Portion of Mission Peak Pl

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)

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

Summary of Comments on Microsoft Word - 100.064-pdr

Page: 14

Author: CDurham Subject: Callout Date: 5/3/2022 6:19:51 PM
Portion of Mission Peak Pl

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:24:01 PM
text added

Author: CDurham Subject: Text Box Date: 5/3/2022 6:28:28 PM
Include discussion of Basin C4.5 or remove basin from hydrology spreadsheets

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:24:10 PM
basin removed

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:

(5-year storm)
Tributary Basins: C1.1 **Inlet/MH Number:** Inlet DP1
Upstream flowby: **Total Street Flow:** 5.6cfs

Flow Intercepted: 5.6cfs **Flow Bypassed:** 0
Inlet Size: 10' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 9cfs, okay

(100-year storm)
Tributary Basins: C1.1 **Inlet/MH Number:** Inlet DP1
Upstream flowby: **Total Street Flow:** 12.2cfs

Flow Intercepted: 12.2cfs **Flow Bypassed:**
Inlet Size: 10' type R, sump

Street Capacity: 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.

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Author: CDurham Subject: Text Box Date: 5/4/2022 10:16:21 AM
Several design point designations are missing in hydrology spreadsheet. Update to ensure all DP's listed here are labeled in spreadsheet.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:24:24 PM
all points in spreadsheet removed

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) = 4.2cfs 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) = 12.8cfs 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 sp or pipe flows in storm sewer summar

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).

(5-year storm)
Tributary Basins: C1.5 **Inlet/MH Number:** Inlet DP6
Upstream flowby: **Total Street Flow:** 3.0cfs

Flow Intercepted: 3.0cfs **Flow Bypassed:** 0cfs in curb downstream
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 2.0%, capacity = 18cfs, okay

(100-year storm)
Tributary Basins: C1.5 **Inlet/MH Number:** Inlet DP6
Upstream flowby: **Total Street Flow:** 6.6cfs

Flow Intercepted: 5.7cfs **Flow Bypassed:** 0.9cfs in curb downstream
Inlet Size: 10' type R, on-grade

Street Capacity: 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) = 29.2cfs 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

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Author: CDurham Subject: Text Box Date: 5/4/2022 11:20:02 AM
Flows do not match the hydrology spreadsheet or pipe flows in storm sewer summary.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:25:07 PM
spreadsheet design pts. removed

Author: CDurham Subject: Text Box Date: 5/4/2022 11:19:57 AM
There is no DP 7 shown in the hydrology spreadsheet.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:25:15 PM
spreadsheet design pts. removed

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

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Author: CDurham Subject: Text Box Date: 5/4/2022 11:30:16 AM
Design point not in table

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:25:18 PM
spreadsheet design pts. removed

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 **Inlet/MH Number:** Inlet DP25
Upstream flowby: **Total Street Flow:** 10.0cfs

Flow Intercepted: 7.2cfs **Flow Bypassed:** 2.9cfs in curb downstream
Inlet Size: 10' type R, on-grade

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

(100-year storm)
Tributary Basins: C3.8 **Inlet/MH Number:** Inlet DP25
Upstream flowby: 4.4cfs from Des. Pt 21 **Total Street Flow:** 26.4cfs

Flow Intercepted: 11.3cfs **Flow Bypassed:** 15.1cfs in curb downstream
Inlet Size: 10' type R, on-grade

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 **Inlet/MH Number:** Inlet DP27
Upstream flowby: 0.3cfs from Des.Pt. 23 **Total Street Flow:** 8.4cfs

Flow Intercepted: 8.4cfs **Flow Bypassed:** 0cfs in curb downstream
Inlet Size: 20' type R, on-grade

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

(100-year storm)
Tributary Basins: C3.9 **Inlet/MH Number:** Inlet DP27
Upstream flowby: 10.4cfs from Des. Pt 23 **Total Street Flow:** 28.3cfs

Flow Intercepted: 20.7cfs **Flow Bypassed:** 7.6cfs in curb downstream
Inlet Size: 20' type R, on-grade

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.

