

# **FINAL DRAINAGE PLAN**

## **THE RIDGE AT LORSON RANCH**

**FILING NO. 1: SF 22-004**

**FILING NO. 2 : SF22-005**

**FILING NO. 3: SF22-007**

**JANUARY, 2022**  
**REV. MARCH, 2022**

***Prepared for:***

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Project No. 100.066



**CORE**  

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**ENGINEERING GROUP**

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**ENGINEER'S STATEMENT**

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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.

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

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**OWNER'S STATEMENT**

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

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Lorson, LLC Date

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By  
Jeff Mark

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Title  
Manager

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

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**FLOODPLAIN STATEMENT**

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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. and 08041C0976 G, dated December 7, 2018. (See Appendix A, FEMA FIRM Exhibit)

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Richard L. Schindler, #33997 Date

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**EL PASO COUNTY**

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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.

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Jennifer Irvine Date  
County Engineer/ECM Administrator

Conditions: \_\_\_\_\_

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## 1.0 LOCATION and DESCRIPTION

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**The Ridge at Lorson Ranch Filing No's. 1-3** is located east of the East Tributary of Jimmy Camp Creek. The entire three filings are located on approximately 206.473 acres of vacant land. This project will develop this site into a single-family residential development. The land for the residential lots is currently owned by Love In Action

The site is located in the NE 1/4 of Sections 24 and the SE 1/4 of Section 13, Township 15 South and Range 65 West of the 6<sup>th</sup> Principal Meridian. The site is bounded on the north by unplatted land owned by Bull Hill, LLC, on the west by The Hills at Lorson Ranch, on the east by unplatted land, and the south by unplatted land in Lorson Ranch. For reference, a vicinity map is included in Appendix A of this report.

### Conformance with applicable Drainage Basin Planning Studies (DBPS)

There is an existing (unapproved) DBPS for Jimmy Camp Creek prepared by Wilson & Company in 1987, and is referenced in this report. The only major drainage improvements for this study area according to the 1987 Wilson study was the reconstruction of the East Tributary of Jimmy Camp Creek (East Tributary). In 2014 and in 2018 the East Tributary was reconstructed from downstream of Lorson Boulevard north to the northern property line of Lorson Ranch in accordance with the 1987 study. The last section of the East Tributary (to the south property line of Lorson Ranch) has been designed by Kiowa Engineering and will be completed in 2020. There are no further improvements to be made on the East Tributary. 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. The concept design includes the East Tributary armoring concept and the full spectrum detention pond requirements. The Kiowa DBPS did not calculate drainage fees so current El Paso County drainage/bridge fees apply to this development.

### Conformance with Lorson East MDDP by Core Engineering Group and Previous Drainage Studies

Core Engineering Group has an approved MDDP for Lorson East which covers this study area including an approved Preliminary Drainage for this site titled The Ridge at Lorson Ranch, PUD/SP 21-006. This Final Drainage Report conforms to the MDDP for Lorson East and the PDR. The major infrastructure to be constructed in this site includes outlet structures in Detention/WQ Ponds C2.1 and C4 and WQ Pond F. Pond C2.1 and C4 were graded, low flow channels, and forebays were constructed as part of The Hills at Lorson Ranch under PUDSP-20-003 and the WQ Pond F will be constructed with this project. There are also two bridges over the East Tributary that were built in 2018 to provide access to this development across the East Tributary. The bridges are located at Fontaine Boulevard and Lorson Boulevard.

The Ridge at Lorson Ranch is located within the ***“Jimmy Camp Creek Drainage Basin”***, which is a fee basin in El Paso County and a small portion (SE corner) within the “Upper Williams Creek Drainage Basin which does not have a DBPS.

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## 2.0 DRAINAGE CRITERIA

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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 and full spectrum ponds. 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.

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### 3.0 EXISTING HYDROLOGICAL CONDITIONS

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This site is currently 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 site as Manzanola clay loam; Midway Clay Loam, Nelson-Tassel fine Sandy loam; Razor clay loam; and Wiley silt loam [3]. 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/D 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 may 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
52-Manzanola Clay Loam	C	High	Slow	Medium	Moderate
54-Midway Clay Loam	D	High	Slow	Medium	Moderate
56-Nelson – Tassel Fine Sandy Loam	B	Moderate	Moderately Rapid	Slow	Moderate
75-Razor Clay Loam	C	High	Slow	Medium	Moderate
108-Wiley Silt Loam	B	Moderate	Moderate	Medium	Moderate

Excerpts from the SCS “Soil Survey of El Paso County Area, Colorado” 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.

An existing electrical easement, with existing transmission towers, is located west side of this site and will be set aside as open space. It is the intent to utilize some of the open space under the towers for detention of storm flow.

This site is not located within the 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 08041C10976 G, effective December 7, 2018.

#### Basin OS-B1.1

This existing offsite basin consists of existing flow from undeveloped areas east of Lorson Ranch. Runoff flows overland to the northwest and drains offsite at Design Point 1x. The existing runoff is 5.2cfs and 29.0cfs for the 5-year and 100-year events.

#### Basin EX-B1

This existing basin consists of existing flow from undeveloped areas within Lorson Ranch near the north property line. Runoff flows overland to the north and drains offsite at Design Point 1x. The existing runoff is 5.6cfs and 31.2cfs for the 5-year and 100-year events.

#### Design Point 1x

Design Point 1x is the total existing runoff flowing offsite to the north. The developed runoff flowing north will need to be lower than the existing runoff at this design point. The existing runoff is 9.7cfs and 54.2cfs for the 5-year and 100-year events.

#### Basin C1.1-ex

This existing basin consists of existing flow from undeveloped areas east of the Lorson Boulevard/Walleye Drive intersection. Runoff flows overland to the west and drains into an existing storm sewer system in Lorson/Walleye. The existing runoff is 3.2cfs and 21.4cfs for the 5-year and 100-year events.

#### Basin C2.1-ex

This existing basin consists of existing flow from undeveloped areas east of the Fontaine Boulevard/Walleye Drive intersection. Runoff flows overland to the west and drains into an existing storm sewer system in Fontaine/Walleye. The existing runoff is 6.1cfs and 40.2cfs for the 5-year and 100-year events.

#### Basin C2.2-ex

This existing basin consists of existing flow from undeveloped areas on west side of the site. Runoff flows overland to the west and drains to an existing 42" storm sewer that discharges west into Existing Pond C2.1. The existing runoff is 12.2cfs and 81.8cfs for the 5-year and 100-year events.

#### Basin C3.1-ex

This existing basin consists of existing flow from undeveloped areas on the central portion of the PUD. Runoff flows overland to the west and drains into an existing storm sewer system at the intersection of Walleye Drive/Grayling Drive. The existing runoff is 2.6cfs and 15.0cfs for the 5-year and 100-year events.

#### Basin C4.1-ex

This existing basin consists of existing flow from offsite undeveloped areas east of Lorson Ranch. Runoff flows overland to the west into Basin C4.2-ex. The existing runoff is 1.2cfs and 7.8cfs for the 5-year and 100-year events.

#### Basin C4.2-ex

This existing basin consists of existing flow from undeveloped areas in the northern portion of the PUD. Runoff flows overland to the west to Existing Pond C4 excavated as part of The Hills at Lorson Ranch. The existing runoff is 15.0cfs and 85.1cfs for the 5-year and 100-year events.

#### Design Point 4x

Design Point 4x is the existing flow entering Existing Pond C4 from Basin C4.1-ex and C4.2-ex. The existing runoff is 15.2cfs and 86.9cfs for the 5-year and 100-year events from these two basins. This flow is then routed south into Existing Pond C3.

#### Basin EX-F1

This existing basin consists of existing flow from undeveloped areas in the east portions of the PUD. Runoff flows overland eastward and offsite to the adjacent landowner located in the Upper Williams Creek Drainage Basin. The existing runoff is 6.3cfs and 38.5cfs for the 5-year and 100-year events.

#### Basin EX-F2

This existing basin consists of existing flow from undeveloped areas in the east portions of the PUD. Runoff flows overland southeast and offsite to the adjacent landowner located in the Upper Williams Creek Drainage Basin. The existing runoff is 9.1cfs and 51.1cfs for the 5-year and 100-year events.

#### Design Point 2x

Design Point 2x is the total existing flow at the east property line from Basins EX-F1 and EX-F2. The existing runoff is 12.4cfs and 72.7cfs for the 5-year and 100-year events from these two basins. This flows east overland and offsite in the Upper Williams Creek Drainage Basin. Per Colorado Water regulations Lorson Ranch will need to maintain existing runoff amounts into the Upper Williams Creek Drainage Basin.

#### Basin EX-G

This existing basin consists of existing flow from undeveloped areas in the south portions of the PUD. Runoff flows overland south offsite to the adjacent landowner located in the Upper Williams Creek Drainage Basin. The existing runoff is 2.9cfs and 21.6cfs for the 5-year and 100-year events.

#### Basin EX-H

This existing basin consists of existing flow from undeveloped areas in the south portions of the PUD. Runoff flows overland south offsite to the adjacent landowner located in the Upper Williams Creek Drainage Basin. The existing runoff is 6.1cfs and 42.9cfs for the 5-year and 100-year events.

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## **4.0 DEVELOPED HYDROLOGICAL CONDITIONS**

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Hydrology for the **The Ridge at Lorson Ranch** 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 B/C/D has been assumed for the developed hydrologic conditions. 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.

All detention ponds for this project have been constructed per The Hills at Lorson Ranch (SF21-010 & EGP 20-005) and WQ Pond F will be constructed with this project. See Section 6.0 for Detention Pond Discussions. The list below shows the ponds and the tributary drainage basins:

1. C1 Basins drain to Pond C1
2. C3 & C4 Basins drain to Pond C2.1
3. C5 Basins drain to Pond C2.2
4. C8 Basins drain to Pond C4
5. F Basins drain to WQ Pond F

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

#### Basin C1.1

This basin consists of runoff from residential development and the east side of Nystrom Terrace and the north side of Aspen Butte Terrace. Runoff will be directed west to Design Point 1 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 5.6cfs and 12.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C1.2

This basin consists of runoff from residential development and the west side of Nystrom Terrace and the south side of Aspen Butte Terrace. Runoff will be directed west to Design Point 2 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 2.7cfs and 5.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C1.3

This basin consists of runoff from residential development and the north side of Lorson Blvd. Runoff will be directed south and west in Lorson Boulevard to Design Point 4 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 8.9cfs and 19.7cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C1.4

This basin consists of runoff from residential development, Nystrom Terrace, and Walleye Drive. Runoff will be directed west to Walleye Drive, then south to Design Point 1b in curb/gutter where it will be collected by an existing 15' Type R inlet. The developed flow from this basin is 4.2cfs and 9.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C1.5

This basin consists of runoff from future residential development and the south side of Lorson Blvd. Runoff will be directed north and west in Lorson Boulevard to Design Point 6 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 3.0cfs and 6.6cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C1.6

This basin consists of runoff from future residential development southeast of Walleye Dr./Lorson Blvd at Design Point 1a. Runoff will be directed north to Design Point 1a by future streets and a future storm sewer sized to handle a portion of the 100-year storm event from this basin. The remaining runoff will continue west in a future street to a future street intersection at Lorson Boulevard west of Brook Trout Trail. The future developed flow from this basin is 12.8cfs and 28.3cfs for the 5/100-year storm event. See the appendix for detailed calculations. This flow is only to be used to size a storm sewer stub from Design Point 6

#### Basin C3.1

This basin consists of runoff from residential development, Aspen Butte Terrace, Copper Butte Way, and the east half of Split Mountain Drive. Runoff will be directed west and north to Design Point 12 in curb/gutter of Split Mountain Drive where it will be collected by a Type R inlet. The developed flow from this basin is 9.9cfs and 21.8cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C3.2



This basin consists of runoff from residential development, Mission Peak Place, and the east half of Split Mountain Drive. Runoff will be directed west and north to Design Point 13 in curb/gutter of Split Mountain Drive where it will be collected by a Type R inlet. The developed flow from this basin is 7.9cfs and 17.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C3.3

This basin consists of runoff from residential development, Pearsoll Street, and the east half of Split Mountain Drive. Runoff will be directed west and north to Design Point 15 in curb/gutter of Split Mountain Drive where it will be collected by a Type R inlet. The developed flow from this basin is 8.5cfs and 18.6cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C3.4

This basin consists of runoff from residential development, Lost Peak Lane, and the east half of Split Mountain Drive. Runoff will be directed west and north to Design Point 17 in curb/gutter of Split Mountain Drive where it will be collected by a Type R inlet. The developed flow from this basin is 7.2cfs and 15.8cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C3.5

This basin consists of runoff from residential development, Split Mountain Drive, west side of Pearsoll St, and the south side of Lake Trout Dr. Runoff will be directed north and west to Design Point 19 in curb/gutter of Lake Trout Dr where it will be collected by a Type R inlet. The developed flow from this basin is 10.3cfs and 22.6cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C3.6a

This basin consists of runoff from residential development and the north side of Lake Trout Dr. Runoff will be directed west to Design Point 20a in curb/gutter of Lake Trout Dr where it will be collected by a Type R inlet. The developed flow from this basin is 5.6cfs and 12.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C3.6b

This basin consists of runoff from residential development and Lookout Peak Lane. Runoff will be directed west and south to Design Point 21 in curb/gutter of Lake Trout Dr where it will be collected by a Type R inlet. The developed flow from this basin is 7.2cfs and 15.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C3.7

This basin consists of runoff from residential development, Dragontail Terrace, and the south side of Lake Trout Dr. Runoff will be directed north and west to Design Point 23 in curb/gutter of Lake Trout Dr where it will be collected by a Type R inlet. The developed flow from this basin is 8.7cfs and 19.1cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C3.8

This basin consists of runoff from residential development, Foraker Lane, Raven Ridge Terrace, and the north side of Lake Trout Dr. Runoff will be directed west and south to Design Point 25 in curb/gutter of Lake Trout Dr where it will be collected by a Type R inlet. The developed flow from this basin is 10.0cfs and 22.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C3.9

This basin consists of runoff from residential development, Raven Ridge Terrace, and the south side of Lake Trout Dr. Runoff will be directed north and west to Design Point 27 in curb/gutter of Lake Trout Dr where it will be collected by a Type R inlet. The developed flow from this basin is 8.1cfs and 17.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C3.10

This basin consists of runoff from residential development, Nystrom Terrace, and the south side of Lake Trout Dr. Runoff will be directed north and west to Design Point 29 in curb/gutter of Lake Trout Dr where it will be collected by a Type R inlet. The developed flow from this basin is 9.2cfs and 20.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C4.1

This basin consists of runoff from residential development, Pearsoll Street, Buckner Way, north side of Foraker Ln, and the south side of Fontaine Boulevard. Runoff will be directed north and west to Fontaine Boulevard where it will flow west to Design Point 31. The developed flow from this basin is 6.4cfs and 14.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C4.2

This basin consists of runoff from residential development and the south side of Fontaine Boulevard. Runoff will be directed north and west to Fontaine Boulevard to Design Point 31. The developed flow from this basin is 4.8cfs and 10.5cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C4.3

This basin consists of runoff from residential development, Lake Trout Dr, and Nystrom Terrace. Runoff will be directed north and west to Design Point 32 in curb/gutter of Nystrom Terrace where it will be collected by a Type R inlet. The developed flow from this basin is 5.7cfs and 12.4cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C4.4

This basin consists of runoff from residential development, Lake Trout Dr, and the west side of Walleye Drive. Runoff will be directed west and north to an existing 25' Type R inlet at Design Point 33 in curb/gutter of Walleye Drive. The developed flow from this basin is 6.2cfs and 13.5cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C5.1a

This basin consists of runoff from residential development and the south side of Sanderling Street. Runoff will be directed west and south to Design Point 39 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 4.2cfs and 9.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C5.1b

This basin consists of runoff from residential development and the north side of Gray Wolf Court. Runoff will be directed west to Design Point 36 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 11.4cfs and 25.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C5.1c

This basin consists of runoff from residential development and the south side of Gray Wolf Court. Runoff will be directed west to Design Point 37 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 7.4cfs and 16.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C5.1d

This basin consists of runoff from residential development and the north side of Snowfield Court. Runoff will be directed west and north to Design Point 41 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 9.3cfs and 20.7cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C5.1e

This basin consists of runoff from residential development, open space, Buckner Way, north half of Fontaine Blvd., and the south side of Snowfield Court. Runoff will be directed west to Design Point 43 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 10.0cfs and 21.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C5.2

This basin consists of runoff from residential development and the west side of Walleye Drive. Runoff will be directed south to Design Point 45 in curb/gutter where it will be collected by an existing 15' Type R inlet. The developed flow from this basin is 3.7cfs and 8.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C5.3

This basin consists of runoff from residential development and the north side of Fontaine Boulevard. Runoff will be directed west to Design Point 45 in curb/gutter where it will be collected by an existing 15' Type R inlet. The developed flow from this basin is 4.3cfs and 9.5cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.1a

This basin consists of runoff from residential development, west side of Danis Dr, and the south side of Meridith Ridge Way. Runoff will be directed west to Design Point 47 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 7.5cfs and 16.4cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.1b

This basin consists of runoff from residential development and the north side of Meridith Ridge Way and Donnas Drive. Runoff will be directed west and south to Design Point 49 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 6.3cfs and 13.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.1c

This basin consists of runoff from residential development and the north side of Sanderling Street. Runoff will be directed west to Design Point 48 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 3.4cfs and 7.6cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.2

This basin consists of runoff from residential development and the east side of Walleye Drive. Runoff will be directed west and north to Design Point 51 in curb/gutter where it will be collected by an existing 25' Type R inlet in Walleye Drive. The developed flow from this basin is 4.5cfs and 10.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin OS-C4a

This basin consists of runoff from undeveloped offsite land east of Lorson Ranch. Runoff will be directed northwest to a swale where the flow is conveyed north to Design Point 63a. The existing flow from this basin is 1.2cfs and 7.7cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.3a

This basin consists of runoff from residential development and the east/north side of Danis Drive. Runoff will be directed north to Design Point 53 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 10.5cfs and 23.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.3b

This basin consists of runoff from residential development and the east side of Rikers Ridge Lane and the south side of Walleye Drive. Runoff will be directed west to Design Point 54 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 6.0cfs and 13.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin OS-C4b

This basin consists of runoff from undeveloped offsite land east of Lorson Ranch. Runoff will be directed northwest to a swale where the flow is conveyed north to Design Point 63a. At Design Point 63a the concentrated flow will be dissipated by two rip rap pads to change the flow to be closer to overland sheet flow. Lorson Ranch owns the downstream offsite land (to the north) and a letter of understanding has been secured to address maintenance of any erosion issues should they occur on the offsite area and to acknowledge the manner of which drainage enters the offsite property has changed. See appendix for agreement. The existing flow from this basin is 0.9cfs and 5.5cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.3c

These basins consist of runoff from residential development, south side of Walleye Dr, and the west/south side of Danis Drive. Runoff will be directed west to Design Point 54 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 4.5cfs and 9.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.3d

This basin consists of runoff from residential development and the north side of Jasons Ridge Way, and Donnas Drive. Runoff will be directed northwest to Design Point 56 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 8.9cfs and 19.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.4

This basin consists of runoff from residential development and the south side of Jasons Ridge Way, west side of Danis Dr, and Donnas Drive. Runoff will be directed southwest to Design Point 57 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 11.0cfs and 24.1cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.5

This basin consists of runoff from residential development and the west side of Rikers Ridge Way, a portion of Broken Top Ter, and the north side of Walleye Drive. Runoff will be directed southwest to Design Point 59 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 7.0cfs and 15.5cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.6

This basin consists of runoff from residential development, west side of Walleye Drive, and the north side of Grayling Drive. Runoff will be directed west to Design Point 62 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 4.0cfs and 6.4cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.7a

This basin consists of runoff from residential development and the north side of Logans Ridge Lane, west side of Rikers Ridge Ln, and the south side of Reagan Ridge Drive. Runoff will be directed west to Design Point 63 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 8.1cfs and 18.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.7b

This basin consists of runoff from residential development, west side of Rikers Ridge Ln, and the south side of Logans Ridge Lane. Runoff will be directed west to Design Point 63 in curb/gutter where it will

be collected by a Type R inlet. The developed flow from this basin is 3.4cfs and 7.6cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.7c

This basin consists of runoff from residential development and Cody Ridge Way. Runoff will be directed west to Design Point 64 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 9.4cfs and 21.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.7d

This basin consists of runoff from residential development and the east side of Reagan Ridge Drive. Runoff will be directed west to Design Point 66 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 0.6cfs and 1.4cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.7e

This basin consists of runoff from residential development, Broken Top Ter, the east side of Reagan Ridge Drive, and Alpine Ridge Lane. Runoff will be directed southwest to Design Point 62 in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 11.1cfs and 24.5cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin OS-B1.1

This existing basin consists of runoff from undeveloped offsite land east of Lorson Ranch. Runoff will be directed north to Design Point 63a in a swale. The existing flow from this basin is 5.2cfs and 29.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.8a

This basin consists of runoff from residential development, the west/north side of Reagan Ridge Drive. Runoff will be directed southwest to Design Point 69 in curb/gutter where it will be collected by an existing 25' Type R inlet. The developed flow from this basin is 7.9cfs and 17.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin C8.8

This basin consists of runoff from residential development. Runoff will be directed south directly to existing Pond C4. The developed flow from this basin is 5.9cfs and 21.8cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin F1.1

This basin consists of runoff from residential development. Runoff will be directed east into Basin F1.2 as sheet flow. The developed flow from this basin is 7.5cfs and 16.5cfs for the 5/100-year storm event. See the appendix for detailed calculations. Water quality for this basin flowing offsite will be addressed by the Runoff Reduction method for sheet flows crossing open space in Basin F1.2. See water quality section.

#### Basin F1.2

This basin consists of runoff from open space and will be directed east offsite generally as sheet flow which will not significantly be changed from existing conditions and grading. The flow from this basin is 6.1cfs and 44.6cfs for the 5/100-year storm event. See the appendix for detailed calculations.

#### Basin F1.3

This basin consists of runoff from residential development, the north side of Mission Peak Pl, and the east side of Kingston Peak Place. Runoff will be directed south to Design Point 35b in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 1.9cfs and 4.6cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Portion of Mission Peak PI



Basin F1.4

This basin consists of runoff from residential development, portions of Copper Butte Wy, portions of Aspen Butte Ter, and the west side of Kingston Peak Place. Runoff will be directed south to Design Point 35a in curb/gutter where it will be collected by a Type R inlet. The developed flow from this basin is 5.9cfs and 13.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Combined Flow From the “F” developed basins

Developed runoff flowing east into the Upper Williams Creek Drainage Basin is required to match existing conditions. See Design Point 35 for analysis of offsite flows to the east.

Interim Basin G1

This basin consists of existing runoff from undeveloped land. Runoff flows south to Design Point 35e located on the south property line of Lorson Ranch. This basin was added to analyze existing runoff rates before and after development flowing south in the Upper Williams Creek Drainage Basin at the Lorson Ranch south property line. See Design Point 35e for this analysis. The existing flow from this basin is 2.5cfs and 18.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Interim Basin H1

This basin consists of existing runoff from undeveloped land. Runoff flows south to Design Point 35f located on the south property line of Lorson Ranch. This basin was added to analyze existing runoff rates before and after development flowing south in the Upper Williams Creek Drainage Basin at the Lorson Ranch south property line. See Design Point 35f for this analysis. The existing flow from this basin is 6.0cfs and 40.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

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.

Include discussion of Basin C4.5 or remove basin from hydrology spreadsheets

5.0 HYDRAULIC SUMMARY

The sizing of the hydraulic structures and detentions ponds were prepared by using the *Storm Sewer* 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 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)

Street Slope	Residential Local		Residential Collector		Principal Arterial	
	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	29.7
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 1a

Design Point 1a is located south of Lorson Boulevard and Walleye Drive and flow is from future development from Basin C1.6. A 24" storm sewer will be stubbed out from Design Pt. 6a at Lorson Boulevard north towards this design point. The total future flow is 12.8cfs/28.3cfs in the 5/100-year storm events for this basin. In the 5-year storm event all flow will be routed north to Design Point 6a (in pipe). In the 100-year storm event 25.3cfs will be routed north to Design Point 6a (in pipe) and 3cfs will be routed west in the future street (surface flow in street).

Design Point 1

Design Point 1 is located at the NE corner of Nystrom Terrace and Aspen Butte Terrace at a knuckle and accepts flows from Basin C1.1 The developed conditions are as follows:

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C1.1	<b>Inlet/MH Number:</b> Inlet DP1
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 5.6cfs
<b>Flow Intercepted:</b> 5.6cfs	<b>Flow Bypassed:</b> 0
<b>Inlet Size:</b> 10' type R, sump	
<b>Street Capacity:</b> Street slope = 1.0%, capacity = 9cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C1.1	<b>Inlet/MH Number:</b> Inlet DP1
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 12.2cfs
<b>Flow Intercepted:</b> 12.2cfs	<b>Flow Bypassed:</b>
<b>Inlet Size:</b> 10' type R, sump	
<b>Street Capacity:</b> Street slope = 1.0%, capacity = 37cfs (half street) is okay	

Several design point designations are missing in hydrology spreadsheet. Update to ensure all DP's listed here are labeled in spreadsheet.

### Design Point 2

Design Point 2 is located at the SW corner of Nystrom Terrace at a knuckle and accepts flows from Basin C1.2. The developed conditions are as follows:

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C1.2	<b>Inlet/MH Number:</b> Inlet DP2
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 2.7cfs
<b>Flow Intercepted:</b> 2.7cfs	<b>Flow Bypassed:</b> 0
<b>Inlet Size:</b> 10' type R, sump	
<b>Street Capacity:</b> Street slope = 1.0%, capacity = 9cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C1.2	<b>Inlet/MH Number:</b> Inlet DP2
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 5.9cfs
<b>Flow Intercepted:</b> 5.9cfs	<b>Flow Bypassed:</b>
<b>Inlet Size:</b> 10' type R, sump	
<b>Street Capacity:</b> Street slope = 1.0%, capacity = 37cfs (half street) is okay	

### Design Point 3

Design Point 3 is the storm sewer pipe flow from Nystrom Terrace to Lorson Boulevard from Design Pt's 1 and 2. The total pipe flow is 8.3cfs/18.1cfs in the 5/100-year storm events in the storm sewer.

### Design Point 4

Design Point 4 is located at the NE of Lorson Boulevard and Walleye Drive and accepts flows from Lorson Boulevard (Basin C1.3).

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C1.3	<b>Inlet/MH Number:</b> Inlet DP4
<b>Upstream flowby:</b> 0	<b>Total Street Flow:</b> 8.9cfs
<b>Flow Intercepted:</b> 8.9cfs	<b>Flow Bypassed:</b> 0
<b>Inlet Size:</b> 20' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.0%, capacity = 18cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C1.3	<b>Inlet/MH Number:</b> Inlet DP4
<b>Upstream flowby:</b> 1.9cfs from DP35a	<b>Total Street Flow:</b> 19.7cfs
<b>Flow Intercepted:</b> 18.0cfs	<b>Flow Bypassed:</b> 3.6cfs to ex. 15' inlet at Des. Pt. 4a
<b>Inlet Size:</b> 20' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.0%, capacity = 50cfs (half street) is okay	
The existing 15' inlet was designed to accept 10cfs of upstream flow in the 100-year storm. See final drainage report for CDR 20-007 at Design Point 1b and 1.	



Design Point 4a

Design Point 4a is flow at an existing inlet at the NE corner of Grayling/Lorson Blvd. Flow is basin C1.4 and runby from Des. Pt. 4. The total flow at the inlet is  $(4.2+0) = 4.2\text{cfs}$  in the 5-year storm events and the inlet was designed for 4.8cfs per the final drainage report for CDR 20-007. The total flow at the inlet is  $(9.2+3.6) = 12.8\text{cfs}$  in the 100-year storm events and the inlet was designed for 20.3cfs per the final drainage report for CDR 20-007.

Design Point 5

Design Point 5 is the storm sewer pipe flow from Design Pt's 3 and flow from Des. Pt. 4. The total pipe flow is 17.2cfs/36.1cfs in the 5/100-year storm events in the storm sewer.

Flows do not match the hydrology spreadsheet or pipe flows in storm sewer summary

Design Point 6

Design Point 6 is located at the SE of Lorson Boulevard and Walleye Drive and accepts flows from Lorson Boulevard (Basin C1.5).

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C1.5	<b>Inlet/MH Number:</b> Inlet DP6
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 3.0cfs
<b>Flow Intercepted:</b> 3.0cfs	<b>Flow Bypassed:</b> 0cfs in curb downstream
<b>Inlet Size:</b> 10' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.0%, capacity = 18cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C1.5	<b>Inlet/MH Number:</b> Inlet DP6
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 6.6cfs
<b>Flow Intercepted:</b> 5.7cfs	<b>Flow Bypassed:</b> 0.9cfs in curb downstream
<b>Inlet Size:</b> 10' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.0%, capacity = 50cfs (half street) is okay	

Design Point 6a

Design Point 6a is the 24" storm sewer pipe flow located in Lorson Boulevard from Basins C1.5 & C1.6 minus the runby from Des. Pt. 6 and minus runby at Des.Pt. 1a. The total pipe flow is 15.0cfs in the 5-year storm events in the storm sewer. The total pipe flow is  $(33.1-0.9-3) = 29.2\text{cfs}$  in the 100-year storm events in the storm sewer.

Design Point 7

Design Point 7 is the existing 36" storm sewer pipe flow located in Lorson Boulevard from Des. Pt 6a and flow from Des. Pt. 5. The total pipe flow is 32.2cfs/65.3cfs in the 5/100-year storm events in the storm sewer. Per the drainage report for CDR 20-007 the allowable flow in the existing 36" is 37.1cfs/65.3cfs.

There is no DP 7 shown in the hydrology spreadsheet.

Design Points 8-11 are not used

Design Point 12

Design Point 12 is located at the SE corner of Split Mountain Drive and Mission Peak Place and accepts flows from Basin C3.1.

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C3.1	<b>Inlet/MH Number:</b> Inlet DP12
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 9.9cfs
<b>Flow Intercepted:</b> 9.3cfs	<b>Flow Bypassed:</b> 0.6cfs in curb downstream
<b>Inlet Size:</b> 15' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.6%, capacity = 14.4cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C3.1	<b>Inlet/MH Number:</b> Inlet DP12
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 21.8cfs
<b>Flow Intercepted:</b> 14.8cfs	<b>Flow Bypassed:</b> 7.0cfs in curb downstream
<b>Inlet Size:</b> 15' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.6%, capacity = 40.7cfs (half street) is okay	

Design Point 13

Design Point 13 is located at the SE corner of Split Mountain Drive and Pearsoll Street and accepts flows from Basin C3.2.

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C3.2	<b>Inlet/MH Number:</b> Inlet DP13
<b>Upstream flowby:</b> 0.6cfs from Des. Pt 12	<b>Total Street Flow:</b> 8.5cfs
<b>Flow Intercepted:</b> 8.3cfs	<b>Flow Bypassed:</b> 0.2cfs in curb downstream
<b>Inlet Size:</b> 15' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.2%, capacity = 13.3cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C3.2	<b>Inlet/MH Number:</b> Inlet DP13
<b>Upstream flowby:</b> 7.0cfs from Des. Pt 12	<b>Total Street Flow:</b> 24.3cfs
<b>Flow Intercepted:</b> 15.6cfs	<b>Flow Bypassed:</b> 8.7cfs in curb downstream
<b>Inlet Size:</b> 15' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.2%, capacity = 42.8cfs (half street) is okay	

Design Point 14

Design Point 14 is the storm sewer pipe flow from Design Pt's 12 and 13. The total pipe flow is 17.6cfs/30.4cfs in the 5/100-year storm events in the storm sewer.

Design Point 15

Design Point 15 is located at the SE corner of Split Mountain Drive and Lost Peak Lane and accepts flows from Basin C3.3.

(5-year storm)

**Tributary Basins:** C3.3  
**Upstream flowby:** 0.2cfs from Des. Pt 13

**Inlet/MH Number:** Inlet DP15  
**Total Street Flow:** 8.7cfs

**Flow Intercepted:** 8.4cfs  
**Inlet Size:** 15' type R, on-grade

**Flow Bypassed:** 0.3cfs in curb downstream

**Street Capacity:** Street slope = 1.9%, capacity = 12.2cfs, okay

(100-year storm)

**Tributary Basins:** C3.3  
**Upstream flowby:** 8.7cfs from Des. Pt 13

**Inlet/MH Number:** Inlet DP15  
**Total Street Flow:** 27.3cfs

**Flow Intercepted:** 16.5cfs  
**Inlet Size:** 15' type R, on-grade

**Flow Bypassed:** 10.8cfs in curb downstream

**Street Capacity:** Street slope = 1.9%, capacity = 44.0cfs (half street) is okay

Design Point 16

Design Point 16 is the storm sewer pipe flow from Design Pt's 14 and 15. The total pipe flow is 26.0cfs/46.9cfs in the 5/100-year storm events in the storm sewer.

Design Point 17

Design Point 17 is located at the SE corner of Split Mountain Drive and Lake Trout Dr and accepts flows from Basin C3.4.

(5-year storm)

**Tributary Basins:** C3.4  
**Upstream flowby:** 0.3cfs from Des. Pt 15

**Inlet/MH Number:** Inlet DP17  
**Total Street Flow:** 7.5cfs

**Flow Intercepted:** 7.5cfs  
**Inlet Size:** 20' type R, on-grade

**Flow Bypassed:** 0cfs in curb downstream

**Street Capacity:** Street slope = 3.4%, capacity = 16.5cfs, okay

(100-year storm)

**Tributary Basins:** C3.4  
**Upstream flowby:** 10.8cfs from Des. Pt 15

**Inlet/MH Number:** Inlet DP17  
**Total Street Flow:** 26.7cfs

**Flow Intercepted:** 20.4cfs  
**Inlet Size:** 20' type R, on-grade

**Flow Bypassed:** 6.3cfs in curb downstream

**Street Capacity:** Street slope = 3.4%, capacity = 37.0cfs (half street) is okay

Design Point 18

Design Point 18 is the storm sewer pipe flow from Design Pt's 16 and 17. The total pipe flow is 33.5cfs/67.3cfs in the 5/100-year storm events in the storm sewer.

Design Point 19

Design Point 19 is located at the SW corner of Split Mountain Drive and Lake Trout Dr and accepts flows from Basin C3.5.

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C3.5	<b>Inlet/MH Number:</b> Inlet DP19
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 10.3cfs
<b>Flow Intercepted:</b> 10.3cfs	<b>Flow Bypassed:</b> 0cfs in curb downstream
<b>Inlet Size:</b> 20' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.6%, capacity = 14.4cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C3.5	<b>Inlet/MH Number:</b> Inlet DP19
<b>Upstream flowby:</b> 6.3cfs from Des. Pt 17	<b>Total Street Flow:</b> 28.8cfs
<b>Flow Intercepted:</b> 21.2cfs	<b>Flow Bypassed:</b> 7.6cfs in curb downstream
<b>Inlet Size:</b> 20' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.6%, capacity = 40.7cfs (half street) is okay	

Design Point 20

Design Point 20 is the storm sewer pipe flow from Design Pt's 18 and 19. The total pipe flow is 43.8cfs/88.5cfs in the 5/100-year storm events in the storm sewer.

Design Point 20a

Design Point 20a is located at the NE corner of Lookout Peak Lane and Lake Trout Dr and accepts flows from Basin C3.6a.

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C3.6a	<b>Inlet/MH Number:</b> Inlet DP20a
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 5.6cfs
<b>Flow Intercepted:</b> 5.6cfs	<b>Flow Bypassed:</b> 0
<b>Inlet Size:</b> 15' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.1%, capacity = 13.0cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C3.6a	<b>Inlet/MH Number:</b> Inlet DP20a
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 12.3cfs
<b>Flow Intercepted:</b> 10.7cfs	<b>Flow Bypassed:</b> 1.6cfs in curb downstream
<b>Inlet Size:</b> 15' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.1%, capacity = 42.0cfs (half street) is okay	

Design Point 20b

Design Point 20b is the storm sewer pipe flow from Design Pt's 20a and 20. The total pipe flow is 49.4cfs/99.2cfs in the 5/100-year storm events in the storm sewer.

Design Point 21

Design Point 21 is located at the NW corner of Lookout Peak Lane and Lake Trout Dr and accepts flows from Basin C3.6b.

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C3.6b	<b>Inlet/MH Number:</b> Inlet DP21
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 7.2cfs
<b>Flow Intercepted:</b> 7.2cfs	<b>Flow Bypassed:</b>
<b>Inlet Size:</b> 15' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.1%, capacity = 13.0cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C3.6b	<b>Inlet/MH Number:</b> Inlet DP21
<b>Upstream flowby:</b> 1.6cfs from Des. Pt 20a	<b>Total Street Flow:</b> 17.5cfs
<b>Flow Intercepted:</b> 13.1cfs	<b>Flow Bypassed:</b> 4.4cfs in curb downstream
<b>Inlet Size:</b> 15' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.1%, capacity = 42.0cfs (half street) is okay	

Design Point 22 not used

Design Point 23

Design Point 23 is located at the SW corner of Dragontail Terrace and Lake Trout Dr and accepts flows from Basin C3.7.

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C3.7	<b>Inlet/MH Number:</b> Inlet DP23
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 8.7cfs
<b>Flow Intercepted:</b> 8.4cfs	<b>Flow Bypassed:</b> 0.3cfs in curb downstream
<b>Inlet Size:</b> 15' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.0%, capacity = 13.0cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C3.7	<b>Inlet/MH Number:</b> Inlet DP23
<b>Upstream flowby:</b> 7.6cfs from Des. Pt 19	<b>Total Street Flow:</b> 26.7cfs
<b>Flow Intercepted:</b> 16.3cfs	<b>Flow Bypassed:</b> 10.4cfs in curb downstream
<b>Inlet Size:</b> 15' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.0%, capacity = 42.0cfs (half street) is okay	

Design Point 24

Design Point 24 is the storm sewer pipe flow from Design Pt's 20b and 23. The total pipe flow is 57.8cfs/115.5cfs in the 5/100-year storm events in the storm sewer.

Design Point 24a

Design Point 24a is the storm sewer pipe flow from Design Pt's 21 and 24. The total pipe flow is 65cfs/118.6cfs in the 5/100-year storm events in the storm sewer.

Design point not in table

Design Point 25

Design Point 25 is located at the NW corner of Nystrom Terr and Lake Trout Dr and accepts flows from Basin C3.8.

(5-year storm)

**Tributary Basins:** C3.8

**Upstream flowby:**

**Inlet/MH Number:** Inlet DP25

**Total Street Flow:** 10.0cfs

**Flow Intercepted:** 7.2cfs

**Inlet Size:** 10' type R, on-grade

**Flow Bypassed:** 2.9cfs in curb downstream

**Street Capacity:** Street slope = 1.1%, capacity = 10.1cfs, okay

(100-year storm)

**Tributary Basins:** C3.8

**Upstream flowby:** 4.4cfs from Des. Pt 21

**Inlet/MH Number:** Inlet DP25

**Total Street Flow:** 26.4cfs

**Flow Intercepted:** 11.3cfs

**Inlet Size:** 10' type R, on-grade

**Flow Bypassed:** 15.1cfs in curb downstream

**Street Capacity:** Street slope = 1.1%, capacity = 39.0cfs (half street) is okay

Design Point 26 – not used

Design Point 27

Design Point 27 is located at the SW corner of Raven Ridge Terrace and Lake Trout Dr and accepts flows from Basin C3.9.

(5-year storm)

**Tributary Basins:** C3.9

**Upstream flowby:** 0.3cfs from Des.Pt. 23

**Inlet/MH Number:** Inlet DP27

**Total Street Flow:** 8.4cfs

**Flow Intercepted:** 8.4cfs

**Inlet Size:** 20' type R, on-grade

**Flow Bypassed:** 0cfs in curb downstream

**Street Capacity:** Street slope = 1.7%, capacity = 11.9cfs, okay

(100-year storm)

**Tributary Basins:** C3.9

**Upstream flowby:** 10.4cfs from Des. Pt 23

**Inlet/MH Number:** Inlet DP27

**Total Street Flow:** 28.3cfs

**Flow Intercepted:** 20.7cfs

**Inlet Size:** 20' type R, on-grade

**Flow Bypassed:** 7.6cfs in curb downstream

**Street Capacity:** Street slope = 1.7%, capacity = 45.0cfs (half street) is okay

Design Point 28

Design Point 28 is the storm sewer pipe flow from Design Pt's 27 and 24a. The total pipe flow is 73.4cfs/132.7cfs in the 5/100-year storm events in the storm sewer.

Design Point 28a

Design Point 28a is the storm sewer pipe flow from Design Pt's 28 and 25. The total pipe flow is 80.6cfs/133.4cfs in the 5/100-year storm events in the storm sewer.

Design Point 29

Design Point 29 is located at the SW corner of Nystrom Terrace and Lake Trout Dr and accepts flows from Basin C3.10.

(5-year storm)

**Tributary Basins:** C3.10

**Upstream flowby:** 0.3cfs from Des.Pt. 27

**Inlet/MH Number:** Inlet DP29

**Total Street Flow:** 9.5cfs

**Flow Intercepted:** 9.5cfs

**Inlet Size:** 20' type R, on-grade

**Flow Bypassed:** 0cfs in curb downstream

**Street Capacity:** Street slope = 1.0%, capacity = 9.2cfs, okay

(100-year storm)

**Tributary Basins:** C3.10

**Upstream flowby:** 7.6cfs from Des. Pt 27

**Inlet/MH Number:** Inlet DP29

**Total Street Flow:** 27.8cfs

**Flow Intercepted:** 20.5cfs

**Inlet Size:** 20' type R, on-grade

**Flow Bypassed:** 7.3cfs in curb downstream

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

Design Point 30

Design Point 30 is the storm sewer pipe flow from Design Pt's 28a and 29. The total pipe flow is 89.8cfs/153.9cfs in the 5/100-year storm events in the storm sewer.

Design Point 31

Design Point 31 is located east of Walleye Drive on the south side of Fontaine Boulevard and accepts flows from Basin C4.1 and C4.2.

(5-year storm)

**Tributary Basins:** C4.1+C4.2

**Upstream flowby:**

**Inlet/MH Number:** Inlet DP31

**Total Street Flow:** 10.5cfs

**Flow Intercepted:** 9.7cfs

**Inlet Size:** 15' type R, on-grade

**Flow Bypassed:** 0.8cfs in curb downstream

**Street Capacity:** Street slope = 4.8%, capacity = 15.7cfs, okay

(100-year storm)

**Tributary Basins:** C4.1+C4.2

**Upstream flowby:**

**Inlet/MH Number:** Inlet DP31

**Total Street Flow:** 23.2cfs

**Flow Intercepted:** 15.3cfs

**Inlet Size:** 15' type R, on-grade

**Flow Bypassed:** 7.9cfs in curb downstream

**Street Capacity:** Street slope = 4.8%, capacity = 38.3cfs (half street) is okay

Design Point 32

Design Point 32 is located on the north end of Nystrom Terr in a cul-de-sac and accepts flows from Basin C4.3

(5-year storm)

**Tributary Basins:** C4.3  
**Upstream flowby:** 2.8cfs from Des. Pt.25

**Inlet/MH Number:** Inlet DP32  
**Total Street Flow:** 10.3 cfs

**Flow Intercepted:** 10.3cfs  
**Inlet Size:** 20' type R, sump

**Flow Bypassed:**

**Street Capacity:** Street slope = 1.0%, capacity = 9.2cfs, okay

(100-year storm)

**Tributary Basins:** C4.3  
**Upstream flowby:** 15.1cfs from Des.Pt. 25

**Inlet/MH Number:** Inlet DP32  
**Total Street Flow:** 27.5cfs

**Flow Intercepted:** 27.5cfs  
**Inlet Size:** 20' type R, sump

**Flow Bypassed:**

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

Design Point 32a

Design Point 32a is the storm sewer pipe flow from Design Pt's 31 and 32. The total pipe flow is 20.0cfs/42.8cfs in the 5/100-year storm events in the storm sewer.

Design Point 33

Design Point 33 is located on Walleye Drive south of Fontaine Boulevard and is an existing 25' type R inlet in a sump condition constructed as part of CDR 20-007.

(5-year storm)

**Tributary Basins:** C4.4  
**Upstream flowby:** 0.8cfs from Des.Pt. 31

**Inlet/MH Number:** ex. 25' inlet DP33  
**Total Street Flow:** 7.0cfs

**Flow Intercepted:** 7.0cfs  
**Inlet Size:** ex 25' type R, sump

**Flow Bypassed:**

**Street Capacity:** Street slope = 0.7%, capacity = 11.5cfs, okay

(100-year storm)

**Tributary Basins:** C4.4  
**Upstream flowby:** 7.3cfs from Des.Pt. 29  
7.9cfs from Des. Pt. 31

**Inlet/MH Number:** ex. 25' inlet DP33

**Total Street Flow:** 28.7cfs

**Flow Intercepted:** 28.7cfs  
**Inlet Size:** ex 25' type R, sump

**Flow Bypassed:**

**Street Capacity:** Street slope = 0.7%, capacity = 34.6cfs (half street) is okay



Design Point 34

Design Point 34 is the storm sewer pipe flow from Design Pt's 30, 32a, and 33. The total pipe flow is 117.1cfs/225.4cfs in the 5/100-year storm events in the existing 54" storm sewer constructed as part of CDR 20-007. The revised calculated flow in the existing 54" storm sewer is slightly more than the design flow in CDR 20-007 of 101.2cfs/218.6cfs in the 5/100-year storm events but the HGL's are not above the top of the 54" storm sewer.

Design Point 35a

Design Point 35a is located at the NW corner of Kingston Peak Place and Lorson Boulevard and accepts flows from Basin F1.4.

(5-year storm)

**Tributary Basins:** F1.4

**Upstream flowby:**

**Inlet/MH Number:** Inlet DP29

**Total Street Flow:** 5.9cfs

**Flow Intercepted:** 5.9cfs

**Inlet Size:** 15' type R, on-grade

**Flow Bypassed:** 0cfs in curb downstream

**Street Capacity:** Street slope = 0.9%, capacity = 9.2cfs, okay

(100-year storm)

**Tributary Basins:** F1.4

**Upstream flowby:**

**Inlet/MH Number:** Inlet DP29

**Total Street Flow:** 13.2cfs

**Flow Intercepted:** 11.3cfs

**Inlet Size:** 15' type R, on-grade

**Flow Bypassed:** 1.9cfs to DP4

**Street Capacity:** Street slope = 0.9%, capacity = 37.3cfs (half street) is okay

Design Point 35b

Design Point 35b is located at the NE corner of Kingston Peak Place and Lorson Boulevard and accepts flows from Basin F1.3.

(5-year storm)

**Tributary Basins:** F1.3

**Upstream flowby:**

**Inlet/MH Number:** Inlet DP29

**Total Street Flow:** 1.9cfs

**Flow Intercepted:** 1.9cfs

**Inlet Size:** 10' type R, on-grade

**Flow Bypassed:** 0cfs in curb downstream

**Street Capacity:** Street slope = 0.9%, capacity = 9.2cfs, okay

(100-year storm)

**Tributary Basins:** F1.3

**Upstream flowby:**

**Inlet/MH Number:** Inlet DP29

**Total Street Flow:** 4.6cfs

**Flow Intercepted:** 4.4cfs

**Inlet Size:** 10' type R, on-grade

**Flow Bypassed:** 0.2cfs

**Street Capacity:** Street slope = 0.9%, capacity = 37.3cfs (half street) is okay

Design Point 35c

Design Point 35c is the storm sewer pipe flow from Design Pt's 35a and 35b. The total pipe flow is 7.8cfs/15.7cfs in the 5/100-year storm events in the storm sewer. Stormwater enters WQ Pond F

where it will be treated and released. WQ Pond F has been sized for water quality and the 5-100-year storm runoff will be allowed to flow through the pond with minimal detention.

#### Design Point 35

Design Point 35 is located on the east side of this site and is the total flow from Basins F1.1, F1.2, and Design Point 35d. The total flow from these basins and the WQ pond (Des.Pt. 35d) is 15.5cfs/69.5cfs in the 5/100-year storm events. The existing flow calculated at Design Point 2x flowing east offsite is 12.4cfs/72.7cfs in the 5/100-year storm events. The developed flow will remain sheet flow into the Upper Williams Creek Drainage Basin for the majority of the runoff along the east boundary of Lorson Ranch as in existing conditions and will discharge the same runoff rates as in existing flows. BJ Ranches, LLC is the downstream offsite landowner located east of Lorson Ranch. Lorson Ranch will try to secure a letter of understanding with the downstream landowner to address maintenance of any erosion issues should they occur on the offsite area and to acknowledge the manner of which drainage enters the offsite property has changed at the Pond F outfall. A spreader is proposed at the pond outfall to convert point discharges into sheet flow. See Design Point 35d for discussion of concentrated runoff from WQ Pond F.

Design Point not shown in hydrology spreadsheet

#### Design Point 35d

Design Point 35d is located at the storm sewer outfall from WQ Pond F. The total pipe flow is 1.9cfs/8.4cfs in the 5/100-year storm events in the storm sewer per the full spectrum excel spreadsheets. Equation GB-1 from the Grass Buffer worksheet determines the length of the spreader ( $W=Q/2.05$ ) required to convert point discharges into sheet flow to reduce the erosion potential. For a flow of 8.4cfs, the length of the spreader from the storm sewer outfall is required to be 168' long with 1.5" wide openings every 2' along the curb spreader. The curb spreader will be 4' wide with 8" tall curbs. In addition to the curb spreader, the flows will drain and additional 100' overland before exiting the Lorson Ranch property.

Include Grass buffer worksheet in appendix

#### Design Point 35e

Design Point 35e is located on the south property line of Lorson Ranch and is the total flow from Basin G1 which is 2.5cfs/18.2cfs in the 5/100-year storm events. The existing flow at this design point (Basin EX-G) is 2.9cfs/21.6cfs in the 5/100-year storm events. The runoff at the south property line of Lorson Ranch was reduced slightly due to grading north of Lorson Boulevard. The discharge is only slightly less than existing flows resulting in no negative impacts downstream.

#### Design Point 35f

Design Point 35f is located on the south property line of Lorson Ranch and is the total flow from Basin H1 which is 6.0cfs/40.2cfs in the 5/100-year storm events. The existing flow at this design point (Basin EX-H) is 6.1cfs/42.9cfs in the 5/100-year storm events. The runoff at the south property line of Lorson Ranch was reduced slightly due to grading north of Lorson Boulevard. The discharge is slightly less than existing flows resulting in no negative impacts downstream.

DP 35e & 35f missing from spreadsheet

Design Point 36

Design Point 36 is located on the north side of Gray Wolf Court and accepts flows from Basin C5.1b

(5-year storm)

**Tributary Basins:** C5.1b

**Upstream flowby:**

**Inlet/MH Number:** Inlet DP36

**Total Street Flow:** 11.4cfs

**Flow Intercepted:** 4.1cfs

**Inlet Size:** 5' type R, on-grade

**Flow Bypassed:** 7.3cfs in curb downstream

**Street Capacity:** Street slope = 2.7%, capacity = 14.4cfs, okay

(100-year storm)

**Tributary Basins:** C5.1b

**Upstream flowby:**

**Inlet/MH Number:** Inlet DP36

**Total Street Flow:** 25.2cfs

**Flow Intercepted:** 5.7cfs

**Inlet Size:** 5' type R, on-grade

**Flow Bypassed:** 19.5cfs in curb downstream

**Street Capacity:** Street slope = 2.7%, capacity = 40.7cfs (half street) is okay

Design Point 37

Design Point 37 is located on the south side of Gray Wolf Court and accepts flows from Basin C5.1c

(5-year storm)

**Tributary Basins:** C5.1c

**Upstream flowby:**

**Inlet/MH Number:** Inlet DP37

**Total Street Flow:** 7.4cfs

**Flow Intercepted:** 3.4cfs

**Inlet Size:** 5' type R, on-grade

**Flow Bypassed:** 4.0cfs in curb downstream

**Street Capacity:** Street slope = 2.0%, capacity = 12.5cfs, okay

(100-year storm)

**Tributary Basins:** C5.1c

**Upstream flowby:**

**Inlet/MH Number:** Inlet DP37

**Total Street Flow:** 16.3cfs

**Flow Intercepted:** 4.8cfs

**Inlet Size:** 5' type R, on-grade

**Flow Bypassed:** 11.5cfs in curb downstream

**Street Capacity:** Street slope = 2.0%, capacity = 44.0cfs (half street) is okay

Design Point 38

Design Point 38 is the storm sewer pipe flow from Design Pt's 36 and 37. The total pipe flow is 7.5cfs/10.5cfs in the 5/100-year storm events in the storm sewer.

Design Point 39

Design Point 39 is located at the southeast corner of Gray Wolf Court and Donnas Drive and accepts flows from Basin C5.1a.

(5-year storm)

**Tributary Basins:** C5.1a,b,c  
**Upstream flowby:** 20.2cfs – 4.1(inlet DP36) – 3.4(inlet DP37)  
**Inlet/MH Number:** Inlet DP39  
**Total Street Flow:** 12.7cfs

**Flow Intercepted:** 12.7cfs  
**Inlet Size:** 25' type R, on-grade  
**Flow Bypassed:**

**Street Capacity:** Street slope = 1.9%, capacity = 14cfs, okay

(100-year storm)

**Tributary Basins:** C5.1a,b,c  
**Total flow in street:** 44.5cfs – 5.7(inlet DP36) – 4.8(inlet DP37)  
**Inlet/MH Number:** Inlet DP39  
**Total Street Flow:** 34.0cfs

**Flow Intercepted:** 27.0cfs  
**Inlet Size:** 25' type R, on-grade  
**Flow Bypassed:** 7.0cfs in curb downstream

**Street Capacity:** Street slope = 1.9%, capacity = 45.4cfs (half street) is okay

Design Point 40

Design Point 40 is the storm sewer pipe flow from Design Pt's 38 and 39. The total pipe flow is 23.0cfs/37.0cfs in the 5/100-year storm events in the storm sewer.

Design Point 41

Design Point 41 is located south of Gray Wolf Court on the east side of Donnas Drive and accepts flows from Basin C5.1d.

(5-year storm)

**Tributary Basins:** C5.1d  
**Upstream flowby:**  
**Inlet/MH Number:** Inlet DP41  
**Total Street Flow:** 9.3cfs

**Flow Intercepted:** 9.3cfs  
**Inlet Size:** 20' type R, SUMP  
**Flow Bypassed:**

**Street Capacity:** Street slope = 1.4%, capacity = 10.5cfs, okay

(100-year storm)

**Tributary Basins:** C5.1d  
**Upstream flowby:** 7.0cfs from Des.Pt.39  
**Inlet/MH Number:** Inlet DP41  
**Total Street Flow:** 27.7cfs

**Flow Intercepted:** 25.1cfs  
**Inlet Size:** 20' type R, SUMP (inlet overtops to Des. Pt. 43)  
**Flow Bypassed:** 2.6cfs to DP43

**Street Capacity:** Street slope = 1.4%, capacity = 44.1cfs (half street) is okay

Design Point 42

Design Point 42 is the storm sewer pipe flow from Design Pt's 40 and 41. The total pipe flow is 32.3cfs/62.1cfs in the 5/100-year storm events in the storm sewer.

Design Point 43

Design Point 43 is located south of Gray Wolf Court on the west side of Donnas Drive and accepts flows from Basin C5.1e and flowby from Des. Pt. 41. See Des.Pt. 44 for overflow conveyance.

(5-year storm)

**Tributary Basins:** C5.1e

**Upstream flowby:**

**Inlet/MH Number:** Inlet DP43

**Total Street Flow:** 10.0cfs

**Flow Intercepted:** 10.0cfs

**Inlet Size:** 20' type R, SUMP

**Flow Bypassed:**

**Street Capacity:** Street slope = 1.4%, capacity = 10.5cfs, okay

(100-year storm)

**Tributary Basins:** C5.1e

**Upstream flowby:** 2.6cfs from Des.Pt.41

**Inlet/MH Number:** Inlet DP43

**Total Street Flow:** 24.5cfs

**Flow Intercepted:** 24.5cfs

**Inlet Size:** 20' type R, SUMP

**Flow Bypassed:**

**Street Capacity:** Street slope = 1.4%, capacity = 44.1cfs (half street) is okay

Design Point 44

Design Point 44 is the storm sewer pipe flow from Design Pt's 42 and 43. The total pipe flow is 42.3cfs/87.1cfs in the 5/100-year storm events in the storm sewer. The FDR for CDR20-007 (Design Point 16a) was designed to accept 42.3cfs/92.5cfs in the existing 36" RCP stub in Fontaine Boulevard. This design point is also at a low point in Donnas Drive and in the event the inlet at Design Point 43 is clogged, runoff will flow overland through Tract G which has a 25' wide swale (depression) which is 1' lower than the adjacent lots.

Design Points 45 & 46

Design Points 45 & 46 are located at the NE corner of Walleye Drive and Fontaine Boulevard and is an existing 15' type R inlet in a sump condition constructed as part of CDR 20-007

(5-year storm)

**Tributary Basins:** C5.2 & C5.3

**Upstream flowby:**

**Inlet/MH Number:** ex. 15' inlet

**Total Street Flow:** 7.7cfs

**Flow Intercepted:** 7.7cfs

**Inlet Size:** ex 15' type R, sump

**Flow Bypassed:**

**Street Capacity:** Street slope = 1.0%, capacity = 13.7cfs, okay

(100-year storm)

**Tributary Basins:** C5.2 & C5.3

**Upstream flowby:**

**Inlet/MH Number:** ex. 15' inlet

**Total Street Flow:** 17.1cfs

**Flow Intercepted:** 17.1cfs

**Inlet Size:** ex 15' type R, sump

**Flow Bypassed:**

**Street Capacity:** Street slope = 1.0%, capacity = 41.4cfs (half street) is okay

The FDR for CDR 20-007 designed the existing inlet to accept 7.9cfs/17.7cfs in the 5/100 year storm events.

Design Point 47

Design Point 47 is located in the SE corner of Meridith Ridge Way and Donnas Drive and accepts flows from Basin C8.1a.

(5-year storm)

**Tributary Basins:** C8.1a

**Upstream flowby:**

**Inlet/MH Number:** Inlet DP47

**Total Street Flow:** 7.5cfs

**Flow Intercepted:** 6.1cfs

**Inlet Size:** 10' type R, on-grade

**Flow Bypassed:** 1.4cfs

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

(100-year storm)

**Tributary Basins:** C8.1a

**Upstream flowby:**

**Inlet/MH Number:** Inlet DP47

**Total Street Flow:** 16.4cfs

**Flow Intercepted:** 9.1cfs

**Inlet Size:** 10' type R, on-grade

**Flow Bypassed:** 7.3cfs

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

Design Point 48

Design Point 48 is located in the NE corner of Sanderling Street and Donnas Drive and accepts flows from Basin C8.1c.

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C8.1c	<b>Inlet/MH Number:</b> Inlet DP48
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 3.4cfs
<b>Flow Intercepted:</b> 3.4cfs	<b>Flow Bypassed:</b>
<b>Inlet Size:</b> 10' type R, on-grade	
<b>Street Capacity:</b> Street slope = 1.5%, capacity = 11.0 cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C8.1c	<b>Inlet/MH Number:</b> Inlet DP48
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 7.6cfs
<b>Flow Intercepted:</b> 6.2cfs	<b>Flow Bypassed:</b> 1.4cfs
<b>Inlet Size:</b> 10' type R, on-grade	
<b>Street Capacity:</b> Street slope = 1.5%, capacity = 44.5cfs (half street) is okay	

Design Point 49

Design Point 49 is located in the NW corner of Sanderling Street and Donnas Drive and accepts flows from Basin C8.1b.

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C8.1b	<b>Inlet/MH Number:</b> Inlet DP49
<b>Upstream flowby:</b> 1.4cfs from Des.Pt. 47	<b>Total Street Flow:</b> 7.7 cfs
<b>Flow Intercepted:</b> 7.7cfs	<b>Flow Bypassed:</b>
<b>Inlet Size:</b> 20' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.8%, capacity = 14.4cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C8.1b	<b>Inlet/MH Number:</b> Inlet DP49
<b>Upstream flowby:</b> 7.3cfs from Des.Pt.47 1.4cfs from Des.Pt.48 5.1cfs from Des.Pt.57	<b>Total Street Flow:</b> 27.7cfs
<b>Flow Intercepted:</b> 20.8cfs	<b>Flow Bypassed:</b> 6.9cfs
<b>Inlet Size:</b> 20' type R, on-grade	
<b>Street Capacity:</b> Street slope = 2.8%, capacity = 40.7cfs (half street) is okay	

Design point not in spreadsheet

Design Point 50

Design Point 50 is the storm sewer pipe flow from Design Pt's 48 and 49. The total pipe flow is 11.1cfs/27.0cfs in the 5/100-year storm events in the storm sewer. The FDR for CDR20-007 (Design Point 31a) was designed to accept 8.9cfs/20.9cfs in the existing 30" RCP stub from Walleye Drive at Sanderling Street. However, the existing pipe has capacity to handle the additional pipe flow based on the HGL. See Design Point 52.

Design Point 51

Design Point 51 is located at an existing 25' type R inlet in the SW corner of Grayling Drive and Walleye Drive and accepts flows from Basin C8.2.

(5-year storm)

**Tributary Basins:** C8.2

**Inlet/MH Number:** existing 25'

**Upstream flowby:**

**Total Street Flow:** 4.5 cfs

**Flow Intercepted:** 4.5cfs

**Flow Bypassed:**

**Inlet Size:** ex 25' type R, SUMP

**Street Capacity:** Street slope (collector) = 1.0%, capacity = 13.7cfs, okay

(100-year storm)

**Tributary Basins:** C8.2

**Inlet/MH Number:** existing 25'

**Upstream flowby:** 6.9cfs from Des.Pt.49  
9.1cfs from Des.Pt.56

**Total Street Flow:** 26.0cfs

**Flow Intercepted:** 26.0cfs

**Flow Bypassed:**

**Inlet Size:** ex 25' type R, SUMP

**Street Capacity:** Street slope = 1.0% (collector) , capacity = 41.4cfs (half street) is okay

The FDR for CDR 20-007 (Des.Pt. 31) designed the existing inlet to accept 14.5cfs/30.0cfs in the 5/100 year storm events.

Design Point 52

Design Point 52 is the storm sewer pipe flow from Design Pt's 50 and 51 in an existing 36" storm sewer in Walleye Drive. The total pipe flow is 15.6cfs/53.0cfs in the 5/100-year storm events in the storm sewer. The FDR for CDR20-007 (Design Point 31c) designed the storm sewer to accept 23.4cfs/50.9cfs in the existing 36" RCP storm sewer in Walleye Drive. The existing pipe has capacity to handle the slight increase in pipe flow in the 100yr storm event.

Design point not in spreadsheet



Design Point 53

Design Point 53 is located in the SE corner of Danis Drive and Walleye Drive and accepts flows from Basin C8.3a. Basin OS-C4a existing and future flows will be diverted north to Des. Pt. 63a.

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C8.3a	<b>Inlet/MH Number:</b> Inlet DP53
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 10.6cfs
<b>Flow Intercepted:</b> 9.7cfs	<b>Flow Bypassed:</b> 0.9cfs
<b>Inlet Size:</b> 15' type R, on-grade	
<b>Street Capacity:</b> Street slope = 1.4%, capacity = 10.5cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C8.3a	<b>Inlet/MH Number:</b> Inlet DP53
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 26.5cfs
<b>Flow Intercepted:</b> 16.2cfs	<b>Flow Bypassed:</b> 10.3cfs
<b>Inlet Size:</b> 15' type R, on-grade	
<b>Street Capacity:</b> Street slope = 1.4%, capacity = 44.1cfs (half street) is okay	

Design Point 54

Design Point 54 is located in the NE corner of Donnas Drive and Walleye Drive and accepts flows from Basin C8.3b& C8.3c.

Design point not in spreadsheet

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C8.3b & C8.3c	<b>Inlet/MH Number:</b> Inlet DP54
<b>Upstream flowby:</b> 0.9cfs from Des.Pt.53	<b>Total Street Flow:</b> 11.8cfs
<b>Flow Intercepted:</b> 11.7cfs	<b>Flow Bypassed:</b> 0.1cfs
<b>Inlet Size:</b> 20' type R, on-grade	
<b>Street Capacity:</b> Street slope = 1.5%, capacity = 11.8cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C8.3b & C8.3c	<b>Inlet/MH Number:</b> Inlet DP54
<b>Upstream flowby:</b> 10.3cfs from Des.Pt.53	<b>Total Street Flow:</b> 37.6cfs
<b>Flow Intercepted:</b> 24.0cfs	<b>Flow Bypassed:</b> 13.6cfs
<b>Inlet Size:</b> 20' type R, on-grade	
<b>Street Capacity:</b> Street slope = 1.5%, capacity = 45.0cfs (half street) is okay	

Design Point 55

Design Point 55 is the storm sewer pipe flow from Design Pt's 53 and 54. The total pipe flow is 21.4cfs/40.2cfs in the 5/100-year storm events in the storm sewer.

Design Point 56

Design Point 56 is located on Walleye Drive south of Donnas Drive and accepts flows from Basin C8.3d

(5-year storm)

**Tributary Basins:** C8.3d  
**Upstream flowby:** 0.1cfs from Des.Pt.54

**Inlet/MH Number:** Inlet DP56  
**Total Street Flow:** 9.0cfs

**Flow Intercepted:** 9.0cfs  
**Inlet Size:** 20' type R, on-grade

**Flow Bypassed:**

**Street Capacity:** Street slope = 1.2%, capacity = 10.0cfs, okay

(100-year storm)

**Tributary Basins:** C8.3d  
**Upstream flowby:** 13.6cfs from Des.Pt.54

**Inlet/MH Number:** Inlet DP56  
**Total Street Flow:** 32.8cfs

**Flow Intercepted:** 23.7cfs  
**Inlet Size:** 20' type R, on-grade

**Flow Bypassed:** 9.1cfs

**Street Capacity:** Street slope = 1.2%, capacity = 38.0cfs (half street) is okay

Design Point 57

Design Point 57 is located at the NE corner of Donnas Drive and Meridith Ridge Way and accepts flows from Basin C8.4

(5-year storm)

**Tributary Basins:** C8.4  
**Upstream flowby:**

**Inlet/MH Number:** Inlet DP57  
**Total Street Flow:** 11.0cfs

**Flow Intercepted:** 11.0cfs  
**Inlet Size:** 20' type R, on-grade

**Flow Bypassed:**

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

(100-year storm)

**Tributary Basins:** C8.4  
**Upstream flowby:**

**Inlet/MH Number:** Inlet DP57  
**Total Street Flow:** 24.1cfs

**Flow Intercepted:** 19.0cfs  
**Inlet Size:** 20' type R, on-grade

**Flow Bypassed:** 5.1cfs to DP49

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

Design Point 58

Design Point 58 is the storm sewer pipe flow from Design Pt's 57 and 47. The total pipe flow is 17.1cfs/28.1cfs in the 5/100-year storm events in the storm sewer.

Design point not in spreadsheet

Design Point 59

Design Point 59 is located on the north side of Walleye Drive south of Broken Top Drive and accepts flows from Basin C8.5

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C8.5	<b>Inlet/MH Number:</b> Inlet DP59
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 7.0cfs
<b>Flow Intercepted:</b> 5.9cfs	<b>Flow Bypassed:</b> 1.1cfs
<b>Inlet Size:</b> 10' type R, on-grade	
<b>Street Capacity:</b> Street slope = 1.2%, capacity = 10.0cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C8.5	<b>Inlet/MH Number:</b> Inlet DP59
<b>Upstream flowby:</b>	<b>Total Street Flow:</b> 15.5cfs
<b>Flow Intercepted:</b> 8.9cfs	<b>Flow Bypassed:</b> 6.6cfs
<b>Inlet Size:</b> 10' type R, on-grade	
<b>Street Capacity:</b> Street slope = 1.2%, capacity = 38.0cfs (half street) is okay	

Design Point 60

Design Point 60 is the storm sewer pipe flow from Design Pt's 55, 56 and 59. The total pipe flow is 36.3cfs/72.8cfs in the 5/100-year storm events in the storm sewer.

Flow does not match hydrology spreadsheet

Design Point 61

Design Point 61 is the storm sewer pipe flow from the C8.1, C8.3, C8.4, and C8.5 basins taken from the spreadsheet minus bypass flow from Des. Pt. 59. The total pipe flow is 52.9cfs/112.1cfs in the 5/100-year storm events in the storm sewer. The FDR for CDR20-007 (Design Point 32) designed the storm sewer to accept 45.1cfs/105.4cfs in the existing 42" RCP storm sewer in Walleye Drive. The 100-yr HGL for the 42" RCP storm sewer is below the top of pipe and the additional flow has minimal impact.

Design point not in spreadsheet

Design Point 62

Design Point 62 is located in the NE corner of Grayling Drive and Reagan Ridge Drive and accepts flows from Basin C8.6 & C8.7e.

(5-year storm)

**Tributary Basins:** C8.6 & C8.7e  
**Upstream flowby:** 1.1 cfs from Des.Pt.59

**Inlet/MH Number:** Inlet DP62  
**Total Street Flow:** 14.3cfs

**Flow Intercepted:** 14.3cfs  
**Inlet Size:** 30' type R, SUMP

**Flow Bypassed:**

**Street Capacity:** Street slope = 2.5%, capacity = 14.2cfs, okay

(100-year storm)

**Tributary Basins:** C8.6 & C8.7e  
**Upstream flowby:** 6.6cfs from Des.Pt.59  
2.7cfs from Des.Pt.66

**Inlet/MH Number:** Inlet DP62  
**Total Street Flow:** 37.4cfs

**Flow Intercepted:** 37.4cfs  
**Inlet Size:** 30' type R, SUMP

**Flow Bypassed:**

**Street Capacity:** Street slope = 2.5%, capacity = 41.4cfs (half street) is okay

Design Point 63

Design Point 63 is located at the SE corner of Reagan Ridge Drive and Logans Ridge Lane and accepts flows from Basin C8.7a&b

Design point not in spreadsheet

(5-year storm)

**Tributary Basins:** C8.7a&b  
**Upstream flowby:**

**Inlet/MH Number:** Inlet DP63  
**Total Street Flow:** 11.5cfs

**Flow Intercepted:** 10.2cfs  
**Inlet Size:** 15' type R, on-grade

**Flow Bypassed:** 1.3cfs

**Street Capacity:** Street slope = 1.6%, capacity = 11.5cfs, okay

(100-year storm)

**Tributary Basins:** C8.7a&b  
**Upstream flowby:**

**Inlet/MH Number:** Inlet DP63  
**Total Street Flow:** 25.6cfs

**Flow Intercepted:** 15.9cfs  
**Inlet Size:** 15' type R, on-grade

**Flow Bypassed:** 9.7cfs

**Street Capacity:** Street slope = 1.6%, capacity = 45.0cfs (half street) is okay

Design Point 63a Design point not shown in spreadsheet

Design Point 63a is the existing offsite flow from areas west of Lorson Ranch from offsite Basins OS-B1.1, OS-C4a, and OS-C4b. These offsite basins will be routed north in a wide shallow swale onto adjacent land owned by Lorson Ranch. The proposed total flow in the swale is 7.3cfs/42.2cfs in the 5/100-year storm events which is less than existing total flow onto the adjacent property at Design Point 1x which is 9.7cfs/54.2cfs in the 5/100-year storm events (see existing conditions). Lorson Ranch owns the downstream offsite land (to the north) and a letter of understanding regarding the maintenance of any erosion issues should they occur on the offsite property in the manner of which drainage enters the offsite property has changed. Add back in the riprap pads at end of swale to disperse flows and include sizing of riprap

Design Point 64

Design Point 64 is located at the SE corner of Reagan Ridge Drive and Cody Ridge Way and accepts flows from Basin C8.7c

Design point not shown in spreadsheet

<u>(5-year storm)</u>	
<b>Tributary Basins:</b> C8.7c	<b>Inlet/MH Number:</b> Inlet DP64
<b>Upstream flowby:</b> 1.3cfs from Des.Pt.63	<b>Total Street Flow:</b> 10.7cfs
<b>Flow Intercepted:</b> 9.8cfs	<b>Flow Bypassed:</b> 0.9cfs
<b>Inlet Size:</b> 15' type R, on-grade	
<b>Street Capacity:</b> Street slope = 4.0%, capacity = 17.9cfs, okay	
<u>(100-year storm)</u>	
<b>Tributary Basins:</b> C8.7c	<b>Inlet/MH Number:</b> Inlet DP64
<b>Upstream flowby:</b> 9.7cfs from Des.Pt.63	<b>Total Street Flow:</b> 30.6cfs
<b>Flow Intercepted:</b> 17.5cfs	<b>Flow Bypassed:</b> 13.1cfs
<b>Inlet Size:</b> 15' type R, on-grade	
<b>Street Capacity:</b> Street slope = 4.0%, capacity = 35.7cfs (half street) is okay	

Design Point 65

Design Point 65 is the storm sewer pipe flow from Design Pt's 63 and 64. The total pipe flow is 20.0cfs/33.4cfs in the 5/100-year storm events in the storm sewer.

Design point not shown in spreadsheet

Design Point 66

Design point not shown in spreadsheet

Design Point 66 is located at the NE corner of Reagan Ridge Drive and Broken Top Drive and accepts flows from Basin C8.7d

(5-year storm)

**Tributary Basins:** C8.7d **Inlet/MH Number:** Inlet DP66  
**Upstream flowby:** 0.9cfs from Des.Pt.64 **Total Street Flow:** 1.5cfs

**Flow Intercepted:** 1.5cfs **Flow Bypassed:**  
**Inlet Size:** 15' type R, on-grade

**Street Capacity:** Street slope = 2.0%, capacity = 12.5cfs, okay

(100-year storm)

**Tributary Basins:** C8.7d **Inlet/MH Number:** Inlet DP66  
**Upstream flowby:** 13.1cfs from Des.Pt.64 **Total Street Flow:** 14.5cfs

**Flow Intercepted:** 11.8cfs **Flow Bypassed:** 2.7cfs  
**Inlet Size:** 15' type R, on-grade

**Street Capacity:** Street slope = 2.0%, capacity = 44.0cfs (half street) is okay

Design Point 67

Design point not shown in spreadsheet

Design Point 67 is the storm sewer pipe flow from Design Pt's 65 and 66. The total pipe flow is 21.5cfs/45.2cfs in the 5/100-year storm events in the storm sewer.

Design Point 68

Design Point 68 is the storm sewer pipe flow from the C8.6 and the C8.7 basins taken from the spreadsheet and adding bypass flow (1.1cfs.6.6cfs) from Des. Pt. 59. The total pipe flow is 33.0cfs/76.5cfs in the 5/100-year storm events in the storm sewer.

Flows do not match the hydrology spreadsheet

Design Point 69

Design Point 69 is located at the NW corner of Reagan Ridge Drive and Walleye Drive at an existing 25' Type R sump inlet and accepts flows from Basin C8.8a

(5-year storm)

**Tributary Basins:** C8.8a **Inlet/MH Number:** Inlet DP69  
**Upstream flowby:** **Total Street Flow:** 7.9cfs

**Flow Intercepted:** 7.9cfs **Flow Bypassed:**  
**Inlet Size:** Ex 25' type R, SUMP

**Street Capacity:** Street slope = 2.0%, capacity = 12.5cfs, okay

(100-year storm)

**Tributary Basins:** C8.8a **Inlet/MH Number:** Inlet DP69  
**Upstream flowby:** **Total Street Flow:** 17.3cfs

**Flow Intercepted:** 17.3cfs **Flow Bypassed:**  
**Inlet Size:** Ex 25' type R, SUMP

**Street Capacity:** Street slope = 2.0%, capacity = 44.0cfs (half street) is okay

## Design Point 70 **Flows do not match the hydrology spreadsheet**

Design Point 70 is the storm sewer pipe flow from the C8.6 and the C8.7 basins taken from the spreadsheet and adding bypass flow (1.1cfs/6.6cfs) from Des. Pt. 59. . The total pipe flow is 35.3cfs/81.4cfs in the 5/100-year storm events in the storm sewer from the xcel spreadsheet calculations and bypass flows. The FDR for CDR20-007 (Design Point 34a) designed the storm sewer to accept 38.2cfs/84.5cfs in the existing 42" RCP storm sewer in Walleye Drive. The storm sewer has capacity for these basins.

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## **6.0 DETENTION AND WATER QUALITY PONDS**

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Detention and Storm Water Quality for The Ridge at Lorson Ranch is required per El Paso County criteria. We have implemented the Full Spectrum approach for detention for the Denver Urban Drainage Districts specifications. There are four permanent full spectrum ponds previously constructed in The Hills at Lorson Ranch for this development which will incorporate storm water quality features and comply with the Lorson Ranch East MDDP. In addition, one WQ pond will drain eastward as in existing condition into the Upper Williams Creek Drainage Basin required to match existing conditions. The ponds have been sized and include access roads, outlet pipes, overflow structures, and low flow channels. This drainage report provides design information on the outlet structure, trickle channel, and the forebays.

### Full Spectrum Pond Construction Requirements

All four of the detention ponds required for this project have been previously graded as part of The Hills at Lorson Ranch (PUDSP 20-003) and include Pond C1, C2.1, C2.2, and C4. The Hills at Lorson Ranch constructed Existing Pond C1 and C2.2 which are complete full spectrum ponds that do not need to be modified and include the full spectrum outlet structure, forebays, outfall storm sewer, and low flow channels. Existing Pond C2.1 and Pond C4 were graded and constructed with forebays, outfall storm sewers, and low flow channels but did not include the full spectrum outlet structure. The outlet structures for these two ponds will be discussed in this section including what type of structure is proposed. Per the Lorson East MDDP, these four ponds and downstream Pond C5 (at Fontaine/East tributary) are part of an overall storm water system to be constructed by Lorson Ranch. Existing Pond C5 (including the final configuration of the orifice plate) was completed with Lorson Ranch East Filing No. 1 in 2018 and the entire stormwater system tributary to Pond C5 will be completed with this subdivision.

Design calculations for Pond C2.1 and Pond C4 spectrum outlet structures are included in this report. The existing ponds currently have a 15' wide gravel access road at a maximum 10% slope to the pond bottom, forebay, storm sewer outfall, and concrete low flow channels. The final design of the Pond C2.1 and Pond C4 will consist of a full spectrum outlet structure and overflow weirs. Soil borings, embankment, slope, and compaction requirements for detention ponds can be found in the geotechnical report for the The Hills at Lorson Ranch prepared by RMG.

### WQ Pond Construction Requirements

In addition to the four detention ponds Lorson Ranch is required to build WQ Pond F for a small developed area draining eastward into the Upper Williams Creek Drainage Basin. The WQ pond will have a 15' wide gravel access road at a maximum 10% slope to the pond bottom, forebay, and a concrete low flow channel.

### Detention Pond C1 (existing pond for information only, See CDR20-007)

This is an existing permanent full spectrum detention pond that includes water quality and discharges downstream to a storm sewer system in Fontaine Boulevard. Pond C1 is designed in the UDCF Full Spectrum spreadsheets for Water Quality and EURV volumes. The 5-year and 100-year flow rates meet the Lorson East MDDP and have been modeled in the full spectrum worksheets. The outlet

structure is a standard full spectrum extended detention basin structure and will include an emergency overflow spillway. See map in appendix for watershed areas.

- Watershed Area: 71.1 acres
- Watershed Imperviousness: 55%
- Hydrologic Soils Group B
- Zone 1 WQCV: 1.307ac-ft, WSEL: 5746.97
- Zone 2 EURV: 4.212ac-ft, WSEL: 5749.02, Top outlet structure set at 5749.50, 3'x6' outlet structure
- (5-yr): 4.691ac-ft, WSEL: 5749.33, 6.4cfs
- Zone 3 (100-yr): 9.954ac-ft, WSEL: 5752.39, 17.7cfs
- Pipe Outlet: 18" RCP at 0.5%
- Overflow Spillway: 28' wide bottom, elevation=5753.40, 4:1 side slopes, flow depth=1.37' 1.16' freeboard
- Micropool Elevation: 5743.40

#### Detention Pond C2.2 (existing pond for information only, see CDR 20-007)

This is a permanent full spectrum detention pond that includes water quality and discharges downstream to an existing storm sewer in Fontaine Boulevard. Inflow to this pond is from direct tributary development and outflow from Pond C3. The inflow hydrograph has been modeled in the full spectrum spreadsheets by adding the direct tributary area CUHP hydrograph to the upstream pond outflow hydrograph of Pond C3. The outlet structure, overflow wall, pond forebay and low flow channel will be built as part of the CDR 20-007 project. Pond C2.2 is designed in the UDCF Full Spectrum spreadsheets for Water Quality and EURV volumes. The 5-year and 100-year flow rates meet the Lorson East MDDP and have been modeled in the modeled in the full spectrum worksheets. The outlet structure is a standard full spectrum extended detention basin structure and will include an emergency overflow spillway. See map in appendix for watershed areas.

- Watershed Area: 45.0 acres
- Watershed Imperviousness: 55%
- Hydrologic Soils Group B (95%), Group C/D (5%)
- Zone 1 WQCV: 0.829ac-ft, WSEL: 5747.25
- Zone 2 EURV: 2.658ac-ft, WSEL: 5749.17, Top outlet structure set at 5751.00, 8'x6' outlet structure
- (5-yr): 4.475ac-ft, WSEL: 5760.88, 2.7cfs
- Zone 3 (100-yr): 6.67ac-ft, WSEL: 5752.75, 42.9cfs
- Pipe Outlet: 30" RCP w/ 18" restrictor plate
- Overflow Spillway: 20' wide bottom, elevation=5754.00, 4:1 side slopes, flow depth=1.51' 1.49' freeboard
- Micropool Elevation: 5744.00

#### Detention Pond C2.1

This is a permanent full spectrum detention pond that includes water quality and discharges downstream to Pond C2.3. The outlet Structure and overflow wall will be built as part of the final plat for this project. The pond forebay and low flow channel were built as part of the CDR 20-007 project. Pond C2.1 is designed in the UDCF Full Spectrum spreadsheets for Water Quality and EURV volumes. The 5-year and 100-year flow rates meet the Lorson East MDDP and have been modeled in the modeled in the full spectrum worksheets. The outlet structure is a standard full spectrum extended detention basin structure and will include an emergency overflow spillway. The full spectrum print outs are in the appendix of this report. See map in appendix for watershed areas.



- Watershed Area: 74.5 acres
- Watershed Imperviousness: 55%
- Hydrologic Soils Group B
- Zone 1 WQCV: 1.377ac-ft, WSEL: 5763.42
- Zone 2 EURV: 4.415ac-ft, WSEL: 5766.20, Top outlet structure set at 5766.20, 8'x6' outlet structure
- (5-yr): 4.694ac-ft, WSEL: 5766.44, 12.8cfs
- Zone 3 (100-yr): 7.829ac-ft, WSEL: 5768.80, 65.0cfs
- Pipe Outlet: 30" RCP at 0.5%
- Overflow Spillway: 25' wide bottom, elevation=5769.30, 4:1 side slopes, flow depth=1.69' 1.01' freeboard
- Micropool Elevation: 5760.00

#### Detention Pond C4

This is a permanent full spectrum detention pond that includes water quality and discharges downstream to Pond C3. Pond C4 has been graded. The outlet Structure and overflow wall will be built with the final plat of this project. The pond forebay and low flow channel were built as part of the CDR 20-007 project. Pond C4 is designed in the UDCF Full Spectrum spreadsheets for Water Quality and EURV volumes. The 5-year and 100-year flow rates meet the Lorson East MDDP and have been modeled in the modeled in the full spectrum worksheets. The outlet structure is a standard full spectrum extended detention basin structure and will include an emergency overflow spillway. The full spectrum print outs are in the appendix of this report. See map in appendix for watershed areas.

- Watershed Area: 81.00 acres
- Watershed Imperviousness: 55%
- Hydrologic Soils Group B (40%), Group C/D (60%)
- Zone 1 WQCV: 1.488ac-ft, WSEL: 5767.97
- Zone 2 EURV: 4.477ac-ft, WSEL: 5770.41, Top outlet structure set at 5770.50, 6'x6' outlet structure
- (5-yr): 5.031ac-ft, WSEL: 5770.84, 16.5cfs
- Zone 3 (100-yr): 10.152ac-ft, WSEL: 5774.34, 43.7cfs
- Pipe Outlet: 24" RCP at 0.5%
- Overflow Spillway: 30' wide bottom, elevation=5775.00, 4:1 side slopes, flow depth=1.87' 1.13' freeboard
- Micropool Elevation: 5765.00

Unresolved: Notate that all RPA areas will need to be within a no build/drainage easement. Also discuss the RPA's in the maintenance agreement and O&M manual. Also show easement on GEC Plan.

#### Water Quality for Basin F1.1 (4.23ac) - - - [internal note: RPA areas shown on pg 246]

Developed runoff from this basin flows east offsite (shallow sheet flow) and does not include a water quality pond. Runoff from this basin is from a standard 50'x110' lot with the back 90 feet of the residential lots which flows overland east across a 145' wide open space tract prior to discharging to the east. The Runoff Reduction Method procedure from the Mile High Flood Control District spreadsheet (UD-BMP-V3.07) calculations have been applied to a standard 50' wide lot to address water quality provisions for development in this basin (see Appendix D). The UIA area is 4500sf (50'x90') and the RPA area is 7250sf (50'x145') per lot which can then be applied to the remaining lots within the basin. The large 145' wide open space tract provides a 100% reduction in the water quality requirements for this basin. Grading within this basin should not channelize flow from backyards and flow should be allowed to pass under any backyard fencing without obstructing or channelizing the overland flow. Lorson Ranch Metro District owns the open space tract for the runoff reduction area.

#### Water Quality Pond F (4.9ac)

State that this pond will be built within the limits of Filing 1.

This is a permanent water quality pond that discharges eastward overland into the Upper Williams Creek drainage basin. The pond forebay, low flow channel, and outlet structure will be built as part of this project. WQ Pond F is designed in the UDCF Full Spectrum spreadsheets for Water Quality. In order to maintain existing discharge rates to the east (see Design Pt. 35), this pond allow the 5-year

and 100-year storms to discharge undetained through the pond outlet structure and discharge overland to the east. The outlet structure is a standard extended detention basin structure with an orifice plate. Point discharge of stormwater from the outlet pipe will be dispersed by a slotted concrete channel (See Des. Pt. 35d). In addition, the slotted channel is located 100' west of the Lorson Ranch property line and the sheet flow will drain across a 100' wide open space tract on Lorson Ranch before entering the offsite property. Lorson Ranch will try to secure a letter of understanding with the downstream landowner to address maintenance of any erosion issues should they occur on the offsite area and to acknowledge the manner in which drainage enters the offsite property has changed at the Pond F outfall. The pond print outs are in the appendix of this report. See map in appendix for watershed areas.

- Watershed Area: 4.90 acres
- Watershed Imperviousness: 55%
- Hydrologic Soils Group B (100%)
- Zone 1 WQCV: 0.09ac-ft, WSEL: 5845.04
- Zone 2 EURV: not used
- (5-yr): not used
- Zone 3 (100-yr): not used
- Micropool Elevation: 5842.77

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## 7.0 DRAINAGE AND BRIDGE FEES

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The Ridge at Lorson Ranch is located within the Jimmy Camp Creek drainage basin which is currently a fee basin in El Paso County and the Upper Williams Creek Drainage Basin. Current El Paso County regulations require drainage and bridge fees to be paid for platting of land as part of the plat recordation process.

