FINAL DRAINAGE PLAN

LORSON RANCH EAST FILING NO. 3

JANUARY 15, 2019

SF-19-0X / EGP 18-002

SF-19-003

Prepared for:

Lorson, LLC
212 N. Wahsatch Ave, Suite 301
Colorado Springs, Colorado 80903
(719) 635-3200

Prepared by:

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Project No. 100.049

CORE
ENGINEERING GROUP

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ENGINEER'S STATEMENT

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

Richard L. Schindler, P.E. #33997 Date
For and on Behalf of Core Engineering Group, LLC

OWNER'S STATEMENT

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

Lorson, LLC Date

By
Jeff Mark

Title
Manager

Address
212 N. Wahsatch Avenue, Suite 301, Colorado Springs, CO 80903

FLOODPLAIN STATEMENT

To the best of my knowledge and belief, this development is not located within a designated floodplain as shown on Flood Insurance Rate Map Panel No. 08041C0957 F and 08041C1000 F, dated March 17, 1997 and modified by modified per LOMR Case No. 14-08-0534P. (See Appendix A, FEMA FIRM Exhibit)

Richard L. Schindler, #33997 Date

EL PASO COUNTY

Filed in accordance with the requirements of the El Paso County Land Development Code, Drainage Criteria Manual, Volume 1 and 2, and Engineering Criteria Manual, As Amended.

Jennifer Irvine Date
County Engineer/ECM Administrator

Conditions: _____

1.0 LOCATION and DESCRIPTION

Lorson Ranch East Filing No. 3 is located east of the East Tributary of Jimmy Camp Creek and north of Lamprey Drive. The site is located on approximately 19.497acres of vacant land. This project will develop this site into single-family residential developments. The land for the residential lots is currently owned by Lorson LLC or its nominees for Lorson Ranch.

The site is located in the South 1/2 of Section 13, Township 15 South and Range 65 West of the 6th Principal Meridian. The property is bounded on the south by Lamprey Drive, on the east by unplatted land in Lorson Ranch, on the west by Lorson Ranch East Filing No. 2, and the north by unplatted land in Banning Lewis Ranch. For reference, a vicinity map is included in Appendix A of this report.

Conformance with applicable Drainage Basin Planning Studies

There is an existing (unapproved) DBPS for Jimmy Camp Creek prepared by Wilson & Company in 1987, and is referenced in this report. On March 9, 2015 a new DBPS for Jimmy Camp Creek and the East Tributary was completed by Kiowa Engineering. The Kiowa Engineering DBPS for Jimmy Camp Creek has not been adopted by El Paso County but is allowed for concept design. There are no major drainageway improvements shown for this site. Channel improvements in the East Tributary west of this site were designed by Kiowa Engineering and are currently under construction and must be completed before this final plat is recorded. Channel improvements south of Fontaine Boulevard within this final plat limits were constructed in 2014.

Conformance with Lorson Ranch East MDDP and PDR by Core Engineering Group

Core Engineering Group has an approved MDDP for Lorson East and PDR for Lorson Ranch East which covers this final plat area. This FDR conforms to the MDDP and PDR for Lorson East and is referenced in this report. Detention/WQ Pond C5 required for this plat has been constructed as part of Lorson Ranch East Filing No. 1 and does not need modification at this time. The adjacent East Tributary Channel has also been reconstructed as part of Lorson Ranch East Filing No. 1. There are also two bridges over the East Tributary and one bridge over Jimmy Camp Creek at Lorson Boulevard that are required to be built for this plat. The East Tributary bridges are located at Fontaine Boulevard and Lorson Boulevard and are currently under construction. The Jimmy Camp Creek Bridge is approved for construction but is waiting on an approved CLOMR from FEMA. Construction of all bridges must be complete prior to recordation of this plat.

Lorson Ranch East is located within the ***"Jimmy Camp Creek Drainage Basin"***, which is a fee basin in El Paso County.

2.0 DRAINAGE CRITERIA

The supporting drainage design and calculations were performed in accordance with the City of Colorado Springs and El Paso County "Drainage Criteria Manual (DCM)", dated November, 1991, the El Paso County "Engineering Criteria Manual", Chapter 6 and Section 3.2.1 Chapter 13 of the City of Colorado Springs Drainage Criteria Manual dated May 2014, and the UDFCD "Urban Storm Drainage Criteria Manual" Volumes 1, 2 and 3 for inlet sizing. No deviations from these published criteria are requested for this site.

The Rational Method as outlined in Section 6.3.0 of the May 2014 "Drainage Criteria Manual" and in Section 3.2.8.F of the El Paso County "Engineering Criteria Manual" was used for basins less than 130 acres to determine the rainfall and runoff conditions for the proposed development of the site. The runoff rates for the 5-year initial storm and 100-year major design storm were calculated.

Current updates to the Drainage Criteria manual for El Paso County states the if detention is necessary, Full Spectrum Detention will be included in the design, based on this criteria, Full Spectrum Detention will be required for this development. Pond C5 is currently under construction as part of Lorson Ranch East Filing No. 1 and will be complete prior to recordation of this plat.

3.0 EXISTING HYDROLOGICAL CONDITIONS

Prior to the early grading of Lorson Ranch East the site was undeveloped with native vegetation (grass with no shrubs) and moderate to steep slopes in a westerly direction the East Tributary of Jimmy Camp Creek.

The Soil Conservation Service (SCS) classifies the soils within the Lorson Ranch East property as Ascalon Sandy Loam, Manzanola clay loam; Nelson-Tassel fine Sandy loam. The sandy and silty loams are considered hydrologic soil group B soils with moderate to moderately rapid permeability. The Midway and Razor clay loams are considered hydrologic soil group C soils with slow permeability. All of these soils are susceptible to erosion by wind and water, have low bearing strength, moderate shrink-swell potential, and high frost heave potential (see table 3.1 below). The clay loams are difficult to vegetate and comprise of a small portion of the study area. These soils can be mitigated easily by limiting their use as topsoil since they comprise of a small portion of the study area. Weathered bedrock will be encountered beneath some of the site but it can be excavated using conventional techniques.

Table 3.1: SCS Soils Survey

Soil	Hydro. Group	Shrink/Swell Potential	Permeability	Surface Runoff Potential	Erosion Hazard
3-Ascalon Sandy Loam	B	Moderate	Moderate	Slow to Medium	Moderate
52-Manzanola Clay Loam	C	High	Slow	Medium	Moderate
56-Nelson – Tassel Fine Sandy Loam	B	Moderate	Moderately Rapid	Slow	Moderate

Excerpts from the SCS “Soil Survey of El Paso County Area, Colorado” [2] are provided in ***Appendix A*** for further reference.

For the purpose of preparing hydrologic calculations for this report, the soil of each basin are assumed to be wholly comprised of the majority soil hydrologic group. The majority of this site is to be filled by material from the school site which is Razor Clay Loam which is Hydrologic Group C therefore the hydrologic conditions are assumed to be Group C.

An existing electrical easement, with existing transmission towers, is located east side of this site and will be set aside as open space in the future.

This site is not located in a delineated 100-year floodplain of the East Tributary of Jimmy Camp Creek per the Federal Emergency Management Agency (FEMA) Flood Rate Insurance Map (FIRM) number 08041C0957 F & 08041C1000 F, effective 17 March 1997 [2]. Floodplain along the East Tributary was modified per LOMR Case No. 14-08-0534P (see appendix). Floodplain designations include Zone AE and Zone X within the property boundary. A portion of this map is provided in ***Appendix A*** for reference.

The existing basins for this large site were taken from the Lorson Ranch East MDDP East of the East Tributary and depict conditions prior to any grading in Lorson Ranch East. A map from the MDDP has been included in the appendix.

Overall Basin EX-C flows to Design Point 2

This is the largest existing basin at 452.97 acres which includes approximately the northern half of the site. This basin is an overall existing basin including Basins EX-C1 to EX-C10. There are two offsite basins (OS-C6.1 and OS-C5.1) which flow onto the site from the north and east and are included in the flow at Design Point 2. Under existing conditions, this basin contributes 141.0 cfs and 458.0 cfs for the 5-year and 100-year events respectively at Design Point 2. Design Point 2 is located at the East Tributary and all flow is routed to the East Tributary in an existing swale that is eroded and is not armored.

3.1 INTERIM HYDROLOGICAL CONDITIONS

Interim hydrological conditions have been calculated based on grading that has been completed in accordance with Phase 1 of the Early Grading for Lorson Ranch East (PUDSP 16-003), Fontaine Boulevard/Lamprey Drive construction (CDR 183), the school site improvements currently under construction, and Lorson Ranch East Filing No. 2. Interim condition existing flows have been calculated to determine interim drainage impacts to this final plat which is located downstream and to make sure runoff is accommodated by the street/storm sewer system constructed as part of this plat and CDR 183.

Interim conditions consist of Lamprey Drive construction from Fontaine Boulevard northeast 1,800 feet to Yamhill Drive per CDR 183. CDR 183 includes street, storm sewer, sanitary sewer, and watermain construction which provides access to this plat. Interim conditions also include all the interior streets/infrastructure for this final plat and construction of the school site by the school district and street/utility/drainage infrastructure constructed as part of Lorson Ranch East Filing No. 2.

Interim Basin EX3.3

This interim basin consists of existing flow from undeveloped residential areas east of the school site and south of Lamprey Drive. The existing flow is directed north overland to a proposed temporary sediment basin located at Design Point 2. The existing runoff is 7.0cfs and 41.0cfs for the 5-year and 100-year events and is collected by a 15' CDOT Type R inlet. See Design Point 2 for analysis of the 30" storm sewer and the temporary sediment basin at this location.

4.0 DEVELOPED HYDROLOGICAL CONDITIONS

Hydrology for the **Lorson Ranch East Filing No. 3** final drainage report was based on the City of Colorado Springs/El Paso County Drainage Criteria. Sub-basins that lie within this project were determined and the 5-year and 100-year peak discharges for the developed conditions have been presented in this report. Based on these flows, storm inlets will be added when the street capacity is exceeded.

Soil type C/D has been assumed for the hydrologic conditions because most of the site requires fill and the majority of the fill will be from the school site which is Razor Clay Loam (75), Hydrologic Group C. This approach will provide a more conservative approach to designing the storm sewer infrastructure. See Appendix A for SCS Soils Map.

The time of concentration for each basin and sub-basin was developed using an overland, ditch, street and pipe flow components. The maximum overland flow length for developed conditions was limited to 100 feet. Travel time velocities ranged from 2 to 6 feet per second. The travel time calculations are included in the back of this report.

Runoff coefficients for the various land uses were obtained from Table 6-6 dated May, 2014 from the updated City of Colorado Springs/El Paso County Drainage Criteria Manual. See Appendix B.

