June 27, 2024

Town of Erie 645 Holbrook St. Erie, CO 80516 Attention: Planning Department



Re: Mountain View Fire Rescue – Station 15 (Meadow Sweet) SW Corner of Erie Parkway and Meadow View Parkway Traffic Impact Letter

Dear Planning Department,

Strategic Site Designs, LLC is drafting this letter to address site generated traffic for the proposed fire station to be constructed on Tract G of the Flatiron Meadows Subdivision. The Mountain View Fire Rescue is currently planning one principle full movement access onto Meadow Sweet Drive on the south side of the project site. In addition to the Meadow Sweet connection, a new apron is planned along Erie Parkway for emergency response vehicle exit only. All normal, non-emergent responses will depart the Meadow Sweet Lane.

To assess the stations' impact to the local roadway network, our review will primarily focus on the operation of the existing intersection of Meadow View Parkway and Erie Parkway. Today, the intersection is configured as a two-way stop-controlled access with Erie Parkway being the major through street.

Our team has reviewed the original Flatiron Meadows Traffic Impact Analysis (TIA) for Flatiron Meadows prepared by LSC Transportation Consultants, Inc. dated January 28, 2008 and the Technical Memorandum prepared by Aldridge Transportation Consultants, LLC dated December 13, 2011.

The original TIA was prepared for the overall subdivision which included 237 townhomes, 635 single-family residential units and a 900-student school/park. In total, the subdivision was anticipated to generate 8,627 trips. Two primary connections were proposed to Erie Parkway (referred to then as "Leon Wurl Parkway") at 111th and Meadow View Parkway. As described in prior paragraphs, the Meadow View Parkway and Erie Parkway is the principle focus of this letter. The LSC report described and reached the following conclusion regarding this intersection:

"The northbound approach of this unsignalized intersection is expected to operate at a good Level of Service (LOS "C" of better) for all movements during both the morning and evening peak hours without the addition of site generated traffic through 2010. With the addition of site-generated traffic, the southbound approach of this intersection will operate at Level of Service "E" during the morning peak hour and Level of Service "D" during the evening peak hour of Year 2010. By the Year 2025, the northbound and southbound approaches of this intersection will operate at a poor Level of Service "F". Delays commensurate with Level of Service "E" or "F" are typical for minor street movements at Stop sign-controlled intersections along arterial streets during the peak hours. Traffic signal warrants are not expected to be met at this intersection."

The LSC study also recommended that a westbound left turn deceleration lane be installed at the Meadow View Parkway and Erie Parkway which is currently in place.

In December of 2011, Aldridge Transportation Consultants (ATC) prepared a technical memorandum which expanded upon the original LSC Study. The primary purpose of this memorandum was to reassess the recommendations of the original study and provide additional discussion on the phasing of the improvements. The ATC memorandum discusses the overall subdivision being broken into 12 distinct phases. The proposed site lies within Phase 2 which ATC defines as Partition 1, which also includes Phase 1,2 and 3 with a total of 200 units. The ATC Conclusions for the build-out of Partition 1 suggest that a 200-foot westbound left turn lane be constructed at the Meadow View Parkway and Erie Parkway Intersection. The conclusion aligns with the recommendations in the LSC Study. It should be noted that the existing left turn has approximately 150-feet of storage with 150-feet of taper.

With this turn lane in place, ATC's study suggests that the Intersection will operate at LOS C in the short-term horizon. With the buildout of Partition 2, or the remaining 9 phases, ATC recommends an extension of the left turn lane from 200-feet to 350-feet. Under this scenario (2030 Horizon), the existing intersection will operate at LOS F. ATC indicated in their Operations Analysis Summary that this is normal under peak hour conditions. LSC made the same statement in their conclusions for this intersection.

Strategic Site Designs, LLC 88 Inverness Circle East, Suite B101 Englewood, CO 80112 July 1, 2024

Town of Erie 645 Holbrook St Erie, CO 80516 Attention: Planning Department

Re: Mountain View Fire Rescue – Station #15 Erie Parkway and Meadow View Parkway Wildlife Impact Report

Dear Planning Department,

Our team is drafting this letter to address the wildlife impacted by the development of Mountain View Fire Rescue's new Fire Station #15 located on the SW Corner of Erie Parkway and Meadow View Parkway.

This proposed site has been disturbed on multiple occasions are part of the overall subdivision's development. However, due the lack of disturbance in recent years, our team has reviewed existing resources that identify threatened and endangered species to ensure that no new species or designations have been mapped within the project area.

As shown on the attached readouts available from the US Fish and Wildlife Service's "Critical Habitat for Threatened & Endangered Species" GIS catalogs, there are no threatened or endangered species identified within the project area. SSD also completed a site visit approximately two (2) weeks ago and did not note any critical habitat, nests, or other visual evidence of existing wildlife impacting the site.

IN addition to the Threatened and Endangered Species review, our team also reviewed the National Wetlands Inventory. As shown on the attached map, there are not wetlands or other aquatic sustaining wetlands within the limits of the project site.

Given the sites location in an urban environment, the prior disturbances that have occurred to date and our review of available resources, there are no perceived impacts to any threatened or endangered species that will result from this project's development.

Should you have any questions or require additional information, please don't hesitate to contact me directly at <u>CPerdue@ssdeng.com</u> or (720) 206-6931.

Sincerely, Strategic Site Designs, LLC

Christopher L. Perdue, P.E., M.B.A. Owner

СР

Attachments: ECOS Environmental Conservation Online System – Map National Wetlands Inventory - Map

Strategic Site Designs, LLC 88 Inverness Circle, Suite B-101 Englewood, CO 80112 (720) 206-6931





Critical Habitat for Threatened & Endangered Species [USFWS]

A specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection.

Boulder County, City and County of Broomfield, Bureau of Land Management, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA

600ft



U.S. Fish and Wildlife Service National Wetlands Inventory

Mountain View Meadow Sweet Wetlands



July 1, 2024

Wetlands

- Estuarine and Marine Wetland

Estuarine and Marine Deepwater

- - Freshwater Pond

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Lake Other Riverine This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

The proposed fire station will not have any public facilities such as community rooms and thus the main traffic generator (excluding emergency responses) is the fire station's crew at shift change. The 11th Edition of the ITE Trip Generation Manual includes figures for a Fire and Rescue Station but there is limited studies and only the "Weekday Peak Hour of Adjacent Street Traffic" is provided. As such, our team usually relies on the station's staffing and operation information to establish an estimate for non-emergency and determine impacts on the adjacent roadways. In this case, the station will be staffed by five (5) fire fighters with a shift change occurring at 7:00 am every 48 hours. As such, we can reasonably assume that this station will generate five (5) AM trips entering the site and five (5) AM trips exiting the site every other day onto Meadow Sweet Lane. For the purposes of this analysis, we have assumed that all non-emergency traffic entering and exiting the station will use the Erie Parkway and Meadow View Parkway intersection. All emergency response vehicles will depart from the station northbound onto Erie Parkway and return to the station via the Meadow Sweet Lane public access.

Given that the station is only generating 5 trips to the Meadow View and Erie Parkway intersection, no additional adverse impacts are expected to occur at that intersection given that it already operates at a LOS F in the peak hour based on two former studies and their future projections. ATC projected 174 trips using the northbound approach (which we consider the most impacted movement due to the stop control), thus this project is only adding an additional 2.8% assuming all existing vehicles use Meadow View Parkway.

As part of the development plan for the fire station, there are a couple of considerations necessary to safely permit access onto Erie Parkway which should be addressed as part of the Planning and Construction Documents.

There is an existing pedestrian crossing located on the west side of the Meadow View and Erie Parkway intersection. This crossing is largely used by school children traveling north and south to and from Meadowlark Elementary School. Given the crossing's proximity to the proposed fire station exit apron, that crossing should be relocated to the west. The final location should be determined based on connectivity to the existing subdivision and the sidewalk and trail network offering the most effective route for pedestrians flowing south. The pedestrian crossing shall be designed with a, raised refuge island in the median along with a HAWK Signal system to stop traffic on Erie Parkway allowing pedestrians to cross safely.

Additional warning signage will also be required on Erie Parkway to address emergency response vehicles entering Erie Parkway. At a minimum, we recommend installation of Emergency Vehicle Warning Systems on the east bound and west bound approach and one at the northbound approach on Meadow View Parkway to Erie Parkway. We recommend installation of the TS50 manufactured by Traffic Safety Corporation or an approved equivalent. These systems have multiple means of activation including the optical emitters installed in most fire stations. Each Warning System should include flashing lights to alert motorists of emergency vehicles entering the roadway/intersection.

Other than the items outlined herein, there are no other traffic items to address that are not covered in the scope of the civil construction documents. Should you require additional information, please don't hesitate to contact me directly via email at <u>mcleary@ssdeng.com</u> or via phone at (720) 633-0219.