The Ridge at Lorson Ranch Filing No. 1 contains 107.820acres and 86.21acres is in the JCC drainage basin and 21.60acres is in the Upper Williams Creek Drainage Basin. Filing 2 and Filing 3 are completely in the JCC Drainage Basin. The 2022 drainage fees are \$21,134, bridge fees are \$989 and Drainage Surety fees are \$7,285 per impervious acre per Resolution 21-468. The drainage and bridge fees are calculated when the final plat is submitted and are due at plat recordation. Lorson Ranch intends to use the Bridge Fee credits for the bridge fees and pay drainage/surety fees unless the Jimmy Camp Creek DBPS drainage fee structure is updated by El Paso County. The following table details the drainage fees for this filing:

**Table 1a: Filing No. 1 2022 Drainage/Bridge Fees (86.21ac in JCC, 21.60ac in Upper Williams)**

Type of Land Use	Total Area (ac)	Imperviousness	Drainage Fee	Bridge Fee	Surety Fee
JCC Residential Area	82.367	51%	\$888,779	\$41,545	\$339,943
JCC Open Space, Landscape Tracts	3.843	2%	\$1,624	\$76	\$2,378
Up. Williams Residential Area	9.130	0	0	0	0
Up. Williams Open Space, Landscape Tracts	12.480	0	0	0	0
Total			\$890,403	\$41,621	\$342,321

**Table 1b: Filing No. 2 2022 Drainage/Bridge Fees (57.898ac)**

Type of Land Use	Total Area (ac)	Imperviousness	Drainage Fee	Bridge Fee	Surety Fee
Residential Area	50.744	51%	\$546,936	\$25,594	\$188,531
Open Space, Landscape Tracts,	7.154	2%	\$3,023	\$141	\$1,042
Total			\$549,959	\$25,735	\$189,573

**Table 1c: Filing No. 3 2021 Drainage/Bridge Fees (40.755ac)**

Type of Land Use	Total Area (ac)	Imperviousness	Drainage Fee	Bridge Fee	Surety Fee
Residential Area	27.592	51%	\$297,395	\$13,917	\$102,513
Open Space, Landscape Tracts,	13.163	2%	\$5,563	\$260	\$1,917
Total			\$302,958	\$14,177	\$104,430

**Table 7.1: Public Drainage Facility Costs (Filing 1-3, non-reimbursable)**

Item	Quantity	Unit	Unit Cost	Item Total
Inlets/Manholes	65	EA	\$5000/EA	\$325,000
18" Storm	1820	LF	\$35	\$63,700
24" Storm	720	LF	\$40	\$28,800
30" Storm	1330	LF	\$45	\$59,850
36" Storm	1130	LF	\$55	\$62,150
42" Storm	245	LF	\$65	\$15,925
48" Storm	400	LF	\$85	\$34,000
			Subtotal	\$589,425
			Eng/Cont (10%)	\$58,942
			Total Est. Cost	\$648,367

**Table 7.2: Lorson Ranch Metro District Drainage Facility Costs (Filing 1-3, non-reimbursable)**

Item	Quantity	Unit	Unit Cost	Item Total
Full Spectrum Outlets	2	LS	\$20,000	\$40,000

WQ Pond	1	LS	\$20,000	\$20,000
			Subtotal	\$60,000
			Eng/Cont (15%)	\$9,000
			Total Est. Cost	\$69,000

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## 8.0 FOUR STEP PROCESS

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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

The Ridge at Lorson Ranch 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.
- There are large open space buffers under the 325' wide electric transmission easement and on the east side
- Construct outlet structures for two Full Spectrum Detention Ponds. The full spectrum detention mimics existing storm discharges and includes water quality.

### Step 2: Stabilize Drainageways

East Tributary of Jimmy Camp Creek is a major drainageway located west of this site. In 2014 and in 2018 the East Tributary of JCC was reconstructed and stabilized per county criteria. The design included a natural sand bottom and armored sides.

### Step 3: Provide Water Quality Capture Volume

Treatment of the water quality capture volume (WQCV) is required for all new developments. The Ridge at Lorson Ranch will construct two full spectrum stormwater extended detention basins and one WQ pond which include Water Quality Volumes and WQ outlet structures.

### Step 4: Consider Need for Industrial and Commercial BMP's

There are no commercial or industrial areas within this site.

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## 9.0 CONCLUSIONS

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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 west of this study area
- Bridges over the East Tributary at Lorson Boulevard and Fontaine Boulevard and have been constructed providing access to this site.
- Detention and water quality for this site area will be provided in four permanent ponds and one runoff reduction area, and one WQ Pond.

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## 10.0 REFERENCES

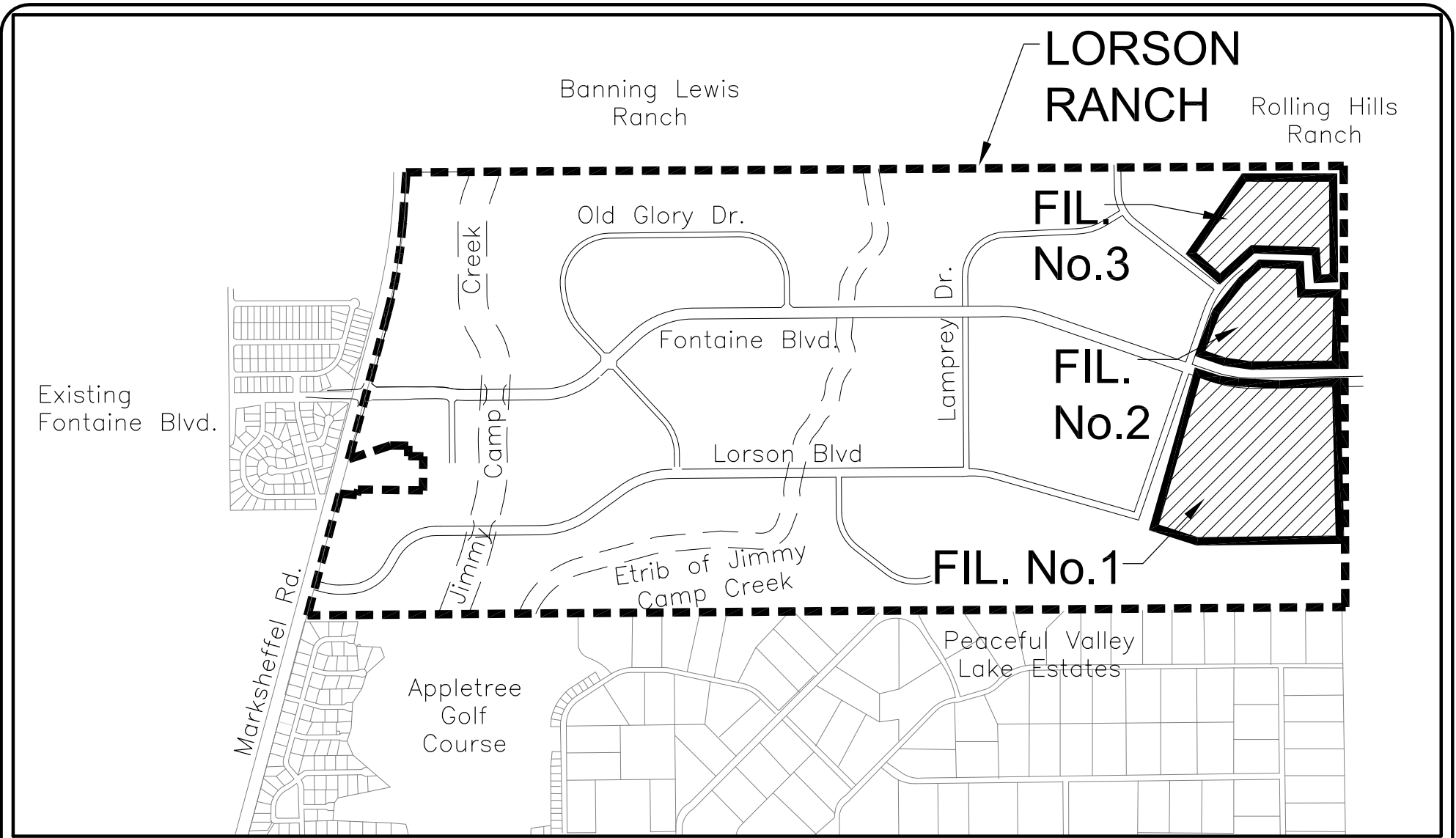
---

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. Lorson Ranch East MDDP, June 30, 2017 by Core Engineering.
7. 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.
8. Lorson Ranch East MDDP prepared by Core Engineering Group, dated November 27, 2017
9. Final Drainage Report for CDR 20-007 prepared by Core Engineering Group, dated October 22, 2020
10. Final Drainage Report for The Hills at Lorson Ranch Filing No. 1 prepared by Core Engineering Group, Reference SF 21-010

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**APPENDIX A – VICINTIY MAP, SOILS MAP, FEMA MAP**

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**VICINITY MAP**  
NO SCALE



**CORE**  
ENGINEERING GROUP

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

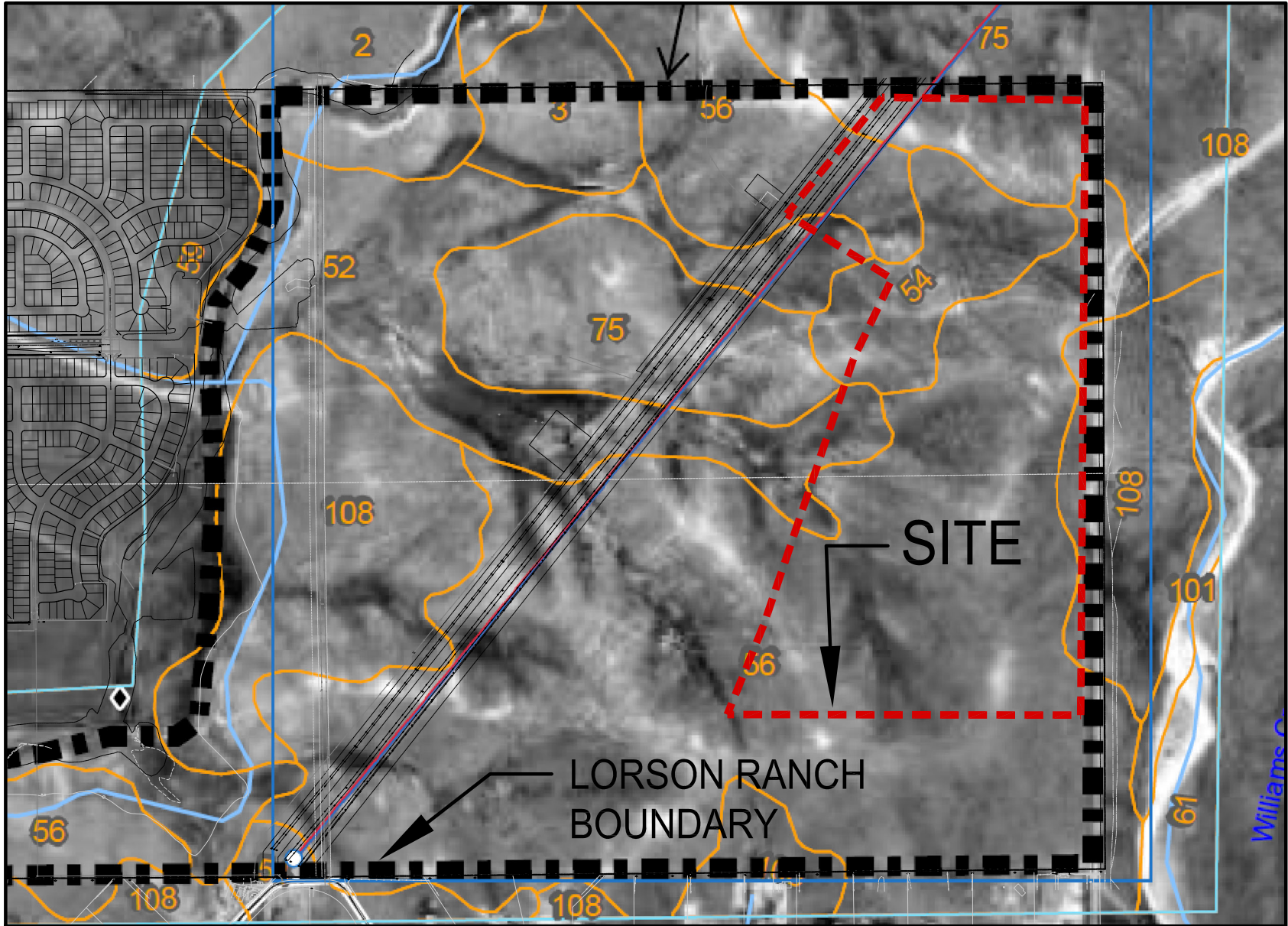
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@ceg1.com

**THE RIDGE AT LORSON RANCH**  
**VICINITY MAP**

SCALE:  
NTS

DATE:  
NOV, 2021

FIGURE NO.  
--



**CORE**  
**ENGINEERING GROUP**

15004 1ST AVENUE S.  
BURNSVILLE, MN 55306  
PH: 719.570.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@ceg1.com

**THE RIDGE AT LORSON RANCH  
SOILS MAP**

SCALE:  
NTS

DATE:  
APRIL, 2021

FIGURE NO.  
--



CITY OF COLORADO SPRINGS  
080060

LOMR 19-08-0605P  
eff. 5/4/2020

FLOODWAY  
Zone AE Zone AE

EL PASO COUNTY  
080059  
08041C0957 G  
eff. 12/7/2018

AREA OF MINIMAL FLOOD HAZARD  
Zone X

08041C0976 G  
eff. 12/7/2018

site

080060



November 5, 2021

**Letter of Understanding**  
**The Ridge at Lorson Ranch Grading and Drainage Improvements**

This Letter of Understanding ("LOU") is entered into in good faith between Lorson Ranch Metropolitan District and BJ Ranches, LLC, otherwise referred to as the Party or Parties. The intent of the LOU is to ensure the drainage flowing onto property owned by BJ Ranches, LLC (Parcel # 4500000082) (the "subject property") located adjacent to and East of The Ridge at Lorson Ranch, is maintained at or below existing rates and to acknowledge the proposed grading in The Ridge at Lorson Ranch changes the manner in which drainage enters the unimproved subject property owned by BJ Ranches, LLC.

It is the intent of the Parties to minimize changes to the existing drainage patterns flowing from Lorson Ranch onto the subject property and to mimic the existing rate and sheet flow characteristics of drainage flowing onto the subject property as much as possible.

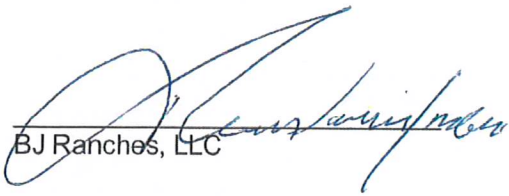
It is, however, acknowledged by the Parties that drainage from Lorson Ranch flowing downstream onto the subject property may cause erosion on the subject property after construction has occurred. The Lorson Ranch Metropolitan District or its assigns will be responsible for the mitigation and restoration of the subject property substantially to its existing condition.

Downstream Erosion Mitigation Protocol.

1. The Lorson Ranch Metropolitan District representative and/or engineer and contractor will meet with the BJ Ranches, LLC representative and engineer and a County storm water inspector prior to the start of construction of the development and review the condition of the land at the property boundary and downstream of Lorson Ranch on the subject property.
2. The existing condition will be documented with photos/video and a written description to establish the baseline condition to be shared and documented between the Parties.
3. The condition of the subject property will be monitored as required by the permits obtained by The Ridge at Lorson Ranch from the State and El Paso County. A BJ Ranches, LLC property representative may also make inspections with each storm event.
4. The inspections will be conducted until the upstream grading is complete and is fully stabilized and vegetated as required by the permits referenced herein.
5. If erosion or sediment transmission impacts are measurable, the Parties shall meet on-site to mutually determine the best course of mitigation action. The mitigation will be conducted within 30 days of the event. If the Parties are unable to reach agreement on the mitigation action to be taken, either party may bring such dispute to binding arbitration, under the rules of the American Arbitration Association.
6. If the mitigation is not undertaken within the 30-day period BJ Ranches, LLC or its assigns may undertake the necessary actions to return the area to its existing condition and Lorson Ranch

Metropolitan District will be billed for reimbursement of the work, which bill will be paid within 30 days after receipt of the bill. If not timely paid, the amount due will accrue interest at the rate of 18% per annum from the date due.

7. In any action brought before a court or judge to enforce this LOU or collect damages on account of a party's breach of their obligations hereunder, the prevailing party shall be awarded their costs and reasonable attorney's fees. This shall include any action brought by BJ Ranches, LLC whereby the district is the prevailing party in which case District shall be awarded reasonable attorney's fees.



BJ Ranches, LLC



Lorson Ranch Metropolitan District  
Jeff Mark, President

November 5, 2021

**Letter of Understanding**  
**The Ridge at Lorson Ranch Grading and Drainage Improvements**

This Letter of Understanding (“LOU”) is entered into in good faith between Lorson Ranch Metropolitan District and Eagle Development Company, otherwise referred to as the Party or Parties. The intent of the LOU is to ensure the drainage flowing onto property owned by Eagle Development Company (Parcel #5500000324) located adjacent to and north of The Ridge at Lorson Ranch, is maintained at or below existing rates and to acknowledge the proposed grading in The Ridge at Lorson Ranch changes the manner in which drainage enters the unimproved subject property owned by Eagle Development Company.

It is the intent of the Parties to minimize changes to the existing drainage patterns flowing from Lorson Ranch onto the subject property and to mimic the existing rate and sheet flow characteristics of drainage flowing onto the subject property owned by Eagle Development Company.

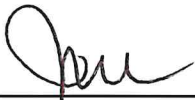
It is, however, acknowledged by the Parties that drainage from Lorson Ranch flowing downstream onto the subject property may cause erosion on the subject property after construction has occurred. The Lorson Ranch Metropolitan District or its assigns will be responsible for the mitigation and restoration of the subject property substantially to its existing condition.

**Downstream Erosion Mitigation Protocol.**

1. The Lorson Ranch Metropolitan District representative and/or engineer and contractor will meet with the Eagle Development Company representative and engineer; and County storm water inspector prior to the start of construction of the development and review the condition of the land at the property boundary and downstream of Lorson Ranch on the subject property.
2. The existing condition will be documented with photos/video and a written description to establish the baseline condition to be shared and documented between the Parties.
3. The condition of the Eagle Development Company property will be monitored as required by the permits obtained by The Ridge at Lorson Ranch from the State and El Paso County. An Eagle Development Company property representative may also make inspections with each storm event.
4. The inspections will be conducted until the upstream grading is complete is fully stabilized and vegetated as required by the permits referenced herein.
5. If erosion or sediment transmission impacts are measurable, the Parties shall meet on-site to mutually determine the best course of mitigation action. The mitigation will be conducted within 30 days of the event. If the Parties are not in agreement with the course of mitigation action, the Parties shall seek a final opinion from an engineering representative from El Paso

County. The Parties shall then agree with whatever determination is made by these governing authorities.

6. If the mitigation is not undertaken within the 30-day period Eagle Development Company or its assigns will undertake the necessary actions to return the area to its existing condition and Lorson Ranch Metropolitan District will be billed for reimbursement of the work, which bill will be paid within 30 days after receipt of the bill. If not timely paid, the amount due will accrue interest at the rate of 18% per annum from the date due.
  
7. In any action brought before a court or judge to enforce this LOU or collect damages on account of a party's breach of their obligations hereunder, the prevailing party shall be awarded their costs and reasonable attorney's fees. This shall include any action brought by Eagle Development Company whereby the district is the prevailing party in which case District shall be awarded reasonable attorney's fees.



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Eagle Development Company  
Jeff Mark, Vice President



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Lorson Ranch Metropolitan District  
Jeff Mark, Manager

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**APPENDIX B – HYDROLOGY CALCULATIONS**

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

Calculated By: Leonard Beasley  
 Date: Feb. 17, 2021  
 Checked By: Leonard Beasley

Job No: 100.064  
 Project: The Ridge at Lorson Ranch  
 Design Storm: **5 - Year Event (Existing)**

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	$t_c$	$\Sigma$ (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	
EX-B1			14.42	0.15	28.1	2.16	2.58	5.6													
OS-B1.1			11.47	0.15	21.0	1.72	3.02	5.2													
<b>EX-B</b>	<b>1X</b>	25.89							29.7	3.88	2.50	9.7									
C1.1-ex			12.49	0.09	23.8	1.12	2.83	3.2													
C2.1-ex			26.58	0.10	33.6	2.66	2.31	6.1													
C2.2-ex			60.28	0.09	35.1	5.43	2.25	12.2													
C3.1-ex			8.36	0.12	28.6	1.00	2.55	2.6													
OS-C4.1			3.90	0.10	20.7	0.39	3.04	1.2													
C4.2-ex			47.93	0.13	31.6	6.23	2.41	15.0													
<b>C4-ex</b>	<b>4X</b>	51.83							34.1	6.62	2.29	15.2									
EX-F1			22.36	0.12	33.1	2.68	2.33	6.3													
EX-F2			17.49	0.15	15.4	2.62	3.48	9.1													
<b>EX-F</b>	<b>2X</b>	39.85							33.1	5.31	2.33	12.4									
EX-G			13.65	0.08	26.0	1.09	2.70	2.9													
Basin G1			10.61	0.08	22.3	0.85	2.93	2.5	existing basin shown on developed conditions map												
EX-H			28.13	0.08	27.8	2.33	2.60	6.1													
Basin H1			27.96	0.09	32.1	2.52	2.38	6.0	existing basin shown on developed conditions map												



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

Calculated By: Leonard Beasley  
 Date: Feb. 17, 2021  
 Checked By: Leonard Beasley

Job No: 100.064  
 Project: The Ridge at Lorson Ranch  
 Design Storm: **100-Year Event (Existing)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t <sub>c</sub>	CA	i	Q	t <sub>c</sub>	Σ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t <sub>t</sub>	
			ac.			min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	
EX-B1			14.42	0.50	28.1	7.21	4.33	31.2													
OS-B1.1			11.47	0.50	21.0	5.74	5.06	29.0													
<b>EX-B</b>	<b>1X</b>	25.89							29.7	12.95	4.19	54.2									
C1.1-ex			12.49	0.36	23.8	4.50	4.75	21.4													
C2.1-ex			26.58	0.39	33.6	10.37	3.88	40.2													
C2.2-ex			60.28	0.36	35.1	21.70	3.77	81.8													
C3.1-ex			8.36	0.42	28.6	3.51	4.28	15.0													
C4.1-ex			3.90	0.39	20.7	1.52	5.10	7.8													
C4.2-ex			47.93	0.44	31.6	21.09	4.04	85.1													
<b>C4-ex</b>	<b>4X</b>	51.83							34.1	22.61	3.84	86.9									
EX-F1			22.36	0.44	33.1	9.84	3.91	38.5													
EX-F2			17.49	0.50	15.4	8.75	5.84	51.1													
<b>EX-F</b>	<b>2X</b>	39.85							33.1	18.58	3.91	72.7									
EX-G			13.65	0.35	26.0	4.78	4.52	21.6													
Basin G1			10.61	0.35	22.3	3.71	4.91	18.2	existing basin shown on developed conditions map												
EX-H			28.13	0.35	27.8	9.85	4.36	42.9													
Basin H1			27.96	0.36	32.1	10.07	3.99	40.2	existing basin shown on developed conditions map												





15004 1st Avenue South  
Burnsville, MN 55306

**PROJECT NAME:** The Ridge at Lorson Ranch  
**PROJECT NUMBER:** 100.064  
**ENGINEER:** LAB  
**DATE:** Feb. 17, 2021

Preliminary Drainage Plan  
CURRENT CONDITIONS COEFFICIENT "C" CALCULATIONS

BASIN	Soil No.	Hydro Group	Area	Cover (%)	C5	Wtd. C5	C100	Wtd. C100	Impervious	Type of Cover
C2.1-ex	56	B	20.95	78.82%	0.09	0.07	0.36	0.28	100%	Undeveloped
	52/54	C	5.63	21.18%	0.16	0.03	0.51	0.11	80%	Undeveloped
			26.58	100.00%		0.10		0.39		
C2.2-ex	56	B	58.51	97.06%	0.09	0.09	0.36	0.35	10%	Undeveloped
	52	C	1.77	2.94%	0.16	0.00	0.51	0.01	10%	Undeveloped
			60.28	100.00%		0.09		0.36		
C3.1-ex	56	B	4.95	59.21%	0.09	0.05	0.36	0.21	10%	Undeveloped
	54	D	3.41	40.79%	0.16	0.07	0.51	0.21	10%	Undeveloped
			8.36	100.00%		0.12		0.42		
OS-C4.1	56	B	3.10	79.49%	0.09	0.07	0.36	0.29	10%	Undeveloped
	75	D	0.80	20.51%	0.16	0.03	0.51	0.10	10%	Undeveloped
			3.90	100.00%		0.10		0.39		
C4.2-ex	56/108	B	21.23	44.29%	0.09	0.04	0.36	0.16	10%	Undeveloped
	52/54/75	D	26.70	55.71%	0.16	0.09	0.51	0.28	10%	Undeveloped
			47.93	100.00%		0.13		0.44		
EX-F1	56/108	B	8.74	39.09%	0.08	0.03	0.35	0.14	10%	Undeveloped
	52	C	13.62	60.91%	0.15	0.09	0.50	0.30	10%	Undeveloped
			22.36	100.00%		0.12		0.44		
EX-F2	56/108	B	0.23	1.32%	0.08	0.00	0.35	0.00	10%	Undeveloped
	52	C	17.26	98.68%	0.15	0.15	0.50	0.49	10%	Undeveloped
			17.49	100.00%		0.15		0.50		
EX-G	56/108	B	13.27	100.00%	0.08	0.08	0.35	0.35	10%	Undeveloped
	52	C	0.00	0.00%	0.15	0.00	0.50	0.00	10%	Undeveloped
			13.27	100.00%		0.08		0.35		
EX-H	56/108	B	28.13	100.00%	0.08	0.08	0.35	0.35	10%	Undeveloped
	52	C	0.00	0.00%	0.15	0.00	0.50	0.00	10%	Undeveloped
			28.13	100.00%		0.08		0.35		



**Standard Form SF-1. Time of Concentration-Current**

Calculated By: Leonard Beasley  
 Date: Feb. 17, 2021  
 Checked By: Leonard Beasley

Job No: 100.064  
 Project: The Ridge at Lorson Ranch

Sub-Basin Data				Initial Overland Time (t <sub>i</sub> )				Travel Time (t <sub>t</sub> )					Final t <sub>c</sub>
BASIN or DESIGN	C <sub>s</sub>	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t <sub>i</sub> minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t <sub>t</sub> minutes	Computed t <sub>c</sub> Minutes	USDCM Recommended t <sub>c</sub> =t <sub>i</sub> +t <sub>t</sub> (min)
EX-B1	0.15	14.42	7.0	300.00	4.00%	0.27	18.80	575.00	4.00%	1.40	6.85		
			20.0					375.00	1.60%	2.53	2.47	28.12	28.12
OS-B1.1	0.15	11.47	20.0	300.00	4.00%	0.27	18.80	550.00	4.40%	4.20	2.19	20.99	20.99
(EX-B) 1X	0.15	20.06	20.0	300.00	2.00%	0.21	23.63	650.00	0.80%	1.79	6.06	29.69	29.69
C1.1-ex	0.09	12.49	7.0	300.00	5.40%	0.28	18.16	434.00	5.50%	1.64	4.41		
			15.0					225.00	4.44%	3.16	1.19	23.75	23.75
C2.1-ex	0.10	26.58	7.0	300.00	5.33%	0.28	18.06	1347.00	5.72%	1.67	13.41		
			15.0					266.00	1.88%	2.06	2.16	33.62	33.62
C2.2-ex	0.09	60.28	7.0	140.00	3.57%	0.16	14.22	1216.00	4.28%	1.45	13.99		
			15.0					1123.00	3.29%	2.72	6.88	35.10	35.10
C3.1-ex	0.12	8.36	7.0	300.00	6.00%	0.29	17.01	1052.00	6.10%	1.73	10.14		
			15.0					152.00	1.32%	1.72	1.47	28.63	28.63
OS-C4.1	0.10	3.90	7.0	300.00	4.50%	0.26	19.10	143.00	4.60%	1.50	1.59	20.68	20.68
C4.2-ex	0.13	47.93	7.0	300.00	5.25%	0.28	17.60	500.00	5.25%	1.60	5.20		
			15.0					1307.00	2.75%	2.49	8.76	31.55	31.55



**Standard Form SF-1. Time of Concentration-Current**

Calculated By: Leonard Beasley  
 Date: Feb. 17, 2021  
 Checked By: Leonard Beasley

Job No: 100.064  
 Project: The Ridge at Lorson Ranch

Sub-Basin Data				Initial Overland Time (ti)				Travel Time (tt)					Final tc
BASIN or DESIGN	C <sub>s</sub>	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	ti minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	tt minutes	Computed tc Minutes	USDCM Recommended tc=ti+tt (min)
(C4-ex) 4X	0.13	51.83	7.0	300.00	4.50%	0.27	18.52	143.00	4.60%	1.50	1.59		
			7.0					500.00	5.25%	1.60	5.20		
			15.0					1307.00	2.75%	2.49	8.76	34.06	34.06
EX-F1	0.12	22.36	7.0	300.00	3.30%	0.24	20.67	950.00	3.30%	1.27	12.45	33.12	33.12
EX-F2	0.15	17.49	15.0	221.00	6.80%	0.27	13.55	406.00	5.90%	3.64	1.86	15.40	15.40
(EX-F) 2X	0.13	39.85	7.0	300.00	3.30%	0.24	20.46	390.00	3.30%	1.27	5.11	25.57	25.57
EX-G	0.08	13.27	7.0	300.00	4.80%	0.26	19.07	640.00	4.80%	1.53	6.96	26.02	26.02
Basin G1	0.08	10.61	7.0	300.00	4.80%	0.26	19.07	300.00	4.80%	1.53	3.26	22.33	22.33
EX-H	0.08	28.13	7.0	300.00	4.80%	0.26	19.07	800.00	4.80%	1.53	8.69	27.76	27.76
Basin H1	0.09	27.96	7.0	30.00	2.00%	0.06	7.98	880.00	1.20%	0.77	19.13		
			15.0					1000.00	5.00%	3.35	4.97	32.07	32.07

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

Calculated By: Leonard Beasley  
 Date: Feb. 18, 2021  
 Checked By: Leonard Beasley

Job No: 100.064  
 Project: The Ridge at Lorson Ranch  
 Design Storm: **5 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time		Remarks	
		Area Design	Area (A)	Runoff Coeff. (C)	t <sub>c</sub>	CA	i	Q	t <sub>c</sub>	Σ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity		t <sub>t</sub>
C1.1	I-1		3.18	0.45	11.8	1.43	3.89	5.6													
C1.2	I-2		1.52	0.45	11.5	0.68	3.92	2.7													
C1.1-C1.2		4.70							11.8	2.12	3.89	8.2									
C1.3			6.71	0.45	21.8	3.02	2.96	8.9													
C1.1-C1.3		11.41							26.1	5.13	2.69	13.8									
C1.4			2.51	0.45	13.2	1.13	3.72	4.2													
C1.5	I-6		1.61	0.45	9.9	0.72	4.14	3.0													
C1.6			9.35	0.45	20.5	4.21	3.05	12.8													
C1.5-C1.6	<b>6a</b>	10.96							20.5	4.93	3.05	15.0									
C3.1	I-12		6.20	0.45	14.7	2.79	3.55	9.9													
C3.2	I-13		5.01	0.45	15.3	2.25	3.49	7.9													
C3.1-C3.2		11.21							16.1	5.04	3.41	17.2									
C3.3	I-15		4.75	0.45	11.2	2.14	3.96	8.5													
C3.1-C3.3		15.96							18.1	7.18	3.24	23.3									
C3.4	I-17		3.77	0.45	9.4	1.70	4.23	7.2													
C3.1-C3.4	<b>18</b>	19.73							18.9	8.88	3.17	28.2									
C3.5	I-19		6.32	0.45	14.1	2.84	3.62	10.3													
C3.1-C3.5		26.05							19.9	11.72	3.10	36.3									
C3.6a	I-20a		3.15	0.45	11.2	1.42	3.96	5.6													
C3.1-C3.6a		29.20							20.0	13.14	3.09	40.6									
C3.6b	I-21		4.80	0.45	16.8	2.16	3.35	7.2													
C3.7	I-23		4.58	0.45	9.4	2.06	4.22	8.7													
C3.1-C3.7		38.58							21.0	17.36	3.02	52.4									
C3.8	I-25		6.51	0.45	16.1	2.93	3.41	10.0													
C3.9	I-27		4.55	0.45	11.1	2.05	3.97	8.1													
C3.1-C3.9	<b>28</b>	49.64							22.3	22.34	2.93	65.4									
C3.10	I-29		6.01	0.45	16.4	2.70	3.39	9.2													
C3.1-C3.10	<b>30</b>	55.65							24.4	25.04	2.79	69.9									
C4.1			4.61	0.45	20.3	2.07	3.07	6.4													
C4.2			3.08	0.45	15.7	1.39	3.45	4.8													
C4.1-C4.2	<b>31</b>	7.69							20.6	3.46	3.04	10.5									
C4.3			3.07	0.46	10.7	1.41	4.02	5.7													

Missing several design point designations which are described in report. Please add them back in. Show pipe routing under "Pipe" section of this spreadsheet or add another method of determining flows in pipe as described in report. Surface Design Points need to include all flows at that location, including flowby from upstream inlets.



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

Calculated By: Leonard Beasley  
 Date: Feb. 18, 2021  
 Checked By: Leonard Beasley

Job No: 100.064  
 Project: The Ridge at Lorson Ranch  
 Design Storm: **5 - Year Event (Proposed)**

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	$t_c$	$\Sigma$ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length		Velocity	t
			ac.			min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in		ft	ft/sec
C4.4			3.29	0.46																	
C4.1-C4.4		14.05																			
C4.5			0.63	0.90																	
F1.1			4.23	0.45	11.3	1.90	3.94	7.5													
F1.2			19.06	0.08	11.0	1.52	3.98	6.1													
F1.3			1.15	0.46	13.6	0.53	3.67	1.9													
F1.4			3.75	0.45	15.3	1.69	3.49	5.9													
F1.1-F1.4		28.19							15.3	3.43	3.49	12.0									
C5.1a	I-39		2.33	0.47	12.5	1.10	3.79	4.2													
C5.1b	I-36		6.32	0.45	10.8	2.84	4.02	11.4													
C5.1c	I-37		3.78	0.45	8.6	1.70	4.35	7.4													
C5.1b-C5.1c	<b>38</b>	10.10							10.8	4.55	4.02	18.3									
C5.1a-C5.1c	I-39 & <b>40</b>	12.43							14.4	5.64	3.58	20.2									
C5.1d	I-41		5.67	0.45	14.0	2.58	3.62	9.3													
C5.1a-C5.1d	<b>42</b>	18.10							14.4	4.28	3.58	15.3									
C5.1e	I-43		6.44	0.46	16.5	2.96	3.38	10.0													
C5.1a-C5.1e		24.54							16.5	11.18	3.38	37.8									
C5.2			1.71	0.49	8.5	0.84	4.37	3.7													
C5.3			2.26	0.46	10.3	1.04	4.09	4.3													
C5.2-C5.3	I-45 & <b>46</b>	3.97							10.3	1.88	4.09	7.7									
C8.1a	I-47		4.12	0.45	10.7	1.85	4.03	7.5													
C8.1b			3.69	0.48	14.6	1.77	3.56	6.3													
C8.1c	I-48		1.88	0.46	11.3	0.86	3.94	3.4													
C8.2	I-51		2.12	0.49	8.9	1.04	4.31	4.5													
OS-C4a			3.40	0.09	11.8	0.31	3.88	1.2													
C8.3a	I-53		5.88	0.46	11.8	2.70	3.89	10.6													

Basin is not in text or shown on drainage map. Either include in these areas or remove from hydrology spreadsheets.





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

Calculated By: Leonard Beasley  
 Date: Feb. 18, 2021  
 Checked By: Leonard Beasley

Job No: 100.064  
 Project: The Ridge at Lorson Ranch  
 Design Storm: **5 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	$t_c$	CA	-	Q	$t_c$	$\Sigma$ (CA)	-	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t	
			ac.			min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	
OS-C4b			2.10	0.11	12.7	0.23	3.78	0.9													
C8.3b			3.46	0.48	14.2	1.66	3.61	6.0													
C8.3c			2.33	0.48	10.7	1.12	4.03	4.5													
C8.3d	I-56		5.26	0.48	15.1	2.52	3.51	8.9													
C8.4	I-57		6.70	0.46	14.5	3.08	3.57	11.0													
C8.5	I-59		3.84	0.49	13.4	1.88	3.69	7.0													
C8.3 and C8.5		20.77							15.1	8.62	3.51	30.3									
C8.1-C8.5	<b>61</b>	39.28							22.4	18.50	2.92	54.0									
C8.6			0.79	0.90	5.6	0.71	5.58	4.0													
C8.7a			4.52	0.49	13.7	2.21	3.66	8.1													
C8.7b			1.77	0.49	11.3	0.87	3.94	3.4													
C8.7a-C8.7b		6.29							13.9	3.08	3.63	11.2									
C8.7c			4.94	0.49	11.7	2.42	3.90	9.4													
C8.7a-C8.7c		11.23							14.4	5.50	3.59	19.7									
C8.7d			0.27	0.46	5.0	0.12	5.17	0.6													
C8.7e			6.09	0.47	11.9	2.86	3.87	11.1													
C8.6+C8.7e	I-62								13.4	3.57	3.69	13.2									
C8.7a-C8.7e		17.59							15.4	8.49	3.48	29.5									
C8.6-C8.7e	<b>I-68</b>	18.38							15.5	9.20	3.47	31.9									
C8.8a			5.65	0.49	23.4	2.77	2.86	7.9													
C8.8a	<b>I-69</b>	5.65							23.4	2.77	2.85	7.9									
C8.6+C8.7's + C8.8a	<b>I-70</b>	24.03							23.4	11.97	2.85	34.2									
C8.8			7.80	0.22	15.6	1.72	3.46	5.9													
<b>C8</b>			73.39	0.43	27.5	31.46	2.61	82.2													
<b>Missing basins H1 &amp; G1</b>																					



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

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 Date: Feb. 19, 2021  
 Checked By: Leonard Beasley

Job No: 100.064  
 Project: The Ridge at Lorson Ranch  
 Design Storm: **100 - Year Event (Proposed)**

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	$t_c$	$\Sigma$ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
C1.1	I-1		3.18	0.59	11.8	1.88	6.52	12.2													
C1.2	I-2		1.52	0.59	11.5	0.90	6.58	5.9													
C1.1-C1.2		4.70							11.8	2.77	6.52	18.1									
C1.3			6.71	0.59	21.8	3.96	4.97	19.7													
C1.1-C1.3		11.41							26.1	6.73	4.52	30.4									
C1.4			2.51	0.59	13.2	1.48	6.24	9.2													
C1.5	I-6		1.61	0.59	9.9	0.95	6.96	6.6													
C1.6			9.35	0.59	20.5	5.52	5.12	28.3													
C1.5-C1.6	<b>6a</b>	10.96							20.5	6.47	5.12	33.1									
C3.1	I-12		6.20	0.59	14.7	3.66	5.96	21.8													
C3.2	I-13		5.01	0.59	15.3	2.96	5.86	17.3													
C3.1-C3.2		11.21							16.1	6.61	5.73	37.9									
C3.3	I-15		4.75	0.59	11.2	2.80	6.65	18.6													
C3.1-C3.3		15.96							18.1	9.42	5.44	51.3									
C3.4	I-17		3.77	0.59	9.4	2.22	7.10	15.8													
C3.1-C3.4	<b>18</b>	19.73							18.9	11.64	5.32	62.0									
C3.5	I-19		6.32	0.59	14.1	3.73	6.07	22.6													
C3.1-C3.5		26.05							19.9	15.37	5.20	80.0									
C3.6a	I-20a		3.15	0.59	11.2	1.86	6.64	12.3													
C3.1-C3.6a		29.20							20.0	17.23	5.19	89.3									
C3.6b	I-21		4.80	0.59	16.8	2.83	5.63	15.9													
C3.7	I-23		4.58	0.59	9.4	2.70	7.08	19.1													
C3.1-C3.7		38.58							21.0	22.76	5.06	115.2									
C3.8	I-25		6.51	0.59	16.1	3.84	5.73	22.0													
C3.9	I-27		4.55	0.59	11.1	2.68	6.66	17.9													
C3.1-C3.9	<b>28</b>	49.64							22.3	29.29	4.92	144.0									
C3.10	I-29		6.01	0.59	16.4	3.55	5.69	20.2													
C3.1-C3.10	<b>30</b>	55.65							24.4	32.83	4.69	153.9									
C4.1			4.61	0.59	20.3	2.72	5.15	14.0													
C4.2			3.08	0.59	15.7	1.82	5.79	10.5													
C4.1-C4.2	<b>31</b>	7.69							20.6	4.54	5.11	23.2									
C4.3			3.07	0.60	10.7	1.84	6.76	12.4													
C4.4			3.29	0.60	10.4	1.97	6.84	13.5													
C4.1-C4.4		14.05							22.6	8.35	4.88	40.8									



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

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 Date: Feb. 19, 2021  
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Job No: 100.064  
 Project: The Ridge at Lorson Ranch  
 Design Storm: **100 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A) ac.	Runoff Coeff. (C)	t <sub>c</sub> min.	CA	i in/hr	Q cfs	t <sub>c</sub> min	Σ(CA)	i in/hr	Q cfs	Slope %	Street Flow cfs	Design Flow cfs	Slope %	Pipe Size in	Length ft	Velocity ft/sec	t <sub>t</sub> min	
C4.5			0.63	0.96	5.0	0.60	8.68	5.2													
F1.1			4.23	0.59	11.3	2.50	6.62	16.5													
F1.2			19.06	0.35	11.0	6.67	6.68	44.6													
F1.3			1.15	0.65	13.6	0.75	6.16	4.6													
F1.4			3.75	0.60	15.3	2.25	5.86	13.2													
F1.1-F4.4									15.3	12.16	5.86	71.3									
C5.1a	I-39		2.33	0.62	12.5	1.44	6.36	9.2													
C5.1b	I-36		6.32	0.59	10.8	3.73	6.75	25.2													
C5.1c	I-37		3.78	0.59	8.6	2.23	7.30	16.3													
C5.1b-C5.1c	<b>38</b>	10.10							10.8	5.96	6.75	40.2									
C5.1a-C5.1c	I-39 & 40	12.43							14.4	7.40	6.01	44.5									
C5.1d	I-41		5.67	0.60	14.0	3.40	6.08	20.7													
C5.1a-C5.1d	<b>42</b>	18.10							14.4	10.81	6.01	64.9									
C5.1e	I-43		6.44	0.60	16.5	3.86	5.68	21.9													
C5.1a-C5.1e		24.54							16.5	14.67	5.68	83.3									
C5.2			1.71	0.65	8.5	1.11	7.33	8.2													
C5.3			2.26	0.61	10.3	1.38	6.87	9.5													
C5.2-C5.3	I-45 & 46	3.97							10.3	2.49	6.87	17.1									
C8.1a	I-47		4.12	0.59	10.7	2.43	6.76	16.4													
C8.1b			3.69	0.63	14.6	2.32	5.97	13.9													
C8.1c	I-48		1.88	0.61	11.3	1.15	6.62	7.6													
C8.2	I-51		2.12	0.65	8.9	1.38	7.23	10.0													
OS-C4a			3.40	0.35	11.8	1.19	6.51	7.7													





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Job No: 100.064  
 Project: The Ridge at Lorson Ranch  
 Design Storm: **100 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff			Street		Pipe		Travel Time			Remarks		
		Area Design	Area (A)	Runoff Coeff. (C)	t <sub>c</sub>	CA	i	Q	t <sub>c</sub>	Σ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length		Velocity	t <sub>t</sub>
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft		ft/sec	min
C8.3a	I-53		5.88	0.60	11.8	3.53	6.53	26.5													
OS-C4b			2.10	0.41	12.7	0.86	6.34	5.5													
C8.3b			3.46	0.63	14.2	2.18	6.06	13.2													
C8.3c			2.33	0.63	10.7	1.47	6.76	9.9													
C8.3d	I-56		5.26	0.62	15.1	3.26	5.89	19.2													
C8.4	I-57		6.70	0.60	14.5	4.02	5.99	24.1													
C8.5			3.84	0.65	13.4	2.50	6.20	15.5													
C8.1-C8.5	I-60	39.28							22.4	24.23	4.90	118.7									
C8.6			0.79	0.96	5.6	0.76	8.40	6.4													
C8.7a			4.52	0.65	13.7	2.94	6.14	18.0													
C8.7b			1.77	0.65	11.3	1.15	6.62	7.6													
C8.7a-C8.7b		6.29							13.9	4.09	6.10	24.9									
C8.7c			4.94	0.65	11.7	3.21	6.55	21.0													
C8.7a-C8.7c		11.23							14.4	7.30	6.01	43.8									
C8.7d			0.27	0.61	5.0	0.16	8.68	1.4													
C8.7a-C8.7d		11.50							15.0	7.46	5.91	44.1									
C8.7e			6.09	0.62	11.9	3.78	6.50	24.5													
C8.6+C8.7e	I-62								13.4	4.53	6.19	28.1									
C8.7a-C8.7e		17.59							15.4	11.24	5.84	65.7									
C8.6-C8.7e	I-68	18.38							15.5	12.00	5.83	69.9									
C8.8a			5.65	0.64	23.4	3.62	4.80	17.3													
C8.8a	I-69	5.65							23.4	3.62	4.79	17.3									
C8.6+C8.7s+ C8.8a	I-70	24.03							23.4	15.61	4.79	74.8									
C8.8			7.80	0.48	15.6	3.74	5.81	21.8													
C8			73.39	0.60	27.5	44.16	4.39	193.7													



15004 1st Avenue South  
Burnsville, MN 55306

**PROJECT NAME:** The Ridge at Lorson Ranch  
**PROJECT NUMBER:** 100.064  
**ENGINEER:** LAB  
**DATE:** Feb. 19, 2021

**Preliminary Drainage Plan**  
**PROPOSED CONDITIONS COEFFICIENT "C" CALCULATIONS**

BASIN	Soil No.	Hydro Group	Area	Cover (%)	C5	Wtd. C5	C100	Wtd. C100	Impervious	Type of Cover
C1.1	56	B	3.18		0.45		0.59		65%	1/8 ac. Single Family
C1.2	56	B	1.52		0.45		0.59		65%	1/8 ac. Single Family
C1.3	56	B	13.47		0.45		0.59		65%	1/8 ac. Single Family
C1.4	56	B	5.19		0.45		0.59		65%	1/8 ac. Single Family
C1.5	56	B	0.70		0.45		0.59		65%	1/8 ac. Single Family
C1.6	56/108	B	9.35		0.45		0.59		65%	1/8 ac. Single Family
C3.1	56	B	6.20		0.45		0.59		65%	1/8 ac. Single Family
C3.2	56	B	5.01		0.45		0.59		65%	1/8 ac. Single Family
C3.3	56	B	4.75		0.45		0.59		65%	1/8 ac. Single Family
C3.4	56	B	3.77		0.45		0.59		65%	1/8 ac. Single Family
C3.5	56	B	6.32		0.45		0.59		65%	1/8 ac. Single Family
C3.6a	56	B	3.15		0.45		0.59		65%	1/8 ac. Single Family
C3.6b	56	B	4.80		0.45		0.59		65%	1/8 ac. Single Family
C3.7	56	B	4.58		0.45		0.59		65%	1/8 ac. Single Family
C3.8	56	B	6.51		0.45		0.59		65%	1/8 ac. Single Family
C3.9	56	B	4.55		0.45		0.59		65%	1/8 ac. Single Family
C3.10	56	B	6.01		0.45		0.59		65%	1/8 ac. Single Family
C4.1	56	B	4.61		0.45		0.59		65%	1/8 ac. Single Family
C4.2	56	B	3.08		0.45		0.59		65%	1/8 ac. Single Family
C4.3	56	B	2.46	80.13%	0.45	0.36	0.59	0.47	65%	1/8 ac. Single Family
	52	C	0.61	19.87%	0.49	0.10	0.65	0.13	65%	1/8 ac. Single Family
			3.07	100.00%		0.46		0.60		
C4.1	56	B	4.61		0.45		0.59		65%	1/8 ac. Single Family
C4.2	56	B	3.08		0.45		0.59		65%	1/8 ac. Single Family
C4.3	56	B	2.46	80.13%	0.45	0.36	0.59	0.47	65%	1/8 ac. Single Family
	52	C	0.61	19.87%	0.49	0.10	0.65	0.13	65%	1/8 ac. Single Family
			3.07	100.00%		0.46		0.60		



**CORE**  
ENGINEERING GROUP

15004 1st Avenue South  
Burnsville, MN 55306

PROJECT NAME: The Ridge at Lorson Ranch

PROJECT NUMBER: 100.064

ENGINEER: LAB

DATE: Feb. 19, 2021

Preliminary Drainage Plan

PROPOSED CONDITIONS COEFFICIENT "C" CALCULATIONS

C4.4	56	B	2.56	77.81%	0.45	0.35	0.59	0.46	65%	1/8 ac. Single Family
	52	C	0.73	22.19%	0.49	0.11	0.65	0.14	65%	1/8 ac. Single Family
			3.29	100.00%		0.46		0.60		
C4.5	56	B	0.26	41.27%	0.90	0.37	0.96	0.40	100%	Roadway
	52	C	0.37	58.73%	0.90	0.53	0.96	0.56	100%	Roadway
			0.63	100.00%		0.90		0.96		
C5.1a	56	B	1.34	57.51%	0.45	0.26	0.59	0.34	65%	1/8 ac. Single Family
	54/52	D/C	0.99	42.49%	0.49	0.21	0.65	0.28	65%	1/8 ac. Single Family
			2.33	100.00%		0.47		0.62		
C5.1b	56	B	5.96	94.30%	0.45	0.42	0.59	0.56	65%	1/8 ac. Single Family
	52	C	0.36	5.70%	0.49	0.03	0.65	0.04	65%	1/8 ac. Single Family
			6.32	100.00%		0.45		0.59		
C5.1c	56	B	3.54	93.65%	0.45	0.42	0.59	0.55	65%	1/8 ac. Single Family
	52	C	0.24	6.35%	0.49	0.03	0.65	0.04	65%	1/8 ac. Single Family
			3.78	100.00%		0.45		0.59		
C5.1d	56	B	4.98	87.83%	0.45	0.40	0.59	0.52	65%	1/8 ac. Single Family
	52	C	0.69	12.17%	0.49	0.06	0.65	0.08	65%	1/8 ac. Single Family
			5.67	100.00%		0.45		0.60		
C5.1e	56	B	5.44	84.47%	0.45	0.38	0.59	0.50	65%	1/8 ac. Single Family
	52	C	1.00	15.53%	0.49	0.08	0.65	0.10	65%	1/8 ac. Single Family
			6.44	100.00%		0.46		0.60		
C5.2	52	C	1.71		0.49		0.65		65%	1/8 ac. Single Family
C5.3	56	B	1.50	66.37%	0.45	0.30	0.59	0.39	65%	1/8 ac. Single Family
	52	C	0.76	33.63%	0.49	0.16	0.65	0.22	65%	1/8 ac. Single Family
			2.26	100.00%		0.46		0.61		



Preliminary Drainage Plan

PROPOSED CONDITIONS COEFFICIENT "C" CALCULATIONS

C8.1a	56	B	3.81	92.48%	0.45	0.42	0.59	0.55	65%	1/8 ac. Single Family
	54	D	0.31	7.52%	0.49	0.04	0.65	0.05	65%	1/8 ac. Single Family
			4.12	100.00%		0.45		0.59		
C8.1b	56	B	1.36	36.86%	0.45	0.17	0.59	0.22	65%	1/8 ac. Single Family
	54	D	2.33	63.14%	0.49	0.31	0.65	0.41	65%	1/8 ac. Single Family
			3.69	100.00%		0.48		0.63		
C8.1c	56	B	1.31	69.68%	0.45	0.31	0.59	0.41	65%	1/8 ac. Single Family
	54	D	0.57	30.32%	0.49	0.15	0.65	0.20	65%	1/8 ac. Single Family
			1.88	100.00%		0.46		0.61		
C8.2	52	C	2.12		0.49		0.65		65%	1/8 ac. Single Family
OS-C4a	56	B	2.29		0.09		0.36		10%	Undeveloped
C8.3a	56	B	4.88	82.99%	0.45	0.37	0.59	0.49	65%	1/8 ac. Single Family
	54	C/D	1.00	17.01%	0.49	0.08	0.65	0.11	65%	1/8 ac. Single Family
			5.88	100.00%		0.46		0.60		
OS-C4b	56	B	1.36	64.76%	0.09	0.06	0.36	0.23	10%	Undeveloped
	75	D	0.74	35.24%	0.16	0.06	0.51	0.18	10%	Undeveloped
			2.10	100.00%		0.11		0.41		
C8.3b	56	B	1.09	31.50%	0.45	0.14	0.59	0.19	65%	1/8 ac. Single Family
	54	D	2.37	68.50%	0.49	0.34	0.65	0.45	65%	1/8 ac. Single Family
			3.46	100.00%		0.48		0.63		
C8.3c	56	B	0.87	37.34%	0.45	0.17	0.59	0.22	65%	1/8 ac. Single Family
	54	D	1.46	62.66%	0.49	0.31	0.65	0.41	65%	1/8 ac. Single Family
			2.33	100.00%		0.48		0.63		
DP-54	56	B	6.84	58.61%	0.45	0.26	0.59	0.35	65%	1/8 ac. Single Family



**CORE**  
ENGINEERING GROUP

15004 1st Avenue South  
Burnsville, MN 55306

PROJECT NAME: The Ridge at Lorson Ranch

PROJECT NUMBER: 100.064

ENGINEER: LAB

DATE: Feb. 19, 2021

Preliminary Drainage Plan

PROPOSED CONDITIONS COEFFICIENT "C" CALCULATIONS

	54	D	4.83	41.39%	0.49	0.20	0.65	0.27	65%	1/8 ac. Single Family
			11.67	100.00%		0.47		0.61		
C8.3d	56	B	0.81	15.40%	0.45	0.07	0.59	0.09	65%	1/8 ac. Single Family
	54	D	4.45	84.60%	0.49	0.41	0.65	0.55	65%	1/8 ac. Single Family
			5.26	100.00%		0.48		0.64		
C8.4	56	B	5.25	78.36%	0.45	0.35	0.59	0.46	65%	1/8 ac. Single Family
	54	D	1.45	21.64%	0.49	0.11	0.65	0.14	65%	1/8 ac. Single Family
			6.70	100.00%		0.46		0.60		
C8.5	54/75	D	3.84		0.49		0.65		100%	1/8 ac. Single Family
C8.6	54	D	0.79		0.90		0.96		100%	Street
C8.7a	75	D	6.29		0.49		0.65		100%	1/8 ac. Single Family
C8.7b	54/75	D	4.94		0.49		0.65		100%	1/8 ac. Single Family
C8.7c	75	D	4.94		0.49		0.65		100%	1/8 ac. Single Family
C8.7d	56	B	0.17	62.96%	0.45	0.28	0.59	0.37	65%	1/8 ac. Single Family
	54	D	0.10	37.04%	0.49	0.18	0.65	0.24	65%	1/8 ac. Single Family
			0.27	100.00%		0.46		0.61		
C8.7e	56	B	2.56	42.04%	0.45	0.19	0.59	0.25	65%	1/8 ac. Single Family
	52/54	C/D	3.53	57.96%	0.49	0.28	0.65	0.38	65%	1/8 ac. Single Family
			6.09	100.00%		0.47		0.62		
OS-B1	56	B	0.75	14.68%	0.09	0.01	0.36	0.05	10%	Undeveloped
	75	D	4.36	85.32%	0.16	0.14	0.51	0.44	10%	Undeveloped
			5.11	100.00%		0.15		0.49		
C8.8a	56	B	0.70	12.39%	0.45	0.06	0.59	0.07	65%	1/8 ac. Single Family
	52/54/75	C/D	4.95	87.61%	0.49	0.43	0.65	0.57	65%	1/8 ac. Single Family
			5.65	100.00%		0.49		0.64		
C8.8	56	B	3.85	49.36%	0.16	0.08	0.41	0.20	13%	Pond / Open Space
	52	C	3.08	39.49%	0.23	0.09	0.54	0.21	13%	Pond / Open Space



15004 1st Avenue South  
Burnsville, MN 55306

**PROJECT NAME:** The Ridge at Lorson Ranch  
**PROJECT NUMBER:** 100.064  
**ENGINEER:** LAB  
**DATE:** Feb. 19, 2021

**Preliminary Drainage Plan**  
**PROPOSED CONDITIONS COEFFICIENT "C" CALCULATIONS**

	56	B	0.63	8.08%	0.45	0.04	0.59	0.05	65%	1/8 ac. Single Family
	52	C	0.24	3.08%	0.49	0.02	0.65	0.02	65%	1/8 ac. Single Family
			7.80	100.00%		0.22		0.48		
C8.4	56	B	4.89	72.99%	0.45	0.33	0.59	0.43	65%	1/8 ac. Single Family
	54	C	1.81	27.01%	0.49	0.13	0.65	0.18	65%	1/8 ac. Single Family
			6.70	100.00%		0.46		0.61		
C8.5	75	D	3.49		0.49		0.65		100%	1/8 ac. Single Family
C8.6	54	D	0.79		0.90		0.96		100%	Street
C8.7	56	B	3.68	15.59%	0.45	0.07	0.59	0.09	65%	1/8 ac. Single Family
	52/54/75	C/D	19.93	84.41%	0.49	0.41	0.65	0.55	65%	1/8 ac. Single Family
			23.61	100.00%		0.48		0.64		
C8.8	56	B	3.85	49.36%	0.16	0.08	0.41	0.20	13%	Pond / Open Space
	52	C	3.08	39.49%	0.23	0.09	0.54	0.21	13%	Pond / Open Space
	56	B	0.63	8.08%	0.45	0.04	0.59	0.05	65%	1/8 ac. Single Family
	52	C	0.24	3.08%	0.49	0.02	0.65	0.02	65%	1/8 ac. Single Family
			7.80	100.00%		0.22		0.48		
	52/75	C/D	0.93	10.65%	0.49	0.05	0.65	0.07	65%	1/8 ac. Single Family
			8.73	110.65%		0.27		0.55		
H1	56	B	27.64	98.86%	0.08	0.08	0.35	0.35	13%	Open Space
	56	B	0.32	1.14%	0.90	0.01	0.96	0.01	65%	Roadway
			27.96	100.00%		0.09		0.36		



**Standard Form SF-1. Time of Concentration-Proposed**

Calculated By: Leonard Beasley  
 Date: Feb. 19, 2021  
 Checked By: Leonard Beasley

Job No: 100.064  
 Project: The Ridge at Lorson Ranch

Sub-Basin Data				Initial Overland Time (ti)				Travel Time (tt)					tc Check (urbanized Basins)		Final tc
BASIN or DESIGN	C <sub>5</sub>	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	Ti minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	Tt minutes	Computed tc Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended tc=ti+tt (min)
C1.1	0.45	3.18	7.0	100.00	3.00%	0.20	8.20	90.00	2.60%	1.13	1.33				
			20.0					350.00	1.71%	2.62	2.23	11.76	540.00	13.00	11.76
C1.2	0.45	1.52	20.0	67.00	2.00%	0.15	7.67	417.00	0.83%	1.82	3.81	11.49	484.00	12.69	11.49
DP-3	0.45	4.70	7.0	100.00	3.00%	0.20	8.20	90.00	2.60%	1.13	1.33				
			20.0					350.00	1.71%	2.62	2.23	11.76	540.00	13.00	11.76
C1.3	0.45	6.71	7.0	80.00	2.00%	0.16	8.38	87.00	1.40%	0.83	1.75				
			20.0					1400.00	1.39%	2.36	9.90				
			20.0					552.00	5.25%	4.58	2.01	22.04	2119.00	21.77	21.77
DP-5	0.45	16.31	7.0	100.00	2.00%	0.18	9.37	87.00	1.40%	0.83	1.75				
			20.0					2158.00	1.39%	2.36	15.25				
			20.0					552.00	5.25%	4.58	2.01	28.38	2897.00	26.09	26.09
C1.4	0.45	2.51	20.0	51.00	2.00%	0.13	6.69	685.00	2.10%	2.90	3.94				
			20.0					302.00	1.00%	2.00	2.52	13.15	1038.00	15.77	13.15
C1.5	0.45	1.61	20.0	23.00	2.00%	0.09	4.50	1220.00	3.52%	3.75	5.42	9.91	1243.00	16.91	9.91
C1.6	0.45	9.35	20.0	81.00	2.90%	0.18	7.46	2102.00	1.80%	2.68	13.06	20.52	2183.00	22.13	20.52
C3.1	0.45	6.20	7.0	100.00	2.00%	0.18	9.37	20.00	2.10%	1.01	0.33				
			20.0					395.00	3.92%	3.96	1.66				
			20.0					440.00	1.82%	2.70	2.72				
			20.0					150.00	3.67%	3.83	0.65	14.73	1105.00	16.14	14.73
C3.2	0.45	5.01	7.0	100.00	2.00%	0.18	9.37	120.00	2.20%	1.04	1.93				
			20.0					940.00	3.80%	3.90	4.02	15.32	1160.00	16.44	15.32
DP-14	0.45	11.21	7.0	100.00	2.00%	0.18	9.37	2.00	2.10%	1.01	0.03				
			20.0					395.00	3.92%	3.96	1.66				
			20.0					440.00	1.82%	2.70	2.72				
			20.0					150.00	3.67%	3.83	0.65				
			20.0					255.00	1.57%	2.51	1.70	16.13	1342.00	17.46	16.13
C3.3	0.45	4.75	7.0	55.00	7.82%	0.21	4.43	165.00	2.79%	1.17	2.35				
			20.0					631.00	4.90%	4.43	2.38				
			20.0					286.00	1.40%	2.37	2.01	11.17	1137.00	16.32	11.17
DP-16	0.45	15.96	7.0	100.00	2.00%	0.18	9.37	20.00	2.10%	1.01	0.33				
			20.0					395.00	3.92%	3.96	1.66				
			20.0					440.00	1.82%	2.70	2.72				



**Standard Form SF-1. Time of Concentration-Proposed**

Calculated By: Leonard Beasley  
 Date: Feb. 19, 2021  
 Checked By: Leonard Beasley

Job No: 100.064  
 Project: The Ridge at Lorson Ranch

Sub-Basin Data				Initial Overland Time (ti)				Travel Time (Tt)					Tc Check (urbanized Basins)		Final tc
BASIN or DESIGN	C <sub>5</sub>	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	Ti minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	Tt minutes	Computed tc Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended tc=ti+tt (min)
			20.0					150.00	3.67%	3.83	0.65				
			20.0					255.00	1.57%	2.51	1.70				
			20.0					247.00	1.62%	2.55	1.62	18.05	1607.00	18.93	18.05
C3.4	0.45	3.77	7.0	45.00	9.33%	0.20	3.78	130.00	2.31%	1.06	2.04				
			20.0					601.00	4.74%	4.35	2.30				
			20.0					225.00	2.22%	2.98	1.26	9.37	1001.00	15.56	9.37
DP-18	0.45	19.73	7.0	100.00	2.00%	0.18	9.37	20.00	2.10%	1.01	0.33				
			20.0					395.00	3.92%	3.96	1.66				
			20.0					440.00	1.82%	2.70	2.72				
			20.0					150.00	3.67%	3.83	0.65				
			20.0					255.00	1.57%	2.51	1.70				
			20.0					247.00	1.62%	2.55	1.62				
			20.0					166.00	2.41%	3.10	0.89	18.94	1773.00	19.85	18.94
C3.5	0.45	6.32	7.0	82.00	6.22%	0.23	5.83	100.00	2.80%	1.17	1.42				
			20.0					535.00	1.16%	2.15	4.14				
			20.0					559.00	5.01%	4.48	2.08				
			20.0					114.00	2.63%	3.24	0.59	14.06	1390.00	17.72	14.06
DP-20	0.45	26.05	7.0	100.00	2.00%	0.18	9.37	20.00	2.10%	1.01	0.33				
			20.0					395.00	3.92%	3.96	1.66				
			20.0					440.00	1.82%	2.70	2.72				
			20.0					150.00	3.67%	3.83	0.65				
			20.0					255.00	1.57%	2.51	1.70				
			20.0					247.00	1.62%	2.55	1.62				
			20.0					166.00	2.41%	3.10	0.89				
			20.0					162.00	2.16%	2.94	0.92	19.86	1935.00	20.75	19.86
C3.6a	0.45	3.15	20.0	63.00	2.00%	0.14	7.44	915.00	4.07%	4.03	3.78	11.22	978.00	15.43	11.22
C3.6b	0.45	4.80	7.0	100.00	2.00%	0.18	9.37	65.00	2.00%	0.99	1.09				
			20.0					301.00	0.90%	1.90	2.64				
			20.0					515.00	5.24%	4.58	1.87				
			20.0					318.00	2.20%	2.97	1.79	16.77	1299.00	17.22	16.77
C3.7	0.45	4.58	20.0	30.00	2.33%	0.10	4.88	364.00	1.73%	2.63	2.31				
			20.0					386.00	5.96%	4.88	1.32				
			20.0					154.00	1.95%	2.79	0.92	9.42	934.00	15.19	9.42
DP-24	0.45	38.58	7.0	100.00	2.00%	0.18	9.37	20.00	2.10%	1.01	0.33				
			20.0					395.00	3.92%	3.96	1.66				
			20.0					440.00	1.82%	2.70	2.72				





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 Project: The Ridge at Lorson Ranch

Sub-Basin Data				Initial Overland Time (ti)				Travel Time (tt)					tc Check (urbanized Basins)		Final tc
BASIN or DESIGN	C <sub>5</sub>	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	Ti minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	Tt minutes	Computed tc Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended tc=ti+tt (min)
			20.0					150.00	3.67%	3.83	0.65				
			20.0					255.00	1.57%	2.51	1.70				
			20.0					247.00	1.62%	2.55	1.62				
			20.0					166.00	2.41%	3.10	0.89				
			20.0					162.00	2.16%	2.94	0.92				
			20.0					236.00	2.97%	3.45	1.14	21.00	2171.00	22.06	21.00
C3.8	0.45	6.51	20.0	39.00	2.00%	0.11	5.85	569.00	1.28%	2.26	4.19				
			20.0					600.00	4.83%	4.40	2.28				
			20.0					539.00	1.39%	2.36	3.81	16.13	1747.00	19.71	16.13
C3.9	0.45	4.55	20.0	54.00	2.78%	0.15	6.18	1063.00	3.20%	3.58	4.95	11.13	1117.00	16.21	11.13
DP-28	0.45	45.09	7.0	100.00	2.00%	0.18	9.37	20.00	2.10%	1.01	0.33				
			20.0					395.00	3.92%	3.96	1.66				
			20.0					440.00	1.82%	2.70	2.72				
			20.0					150.00	3.67%	3.83	0.65				
			20.0					255.00	1.57%	2.51	1.70				
			20.0					247.00	1.62%	2.55	1.62				
			20.0					166.00	2.41%	3.10	0.89				
			20.0					162.00	2.16%	2.94	0.92				
			20.0					236.00	2.97%	3.45	1.14				
			20.0					246.00	2.64%	3.25	1.26	22.26	2417.00	23.43	22.26
C3.10	0.45	6.01	7.0	66.00	3.79%	0.18	6.16	118.00	2.37%	1.08	1.82				
			20.0					1076.00	2.39%	3.09	5.80				
			20.0					343.00	3.79%	3.89	1.47				
			20.0					146.00	1.23%	2.22	1.10	16.35	1749.00	19.72	16.35
DP-30	0.45	51.10	7.0	100.00	2.00%	0.18	9.37	20.00	2.10%	1.01	0.33				
			20.0					395.00	3.92%	3.96	1.66				
			20.0					440.00	1.82%	2.70	2.72				
			20.0					150.00	3.67%	3.83	0.65				
			20.0					255.00	1.57%	2.51	1.70				
			20.0					247.00	1.62%	2.55	1.62				
			20.0					166.00	2.41%	3.10	0.89				
			20.0					162.00	2.16%	2.94	0.92				
			20.0					236.00	2.97%	3.45	1.14				



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Sub-Basin Data				Initial Overland Time (ti)				Travel Time (tt)					tc Check (urbanized Basins)		Final tc
BASIN or DESIGN	C <sub>5</sub>	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	Ti minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	Tt minutes	Computed tc Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended tc=ti+tt (min)
			20.0					246.00	2.64%	3.25	1.26				
			20.0					245.00	0.94%	1.94	2.11	24.37	2662.00	24.79	24.37
C4.1	0.45	4.61	7.0	45.00	10.00%	0.20	3.69	128.00	2.58%	1.12	1.90				
			20.0					1680.00	1.45%	1.36	20.59	26.18	1853.00	20.29	20.29
C4.2	0.45	3.08	20.0	43.00	2.80%	0.13	5.50	124.00	2.72%	3.30	0.63				
			20.0					865.00	4.44%	1.36	10.60	16.73	1032.00	15.73	15.73
DP-31	0.45	7.69	7.0	45.00	10.00%	0.20	3.69	128.00	2.58%	1.12	1.90				
			20.0					1680.00	1.45%	2.41	11.63				
			20.0					865.00	4.44%	4.21	3.42	20.64	2718.00	25.10	20.64
C4.3	0.46	3.07	7.0	100.00	2.00%	0.18	9.23	85.00	2.00%	0.99	1.43				
			20.0					5.07	1.12%	1.36	0.06	10.72	190.07	11.06	10.72
C4.4	0.46	3.29	20.0	34.00	3.82%	0.13	4.34	900.00	3.08%	3.51	4.27				
			20.0					144.00	1.32%	1.36	1.76	10.38	1078.00	15.99	10.38
DP-33	0.45	14.05	7.0	45.00	10.00%	0.20	3.66	128.00	2.58%	1.12	1.90				
			20.0					1680.00	1.45%	2.41	11.63				
			20.0					1170.00	4.27%	4.13	4.72				
			20.0					84.00	1.07%	2.07	0.68	22.58	3107.00	27.26	22.58
C4.5	0.90	0.63	20.0	56.00	3.93%	0.54	1.73	384.00	2.86%	3.38	1.89	3.62	440.00	12.44	3.62
F1.1	0.45	4.23	15.0	88.00	20.00%	0.36	4.10	150.00	2.50%	2.37	1.05	5.16	238.00	11.32	11.32
F1.2	0.08	19.06	7.0	37.00	19.19%	0.15	4.23	150.00	2.50%	1.11	2.26	6.49	187.00	11.04	11.04
F1.3	0.46	1.15	7.0	10.00	2.00%	0.06	2.92	30.00	2.00%	0.99	0.51				
			20.0					830.00	1.00%	1.36	10.17	13.59	870.00	14.83	13.59
F1.4	0.46	3.75	7.0	50.00	2.00%	0.13	6.53	100.00	2.00%	0.99	1.68				
			20.0					580.00	1.00%	1.36	7.11	15.32	730.00	14.06	15.32
C5.1a & I-39	0.47	2.33	7.0	87.00	12.76%	0.32	4.59	141.00	2.13%	1.02	2.30				
			20.0					1159.00	5.13%	4.53	4.26				
			20.0					296.00	3.14%	3.54	1.39	12.54	1683.00	19.35	12.54
C5.1b & I-36	0.45	6.32	7.0	45.00	24.44%	0.27	2.75	255.00	3.53%	1.32	3.23				
			20.0					1212.00	5.07%	4.50	4.49				
			20.0					62.00	3.23%	3.59	0.29	10.75	1574.00	18.74	10.75
C5.1c & I-37	0.45	3.78	7.0	44.00	20.45%	0.25	2.88	47.00	2.55%	1.12	0.70				
			20.0					1335.00	4.85%	4.40	5.05	8.63	1426.00	17.92	8.63



**Standard Form SF-1. Time of Concentration-Proposed**

Calculated By: Leonard Beasley  
 Date: Feb. 19, 2021  
 Checked By: Leonard Beasley

Job No: 100.064  
 Project: The Ridge at Lorson Ranch

Sub-Basin Data				Initial Overland Time (ti)				Travel Time (tt)					tc Check (urbanized Basins)		Final tc
BASIN or DESIGN	C <sub>5</sub>	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	Ti minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	Tt minutes	Computed tc Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended tc=ti+tt (min)
C5.1d & I-41	0.45	5.67	7.0	83.00	15.30%	0.32	4.32	228.00	2.68%	1.15	3.32				
			20.0				1356.00	4.23%	4.11	5.49					
			20.0				115.00	1.13%	2.13	0.90	14.03	1782.00	19.90	14.03	
DP-42	0.46	12.43	7.0	87.00	12.76%	0.31	4.66	141.00	2.13%	1.02	2.30				
			20.0				1159.00	5.13%	4.53	4.26					
			20.0				375.00	2.61%	3.23	1.93					
			20.0					123.00	0.65%	1.61	1.27	14.43	1885.00	20.47	14.43
C5.1e & DP-44	0.46	6.44	7.0	100.00	7.00%	0.27	6.13	191.00	6.00%	1.71	1.86				
			20.0				742.00	1.62%	2.55	4.86					
			20.0				786.00	4.58%	4.28	3.06					
			20.0					104.00	2.40%	3.10	0.56	16.47	1923.00	20.68	16.47
C5.2	0.49	1.71	20.0	38.00	2.63%	0.13	4.95	677.00	2.48%	3.15	3.58	8.53	715.00	13.97	8.53
C5.3	0.46	2.26	20.0	42.00	2.00%	0.12	5.98	1115.00	4.68%	4.33	4.30	10.28	1157.00	16.43	10.28
C8.1a	0.45	4.12	7.0	60.00	7.67%	0.21	4.65	163.00	2.45%	1.10	2.48				
			20.0				966.00	5.12%	4.53	3.56	10.69	1189.00	16.61	10.69	
C8.1b	0.48	3.69	20.0	73.00	2.00%	0.16	7.64	929.00	5.30%	4.60	3.36				
			20.0				465.00	1.08%	2.08	3.73	14.73	1467.00	18.15	14.73	
C8.1c	0.46	1.88	20.0	63.00	2.00%	0.14	7.30	1119.00	5.36%	4.63	4.03	11.32	1182.00	16.57	11.32
C8.1	0.45	9.68	7.0	57.00	8.07%	0.21	4.43	163.00	2.45%	1.10	2.48				
			20.0				1018.00	4.93%	4.44	3.82					
			20.0				363.00	1.29%	2.27	2.66	13.39	1601.00	18.89	13.39	
C8.2	0.49	2.12	20.0	50.00	4.20%	0.17	4.87	385.00	0.64%	1.60	4.01	8.88	435.00	12.42	8.88
OS-C4a	0.09	2.29	7.0	100.00	4.30%	0.15	11.30	227.00	4.40%	1.47	2.58	13.88	327.00	11.82	11.82
C8.3a	0.46	5.88	7.0	61.00	18.85%	0.30	3.43	123.00	2.60%	1.13	1.82				
			20.0				1390.00	3.17%	3.56	6.51	11.75	1574.00	18.74	11.75	
DP-53	0.38	8.17	7.0	100.00	4.30%	0.21	8.06	377.00	5.60%	1.66	3.79				
			20.0				548.00	4.50%	4.24	2.15	14.00	1025.00	15.69	14.00	
OS-C4b	0.11	2.10	7.0	100.00	4.00%	0.15	11.35	378.00	5.00%	1.57	4.02	15.37	478.00	12.66	12.66
C8.3b	0.48	3.46	7.0	100.00	4.50%	0.24	6.84	28.00	16.00%	2.80	0.17				
			7.0				108.00	2.00%	0.99	1.82					
			20.0				672.00	2.40%	3.10	3.61	12.44	908.00	15.04	12.44	
C8.3c	0.48	2.33	7.0	60.00	11.17%	0.26	3.92	148.00	2.36%	1.08	2.29				
			20.0				900.00	3.50%	3.74	4.01					
			20.0				93.00	2.69%	3.28	0.47	10.69	1201.00	16.67	10.69	



**Standard Form SF-1. Time of Concentration-Proposed**

Calculated By: Leonard Beasley  
 Date: Feb. 19, 2021  
 Checked By: Leonard Beasley

Job No: 100.064  
 Project: The Ridge at Lorson Ranch

Sub-Basin Data				Initial Overland Time (ti)				Travel Time (Tt)					Tc Check (urbanized Basins)		Final tc
BASIN or DESIGN	C <sub>5</sub>	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	Ti minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	Tt minutes	Computed tc Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended tc=Ti+Tt (min)
<b>DP-54</b>	0.36	16.06	7.0	100.00	4.00%	0.20	8.48	616.00	4.91%	1.55	6.62				
			20.0					1085.00	3.24%	3.60	5.02	20.13	1801.00	20.01	20.01
C8.3d	0.48	5.26	20.0	76.00	2.00%	0.16	7.79	700.00	5.19%	4.56	2.56				
			20.0					664.00	1.36%	2.33	4.74	15.10	1440.00	18.00	15.10
<b>DP-56</b>	0.44	21.32	7.0	100.00	4.00%	0.22	7.57	616.00	4.91%	1.55	6.62				
			20.0					1310.00	2.92%	3.42	6.39	20.57	2026.00	21.26	20.57
C8.4	0.46	6.70	7.0	42.00	1.19%	0.10	7.16	157.00	4.14%	1.42	1.84				
			20.0					89.00	3.37%	3.67	0.40				
			20.0					697.00	5.16%	4.54	2.56				
			20.0					374.00	1.48%	2.43	2.56	14.52	1359.00	17.55	14.52
<b>DP-51</b>	0.46	39.82	7.0	100.00	4.00%	0.23	7.34	616.00	4.91%	1.55	6.62				
			20.0					1310.00	2.92%	3.42	6.39				
			20.0					391.00	1.20%	9.15	0.71	21.06	2417.00	23.43	21.06
C8.5	0.49	3.84	7.0	45.00	2.20%	0.13	5.72	160.00	1.88%	0.96	2.78				
			20.0					683.00	4.25%	4.12	2.76				
			20.0					320.00	1.60%	2.53	2.11	13.36	1208.00	16.71	13.36
C8.6	0.90	0.79	20.0	25.00	2.00%	0.29	1.44	342.00	1.67%	2.58	2.21				
			20.0					400.00	2.98%	3.45	1.93	5.58	767.00	14.26	5.58
C8.7a	0.49	4.52	7.0	75.00	6.67%	0.24	5.11	108.00	2.50%	1.11	1.63				
			20.0					857.00	1.05%	2.05	6.97	13.71	1040.00	15.78	13.71
C8.7b	0.49	1.77	20.0	33.00	2.00%	0.11	5.05	1040.00	1.92%	2.77	6.25	11.31	1073.00	15.96	11.31
<b>DP-63</b>	0.49	6.29	7.0	75.00	6.67%	0.24	5.11	108.00	2.50%	1.11	1.63				
			20.0					885.00	1.05%	2.05	7.20	13.94	1068.00	15.93	13.94
C8.7c	0.49	4.94	20.0	60.00	2.10%	0.15	6.70	817.00	3.11%	3.53	3.86				
			20.0					172.00	1.74%	2.64	1.09	11.65	1049.00	15.83	11.65
<b>DP-64</b>	0.49	11.23	7.0	75.00	6.67%	0.24	5.11	108.00	2.50%	1.11	1.63				
			20.0					885.00	1.05%	2.05	7.20				
			RCP					270.00	1.00%	10.63	0.42	14.36	1338.00	17.43	14.36
C8.7d	0.46	0.27	7.0	20.00	16.50%	0.16	2.05	166.00	3.31%	1.27	2.17	4.23	186.00	11.03	4.23
C8.7e	0.47	6.09	7.0	40.00	20.00%	0.25	2.68	290.00	2.83%	1.18	4.10				
			20.0					293.00	1.06%	2.06	2.37				
			20.0					577.00	3.14%	3.54	2.71	11.87	1200.00	16.67	11.87
<b>DP-62</b> C3.7a-e	0.48	17.59	7.0	75.00	6.67%	0.24	5.20	108.00	2.50%	1.11	1.63				
			20.0					885.00	1.05%	2.05	7.20				
			RCP					270.00	1.00%	10.63	0.42				
			RCP					777.00	3.40%	13.28	0.98	15.42	2115.00	21.75	15.42



**Standard Form SF-1. Time of Concentration-Proposed**

Calculated By: Leonard Beasley  
 Date: Feb. 19, 2021  
 Checked By: Leonard Beasley

Job No: 100.064  
 Project: The Ridge at Lorson Ranch

Sub-Basin Data				Initial Overland Time (t <sub>i</sub> )				Travel Time (t <sub>t</sub> )					t <sub>c</sub> Check (urbanized Basins)		Final t <sub>c</sub>
BASIN or DESIGN	C <sub>s</sub>	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t <sub>i</sub> minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t <sub>t</sub> minutes	Computed t <sub>c</sub> Minutes	TOTAL LENGTH (L) feet	Regional t <sub>c</sub> =(L/180)+10 minutes	USDCM Recommended t <sub>c</sub> =t <sub>i</sub> +t <sub>t</sub> (min)
<b>DP-62</b> C3.5-C3.7	0.50	22.22	7.0	45.00	2.20%	0.13	5.62	160.00	1.88%	0.96	2.78				
			20.0					683.00	4.25%	4.12	2.76				
			20.0					320.00	1.60%	2.53	2.11				
			20.0					342.00	1.67%	2.58	2.21				
			20.0					400.00	2.98%	3.45	1.93	17.41	1950.00	20.83	17.41
OS-B1	0.15	5.11	7.0	100.00	4.40%	0.16	10.55	388.00	4.30%	1.45	4.46	15.01	488.00	12.71	12.71
C8.8a	0.49	5.65	7.0	100.00	4.60%	0.25	6.68	133.00	4.36%	1.46	1.52				
			20.0					1457.00	1.41%	2.37	10.23				
			20.0					427.00	3.75%	3.87	1.84				
			20.0					650.00	3.06%	3.50	3.10	23.35	2767.00	25.37	23.35
<b>DP-68</b>	0.33	10.76	7.0	100.00	4.50%	0.20	8.49	488.00	2.42%	1.09	7.47				
			20.0					1457.00	1.41%	2.37	10.23				
			20.0					427.00	3.75%	3.87	1.84				
			20.0					650.00	0.60%	1.55	6.99	35.01	3122.00	27.34	27.34
C8.8	0.22	7.80	7.0	100.00	2.00%	0.13	12.69	611.00	5.48%	1.64	6.21				
			7.0					53.00	33.00%	4.02	0.22				
			7.0					245.00	0.60%	0.54	7.53	26.65	1009.00	15.61	15.61
<b>C8</b>	0.43	73.39	7.0	20.00	18.50%	0.16	2.07	99.00	2.42%	1.09	1.52				
			20.0					2654.00	2.15%	2.93	15.08				
			RCP					566.00	5.30%	21.72	0.43				
			7.0					272.00	0.60%	0.54	8.36	27.46	3611.00	30.06	27.46

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## APPENDIX C – HYDRAULIC CALCULATIONS

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# Channel Report

Hydraflow Express by Intelisolve

Wednesday, Mar 9 2022, 9:37 AM

## DES. PT. 44 OVERFLOW SWALE

### Trapezoidal

Bottom Width (ft) = 25.00  
Side Slope (z:1) = 4.00  
Total Depth (ft) = 1.00  
Invert Elev (ft) = 100.00  
Slope (%) = 1.00  
N-Value = 0.020

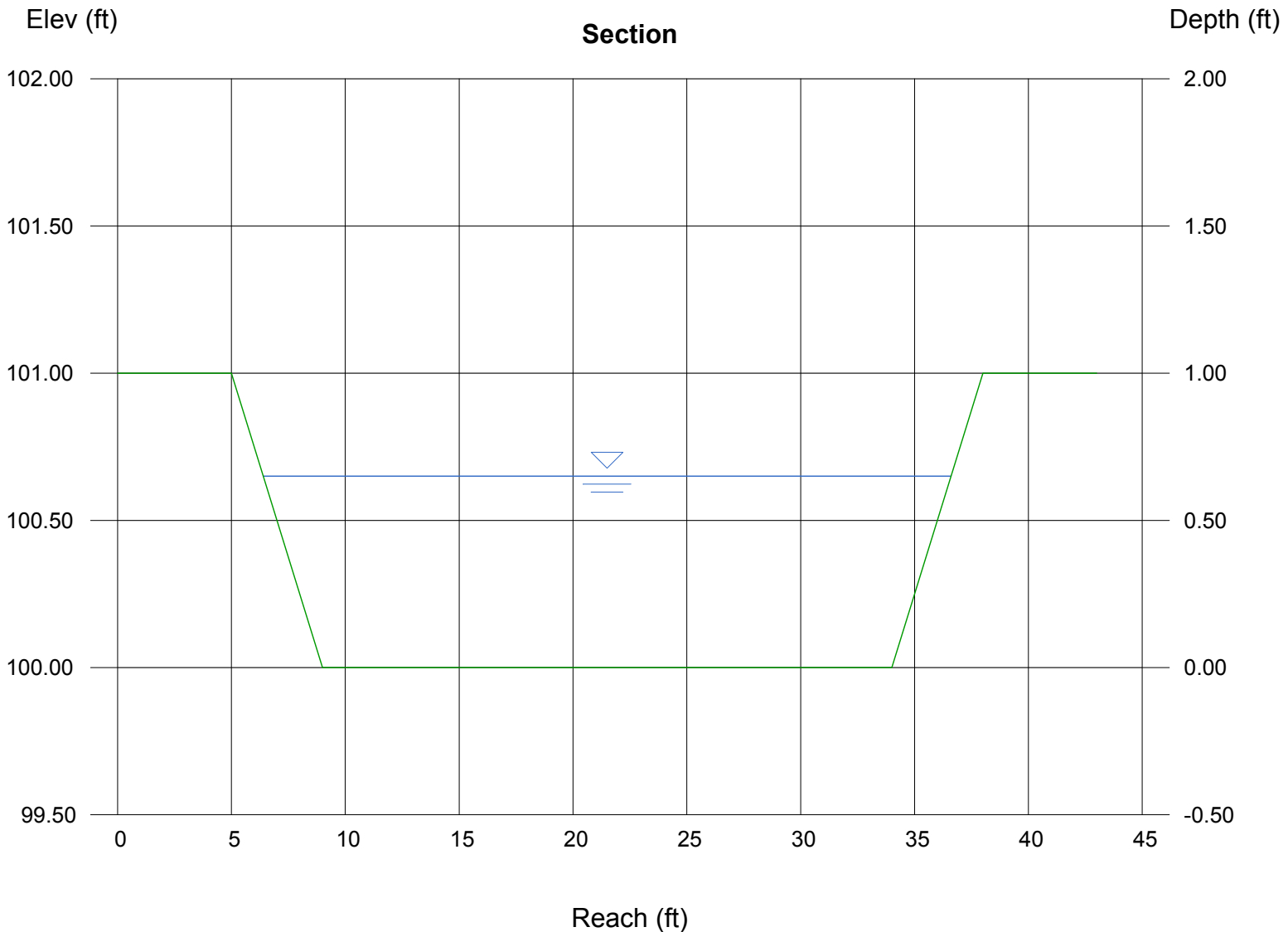
### Calculations

Compute by: Known Q  
Known Q (cfs) = 92.50

### Highlighted

Depth (ft) = 0.65  
Q (cfs) = 92.50  
Area (sqft) = 17.94  
Velocity (ft/s) = 5.16  
Wetted Perim (ft) = 30.36  
Crit Depth,  $Y_c$  (ft) = 0.73  
Top Width (ft) = 30.20  
EGL (ft) = 1.06

Velocity is high. Add lining/reinforcement to swale.