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=Q2/.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

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Author: CDurham Subject: Text Box Date: 5/4/2022 11:57:43 AM
Design Point not shown in hydrology spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:25:23 PM
spreadsheet design pts. removed

Author: CDurham Subject: Text Box Date: 5/4/2022 12:07:59 PM
Include Grass buffer worksheet in appendix

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:29:30 PM

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:34:29 PM
including grass buffer table will be confusing since we are not constructing a grass buffer. We are only using that formula to design the spreader channel length to reduce flows to non-erosive velocities.

Author: CDurham Subject: Text Box Date: 5/4/2022 12:08:55 PM
DP 35e & 35f missing from spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:34:34 PM
spreadsheet design pts. removed

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

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Author: CDurham Subject: Text Box Date: 5/4/2022 12:33:10 PM
Design point not in spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:34:37 PM
spreadsheet design pts. removed

Author: CDurham Subject: Text Box Date: 5/4/2022 12:33:19 PM
Design point not in spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:34:41 PM
spreadsheet design pts. removed

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.

(5-year storm)
Tributary Basins: C8.3a **Inlet/MH Number:** Inlet DP53
Upstream flowby: **Total Street Flow:** 10.6cfs

Flow Intercepted: 9.7cfs **Flow Bypassed:** 0.9cfs
Inlet Size: 15' type R, on-grade

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

(100-year storm)
Tributary Basins: C8.3a **Inlet/MH Number:** Inlet DP53
Upstream flowby: **Total Street Flow:** 26.5cfs

Flow Intercepted: 16.2cfs **Flow Bypassed:** 10.3cfs
Inlet Size: 15' type R, on-grade

Street Capacity: 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

(5-year storm)
Tributary Basins: C8.3b & C8.3c **Inlet/MH Number:** Inlet DP54
Upstream flowby: 0.9cfs from Des.Pt.53 **Total Street Flow:** 11.8cfs

Flow Intercepted: 11.7cfs **Flow Bypassed:** 0.1cfs
Inlet Size: 20' type R, on-grade

Street Capacity: Street slope = 1.5%, capacity = 11.8cfs, okay

(100-year storm)
Tributary Basins: C8.3b & C8.3c **Inlet/MH Number:** Inlet DP54
Upstream flowby: 10.3cfs from Des.Pt.53 **Total Street Flow:** 37.6cfs

Flow Intercepted: 24.0cfs **Flow Bypassed:** 13.6cfs
Inlet Size: 20' type R, on-grade

Street Capacity: 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.

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Author: CDurham Subject: Text Box Date: 5/4/2022 12:38:50 PM
Design point not in spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:34:44 PM
spreadsheet design pts. removed

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 **Inlet/MH Number:** Inlet DP56
Upstream flowby: 0.1cfs from Des.Pt.54 **Total Street Flow:** 9.0cfs

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

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

(100-year storm)
Tributary Basins: C8.3d **Inlet/MH Number:** Inlet DP56
Upstream flowby: 13.6cfs from Des.Pt.54 **Total Street Flow:** 32.8cfs

Flow Intercepted: 23.7cfs **Flow Bypassed:** 9.1cfs
Inlet Size: 20' type R, on-grade

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

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

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

(100-year storm)
Tributary Basins: C8.4 **Inlet/MH Number:** Inlet DP57
Upstream flowby: **Total Street Flow:** 24.1cfs

Flow Intercepted: 19.0cfs **Flow Bypassed:** 5.1cfs to DP49
Inlet Size: 20' type R, on-grade

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

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Author: CDurham Subject: Text Box Date: 5/4/2022 12:46:28 PM
Design point not in spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:34:48 PM
spreadsheet design pts. removed

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

(5-year storm)
Tributary Basins: C8.5 **Inlet/MH Number:** Inlet DP59
Upstream flowby: **Total Street Flow:** 7.0cfs

Flow Intercepted: 5.9cfs **Flow Bypassed:** 1.1cfs
Inlet Size: 10' type R, on-grade

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

(100-year storm)
Tributary Basins: C8.5 **Inlet/MH Number:** Inlet DP59
Upstream flowby: **Total Street Flow:** 15.5cfs

Flow Intercepted: 8.9cfs **Flow Bypassed:** 6.6cfs
Inlet Size: 10' type R, on-grade