Sincerely, Strategic Site Designs, LLC

Michael D. Cleary, P.E. Project Manager

November 1, 2024

Town of Erie, Community Development 2203 North 111th Street Erie, CO 80516 Attention: Harry Brennan, Senior Planner



Re: Abridged Utility Infrastructure Analysis Report

Dear Harry,

Within, or attached to, this report, you will find the necessary information that evaluated the proposed development's impact on the Town's utility infrastructure. This report will include the basis for line sizing, maximum daily demand (MDD) estimates, and fire flow calculations.

Mountain View Fire Rescue Station 15 Infrastructure:

The proposed plans for the Fire Station Facility necessitate the inclusion of numerous lavatories and a fire suppression sprinkler system. To this end, the applicant intends to establish a connection of a 1.5-inch domestic service line to the existing water main in Meadow Sweet Lane. Additionally, a 6-inch fire line is slated to connect to the same water main to accommodate the building's automatic fire suppression system. Furthermore, a new hydrant is proposed to be positioned within close proximity, specifically within 100 feet of the FDC, situated to the north of these two connections.

Based on the water demand estimate and meter sizing utilizing fixture values from *AWWA M22 Manual*, *Second Edition*, the Maximum Daily Demand (MDD) is determined to be 49 gallons per minute (gpm), with a total combined fixture count of 78. See below for water demand calculations.

In the assessment, SSD applied the 2021 International Fire Code (IFC) to determine the required fire flow and fire hydrants count for the site, applying Table B105.01, Table B105.2 and Table C102.1.

Area (sq. ft.)	Constructio n Type	Suppressed?	Required Fire Flow (GPM)	Hydrants Required	Hydrants Available
12,709	Type IB	Yes	1,000*	1	1

*Set at the minimum per IFC Appendix B105.2,

We ask that you review the information provided and consider this letter as sufficient to demonstrate the proposed impacts on the Town's utility infrastructures.

Should you require additional information, please feel free to reach out to me directly at (720) 633-0219 or via email at <u>MCleary@strategicsitedesigns.com</u>

Sincerely,

Strategic Site Designs, LLC

Michael Cleary, PE Senior Project Engineer

Attachments: Water Demand Estimate and Meter Sizing using Fixture Values Fire Flow and Hydrant Spacing Requirements

Water Demand Estimate and Meter Sizing Using Fixture Values

(Based on AWWA M22 Manual, Second Edition)

Project Number	2321		
Building address or number	Station 15		
Residential or Non-Residential	Non-Residential	•	
Pressure Zone at Project	60	•	
Fixture or Appliance	Fixture Value (at 60 psi)	Number of Fixtures	Subtotal Fixture Value
Toilet (tank) Toilet (flush valve) Urinal (wall or stall) Urinal (flush valve) Bidet Shower (single head) Sink (lavatory) Kitchen Sink Utility Sink Dishwasher Bathtub Clothes Washer Hose connections (with 50 ft of hose) 1/2 in. 5/8 in. 3/4 in.	$ \begin{array}{r} 4 \\ 35 \\ 16 \\ 35 \\ 2 \\ 2.5 \\ 1.5 \\ 2.2 \\ 4 \\ 2 \\ 8 \\ 6 \\ \end{array} $	8 6 8 2 3 1 0	32 0 0 0 15 12 4.4 12 2 0 0 0 0
Miscellaneous Bedpan washers Drinking fountains Dental units Combined Fixture Value Demand (gpm) Pressure Adjustment Factor Total Adjusted demand (gpm)	10 2 2	2	0 4 0 96.4 49 1 49
Preliminary Demand Size			1 1/2"
Velocity (fps)			8.9
Required Meter Size			1-1/2"

Fire Flow and Hydrant Spacing Requirements

Project:	Ν	AVFR Station 15	FIRE-FLOW CALCULATION AREA (square feet)						
Date:	10/31/2024		Type IA and IB^{a}	Type IIA and IIIA^{a}	Type IV and V- A^{a}	Type IIB and IIIB^{a}	Type V-B^{a}	FIRE FLOW (gallons per minute)	FLOW DURATION (hours)
			0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	
Building ID:		Building 1	22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
			30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	2
Area:	12,709	_sq. ft.	38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	_
Construction Type:	IB		48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
Flow:	2,500	_per Table B105.1(2)	59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
Sprinklered?:	Yes		70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	
Req'd Fire Flow:	1,000	gpm (min = 1,000)	83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	2
# of Hydrants:	1	 	97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	5
- Max Distance:	337.5	ft. (Street frontage to hydrant)	112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
-	675	_ ft. (Spacing)	128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	
-		_	145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
Building ID:			164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
-			183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
Area:		sq. ft.	203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
Construction Type:		-	225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
- Flow:		– per Table B105.1(2)	247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
		-	271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
- Req'd Fire Flow:		_ 	295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	4
_ # of Hydrants:		-	_	_	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
- Max Distance:		-	_	_	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
-		-	_	_	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
Building ID:			_	_	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
			_	_	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
Area:		sg. ft.	_	_	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
- Construction Type:			_	_	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
		– per Table B105.1(2)	_	_	191,401-Greater	138,301-Greater	85,101-Greater	8,000	
_ Sprinklered?:									
Reg'd Fire Flow:		– apm (min = 1,500)	Min = 1000	903.3.1.1 NFPA 1	3 sprinkler systems				
# of Hydrants:			Min = 1500	903.3.1.2 NFPA 1	3R sprinkler system	s - Group R occupa	ncies		
– Max Distance:		-			, ,				
		_							

Fire Flow and Hydrant Spacing Requirements

 Building ID:
 sq. ft.

 Area:
 sq. ft.

 Construction Type:
 per Table B105.1(2)

 Sprinklered?:
 gpm (min = 1,500)

 # of Hydrants:
 Max Distance:

FIRE FLOW REQ.	MIN # HYD.	AVG. SPACING BETWEEN HYD.	MIN. DISTANCE FROM ANY POINT ON STREET
1,750 or less	1	500	250
1,751–2,250	2	450	225
2,251–2,750	3	450	225
2,751–3,250	3	400	225
3,251-4,000	4	350	210
4,001–5,000	5	300	180
5,001–5,500	6	300	180
5,501–6,000	6	250	150
6,001–7,000	7	250	150
7,001 or more	8 or more^{e}	200	120

A 50-percent spacing increase shall be permitted where the building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1 of the International Fire Code.

A 25-percent spacing increase shall be permitted where the building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.2 or 903.3.1.3 of the International Fire Code or Section P2904 of the International Residential Code.

Phase III Drainage Report

for

Mountain View Fire Rescue Station 15 Flatirons Meadows Master Plat Tract G

S 1/2 of Section 23, T1N, R69W of the 6th P.M. Town of Erie, County of Boulder, State of Colorado



SDD Project Number: 2321-001

Prepared by: **Strategic Site Designs, LLC** 88 Inverness Circle East, Suite B101 Englewood, CO 80112 Contact: Michael Cleary, PE (720) 633-0219

Drainage Report Prepared for: **Town of Erie Planning & Development Department** 645 Holbrook St Erie, CO 80516 Contact: Harry Brennan, Senior Planner (303) 926-2770

Initial Submittal: Resubmittal: Resubmittal (If required): Resubmittal: For Signatures: June 28, 2024 November 1, 2024

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Certifications

Engineer's Certification

"I hereby certify that this **Phase III drainage report** for the design of MVFR – Station 15 was prepared by me (or under my direct supervision) in accordance with the provisions of the Town of Erie Standards and Specifications for Design and Construction for the owners thereof. I understand that the Town of Erie does not and will not assume liability for drainage facilities designed by others, including the designs presented in this report."

(AFFIX SEAL)	

Signature:

Michael Cleary, P.E. Registered Professional Engineer State of Colorado No. 60575

Town Acceptance

This report has been reviewed and found to be in general compliance with *the Town of Erie Standards and Specifications for Design and Construction* and other Town requirements. THE ACCURACY AND VALIDITY OF THE ENGINEERING DESIGN, DETAILS, DIMENSIONS, QUANTITIES, AND CONCEPTS IN THIS REPORT REMAINS THE SOLE RESPONSIBILITY OF THE PROFESSIONAL ENGINEER WHOSE STAMP AND SIGNATURE APPEAR HEREON.

Accepted by:

Town Engineer or designee

Date

Scope and Purpose

The purpose of this report is to support the projected patterns of development proposed within Tract G of Flatiron Meadows development. The development features existing regional stormwater infrastructure designed and approved to serve the subject property. This report includes analysis and design of existing inlets and storm systems intended to demonstrate compliance with the approved master study and the assumptions made therein.

Section I – Introduction

1.1 Site Location

The subject property and proposed development are located within the planned development identified as Flatiron Meadows Subdivision, located in the S 1/2 of section 23 and NW 1/4 of section 24, township 1 north, range 69 west.