# Channel Report

Hydraflow Express by Intelisolve

Thursday, Jun 17 2021, 9:45 AM

## EAST SWALE 3%

### Trapezoidal

Bottom Width (ft) = 10.00  
Side Slope (z:1) = 10.00  
Total Depth (ft) = 1.00  
Invert Elev (ft) = 100.00  
Slope (%) = 3.00  
N-Value = 0.020

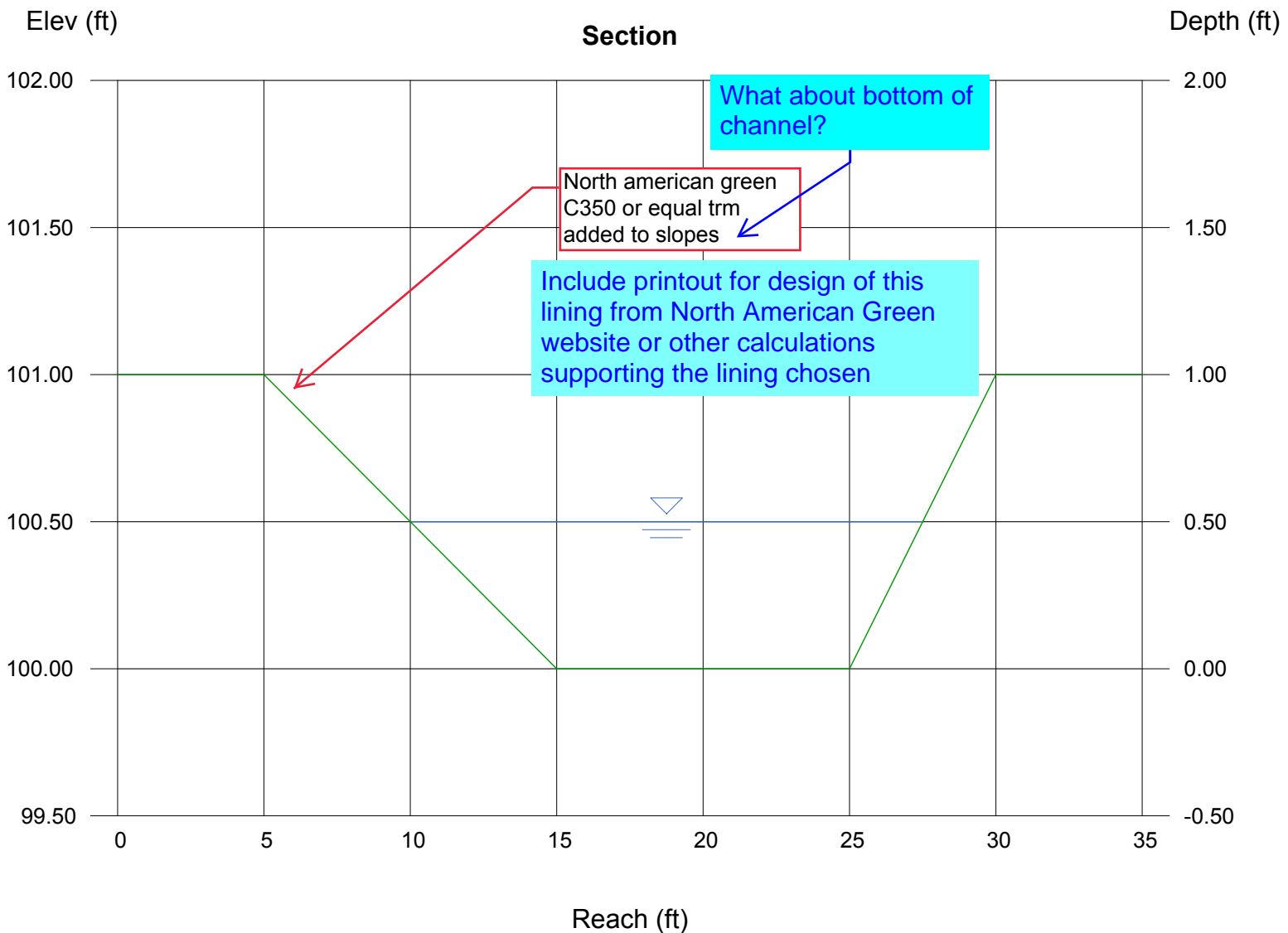
Per section below, one side is 5:1, not 10:1. Please revise design section.

### Highlighted

Depth (ft) = 0.50  
Q (cfs) = 47.31  
Area (sqft) = 6.88  
Velocity (ft/s) = 6.88  
Wetted Perim (ft) = 17.57  
Crit Depth, Yc (ft) = 0.59  
Top Width (ft) = 17.50  
EGL (ft) = 1.24

### Calculations

Compute by: Q vs Depth  
No. Increments = 10





# Channel Report

Hydraflow Express by Intelisolve

Wednesday, Sep 29 2021, 9:32 AM

## EAST SWALE BY CUT/FILL (0.52%)

### Triangular

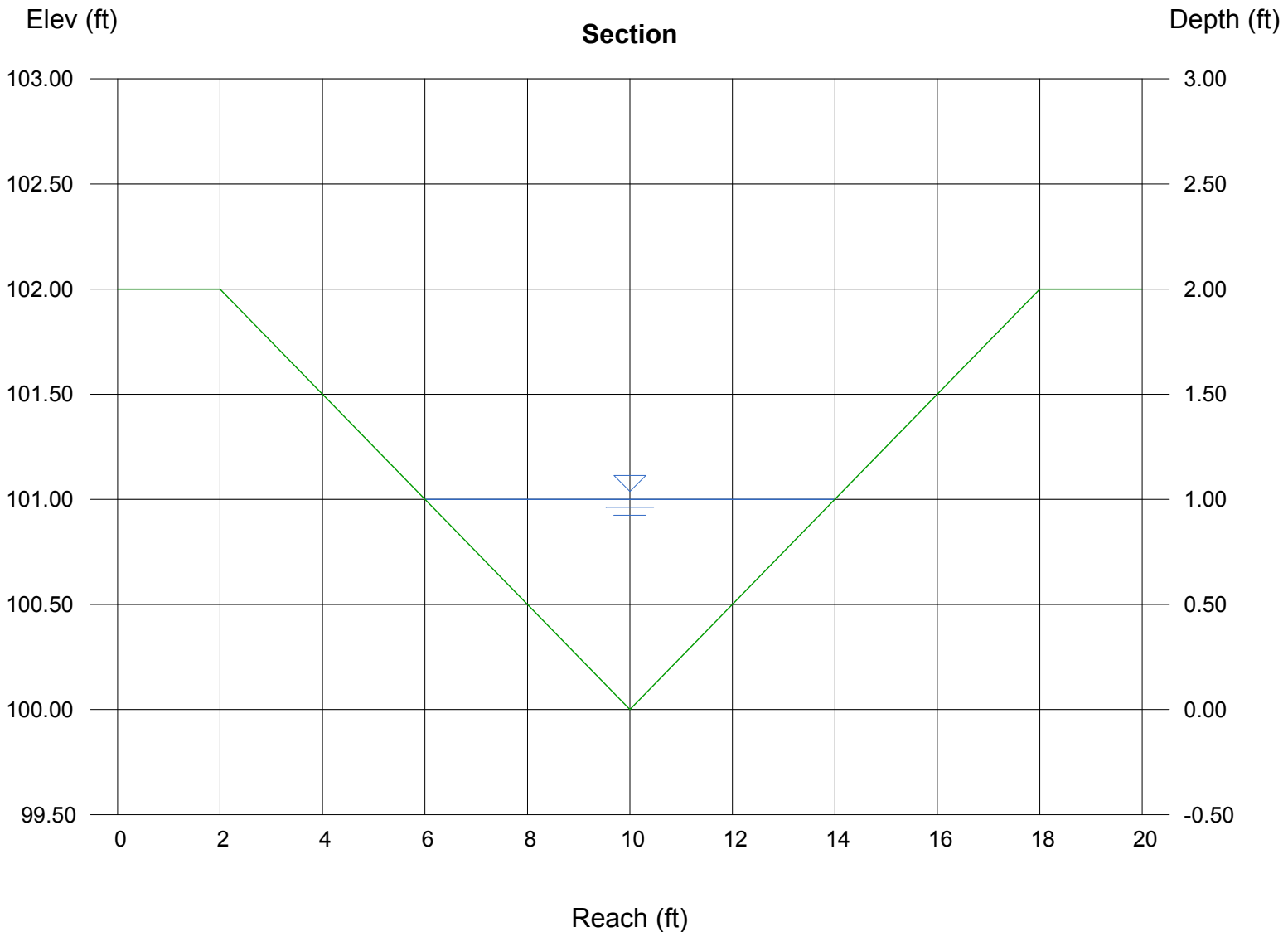
Side Slope (z:1) = 4.00  
Total Depth (ft) = 2.00  
  
Invert Elev (ft) = 100.00  
Slope (%) = 0.52  
N-Value = 0.020

### Highlighted

Depth (ft) = 1.00  
Q (cfs) = 13.23  
Area (sqft) = 4.00  
Velocity (ft/s) = 3.31  
Wetted Perim (ft) = 8.25  
Crit Depth,  $Y_c$  (ft) = 0.73  
Top Width (ft) = 8.00  
EGL (ft) = 1.17

### Calculations

Compute by: Q vs Depth  
No. Increments = 10



# Channel Report

## EAST SWALE BY CUT/FILL (5.0%)

### Triangular

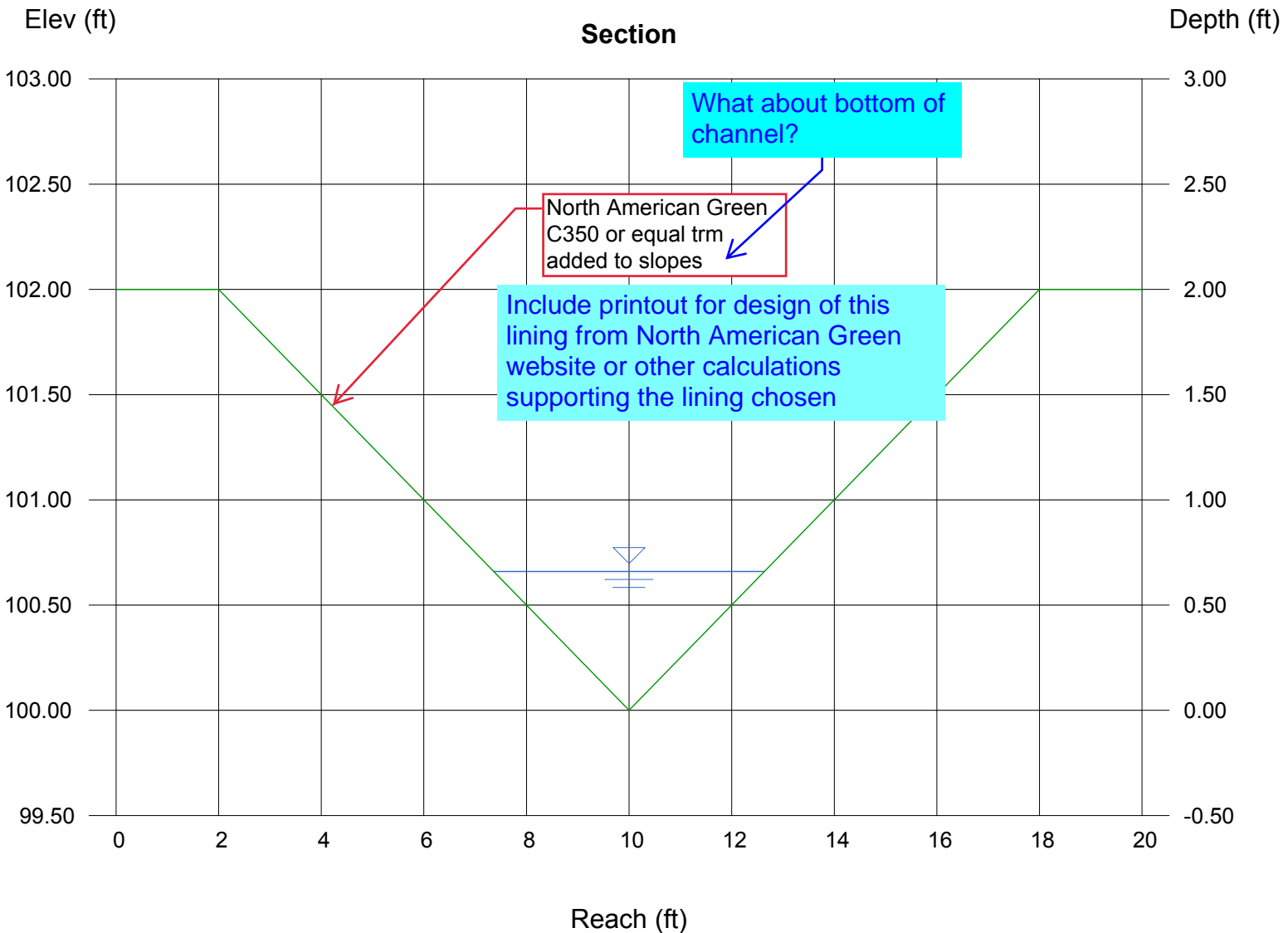
Side Slope (z:1) = 4.00  
Total Depth (ft) = 2.00  
  
Invert Elev (ft) = 100.00  
Slope (%) = 5.00  
N-Value = 0.020

### Highlighted

Depth (ft) = 0.66  
Q (cfs) = 13.20  
Area (sqft) = 1.74  
Velocity (ft/s) = 7.58  
Wetted Perim (ft) = 5.44  
Crit Depth, Yc (ft) = 0.93  
Top Width (ft) = 5.28  
EGL (ft) = 1.55

### Calculations

Compute by: Known Q  
Known Q (cfs) = 13.20



# Channel Report

Hydraflow Express by Intelisolve

Friday, Nov 5 2021, 10:47 AM

## Pond F spreader - 8-in curbhead

### Rectangular

Bottom Width (ft) = 4.00  
Total Depth (ft) = 0.67  
  
Invert Elev (ft) = 100.00  
Slope (%) = 0.60  
N-Value = 0.013

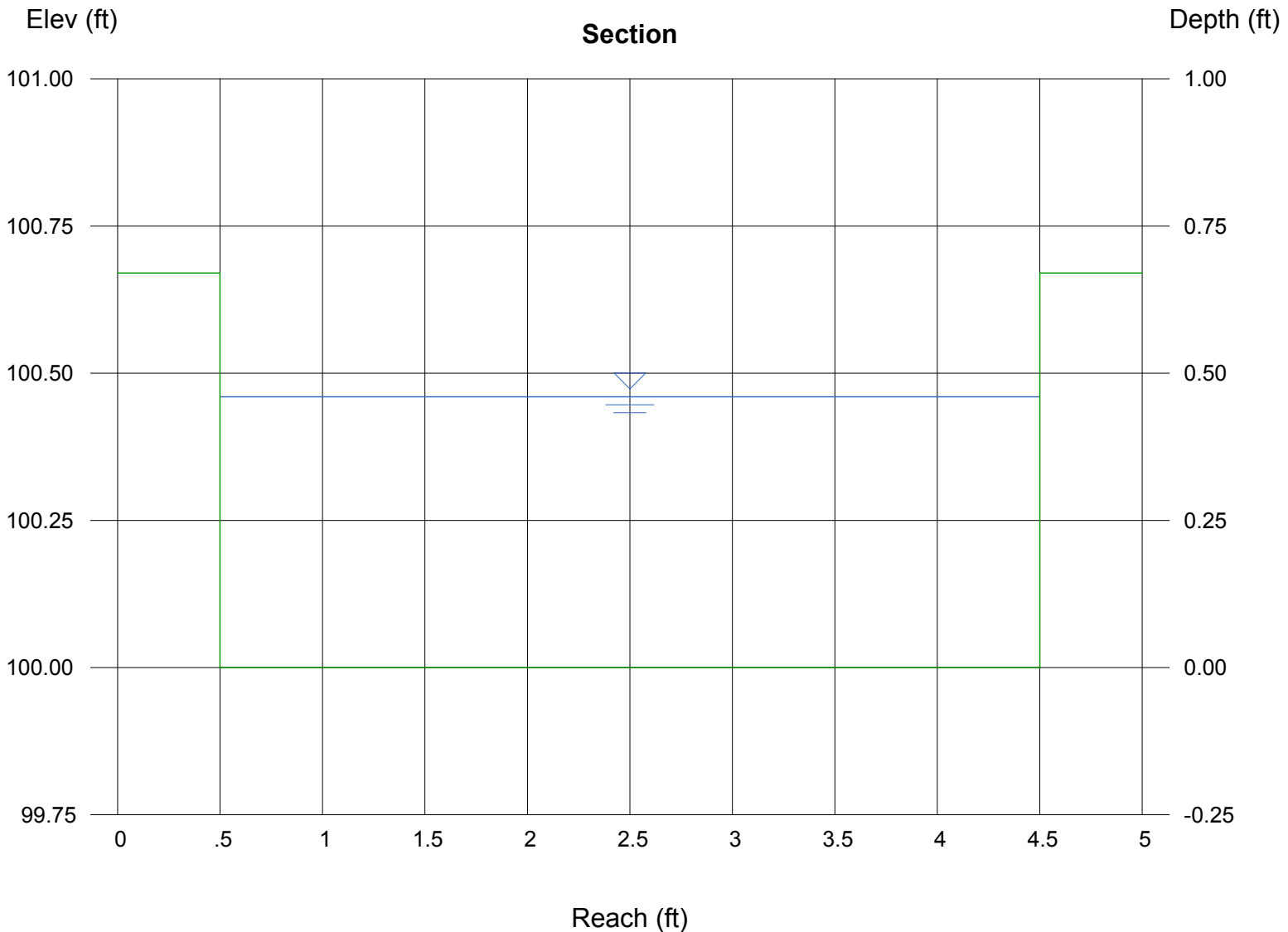
### Calculations

Compute by: Known Q  
Known Q (cfs) = 8.40

### Highlighted

Depth (ft) = 0.46  
Q (cfs) = 8.400  
Area (sqft) = 1.84  
Velocity (ft/s) = 4.57  
Wetted Perim (ft) = 4.92  
Crit Depth,  $Y_c$  (ft) = 0.52  
Top Width (ft) = 4.00  
EGL (ft) = 0.78

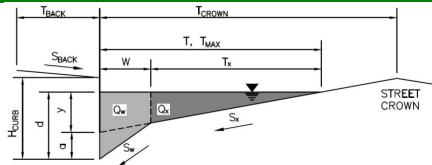
Include calculation to size riprap for spreader.



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

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

Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-1

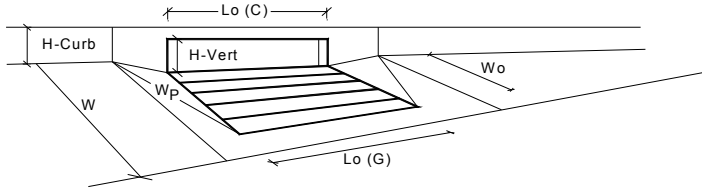


<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_X = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = 0.000$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> </thead> <tbody> <tr> <td>17.0</td> <td>17.0</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	ft	17.0	17.0	
Minor Storm	Major Storm	ft					
17.0	17.0						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> </thead> <tbody> <tr> <td>5.6</td> <td>7.9</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	inches	5.6	7.9	
Minor Storm	Major Storm	inches					
5.6	7.9						
Check boxes are not applicable in SUMP conditions	<input type="checkbox"/> <input type="checkbox"/>						
<b>Maximum Capacity for 1/2 Street based On Allowable Spread</b>							
Water Depth without Gutter Depression (Eq. ST-2)	$y = 4.08$ inches						
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	$d_c = 2.0$ inches						
Gutter Depression ( $d_c - (W * S_x * 12)$ )	$a = 1.51$ inches						
Water Depth at Gutter Flowline	$d = 5.59$ inches						
Allowable Spread for Discharge outside the Gutter Section $W$ ( $T - W$ )	$T_X = 15.0$ ft						
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_O = 0.350$						
Discharge outside the Gutter Section $W$ , carried in Section $T_X$	$Q_X = 0.0$ cfs						
Discharge within the Gutter Section $W$ ( $Q_T - Q_X$ )	$Q_W = 0.0$ cfs						
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	$Q_{BACK} = 0.0$ cfs						
<b>Maximum Flow Based On Allowable Spread</b>	$Q_T = \text{SUMP}$ cfs						
Flow Velocity within the Gutter Section	$V = 0.0$ fps						
$V*d$ Product: Flow Velocity times Gutter Flowline Depth	$V*d = 0.0$						
<b>Maximum Capacity for 1/2 Street based on Allowable Depth</b>							
Theoretical Water Spread	$T_{TH} = 17.0$ ft						
Theoretical Spread for Discharge outside the Gutter Section $W$ ( $T - W$ )	$T_{XTH} = 15.0$ ft						
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_O = 0.349$						
Theoretical Discharge outside the Gutter Section $W$ , carried in Section $T_{XTH}$	$Q_{XTH} = 0.0$ cfs						
Actual Discharge outside the Gutter Section $W$ , (limited by distance $T_{CROWN}$ )	$Q_X = 0.0$ cfs						
Discharge within the Gutter Section $W$ ( $Q_T - Q_X$ )	$Q_W = 0.0$ cfs						
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	$Q_{BACK} = 0.0$ cfs						
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	$Q = 0.0$ cfs						
Average Flow Velocity Within the Gutter Section	$V = 0.0$ fps						
$V*d$ Product: Flow Velocity Times Gutter Flowline Depth	$V*d = 0.0$						
Slope-Based Depth Safety Reduction Factor for Major & Minor ( $d \geq 6"$ ) Storm	$R = \text{SUMP}$						
<b>Max Flow Based on Allowable Depth (Safety Factor Applied)</b>	$Q_d = \text{SUMP}$ cfs						
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	$d =$ inches						
Resultant Flow Depth at Street Crown (Safety Factor Applied)	$d_{CROWN} =$ inches						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> </thead> <tbody> <tr> <td>SUMP</td> <td>SUMP</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	cfs	SUMP	SUMP	
Minor Storm	Major Storm	cfs					
SUMP	SUMP						

Recommend including a copy of inlet summaries which is part of MHFD Inlet spreadsheets.

## INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



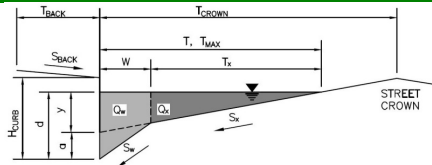
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	5.2	7.0	inches
<b>Grate Information</b>	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>	MINOR	MAJOR	
Length of a Unit Curb Opening	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.27	0.42	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.49	0.66	
Curb Opening Performance Reduction Factor for Long Inlets	0.88	0.99	
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>	MINOR	MAJOR	
<b>Q<sub>a</sub></b>	5.6	12.2	cfs
Q <sub>PEAK REQUIRED</sub>	5.6	12.2	cfs

**Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)**

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

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

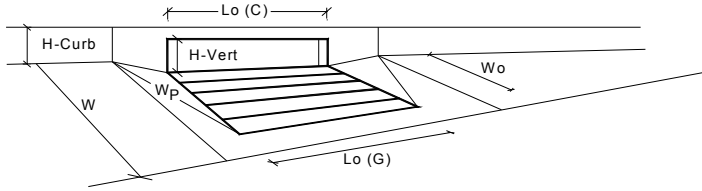
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-2



<b>Gutter Geometry (Enter data in the blue cells)</b>									
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="8.0"/> ft								
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft								
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.015"/>								
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches								
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft								
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft								
Street Transverse Slope	$S_x = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft								
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft								
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = $ <input style="width: 50px;" type="text" value="0.000"/> ft/ft								
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.017"/>								
Max. Allowable Spread for Minor & Major Storm	<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;"></th> <th style="width: 25%; text-align: center;">Minor Storm</th> <th style="width: 25%; text-align: center;">Major Storm</th> <th style="width: 10%;"></th> </tr> <tr> <td><math>T_{MAX} = </math></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="17.0"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="17.0"/></td> <td style="text-align: right;">ft</td> </tr> </table>		Minor Storm	Major Storm		$T_{MAX} = $	<input style="width: 50px;" type="text" value="17.0"/>	<input style="width: 50px;" type="text" value="17.0"/>	ft
	Minor Storm	Major Storm							
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Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;"></th> <th style="width: 25%; text-align: center;">Minor Storm</th> <th style="width: 25%; text-align: center;">Major Storm</th> <th style="width: 10%;"></th> </tr> <tr> <td><math>d_{MAX} = </math></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="5.6"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="7.9"/></td> <td style="text-align: right;">inches</td> </tr> </table>		Minor Storm	Major Storm		$d_{MAX} = $	<input style="width: 50px;" type="text" value="5.6"/>	<input style="width: 50px;" type="text" value="7.9"/>	inches
	Minor Storm	Major Storm							
$d_{MAX} = $	<input style="width: 50px;" type="text" value="5.6"/>	<input style="width: 50px;" type="text" value="7.9"/>	inches						
Check boxes are not applicable in SUMP conditions	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;"><input type="checkbox"/></td> <td style="width: 50%; text-align: center;"><input type="checkbox"/></td> </tr> </table>	<input type="checkbox"/>	<input type="checkbox"/>						
<input type="checkbox"/>	<input type="checkbox"/>								
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>									
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>									
$Q_{allow} = $	<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;"></th> <th style="width: 25%; text-align: center;">Minor Storm</th> <th style="width: 25%; text-align: center;">Major Storm</th> <th style="width: 10%;"></th> </tr> <tr> <td></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="SUMP"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="SUMP"/></td> <td style="text-align: right;">cfs</td> </tr> </table>		Minor Storm	Major Storm			<input style="width: 50px;" type="text" value="SUMP"/>	<input style="width: 50px;" type="text" value="SUMP"/>	cfs
	Minor Storm	Major Storm							
	<input style="width: 50px;" type="text" value="SUMP"/>	<input style="width: 50px;" type="text" value="SUMP"/>	cfs						

## INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



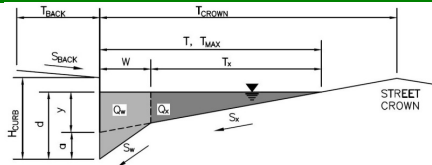
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	4.6	6.3	inches
<b>Grate Information</b>	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>	MINOR	MAJOR	
Length of a Unit Curb Opening	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.21	0.36	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.43	0.59	
Curb Opening Performance Reduction Factor for Long Inlets	0.84	0.95	
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>	MINOR	MAJOR	
<b>Q<sub>a</sub></b>	3.8	9.2	cfs
Q <sub>PEAK REQUIRED</sub>	2.7	5.9	cfs

**Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)**

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

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

Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-4

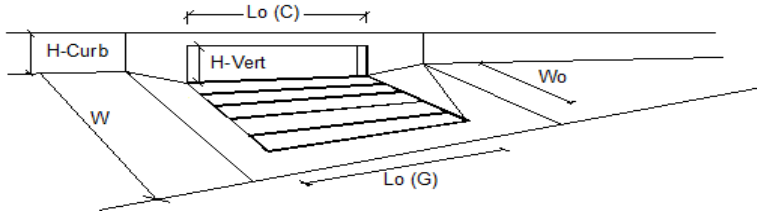


Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 10.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 22.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.026$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> </thead> <tbody> <tr> <td><math>T_{MAX} = 22.0</math></td> <td><math>T_{MAX} = 22.0</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	ft	$T_{MAX} = 22.0$	$T_{MAX} = 22.0$	
Minor Storm	Major Storm	ft					
$T_{MAX} = 22.0$	$T_{MAX} = 22.0$						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> </thead> <tbody> <tr> <td><math>d_{MAX} = 6.0</math></td> <td><math>d_{MAX} = 8.4</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	inches	$d_{MAX} = 6.0$	$d_{MAX} = 8.4$	
Minor Storm	Major Storm	inches					
$d_{MAX} = 6.0$	$d_{MAX} = 8.4$						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> Minor Storm <input checked="" type="checkbox"/> Major Storm    check = yes						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> </thead> <tbody> <tr> <td><math>Q_{allow} = 17.5</math></td> <td><math>Q_{allow} = 44.5</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	cfs	$Q_{allow} = 17.5$	$Q_{allow} = 44.5$	
Minor Storm	Major Storm	cfs					
$Q_{allow} = 17.5$	$Q_{allow} = 44.5$						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							



## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



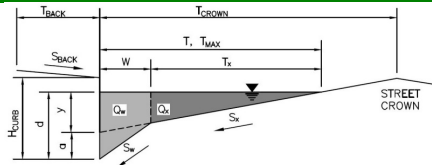
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
<b>Design Discharge for Half of Street (from Sheet Inlet Management)</b>			
Water Spread Width	8.9	21.6	cfs
Water Depth at Flowline (outside of local depression)	13.3	19.0	ft
Water Depth at Street Crown (or at T <sub>MAX</sub> )	4.7	6.1	inches
Ratio of Gutter Flow to Design Flow	0.0	0.0	inches
Discharge outside the Gutter Section W, carried in Section T <sub>x</sub>	0.448	0.312	
Discharge within the Gutter Section W	4.9	14.9	cfs
Discharge Behind the Curb Face	4.0	6.7	cfs
Flow Area within the Gutter Section W	0.0	0.0	cfs
Velocity within the Gutter Section W	0.62	0.85	sq ft
Water Depth for Design Condition	6.5	8.0	fps
	7.7	9.1	inches
<b>Grate Analysis (Calculated)</b>			
Total Length of Inlet Grate Opening	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	N/A	N/A	
<b>Under No-Clogging Condition</b>			
Minimum Velocity Where Grate Splash-Over Begins	N/A	N/A	fps
Interception Rate of Frontal Flow	N/A	N/A	
Interception Rate of Side Flow	N/A	N/A	
Interception Capacity	N/A	N/A	cfs
<b>Under Clogging Condition</b>			
Clogging Coefficient for Multiple-unit Grate Inlet	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	N/A	N/A	fps
Interception Rate of Frontal Flow	N/A	N/A	
Interception Rate of Side Flow	N/A	N/A	
<b>Actual Interception Capacity</b>	N/A	N/A	cfs
<b>Carry-Over Flow = Q<sub>o</sub> - Q<sub>a</sub></b> (to be applied to curb opening or next d/s inlet)	N/A	N/A	cfs
<b>Curb or Slotted Inlet Opening Analysis (Calculated)</b>			
Equivalent Slope S <sub>e</sub> (based on grate carry-over)	0.104	0.079	ft/ft
Required Length L <sub>T</sub> to Have 100% Interception	17.27	30.89	ft
<b>Under No-Clogging Condition</b>			
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L <sub>T</sub> )	17.27	20.00	ft
Interception Capacity	8.9	18.3	cfs
<b>Under Clogging Condition</b>			
Clogging Coefficient	1.33	1.33	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	0.03	0.03	
Effective (Unclogged) Length	17.34	17.34	ft
<b>Actual Interception Capacity</b>	8.9	18.0	cfs
<b>Carry-Over Flow = Q<sub>b(GRATE)</sub> - Q<sub>a</sub></b>	0.0	3.6	cfs
<b>Summary</b>			
Total Inlet Interception Capacity	8.9	18.0	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	3.6	cfs
Capture Percentage = Q <sub>a</sub> /Q <sub>o</sub> =	100	83	%

Report has flow at this design point as Q100 = 19.7 at DP-4

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

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

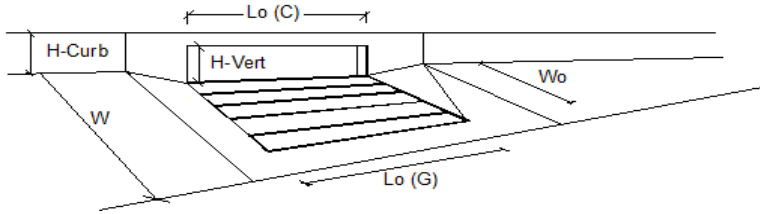
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-6



Gutter Geometry (Enter data in the blue cells)													
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 10.0$ ft												
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft												
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$												
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches												
Distance from Curb Face to Street Crown	$T_{CROWN} = 22.0$ ft												
Gutter Width	$W = 2.00$ ft												
Street Transverse Slope	$S_x = 0.020$ ft/ft												
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft												
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.025$ ft/ft												
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$												
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> <th></th> </tr> </thead> <tbody> <tr> <td><math>T_{MAX} =</math></td> <td>18.5</td> <td>22.0</td> <td>ft</td> </tr> <tr> <td><math>d_{MAX} =</math></td> <td>6.0</td> <td>8.4</td> <td>inches</td> </tr> </tbody> </table>		Minor Storm	Major Storm		$T_{MAX} =$	18.5	22.0	ft	$d_{MAX} =$	6.0	8.4	inches
	Minor Storm	Major Storm											
$T_{MAX} =$	18.5	22.0	ft										
$d_{MAX} =$	6.0	8.4	inches										
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm													
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/> check = yes												
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>													
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>													
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'													
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	Minor Storm	Major Storm											
$Q_{allow} =$	17.7	44.8	cfs										

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



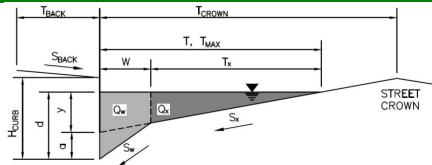
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	3.0	5.7	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	0.9	cfs
Capture Percentage = $Q_i/Q_c$ =	100	86	%

Hydrology spreadsheet has flows of 9.9 & 21.8 at DP-12

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

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

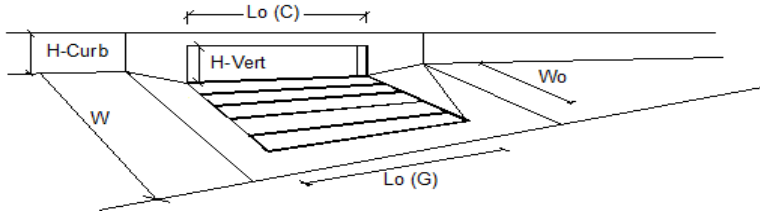
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-12



Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.026$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> </thead> <tbody> <tr> <td>17.0</td> <td>17.0</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	ft	17.0	17.0	
Minor Storm	Major Storm	ft					
17.0	17.0						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> </thead> <tbody> <tr> <td>5.6</td> <td>7.9</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	inches	5.6	7.9	
Minor Storm	Major Storm	inches					
5.6	7.9						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> Minor Storm <input checked="" type="checkbox"/> Major Storm    check = yes						
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> </thead> <tbody> <tr> <td>16.3</td> <td>34.6</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	cfs	16.3	34.6	
Minor Storm	Major Storm	cfs					
16.3	34.6						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



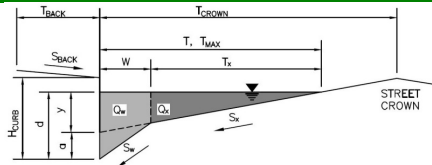
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	9.3	14.8	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.6	7.0	cfs
Capture Percentage = $Q_i/Q_c$ =	94	68	%

Report has flows of 9.9 & 21.8 at DP-12.

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

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

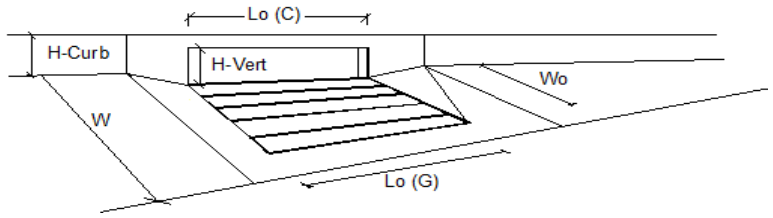
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-13



Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_X = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = 0.022$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> </thead> <tbody> <tr> <td><math>T_{MAX} = 17.0</math></td> <td><math>T_{MAX} = 17.0</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	ft	$T_{MAX} = 17.0$	$T_{MAX} = 17.0$	
Minor Storm	Major Storm	ft					
$T_{MAX} = 17.0$	$T_{MAX} = 17.0$						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> </thead> <tbody> <tr> <td><math>d_{MAX} = 5.6</math></td> <td><math>d_{MAX} = 7.9</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	inches	$d_{MAX} = 5.6$	$d_{MAX} = 7.9$	
Minor Storm	Major Storm	inches					
$d_{MAX} = 5.6$	$d_{MAX} = 7.9$						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> Minor Storm <input checked="" type="checkbox"/> Major Storm    check = yes						
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> </thead> <tbody> <tr> <td><math>Q_{allow} = 15.2</math></td> <td><math>Q_{allow} = 36.0</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	cfs	$Q_{allow} = 15.2$	$Q_{allow} = 36.0$	
Minor Storm	Major Storm	cfs					
$Q_{allow} = 15.2$	$Q_{allow} = 36.0$						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



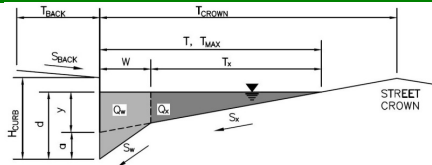
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	8.3	15.6	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.2	8.7	cfs
Capture Percentage = $Q_i/Q_c$ =	97	64	%

Hydrology spreadsheet has flows of 7.9 & 17.3 at DP-13

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

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

Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-15

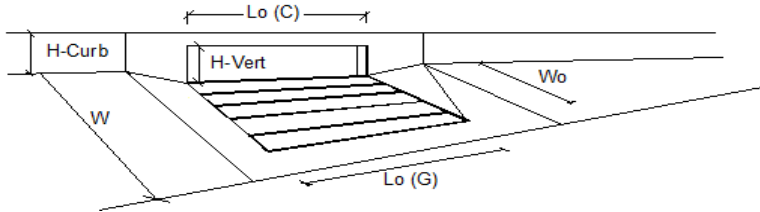


Gutter Geometry (Enter data in the blue cells)													
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft												
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft												
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$												
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches												
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft												
Gutter Width	$W = 2.00$ ft												
Street Transverse Slope	$S_x = 0.020$ ft/ft												
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft												
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.019$ ft/ft												
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$												
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> <th></th> </tr> </thead> <tbody> <tr> <td><math>T_{MAX} =</math></td> <td>17.0</td> <td>17.0</td> <td>ft</td> </tr> <tr> <td><math>d_{MAX} =</math></td> <td>5.6</td> <td>7.9</td> <td>inches</td> </tr> </tbody> </table>		Minor Storm	Major Storm		$T_{MAX} =$	17.0	17.0	ft	$d_{MAX} =$	5.6	7.9	inches
	Minor Storm	Major Storm											
$T_{MAX} =$	17.0	17.0	ft										
$d_{MAX} =$	5.6	7.9	inches										
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm													
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/> check = yes												
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>													
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>													
	<table border="1"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> <th></th> </tr> </thead> <tbody> <tr> <td><math>Q_{allow} =</math></td> <td>14.1</td> <td>37.8</td> <td>cfs</td> </tr> </tbody> </table>		Minor Storm	Major Storm		$Q_{allow} =$	14.1	37.8	cfs				
	Minor Storm	Major Storm											
$Q_{allow} =$	14.1	37.8	cfs										
<p><b>Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'</b></p> <p><b>Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'</b></p>													



## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



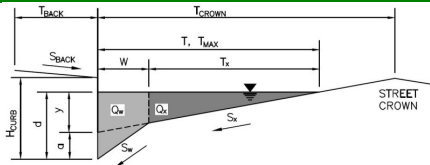
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	8.4	16.5	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.3	10.8	cfs
Capture Percentage = $Q_i/Q_c$ =	97	60	%

Hydrology spreadsheet has Q100 = 18.6 at DP-15

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

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

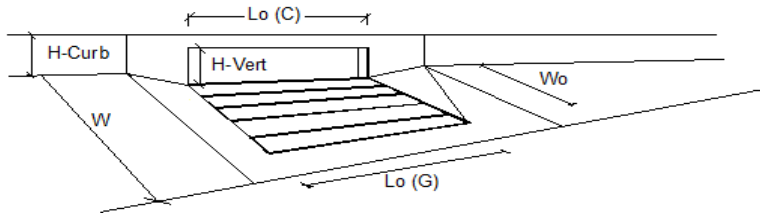
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-17



Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.034$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> </thead> <tbody> <tr> <td><math>T_{MAX} = 17.0</math></td> <td><math>T_{MAX} = 17.0</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	ft	$T_{MAX} = 17.0$	$T_{MAX} = 17.0$	
Minor Storm	Major Storm	ft					
$T_{MAX} = 17.0$	$T_{MAX} = 17.0$						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> </thead> <tbody> <tr> <td><math>d_{MAX} = 5.6</math></td> <td><math>d_{MAX} = 7.9</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	inches	$d_{MAX} = 5.6$	$d_{MAX} = 7.9$	
Minor Storm	Major Storm	inches					
$d_{MAX} = 5.6$	$d_{MAX} = 7.9$						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> Minor Storm <input checked="" type="checkbox"/> Major Storm    check = yes						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> </thead> <tbody> <tr> <td><math>Q_{allow} = 16.0</math></td> <td><math>Q_{allow} = 31.6</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	cfs	$Q_{allow} = 16.0$	$Q_{allow} = 31.6$	
Minor Storm	Major Storm	cfs					
$Q_{allow} = 16.0$	$Q_{allow} = 31.6$						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017

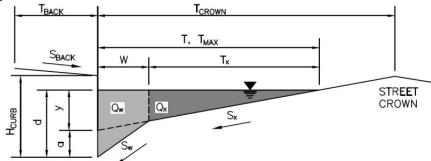


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	7.5	20.4	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	6.3	cfs
Capture Percentage = $Q_i/Q_c$ =	100	77	%

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

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

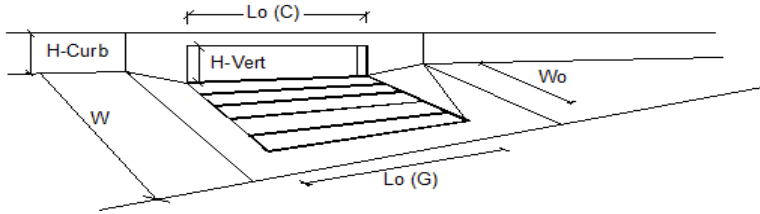
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-19



<b>Gutter Geometry (Enter data in the blue cells)</b>									
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="8.0"/> ft								
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft								
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.015"/>								
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches								
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft								
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft								
Street Transverse Slope	$S_x = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft								
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft								
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = $ <input style="width: 50px;" type="text" value="0.026"/> ft/ft								
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.017"/>								
Max. Allowable Spread for Minor & Major Storm	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center; border: none;"><math>T_{MAX} = </math></td> <td style="text-align: center; border: none;">Minor Storm</td> <td style="text-align: center; border: none;">Major Storm</td> <td style="border: none;"></td> </tr> <tr> <td style="border: 1px solid black; width: 50px;"></td> <td style="border: 1px solid black; width: 50px; text-align: center;">17.0</td> <td style="border: 1px solid black; width: 50px; text-align: center;">17.0</td> <td style="border: none;">ft</td> </tr> </table>	$T_{MAX} = $	Minor Storm	Major Storm			17.0	17.0	ft
$T_{MAX} = $	Minor Storm	Major Storm							
	17.0	17.0	ft						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table style="width: 100%; border: none;"> <tr> <td style="border: none;"><math>d_{MAX} = </math></td> <td style="border: none;">Minor Storm</td> <td style="border: none;">Major Storm</td> <td style="border: none;"></td> </tr> <tr> <td style="border: 1px solid black; width: 50px;"></td> <td style="border: 1px solid black; width: 50px; text-align: center;">5.6</td> <td style="border: 1px solid black; width: 50px; text-align: center;">7.9</td> <td style="border: none;">inches</td> </tr> </table>	$d_{MAX} = $	Minor Storm	Major Storm			5.6	7.9	inches
$d_{MAX} = $	Minor Storm	Major Storm							
	5.6	7.9	inches						
Allow Flow Depth at Street Crown (leave blank for no)	<table style="width: 100%; border: none;"> <tr> <td style="border: none;"><input type="checkbox"/></td> <td style="border: none;"><input checked="" type="checkbox"/></td> <td style="border: none;">check = yes</td> </tr> </table>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes					
<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes							
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>									
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>									
	<table style="width: 100%; border: none;"> <tr> <td style="border: none;"><math>Q_{allow} = </math></td> <td style="border: none;">Minor Storm</td> <td style="border: none;">Major Storm</td> <td style="border: none;"></td> </tr> <tr> <td style="border: 1px solid black; width: 50px;"></td> <td style="border: 1px solid black; width: 50px; text-align: center;">16.4</td> <td style="border: 1px solid black; width: 50px; text-align: center;">34.5</td> <td style="border: none;">cfs</td> </tr> </table>	$Q_{allow} = $	Minor Storm	Major Storm			16.4	34.5	cfs
$Q_{allow} = $	Minor Storm	Major Storm							
	16.4	34.5	cfs						
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'									
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'									

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



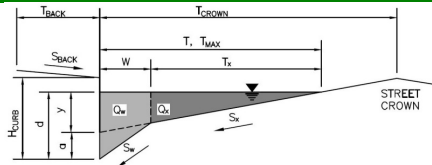
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	10.3	21.2	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	7.6	cfs
Capture Percentage = $Q_i/Q_c$ =	100	74	%

Hydrology spreadsheet has Q100=22.6 at DP-19

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

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

Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-20a

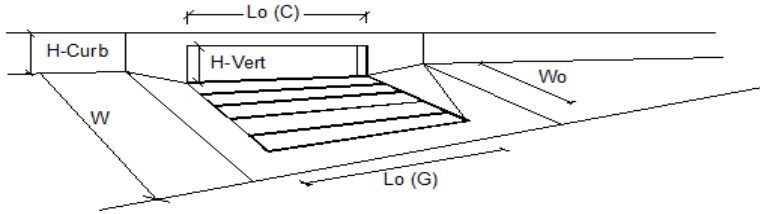


Gutter Geometry (Enter data in the blue cells)					
Maximum Allowable Width for Spread Behind Curb	T <sub>BACK</sub> = 8.0 ft				
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S <sub>BACK</sub> = 0.020 ft/ft				
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n <sub>BACK</sub> = 0.015				
Height of Curb at Gutter Flow Line	H <sub>CURB</sub> = 6.00 inches				
Distance from Curb Face to Street Crown	T <sub>CROWN</sub> = 17.0 ft				
Gutter Width	W = 2.00 ft				
Street Transverse Slope	S <sub>x</sub> = 0.020 ft/ft				
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S <sub>w</sub> = 0.083 ft/ft				
Street Longitudinal Slope - Enter 0 for sump condition	S <sub>o</sub> = 0.030 ft/ft				
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n <sub>STREET</sub> = 0.017				
Max. Allowable Spread for Minor & Major Storm	T <sub>MAX</sub> = <table border="1"><tr><th>Minor Storm</th><th>Major Storm</th></tr><tr><td>17.0</td><td>17.0</td></tr></table> ft	Minor Storm	Major Storm	17.0	17.0
Minor Storm	Major Storm				
17.0	17.0				
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d <sub>MAX</sub> = <table border="1"><tr><th>Minor Storm</th><th>Major Storm</th></tr><tr><td>5.6</td><td>7.9</td></tr></table> inches	Minor Storm	Major Storm	5.6	7.9
Minor Storm	Major Storm				
5.6	7.9				
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/> check = yes				
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>					
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>					
	Q <sub>allow</sub> = <table border="1"><tr><th>Minor Storm</th><th>Major Storm</th></tr><tr><td>16.7</td><td>32.9</td></tr></table> cfs	Minor Storm	Major Storm	16.7	32.9
Minor Storm	Major Storm				
16.7	32.9				

**Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'**  
**Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'**

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



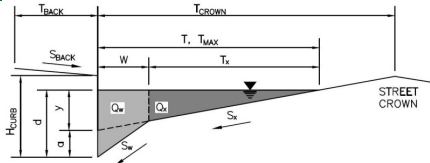
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	5.6	10.7	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	1.61	cfs
Capture Percentage = $Q_i/Q_c$ =	100	87	%

Hydrology spreadsheet has Q100=12.3 at DP-20a

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

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

Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-21

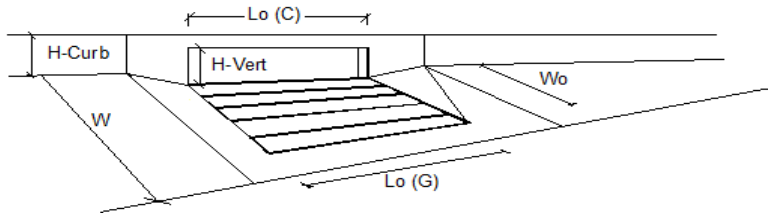


Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.021$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> <tr> <td><math>T_{MAX} = 17.0</math></td> <td><math>T_{MAX} = 17.0</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	$T_{MAX} = 17.0$	$T_{MAX} = 17.0$	
Minor Storm	Major Storm	ft					
$T_{MAX} = 17.0$	$T_{MAX} = 17.0$						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> <tr> <td><math>d_{MAX} = 5.6</math></td> <td><math>d_{MAX} = 7.9</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	$d_{MAX} = 5.6$	$d_{MAX} = 7.9$	
Minor Storm	Major Storm	inches					
$d_{MAX} = 5.6$	$d_{MAX} = 7.9$						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> Minor Storm <input checked="" type="checkbox"/> Major Storm    check = yes						
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> <tr> <td><math>Q_{allow} = 14.8</math></td> <td><math>Q_{allow} = 36.6</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	$Q_{allow} = 14.8$	$Q_{allow} = 36.6$	
Minor Storm	Major Storm	cfs					
$Q_{allow} = 14.8$	$Q_{allow} = 36.6$						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							



## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



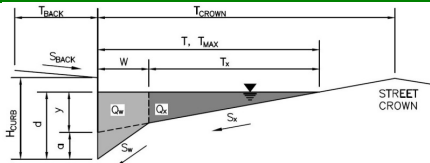
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	7.2	13.1	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	4.4	cfs
Capture Percentage = $Q_i/Q_c$ =	100	75	%

Hydrology spreadsheet has Q100=15.9 at DP-21

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

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

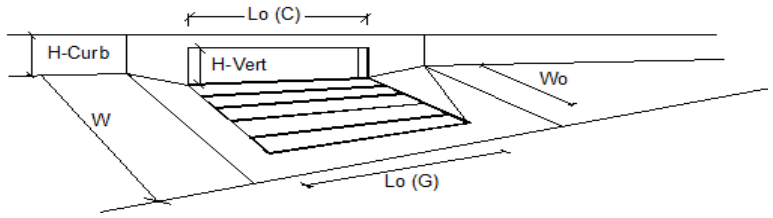
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-23



Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.020$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> </thead> <tbody> <tr> <td><math>T_{MAX} = 17.0</math></td> <td><math>T_{MAX} = 17.0</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	ft	$T_{MAX} = 17.0$	$T_{MAX} = 17.0$	
Minor Storm	Major Storm	ft					
$T_{MAX} = 17.0$	$T_{MAX} = 17.0$						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> </thead> <tbody> <tr> <td><math>d_{MAX} = 5.6</math></td> <td><math>d_{MAX} = 7.9</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	inches	$d_{MAX} = 5.6$	$d_{MAX} = 7.9$	
Minor Storm	Major Storm	inches					
$d_{MAX} = 5.6$	$d_{MAX} = 7.9$						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> Minor Storm <input checked="" type="checkbox"/> Major Storm    check = yes						
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> </thead> <tbody> <tr> <td><math>Q_{allow} = 14.5</math></td> <td><math>Q_{allow} = 37.1</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	cfs	$Q_{allow} = 14.5$	$Q_{allow} = 37.1$	
Minor Storm	Major Storm	cfs					
$Q_{allow} = 14.5$	$Q_{allow} = 37.1$						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



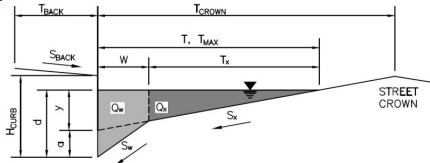
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	8.4	16.3	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.3	10.4	cfs
Capture Percentage = $Q_i/Q_c$ =	97	61	%

Hydrology spreadsheet has Q100=19.1 at DP-23

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

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

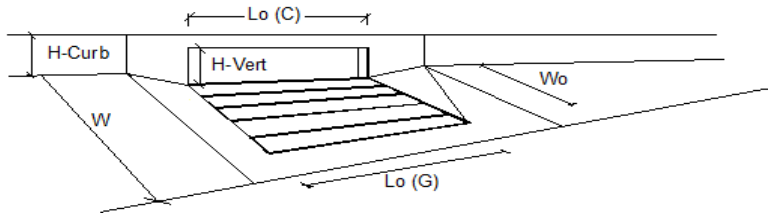
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-25



<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="8.0"/> ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.015"/>						
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft						
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft						
Street Transverse Slope	$S_x = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = $ <input style="width: 50px;" type="text" value="0.011"/> ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.017"/>						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> <tr> <td style="text-align: center;"><input style="width: 40px;" type="text" value="17.0"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="17.0"/></td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	<input style="width: 40px;" type="text" value="17.0"/>	<input style="width: 40px;" type="text" value="17.0"/>	
Minor Storm	Major Storm	ft					
<input style="width: 40px;" type="text" value="17.0"/>	<input style="width: 40px;" type="text" value="17.0"/>						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">inches</th> </tr> <tr> <td style="text-align: center;"><input style="width: 40px;" type="text" value="5.6"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="7.9"/></td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	<input style="width: 40px;" type="text" value="5.6"/>	<input style="width: 40px;" type="text" value="7.9"/>	
Minor Storm	Major Storm	inches					
<input style="width: 40px;" type="text" value="5.6"/>	<input style="width: 40px;" type="text" value="7.9"/>						
Allow Flow Depth at Street Crown (leave blank for no)	<table style="display: inline-table; border-collapse: collapse;"> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>check = yes</td> </tr> </table>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes			
<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes					
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">cfs</th> </tr> <tr> <td style="text-align: center;"><input style="width: 40px;" type="text" value="10.7"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="33.0"/></td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	<input style="width: 40px;" type="text" value="10.7"/>	<input style="width: 40px;" type="text" value="33.0"/>	
Minor Storm	Major Storm	cfs					
<input style="width: 40px;" type="text" value="10.7"/>	<input style="width: 40px;" type="text" value="33.0"/>						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



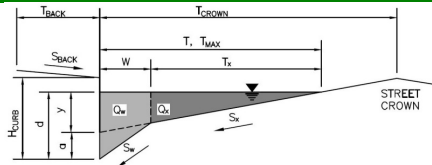
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	7.2	11.3	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	2.9	15.1	cfs
Capture Percentage = $Q_i/Q_c$ =	71	43	%

Hydrology spreadsheet has flows of 10.0 & 22.0 at DP-25

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

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

Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-27

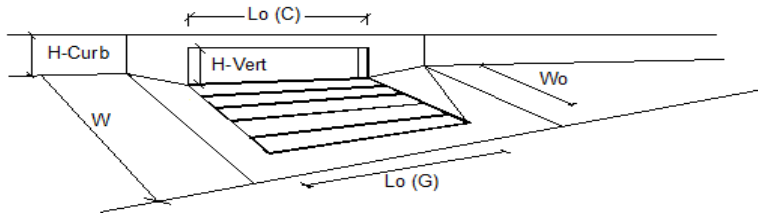


Gutter Geometry (Enter data in the blue cells)					
Maximum Allowable Width for Spread Behind Curb	T <sub>BACK</sub> = 8.0 ft				
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S <sub>BACK</sub> = 0.020 ft/ft				
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n <sub>BACK</sub> = 0.015				
Height of Curb at Gutter Flow Line	H <sub>CURB</sub> = 6.00 inches				
Distance from Curb Face to Street Crown	T <sub>CROWN</sub> = 17.0 ft				
Gutter Width	W = 2.00 ft				
Street Transverse Slope	S <sub>X</sub> = 0.020 ft/ft				
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S <sub>W</sub> = 0.083 ft/ft				
Street Longitudinal Slope - Enter 0 for sump condition	S <sub>O</sub> = 0.011 ft/ft				
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n <sub>STREET</sub> = 0.017				
Max. Allowable Spread for Minor & Major Storm	T <sub>MAX</sub> = <table border="1"><tr><th>Minor Storm</th><th>Major Storm</th></tr><tr><td>17.0</td><td>17.0</td></tr></table> ft	Minor Storm	Major Storm	17.0	17.0
Minor Storm	Major Storm				
17.0	17.0				
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d <sub>MAX</sub> = <table border="1"><tr><th>Minor Storm</th><th>Major Storm</th></tr><tr><td>5.6</td><td>7.9</td></tr></table> inches	Minor Storm	Major Storm	5.6	7.9
Minor Storm	Major Storm				
5.6	7.9				
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/> check = yes				
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>					
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>					
	Q <sub>allow</sub> = <table border="1"><tr><th>Minor Storm</th><th>Major Storm</th></tr><tr><td>10.7</td><td>33.0</td></tr></table> cfs	Minor Storm	Major Storm	10.7	33.0
Minor Storm	Major Storm				
10.7	33.0				

**Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'**  
**Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'**

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017

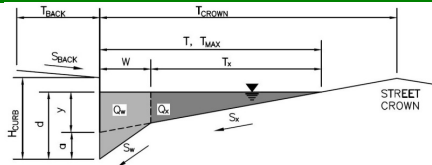


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity*</b>			
Total Inlet Interception Capacity	8.4	20.7	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	7.6	cfs
Capture Percentage = $Q_i/Q_c$ =	100	73	%

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

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

Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-29

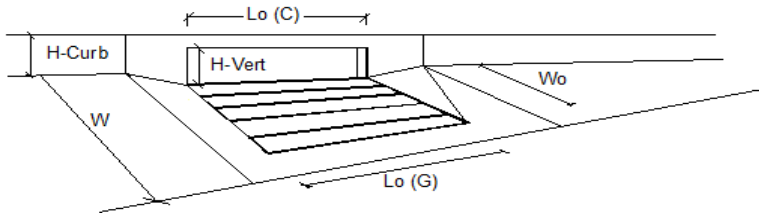


<b>Gutter Geometry (Enter data in the blue cells)</b>									
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="8.0"/> ft								
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft								
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.015"/>								
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches								
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft								
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft								
Street Transverse Slope	$S_x = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft								
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft								
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = $ <input style="width: 50px;" type="text" value="0.010"/> ft/ft								
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.017"/>								
Max. Allowable Spread for Minor & Major Storm	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center; border: none;"><math>T_{MAX} = </math></td> <td style="text-align: center; border: none;">Minor Storm</td> <td style="text-align: center; border: none;">Major Storm</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; text-align: center;">17.0</td> <td style="border: 1px solid black; text-align: center;">17.0</td> <td style="border: none;">ft</td> </tr> </table>	$T_{MAX} = $	Minor Storm	Major Storm			17.0	17.0	ft
$T_{MAX} = $	Minor Storm	Major Storm							
	17.0	17.0	ft						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table style="width: 100%; border: none;"> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; text-align: center;">5.6</td> <td style="border: 1px solid black; text-align: center;">7.9</td> <td style="border: none;">inches</td> </tr> </table>		5.6	7.9	inches				
	5.6	7.9	inches						
Allow Flow Depth at Street Crown (leave blank for no)	<table style="width: 100%; border: none;"> <tr> <td style="border: none;"></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="border: none;">check = yes</td> </tr> </table>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes				
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes						
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>									
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>									
	<table style="width: 100%; border: none;"> <tr> <td style="border: none;"></td> <td style="text-align: center; border: none;">Minor Storm</td> <td style="text-align: center; border: none;">Major Storm</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"><math>Q_{allow} = </math></td> <td style="border: 1px solid black; text-align: center;">10.2</td> <td style="border: 1px solid black; text-align: center;">31.8</td> <td style="border: none;">cfs</td> </tr> </table>		Minor Storm	Major Storm		$Q_{allow} = $	10.2	31.8	cfs
	Minor Storm	Major Storm							
$Q_{allow} = $	10.2	31.8	cfs						
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management' Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'									



## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017

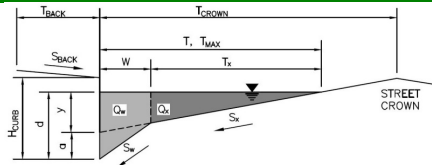


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	9.5	20.5	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	7.3	cfs
Capture Percentage = $Q_i/Q_c$ =	100	74	%

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

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

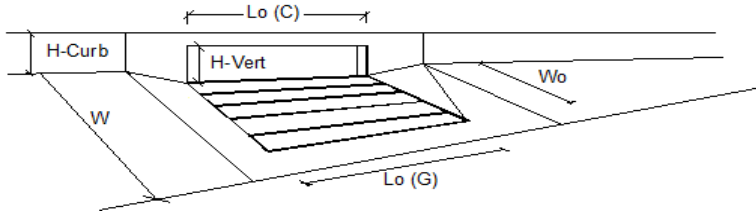
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-31



<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 24.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 26.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.048$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="text-align: center;">Minor Storm</th> <th style="text-align: center;">Major Storm</th> <th></th> </tr> <tr> <td style="text-align: center;"><math>T_{MAX} = 26.0</math></td> <td style="text-align: center;"><math>26.0</math></td> <td style="text-align: center;">ft</td> </tr> </table>	Minor Storm	Major Storm		$T_{MAX} = 26.0$	$26.0$	ft
Minor Storm	Major Storm						
$T_{MAX} = 26.0$	$26.0$	ft					
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="text-align: center;">Minor Storm</th> <th style="text-align: center;">Major Storm</th> <th></th> </tr> <tr> <td style="text-align: center;"><math>d_{MAX} = 6.0</math></td> <td style="text-align: center;"><math>11.8</math></td> <td style="text-align: center;">inches</td> </tr> </table>	Minor Storm	Major Storm		$d_{MAX} = 6.0$	$11.8$	inches
Minor Storm	Major Storm						
$d_{MAX} = 6.0$	$11.8$	inches					
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> Minor Storm <input checked="" type="checkbox"/> Major Storm    check = yes						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="text-align: center;">Minor Storm</th> <th style="text-align: center;">Major Storm</th> <th></th> </tr> <tr> <td style="text-align: center;"><math>Q_{allow} = 14.5</math></td> <td style="text-align: center;"><math>115.2</math></td> <td style="text-align: center;">cfs</td> </tr> </table>	Minor Storm	Major Storm		$Q_{allow} = 14.5$	$115.2$	cfs
Minor Storm	Major Storm						
$Q_{allow} = 14.5$	$115.2$	cfs					
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



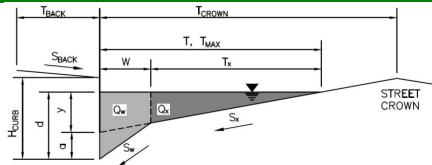
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	Type = CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a <sub>LOCAL</sub> = 3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No = 1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L <sub>o</sub> = 15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W <sub>o</sub> = N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C <sub>T-G</sub> = N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C <sub>T-C</sub> = 0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
<b>Design Discharge for Half of Street (from Sheet Inlet Management)</b>			
Water Spread Width	Q <sub>o</sub> = 10.5	23.2	cfs
Water Depth at Flowline (outside of local depression)	T = 12.4	17.2	ft
Water Depth at Street Crown (or at T <sub>MAX</sub> )	d = 4.5	5.6	inches
Ratio of Gutter Flow to Design Flow	d <sub>CROWN</sub> = 0.0	0.0	inches
Discharge outside the Gutter Section W, carried in Section T <sub>x</sub>	E <sub>o</sub> = 0.477	0.346	
Discharge within the Gutter Section W	Q <sub>x</sub> = 5.5	15.2	cfs
Discharge Behind the Curb Face	Q <sub>w</sub> = 5.0	8.0	cfs
Flow Area within the Gutter Section W	Q <sub>BACK</sub> = 0.0	0.0	cfs
Velocity within the Gutter Section W	A <sub>w</sub> = 0.58	0.77	sq ft
Water Depth for Design Condition	V <sub>w</sub> = 8.6	10.4	fps
	d <sub>LOCAL</sub> = 7.5	8.6	inches
<b>Grate Analysis (Calculated)</b>			
Total Length of Inlet Grate Opening	L = N/A	N/A	ft
Ratio of Grate Flow to Design Flow	E <sub>o-GRATE</sub> = N/A	N/A	
<b>Under No-Clogging Condition</b>			
Minimum Velocity Where Grate Splash-Over Begins	V <sub>o</sub> = N/A	N/A	fps
Interception Rate of Frontal Flow	R <sub>f</sub> = N/A	N/A	
Interception Rate of Side Flow	R <sub>s</sub> = N/A	N/A	
Interception Capacity	Q <sub>i</sub> = N/A	N/A	cfs
<b>Under Clogging Condition</b>			
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 <sub>e</sub> = N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V <sub>o</sub> = N/A	N/A	fps
Interception Rate of Frontal Flow	R <sub>f</sub> = N/A	N/A	
Interception Rate of Side Flow	R <sub>s</sub> = N/A	N/A	
<b>Actual Interception Capacity</b>	Q <sub>a</sub> = N/A	N/A	cfs
<b>Carry-Over Flow = Q<sub>o</sub> - Q<sub>a</sub></b> (to be applied to curb opening or next d/s inlet)	Q <sub>b</sub> = N/A	N/A	cfs
<b>Curb or Slotted Inlet Opening Analysis (Calculated)</b>			
Equivalent Slope S <sub>e</sub> (based on grate carry-over)	S <sub>e</sub> = 0.110	0.085	ft/ft
Required Length L <sub>T</sub> to Have 100% Interception	L <sub>T</sub> = 19.05	32.09	ft
<b>Under No-Clogging Condition</b>			
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L <sub>T</sub> )	L = 15.00	15.00	ft
Interception Capacity	Q <sub>i</sub> = 9.9	15.7	cfs
<b>Under Clogging Condition</b>			
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 <sub>e</sub> = 13.03	13.03	ft
<b>Actual Interception Capacity</b>	Q <sub>a</sub> = 9.7	15.3	cfs
<b>Carry-Over Flow = Q<sub>b(GRATE)</sub> - Q<sub>a</sub></b>	Q <sub>b</sub> = 0.8	7.9	cfs
<b>Summary</b>			
<b>Total Inlet Interception Capacity</b>	Q = 9.7	15.3	cfs
<b>Total Inlet Carry-Over Flow (flow bypassing inlet)</b>	Q <sub>b</sub> = 0.8	7.9	cfs
<b>Capture Percentage = Q<sub>a</sub>/Q<sub>o</sub></b>	C% = 92	66	%

Hydrology spreadsheet has Q100=23.2 at DP-31

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

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

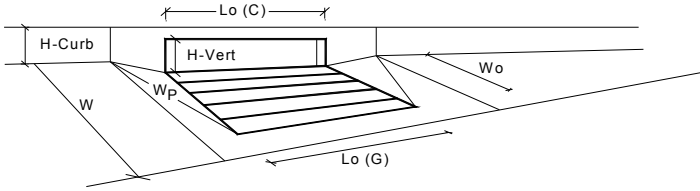
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-32



<b>Gutter Geometry (Enter data in the blue cells)</b>													
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="8.0"/> ft												
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft												
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.015"/>												
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches												
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft												
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft												
Street Transverse Slope	$S_X = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft												
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft												
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = $ <input style="width: 50px;" type="text" value="0.000"/> ft/ft												
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.017"/>												
Max. Allowable Spread for Minor & Major Storm	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"></th> <th style="width: 25%; text-align: center;">Minor Storm</th> <th style="width: 25%; text-align: center;">Major Storm</th> <th style="width: 10%;"></th> </tr> </thead> <tbody> <tr> <td><math>T_{MAX} = </math></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="17.0"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="17.0"/></td> <td style="text-align: right;">ft</td> </tr> <tr> <td><math>d_{MAX} = </math></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="5.6"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="7.9"/></td> <td style="text-align: right;">inches</td> </tr> </tbody> </table>		Minor Storm	Major Storm		$T_{MAX} = $	<input style="width: 40px;" type="text" value="17.0"/>	<input style="width: 40px;" type="text" value="17.0"/>	ft	$d_{MAX} = $	<input style="width: 40px;" type="text" value="5.6"/>	<input style="width: 40px;" type="text" value="7.9"/>	inches
	Minor Storm	Major Storm											
$T_{MAX} = $	<input style="width: 40px;" type="text" value="17.0"/>	<input style="width: 40px;" type="text" value="17.0"/>	ft										
$d_{MAX} = $	<input style="width: 40px;" type="text" value="5.6"/>	<input style="width: 40px;" type="text" value="7.9"/>	inches										
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm													
Check boxes are not applicable in SUMP conditions	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;"><input type="checkbox"/></td> <td style="width: 50%; text-align: center;"><input type="checkbox"/></td> </tr> </table>	<input type="checkbox"/>	<input type="checkbox"/>										
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<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>													
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"></th> <th style="width: 25%; text-align: center;">Minor Storm</th> <th style="width: 25%; text-align: center;">Major Storm</th> <th style="width: 10%;"></th> </tr> </thead> <tbody> <tr> <td><math>Q_{allow} = </math></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="SUMP"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="SUMP"/></td> <td style="text-align: right;">cfs</td> </tr> </tbody> </table>		Minor Storm	Major Storm		$Q_{allow} = $	<input style="width: 40px;" type="text" value="SUMP"/>	<input style="width: 40px;" type="text" value="SUMP"/>	cfs				
	Minor Storm	Major Storm											
$Q_{allow} = $	<input style="width: 40px;" type="text" value="SUMP"/>	<input style="width: 40px;" type="text" value="SUMP"/>	cfs										

## INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



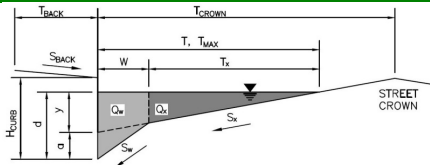
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	5.6	8.4	inches
<b>Grate Information</b>	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>	MINOR	MAJOR	
Length of a Unit Curb Opening	20.00	20.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.53	0.79	
Curb Opening Performance Reduction Factor for Long Inlets	0.76	0.91	
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>	MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	10.3	29.2	cfs
Q PEAK REQUIRED =	8.6	27.5	cfs

Please include DP-32 on hydrology spreadsheet to verify inlet flows

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

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

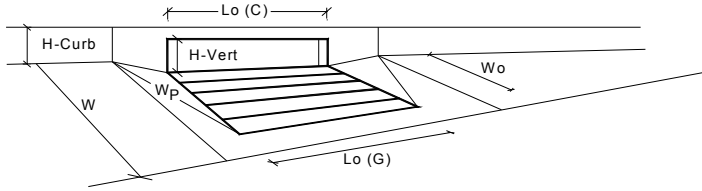
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-33 (Exist. 25' Type "R")



<b>Gutter Geometry (Enter data in the blue cells)</b>																	
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft																
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft																
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$																
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches																
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft																
Gutter Width	$W = 2.00$ ft																
Street Transverse Slope	$S_x = 0.020$ ft/ft																
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft																
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.000$ ft/ft																
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$																
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">Minor Storm</th> <th style="text-align: center;">Major Storm</th> <th></th> </tr> </thead> <tbody> <tr> <td style="text-align: right;"><math>T_{MAX} =</math></td> <td style="text-align: center;">17.0</td> <td style="text-align: center;">17.0</td> <td style="text-align: right;">ft</td> </tr> <tr> <td style="text-align: right;"><math>d_{MAX} =</math></td> <td style="text-align: center;">5.6</td> <td style="text-align: center;">7.9</td> <td style="text-align: right;">inches</td> </tr> <tr> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> </tbody> </table>		Minor Storm	Major Storm		$T_{MAX} =$	17.0	17.0	ft	$d_{MAX} =$	5.6	7.9	inches		<input type="checkbox"/>	<input type="checkbox"/>	
	Minor Storm	Major Storm															
$T_{MAX} =$	17.0	17.0	ft														
$d_{MAX} =$	5.6	7.9	inches														
	<input type="checkbox"/>	<input type="checkbox"/>															
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm																	
Check boxes are not applicable in SUMP conditions																	
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>																	
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">Minor Storm</th> <th style="text-align: center;">Major Storm</th> <th></th> </tr> </thead> <tbody> <tr> <td style="text-align: right;"><math>Q_{allow} =</math></td> <td style="text-align: center;">SUMP</td> <td style="text-align: center;">SUMP</td> <td style="text-align: right;">cfs</td> </tr> </tbody> </table>		Minor Storm	Major Storm		$Q_{allow} =$	SUMP	SUMP	cfs								
	Minor Storm	Major Storm															
$Q_{allow} =$	SUMP	SUMP	cfs														

## INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



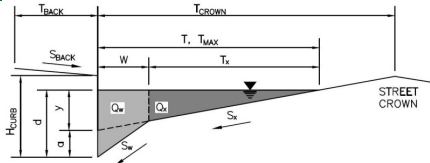
Design Information (Input)	MINOR      MAJOR	
Type of Inlet	CDOT Type R Curb Opening	
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00 inches
Number of Unit Inlets (Grate or Curb Opening)	1	1
Water Depth at Flowline (outside of local depression)	4.6	7.7 inches
<b>Grate Information</b>	MINOR	MAJOR <input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A feet
Width of a Unit Grate	N/A	N/A feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A
<b>Curb Opening Information</b>	MINOR	MAJOR
Length of a Unit Curb Opening	25.00	25.00 feet
Height of Vertical Curb Opening in Inches	6.00	6.00 inches
Height of Curb Orifice Throat in Inches	6.00	6.00 inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40 degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00 feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67
<b>Low Head Performance Reduction (Calculated)</b>	MINOR	MAJOR
Depth for Grate Midwidth	N/A	N/A ft
Depth for Curb Opening Weir Equation	0.22	0.47 ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.43	0.72
Curb Opening Performance Reduction Factor for Long Inlets	0.69	0.88
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>	MINOR	MAJOR
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	7.0	28.7 cfs
Q PEAK REQUIRED =	7.0	28.7 cfs

Please include DP-33 on hydrology spreadsheet to verify inlet flows

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

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

Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-35a

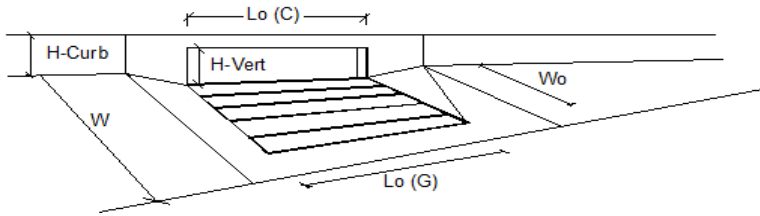


<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="8.0"/> ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.015"/>						
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft						
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft						
Street Transverse Slope	$S_x = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = $ <input style="width: 50px;" type="text" value="0.090"/> ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.017"/>						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> <tr> <td style="text-align: center;"><input style="width: 40px;" type="text" value="17.0"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="17.0"/></td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	<input style="width: 40px;" type="text" value="17.0"/>	<input style="width: 40px;" type="text" value="17.0"/>	
Minor Storm	Major Storm	ft					
<input style="width: 40px;" type="text" value="17.0"/>	<input style="width: 40px;" type="text" value="17.0"/>						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">inches</th> </tr> <tr> <td style="text-align: center;"><input style="width: 40px;" type="text" value="5.6"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="7.9"/></td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	<input style="width: 40px;" type="text" value="5.6"/>	<input style="width: 40px;" type="text" value="7.9"/>	
Minor Storm	Major Storm	inches					
<input style="width: 40px;" type="text" value="5.6"/>	<input style="width: 40px;" type="text" value="7.9"/>						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input type="checkbox"/> check = yes						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	$Q_{allow} = $ <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">cfs</th> </tr> <tr> <td style="text-align: center;"><input style="width: 40px;" type="text" value="12.0"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="23.5"/></td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	<input style="width: 40px;" type="text" value="12.0"/>	<input style="width: 40px;" type="text" value="23.5"/>	
Minor Storm	Major Storm	cfs					
<input style="width: 40px;" type="text" value="12.0"/>	<input style="width: 40px;" type="text" value="23.5"/>						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							



## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



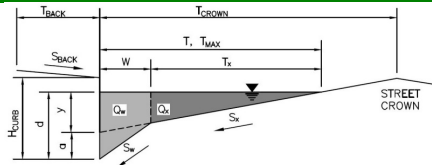
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity*</b>			
Total Inlet Interception Capacity	5.9	11.3	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	1.9	cfs
Capture Percentage = $Q_i/Q_c$ =	100	86	%

Include DP-35a on hydrology spreadsheet to verify inlet flows

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

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

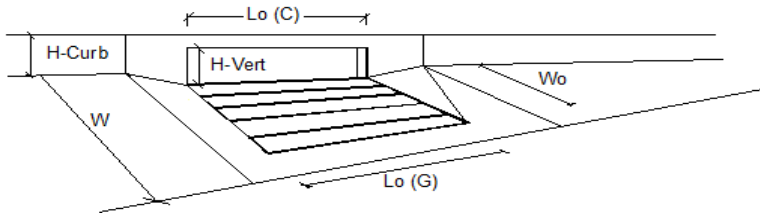
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-35b



<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.006$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> <tr> <td style="text-align: center; padding: 2px;">17.0</td> <td style="text-align: center; padding: 2px;">17.0</td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	17.0	17.0	
Minor Storm	Major Storm	ft					
17.0	17.0						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">inches</th> </tr> <tr> <td style="text-align: center; padding: 2px;">5.6</td> <td style="text-align: center; padding: 2px;">7.9</td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	5.6	7.9	
Minor Storm	Major Storm	inches					
5.6	7.9						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/> check = yes						
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">cfs</th> </tr> <tr> <td style="text-align: center; padding: 2px;">7.9</td> <td style="text-align: center; padding: 2px;">24.2</td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	7.9	24.2	
Minor Storm	Major Storm	cfs					
7.9	24.2						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



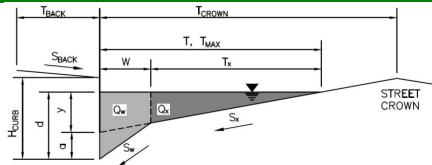
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	1.9	4.4	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	0.2	cfs
Capture Percentage = $Q_i/Q_c$ =	100	96	%

Include DP-35b on hydrology spreadsheet to verify inlet flows

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

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

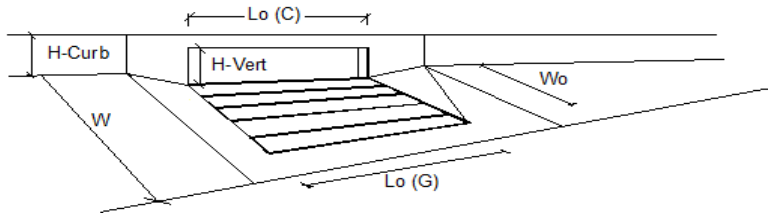
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-36



Gutter Geometry (Enter data in the blue cells)													
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft												
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft												
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$												
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches												
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft												
Gutter Width	$W = 2.00$ ft												
Street Transverse Slope	$S_x = 0.020$ ft/ft												
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft												
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.027$ ft/ft												
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$												
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> <th></th> </tr> </thead> <tbody> <tr> <td><math>T_{MAX} =</math></td> <td>17.0</td> <td>17.0</td> <td>ft</td> </tr> <tr> <td><math>d_{MAX} =</math></td> <td>5.6</td> <td>7.9</td> <td>inches</td> </tr> </tbody> </table>		Minor Storm	Major Storm		$T_{MAX} =$	17.0	17.0	ft	$d_{MAX} =$	5.6	7.9	inches
	Minor Storm	Major Storm											
$T_{MAX} =$	17.0	17.0	ft										
$d_{MAX} =$	5.6	7.9	inches										
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm													
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/> check = yes												
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>													
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>													
	<table border="1"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> <th></th> </tr> </thead> <tbody> <tr> <td><math>Q_{allow} =</math></td> <td>16.8</td> <td>34.0</td> <td>cfs</td> </tr> </tbody> </table>		Minor Storm	Major Storm		$Q_{allow} =$	16.8	34.0	cfs				
	Minor Storm	Major Storm											
$Q_{allow} =$	16.8	34.0	cfs										
<p><b>Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'</b></p> <p><b>Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'</b></p>													

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



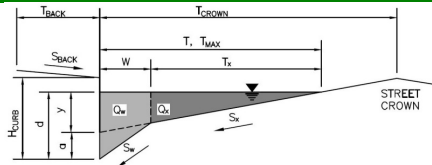
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	4.1	5.7	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	7.3	19.5	cfs
Capture Percentage = $Q_i/Q_c$ =	36	22	%

Hydrology spreadsheet has flows of 11.4 & 25.2 at DP-36

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

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

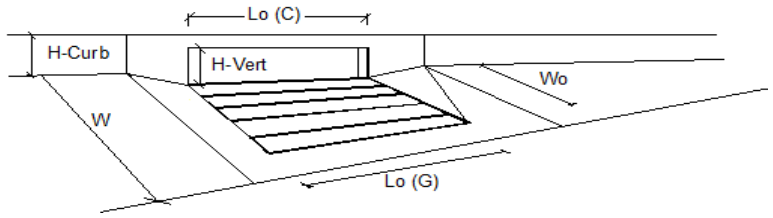
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-37



Gutter Geometry (Enter data in the blue cells)													
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft												
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft												
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$												
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches												
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft												
Gutter Width	$W = 2.00$ ft												
Street Transverse Slope	$S_x = 0.020$ ft/ft												
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft												
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.020$ ft/ft												
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$												
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> <th></th> </tr> </thead> <tbody> <tr> <td><math>T_{MAX} =</math></td> <td>17.0</td> <td>17.0</td> <td>ft</td> </tr> <tr> <td><math>d_{MAX} =</math></td> <td>5.6</td> <td>7.9</td> <td>inches</td> </tr> </tbody> </table>		Minor Storm	Major Storm		$T_{MAX} =$	17.0	17.0	ft	$d_{MAX} =$	5.6	7.9	inches
	Minor Storm	Major Storm											
$T_{MAX} =$	17.0	17.0	ft										
$d_{MAX} =$	5.6	7.9	inches										
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm													
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/> check = yes												
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>													
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>													
	<table border="1"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> <th></th> </tr> </thead> <tbody> <tr> <td><math>Q_{allow} =</math></td> <td>14.5</td> <td>37.2</td> <td>cfs</td> </tr> </tbody> </table>		Minor Storm	Major Storm		$Q_{allow} =$	14.5	37.2	cfs				
	Minor Storm	Major Storm											
$Q_{allow} =$	14.5	37.2	cfs										
<p><b>Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'</b></p> <p><b>Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'</b></p>													

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



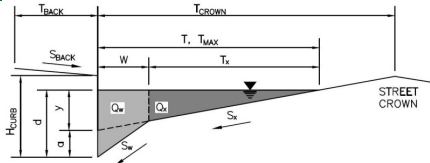
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	3.4	4.8	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	4.0	11.5	cfs
Capture Percentage = $Q_i/Q_c$ =	46	29	%

Hydrology spreadsheet has flows of 7.4 & 16.3 at DP-37

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

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

Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-39

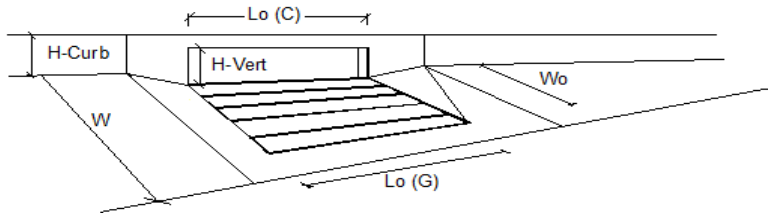


<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="8.0"/> ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.015"/>						
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft						
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft						
Street Transverse Slope	$S_x = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = $ <input style="width: 50px;" type="text" value="0.019"/> ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.017"/>						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><input style="width: 40px;" type="text" value="17.0"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="17.0"/></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	ft	<input style="width: 40px;" type="text" value="17.0"/>	<input style="width: 40px;" type="text" value="17.0"/>	
Minor Storm	Major Storm	ft					
<input style="width: 40px;" type="text" value="17.0"/>	<input style="width: 40px;" type="text" value="17.0"/>						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">inches</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><input style="width: 40px;" type="text" value="5.6"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="7.9"/></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	inches	<input style="width: 40px;" type="text" value="5.6"/>	<input style="width: 40px;" type="text" value="7.9"/>	
Minor Storm	Major Storm	inches					
<input style="width: 40px;" type="text" value="5.6"/>	<input style="width: 40px;" type="text" value="7.9"/>						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/> check = yes						
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">cfs</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><input style="width: 40px;" type="text" value="14.1"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="38.0"/></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	cfs	<input style="width: 40px;" type="text" value="14.1"/>	<input style="width: 40px;" type="text" value="38.0"/>	
Minor Storm	Major Storm	cfs					
<input style="width: 40px;" type="text" value="14.1"/>	<input style="width: 40px;" type="text" value="38.0"/>						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							



## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



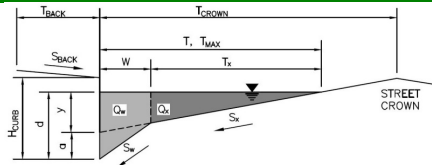
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	25.00	25.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	12.7	27.0	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	7.0	cfs
Capture Percentage = $Q_i/Q_c$ =	100	79	%

These flows are way larger than those shown on hydrology spreadsheet for DP 39. Are they for the same location?