Street Capacity: 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

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Author: CDurham Subject: Text Box Date: 5/4/2022 1:01:22 PM
Flow does not match hydrology spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:34:55 PM
spreadsheet design pts. removed

Author: CDurham Subject: Text Box Date: 5/4/2022 1:01:26 PM
Design point not in spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:34:59 PM
spreadsheet design pts. removed

Page: 36

Author: CDurham Subject: Text Box Date: 5/4/2022 1:12:18 PM
Design point not in spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:35:02 PM
spreadsheet design pts. removed

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 **Inlet/MH Number:** Inlet DP62
Upstream flowby: 1.1 cfs from Des.Pt.59 **Total Street Flow:** 14.3cfs

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

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

(100-year storm)
Tributary Basins: C8.6 & C8.7e **Inlet/MH Number:** Inlet DP62
Upstream flowby: 6.6cfs from Des.Pt.59
2.7cfs from Des.Pt.66 **Total Street Flow:** 37.4cfs

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

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

Flow Intercepted: 10.2cfs **Flow Bypassed:** 1.3cfs
Inlet Size: 15' type R, on-grade

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

(100-year storm)
Tributary Basins: C8.7a&b **Inlet/MH Number:** Inlet DP63
Upstream flowby: **Total Street Flow:** 25.6cfs

Flow Intercepted: 15.9cfs **Flow Bypassed:** 9.7cfs
Inlet Size: 15' type R, on-grade

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 understan Add back in the riprap pads at end of swale to disperse flows and include sizing of riprap maintenance of any erosion issues should they occur on the offs manner of which drainage enters the offsite property has changed.

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

(5-year storm)
Tributary Basins: C8.7c **Inlet/MH Number:** Inlet DP64
Upstream flowby: 1.3cfs from Des.Pt.63 **Total Street Flow:** 10.7cfs

Flow Intercepted: 9.8cfs **Flow Bypassed:** 0.9cfs
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 4.0%, capacity = 17.9cfs, okay

(100-year storm)
Tributary Basins: C8.7c **Inlet/MH Number:** Inlet DP64
Upstream flowby: 9.7cfs from Des.Pt.63 **Total Street Flow:** 30.6cfs

Flow Intercepted: 17.5cfs **Flow Bypassed:** 13.1cfs
Inlet Size: 15' type R, on-grade

Street Capacity: 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

Page: 37

Author: CDurham Subject: Text Box Date: 5/4/2022 1:12:32 PM
Design point not shown in spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:35:07 PM
spreadsheet design pts. removed

Author: CDurham Subject: Text Box Date: 5/4/2022 1:16:53 PM
Add back in the riprap pads at end of swale to disperse flows and include sizing of riprap

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:35:54 PM
lorson owns the land to the north and if there is erosion we have an agreement to maintain the offsite property should erosion occur

Author: CDurham Subject: Text Box Date: 5/4/2022 1:42:29 PM
Design point not shown in spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:36:00 PM
spreadsheet design pts. removed

Author: CDurham Subject: Text Box Date: 5/4/2022 1:43:11 PM
Design point not shown in spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:36:03 PM
spreadsheet design pts. removed

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

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Author: CDurham Subject: Text Box Date: 5/4/2022 1:43:44 PM
Design point not shown in spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:36:06 PM
spreadsheet design pts. removed

Author: CDurham Subject: Text Box Date: 5/4/2022 1:45:09 PM
Design point not shown in spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:36:09 PM
spreadsheet design pts. removed

Author: CDurham Subject: Text Box Date: 5/4/2022 1:45:45 PM
Flows do not match the hydrology spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:36:13 PM
spreadsheet design pts. removed

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.

6.0 DETENTION AND WATER QUALITY PONDS

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

Page: 39

Author: CDurham Subject: Text Box Date: 5/4/2022 1:48:12 PM
Flows do not match the hydrology spreadsheet

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:36:17 PM
spreadsheet design pts. removed

- 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 5770.60, 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. [internal note: RPA areas shown on pg 246]

Water Quality for Basin F1.1 (4.23ac)

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.

