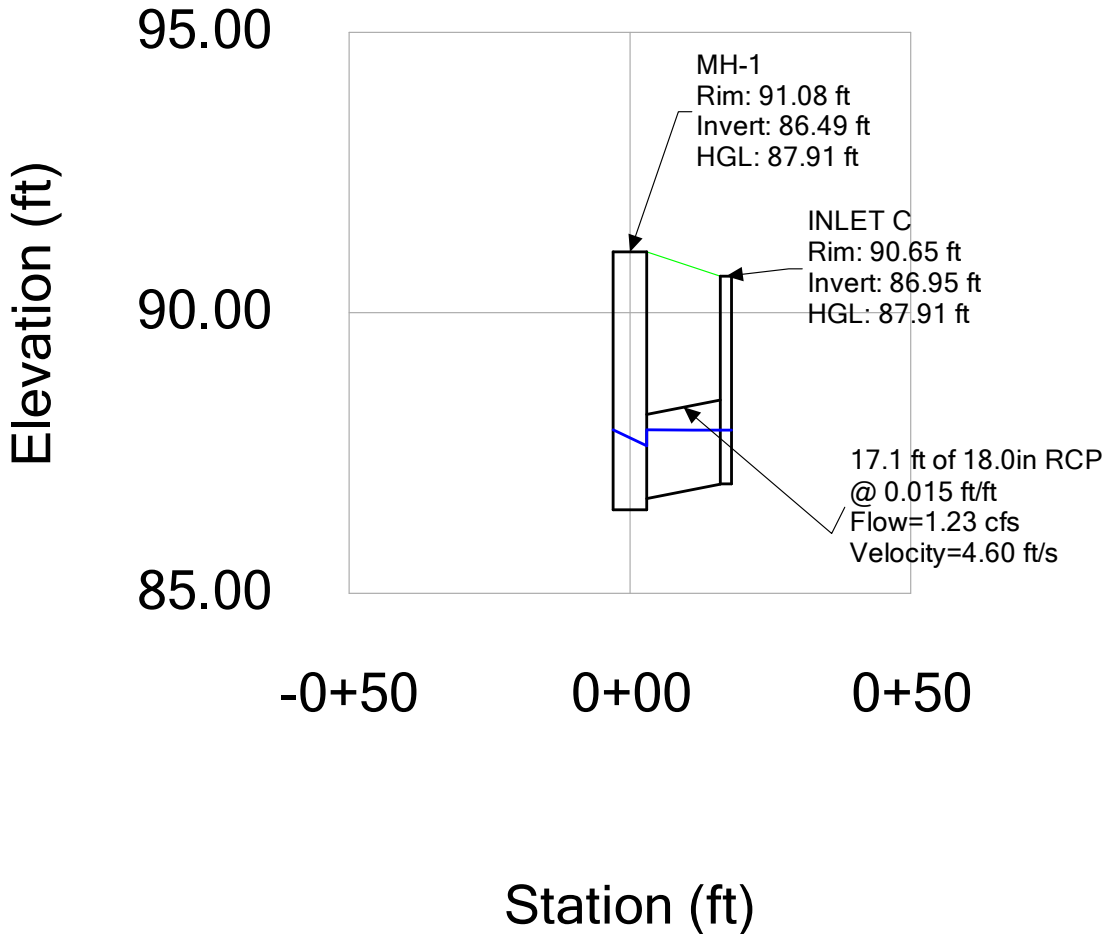


Falcon Marketplace, Lot 4

Profile Report

Engineering Profile - Storm C (DTC (Falcon).stsw)

Active Scenario: 100-year



Falcon Marketplace, Lot 4

FlexTable: Conduit Table

Active Scenario: 5-year

Start Node	Label	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Capacity (Full Flow) (cfs)	Velocity (In) (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
INLET A	PIPE -17	88.16	MH-2	87.85	51.8	51.8	0.006	18.0	0.013	8.16	2.56	88.46	88.13
MH-2	PIPE -19	87.65	MH-1	86.69	159.5	159.5	0.006	18.0	0.013	8.16	2.56	87.94	87.35
RD CONNECTION	PIPE -15 (1)	87.61	INLET B2	87.37	39.2	39.2	0.006	18.0	0.013	8.21	2.77	87.95	87.69
INLET B2	PIPE -15 (1) (1)	87.17	MH-1	86.69	79.6	79.6	0.006	18.0	0.013	8.18	3.03	87.57	87.35
INLET B1	PIPE -15	87.73	RD CONNECTION	87.61	18.9	18.9	0.006	18.0	0.013	8.21	2.28	87.96	87.95
MH-1	PIPE -14	86.49	CONNECT TO STUB	86.46	5.3	5.3	0.005	18.0	0.013	7.43	3.73	87.07	87.04
INLET C	PIPE -25	86.95	MH-1	86.69	17.1	17.1	0.015	18.0	0.013	12.91	1.62	87.33	87.35
CONNECT TO STUB	PIPE -13 (EX)	86.46	EXISTING MH	86.29	17.2	17.2	0.010	18.0	0.013	10.50	3.73	87.04	86.78
CB-1	PIPE -24	89.37	RD CONNECTION	88.61	51.0	51.0	0.015	6.0	0.010	0.89	3.08	89.70	88.86

Falcon Marketplace, Lot 4
FlexTable: Catch Basin Table
Active Scenario: 5-year

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Length (ft)	Width (ft)	Inlet Type	Flow (Additional Subsurface) (cfs)	Capture Efficiency (Calculated) (%)	Hydraulic Grade Line (In) (ft)
CB-1	93.00	89.37			Full Capture	0.43	100.0	89.70
INLET B1	91.53	87.73	2.00	3.00	Full Capture	0.40	100.0	87.96
INLET B2	91.62	87.17	2.00	3.00	Full Capture	0.32	100.0	87.57
INLET C	90.65	86.95	2.00	3.00	Full Capture	0.58	100.0	87.33
INLET A	91.16	88.16	2.00	3.00	Full Capture	0.62	100.0	88.46

Falcon Marketplace, Lot 4
FlexTable: Manhole Table
Active Scenario: 5-year

Label	Elevation (Rim) (ft)	Elevation (Invert in 1) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method	Hydraulic Grade Line (In) (ft)	Notes
MH-2	92.04	87.85	0.62	0.29	87.94	Standard	88.08	PRIVATE 5' MANHOLEPER CDOT STD DTL M-604-20
MH-1	91.08	86.69	2.35	0.58	87.07	Standard	87.35	PRIVATE 6' MANHOLEPER CDOT STD DTL M-604-20

Falcon Marketplace, Lot 4
FlexTable: Outfall Table
Active Scenario: 5-year

ID	Label	Elevation (Ground) (ft)	Set Rim to Ground Elevation?	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)	Notes
66	EXISTING MH	90.80	True	85.80	Free Outfall		86.78	2.35	MH

Falcon Marketplace, Lot 4

FlexTable: Conduit Table

Active Scenario: 100-year

Start Node	Label	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Capacity (Full Flow) (cfs)	Velocity (In) (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
INLET A	PIPE -17	88.16	MH-2	87.85	51.8	51.8	0.006	18.0	0.013	8.16	3.28	88.63	88.33
MH-2	PIPE -19	87.65	MH-1	86.69	159.5	159.5	0.006	18.0	0.013	8.16	3.28	88.11	87.91
RD CONNECTION	PIPE -15 (1)	87.61	INLET B2	87.37	39.2	39.2	0.006	18.0	0.013	8.21	3.50	88.13	87.91
INLET B2	PIPE -15 (1) (1)	87.17	MH-1	86.69	79.6	79.6	0.006	18.0	0.013	8.18	2.98	87.91	87.91
INLET B1	PIPE -15	87.73	RD CONNECTION	87.61	18.9	18.9	0.006	18.0	0.013	8.21	2.53	88.11	88.13
MH-1	PIPE -14	86.49	CONNECT TO STUB	86.46	5.3	5.3	0.005	18.0	0.013	7.43	3.72	87.63	87.62
INLET C	PIPE -25	86.95	MH-1	86.69	17.1	17.1	0.015	18.0	0.013	12.91	1.03	87.91	87.91
CONNECT TO STUB	PIPE -13 (EX)	86.46	EXISTING MH	86.29	17.2	17.2	0.010	18.0	0.013	10.50	3.66	87.62	87.62
CB-1	PIPE -24	89.37	RD CONNECTION	88.61	51.0	51.0	0.015	6.0	0.010	0.89	5.04	90.03	89.08

Falcon Marketplace, Lot 4
FlexTable: Catch Basin Table
Active Scenario: 100-year

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Length (ft)	Width (ft)	Inlet Type	Flow (Additional Subsurface) (cfs)	Capture Efficiency (Calculated) (%)	Hydraulic Grade Line (In) (ft)
CB-1	93.00	89.37			Full Capture	0.99	100.0	90.03
INLET B1	91.53	87.73	2.00	3.00	Full Capture	0.91	100.0	88.11
INLET B2	91.62	87.17	2.00	3.00	Full Capture	0.70	100.0	87.91
INLET C	90.65	86.95	2.00	3.00	Full Capture	1.23	100.0	87.91
INLET A	91.16	88.16	2.00	3.00	Full Capture	1.52	100.0	88.63

Falcon Marketplace, Lot 4
FlexTable: Manhole Table
Active Scenario: 100-year

Label	Elevation (Rim) (ft)	Elevation (Invert in 1) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method	Hydraulic Grade Line (In) (ft)	Notes
MH-2	92.04	87.85	1.52	0.46	88.11	Standard	88.33	PRIVATE 5' MANHOLEPER CDOT STD DTL M-604-20
MH-1	91.08	86.69	5.35	1.14	87.63	Standard	87.91	PRIVATE 6' MANHOLEPER CDOT STD DTL M-604-20

Falcon Marketplace, Lot 4
FlexTable: Outfall Table
Active Scenario: 100-year

ID	Label	Elevation (Ground) (ft)	Set Rim to Ground Elevation?	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)	Notes
66	EXISTING MH	90.80	True	85.80	User Defined Tailwater	87.62	87.62	5.35	MH

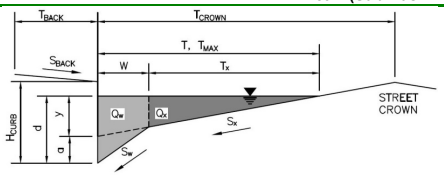
Version 4.06 Released August 2018

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

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

Project: Discount Tire (Falcon)

Inlet ID: Inlet A (Sub-Basin A4)



Gutter Geometry (Enter data in the blue cells)

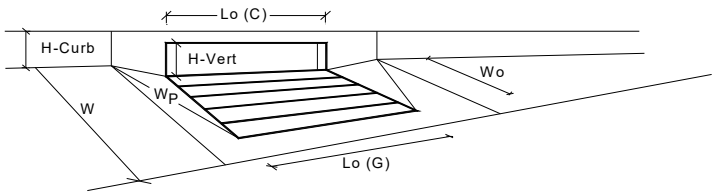
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.000	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	44.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.033	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	CDOT/Denver 13 Valley Grate	Type =	CDOT/Denver 13 Valley Grate	
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	2.00	2.00 inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	6.0 inches
Grate Information		MINOR	MAJOR	Override Depths
Length of a Unit Grate		L_o (G) =	3.00	3.00 feet
Width of a Unit Grate		W_o =	1.73	1.73 feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	0.43	0.43
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	0.50	0.50
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	3.30	3.30
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	0.60	0.60
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	N/A	N/A feet
Height of Vertical Curb Opening in Inches		H_{vert} =	N/A	N/A inches
Height of Curb Orifice Throat in Inches		H_{throat} =	N/A	N/A inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	N/A	N/A degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	N/A	N/A feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	N/A	N/A
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	N/A	N/A
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	N/A	N/A

Low Head Performance Reduction (Calculated)	MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	0.523	0.523 ft
Depth for Curb Opening Weir Equation	d_{Curb} =	N/A	N/A ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	N/A	N/A
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	0.94	0.94

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**2.6**	**2.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.6	1.5	cfs

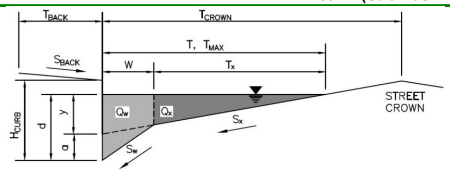
Version 4.06 Released August 2018

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

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

Project: Discount Tire (Falcon)