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

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

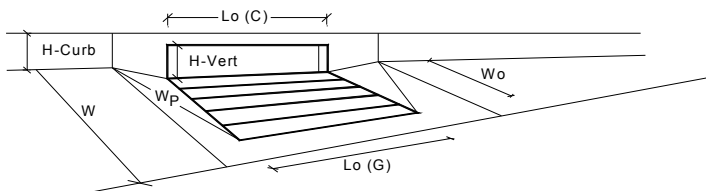
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-41



Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.000$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> <tr> <td style="text-align: center; padding: 2px;">17.0</td> <td style="text-align: center; padding: 2px;">17.0</td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	17.0	17.0	
Minor Storm	Major Storm	ft					
17.0	17.0						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">inches</th> </tr> <tr> <td style="text-align: center; padding: 2px;">5.6</td> <td style="text-align: center; padding: 2px;">7.9</td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	5.6	7.9	
Minor Storm	Major Storm	inches					
5.6	7.9						
Check boxes are not applicable in SUMP conditions	<input type="checkbox"/> <input type="checkbox"/>						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Q <sub>allow</sub>	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">cfs</th> </tr> <tr> <td style="text-align: center; padding: 2px;">SUMP</td> <td style="text-align: center; padding: 2px;">SUMP</td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	SUMP	SUMP	
Minor Storm	Major Storm	cfs					
SUMP	SUMP						

## INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	5.6	7.9	inches
<b>Grate Information</b>	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>	MINOR	MAJOR	
Length of a Unit Curb Opening	20.00	20.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.30	0.49	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.53	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	0.76	0.89	
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>	MINOR	MAJOR	
<b>Q<sub>a</sub></b>	10.3	25.1	cfs
<b>Q<sub>PEAK REQUIRED</sub></b>	9.3	27.7	cfs

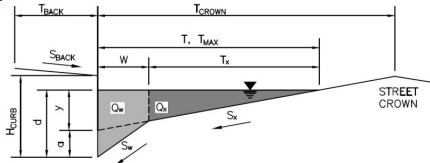
WARNING: Inlet Capacity less than Q Peak for Major Storm

inlet overtops and flows to Inlet DP-43

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

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

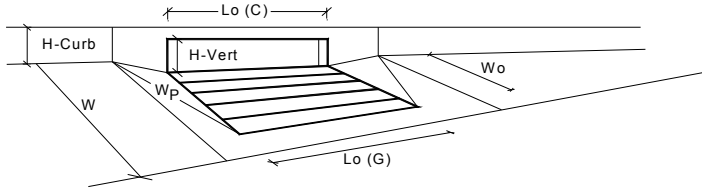
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-43



Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 35.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.000$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="text-align: center;">Minor Storm</th> <th style="text-align: center;">Major Storm</th> <th></th> </tr> <tr> <td style="text-align: center;"><math>T_{MAX} = 35.0</math></td> <td style="text-align: center;"><math>35.0</math></td> <td style="text-align: center;">ft</td> </tr> </table>	Minor Storm	Major Storm		$T_{MAX} = 35.0$	$35.0$	ft
Minor Storm	Major Storm						
$T_{MAX} = 35.0$	$35.0$	ft					
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="text-align: center;">Minor Storm</th> <th style="text-align: center;">Major Storm</th> <th></th> </tr> <tr> <td style="text-align: center;"><math>d_{MAX} = 6.0</math></td> <td style="text-align: center;"><math>7.9</math></td> <td style="text-align: center;">inches</td> </tr> </table>	Minor Storm	Major Storm		$d_{MAX} = 6.0$	$7.9$	inches
Minor Storm	Major Storm						
$d_{MAX} = 6.0$	$7.9$	inches					
Check boxes are not applicable in SUMP conditions	<input type="checkbox"/> <input type="checkbox"/>						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Q <sub>allow</sub>	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="text-align: center;">Minor Storm</th> <th style="text-align: center;">Major Storm</th> <th></th> </tr> <tr> <td style="text-align: center;">SUMP</td> <td style="text-align: center;">SUMP</td> <td style="text-align: center;">cfs</td> </tr> </table>	Minor Storm	Major Storm		SUMP	SUMP	cfs
Minor Storm	Major Storm						
SUMP	SUMP	cfs					

## INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



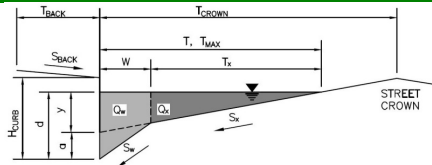
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	5.6	7.9	inches
<b>Grate Information</b>	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>	MINOR	MAJOR	
Length of a Unit Curb Opening	20.00	20.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.30	0.49	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.53	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	0.76	0.89	
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>	MINOR	MAJOR	
<b>Q<sub>a</sub></b>	10.3	25.0	cfs
Q <sub>PEAK REQUIRED</sub>	10.0	24.5	cfs

Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)

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

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

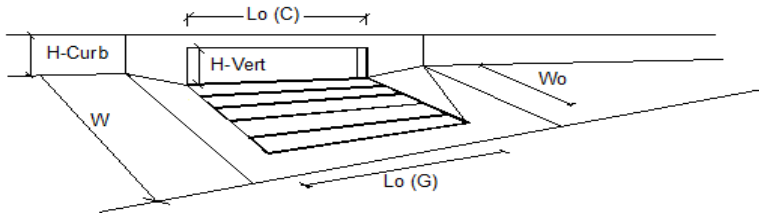
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-47



Gutter Geometry (Enter data in the blue cells)													
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft												
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft												
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$												
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches												
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft												
Gutter Width	$W = 2.00$ ft												
Street Transverse Slope	$S_x = 0.020$ ft/ft												
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft												
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.010$ ft/ft												
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$												
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> <th></th> </tr> </thead> <tbody> <tr> <td><math>T_{MAX} =</math></td> <td>17.0</td> <td>17.0</td> <td>ft</td> </tr> <tr> <td><math>d_{MAX} =</math></td> <td>5.6</td> <td>7.9</td> <td>inches</td> </tr> </tbody> </table>		Minor Storm	Major Storm		$T_{MAX} =$	17.0	17.0	ft	$d_{MAX} =$	5.6	7.9	inches
	Minor Storm	Major Storm											
$T_{MAX} =$	17.0	17.0	ft										
$d_{MAX} =$	5.6	7.9	inches										
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm													
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/> check = yes												
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>													
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>													
	<table border="1"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> <th></th> </tr> </thead> <tbody> <tr> <td><math>Q_{allow} =</math></td> <td>10.2</td> <td>31.5</td> <td>cfs</td> </tr> </tbody> </table>		Minor Storm	Major Storm		$Q_{allow} =$	10.2	31.5	cfs				
	Minor Storm	Major Storm											
$Q_{allow} =$	10.2	31.5	cfs										
<p><b>Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'</b></p> <p><b>Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'</b></p>													

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017

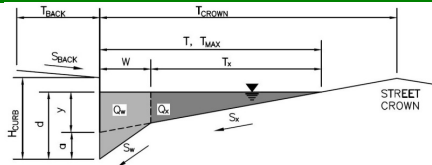


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	6.1	9.1	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	1.4	7.3	cfs
Capture Percentage = $Q_i/Q_c$ =	81	56	%

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

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

Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-48

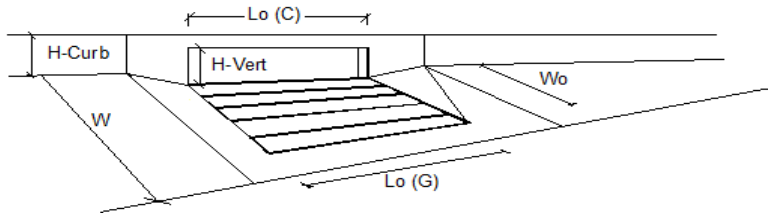


<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="8.0"/> ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.015"/>						
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft						
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft						
Street Transverse Slope	$S_x = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = $ <input style="width: 50px;" type="text" value="0.015"/> ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.017"/>						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><input style="width: 40px;" type="text" value="17.0"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="17.0"/></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	ft	<input style="width: 40px;" type="text" value="17.0"/>	<input style="width: 40px;" type="text" value="17.0"/>	
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Minor Storm	Major Storm	inches					
<input style="width: 40px;" type="text" value="5.6"/>	<input style="width: 40px;" type="text" value="7.9"/>						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/> check = yes						
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">cfs</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><input style="width: 40px;" type="text" value="12.6"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="38.8"/></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	cfs	<input style="width: 40px;" type="text" value="12.6"/>	<input style="width: 40px;" type="text" value="38.8"/>	
Minor Storm	Major Storm	cfs					
<input style="width: 40px;" type="text" value="12.6"/>	<input style="width: 40px;" type="text" value="38.8"/>						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							



## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



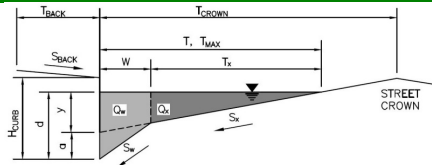
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	3.4	6.2	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	1.4	cfs
Capture Percentage = $Q_i/Q_c$ =	100	81	%

Hydrology spreadsheet has flows of 7.6 at DP-37

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

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

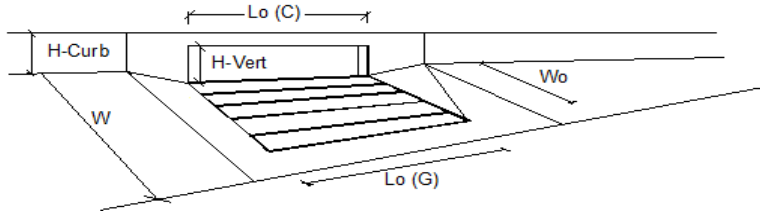
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-49



Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_X = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = 0.028$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> </thead> <tbody> <tr> <td>17.0</td> <td>17.0</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	ft	17.0	17.0	
Minor Storm	Major Storm	ft					
17.0	17.0						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> </thead> <tbody> <tr> <td>5.6</td> <td>7.9</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	inches	5.6	7.9	
Minor Storm	Major Storm	inches					
5.6	7.9						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> Minor Storm <input checked="" type="checkbox"/> Major Storm    check = yes						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> </thead> <tbody> <tr> <td>17.0</td> <td>33.6</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	cfs	17.0	33.6	
Minor Storm	Major Storm	cfs					
17.0	33.6						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



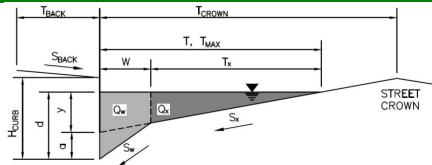
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	7.7	20.8	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	6.9	cfs
Capture Percentage = $Q_i/Q_c$ =	100	75	%

Previously there were 2 DP 49's in hydrology spreadsheet, now there aren't any. Please provide a DP 49 to verify flows against.

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

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

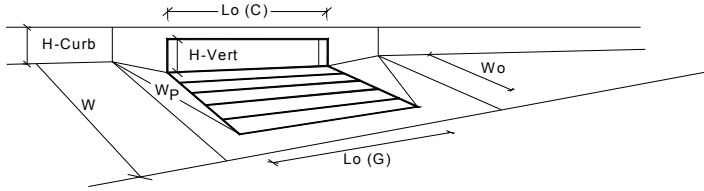
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-51



<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.000$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> <tr> <td style="text-align: center; padding: 2px;">17.0</td> <td style="text-align: center; padding: 2px;">17.0</td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	17.0	17.0	
Minor Storm	Major Storm	ft					
17.0	17.0						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">inches</th> </tr> <tr> <td style="text-align: center; padding: 2px;">5.6</td> <td style="text-align: center; padding: 2px;">7.9</td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	5.6	7.9	
Minor Storm	Major Storm	inches					
5.6	7.9						
Check boxes are not applicable in SUMP conditions	<input type="checkbox"/> <input type="checkbox"/>						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Q <sub>allow</sub>	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">cfs</th> </tr> <tr> <td style="text-align: center; padding: 2px;">SUMP</td> <td style="text-align: center; padding: 2px;">SUMP</td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	SUMP	SUMP	
Minor Storm	Major Storm	cfs					
SUMP	SUMP						

## INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



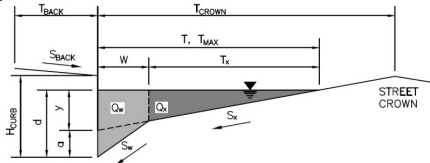
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	4.0	7.1	inches
<b>Grate Information</b>	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>	MINOR	MAJOR	
Length of a Unit Curb Opening	25.00	25.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.17	0.43	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.38	0.67	
Curb Opening Performance Reduction Factor for Long Inlets	0.64	0.85	
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>	MINOR	MAJOR	
<b>Q<sub>a</sub></b>	4.5	24.0	cfs
<b>Q<sub>PEAK REQUIRED</sub></b>	4.5	26.0	cfs

WARNING: Inlet Capacity less than Q Peak for Major Storm

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

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

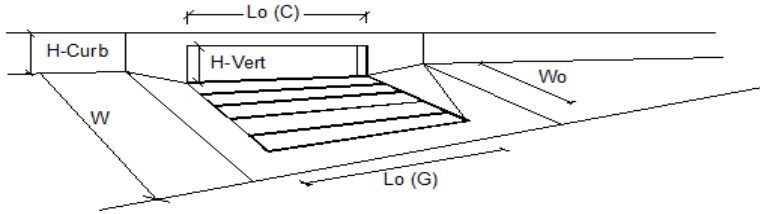
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-53



<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="8.0"/> ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.015"/>						
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft						
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft						
Street Transverse Slope	$S_x = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = $ <input style="width: 50px;" type="text" value="0.014"/> ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.017"/>						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> <tr> <td style="text-align: center;"><input style="width: 50px;" type="text" value="17.0"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="17.0"/></td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	<input style="width: 50px;" type="text" value="17.0"/>	<input style="width: 50px;" type="text" value="17.0"/>	
Minor Storm	Major Storm	ft					
<input style="width: 50px;" type="text" value="17.0"/>	<input style="width: 50px;" type="text" value="17.0"/>						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">inches</th> </tr> <tr> <td style="text-align: center;"><input style="width: 50px;" type="text" value="5.6"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="7.9"/></td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	<input style="width: 50px;" type="text" value="5.6"/>	<input style="width: 50px;" type="text" value="7.9"/>	
Minor Storm	Major Storm	inches					
<input style="width: 50px;" type="text" value="5.6"/>	<input style="width: 50px;" type="text" value="7.9"/>						
Allow Flow Depth at Street Crown (leave blank for no)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="padding-left: 10px;">check = yes</td> </tr> </table>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes			
<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes					
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
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Minor Storm	Major Storm	cfs					
<input style="width: 50px;" type="text" value="12.3"/>	<input style="width: 50px;" type="text" value="37.8"/>						
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management' Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



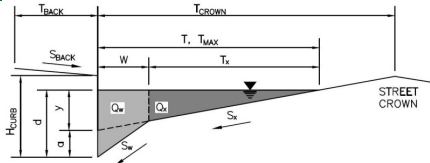
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	9.7	16.2	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.9	10.3	cfs
Capture Percentage = $Q_i/Q_c$ =	91	61	%

Hydrology spreadsheet has Q100=26.5 at DP-53

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

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

Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-54

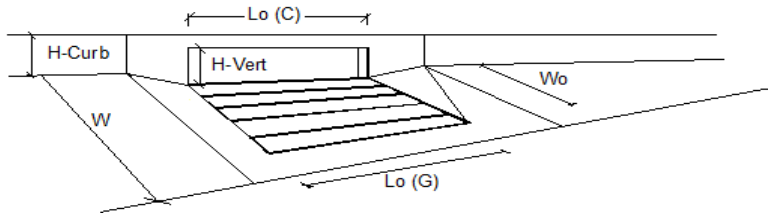


<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="8.0"/> ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.015"/>						
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft						
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft						
Street Transverse Slope	$S_x = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = $ <input style="width: 50px;" type="text" value="0.015"/> ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.017"/>						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><input style="width: 40px;" type="text" value="17.0"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="17.0"/></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	ft	<input style="width: 40px;" type="text" value="17.0"/>	<input style="width: 40px;" type="text" value="17.0"/>	
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Minor Storm	Major Storm	inches					
<input style="width: 40px;" type="text" value="5.6"/>	<input style="width: 40px;" type="text" value="7.9"/>						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/> check = yes						
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">cfs</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><input style="width: 40px;" type="text" value="12.5"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="38.6"/></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	cfs	<input style="width: 40px;" type="text" value="12.5"/>	<input style="width: 40px;" type="text" value="38.6"/>	
Minor Storm	Major Storm	cfs					
<input style="width: 40px;" type="text" value="12.5"/>	<input style="width: 40px;" type="text" value="38.6"/>						
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management' Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							



## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



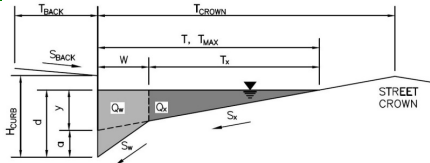
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	11.7	24.0	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.1	13.6	cfs
Capture Percentage = $Q_i/Q_c$ =	99	64	%

DP 54 was removed from hydrology spreadsheet. Please add back in for verification of flows at inlet.

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

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

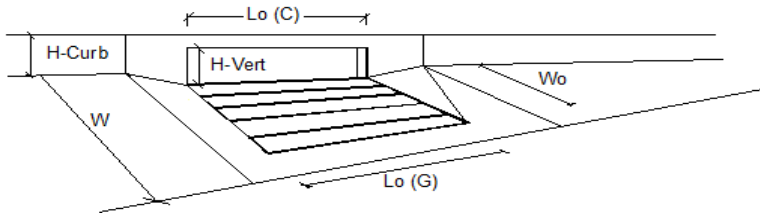
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-56



Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_X = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = 1.210$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> <tr> <td><math>T_{MAX} = 17.0</math></td> <td><math>T_{MAX} = 17.0</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	$T_{MAX} = 17.0$	$T_{MAX} = 17.0$	
Minor Storm	Major Storm	ft					
$T_{MAX} = 17.0$	$T_{MAX} = 17.0$						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> <tr> <td><math>d_{MAX} = 5.6</math></td> <td><math>d_{MAX} = 7.9</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	$d_{MAX} = 5.6$	$d_{MAX} = 7.9$	
Minor Storm	Major Storm	inches					
$d_{MAX} = 5.6$	$d_{MAX} = 7.9$						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> Minor Storm <input checked="" type="checkbox"/> Major Storm    check = yes						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> <tr> <td><math>Q_{allow} = 5.5</math></td> <td><math>Q_{allow} = 10.9</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	$Q_{allow} = 5.5$	$Q_{allow} = 10.9$	
Minor Storm	Major Storm	cfs					
$Q_{allow} = 5.5$	$Q_{allow} = 10.9$						
<p><b>WARNING: MINOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'</b></p> <p><b>WARNING: MAJOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'</b></p>							

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017

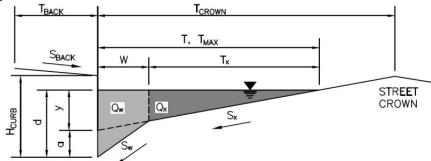


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: WARNING: Q &gt; ALLOWABLE Q FOR MINOR &amp; MAJOR STORM</b>			
Total Inlet Interception Capacity	9.0	23.7	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	9.1	cfs
Capture Percentage = $Q_i/Q_c$ =	100	72	%

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

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

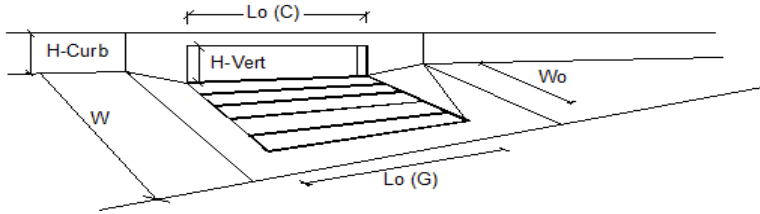
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-57



Gutter Geometry (Enter data in the blue cells)													
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft												
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft												
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$												
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches												
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft												
Gutter Width	$W = 2.00$ ft												
Street Transverse Slope	$S_X = 0.020$ ft/ft												
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = 0.083$ ft/ft												
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = 0.010$ ft/ft												
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$												
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> <th></th> </tr> </thead> <tbody> <tr> <td><math>T_{MAX} =</math></td> <td>17.0</td> <td>17.0</td> <td>ft</td> </tr> <tr> <td><math>d_{MAX} =</math></td> <td>5.6</td> <td>7.9</td> <td>inches</td> </tr> </tbody> </table>		Minor Storm	Major Storm		$T_{MAX} =$	17.0	17.0	ft	$d_{MAX} =$	5.6	7.9	inches
	Minor Storm	Major Storm											
$T_{MAX} =$	17.0	17.0	ft										
$d_{MAX} =$	5.6	7.9	inches										
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm													
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/> check = yes												
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>													
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	Minor Storm	Major Storm											
$Q_{allow} =$	10.2	31.5	cfs										
<p><b>WARNING: MINOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'</b></p> <p><b>Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'</b></p>													

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



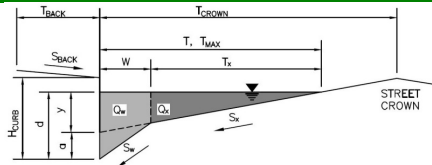
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: WARNING: Q &gt; ALLOWABLE Q FOR MINOR STORM!</b>			
Total Inlet Interception Capacity	11.0	19.0	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	5.7	cfs
Capture Percentage = $Q_i/Q_c$ =	100	79	%

Hydrology spreadsheet has Q100=24.1 at DP-57

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

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

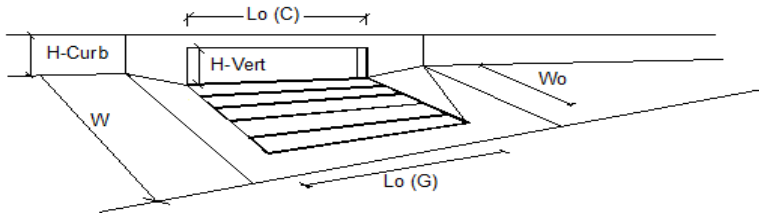
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-59



Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.012$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> </thead> <tbody> <tr> <td><math>T_{MAX} = 17.0</math></td> <td><math>T_{MAX} = 17.0</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	ft	$T_{MAX} = 17.0$	$T_{MAX} = 17.0$	
Minor Storm	Major Storm	ft					
$T_{MAX} = 17.0$	$T_{MAX} = 17.0$						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> </thead> <tbody> <tr> <td><math>d_{MAX} = 5.6</math></td> <td><math>d_{MAX} = 7.9</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	inches	$d_{MAX} = 5.6$	$d_{MAX} = 7.9$	
Minor Storm	Major Storm	inches					
$d_{MAX} = 5.6$	$d_{MAX} = 7.9$						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> Minor Storm <input checked="" type="checkbox"/> Major Storm    check = yes						
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> </thead> <tbody> <tr> <td><math>Q_{allow} = 11.2</math></td> <td><math>Q_{allow} = 34.7</math></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	cfs	$Q_{allow} = 11.2$	$Q_{allow} = 34.7$	
Minor Storm	Major Storm	cfs					
$Q_{allow} = 11.2$	$Q_{allow} = 34.7$						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



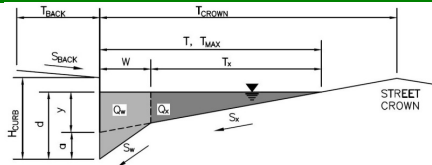
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	5.9	8.9	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	1.1	6.6	cfs
Capture Percentage = $Q_i/Q_c$ =	84	58	%

No DP 59 in hydrology spreadsheet to verify flows against. Please provide

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

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

Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-62

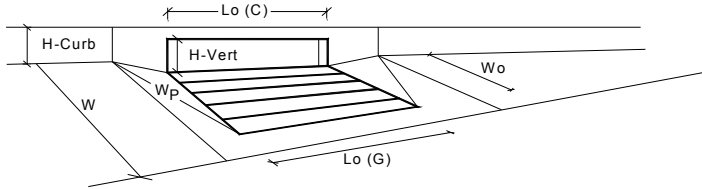


<b>Gutter Geometry (Enter data in the blue cells)</b>													
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft												
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft												
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$												
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches												
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft												
Gutter Width	$W = 2.00$ ft												
Street Transverse Slope	$S_x = 0.020$ ft/ft												
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft												
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.000$ ft/ft												
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$												
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 50%;">Minor Storm</th> <th style="width: 50%;">Major Storm</th> <th style="width: 50px;"></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>T_{MAX} = 17.0</math></td> <td style="text-align: center;"><math>17.0</math></td> <td style="text-align: right;">ft</td> </tr> <tr> <td style="text-align: center;"><math>d_{MAX} = 5.6</math></td> <td style="text-align: center;"><math>7.9</math></td> <td style="text-align: right;">inches</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm		$T_{MAX} = 17.0$	$17.0$	ft	$d_{MAX} = 5.6$	$7.9$	inches	<input type="checkbox"/>	<input type="checkbox"/>	
Minor Storm	Major Storm												
$T_{MAX} = 17.0$	$17.0$	ft											
$d_{MAX} = 5.6$	$7.9$	inches											
<input type="checkbox"/>	<input type="checkbox"/>												
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm													
Check boxes are not applicable in SUMP conditions													
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>													
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 50%;">Minor Storm</th> <th style="width: 50%;">Major Storm</th> <th style="width: 50px;"></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>Q_{allow} = \text{SUMP}</math></td> <td style="text-align: center;"><math>\text{SUMP}</math></td> <td style="text-align: right;">cfs</td> </tr> </tbody> </table>	Minor Storm	Major Storm		$Q_{allow} = \text{SUMP}$	$\text{SUMP}$	cfs						
Minor Storm	Major Storm												
$Q_{allow} = \text{SUMP}$	$\text{SUMP}$	cfs											



## INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



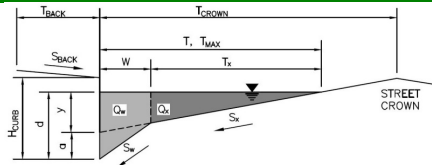
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	5.6	8.0	inches
<b>Grate Information</b>	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>	MINOR	MAJOR	
Length of a Unit Curb Opening	30.00	30.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.30	0.50	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.53	0.75	
Curb Opening Performance Reduction Factor for Long Inlets	0.76	0.89	
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>	MINOR	MAJOR	
<b>Q<sub>a</sub></b>	14.9	37.4	cfs
<b>Q<sub>PEAK REQUIRED</sub></b>	14.3	37.4	cfs

**Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)**

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

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

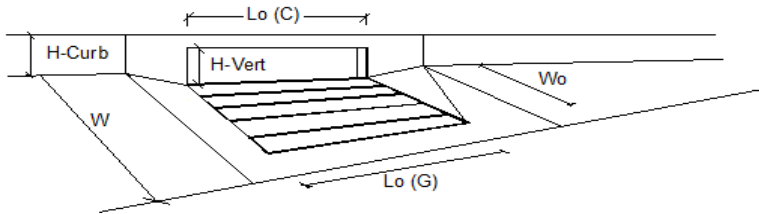
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-63



Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.016$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> <tr> <td><math>T_{MAX} = 17.0</math></td> <td><math>T_{MAX} = 17.0</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	$T_{MAX} = 17.0$	$T_{MAX} = 17.0$	
Minor Storm	Major Storm	ft					
$T_{MAX} = 17.0$	$T_{MAX} = 17.0$						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> <tr> <td><math>d_{MAX} = 5.6</math></td> <td><math>d_{MAX} = 7.9</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	$d_{MAX} = 5.6$	$d_{MAX} = 7.9$	
Minor Storm	Major Storm	inches					
$d_{MAX} = 5.6$	$d_{MAX} = 7.9$						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> Minor Storm <input checked="" type="checkbox"/> Major Storm    check = yes						
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> <tr> <td><math>Q_{allow} = 13.1</math></td> <td><math>Q_{allow} = 39.4</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	$Q_{allow} = 13.1$	$Q_{allow} = 39.4$	
Minor Storm	Major Storm	cfs					
$Q_{allow} = 13.1$	$Q_{allow} = 39.4$						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



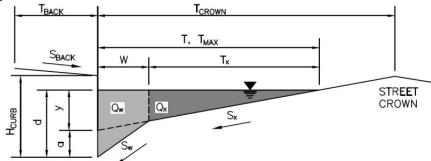
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	10.2	15.9	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	1.3	9.7	cfs
Capture Percentage = $Q_i/Q_c$ =	89	62	%

Previously there were 2 DP-63's show. Now there are none. Please provide a DP-63 in the hydrology spreadsheet for verification of flows at inlet.

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

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

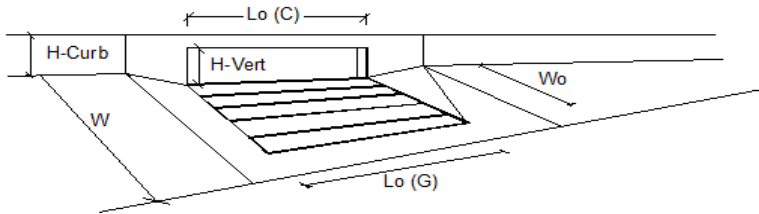
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-64



Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_X = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = 0.040$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> </thead> <tbody> <tr> <td>17.0</td> <td>17.0</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	ft	17.0	17.0	
Minor Storm	Major Storm	ft					
17.0	17.0						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> </thead> <tbody> <tr> <td>5.6</td> <td>7.9</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	inches	5.6	7.9	
Minor Storm	Major Storm	inches					
5.6	7.9						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> Minor Storm <input checked="" type="checkbox"/> Major Storm    check = yes						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							
<b>WARNING: MAJOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'</b>							
Allowable Capacity	<table border="1"> <thead> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> </thead> <tbody> <tr> <td>15.3</td> <td>30.2</td> <td></td> </tr> </tbody> </table>	Minor Storm	Major Storm	cfs	15.3	30.2	
Minor Storm	Major Storm	cfs					
15.3	30.2						

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



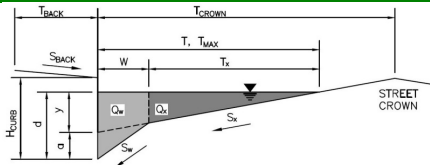
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: WARNING: Q &gt; ALLOWABLE Q FOR MAJOR STORM</b>			
Total Inlet Interception Capacity	9.8	17.5	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.9	13.1	cfs
Capture Percentage = $Q_i/Q_o$ =	92	57	%

Previously there were 2 DP-64's show. Now there are none. Please provide a DP-64 in the hydrology spreadsheet for verification of flows at inlet.

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

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

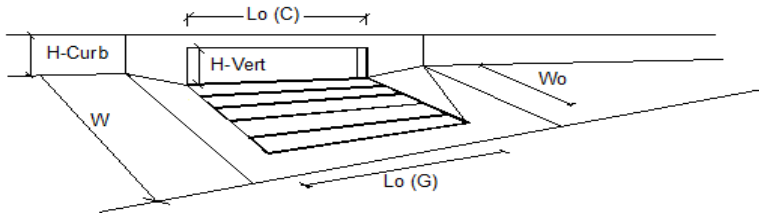
Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-66



Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.020$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> <tr> <td><math>T_{MAX} = 17.0</math></td> <td><math>T_{MAX} = 17.0</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	$T_{MAX} = 17.0$	$T_{MAX} = 17.0$	
Minor Storm	Major Storm	ft					
$T_{MAX} = 17.0$	$T_{MAX} = 17.0$						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> <tr> <td><math>d_{MAX} = 5.6</math></td> <td><math>d_{MAX} = 7.9</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	$d_{MAX} = 5.6$	$d_{MAX} = 7.9$	
Minor Storm	Major Storm	inches					
$d_{MAX} = 5.6$	$d_{MAX} = 7.9$						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> Minor Storm <input checked="" type="checkbox"/> Major Storm    check = yes						
<b>MINOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> <tr> <td><math>Q_{allow} = 14.5</math></td> <td><math>Q_{allow} = 37.2</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	$Q_{allow} = 14.5$	$Q_{allow} = 37.2$	
Minor Storm	Major Storm	cfs					
$Q_{allow} = 14.5$	$Q_{allow} = 37.2$						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							

## INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



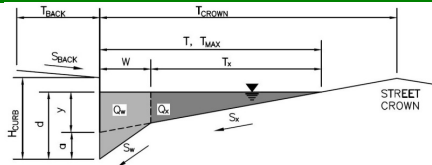
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	1.5	11.8	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	2.7	cfs
Capture Percentage = $Q_i/Q_c$ =	100	81	%

Please provide a DP-66 in hydrology spreadsheet for verification of flows at inlet.

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

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

Project: The Ridge at Lorson Ranch, #100.064  
 Inlet ID: Inlet DP-69

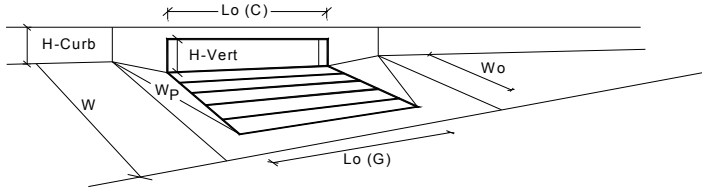


<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 8.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.000$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.017$						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> <tr> <td style="text-align: center; padding: 2px;">17.0</td> <td style="text-align: center; padding: 2px;">17.0</td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	17.0	17.0	
Minor Storm	Major Storm	ft					
17.0	17.0						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">inches</th> </tr> <tr> <td style="text-align: center; padding: 2px;">5.6</td> <td style="text-align: center; padding: 2px;">7.9</td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	5.6	7.9	
Minor Storm	Major Storm	inches					
5.6	7.9						
Check boxes are not applicable in SUMP conditions	<input type="checkbox"/> <input type="checkbox"/>						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
Q <sub>allow</sub>	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">cfs</th> </tr> <tr> <td style="text-align: center; padding: 2px;">SUMP</td> <td style="text-align: center; padding: 2px;">SUMP</td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	SUMP	SUMP	
Minor Storm	Major Storm	cfs					
SUMP	SUMP						



## INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	5.5	7.8	inches
<b>Grate Information</b>	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>	MINOR	MAJOR	
Length of a Unit Curb Opening	25.00	25.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.29	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.52	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	0.75	0.88	
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>	MINOR	MAJOR	
<b>Q<sub>a</sub></b>	12.0	29.8	cfs
<b>Q<sub>PEAK REQUIRED</sub></b>	7.9	17.3	cfs

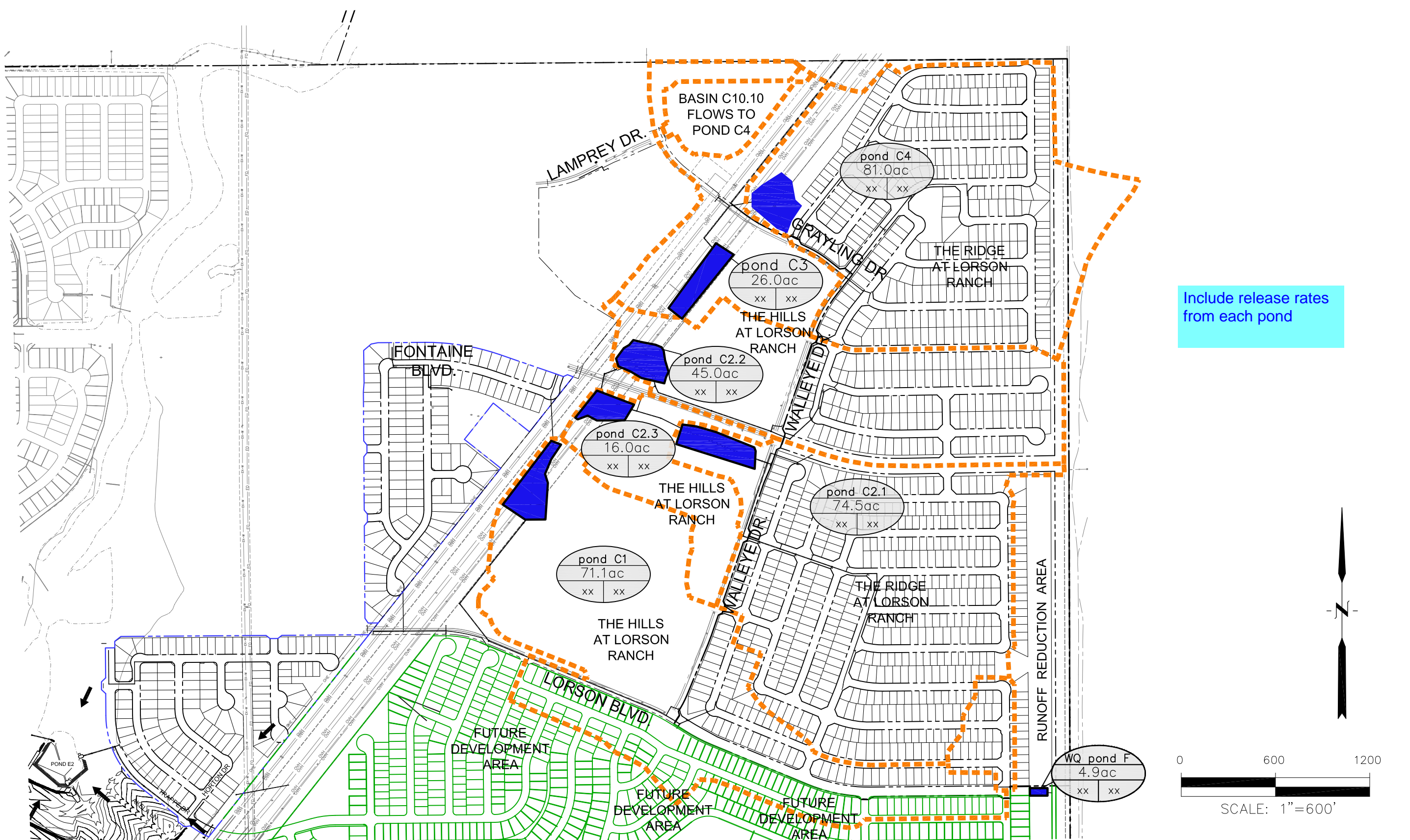
**Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)**

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## APPENDIX D – POND AND ROUTING CALCULATIONS

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Please include spreadsheet/table listing contributing basins and % impervious to each pond.



**CORE**  
**ENGINEERING GROUP**  
 15004 1ST AVENUE S.  
 BURNSVILLE, MN 55306  
 PH: 719.570.1100  
 CONTACT: RICHARD L. SCHINDLER, P.E.  
 EMAIL: Rich@ceg1.com

**THE RIDGE AT LORSON RANCH**  
**WATER QUALITY & POND TRIBUTARY AREAS**

SCALE: NTS	DATE: SEPT, 2021	FIGURE NO. 1
---------------	---------------------	-----------------

**Design Procedure Form: Runoff Reduction**

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 1

**Designer:** Richard Schindler  
**Company:** Core Engineering Group  
**Date:** March 18, 2021  
**Project:** The Ridge at Lorson Ranch  
**Location:** Basin F1

Make note that is representative for a single lot, not the whole basin.

**SITE INFORMATION (User Input in Blue Cells)**

WQCV Rainfall Depth = 0.60 inches  
 Depth of Average Runoff Producing Storm,  $d_0$  = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA																			
Area ID	res. Lot																			
Downstream Design Point ID	1																			
Downstream BMP Type	None																			
DCIA (ft <sup>2</sup> )	--																			
UIA (ft <sup>2</sup> )	4,500																			
RPA (ft <sup>2</sup> )	7,250																			
SPA (ft <sup>2</sup> )	--																			
HSG A (%)	0%																			
HSG B (%)	100%																			
HSG C/D (%)	0%																			
Average Slope of RPA (ft/ft)	0.060																			
UIA:RPA Interface Width (ft)	145.00																			

**CALCULATED RUNOFF RESULTS**

Area ID	res. Lot																			
UIA:RPA Area (ft <sup>2</sup> )	11,750																			
L / W Ratio	0.56																			
UIA / Area	0.3830																			
Runoff (in)	0.00																			
Runoff (ft <sup>3</sup> )	0																			
Runoff Reduction (ft <sup>3</sup> )	188																			

**CALCULATED WQCV RESULTS**

Area ID	res. Lot																			
WQCV (ft <sup>3</sup> )	188																			
WQCV Reduction (ft <sup>3</sup> )	188																			
WQCV Reduction (%)	100%																			
Untreated WQCV (ft <sup>3</sup> )	0																			

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

Downstream Design Point ID	1																			
DCIA (ft <sup>2</sup> )	0																			
UIA (ft <sup>2</sup> )	4,500																			
RPA (ft <sup>2</sup> )	7,250																			
SPA (ft <sup>2</sup> )	0																			
Total Area (ft <sup>2</sup> )	11,750																			
Total Impervious Area (ft <sup>2</sup> )	4,500																			
WQCV (ft <sup>3</sup> )	188																			
WQCV Reduction (ft <sup>3</sup> )	188																			
WQCV Reduction (%)	100%																			
Untreated WQCV (ft <sup>3</sup> )	0																			

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

Total Area (ft <sup>2</sup> )	11,750
Total Impervious Area (ft <sup>2</sup> )	4,500
WQCV (ft <sup>3</sup> )	188
WQCV Reduction (ft <sup>3</sup> )	188
WQCV Reduction (%)	100%
Untreated WQCV (ft <sup>3</sup> )	0

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

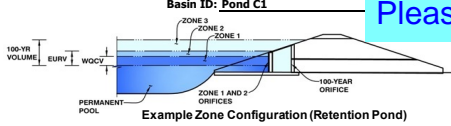
MHFD-Detention, Version 4.02 (February 2020)

Project: **The Hills at Lorson Ranch**

Basin ID: **Pond C1**

Please label as existing

pond bottom=5743.40



**Watershed Information**

Selected BMP Type =	<b>EDB</b>	
Watershed Area =	71.10	acres
Watershed Length =	4,800	ft
Watershed Length to Centroid =	2,100	ft
Watershed Slope =	0.040	ft/ft
Watershed Imperviousness =	55.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Water Quality Capture Volume (WQCV) =	1.306	acre-feet
Excess Urban Runoff Volume (EURV) =	4.212	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	3.975	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	5.580	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	6.975	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	8.792	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	10.293	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	12.175	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	16.033	acre-feet
Approximate 2-yr Detention Volume =	3.210	acre-feet
Approximate 5-yr Detention Volume =	4.365	acre-feet
Approximate 10-yr Detention Volume =	5.698	acre-feet
Approximate 25-yr Detention Volume =	6.193	acre-feet
Approximate 50-yr Detention Volume =	6.465	acre-feet
Approximate 100-yr Detention Volume =	7.133	acre-feet

**Optional User Overrides**

		acre-feet
		acre-feet
	1.19	inches
	1.50	inches
	1.75	inches
	2.00	inches
	2.25	inches
	2.52	inches
		inches

**Define Zones and Basin Geometry**

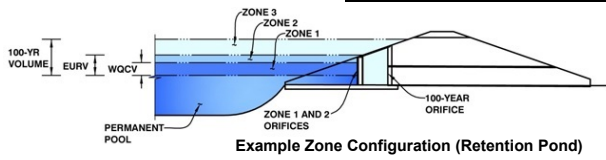
Zone 1 Volume (WQCV) =	1.306	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.906	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	3.574	acre-feet
Total Detention Basin Volume =	7.786	acre-feet
Initial Surcharge Volume (ISV) =	user	ft <sup>3</sup>
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H <sub>total</sub> ) =	user	ft
Depth of Trickle Channel (H <sub>TC</sub> ) =	user	ft
Slope of Trickle Channel (S <sub>TC</sub> ) =	user	ft/ft
Slopes of Main Basin Sides (S <sub>main</sub> ) =	user	H:V
Basin Length-to-Width Ratio (R <sub>L/W</sub> ) =	user	
Initial Surcharge Area (A <sub>ISV</sub> ) =	user	ft <sup>2</sup>
Surcharge Volume Length (L <sub>ISV</sub> ) =	user	ft
Surcharge Volume Width (W <sub>ISV</sub> ) =	user	ft
Depth of Basin Floor (H <sub>FLOOR</sub> ) =	user	ft
Length of Basin Floor (L <sub>FLOOR</sub> ) =	user	ft
Width of Basin Floor (W <sub>FLOOR</sub> ) =	user	ft
Area of Basin Floor (A <sub>FLOOR</sub> ) =	user	ft <sup>2</sup>
Volume of Basin Floor (V <sub>FLOOR</sub> ) =	user	ft <sup>3</sup>
Depth of Main Basin (H <sub>MAIN</sub> ) =	user	ft
Length of Main Basin (L <sub>MAIN</sub> ) =	user	ft
Width of Main Basin (W <sub>MAIN</sub> ) =	user	ft
Area of Main Basin (A <sub>MAIN</sub> ) =	user	ft <sup>2</sup>
Volume of Main Basin (V <sub>MAIN</sub> ) =	user	ft <sup>3</sup>
Calculated Total Basin Volume (V <sub>total</sub> ) =	user	acre-feet

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft <sup>2</sup> )	Optional Override Area (ft <sup>2</sup> )	Area (acre)	Volume (ft <sup>3</sup> )	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	40	0.001		
5743.73	--	0.33	--	--	--	52	0.001	15	0.000
5744	--	0.60	--	--	--	300	0.007	63	0.001
5745	--	1.60	--	--	--	4,017	0.092	2,221	0.051
5746	--	2.60	--	--	--	26,320	0.604	17,389	0.399
5747	--	3.60	--	--	--	56,078	1.287	58,588	1.345
5748	--	4.60	--	--	--	62,238	1.429	117,746	2.703
5749	--	5.60	--	--	--	66,563	1.528	182,147	4.182
5750	--	6.60	--	--	--	70,969	1.629	250,913	5.760
5751	--	7.60	--	--	--	75,495	1.733	324,145	7.441
5752	--	8.60	--	--	--	80,136	1.840	401,960	9.228
5753	--	9.60	--	--	--	85,057	1.953	484,557	11.124
5754	--	10.60	--	--	--	90,000	2.066	572,085	13.133
5755	--	11.60	--	--	--	95,000	2.181	664,585	15.257
5756	--	12.60	--	--	--	100,000	2.296	762,085	17.495

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.02 (February 2020)

**Project: The Hills at Lorson Ranch**  
**Basin ID: Pond C1**



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.57	1.306	Orifice Plate
Zone 2 (EURV)	5.63	2.906	Rectangular Orifice
Zone 3 (100+1/2WQCV)	7.80	3.574	Weir&Pipe (Restrict)
<b>Total (all zones)</b>		<b>7.786</b>	

**User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)**

Underdrain Orifice Invert Depth =  ft (distance below the filtration media surface)  
 Underdrain Orifice Diameter =  inches

**Calculated Parameters for Underdrain**

Underdrain Orifice Area =  ft<sup>2</sup>  
 Underdrain Orifice Centroid =  feet

**User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)**

Invert of Lowest Orifice =  0.00 ft (relative to basin bottom at Stage = 0 ft)  
 Depth at top of Zone using Orifice Plate =  3.57 ft (relative to basin bottom at Stage = 0 ft)  
 Orifice Plate: Orifice Vertical Spacing =  14.60 inches  
 Orifice Plate: Orifice Area per Row =  3.55 sq. inches (use rectangular openings)

**Calculated Parameters for Plate**

WQ Orifice Area per Row =  2.465E-02 ft<sup>2</sup>  
 Elliptical Half-Width =  N/A feet  
 Elliptical Slot Centroid =  N/A feet  
 Elliptical Slot Area =  N/A ft<sup>2</sup>

**User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)**

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.20	2.40					
Orifice Area (sq. inches)	3.55	3.55	3.55					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

**User Input: Vertical Orifice (Circular or Rectangular)**

	Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	3.64	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	5.63	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	6.00	N/A	inches
Vertical Orifice Width =	19.74		inches

**Calculated Parameters for Vertical Orific**

	Zone 2 Rectangular	Not Selected
Vertical Orifice Area =	0.82	N/A
Vertical Orifice Centroid =	0.25	N/A

**User Input: Overflow Weir (Dropbox with Flat or Sloped Gate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe))**

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	6.10	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	5.66	N/A	feet
Overflow Weir Gate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	3.00	N/A	feet
Overflow Gate Open Area % =	70%	N/A	% gate open area/total area
Debris Clogging % =	50%	N/A	%

**Calculated Parameters for Overflow Weir**

	Zone 3 Weir	Not Selected
Height of Gate Upper Edge, H <sub>1</sub> =	6.10	N/A
Overflow Weir Slope Length =	3.00	N/A
Gate Open Area / 100-yr Orifice Area =	9.41	N/A
Overflow Gate Open Area w/o Debris =	11.89	N/A
Overflow Gate Open Area w/ Debris =	5.94	N/A

**User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)**

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	12.10		inches

**Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate**

	Zone 3 Restrictor	Not Selected
Outlet Orifice Area =	1.26	N/A
Outlet Orifice Centroid =	0.57	N/A
Half-Central Angle of Restrictor Plate on Pipe =	1.92	N/A

**User Input: Emergency Spillway (Rectangular or Trapezoidal)**

Spillway Invert Stage =	10.00	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	28.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.16	feet

**Calculated Parameters for Spillway**

Spillway Design Flow Depth =	1.37	feet
Stage at Top of Freeboard =	12.53	feet
Basin Area at Top of Freeboard =	2.29	acres
Basin Volume at Top of Freeboard =	17.33	acre-ft

micropool = 0 = 5743.40

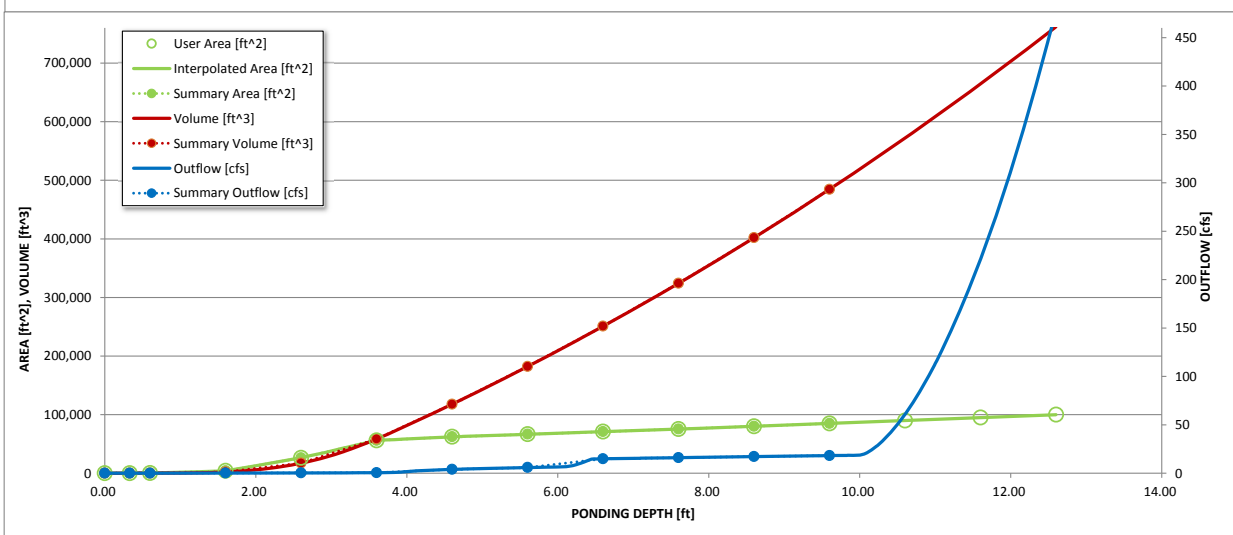
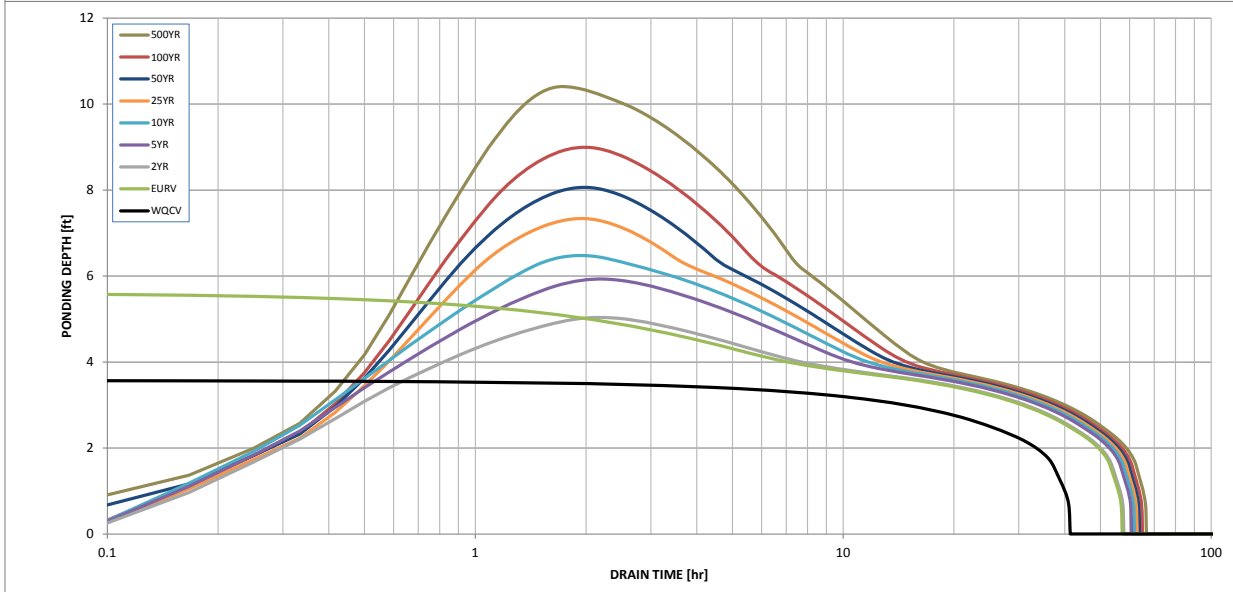
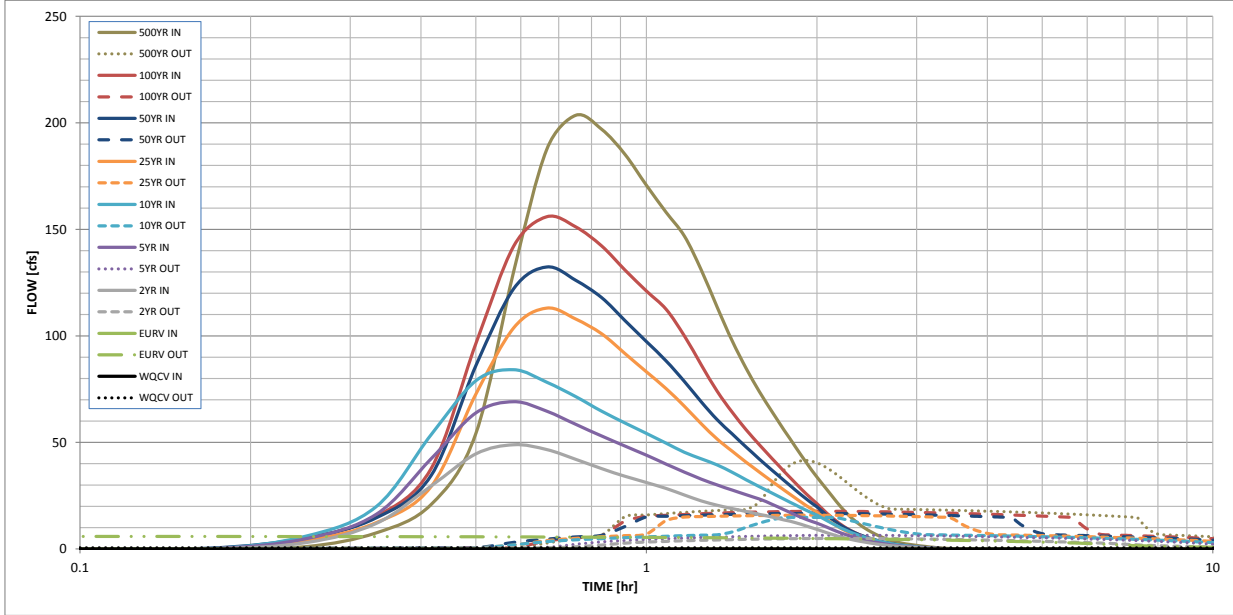
## Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF)

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Design Storm Return Period =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	1.306	4.212	3.975	5.580	6.975	8.792	10.293	12.175
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	3.975	5.580	6.975	8.792	10.293	12.175
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	5.2	14.7	22.8	41.9	52.7	68.0
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A						
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.07	0.21	0.32	0.59	0.74	0.96
Peak Inflow Q (cfs) =	N/A	N/A	48.9	69.1	84.1	113.0	132.4	155.9
Peak Outflow Q (cfs) =	0.5	5.9	4.9	6.4	14.8	15.8	16.7	17.7
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.4	0.6	0.4	0.3	0.3
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	N/A	0.6	0.6	0.6	0.6
Max Velocity through Gate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	50	51	51	51	50	49	48
Time to Drain 99% of Inflow Volume (hours) =	40	54	54	56	57	57	57	58
Maximum Ponding Depth (ft) =	3.57	5.62	5.04	5.93	6.48	7.33	8.06	8.99
Area at Maximum Ponding Depth (acres) =	1.27	1.53	1.47	1.56	1.62	1.71	1.78	1.88
Maximum Volume Stored (acre-ft) =	1.307	4.212	3.327	4.691	5.549	6.977	8.250	9.954

# DETENTION BASIN OUTLET STRUCTURE DESIGN

*MHFD-Depotion, Version 4.00 (December 2019)*



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			







**Design Procedure Form: Extended Detention Basin (EDB)**

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 3

**Designer:** Richard Schindler  
**Company:** Core Engineering Group  
**Date:** April 30, 2020  
**Project:** The Hills at Lorson Ranch  
**Location:** Pond C1

<p>1. Basin Storage Volume</p> <p>A) Effective Imperviousness of Tributary Area, <math>I_a</math></p> <p>B) Tributary Area's Imperviousness Ratio (<math>i = I_a / 100</math>)</p> <p>C) Contributing Watershed Area</p> <p>D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm</p> <p>E) Design Concept (Select EURV when also designing for flood control)</p> <p>F) Design Volume (WQCV) Based on 40-hour Drain Time (<math>V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area)</math>)</p> <p>G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume (<math>V_{WQCV\ OTHER} = (d_6 * V_{DESIGN} / 0.43)</math>)</p> <p>H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)</p> <p>I) NRCS Hydrologic Soil Groups of Tributary Watershed              i) Percentage of Watershed consisting of Type A Soils              ii) Percentage of Watershed consisting of Type B Soils              iii) Percentage of Watershed consisting of Type C/D Soils</p> <p>J) Excess Urban Runoff Volume (EURV) Design Volume              For HSG A: <math>EURV_A = 1.68 * i^{1.28}</math>              For HSG B: <math>EURV_B = 1.36 * i^{1.08}</math>              For HSG C/D: <math>EURV_{C/D} = 1.20 * i^{1.08}</math></p> <p>K) User Input of Excess Urban Runoff Volume (EURV) Design Volume (Only if a different EURV Design Volume is desired)</p>	<p><math>I_a =</math> <input type="text" value="55.0"/> %</p> <p><math>i =</math> <input type="text" value="0.550"/></p> <p>Area = <input type="text" value="76.000"/> ac</p> <p><math>d_6 =</math> <input type="text" value=""/></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Choose One</p> <p><input checked="" type="radio"/> Water Quality Capture Volume (WQCV)</p> <p><input type="radio"/> Excess Urban Runoff Volume (EURV)</p> </div> <p><math>V_{DESIGN} =</math> <input type="text" value="1.396"/> ac-ft</p> <p><math>V_{DESIGN\ OTHER} =</math> <input type="text" value=""/> ac-ft</p> <p><math>V_{DESIGN\ USER} =</math> <input type="text" value=""/> ac-ft</p> <p>HSG <sub>A</sub> = <input type="text" value=""/> %              HSG <sub>B</sub> = <input type="text" value=""/> %              HSG <sub>C/D</sub> = <input type="text" value=""/> %</p> <p>EURV<sub>DESIGN</sub> = <input type="text" value=""/> ac-ft</p> <p>EURV<sub>DESIGN\ USER</sub> = <input type="text" value=""/> ac-ft</p>
<p>2. Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.)</p>	<p>L : W = <input type="text" value="2.0"/> : 1</p>
<p>3. Basin Side Slopes</p> <p>A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred)</p>	<p>Z = <input type="text" value="3.00"/> ft / ft</p> <p align="center"><b>DIFFICULT TO MAINTAIN, INCREASE WHERE POSSIBLE</b></p>
<p>4. Inlet</p> <p>A) Describe means of providing energy dissipation at concentrated inflow locations:</p>	<p>_____</p> <p>_____</p> <p>_____</p>
<p>5. Forebay</p> <p>A) Minimum Forebay Volume (<math>V_{MIN} =</math> <input type="text" value="3%"/> of the WQCV)</p> <p>B) Actual Forebay Volume</p> <p>C) Forebay Depth (<math>D_F =</math> <input type="text" value="30"/> inch maximum)</p> <p>D) Forebay Discharge</p> <p>i) Undetained 100-year Peak Discharge</p> <p>ii) Forebay Discharge Design Flow (<math>Q_F = 0.02 * Q_{100}</math>)</p> <p>E) Forebay Discharge Design</p> <p>F) Discharge Pipe Size (minimum 8-inches)</p> <p>G) Rectangular Notch Width</p>	<p><math>V_{MIN} =</math> <input type="text" value="0.042"/> ac-ft</p> <p><math>V_F =</math> <input type="text" value="0.045"/> ac-ft</p> <p><math>D_F =</math> <input type="text" value="24.0"/> in</p> <p><math>Q_{100} =</math> <input type="text" value="170.00"/> cfs</p> <p><math>Q_F =</math> <input type="text" value="3.40"/> cfs</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Choose One</p> <p><input type="radio"/> Berm With Pipe</p> <p><input checked="" type="radio"/> Wall with Rect. Notch</p> <p><input type="radio"/> Wall with V-Notch Weir</p> </div> <p>Calculated <math>D_p =</math> <input type="text" value=""/> in</p> <p>Calculated <math>W_N =</math> <input type="text" value="9.1"/> in</p>

**Design Procedure Form: Extended Detention Basin (EDB)**

Sheet 2 of 3

**Designer:** Richard Schindler  
**Company:** Core Engineering Group  
**Date:** April 30, 2020  
**Project:** The Hills at Lorson Ranch  
**Location:** Pond C1

<p>6. Trickle Channel</p> <p>A) Type of Trickle Channel</p> <p>F) Slope of Trickle Channel</p>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             Choose One  <input checked="" type="radio"/> Concrete  <input type="radio"/> Soft Bottom         </div> <p>S = <input type="text" value="0.0050"/> ft / ft</p>
<p>7. Micropool and Outlet Structure</p> <p>A) Depth of Micropool (2.5-foot minimum)</p> <p>B) Surface Area of Micropool (10 ft<sup>2</sup> minimum)</p> <p>C) Outlet Type</p> <p>D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention)</p> <p>E) Total Outlet Area</p>	<p>D<sub>M</sub> = <input type="text" value="2.5"/> ft</p> <p>A<sub>M</sub> = <input type="text" value="50"/> sq ft</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             Choose One  <input checked="" type="radio"/> Orifice Plate  <input type="radio"/> Other (Describe):         </div> <hr/> <hr/> <p>D<sub>orifice</sub> = <input type="text" value="1.93"/> inches</p> <p>A<sub>orifice</sub> = <input type="text" value="6.45"/> square inches</p>
<p>8. Initial Surcharge Volume</p> <p>A) Depth of Initial Surcharge Volume (Minimum recommended depth is 4 inches)</p> <p>B) Minimum Initial Surcharge Volume (Minimum volume of 0.3% of the WQCV)</p> <p>C) Initial Surcharge Provided Above Micropool</p>	<p>D<sub>IS</sub> = <input type="text" value="4"/> in</p> <p>V<sub>IS</sub> = <input type="text" value="182"/> cu ft</p> <p>V<sub>s</sub> = <input type="text" value="16.7"/> cu ft</p>
<p>9. Trash Rack</p> <p>A) Water Quality Screen Open Area: <math>A_t = A_{ot} * 38.5 * (e^{-0.095D})</math></p> <p>B) Type of Screen (If specifying an alternative to the materials recommended in the USDCM, indicate "other" and enter the ratio of the total open area to the total screen area for the material specified.)</p> <p style="text-align: right;">Other (Y/N): <input type="text" value="y"/></p> <p>C) Ratio of Total Open Area to Total Area (only for type 'Other')</p> <p>D) Total Water Quality Screen Area (based on screen type)</p> <p>E) Depth of Design Volume (EURV or WQCV) (Based on design concept chosen under 1E)</p> <p>F) Height of Water Quality Screen (H<sub>TR</sub>)</p> <p>G) Width of Water Quality Screen Opening (W<sub>opening</sub>) (Minimum of 12 inches is recommended)</p>	<p>A<sub>t</sub> = <input type="text" value="207"/> square inches</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             Other (Please describe below)         </div> <p>wellscreen stainless</p> <hr/> <hr/> <p>User Ratio = <input type="text" value="0.6"/></p> <p>A<sub>total</sub> = <input type="text" value="345"/> sq. in. <span style="color: blue;">Based on type 'Other' screen ratio</span></p> <p>H = <input type="text" value="3.64"/> feet</p> <p>H<sub>TR</sub> = <input type="text" value="71.68"/> inches</p> <p>W<sub>opening</sub> = <input type="text" value="12.0"/> inches <span style="color: red;">VALUE LESS THAN RECOMMENDED MIN. WIDTH. WIDTH HAS BEEN SET TO 12 INCHES.</span></p>

# Weir Report

## Pond C1 forebay overflow

### Rectangular Weir

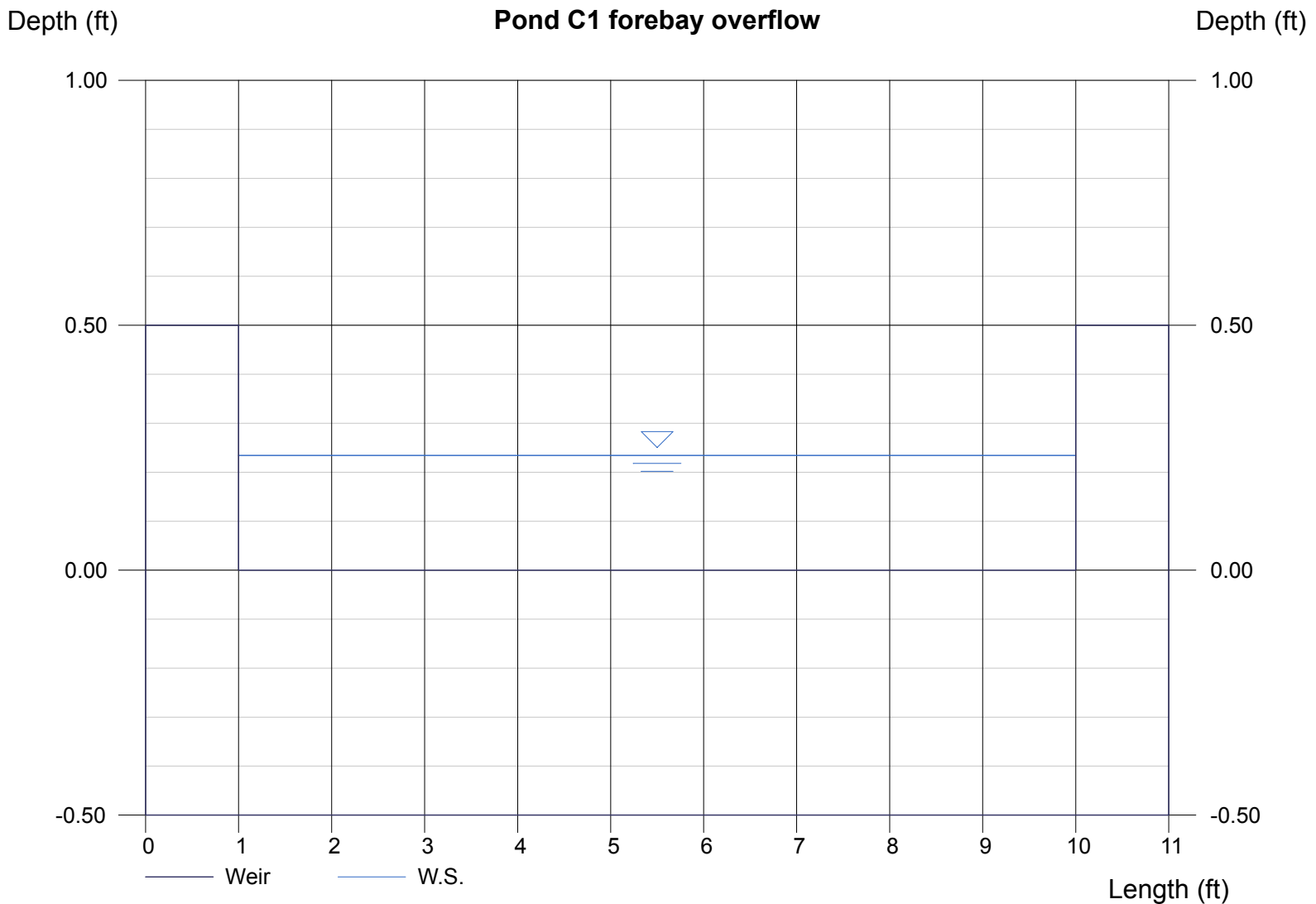
Crest = Sharp  
Bottom Length (ft) = 9.00  
Total Depth (ft) = 0.50

### Highlighted

Depth (ft) = 0.23  
Q (cfs) = 3.400  
Area (sqft) = 2.11  
Velocity (ft/s) = 1.61  
Top Width (ft) = 9.00

### Calculations

Weir Coeff. Cw = 3.33  
Compute by: Known Q  
Known Q (cfs) = 3.40



# Channel Report

Hydraflow Express by Intelisolve

Friday, May 1 2020, 6:2 AM

## pond C1 low flow channel (2 x forebay release = 6.8cfs)

### Rectangular

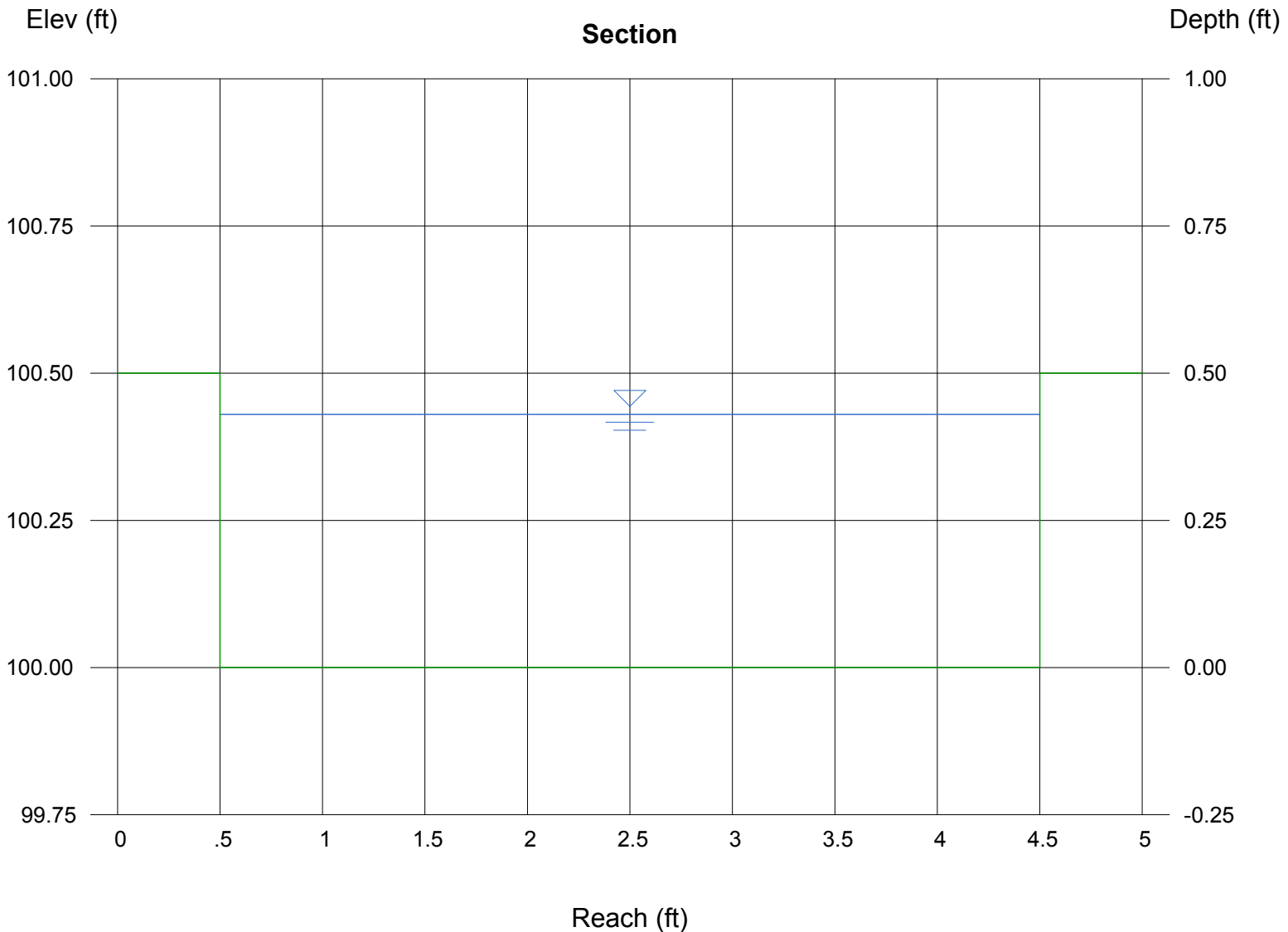
Bottom Width (ft) = 4.00  
Total Depth (ft) = 0.50  
  
Invert Elev (ft) = 100.00  
Slope (%) = 0.50  
N-Value = 0.013

### Calculations

Compute by: Known Q  
Known Q (cfs) = 6.80

### Highlighted

Depth (ft) = 0.43  
Q (cfs) = 6.800  
Area (sqft) = 1.72  
Velocity (ft/s) = 3.95  
Wetted Perim (ft) = 4.86  
Crit Depth,  $Y_c$  (ft) = 0.45  
Top Width (ft) = 4.00  
EGL (ft) = 0.67



DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: The Hills at Lorson Ranch  
Basin ID: Pond C2.1

Please label as existing



Example Zone Configuration (Retention Pond)

top micropool-5760.00

Watershed Information

Selected BMP Type = EDB
Watershed Area = 74.50 acres
Watershed Length = 2,500 ft
Watershed Length to Centroid = 2,000 ft
Watershed Slope = 0.038 ft/ft
Watershed Imperviousness = 55.00% percent
Percentage Hydrologic Soil Group A = 0.0% percent
Percentage Hydrologic Soil Group B = 100.0% percent
Percentage Hydrologic Soil Groups C/D = 0.0% percent
Target WQCV Drain Time = 40.0 hours
Location for 1-hr Rainfall Depths = User Input

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Water Quality Capture Volume (WQCV) = 1.368 acre-feet
Excess Urban Runoff Volume (EURV) = 4.414 acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) = 4.152 acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) = 5.828 acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) = 7.285 acre-feet
25-yr Runoff Volume (P1 = 2 in.) = 9.182 acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) = 10.750 acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) = 12.716 acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) = 16.746 acre-feet
Approximate 2-yr Detention Volume = 3.363 acre-feet
Approximate 5-yr Detention Volume = 4.574 acre-feet
Approximate 10-yr Detention Volume = 5.970 acre-feet
Approximate 25-yr Detention Volume = 6.490 acre-feet
Approximate 50-yr Detention Volume = 6.774 acre-feet
Approximate 100-yr Detention Volume = 7.475 acre-feet

Optional User Overrides

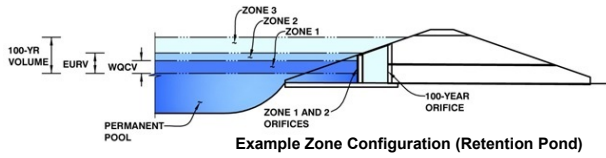
Table with 2 columns: Description (acre-feet, inches) and Value (1.19, 1.50, 1.75, 2.00, 2.25, 2.52 inches)

Main stage-storage table with columns: Stage - Storage Description, Stage (ft), Optional Override Stage (ft), Length (ft), Width (ft), Area (ft^2), Optional Override Area (ft^2), Area (acre), Volume (ft^3), Volume (ac-ft). Rows include Top of Micropool and stages 5760.33 to 5772.

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.02 (February 2020)

**Project: The Hills at Lorson Ranch**  
**Basin ID: Pond C2.1**



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.42	1.368	Orifice Plate
Zone 2 (EURV)	6.20	3.045	Rectangular Orifice
Zone 3 (100+1/2WQCV)	9.04	3.745	Weir&Pipe (Restrict)
<b>Total (all zones)</b>		<b>8.159</b>	

**User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)**

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	N/A	inches

Calculated Parameters for Underdrain	
Underdrain Orifice Area =	N/A ft <sup>2</sup>
Underdrain Orifice Centroid =	N/A feet

**User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)**

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	3.42	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	13.70	inches
Orifice Plate: Orifice Area per Row =	4.06	sq. inches (use rectangular openings)

Calculated Parameters for Plate	
WQ Orifice Area per Row =	2.819E-02 ft <sup>2</sup>
Elliptical Half-Width =	N/A feet
Elliptical Slot Centroid =	N/A feet
Elliptical Slot Area =	N/A ft <sup>2</sup>

**User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)**

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.14	2.28					
Orifice Area (sq. inches)	4.06	4.06	4.06					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

**User Input: Vertical Orifice (Circular or Rectangular)**

	Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	3.42	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	6.20	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	6.00	N/A	inches
Vertical Orifice Width =	14.59		inches

Calculated Parameters for Vertical Orific	
Zone 2 Rectangular	Not Selected
Vertical Orifice Area =	0.61 N/A
Vertical Orifice Centroid =	0.25 N/A

**User Input: Overflow Weir (Dropbox with Flat or Sloped Gate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe)**

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	6.20	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	8.00	N/A	feet
Overflow Weir Gate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	6.00	N/A	feet
Overflow Gate Open Area % =	70%	N/A	% gate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir	
Zone 3 Weir	Not Selected
Height of Gate Upper Edge, H <sub>1</sub> =	6.20 N/A
Overflow Weir Slope Length =	6.00 N/A
Gate Open Area / 100-yr Orifice Area =	6.84 N/A
Overflow Gate Open Area w/o Debris =	33.60 N/A
Overflow Gate Open Area w/ Debris =	16.80 N/A

**User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)**

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	30.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	30.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate	
Zone 3 Restrictor	Not Selected
Outlet Orifice Area =	4.91 N/A
Outlet Orifice Centroid =	1.25 N/A
Half-Central Angle of Restrictor Plate on Pipe =	3.14 N/A

**User Input: Emergency Spillway (Rectangular or Trapezoidal)**

Spillway Invert Stage =	9.30	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	25.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.01	feet

Calculated Parameters for Spillway	
Spillway Design Flow Depth =	1.69 feet
Stage at Top of Freeboard =	12.00 feet
Basin Area at Top of Freeboard =	1.71 acres
Basin Volume at Top of Freeboard =	12.83 acre-ft

top micropool = 5761= stage 0

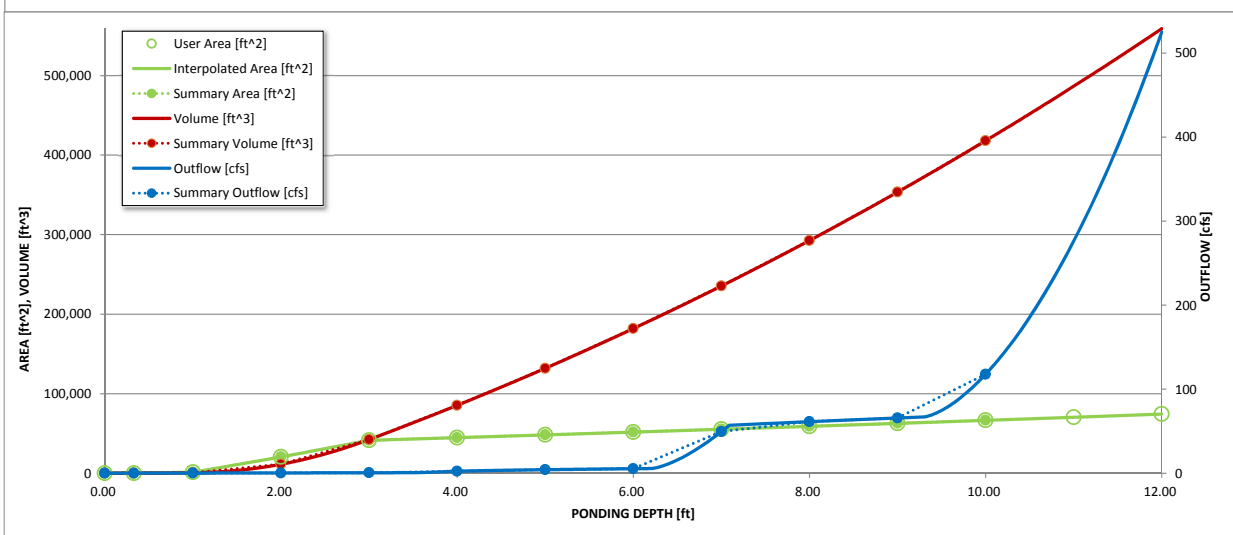
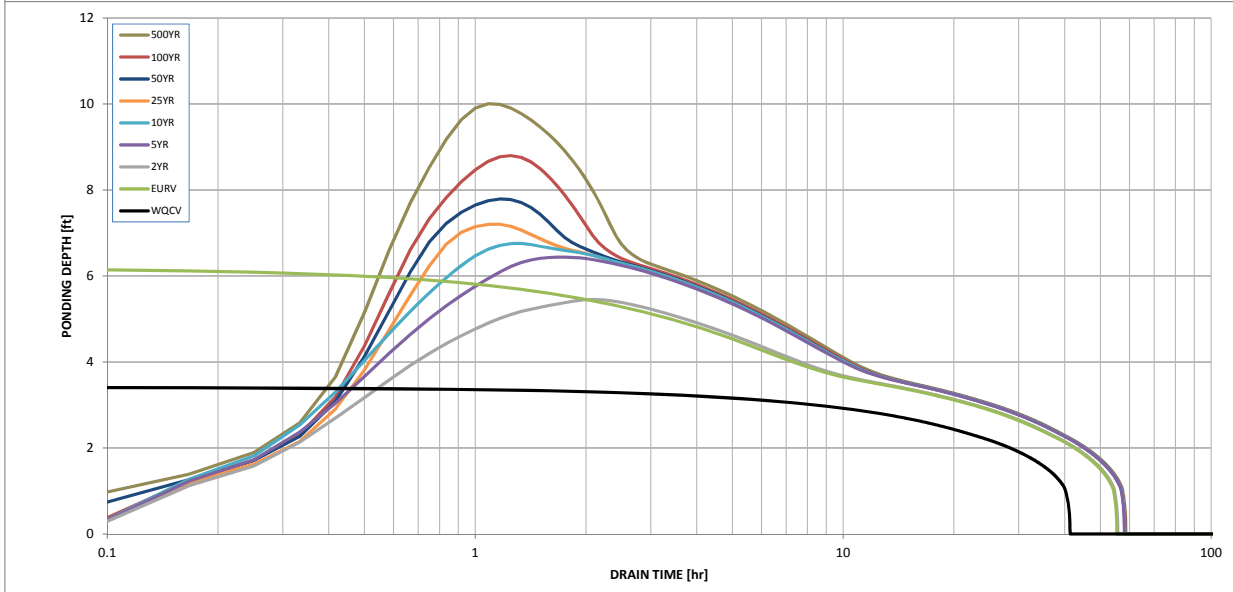
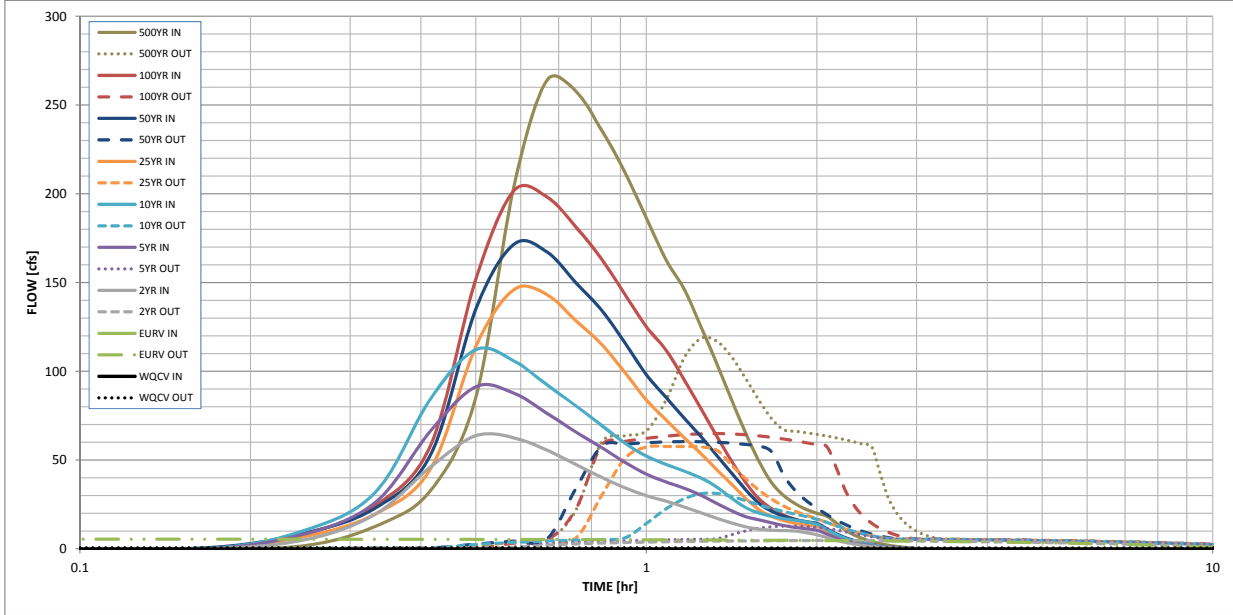
## Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF)

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Design Storm Return Period =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
One-Hour Rainfall Depth (in) =	1.368	4.414	4.152	5.828	7.285	9.182	10.750	12.716
CUHP Runoff Volume (acre-ft) =	N/A	N/A	4.152	5.828	7.285	9.182	10.750	12.716
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	7.5	21.2	32.2	57.6	72.4	92.1
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A						
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A						
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.10	0.28	0.43	0.77	0.97	1.24
Peak Inflow Q (cfs) =	N/A	N/A	63.8	91.4	112.2	146.0	171.6	201.7
Peak Outflow Q (cfs) =	0.6	5.6	4.8	12.8	31.2	57.7	60.5	65.0
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.6	1.0	1.0	0.8	0.7
Structure Controlling Flow =	Vertical Orifice 1	Overflow Weir 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	0.2	0.8	1.5	1.6	1.7
Max Velocity through Gate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	48	48	49	47	45	43	41
Time to Drain 99% of Inflow Volume (hours) =	40	52	53	54	53	52	52	51
Maximum Ponding Depth (ft) =	3.42	6.20	5.45	6.44	6.76	7.20	7.79	8.80
Area at Maximum Ponding Depth (acres) =	0.98	1.20	1.14	1.22	1.25	1.29	1.34	1.42
Maximum Volume Stored (acre-ft) =	1.377	4.415	3.534	4.694	5.090	5.661	6.435	7.829

# DETENTION BASIN OUTLET STRUCTURE DESIGN

*MHFD-Depotion, Version 4.00 (December 2019)*



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			







**Design Procedure Form: Extended Detention Basin (EDB)**

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 3

**Designer:** Richard Schindler  
**Company:** Core Engineering Group  
**Date:** May 2, 2020  
**Project:** The Hills at Lorson Ranch  
**Location:** Pond C2.1

<p>1. Basin Storage Volume</p> <p>A) Effective Imperviousness of Tributary Area, <math>I_a</math></p> <p>B) Tributary Area's Imperviousness Ratio (<math>i = I_a / 100</math>)</p> <p>C) Contributing Watershed Area</p> <p>D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm</p> <p>E) Design Concept (Select EURV when also designing for flood control)</p> <p>F) Design Volume (WQCV) Based on 40-hour Drain Time (<math>V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area)</math>)</p> <p>G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume (<math>V_{WQCV\ OTHER} = (d_6 * V_{DESIGN} * 0.43)</math>)</p> <p>H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)</p> <p>I) NRCS Hydrologic Soil Groups of Tributary Watershed              i) Percentage of Watershed consisting of Type A Soils              ii) Percentage of Watershed consisting of Type B Soils              iii) Percentage of Watershed consisting of Type C/D Soils</p> <p>J) Excess Urban Runoff Volume (EURV) Design Volume              For HSG A: <math>EURV_A = 1.68 * i^{1.28}</math>              For HSG B: <math>EURV_B = 1.36 * i^{1.08}</math>              For HSG C/D: <math>EURV_{C/D} = 1.20 * i^{1.08}</math></p> <p>K) User Input of Excess Urban Runoff Volume (EURV) Design Volume (Only if a different EURV Design Volume is desired)</p>	<p><math>I_a =</math> <input type="text" value="55.0"/> %</p> <p><math>i =</math> <input type="text" value="0.550"/></p> <p>Area = <input type="text" value="74.500"/> ac</p> <p><math>d_6 =</math> <input type="text" value=""/></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;">             Choose One  <input checked="" type="radio"/> Water Quality Capture Volume (WQCV)  <input type="radio"/> Excess Urban Runoff Volume (EURV)         </div> <p><math>V_{DESIGN} =</math> <input type="text" value="1.368"/> ac-ft</p> <p><math>V_{DESIGN\ OTHER} =</math> <input type="text" value=""/> ac-ft</p> <p><math>V_{DESIGN\ USER} =</math> <input type="text" value=""/> ac-ft</p> <p>HSG <sub>A</sub> = <input type="text" value=""/> %              HSG <sub>B</sub> = <input type="text" value=""/> %              HSG <sub>C/D</sub> = <input type="text" value=""/> %</p> <p>EURV<sub>DESIGN</sub> = <input type="text" value=""/> ac-ft</p> <p>EURV<sub>DESIGN\ USER</sub> = <input type="text" value=""/> ac-ft</p>
<p>2. Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.)</p>	<p>L : W = <input type="text" value="2.0"/> : 1</p>
<p>3. Basin Side Slopes</p> <p>A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred)</p>	<p>Z = <input type="text" value="3.00"/> ft / ft  <span style="color: red; font-weight: bold;">DIFFICULT TO MAINTAIN, INCREASE WHERE POSSIBLE</span></p>
<p>4. Inlet</p> <p>A) Describe means of providing energy dissipation at concentrated inflow locations:</p>	<p>_____</p> <p>_____</p> <p>_____</p>
<p>5. Forebay</p> <p>A) Minimum Forebay Volume (<math>V_{MIN} =</math> <input type="text" value="3%"/> of the WQCV)</p> <p>B) Actual Forebay Volume</p> <p>C) Forebay Depth (<math>D_F =</math> <input type="text" value="30"/> inch maximum)</p> <p>D) Forebay Discharge</p> <p style="margin-left: 20px;">i) Undetained 100-year Peak Discharge</p> <p style="margin-left: 20px;">ii) Forebay Discharge Design Flow (<math>Q_F = 0.02 * Q_{100}</math>)</p> <p>E) Forebay Discharge Design</p> <p>F) Discharge Pipe Size (minimum 8-inches)</p> <p>G) Rectangular Notch Width</p>	<p><math>V_{MIN} =</math> <input type="text" value="0.041"/> ac-ft</p> <p><math>V_F =</math> <input type="text" value="0.045"/> ac-ft</p> <p><math>D_F =</math> <input type="text" value="24.0"/> in</p> <p><math>Q_{100} =</math> <input type="text" value="202.00"/> cfs</p> <p><math>Q_F =</math> <input type="text" value="4.04"/> cfs</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;">             Choose One  <input type="radio"/> Berm With Pipe  <input checked="" type="radio"/> Wall with Rect. Notch  <input type="radio"/> Wall with V-Notch Weir         </div> <p>Calculated <math>D_p =</math> <input type="text" value=""/> in</p> <p>Calculated <math>W_N =</math> <input type="text" value="9.9"/> in</p>

**Design Procedure Form: Extended Detention Basin (EDB)**

**Designer:** Richard Schindler  
**Company:** Core Engineering Group  
**Date:** May 2, 2020  
**Project:** The Hills at Lorson Ranch  
**Location:** Pond C2.1