The Project Site is located within the NE portion of the subdivision, adjacent and west of Meadow View Parkway, south of Erie Parkway.

1.2 Description of Property Site

The property is currently vacant and undeveloped, covering 1.56 acres, surrounded by single family residential development. The property is covered with native grasses with agricultural soils and, in general, slopes gradually to the south-southwest with gentle to moderate slopes.

The geotechnical report made available to us during the design process did not allude to any significant geological hazards within the property. A summary of the on-site soils is provided in the table below based on NRCS information made publicly available.

	Map Unit Symbol	Map Unit Name	% of AOI	Hydrologic Soil Group	
ĺ	AcA	Ascalon sandy loam, 0 to 3% slopes	83.5	В	
	MdD	Manter sandy loam, 3 to 9% slopes	16.5	A	

The predominant soil type for each of the sections included in the development area is Hydrologic Group Type "B." Additional soil information is available in the custom soils report in the appendices. A review of the FEMA map database, the subject property is represented on panel 08013C0437J, with a revised date of December 18th, 2012, indicates that the site does not lie within a major floodplain and is in an area of minimal flood hazard (Zone X).

1.3 General Description of Proposed Development

- When the development was platted, Tract G was created and allotted for the development of a future fire station.
- A 12,000 sq. ft. firehouse will be centrally located within the subject property with access to both Erie Parkway and Meadow Sweet Lane.

• Adjacent storm sewer infrastructure is limited and surface grading, curb and gutter, and landscape swales will direct runoff toward the adjacent roadway as assumed in the development's master drainage plan.

Section II – Drainage Basins

2.1 Major Basins Description

Tract G is located within the limits of the Town of Erie Outfall Systems Plan, West of Coal Creek (OSP).

2.1 Minor-Basins Description

The subject property has been platted as Tract G of the Flatiron Meadows Master Plat. In the *Phase III Drainage Report for Flatiron Meadows Filing No.1, completed* by Calibre Engineering, Inc in 2012, Tract G is shown as being located within the Filing No. 2, which is described in Section 4.4 of that report as being tributary to regional detention facilities.



More specifically, the subject property was identified as being located within basin B-3 and shown to be tributary to an interim detention pond. Later the interim pond was replaced by a permanent regional detention facility – pond 1029. Refer to Appendix C for excerpts from the relevant maps and analysis.



Section III – Drainage Design Criteria

3.1 Regulations

All storm drainage analysis and design in connection with this Project has been executed in accordance with all applicable design criteria including:

- Town of Erie 2024 Standards & Specifications Section 800 (2024)
- Urban Drainage and Flood Control District's (MHFD) Technical Criteria Manual Volumes I, II, III.

3.2 Drainage Studies, Outfall Systems Plans, Site Constraints

As furnished by the Town of Erie, the following drainage studies are relevant to the subject property.

• Phase III Drainage Report for Flatiron Meadows Filing No.1 – Calibre Engineering, Inc (2012).

The referenced reports and addendums outline the stormwater analysis and designs for the area that includes the subject property, as approved by the Town of Erie, have been reviewed by SSD engineers and the relevant portions have been considered and referenced in the analysis outlined herein.

3.3 Hydrological Criteria

All hydrologic calculations were completed in accordance with Section 800 of the Town standards, using the rational method utilizing MHFD UD-Rationale Software. Given the size of the site, the rational method is an appropriate methodology and sufficient to deliver accurate results because the limit of the application of the Rational Method is approximately 160 acres. Each basin was identified based on the relevant topographic features and those variables (flow path length, basin slope, composite impervious percentage, etc.) were to calculate a flow rate for the desired storm event. The Runoff Coefficients and rainfall depth data utilized were obtained from *Section 813.00 of the Town of Erie Standards and Specifications*. (See Appendix A).

Painfall	Design Storm Return Period				
Kaimai	2-year	5-year	100-year		
1-hr Depth	0.81	1.11	2.68		

* Per Table 800-1 and 800-2 Town of Erie Standards and Specifications

3.4 Hydraulic Criteria

Stormwater is to be captured and conveyed using surface grading, street section geometry, and existing curb inlets. Conveyance systems have been analyzed in accordance with the approved master study and *Section 800 of the Town of Erie Standards and Specifications.*

Methods used are likely to include High Flood District's MHFD-Inlet V5.03 for street and inlet capacities and Stormwater Studio software for hydraulic modeling/analysis of proposed storm sewer. Hydraulic modeling input and output can be found in Appendix B.

Section IV – Drainage Facility Design

4.1 Existing Stormwater System Description

The previously approved *Phase III Drainage Report for Flatiron Meadows Filing No.1 – Calibre Engineering, LLC (2012)* outlines a regional stormwater management system for the development. Much of the infrastructure is already in place and was initially designed to include development within Tract G. With the construction of Filing Nos. 1, 3 & 5, the development of the subdivision included a detention pond that has been constructed.

The regional detention pond, located in the NW portion of the development, serves to capture flows from most Filings within the subdivision as well as some offsite areas. The area tributary to pond consists of single-family residential, roadways, commercial, and open space mostly within the Flatiron Meadows subdivision. The facility was designed and adequately sized to capture, detain, and release the required storm events in compliance with local jurisdictional requirements and the Mile High Flood District Criteria.

According to Calibre's report, the subject property was accounted for as flowing overland to the Smoky Hill Lane right-of-way and carried west to a curb inlet. assuming an area of 1.78 acres with an imperviousness of 70%. However, changes to the local street layout in the adjacent residential areas and improvements made to Erie Parkway result in a slightly different distribution and conveyance of runoff originating from the Tract G. According to Calibre's report, the regional detention pond will be built in a subsequent phase. A temporary drainage pond will provide service for the project site and is stated to be capable of providing capacity until the regional detention pond is in place.

4.2 Proposed Stormwater System Description

In the development plan for the fire station, an effort was made to align with the overall development plans, to the extent possible, while recognizing the changes that have been made since the Calibre report was approved.

Development plans proposed for Tract G will continue to promote surface runoff to the adjacent streets, using the existing curb and gutter to convey flows to existing curb inlets and be conveyed west to the regional pond. Based on the site configuration and proposed grading of the fire station, four drainage sub-basins have been delineated within the property of Tract G:

MVFR – STATION 15 FLATIRON MEADOWS MASTER PLAT TRACT G

Basin ID	Description	Area (ac)	% Imp.	Drainage Pattern	Q5 (cfs)	Q100 cfs)	Design Pt.
A1	Building roof and open space areas along the northwest portion of site	0.28	33.9%	Surface runoff flowing west to Smoky Hill Lane and conveyed to an existing curb inlet.	0.27	1.45	1
A2	Portion of northern driveway and open space	0.17	79.0%	Surface runoff flowing north to Erie Parkway and conveyed west to an existing curb inlet.	0.42	1.23	2
A3	Building roof, driveway, and open space areas.	1.00	59.6%	Surface runoff flowing south to Meadow Sweet Lane an conveyed west to an existing curb inlet.	1.30	4.53	3
A4	Portion northeast open space	0.10	2.0%	Surface runoff flowing east to an existing sump inlet in Meadow View Parkway.	0.004	0.32	4

The total area (1.55 acres) and combined imperviousness (53.4%) within the subject property, post-development were both determined to be lower than those values assumed in the Filing No. 1 report.

	Area	% Imp
Calibre Filing No. 1 Report	1.78	70
This Report	1.55	53

However, to account for the street layout changes and subsequent Erie Parkway infrastructure improvements, new basin boundaries for the existing inlets expected to receive flow from the subject property. Effectively, Basin B-1, B-3 and B-6 from the Calibre report have been redelineated and re-evaluated, along with adjacent basins, under current conditions (Table 4.2) and then accounting for changes resulting from the proposed fire station development (Table 4.3).

			-
Tab	le	4.	.2

	EXISTING BASIN SUMMARY TABLE - OVERALL									
BASIN ID	DESIGN POINT	AREA (ac)	% IMPERVIOUS	C5	C100	Q5	Q100			
E1	17	1.24	21.0%	0.16	0.52	0.36	2.93			
E2	5	6.96	31.4%	0.29	0.61	5.68	28.88			
E3	5.1	0.89	48.7%	0.43	0.68	1.45	5.53			
E4	5A	1.21	40.1%	0.36	0.65	1.65	7.13			
E5	5A.1	0.48	36.8%	0.33	0.63	0.46	2.12			
E6	5B	0.64	47.5%	0.38	0.65	0.92	3.76			
E7	25	0.15	80.4%	0.68	0.80	0.38	1.09			
E8	21	3.55	30.4%	0.28	0.61	2.48	12.89			
E9	22	2.79	28.8%	0.22	0.56	1.60	9.77			

	PROPOSED BASIN SUMMARY TABLE - Overall (Post Development of Tract G)								
BASIN ID	DESIGN POINT	AREA (ac)	% IMPERVIOUS	C5	C100	Q5	Q100		
P1	17	1.02	31.2%	0.31	0.62	0.84	4.05		
P2	5	6.42	42.8%	0.38	0.66	7.01	29.08		
P7	25	0.39	47.2%	0.38	0.65	0.50	2.04		
P8	21	3.55	34.1%	0.27	0.58	2.38	12.66		

Flows from the subject property and adjacent basins are conveyed within the existing roadway curb and gutter to an existing series of curb inlets and storm sewer to the regional pond to the west. Inlets within Erie Parkway, Flat Iron Meadow and Meadow Sweet Lane were evaluated storm network and determined to be sufficient to capture the tributary flows.