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

Water Quality Pond F (4.9ac)

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

Page: 41

Author: Glenn Reese - EPC Stormwater Subject: SW - Textbox with Arrow Date: 4/20/2022 10:19:24 AM
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]

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:37:56 PM
lorson ranch metro owns the tract which is an open space tract.

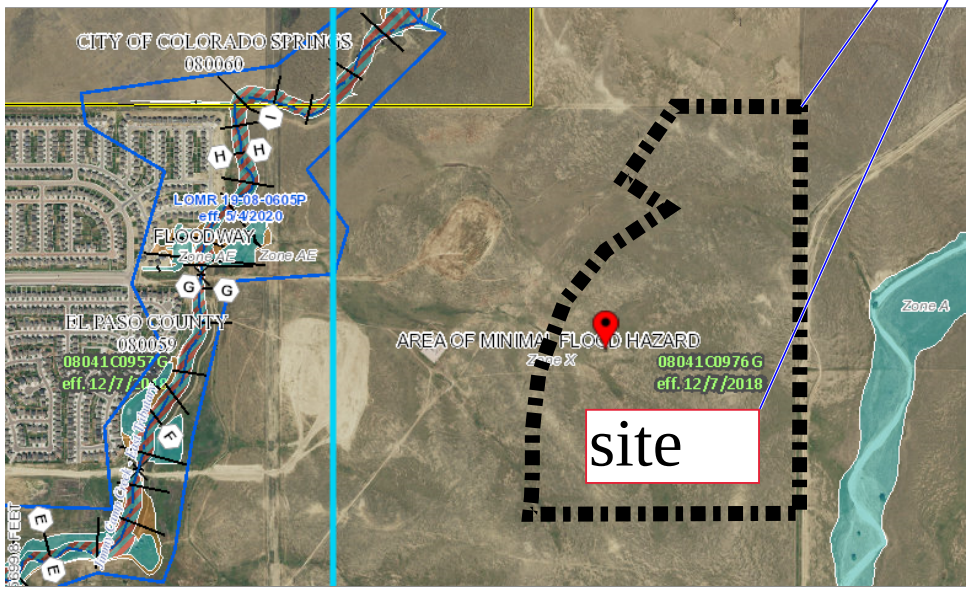
Author: Glenn Reese - EPC Stormwater Subject: SW - Textbox with Arrow Date: 4/20/2022 10:19:24 AM
State that this pond will be built within the limits of Filing 1.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:38:10 PM
this pond is actually in an easement.

Author: RSchindler Subject: Polygonal Line Date: 3/18/2021 3:42:47 PM

Author: RSchindler Subject: Text Box Date: 3/18/2021 3:42:51 PM

site



CORE ENGINEERING GROUP

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: Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	Total Runoff: t_c	∑ (CA)	i	Q	Street: Slope	Street Flow	Pipe: Design Flow	Slope	Pipe Size	Travel Time: Length	Velocity	t_t	Remarks
		ac.			min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
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	**6a**	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	**18**	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	**28**	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	**30**	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	**31**	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.

Author: CDurham Subject: Text Box Date: 5/4/2022 4:45:33 PM
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.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:38:21 PM
spreadsheet design pts. removed

CORE ENGINEERING GROUP

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	Σ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
		ac.			min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
C4.4			3.29	0.46																	
C4.1-C4.4		14.05										18.6									
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	**38**	10.10							10.8	4.55	4.02	18.3									
C5.1a-C5.1c	I-39 & **40**	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	**42**	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 & **46**	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.

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Author: CDurham Subject: Callout Date: 5/4/2022 10:14:18 AM
Basin is not in text or shown on drainage map. Either include in these areas or remove from hydrology spreadsheets.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:38:29 PM
basin removed

CORE ENGINEERING GROUP

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: Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	Total Runoff: t_c	∑ (CA)	i	Q	Street: Slope	Street Flow	Pipe: Design Flow	Slope	Pipe Size	Travel Time: Length	Velocity	t_t	Remarks
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
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	**61**	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	**I-68**	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	**I-69**	5.65							23.4	2.77	2.85	7.9									
C8.6+C8.7's + C8.8a	**I-70**	24.03							23.4	11.97	2.85	34.2									
C8.8			7.80	0.22	15.3	1.72	3.46	5.9													
C8			73.39	0.43	27.5	31.46	2.61	82.2													

Missing basins H1 & G1

Author: CDurham Subject: Text Box Date: 5/4/2022 4:32:31 PM
Missing basins H1 & G1

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:38:40 PM
these are in existing conditions.