<p>6. Trickle Channel</p> <p>A) Type of Trickle Channel</p> <p>F) Slope of Trickle Channel</p>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             Choose One  <input checked="" type="radio"/> Concrete  <input type="radio"/> Soft Bottom         </div> <p>S = <input style="width: 50px;" type="text" value="0.0050"/> ft / ft</p>
<p>7. Micropool and Outlet Structure</p> <p>A) Depth of Micropool (2.5-foot minimum)</p> <p>B) Surface Area of Micropool (10 ft<sup>2</sup> minimum)</p> <p>C) Outlet Type</p> <p>D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention)</p> <p>E) Total Outlet Area</p>	<p>D<sub>M</sub> = <input style="width: 50px;" type="text" value="2.5"/> ft</p> <p>A<sub>M</sub> = <input style="width: 50px;" type="text" value="50"/> sq ft</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             Choose One  <input checked="" type="radio"/> Orifice Plate  <input type="radio"/> Other (Describe):         </div> <hr/> <hr/> <p>D<sub>orifice</sub> = <input style="width: 50px;" type="text" value="2.01"/> inches</p> <p>A<sub>orifice</sub> = <input style="width: 50px;" type="text" value="12.60"/> square inches</p>
<p>8. Initial Surcharge Volume</p> <p>A) Depth of Initial Surcharge Volume (Minimum recommended depth is 4 inches)</p> <p>B) Minimum Initial Surcharge Volume (Minimum volume of 0.3% of the WQCV)</p> <p>C) Initial Surcharge Provided Above Micropool</p>	<p>D<sub>IS</sub> = <input style="width: 50px;" type="text" value="4"/> in</p> <p>V<sub>IS</sub> = <input style="width: 50px;" type="text" value="179"/> cu ft</p> <p>V<sub>s</sub> = <input style="width: 50px;" type="text" value="16.7"/> cu ft</p>
<p>9. Trash Rack</p> <p>A) Water Quality Screen Open Area: <math>A_t = A_{ot} * 38.5 * (e^{-0.095D})</math></p> <p>B) Type of Screen (If specifying an alternative to the materials recommended in the USDCM, indicate "other" and enter the ratio of the total open area to the total screen area for the material specified.)</p> <p style="text-align: right;">Other (Y/N): <input style="width: 50px;" type="text" value="y"/></p> <p>C) Ratio of Total Open Area to Total Area (only for type 'Other')</p> <p>D) Total Water Quality Screen Area (based on screen type)</p> <p>E) Depth of Design Volume (EURV or WQCV) (Based on design concept chosen under 1E)</p> <p>F) Height of Water Quality Screen (H<sub>TR</sub>)</p> <p>G) Width of Water Quality Screen Opening (W<sub>opening</sub>) (Minimum of 12 inches is recommended)</p>	<p>A<sub>t</sub> = <input style="width: 50px;" type="text" value="401"/> square inches</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; width: fit-content;">             Other (Please describe below)         </div> <p>wellscreen stainless</p> <hr/> <hr/> <p>User Ratio = <input style="width: 50px;" type="text" value="0.6"/></p> <p>A<sub>total</sub> = <input style="width: 50px;" type="text" value="668"/> sq. in. <span style="color: blue;">Based on type 'Other' screen ratio</span></p> <p>H = <input style="width: 50px;" type="text" value="3.42"/> feet</p> <p>H<sub>TR</sub> = <input style="width: 50px;" type="text" value="69.04"/> inches</p> <p>W<sub>opening</sub> = <input style="width: 50px;" type="text" value="12.0"/> inches <span style="color: red;">VALUE LESS THAN RECOMMENDED MIN. WIDTH. WIDTH HAS BEEN SET TO 12 INCHES.</span></p>

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Richard Schindler  
Company: Core Engineering Group  
Date: May 2, 2020  
Project: The Hills at Lorson Ranch  
Location: Pond C2.1

<p>10. Overflow Embankment</p> <p>A) Describe embankment protection for 100-year and greater overtopping:</p> <p>B) Slope of Overflow Embankment (Horizontal distance per unit vertical, 4:1 or flatter preferred)</p>	<p>_____</p> <p>_____</p> <p>_____</p> <p>Ze = <input type="text" value=""/> ft / ft</p>
<p>11. Vegetation</p>	<p>Choose One</p> <p><input type="radio"/> Irrigated</p> <p><input type="radio"/> Not Irrigated</p>
<p>12. Access</p> <p>A) Describe Sediment Removal Procedures</p>	<p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
<p>Notes: _____</p> <p>_____</p> <p>_____</p> <p>_____</p>	

# Channel Report

Hydraflow Express by Intelisolve

Saturday, May 2 2020, 7:49 AM

## pond C2.1 low flow channel (2 x forebay release = 8.08cfs)

### Rectangular

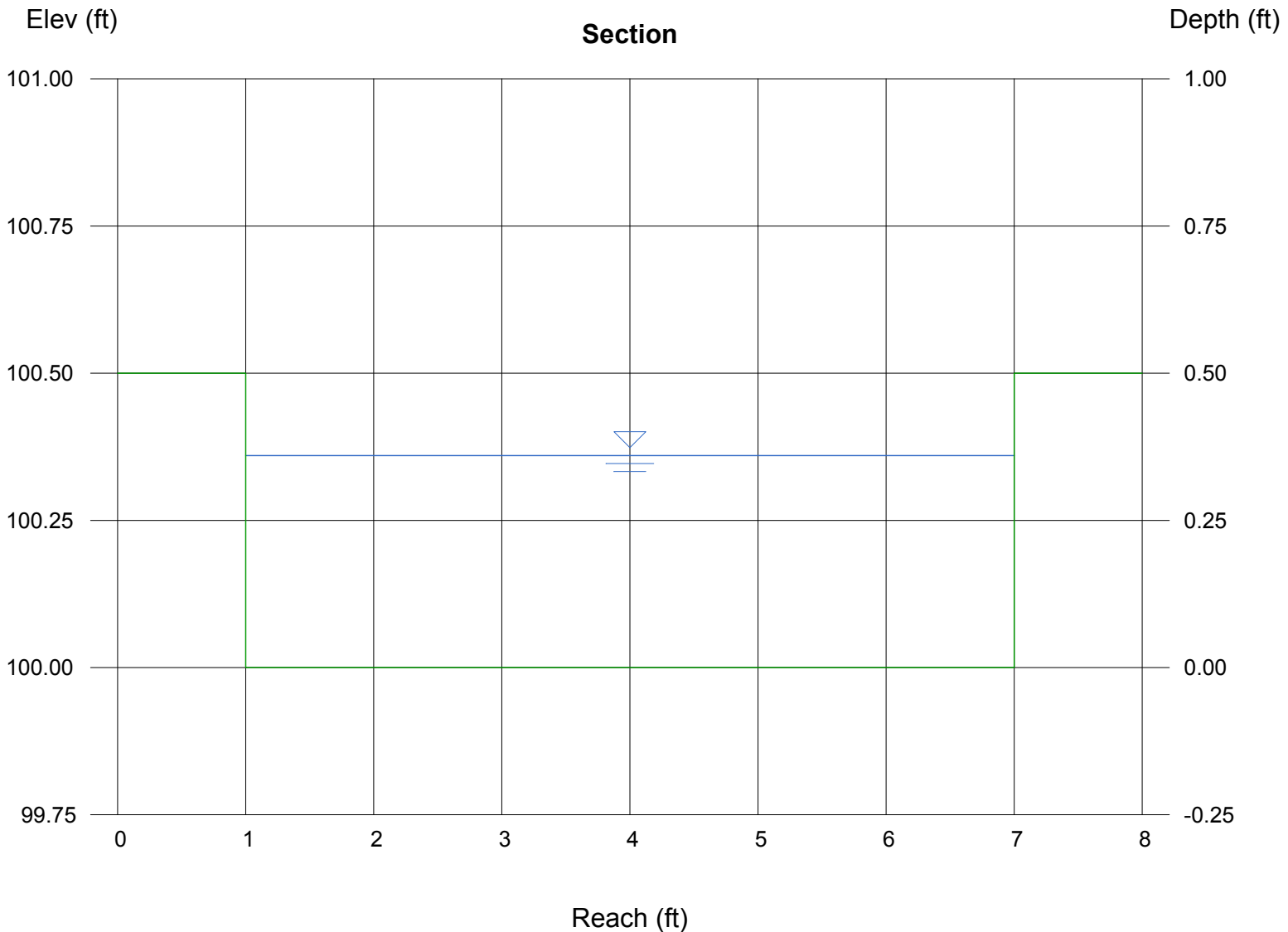
Bottom Width (ft) = 6.00  
Total Depth (ft) = 0.50  
  
Invert Elev (ft) = 100.00  
Slope (%) = 0.50  
N-Value = 0.013

### Highlighted

Depth (ft) = 0.36  
Q (cfs) = 8.080  
Area (sqft) = 2.16  
Velocity (ft/s) = 3.74  
Wetted Perim (ft) = 6.72  
Crit Depth, Yc (ft) = 0.39  
Top Width (ft) = 6.00  
EGL (ft) = 0.58

### Calculations

Compute by: Known Q  
Known Q (cfs) = 8.08



# Weir Report

Hydraflow Express by Intelisolve

Saturday, May 2 2020, 7:52 AM

## Pond C2.1 forebay overflow

### Rectangular Weir

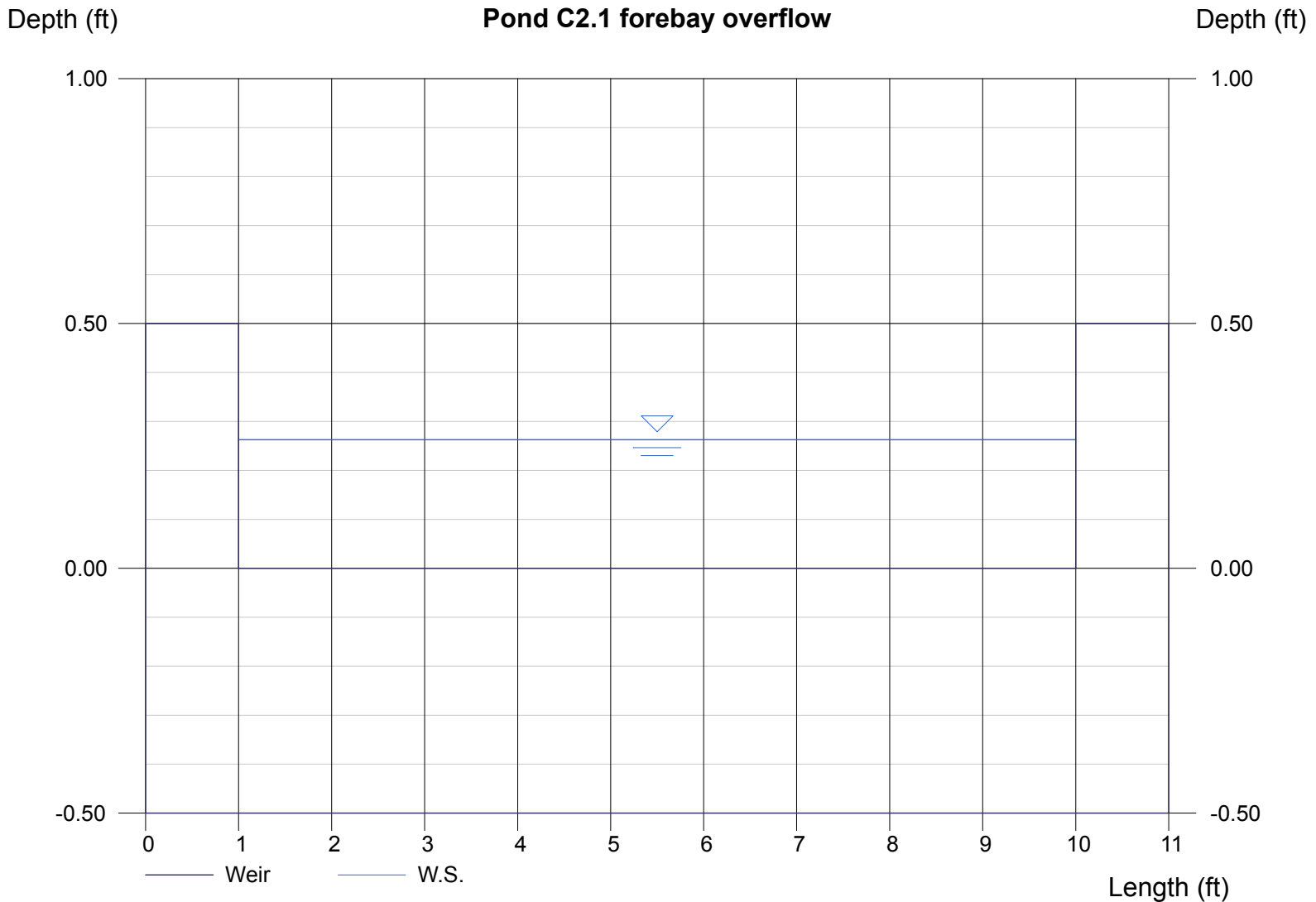
Crest = Sharp  
Bottom Length (ft) = 9.00  
Total Depth (ft) = 0.50

### Highlighted

Depth (ft) = 0.26  
Q (cfs) = 4.040  
Area (sqft) = 2.36  
Velocity (ft/s) = 1.71  
Top Width (ft) = 9.00

### Calculations

Weir Coeff. Cw = 3.33  
Compute by: Known Q  
Known Q (cfs) = 4.04







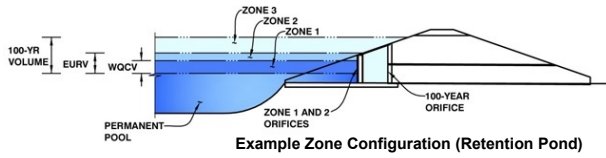
Pond C2.2 Developed Inflow Hydrograph---- Pond C3 outflow + C5 Basin + C7 Basin

Time [hr]	Time [min]	2 Year		5yr		10yr		25yr		50yr		100yr		500yr	
		Pond C3 Outflow2 - [cfs]	CUHP	Combined Hydrograph	Pond C3 Outflow2 - [cfs]	CUHP	Combined Hydrograph	Pond C3 Outflow2 - [cfs]	CUHP	Combined Hydrograph	Pond C3 Outflow2 - [cfs]	CUHP	Combined Hydrograph	Pond C3 Outflow2 - [cfs]	CUHP
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.08	5.00	0.03	0.00	0.03	0.03	0.00	0.03	0.03	0.00	0.03	0.04	0.00	0.03	0.00	0.03
0.17	10.00	0.06	0.00	0.06	0.07	0.00	0.07	0.08	0.00	0.08	0.07	0.00	0.07	0.04	0.11
0.25	15.00	0.10	3.74	3.84	0.11	6.11	6.22	0.11	7.57	7.68	0.10	5.09	5.19	0.10	6.38
0.33	20.00	0.14	13.60	13.74	0.16	18.00	18.16	0.17	21.92	22.09	0.14	13.38	13.52	0.15	15.61
0.42	25.00	0.17	31.11	31.28	0.20	45.07	45.27	0.52	57.54	58.06	0.19	30.50	30.69	0.24	35.87
0.50	30.00	0.24	40.82	41.06	1.21	58.25	59.46	1.95	71.19	73.14	1.68	76.90	78.58	2.14	91.05
0.58	35.00	0.87	38.60	39.47	2.10	53.89	55.99	2.57	65.04	67.61	2.72	92.11	94.83	3.16	108.06
0.67	40.00	1.66	33.84	35.50	2.52	46.24	48.76	2.99	55.88	58.87	3.44	88.47	91.91	3.89	103.22
0.75	45.00	2.01	28.43	30.44	2.81	39.40	42.21	3.35	48.41	51.76	3.99	77.76	81.75	4.43	90.67
0.83	50.00	2.25	23.82	26.07	3.03	33.85	36.88	3.70	41.10	44.80	4.43	69.49	73.92	4.85	81.04
0.92	55.00	2.44	20.11	22.55	3.21	28.41	31.62	4.03	34.74	38.77	4.78	58.63	63.41	5.19	68.45
1.00	60.00	2.59	17.63	20.22	3.38	24.74	28.12	4.33	30.90	35.23	5.08	48.90	53.98	5.49	57.23
1.08	65.00	2.70	15.89	18.59	3.55	22.20	25.75	4.58	28.16	32.74	5.33	42.78	48.11	6.30	50.23
1.17	70.00	2.79	13.63	16.42	3.70	19.91	23.61	4.81	25.58	30.39	5.55	36.41	41.96	14.94	42.84
1.25	75.00	2.87	11.46	14.33	3.84	17.10	20.94	5.01	23.01	28.02	6.25	30.66	36.91	24.32	36.16
1.33	80.00	2.93	9.51	12.44	3.97	14.14	18.11	5.18	19.48	24.66	12.33	24.76	37.09	29.87	29.17
1.42	85.00	2.99	7.93	10.92	4.09	11.69	15.78	5.32	15.58	20.90	19.28	19.60	38.88	30.07	23.03
1.50	90.00	3.05	6.97	10.02	4.20	10.29	14.49	5.44	13.16	18.60	25.17	14.82	39.99	30.25	17.32
1.58	95.00	3.10	6.50	9.60	4.30	9.58	13.88	5.55	11.74	17.29	29.61	11.96	41.57	30.41	13.95
1.67	100.00	3.15	6.27	9.42	4.40	8.56	12.96	5.64	10.76	16.40	29.92	10.21	40.13	30.56	11.85
1.75	105.00	3.20	6.14	9.34	4.48	7.72	12.20	6.07	10.05	16.12	30.03	9.08	39.11	30.69	10.48
1.83	110.00	3.24	6.04	9.28	4.55	7.11	11.66	6.15	9.57	17.72	30.13	8.29	38.42	30.82	9.52
1.92	115.00	3.28	5.34	8.62	4.62	6.67	11.29	10.36	8.98	19.34	30.22	7.79	38.01	30.93	8.90
2.00	120.00	3.32	4.68	8.00	4.67	6.16	10.83	12.00	8.10	20.10	30.31	7.44	37.75	31.04	8.45
2.08	125.00	3.35	3.59	6.94	4.71	4.72	9.43	12.85	6.16	19.01	30.35	5.71	36.06	31.13	6.47
2.17	130.00	3.37	2.65	6.02	4.75	3.44	8.19	13.03	4.45	17.48	30.34	4.14	34.48	31.20	4.68
2.25	135.00	3.39	1.95	5.34	4.77	2.52	7.29	12.75	3.22	15.97	30.26	3.01	33.27	31.26	3.40
2.33	140.00	3.41	1.42	4.83	4.79	1.83	6.62	12.18	2.34	14.52	30.12	2.20	32.32	31.31	2.48
2.42	145.00	3.43	1.02	4.45	4.80	1.28	6.08	11.47	1.67	13.14	29.95	1.56	31.51	31.35	1.75
2.50	150.00	3.44	0.71	4.15	4.81	0.88	5.69	10.72	1.17	11.89	28.62	1.10	29.72	31.39	1.23
2.58	155.00	3.46	0.49	3.95	4.81	0.61	5.42	10.00	0.82	10.82	23.64	0.79	24.43	31.37	0.88
2.67	160.00	3.47	0.31	3.78	4.82	0.41	5.23	9.36	0.53	9.89	19.85	0.52	20.37	31.27	0.59
2.75	165.00	3.48	0.17	3.65	4.82	0.24	5.06	8.83	0.31	9.14	16.93	0.32	17.25	31.13	0.35
2.83	170.00	3.50	0.08	3.58	4.83	0.12	4.95	8.39	0.15	8.54	14.67	0.16	14.83	30.96	0.18
2.92	175.00	3.51	0.03	3.54	4.83	0.04	4.87	8.03	0.05	8.08	12.93	0.05	12.98	30.76	0.06
3.00	180.00	3.52	0.00	3.52	4.84	0.00	4.84	7.72	0.00	7.72	11.61	0.00	11.61	30.54	0.00
3.08	185.00	3.53		3.53	4.84	0.00	4.84	7.47	0.00	7.47	10.59	0.00	10.59	30.31	0.00
3.17	190.00	3.54		3.54	4.85		4.85	7.25		7.25	9.79	0.00	9.79	30.07	0.00
3.25	195.00	3.55		3.55	4.85		4.85	7.06		7.06	9.15	0.00	9.15	29.82	0.00
3.33	200.00	3.56		3.56	4.86		4.86	6.90		6.90	8.63	0.00	8.63	23.98	0.00
3.42	205.00	3.57		3.57	4.86		4.86	6.76		6.76	8.21	0.00	8.21	19.59	0.00
3.50	210.00	3.58		3.58	4.86		4.86	6.63		6.63	7.86		7.86	16.49	0.00
3.58	215.00	3.59		3.59	4.87		4.87	6.52		6.52	7.57		7.57	14.25	
3.67	220.00	3.59		3.59	4.87		4.87	6.42		6.42	7.32		7.32	12.58	
3.75	225.00	3.60		3.60	4.87		4.87	6.32		6.32	7.11		7.11	11.31	
3.83	230.00	3.61		3.61	4.88		4.88	6.24		6.24	6.92		6.92	10.33	
3.92	235.00	3.61		3.61	4.88		4.88	6.17		6.17	6.76		6.76	9.56	
4.00	240.00	3.62		3.62	4.88		4.88	6.10		6.10	6.62		6.62	8.94	
4.08	245.00	3.63		3.63	4.88		4.88	6.04		6.04	6.50		6.50	8.44	
4.17	250.00	3.63		3.63	4.88		4.88	5.98		5.98	6.39		6.39	8.03	
4.25	255.00	3.64		3.64	4.88		4.88	5.93		5.93	6.29		6.29	7.69	
4.33	260.00	3.64		3.64	4.89		4.89	5.88		5.88	6.21		6.21	7.41	
4.42	265.00	3.65		3.65	4.89		4.89	5.84		5.84	6.13		6.13	7.17	
4.50	270.00	3.65		3.65	4.89		4.89	5.80		5.80	6.05		6.05	6.96	
4.58	275.00	3.65		3.65	4.89		4.89	5.76		5.76	5.99		5.99	6.78	
4.67	280.00	3.66		3.66	4.89		4.89	5.74		5.74	5.93		5.93	6.63	
4.75	285.00	3.66		3.66	4.89		4.89	5.71		5.71	5.88		5.88	6.49	
4.83	290.00	3.66		3.66	4.89		4.89	5.70		5.70	5.83		5.83	6.37	
4.92	295.00	3.67		3.67	4.89		4.89	5.69		5.69	5.79		5.79	6.27	
5.00	300.00	3.67		3.67	4.89		4.89	5.69		5.69	5.75		5.75	6.17	
5.08	305.00	3.67		3.67	4.89		4.89	5.69		5.69	5.73		5.73	6.09	
5.17	310.00	3.67		3.67	4.89		4.89	5.68		5.68	5.70		5.70	6.01	
5.25	315.00	3.67		3.67	4.89		4.89	5.68		5.68	5.69		5.69	5.94	
5.33	320.00	3.67		3.67	4.89		4.89	5.68		5.68	5.69		5.69	5.88	
5.42	325.00	3.67		3.67	4.88		4.88	5.67		5.67	5.69		5.69	5.83	
5.50	330.00	3.67		3.67	4.88		4.88	5.67		5.67	5.68		5.68	5.78	
5.58	335.00	3.67		3.67	4.88		4.88	5.66		5.66	5.68		5.68	5.75	
5.67	340.00	3.67		3.67	4.88		4.88	5.66		5.66	5.68		5.68	5.72	
5.75	345.00	3.67		3.67	4.88		4.88	5.65		5.65	5.67		5.67	5.70	

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.02 (February 2020)

**Project: The Hills at Lorson Ranch**  
**Basin ID: Pond C2.2**



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.25	0.827	Orifice Plate
Zone 2 (EURV)	5.17	1.824	Rectangular Orifice
Zone 3 (100+1/2WQCV)	7.28	2.269	Weir&Pipe (Restrict)
<b>Total (all zones)</b>		<b>4.920</b>	

**User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)**

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	N/A	inches

Calculated Parameters for Underdrain	
Underdrain Orifice Area =	N/A ft <sup>2</sup>
Underdrain Orifice Centroid =	N/A feet

**User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)**

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	3.25	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	13.00	inches
Orifice Plate: Orifice Area per Row =	2.21	sq. inches (diameter = 1-11/16 inches)

Calculated Parameters for Plate	
WQ Orifice Area per Row =	1.535E-02 ft <sup>2</sup>
Elliptical Half-Width =	N/A feet
Elliptical Slot Centroid =	N/A feet
Elliptical Slot Area =	N/A ft <sup>2</sup>

**User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)**

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.08	2.17					
Orifice Area (sq. inches)	2.21	2.21	2.21					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

**User Input: Vertical Orifice (Circular or Rectangular)**

	Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	3.25	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	5.17	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	6.00	N/A	inches
Vertical Orifice Width =	6.00	N/A	inches

Calculated Parameters for Vertical Orific	
Zone 2 Rectangular	Not Selected
Vertical Orifice Area =	0.25 N/A
Vertical Orifice Centroid =	0.25 N/A

**User Input: Overflow Weir (Dropbox with Flat or Sloped Gate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe)**

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	7.00	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	8.00	N/A	feet
Overflow Weir Gate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	6.00	N/A	feet
Overflow Gate Open Area % =	70%	N/A	% gate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir	
Zone 3 Weir	Not Selected
Height of Gate Upper Edge, H <sub>1</sub> =	7.00 N/A
Overflow Weir Slope Length =	6.00 N/A
Gate Open Area / 100-yr Orifice Area =	10.58 N/A
Overflow Gate Open Area w/o Debris =	33.60 N/A
Overflow Gate Open Area w/ Debris =	16.80 N/A

**User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)**

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	30.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	18.50	N/A	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate	
Zone 3 Restrictor	Not Selected
Outlet Orifice Area =	3.18 N/A
Outlet Orifice Centroid =	0.87 N/A
Half-Central Angle of Restrictor Plate on Pipe =	1.81 N/A

**User Input: Emergency Spillway (Rectangular or Trapezoidal)**

Spillway Invert Stage =	10.00	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	20.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.49	feet

Calculated Parameters for Spillway	
Spillway Design Flow Depth =	1.51 feet
Stage at Top of Freeboard =	13.00 feet
Basin Area at Top of Freeboard =	1.33 acres
Basin Volume at Top of Freeboard =	8.28 acre-ft

micropool = 0 = 5744.00

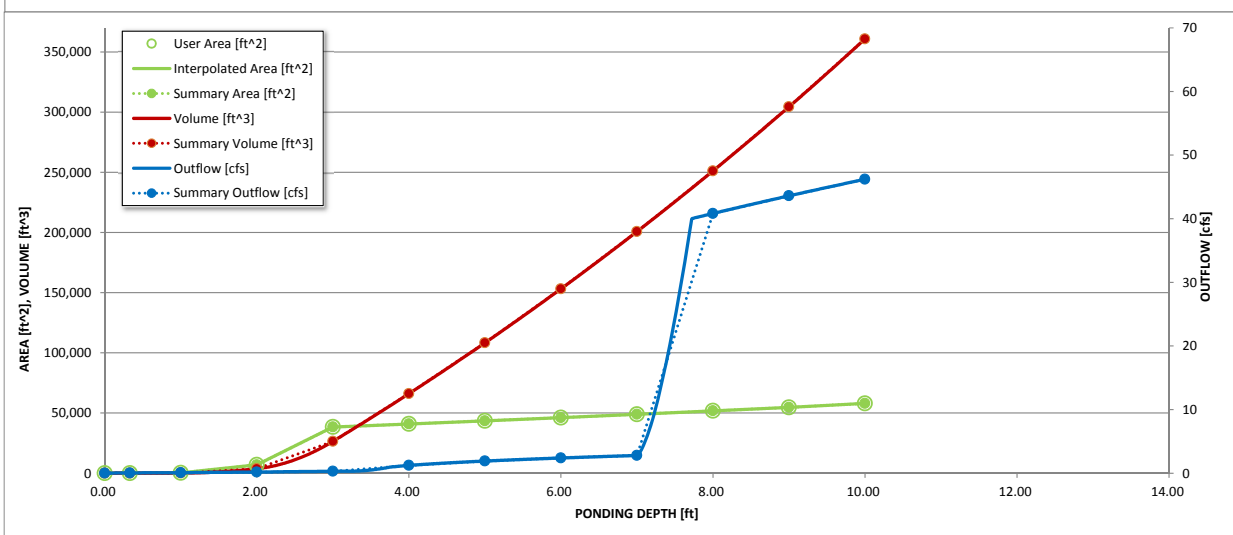
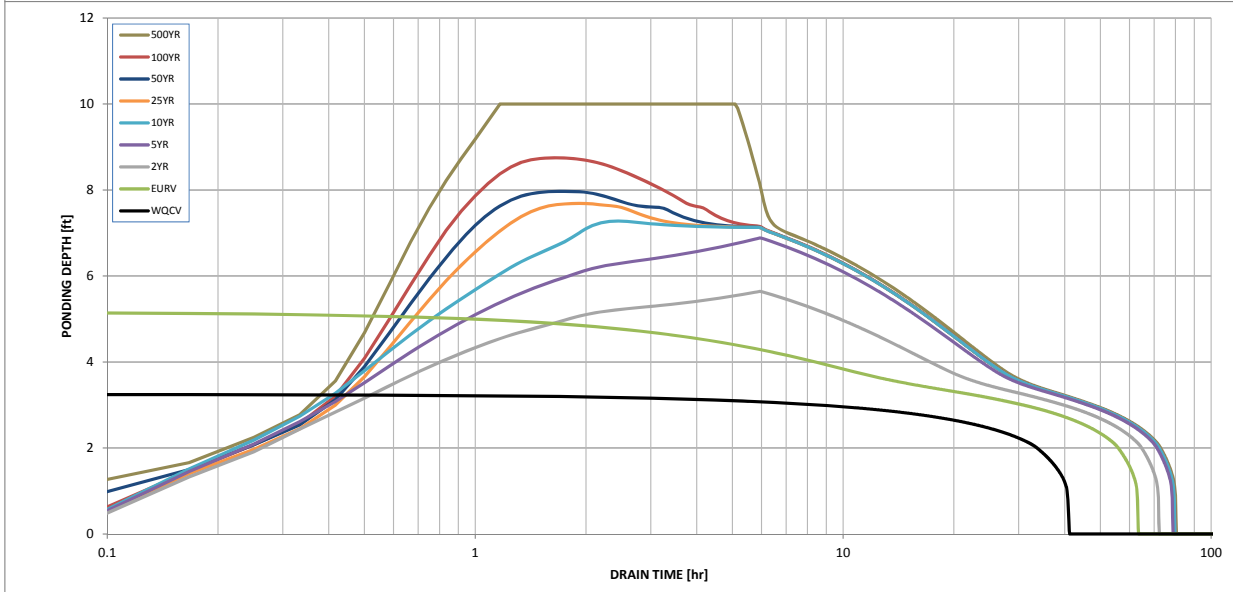
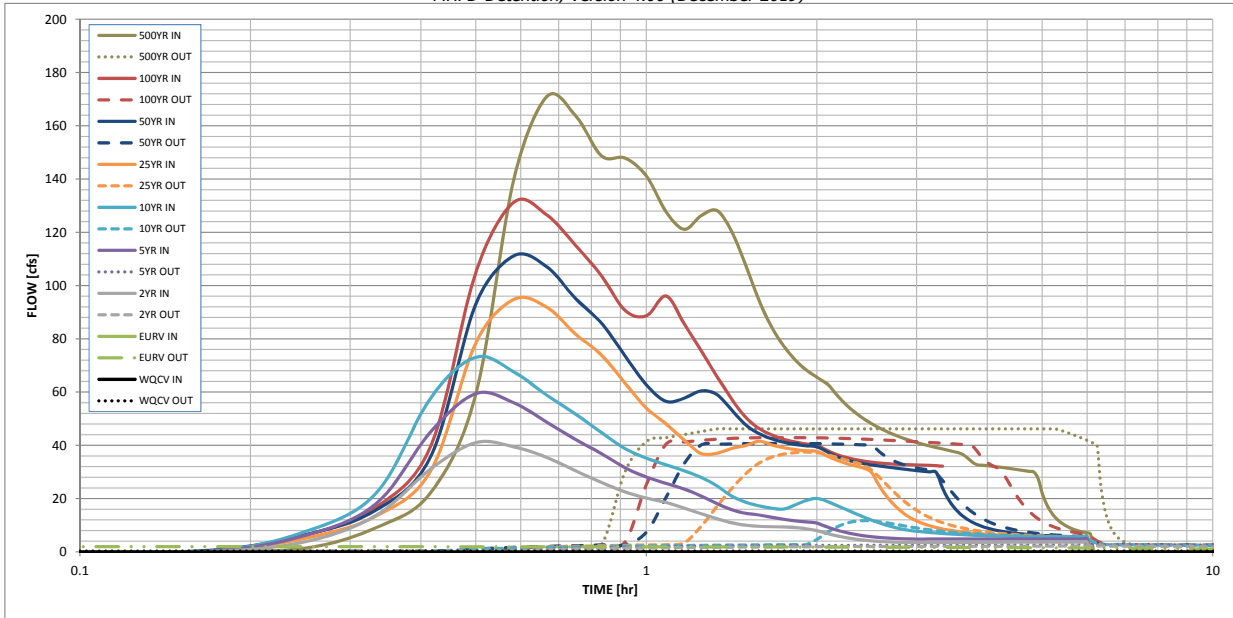
**Routed Hydrograph Results**

*The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF)*

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Design Storm Return Period =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
One-Hour Rainfall Depth (in)	N/A	N/A	2.510	3.521	4.403	5.541	6.487	7.671
CUHP Runoff Volume (acre-ft)	0.827	2.651	2.510	3.521	4.403	5.541	6.487	7.671
User Override Inflow Hydrograph Volume (acre-ft)	N/A	N/A	4.034	5.603	7.467	11.034	14.029	17.717
CUHP Predevelopment Peak Q (cfs)	N/A	N/A	5.0	13.5	20.5	36.5	45.7	58.2
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A						
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	0.11	0.30	0.46	0.81	1.02	1.29
Peak Inflow Q (cfs)	N/A	N/A	41.1	59.5	73.1	94.8	111.2	131.3
Peak Outflow Q (cfs)	0.3	2.0	2.2	2.7	11.7	37.5	40.7	42.9
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	0.2	0.6	1.0	0.9	0.7
Structure Controlling Flow	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Gate 1 (fps)	N/A	N/A	N/A	N/A	0.3	1.0	1.1	1.2
Max Velocity through Gate 2 (fps)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours)	38	56	62	66	64	59	55	50
Time to Drain 99% of Inflow Volume (hours)	40	61	68	73	73	71	69	67
Maximum Ponding Depth (ft)	3.25	5.17	5.64	6.88	7.28	7.69	7.97	8.75
Area at Maximum Ponding Depth (acres)	0.90	1.01	1.04	1.12	1.14	1.17	1.19	1.24
Maximum Volume Stored (acre-ft)	0.829	2.658	3.139	4.475	4.916	5.390	5.720	6.666

# DETENTION BASIN OUTLET STRUCTURE DESIGN

*MHFD-Detention, Version 4.00 (December 2019)*



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

# DETENTION BASIN OUTLET STRUCTURE DESIGN

*Outflow Hydrograph Workbook Filename:*

## Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

Time Interval	SOURCE	CUHP	CUHP	USER	USER	USER	USER	USER	USER	USER
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.03
	0:05:00	0.00	0.00	0.03	0.03	0.03	0.03	0.04	0.03	0.04
	0:10:00	0.00	0.00	0.06	0.07	0.08	0.07	0.50	0.11	1.45
	0:15:00	0.00	0.00	3.84	6.22	7.68	5.19	6.48	6.30	9.13
	0:20:00	0.00	0.00	13.74	18.16	22.09	13.52	15.76	16.84	22.46
	0:25:00	0.00	0.00	31.28	45.27	58.06	30.69	36.11	40.02	59.40
	0:30:00	0.00	0.00	41.06	59.46	73.14	78.58	93.19	105.11	139.94
	0:35:00	0.00	0.00	39.47	55.99	67.61	94.83	111.22	131.32	170.94
	0:40:00	0.00	0.00	35.50	48.76	58.87	91.91	107.11	126.58	163.75
	0:45:00	0.00	0.00	30.44	42.21	51.76	81.75	95.10	115.09	148.71
	0:50:00	0.00	0.00	26.07	36.88	44.80	73.92	85.89	103.64	147.91
	0:55:00	0.00	0.00	22.55	31.62	38.77	63.41	73.64	90.72	141.15
	1:00:00	0.00	0.00	20.22	28.12	35.23	53.98	62.72	88.66	127.73
	1:05:00	0.00	0.00	18.59	25.75	32.74	48.11	56.53	96.09	121.15
	1:10:00	0.00	0.00	16.42	23.61	30.39	41.96	57.78	85.55	126.33
	1:15:00	0.00	0.00	14.33	20.94	28.02	36.91	60.48	75.50	128.13
	1:20:00	0.00	0.00	12.44	18.11	24.66	37.09	59.04	65.72	120.01
	1:25:00	0.00	0.00	10.92	15.78	20.90	38.88	53.10	57.24	107.22
	1:30:00	0.00	0.00	10.02	14.49	18.60	39.99	47.57	50.31	94.07
	1:35:00	0.00	0.00	9.60	13.88	17.29	41.57	44.36	46.27	84.16
	1:40:00	0.00	0.00	9.42	12.96	16.40	40.13	42.41	43.92	77.14
	1:45:00	0.00	0.00	9.34	12.20	16.12	39.11	41.17	42.30	72.01
	1:50:00	0.00	0.00	9.28	11.66	17.72	38.42	40.34	41.24	68.29
	1:55:00	0.00	0.00	8.62	11.29	19.34	38.01	39.83	40.52	65.51
	2:00:00	0.00	0.00	8.00	10.83	20.10	37.75	39.49	40.03	63.22
	2:05:00	0.00	0.00	6.94	9.43	19.01	36.06	37.60	38.17	59.07
	2:10:00	0.00	0.00	6.02	8.19	17.48	34.48	35.88	36.60	55.39
	2:15:00	0.00	0.00	5.34	7.29	15.97	33.27	34.66	35.51	52.45
	2:20:00	0.00	0.00	4.83	6.62	14.52	32.32	33.79	34.73	50.10
	2:25:00	0.00	0.00	4.45	6.08	13.14	31.51	33.10	34.12	48.09
	2:30:00	0.00	0.00	4.15	5.69	11.89	29.72	32.62	33.67	46.42
	2:35:00	0.00	0.00	3.95	5.42	10.82	24.43	32.25	33.38	45.06
	2:40:00	0.00	0.00	3.78	5.23	9.89	20.37	31.86	33.14	43.85
	2:45:00	0.00	0.00	3.65	5.06	9.14	17.25	31.48	32.95	42.78
	2:50:00	0.00	0.00	3.58	4.95	8.54	14.83	31.14	32.81	41.86
	2:55:00	0.00	0.00	3.54	4.87	8.08	12.98	30.82	32.72	41.05
	3:00:00	0.00	0.00	3.52	4.84	7.72	11.61	30.54	32.67	40.37
	3:05:00	0.00	0.00	3.53	4.84	7.47	10.59	30.31	32.62	39.78
	3:10:00	0.00	0.00	3.54	4.85	7.25	9.79	30.07	32.51	39.21
	3:15:00	0.00	0.00	3.55	4.85	7.06	9.15	29.82	32.37	38.66
	3:20:00	0.00	0.00	3.56	4.86	6.90	8.63	23.98	32.19	38.13
	3:25:00	0.00	0.00	3.57	4.86	6.76	8.21	19.59	31.99	37.60
	3:30:00	0.00	0.00	3.58	4.86	6.63	7.86	16.49	31.78	37.04
	3:35:00	0.00	0.00	3.59	4.87	6.52	7.57	14.25	31.55	35.80
	3:40:00	0.00	0.00	3.59	4.87	6.42	7.32	12.58	31.31	33.93
	3:45:00	0.00	0.00	3.60	4.87	6.32	7.11	11.31	31.07	32.74
	3:50:00	0.00	0.00	3.61	4.88	6.24	6.92	10.33	30.82	32.57
	3:55:00	0.00	0.00	3.61	4.88	6.17	6.76	9.56	30.57	32.38
	4:00:00	0.00	0.00	3.62	4.88	6.10	6.62	8.94	30.32	32.17
	4:05:00	0.00	0.00	3.63	4.88	6.04	6.50	8.44	30.07	31.94
	4:10:00	0.00	0.00	3.63	4.88	5.98	6.39	8.03	29.77	31.71
	4:15:00	0.00	0.00	3.64	4.88	5.93	6.29	7.69	23.75	31.47
	4:20:00	0.00	0.00	3.64	4.89	5.88	6.21	7.41	19.39	31.22
	4:25:00	0.00	0.00	3.65	4.89	5.84	6.13	7.17	16.31	30.98
	4:30:00	0.00	0.00	3.65	4.89	5.80	6.05	6.96	14.07	30.73
	4:35:00	0.00	0.00	3.65	4.89	5.76	5.99	6.78	12.41	30.48
	4:40:00	0.00	0.00	3.66	4.89	5.74	5.93	6.63	11.14	30.22
	4:45:00	0.00	0.00	3.66	4.89	5.71	5.88	6.49	10.17	29.97
	4:50:00	0.00	0.00	3.66	4.89	5.70	5.83	6.37	9.40	27.51
	4:55:00	0.00	0.00	3.67	4.89	5.69	5.79	6.27	8.78	21.96
	5:00:00	0.00	0.00	3.67	4.89	5.69	5.75	6.17	8.29	18.12
	5:05:00	0.00	0.00	3.67	4.89	5.69	5.73	6.09	7.88	15.38
	5:10:00	0.00	0.00	3.67	4.89	5.68	5.70	6.01	7.54	13.38
	5:15:00	0.00	0.00	3.67	4.89	5.68	5.69	5.94	7.26	11.87
	5:20:00	0.00	0.00	3.67	4.89	5.68	5.69	5.88	7.02	10.72
	5:25:00	0.00	0.00	3.67	4.88	5.67	5.69	5.83	6.81	9.83
	5:30:00	0.00	0.00	3.67	4.88	5.67	5.68	5.78	6.64	9.12
	5:35:00	0.00	0.00	3.67	4.88	5.66	5.68	5.75	6.48	8.55
	5:40:00	0.00	0.00	3.67	4.88	5.66	5.68	5.72	6.35	8.09
	5:45:00	0.00	0.00	3.67	4.88	5.65	5.67	5.70	6.23	7.71
	5:50:00	0.00	0.00	3.67	4.87	5.65	5.67	5.69	6.13	7.39
	5:55:00	0.00	0.00	3.67	4.87	5.64	5.66	5.69	6.04	7.13
	6:00:00	0.00	0.00	3.65	4.86	5.63	5.65	5.68	5.81	6.62



**Design Procedure Form: Extended Detention Basin (EDB)**

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 3

**Designer:** Richard Schindler  
**Company:** Core Engineering Group  
**Date:** May 2, 2020  
**Project:** The Hills at Lorson Ranch  
**Location:** Pond C2.2

<p>1. Basin Storage Volume</p> <p>A) Effective Imperviousness of Tributary Area, <math>I_a</math></p> <p>B) Tributary Area's Imperviousness Ratio (<math>i = I_a / 100</math>)</p> <p>C) Contributing Watershed Area</p> <p>D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm</p> <p>E) Design Concept (Select EURV when also designing for flood control)</p> <p>F) Design Volume (WQCV) Based on 40-hour Drain Time (<math>V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area)</math>)</p> <p>G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume (<math>V_{WQCV\ OTHER} = (d_6 * V_{DESIGN} * 0.43)</math>)</p> <p>H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)</p> <p>I) NRCS Hydrologic Soil Groups of Tributary Watershed              i) Percentage of Watershed consisting of Type A Soils              ii) Percentage of Watershed consisting of Type B Soils              iii) Percentage of Watershed consisting of Type C/D Soils</p> <p>J) Excess Urban Runoff Volume (EURV) Design Volume              For HSG A: <math>EURV_A = 1.68 * i^{1.28}</math>              For HSG B: <math>EURV_B = 1.36 * i^{1.08}</math>              For HSG C/D: <math>EURV_{C/D} = 1.20 * i^{1.08}</math></p> <p>K) User Input of Excess Urban Runoff Volume (EURV) Design Volume (Only if a different EURV Design Volume is desired)</p>	<p><math>I_a =</math> <input type="text" value="55.0"/> %</p> <p><math>i =</math> <input type="text" value="0.550"/></p> <p>Area = <input type="text" value="45.000"/> ac</p> <p><math>d_6 =</math> <input type="text" value=""/></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;">                 Choose One  <input checked="" type="radio"/> Water Quality Capture Volume (WQCV)  <input type="radio"/> Excess Urban Runoff Volume (EURV)             </div> <p><math>V_{DESIGN} =</math> <input type="text" value="0.827"/> ac-ft</p> <p><math>V_{DESIGN\ OTHER} =</math> <input type="text" value=""/> ac-ft</p> <p><math>V_{DESIGN\ USER} =</math> <input type="text" value=""/> ac-ft</p> <p>HSG <sub>A</sub> = <input type="text" value=""/> %              HSG <sub>B</sub> = <input type="text" value=""/> %              HSG <sub>C/D</sub> = <input type="text" value=""/> %</p> <p>EURV<sub>DESIGN</sub> = <input type="text" value=""/> ac-ft</p> <p>EURV<sub>DESIGN\ USER</sub> = <input type="text" value=""/> ac-ft</p>
<p>2. Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.)</p>	<p>L : W = <input type="text" value="2.0"/> : 1</p>
<p>3. Basin Side Slopes</p> <p>A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred)</p>	<p>Z = <input type="text" value="3.00"/> ft / ft  <span style="color: red; font-weight: bold;">DIFFICULT TO MAINTAIN, INCREASE WHERE POSSIBLE</span></p>
<p>4. Inlet</p> <p>A) Describe means of providing energy dissipation at concentrated inflow locations:</p>	<p>_____</p> <p>_____</p> <p>_____</p>
<p>5. Forebay</p> <p>A) Minimum Forebay Volume (<math>V_{MIN} =</math> <input type="text" value="3%"/> of the WQCV)</p> <p>B) Actual Forebay Volume</p> <p>C) Forebay Depth (<math>D_F =</math> <input type="text" value="30"/> inch maximum)</p> <p>D) Forebay Discharge</p> <p style="margin-left: 20px;">i) Undetained 100-year Peak Discharge</p> <p style="margin-left: 20px;">ii) Forebay Discharge Design Flow (<math>Q_F = 0.02 * Q_{100}</math>)</p> <p>E) Forebay Discharge Design</p> <p>F) Discharge Pipe Size (minimum 8-inches)</p> <p>G) Rectangular Notch Width</p>	<p><math>V_{MIN} =</math> <input type="text" value="0.025"/> ac-ft</p> <p><math>V_F =</math> <input type="text" value="0.028"/> ac-ft</p> <p><math>D_F =</math> <input type="text" value="24.0"/> in</p> <p><math>Q_{100} =</math> <input type="text" value="131.00"/> cfs</p> <p><math>Q_F =</math> <input type="text" value="2.62"/> cfs</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;">                 Choose One  <input type="radio"/> Berm With Pipe  <input checked="" type="radio"/> Wall with Rect. Notch  <input type="radio"/> Wall with V-Notch Weir             </div> <p>Calculated <math>D_P =</math> <input type="text" value=""/> in</p> <p>Calculated <math>W_N =</math> <input type="text" value="8.1"/> in</p>

**Design Procedure Form: Extended Detention Basin (EDB)**

Sheet 2 of 3

**Designer:** Richard Schindler  
**Company:** Core Engineering Group  
**Date:** May 2, 2020  
**Project:** The Hills at Lorson Ranch  
**Location:** Pond C2.2

<p>6. Trickle Channel</p> <p>A) Type of Trickle Channel</p> <p>F) Slope of Trickle Channel</p>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             Choose One  <input checked="" type="radio"/> Concrete  <input type="radio"/> Soft Bottom         </div> <p>S = <input type="text" value="0.0050"/> ft / ft</p>
<p>7. Micropool and Outlet Structure</p> <p>A) Depth of Micropool (2.5-foot minimum)</p> <p>B) Surface Area of Micropool (10 ft<sup>2</sup> minimum)</p> <p>C) Outlet Type</p> <p>D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention)</p> <p>E) Total Outlet Area</p>	<p>D<sub>M</sub> = <input type="text" value="2.5"/> ft</p> <p>A<sub>M</sub> = <input type="text" value="50"/> sq ft</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             Choose One  <input checked="" type="radio"/> Orifice Plate  <input type="radio"/> Other (Describe):         </div> <hr/> <hr/> <p>D<sub>orifice</sub> = <input type="text" value="1.48"/> inches</p> <p>A<sub>orifice</sub> = <input type="text" value="6.63"/> square inches</p>
<p>8. Initial Surcharge Volume</p> <p>A) Depth of Initial Surcharge Volume (Minimum recommended depth is 4 inches)</p> <p>B) Minimum Initial Surcharge Volume (Minimum volume of 0.3% of the WQCV)</p> <p>C) Initial Surcharge Provided Above Micropool</p>	<p>D<sub>IS</sub> = <input type="text" value="4"/> in</p> <p>V<sub>IS</sub> = <input type="text" value="108"/> cu ft</p> <p>V<sub>s</sub> = <input type="text" value="16.7"/> cu ft</p>
<p>9. Trash Rack</p> <p>A) Water Quality Screen Open Area: <math>A_t = A_{ot} * 38.5 * (e^{-0.095D})</math></p> <p>B) Type of Screen (If specifying an alternative to the materials recommended in the USDCM, indicate "other" and enter the ratio of the total open area to the total screen area for the material specified.)</p> <p style="margin-left: 40px;">Other (Y/N): <input type="text" value="y"/></p> <p>C) Ratio of Total Open Area to Total Area (only for type 'Other')</p> <p>D) Total Water Quality Screen Area (based on screen type)</p> <p>E) Depth of Design Volume (EURV or WQCV) (Based on design concept chosen under 1E)</p> <p>F) Height of Water Quality Screen (H<sub>TR</sub>)</p> <p>G) Width of Water Quality Screen Opening (W<sub>opening</sub>) (Minimum of 12 inches is recommended)</p>	<p>A<sub>t</sub> = <input type="text" value="222"/> square inches</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; width: fit-content;">             Other (Please describe below)         </div> <p>wellscreen stainless</p> <hr/> <hr/> <p>User Ratio = <input type="text" value="0.6"/></p> <p>A<sub>total</sub> = <input type="text" value="370"/> sq. in. <span style="color: blue;">Based on type 'Other' screen ratio</span></p> <p>H = <input type="text" value="3.25"/> feet</p> <p>H<sub>TR</sub> = <input type="text" value="67"/> inches</p> <p>W<sub>opening</sub> = <input type="text" value="12.0"/> inches <span style="color: red;">VALUE LESS THAN RECOMMENDED MIN. WIDTH. WIDTH HAS BEEN SET TO 12 INCHES.</span></p>

# Channel Report

Hydraflow Express by Intelisolve

Saturday, May 2 2020, 9:18 AM

## pond C2.2 low flow channel (2 x forebay release = 5.24cfs)

### Rectangular

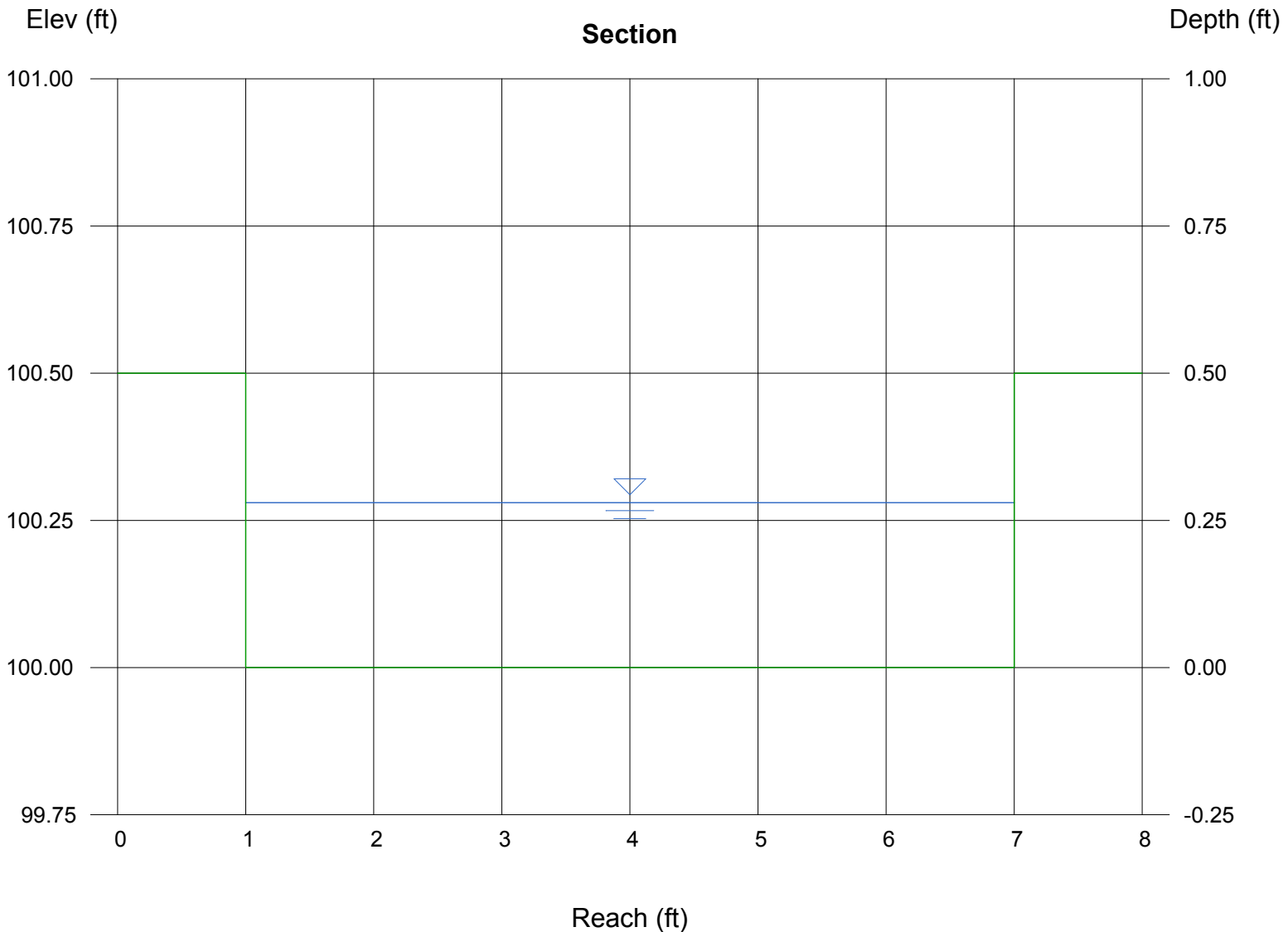
Bottom Width (ft) = 6.00  
Total Depth (ft) = 0.50  
  
Invert Elev (ft) = 100.00  
Slope (%) = 0.50  
N-Value = 0.013

### Calculations

Compute by: Known Q  
Known Q (cfs) = 5.24

### Highlighted

Depth (ft) = 0.28  
Q (cfs) = 5.240  
Area (sqft) = 1.68  
Velocity (ft/s) = 3.12  
Wetted Perim (ft) = 6.56  
Crit Depth, Yc (ft) = 0.29  
Top Width (ft) = 6.00  
EGL (ft) = 0.43





# Weir Report

## Pond C2.2 forebay overflow

### Rectangular Weir

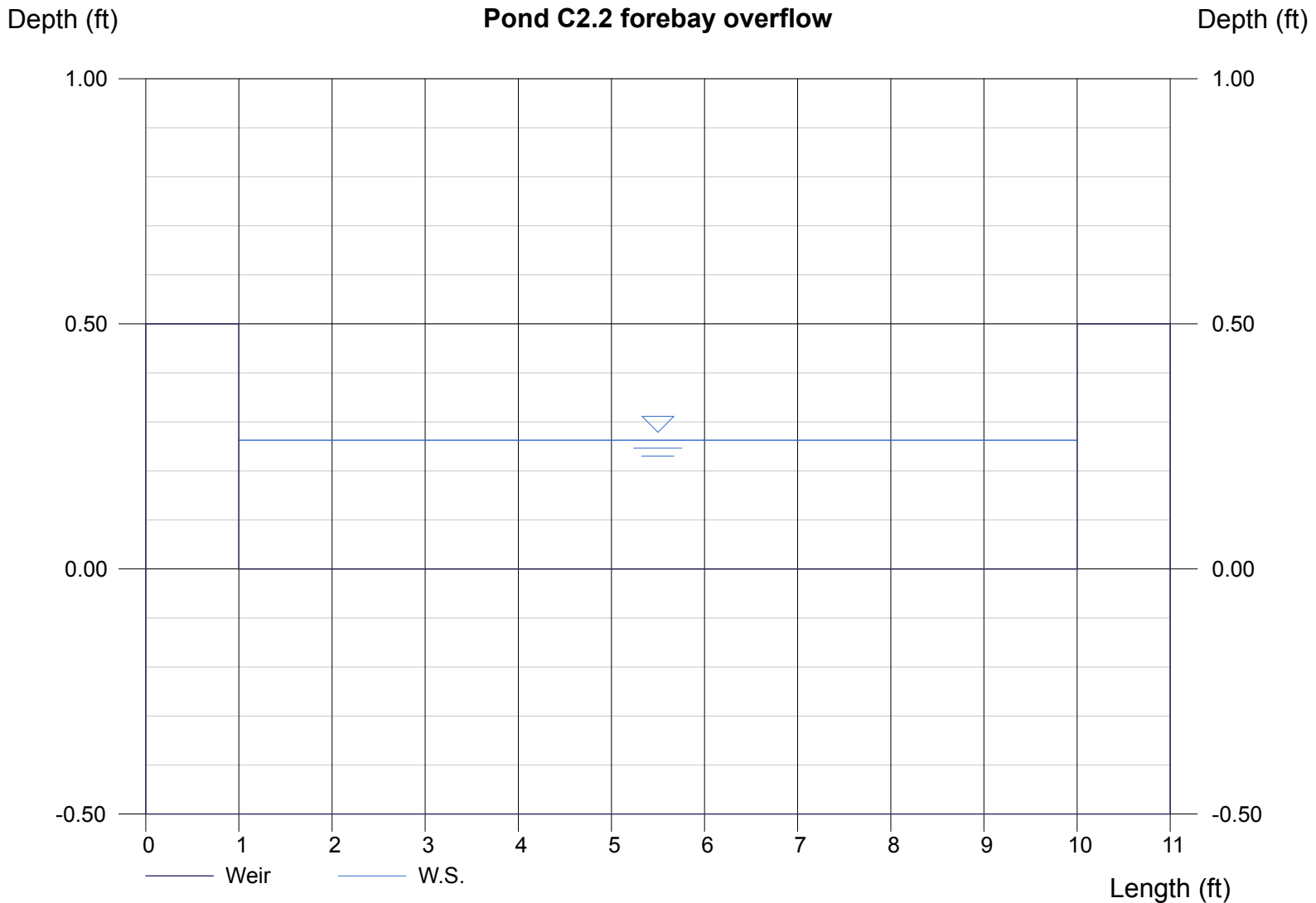
Crest = Sharp  
Bottom Length (ft) = 9.00  
Total Depth (ft) = 0.50

### Highlighted

Depth (ft) = 0.26  
Q (cfs) = 4.040  
Area (sqft) = 2.36  
Velocity (ft/s) = 1.71  
Top Width (ft) = 9.00

### Calculations

Weir Coeff. Cw = 3.33  
Compute by: Known Q  
Known Q (cfs) = 4.04



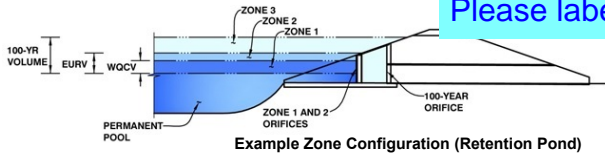


# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.02 (February 2020)

**Project: The Hills at Lorson Ranch**  
**Basin ID: Pond C4**

Please label as existing



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.97	1.488	Orifice Plate
Zone 2 (EURV)	5.41	2.980	Rectangular Orifice
Zone 3 (100+1/2WQCV)	8.40	4.225	Weir&Pipe (Restrict)
<b>Total (all zones)</b>		<b>8.692</b>	

**User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)**

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	N/A	inches

Calculated Parameters for Underdrain	
Underdrain Orifice Area =	N/A ft <sup>2</sup>
Underdrain Orifice Centroid =	N/A feet

**User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)**

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	2.97	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	11.90	inches
Orifice Plate: Orifice Area per Row =	4.68	sq. inches (use rectangular openings)

Calculated Parameters for Plate	
WQ Orifice Area per Row =	3.250E-02 ft <sup>2</sup>
Elliptical Half-Width =	N/A feet
Elliptical Slot Centroid =	N/A feet
Elliptical Slot Area =	N/A ft <sup>2</sup>

**User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)**

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.99	1.98					
Orifice Area (sq. inches)	4.68	4.68	4.68					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

**User Input: Vertical Orifice (Circular or Rectangular)**

	Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	2.97	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	5.41	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	6.00	N/A	inches
Vertical Orifice Width =	16.39	N/A	inches

Calculated Parameters for Vertical Orific	
Zone 2 Rectangular	Not Selected
Vertical Orifice Area =	0.68 N/A
Vertical Orifice Centroid =	0.25 N/A

**User Input: Overflow Weir (Dropbox with Flat or Sloped Gate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe))**

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.50	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	6.00	N/A	feet
Overflow Weir Gate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	6.00	N/A	feet
Overflow Gate Open Area % =	70%	N/A	% gate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir	
Zone 3 Weir	Not Selected
Height of Gate Upper Edge, H <sub>1</sub> =	5.50 N/A
Overflow Weir Slope Length =	6.00 N/A
Gate Open Area / 100-yr Orifice Area =	8.02 N/A
Overflow Gate Open Area w/o Debris =	25.20 N/A
Overflow Gate Open Area w/ Debris =	12.60 N/A

**User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)**

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	24.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	24.00	N/A	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate	
Zone 3 Restrictor	Not Selected
Outlet Orifice Area =	3.14 N/A
Outlet Orifice Centroid =	1.00 N/A
Half-Central Angle of Restrictor Plate on Pipe =	3.14 N/A

**User Input: Emergency Spillway (Rectangular or Trapezoidal)**

Spillway Invert Stage =	10.00	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	30.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.13	feet

Calculated Parameters for Spillway	
Spillway Design Flow Depth =	1.87 feet
Stage at Top of Freeboard =	13.00 feet
Basin Area at Top of Freeboard =	1.72 acres
Basin Volume at Top of Freeboard =	12.89 acre-ft

micropool = 0 = 5765

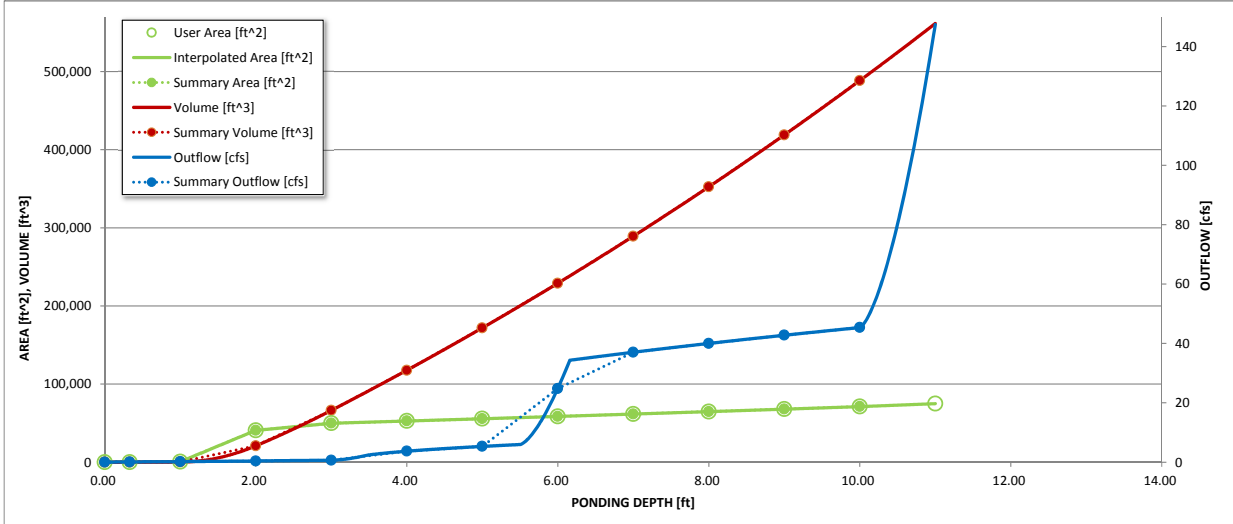
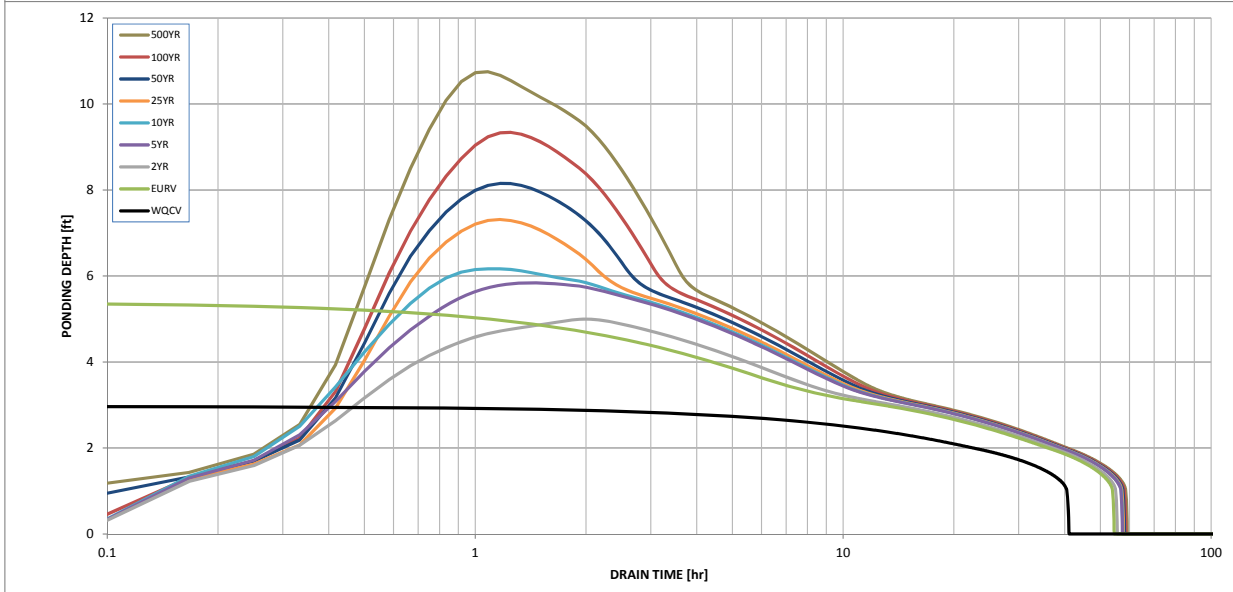
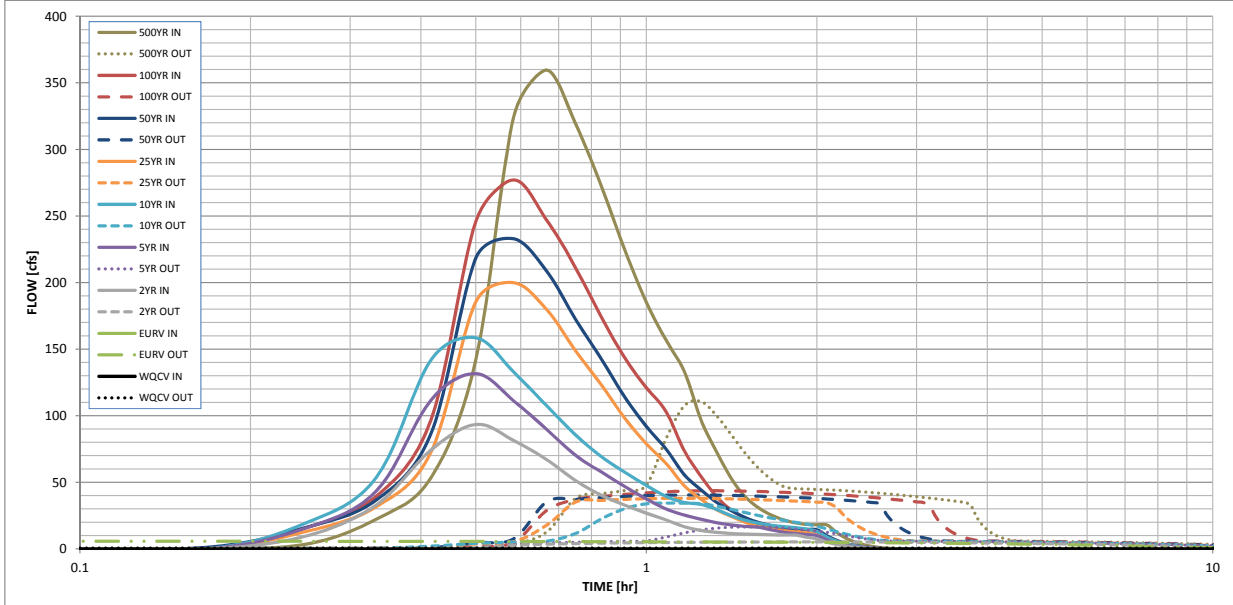
**Routed Hydrograph Results**

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF)

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Design Storm Return Period =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
One-Hour Rainfall Depth (in)	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft)	1.488	4.468	4.607	6.475	8.109	10.045	11.748	13.830
Inflow Hydrograph Volume (acre-ft)	N/A	N/A	4.607	6.475	8.109	10.045	11.748	13.830
CUHP Predevelopment Peak Q (cfs)	N/A	N/A	17.5	39.6	56.8	90.6	111.9	138.5
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A						
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	0.22	0.49	0.70	1.12	1.38	1.71
Peak Inflow Q (cfs)	N/A	N/A	93.5	131.6	158.6	200.0	232.9	277.2
Peak Outflow Q (cfs)	0.6	5.8	5.3	16.5	34.4	38.0	40.5	43.7
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	0.4	0.6	0.4	0.4	0.3
Structure Controlling Flow =	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Gate 1 (fps)	N/A	N/A	N/A	0.4	1.1	1.2	1.3	1.4
Max Velocity through Gate 2 (fps)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours)	39	48	49	49	47	45	44	42
Time to Drain 99% of Inflow Volume (hours)	40	52	53	54	53	53	53	52
Maximum Ponding Depth (ft)	2.97	5.41	5.00	5.84	6.17	7.31	8.15	9.34
Area at Maximum Ponding Depth (acres)	1.14	1.31	1.28	1.34	1.36	1.44	1.50	1.59
Maximum Volume Stored (acre-ft)	1.488	4.477	3.934	5.031	5.476	7.083	8.317	10.152

# DETENTION BASIN OUTLET STRUCTURE DESIGN

*MHFD-Detention, Version 4.00 (December 2019)*



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			





**Design Procedure Form: Extended Detention Basin (EDB)**

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 3

**Designer:** Richard Schindler  
**Company:** Core Engineering Group  
**Date:** May 4, 2020  
**Project:** The Hills at Lorson Ranch  
**Location:** Pond C4

<p>1. Basin Storage Volume</p> <p>A) Effective Imperviousness of Tributary Area, <math>I_a</math></p> <p>B) Tributary Area's Imperviousness Ratio (<math>i = I_a / 100</math>)</p> <p>C) Contributing Watershed Area</p> <p>D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm</p> <p>E) Design Concept (Select EURV when also designing for flood control)</p> <p>F) Design Volume (WQCV) Based on 40-hour Drain Time (<math>V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area)</math>)</p> <p>G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume (<math>V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN} * 0.43))</math>)</p> <p>H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)</p> <p>I) NRCS Hydrologic Soil Groups of Tributary Watershed              i) Percentage of Watershed consisting of Type A Soils              ii) Percentage of Watershed consisting of Type B Soils              iii) Percentage of Watershed consisting of Type C/D Soils</p> <p>J) Excess Urban Runoff Volume (EURV) Design Volume              For HSG A: <math>EURV_A = 1.68 * i^{1.28}</math>              For HSG B: <math>EURV_B = 1.36 * i^{1.08}</math>              For HSG C/D: <math>EURV_{C/D} = 1.20 * i^{1.08}</math></p> <p>K) User Input of Excess Urban Runoff Volume (EURV) Design Volume (Only if a different EURV Design Volume is desired)</p>	<p><math>I_a =</math> <input type="text" value="55.0"/> %</p> <p><math>i =</math> <input type="text" value="0.550"/></p> <p>Area = <input type="text" value="81.000"/> ac</p> <p><math>d_6 =</math> <input type="text" value=""/></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Choose One</p> <p><input checked="" type="radio"/> Water Quality Capture Volume (WQCV)</p> <p><input type="radio"/> Excess Urban Runoff Volume (EURV)</p> </div> <p><math>V_{DESIGN} =</math> <input type="text" value="1.488"/> ac-ft</p> <p><math>V_{DESIGN\ OTHER} =</math> <input type="text" value=""/> ac-ft</p> <p><math>V_{DESIGN\ USER} =</math> <input type="text" value=""/> ac-ft</p> <p>HSG <math>A =</math> <input type="text" value=""/> %              HSG <math>B =</math> <input type="text" value=""/> %              HSG <math>C/D =</math> <input type="text" value=""/> %</p> <p>EURV<math>_{DESIGN} =</math> <input type="text" value=""/> ac-ft</p> <p>EURV<math>_{DESIGN\ USER} =</math> <input type="text" value=""/> ac-ft</p>
<p>2. Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.)</p>	<p>L : W = <input type="text" value="2.0"/> : 1</p>
<p>3. Basin Side Slopes</p> <p>A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred)</p>	<p>Z = <input type="text" value="3.00"/> ft / ft</p> <p align="center"><b>DIFFICULT TO MAINTAIN, INCREASE WHERE POSSIBLE</b></p>
<p>4. Inlet</p> <p>A) Describe means of providing energy dissipation at concentrated inflow locations:</p>	<p>_____</p> <p>_____</p> <p>_____</p>
<p>5. Forebay</p> <p>A) Minimum Forebay Volume (<math>V_{MIN} =</math> <input type="text" value="3%"/> of the WQCV)</p> <p>B) Actual Forebay Volume</p> <p>C) Forebay Depth (<math>D_F =</math> <input type="text" value="30"/> inch maximum)</p> <p>D) Forebay Discharge</p> <p>i) Undetained 100-year Peak Discharge</p> <p>ii) Forebay Discharge Design Flow (<math>Q_F = 0.02 * Q_{100}</math>)</p> <p>E) Forebay Discharge Design</p> <p>F) Discharge Pipe Size (minimum 8-inches)</p> <p>G) Rectangular Notch Width</p>	<p><math>V_{MIN} =</math> <input type="text" value="0.045"/> ac-ft</p> <p><math>V_F =</math> <input type="text" value="0.050"/> ac-ft</p> <p><math>D_F =</math> <input type="text" value="24.0"/> in</p> <p><math>Q_{100} =</math> <input type="text" value="277.00"/> cfs</p> <p><math>Q_F =</math> <input type="text" value="5.54"/> cfs</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Choose One</p> <p><input type="radio"/> Berm With Pipe</p> <p><input checked="" type="radio"/> Wall with Rect. Notch</p> <p><input type="radio"/> Wall with V-Notch Weir</p> </div> <p>Calculated <math>D_P =</math> <input type="text" value=""/> in</p> <p>Calculated <math>W_N =</math> <input type="text" value="11.9"/> in</p>

**Design Procedure Form: Extended Detention Basin (EDB)**

Sheet 2 of 3

**Designer:** Richard Schindler  
**Company:** Core Engineering Group  
**Date:** May 4, 2020  
**Project:** The Hills at Lorson Ranch  
**Location:** Pond C4

<p>6. Trickle Channel</p> <p>A) Type of Trickle Channel</p> <p>F) Slope of Trickle Channel</p>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             Choose One  <input checked="" type="radio"/> Concrete  <input type="radio"/> Soft Bottom         </div> <p>S = <input type="text" value="0.0050"/> ft / ft</p>
<p>7. Micropool and Outlet Structure</p> <p>A) Depth of Micropool (2.5-foot minimum)</p> <p>B) Surface Area of Micropool (10 ft<sup>2</sup> minimum)</p> <p>C) Outlet Type</p> <p>D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention)</p> <p>E) Total Outlet Area</p>	<p>D<sub>M</sub> = <input type="text" value="2.5"/> ft</p> <p>A<sub>M</sub> = <input type="text" value="50"/> sq ft</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             Choose One  <input checked="" type="radio"/> Orifice Plate  <input type="radio"/> Other (Describe):         </div> <hr/> <hr/> <p>D<sub>orifice</sub> = <input type="text" value="2.16"/> inches</p> <p>A<sub>orifice</sub> = <input type="text" value="14.04"/> square inches</p>
<p>8. Initial Surcharge Volume</p> <p>A) Depth of Initial Surcharge Volume (Minimum recommended depth is 4 inches)</p> <p>B) Minimum Initial Surcharge Volume (Minimum volume of 0.3% of the WQCV)</p> <p>C) Initial Surcharge Provided Above Micropool</p>	<p>D<sub>IS</sub> = <input type="text" value="4"/> in</p> <p>V<sub>IS</sub> = <input type="text" value="194"/> cu ft</p> <p>V<sub>s</sub> = <input type="text" value="16.7"/> cu ft</p>
<p>9. Trash Rack</p> <p>A) Water Quality Screen Open Area: <math>A_t = A_{ot} * 38.5 * (e^{-0.095D})</math></p> <p>B) Type of Screen (If specifying an alternative to the materials recommended in the USDCM, indicate "other" and enter the ratio of the total open area to the total screen area for the material specified.)</p> <p style="text-align: right;">Other (Y/N): <input type="text" value="y"/></p> <p>C) Ratio of Total Open Area to Total Area (only for type 'Other')</p> <p>D) Total Water Quality Screen Area (based on screen type)</p> <p>E) Depth of Design Volume (EURV or WQCV) (Based on design concept chosen under 1E)</p> <p>F) Height of Water Quality Screen (H<sub>TR</sub>)</p> <p>G) Width of Water Quality Screen Opening (W<sub>opening</sub>) (Minimum of 12 inches is recommended)</p>	<p>A<sub>t</sub> = <input type="text" value="440"/> square inches</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             Other (Please describe below)         </div> <p>wellscreen stainless</p> <hr/> <hr/> <p>User Ratio = <input type="text" value="0.6"/></p> <p>A<sub>total</sub> = <input type="text" value="734"/> sq. in. <span style="color: blue;">Based on type 'Other' screen ratio</span></p> <p>H = <input type="text" value="2.97"/> feet</p> <p>H<sub>TR</sub> = <input type="text" value="63.64"/> inches</p> <p>W<sub>opening</sub> = <input type="text" value="12.0"/> inches <span style="color: red;">VALUE LESS THAN RECOMMENDED MIN. WIDTH. WIDTH HAS BEEN SET TO 12 INCHES.</span></p>



# Channel Report

Hydraflow Express by Intelisolve

Monday, May 4 2020, 6:54 AM

## pond C4 low flow channel (2 x forebay release = 11.08cfs)

### Rectangular

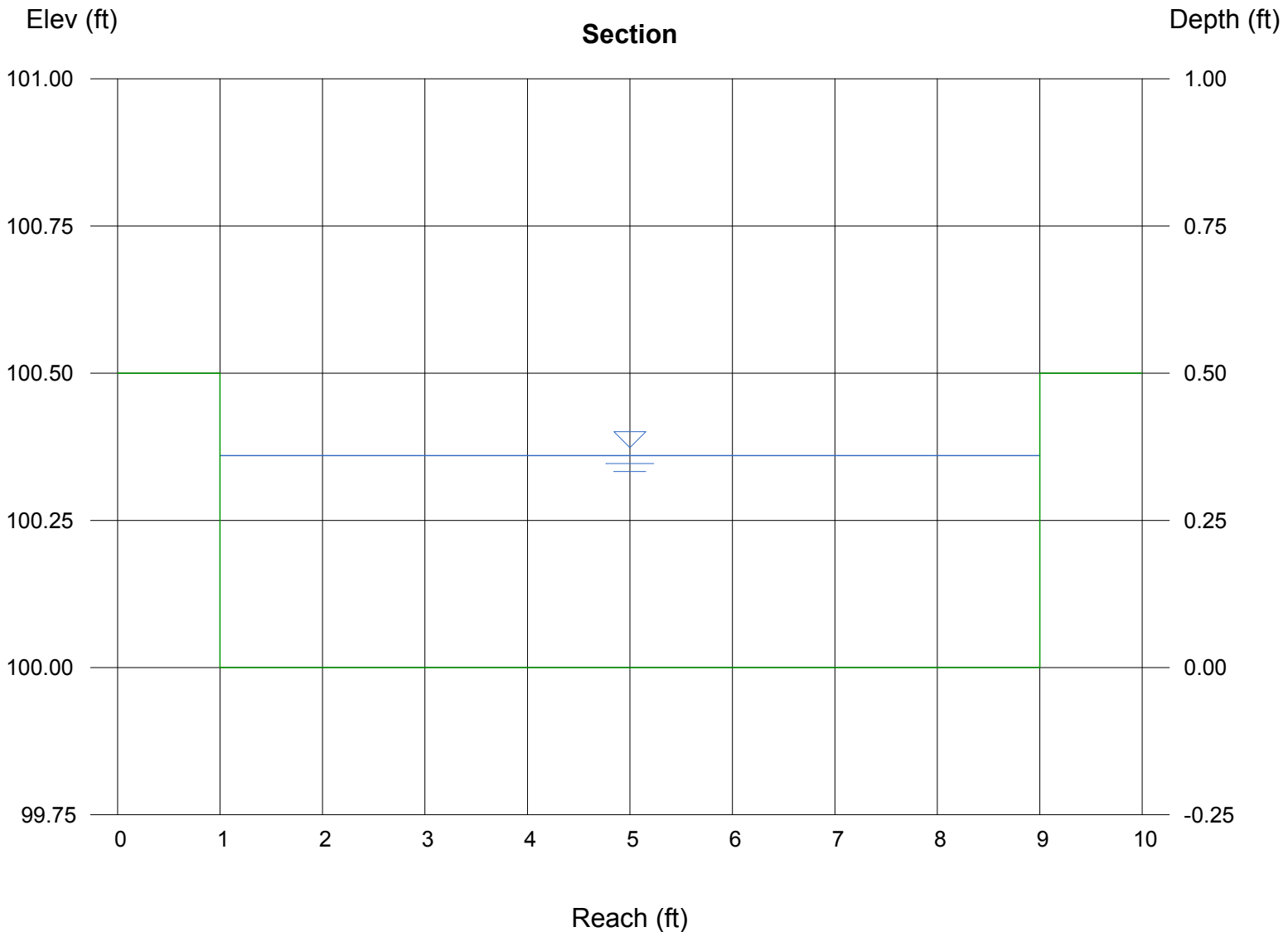
Bottom Width (ft) = 8.00  
Total Depth (ft) = 0.50  
  
Invert Elev (ft) = 100.00  
Slope (%) = 0.50  
N-Value = 0.013

### Highlighted

Depth (ft) = 0.36  
Q (cfs) = 11.08  
Area (sqft) = 2.88  
Velocity (ft/s) = 3.85  
Wetted Perim (ft) = 8.72  
Crit Depth,  $Y_c$  (ft) = 0.40  
Top Width (ft) = 8.00  
EGL (ft) = 0.59

### Calculations

Compute by: Known Q  
Known Q (cfs) = 11.08



# Weir Report

## Pond C4 forebay overflow

### Rectangular Weir

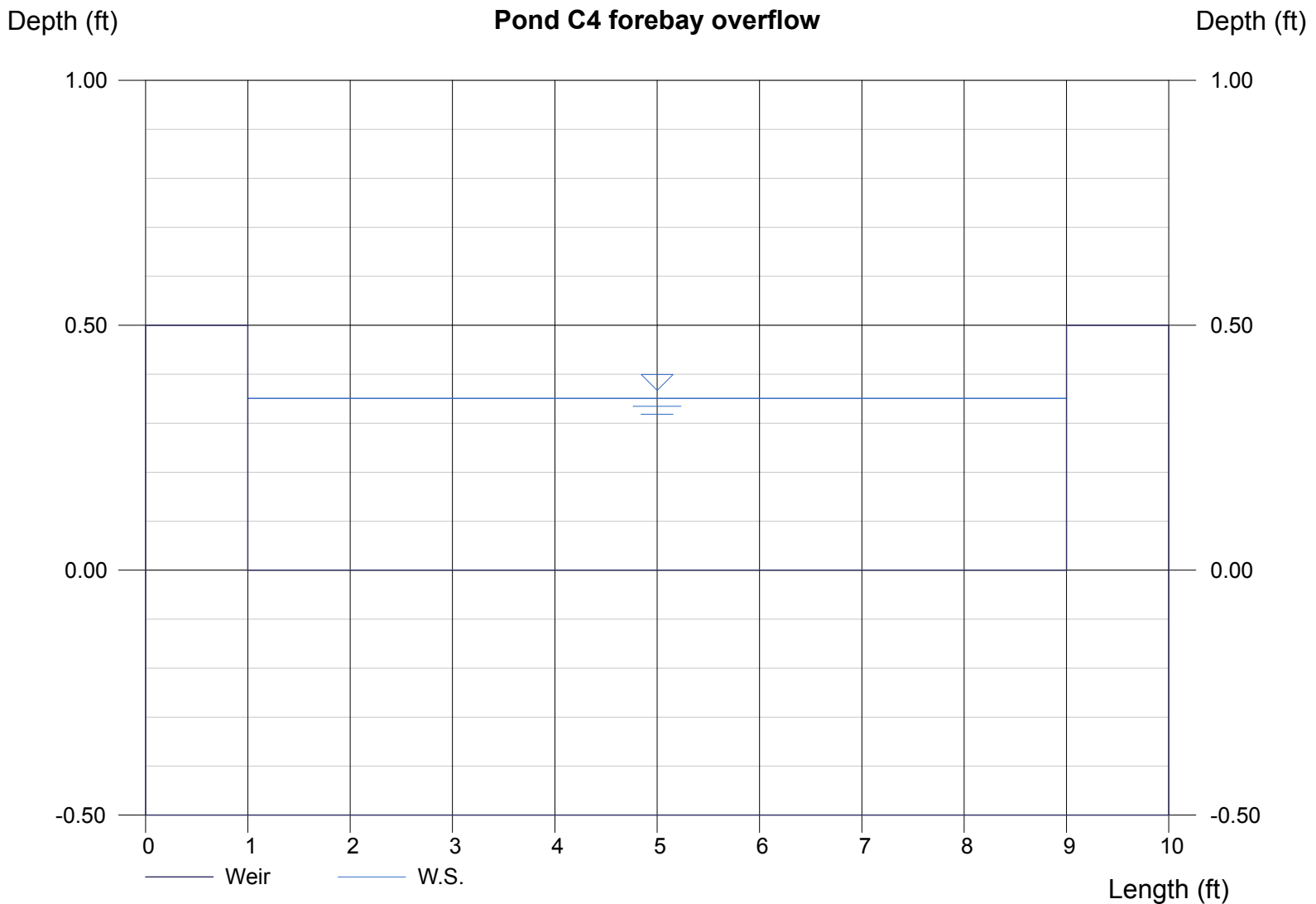
Crest = Sharp  
Bottom Length (ft) = 8.00  
Total Depth (ft) = 0.50

### Highlighted

Depth (ft) = 0.35  
Q (cfs) = 5.540  
Area (sqft) = 2.81  
Velocity (ft/s) = 1.97  
Top Width (ft) = 8.00

### Calculations

Weir Coeff. Cw = 3.33  
Compute by: Known Q  
Known Q (cfs) = 5.54

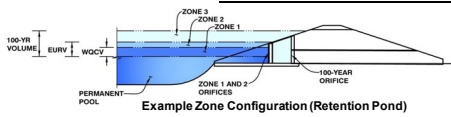


# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **The Ridge at Larson Ranch**