Inlet ID: Inlet B1 (Sub-Basin A1)



Gutter Geometry (Enter data in the blue cells)

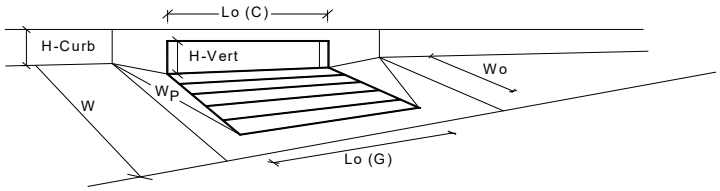
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.000	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.030	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)	CDOT/Denver 13 Valley Grate			
		MINOR	MAJOR	
Type of Inlet	Type =	CDOT/Denver 13 Valley Grate		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	3.00	3.00	feet
Width of a Unit Grate	W_o =	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	0.60	0.60	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	N/A	N/A	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	N/A	N/A	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	N/A	N/A	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	N/A	N/A	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	N/A	N/A	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	N/A	N/A	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	N/A	N/A	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	N/A	N/A	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	0.523	0.523	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	N/A	N/A	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	N/A	N/A	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	0.94	0.94	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**2.6**	**2.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.4	0.9	cfs

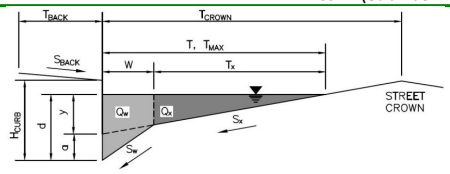
Version 4.06 Released August 2018

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

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

Project: Discount Tire (Falcon)

Inlet ID: Inlet B2 (Sub-Basin A2)



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.000	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.015	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

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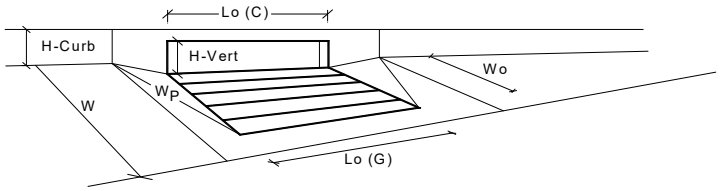


Design Information (Input)	CDOT/Denver 13 Valley Grate		MINOR	MAJOR	
Type of Inlet		Type =	CDOT/Denver 13 Valley Grate		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.2	5.2	inches
Grate Information			MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate		L_o (G) =	3.00	3.00	feet
Width of a Unit Grate		W_o =	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	0.60	0.60	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	N/A	N/A	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	N/A	N/A	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	N/A	N/A	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	N/A	N/A	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	N/A	N/A	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	N/A	N/A	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	N/A	N/A	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	N/A	N/A	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	0.459	0.459	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	N/A	N/A	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	N/A	N/A	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	0.82	0.82	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**1.9**	**1.9**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	0.3	0.7	cfs

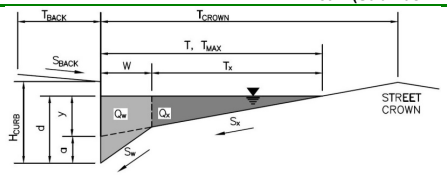
Version 4.06 Released August 2018

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

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

Project: Discount Tire (Falcon)

Inlet ID: Inlet C (Sub-Basin A3)



Gutter Geometry (Enter data in the blue cells)

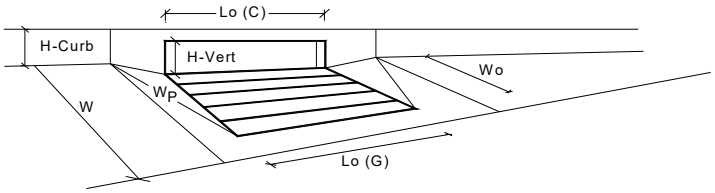
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.000	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	35.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.033	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	CDOT/Denver 13 Valley Grate	Type =	CDOT/Denver 13 Valley Grate	
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	2.00	2.00 inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	6.0 inches
Grate Information		MINOR	MAJOR	Override Depths
Length of a Unit Grate		L_o (G) =	3.00	3.00 feet
Width of a Unit Grate		W_o =	1.73	1.73 feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	0.43	0.43
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	0.50	0.50
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	3.30	3.30
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	0.60	0.60
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	N/A	N/A feet
Height of Vertical Curb Opening in Inches		H_{vert} =	N/A	N/A inches
Height of Curb Orifice Throat in Inches		H_{throat} =	N/A	N/A inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	N/A	N/A degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	N/A	N/A feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	N/A	N/A
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	N/A	N/A
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	N/A	N/A

Low Head Performance Reduction (Calculated)	MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	0.523	0.523 ft
Depth for Curb Opening Weir Equation	d_{Curb} =	N/A	N/A ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	N/A	N/A
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	0.94	0.94

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**2.6**	**2.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.6	1.2	cfs

APPENDIX E - EOPCC

Kimley»Horn

Kimley-Horn & Associates, Inc. **Opinion of Probable Construction Cost**

Client:	**Halle Properties, Inc.**	**Date:**	**4/22/2021**
Project:	**Falcon Marketplace, Lot 4 - Discount Tire**	**Prepared By:**	**JM**
KHA No.:	**096010025**	**Checked By:**	**MH**

Sheet: **1 of 1**

This OPC is not intended for basing financial decisions, or securing funding. Review all notes and assumptions. Since Kimley-Horn & Associates, Inc. has no control over the cost of labor, materials, equipment, or services furnished by others, or over methods of determining price, or over competitive bidding or market conditions, any and all opinions as to the cost herein, including but not limited to opinions as to the costs of construction materials, shall be made on the basis of experience and best available data. Kimley-Horn & Associates, Inc. cannot and does not guarantee that proposals, bids, or actual costs will not vary from the opinions on costs shown herein. The total costs and other numbers in this Opinion of Probable Cost have been rounded.

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Private Storm Sewer (Non-Reimbursible)				
1	18" RCP Storm Pipe	371	LF	$67.00	$24,857
2	CDOT Type 13 Inlet	4	EA	$4,500.00	$18,000
3	5-FT Diameter SD Manhole	1	EA	$6,619.00	$6,619
4	6-FT Diameter SD Manhole	1	EA	$7,500.00	$7,500
5	6" PVD Roof Drain	51	LF	$10.00	$510
			Subtotal:		$57,486
			Contingency (%,+/-)	10%	$5,749
			Project Total:		**$63,235**

Basis for Cost Projection:

- ☐ No Design Completed
- ☐ Preliminary Design
- ☑ Final Design

Design Engineer:

Mitchell O. Hess
Registered Professional Engineer, State of Colorado No. 53916

APPENDIX F1 - EXCERPTS FROM THE MASTER PLAN

Rational Method Runoff Summary

BASIN	DP	Area (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
A1	DP1	1.81	3.4	7.7
	DP2	1.81	3.4	7.7
A2		4.82	1.4	10.2
	DP3	6.63	4.6	17.3
B4	DP4	2.35	7.5	14.6
B5		0.63	2.8	5.1
	DP5	2.99	10.0	19.3
B6	DP6	3.19	12.8	23.6
B7		0.46	2.0	3.7
	DP7	6.63	23.8	28.0
B8	DP8	1.04	3.5	6.9
B9		0.30	1.4	2.5
	DP9	1.35	4.9	9.3
B10		0.18	0.8	1.4
	DP10	8.16	29.2	38.1
B11	DP11	2.01	7.8	14.6
B12		0.18	0.8	1.5
	DP12	10.35	36.4	51.9
B13		0.20	0.9	1.6
	DP13	10.55	37.1	53.2
B14	DP14	2.49	9.1	17.0
B15	DP15	5.73	20.3	38.0
B16		0.35	1.6	2.9
	DP16	8.56	30.6	57.1
B17		0.33	1.5	2.7

BASIN	DP	Area (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
	DP17	8.89	31.9	59.3
	DP18	19.44	52.1	88.2
B18	DP19	2.18	7.8	15.0
B19	DP20	2.57	10.1	18.8
	DP21	24.19	67.6	117.5
B20	DP22	2.03	5.6	11.4
B21		1.62	0.5	4.0
	DP23	27.85	67.4	121.8
C1	DP24	0.35	1.3	2.6
C2		0.23	0.8	1.5
	DP25	0.59	2.0	3.8
C3		1.88	0.6	4.2
C4		2.19	6.9	13.8
	DP26	4.08	5.4	13.7
C5	DP27	0.64	0.5	1.9
C6		0.45	0.2	1.2
	DP28	5.31	7.4	18.3
C7	DP29	0.19	0.7	1.3
C8		1.14	2.5	5.5
	DP30	1.33	3.1	6.6
C9		3.43	7.3	16.2
D1		2.62	4.1	8.8
D2		0.07	0.3	0.6
D3		0.07	0.3	0.6
	DPO1	32.50	10.3	30.2

B-GROUP basins represent the bulk of the site, with flows generally travelling southwards via curb and gutter, and storm sewer towards Pond #2. Pond #2 has been designed as a 3.5 ac-ft basin, sufficient to detain and release the WQCV generated by the site.

Basin B4 covers proposed lots 3 and 4 at the northeast corner of the Falcon Marketplace site. Flows generated by this basin Q_5 =7.5 cfs, Q_{100} =14.6 cfs are intended to culminate at **Design Point 4** where a proposed private 24" RCP storm sewer stub is provided to allow for storm sewer connection as needed by the future lot developer(s). Design of the internal storm sewer/drainage configuration for lots 3 and 4 will be determined by the individual lot developer(s) at a later date.

Basin B5 covers a portion of the east side of Falcon Market Place adjacent to lots 3 and 4. Flows of Q_5 =2.8 cfs, Q_{100} =5.1 cfs are generated by this basin and will travel to the south towards a proposed public 10' Type R at-grade inlet (**Design Point 5**). Flows exit this proposed in let lB1 to the west via public 24" RCP storm sewer.

Basin B6 covers the northeast corner of lot 2. Flows generated by this basin Q_5 =12.8 cfs, Q_{100} =23.6 cfs are intended to culminate at **Design Point 6** where a proposed private 24" RCP storm sewer stub is provided to allow for storm sewer connection as needed by the

south towards proposed Pond 2 via proposed public 48" RCP storm sewer.

Basin B20 covers the west side of Meridian Road between Eastonville Road and E. Woodmen Road adjacent to the Falcon Marketplace site. Flows of Q_5 =5.6 cfs, Q_{100} =11.4 cfs are generated by this widening of Meridian Road and will travel to the south towards a proposed curb cut and riprap swale (**Design Point 22**). Flows will exit Meridian Road at this curb cut and travel via riprap lined swale towards the proposed water quality facility pond 2.

Basin B21 covers the entirety of proposed Water Quality Facility Pond 2. Flows of Q_5 =0.5 cfs, Q_{100} =4.0 cfs generated by this basin are immediately absorbed by the pond volume.

Design Point 23 represents those flows Q_5 =67.4 cfs, Q_{100} =121.8 cfs generated by the Falcon Marketplace development reaching the outlet structure of proposed Water Quality Facility Pond 2. See below for further discussion of the Water Quality Facilities.

C-GROUP basins cover the western and southern portions of the site that travel towards Pond #3, along with flows off E. Woodmen Road that will discharge into the open channel.

Basin C1 covers a portion of the east side of the proposed southwest roundabout. Flows of Q_5 =1.3 cfs, Q_{100} =2.6 cfs are generated by this basin and will travel to the south towards a proposed low point and public 5' Type R sump inlet (**Design Point 24**). Flows exiting this inlet will travel to the west via proposed public 18" RCP storm sewer.

Basin C2 covers a portion of the west side of the proposed southwest roundabout. Flows of Q_5 =0.8 cfs, Q_{100} =1.5 cfs are generated by this basin and will travel to the south towards a proposed low point and public 5' Type R sump inlet (**Design Point 25**). Flows exiting this inlet will travel to the west via proposed public 18" RCP storm sewer.

Basin C3 covers an offsite tract along the western boundary of the property. Flows generated by this basin Q_5 =0.6 cfs, Q_{100} =4.2 cfs travel overland to the east.

Basin C4 covers the western portion of lot 1 and lot 11. Flows generated by this basin Q_5 =6.9 cfs, Q_{100} =13.8 cfs are intended to culminate at **Design Point 26** where a proposed private 24" RCP storm sewer stub is provided to allow for storm sewer connection as needed by the future lot developer. Design of the internal storm sewer/drainage configuration for lot 1 and lot 11 will be determined by the individual lot developer at a later date.