Drainage concepts for each of the basins are briefly discussed as follow:

Basin C16.1
Basin C16.1 consists of residential development located NE of Yamhill and Lamprey Drive. Runoff is directed southwest in curb/gutter in Mumford Drive and then south to Design Point 3 to a proposed Type "R" inlet in Yamhill Drive. The peak developed flow from this basin is 6.0cfs and 13.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C16.2
Basin C16.2 consists of residential development and Lamprey Drive. Runoff is directed west in curb/gutter in Lamprey Drive and to Design Point 3 to a proposed Type "R" inlet in Yamhill Drive. The peak developed flow from this basin is 3.6cfs and 7.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C16.3
Basin C16.3 consists of residential development located NE of Shavers Drive and Lamprey Drive. Runoff is directed southwest in curb/gutter in Mumford Drive and then south to Design Point 6a to a proposed Type "R" inlet in Shavers Drive. The peak developed flow from this basin is 3.6cfs and 7.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C16.4
Basin C16.4 consists of residential development located east of Shavers Drive on Lamprey Drive. Runoff is directed west in curb/gutter in Lamprey Drive to a proposed 10' Type "R" inlet in Shavers Drive. The peak developed flow from this basin is 1.7cfs and 3.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C16.5
Basin C16.5 consists of residential development located NE of Yamhill Drive and Lamprey Drive. Runoff is directed southwest in curb/gutter in Mumford Drive to Design Point 4 in Mumford Drive. The peak developed flow from this basin is 1.2cfs and 2.7cfs for the 5/100-year storm event. See the appendix for detailed calculations for this basin.

Basin C16.6
Basin C16.6 consists of residential development located NE of Yamhill Drive and Lamprey Drive. Runoff is directed southwest in curb/gutter in Mumford Drive to Design Point 4 in Mumford Drive. The peak developed flow from this basin is 2.9cfs and 6.4cfs for the 5/100-year storm event. See the appendix for detailed calculations for this basin.

Basin C16.7
Basin C16.7 consists of residential development located NE of Yamhill Drive and Lamprey Drive. Runoff is directed southwest in curb/gutter in Mumford Drive to Design Point 4 in Mumford Drive. The peak developed flow from this basin is 1.2cfs and 2.7cfs for the 5/100-year storm event. See the appendix for detailed calculations for thos basin.

Basin C16.8
Basin C16.8 consists of residential development located NE of Yamhill Drive and Lamprey Drive. Runoff is directed southwest in curb/gutter in Yamhill Drive to Design Point 4 in Mumford Drive. The peak developed flow from this basin is 1.2cfs and 2.8cfs for the 5/100-year storm event. See the appendix for detailed calculations for this basin.

Basin C16.9
Basin C16.9 consists of residential development located NE of Yamhill Drive and Lamprey Drive. Runoff is directed southwest in curb/gutter in Yamhill Drive to Design Point 4 in Mumford Drive. The peak developed flow from this basin is 3.6cfs and 7.9cfs for the 5/100-year storm event. See the appendix for detailed calculations for this basin.

Basin C16.10
Basin C16.10 consists of residential development located NE of Yamhill Drive and Lamprey Drive. Runoff is directed southwest in curb/gutter in Yamhill Drive to Design Point 4 in Mumford Drive. The peak developed flow from this basin is 1.2cfs and 2.7cfs for the 5/100-year storm event. See the appendix for detailed calculations for this basin.

Basin C16.11
Basin C16.11 consists of residential development located NE of Napa Drive and Mumford Drive. Runoff is directed southwest in curb/gutter in Mumford Drive to a Type "R" inlet at Design Point 6 in Mumford Drive. The peak developed flow from this basin is 0.8cfs and 1.7cfs for the 5/100-year storm event. See the appendix for detailed calculations for this basin.

Basin C16.12
Basin C16.12 consists of residential development located NE of Napa Drive and Mumford Drive. Runoff is directed southwest in curb/gutter in Napa Drive to a Type "R" inlet at Design Point 6 in Mumford Drive. The peak developed flow from this basin is 4.2cfs and 9.3cfs for the 5/100-year storm event. See the appendix for detailed calculations for this basin.

Basin C16.13
Basin C16.13 consists of residential development located NE of Napa Drive and Mumford Drive. Runoff is directed southwest in curb/gutter in Napa Drive to a Type "R" inlet at Design Point 6 in Mumford Drive. The peak developed flow from this basin is 7.0cfs and 15.5cfs for the 5/100-year storm event. See the appendix for detailed calculations for this basin.

See the Developed Conditions Hydrology Calculations in the back of this report and the Developed Conditions Drainage Map (Map Pocket) for the 5-year and 100-year storm event amounts.

5.0 HYDRAULIC SUMMARY

The sizing of the hydraulic structures and detentions ponds were prepared by using the *StormSewers* and *Hydrographs* computer software programs developed by Intellisolve, which conforms to the methods outlined in the "City of Colorado Springs/El Paso County Drainage Criteria Manual". Street capacities and Inlets were sized by Denver Urban Drainage's xcel spreadsheet UD-Inlet.

It is the intent of this drainage report to use the proposed curb/gutter and storm sewer in the streets to convey runoff to detention and water quality ponds then to the East Tributary of Jimmy Camp Creek. Inlet size and location are preliminary only as shown on the storm sewer layout in the appendix. See Appendix C for detailed hydraulic calculations and the storm sewer model.

Table 1: Street Capacities (100-year capacity is only ½ of street)

	Residential Local		Residential Collector		Principal Arterial	
Street Slope	5-year	100-year	5-year	100-year	5-year	100-year
0.5%	6.3	26.4	9.7	29.3	9.5	28.5
0.6%	6.9	28.9	10.6	32.1	10.4	31.2
0.7%	7.5	31.2	11.5	34.6	11.2	33.7
0.8%	8.0	33.4	12.3	37.0	12.0	36.0
0.9%	8.5	35.4	13.0	39.3	12.7	38.2
1.0%	9.0	37.3	13.7	41.4	13.4	40.2
1.4%	10.5	44.1	16.2	49.0	15.9	47.6
1.8%	12.0	45.4	18.4	50.4	18.0	50.4
2.2%	13.3	42.8	19.4	47.5	19.5	47.5
2.6%	14.4	40.7	18.5	45.1	18.5	45.1
3.0%	15.5	39.0	17.7	43.2	17.8	43.2
3.5%	16.7	37.2	16.9	41.3	17.0	41.3

4.0%	17.9	35.7	16.2	39.7	16.3	39.7
4.5%	19.0	34.5	15.7	38.3	15.7	38.3
5.0%	19.9	33.4	15.2	37.1	15.2	37.1

Note: all flows are in cfs (cubic feet per second)

Design Point 2

Design Point 2 is located at the south side of the future Lamprey Drive east of the school site where a natural drainageway is located. This design point accepts flow from an existing undeveloped Basin EX-3.3. The majority of the existing upstream runoff will be diverted into Pond C3 (see Lorson Ranch East Filing No. 2, approved) which will be constructed prior to this plat resulting in reduced flow rates to this design point. The existing runoff is 7cfs and 41cfs in the 5/100-year storm events. The flow is directed west and north in the rough graded Lamprey Drive which is sloped north to Design Point 2 and a temporary sediment basin. A 15' CDOT Type R inlet will collect the flow and a 30" RCP will convey it downstream. The existing flows do not exceed the future flows for this 30" storm sewer as calculated in the Lorson Ranch East PDR. The 15' CDOT Type R inlet will not have the curb poured next to it so the rough opening will be 12" high allowing the 41cfs to enter the inlet without overtopping. The flow depth into the inlet is 0.88' deep in the 12" curb opening. In the future this inlet will be used to collect developed flow when Basin Ex-3.3 is developed.

Design Point 3

Design Point 3 is located at the SE corner of Yamhill Drive and Mumford Drive

(5-year storm)

Tributary Basins: C16.1 & C16.2 **Inlet/MH Number:** Inlet DP3
Upstream flowby: 0cfs **Total Street Flow:** 8.8cfs

Flow Intercepted: 8.9 cfs **Flow Bypassed:** 0
Inlet Size: 15' Type R Inlet, sump

Street Capacity: Street slope = 1.0%, capacity = 9.0cfs is okay

(100-year storm)

Tributary Basins: C16.1 & C16.2 **Inlet/MH Number:** Inlet DP3
Upstream flowby: 0 **Total Street Flow:** 19.6cfs

Flow Intercepted: 20.1 cfs **Flow Bypassed:** 0
Inlet Size: 15' Type R Inlet, sump

Street Capacity: Street slope = 1.0%, capacity = 37.3cfs (half street) is okay

Design Point 4
Design Point 4 is located at the corner of Yamhill and Mumford Drive

(5-year storm)
Tributary Basins: C16.5 - C16.10 **Inlet/MH Number:** Inlet DP4
Upstream flowby: 0 **Total Street Flow:** 10.2cfs

Flow Intercepted: 9.52 cfs **Flow Bypassed:** 0.7cfs to Inlet DP6
Inlet Size: 15' Type R Inlet, on-grade

Street Capacity: Street slope = 1.0%, capacity = 9.0cfs, inlet needed

(100-year storm)
Tributary Basins: C16.5 - C16.10 **Inlet/MH Number:** Inlet DP4
Upstream flowby: 0 **Total Street Flow:** 22.8cfs

Flow Intercepted: 15.29 cfs **Flow Bypassed:** 7.5cfs to Inlet DP6
Inlet Size: 15' Type R Inlet, on-grade

Street Capacity: Street slope = 1.0%, capacity = 37.3cfs (half street) is okay

Design Point 5
Design Point 5 is located at the SW corner of Yamhill and Lamprey Drives. This is a small drainage basin that needs a 5' Type R inlet to drain the curb. The total flow is 0.3cfs and 0.6cfs in the 5/100 year storm events.