Basin ID: **Pond F**



top micropool-5842.77

**Watershed Information**

Selected BMP Type =	<b>EDB</b>	
Watershed Area =	4.90	acres
Watershed Length =	900	ft
Watershed Length to Centroid =	450	ft
Watershed Slope =	0.009	ft/ft
Watershed Imperviousness =	55.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQC Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click "Run CUHP" to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Water Quality Capture Volume (WQCV) =	0.090	acre-feet
Excess Urban Runoff Volume (EURV) =	0.290	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.270	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.379	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	0.474	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	0.597	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	0.699	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	0.827	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	1.089	acre-feet
Approximate 2-yr Detention Volume =	0.221	acre-feet
Approximate 5-yr Detention Volume =	0.301	acre-feet
Approximate 10-yr Detention Volume =	0.393	acre-feet
Approximate 25-yr Detention Volume =	0.427	acre-feet
Approximate 50-yr Detention Volume =	0.446	acre-feet
Approximate 100-yr Detention Volume =	0.492	acre-feet

**Optional User Overrides**

		acre-feet
		acre-feet
	1.19	inches
	1.50	inches
	1.75	inches
	2.00	inches
	2.25	inches
	2.52	inches
		inches

**Define Zones and Basin Geometry**

Zone 1 Volume (WQCV) =	0.090	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.200	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	0.246	acre-feet
Total Detention Basin Volume =	0.537	acre-feet
Initial Surcharge Volume (ISV) =	user	ft <sup>3</sup>
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H <sub>total</sub> ) =	user	ft
Depth of Trickle Channel (H <sub>TC</sub> ) =	user	ft
Slope of Trickle Channel (S <sub>TC</sub> ) =	user	ft/ft
Slopes of Main Basin Sides (S <sub>main</sub> ) =	user	H:V
Basin Length-to-Width Ratio (R <sub>L/W</sub> ) =	user	
Initial Surcharge Area (A <sub>ISV</sub> ) =	user	ft <sup>2</sup>
Surcharge Volume Length (L <sub>ISV</sub> ) =	user	ft
Surcharge Volume Width (W <sub>ISV</sub> ) =	user	ft
Depth of Basin Floor (H <sub>FLOOR</sub> ) =	user	ft
Length of Basin Floor (L <sub>FLOOR</sub> ) =	user	ft
Width of Basin Floor (W <sub>FLOOR</sub> ) =	user	ft
Area of Basin Floor (A <sub>FLOOR</sub> ) =	user	ft <sup>2</sup>
Volume of Basin Floor (V <sub>FLOOR</sub> ) =	user	ft <sup>3</sup>
Depth of Main Basin (H <sub>MAIN</sub> ) =	user	ft
Length of Main Basin (L <sub>MAIN</sub> ) =	user	ft
Width of Main Basin (W <sub>MAIN</sub> ) =	user	ft
Area of Main Basin (A <sub>MAIN</sub> ) =	user	ft <sup>2</sup>
Volume of Main Basin (V <sub>MAIN</sub> ) =	user	ft <sup>3</sup>
Calculated Total Basin Volume (V <sub>total</sub> ) =	user	acre-feet

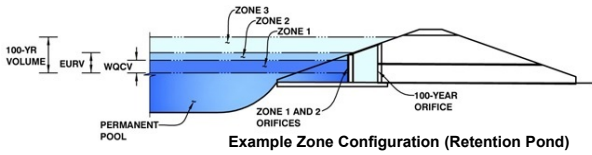
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft <sup>2</sup> )	Optional Override Area (ft <sup>2</sup> )	Area (acre)	Volume (ft <sup>3</sup> )	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	30	0.001		
5844	--	1.23	--	--	--	1,180	0.027	744	0.017
5845	--	2.23	--	--	--	4,840	0.111	3,754	0.086
5846	--	3.23	--	--	--	6,608	0.152	9,478	0.218
5847	--	4.23	--	--	--	8,201	0.188	16,883	0.388
5848	--	5.23	--	--	--	9,600	0.220	25,783	0.592
5849	--	6.23	--	--	--	10,600	0.243	35,883	0.824

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.02 (February 2020)

**Project: The Ridge at Lorson Ranch**

**Basin ID: Pond F**



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.27	0.090	Orifice Plate
Zone 2 (EURV)	3.69	0.200	Rectangular Orifice
Zone 3 (100+1/2WQCV)	4.98	0.246	Weir&Pipe (Restrict)
<b>Total (all zones)</b>		<b>0.537</b>	

**User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)**

**Calculated Parameters for Underdrain**

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	Underdrain Orifice Area =	N/A	ft <sup>2</sup>
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

**User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)**

**Calculated Parameters for Plate**

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	2.569E-03	ft <sup>2</sup>
Depth at top of Zone using Orifice Plate =	2.27	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	8.30	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	0.37	sq. inches (diameter = 11/16 inch)	Elliptical Slot Area =	N/A	ft <sup>2</sup>

**User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)**

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.76	1.51					
Orifice Area (sq. inches)	0.37	0.37	0.37					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

**User Input: Vertical Orifice (Circular or Rectangular)**

**Calculated Parameters for Vertical Orifice**

	Zone 2 Rectangular	Not Selected		Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	2.27	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.08	ft <sup>2</sup>
Depth at top of Zone using Vertical Orifice =	3.69	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.04	feet
Vertical Orifice Height =	1.00	N/A	inches			
Vertical Orifice Width =	12.00	N/A	inches			

**User Input: Overflow Weir (Dropbox with Flat or Sloped Gate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe))**

**Calculated Parameters for Overflow Weir**

	Zone 3 Weir	Not Selected		Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.23	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Gate Upper Edge, H <sub>1</sub> =	3.23	feet
Overflow Weir Front Edge Length =	3.00	N/A	feet	Overflow Weir Slope Length =	6.00	feet
Overflow Weir Gate Slope =	0.00	N/A	H:V	Gate Open Area / 100-yr Orifice Area =	5.09	N/A
Horiz. Length of Weir Sides =	6.00	N/A	feet	Overflow Gate Open Area w/o Debris =	9.00	ft <sup>2</sup>
Overflow Gate Open Area % =	50%	N/A	%, gate open area/total area	Overflow Gate Open Area w/ Debris =	4.50	ft <sup>2</sup>
Debris Clogging % =	50%	N/A	%			

**User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)**

**Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate**

	Zone 3 Restrictor	Not Selected		Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	1.77	ft <sup>2</sup>
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.75	feet
Restrictor Plate Height Above Pipe Invert =	18.00	N/A	inches	Half-Central Angle of Restrictor Plate on Pipe =	3.14	radians

**User Input: Emergency Spillway (Rectangular or Trapezoidal)**

**Calculated Parameters for Spillway**

Spillway Invert Stage =	4.23	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth =	0.44	feet
Spillway Crest Length =	10.00	feet	Stage at Top of Freeboard =	5.17	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.22	acres
Freeboard above Max Water Surface =	0.50	feet	Basin Volume at Top of Freeboard =	0.58	acre-ft

top micropool = 5842.77 = stage 0

## Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =									
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	0.090	0.290	0.270	0.379	0.474	0.597	0.699	0.827	1.089
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.270	0.379	0.474	0.597	0.699	0.827	1.089
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.3	1.0	1.5	2.8	3.5	4.5	6.3
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.07	0.20	0.31	0.57	0.72	0.92	1.29
Peak Inflow Q (cfs) =	N/A	N/A	3.2	4.5	5.5	7.4	8.6	10.2	13.3
Peak Outflow Q (cfs) =	0.0	5.8	0.4	1.9	2.9	5.1	6.5	8.4	11.7
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.9	2.0	1.8	1.9	1.9	1.9
Structure Controlling Flow =	Vertical Orifice 1	Overflow Weir 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1
Max Velocity through Gate 1 (fps) =	N/A	0.96	N/A	0.2	0.3	0.5	0.7	0.9	1.2
Max Velocity through Gate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	37	38	40	38	36	34	33	31	28
Time to Drain 99% of Inflow Volume (hours) =	40	45	46	45	44	43	42	40	39
Maximum Ponding Depth (ft) =	2.27	3.69	3.20	3.37	3.43	3.53	3.59	3.66	3.77
Area at Maximum Ponding Depth (acres) =	0.11	0.17	0.15	0.16	0.16	0.16	0.16	0.17	0.17
Maximum Volume Stored (acre-ft) =	0.091	0.291	0.213	0.238	0.247	0.265	0.275	0.286	0.305

**Design Procedure Form: Extended Detention Basin (EDB)**

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 3

**Designer:** Richard Schindler  
**Company:** Core Engineering Group  
**Date:** July 17, 2021  
**Project:** The ridge at Lorson Ranch  
**Location:** Pond F

<p>1. Basin Storage Volume</p> <p>A) Effective Imperviousness of Tributary Area, <math>I_a</math></p> <p>B) Tributary Area's Imperviousness Ratio (<math>i = I_a / 100</math>)</p> <p>C) Contributing Watershed Area</p> <p>D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm</p> <p>E) Design Concept (Select EURV when also designing for flood control)</p> <p>F) Design Volume (WQCV) Based on 40-hour Drain Time (<math>V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area)</math>)</p> <p>G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume (<math>V_{WQCV\ OTHER} = (d_6 * V_{DESIGN} * 0.43)</math>)</p> <p>H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)</p> <p>I) NRCS Hydrologic Soil Groups of Tributary Watershed              i) Percentage of Watershed consisting of Type A Soils              ii) Percentage of Watershed consisting of Type B Soils              iii) Percentage of Watershed consisting of Type C/D Soils</p> <p>J) Excess Urban Runoff Volume (EURV) Design Volume              For HSG A: <math>EURV_A = 1.68 * i^{1.28}</math>              For HSG B: <math>EURV_B = 1.36 * i^{1.08}</math>              For HSG C/D: <math>EURV_{C/D} = 1.20 * i^{1.08}</math></p> <p>K) User Input of Excess Urban Runoff Volume (EURV) Design Volume (Only if a different EURV Design Volume is desired)</p>	<p><math>I_a =</math> <input type="text" value="55.0"/> %</p> <p><math>i =</math> <input type="text" value="0.550"/></p> <p>Area = <input type="text" value="4.900"/> ac</p> <p><math>d_6 =</math> <input type="text" value=""/></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Choose One</p> <p><input checked="" type="radio"/> Water Quality Capture Volume (WQCV)</p> <p><input type="radio"/> Excess Urban Runoff Volume (EURV)</p> </div> <p><math>V_{DESIGN} =</math> <input type="text" value=""/> ac-ft</p> <p><math>V_{DESIGN\ OTHER} =</math> <input type="text" value=""/> ac-ft</p> <p><math>V_{DESIGN\ USER} =</math> <input type="text" value="0.120"/> ac-ft</p> <p>HSG <math>A =</math> <input type="text" value=""/> %              HSG <math>B =</math> <input type="text" value=""/> %              HSG <math>C/D =</math> <input type="text" value=""/> %</p> <p><math>EURV_{DESIGN} =</math> <input type="text" value=""/> ac-ft</p> <p><math>EURV_{DESIGN\ USER} =</math> <input type="text" value=""/> ac-ft</p>
<p>2. Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.)</p>	<p>L : W = <input type="text" value="2.0"/> : 1</p>
<p>3. Basin Side Slopes</p> <p>A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred)</p>	<p>Z = <input type="text" value="4.00"/> ft / ft</p>
<p>4. Inlet</p> <p>A) Describe means of providing energy dissipation at concentrated inflow locations:</p>	<p>_____</p> <p>_____</p> <p>_____</p>
<p>5. Forebay</p> <p>A) Minimum Forebay Volume (<math>V_{MIN} =</math> <input type="text" value="2%"/> of the WQCV)</p> <p>B) Actual Forebay Volume</p> <p>C) Forebay Depth (<math>D_F =</math> <input type="text" value="18"/> inch maximum)</p> <p>D) Forebay Discharge</p> <p>i) Undetained 100-year Peak Discharge</p> <p>ii) Forebay Discharge Design Flow (<math>Q_F = 0.02 * Q_{100}</math>)</p> <p>E) Forebay Discharge Design</p> <p>F) Discharge Pipe Size (minimum 8-inches)</p> <p>G) Rectangular Notch Width</p>	<p><math>V_{MIN} =</math> <input type="text" value="0.002"/> ac-ft</p> <p><math>V_F =</math> <input type="text" value="0.004"/> ac-ft</p> <p><math>D_F =</math> <input type="text" value="18.0"/> in</p> <p><math>Q_{100} =</math> <input type="text" value="17.60"/> cfs</p> <p><math>Q_F =</math> <input type="text" value="0.35"/> cfs</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Choose One</p> <p><input type="radio"/> Berm With Pipe</p> <p><input checked="" type="radio"/> Wall with Rect. Notch</p> <p><input type="radio"/> Wall with V-Notch Weir</p> </div> <p>Flow too small for berm w/ pipe</p> <p>Calculated <math>D_P =</math> <input type="text" value=""/> in</p> <p>Calculated <math>W_N =</math> <input type="text" value="4.3"/> in</p>

**Design Procedure Form: Extended Detention Basin (EDB)**

Sheet 2 of 3

**Designer:** Richard Schindler  
**Company:** Core Engineering Group  
**Date:** July 17, 2021  
**Project:** The ridge at Lorson Ranch  
**Location:** Pond F

<p>6. Trickle Channel</p> <p>A) Type of Trickle Channel</p> <p>F) Slope of Trickle Channel</p>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             Choose One  <input checked="" type="radio"/> Concrete  <input type="radio"/> Soft Bottom         </div> <p>S = <input style="width: 50px;" type="text" value="0.0050"/> ft / ft</p>
<p>7. Micropool and Outlet Structure</p> <p>A) Depth of Micropool (2.5-foot minimum)</p> <p>B) Surface Area of Micropool (10 ft<sup>2</sup> minimum)</p> <p>C) Outlet Type</p> <p>D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention)</p> <p>E) Total Outlet Area</p>	<p>D<sub>M</sub> = <input style="width: 50px;" type="text" value="2.5"/> ft</p> <p>A<sub>M</sub> = <input style="width: 50px;" type="text" value="50"/> sq ft</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             Choose One  <input checked="" type="radio"/> Orifice Plate  <input type="radio"/> Other (Describe):         </div> <hr/> <hr/> <p>D<sub>orifice</sub> = <input style="width: 50px;" type="text" value="2.01"/> inches</p> <p>A<sub>orifice</sub> = <input style="width: 50px;" type="text" value="12.60"/> square inches</p>
<p>8. Initial Surcharge Volume</p> <p>A) Depth of Initial Surcharge Volume (Minimum recommended depth is 4 inches)</p> <p>B) Minimum Initial Surcharge Volume (Minimum volume of 0.3% of the WQCV)</p> <p>C) Initial Surcharge Provided Above Micropool</p>	<p>D<sub>IS</sub> = <input style="width: 50px;" type="text" value="4"/> in</p> <p>V<sub>IS</sub> = <input style="width: 50px;" type="text" value=""/> cu ft</p> <p>V<sub>s</sub> = <input style="width: 50px;" type="text" value="16.7"/> cu ft</p>
<p>9. Trash Rack</p> <p>A) Water Quality Screen Open Area: <math>A_t = A_{ot} * 38.5 * (e^{-0.095D})</math></p> <p>B) Type of Screen (If specifying an alternative to the materials recommended in the USDCM, indicate "other" and enter the ratio of the total open area to the total screen area for the material specified.)</p> <p style="margin-left: 40px;">Other (Y/N): <input style="width: 80px;" type="text" value="y"/></p> <p>C) Ratio of Total Open Area to Total Area (only for type 'Other')</p> <p>D) Total Water Quality Screen Area (based on screen type)</p> <p>E) Depth of Design Volume (EURV or WQCV) (Based on design concept chosen under 1E)</p> <p>F) Height of Water Quality Screen (H<sub>TR</sub>)</p> <p>G) Width of Water Quality Screen Opening (W<sub>opening</sub>) (Minimum of 12 inches is recommended)</p>	<p>A<sub>t</sub> = <input style="width: 50px;" type="text" value="401"/> square inches</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; width: fit-content;">             Other (Please describe below)         </div> <p>wellscreen stainless</p> <hr/> <hr/> <p>User Ratio = <input style="width: 50px;" type="text" value="0.6"/></p> <p>A<sub>total</sub> = <input style="width: 50px;" type="text" value="668"/> sq. in. <span style="color: blue;">Based on type 'Other' screen ratio</span></p> <p>H = <input style="width: 50px;" type="text" value="2.14"/> feet</p> <p>H<sub>TR</sub> = <input style="width: 50px;" type="text" value="53.68"/> inches</p> <p>W<sub>opening</sub> = <input style="width: 50px;" type="text" value="12.4"/> inches</p>

**Design Procedure Form: Extended Detention Basin (EDB)**

Sheet 3 of 3

**Designer:** R. Schindler  
**Company:** Core Engineering Group  
**Date:** November 5, 2021  
**Project:** The Ridge at Lorson Ranch  
**Location:** Pond F - WQ pond only

<p>10. Overflow Embankment</p> <p>A) Describe embankment protection for 100-year and greater overtopping:</p> <p>B) Slope of Overflow Embankment (Horizontal distance per unit vertical, 4:1 or flatter preferred)</p>	<p>TRM added to emergency overflow. All of 100-year flows will enter outlet structure before entering emergency overflow.</p> <hr/> <p>Ze = <input type="text" value="4.00"/> ft / ft</p>
<p>11. Vegetation</p>	<p>Choose One</p> <p><input type="radio"/> Irrigated</p> <p><input type="radio"/> Not Irrigated</p>
<p>12. Access</p> <p>A) Describe Sediment Removal Procedures</p>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<p>Notes: _____</p> <hr/> <hr/> <hr/>	

# Channel Report

Hydraflow Express by Intelisolve

Thursday, Mar 10 2022, 12:56 PM

## WQ Pond low flow - 2xforebay release (2x0.35=0.7cfs)

### Rectangular

Bottom Width (ft) = 3.00  
Total Depth (ft) = 0.50  
  
Invert Elev (ft) = 100.00  
Slope (%) = 0.50  
N-Value = 0.013

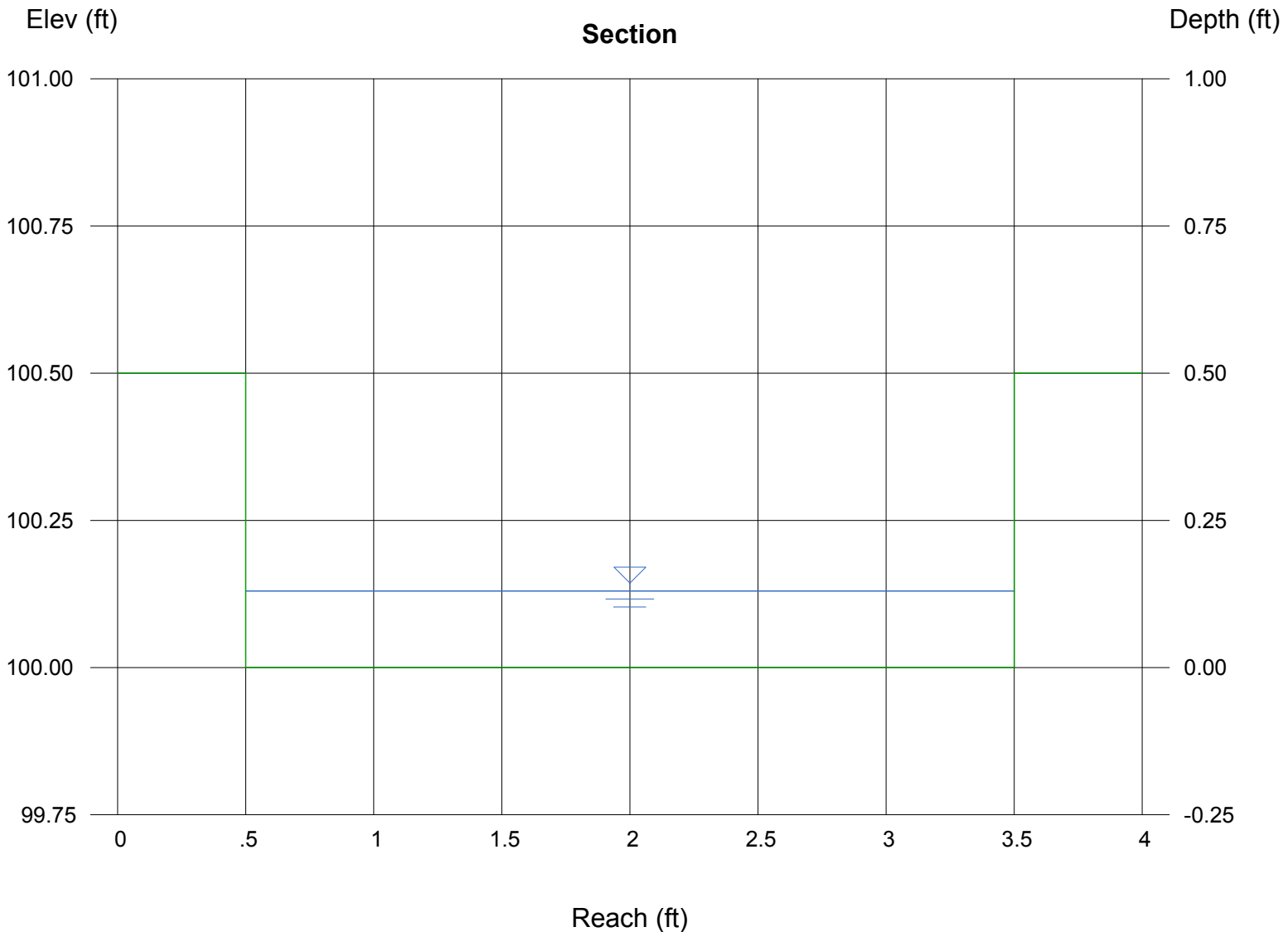
### Highlighted

Depth (ft) = 0.13  
Q (cfs) = 0.700  
Area (sqft) = 0.39  
Velocity (ft/s) = 1.79  
Wetted Perim (ft) = 3.26  
Crit Depth, Yc (ft) = 0.12  
Top Width (ft) = 3.00  
EGL (ft) = 0.18

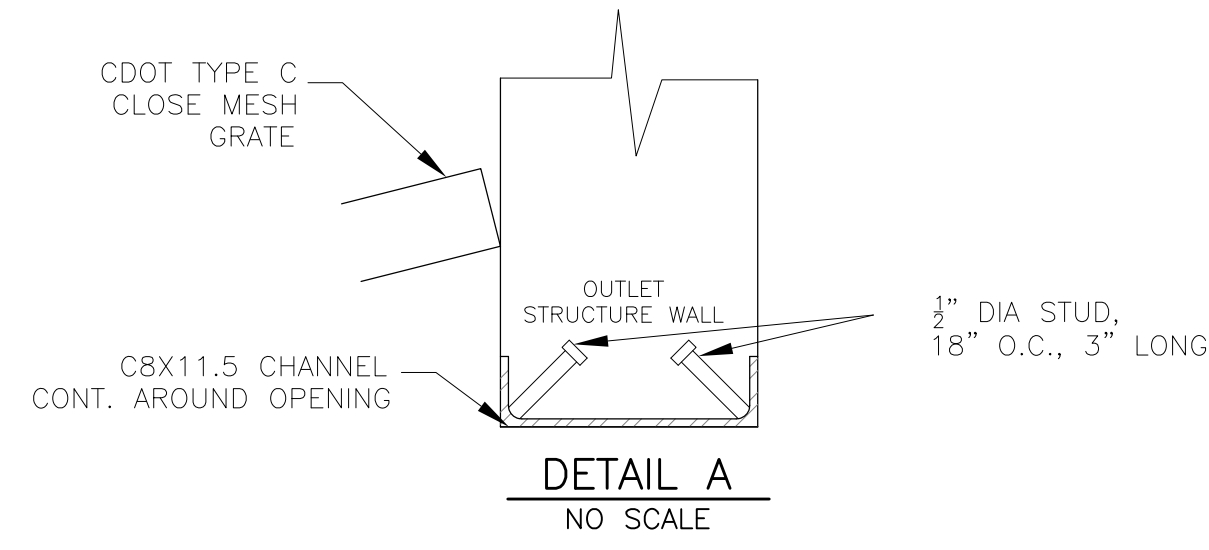
### Calculations

Compute by: Known Q  
Known Q (cfs) = 0.70

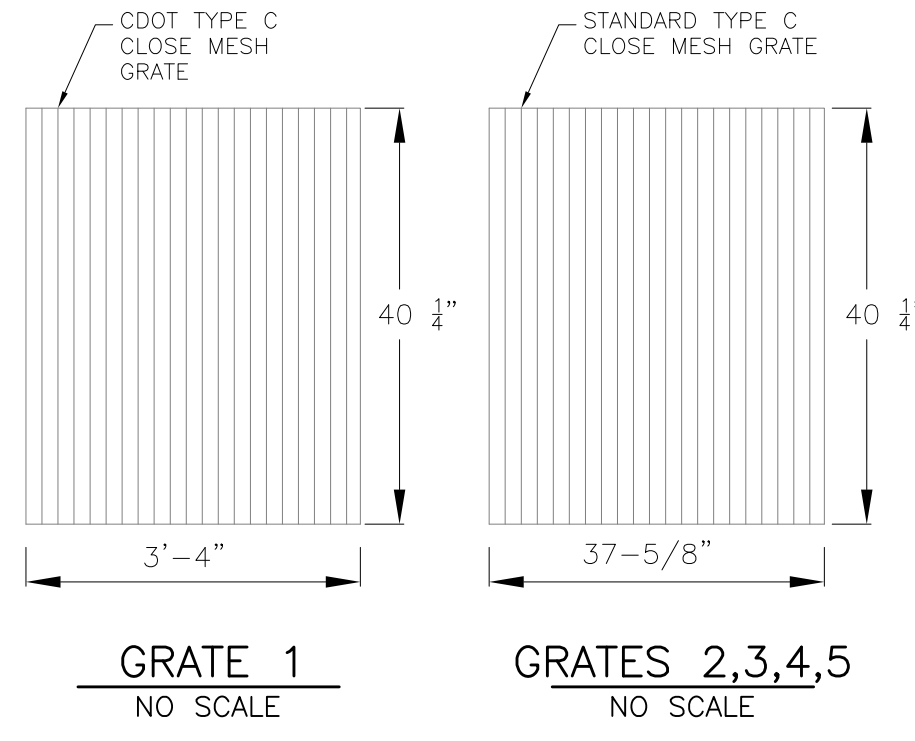
Please include calculation for riprap sizing for spillway





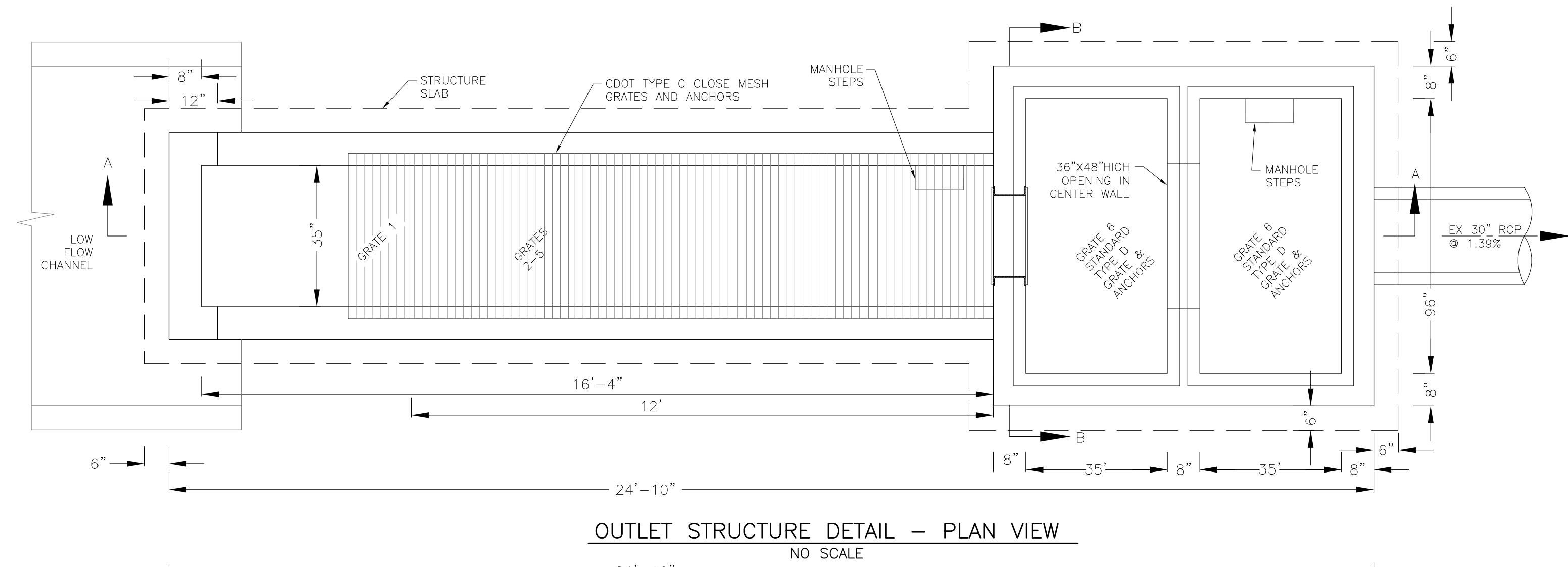


NOTE:  
AFTER CONCRETE STRUCTURE HAS BEEN POURED  
ALL GRATE DIMENSIONS SHALL BE FIELD VERIFIED  
PRIOR TO GRATE CONSTRUCTION

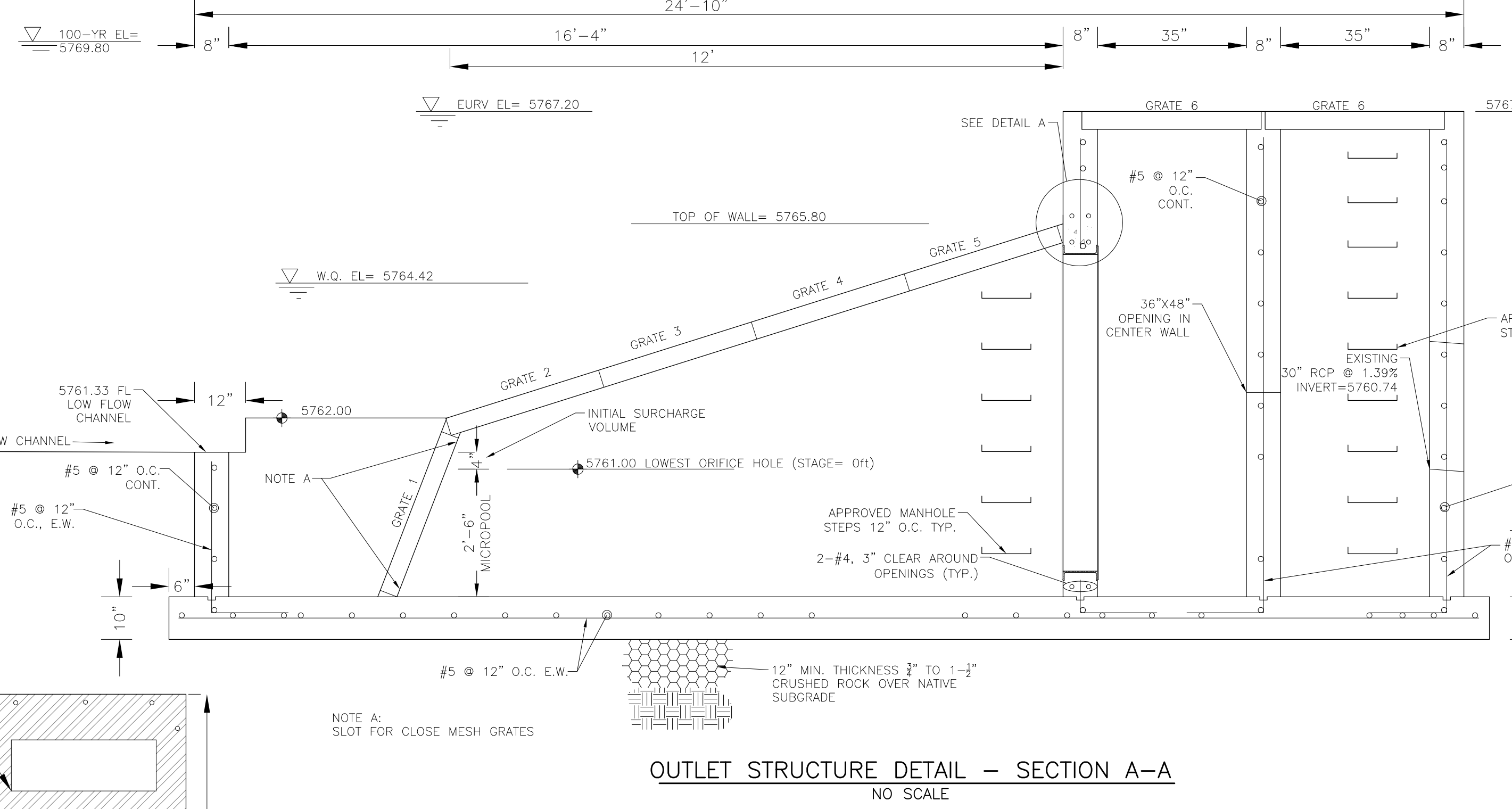


GRATE 1  
NO SCALE

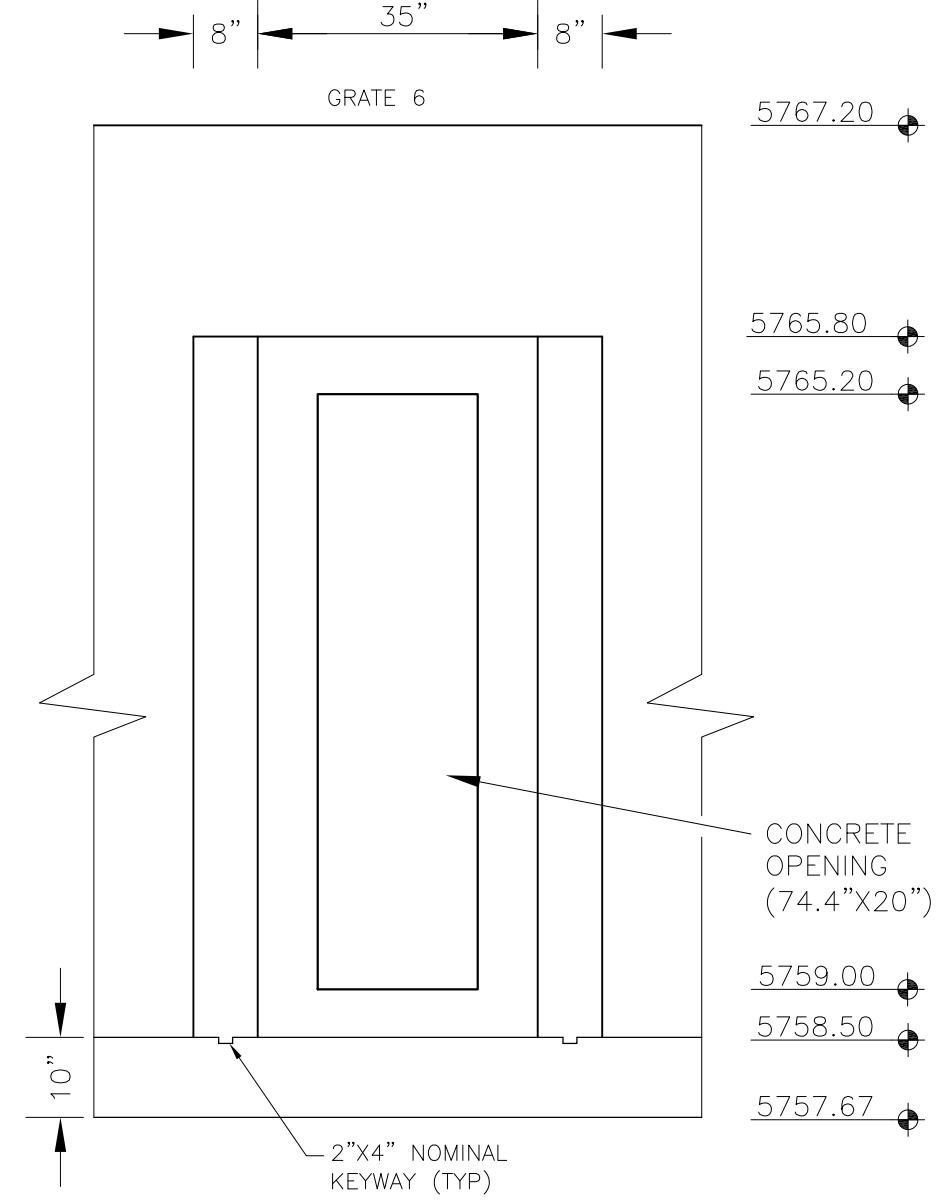
GRATES 2,3,4,5  
NO SCALE



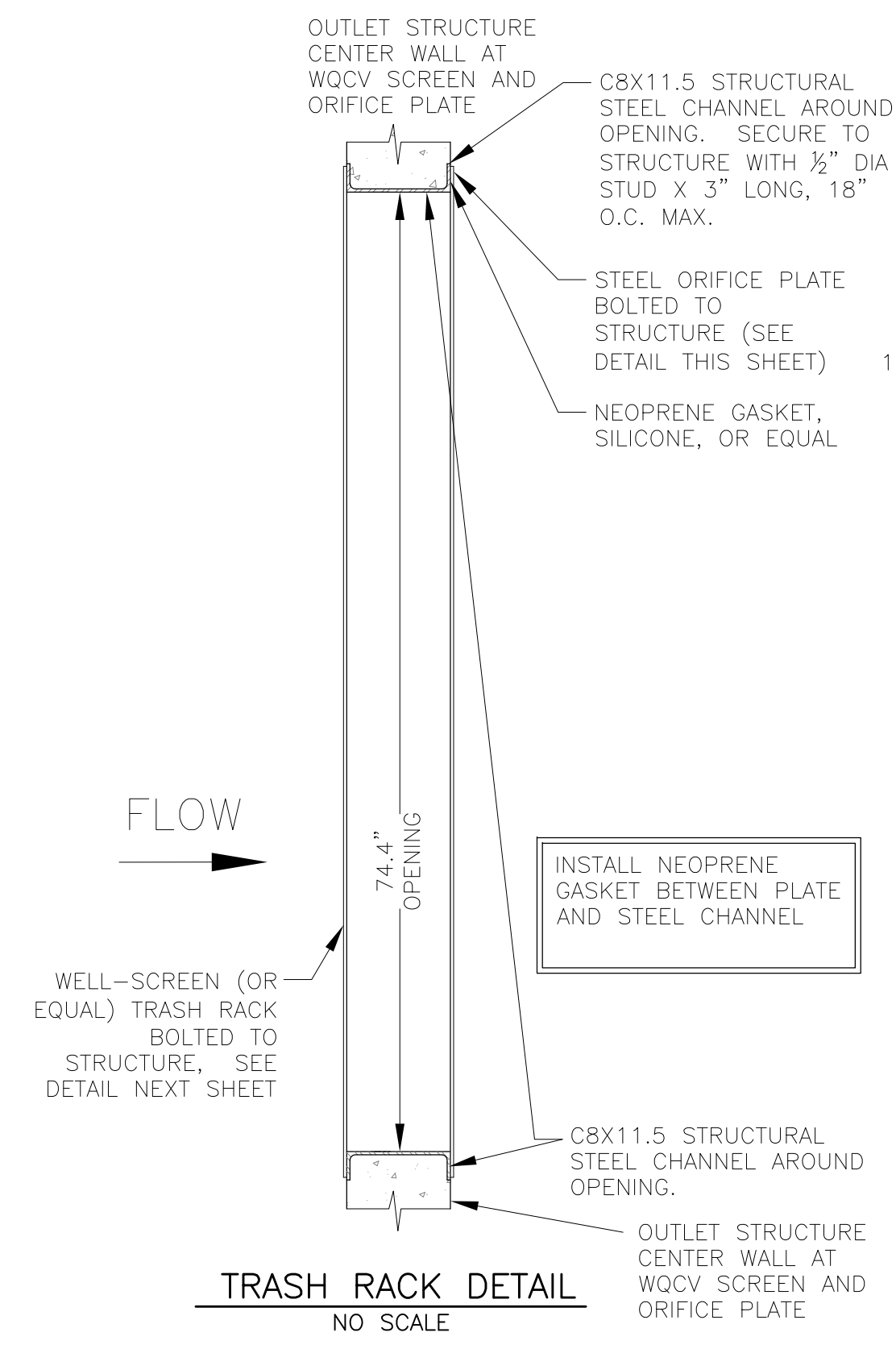
OUTLET STRUCTURE DETAIL - PLAN VIEW  
NO SCALE



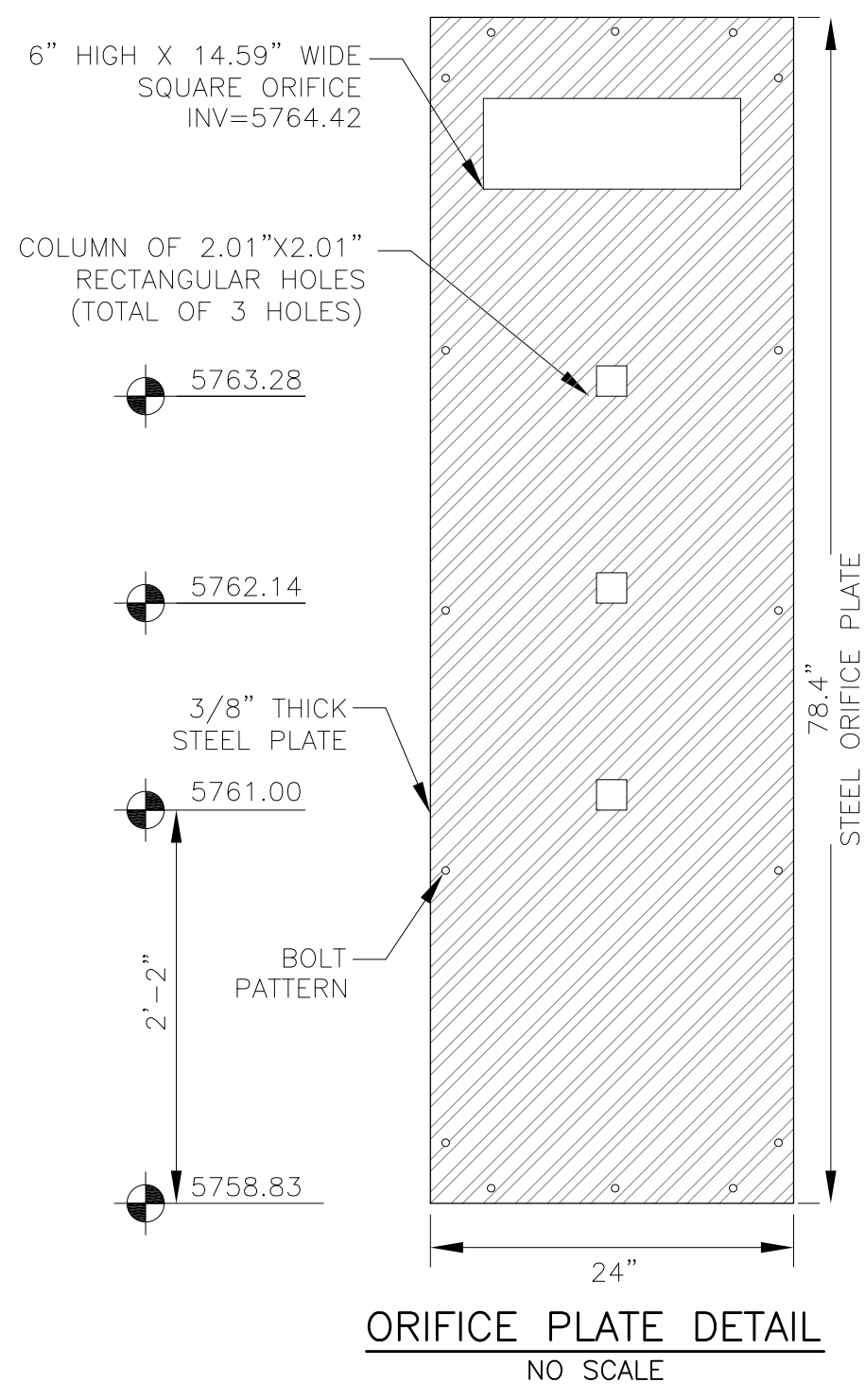
OUTLET STRUCTURE DETAIL - SECTION A-A  
NO SCALE



OUTLET STRUCTURE DETAIL - SECTION B-B  
NO SCALE



TRASH RACK DETAIL  
NO SCALE



ORIFICE PLATE DETAIL  
NO SCALE

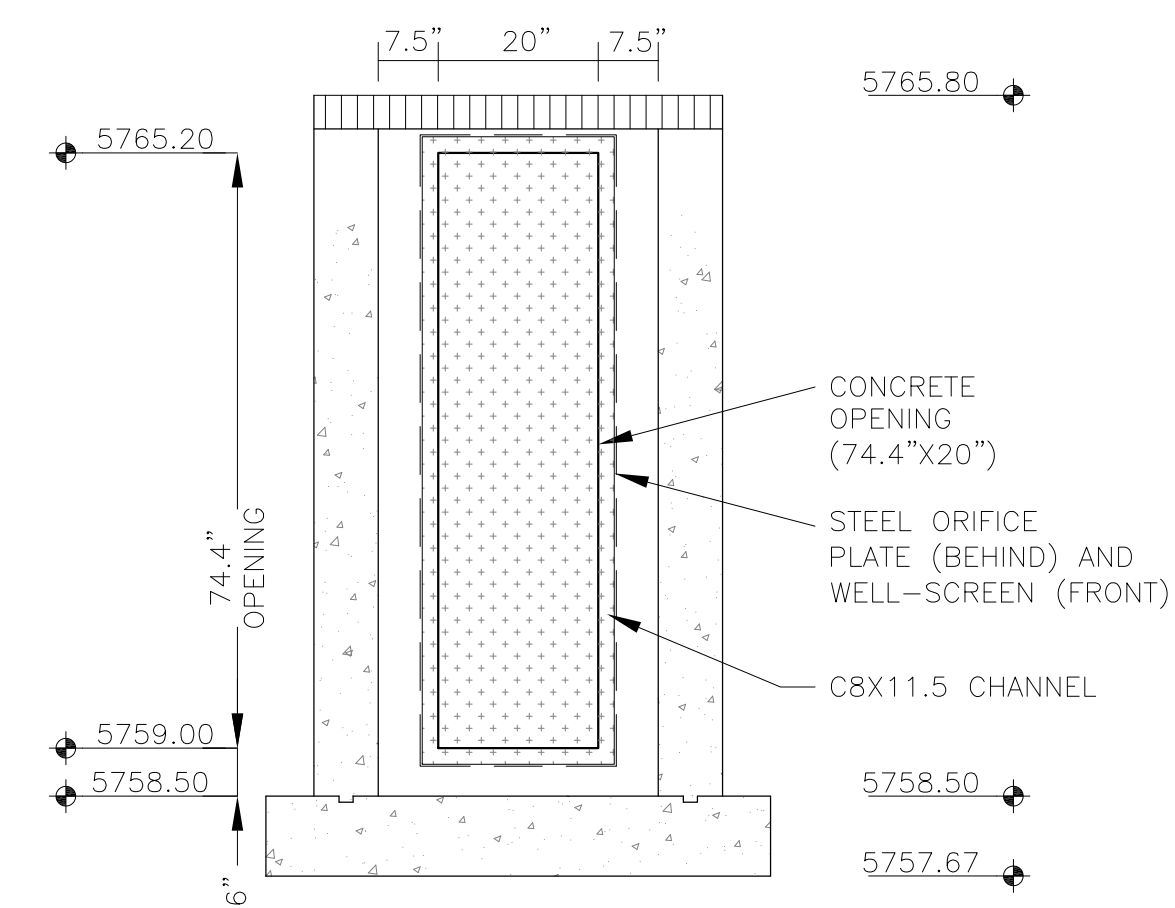
OUTLET STRUCTURE, FOREBAY, AND DRAIN CHANNEL NOTES:

- PRIOR TO CONSTRUCTION, CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR ALL COMPONENTS OF THE OUTLET STRUCTURE.
- GRADE 60 REINFORCING STEEL REQUIRED. SEE TABLE FOR THE MINIMUM LAP SPLICE LENGTH FOR REINFORCING BARS. ALL REINFORCING STEEL SHALL HAVE A TWO-INCH MINIMUM CLEARANCE FROM EDGE OF CONCRETE, UNLESS OTHERWISE NOTED.
- CONCRETE FOR THE OUTLET STRUCTURE AND FOREBAY SHALL BE CDOT CLASS D CONCRETE.
- CONCRETE FOR DRAIN CHANNELS SHALL BE CDOT CLASS B CONCRETE
- EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213. EXPANSION JOINT MATERIAL SHALL BE 1/2" THICK, SHALL EXTEND THE FULL DEPTH OF CONTACT SURFACE AND THE JOINT SHALL BE SEALED, REFER TO DETAILS.
- ALL EXPOSED CONCRETE CORNERS SHALL HAVE A 3/8" CHAMFER UNLESS OTHERWISE NOTED.
- SUBGRADE TO BE 12" THICK CLEAN FILL COMPACTED TO 95% STANDARD PROCTOR DENSITY PER ASTM M698 UNDER STRUCTURE.
- REFER TO POND DETAILS FOR PRESEDIMENTATION/FOREBAY DESIGN.
- ENGINEER SHALL BE NOTIFIED PRIOR TO BEGINNING CONSTRUCTION OF OUTLET STRUCTURE TO SCHEDULE OBSERVATION VISITS FOR STRUCTURES.

BAR SIZE	#4	#5	#6
MIN. SPLICE LENGTH	1'-3"	1'-7"	2'-0"

WQCV WELL-SCREEN NOTES:

- Well-Screen shall be stainless steel and attached by stainless steel bolts along edge of the mounting frame.
- WQCV Well Screen
  - Type of Screen: Stainless steel #93 Vee Wire (Johnson Vee Wire (tm) Stainless Steel Screen or equivalent with 60% open area)
  - Screen slot opening dimension: 0.139" (Screen #93 Vee Wire Slot Opening)
  - Type and Size of Support Rod: TE 0.074"x0.50"
  - Spacing of Support Rod (O.C.): 1.0 Inch
  - Total Screen Thickness: 0.655"
  - Carbon Steel Holding Frame Type: 3/4" x 1.0" angle



OUTLET STRUCTURE DETAIL - SECTION B-B  
NO SCALE

Unresolved Comment:  
Sheets C9.3, C9.4, and C9 need to be included  
in the GEC Plans or the CD's so our SW  
inspectors can see them in the field. Our SW  
inspectors do not look at drainage reports for  
drawings.

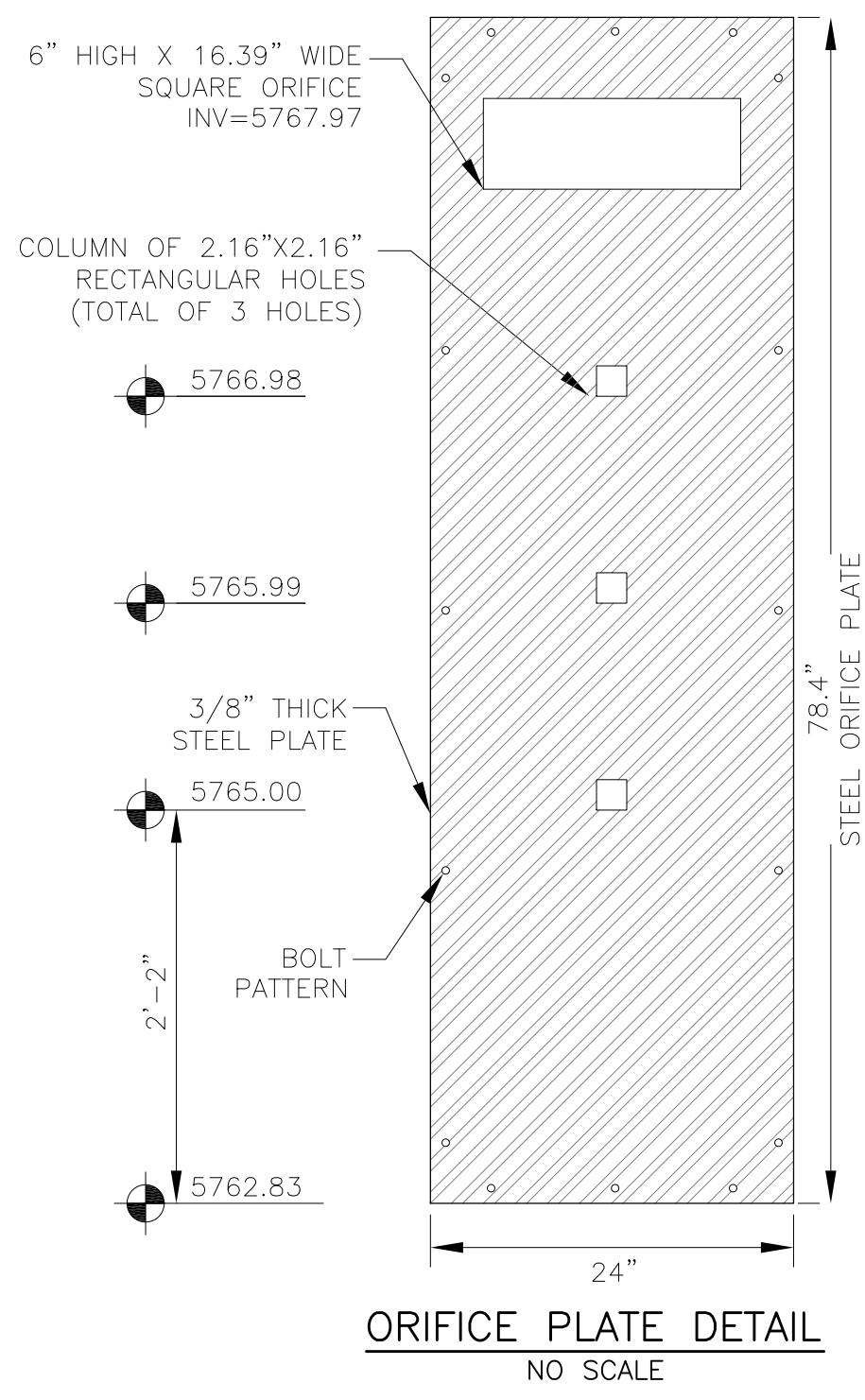
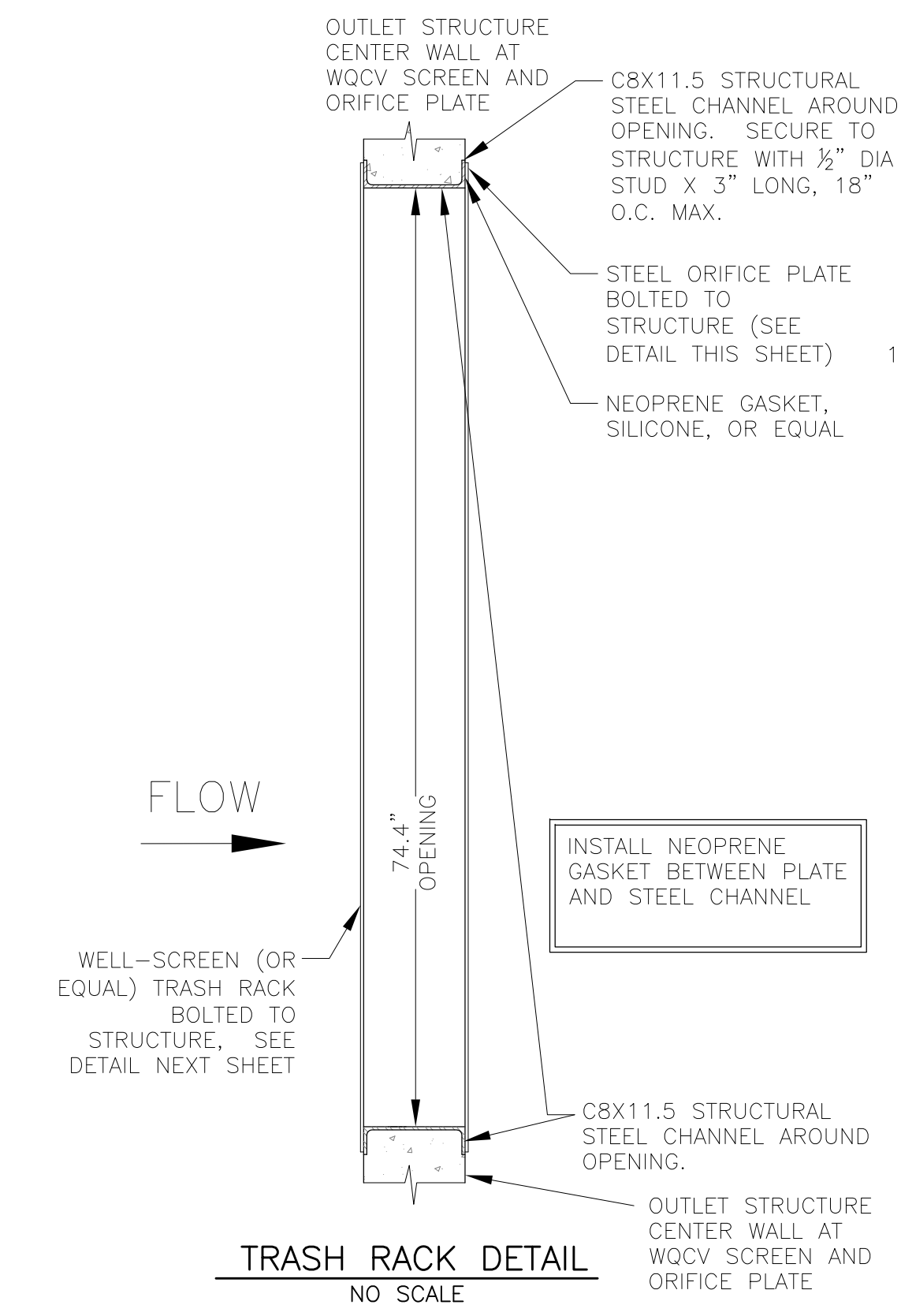
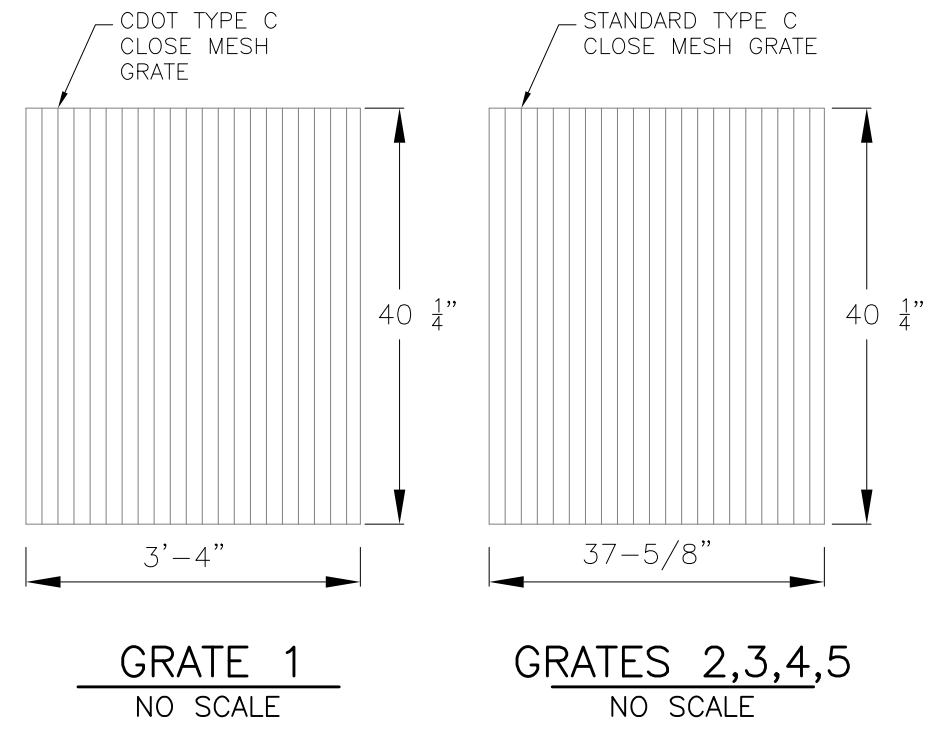
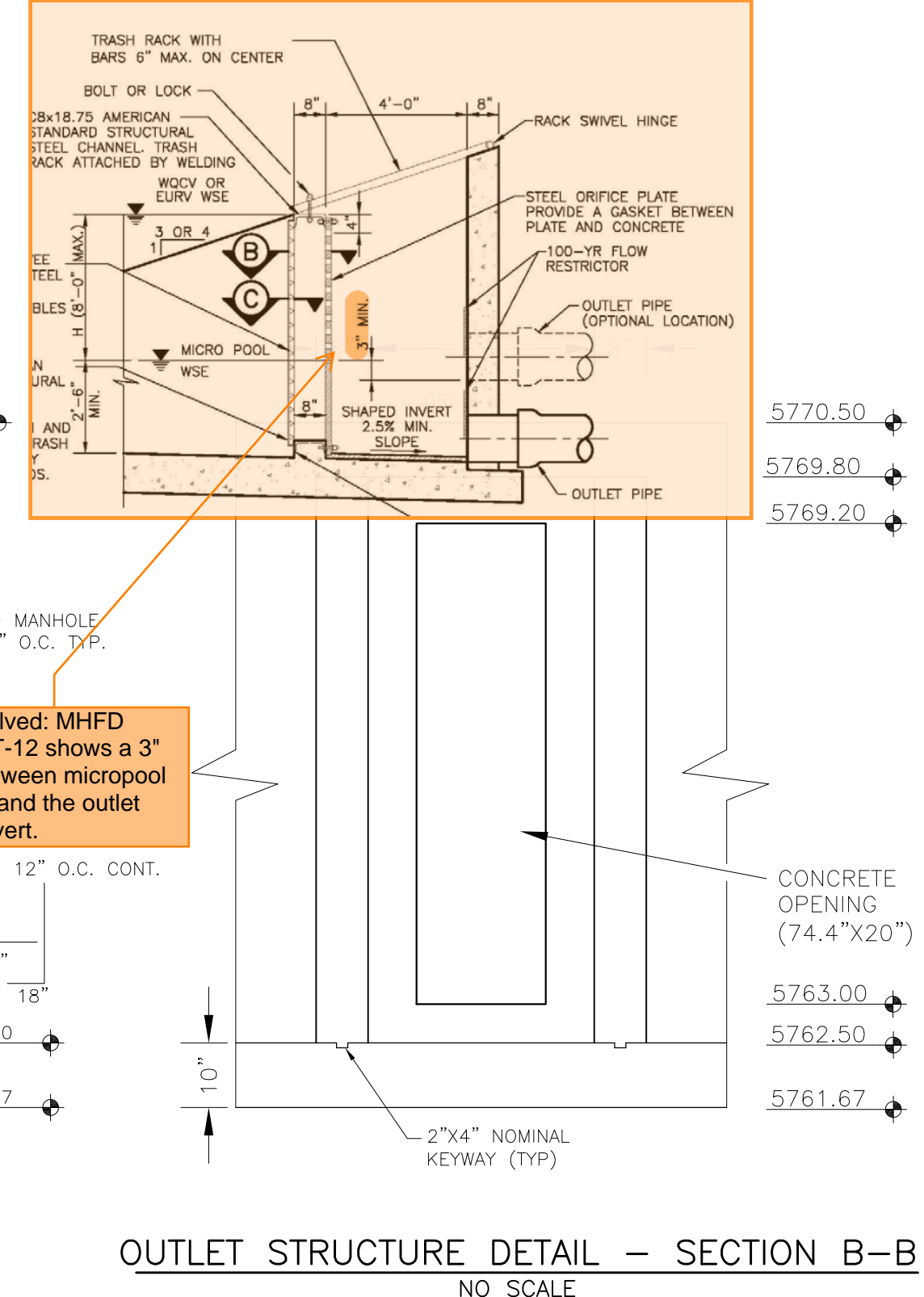
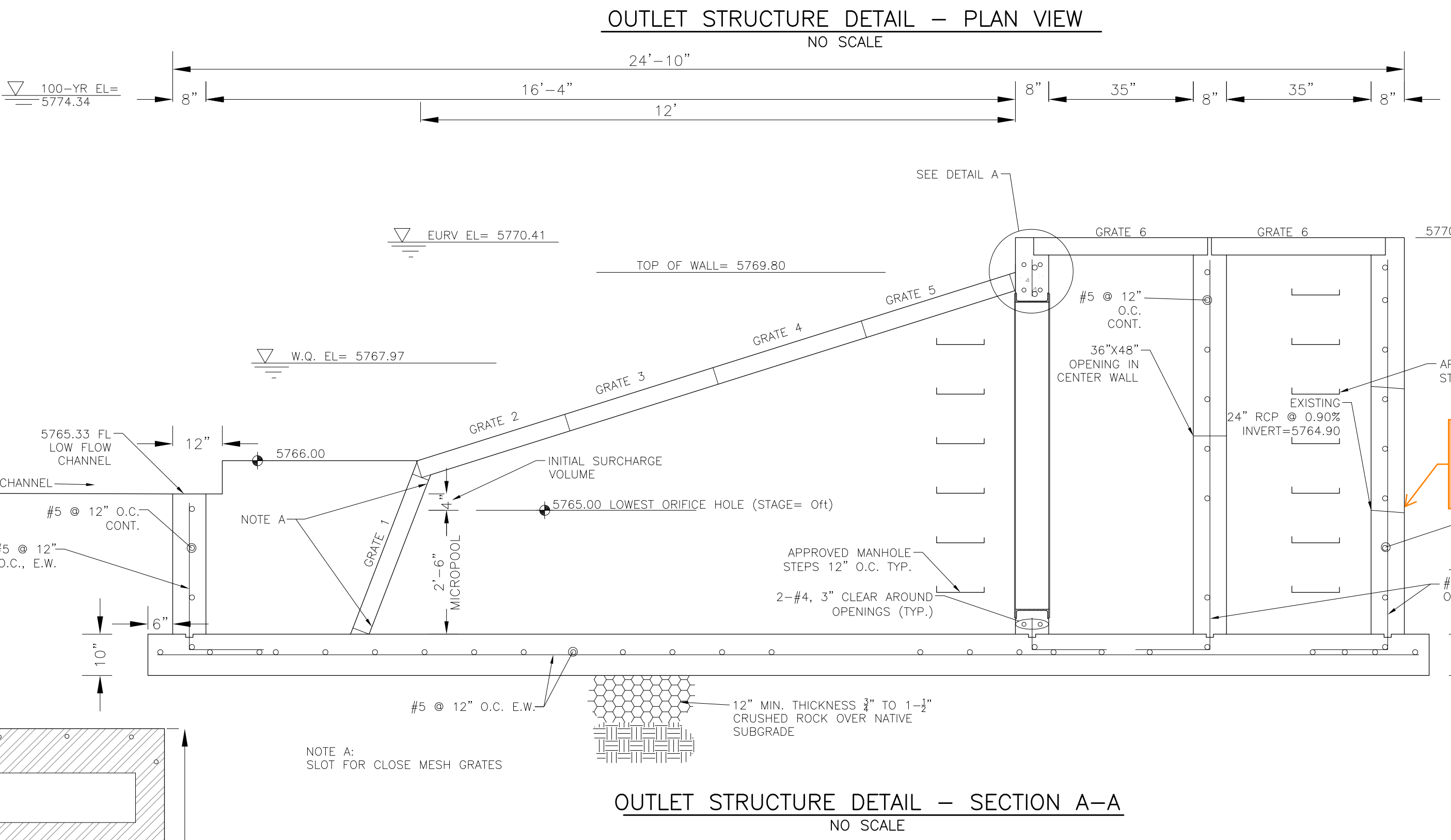
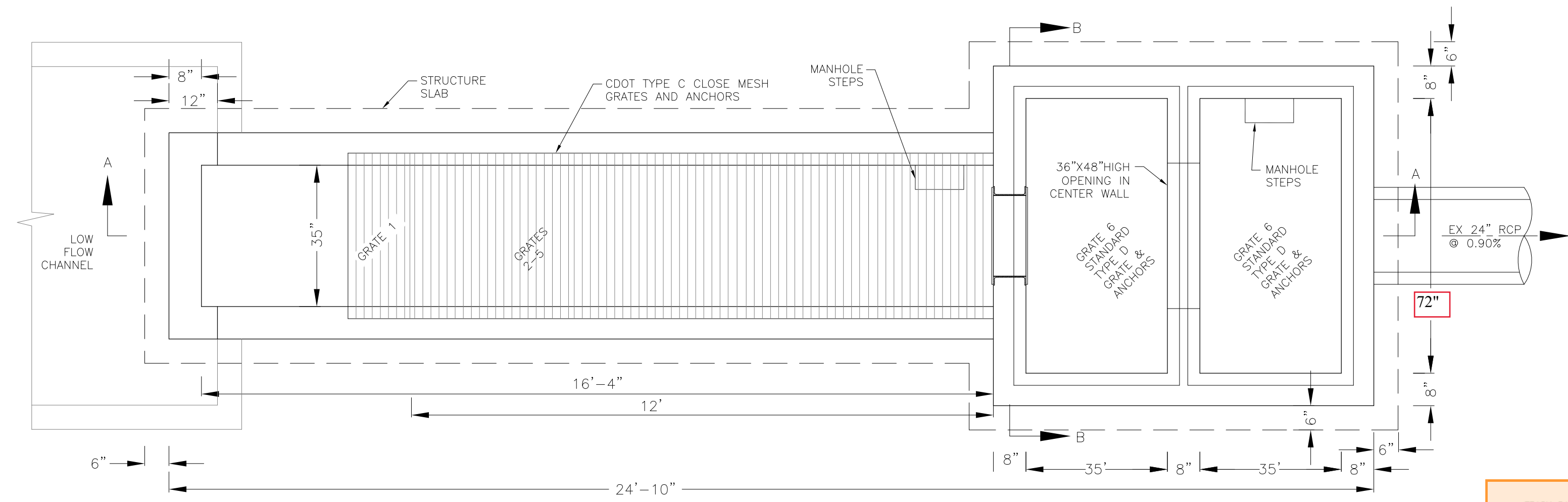
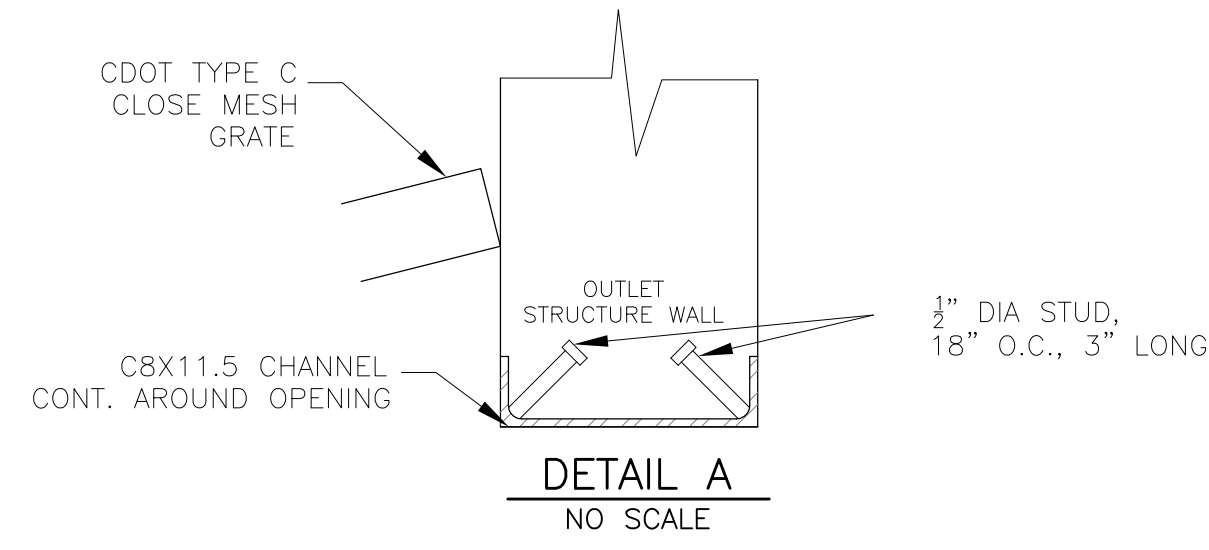
**CORE**  
**ENGINEERING GROUP**  
15004 1ST AVENUE, S.  
DENVER, CO 80202  
PH: 719.570.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@cegi.com

DATE: \_\_\_\_\_  
DESCRIPTION: \_\_\_\_\_  
NO: \_\_\_\_\_  
PREPARED FOR:  
**LORSON, LLC**  
212 N. WAHSATCH AVE, SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
(719) 635-3200  
CONTACT: JEFF MARK

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

PROJECT:  
**THE RIDGE AT LORSON RANCH**  
FONTAINE BLVD. - WALLEYE DR  
COLORADO SPRINGS, COLORADO

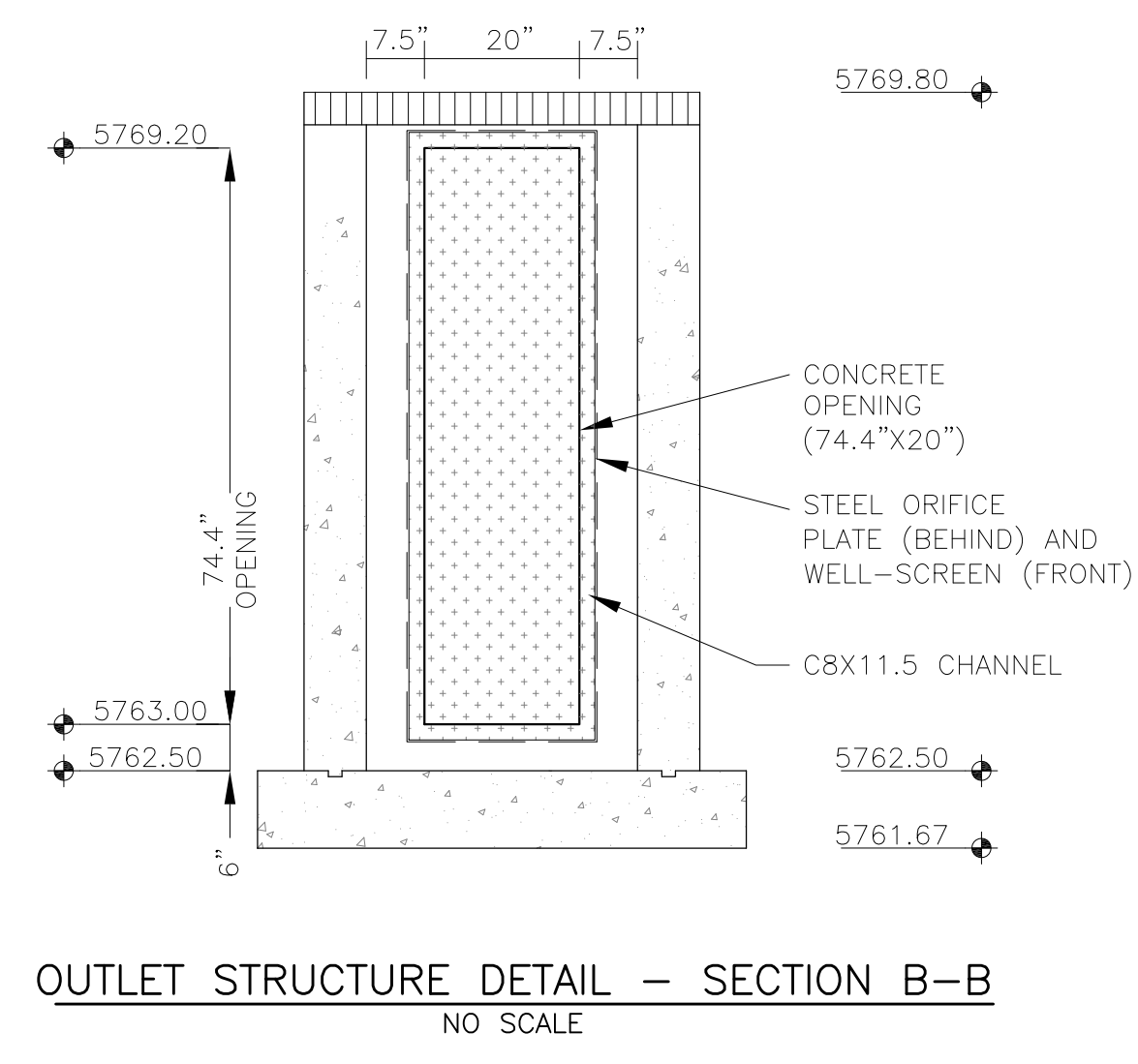
DATE:  
JULY, 2021  
PROJECT NO.  
100.064  
SHEET NUMBER  
**C9.3**  
TOTAL SHEETS: 21

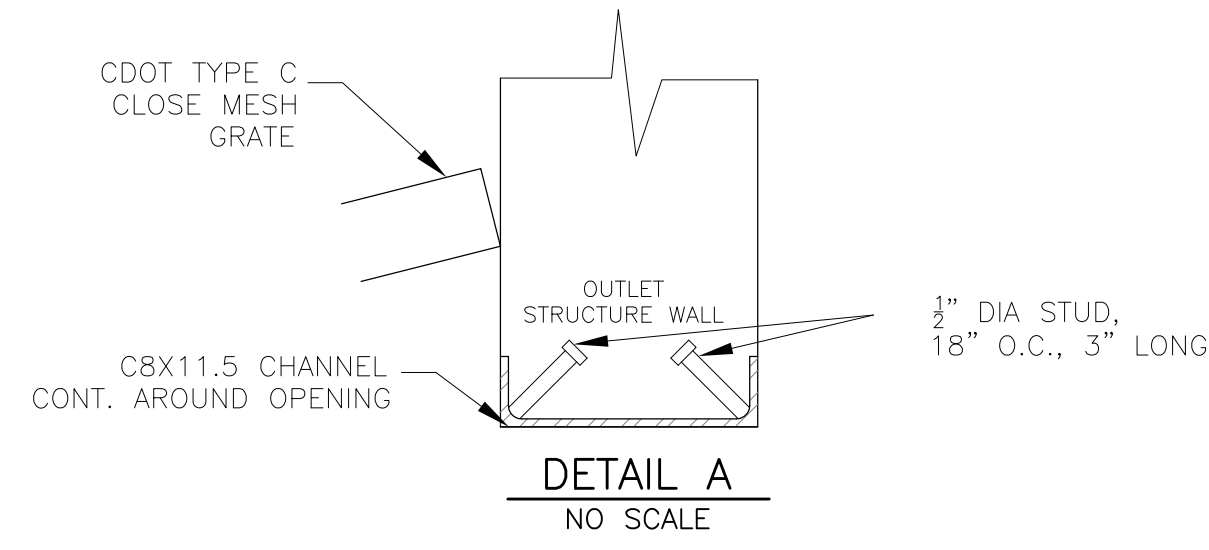


**OUTLET STRUCTURE, FOREBAY, AND DRAIN CHANNEL NOTES:**

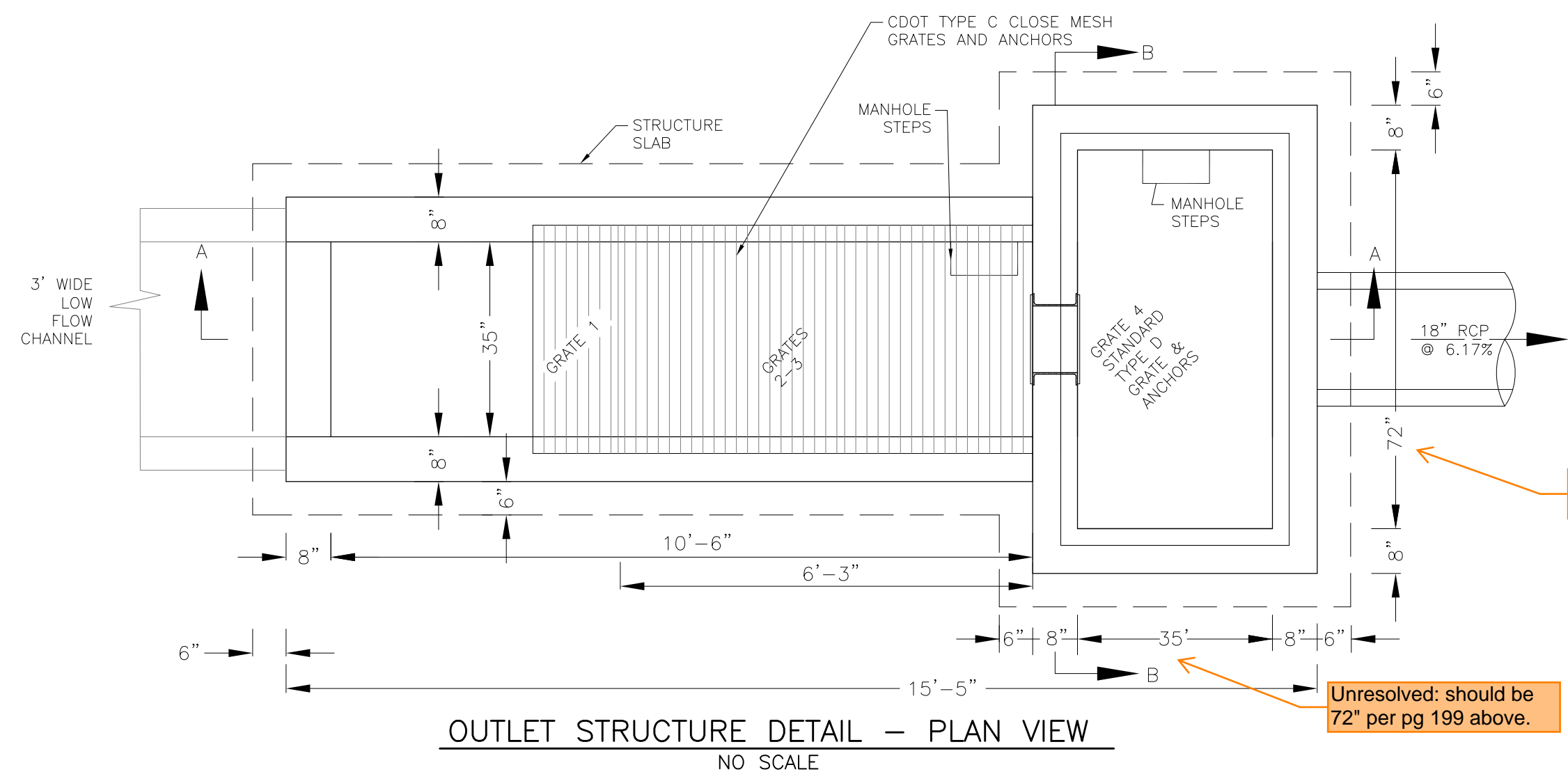
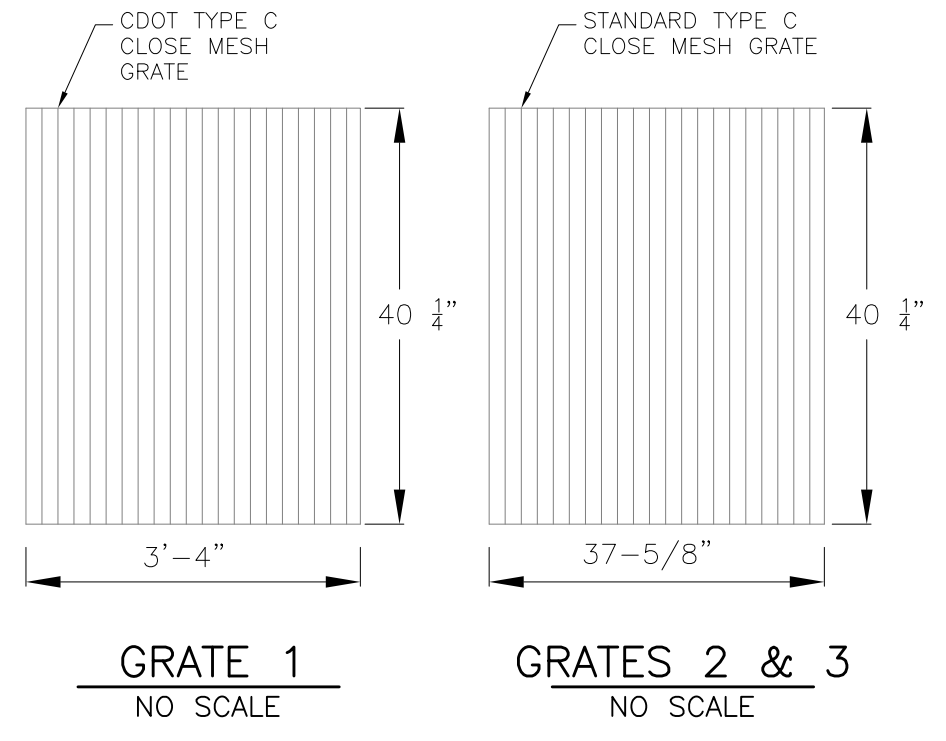
- PRIOR TO CONSTRUCTION, CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR ALL COMPONENTS OF THE OUTLET STRUCTURE.
  - GRADE 60 REINFORCING STEEL REQUIRED. SEE TABLE FOR THE MINIMUM LAP SPLICE LENGTH FOR REINFORCING BARS. ALL REINFORCING STEEL SHALL HAVE A TWO-INCH MINIMUM CLEARANCE FROM EDGE OF CONCRETE, UNLESS OTHERWISE NOTED.
- | BAR SIZE           | #4    | #5    | #6    |
|--------------------|-------|-------|-------|
| MIN. SPLICE LENGTH | 1'-3" | 1'-7" | 2'-0" |
- CONCRETE FOR THE OUTLET STRUCTURE AND FOREBAY SHALL BE CDOT CLASS D CONCRETE.
  - CONCRETE FOR DRAIN CHANNELS SHALL BE CDOT CLASS B CONCRETE
  - EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213. EXPANSION JOINT MATERIAL SHALL BE 1/2" THICK, SHALL EXTEND THE FULL DEPTH OF CONTACT SURFACE AND THE JOINT SHALL BE SEALED, REFER TO DETAILS.
  - ALL EXPOSED CONCRETE CORNERS SHALL HAVE A 3/8" CHAMFER UNLESS OTHERWISE NOTED.
  - SUBGRADE TO BE 12" THICK CLEAN FILL COMPACTED TO 95% STANDARD PROCTOR DENSITY PER ASTM M698 UNDER STRUCTURE.
  - REFER TO POND DETAILS FOR PRESEDIMENTATION/FOREBAY DESIGN.
  - ENGINEER SHALL BE NOTIFIED PRIOR TO BEGINNING CONSTRUCTION OF OUTLET STRUCTURE TO SCHEDULE OBSERVATION VISITS FOR STRUCTURES.