Basin C5 covers an offsite tract along the southern boundary of the adjacent Courtyards West property. Flows generated by this basin Q_5 =0.5 cfs, Q_{100} =1.9 cfs travel overland to the east towards a proposed public 18" RCP culvert **Design Point 27,** that will discharge into Pond #3.

Basin C6 covers the entirety of proposed Water Quality Facility Pond 3 and some offsite open tract area to the east. Flows of Q_5 =0.2 cfs, Q_{100} =1.2 cfs generated by this basin are immediately absorbed by the pond volume.

8.0 PROPOSED DETENTION/WATER QUALITY FACILITIES

As previously mentioned, three separate detention/water quality facilities are proposed with this development:

Pond #1 (DBPS – SR4), a 26.7 ac-ft sub-regional detention facility is proposed along the northern boundary of the project site, to intercept flows from the UTBSC, and release it at a reduced flow rate into the 96" pipe. In accordance with El Paso County criteria, a 12'x8' modified type D outlet structure with a permanent micropool will release the WQCV over a 40-hour period. A gravel maintenance access road will be constructed in to, and around the entire perimeter of the pond. Pond #1 will be owned and maintained by El Paso County.

Two options were considered for the construction of the drop structure into the proposed Pond SR4. A geocell product was considered for both its aesthetics and constructability, however with the consideration of both time, cost and local contractor experience, a grouted riprap structure was determined as the more appropriate option. Inspection of the placement and grouting of the riprap during construction will be required to provide for longevity and functional design.

Pond #2, a proposed 3.5 ac-ft private water-quality basin will intercept the majority of flows generated by the site, south of the proposed sub-regional pond #1. As with pond #1, in accordance with El Paso County criteria, an outlet structure with permanent micropool will release the WQCV over a 40-hour period, to the open channel along E. Woodmen Road. A gravel maintenance access road will be constructed in to, and around the southern perimeter of the pond.

Pond #3, is a small 0.21 ac-ft proposed private water-quality basin intended to intercept the flows generated by the western portion of the site. As with pond #2, in accordance with El Paso County criteria, an outlet structure with permanent micropool will release the WQCV over a 40-hour period. Flows will discharge into the 96" RCP, and ultimately reach the open channel along E. Woodmen Road.

Ponds 2 & 3 are designed as water quality basins, not full extended detention basins. Therefore release of the developed flows may be higher than the predevelopment inflow, as indicated by the UD-Detention spreadsheets in the appendix. The capacity of the open channel downstream has been designed to accommodate these flows while restricting flow discharging the overall site to no greater than historic.

The HEC-HMS study determined that allowable flow generated by the site (B & C-group basins) cannot exceed Q_{100}=113-cfs. This represents the difference between the open channel design flow and discharge from the 96" pipe (757 cfs – 644 cfs = 113 cfs).

From the UD-Detention spreadsheets in the appendix, release rates for Pond 2 (Q_5 =21.7 cfs, Q_{100} =50.2 cfs) and Pond 3 (Q_5 =3.7 cfs, Q_{100} =14.7 cfs) are within the parameters listed above. Flows combine with the 96" outflow (Q_{100} =644 cfs) and offsite contribution from basin C9 (Q_5 =7.3 cfs, Q_{100} =16.2 cfs), to generate 100-year flows of 725 cfs. This flow is within the HEC-HMS design parameters listed above, and less than the historic discharge of 760-cfs, and as such will not negatively impact the downstream facilities.

PROJECT INFORMATION

PROJECT:	Falcon Marketplace
PROJECT NO:	20988-00CSCV
DESIGN BY:	KGV
REV. BY:	TDM
AGENCY:	El Paso County
REPORT TYPE:	Final
DATE:	4/17/2019

Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Commercial Development		0.81		0.88	95
Open Space		0.08		0.35	0
Asphalt Roadway		0.90		0.96	100

*C-Values and Basin Imperviousness based on Table 5-1, City of Colorado Springs and El Paso County "Drainage Criteria Manual"

SUB-BASIN	SURFACE DESIGNATION	sf	AREA ACRE	COMPOSITE RUNOFF COEFFICIENTS C2	C5	C10	C100	% IMPERV
A1	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	39449	0.91		0.08		0.35	0
	Asphalt Roadway	39255	0.90		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	78704	1.81		0.49		0.65	50
A2	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	210108	4.82		0.08		0.35	0
	Asphalt Roadway	0	0.00		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	210108	4.82		0.08		0.35	0
B4	Commercial Development	82558	1.90		0.81		0.88	95
	Open Space	19878	0.46		0.08		0.35	0
	Asphalt Roadway	0	0.00		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	102436	2.35		0.67		0.78	77
B5	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	1202	0.03		0.08		0.35	0
	Asphalt Roadway	26452	0.61		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	27654	0.63		0.86		0.93	96
B6	Commercial Development	135219	3.10		0.81		0.88	95
	Open Space	3694	0.08		0.08		0.35	0
	Asphalt Roadway	0	0.00		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	138913	3.19		0.79		0.87	92
B7	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	706	0.02		0.08		0.35	0
	Asphalt Roadway	19274	0.44		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	19980	0.46		0.87		0.94	96
B8	Commercial Development	37504	0.86		0.81		0.88	95
	Open Space	7871	0.18		0.08		0.35	0
	Asphalt Roadway	0	0.00		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	45375	1.04		0.68		0.79	79
B9	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	0	0.00		0.08		0.35	0
	Asphalt Roadway	13266	0.30		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	13266	0.30		0.90		0.96	100
B10	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	0	0.00		0.08		0.35	0
	Asphalt Roadway	7648	0.18		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	7648	0.18		0.90		0.96	100

PROJECT INFORMATION

PROJECT:	Falcon Marketplace
PROJECT NO:	20988-00CSCV
DESIGN BY:	KGV
REV. BY:	TDM
AGENCY:	El Paso County
REPORT TYPE:	Final
DATE:	4/17/2019

Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Commercial Development		0.81		0.88	95
Open Space		0.08		0.35	0
Asphalt Roadway		0.90		0.96	100

*C-Values and Basin Imperviousness based on Table 5-1, City of Colorado Springs and El Paso County "Drainage Criteria Manual"

B11	Commercial Development	*82352*	*1.89*		*0.81*		*0.88*	*95*
	Open Space	*5276*	*0.12*		*0.08*		*0.35*	*0*
	Asphalt Roadway	*0*	*0.00*		*0.90*		*0.96*	*100*
TOTAL	*WEIGHTED AVERAGE*	*87628*	2.01		0.77		0.85	89
B12	Commercial Development	*0*	*0.00*		*0.81*		*0.88*	*95*
	Open Space	*0*	*0.00*		*0.08*		*0.35*	*0*
	Asphalt Roadway	*7868*	*0.18*		*0.90*		*0.96*	*100*
TOTAL	*WEIGHTED AVERAGE*	*7868*	0.18		0.90		0.96	100
B13	Commercial Development	*0*	*0.00*		*0.81*		*0.88*	*95*
	Open Space	*0*	*0.00*		*0.08*		*0.35*	*0*
	Asphalt Roadway	*8699*	*0.20*		*0.90*		*0.96*	*100*
TOTAL	*WEIGHTED AVERAGE*	*8699*	0.20		0.90		0.96	100
B14	Commercial Development	*100956*	*2.32*		*0.81*		*0.88*	*95*
	Open Space	*7304*	*0.17*		*0.08*		*0.35*	*0*
	Asphalt Roadway	*0*	*0.00*		*0.90*		*0.96*	*100*
TOTAL	*WEIGHTED AVERAGE*	*108260*	2.49		0.76		0.84	89
B15	Commercial Development	*230636*	*5.29*		*0.81*		*0.88*	*95*
	Open Space	*18865*	*0.43*		*0.08*		*0.35*	*0*
	Asphalt Roadway	*0*	*0.00*		*0.90*		*0.96*	*100*
TOTAL	*WEIGHTED AVERAGE*	*249501*	5.73		0.75		0.84	88
B16	Commercial Development	*0*	*0.00*		*0.81*		*0.88*	*95*
	Open Space	*0*	*0.00*		*0.08*		*0.35*	*0*
	Asphalt Roadway	*15279*	*0.35*		*0.90*		*0.96*	*100*
TOTAL	*WEIGHTED AVERAGE*	*15279*	0.35		0.90		0.96	100
B17	Commercial Development	*0*	*0.00*		*0.81*		*0.88*	*95*
	Open Space	*0*	*0.00*		*0.08*		*0.35*	*0*
	Asphalt Roadway	*14340*	*0.33*		*0.90*		*0.96*	*100*
TOTAL	*WEIGHTED AVERAGE*	*14340*	0.33		0.90		0.96	100
B18	Commercial Development	*81327*	*1.87*		*0.81*		*0.88*	*95*
	Open Space	*13537*	*0.31*		*0.08*		*0.35*	*0*
	Asphalt Roadway	*0*	*0.00*		*0.90*		*0.96*	*100*
TOTAL	*WEIGHTED AVERAGE*	*94864*	2.18		0.71		0.80	81
B19	Commercial Development	*106398*	*2.44*		*0.81*		*0.88*	*95*
	O en S ace	*5768*	*0.13*		*0.08*		*0.35*	*0*
	Asphalt Roadway	*0*	*0.00*		*0.90*		*0.96*	*100*
TOTAL	*WEIGHTED AVERAGE*	*112166*	2.57		0.77		0.85	90
B20	Commercial Development	*0*	*0.00*		*0.81*		*0.88*	*95*
	Open Space	*30159*	*0.69*		*0.08*		*0.35*	*0*

PROJECT INFORMATION

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REV. BY:	TDM
AGENCY:	El Paso County
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Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Commercial Development		0.81		0.88	95
Open Space		0.08		0.35	0
Asphalt Roadway		0.90		0.96	100

*C-Values and Basin Imperviousness based on Table 5-1, City of Colorado Springs and El Paso County "Drainage Criteria Manual"

	Asphalt Roadway	58407	1.34		0.90		0.96	100
TOTAL	*WEIGHTED AVERAGE*	88566	2.03		0.62		0.75	66
B21	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	70589	1.62		0.08		0.35	0
	Asphalt Roadway	0	0.00		0.90		0.96	100
TOTAL	*WEIGHTED AVERAGE*	70589	1.62		0.08		0.35	0
C1	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	2771	0.06		0.08		0.35	0
	Asphalt Roadway	12632	0.29		0.90		0.96	100
TOTAL	*WEIGHTED AVERAGE*	15403	0.35		0.75		0.85	82
C2	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	1886	0.04		0.08		0.35	0
	Asphalt Roadway	8276	0.19		0.90		0.96	100
TOTAL	*WEIGHTED AVERAGE*	10162	0.23		0.75		0.85	81
C3	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	82100	1.88		0.08		0.35	0
	Asphalt Roadway	0	0.00		0.90		0.96	100
TOTAL	*WEIGHTED AVERAGE*	82100	1.88		0.08		0.35	0
C4	Commercial Development	71280	1.64		0.81		0.88	95
	Open Space	24284	0.56		0.08		0.35	0
	Asphalt Roadway	0	0.00		0.90		0.96	100
TOTAL	*WEIGHTED AVERAGE*	95564	2.19		0.62		0.75	71
C5	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	23525	0.54		0.08		0.35	0
	Asphalt Roadway	4356	0.10		0.90		0.96	100
TOTAL	*WEIGHTED AVERAGE*	27881	0.64		0.21		0.45	16
C6	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	19540	0.45		0.08		0.35	0
	Asphalt Roadway	0	0.00		0.90		0.96	100
TOTAL	*WEIGHTED AVERAGE*	19540	0.45		0.08		0.35	0
C7	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	1346	0.03		0.08		0.35	0
	Asphalt Roadway	6971	0.16		0.90		0.96	100
TOTAL	*WEIGHTED AVERAGE*	8317	0.19		0.77		0.86	84
C8	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	21695	0.50		0.08		0.35	0
	Asphalt Roadway	27878	0.64		0.90		0.96	100
TOTAL	*WEIGHTED AVERAGE*	49573	1.14		0.54		0.69	56

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Drexel, Barrell & Co.

RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

DEVELOPED TIME OF CONCENTRATION STANDARD FORM SF-2

SUB-BASIN DATA				INITIAL/OVERLAND TIME (t_i)							TIME OF CONC. t_c		FINAL t_c	
BASIN	DESIGN PT:	C_5	C_{100}	AREA	LENGTH	SLOPE	t_i	LENGTH	SLOPE	VEL.	t_t	COMP.	*MINIMUM*	
				Ac	Ft	%	Min	Ft	%	FPS	Min	t_c	t_c	Min
	(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)*	(11)	(12)	*(13)*	(14)
A1	DP1	0.49	0.65	1.81	100	2.0	9.1	750	2.0	5.8	2.2	11.2	*5.0*	11.2
A2		0.08	0.35	4.82	100	25.0	6.5	900	0.5	2.2	6.8	13.3	*5.0*	13.3
	DP3	0.19	0.43	6.63			13.3				0.0	13.3	*5.0*	13.3
B4	DP4	0.67	0.78	2.35	50	2.0	4.5	600	1.8	5.5	1.8	6.3	*5.0*	6.3
B5		0.86	0.93	0.63	50	2.0	2.5	650	1.5	4.8	2.3	4.7	*5.0*	5.0
	DP5	0.71	0.81	2.99			6.3	20	1.0	4.3	0.1	6.4	*5.0*	6.4
B6	DP6	0.79	0.87	3.19	100	25.0	2.0	500	1.0	4.3	1.9	3.9	*5.0*	5.0
B7		0.87	0.94	0.46	50	2.0	2.4	300	1.5	4.8	1.0	3.4	*5.0*	5.0
	DP7	0.76	0.53	6.63			6.4	52	1.9	8.4	0.1	6.5	*5.0*	6.5
B8	DP8	0.68	0.79	1.04	50	2.0	4.4	300	1.5	4.8	1.0	5.4	*5.0*	5.4
B9		0.90	0.96	0.30	20	2.0	1.3	300	1.0	4.3	1.2	2.5	*5.0*	5.0
	DP9	0.73	0.83	1.35			5.4	20	1.0	4.3	0.1	5.5	*5.0*	5.5
B10		0.90	0.96	0.18	20	2.0	1.3	210	1.5	5.3	0.7	2.0	*5.0*	5.0
	DP10	0.76	0.59	8.16			6.5	280	1.0	6.8	0.0	6.5	*5.0*	6.5
B11	DP11	0.77	0.85	2.01	20	2.0	2.2	350	2.5	5.8	1.0	3.2	*5.0*	5.0
B12		0.90	0.96	0.18	20	2.0	1.3	210	1.5	4.3	0.8	2.1	*5.0*	5.0
	DP12	0.76	0.65	10.35			6.5	219	1.0	8.4	0.4	7.0	*5.0*	7.0

B13		0.90	0.96	0.20	20	2.0	1.3	250	1.5	4.3	1.0	2.3	5.0	5.0
	DP13	0.76	0.65	10.55			7.0	50	1.0	8.4	0.1	7.1	5.0	7.1
B14	DP14	0.76	0.84	2.49	100	25.0	2.2	950	1.0	4.1	3.9	6.0	5.0	6.0
B15	DP15	0.75	0.84	5.73	100	25.0	2.2	1080	1.0	4.1	4.4	6.6	5.0	6.6
B16		0.90	0.96	0.35	20	2.0	1.3	500	1.5	5.3	1.6	2.9	5.0	5.0
	DP16	0.76	0.85	8.56			6.6	20	1.0	7.4	0.0	6.6	5.0	6.6
B17		0.90	0.96	0.33	20	2.0	1.3	480	1.5	5.3	1.5	2.8	5.0	5.0
	DP17	0.77	0.85	8.89			6.6	50	1.0	8.4	0.1	6.7	5.0	6.7
	DP18	0.58	0.58	19.44			6.7	52	1.0	8.5	0.1	6.8	5.0	6.8
B18	DP19	0.71	0.80	2.18	20	2.0	2.6	300	1.5	4.3	1.2	3.8	5.0	5.0
B19	DP20	0.77	0.85	2.57	20	2.0	2.2	420	1.5	4.3	1.6	3.8	5.0	5.0
	DP21	0.61	0.63	24.19			6.8	141	0.8	8.5	0.3	7.1	5.0	7.1
B20	DP22	0.62	0.75	2.03	50	2.0	5.0	900	2.2	5.4	2.8	7.8	5.0	7.8
B21		0.08	0.35	1.62	80	33.0	5.3	520	0.1	2.2	3.9	9.3	5.0	9.3
	DP23	0.58	0.62	27.85			9.3				0.0	9.3	5.0	9.3
C1	DP24	0.75	0.85	0.35	50	1.0	4.6	150	1.0	5.2	0.5	5.1	5.0	5.1
C2		0.75	0.85	0.23	100	1.0	6.6	170	1.0	4.3	0.7	7.2	5.0	7.2
	DP25	0.75	0.85	0.59			7.2					7.2	5.0	7.2
C3		0.08	0.35	1.88	100	4.0	12.0				0.0	12.0	5.0	12.0
C4		0.62	0.75	2.19	100	25.0	3.0	765	2.0	5.8	2.2	5.2	5.0	5.2
	DP26	0.37	0.56	4.08			12.0	550	2.0	5.8	1.6	13.6	5.0	13.6
C5	DP27	0.21	0.45	0.64	100	5.0	9.8	295	1.0	4.3	1.1	10.9	5.0	10.9
C6		0.08	0.35	0.45	50	5.0	7.9	120	5.0	8.4	0.2	8.1	5.0	8.1
	DP28	0.39	0.58	5.31			13.6	100	1.0	5.9	0.3	13.9	5.0	13.9
C7	DP29	0.77	0.86	0.19	100	1.0	6.2	150	1.0	4.3	0.6	6.8	5.0	6.8
C8		0.54	0.69	1.14	100	2.0	8.3	325	1.0	4.3	1.3	9.6	5.0	9.6
	DP30	0.57	0.72	1.33			9.6				0.0	9.6	5.0	9.6
C9		0.50	0.66	3.43	100	2.0	8.9	50	33.0	11.0	0.1	8.9	5.0	8.9
D1		0.55	0.70	2.62	50	2.0	5.8	1900	2.0	2.1	15.1	20.9	5.0	20.9
D2		0.90	0.96	0.07	20	2.0	1.3	200	2.0	2.1	1.6	2.9	5.0	5.0
D3		0.90	0.96	0.07	10	2.0	0.9	350	2.0	2.1	2.8	3.7	5.0	5.0

PROJECT INFORMATION

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AGENCY:	El Paso County
REPORT TYPE:	Final
DATE:	4/17/2019

RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

DEVELOPED RUNOFF 5 YR STORM P1= 1.50

BASIN (S)	DIRECT RUNOFF							TOTAL RUNOFF			
	DESIGN POINT	AREA (AC)	RUNOFF COEFF	t_c (MIN)	C * A	I (IN/HR)	Q (CFS)	t_c (MIN)	S (C * A)	I (IN/HR)	Q (CFS)
	(2)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
A1	DP1	1.81	0.49	11.2	0.88	3.87	3.4				
A2		4.82	0.08	13.3	0.39	3.59	1.4				
	DP3	6.63	0.19	13.3	1.27	3.59	4.6				
B4	DP4	2.35	0.67	6.3	1.57	4.75	7.5				
B5		0.63	0.86	5.0	0.55	5.09	2.8				
	DP5	2.99	0.71	6.4	2.12	4.74	10.0				
B6	DP6	3.19	0.79	5.0	2.52	5.09	12.8				
B7		0.46	0.87	5.0	0.40	5.09	2.0				
	DP7	6.63	0.76	6.5	5.04	4.71	23.8				
B8	DP8	1.04	0.68	5.4	0.71	4.98	3.5				
B9		0.30	0.90	5.0	0.27	5.09	1.4				
	DP9	1.35	0.73	5.5	0.99	4.96	4.9				
B10		0.18	0.90	5.0	0.16	5.09	0.8				
	DP10	8.16	0.76	6.5	6.19	4.71	29.2				
B11	DP11	2.01	0.77	5.0	1.54	5.09	7.8				
B12		0.18	0.90	5.0	0.16	5.09	0.8				

	DP12	10.35	0.76	7.0	7.89	4.62	36.4				
B13		0.20	0.90	5.0	0.18	5.09	0.9				
	DP13	10.55	0.76	7.1	8.07	4.60	37.1				
B14	DP14	2.49	0.76	6.0	1.89	4.83	9.1				
B15	DP15	5.73	0.75	6.6	4.32	4.70	20.3				
B16		0.35	0.90	5.0	0.32	5.09	1.6				
	DP16	8.56	0.76	6.6	6.53	4.69	30.6				
B17		0.33	0.90	5.0	0.30	5.09	1.5				
	DP17	8.89	0.77	6.7	6.83	4.67	31.9				
	DP18	19.44	0.58	6.8	11.21	4.64	52.1				
B18	DP19	2.18	0.71	5.0	1.54	5.09	7.8				
B19	DP20	2.57	0.77	5.0	1.99	5.09	10.1				
	DP21	24.19	0.61	7.1	14.73	4.59	67.6				
B20	DP22	2.03	0.62	7.8	1.26	4.45	5.6				
B21		1.62	0.08	9.3	0.13	4.18	0.5				
POND 2	DP23	27.85	0.58	9.3	16.13	4.18	67.4				
C1	DP24	0.35	0.75	5.1	0.27	5.07	1.3				
C2		0.23	0.75	7.2	0.17	4.56	0.8				
	DP25	0.59	0.75	7.2	0.44	4.56	2.0				
C3		1.88	0.08	12.0	0.15	3.76	0.6				
C4		2.19	0.62	5.2	1.37	5.02	6.9				
	DP26	4.08	0.37	13.6	1.52	3.56	5.4				
C5	DP27	0.64	0.21	10.9	0.13	3.92	0.5				
C6		0.45	0.08	8.1	0.04	4.38	0.2				
POND 3	DP28	5.31	0.39	13.9	2.09	3.53	7.4				
C7	DP29	0.19	0.77	6.8	0.15	4.65	0.7				
C8		1.14	0.54	9.6	0.62	4.13	2.5				
	DP30	1.33	0.57	9.6	0.76	4.13	3.1				
C9		3.43	0.50	8.9	1.73	4.24	7.3				
D1		2.62	0.55	20.9	1.43	2.88	4.1				
D2		0.07	0.90	5.0	0.06	5.09	0.3				
D3		0.07	0.90	5.0	0.07	5.09	0.3				