Design Point 6
Design Point 6 is located at the NW corner of Napa Drive and Mumford Drive

(5-year storm)
Tributary Basins: C16.11-C16.13 **Inlet/MH Number:** Inlet DP6a
Upstream flowby: 0.7cfs **Total Street Flow:** 11.9cfs

Flow Intercepted: 10.58cfs **Flow Bypassed:** 1.3cfs to Inlet DP6a
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 2.5%, capacity = 14.1cfs, inlet needed

(100-year storm)
Tributary Basins: C16.11-C16.13 **Inlet/MH Number:** Inlet DP6a
Upstream flowby: 7.5cfs **Total Street Flow:** 30.3cfs

Flow Intercepted: 17.61cfs **Flow Bypassed:** 12.7cfs to Inlet DP6a
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 2.5%, capacity = 40.7cfs (half street) is okay

Design Point 6a (from Lorson Ranch East Filing No. 2 FDR)
Design Point 6a is located at the SE corner of Shavers Drive and Mumford Drive

Data taken from Lorson Ranch East Filing No. 2

(5-year storm)
Tributary Basins: C16.15 **Inlet/MH Number:** Inlet DP6a
Upstream flowby: 1.77cfs **Total Street Flow:** 6.61cfs

Flow Intercepted: 5.71cfs **Flow Bypassed:** 0.9 cfs to Inlet DP8
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 9.0cfs, inlet needed

(100-year storm)
Tributary Basins: C16.15 **Inlet/MH Number:** Inlet DP6a
Upstream flowby: 14.75cfs **Total Street Flow:** 24.87cfs

Flow Intercepted: 11.17cfs **Flow Bypassed:** 13.7cfs to Inlet DP8
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 37.3cfs (half street) is okay

6.0 DETENTION AND WATER QUALITY PONDS

Detention and Storm Water Quality for Lorson Ranch East Filing No. 3 is required per El Paso County criteria. We have implemented the Full Spectrum approach for detention per the Denver Urban Drainage Districts specifications. All runoff from this site flows to Pond C5 which is a permanent full spectrum pond and incorporates storm water quality features and complies with the Lorson Ranch East MDDP. Pond C5 has been sized, graded, access roads, outlet pipes, overflow structures are provided with the Lorson Ranch East Filing No. 1 development.

Detention Pond C5 (Ultimate Conditions, from Fontaine FDR, CDR183)
This is a permanent full spectrum detention pond that includes water quality and discharges directly into the East Tributary. Pond C5 is designed in the UDCF Full Spectrum spreadsheets for Water Quality and EURV volumes only. The 5-year and 100-year flow rates are taken from the Lorson East MDDP and have been modeled in a hydraulic modeling software. The outlet structure is a five cell CDOT type D outlet in parallel and the overflow spillway is a wier set slightly above the outlet structure so it releases the 5yr/100yr storm events quickly to match pre-developed rates.

- Watershed Ares: 171 acres (Ultimate Area)
- Watershed Imperviousness: 63%
- Hydrologic Soils Group C/D
- Forebay: 3.51ac-ft (see spreadsheet in appendix) divided between two forebays
- Zone 1 WQCV: 3.298ac-ft, WSEL: 5709.92
- Zone 2 EURV: 9.524ac-ft, WSEL: 5712.27, Top outlet structure set at 5712.60, 3'x18' triple CDOT Type D outlets in parallel.
- (5-yr): 13.06ac-ft, WSEL: 5713.49, 126.3cfs (hydraflow)
- Zone 3 (100-yr): 15.86ac-ft, WSEL: 5714.42, 453.2cfs (hydraflow)
- Pipe Outlet: 48" RCP at 0.5%

- Overflow Spillway: 52' wide bottom, elevation=5713, 4:1 side slopes, flow depth=2.0' at 519cfs inflow, 1' freeboard
- Pre-development release rate into East Tributary=141cfs/458cfs in the 5yr/100 yr storm at this pond outfall (Design Pt. 2, Table 6.2 in MDDP). See Design Point 46 for discussion on flows in creek from this pond
- Pond Bottom Elevation: 5706.00

Design: Composite, WQ/EURV by Full Spectrum Excel Worksheets, 5/100yr by Hydraflow

	WQ	EURV	5-yr	100-yr
Peak Inflow	63.1cfs	181.4cfs	167.5cfs	519.1cfs
Peak Outflow	1.4cfs	7.3cfs	126.3cfs	453.2cfs
Ponding Depth	3.92ft	6.27ft	7.49ft	8.42ft
Stored Volume	3.29ac-ft	9.52ac-ft	13.01ac-ft	15.86ac-ft
Spillway Stage	7.00ft, 52' wide			
Structure Type:	5'x18' flat top outlet structure (cdot type d) with top at stage 6.60ft			

Water Quality Design

Water quality for this final plat will be provided by Pond C5.

7.0 DRAINAGE AND BRIDGE FEES

Lorson Ranch East Filing No. 3 is located within the Jimmy Camp Creek drainage basin which is currently a fee basin in El Paso County.

Lorson Ranch East Filing No. 3 contains 19.497 acres. This project consists of 0.962 acres of open space (2% impervious), and the remaining 18.535 acres is residential (52% impervious). The 2018 drainage fees are $17,197, bridge fees are $804 and Drainage Surety fees are $7,285 per impervious acre per Resolution 17-348. The drainage and bridge fees are calculated when the final plat is submitted. The fees are due at plat recordation. The following table details the drainage fees for the platted area.

Use 2019 fees.

Table 1: Drainage/Bridge Fees

Type of Land Use	Total Area (ac)	Imperviousness	Drainage Fee	Bridge Fee	Surety Fee
Residential Area	18.535	52%	$165,748	$7,749	$70,214
Open Space, Landscape Tracts,	0.962	2%	$330	$16	$140
		Total	$166,078	$7,765	$70,354

18350 and 858.

Table 7.1: Public Drainage Facility Costs (non-reimbursable)

Item	Quantity	Unit	Unit Cost	Item Total
Inlets/Manholes	7	EA	$3000/EA	$21,000
18" Storm	7	LF	$35	$245
24" Storm	254	LF	$40	$10,160
30" Storm	300	LF	$45	$13,500
			Subtotal	$44,905
			Eng/Cont (15%)	$6,735
			Total Est. Cost	$51,640

8.0 FOUR STEP PROCESS

The site has been developed to minimize wherever possible the rate of developed runoff that will leave the site and to provide water quality management for the runoff produced by the site as proposed on the development plan. The following four step process should be considered and incorporated into the storm water collection system and storage facilities where applicable.

Step 1: Employ Runoff Reduction Practices

Lorson Ranch East Filing No. 3 has employed several methods of reducing runoff.

- The street configuration was laid out to minimize the length of streets. Many streets are straight and perpendicular resulting in lots with less wasted space.
- East Tributary of Jimmy Camp Creek with a natural sand bottom and vegetated slopes has been preserved through the preliminary plan area.
- A buffer tract has been added along the north property line which reduces impervious areas
- Lorson Ranch Metro District requires homeowners to maintain landscaping on lots
- Full Spectrum Detention Pond C5 (LRE 1) has been constructed. The full spectrum detention mimics existing storm discharges

Step 2: Implement BMP's that Slowly Release the Water Quality Capture Volume

Treatment and slow release of the water quality capture volume (WQCV) is required. Lorson Ranch East Filing No. 3 will utilize Pond C5, a full spectrum stormwater detention pond which includes Water Quality Volumes and WQ outlet structures constructed as part of Lorson Ranch East Filing No. 1.

Step 3: Stabilize Drainageways

East Tributary of Jimmy Camp Creek is a major drainageway located west of this site. In 2018 the East Tributary of JCC was reconstructed and stabilized per county criteria. The design included a low flow channel bottom and selectively armored sides.

Step 4: Implement Site Specific & Source Control BMP's

There are no potential sources of contaminants that could be introduced to the County's MS4. During construction source control will be provided with the proper installation of erosion control BMPs to limit erosion and transport of sediment. Area disturbed by construction will be seeded and mulched. Cut and fill slopes will be reseeded, and the slopes equal to or greater than three-to-one will be protected with erosion control fabric. Silt fences will be placed at the bottom of re-vegetated and rough graded slopes. Inlet protection will be used around proposed inlets. In addition, temporary sediment basins will be constructed so runoff will be treated prior to discharge. Construction BMPs in the form of vehicle

tracking control, sediment basins, concrete washout area, rock socks, buffers, and silt fences can be utilized to protect receiving waters.

9.0 CONCLUSIONS

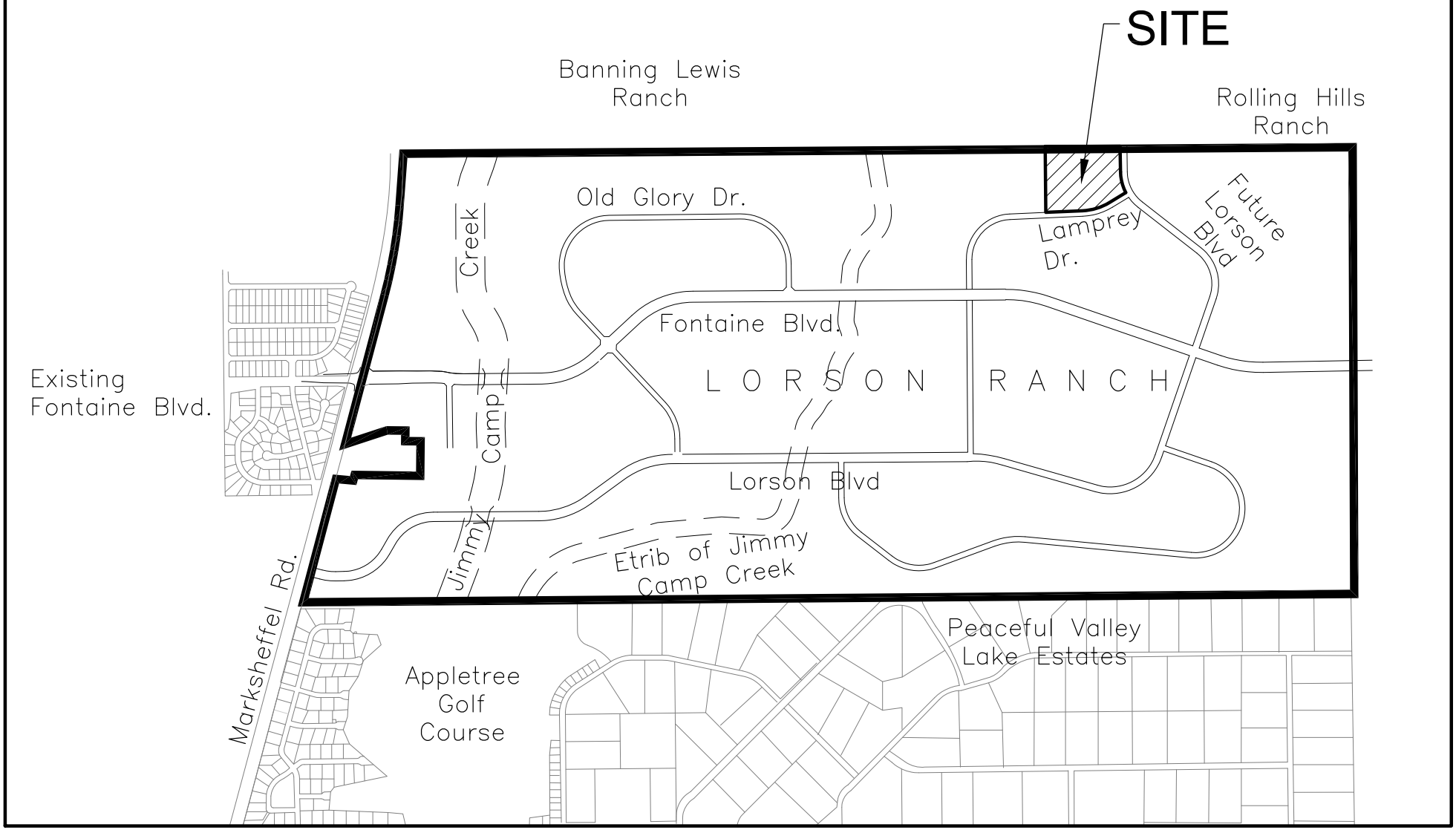
This drainage report has been prepared in accordance with the City of Colorado Springs/El Paso County Drainage Criteria Manual. The proposed development and drainage infrastructure will not cause adverse impacts to adjacent properties or properties located downstream. Several key aspects of the development discussed above are summarized as follows:

- Developed runoff will be conveyed via curb/gutter and storm sewer facilities
- The East Tributary of Jimmy Camp Creek has been reconstructed located west of this study area
- Bridges over the East Tributary will be required at Lorson Boulevard and Fontaine Boulevard and have been previously designed by Kiowa Engineering providing access to this site.
- The bridge over Jimmy Camp Creek at Lorson Boulevard is required for this plat
- Detention and water quality for this site area will be provided in a permanent pond C5 maintained by the Lorson Ranch Metro District.
- Lorson Ranch Metro District will maintain Pond C5 and the East Tributary.