			CARRYOVER SU	JMMARY TABLE		
BASIN ID	DESIGN POINT	Q100 (CFS)	% CAPTURE (100 YR - CFS)	INLET INTERCEPTION CAPACITY (CFS)	CARYOVER RECIEVED (CFS)	CARRYOVER OUT (CFS)
P1	17	4.05	60.0%	2.4	0	1.6
P8	21	12.66	60.0%	7.6	0	5.10
E9	22	9.77	SUMP	35.9	5.10	0
P7	25	2.04	83.0%	1.7	0	0.3
P2	5	29.08	38.0%	10.9	0	18.2
E3	5.1	5.53	SUMP	17.2	18.2	14.2
E4	5A	7.13	45.0%	9.6	14.2	11.8
E5	5A.1	2.12	SUMP	17.2	11.8	0
E6	5B	3.76	SUMP	54.9	0	0

5.1 Conclusions and Recommendations

As shown in the analysis provided above, the grading changes and anticipated development proposed for Tract G of Flatirons Meadows Subdivision result in conditions that remain consistent with those used in the master drainage study. As such, it is our opinion that the fire station proposal will not result in any increase in required storage volume for the regional pond and would not adversely impact the conveyance infrastructure or neighboring properties.

Table 4.3

Table 4.4

References

- 1. Town of Erie Design Standards and Specifications (2024)
- 2. Urban Storm Drainage Criteria Manual, Urban Drainage and Flood Control District, Volume 1 revised March 2017, Volume 2 revised September 2017, Volume 3 Revised November 2010

Appendix	Title	Included Material
Appendix A	Hydrology	 Imperviousness Calculation Rational Method Runoff Calculations
Appendix B	Hydraulics	Street Cross-Section CapacitiesStorm Inlet Capacity
Appendix C	Reference Material	 FIRM Map Index – Panel 08013C0437J Flatiron Meadows Filing Map – Calibre Engineering, Inc (2012) Flatiron Meadows Filing Map – Calibre Engineering, Inc (2017) Page 8 of Phase III Drainage Report – Calibre Engineering, Inc (2012) Flatiron Meadows Sheet GE1 (4 of 29) Flatiron Meadows Filing No.1 Proposed Drainage Exhibit – Calibre Engineering, Inc (2012). Town of Erie Sub-Basin Map Town of Erie Standards and Specifications Section 800 pages 6-7 Storm Drainage System Inlet Design Information – Calibre Engineering, Inc (2012)
Appendix D	Drainage Maps	• Drainage Maps
Appendix E	Soils Information	Web Soil Survey Report

MVFR – STATION 15 FLATIRON MEADOWS MAST PLAT TRACT G PHASE III DRAINAGE REPORT



Impervious Percentage Calculations

Flatirons Meadows Tract G Erie, CO

Designer	Andres S			Overall Inputs				*Table 800-3	
Company	SSD			Land Use		% Imp	ervious		
Date	6/17/2024			Commercial A	Area	9	5%		
Project	Flatiron Meado	ws Fire Station		Neighborhood	d Areas	75	5%		
Location	Erie, CO			Residential		4	5%		
				Parks, Cemet	teries	1()%		
				Playgrounds		25	5%		
				Schools		55	5%		
				Paved Streets	S	10	0%		
				Gravel (packe	ed)	40)%		
				Railroad Yarc	Access	50)%		
				Public/Institut	ional	50)%		
				Roofs		90)%		
				Lawns, Sandy	y Soil	2	%		
				Lawns, Clay	Soil	2	%		
				Greenbelts, A	gricultural	2	%		
				Offsite Flow		4	<u>0%</u>		
				Undeveloped	HISTORIC FIOW	2	%		
Subcatchment	Total Area	NRCS	Open Space/Lawn	Roadways /Pavement	Residential	Institutional	Building Roof		Percent
Name	(ac)	Soil Group	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Area (ac)	% Check	Impervious
A1	0.28	B	0.18	0.03	1	7	0.07	100%	33.9%
A2	0.17	B	0.04	0.13				100%	79.0%
A3	1.00	B	0.39	0.39			0.22	100%	59.6%
A4	0.10	B	0.10	0.00				100%	2.0%
	1.55	. –							53.4%
E1	1.24	В	1.00	0.24				100%	21.0%
E2	6.96	С	3.74	1.20	2.02			100%	31.4%
E3	0.89	С	0.15	0.18	0.57			100%	48.7%
E4	1.21	C	0.44	0.24	0.54			100%	40.1%
E5	0.48	C	0.23	0.11	0.14			100%	36.8%
E6	0.64	В	0.23	0.21	0.19			100%	47.5%
E7	0.15	В	0.03	0.12				100%	80.4%
E8	3.55	С	2.52	1.03				100%	30.4%
FQ	2 79	I B	2 4 8	0.31	1 00			136%	28.8%



se Rational Method coefficients may not be valid for large basins.

Rainfall Intensities

fall intensities to be used in the computation of runoff using the Rational M

61

P1	1.02	С	0.71	0.24		0.07	100%	31.2%
P2	6.42	С	2.59	1.60	2.02	0.22	100%	42.8%
P7	0.39	В	0.21	0.18			100%	47.2%
P8	3.55	В	2.39	1.16			100%	34.1%