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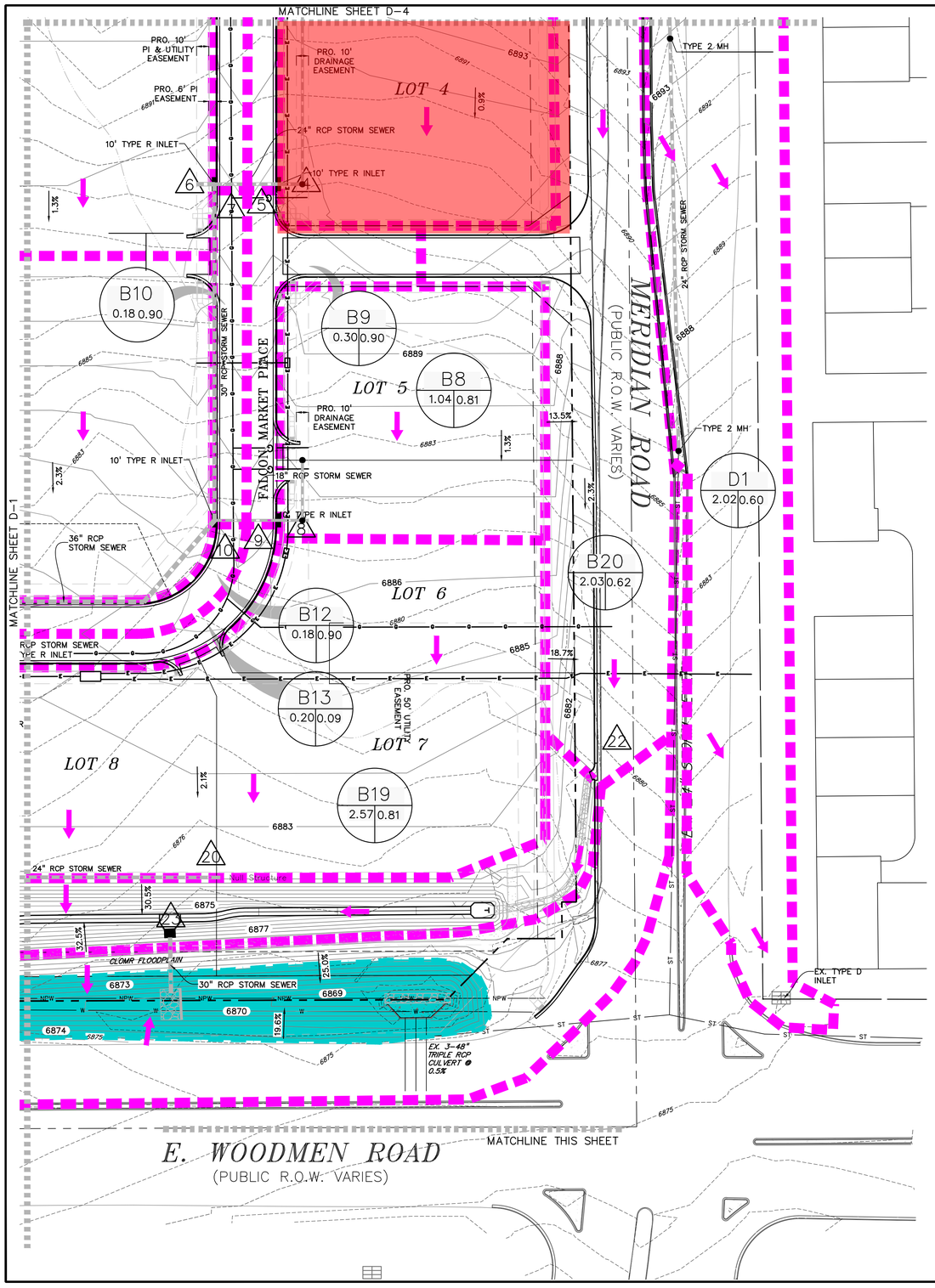
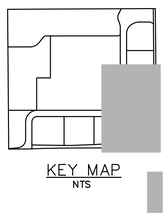
RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

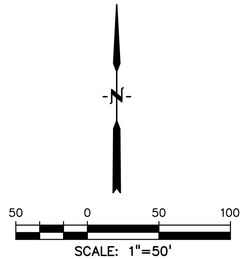
DEVELOPED RUNOFF 5 YR STORM P1= **2.52**

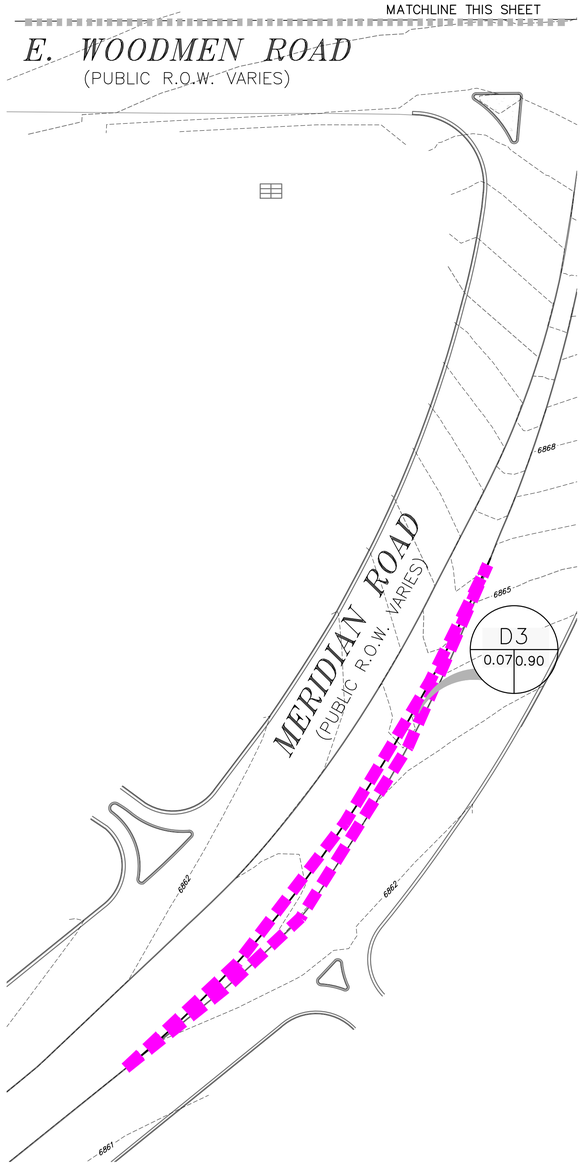
BASIN (S)	DIRECT RUNOFF							TOTAL RUNOFF			
	DESIGN POINT	AREA (AC)	RUNOFF COEFF	t_c (MIN)	C * A	I (IN/HR)	Q (CFS)	t_c (MIN)	S (C * A)	I (IN/HR)	Q (CFS)
	(2)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
A1	DP1	1.81	0.65	11.2	1.18	6.51	7.7				
A2		4.82	0.35	13.3	1.69	6.04	10.2				
	DP3	6.63	0.43	13.3	2.87	6.04	17.3				
B4	DP4	2.35	0.78	6.3	1.83	7.99	14.6				
B5		0.63	0.93	5.0	0.59	8.55	5.1				
	DP5	2.99	0.81	6.4	2.42	7.96	19.3				
B6	DP6	3.19	0.87	5.0	2.76	8.55	23.6				
B7		0.46	0.94	5.0	0.43	8.55	3.7				
	DP7	6.63	0.53	6.5	3.53	7.92	28.0				
B8	DP8	1.04	0.79	5.4	0.82	8.37	6.9				
B9		0.30	0.96	5.0	0.29	8.55	2.5				
	DP9	1.35	0.83	5.5	1.11	8.33	9.3				
B10		0.18	0.96	5.0	0.17	8.55	1.4				
	DP10	8.16	0.59	6.5	4.81	7.92	38.1				
B11	DP11	2.01	0.85	5.0	1.71	8.55	14.6				
B12		0.18	0.96	5.0	0.17	8.55	1.5				

	DP12	10.35	0.65	7.0	6.69	7.76	51.9				
B13		0.20	0.96	5.0	0.19	8.55	1.6				
	DP13	10.55	0.65	7.1	6.88	7.72	53.2				
B14	DP14	2.49	0.84	6.0	2.10	8.11	17.0				
B15	DP15	5.73	0.84	6.6	4.81	7.89	38.0				
B16		0.35	0.96	5.0	0.34	8.55	2.9				
	DP16	8.56	0.85	6.6	7.25	7.88	57.1				
B17		0.33	0.96	5.0	0.32	8.55	2.7				
	DP17	8.89	0.85	6.7	7.56	7.84	59.3				
	DP18	19.44	0.58	6.8	11.30	7.80	88.2				
B18	DP19	2.18	0.80	5.0	1.75	8.55	15.0				
B19	DP20	2.57	0.85	5.0	2.20	8.55	18.8				
	DP21	24.19	0.63	7.1	15.25	7.70	117.5				
B20	DP22	2.03	0.75	7.8	1.53	7.47	11.4				
B21		1.62	0.35	9.3	0.57	7.02	4.0				
POND 2	DP23	27.85	0.62	9.3	17.34	7.02	121.8				
C1	DP24	0.35	0.85	5.1	0.30	8.51	2.6				
C2		0.23	0.85	7.2	0.20	7.66	1.5				
	DP25	0.59	0.85	7.2	0.50	7.66	3.8				
C3		1.88	0.35	12.0	0.66	6.32	4.2				
C4		2.19	0.75	5.2	1.64	8.44	13.8				
	DP26	4.08	0.56	13.6	2.29	5.99	13.7				
C5	DP27	0.64	0.45	10.9	0.29	6.59	1.9				
C6		0.45	0.35	8.1	0.16	7.37	1.2				
POND 3	DP28	5.31	0.58	13.9	3.08	5.93	18.3				
C7	DP29	0.19	0.86	6.8	0.16	7.82	1.3				
C8		1.14	0.69	9.6	0.79	6.94	5.5				
	DP30	1.33	0.72	9.6	0.95	6.94	6.6				
C9		3.43	0.66	8.9	2.28	7.12	16.2				
D1		2.62	0.70	20.9	1.82	4.84	8.8				
D2		0.07	0.96	5.0	0.07	8.55	0.6				
D3		0.07	0.96	5.0	0.07	8.55	0.6				









RUNOFF SUMMARY

BASIN	DP	Area (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
A1	DP1	1.81	3.4	7.7
	DP2	1.81	3.4	7.7
A2		4.82	1.4	10.2
	DP3	6.63	4.6	17.3
B4	DP4	2.35	7.5	14.6
B5		0.63	2.8	5.1
	DP5	2.99	10.0	19.3
B6	DP6	3.19	12.8	23.6
B7		0.46	2.0	3.7
	DP7	6.63	23.8	28.0
B8	DP8	1.04	3.5	6.9
B9		0.30	1.4	2.5
	DP9	1.35	4.9	9.3
B10		0.18	0.8	1.4
	DP10	8.16	29.2	38.1
B11	DP11	2.01	7.8	14.6
B12		0.18	0.8	1.5
	DP12	10.35	36.4	51.9
B13		0.20	0.9	1.6
	DP13	10.55	37.1	53.2
B14	DP14	2.49	9.1	17.0
B15	DP15	5.73	20.3	38.0
B16		0.35	1.6	2.9
	DP16	8.56	30.6	57.1
B17		0.33	1.5	2.7

BASIN	DP	Area (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
	DP17	8.89	31.9	59.3
	DP18	19.44	52.1	88.2
B18	DP19	2.18	7.8	15.0
B19	DP20	2.57	10.1	18.8
	DP21	24.19	67.6	117.5
B20	DP22	2.03	5.6	11.4
B21		1.62	0.5	4.0
	DP23	27.85	67.4	121.8
C1	DP24	0.35	1.3	2.6
C2		0.23	0.8	1.5
	DP25	0.59	2.0	3.8
C3		1.88	0.6	4.2
C4		2.19	6.9	13.8
	DP26	4.08	5.4	13.7
C5	DP27	0.64	0.5	1.9
C6		0.45	0.2	1.2
	DP28	5.31	7.4	18.3
C7	DP29	0.19	0.7	1.3
C8		1.14	2.5	5.5
	DP30	1.33	3.1	6.6
C9		3.43	7.3	16.2
D1		2.62	4.1	8.8
D2		0.07	0.3	0.6
D3		0.07	0.3	0.6
	DP01	32.50	10.3	30.2

PREPARED BY:

DREXEL, BARRELL & CO.
Engineers • Surveyors
3 SOUTH 7TH STREET
COLORADO SPGS, COLORADO 80905
CONTACT: TIM D. McCONNELL, P.E.
(719)260-0887
BOULDER • COLORADO SPRINGS

CLIENT:

HUMMEL INVESTMENTS, LLC
8117 PRESTON ROAD, SUITE 120
DALLAS, TEXAS 75225
(214) 416-9820

DRAINAGE PLAN FOR
FALCON MARKETPLACE
FALCON, COLORADO

ISSUE	DATE
INITIAL ISSUE	6-28-19
REVISED	7-19-19

DESIGNED BY:	TDM
DRAWN BY:	KGV
CHECKED BY:	TDM
FILE NAME:	

COLORADO REGISTERED PROFESSIONAL ENGINEER TIMOTHY D. McCONNELL 37707 7-12-19

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF DREXEL, BARRELL & CO.