10.0 REFERENCES

1. City of Colorado Springs/El Paso County Drainage Criteria Manual DCM, dated November, 1991
2. Soil Survey of El Paso County Area, Colorado by USDA, SCS
3. Jimmy Camp Creek Drainage Basin Planning Study, Dated March 9, 2015, by Kiowa Engineering Corporation
4. City of Colorado Springs “Drainage Criteria Manual, Volume 2
5. El Paso County “Engineering Criteria Manual”
6. Final Drainage Report for Lorson Ranch East Filing No. 2 by Core Engineering Group approved October 31, 2018.
7. Final construction plans “Fontaine Boulevard and East Fork Jimmy Camp Creek Channel Design”, Dated March 10, 2017, by Kiowa Engineering Corporation
8. El Paso County Resolution #15-042, El Paso County adoption of Chapter 6 and Section 3.2.1 of the City of Colorado Springs Drainage Criteria Manual dated May, 2014.
9. Kiowa Engineering Corporation “Final Bridge and Channel Design Report, CDR 16-009” revised August 24, 2017
10. Lorson Ranch East MDDP prepared by Core Engineering Group, dated November 27, 2017
11. Lorson Ranch East PDR prepared by Core Engineering Group, dated December 18, 2017
12. Final Drainage Report for Fontaine Boulevard prepared by Core Engineering Group, Reference CDR183, dated December 20, 2017

APPENDIX A – VICINTIY MAP, SOILS MAP, FEMA MAP



N

VICINITY MAP

NO SCALE

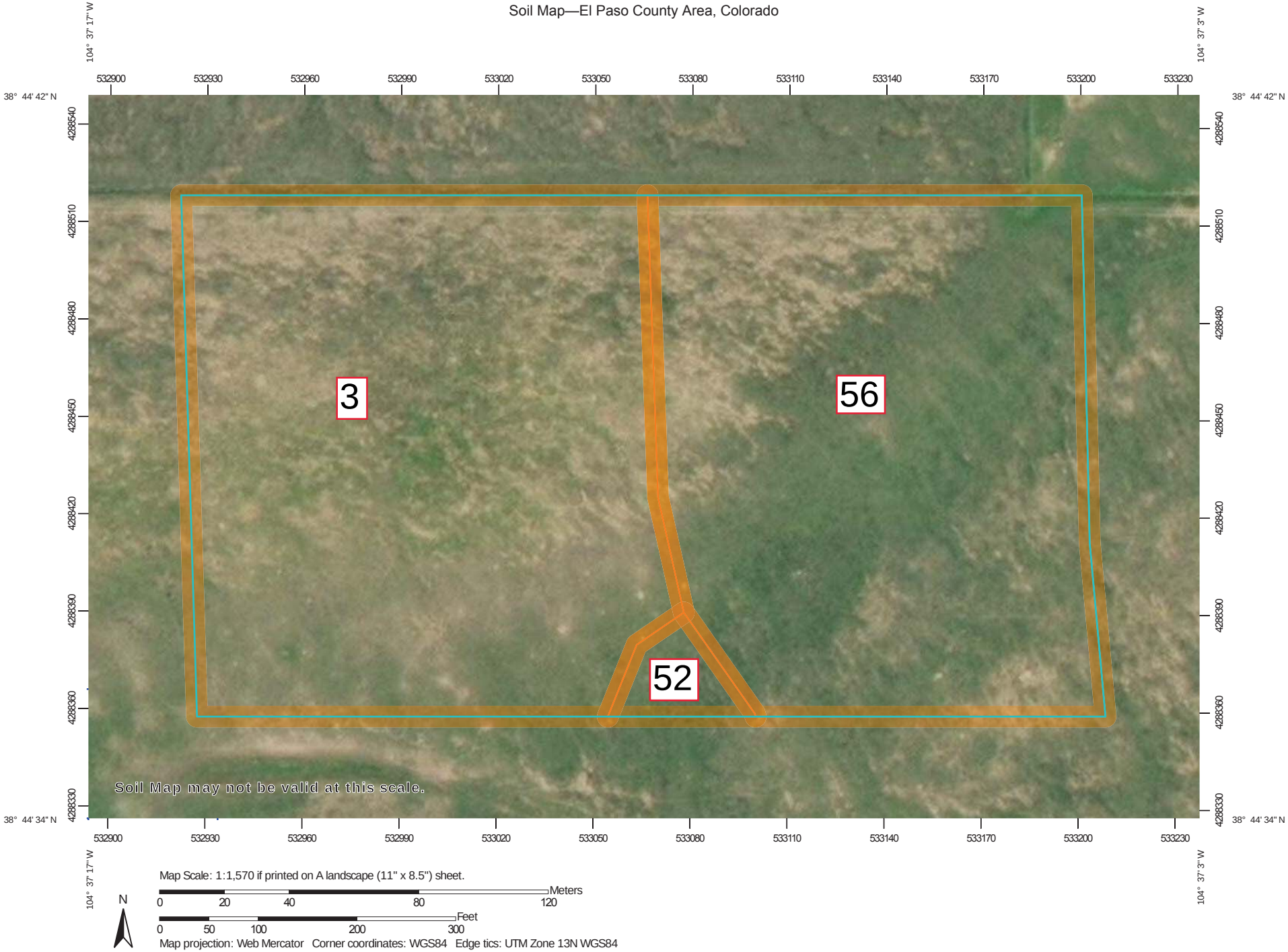
CORE ENGINEERING GROUP

15004 1ST AVE. S.
BURNSVILLE, MN 55306
PH: 719.570.1100

CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@ceg1.com

LORSON RANCH EAST FILING NO. 3
VICINITY MAP

SCALE:	DATE:	FIGURE NO.
NTS	JANUARY, 2019	--



Map Scale: 1:1,570 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

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 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 16, Sep 10, 2018

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

Date(s) aerial images were photographed: Apr 12, 2017—Nov 17, 2017

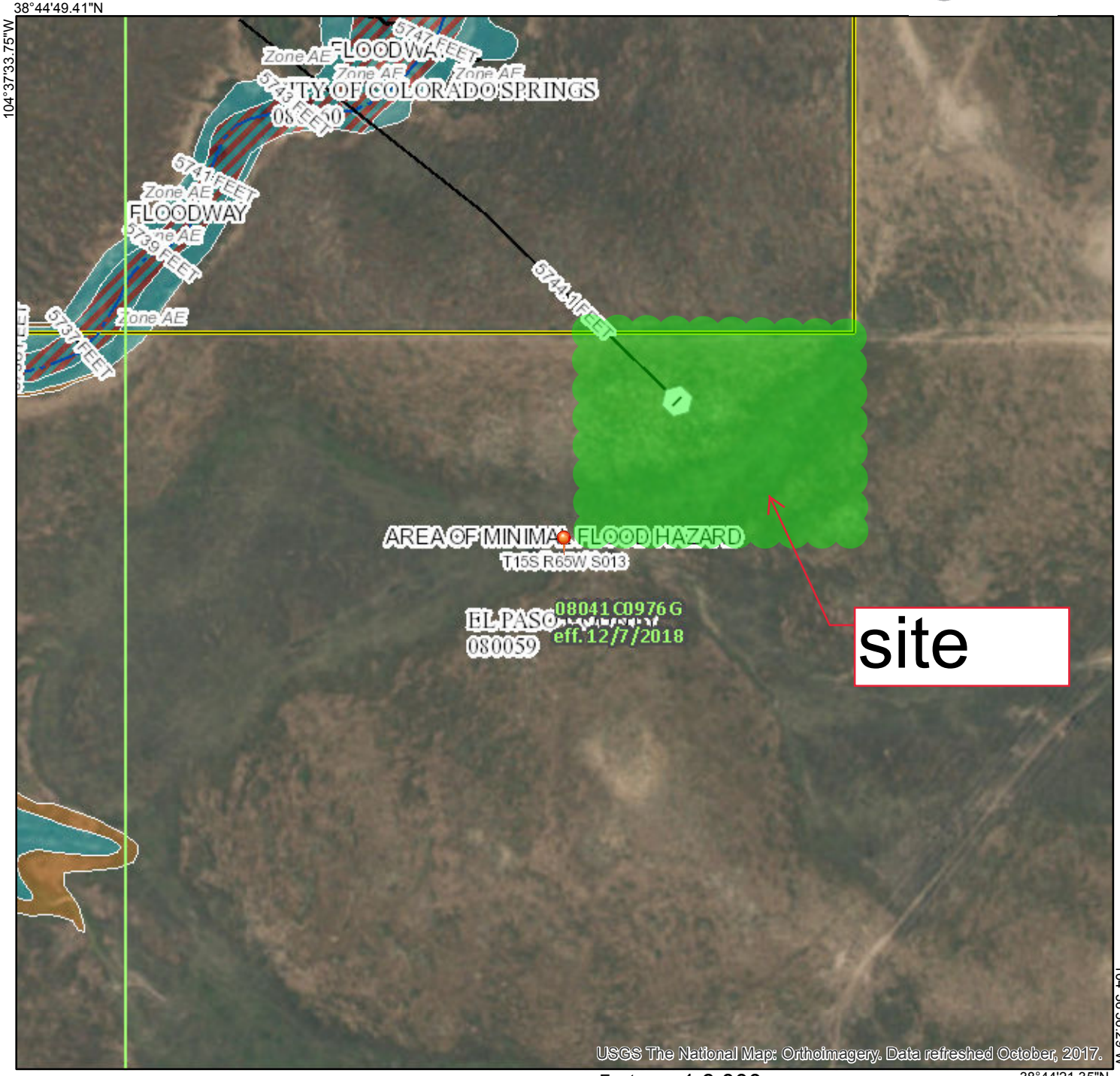
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Ascalon sandy loam, 3 to 9 percent slopes	5.7	51.5%
52	Manzanst clay loam, 0 to 3 percent slopes	0.2	1.9%
56	Nelson-Tassel fine sandy loams, 3 to 18 percent slopes	5.2	46.6%
Totals for Area of Interest		**11.1**	**100.0%**

National Flood Hazard Layer FIRMette

FEMA



Legend

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

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

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

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

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

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 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 12/20/2018 at 10:26:36 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX B – HYDROLOGY CALCULATIONS

Table 6-6. Runoff Coefficients for Rational Method
(Source: UDFCD 2001)

Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential													
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
Undeveloped Areas													
Historic Flow Analysis-- Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

3.2 Time of Concentration

One of the basic assumptions underlying the Rational Method is that runoff is a function of the average rainfall rate during the time required for water to flow from the hydraulically most remote part of the drainage area under consideration to the design point. However, in practice, the time of concentration can be an empirical value that results in reasonable and acceptable peak flow calculations.