													Calcula	tion of Pe	eak Runof	f using Ra	tional Me	ethod																
Designer: Andres S Company: SSD Date: 10/31/2024 Project: Flatron Meadows Location: Erie	s Subdivision		Version 2 Cells of th Cells of th Cells of th	00 released May is color are for rec is color are for op is color are for cal	y 2017 quired us stional ove lculated r	ser-input erride values results based on o	overrides	t _i =	$\frac{0.395(1.1 - C_5)}{S_i^{0.33}} = \frac{L_t}{60K\sqrt{S_t}} = \frac{L}{60K}$	$\frac{\sqrt{L_i}}{V_t}$	Computed Regional t	$t_c = t_i + t_t$ $c = (26 - 17i)$	$+\frac{L_t}{60(14i+9)}$	/St	t _{minimum} = t _{minimum} = Selected t _c =	5 (urban) 10 (non-urban) = max{t _{minimum}	, min(Comput	ed t _c , Regional	t _c)}	Rainfall Int	Sele 1-hour rainfall ensity Equatior	depth, P1 (in) = n Coefficients =	tion for NOA 2-yr 0.82 a 28.50	A Atlas 14 Rain 5-yr 10 1.11 1 b 10.00 0.	all Depths fr -yr 25- 39 1.8 c 786 I (in	$\frac{yr}{36} = \frac{50 \cdot yr}{2.29}$ $\frac{a \cdot hr}{(b + 1)} = \frac{a \cdot hr}{(b + 1)}$	100-yr 2.68 P ₁ t _c) ^c	er your own 500-yr 4.16	depths obta	ained from t	the NOAA w	cfs) = CIA	this link)	
Subcatchment Name Area (ac) NRCS (ac) Soil Gro	S Perc ogic Impervio	ent ousness	2-yr 5-yr	Runoff Co 10-yr 25-	-yr	t, C 50-yr 100-yr	500-yr	Overland Flow Length L _i (ft)	Over U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	w Time Overland Flow Slope S _i (ft/ft)	Overland Flow Time t _i (min)	Channelized Flow Length L _t (ft)	U/S Elevation (ft) (Optional)	Chann D/S Elevation (ft) (Optional)	elized (Travel) F n Channelized Flow Slope S _t (ft/ft)	low Time 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	Peak 10-yr	Flow, Q (cfs 25-yr	50-yr	100-yr 500-yr
A1 0.28 B	33	.9	0.24 0.26	0.33 0.4	46	0.52 0.58	0.66	20.00	5172.31	5171.81	0.025	4.99	83.00	5171.81	5169.70	0.025	20	3.19	0.43	5.42	20.87	5.42	2.71	3.68 4	61 6.1	17 7.60	8.89	13.81	0.18	0.27	0.43	0.80	1.10	1.45 2.55
A2 0.17 B	79	.0	0.63 0.66	0.69 0.1	.75	0.77 0.79	0.83	0.00	5172.20	5172.19	100.000	0.00	100.81	5172.19	5171.25	0.009	20	1.93	0.87	0.87	13.44	5.00	2.77	3.76 4	.71 6.3	31 7.77	9.09	14.11	0.30	0.42	0.56	0.80	1.02	1.23 1.98
A3 1.00 B	57	.4	0.44 0.47	0.52 0.0	.61	0.65 0.69	0.75	27.00	5172.14	5171.89	0.009	6.08	267.52	5171.89	5167.94	0.015	5	0.61	7.34	13.42	18.40	13.42	1.95	2.65 3	.32 4.4	45 5.47	6.41	9.94	0.85	1.24	1.73	2.71	3.55	4.44 7.42
A4 0.10 B	2.	0	0.01 0.01	0.07 0.1	38	0.34 0.44	0.54	48.42	5172.45	5170.66	0.037	30.86	0.00			0.000	5	0.05	0.00	33.33	25.66	26.57	1.37	1.87 2	34 3.1	13 3.86	1.25	7.00	0.00	0.004	0.03	1.48	2.13	2.03 5.32
E1 1.24 B	21	.0	0.23 0.29	0.36 0.4	49	0.55 0.61	0.69	191.00	5170.84	5170.00	0.004	3.43	509.00	5170.00	5155.00	0.029	20	3.43	2.47	11.80	26.57	11.80	2.06	2.81 3	51 4.7	70 5.79	6.78	10.52	3.26	5.68	8.87	16.19	22.09	28.88 50.28
E2 6.96 C	31	.4	0.37 0.43	0.49 0.5	.59	0.63 0.68	0.74	29.00	5170.60	5167.00	0.000	0.17	311.00	5160.00	5145.00	0.026	20	3.21	8.38	1.79	19.76	5.00	2.77	3.76 4	.71 6.3	31 7.77	9.09	14.11	0.92	1.45	2.06	3.32	4.38	5.53 9.31
E3 0.00 C	40	1 -	0.30 0.36	0.43 0.5	.54	0.59 0.65	0.71	0.00			0.000	0.06	486.00	5160.00	5145.00	0.020	20	3.51	2.31	2.37	22.34	5.00	2.77	3.76 4	.71 6.3	31 7.77	9.09	14.11	1.00	1.65	2.43	4.15	5.56	7.13 12.20
E5 0.48 C	36	.8	0.27 0.33	0.40 0.4	.53	0.57 0.63	0.70	116.00	5153.00	5149.00	0.034	9.89	196.00	5149.00	5145.00	0.020	20	2.86	1.14	11.03	21.36	11.03	2.12	2.89 3	61 4.8	34 5.96	6.97	10.82	0.28	0.46	0.70	1.22	1.64	2.12 3.66
E6 0.64 B	47	.5	0.35 0.38	0.44 0.5	.55	0.59 0.65	0.71	0.00			0.000	0.06	258.00	5150.00	5144.00	0.023	20	3.05	1.41	1.47	19.73	5.00	2.77	3.76 4	.71 6.3	31 7.77	9.09	14.11	0.62	0.92	1.33	2.21	2.95	3.76 6.41
E7 0.15 B	80	.4	0.65 0.68	0.71 0.1	.75	0.78 0.80	0.83	0.00			0.000	0.03	52.00	5170.20	5169.80	0.008	20	1.75	0.49	0.53	12.82	5.00	2.77	3.76 4	.71 6.3	31 7.77	9.09	14.11	0.27	0.38	0.50	0.71	0.90	1.09 1.76
E8 3.55 C	30	.4	0.22 0.28	0.36 0.4	49	0.54 0.61	0.68	45.00	5172.00	5171.00	0.022	7.61	1571.00	5171.00	5129.00	0.027	20	3.27	8.01	15.61	32.91	15.61	1.82	2.47 3	.10 4.1	14 5.10	5.97	9.27	1.41	2.48	3.91	7.20	9.84	12.89 22.49
E9 2.79 B	28	.8	0.19 0.22	0.29 0.4	43	0.49 0.56	0.64	90.00	5144.00	5141.00	0.033	10.12	653.00	5141.00	5129.00	0.018	20	2.71	4.01	14.13	27.26	14.13	1.90	2.59 3	24 4.3	34 5.35	6.26	9.71	1.04	1.60	2.62	5.21	7.29	9.77 17.38
P1 1.02 C	33	.8	0.25 0.31	0.38 0.5	.51	0.56 0.62	0.69	103.90	5172.30	5169.90	0.023	11.02	509.00	5169.90	5155.00	0.029	20	3.42	2.48	13.50	23.86	13.50	1.94	2.65 3	.31 4.4	43 5.46	6.39	9.91	0.49	0.84	1.29	2.30	3.12	4.05 7.02
P2 6.42 C	42	.8	0.32 0.38	0.45 0.4	.56	0.60 0.66	0.72	29.00	5170.60	5167.00	0.124	3.03	1305.00	5167.00	5145.00	0.017	20	2.60	8.38	11.41	29.90	11.41	2.09	2.85 3	.56 4.7	77 5.87	6.87	10.67	4.32	7.01	10.22	17.11	22.79	29.08 49.51
P7 0.39 B	47	.2	0.35 0.38	0.44 0.	.55	0.59 0.65	0.71	67.00	5172.21	5170.16	0.031	7.37	0.00			0.000	5	0.05	0.00	7.37	17.98	7.37	2.47	3.35 4	20 5.6	6.92	8.10	12.57	0.33	0.50	0.72	1.20	1.60	2.04 3.48
P8 3.55 B	34	.1	0.24 0.27	0.33 0.4	.46	0.52 0.58	0.66	45.00	5172.80	5171.40	0.031	6.95	1571.00	5171.40	5129.00	0.027	20	3.29	7.97	14.92	31.77	14.92	1.86	2.53 3	.16 4.2	23 5.21	6.10	9.47	1.57	2.38	3.73	6.96	9.59	12.66 22.21
																					1													

Flatirons Meadows Tract G Erie, CO

Designer	Andres S
Company	SSD
Date	6/24/2024
Project	Flatirons Meadows Tract G
Location	Erie, CO

	BASIN SUMMARY TABLE - Tract G											
BASIN ID	DESIGN POINT	AREA (ac)	% IMPERVIOUS	C5	C100	Q5	Q100					
A1	1	0.28	33.9%	0.26	0.58	0.27	1.45					
A2	2	0.17	79.0%	0.66	0.79	0.42	1.23					
A3	3	1.00	59.6%	0.47	0.69	1.24	4.44					
A4	4	0.10	2.0%	0.47	0.44	0.004	0.32					

	EXISTING BASIN SUMMARY TABLE - Overall												
BASIN ID	DESIGN POINT	AREA (ac)	% IMPERVIOUS	C5	C100	Q5	Q100						
E1	17	1.24	21.0%	0.16	0.52	0.36	2.93						
E2	5	6.96	31.4%	0.29	0.61	5.68	28.88						
E3	5.1	0.89	48.7%	0.43	0.68	1.45	5.53						
E4	5A	1.21	40.1%	0.36	0.65	1.65	7.13						
E5	5A.1	0.48	36.8%	0.33	0.63	0.46	2.12						
E6	5B	0.64	47.5%	0.38	0.65	0.92	3.76						
E7	25	0.15	80.4%	0.68	0.80	0.38	1.09						
E8	21	3.55	30.4%	0.28	0.61	2.48	12.89						
E9	22	2.79	28.8%	0.22	0.56	1.60	9.77						

	PROPOSED BASIN SUMMARY TABLE - Overall (Post Development of Tract G)											
BASIN ID	DESIGN POINT	AREA (ac)	% IMPERVIOUS	C5	C100	Q5	Q100					
P1	17	1.02	31.2%	0.31	0.62	0.84	4.05					
P2	5	6.42	42.8%	0.38	0.66	7.01	29.08					
P7	25	0.39	47.2%	0.38	0.65	0.50	2.04					
P8	21	3.55	34.1%	0.27	0.58	2.38	12.66					