DRAWING SCALE:
HORIZONTAL: 1"=50'
VERTICAL: N/A

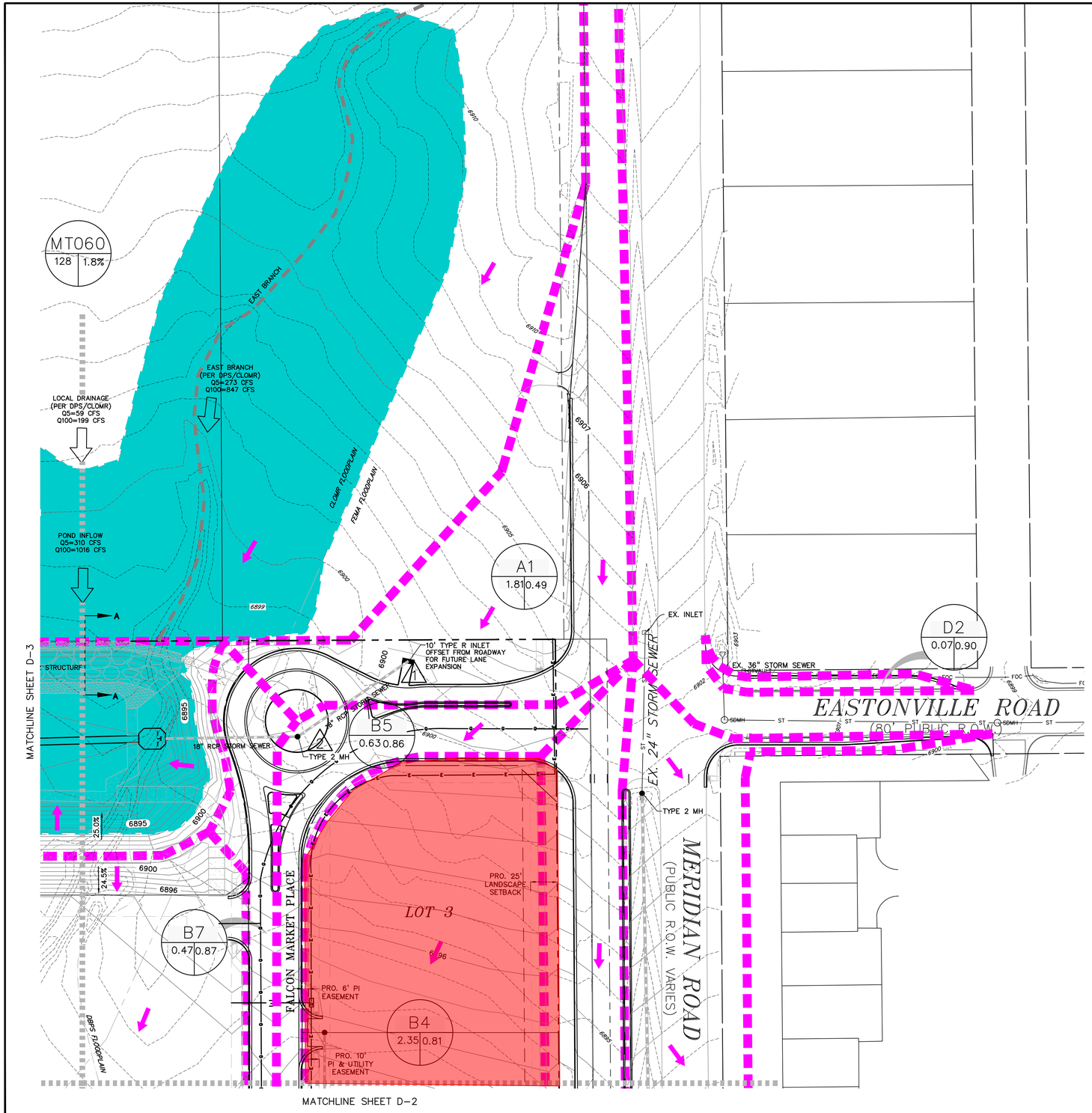
PROPOSED DRAINAGE CONDITIONS

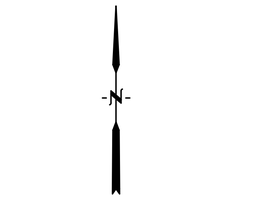
PROJECT NO. 20988-00CSCV

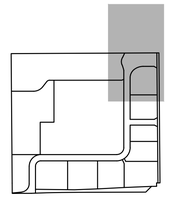
DRAWING NO.

D-2

SHEET: 2 OF 5







KEY MAP
NTS

LEGEND

- PROPERTY LINE
- LOT LINE
- PROPOSED STORM SEWER
- EX. MINOR CONTOUR
- EX. MAJOR CONTOUR — 6800 —
- PR. MINOR CONTOUR
- PR. MAJOR CONTOUR — 6800 —
- BASIN BOUNDARY
- FLOW DIRECTION
- PROPOSED (CLOMR/LOMR) FLOODPLAIN
- DESIGN POINT
- BASIN DESCRIPTION — BASIN; IMPERVIOUS COVERAGE
- BASIN AREA (ACRES)

RUNOFF SUMMARY

BASIN	DP	Area (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
A1	DP1	1.81	3.4	7.7
	DP2	1.81	3.4	7.7
A2		4.82	1.4	10.2
	DP3	6.63	4.6	17.3
B4	DP4	2.35	7.5	14.6
B5		0.63	2.8	5.1
	DP5	2.99	10.0	19.3
B6	DP6	3.19	12.8	23.6
B7		0.46	2.0	3.7
	DP7	6.63	23.8	28.0
B8	DP8	1.04	3.5	6.9
B9		0.30	1.4	2.5
	DP9	1.35	4.9	9.3
B10		0.18	0.8	1.4
	DP10	8.16	29.2	38.1
B11	DP11	2.01	7.8	14.6
B12		0.18	0.8	1.5
	DP12	10.35	36.4	51.9
B13		0.20	0.9	1.6
	DP13	10.55	37.1	53.2
B14	DP14	2.49	9.1	17.0
B15	DP15	5.73	20.3	38.0
B16		0.35	1.6	2.9
	DP16	8.56	30.6	57.1
B17		0.33	1.5	2.7

BASIN	DP	Area (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
	DP17	8.89	31.9	59.3
	DP18	19.44	52.1	88.2
B18	DP19	2.18	7.8	15.0
B19	DP20	2.57	10.1	18.8
	DP21	24.19	67.6	117.5
B20	DP22	2.03	5.6	11.4
B21		1.62	0.5	4.0
	DP23	27.85	67.4	121.8
C1	DP24	0.35	1.3	2.6
C2		0.23	0.8	1.5
	DP25	0.59	2.0	3.8
C3		1.88	0.6	4.2
C4		2.19	6.9	13.8
	DP26	4.08	5.4	13.7
C5	DP27	0.64	0.5	1.9
C6		0.45	0.2	1.2
	DP28	5.31	7.4	18.3
C7	DP29	0.19	0.7	1.3
C8		1.14	2.5	5.5
	DP30	1.33	3.1	6.6
C9		3.43	7.3	16.2
D1		2.62	4.1	8.8
D2		0.07	0.3	0.6
D3		0.07	0.3	0.6
	DPO1	32.50	10.3	30.2

PREPARED BY:

DREXEL, BARRELL & CO.
Engineers • Surveyors
3 SOUTH 7TH STREET
COLORADO SPGS, COLORADO 80905
CONTACT: TIM D. McCONNELL, P.E.
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CLIENT:

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8117 PRESTON ROAD, SUITE 120
DALLAS, TEXAS 75225
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DRAINAGE PLAN FOR FALCON MARKETPLACE
FALCON, COLORADO

ISSUE	DATE
INITIAL ISSUE	6-28-19
REVISED	7-19-19

DESIGNED BY:	TDM
DRAWN BY:	KGV
CHECKED BY:	TDM
FILE NAME:	

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF DREXEL, BARRELL & CO.

DRAWING SCALE:
HORIZONTAL: 1"=50'
VERTICAL: N/A

PROPOSED DRAINAGE CONDITIONS

PROJECT NO. 20988-00CSCV
DRAWING NO.

D-4

SHEET: 4 OF 5

APPENDIX F2 – EXCERPTS FROM LOT 3 DRAINAGE CONFORMANCE LETTER

Galloway
6162 S. Willow Drive, Suite 320
Greenwood Village, CO 80111
303.770.8884 • GallowayUS.com

March 23, 2020

Kari Parsons
Planning and Community Development
2880 International Circle, Suite 110
Colorado Springs, CO 80910

Re: Preliminary Drainage Conformance Letter for King Soopers #147 on Lot 2 & 3 – Falcon Marketplace Subdivision Filing No. 1

This drainage conformance letter has been prepared for Lots 2 & 3 of Falcon Marketplace Subdivision Filing No. 1 located in the southeast quarter of the southeast quarter of Section 1, Township 13 South, Range 65 West of the 6th Principal Meridian, County of El Paso, State of Colorado. The purpose of this letter is to show that the proposed drainage for Lots 2 & 3 conform to the current El Paso County *Drainage Criteria Manual* and the *Final Drainage Report for Falcon Marketplace* prepared by Drexel, Barrell & Co. dated July 22, 2019. A composite runoff coefficient calculation was performed for the subject site and these calculations are attached herein.

The King Soopers grocery store is to be located on Lot 2 of the subdivision, a 9.977-acre lot, and the King Soopers fuel facility is to be located on Lot 3 of the subdivision, a 1.309-acre lot. The project site is located within basins B4, B6, B11, B14, and B15 of the *Final Drainage Report.* Runoff from these lots was designed to be captured on-site and routed to storm sewer stubs provided along the adjacent public street. Detention and water quality will be provided by a pond located on the south side of the development, adjacent to E Woodmen Road.

The proposed site generally slopes from the north to the south and the grading is consistent with the intended grading and drainage pattern proposed in the original *Final Drainage Report* design. The proposed 5-yr and 100-yr runoff coefficients for the site were compared to the those designed in the *Final Drainage Report* to determine that the storm sewer system and detention pond provided by the master infrastructure has adequate capacity. Hydrologic calculations are included herein. All proposed inlets will be sized using UDFCD Street and Inlet Hydraulic spreadsheets. StormCAD will be used to model the proposed storm sewer on-site and calculations will be included with the Final Drainage Conformance Letter.

The proposed drainage plan for Lots 2 & 3 consists of 18 drainage basins (totaling 14.81 acres). Runoff from basins A-1 through A-9 will be collected into multiple curb inlets on-site which will connect to the master infrastructure storm sewer system and be routed to the south pond provided by the master developer. Basins B-1 through B-4 consist of roof areas that will be connected via roof drains to the on-site storm sewer system. Basins OS-1 through OS-5 consist of paved access aprons that sheet flow off-site and route to inlets within the adjacent public street provided by the master developer. The 100-year spillway will remain in the inundation easement, per plat and no structures will be built within this easement. The combined runoff coefficients for basins A-1 through A-9, B-1

through B-4, and OS-1 through OS-5 are estimated to be 0.75 and 0.84 for the 5- and 100- year storms, respectively (see calculations included herein). These runoff coefficients are equal to the planned values designed in the *Final Drainage Report* and thus the runoff will not exceed the anticipated amount. The overall imperviousness of the site after final stabilization has been calculated to be 85%. These findings indicated that this project will have no negative impacts on the existing drainage infrastructure.

Stormwater runoff from the fuel facility on Lot 2 will be collected at the inlet located at design point 8 and routed to Water Quality Pond #2 as determined by the *Final Drainage Report*. Water quality will be provided by Pond #2 and discharged into the open grass-lined channel along the north side of Woodmen Road.

The Four Step Process:

Step 1: Employ Runoff Reduction Practices
This step uses low impact development (LID) practices to reduce runoff at the source. Every attempt was made to reduce impervious areas while also complying with the parking requirements set forth by El Paso County. The site is comprised of NRCS Type A soils, so all landscaped areas promote infiltration. Grass buffers have been utilized where possible.

Step 2: Implement BMPs that Provide a Water Quality Capture Volume with Slow Release
The proposed storm sewer inlets are scattered around the perimeter of the site, ensuring that the stormwater quality and flood detention is not concentrated in one area.

Step 3: Stabilize Drainageways
Pond S4 The upstream SR4 pond, as constructed by the master developer, reduces downstream runoff, therefore stabilizing the downstream systems.

Step 4: Implement Site Specific and Other Source Control BMPs
The site is compliant with the approved Final Drainage Report for Falcon Marketplace, prepared by Drexel, Barrell & Co. The runoff from this site will be collected via the proposed storm sewer and will tie into the existing storm sewer, which is routed to an existing water quality pond located south of the site.

Drainage Fees:

The El Paso County Drainage Basin Fee is $305,322.17 based on the 2019 fee schedule of $29,622/impervious acre with an impervious acreage of 10.31 acres for Lots 2 and 3. This fee is expected to be paid for by the seller of the property due at the time of Final Plat recording.

The El Paso County Bridge Fee is $41,951.39 based on the 2019 fee schedule of $4,069/impervious acre and 10.31 acres of imperviousness for Lots 2 and 3. This fee is expected to be paid for by the seller of the property due at the time of Final Plat recording.