For urban areas, the time of concentration (t_c) consists of an initial time or overland flow time (t_i) plus the travel time (t_t) in the storm sewer, paved gutter, roadside drainage ditch, or drainage channel. For non-urban areas, the time of concentration consists of an overland flow time (t_i) plus the time of travel in a concentrated form, such as a swale or drainageway. The travel portion (t_t) of the time of concentration can be estimated from the hydraulic properties of the storm sewer, gutter, swale, ditch, or drainageway. Initial time, on the other hand, will vary with surface slope, depression storage, surface cover, antecedent rainfall, and infiltration capacity of the soil, as well as distance of surface flow. The time of concentration is represented by Equation 6-7 for both urban and non-urban areas.

CORE ENGINEERING GROUP

Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date: January 15, 2019
Checked By: Leonard Beasley

Job No: 100.049
Project: Lorson Ranch East Filing No. 3
Design Storm: **5 - Year Event, Proposed Conditions**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	$\sum$ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
C16.1			2.68	0.49	7.55	1.31	4.55	6.0													
C16.2			1.82	0.49	10.97	0.89	3.99	3.6													
	3								10.90	2.21	4.00	8.8									
C16.3			1.78	0.49	10.35	0.87	4.08	3.6													
C16.4			0.81	0.49	8.40	0.40	4.39	1.7													
C16.5			0.50	0.49	5.63	0.25	4.99	1.2													
C16.6			1.43	0.49	10.27	0.70	4.09	2.9													
C16.7			0.54	0.49	7.60	0.26	4.54	1.2													
C16.8			0.53	0.49	6.43	0.26	4.79	1.2													
C16.9			1.60	0.49	7.62	0.78	4.54	3.6													
C16.10			0.52	0.49	6.35	0.25	4.81	1.2													
	4								10.35	2.51	4.08	10.2									
C16.11			0.38	0.49	9.76	0.19	4.17	0.8													
C16.12			1.82	0.49	6.89	0.89	4.69	4.2													
C16.13			3.62	0.49	11.45	1.77	3.93	7.0													
	6								11.45	2.85	3.93	11.2									
EX-3.3			13.4	0.15	13.80	2.01	3.65	7													

CORE ENGINEERING GROUP

Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date: January 15, 2019
Checked By: Leonard Beasley

Job No: 100.049
Project: Lorson Ranch East Filing No. 3
Design Storm: **100 - Year Event, Proposed Conditions**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	Σ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
C16.1			2.68	0.65	7.55	1.74	7.64	13.3													
C16.2			1.82	0.65	10.97	1.18	6.70	7.9													
	3								10.97	2.93	6.70	19.6									
C16.3			1.78	0.65	10.35	1.16	6.85	7.9													
C16.4			0.81	0.65	8.40	0.53	7.37	3.9													
C16.5			0.50	0.65	5.63	0.33	8.38	2.7													
C16.6			1.43	0.65	10.27	0.93	6.87	6.4													
C16.7			0.54	0.65	7.60	0.35	7.62	2.7													
C16.8			0.53	0.65	6.43	0.34	8.05	2.8													
C16.9			1.60	0.65	7.62	1.04	7.62	7.9													
C16.10			0.52	0.65	6.35	0.34	8.08	2.7													
	4								10.27	3.33	6.87	22.8									
C16.11			0.38	0.65	9.76	0.25	6.99	1.7													
C16.12			1.82	0.65	6.89	1.18	7.87	9.3													
C16.13			3.62	0.65	11.45	2.35	6.59	15.5													
	6								11.45	3.78	6.59	24.9									
EX-3.3			13.4	0.50	13.80	6.70	6.12	41													
															#REF!						

CORE ENGINEERING GROUP

Standard Form SF-1. Time of Concentration-Proposed

Calculated By: Leonard Beasley
Date: January 19, 2019
Checked By: Leonard Beasley

Job No: 100.049
Project: Lorson Ranch East Filing No. 3

Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)				t_c Check (urbanized Basins)		Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_t minutes	Computed t_c Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended $t_c=t_i+t_t$ (min)
C16.1	0.49	2.68	15.0	30.00	18.33%	0.22	2.31	150.0	2.67%	2.45	1.02				
			20.0					850.0	2.82%	3.36	4.22	7.55	1030.00	15.72	7.55
C16.2	0.49	1.82	20.0	27.00	3.00%	0.11	3.98	1332.0	2.52%	3.17	6.99	10.97	1359.00	17.55	10.97
C16.3	0.49	1.78	20.0	89.00	3.37%	0.21	6.96	530.0	1.70%	2.61	3.39	10.35	619.00	13.44	10.35
C16.4	0.49	0.81	20.0	45.00	3.33%	0.15	4.97	563.0	1.87%	2.73	3.43	8.40	608.00	13.38	8.40
C16.5	0.49	0.50	20.0	30.00	3.33%	0.12	4.06	370.0	3.85%	3.92	1.57	5.63	400.00	12.22	5.63
C16.6	0.49	1.43	15.0	98.00	5.10%	0.26	6.37	238.0	3.78%	2.92	1.36				
			20.0					437.0	2.06%	2.87	2.54	10.27	773.00	14.29	10.27
C16.7	0.49	0.54	15.0	85.00	4.24%	0.22	6.30	110.0	3.18%	2.67	0.69				
			20.0					123.0	2.85%	3.38	0.61	7.60	318.00	11.77	7.60
C16.8	0.49	0.53	20.0	25.00	4.00%	0.12	3.49	488.0	1.91%	2.76	2.94	6.43	513.00	12.85	6.43
C16.9	0.49	1.60	15.0	59.00	4.24%	0.19	5.25	108.0	2.31%	2.28	0.79				
			20.0					330.0	3.03%	3.48	1.58	7.62	497.00	12.76	7.62
C16.10	0.49	0.52	20.0	28.00	2.14%	0.10	4.53	397.0	3.32%	3.64	1.82	6.35	425.00	12.36	6.35
C16.11	0.49	0.38	15.0	89.00	2.00%	0.18	8.27	75.0	2.80%	2.51	0.50				
			20.0					120.0	1.00%	2.00	1.00	9.76	284.00	11.58	9.76
C16.12	0.49	1.82	20.0	18.00	2.22%	0.08	3.59	603.0	2.32%	3.05	3.30	6.89	621.00	13.45	6.89
C16.13	0.49	3.62	15.0	30.00	18.33%	0.22	2.31	150.0	2.67%	2.45	1.02				

APPENDIX C – HYDRAULIC CALCULATIONS

Weir Report

Inlet DP2 - 15ft type R

Rectangular Weir

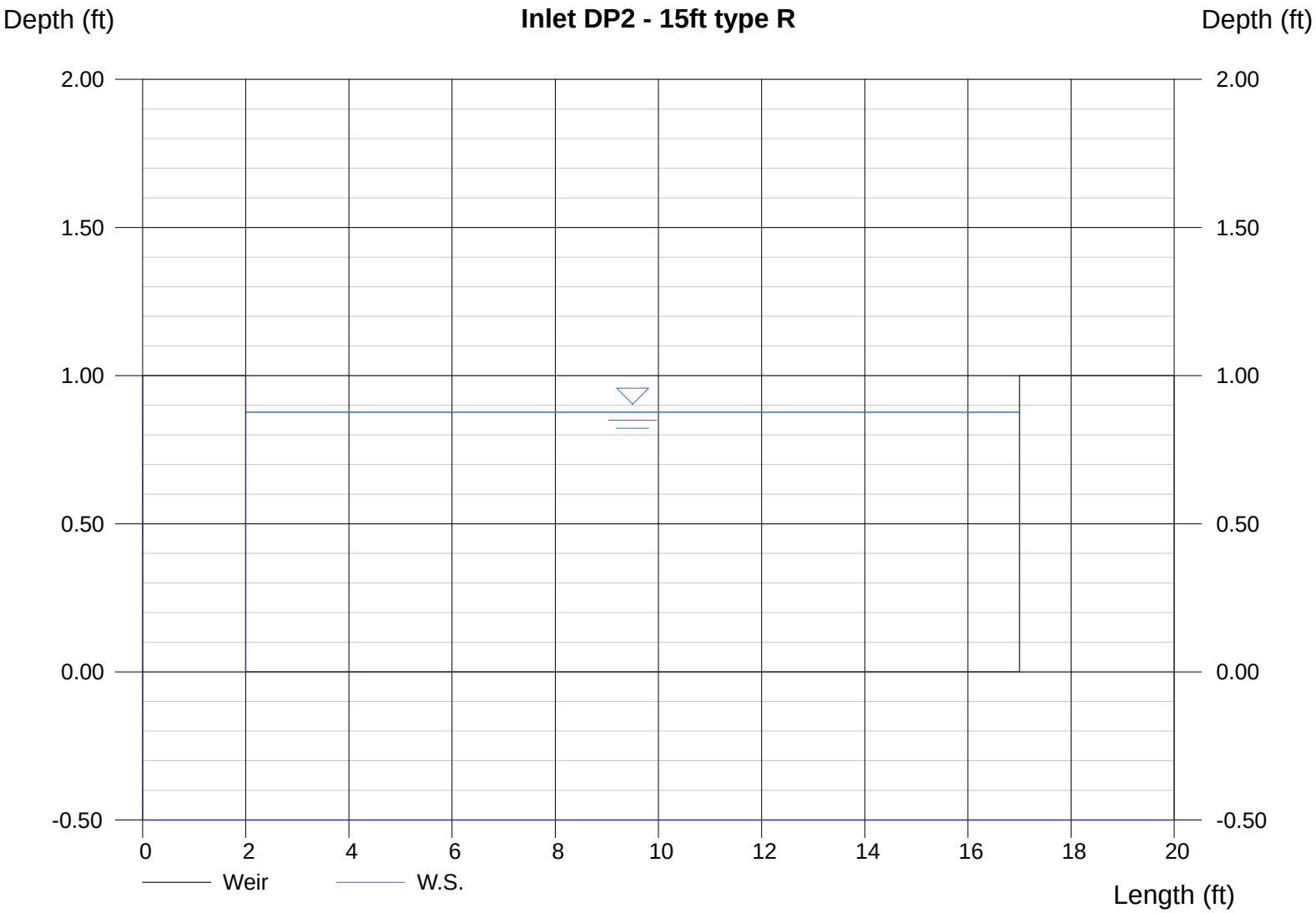
Crest	=	Sharp
Bottom Length (ft)	=	15.00
Total Depth (ft)	=	1.00