MVFR – STATION 15 FLATIRON MEADOWS MAST PLAT TRACT G PHASE III DRAINAGE REPORT

Appendix B Hydraulics

MHFD-Inlet, Version 5.03 (August 2023) INLET MANAGEMENT

TNI ET NAME	DP 17	DP 21	DP 22	DP 25	DP 5	DP 5 1	DP 54	DP 54 1	DP 58
Site Type (Urban or Rural)	URBAN	URBAN	LIRBAN	LIRBAN	LIRBAN	LIBBAN	LIRBAN	LIRBAN	URBAN
Inlat Application (Street or Area)	STREET	CTREET	CTREET	CTREET	CTREET	CTREET	CTREET	CTREET	CTREET
Hudraulic Condition	On Grade	On Grada	In Sump	On Grada	On Grada	In Sump	On Grade	In Sump	JI Sumo
Injet Tures	CDOT Turce R Curb Opening	CDOT Turos B Curch Onoming	CDOT Tupo R Curb Opening	CDOT Turos R Curb Opening	CDOT Turce R Curb Opening	CDOT Type R Cyrb Opening	CDOT Turos R Curch Opening	CDOT Turce R Curth Opening	CDOT Turce R Curb Opening
Inec type	CDOT Type K Carb Opening	CDOT Type K Curb Opening	CDOT Type K Curb Opening	CDOT Type K Curb Opening	coor type k carb opening	COOT Type K carb opening	CDOT Type K curb Opening	CDOT Type K Curb Opening	COOT Type K Carb Opening
USER-DEFINED INPUT									
User-Defined Design Flows									
Minor Q _{Kryan} (cfs)	0.8	2.4	1.6	0.5	7.0	1.5	1.7	0.5	0.9
Maior Oxivian (cfs)	4.1	12.7	9.8	2.0	29.1	5.5	7.1	2.1	3.8
Bypass (Carry-Over) Flow from Upstream	Inlets must be organized from upst	tream (left) to downstream (right) in orde	er for bypass flows to be linked.						
Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	DP 21	No Bypass Flow Received	No Bypass Flow Received	DP 5	User-Defined	DP 5A	No Bypass Flow Received
Minor Bypass Flow Received, Q, (cfs)	0.0	0.0	0.0	0.0	0.0	1.4	2.5	0.2	0.0
Maior Bypass Flow Received. On (cfs)	0.0	0.0	5.1	0.0	0.0	18.2	14.2	11.8	0.0
Watershed Characteristics									
Subcatchment Area (acres)									
Percent Impervious									
NRCS Soil Type									
Watershed Profile									
Overland Slope (ft/ft)									
Overland Length (ft)									
Channel Slope (ft/ft)									
Channel Length (ft)									
		-1				•	•		
Minor Storm Rainfall Input									
Design Storm Return Period, T, (years)									
One-Hour Precipitation, P1 (inches)									
Major Storm Rainfall Input									
Design Storm Return Period, T, (years)									
One-Hour Precipitation, P ₁ (inches)									
CALCULATED OUTPUT									
Minor Total Design Peak Flow, O (cfs)	0.8	2.4	1.6	0.5	7.0	2.9	4.2	0.6	0.9
Major Total Design Peak Flow, Q (cfs)	4.1	12.7	14.9	2.0	29.1	23.7	21.3	13.9	3.8
Minor Flow Bypassed Downstream, Q, (cfs)	0.0	0.0	N/A	0.0	1.4	N/A	0.2	N/A	N/A
Major Flow Bypassed Downstream, Q _h (cfs)	1.6	5.1	N/A	0.3	18.2	N/A	11.8	N/A	N/A
		2.1					-110		





Note: Storm sewer should be sized for the sum of the unclogged interception capacities (Qminor = 0.8 cfs and Qmajor = 2.7 cfs)

MHFD-Inlet, Version 5.03 (August 2023) ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm) (Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Worksheet Protected

Quick Links INTRO Q-Peak Inlet Management



INLET ON A CONTI	INUOUS G	RADE			
MHFD-Inlet, Version 5.	03 (August 2023	2)			
۲ Lo (C)					
H-Curb					
IN / Ferrar					
10(0)					
CDOT Type R Curb Opening		MINOR	MAIOR		
Type of Inlet	Type =	CDOT Type R	Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	inches	
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1		
Length of a Single Unit Inlet (Grate or Curb Opening)	L ₀ =	10.00	10.00	ft	
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_ =	N/A	N/A	ft	
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_{r}(G) =$	N/A	N/A		
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_f(C) =$	0.10	0.10	1	
Street Hydraulics: OK - Q < Allowable Street Capacity		MINOR	MAJOR		
Total Inlet Interception Capacity	Q =	2.4	7.6	cfs	
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q _b =	0.0	5.1	cfs	
Capture Percentage = O_a/O_a	C% =	100	60	%	

Note: Storm sewer should be sized for the sum of the unclogged interception capacities (Qminor = 2.4 cfs and Qmajor = 8 cfs)



INLET IN A SUMP OR SAG LOCATION





CDOT Type R Curb Opening				
Design Information (Input)	-	MINOR	MAJOR	_
Type of Inlet	Type =	CDOT Type R	Curb Opening	
Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.7	24.0	Jinches
Grate Information		MINOR	MAJOR	_
Length of a Unit Grate	$L_{o}(G) =$	N/A	N/A	feet
Width of a Unit Grate	W _o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	$C_{f}(G) =$	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_{w} (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_o(G) =$	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	_
Length of a Unit Curb Opening	$L_{o}(C) =$	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H _{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	$C_{f}(C) =$	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	$C_{w}(C) =$	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	$C_{o}(C) =$	0.67	0.67	
	-			-
Low Head Performance Reduction (Calculated)	-	MINOR	MAJOR	_
Depth for Grate Midwidth	d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d _{Curb} =	0.31	1.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF _{Curb} =	0.92	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	N/A	N/A	
	-	MINOR	MAJOR	_
Total Inlet Interception Capacity (assumes clogged condition)	Qa =	7.3	35.9	cfs
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	Q PEAK REQUIRED =	1.6	14.9	cfs





Note: Storm sewer should be sized for the sum of the unclogged interception capacities (Qminor = 0.5 cfs and Qmajor = 1.8 cfs)





Note: Storm sewer should be sized for the sum of the unclogged interception capacities (Qminor = 5.8 cfs and Qmajor = 11.6 cfs)

MHFD-Inlet, Version 5.03 (August 2023) ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm) (Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)



INLET IN A SUMP OR SAG LOCATION MHFD-Inlet, Version 5.03 (August 2023)



CDOT Type R Curb Opening				
Design Information (Input)		MINOR	MAJOR	_
Type of Inlet	Type =	CDOT Type R	Curb Opening	
Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.6	24.0	I Overnde Depths
Grate Information		MINOR	MAJOR	
Length of a Unit Grate	$L_{o}(G) =$	N/A	N/A	feet
Width of a Unit Grate	W _o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	$C_{f}(G) =$	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	$C_{w}(G) =$	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_o(G) =$	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	$L_{o}(C) =$	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H _{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	$C_f(C) =$	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	$C_w(C) =$	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	$C_{o}(C) =$	0.67	0.67	
	•			-
Low Head Performance Reduction (Calculated)	-	MINOR	MAJOR	_
Depth for Grate Midwidth	d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d _{Curb} =	0.22	1.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF _{curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	N/A	N/A	
		MINOR	MAJOR	_
Total Inlet Interception Capacity (assumes clogged condition)	Q _a =	2.9	17.2	cfs
WARNING: Inlet Capacity < Q Peak for Minor and Major Storms	Q PEAK REQUIRED =	2.9	23.7	cfs

The Ponding Depths default to the minimum of the depth values for maximum allowable depth (cells D29:E29) or the depth based on allowable spread (cells D36:E36). You can override these default values by checking the 'Override Depths' checkbox.

Quick Links INTRO Q-Peak Inlet Management



INLET ON A CONTINUOUS GRADE MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R	Curb Opening	
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L _o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W _o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_{f}(G) =$	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_{f}(C) =$	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity		MINOR	MAJOR	_
Total Inlet Interception Capacity	Q =	4.0	9.6	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b =$	0.2	11.8	cfs
Capture Percentage = Q_a/Q_o	C% =	96	45	%

Note: Storm sewer should be sized for the sum of the unclogged interception capacities (Qminor = 4.1 cfs and Qmajor = 10.1 cfs)





INLET IN A SUMP OR SAG LOCATION

Low Head Performance Reduction (Calculated) MINOR MAJOR Depth for Grate Midwidth d_{Grate} N/A N/A fl Depth for Curb Opening Weir Equation Grated Inlet Performance Reduction Factor for Long Inlets d_{Curb} = 0.22 1.83 1_{ft} $\mathsf{RF}_{\mathsf{Grate}}$ N/A N/A Curb Opening Performance Reduction Factor for Long Inlets RF_{Curb} = 1.00 1.00 Combination Inlet Performance Reduction Factor for Long Inlets RF_{Co} N/A N/A tion MINOR MAJOR Total Inlet Interception Capacity (assumes clogged condition) Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak) 17.2 13.9 Q_a = **2.9** 0.6 cfs Q PEAK REQUIRED