Design Engineer's Statement:

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

Jennifer R. Romano, PE
Licensed Professional Engineer, State of Colorado No. 44401

6/8/20
Date

Owner/Developer's Statement:

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

Charles Boehm
King Soopers
800 Ridgelake Boulevard
Memphis, TN 38101-1878

6/2/2020
Date

El Paso County:

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

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

Date

Conditions:

PROJECT: King Soopers Falcon Marketplace
LOCATION: E. Woodsmen Road & Meridian Road
Colorado Springs, El Paso County

Project No.: KSS147
Date: August 26, 2019
Engineer: Natalie Haber

*PERCENT IMPERVIOUS VALUES	
LANDSCAPE	0
PAVING	100
ROOFING	90
COMMERCIAL	95

* RUNOFF COEFFICIENTS USED (Type A Soils)				
	2-Year	5-Year	10-year	100-Year
LANDSCAPE	0.02	0.08	0.15	0.35
PAVING	0.89	0.90	0.92	0.96
ROOFING	0.71	0.73	0.75	0.81
COMMERCIAL	0.79	0.81	0.83	0.88

* Table 6-6 in CO Springs, Drainage Criteria Manual Revised May 2014

Composite Runoff Coefficients and Percent Imperviousness for Developed Drainage Basins

BASIN DESIG.	OVERALL AREA (sf)	LANDSCAPE AREA (sf)	PAVED AREA (sf)	ROOF AREA (sf)	COMMERCIAL AREA (sf)	2-YEAR COEFF.	5-YEAR COEFF.	10-YEAR COEFF.	100-YEAR COEFF.	PERCENT IMPERVIOUS
A-1	6,275	0	6,275	0	0	0.89	0.90	0.92	0.96	100%
A-2	18,589	8,629	9,960	0	0	0.49	0.52	0.56	0.68	54%
A-3	14,303	6,725	7,578	0	0	0.48	0.51	0.56	0.67	53%
A-4	22,967	7,038	15,929	0	0	0.62	0.65	0.68	0.77	69%
A-5	49,735	17,988	31,747	0	0	0.58	0.60	0.64	0.74	64%
A-6	18,257	5,209	13,048	0	0	0.64	0.67	0.70	0.79	71%
A-7	71,902	8,126	63,776	0	0	0.79	0.81	0.83	0.89	89%
A-8	233,171	21,075	116,465	0	95,631	0.77	0.79	0.81	0.87	89%
A-9	74,415	3,580	70,835	0	0	0.85	0.86	0.88	0.93	95%
B-1	56,790	0	0	56,790	0	0.71	0.73	0.75	0.81	90%
B-2	64,063	0	0	64,063	0	0.71	0.73	0.75	0.81	90%
B-3	3,742	0	0	3,742	0	0.71	0.73	0.75	0.81	90%
B-4	6,880	0	0	6,880	0	0.71	0.73	0.75	0.81	90%
TOTAL ON-SITE	**641,089**	**78,370**	**335,613**	**131,475**	**95,631**	**0.73**	**0.75**	**0.78**	**0.84**	**85%**
OS-1	713	0	713	0	0	0.89	0.90	0.92	0.96	100%
OS-2	710	0	710	0	0	0.89	0.90	0.92	0.96	100%
OS-3	1,044	0	1,044	0	0	0.89	0.90	0.92	0.96	100%
OS-4	710	0	710	0	0	0.89	0.90	0.92	0.96	100%
OS-5	712	0	712	0	0	0.89	0.90	0.92	0.96	100%
TOTAL OFF-SITE	**3,889**	**0**	**3,889**	**0**	**0**	**0.89**	**0.90**	**0.92**	**0.96**	**100%**
TOTAL SITE	**644,978**	**78,370**	**339,502**	**131,475**	**95,631**	**0.73**	**0.75**	**0.78**	**0.84**	**85%**

FINAL DRAINAGE REPORT FOR FALCON MARKETPLACE

B4	*102,436*	*0.67*	*0.78*
B6	*138,913*	*0.79*	*0.87*
B11	*87,628*	*0.77*	*0.85*
B14	*108,260*	*0.76*	*0.84*
B15	*249,501*	*0.75*	*0.84*
TOTAL SITE	***686,738***	***0.75***	***0.84***

STANDARD FORM SF-2
TIME OF CONCENTRATION

Subdivision:
Location: CO, El Paso County

Project Name: King Soopers Falcon Marketplace
Project No.: KSS147
Calculated By: SMB
Checked By:
Date: 11/16/19

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					Tc CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C_{100}	C_5	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	Cv	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH (FT)	Urbanized T_c (MIN)	T_c (MIN)
A-1	0.14	A	100	0.96	0.90	95	6.0	2.0						2.0	95.0	10.5	5.0
A-2	0.43	A	54	0.68	0.52	85	1.0	9.8	105	0.5	20.0	1.4	1.2	11.0	190.0	11.1	11.0
A-3	0.33	A	53	0.67	0.51	45	1.0	7.2	115	0.5	20.0	1.4	1.4	8.5	160.0	10.9	8.5
A-4	0.53	A	69	0.77	0.65	75	4.6	4.3	125	0.5	20.0	1.4	1.5	5.8	200.0	11.1	5.8
A-5	1.14	A	64	0.74	0.60	100	1.8	7.5	120	1.8	20.0	2.7	0.7	8.2	220.0	11.2	8.2
A-6	0.42	A	71	0.79	0.67	95	0.7	8.7	85	2.0	20.0	2.8	0.5	9.2	180.0	11.0	9.2
A-7	1.65	A	89	0.89	0.81	100	2.3	4.1	365	1.5	20.0	2.4	2.5	6.5	465.0	12.6	6.5
A-8	5.35	A	89	0.87	0.79	55	2.9	3.0	480	1.8	20.0	2.7	3.0	5.9	535.0	13.0	5.9
A-9	1.71	A	95	0.93	0.86	100	2.0	3.5	305	2.5	20.0	3.2	1.6	5.1	405.0	12.3	5.1
B-1	1.30	A	90	0.81	0.73												5.0
B-2	1.47	A	90	0.81	0.73												5.0
B-3	0.09	A	90	0.81	0.73												5.0
B-4	0.16	A	90	0.81	0.73												5.0
OS-1	0.02	A	100	0.96	0.90	16	2.0	1.2						1.2	16.0	10.1	5.0
OS-2	0.02	A	100	0.96	0.90	20	2.0	1.3						1.3	20.0	10.1	5.0
OS-3	0.02	A	100	0.96	0.90	22	2.0	1.4						1.4	22.0	10.1	5.0
OS-4	0.02	A	100	0.96	0.90	18	2.0	1.2						1.2	18.0	10.1	5.0
OS-5	0.02	A	100	0.96	0.90	20	2.0	1.3						1.3	20.0	10.1	5.0

NOTES:

$T_i = (0.395*(1.1 - C_5)*(L)^0.5)/((S)^0.33)$, S in ft/ft

T_t=L/60V (Velocity From Fig. 501)

Velocity V=Cv*S^0.5, S in ft/ft

Tc Check = 10+L/180

For Urbanized basins a minimum T_c of 5.0 minutes is required.

For non-urbanized basins a minimum T_c of 10.0 minutes is required

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

Subdivision:
Location: CO, El Paso County
Design Storm: 5-Year

Project Name: King Soopers Falcon Marketplace
Project No.: KSS147
Calculated By: SMB
Checked By:
Date: 11/16/19

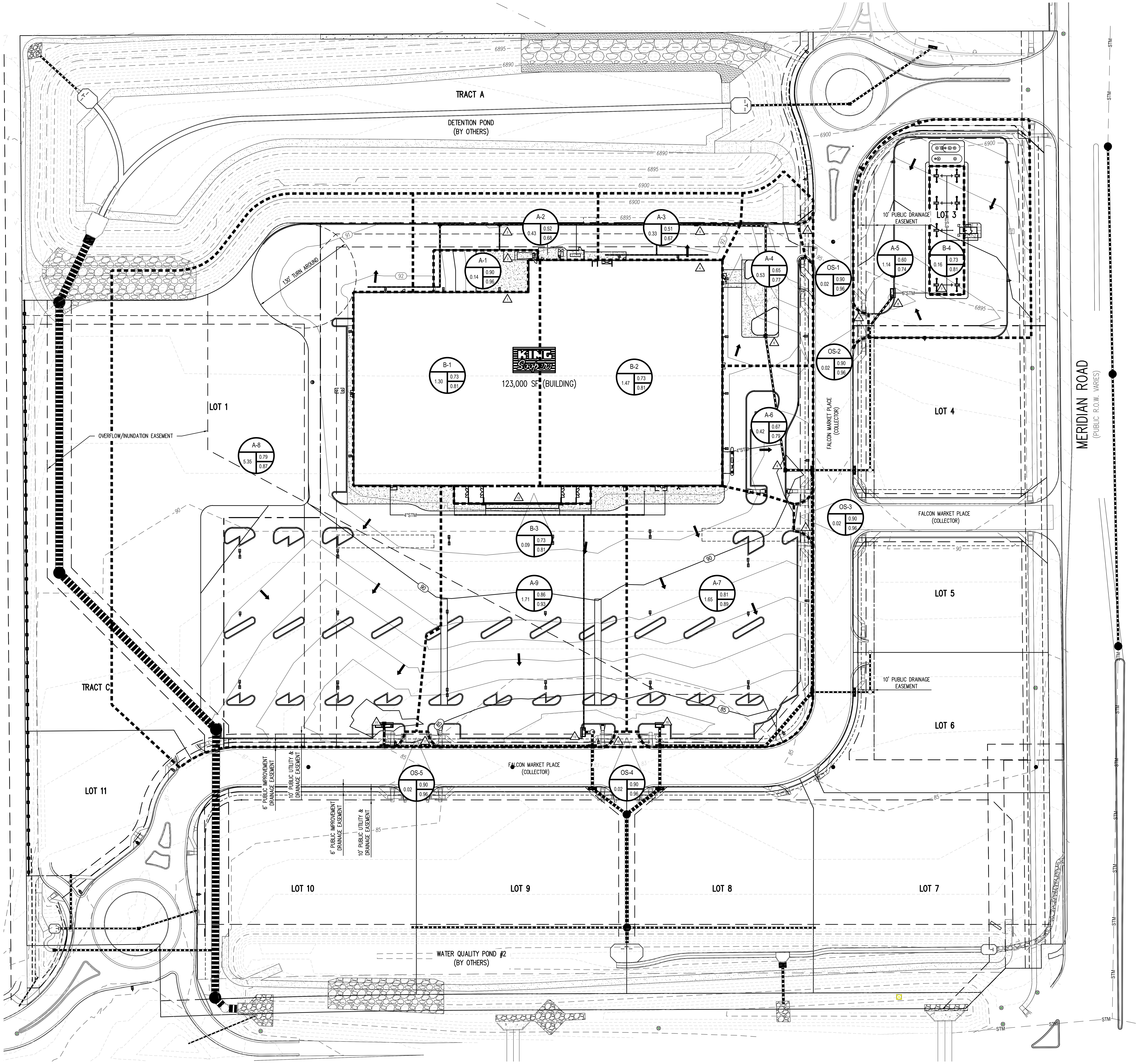
STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
	1	B-1	1.30	0.73	5.0	0.95	5.10	4.8													Roof drain piped to DP 2
	2	A-1	0.14	0.90	5.0	0.13	5.10	0.7													Type 13 Combination Sump Inlet
	2								5.0	1.08	5.10	5.5			5.5						Piped to DP 3
	3	A-2	0.43	0.52	11.0	0.22	3.95	0.9													Type 13 Combination Sump Inlet
	3								5.0	1.30	5.10	6.6			6.6						Piped to DP 5
	4	B-2	1.47	0.73	5.0	1.07	5.10	5.5													Roof drain piped to DP 5
	5	A-3	0.33	0.51	8.5	0.17	4.34	0.7													Type 13 Combination Sump Inlet
	5								8.5	2.54	4.34	11.0			11.0						Piped to DP 6
	6	A-4	0.53	0.65	5.8	0.34	4.91	1.7													Type 13 Combination Sump Inlet
	6								8.5	2.88	4.34	12.5			12.5						Piped to DP 9
	7	B-4	0.16	0.73	5.0	0.12	5.10	0.6													Roof drain piped to DP 8
	8	A-5	1.14	0.60	8.2	0.69	4.40	3.0													10' CDOT Type R Sump Inlet
	8								8.2	0.81	4.40	3.6			3.6						Piped to stub from overall development
	9	A-6	0.42	0.67	9.2	0.28	4.23	1.2													Type 13 Combination Inlet
	9								9.2	3.16	4.23	13.4			13.4						Piped to stub from overall development
	10	A-7	1.65	0.81	6.5	1.33	4.74	6.3							6.3						10' CDOT Type R Sump Inlet Piped to stub from overall development
	11	A-8	5.35	0.79	5.9	4.22	4.87	20.6							20.6						20' CDOT Type R Sump Inlet Piped to stub from overall development
	12	B-3	0.09	0.73	5.0	0.06	5.10	0.3													Roof drain piped to DP 13
	13	A-9	1.71	0.86	5.1	1.47	5.08	7.5													10' CDOT Type R Sump Inlet
	13								5.1	1.53	5.08	7.8			7.8						Piped to stub from overall development
	14	OS-1	0.02	0.90	5.0	0.01	5.10	0.1													Flows directly into roadway
	15	OS-2	0.02	0.90	5.0	0.01	5.10	0.1													Flows directly into roadway
	16	OS-3	0.02	0.90	5.0	0.02	5.10	0.1													Flows directly into roadway