Calculations

Weir Coeff. Cw	=	3.33
Compute by:		Known Q
Known Q (cfs)	=	41.00

Highlighted

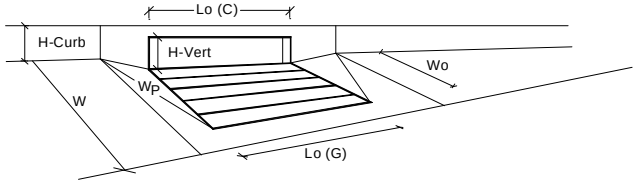
Depth (ft)	=	0.88
Q (cfs)	=	41.00
Area (sqft)	=	13.15
Velocity (ft/s)	=	3.12
Top Width (ft)	=	15.00



INLET IN A SUMP OR SAG LOCATION

Project = Lorson East 3 #100.049

Inlet ID = Inlet DP-3 (C16.1+C16.2)

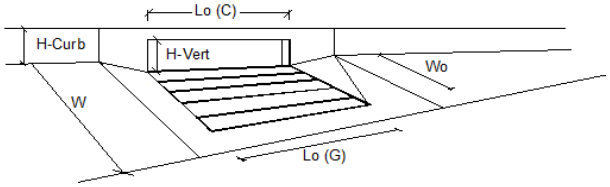


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Inlet Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.5	8.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
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
Area Opening 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) =	15.00	15.00	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 (see USDCM Figure ST-5)	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	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on UDFCD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on UDFCD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.31	1.31	
Clogging Factor for Multiple Units	Clog =	0.04	0.04	
Curb Opening as a Weir (based on UDFCD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	12.45	21.18	cfs
Interception with Clogging	Q_{wa} =	11.90	20.25	cfs
Curb Opening as an Orifice (based on UDFCD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	30.33	33.57	cfs
Interception with Clogging	Q_{oa} =	29.00	32.11	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	18.07	24.80	cfs
Interception with Clogging	Q_{ma} =	17.28	23.72	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**11.90**	**20.25**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	15.00	15.00	feet
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	39.3	52.1	ft.>T-Crown
Resultant Flow Depth at Street Crown	d_{CROWN} =	2.7	4.2	inches
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**11.9**	**20.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	8.8	19.6	cfs

INLET ON A CONTINUOUS GRADE

Project: Lorson East 3 #100.049

Inlet ID: Inlet DP-4 (Basins C16.5-16.10)

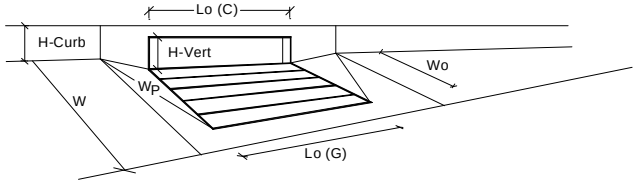


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grade or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grade or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W from Q-Allow)	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 < maximum allowable from sheet 'Q-Allow'		MINOR	MAJOR	
Design Discharge for Half of Street (from Sheet *Q-Peak*)	**Q_o =**	10.2	22.8	cfs
Water Spread Width	T =	15.1	17.0	ft
Water Depth at Flowline (outside of local depression)	d =	5.1	6.5	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.9	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.395	0.286	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	6.2	16.2	cfs
Discharge within the Gutter Section W	Q_w =	4.0	6.5	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.1	cfs
Flow Area within the Gutter Section W	A_W =	2.41	4.36	sq ft
Velocity within the Gutter Section W	V_W =	4.2	5.2	fps
Water Depth for Design Condition	d_{LOCAL} =	8.1	9.5	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	N/A	N/A	cfs
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	N/A	N/A	cfs
Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e (based on grate carry-over)	S_e =	0.094	0.074	ft/ft
Required Length L_T to Have 100% Interception	L_T =	18.63	31.37	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	15.00	15.00	ft
Interception Capacity	Q_i =	9.7	15.7	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoef =	1.31	1.31	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	
Effective (Unclogged) Length	L_e =	13.03	13.03	ft
Actual Interception Capacity	**Q_a =**	9.5	15.3	cfs
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	0.7	7.5	cfs
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**9.52**	**15.29**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.7**	**7.5**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**93**	**67**	**%**

INLET IN A SUMP OR SAG LOCATION

Project = Lorson East 3 #100.049

Inlet ID = Inlet DP-5



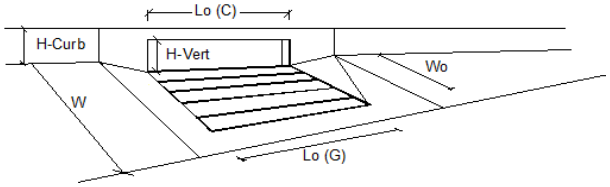
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Inlet Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.5	8.0	inches
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
Area Opening 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 (see USDCM Figure ST-5)	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	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on UDFCD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on UDFCD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb Opening as a Weir (based on UDFCD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	7.06	10.97	cfs
Interception with Clogging	Q_{wa} =	6.35	9.87	cfs
Curb Opening as an Orifice (based on UDFCD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	10.11	11.19	cfs
Interception with Clogging	Q_{oa} =	9.10	10.07	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	7.86	10.30	cfs
Interception with Clogging	Q_{ma} =	7.07	9.27	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**6.35**	**9.27**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	5.00	5.00	feet
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	20.7	27.0	ft.>T-Crown
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.9	2.4	inches
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**6.4**	**9.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.3	0.6	cfs

Override Depths

INLET ON A CONTINUOUS GRADE

Project: Lorson East 3 #100.049

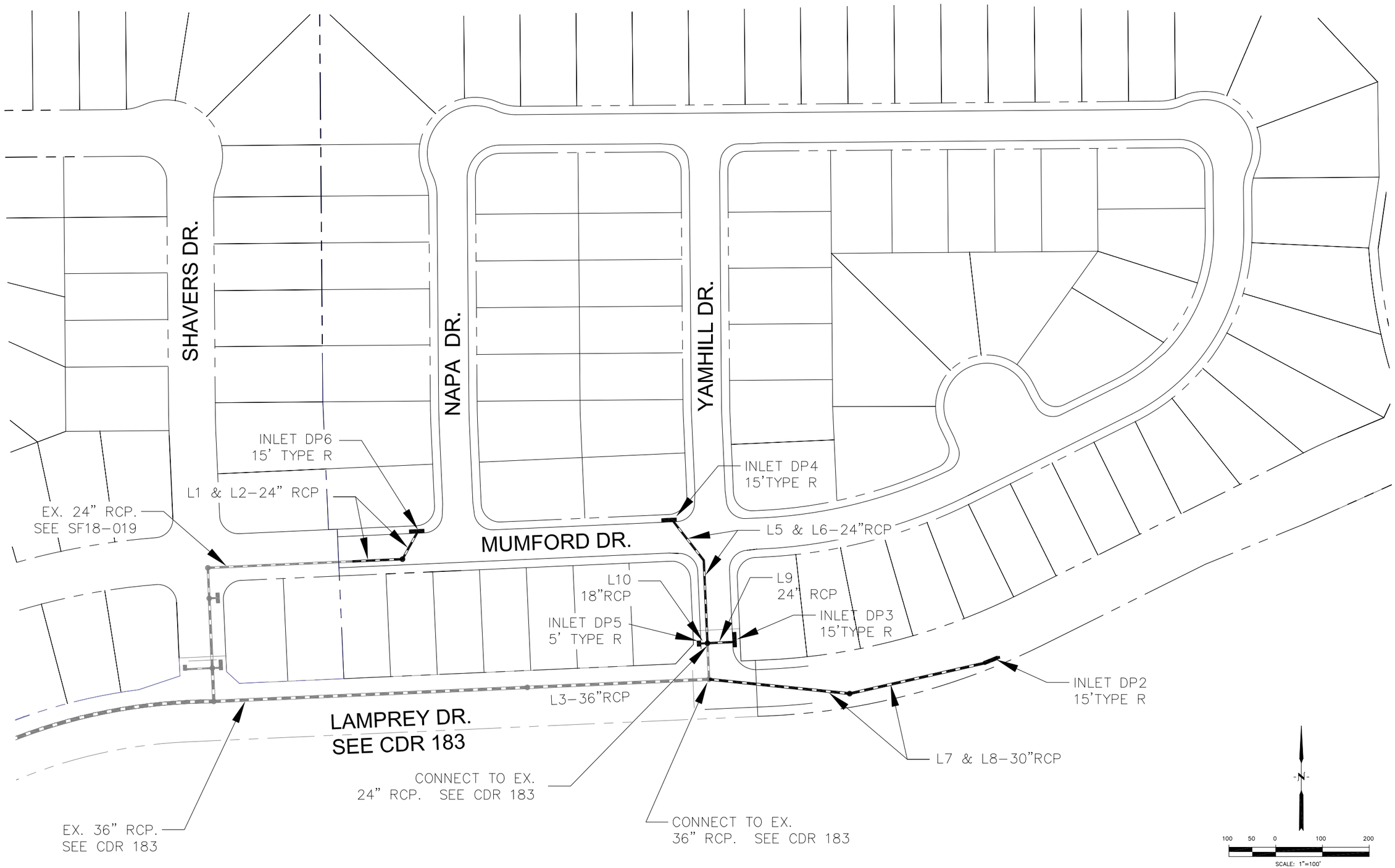
Inlet ID: Inlet DP-6 (Basins C16.11-C16.13 + bypass from Inlet DP-4)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grade or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grade or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grade (cannot be greater than W from Q-Allow)	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 < maximum allowable from sheet 'Q-Allow'		MINOR	MAJOR	
Design Discharge for Half of Street (from Sheet *Q-Peak*)	**Q_o =**	11.9	30.3	cfs
Water Spread Width	T =	15.4	17.0	ft
Water Depth at Flowline (outside of local depression)	d =	5.2	6.9	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	1.3	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.388	0.269	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	7.3	22.0	cfs
Discharge within the Gutter Section W	Q_w =	4.6	8.1	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.3	cfs
Flow Area within the Gutter Section W	A_W =	2.49	4.87	sq ft
Velocity within the Gutter Section W	V_W =	4.8	6.2	fps
Water Depth for Design Condition	d_{LOCAL} =	8.2	9.9	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	N/A	N/A	cfs
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	N/A	N/A	cfs
Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e (based on grate carry-over)	S_e =	0.093	0.071	ft/ft
Required Length L_T to Have 100% Interception	L_T =	20.55	37.37	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	15.00	15.00	ft
Interception Capacity	Q_i =	10.8	18.1	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoef =	1.31	1.31	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	
Effective (Unclogged) Length	L_e =	13.03	13.03	ft
Actual Interception Capacity	**Q_a =**	10.6	17.6	cfs
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	1.3	12.7	cfs
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**10.58**	**17.61**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**1.3**	**12.7**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**89**	**58**	**%**