Channel Report

Hydraflow Express by Intelisolve — Wednesday, Mar 9 2022, 9:37 AM

Author: CDurham Subject: Callout Date: 5/4/2022 4:33:50 PM
Velocity is high. Add lining/reinforcement to swale.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:39:51 PM
this is more of a depressed area within a tract owned by the district. District will put ECB on this area and vegetate and maintain tract.

DES. PT. 44 OVERFLOW SWALE

Trapezoidal

Botom 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

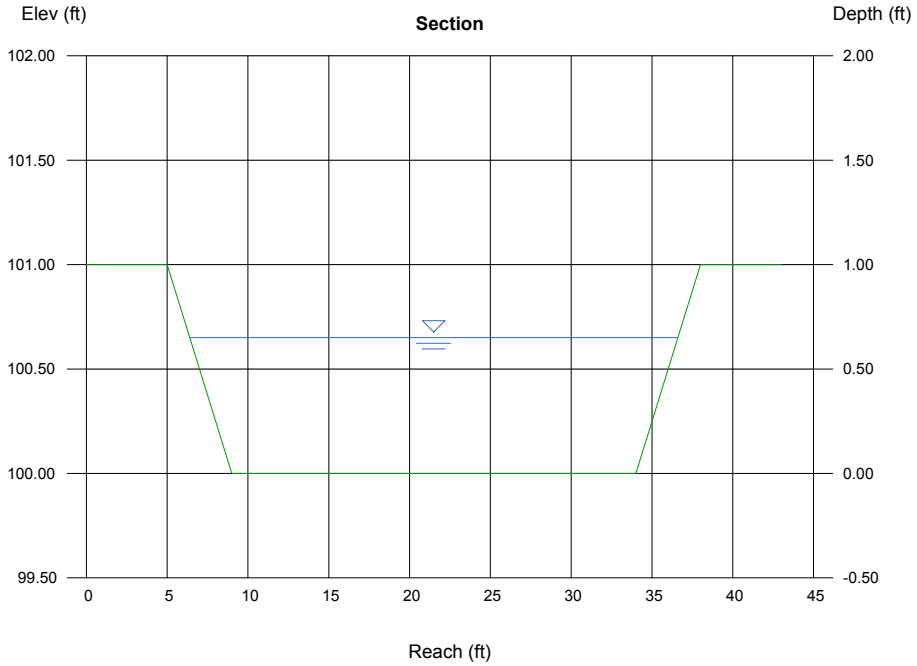
Calculations

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, Yc (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