- WQCV WELL-SCREEN NOTES:**
- Well-Screen shall be stainless steel and attached by stainless steel bolts along edge of the mounting frame.
  - WQCV Well Screen
    - Type of Screen: Stainless steel #93 Vee Wire (Johnson Vee Wire (tm) Stainless Steel Screen or equivalent with 60% open area)
    - Screen slot opening dimension: 0.139" (Screen #93 Vee Wire Slot Opening)
    - Type and Size of Support Rod: TE 0.074"x0.50"
    - Spacing of Support Rod (O.C.): 1.0 Inch
    - Total Screen Thickness: 0.655"
    - Carbon Steel Holding Frame Type: 3/4" x 1.0" angle





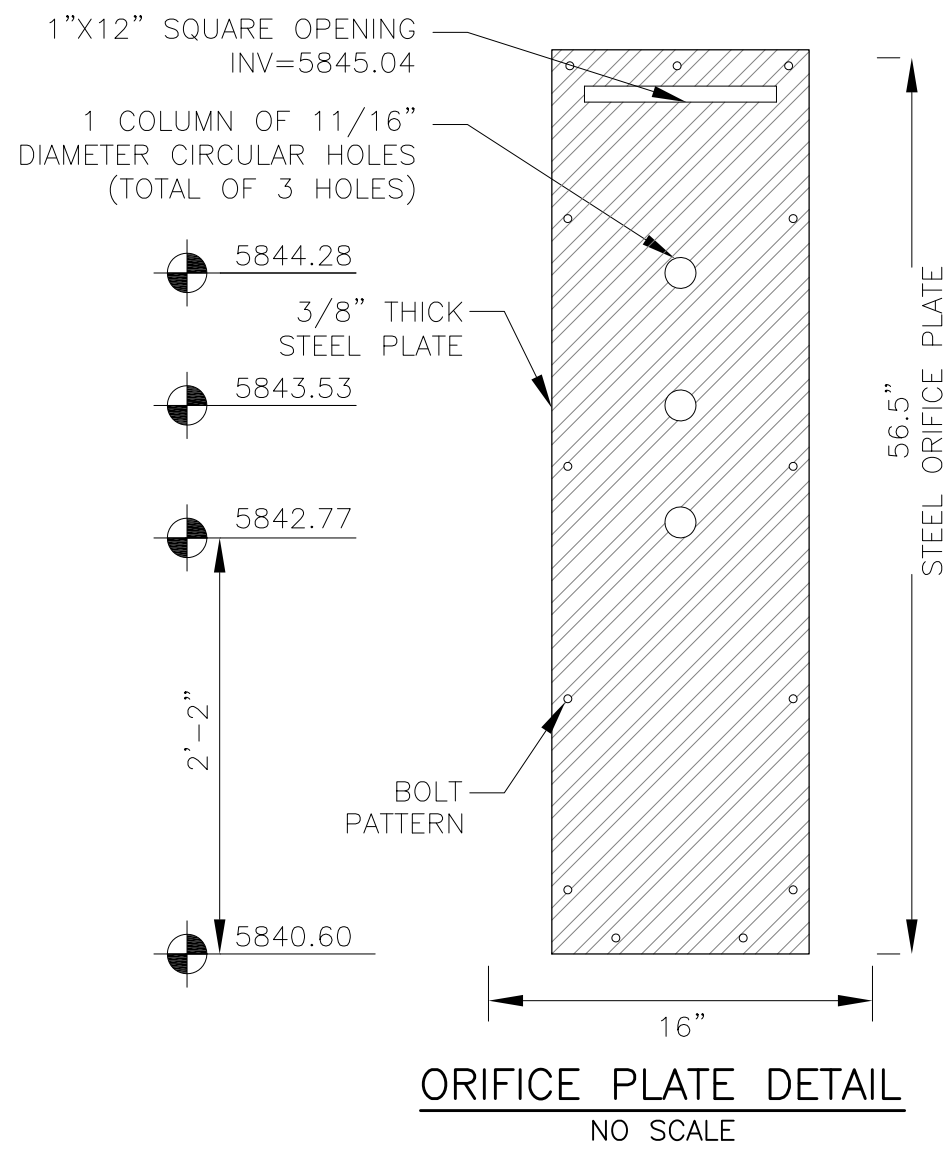
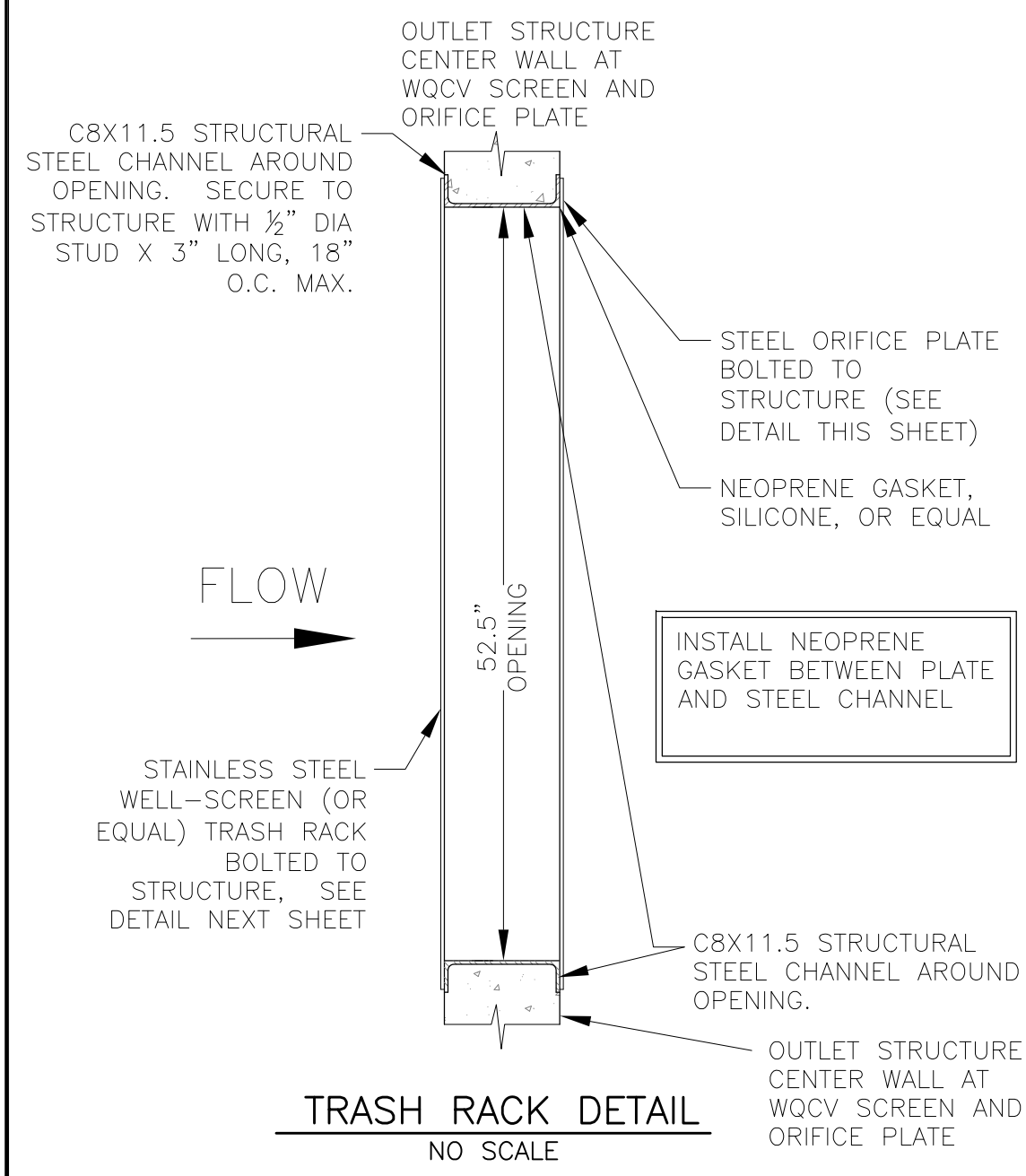
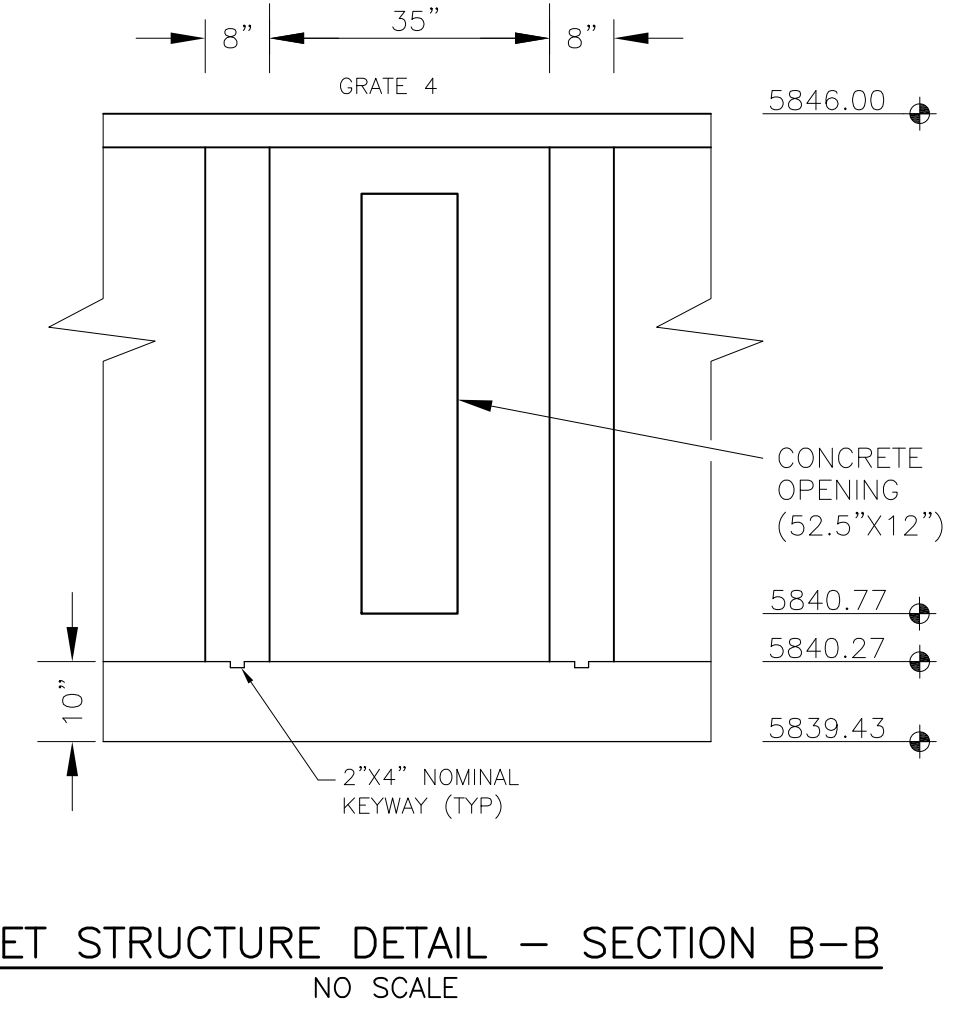
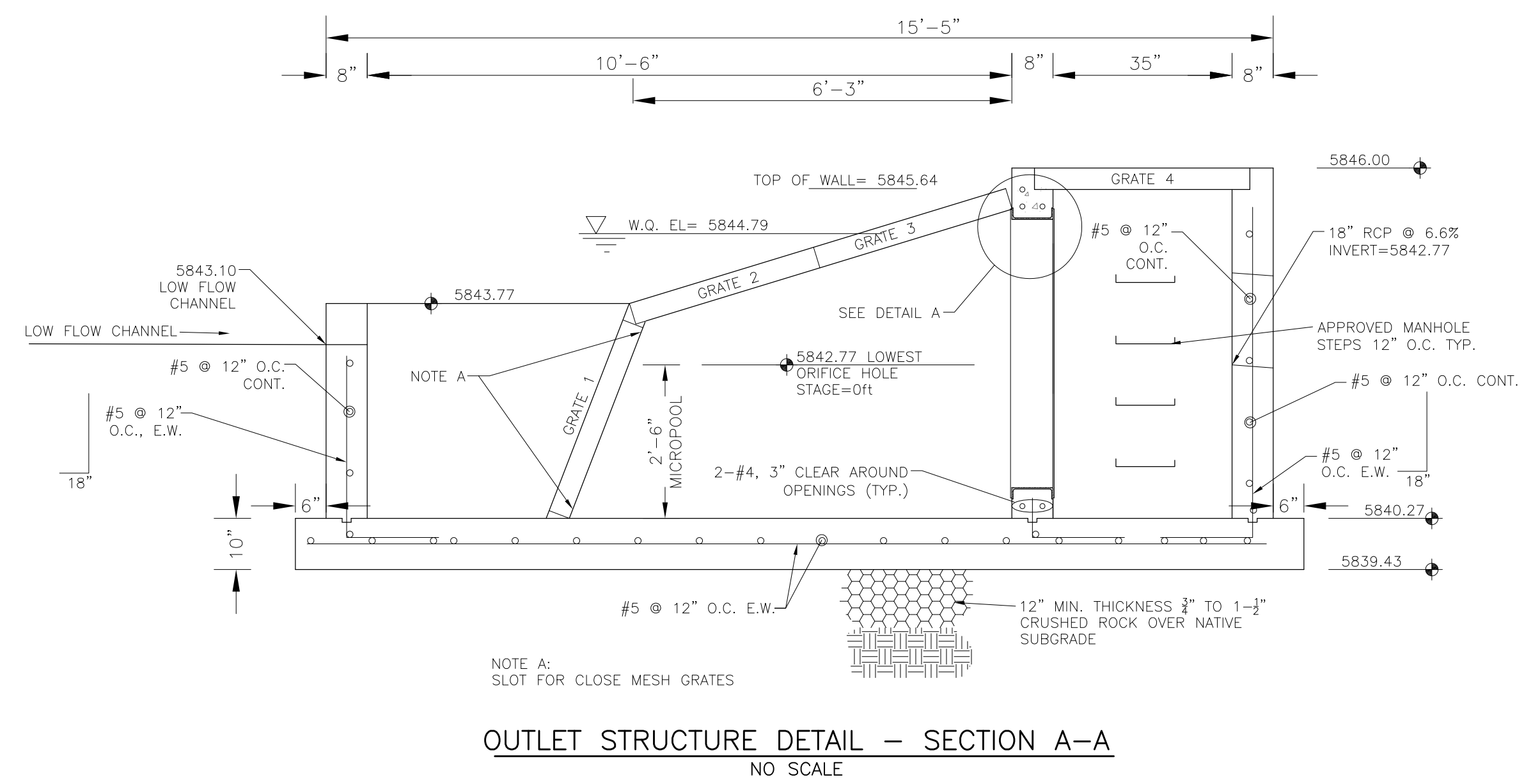
NOTE:  
AFTER CONCRETE STRUCTURE HAS BEEN POURED  
ALL GRATE DIMENSIONS SHALL BE FIELD VERIFIED  
PRIOR TO GRATE CONSTRUCTION



Unresolved: should be 36" per pg 199 above.

Unresolved: should be 72" per pg 199 above.

Review #2 update:  
Revise outlet structure accordingly or revise MTFD calcs on pg 204 to reflect this outlet configuration so there is not a discrepancy.

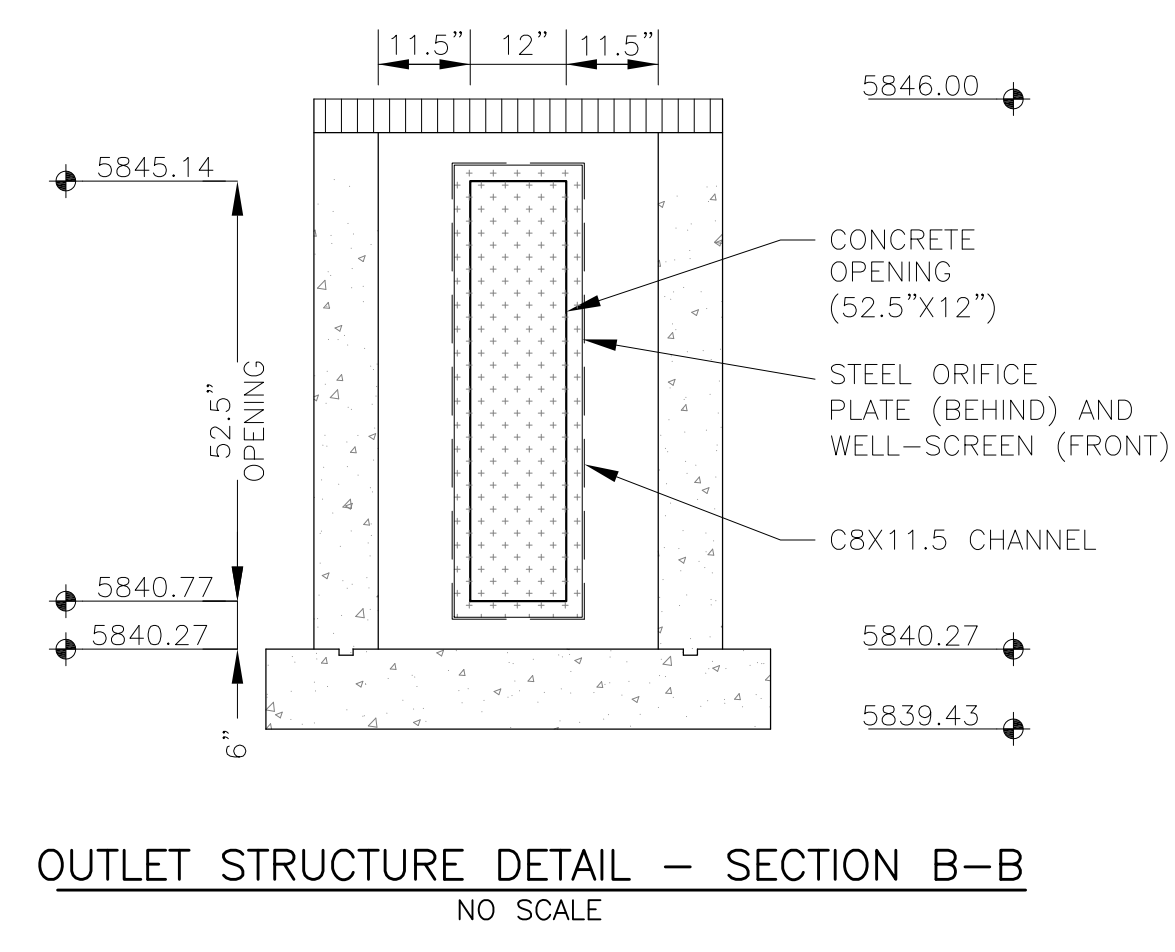


OUTLET STRUCTURE, FOREBAY, AND DRAIN CHANNEL NOTES:

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- | BAR SIZE           | #4    | #5    | #6    |
|--------------------|-------|-------|-------|
| MIN. SPLICE LENGTH | 1'-3" | 1'-7" | 2'-0" |
- CONCRETE FOR THE OUTLET STRUCTURE AND FOREBAY SHALL BE CDOT CLASS D CONCRETE.
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  - Screen slot opening dimension: 0.139" (Screen #93 Vee Wire Slot Opening)
  - Type and Size of Support Rod: 1E 0.074"x0.50"
  - Spacing of Support Rod (O.C.): 1.0 Inch
  - Total Screen Thickness: 0.655"
  - Carbon Steel Holding Frame Type: 3/4" x 1.0" angle



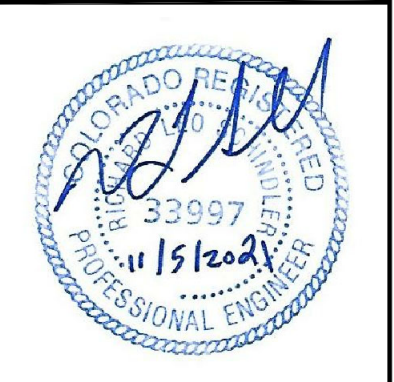
**CORE ENGINEERING GROUP**  
15004 1ST AVENUE S.  
DENVER, CO 80206  
PH: 719.570.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@ceg1.com

DATE: NOV 30, 2021  
DESCRIPTION: MODIFY CIRCULAR HOLES IN ORIFICE PLATE  
PREPARED FOR: **LORSON, LLC**  
212 N. WAHSATCH AVE, SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
CONTACT: JEFF MARK

PROJECT: **THE RIDGE AT LORSON RANCH**  
FONTAINE BLVD. - WALLEYE DR  
COLORADO SPRINGS, COLORADO

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

POND F  
WQ POND  
OUTLET STRUCTURE DETAILS



DATE: NOV 5, 2021

PROJECT NO. 100.064

SHEET NUMBER **C9.6**  
TOTAL SHEETS: 23

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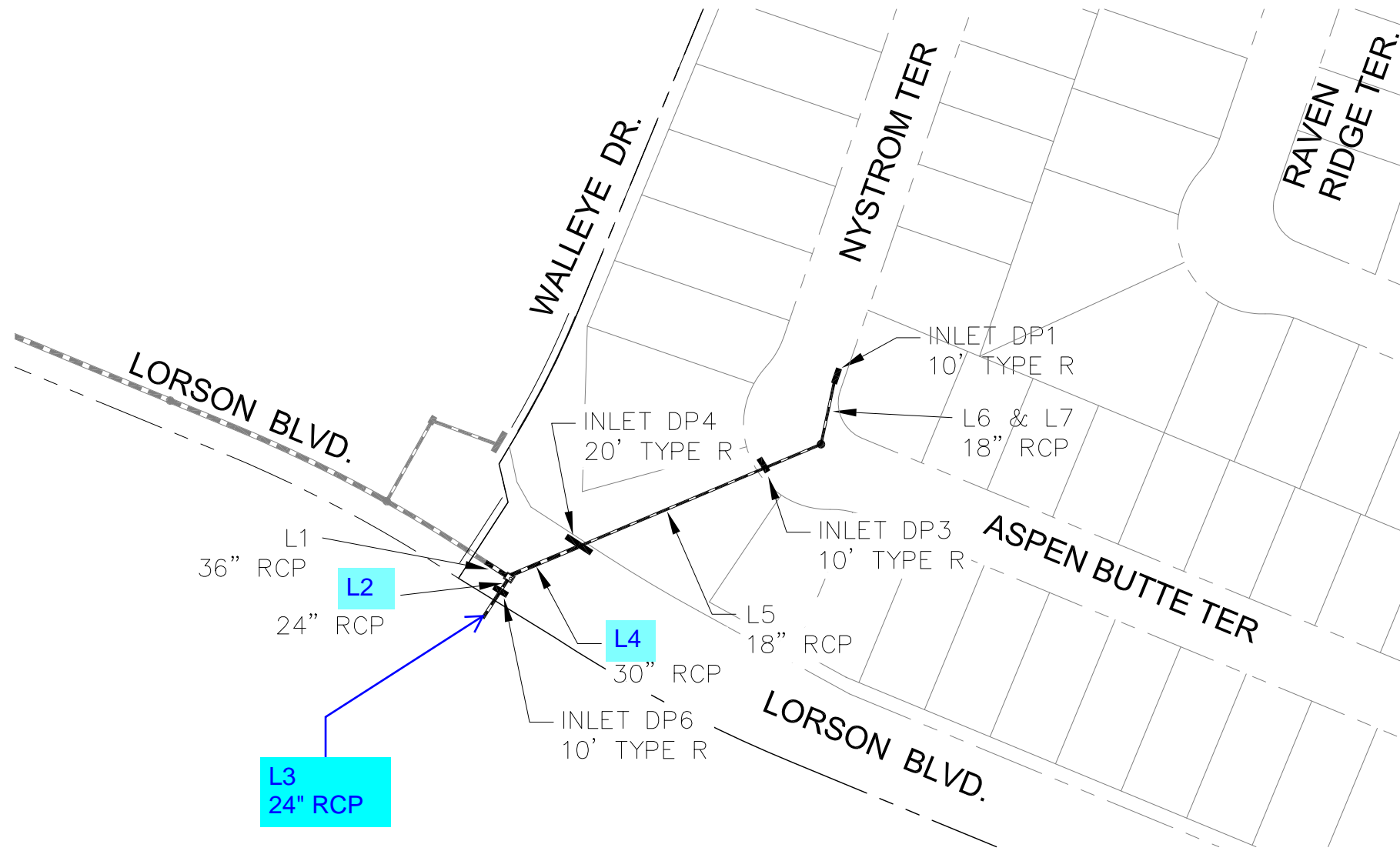
## APPENDIX E– STORM SEWER SCHEMATIC AND HYDRAFLOW STORM SEWER CALCS

---

Update storm sewer calculations as flows at proposed inlets may have changed

Update storm calculations to match CD's for Filings 1-3. CD's have been marked with locations where the 2 documents do not match. Revise either report or plans so documents match.

# BASINS C1 STORM SCHEMATIC



**CORE ENGINEERING GROUP**  
 15004 1ST AVE. S.  
 BURNSVILLE, MN 55306  
 PH: 719.570.1100  
 CONTACT: RICHARD L. SCHINDLER, P.E.  
 EMAIL: Rich@cegi.com

NO.	DESCRIPTION	DATE

PREPARED FOR: **LORSON, LLC**  
 212 N. WAHSATCH AVE., SUITE 301  
 COLORADO SPRINGS, COLORADO 80903  
 CONTRACT: JEFF MARK

DRAWN: RLS  
 DESIGNED: LAB  
 CHECKED: LAB

**STORM SEWER SCHEMATIC**  
**BASINS C1**  
**THE RIDGE AT LORSON RANCH**

DATE	MARCH, 2021
PROJECT NO.	100.064
SHEET NUMBER	1
TOTAL SHEETS:	1

P: 100.100.064\_ebschong-100.064-storm\_schematic.dwg, Mar. 19, 2021, 8:02am

# 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	36.80	36 c	20.5	5798.38	5798.69	1.509	5800.33	5800.62	0.91	5800.62	End
2	2	15.00	24 c	8.0	5799.69	5799.81	1.525	5801.18	5801.18	n/a	5801.18	1
3	3	12.00	24 c	25.2	5799.91	5800.16	0.992	5801.62	5801.58	0.39	5801.97	2
4	4	21.80	30 c	51.4	5799.19	5799.70	0.993	5801.23	5801.26	n/a	5801.26 j	1
5	5	8.30	18 c	149.1	5800.70	5811.21	7.049	5801.63	5812.31	n/a	5812.31	4
6	6	5.60	18 c	39.8	5811.71	5812.09	0.953	5812.71	5812.99	n/a	5812.99 j	5
7	7	5.60	18 c	46.3	5812.49	5812.95	0.993	5813.27	5813.86	0.39	5814.25	6

<b>C1 basins 5yr storm</b>	Number of lines: 7	Run Date: 03-18-2021
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NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; 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	65.80	36 c	20.5	5798.38	5798.69	1.509	5801.00	5801.29	1.59	5801.29	End
2	2	25.70	24 c	8.0	5799.69	5799.81	1.512	5801.84*	5801.94*	0.52	5802.46	1
3	3	20.00	24 c	25.2	5800.00	5800.25	0.992	5802.87*	5803.07*	0.63	5803.70	2
4	4	40.10	30 c	51.4	5799.19	5799.70	0.993	5801.84*	5802.33*	0.52	5802.85	1
5	5	18.10	18 c	149.1	5801.20	5811.71	7.049	5802.85	5813.16	n/a	5813.16 j	4
6	6	12.20	18 c	39.8	5811.71	5812.11	1.001	5814.08*	5814.62*	0.64	5815.26	5
7	7	12.20	18 c	46.3	5812.49	5812.96	1.014	5815.26*	5815.89*	0.74	5816.63	6

<b>C1 basins 100yr storm</b>	Number of lines: 7	Run Date: 03-18-2021
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NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; \*Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Line No.	Flow Rate (cfs)	Line Size (in)	Line Type	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Minor Loss (ft)	HGL Jnct (ft)	Depth Up (ft)	Vel Dn (ft/s)
1	65.80	36	Cir	5798.38	5798.69	1.51	5801.00	5801.29	1.59	5801.29	2.60**	10.05
2	25.70	24	Cir	5799.69	5799.81	1.51	5801.84	5801.94	0.52	5802.46	2.00	8.18
3	20.00	24	Cir	5800.00	5800.25	0.99	5802.87	5803.07	0.63	5803.70	2.00	6.37
4	40.10	30	Cir	5799.19	5799.70	0.99	5801.84	5802.33	0.52	5802.85	2.50	8.17
5	18.10	18	Cir	5801.20	5811.71	7.05	5802.85	5813.16 j	n/a	5813.16	1.45**	10.24
6	12.20	18	Cir	5811.71	5812.11	1.00	5814.08	5814.62	0.64	5815.26	1.50	6.91
7	12.20	18	Cir	5812.49	5812.96	1.01	5815.26	5815.89	0.74	5816.63	1.50	6.91

<b>C1 basins 100yr storm</b>	Number of lines: 7	Date: 09-30-2021
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NOTES: \*\* Critical depth



# BASINS C3 STORM SCHEMATIC



**CORE ENGINEERING GROUP**  
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NO.	DESCRIPTION	DATE

PREPARED FOR: **LORSON, LLC**  
 212 N. WAHSATCH AVE., SUITE 301  
 COLORADO SPRINGS, COLORADO 80903  
 CONTACT: JEFF MARK

DRAWN: RLS  
 DESIGNED: LAB  
 CHECKED: LAB

**STORM SEWER SCHEMATIC**  
**BASINS C3**  
**THE RIDGE AT LORSON RANCH**

DATE	MARCH, 2021
PROJECT NO.	100.064
SHEET NUMBER	1
TOTAL SHEETS:	1

P: 100.100.064\_eb30c3e - 100.064-storm\_schematic.dwg, Mar. 11, 2021, 6:58am

# 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	115.0	54 c	38.4	5775.60	5776.70	2.869	5779.89	5779.78	1.53	5779.78	End
2	2	89.80	48 c	183.5	5777.70	5780.82	1.700	5780.51	5783.62	n/a	5783.62	1
3	3	89.80	48 c	307.6	5781.12	5790.01	2.890	5784.25	5792.81	n/a	5792.81	2
4	4	89.80	48 c	110.3	5790.30	5791.62	1.197	5793.44	5794.42	n/a	5794.42	3
5	5	80.60	48 c	102.4	5791.82	5793.05	1.201	5795.20	5795.71	n/a	5795.71	4
6	6	73.40	48 c	142.7	5793.05	5794.76	1.198	5796.46	5797.29	0.12	5797.29	5
7	7	65.00	42 c	104.4	5795.36	5796.61	1.197	5797.77	5799.08	n/a	5799.08	6
8	8	57.80	42 c	141.7	5796.92	5801.92	3.530	5799.77	5804.25	0.22	5804.25	7
9	9	49.40	36 c	135.8	5802.38	5805.38	2.209	5804.61	5807.62	n/a	5807.62	8
10	10	43.80	36 c	98.2	5805.58	5809.02	3.502	5808.21	5811.13	n/a	5811.13 j	9
11	11	33.50	36 c	57.5	5809.32	5810.48	2.016	5811.84	5812.33	n/a	5812.33 j	10
12	12	33.50	36 c	66.7	5810.69	5812.02	1.996	5812.82	5813.87	n/a	5813.87 j	11
13	13	33.50	36 c	35.9	5812.02	5812.74	2.005	5814.36	5814.59	n/a	5814.59 j	12
14	14	26.00	30 c	165.8	5813.24	5817.72	2.702	5814.99	5819.42	n/a	5819.42 j	13
15	15	17.60	24 c	245.7	5818.20	5822.14	1.604	5819.76	5823.63	n/a	5823.63 j	14
16	16	9.30	18 c	245.6	5822.64	5830.50	3.201	5823.96	5831.66	n/a	5831.66 j	15
17	17	9.20	18 c	7.9	5794.12	5794.44	4.057	5795.42	5795.60	n/a	5795.60	4
18	18	7.20	18 c	27.3	5795.76	5796.03	0.990	5796.73	5797.05	0.20	5797.05	5
19	19	8.40	18 c	8.0	5797.26	5797.58	4.003	5798.13	5798.69	0.56	5798.69	6
20	20	7.20	18 c	27.3	5798.78	5799.05	0.991	5800.07	5800.08	n/a	5800.27 j	7
21	21	8.40	18 c	8.0	5803.88	5804.20	4.020	5805.02	5805.31	0.00	5805.31	8
22	22	10.30	18 c	7.4	5810.82	5811.52	9.416	5811.66	5812.75	0.34	5813.09	10
23	23	7.50	18 c	7.5	5814.24	5814.54	4.004	5815.14	5815.59	0.51	5815.59	13
24	24	8.40	18 c	7.6	5818.70	5818.78	1.046	5819.90	5819.89	0.56	5820.45	14
25	25	8.30	18 c	10.1	5822.64	5822.74	0.996	5823.84	5823.84	0.55	5824.40	15
26	26	5.60	18 c	28.0	5807.28	5807.54	0.933	5808.65	5808.65	0.02	5808.68	9
27	27	7.00	24 c	17.8	5779.20	5779.94	4.149	5781.08	5780.88	0.14	5781.03	1
28	28	18.20	30 c	64.4	5778.80	5779.44	0.994	5781.10	5781.02	0.10	5781.12	1
29	29	18.20	30 c	172.1	5780.00	5786.88	3.997	5781.38	5788.31	n/a	5788.31	28
30	30	9.70	18 c	123.9	5787.88	5791.52	2.939	5788.66	5792.71	0.26	5792.71	29
31	31	8.50	24 c	15.9	5787.98	5788.30	2.005	5788.81	5789.33	0.17	5789.33	29

**C3 basins 5yr storm** Number of lines: 31 Run Date: 03-18-2021

NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; 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	225.4	54 c	38.4	5775.60	5776.70	2.869	5779.89	5780.88	n/a	5780.88	End
2	2	153.9	48 c	183.5	5777.70	5780.82	1.700	5781.88	5784.45	0.38	5784.45	1
3	3	153.9	48 c	307.6	5781.12	5790.01	2.890	5784.68	5793.64	1.28	5793.64	2
4	4	153.9	48 c	110.3	5790.30	5791.62	1.197	5793.87	5795.25	0.26	5795.25	3
5	5	133.4	48 c	102.4	5791.82	5793.05	1.201	5796.06	5796.78	0.19	5796.97	4
6	6	132.7	48 c	142.7	5793.05	5794.76	1.198	5797.09	5798.21	n/a	5798.21	5
7	7	118.6	42 c	104.4	5795.36	5796.61	1.197	5798.86*	5800.31*	0.24	5800.55	6
8	8	115.5	42 c	141.7	5796.92	5801.92	3.530	5800.67	5805.14	n/a	5805.14	7
9	9	99.20	36 c	135.8	5802.38	5805.38	2.209	5805.14	5808.28	0.63	5808.28	8
10	10	88.50	36 c	98.2	5805.58	5809.02	3.502	5808.97	5811.86	0.76	5811.86	9
11	11	67.30	36 c	57.5	5809.32	5810.48	2.016	5812.99*	5813.58*	1.41	5814.99	10
12	12	67.30	36 c	66.7	5810.69	5812.02	1.996	5814.99*	5815.67*	0.21	5815.88	11
13	13	67.30	36 c	35.9	5812.02	5812.74	2.005	5815.88*	5816.24*	0.70	5816.95	12
14	14	46.90	30 c	165.8	5813.24	5817.72	2.702	5816.95	5819.98	n/a	5819.98	13
15	15	30.40	24 c	245.7	5818.20	5822.14	1.604	5820.09	5824.12	0.73	5824.85	14
16	16	14.80	18 c	245.6	5822.64	5830.50	3.201	5825.22	5831.90	n/a	5831.90 j	15
17	17	20.50	18 c	7.9	5794.12	5794.44	4.057	5795.72*	5796.02*	2.09	5798.12	4
18	18	11.30	18 c	27.3	5795.76	5796.03	0.990	5798.19*	5798.51*	0.25	5798.76	5
19	19	20.70	18 c	8.0	5797.26	5797.58	4.003	5798.47*	5799.51*	2.13	5801.64	6
20	20	13.10	18 c	27.3	5798.78	5799.05	0.991	5802.06*	5802.48*	0.34	5802.82	7
21	21	16.30	18 c	8.0	5803.88	5804.20	4.020	5806.24*	5806.43*	0.00	5806.43	8
22	22	21.20	18 c	7.4	5810.82	5811.12	4.033	5812.16*	5812.72*	2.24	5814.96	10
23	23	20.40	18 c	7.5	5814.24	5814.54	4.004	5816.95*	5817.23*	2.07	5819.30	13
24	24	16.50	18 c	7.6	5818.70	5818.78	1.046	5820.20*	5820.39*	1.36	5821.74	14
25	25	15.60	18 c	10.1	5822.64	5822.74	0.996	5825.10*	5825.32*	1.21	5826.53	15
26	26	10.70	18 c	28.0	5806.88	5807.14	0.929	5810.84*	5811.13*	0.06	5811.18	9
27	27	28.70	24 c	17.8	5779.20	5779.94	4.149	5782.91*	5783.20*	0.52	5783.72	1
28	28	42.80	30 c	64.4	5778.80	5779.44	0.994	5783.03*	5783.73*	0.24	5783.97	1
29	29	42.80	30 c	172.1	5780.00	5786.88	3.997	5783.97	5789.07	0.14	5789.07	28
30	30	15.30	18 c	123.9	5787.88	5791.52	2.939	5789.27	5792.93	0.49	5792.93	29
31	31	27.50	24 c	15.9	5787.98	5788.30	2.005	5789.41*	5790.54*	0.48	5791.01	29

**C3 basins 100yr storm** Number of lines: 31 Run Date: 03-18-2021

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

Line No.	Flow Rate (cfs)	Line Size (in)	Line Type	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Minor Loss (ft)	HGL Jnct (ft)	Depth Up (ft)	Vel Dn (ft/s)
1	225.40	54	Cir	5775.60	5776.70	2.87	5779.89	5780.88	n/a	5780.88	4.18**	14.42
2	153.90	48	Cir	5777.70	5780.82	1.70	5781.88	5784.45	0.38	5784.45	3.63**	12.25
3	153.90	48	Cir	5781.12	5790.01	2.89	5784.68	5793.64	1.28	5793.64	3.63**	13.02
4	153.90	48	Cir	5790.30	5791.62	1.20	5793.87	5795.25	0.26	5795.25	3.63**	13.00
5	133.40	48	Cir	5791.82	5793.05	1.20	5796.06	5796.78	0.19	5796.97	3.73	10.62
6	132.70	48	Cir	5793.05	5794.76	1.20	5797.09	5798.21	n/a	5798.21	3.45**	10.56
7	118.60	42	Cir	5795.36	5796.61	1.20	5798.86	5800.31	0.24	5800.55	3.50	12.33
8	115.50	42	Cir	5796.92	5801.92	3.53	5800.67	5805.14	n/a	5805.14	3.22**	12.01
9	99.20	36	Cir	5802.38	5805.38	2.21	5805.14	5808.28	0.63	5808.28	2.90**	14.57
10	88.50	36	Cir	5805.58	5809.02	3.50	5808.97	5811.86	0.76	5811.86	2.84**	12.52
11	67.30	36	Cir	5809.32	5810.48	2.02	5812.99	5813.58	1.41	5814.99	3.00	9.52
12	67.30	36	Cir	5810.69	5812.02	2.00	5814.99	5815.67	0.21	5815.88	3.00	9.52
13	67.30	36	Cir	5812.02	5812.74	2.00	5815.88	5816.24	0.70	5816.95	3.00	9.52
14	46.90	30	Cir	5813.24	5817.72	2.70	5816.95	5819.98	n/a	5819.98	2.26**	9.56
15	30.40	24	Cir	5818.20	5822.14	1.60	5820.09	5824.12	0.73	5824.85	1.98	9.88
16	14.80	18	Cir	5822.64	5830.50	3.20	5825.22	5831.90 j	n/a	5831.90	1.40**	8.38
17	20.50	18	Cir	5794.12	5794.44	4.06	5795.72	5796.02	2.09	5798.12	1.50	11.60
18	11.30	18	Cir	5795.76	5796.03	0.99	5798.19	5798.51	0.25	5798.76	1.50	6.40
19	20.70	18	Cir	5797.26	5797.58	4.00	5798.47	5799.51	2.13	5801.64	1.50	13.55
20	13.10	18	Cir	5798.78	5799.05	0.99	5802.06	5802.48	0.34	5802.82	1.50	7.41
21	16.30	18	Cir	5803.88	5804.20	4.02	5806.24	5806.43	0.00	5806.43	1.50	9.23

<b>C3 basins 100yr storm</b>	Number of lines: 31	Date: 09-30-2021
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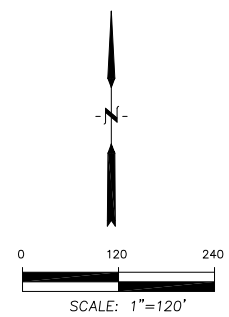
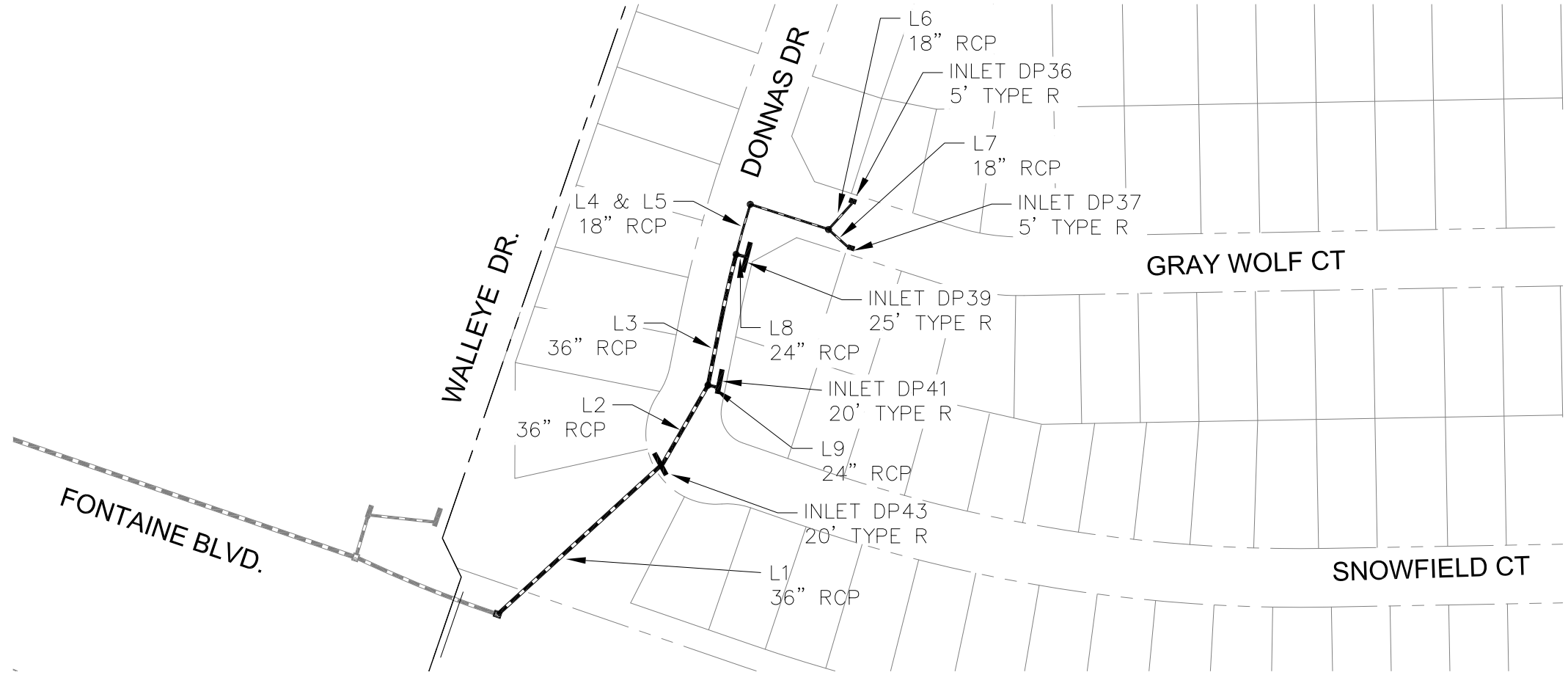
NOTES: \*\* Critical depth

Line No.	Flow Rate (cfs)	Line Size (in)	Line Type	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Minor Loss (ft)	HGL Jnct (ft)	Depth Up (ft)	Vel Dn (ft/s)
22	21.20	18	Cir	5810.82	5811.12	4.03	5812.16	5812.72	2.24	5814.96	1.50	12.71
23	20.40	18	Cir	5814.24	5814.54	4.00	5816.95	5817.23	2.07	5819.30	1.50	11.55
24	16.50	18	Cir	5818.70	5818.78	1.05	5820.20	5820.39	1.36	5821.74	1.50	9.34
25	15.60	18	Cir	5822.64	5822.74	1.00	5825.10	5825.32	1.21	5826.53	1.50	8.83
26	10.70	18	Cir	5806.88	5807.14	0.93	5810.84	5811.13	0.06	5811.18	1.50	6.06
27	28.70	24	Cir	5779.20	5779.94	4.15	5782.91	5783.20	0.52	5783.72	2.00	9.14
28	42.80	30	Cir	5778.80	5779.44	0.99	5783.03	5783.73	0.24	5783.97	2.50	8.72
29	42.80	30	Cir	5780.00	5786.88	4.00	5783.97	5789.07	0.14	5789.07	2.19**	8.72
30	15.30	18	Cir	5787.88	5791.52	2.94	5789.27	5792.93	0.49	5792.93	1.41**	8.93
31	27.50	24	Cir	5787.98	5788.30	2.01	5789.41	5790.54	0.48	5791.01	2.00	11.46

<b>C3 basins 100yr storm</b>	Number of lines: 31	Date: 09-30-2021
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NOTES: \*\* Critical depth

# BASINS C5 STORM SCHEMATIC



**CORE ENGINEERING GROUP**  
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NO.	DESCRIPTION	DATE

PREPARED FOR: **LORSON, LLC**  
 212 N. WAHSATCH AVE., SUITE 301  
 COLORADO SPRINGS, COLORADO 80903  
 CONTRACT: JEFF MARK

PROJECT: **THE RIDGE AT LORSON RANCH**  
 FONTAINE BLVD, WALLEYE DR  
 EL PASO COUNTY, COLORADO

DRAWN: RLS  
 DESIGNED: LAB  
 CHECKED: LAB

**STORM SEWER SCHEMATIC**  
**BASINS C5**  
**THE RIDGE AT LORSON RANCH**

DATE	MARCH, 2021
PROJECT NO.	100.064
SHEET NUMBER	1
TOTAL SHEETS:	1

P: 100.100.064\_ebriocoye-100.064-storm\_schematic.dwg Mar\_23\_2021 - 11:10am

# 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		42.30	36 c	190.8	5782.00	5788.40	3.354	5784.83	5790.47	n/a	5790.47 j	End
2		32.30	36 c	77.0	5789.50	5790.37	1.130	5791.17	5792.18	0.80	5792.18	1
3		23.00	36 c	121.5	5790.47	5791.49	0.839	5792.83	5793.02	n/a	5793.02 j	2
4		7.50	18 c	38.1	5793.00	5793.38	0.998	5793.94	5794.43	0.50	5794.93	3
5		7.50	18 c	70.0	5793.58	5794.28	1.000	5795.15	5795.39	0.41	5795.80	4
6		4.10	18 c	30.4	5794.48	5794.82	1.119	5796.14	5796.17	0.09	5796.27	5
7		3.40	18 c	23.5	5794.48	5794.81	1.406	5796.17	5796.19	0.06	5796.25	5
8		15.50	24 c	10.8	5792.50	5792.62	1.109	5793.68	5794.30	0.47	5794.77	3
9		9.30	24 c	14.0	5791.37	5791.65	2.002	5792.86	5792.73	n/a	5792.73 j	2

<b>C5 basins 5yr storm</b>	Number of lines: 9	Run Date: 03-18-2021
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NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; 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		87.10	36 c	190.8	5782.00	5787.80	3.039	5784.83	5790.63	1.38	5790.63	End
2		62.10	36 c	77.0	5788.70	5790.37	2.169	5791.90	5792.88	n/a	5792.88	1
3		37.00	36 c	121.5	5790.47	5791.44	0.797	5793.75	5794.03	0.50	5794.54	2
4		10.50	18 c	38.1	5793.00	5793.38	0.998	5794.54	5794.87	0.55	5795.42	3
5		10.50	18 c	70.0	5793.58	5794.28	1.000	5795.42*	5796.12*	0.50	5796.63	4
6		5.70	18 c	30.4	5794.48	5794.82	1.119	5797.02*	5797.10*	0.16	5797.27	5
7		4.80	18 c	23.5	5794.48	5794.81	1.406	5797.06*	5797.11*	0.11	5797.23	5
8		26.50	24 c	10.8	5792.50	5792.72	2.034	5794.54	5794.65	1.13	5795.78	3
9		25.10	24 c	14.0	5791.37	5791.65	2.002	5793.39	5793.42	1.13	5794.55	2

<b>C5 basins 100yr storm</b>	Number of lines: 9	Run Date: 03-18-2021
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NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; \*Surcharged (HGL above crown).

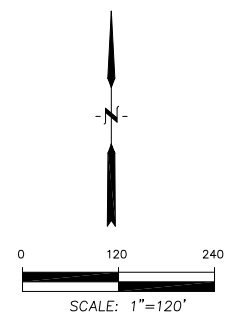
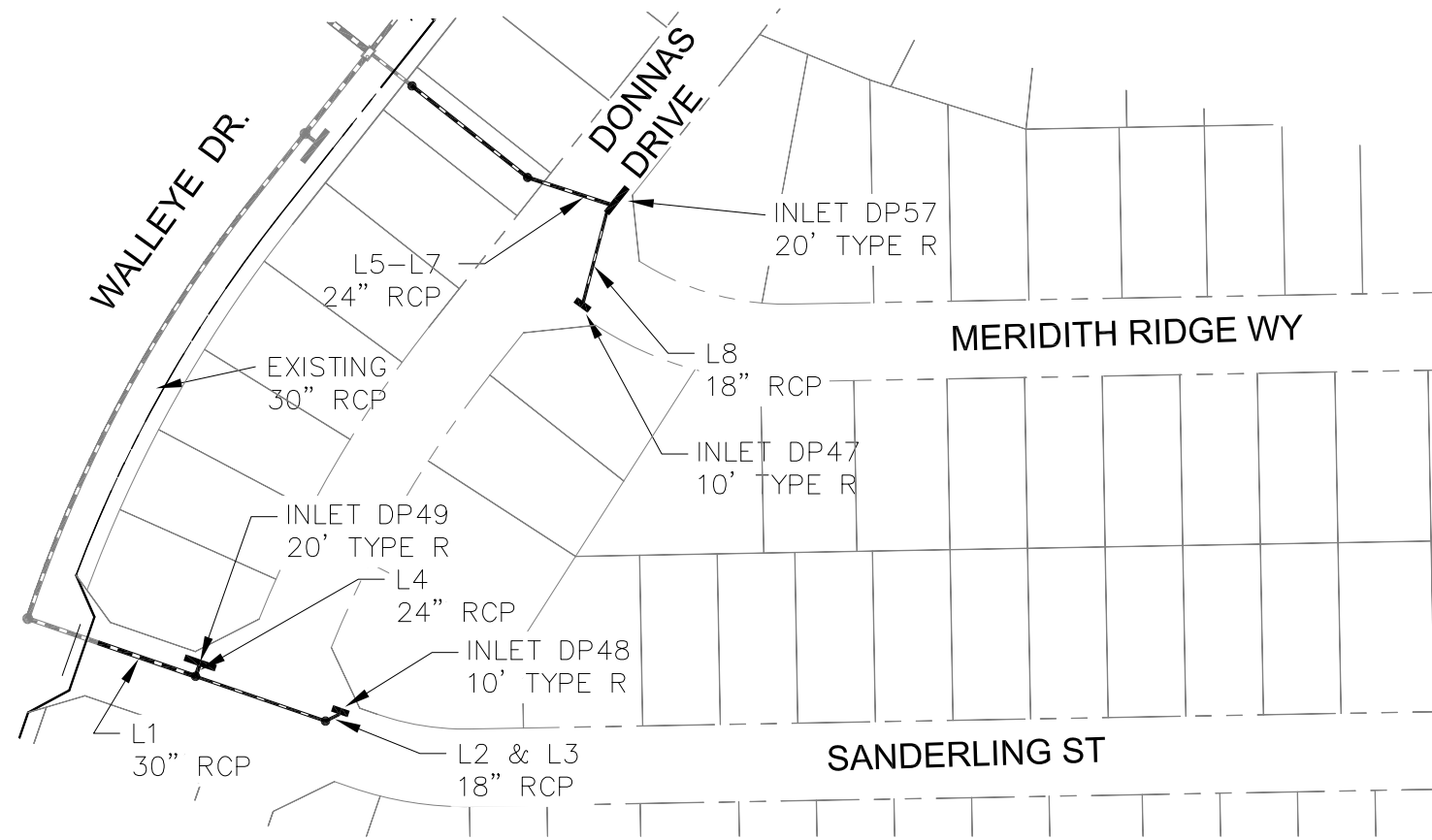


Line No.	Flow Rate (cfs)	Line Size (in)	Line Type	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Minor Loss (ft)	HGL Jnct (ft)	Depth Up (ft)	Vel Dn (ft/s)
1	87.10	36	Cir	5782.00	5787.80	3.04	5784.83	5790.63	1.38	5790.63	2.83**	12.61
2	62.10	36	Cir	5788.70	5790.37	2.17	5791.90	5792.88	n/a	5792.88	2.51**	8.79
3	37.00	36	Cir	5790.47	5791.44	0.80	5793.75	5794.03	0.50	5794.54	2.59	5.24
4	10.50	18	Cir	5793.00	5793.38	1.00	5794.54	5794.87	0.55	5795.42	1.49	5.94
5	10.50	18	Cir	5793.58	5794.28	1.00	5795.42	5796.12	0.50	5796.63	1.50	5.94
6	5.70	18	Cir	5794.48	5794.82	1.12	5797.02	5797.10	0.16	5797.27	1.50	3.23
7	4.80	18	Cir	5794.48	5794.81	1.41	5797.06	5797.11	0.11	5797.23	1.50	2.72
8	26.50	24	Cir	5792.50	5792.72	2.03	5794.54	5794.65	1.13	5795.78	1.93	8.44
9	25.10	24	Cir	5791.37	5791.65	2.00	5793.39	5793.42	1.13	5794.55	1.77**	7.99

<b>C5 basins 100yr storm</b>	Number of lines: 9	Date: 09-30-2021
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NOTES: \*\* Critical depth

# BASINS C8.1 & C8.4 STORM SCHEMATIC



NO.	DESCRIPTION	DATE

PROJECT: THE RIDGE AT LORSON RANCH  
 FONTAINE BLVD., WALLEYE DR  
 EL PASO COUNTY, COLORADO  
 PREPARED FOR: LORSON, LLC  
 212 N. WAHSATCH AVE., SUITE 301  
 COLORADO SPRINGS, COLORADO 80903  
 CONTRACT: JEFF MARK

DRAWN: RLS  
 DESIGNED: LAB  
 CHECKED: LAB

## STORM SEWER SCHEMATIC BASINS C8.1 & C8.4 THE RIDGE AT LORSON RANCH

DATE	MARCH, 2021
PROJECT NO.	100.064
SHEET NUMBER	1
TOTAL SHEETS:	1

**CORE ENGINEERING GROUP**  
 15004 1ST AVE. S.  
 BURNSVILLE, MN 55306  
 PH: 719.570.1100  
 CONTACT: RICHARD L. SCHINDLER, P.E.  
 EMAIL: Rich@cegi.com

P: 100.100.064\_ebriocopy-100.064-storm\_schematic.dwg Mar\_23\_2021 11:11am

# 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		11.10	30 c	67.8	5796.22	5796.92	1.032	5798.38	5798.33	0.24	5798.56	End
2		3.40	18 c	70.9	5798.90	5800.32	2.003	5799.39	5801.02	n/a	5801.02	1
3		3.40	18 c	14.9	5800.52	5800.82	2.012	5801.24	5801.52	n/a	5801.52 j	2
4		7.70	24 c	9.5	5798.10	5798.48	3.987	5798.71	5800.16	0.12	5800.27	1
5		17.10	24 c	36.5	5792.52	5793.43	2.492	5794.44	5794.90	n/a	5794.90 j	End
6		17.10	24 c	94.9	5793.88	5801.00	7.504	5795.18	5802.47	0.31	5802.47	5
7		17.10	24 c	55.5	5801.30	5802.13	1.496	5802.75	5803.60	1.12	5803.60	6
8		6.10	18 c	68.5	5803.23	5803.92	1.007	5804.16	5804.86	0.42	5804.86	7

<b>C8.1 basins 5yr storm</b>	Number of lines: 8	Run Date: 03-18-2021
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NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; 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		27.00	30 c	67.8	5796.22	5796.92	1.032	5798.38	5798.66	n/a	5798.66 j	End
2		6.20	18 c	70.9	5798.90	5800.32	2.003	5799.58	5801.27	n/a	5801.27	1
3		6.20	18 c	14.9	5800.52	5800.82	2.012	5801.51	5801.77	n/a	5801.77 j	2
4		20.80	24 c	9.5	5798.40	5798.78	3.997	5799.35*	5801.99*	0.68	5802.67	1
5		28.10	24 c	36.5	5792.52	5793.43	2.492	5794.44	5795.26	n/a	5795.26 j	End
6		28.10	24 c	94.9	5793.88	5801.00	7.504	5795.37	5802.83	0.57	5802.83	5
7		28.10	24 c	55.5	5801.30	5802.13	1.496	5802.97	5804.02	1.95	5805.97	6
8		9.10	18 c	68.5	5803.23	5803.92	1.007	5806.86*	5807.37*	0.41	5807.79	7

<b>C8.1 basins 100yr storm</b>	Number of lines: 8	Run Date: 03-18-2021
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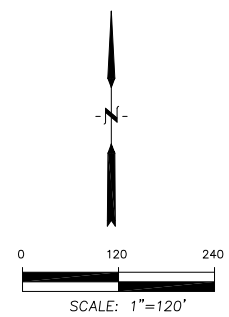
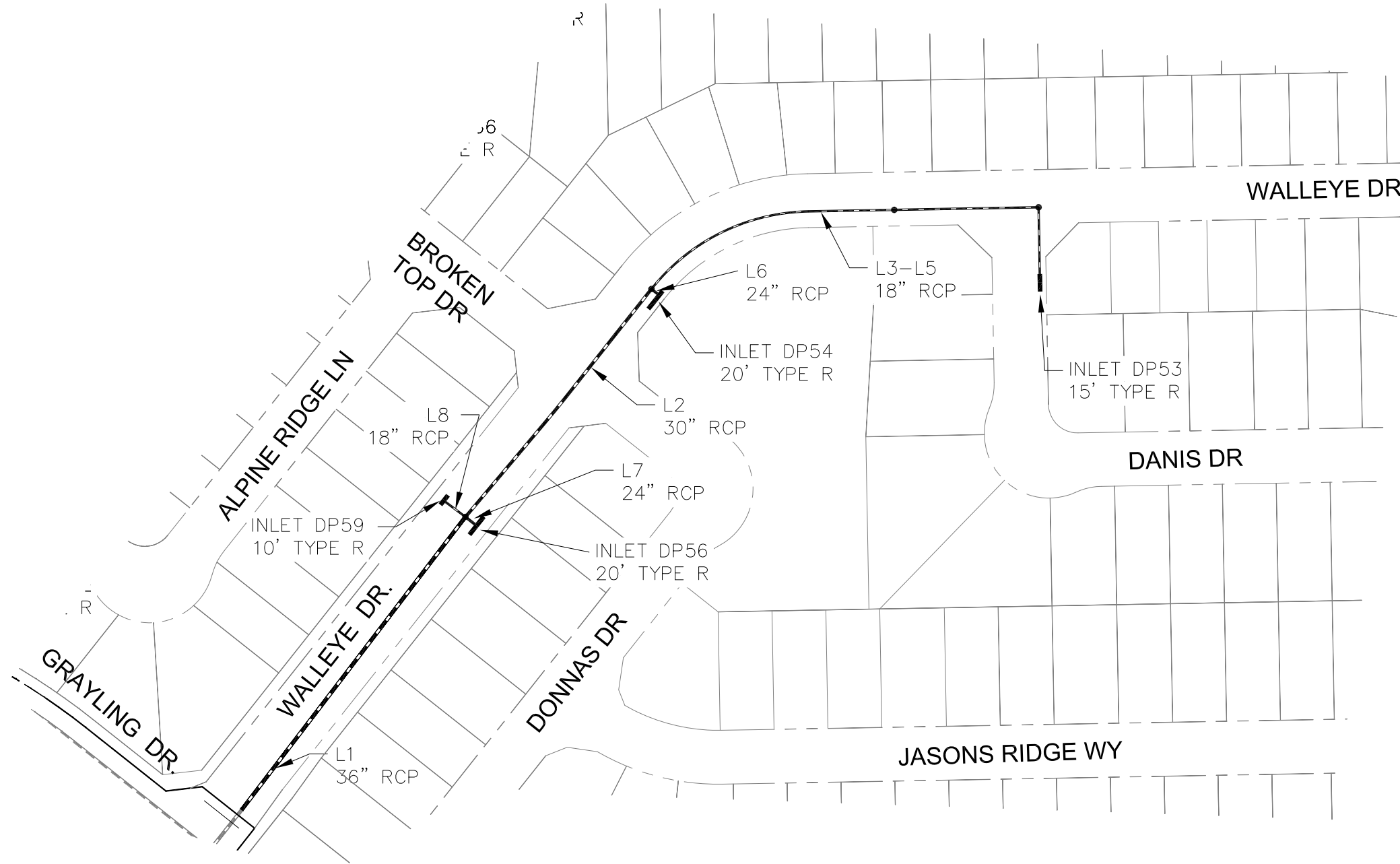
NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; \*Surcharged (HGL above crown). ; j - Line contains hyd. jump.


Line No.	Flow Rate (cfs)	Line Size (in)	Line Type	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Minor Loss (ft)	HGL Jnct (ft)	Depth Up (ft)	Vel Dn (ft/s)
1	27.00	30	Cir	5796.22	5796.92	1.03	5798.38	5798.66 j	n/a	5798.66	1.74**	5.99
2	6.20	18	Cir	5798.90	5800.32	2.00	5799.58	5801.27	n/a	5801.27	0.95**	8.03
3	6.20	18	Cir	5800.52	5800.82	2.01	5801.51	5801.77 j	n/a	5801.77	0.95**	5.03
4	20.80	24	Cir	5798.40	5798.78	4.00	5799.35	5801.99	0.68	5802.67	2.00	14.09
5	28.10	24	Cir	5792.52	5793.43	2.49	5794.44	5795.26 j	n/a	5795.26	1.83**	9.07
6	28.10	24	Cir	5793.88	5801.00	7.50	5795.37	5802.83	0.57	5802.83	1.83**	11.20
7	28.10	24	Cir	5801.30	5802.13	1.50	5802.97	5804.02	1.95	5805.97	1.89	10.03
8	9.10	18	Cir	5803.23	5803.92	1.01	5806.86	5807.37	0.41	5807.79	1.50	5.15

<b>C8.1 basins 100yr storm</b>	Number of lines: 8	Date: 09-30-2021
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NOTES: \*\* Critical depth

# BASINS C8.3 STORM SCHEMATIC



 <b>CORE ENGINEERING GROUP</b> 15004 1ST AVE. S. BURNSVILLE, MN 55306 PH: 719.570.1100 CONTACT: RICHARD L. SCHINDLER, P.E. EMAIL: Rich@cegi.com							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">NO.</th> <th style="width: 80%;">DESCRIPTION</th> <th style="width: 10%;">DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	NO.	DESCRIPTION	DATE				<p>PREPARED FOR:  <b>LORSON, LLC</b>          212 N. WAHSATCH AVE., SUITE 301          COLORADO SPRINGS, COLORADO 80903          CONTRACT: JEFF MARK</p> <p>PROJECT:  <b>THE RIDGE AT LORSON RANCH</b>          FONTAINE BLVD., WALLEYE DR          EL PASO COUNTY, COLORADO</p> <p>DRAWN: RLS          DESIGNED: LAB          CHECKED: LAB</p>
NO.	DESCRIPTION	DATE					
<b>STORM SEWER SCHEMATIC</b> <b>BASINS C8.3</b> <b>THE RIDGE AT LORSON RANCH</b>							
DATE <b>MARCH, 2021</b>							
PROJECT NO. <b>100.064</b>							
SHEET NUMBER <b>1</b>							
TOTAL SHEETS: <b>1</b>							

P: 100.100.064\_ebschong - 100.064-storm\_schematic.dwg, Mar. 23, 2021, 11:12am

# 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		36.30	36 c	388.3	5792.00	5797.44	1.401	5794.98	5799.36	n/a	5799.36 j	End
2		21.40	30 c	218.5	5797.94	5800.62	1.227	5799.96	5802.17	n/a	5802.17 j	1
3		9.70	18 c	212.9	5801.62	5809.62	3.758	5802.40	5810.81	0.38	5810.81	2
4		9.70	18 c	213.7	5809.82	5817.64	3.660	5810.99	5818.83	0.65	5818.83	3
5		9.70	18 c	61.5	5817.95	5818.86	1.480	5819.01	5820.05	0.65	5820.05	4
6		11.70	24 c	8.0	5801.50	5801.74	3.003	5802.65	5802.95	n/a	5802.95	2
7		9.00	24 c	9.9	5798.44	5798.64	2.028	5800.01	5799.94	0.27	5800.21	1
8		5.90	18 c	25.1	5798.94	5799.19	0.997	5800.08	5800.12	n/a	5800.12 j	1

<b>C8.3 basins 5yr storm</b>	Number of lines: 8	Run Date: 03-09-2022
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NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; 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		72.80	36 c	388.3	5792.00	5797.44	1.401	5794.98	5800.14	1.84	5800.14	End
2		40.20	30 c	218.5	5797.94	5800.62	1.227	5800.93	5802.74	1.27	5804.02	1
3		16.20	18 c	212.9	5801.62	5809.62	3.758	5804.02	5811.05	n/a	5811.05 j	2
4		16.20	18 c	213.7	5809.82	5817.64	3.660	5811.10	5819.07	1.35	5819.07	3
5		16.20	18 c	61.5	5817.95	5818.86	1.480	5819.45*	5820.91*	1.31	5822.22	4
6		24.00	24 c	8.0	5801.50	5801.74	3.003	5804.38*	5804.47*	0.91	5805.38	2
7		23.70	24 c	9.9	5798.44	5798.64	2.028	5801.09*	5801.20*	0.88	5802.08	1
8		8.90	18 c	25.1	5798.94	5799.19	0.997	5801.58*	5801.76*	0.39	5802.16	1

<b>C8.3 basins 100yr storm</b>	Number of lines: 8	Run Date: 03-09-2022
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NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; \*Surcharged (HGL above crown). ; j - Line contains hyd. jump.

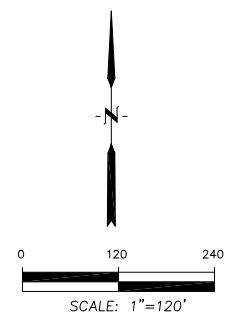
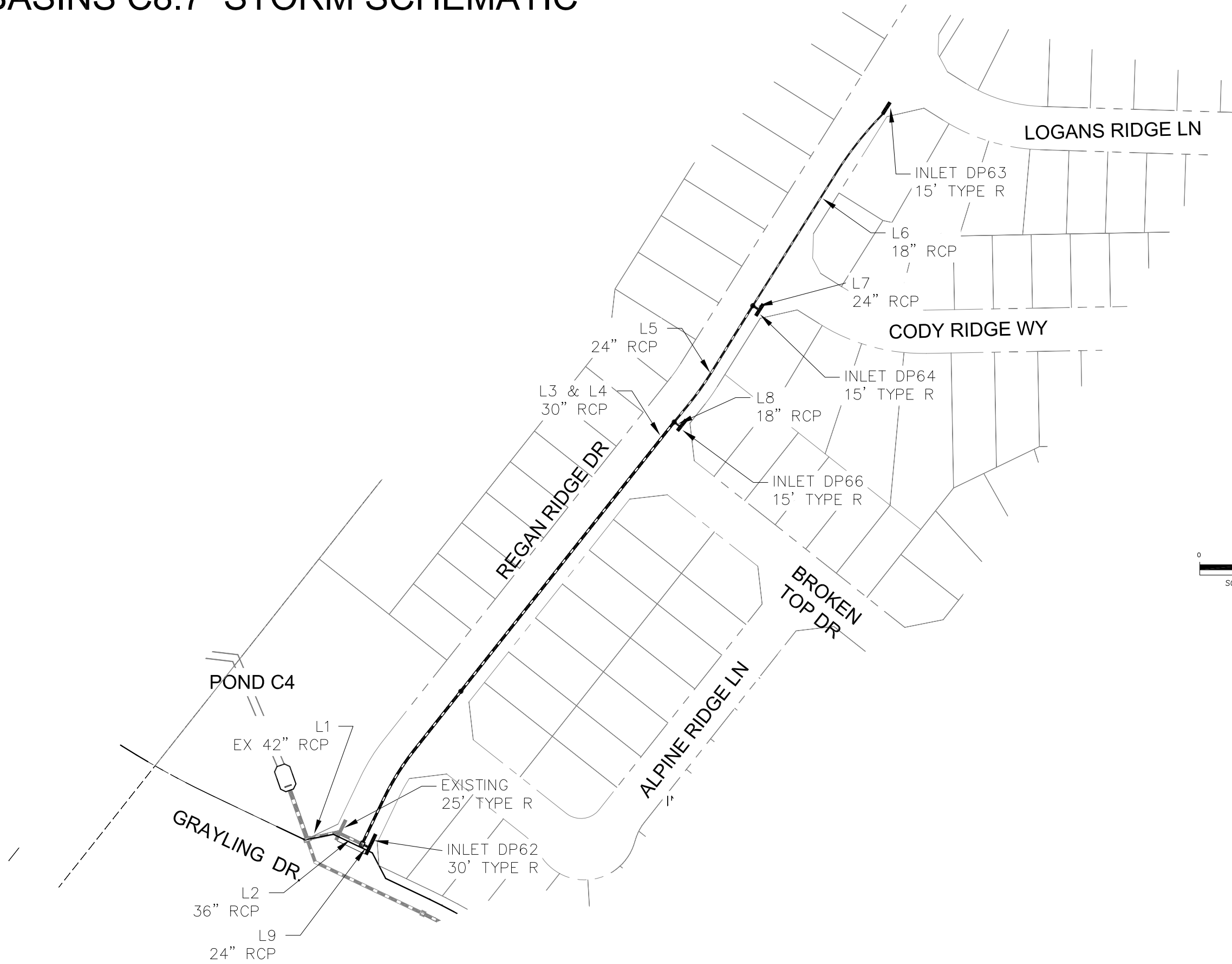


Line No.	Flow Rate (cfs)	Line Size (in)	Line Type	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Minor Loss (ft)	HGL Jnct (ft)	Depth Up (ft)	Vel Dn (ft/s)
1	73.30	36	Cir	5792.00	5797.44	1.40	5794.98	5800.15	n/a	5800.15	2.71**	10.38
2	40.20	30	Cir	5797.94	5800.62	1.23	5800.96	5802.78	1.24	5804.02	2.16	8.19
3	16.20	18	Cir	5801.62	5809.62	3.76	5804.02	5811.05 j	n/a	5811.05	1.43**	9.17
4	16.20	18	Cir	5809.82	5817.64	3.66	5811.10	5819.07	1.35	5819.07	1.43**	10.12
5	16.20	18	Cir	5817.95	5818.86	1.48	5819.45	5820.91	1.31	5822.22	1.50	9.17
6	24.00	24	Cir	5801.50	5801.74	3.00	5804.35	5804.44	0.91	5805.34	2.00	7.64
7	32.80	24	Cir	5798.44	5798.64	2.03	5800.31	5800.55	1.75	5802.30	1.91**	10.75
8	8.90	18	Cir	5798.94	5799.19	1.00	5801.61	5801.79	0.39	5802.18	1.50	5.04

<b>C8.3 basins 100yr storm</b>	Number of lines: 8	Date: 09-30-2021
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NOTES: \*\* Critical depth

# BASINS C8.7 STORM SCHEMATIC



P: 100.100.064\_ebriocspg-100.064-storm\_schematic.dwg Mar. 10. 2021 - 1:21pm

<p><b>CORE ENGINEERING GROUP</b> 15004 1ST AVE. S. BURNSVILLE, MN 55306 PH: 719.570.1100 CONTACT: RICHARD L. SCHINDLER, P.E. EMAIL: Rich@cegi.com</p>		DATE
NO.	DESCRIPTION	PREPARED FOR:
		PROJECT:
DRAWN: RLS DESIGNED: LAB CHECKED: LAB		LORSON, LLC 212 N. WAHSATCH AVE., SUITE 301 COLORADO SPRINGS, COLORADO 80903 CONTACT: JEFF MARK
<b>STORM SEWER SCHEMATIC</b> <b>BASINS C8.7</b> <b>THE RIDGE AT LORSON RANCH</b>		
DATE		
MARCH, 2021		
PROJECT NO.		
100.064		
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		34.50	42 c	36.0	5778.08	5779.02	2.611	5781.58	5781.47	0.28	5781.75	End
2		33.00	36 c	31.0	5779.52	5779.89	1.194	5781.77	5781.72	0.33	5781.72	1
3		21.50	30 c	211.2	5780.39	5784.82	2.098	5782.25	5786.37	n/a	5786.37 j	2
4		21.50	30 c	394.6	5785.15	5798.76	3.449	5786.78	5800.31	n/a	5800.31 j	3
5		20.00	24 c	168.5	5799.30	5806.04	3.999	5800.38	5807.62	0.87	5807.62	4
6		10.20	18 c	269.2	5807.50	5816.38	3.298	5808.28	5817.60	0.68	5817.60	5
7		9.80	24 c	11.2	5807.10	5807.32	1.968	5808.35	5808.43	0.47	5808.43	5
8		1.50	18 c	10.7	5799.80	5800.01	1.956	5800.98	5800.97	0.02	5801.00	4
9		14.30	24 c	7.3	5780.39	5780.46	0.955	5782.14	5782.14	0.40	5782.54	2

<b>C8.7 basins 5yr storm</b>	Number of lines: 9	Run Date: 03-18-2021
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NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; 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		86.30	42 c	36.0	5778.08	5779.02	2.611	5781.58	5781.87	1.30	5781.87	End
2		76.50	36 c	31.0	5779.52	5779.89	1.194	5782.14	5782.70	0.77	5783.47	1
3		45.20	30 c	211.2	5780.39	5784.82	2.098	5784.07	5787.05	n/a	5787.05	2
4		45.20	30 c	394.6	5785.15	5798.76	3.449	5787.22	5800.99	n/a	5800.99	3
5		33.40	24 c	168.5	5799.30	5806.04	3.999	5800.99	5807.95	n/a	5807.95	4
6		15.90	18 c	269.2	5807.50	5816.38	3.298	5808.55	5817.81	n/a	5817.81	5
7		17.50	24 c	11.2	5807.10	5807.32	1.968	5809.27	5809.32	0.48	5809.80	5
8		11.80	18 c	10.7	5799.80	5800.01	1.956	5801.78*	5801.92*	0.69	5802.61	4
9		37.40	24 c	7.3	5780.39	5780.46	0.955	5783.47*	5783.67*	2.20	5785.87	2

<b>C8.7 basins 100yr storm</b>	Number of lines: 9	Run Date: 03-18-2021
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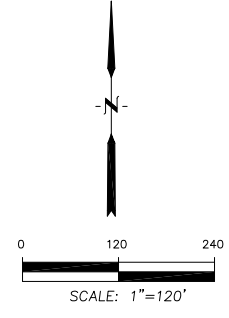
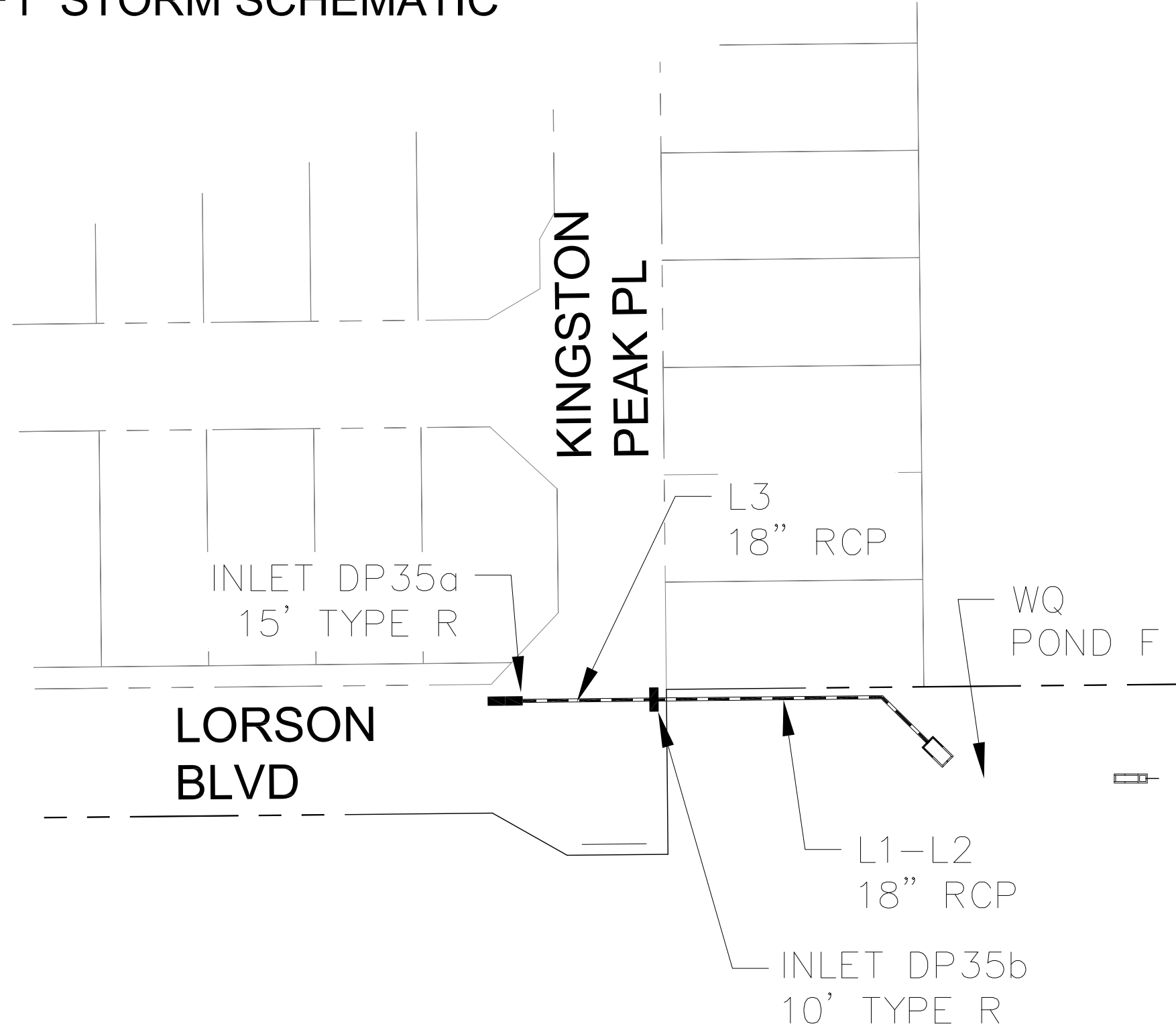
NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; \*Surcharged (HGL above crown).


Line No.	Flow Rate (cfs)	Line Size (in)	Line Type	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Minor Loss (ft)	HGL Jnct (ft)	Depth Up (ft)	Vel Dn (ft/s)
1	86.30	42	Cir	5778.08	5779.02	2.61	5781.58	5781.87	1.30	5781.87	2.84**	8.97
2	76.50	36	Cir	5779.52	5779.89	1.19	5782.14	5782.70	0.77	5783.47	2.81	11.68
3	45.20	30	Cir	5780.39	5784.82	2.10	5784.07	5787.05	n/a	5787.05	2.23**	9.21
4	45.20	30	Cir	5785.15	5798.76	3.45	5787.22	5800.99	n/a	5800.99	2.23**	10.41
5	33.40	24	Cir	5799.30	5806.04	4.00	5800.99	5807.95	n/a	5807.95	1.91**	11.78
6	15.90	18	Cir	5807.50	5816.38	3.30	5808.55	5817.81	n/a	5817.81	1.42**	12.07
7	17.50	24	Cir	5807.10	5807.32	1.97	5809.27	5809.32	0.48	5809.80	2.00	5.57
8	11.80	18	Cir	5799.80	5800.01	1.96	5801.78	5801.92	0.69	5802.61	1.50	6.68
9	37.40	24	Cir	5780.39	5780.46	0.95	5783.47	5783.67	2.20	5785.87	2.00	11.91

<b>C8.7 basins 100yr storm</b>	Number of lines: 9	Date: 09-30-2021
--------------------------------	--------------------	------------------

NOTES: \*\* Critical depth

# BASINS F1 STORM SCHEMATIC



 <b>CORE ENGINEERING GROUP</b> 15004 1ST AVE. S. BURNSVILLE, MN 55306 PH: 719.570.1100 CONTACT: RICHARD L. SCHINDLER, P.E. EMAIL: Rich@cegi.com			
NO.	DESCRIPTION	DATE	PREPARED FOR: <b>LORSON, LLC</b> 212 N. WAHSATCH AVE., SUITE 301 COLORADO SPRINGS, COLORADO 80903 CONTRACT: JEFF MARK
PROJECT: <b>THE RIDGE AT LORSON RANCH</b> FONTAINE BLVD, WALLEE DR EL PASO COUNTY, COLORADO		DRAWN: RLS DESIGNED: LAB CHECKED: LAB	<b>STORM SEWER SCHEMATIC</b> <b>BASINS F1</b> <b>THE RIDGE AT LORSON RANCH</b>
DATE <b>MARCH, 2021</b>		PROJECT NO. <b>100.064</b>	SHEET NUMBER <b>1</b>
TOTAL SHEETS: <b>1</b>			

P: 100.100.064\_ebriocoye-100.064-storm\_schematic.dwg Jul 17, 2021 -- 8:55am

# 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	3	7.80	18 c	51.1	5844.50	5845.52	1.997	5845.57	5846.59	n/a	5846.59 j	End
2		7.80	18 c	106.7	5845.52	5854.05	7.998	5846.81	5855.12	n/a	5855.12 j	1
3		5.90	18 c	82.6	5854.38	5855.21	1.006	5855.47	5856.14	n/a	5856.14 j	2

F1 basins 5yr storm

Number of lines: 3

Run Date: 07-17-2021

NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; 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	3	15.70	18 c	51.1	5844.50	5845.52	1.997	5845.95	5847.01	0.85	5847.86	End
2		15.70	18 c	106.7	5845.52	5854.05	7.998	5847.86	5855.47	n/a	5855.47 j	1
3		11.30	18 c	82.6	5854.38	5855.21	1.006	5856.11*	5857.07*	0.64	5857.71	2

<b>F1 basins 100yr storm</b>	Number of lines: 3	Run Date: 09-29-2021
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NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; \*Surcharged (HGL above crown). ; j - Line contains hyd. jump.

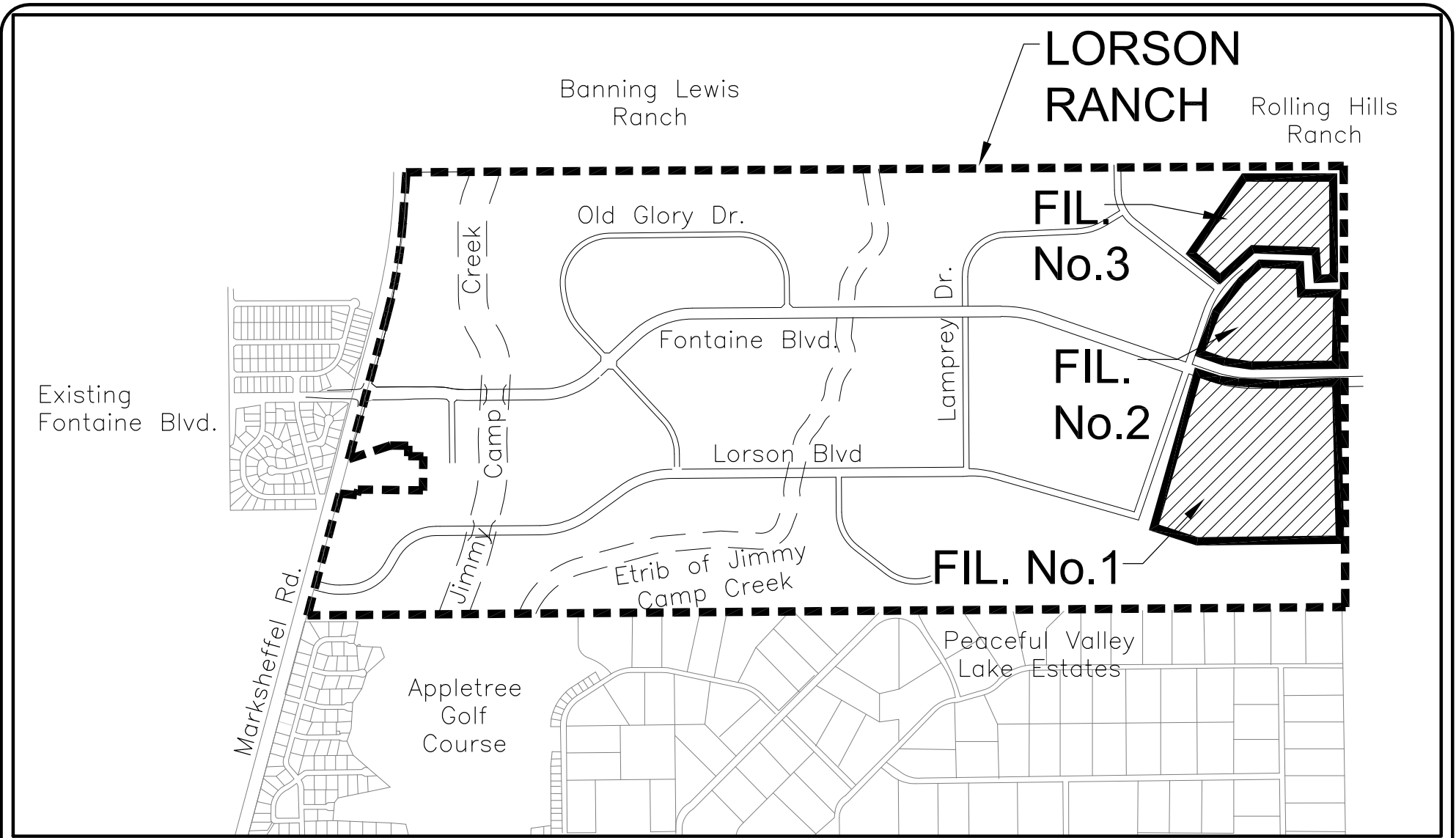


Line No.	Flow Rate (cfs)	Line Size (in)	Line Type	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Minor Loss (ft)	HGL Jnct (ft)	Depth Up (ft)	Vel Dn (ft/s)
1	15.70	18	Cir	5844.50	5845.52	2.00	5845.95	5847.01	0.85	5847.86	1.49	8.98
2	15.70	18	Cir	5845.52	5854.05	8.00	5847.86	5855.47 j	n/a	5855.47	1.42**	8.89
3	11.30	18	Cir	5854.38	5855.21	1.01	5856.11	5857.07	0.64	5857.71	1.50	6.40

<b>F1 basins 100yr storm</b>	Number of lines: 3	Date: 09-30-2021
------------------------------	--------------------	------------------

NOTES: \*\* Critical depth

# MAP POCKET



**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

**THE RIDGE AT LORSON RANCH**  
**VICINITY MAP**

SCALE:  
NTS

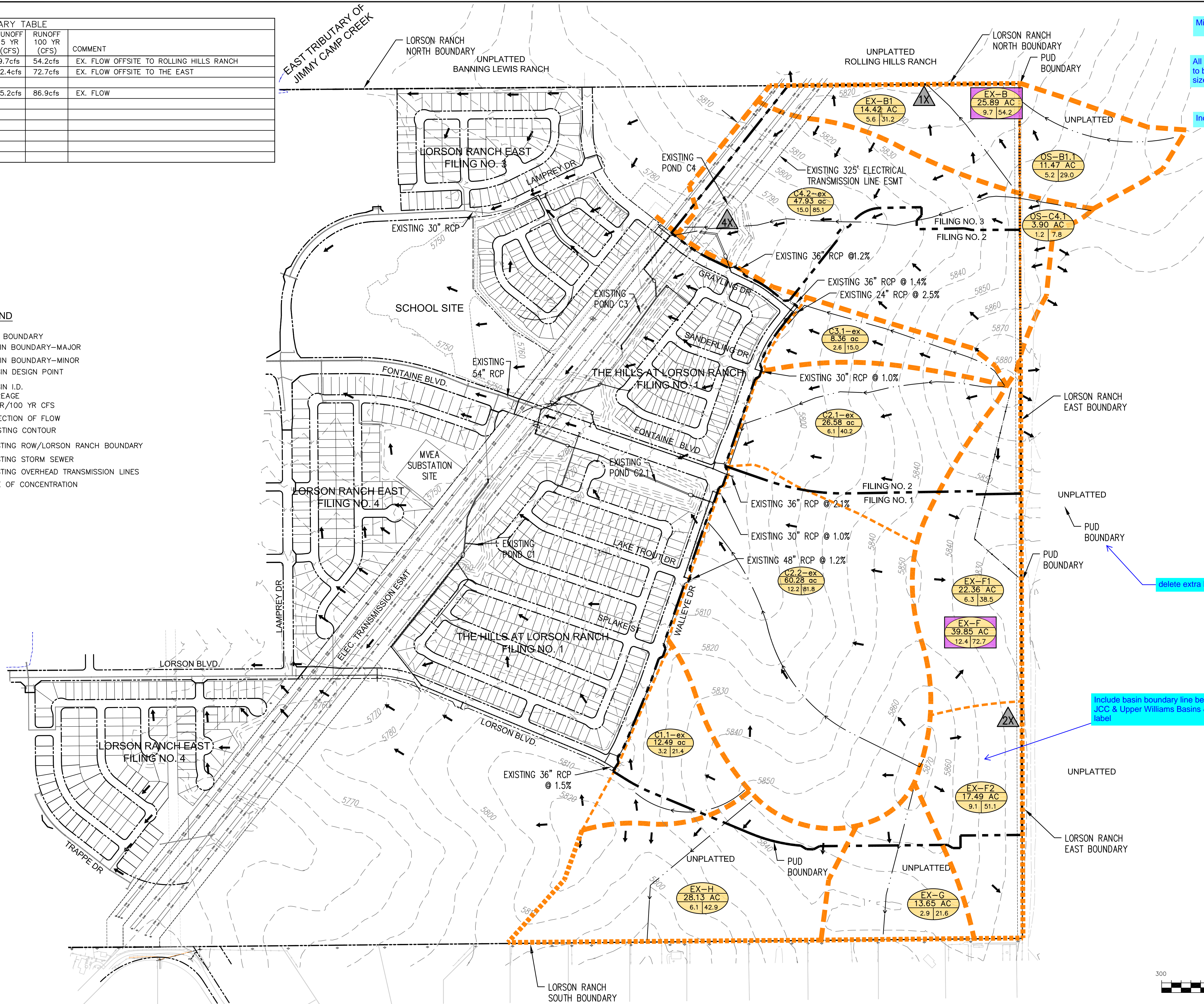
DATE:  
NOV, 2021

FIGURE NO.  
--

DESIGN POINT SUMMARY TABLE					
DESIGN POINT	BASIN	DRAINAGE AREA (AC)	RUNOFF 5 YR (CFS)	RUNOFF 100 YR (CFS)	COMMENT
1X	EX-B	25.89	9.7cfs	54.2cfs	EX. FLOW OFFSITE TO ROLLING HILLS RANCH
2X	EX-F	39.85	12.4cfs	72.7cfs	EX. FLOW OFFSITE TO THE EAST
4X	C4-ex	51.83	15.2cfs	86.9cfs	EX. FLOW

**LEGEND**

- PUD BOUNDARY
- BASIN BOUNDARY-MAJOR
- BASIN BOUNDARY-MINOR
- BASIN DESIGN POINT
- BASIN I.D. ACREAGE 5 YR/100 YR CFS
- DIRECTION OF FLOW
- EXISTING CONTOUR
- EXISTING ROW/LORSON RANCH BOUNDARY
- EXISTING STORM SEWER
- EXISTING OVERHEAD TRANSMISSION LINES
- TIME OF CONCENTRATION



Missing minor contours

All existing storm facilities need to be labeled, (include material, size, shape, slope, etc)

Include basin summary table

delete extra label

Include basin boundary line between JCC & Upper Williams Basins & label

**CORE ENGINEERING GROUP**

15004 1ST AVENUE S.  
 PHOENIX, AZ 85046  
 CONTACT: RICHARD L. SCHINDLER, P.E.  
 EMAIL: Rich@cegi.com

DATE: \_\_\_\_\_

DESCRIPTION: \_\_\_\_\_

NO. \_\_\_\_\_

PROJECT: **THE RIDGE AT LORSON RANCH**

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

DRAWN: RLS  
 DESIGNED: RLS  
 CHECKED: RLS

**EXISTING CONDITIONS**

**FILING 1-3**

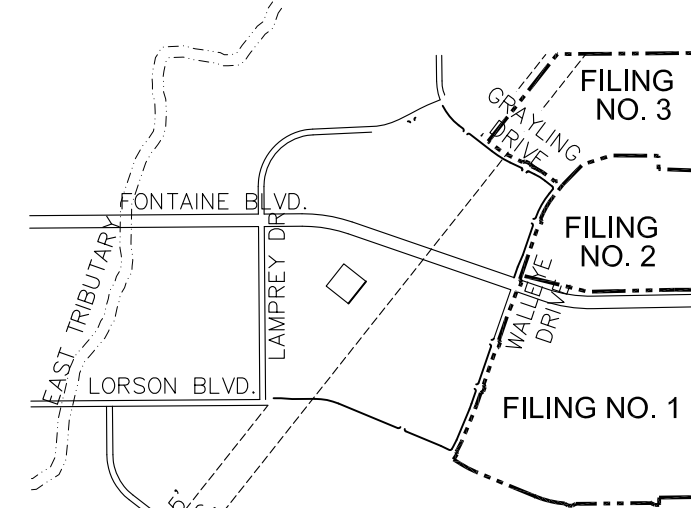
**THE RIDGE AT LORSON RANCH**

DATE: **MARCH, 2022**

PROJECT NO. **100.066 - 100.068**

SHEET NUMBER **1**

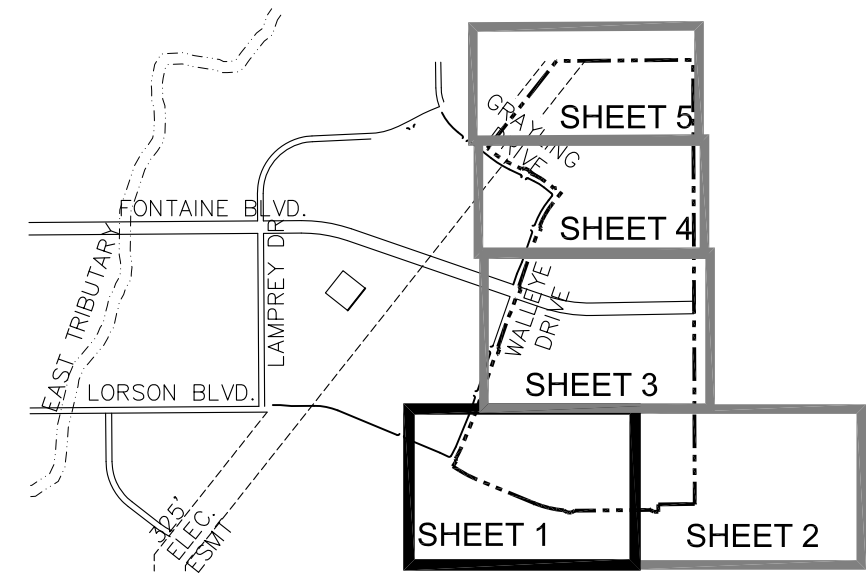
TOTAL SHEETS: **1**



**LEGEND**

- PUD BOUNDARY
- BASIN BOUNDARY
- INTERIM EXISTING BASIN BOUNDARY
- BASIN DESIGN POINT
- BASIN I.D. ACREAGE
- 5 YR/100 YR CFS
- DIRECTION OF FLOW
- EXISTING CONTOUR
- PROPOSED CONTOUR
- ROW/LORSON RANCH BOUNDARY
- EXISTING STORM SEWER
- EXISTING OVERHEAD TRANSMISSION LINES
- PROPOSED STORM SEWER
- TIME OF CONCENTRATION
- HIGH POINT
- LOW POINT

Have different design point style for DP's that are for pipe flow vs. surface/basin flow.