INLET IN A SUMP OR SAG LOCATION



	CDOT Type R Curb Opening				
Design Information (Input)			MINOR	MAJOR	_
Type of Inlet		Type =	CDOT Type R	Curb Opening	
Local Depression (additional to c	continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or	Curb Opening)	No =	3	3	
Water Depth at Flowline (outside	e of local depression)	Ponding Depth =	4.6	24.0	Vernae Depths
Grate Information			MINOR	MAJOR	
Length of a Unit Grate		$L_{o}(G) =$	N/A	N/A	feet
Width of a Unit Grate		W _o =	N/A	N/A	feet
Open Area Ratio for a Grate (typ	ical values 0.15-0.90)	A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grat	e (typical value 0.50 - 0.70)	$C_{f}(G) =$	N/A	N/A	
Grate Weir Coefficient (typical va	alue 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical	value 0.60 - 0.80)	$C_{0}(G) =$	N/A	N/A	
Curb Opening Information		-	MINOR	MAJOR	_
Length of a Unit Curb Opening		$L_{o}(C) =$	5.00	5.00	feet
Height of Vertical Curb Opening	in Inches	H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in	Inches	H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (t	typically the gutter width of 2 feet)	W _p =	2.00	2.00	feet
Clogging Factor for a Single Curt	o Opening (typical value 0.10)	$C_{f}(C) =$	0.10	0.10	
Curb Opening Weir Coefficient (t	typical value 2.3-3.7)	$C_w(C) =$	3.60	3.60	
Curb Opening Orifice Coefficient	(typical value 0.60 - 0.70)	$C_{o}(C) =$	0.67	0.67	
					-
Low Head Performance Reduce	tion (Calculated)	-	MINOR	MAJOR	_
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Eq	uation	d _{Curb} =	0.22	1.83	ft
Grated Inlet Performance Reduct	RF _{Grate} =	N/A	N/A		
Curb Opening Performance Reduction Factor for Long Inlets		RF _{curb} =	0.69	1.00	
Combination Inlet Performance F	Reduction Factor for Long Inlets	RF _{Combination} =	N/A	N/A	
		-	MINOR	MAJOR	_
Total Inlet Interception Capacity	(assumes clogged condition)	Q _a =	4.6	54.9	cfs
Inlet Capacity IS GOOD for M	linor and Major Storms (>Q Peak)	$Q_{PEAK REQUIRED} =$	0.9	3.8	cfs

MVFR – STATION 15 FLATIRON MEADOWS MAST PLAT TRACT G PHASE III DRAINAGE REPORT





FLOOD HAZARD INFORMATION

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM) available products associated with its FIRM including historic versions, the current map date for each TRIM panel, how to order products, or the National Flood Insurance Program (NFIP) is general, please call the FEMA Hogoing and Insurance ackhange at 1877/FEMA-MAP (1877-382-6227) or visit the FEMA Flood Mag. Service Center versions at https://msc.fema.gov. Available products may include previously issued Letters of Mag. Change, a Flood Insurance.Study.Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the webste.

nities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as ent FIRM Index. These may be ordered directly from the Flood Mag Service Center at the number listed

nity and countywide map dates refer to the Flood Insurance Study Report for this ju

nine if flood insurance is available in this community, contact your insurance agent or call the Nationa urance Program at 1-800-638-6620.

ation shown on the FIRM was derived from the Bureau of Land Management, dated 2011, the eospatial Open Data site, dated 2019, and the US Department of Agriculture Natural Resources of 2014.

ADMINISTRATIVE FLOODWAY: Check with your local community floodplain information.

SCALE

0438

0439

0443

VERSION NUMBER 2.5.3.6

1

FEMA

0437 0437 ĸ

MAP NUMBER 08013C0437K

MAP REVISED **OCTOBER 24, 2024**

Without Base Flood Elevation (BFE)

With BFE or Depth Zone AE, AO, AH, VE, AR

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

Levee. See Notes. Zone X

Area of Undetermined Flood Hazard Zone D

No Digital Data Available

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

XREFS: 10EMA, 33BASE, 32BASE, 10base

P:\WORTH FLATIRON\CADD\Exhibits\ PLOTTED BY: khouse

DRAWING NAME: 10DR-FILING MAP.dwgPATH:

FLATIRON MEADOWS PHASE III DRAINAGE REPORT FILING NO. 1 Page 8

of the future multi-family parcel depicted as Tract D on the Flatiron Meadows Master Plat.

- 4.4 Detention Pond Storage and Outlet Design
 - An interim detention and water quality pond is proposed for Filing No. 1, Filing No. 2 and Filing No. 3.
 - Ultimately Filing No. 1 will drain to the regional detention facility and water quality pond to the west ponds 1034 and 1029.
 - Design calculations for the interim pond, including the outlet and trash rack are in Appendix D.
 - As stated previously the interim pond outfall pipe crossing the Leyner Cottonwood Ditch was sized to convey developed flows from future multifamily parcel.

4.5 Maintenance Access & Easements and Tracts

- Storm sewer systems will be accessed from the proposed roads onsite.
- Easements and tracts will be used for drainage purposes in specific locations where flooding in the 100-year storm may occur.
- Other storm sewer will be kept within the right-of-way to minimize special drainage easements and tracts.

4.6 Impact on Downstream Properties & Existing Floodplains

• Downstream properties should not be affected by the development of the proposed site. The interim detention and water quality pond will provide the appropriate detention to control the release from the Flatiron Meadows Development to the downstream properties to the north.

5.0 BEST MANAGEMENT PRACTICES

5.1 Construction BMP's

- Trash receptacles will have covers preventing precipitation from entering and regular trash pick-up to occur when receptacles are near full capacity.
- Portable toilets will be cleaned regularly and securely pinned down to the ground.
- Chemical substances on site shall be identified, listed and the Material Safety Data Sheet (MSDS) obtained for each.
- Containers shall be labeled to show the name and type of substance, stock number, expiration date, health hazards including reactivity, corrosivity, ignitability and toxicity, suggestions for handling, and first aid information.

Name E1.dwg	0 30	60 	120	RADO LICENT	Calibre	FL
^{ber} ORTH FLATIRON	1 inch :	= 60 ft. Ho	orizontal	37660 03-31-16	Calibre Engineering, Inc. 9090 South Ridgeline Blvd., Suite 105	REGIONAL DE
I For IT FLATIRON LP	Designer KLH	Drafter KLH	Checked BKM	NAL ENGLINE	Highlands Ranch, CO 80129 (303) 730-0434 www.calibre-engineering.com Municipal Engineering Development Surveying	GRADINO

E:WORTH FLATIRON/CADD/EXHIBITS\32
TED BY: Kristine House
 PLOT DATE: 1

:\2234\GIS\2234.MXD - 12/12/12 - NRT

WRC ENGINEERING, INC. 950 SOUTH CHERRY STREET, SUITE 404 DENVER, COLORADO 80246 PHONE: 303-757-8513 FAX: 303-758-3208

TOWN OF ERIE OUTFALL SYSTEMS PLAN (WEST OF COAL CREEK)

SUBBASIN MAP

FIGURE B-2

813.03 Runoff Computations, Colorado Urban Hydrograph Procedure (CUHP)

The CUHP method is generally applicable to drainage basins greater than 90 acres. However, the CUHP is required for watershed areas larger than 160-acres. The procedures for the CUHP, as explained in the Urban Storm Drainage Criteria Manual, shall be followed in the preparation of drainage reports and storm drainage facility designs in the Town. The CUHP program requires the input of a design storm, either as a detailed hyetograph or as a 1-hour rainfall depth. The program for the latter using the 2-hour storm distribution recommended in the Urban Storm Drainage Criteria Manual generates a detailed hyetograph distribution. The 1-hour rainfall depths for the Town of Erie are presented in Table 800-2.

UNE-HOUK KAINFALL DEFTH						
Design Storm	Rainfall Depth (in.)					
2-Year	0.81					
5-Year	1.11					
10-Year	1.39					
25-Year	1.84					
50-Year	2.24					
100-Year	2.68					
500-Year	3.89					

Table 800-2 TOWN OF ERIE ONE-HOUR RAINFALL DEPTH

The hydrograph from the CUHP program must be routed through any proposed conveyance facility using the Storm Water Management Model (SWMM) or a similar method approved by the Town Engineer.

813.04 Runoff Computations, Rational Method

The Rational Method will be utilized for sizing storm sewers and for determining runoff magnitude from un-sewered areas. The limit of application of the Rational Method is approximately 160 acres. When the drainage basin exceeds 160 acres, the CUHP method shall be used. The procedures for the Rational Method, as explained in the Urban Storm Drainage Criteria Manual, shall be followed in the preparation of drainage reports in the Town.

813.05 Runoff Coefficients

<u>Rational method runoff coefficients</u>: The runoff coefficient (C) to be used in conjunction with the Rational Method will be calculated using the percent imperviousness shown in Table 800-3 as explained in the Urban Storm Drainage Criteria Manual.