Botom 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

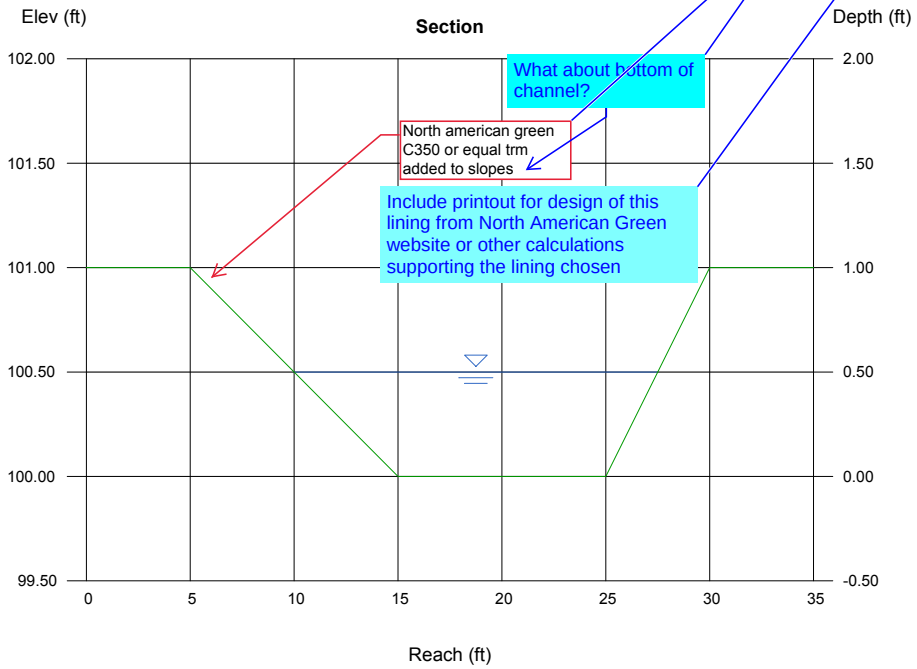
Calculations

Compute by:	Q vs Depth
No. Increments	= 10

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

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



Page: 80

Author: CDurham Subject: Callout Date: 5/4/2022 4:38:40 PM
Per section below, one side is 5:1, not 10:1. Please revise design section.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:47:13 PM
NOTES ADDED TO SECTION

Author: CDurham Subject: Callout Date: 5/4/2022 4:39:14 PM
What about bottom of channel?

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:47:50 PM
BOTTOM INCLUDED

Author: RSchindler Subject: Callout Date: 3/10/2022 8:58:37 AM -06'00'
North american green C350 or equal trm added to slopes

Author: CDurham Subject: Text Box Date: 5/4/2022 4:36:55 PM
Include printout for design of this lining from North American Green website or other calculations supporting the lining chosen

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:48:40 PM
INCLUDED

Channel Report

Hydraflow Express by Intelisolve — Wednesday, Sep 29 2021, 9:34 AM

Author: CDurham Subject: Callout Date: 5/4/2022 4:39:28 PM
What about bottom of channel?

Author: RSchindler Subject: Callout Date: 5/31/2022 2:49:12 PM
North American Green C350 or equal trm added to slopes AND BOTTOM

Author: CDurham Subject: Text Box Date: 5/4/2022 4:37:08 PM
Include printout for design of this lining from North American Green website or other calculations supporting the lining chosen

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:49:26 PM
ADDED

EAST SWALE BY CUT/FILL (5.0%)

Triangular

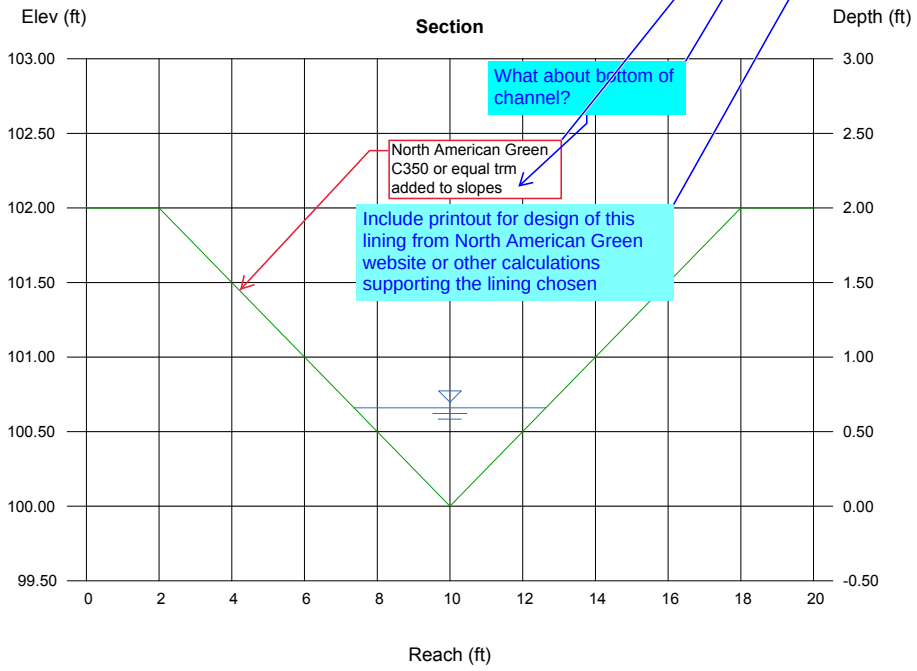
Side Slope (z:1)	= 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 5.00
N-Value	= 0.020

Calculations

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

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



Channel Report

Hydraflow Express by Intelisolve — Friday, Nov 5 2021, 10:47 AM

Author: CDurham Subject: Text Box Date: 5/4/2022 4:41:23 PM
Include calculation to size riprap for spreader.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:52:59 PM
WE ADDED SMALL COBBLE AS AN ADDITIONAL PROTECTION AGAINST EROSION.