APENDIX D– STORM SEWER SCHEMATIC AND HYDRAFLOW STORM SEWER CALCS

BASIN C16 STORM SCHEMATIC



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NO. | DESCRIPTION | DATE

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(719) 635-3200
CONTACT: JEFF MARK

PROJECT:
LORSON RANCH EAST FIL 4
EAST OF EAST TRIBUTARY
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: LAB

STORM SEWER SCHEMATIC
BASIN C16
LORSON RANCH EAST FILING NO. 3

DATE
JANUARY 15, 2019

PROJECT NO.
100.049

SHEET NUMBER
1

TOTAL SHEETS: 1

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	1	10.58	24 c	51.7	5737.53	5738.46	1.798	5739.02	5739.61	n/a	5739.61 j	End
2	2	10.58	24 c	32.2	5739.49	5741.10	4.998	5740.11*	5743.28*	0.05	5743.34	1
3	3	25.72	36 c	24.8	5740.10	5740.50	1.610	5742.85	5742.81	0.09	5742.90	End
4	4	18.72	24 c	39.5	5741.50	5742.35	2.150	5742.90	5743.88	n/a	5743.88	3
5	5	9.52	24 c	88.1	5742.53	5744.25	1.953	5744.56	5745.34	n/a	5745.34 j	4
6	6	9.52	24 c	51.3	5744.25	5745.25	1.949	5745.66	5746.34	n/a	5746.34 j	5
7	7	7.00	30 c	150.5	5741.00	5743.86	1.901	5743.17	5744.74	n/a	5744.74 j	3
8	8	7.00	30 c	145.6	5744.00	5746.91	1.999	5745.03	5747.79	n/a	5747.79 j	7
9	9	8.90	24 c	27.5	5743.03	5743.58	1.999	5744.57	5744.64	n/a	5744.64 j	4
10	10	0.30	18 c	10.0	5743.63	5743.83	2.002	5744.69	5744.69	0.00	5744.69	4

LINE 2 IS NOT SURCHARGED ABOVE CROWN AT DOWNSTREAM END. THIS PIPE IS AT 5% SLOPE WHICH MAKES IT LOOK LIKE IT IS SURCHARGED.

LRE 3 - 5yr | Number of lines: 10 | Run Date: 12-21-2018

NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	1	17.61	24 c	51.7	5737.53	5738.46	1.798	5739.02	5739.95	n/a	5739.95 j	End
2	2	17.61	24 c	32.2	5739.49	5741.10	4.998	5740.31*	5744.05*	0.15	5744.20	1
3	3	76.99	36 c	24.8	5740.10	5740.50	1.610	5742.85	5743.25	0.60	5743.25	End
4	4	35.99	24 c	39.5	5741.50	5742.35	2.150	5743.50*	5744.50*	0.61	5745.12	3
5	5	15.29	24 c	88.1	5742.53	5744.25	1.953	5746.79*	5747.19*	0.04	5747.23	4
6	6	15.29	24 c	51.3	5744.25	5745.25	1.949	5747.23*	5747.46*	0.11	5747.57	5
7	7	41.00	30 c	150.5	5741.00	5743.86	1.901	5744.17	5746.02	n/a	5746.02 j	3
8	8	41.00	30 c	145.6	5744.00	5746.91	1.999	5746.22	5749.07	n/a	5749.07 j	7
9	9	20.10	24 c	27.5	5743.03	5743.58	1.999	5746.52*	5746.74*	0.19	5746.93	4
10	10	0.60	18 c	10.0	5743.63	5743.83	2.002	5747.15*	5747.15*	0.00	5747.15	4

LRE 3 - 100yr | Number of lines: 10 | Run Date: 12-21-2018

NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

MAP POCKET

DESIGN POINT SUMMARY TABLE								
DESIGN POINT	BASIN	DRAINAGE AREA (AC)	RUNOFF 2 YR (CFS)	RUNOFF 5 YR (CFS)	RUNOFF 10 YR (CFS)	RUNOFF 25 YR (CFS)	RUNOFF 50 YR (CFS)	RUNOFF 100 YR (CFS)
1	EX–B	20.06		10.5				58.8
2	EX–C*	452.97	17.1	141.0	189.0	263.8	368.7	458.0
3	EX–D	109.55		29.7				166.5
4	EX–E*	187.30	22.4	104.0	135.4	179.3	237.6	286.0
5	EX–F	39.85		19.3				113.7
6	EX–G	14.91		7.9				44.1
7	EX–H	28.13		12.3				73.2
8	EX–I	32.92		12.4				74.1
9	EX–J	25.78		9.0				55.9
10	EX–K	7.57		2.1				15.2

* 2, 10, 25, 50–YEAR STORMS USED TO COMPARE EXISTING–DEVELOPED AT ETRIB

EAST TRIBUTARY FEMA FLOW DATA			EAST TRIBUTARY DBPS FLOW DATA	
DESIGN POINT	RUNOFF 10 YR (CFS)	RUNOFF 100 YR (CFS)	RUNOFF 2 YR (CFS)	RUNOFF 100 YR (CFS)
ET1	2400	4750	100	4220
ET2	2600	5200	110	4530
ET3	2800	5500	110	4570
ET4	2800	5500	120	4600

LEGEND

- BASIN BOUNDARY–MAJOR
- BASIN BOUNDARY–MINOR
- BASIN DESIGN POINT
- BASIN I.D. / ACREAGE / 5 YR/100 YR CFS
- DIRECTION OF FLOW
- EXISTING CONTOUR
- TIME OF CONCENTRATION
- 100–YR FLOODPLAIN

UNPLATTED
EAST TRIBUTARY OF JIMMY CAMP CREEK
LORSON RANCH NORTH BOUNDARY
PIONEER LANDING FILING NO. 2
OLD GLORY DR
FONTAINE BLVD
MEADOWS FILING NO. 3
MEADOWS FILING NO. 4
ALLEGIANT
EXISTING 100 YR FLOOD PLAIN
ABANDONED FMIC CHANNEL
EXISTING 325' ELECTRICAL TRANSMISSION LINE ESMT
MVEA SUBSTATION SITE
LORSON RANCH EAST BOUNDARY
RELOCATED FMIC
REALIGNED JIMMY CAMP CREEK
LORSON RANCH SOUTH BOUNDARY
EXISTING SDS
APPLE RIDGE SUB.
APPLETREE GOLF COURSE
APPLETREE SUB. NO. 3
ROLLING RIDGE RD
HERITAGE RD
PEACEFUL VALLEY LAKE ESTATES 1st FILING
PEACEFUL VALLEY RD
RAINTREE DR

EX–A1 4.28 AC 1.1 | 8.0
EX–B 20.06 AC 10.5 | 58.8
EX–B1 14.42 AC 7.2 | 40.4
OS–B1.1 5.64 AC 3.0 | 16.8
OS–C6.1 9.96 AC 5.4 | 30.2
EX–C6 11.47 AC 5.0 | 29.5
EX–C5 102.19 AC 37.7 | 211.1
OS–C5.1 3.59 AC 2.0 | 11.4
EX–C9 41.18 AC 14.7 | 90.2
EX–C7 39.02 AC 15.8 | 91.2
EX–C 452.97 AC 141 | 458
EX–C4 27.13 AC 12.7 | 71.0
EX–C2 10.67 AC 5.7 | 31.8
EX–C10 10.89 AC 3.5 | 23.7
EX–C8 12.62 AC 5.1 | 29.6
EX–D 109.55 AC 29.7 | 166.5
EX–C3 74.40 AC 27.6 | 151.2
EX–C1 109.97 AC 41.3 | 230.8
EX–F1 22.35 AC 9.8 | 60.2
EX–F 39.85 AC 19.3 | 113.7
EX–F2 17.49 AC 9.7 | 54.0
EX–E1 79.5 AC 27.9 | 152.9
EX–E2 30.4 AC 15.2 | 85.0
EX–F 187.3AC 104.0 | 286.0
EX–H 28.13 AC 12.3 | 73.2
EX–G 14.91 AC 7.9 | 44.1
EX–K1 5.59 AC 1.6 | 11.5
EX–K 7.57 AC 2.1 | 15.2
EX–J1 13.42 AC 4.7 | 31.5
EX–J 25.78 AC 9.0 | 55.9
EX–I1 16.96 AC 8.8 | 49.1
EX–I 32.92 AC 12.4 | 74.1
OS–J1.1 12.36 AC 5.4 | 31.1
OS–I1.1 15.96 AC 5.4 | 35.4
OS–E2.1 46.9 AC 38.0 | 102.0
OS–E1.1 31 AC 25.3 | 83.5
OS–K1.1 1.98 AC 0.5 | 4.0

ET1 ET2 ET3 ET4

400 200 0 400 800
SCALE: 1"=400'

CORE ENGINEERING GROUP
15304 1ST AVENUE S.
BURNSVILLE, MN 55306
PH: 719.570.1100
CONTACT: RICHARD L SCHINDLER, P.E.
EMAIL: rlschindler@coreengr.com

DATE
DESCRIPTION
NO.