LAND USE OR SURFACE	PERCENT		
CHARACTERISTICS	IMPERVIOUS		
Business			
Commercial Areas	95		
Neighborhood Areas	75		
Residential Lots (Lot Area Only):			
Single-Family			
2.5 Acres or Larger	12		
0.75 – 2.49 Acres	20		
0.25 – 0.74 Acres	30		
0.24 Acres or Less	45		
Apartments	75		
Industrial:			
Light Areas	80		
Heavy Areas	90		
Parks, Cemeteries	10		
Playgrounds	25		
Schools	55		
Railroad Yard Areas	50		
Undeveloped Areas:			
Historic Flow Analysis	2		
Greenbelts, Agricultural	2		
Offsite Flow Analysis	45		
(when land use not defined)			
Streets:			
Paved	100		
Gravel (Packed)	40		
Drives and Walks	90		
Roofs	90		
Lawns, Sandy Soil	2		
Lawns, Clay Soil	2		

TABLE 800-3PERCENT IMPERVIOUS FOR RATIONAL METHOD

Note: These Rational Method coefficients may not be valid for large basins.

813.06 Rainfall Intensities

The rainfall intensities to be used in the computation of runoff using the Rational Method shall be obtained from the Rainfall Intensity Duration Curves for the Town of Erie, included in these STANDARDS AND SPECIFICATIONS, or can be computed using the following equation.

STORM DRAINAGE SYSTEM DESIGN

INLET DESIGN INFORMATION

Calc. by: KLH

					<u>Chk'd by:</u> BKM					ВКМ	
LOCATION:	FILING N	0. 1			FLATIRON ME	ADOWS		Т	OWN OF ERIE	Date:	1/26/2012
Design Point	Q2 (cfs)	Q100 (cfs)	Inlet Size	On-Grade or Sump	Ponding Depth 2 Year (in)	Inlet Capacity 2 Year (cfs)	Carryover 2 Years (cfs)	Ponding Depth 100 Year (in)	Inlet Capacity 100 Year (cfs)	Carrryover 100 Year (cfs)	Comments
5	5.8	23.3	10' Type R	On-Grade	N/A	5.3	0.5	N/A	10.9	12.4	Carryover to DP 5a
5a	2.0	8.0	10' Type R	On-Grade	N/A	2.5	0.0	N/A	10.2	10.2	Carryover to DP 5b
5b	0.8	3.2	15' Type R	Sump	0.00	13.5	0.0	1.3	34.0	0.0	Captures 100 Year Flow
7	7.4	39.6	20' Type R	Sump	0.00	18.1	0.0	1.3	45.8	0.0	Captures 100 Year Flow
18	3.1	12.3	10' Type R	Sump	0.00	3.1	0.0	1.1	13.3	0.0	Captures 100 Year Flow
19	2.3	9.1	10' Type R	Sump	0.00	3.1	0.0	1.1	13.3	0.0	Captures 100 Year Flow
21	4.5	17.9	Туре С	Sump	N/A	14.0	0.0	N/A	20.0	0.0	Captures 100 Year Flow
22	2.1	8.4	10' Type R	On-Grade	0.00	2.1	0.0	0.0	6.6	1.8	Carryover to DP 24
23	2.1	6.6	10' Type R	On-Grade	0.00	2.1	0.0	0.0	5.7	0.9	Carryover to DP 24
INTERIN	I CONDIT	IONS									
5	3.2	20.6	10' Type R	On-Grade	N/A	3.2	0.0	N/A	10.3	10.3	Carryover to DP 5a
5a	2.0	8.0	10' Type R	On-Grade	N/A	2.0	0.0	N/A	9.7	8.6	Carryover to DP 5b
5b	0.8	3.2	15' Type R	Sump	0.00	13.5	0.0	1.3	34.0	0.0	Captures 100 Year Flow (2)
7	4.1	58.1	20' Type R	Sump	0.00	18.1	0.0	1.3	45.8	12.3	Captures 100 Year Flow ⁽²⁾

NOTES:

1 Inlet capacities determined by UD-Inlet Spreadsheets using 4" depth for Minor Storm Event and ROW Elevation for Major Storm Event

Ponding detpth is at crown of street

2 Design Points 5b and 7 share a sump and flows will overtop the crown of the road in the 100-year event, therefore it is assumed that the total runoff tributary to these two points can be split between the two inlets.

MVFR – STATION 15 FLATIRON MEADOWS MAST PLAT TRACT G PHASE III DRAINAGE REPORT

BASIN SUMMARY TABLE - Tract G								
BASIN ID	DESIGN POINT	AREA (ac)	% IMPERVIOUS	C5	C100	Q5	Q100	
A1	1	0.28	33.9%	0.26	0.58	0.27	1.45	
A2	2	0.17	79.0%	0.66	0.79	0.42	1.23	
A3	3	1.00	59.6%	0.49	0.70	1.30	4.53	
A4	4	0.10	2.0%	0.49	0.44	0.004	0.32	

DRAINAGE MAP LEGEND

DESIGN POINT (OUTFALL)

— > — > — > — FLOW PATH

DRAINAGE DIVIDE

	88 INVERNESS CIRCLE EAST, SUITE B-101 ENGLEWOOD, CO 80112	STRATEGIC (720) 206-6931 SITE DESIGNS DEFINITION OF TRANSPORTED OF TO	CPERDUE@STRATEGICSITEDESIGNS.COM	ATTENTION: CHRISTOPHER PERDUE, P.E., I		
FLATIRONS MEADOWS	FIRE STATION	ERIE. CO		COUNTY		
PROPOSED DRAINAGE MAP						
BY DATE						
NOI						
EV DESCRIPT						
문 JOB NO ORIGIN		UE:	23 6/1	21-0 7/24	01 1	
DESIG CHECK SCALE	N BY: (ED BY: :		AS M[1"	5 DC = 20	D'	
SHEET		ER -0	1			

1.B.A.

% IMPERVIOUS	C5	C100	Q5	Q100
31.2%	0.31	0.62	0.84	4.05
42.8%	0.38	0.66	7.01	29.08
47.2%	0.38	0.65	0.50	2.04
34.1%	0.27	0.58	2.38	12.66

MVFR – STATION 15 FLATIRON MEADOWS MAST PLAT TRACT G PHASE III DRAINAGE REPORT

USDA Natural Resources Conservation Service Web Soil Survey National Cooperative Soil Survey

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AcA	Ascalon sandy loam, 0 to 3 percent slopes	В	7.2	23.1%
AcC	Ascalon sandy loam, 3 to 5 percent slopes	В	4.3	13.7%
HaD	Hargreave fine sandy loam, 3 to 9 percent slopes	C	19.0	60.9%
MdD	Manter sandy loam, 3 to 9 percent slopes	A	0.7	2.3%
Totals for Area of Intere	st	31.2	100.0%	

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition Component Percent Cutoff: None Specified Tie-break Rule: Higher

STORM DRAINAGE FACILITIES

existence or function of a ditch. If a variance is requested to the Town Engineer for use of a ditch as an outfall, it is the design engineer's responsibility to complete all studies and designs deemed necessary by the Town Engineer to support the use of the ditch as well as a secondary drainage design should the ditch cease to exist.

Expressed written approval must be obtained from the managing organization for irrigation ditches being considered for crossing or easements.

813.00 Design Methods

813.01 Initial and Major Design Storms

Every urban area has two separate and distinct drainage systems whether or not they are actually planned for and designed. One is the initial system corresponding to the initial (or ordinary) storm recurring at regular intervals. The other is the major system corresponding to the major (or extraordinary storm), which is unlikely to occur more often than once in 100 or more years. Since the effects and routing of storm waters for the major storm may not be the same as for the initial storm, all storm drainage plans submitted for acceptance will detail two separate systems; one indicating the effects of the initial storm and the other showing the effects of the major storm.

- A. *Initial storm provisions:* The objectives of such drainage system planning are to minimize inconvenience, to protect against recurring minor damage, to reduce rising maintenance costs, and to create an orderly drainage system. The initial storm drainage system may include such facilities as curb and gutter, storm sewer, swales, and other open drainageways and detention facilities.
- B. *Major storm provisions:* The major storm will be considered the 100-year storm. The objectives of the major storm planning are to eliminate substantial property damage or loss of life and will be as directed and accepted by the Town Engineer. Major drainage systems may include storm sewers, open drainageways and detention facilities. The correlation between the initial and major storm system will be analyzed to insure a well-coordinated drainage system.
- 813.02 Storm Return Periods

The initial and major storm design return periods will not be less than those found in Table 800-1:

Land Use or Zoning	Design Storm Return Period		
	Initial Storm	Major Storm	
Residential	2-year	100-year	
Commercial and Business	5-year	100-year	
Public Building Areas	5-year	100-year	
Parks, Greenbelts, etc.	2-year	100-year	

TABLE 800-1DESIGN STORM RETURN PERIODS