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

Subdivision:
Location: CO, El Paso County
Design Storm: 100-Year

Project Name: King Soopers Falcon Marketplace
Project No.: KSS147
Calculated By: SMB
Checked By:
Date: 11/16/19

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
	1	B-1	1.30	0.81	5.0	1.06	9.09	9.6													Roof drain piped to DP 2
	2	A-1	0.14	0.96	5.0	0.14	9.09	1.3													Type 13 Combination Sump Inlet
	2								5.0	1.20	9.09	10.9			10.9						Piped to DP 3
	3	A-2	0.43	0.68	11.0	0.29	7.03	2.0													Type 13 Combination Sump Inlet
	3								5.0	1.49	9.09	13.5			13.5						Piped to DP 5
	4	B-2	1.47	0.81	5.0	1.19	9.09	10.8													Roof drain piped to DP 5
	5	A-3	0.33	0.67	8.5	0.22	7.73	1.7													Type 13 Combination Sump Inlet
	5								8.5	2.90	7.73	22.4			22.4						Piped to DP 6
	6	A-4	0.53	0.77	5.8	0.41	8.74	3.6													Type 13 Combination Sump Inlet
	6								8.5	3.31	7.73	25.6			25.6						Piped to DP 9
	7	B-4	0.16	0.81	5.0	0.13	9.09	1.2													Roof drain piped to DP 8
	8	A-5	1.14	0.74	8.2	0.84	7.84	6.6													10' CDOT Type R Sump Inlet
	8								8.2	0.97	7.84	7.6			7.6						Piped to stub from overall development
	9	A-6	0.42	0.79	9.2	0.33	7.53	2.5													Type 13 Combination Inlet
	9								9.2	3.64	7.53	27.4			27.4						Piped to stub from overall development
	10	A-7	1.65	0.89	6.5	1.47	8.43	12.4							12.4						10' CDOT Type R Sump Inlet Piped to stub from overall development
	11	A-8	5.35	0.87	5.9	4.67	8.67	40.5							40.5						20' CDOT Type R Sump Inlet Piped to stub from overall development
	12	B-3	0.09	0.81	5.0	0.07	9.09	0.6													Roof drain piped to DP 13
	13	A-9	1.71	0.93	5.1	1.59	9.05	14.4													10' CDOT Type R Sump Inlet
	13								5.1	1.66	9.05	15.0			15.0						Piped to stub from overall development
	14	OS-1	0.02	0.96	5.0	0.02	9.09	0.2													Flows directly into roadway
	15	OS-2	0.02	0.96	5.0	0.02	9.09	0.2													Flows directly into roadway
	16	OS-3	0.02	0.96	5.0	0.02	9.09	0.2													Flows directly into roadway
	17	OS-5	0.02	0.96	5.0	0.02	9.09	0.2													Flows directly into roadway
	18	OS-4	0.02	0.96	5.0	0.02	9.09	0.2													Flows directly into roadway



N
0 10 30 60
SCALE: 1"=60'

DRAINAGE LEGEND

- PROPERTY BOUNDARY LINE
- ADJACENT PROPERTY BOUNDARY LINE
- EASEMENT BOUNDARY LINE
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- EXISTING MANHOLE
- PROPOSED MANHOLE
- PROPOSED INLETS
- PROPOSED BASIN BOUNDARY
- DESIGN POINT

A-1 / 0.43 / 0.08 / 0.35
- PROPOSED BASIN DESIGNATION
- 5-YEAR RUNOFF COEFFICIENT
- 100-YEAR RUNOFF COEFFICIENT
- BASIN AREA IN ACRES

NOTE

CITY/COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH CITY/COUNTY DESIGN CRITERIA. THE CITY/COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AN ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE CITY/COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT. ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
A-1	0.14	0.90	0.96	5.00	0.7	1.3
A-2	0.43	0.52	0.68	11.04	0.9	2.0
A-3	0.33	0.51	0.67	8.55	0.7	1.7
A-4	0.53	0.65	0.77	5.78	1.7	3.6
A-5	1.14	0.60	0.74	8.22	3.0	6.6
A-6	0.42	0.67	0.79	9.22	1.2	2.5
A-7	1.65	0.81	0.89	6.54	6.3	12.4
A-8	5.35	0.79	0.87	5.94	20.6	40.5
A-9	1.71	0.86	0.93	5.09	7.5	14.4
B-1	1.30	0.73	0.81	5.00	4.9	9.6
B-2	1.47	0.73	0.81	5.00	5.5	10.8
B-3	0.09	0.73	0.81	5.00	0.3	0.6
B-4	0.16	0.73	0.81	5.00	0.6	1.2
OS-1	0.02	0.90	0.96	5.00	0.1	0.1
OS-2	0.02	0.90	0.96	5.00	0.1	0.1
OS-3	0.02	0.90	0.96	5.00	0.1	0.2
OS-4	0.02	0.90	0.96	5.00	0.1	0.1
OS-5	0.02	0.90	0.96	5.00	0.1	0.1

RUNOFF COEFFICIENT TABLE

	EXISTING COEFFICIENTS		PROPOSED COEFFICIENTS	
	5-YEAR	100-YEAR	5-YEAR	100-YEAR
COMPOSITE COEFFICIENT	0.75	0.84	0.75	0.84

Galloway
6162 S. Willow Drive, Suite 320
Greenwood Village, CO 80111
303.770.8884
GallowayUS.com

KING Soopers

King Soopers
Supermarket / Petroleum
65 Tejon Street
Denver, CO 80223
Phone (303) 778-3053
Fax (303) 871-9262

KING SOOPERS #147
FALCON MARKETPLACE
LOTS 2 & 3, BLOCK 1

7530 & 7595 FALCON MARKET PL.
FALCON, CO

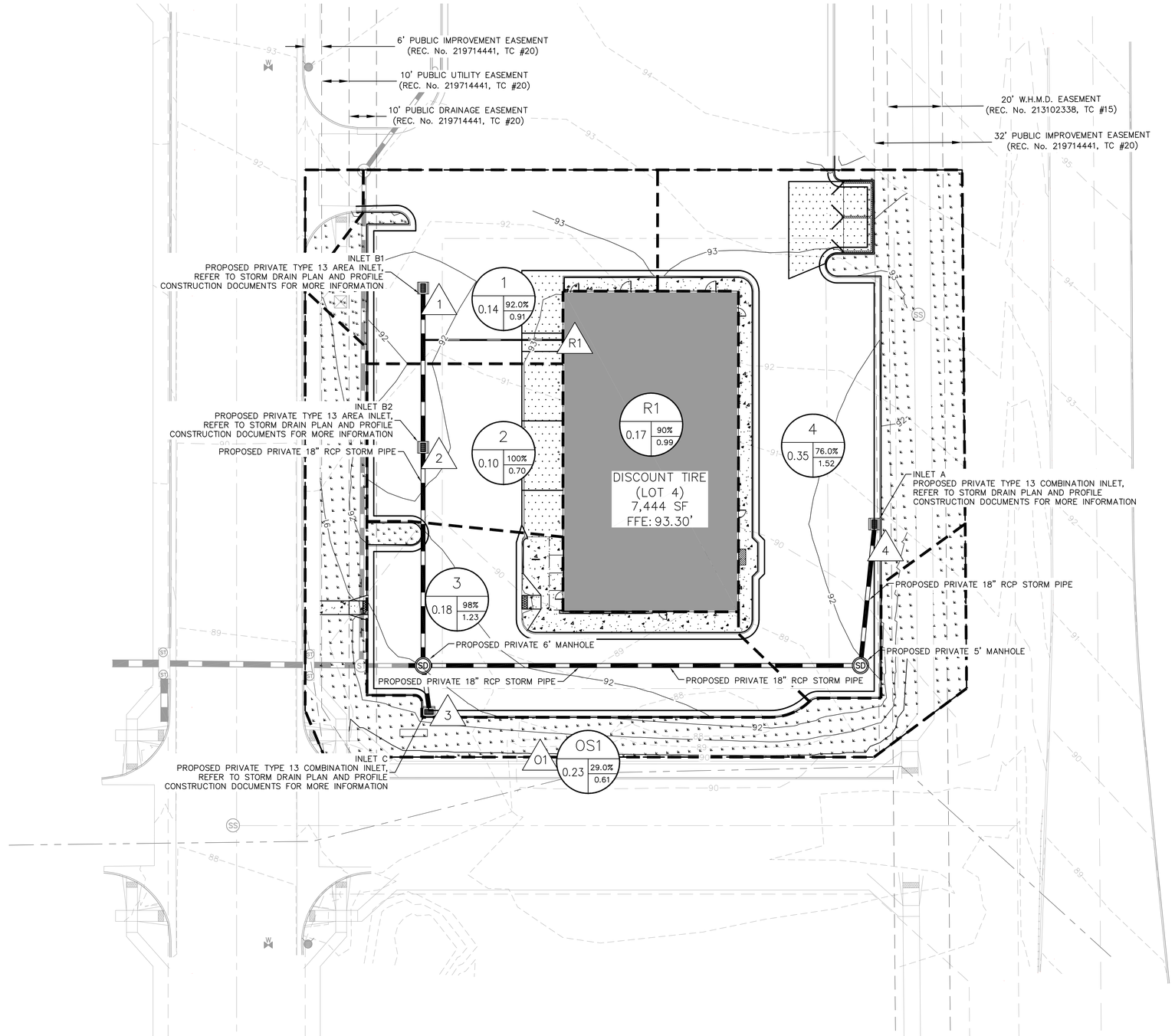
#	Date	Issue / Description	Init.
1	12/16/19	2ND SDP Sub.	ACJ

Project No: KSS000147
Drawn By:
Checked By:
Date: 8/29/19

DRAINAGE PLAN

DR1

APPENDIX G – DRAINAGE EXHIBIT



LEGEND

- A = BASIN DESIGNATION
- B = AREA (ACRES)
- C = BASIN IMPERVIOUSNESS
- D = 100YR DESIGN STORM RUNOFF (CFS)
- # = DESIGN POINT
- FLOW DIRECTION
- PROPERTY BOUNDARY
- EASEMENT
- BUILDING SETBACK
- EXISTING STORM SEWER (OR PROPOSED BY OTHERS)
- DRAINAGE BASIN BOUNDARY
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED STORM SEWER
- PROPOSED AREA INLET

NOTES:
1) ALL CURB AND GUTTER WILL BE TYPE A PER EL PASO COUNTY STD. DTL. SD_2-20
2) ADD 6800 FEET TO ALL PROPOSED CONTOURS AND SPOT GRADES TO OBTAIN ELEVATIONS IN REFERENCE TO NAVD88 DATUM.

GRAPHIC SCALE IN FEET
0 10 20 40

NORTH

DESIGN POINT SUMMARY TABLE		
DESIGN POINT	RUNOFF 5 YR (CFS)	RUNOFF 100 YR (CFS)
1	0.40	0.91
2	0.32	0.70
3	0.56	1.23
4	0.62	1.52
R1	0.43	0.99
O1	0.15	0.61

PROPOSED DRAINAGE MAP – FALCON MARKETPLACE, LOT 4 – DISCOUNT TIRE

Kimley»Horn

2 NORTH NEVADA AVENUE, SUITE 300
COLORADO SPRINGS, COLORADO 80903 (719) 453-0180

K:\COS_Civil\096010025_DTC Falcon CO\CADD\PlanSheets\Drainage Map.dwg