PREPARED FOR:
LORSON LLC
212 NORTH WAHSATCH AVE, SUITE 301
COLORADO SPRINGS, COLORADO 80903 (719) 635-3200
CONTACT: JEFF MINER

PROJECT:
LORSON RANCH EAST MDDP
EAST OF THE EAST TRIBUTARY
EL PASO COUNTY, COLORADO

DRAWN: LJA
DESIGNED: LAB
CHECKED: RLS

EXISTING CONDITIONS
LORSON RANCH EAST MDDP
EAST OF ETRIB OF JIMMY CAMP CREEK

DATE: NOV, 2017
PROJECT NO. 100.013
SHEET NUMBER 1
TOTAL SHEETS: 1

LEGEND

BASIN BOUNDARY–MAJOR

BASIN I.D.
ACREAGE
5 YR/100 YR CFS

DIRECTION OF FLOW

EXISTING CONTOUR

PROPOSED CONTOUR

PRELIMINARY PLAN SITE AREA

EXISTING VERSUSES DEVELOPED FLOW AT OUTFLOWS TO ETRIB				
DESIGN POINT	EXISTING RUNOFF 5 YR (CFS)	EXISTING RUNOFF 100 YR (CFS)	DEVELOPED RUNOFF 5 YR (CFS)	DEVELOPED RUNOFF 100 YR (CFS)
46	141	458	121	443
58a	29.7	166.5	8.8	133.6
73	100	280	120*	280*

DATA FROM LORSON EAST MDDP AND PDR
*INTERIM FLOW RATES FROM PDR

NOTE:

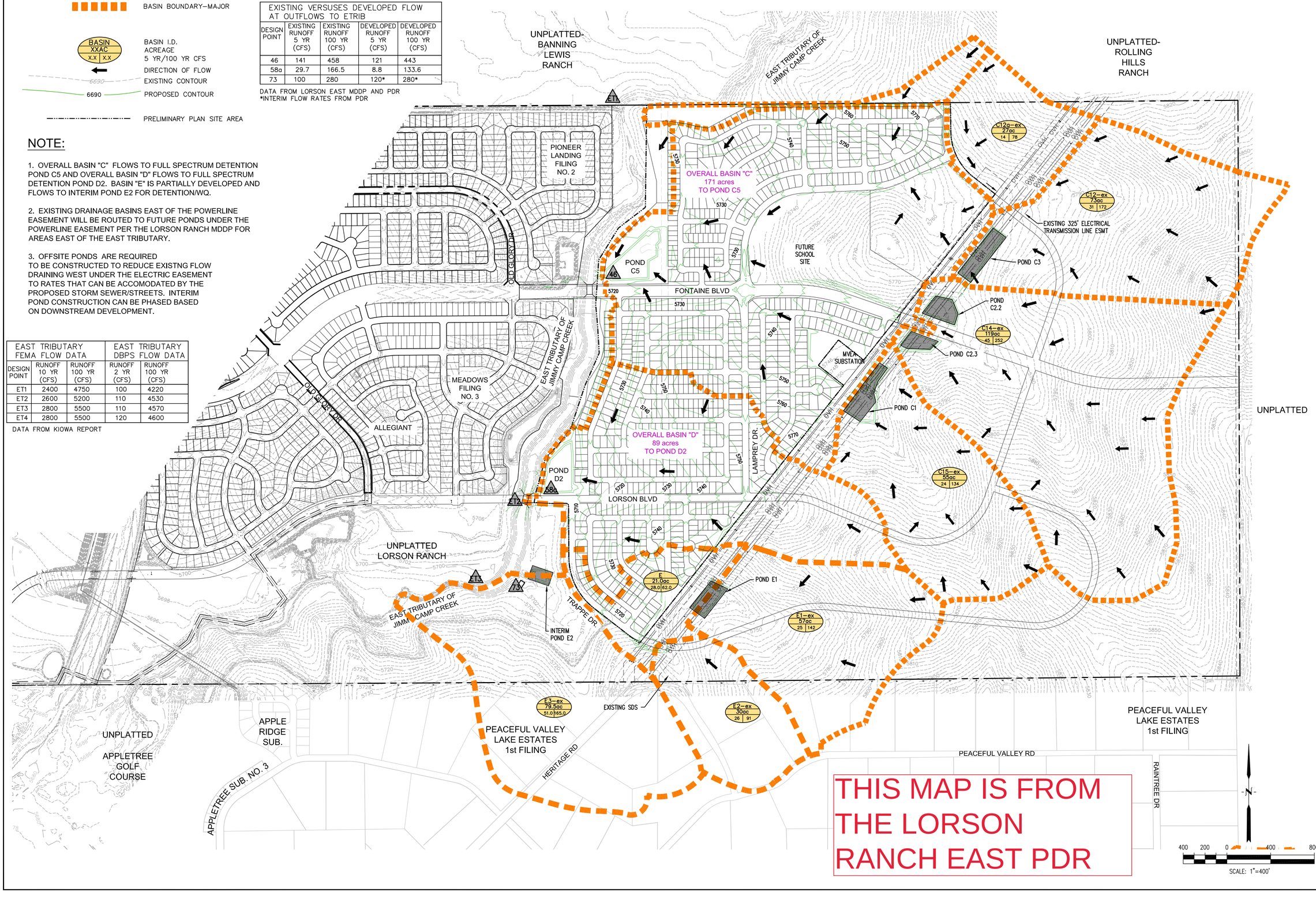
1. OVERALL BASIN "C" FLOWS TO FULL SPECTRUM DETENTION POND C5 AND OVERALL BASIN "D" FLOWS TO FULL SPECTRUM DETENTION POND D2. BASIN "E" IS PARTIALLY DEVELOPED AND FLOWS TO INTERIM POND E2 FOR DETENTION/WQ.

2. EXISTING DRAINAGE BASINS EAST OF THE POWERLINE EASEMENT WILL BE ROUTED TO FUTURE PONDS UNDER THE POWERLINE EASEMENT PER THE LORSON RANCH MDDP FOR AREAS EAST OF THE EAST TRIBUTARY.

3. OFFSITE PONDS ARE REQUIRED TO BE CONSTRUCTED TO REDUCE EXISTNG FLOW DRAINING WEST UNDER THE ELECTRIC EASEMENT TO RATES THAT CAN BE ACCOMODATED BY THE PROPOSED STORM SEWER/STREETS. INTERIM POND CONSTRUCTION CAN BE PHASED BASED ON DOWNSTREAM DEVELOPMENT.

EAST TRIBUTARY FEMA FLOW DATA			EAST TRIBUTARY DBPS FLOW DATA	
DESIGN POINT	RUNOFF 10 YR (CFS)	RUNOFF 100 YR (CFS)	RUNOFF 2 YR (CFS)	RUNOFF 100 YR (CFS)
ET1	2400	4750	100	4220
ET2	2600	5200	110	4530
ET3	2800	5500	110	4570
ET4	2800	5500	120	4600

DATA FROM KIOWA REPORT



THIS MAP IS FROM THE LORSON RANCH EAST PDR

CORE ENGINEERING GROUP
15004 1ST AVENUE S.
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EMAIL: rlsdberg1.com

NO. | DESCRIPTION | DATE

PREPARED FOR:
LORSON LLC
212 NORTH WAHSATCH AVE, SUITE 301
COLORADO SPRINGS, COLORADO 80903 (719) 635-3200
CONTACT: JEFF MARK

PROJECT:
LORSON RANCH EAST
EAST OF THE EAST TRIBUTARY
EL PASO COUNTY, COLORADO

DRAWN: LJA
DESIGNED: LAB
CHECKED: RLS

OVERALL DEVELOPED CONDITIONS
LORSON RANCH EAST
EAST OF ETRIB OF JIMMY CAMP CREEK

DATE:
OCTOBER 20, 2017

PROJECT NO.
100.040

SHEET NUMBER
1

TOTAL SHEETS: 1

LEGEND

- DRAINAGE BASIN BOUNDARY
- SITE BOUNDARY
- BASIN I.D. (BASIN: XX AC; X.X | X.X)
- ACREAGE
- 5 YR/100 YR CFS
- DIRECTION OF FLOW
- 6690 EXISTING CONTOUR
- 6670 SCHOOL GRADING
- 6670 PROPOSED CONTOURS PER EARLY GRADING
- HP HIGH POINT
- LP LOW POINT
- TIME OF CONCENTRATION

RUNOFF SUMMARY			
DESIGN POINT	5 YEAR	100 YEAR	NOTES
2	7.0	41.0	EXISTING FLOW
3	8.8	19.6	STREET FLOW
4	10.2	22.8	STREET FLOW
5	0.3	0.6	STREET FLOW
6	11.9	30.3	STREET FLOW
6a	6.61	24.87	STREET FLOW FROM LRE2 FDR

N

0 100 200

SCALE: 1"=100'

UNPLATTED BANNING LEWIS RANCH

UNPLATTED ROLLING HILLS RANCH

EXISTING NORTH DIVERSION SWALE "V" swale, 2.5' deep, 1% slope (MIN), 3:1 sides SEE LORSON RANCH EAST FILING NO. 2

TRACT A

LRE 2

HALIFAX DR.

SHAVERS DR.

NAPA DR.

YAMHILL DR.

MUMFORD DR.

LORSON BLVD.

LAMPREY DR

FUTURE DEVELOPMENT AREA

LORSON BLVD. HAS BEEN ROUGH GRADED AT 0.6% SLOPE (collector)

C16.8 0.53 AC 1.2 | 2.8

C16.6 1.43 AC 2.9 | 6.4

C16.5 0.50 AC 1.2 | 2.7

C16.1 2.68 AC 6.0 | 13.3

C16.9 1.60 AC 3.6 | 7.9

C16.13 3.92 AC 7.0 | 15.5

C16.12 1.82 AC 4.2 | 9.3

C16.10 0.52 AC 1.2 | 2.7

C16.11 0.38 AC 0.8 | 1.7

C16.7 0.54 AC 1.2 | 2.7

C16.2 1.82 AC 3.6 | 7.9

C16.3 1.78 AC 3.6 | 7.9

C16.4 0.81 AC 1.7 | 3.9

EX-3.3 13.4 AC 7.0 | 41.0

24" RCP

15' Type R

10' Type R

30" RCP

18" RCP

5' Type R

42" RCP

EX 36" RCP

EX 24" RCP

TEMP SEDIMENT BASIN

SCHOOL SITE

SCHOOL STM SWR

SWALE TO DRAIN PER LORSON RANCH EAST FIL. 2

POND C3

POND C3 PER LORSON RANCH EAST FIL. 2

24" RCP OUTLET PIPE FOR POND C3 PER LORSON RANCH EAST FIL 2

P:\100.049 drainage\100.049-DevConditions.dwg, Jan 15, 2019 - 7:20am

CORE ENGINEERING GROUP
15004 1ST AVE. S.
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CONTACT: RICHARD L. SCHINDLER, P.E.
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PREPARED FOR:
LORSON, LLC
212 N. WAHSATCH AVE., SUITE 301
COLORADO SPRINGS, COLORADO 80903
(719) 635-3200
CONTACT: JEFF MARK

NO. | DESCRIPTION | DATE

PROJECT:
LORSON RANCH EAST FIL. 4
FONTAINE BLVD. – LAMPREY DRIVE
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: LAB

DEVELOPED CONDITIONS
LORSON RANCH EAST FILING NO. 3

DATE
JANUARY 15, 2019

PROJECT NO.
100.049

SHEET NUMBER
1

TOTAL SHEETS: 1

Markup Summary

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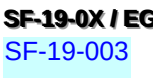

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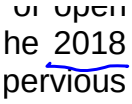

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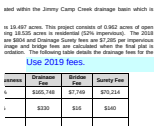

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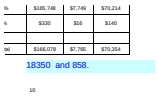
Use 2019 fees.



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