**DETENTION POND AREAS:**

1. C1 BASINS DRAIN TO POND C1
2. C3 & C4 BASINS DRAIN TO POND C2.1
3. C5 BASINS DRAIN TO POND C2.2
4. C8 BASINS DRAIN TO POND C4
5. F1.3-F1.4 BASINS DRAIN TO WQ POND F (NO DETENTION, WQ ONLY)

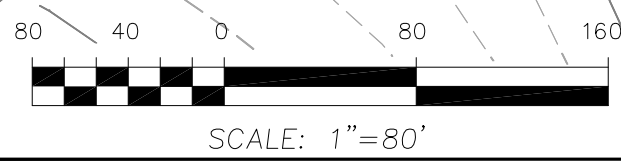
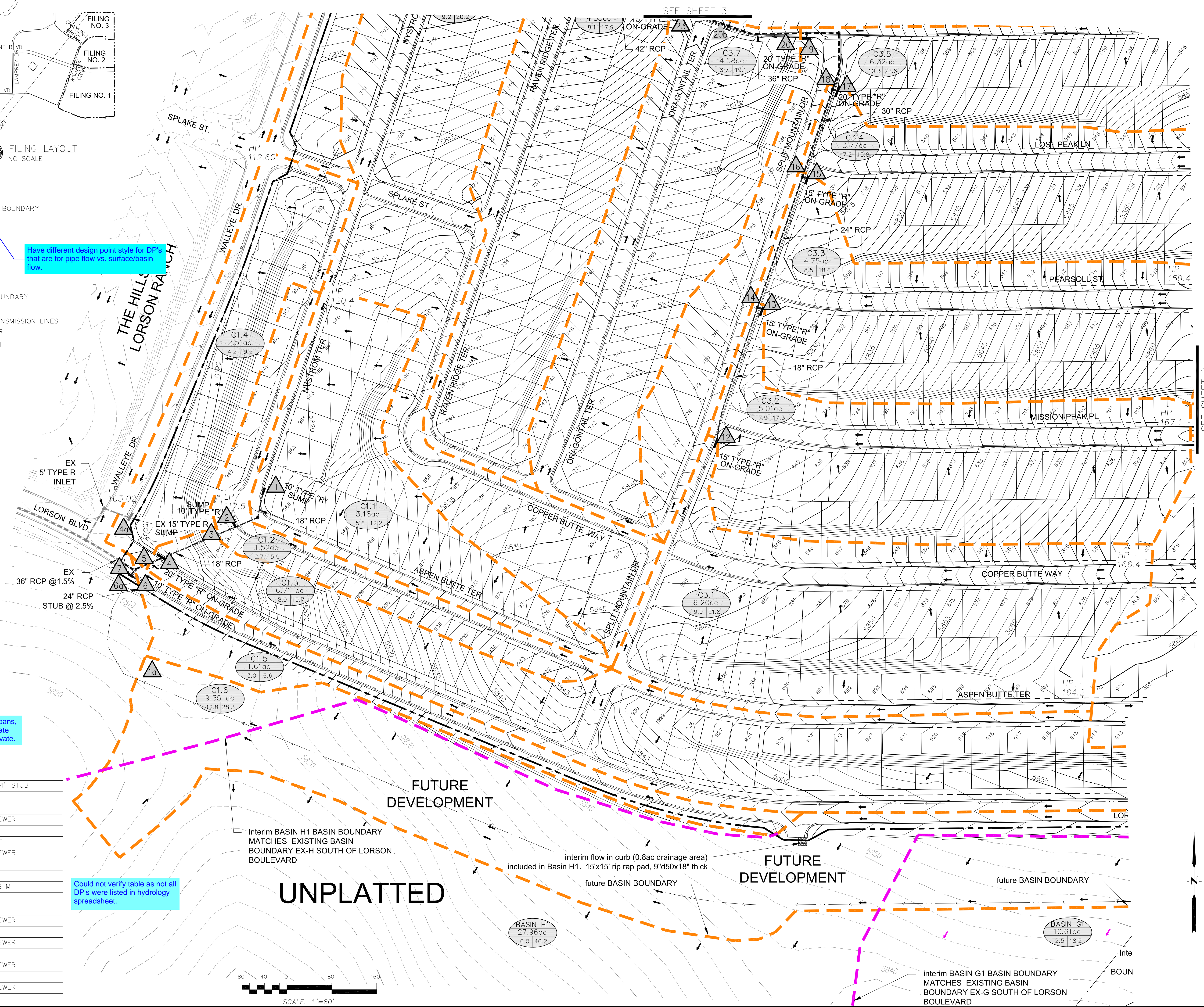
\*ALL DETENTION PONDS HAVE BEEN CONSTRUCTED PER SF 21-010 AND EGP 20-005 (THE HILLS AT LORSON RANCH) EXCEPT WQ POND F

\*\*SEE POND EXHIBIT FOR POND LOCATIONS

Include basin summary table (all sheets)  
Label all curb types, cross pans, manholes, pipes, etc. Indicate what items are public or private.

D.P.	DESIGN POINT		SUMMARY	NOTES
	5 YEAR cfs	100 YEAR cfs		
1a	12.8	25.3	FUTURE FLOW IN 24" STUB	
1	5.6	12.2	STREET FLOW	
2	2.7	5.9	STREET FLOW	
3	8.3	18.1	FLOW IN STORM SEWER	
4	8.9	21.6	STREET FLOW	
4a	4.2	12.8	FLOW AT EX. INLET	
5	17.2	36.1	FLOW IN STORM SEWER	
6	3.0	6.6	STREET FLOW	
6a	15.0	29.2	FLOW IN 24" STM	
7	32.2	65.3	FLOW IN EX. 36" STM	
12	9.9	21.8	STREET FLOW	
13	8.5	24.3	STREET FLOW	
14	17.6	30.4	FLOW IN STORM SEWER	
15	8.7	27.3	STREET FLOW	
16	26.0	46.9	FLOW IN STORM SEWER	
17	7.5	26.7	STREET FLOW	
18	33.5	67.3	FLOW IN STORM SEWER	
19	10.3	28.8	STREET FLOW	
20	43.8	88.5	FLOW IN STORM SEWER	

Could not verify table as not all DP's were listed in hydrology spreadsheet.

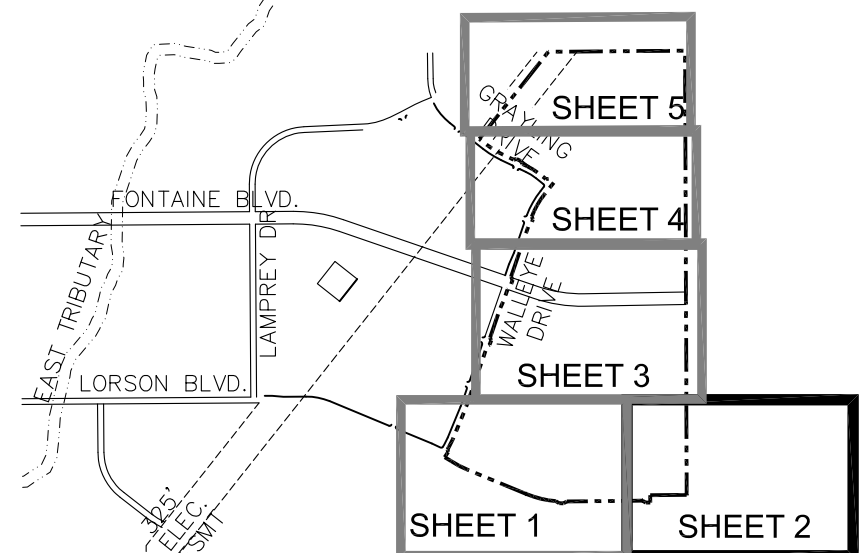


**CORE ENGINEERING GROUP**  
 15004 1ST AVE. S.  
 BURNSVILLE, MN 55306  
 PH: 763-570-1100  
 FAX: 763-570-1100  
 EMAIL: Rich@ceeg.com

PROJECT: THE RIDGE AT LORSON RANCH  
 212 N. WAHSAUCH AVE. SUITE 301  
 COLORADO SPRINGS, COLORADO 80903  
 (719) 635-3200  
 CONTACT: JEFF MARK

**DEVELOPED CONDITIONS**  
**THE RIDGE AT LORSON RANCH**  
**FILING NO. 1**

DATE: MARCH, 2022  
 PROJECT NO: 100.064  
 SHEET NUMBER: 1  
 TOTAL SHEETS: 5



**DETENTION POND AREAS:**

1. C1 BASINS DRAIN TO POND C1
2. C3 & C4 BASINS DRAIN TO POND C2.1
3. C5 BASINS DRAIN TO POND C2.2
4. C8 BASINS DRAIN TO POND C4
5. F1.3-F1.4 BASINS DRAIN TO WQ POND F (NO DETENTION, WQ ONLY)

\*ALL DETENTION PONDS HAVE BEEN CONSTRUCTED PER SF 21-010 AND EGP 20-005 (THE HILLS AT LORSON RANCH) EXCEPT WQ POND F

\*\*SEE POND EXHIBIT FOR POND LOCATIONS



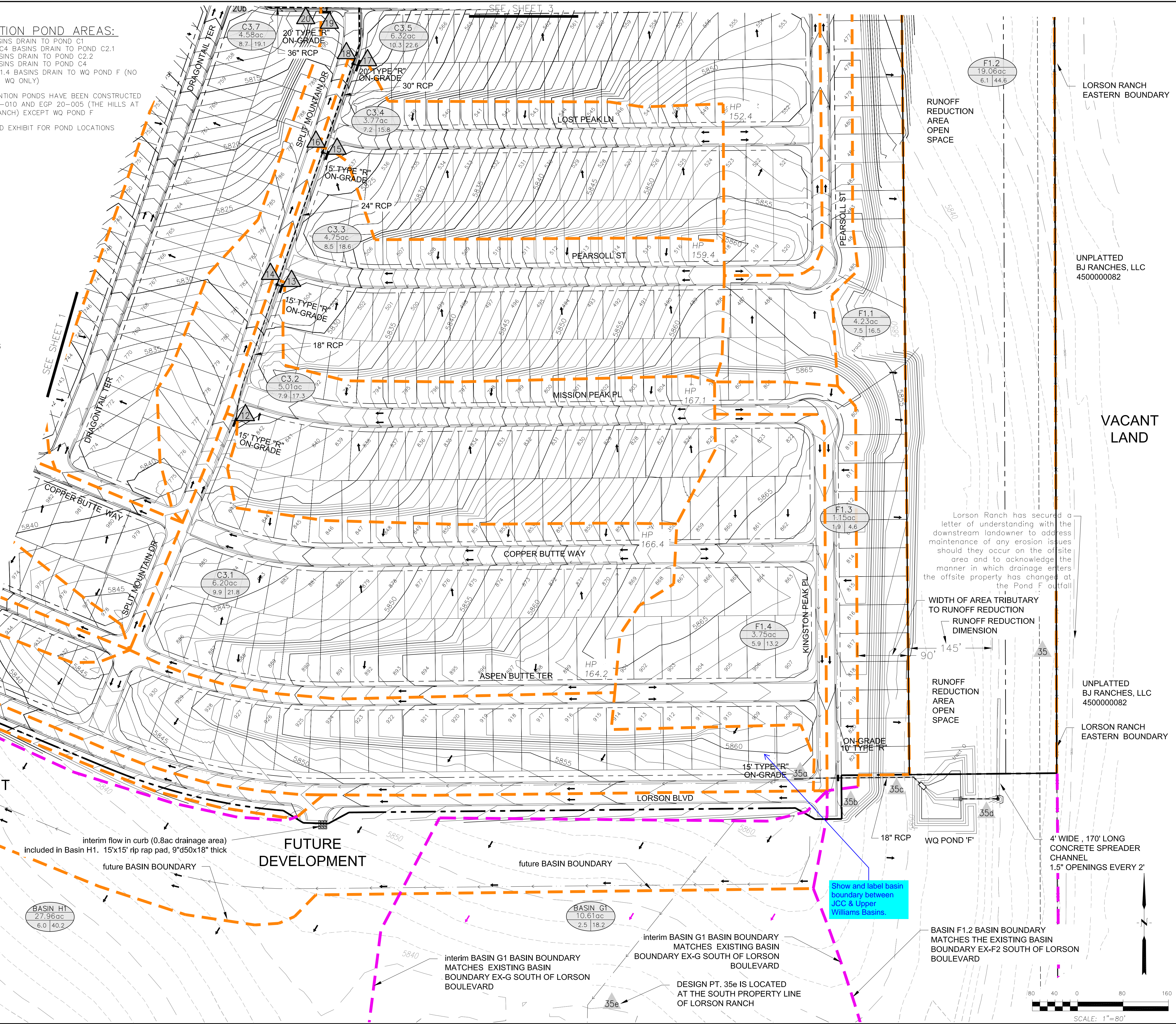
**LEGEND**

- PUD BOUNDARY
- BASIN BOUNDARY
- INTERIM EXISTING BASIN BOUNDARY
- BASIN DESIGN POINT
- BASIN I.D.
- ACREAGE
- 5 YR/100 YR CFS
- DIRECTION OF FLOW
- EXISTING CONTOUR
- PROPOSED CONTOUR
- ROW/LORSON RANCH BOUNDARY
- EXISTING STORM SEWER
- EXISTING OVERHEAD TRANSMISSION LINES
- PROPOSED STORM SEWER
- TIME OF CONCENTRATION
- HP HIGH POINT
- LP LOW POINT

Denotes Overall Basin

**RUNOFF SUMMARY**

D.P.	5 YEAR cfs	100 YEAR cfs	NOTES
12	9.9	21.8	STREET FLOW
13	8.5	24.3	STREET FLOW
14	17.6	30.4	FLOW IN STORM SEWER
15	8.7	27.3	STREET FLOW
16	26.0	46.9	FLOW IN STORM SEWER
17	7.5	26.7	STREET FLOW
18	33.5	67.3	FLOW IN STORM SEWER
19	10.3	28.8	STREET FLOW
20	43.8	88.5	FLOW IN STORM SEWER
35a	5.9	13.2	STREET FLOW
35b	1.9	4.6	STREET FLOW
35c	7.8	15.7	FLOW STORM SEWER
35d	1.9	8.4	FLOW FROM WQ POND F
35e	2.5	18.2	FLOW OFFSITE TO SOUTH
35f	6.0	40.2	FLOW OFFSITE TO THE SOUTH
35	15.5	69.5	FLOW OFFSITE TO THE EAST



Lorson Ranch has secured a letter of understanding with the downstream landowner to address maintenance of any erosion issues should they occur on the offsite area and to acknowledge the manner in which drainage enters the offsite property has changed at the Pond F outfall

WIDTH OF AREA TRIBUTARY TO RUNOFF REDUCTION

RUNOFF REDUCTION DIMENSION

RUNOFF REDUCTION AREA OPEN SPACE

RUNOFF REDUCTION AREA OPEN SPACE

4' WIDE, 170' LONG CONCRETE SPREADER CHANNEL 1.5" OPENINGS EVERY 2'

WQ POND F

BASIN F1.2 BASIN BOUNDARY MATCHES THE EXISTING BASIN BOUNDARY EX-F2 SOUTH OF LORSON BOULEVARD

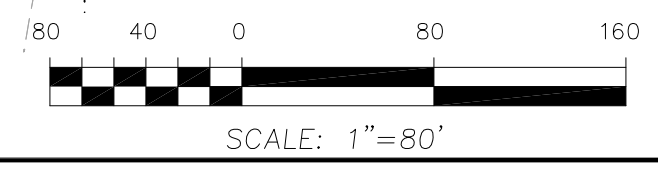
interim BASIN G1 BASIN BOUNDARY MATCHES EXISTING BASIN BOUNDARY EX-G SOUTH OF LORSON BOULEVARD

interim BASIN G1 BASIN BOUNDARY MATCHES EXISTING BASIN BOUNDARY EX-G SOUTH OF LORSON BOULEVARD

DESIGN PT. 35e IS LOCATED AT THE SOUTH PROPERTY LINE OF LORSON RANCH

DESIGN PT. 35f IS LOCATED AT THE SOUTH PROPERTY LINE OF LORSON RANCH

Show and label basin boundary between JCC & Upper Williams Basins.



**CORE ENGINEERING GROUP**

15004 1ST AVE. S.  
BURNSVILLE, MN 55306  
PH: 763-570-1100  
FAX: 763-570-1100  
EMAIL: Rich@cegroup.com

PROJECT: THE RIDGE AT LORSON RANCH  
212 N. WAHARACHA AVE. SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
(719) 635-3200  
CONTACT: JEFF MARK

UNPLATTED BJ RANCHES, LLC  
4500000082

UNPLATTED BJ RANCHES, LLC  
4500000082

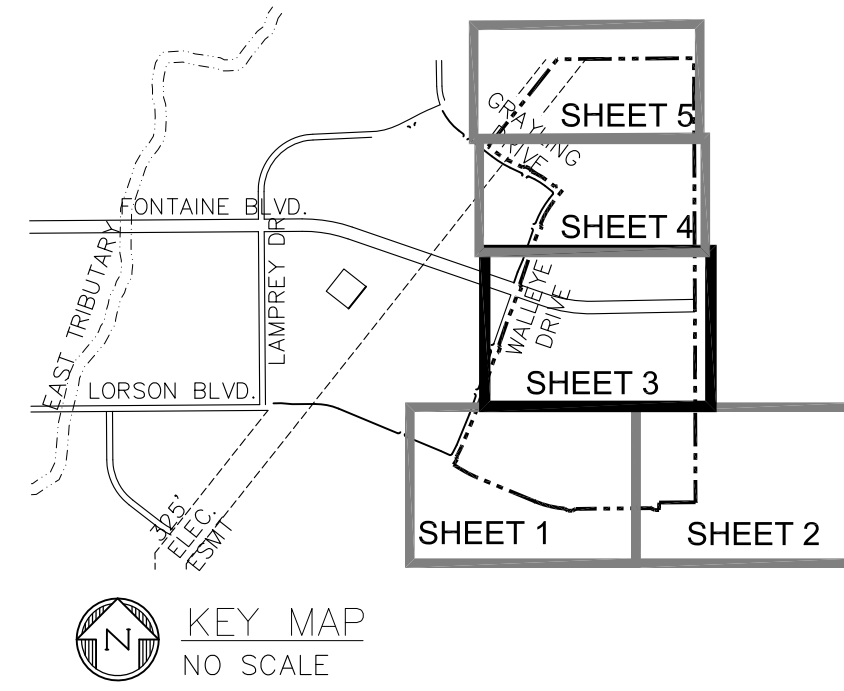
UNPLATTED BJ RANCHES, LLC  
4500000082

DATE: MARCH, 2022  
PROJECT NO.: 100.064  
SHEET NUMBER: 2  
TOTAL SHEETS: 5

DEVELOPED CONDITIONS  
THE RIDGE AT LORSON RANCH  
FILING NO. 1

RUNOFF SUMMARY			
D.P.	5 YEAR cfs	100 YEAR cfs	NOTES
17	7.5	26.7	STREET FLOW
18	33.5	67.3	FLOW IN STORM SEWER
19	10.3	28.8	STREET FLOW
20	43.8	88.5	FLOW IN STORM SEWER
20a	5.6	12.3	STREET FLOW
20b	49.4	99.2	FLOW IN STORM SEWER
21	7.2	17.5	STREET FLOW
23	8.7	26.7	STREET FLOW
24	57.8	115.5	FLOW IN STORM SEWER
24a	65.0	118.6	FLOW IN STORM SEWER
25	10.0	26.4	STREET FLOW
27	8.4	28.3	STREET FLOW
28	73.4	132.7	FLOW IN STORM SEWER
28a	80.6	133.4	FLOW IN STORM SEWER
29	9.5	27.8	STREET FLOW
30	89.8	153.9	FLOW IN STORM SEWER

RUNOFF SUMMARY			
D.P.	5 YEAR cfs	100 YEAR cfs	NOTES
31	10.5	23.2	STREET FLOW
32	10.3	27.5	STREET FLOW
32a	20.0	42.8	FLOW IN STORM SEWER
33	7.0	28.7	STREET FLOW AT EX. INLET
34	117.1	225.4	FLOW IN EX. 54" STM
36	11.4	25.2	STREET FLOW
37	7.4	16.3	STREET FLOW
38	7.5	10.5	FLOW IN STORM SEWER
39	12.7	34.0	STREET FLOW
40	23.0	37.0	FLOW IN STORM SEWER
41	9.3	27.7	STREET FLOW
42	32.3	62.1	FLOW IN STORM SEWER
43	10.0	24.5	STREET FLOW
44	42.3	87.1	FLOW INTO EX. STORM SEWER
45	7.7	17.1	STREET FLOW AT EX. INLET

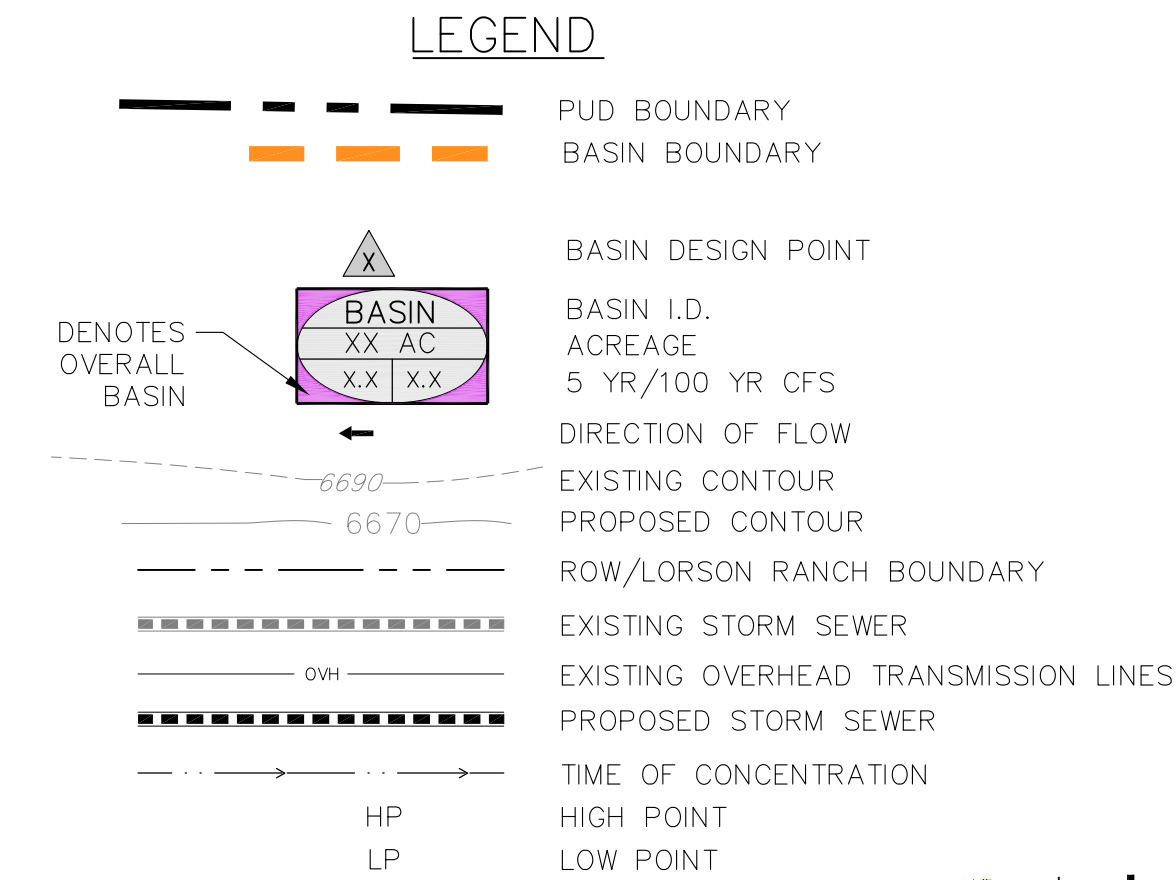


**DETENTION POND AREAS:**

1. C1 BASINS DRAIN TO POND C1
2. C3 & C4 BASINS DRAIN TO POND C2.1
3. C5 BASINS DRAIN TO POND C2.2
4. C8 BASINS DRAIN TO POND C4
5. F1.3-F1.4 BASINS DRAIN TO WQ POND F (NO DETENTION, WQ ONLY)

\*ALL DETENTION PONDS HAVE BEEN CONSTRUCTED PER SF 21-010 AND EGP 20-005 (THE HILLS AT LORSON RANCH) EXCEPT WQ POND F

\*\*SEE POND EXHIBIT FOR POND LOCATIONS



**CORE ENGINEERING GROUP**  
 15004 1ST AVE. S.  
 BURNSVILLE, MN 55306  
 PH: 763-270-1100  
 FAX: 763-270-1100  
 EMAIL: Rich@cegroup.com

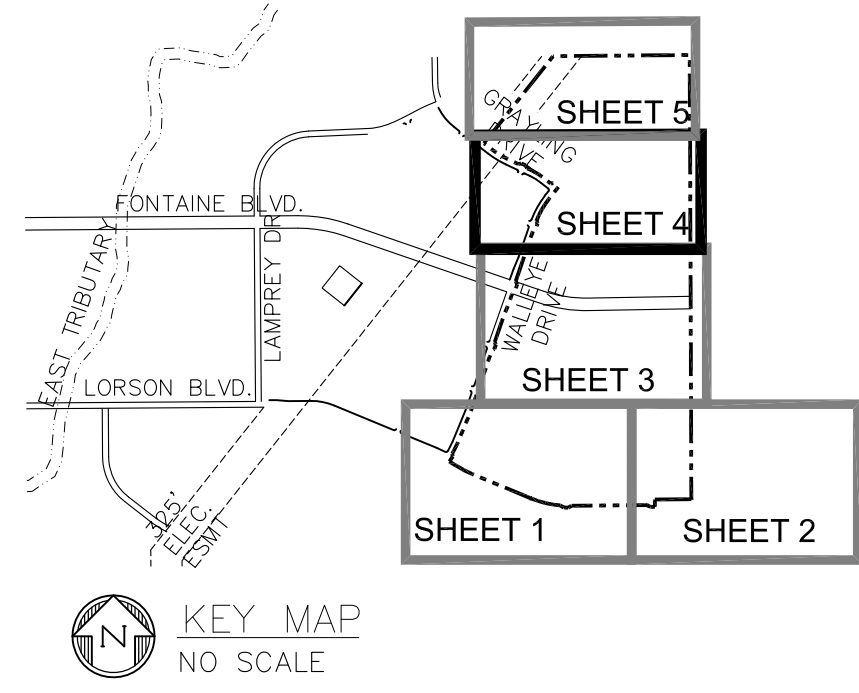
DATE: \_\_\_\_\_  
 DESCRIPTION: \_\_\_\_\_  
 NO. \_\_\_\_\_

PREPARED FOR: **LORSON, LLC**  
 212 N. WAHSAWA AVE. SUITE 301  
 COLORADO SPRINGS, COLORADO 80903  
 CONTACT: JEFF MARK

PROJECT: **THE RIDGE AT LORSON RANCH**  
 FONTAINE BLVD. - WALLEYE DRIVE  
 EL PASO COUNTY, COLORADO

DEVELOPED CONDITIONS  
 THE RIDGE AT LORSON RANCH  
 FILING 1 & FILING 2

DATE: MARCH, 2022  
 PROJECT NO.: 100.064  
 SHEET NUMBER: 3  
 TOTAL SHEETS: 5



RUNOFF SUMMARY			
D.P.	5 YEAR cfs	100 YEAR cfs	NOTES
36	11.4	25.2	STREET FLOW
37	7.4	16.3	STREET FLOW
38	7.5	10.5	FLOW IN STORM SEWER
39	12.7	34.0	STREET FLOW
40	23.0	37.0	FLOW IN STORM SEWER
41	9.3	27.7	STREET FLOW
42	32.3	62.1	FLOW IN STORM SEWER
43	10.0	24.5	STREET FLOW
44	42.3	87.1	FLOW INTO EX. STORM SEWER
45	7.7	17.1	STREET FLOW AT EX. INLET
47	7.5	16.4	STREET FLOW
48	3.4	7.6	STREET FLOW

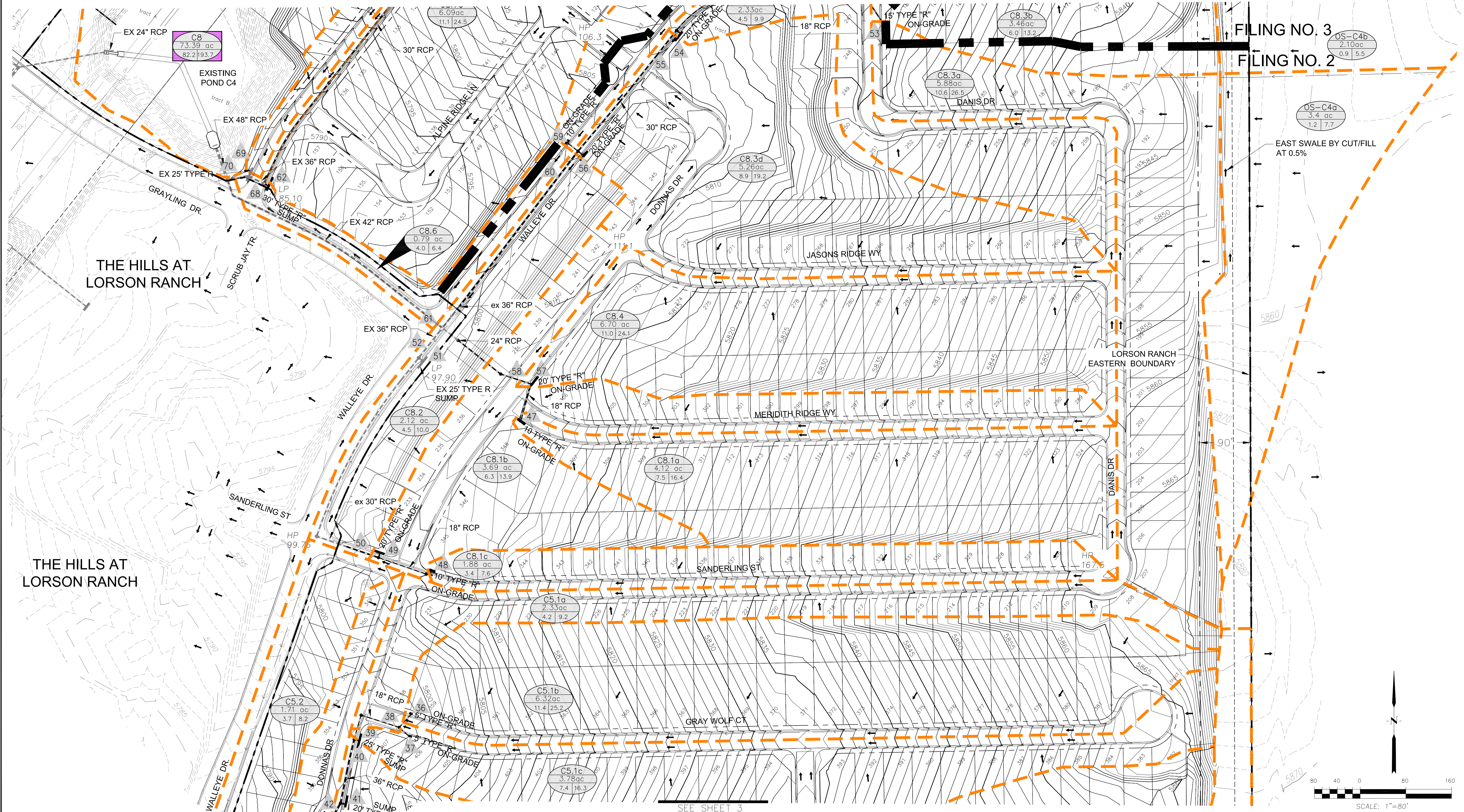
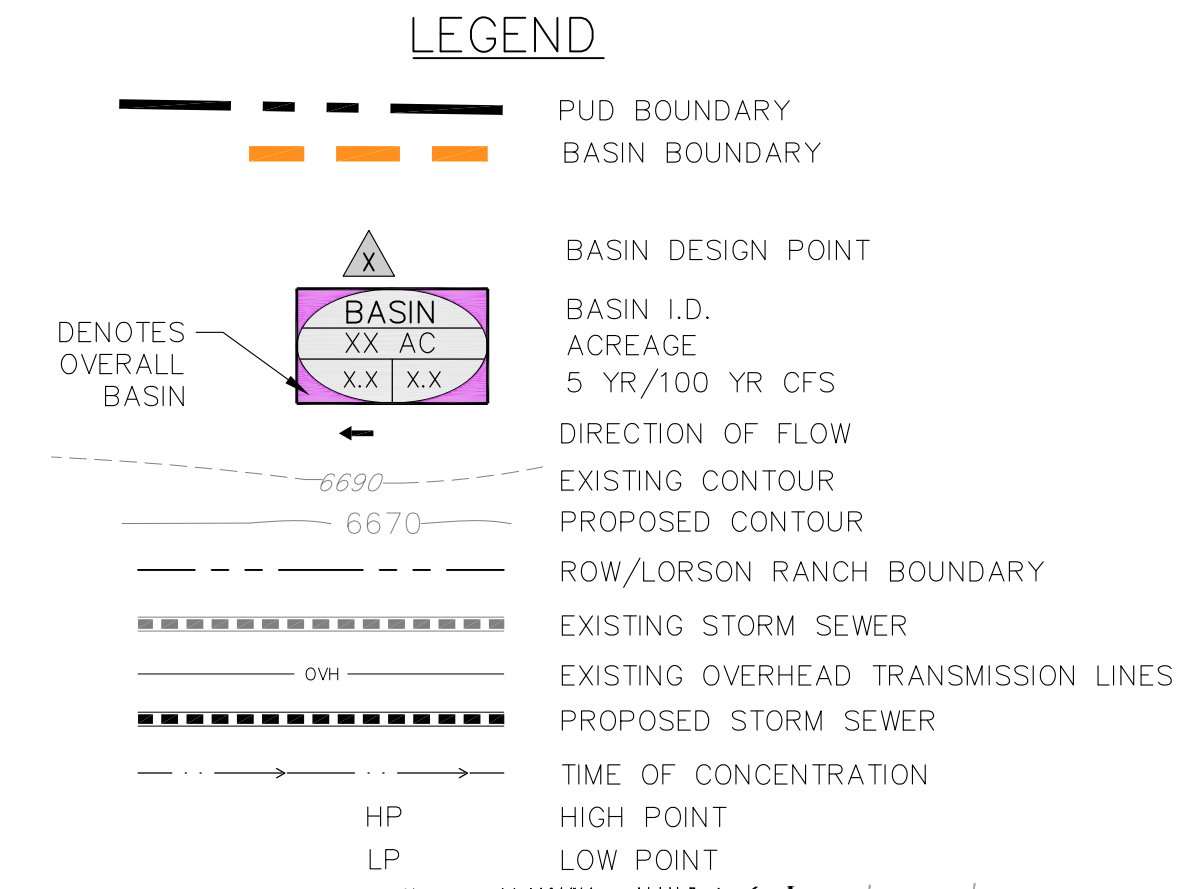
RUNOFF SUMMARY			
D.P.	5 YEAR cfs	100 YEAR cfs	NOTES
49	7.7	27.7	STREET FLOW
50	11.1	27.0	FLOW INTO EX. STORM SEWER
51	4.5	26.0	STREET FLOW AT EX. INLET
52	15.6	53.0	FLOW IN EX. STORM SEWER
53	10.6	26.5	STREET FLOW
54	11.8	37.6	STREET FLOW
55	21.4	40.2	FLOW IN STORM SEWER
56	9.0	32.8	STREET FLOW
57	11.0	24.1	STREET FLOW
58	17.1	28.1	FLOW IN STORM SEWER
59	7.0	15.5	STREET FLOW
60	36.3	72.8	FLOW IN STORM SEWER

**DETENTION POND AREAS:**

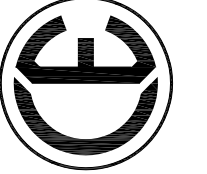
1. C1 BASINS DRAIN TO POND C1
2. C3 & C4 BASINS DRAIN TO POND C2.1
3. C5 BASINS DRAIN TO POND C2.2
4. C8 BASINS DRAIN TO POND C4
5. F1.3-F1.4 BASINS DRAIN TO WQ POND F (NO DETENTION, WQ ONLY)

\*ALL DETENTION PONDS HAVE BEEN CONSTRUCTED PER SF 21-010 AND EGP 20-005 (THE HILLS AT LORSON RANCH) EXCEPT WQ POND F

\*\*SEE POND EXHIBIT FOR POND LOCATIONS



**CORE ENGINEERING GROUP**  
 15004 1ST AVE. S.  
 BURNSVILLE, MN 55306  
 PH: 763-570-1100  
 FAX: 763-570-1100  
 EMAIL: Rich@cegg.com

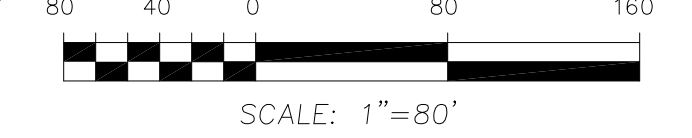


DATE: \_\_\_\_\_  
 DESCRIPTION: \_\_\_\_\_  
 NO. \_\_\_\_\_  
 PREPARED FOR: **LORSON, LLC**  
 PROJECT: **THE RIDGE AT LORSON RANCH**  
 212 N. WAHSAKCHA AVE. SUITE 301  
 COLORADO SPRINGS, COLORADO 80903  
 CONTACT: JEFF MARK

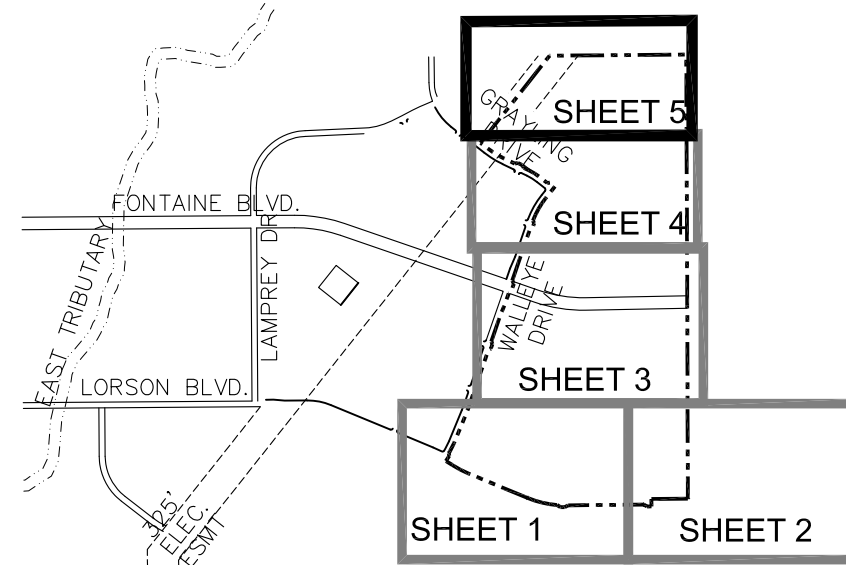
DRAWN: RL6  
 DESIGNED: LB  
 CHECKED: LB

**DEVELOPED CONDITIONS**  
**THE RIDGE AT LORSON RANCH**  
**FILING NO. 2 & FILING NO. 3**

DATE: **MARCH, 2022**  
 PROJECT NO.: **100.064**  
 SHEET NUMBER: **4**  
 TOTAL SHEETS: **5**







RUNOFF SUMMARY			
D.P.	5 YEAR cfs	100 YEAR cfs	NOTES
62	14.3	37.4	STREET FLOW
63	11.5	25.6	STREET FLOW
63a	7.3	42.2	OFFSITE FLOW ROUTED NORTH
64	10.7	30.6	STREET FLOW
65	20.0	33.4	FLOW IN STORM SEWER
66	1.5	14.5	STREET FLOW
67	21.5	45.2	FLOW IN STORM SEWER
68	33.0	76.5	FLOW INTO EX. STORM SEWER
69	7.9	17.3	STREET FLOW AT EX. INLET
70	35.3	81.4	FLOW IN EX. 42" STORM SEWER

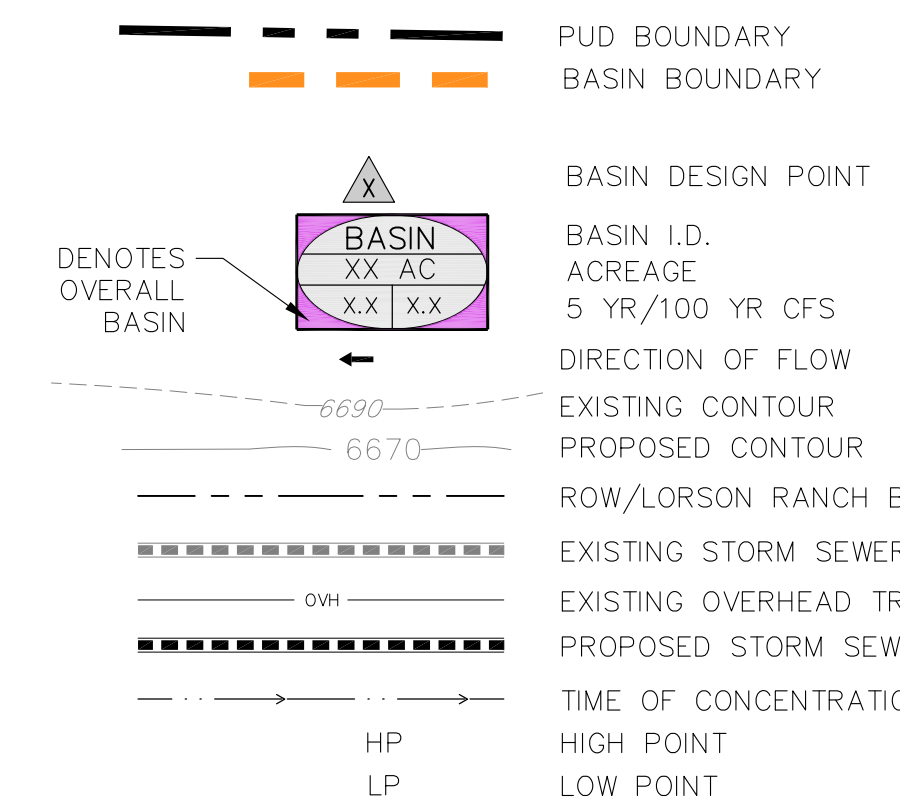
**DETENTION POND AREAS:**

1. C1 BASINS DRAIN TO POND C1
2. C3 & C4 BASINS DRAIN TO POND C2.1
3. C5 BASINS DRAIN TO POND C2.2
4. C8 BASINS DRAIN TO POND C4
5. F1.3-F1.4 BASINS DRAIN TO WQ POND F (NO DETENTION, WQ ONLY)

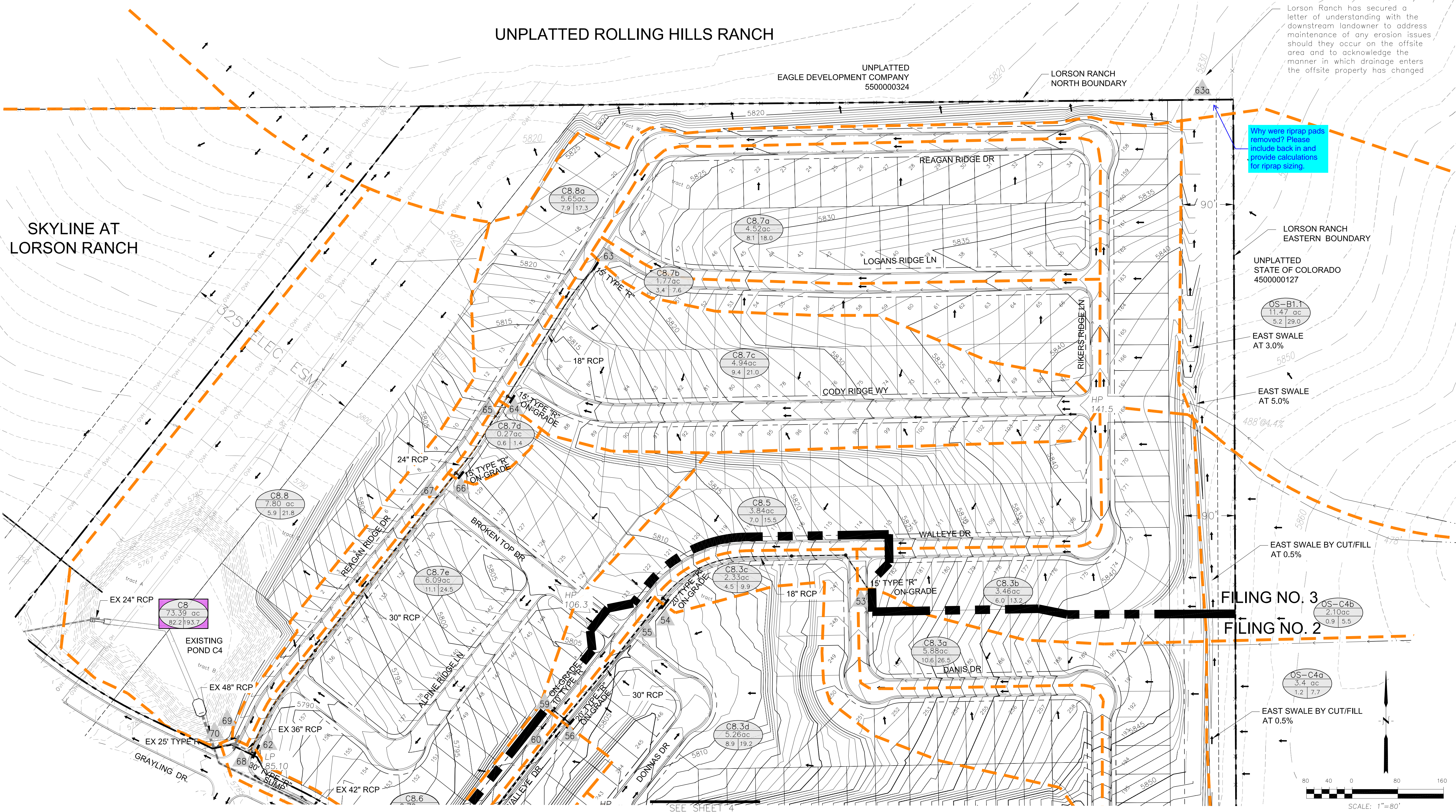
\*ALL DETENTION PONDS HAVE BEEN CONSTRUCTED PER SF 21-010 AND EGP 20-005 (THE HILLS AT LORSON RANCH) EXCEPT WQ POND F

\*\*SEE POND EXHIBIT FOR POND LOCATIONS

**LEGEND**



**UNPLATTED ROLLING HILLS RANCH**



Lorson Ranch has secured a letter of understanding with the downstream landowner to address maintenance of any erosion issues should they occur on the offsite area and to acknowledge the manner in which drainage enters the offsite property has changed

Why were riprap pads removed? Please include back in and provide calculations for riprap sizing.

**CORE ENGINEERING GROUP**  
 15004 1ST AVE. S.  
 BURNSVILLE, MN 55306  
 PH: 763-270-1100  
 FAX: 763-270-1100  
 EMAIL: Rich@ceeg.com



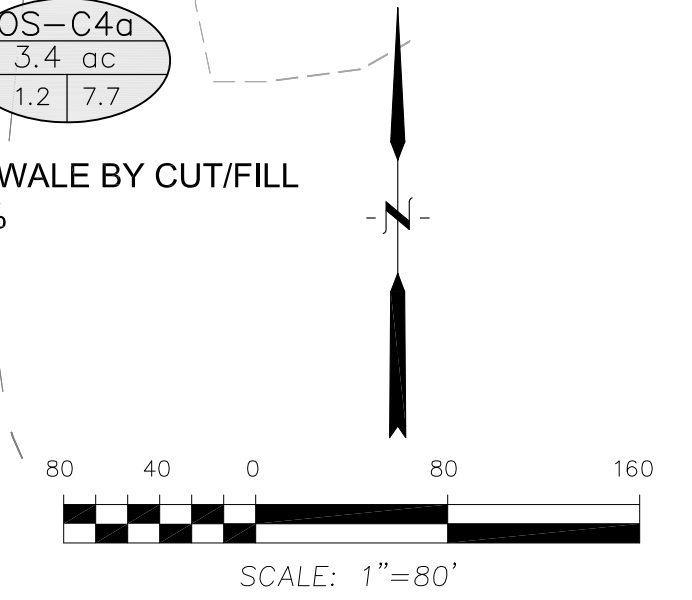
DATE: \_\_\_\_\_  
 DESCRIPTION: \_\_\_\_\_  
 NO: \_\_\_\_\_  
 DRAWN: RL6  
 DESIGNED: LAB  
 CHECKED: LB

PREPARED FOR:  
**LORSON, LLC**  
 212 N. WAHSAKCH AVE. SUITE 301  
 COLORADO SPRINGS, COLORADO 80903  
 CONTACT: JEFF MARK

PROJECT:  
**THE RIDGE AT LORSON RANCH**  
 FONTAINE BLVD. - WALLEYE DRIVE  
 EL PASO COUNTY, COLORADO

DEVELOPED CONDITIONS  
 THE RIDGE AT LORSON RANCH  
 FILING NO. 3

DATE: MARCH, 2022  
 PROJECT NO.: 100.064  
 SHEET NUMBER: 5  
 TOTAL SHEETS: 5



# Drainage Report - Final\_v2.pdf Markup Summary

CDurham (89)

Portion of Mission Peak PI  
development, portions of Copper Bu on Peak Place. Runoff will be direct by a Type R inlet. The developed l

**Subject:** Callout  
**Page Label:** 14  
**Author:** CDurham  
**Date:** 5/3/2022 5:19:51 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Portion of Mission Peak PI

located on the south property line of Loren Ranch, east before and after development being south of Loren Ranch south property line. See Design Point basin 6.5 cfs and 42.2 cfs for the 510-year storm e  
See the Developed Conditions Hydrology Calculations Conditions Drainage Map (Map Project) for the 5-year hydrology discussion of Basin C4.5 or remove basin from hydrology spreadsheets  
The sizing of the hydraulic structures and collections and hydrology computer software programs do methods outlined in the City of Colorado Springs conditions and data were used by Denver Civil Div  
It is the intent of this drainage report to use the prop

**Subject:** Text Box  
**Page Label:** 14  
**Author:** CDurham  
**Date:** 5/3/2022 5:28:28 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Include discussion of Basin C4.5 or remove basin from hydrology spreadsheets

DP 7 located in Loren Roadwest from Des. PI 6 in 2020-2021 to the 510-year storm event in the 2020-2021. The total flow for the storm is 20.3 cfs. There is no DP 7 shown in the hydrology spreadsheet.

**Subject:** Text Box  
**Page Label:** 17  
**Author:** CDurham  
**Date:** 5/4/2022 10:19:57 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

There is no DP 7 shown in the hydrology spreadsheet.

Hydrology Detail - Flow in Basin C1.4 = 4.2 cfs in the 5-year storm event and 20.3 cfs in the 510-year storm event. The total flow for the storm is 20.3 cfs per the total flow from Des. PI 4. The total pipe flow is 20.3 cfs. Flows do not match the hydrology spreadsheet or pipe flows in storm sewer summary. Walkley Drive and accepts flow from  
number: 1001201  
4 Flow: 3.0 cfs  
excess: 0 cfs in curb downstream

**Subject:** Text Box  
**Page Label:** 17  
**Author:** CDurham  
**Date:** 5/4/2022 10:20:02 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Flows do not match the hydrology spreadsheet or pipe flows in storm sewer summary.

in PIs 21 and 24. The total pipe flow is 20.3 cfs. Design point not in table  
and Lake Trout Dr and accepts flows from

**Subject:** Text Box  
**Page Label:** 22  
**Author:** CDurham  
**Date:** 5/4/2022 10:30:16 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Design point not in table

to acknowledge the manner of which drainage landowner to address maintenance. A spreader is proposed at the Design Point 05d for discussion of concern. Design Point not shown in hydrology spreadsheet  
all from WQ Pond F. The total pipe flow is 20.3 cfs per the full spectrum spreadsheet determines the length of the pipe to reduce the erosion potential.

**Subject:** Text Box  
**Page Label:** 26  
**Author:** CDurham  
**Date:** 5/4/2022 10:57:43 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Design Point not shown in hydrology spreadsheet

is located at the storm sewer outlet from 1102 Third St. The 1  
a 5/100-year storm event in the storm sewer per the 10  
ation 2012 from the Grass Buffer worksheet determine the amount  
to correct point discharge into street flow to reduce the excess  
width of the sewer from the storm sewer outlet to required 14  
feet at along the curb sidewalk. The curb structure will be  
to the curb sidewalk. The flows will drain and additional 100 events  
capacity.  
[Include Grass buffer worksheet in appendix](#)

**Subject:** Text Box  
**Page Label:** 26  
**Author:** CDurham  
**Date:** 5/4/2022 11:07:59 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Include Grass buffer worksheet in appendix

located on the south property line of Lanes French and in the lots  
18.2x in the 5/100-year storm event. The existing flow at this loca  
tion is the 5/100-year storm event. The total flow at this loca  
tion is slightly due to grading north of Lanes Boulevard. The existing  
flow resulting in no negative impacts downstream.

**Subject:** Text Box  
**Page Label:** 26  
**Author:** CDurham  
**Date:** 5/4/2022 11:08:55 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

DP 35e & 35f missing from spreadsheet

**Design Point 35f**  
Design Point 35f is located on the south property line  
of 11 which is 6.02x40.2x in the 5/100-year storm event  
25.4x is 6.02x40.2x in the 5/100-year storm event  
which was reduced slightly due to grading north of L  
than existing flows resulting in no negative impacts dow  
[DP 35e & 35f missing from spreadsheet](#)

**Design Point 32**  
Design Point 32 is located on the south property line  
of 150. The total pipe flow is 11  
cfs in the 5/100-year storm event in the storm se  
wer designed to accept 8.9cfs/20.4cfs in the exist  
ing pipe. However, the existing pipe has capacity to  
be Design Point 32.

**Subject:** Text Box  
**Page Label:** 32  
**Author:** CDurham  
**Date:** 5/4/2022 11:33:10 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Design point not in spreadsheet

**Design Point 33**  
Design Point 33 is the storm sewer pipe flow  
in Walleye Drive. The total pipe flow is 11  
cfs. The FCR for CDR20/007 (DR  
25.4x/50.9cfs in the existing 36" RCP storm  
handle the slight increase in pipe flow in the  
[Design point not in spreadsheet](#)

**Subject:** Text Box  
**Page Label:** 32  
**Author:** CDurham  
**Date:** 5/4/2022 11:33:19 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Design point not in spreadsheet

street slope = 1.4%, capacity = 44.1 cfs (main street)

located in the NE corner of Donnas Drive and Wall  
St.  
[Design point not in spreadsheet](#)

C8.3b & C8.3c	Inlet/MH Number
0.9cfs from Des.Pt.53	Total Street Flow
1.7cfs	Flow Bypassed:
1.8, on-grade	

**Subject:** Text Box  
**Page Label:** 33  
**Author:** CDurham  
**Date:** 5/4/2022 11:38:50 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Design point not in spreadsheet

**Design Point 34**  
Design Point 34 is the storm sewer pipe #  
17.5x26.1cfs in the 5/100-year storm event  
[Design point not in spreadsheet](#)

**Subject:** Text Box  
**Page Label:** 34  
**Author:** CDurham  
**Date:** 5/4/2022 11:46:28 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Design point not in spreadsheet

half street) is okay

Pi's 55, 56 and 59. The total pipe flow is sewer. Flow does not match hydrology spreadsheet

CB, 3, CB 4, and CB 5 basins taken from the 4 pipe flow is 52.3cfs(112.1cfs in the 5100-3007 (Design Point 32) designed the storm storm sewer at Wallace Drive. The 100-yr not the additional flow has minimal impact.

**Subject:** Text Box  
**Page Label:** 35  
**Author:** CDurham  
**Date:** 5/4/2022 12:01:22 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Flow does not match hydrology spreadsheet

Design Point 61

Design Point 61 is the storm sewer pipe flow spreadsheet minus bypass flow from Des. 1 year storm events in the storm sewer. The sewer is accept 45.1cfs(105.4cfs in the existing HGL for the 42" RCP storm sewer is below 1

Design point not in spreadsheet

**Subject:** Text Box  
**Page Label:** 35  
**Author:** CDurham  
**Date:** 5/4/2022 12:01:26 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Design point not in spreadsheet

e = 2.5%, capacity = 41.4cfs (half street) is okay

1 the SE corner of Reason Ridge Drive and Log a&b Design point not in spreadsheet

b Inlet/Man Number: Inlet DP6  
Total Street Flow: 11.5cfs

Flow Bypassed: 1.3cfs

3e

**Subject:** Text Box  
**Page Label:** 36  
**Author:** CDurham  
**Date:** 5/4/2022 12:12:18 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Design point not in spreadsheet

Design point not shown in spreadsheet

11.5cfs is the existing offsite flow from areas west of Lorson Dr. and DS-Cab. These offsite basins will be routed north to Lorson Ranch. The proposed total flow in the storm sewer which is less than existing total flow into the 5100-3007 in the 5100-year storm events (see existing c basin offsite land to the north and a table of understanding if any action issues should they occur on the offsite which will be shown in the offsite spreadsheet.

**Subject:** Text Box  
**Page Label:** 37  
**Author:** CDurham  
**Date:** 5/4/2022 12:12:32 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Design point not shown in spreadsheet

of Lorson Ranch from offsite Basins OS- added north in a wide shallow swale onto flow in the swale is 7.3cfs(42.2cfs in the onto the adjacent property at Design Point (existing condition). Lorson Ranch owner. Add back in the riprap pads at end of the off of swale to disperse flows and opt. include sizing of riprap

Drive and Cody Ridge Way and accepts

**Subject:** Text Box  
**Page Label:** 37  
**Author:** CDurham  
**Date:** 5/4/2022 12:16:53 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Add back in the riprap pads at end of swale to disperse flows and include sizing of riprap

54.2cfs in the 5100-year storm events (see existing condition) and to the north and a table of understanding has any action issues should they occur on the offsite area storage areas the offsite property has changes.

located at the SE corner of Reason Ridge Drive and Cody 28.7c. Design point not shown in spreadsheet

1. CB 7c  
1.3cfs from Des-PI63  
Inlet/Man Number: Inlet 1  
Total Street Flow: 10.7cfs  
Flow Bypassed: 0.9cfs  
W.R. Originate

**Subject:** Text Box  
**Page Label:** 37  
**Author:** CDurham  
**Date:** 5/4/2022 12:42:29 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Design point not shown in spreadsheet

Street Capacity: Street slope = 4.0%, capacity = 31  
Design Point 65  
Design Point 65 is the storm sewer pipe flow from 20.05x10.54x6 in the 5100-year storm events in the  
Design point not shown in spreadsheet

**Subject:** Text Box  
**Page Label:** 37  
**Author:** CDurham  
**Date:** 5/4/2022 12:43:11 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Design point not shown in spreadsheet

Design Point 66  
Design Point 66 is located at the NE corner of Reagan Ridge Drive in Basin C8.7  
Design point not shown in spreadsheet  
Basin: C8.7  
Inlet/Outlet Number  
in Flowby: 0.5cfs from Des P1.64  
Total Street Flo

**Subject:** Text Box  
**Page Label:** 38  
**Author:** CDurham  
**Date:** 5/4/2022 12:43:44 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Design point not shown in spreadsheet

Flowby: 13.1cfs from Des P1.64  
Total Street Flow:  
Capacity: 11.0cfs  
Flow Bypassed: 1  
Type: R, Longgrade  
Capacity: Street slope = 2.0%, capacity = 44.0cfs (half street)

**Subject:** Text Box  
**Page Label:** 38  
**Author:** CDurham  
**Date:** 5/4/2022 12:45:09 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Design point not shown in spreadsheet

Design Point 67  
Design Point 67 is the storm sewer pipe flow from Design P1.65 in Basin C8.7 in the 5100-year storm events in the storm sewer.  
Design Point 68  
Design Point 68 is the storm sewer pipe flow from the C8.6 and C8.7 and adding bypass flow (1.10x0.6cfs) from Des. P1.65 in the 5100-year storm events in the storm sewer.

C8.6 and the C8.7 basins taken from Design P1.65. The total pipe flow ver. Flows do not match the hydrology spreadsheet  
a Drive and Walleye Drive at an exist

**Subject:** Text Box  
**Page Label:** 38  
**Author:** CDurham  
**Date:** 5/4/2022 12:45:45 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Flows do not match the hydrology spreadsheet

Flows do not match the hydrology spreadsheet  
Design P1.65 is the storm sewer pipe flow from the C8.6 and the C8.7 and adding bypass flow (1.10x0.6cfs) from Des. P1.65 in the 5100-year storm events in the storm sewer. The flow is 13.1cfs from Design P1.65 and bypass flow. The flow is 13.1cfs from Design P1.65 and bypass flow. The flow is 13.1cfs from Design P1.65 and bypass flow. The flow is 13.1cfs from Design P1.65 and bypass flow.  
ATTENTION AND WATER QUALITY FORDS

**Subject:** Text Box  
**Page Label:** 39  
**Author:** CDurham  
**Date:** 5/4/2022 12:48:12 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Flows do not match the hydrology spreadsheet

C8.6a	Flow	Capacity	Flow	Capacity
C8.6	7.80	0.22	16	
C8	73.39	0.43	27	
Missing basins H1 & G1				

**Subject:** Text Box  
**Page Label:** 62  
**Author:** CDurham  
**Date:** 5/4/2022 3:32:31 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

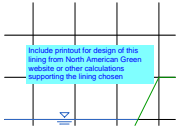
Missing basins H1 & G1

U (ft/s) = 92.50  
Flow Rate = 17.94  
Velocity (ft/s) = 3.16  
Vertical Pressure (ft) = 80.26  
Crest Depth, Yc (ft) = 6.73  
Sog Width (ft) = 30.20  
EDL (ft) = 1.06

Velocity is high. Add lining/reinforcement to swale.

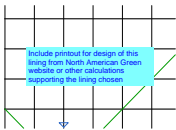
**Subject:** Callout  
**Page Label:** 79  
**Author:** CDurham  
**Date:** 5/4/2022 3:33:50 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Velocity is high. Add lining/reinforcement to swale.



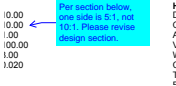
**Subject:** Text Box  
**Page Label:** 80  
**Author:** CDurham  
**Date:** 5/4/2022 3:36:55 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Include printout for design of this lining from North American Green website or other calculations supporting the lining chosen



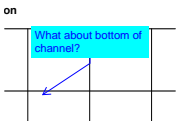
**Subject:** Text Box  
**Page Label:** 82  
**Author:** CDurham  
**Date:** 5/4/2022 3:37:08 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Include printout for design of this lining from North American Green website or other calculations supporting the lining chosen



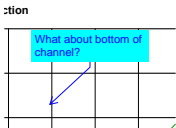
**Subject:** Callout  
**Page Label:** 80  
**Author:** CDurham  
**Date:** 5/4/2022 3:38:40 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Per section below, one side is 5:1, not 10:1. Please revise design section.



**Subject:** Callout  
**Page Label:** 80  
**Author:** CDurham  
**Date:** 5/4/2022 3:39:14 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

What about bottom of channel?



**Subject:** Callout  
**Page Label:** 82  
**Author:** CDurham  
**Date:** 5/4/2022 3:39:28 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

What about bottom of channel?

EGL (ft) = 0.78

Include calculation to size riprap for spreader.

**Subject:** Text Box  
**Page Label:** 83  
**Author:** CDurham  
**Date:** 5/4/2022 3:41:23 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Include calculation to size riprap for spreader.

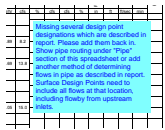


Report has flow at this design point as Q100 = 19.7 at DP-4

PROJECT: 12345678

**Subject:** Callout  
**Page Label:** 89  
**Author:** CDurham  
**Date:** 5/4/2022 3:44:39 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Report has flow at this design point as Q100 = 19.7 at DP-4



Missing several design point designations which are described in report. Please add them back in. Show pipe routing under "Pipe" section of this spreadsheet or add another method of determining flows in pipe as described in report. Surface Design Points need to include all flows at that location, including flow from upstream inlets.

**Subject:** Text Box  
**Page Label:** 60  
**Author:** CDurham  
**Date:** 5/4/2022 3:45:33 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Missing several design point designations which are described in report. Please add them back in. Show pipe routing under "Pipe" section of this spreadsheet or add another method of determining flows in pipe as described in report. Surface Design Points need to include all flows at that location, including flow from upstream inlets.



Report has flows of 9.9 & 21.8 at DP-12.

**Subject:** Callout  
**Page Label:** 93  
**Author:** CDurham  
**Date:** 5/4/2022 3:49:16 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Report has flows of 9.9 & 21.8 at DP-12.



Hydrology spreadsheet has flows of 9.9 & 21.8 at DP-12.

**Subject:** Callout  
**Page Label:** 91  
**Author:** CDurham  
**Date:** 5/4/2022 3:49:43 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

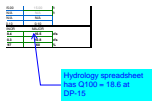
Hydrology spreadsheet has flows of 9.9 & 21.8 at DP-12



Hydrology spreadsheet has flows of 7.9 & 17.3 at DP-13.

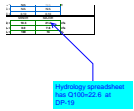
**Subject:** Callout  
**Page Label:** 95  
**Author:** CDurham  
**Date:** 5/4/2022 3:50:58 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Hydrology spreadsheet has flows of 7.9 & 17.3 at DP-13



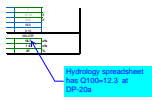
**Subject:** Callout  
**Page Label:** 97  
**Author:** CDurham  
**Date:** 5/4/2022 3:51:19 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Hydrology spreadsheet has Q100 = 18.6 at DP-15



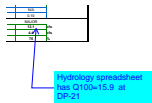
**Subject:** Callout  
**Page Label:** 101  
**Author:** CDurham  
**Date:** 5/4/2022 3:51:49 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Hydrology spreadsheet has Q100=22.6 at DP-19



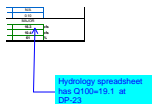
**Subject:** Callout  
**Page Label:** 103  
**Author:** CDurham  
**Date:** 5/4/2022 3:52:23 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Hydrology spreadsheet has Q100=12.3 at DP-20a



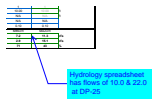
**Subject:** Callout  
**Page Label:** 105  
**Author:** CDurham  
**Date:** 5/4/2022 3:52:56 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Hydrology spreadsheet has Q100=15.9 at DP-21



**Subject:** Callout  
**Page Label:** 107  
**Author:** CDurham  
**Date:** 5/4/2022 3:53:20 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

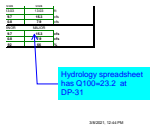
Hydrology spreadsheet has Q100=19.1 at DP-23



**Subject:** Callout  
**Page Label:** 109  
**Author:** CDurham  
**Date:** 5/4/2022 3:58:10 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

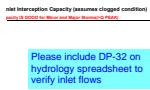
Hydrology spreadsheet has flows of 10.0 & 22.0 at DP-25





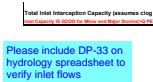
**Subject:** Callout  
**Page Label:** 115  
**Author:** CDurham  
**Date:** 5/4/2022 3:59:17 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Hydrology spreadsheet has Q100=23.2 at DP-31



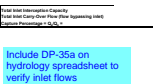
**Subject:** Text Box  
**Page Label:** 117  
**Author:** CDurham  
**Date:** 5/4/2022 3:59:41 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Please include DP-32 on hydrology spreadsheet to verify inlet flows



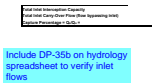
**Subject:** Text Box  
**Page Label:** 119  
**Author:** CDurham  
**Date:** 5/4/2022 4:00:08 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Please include DP-33 on hydrology spreadsheet to verify inlet flows



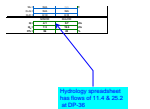
**Subject:** Text Box  
**Page Label:** 121  
**Author:** CDurham  
**Date:** 5/4/2022 4:00:31 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Include DP-35a on hydrology spreadsheet to verify inlet flows



**Subject:** Text Box  
**Page Label:** 123  
**Author:** CDurham  
**Date:** 5/4/2022 4:00:56 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Include DP-35b on hydrology spreadsheet to verify inlet flows



**Subject:** Callout  
**Page Label:** 125  
**Author:** CDurham  
**Date:** 5/4/2022 4:01:28 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Hydrology spreadsheet has flows of 11.4 & 25.2 at DP-36



Hydrology spreadsheet has flows of 7.4 & 16.3 at DP-37

**Subject:** Callout  
**Page Label:** 127  
**Author:** CDurham  
**Date:** 5/4/2022 4:01:57 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Hydrology spreadsheet has flows of 7.4 & 16.3 at DP-37



These flows are way larger than those shown on hydrology spreadsheet for DP-39. Are they for the same location?

**Subject:** Text Box  
**Page Label:** 129  
**Author:** CDurham  
**Date:** 5/4/2022 4:03:12 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

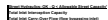
These flows are way larger than those shown on hydrology spreadsheet for DP 39. Are they for the same location?



Hydrology spreadsheet has flows of 7.6 at DP-37

**Subject:** Callout  
**Page Label:** 137  
**Author:** CDurham  
**Date:** 5/4/2022 4:06:21 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Hydrology spreadsheet has flows of 7.6 at DP-37



Previously there were 2 DP 49's in hydrology spreadsheet, now there aren't any. Please provide a DP 49 to verify flows against.

**Subject:** Text Box  
**Page Label:** 139  
**Author:** CDurham  
**Date:** 5/4/2022 4:07:36 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Previously there were 2 DP 49's in hydrology spreadsheet, now there aren't any. Please provide a DP 49 to verify flows against.



Hydrology spreadsheet has Q100=26.5 at DP-53

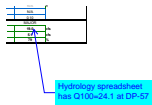
**Subject:** Callout  
**Page Label:** 143  
**Author:** CDurham  
**Date:** 5/4/2022 4:08:23 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Hydrology spreadsheet has Q100=26.5 at DP-53

DP 54 was removed from hydrology spreadsheet. Please add back in for verification of flows at inlet.

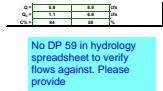
**Subject:** Text Box  
**Page Label:** 145  
**Author:** CDurham  
**Date:** 5/4/2022 4:09:30 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

DP 54 was removed from hydrology spreadsheet. Please add back in for verification of flows at inlet.



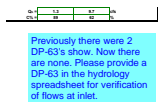
**Subject:** Callout  
**Page Label:** 149  
**Author:** CDurham  
**Date:** 5/4/2022 4:10:30 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Hydrology spreadsheet has Q100=24.1 at DP-57



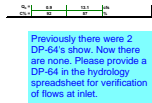
**Subject:** Text Box  
**Page Label:** 151  
**Author:** CDurham  
**Date:** 5/4/2022 4:11:45 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

No DP 59 in hydrology spreadsheet to verify flows against. Please provide



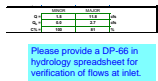
**Subject:** Text Box  
**Page Label:** 155  
**Author:** CDurham  
**Date:** 5/4/2022 4:13:41 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Previously there were 2 DP-63's show. Now there are none. Please provide a DP-63 in the hydrology spreadsheet for verification of flows at inlet.



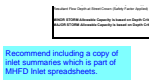
**Subject:** Text Box  
**Page Label:** 157  
**Author:** CDurham  
**Date:** 5/4/2022 4:14:25 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Previously there were 2 DP-64's show. Now there are none. Please provide a DP-64 in the hydrology spreadsheet for verification of flows at inlet.



**Subject:** Text Box  
**Page Label:** 159  
**Author:** CDurham  
**Date:** 5/4/2022 4:15:19 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Please provide a DP-66 in hydrology spreadsheet for verification of flows at inlet.



**Subject:** Text Box  
**Page Label:** 84  
**Author:** CDurham  
**Date:** 5/4/2022 4:16:47 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Recommend including a copy of inlet summaries which is part of MHFD Inlet spreadsheets.

Please include spreadsheet/table listing contributing basins and % impervious to each pond.

**Subject:** Text Box  
**Page Label:** 162  
**Author:** CDurham  
**Date:** 5/4/2022 4:17:29 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Please include spreadsheet/table listing contributing basins and % impervious to each pond.

Include release rates from each pond

**Subject:** Text Box  
**Page Label:** 163  
**Author:** CDurham  
**Date:** 5/4/2022 4:17:53 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Include release rates from each pond

**Subject:** Text Box  
**Page Label:** 164  
**Author:** CDurham  
**Date:** 5/4/2022 4:18:21 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Make note that is representative for a single lot, not the whole basin.

**Subject:** Text Box  
**Page Label:** 165  
**Author:** CDurham  
**Date:** 5/4/2022 4:18:42 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

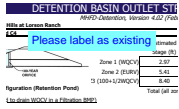
Please label as existing

**Subject:** Text Box  
**Page Label:** 174  
**Author:** CDurham  
**Date:** 5/4/2022 4:21:48 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Please label as existing

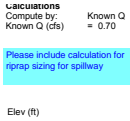
**Subject:** Text Box  
**Page Label:** 184  
**Author:** CDurham  
**Date:** 5/4/2022 4:22:22 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Please label as existing



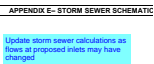
**Subject:** Text Box  
**Page Label:** 195  
**Author:** CDurham  
**Date:** 5/4/2022 4:22:55 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Please label as existing



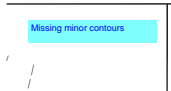
**Subject:** Text Box  
**Page Label:** 208  
**Author:** CDurham  
**Date:** 5/4/2022 4:24:18 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Please include calculation for riprap sizing for spillway



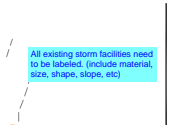
**Subject:** Text Box  
**Page Label:** 212  
**Author:** CDurham  
**Date:** 5/4/2022 4:24:50 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Update storm sewer calculations as flows at proposed inlets may have changed



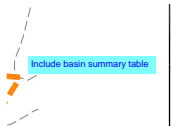
**Subject:** Text Box  
**Page Label:** 244  
**Author:** CDurham  
**Date:** 5/4/2022 4:26:22 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Missing minor contours



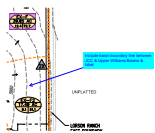
**Subject:** Text Box  
**Page Label:** 244  
**Author:** CDurham  
**Date:** 5/4/2022 4:26:29 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

All existing storm facilities need to be labeled. (include material, size, shape, slope, etc)



**Subject:** Text Box  
**Page Label:** 244  
**Author:** CDurham  
**Date:** 5/4/2022 4:26:39 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Include basin summary table



**Subject:** Callout  
**Page Label:** 244  
**Author:** CDurham  
**Date:** 5/4/2022 4:27:21 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Include basin boundary line between JCC & Upper Williams Basins & label



**Subject:** Callout  
**Page Label:** 244  
**Author:** CDurham  
**Date:** 5/4/2022 4:27:39 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

delete extra label

LURSON RAN(R) EXCEPT WJ PFI  
\*\*SEE POND EXHIBIT FOR POND

Include basin summary table  
(all sheets)

D.P.	RUNOFF	
	5 YEAR cfs	100 YE cfs

**Subject:** Text Box  
**Page Label:** 245  
**Author:** CDurham  
**Date:** 5/4/2022 4:30:46 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Include basin summary table (all sheets)

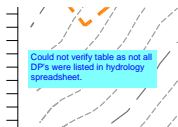
W POND F  
POND LOCATIONS

Label all curb types, cross pans,  
manholes, pipes, etc. Indicate  
what items are public or private.

100 YEAR		NOTES
cfs		

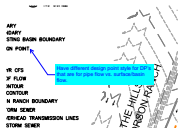
**Subject:** Text Box  
**Page Label:** 245  
**Author:** CDurham  
**Date:** 5/4/2022 4:30:55 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Label all curb types, cross pans, manholes, pipes, etc. Indicate what items are public or private.



**Subject:** Text Box  
**Page Label:** 245  
**Author:** CDurham  
**Date:** 5/4/2022 4:33:06 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Could not verify table as not all DP's were listed in hydrology spreadsheet.



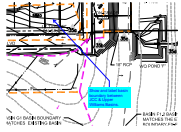
**Subject:** Callout  
**Page Label:** 245  
**Author:** CDurham  
**Date:** 5/4/2022 4:34:21 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Have different design point style for DP's that are for pipe flow vs. surface/basin flow.

DESIGN POINT S	
5 YEAR cfs	100 YEAR cfs

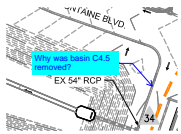
**Subject:** Text Box  
**Page Label:** 245  
**Author:** CDurham  
**Date:** 5/4/2022 4:34:48 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

DESIGN POINT



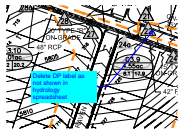
**Subject:** Callout  
**Page Label:** 246  
**Author:** CDurham  
**Date:** 5/4/2022 4:36:09 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Show and label basin boundary between JCC & Upper Williams Basins.



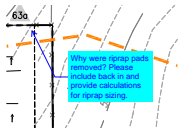
**Subject:** Callout  
**Page Label:** 247  
**Author:** CDurham  
**Date:** 5/4/2022 4:37:16 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Why was basin C4.5 removed?



**Subject:** Callout  
**Page Label:** 247  
**Author:** CDurham  
**Date:** 5/4/2022 4:39:32 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Delete DP label as not shown in hydrology spreadsheet



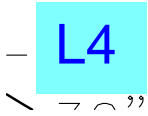
**Subject:** Callout  
**Page Label:** 249  
**Author:** CDurham  
**Date:** 5/4/2022 4:46:47 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Why were riprap pads removed? Please include back in and provide calculations for riprap sizing.

L2

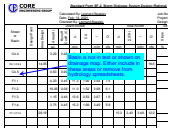
**Subject:** Text Box  
**Page Label:** 213  
**Author:** CDurham  
**Date:** 5/4/2022 6:25:51 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

L2



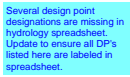
**Subject:** Text Box  
**Page Label:** 213  
**Author:** CDurham  
**Date:** 5/4/2022 6:25:58 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

L4



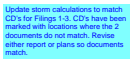
**Subject:** Callout  
**Page Label:** 61  
**Author:** CDurham  
**Date:** 5/4/2022 9:14:18 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Basin is not in text or shown on drainage map. Either include in these areas or remove from hydrology spreadsheets.



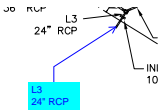
**Subject:** Text Box  
**Page Label:** 15  
**Author:** CDurham  
**Date:** 5/4/2022 9:16:21 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Several design point designations are missing in hydrology spreadsheet. Update to ensure all DP's listed here are labeled in spreadsheet.



**Subject:** Text Box  
**Page Label:** 212  
**Author:** CDurham  
**Date:** 5/5/2022 11:30:43 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

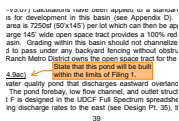
Update storm calculations to match CD's for Filings 1-3. CD's have been marked with locations where the 2 documents do not match. Revise either report or plans so documents match.



**Subject:** Callout  
**Page Label:** 213  
**Author:** CDurham  
**Date:** 5/5/2022 7:40:54 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

L3  
24" RCP

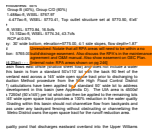
**Glenn Reese - EPC Stormwater (8)**



**Subject:** SW - Textbox with Arrow  
**Page Label:** 41  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 4/20/2022 9:19:24 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

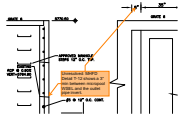
State that this pond will be built within the limits of Filing 1.





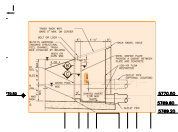
**Subject:** SW - Textbox with Arrow  
**Page Label:** 41  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 4/20/2022 9:19:24 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Unresolved: Notate that all RPA areas will need to be within a no build/drainage easement. Also discuss the RPA's in the maintenance agreement and O&M manual. Also show easement on GEC Plan.  
 [internal note: RPA areas shown on pg 246]



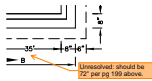
**Subject:** SW - Textbox with Arrow  
**Page Label:** 210  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 4/20/2022 9:22:08 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Unresolved: MHFD Detail T-12 shows a 3" min between micropool WSEL and the outlet pipe invert.



**Subject:** Image  
**Page Label:** 210  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 4/20/2022 9:22:08 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Unresolved: MHFD Detail T-12 shows a 3" min between micropool WSEL and the outlet pipe invert.



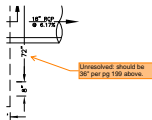
**Subject:** SW - Textbox with Arrow  
**Page Label:** 211  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 4/20/2022 9:22:47 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Unresolved: should be 72" per pg 199 above.



**Subject:** SW - Textbox with Arrow  
**Page Label:** 211  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 4/20/2022 9:22:47 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Review #2 update: Revise outlet structure accordingly or revise MHFD calcs on pg 204 to reflect this outlet configuration so there is not a discrepancy.



**Subject:** SW - Textbox with Arrow  
**Page Label:** 211  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 4/20/2022 9:22:47 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Unresolved: should be 36" per pg 199 above.

Unresolved Comment:  
Sheets C9.3, C9.4, and C9 need to be included  
in the GEC Plans or the CD's so our SW  
inspectors can see them in the field. Our SW  
inspectors do not look at drainage reports for  
drawings.

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**Subject:** SW - Textbox  
**Page Label:** 209  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 4/20/2022 9:36:11 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Unresolved Comment:  
Sheets C9.3, C9.4, and C9 need to be included in  
the GEC Plans or the CD's so our SW inspectors  
can see them in the field. Our SW inspectors do  
not look at drainage reports for drawings.