Pond F spreader - 8-in curbhead

Rectangular

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

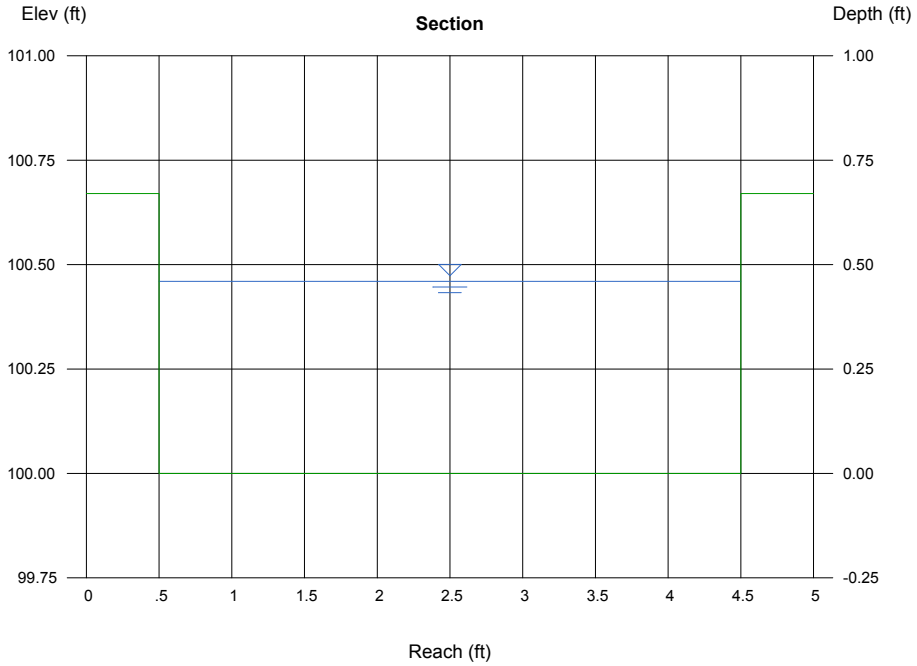
Calculations

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, Yc (ft)	= 0.52
Top Width (ft)	= 4.00
EGL (ft)	= 0.78

Include calculation to size riprap for spreader.



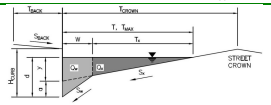
Version 4.05 Released March 2017

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



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	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T** =	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Capacity for 1/2 Street based on Allowable Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	17.0	26.7	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X,TH}$ =	15.0	24.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.349	0.219	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X,TH}$	$Q_{X,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_o - Q_x)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d** =	**SUMP**	**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

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

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

Author: CDurham Subject: Text Box Date: 5/4/2022 5:16:47 PM

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

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:55:52 PM

ADDED TO THE END OF THIS APPENDIX SECTION

Author: CDurham Subject: Callout Date: 5/4/2022 4:44:39 PM

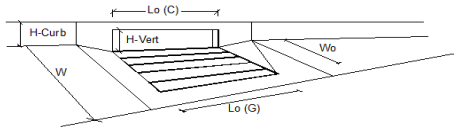
Report has flow at this design point as Q100 = 19.7 at DP-4

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:56:04 PM

REPORT UPDATED

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity		MINOR	MAJOR	
Design Discharge for Half of Street (from Sheet *Inlet Management*)	Q_o =	**8.9**	**21.6**	cfs
Water Spread Width	T =	13.3	19.0	ft
Water Depth at Flowline (outside of local depression)	d =	4.7	6.1	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.448	0.312	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	4.9	14.9	cfs
Discharge within the Gutter Section W	Q_w =	4.0	6.7	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.62	0.85	sq ft
Velocity within the Gutter Section W	V_W =	6.5	8.0	fps
Water Depth for Design Condition	d_{LOCAL} =	7.7	9.1	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	Q_a =	**N/A**	**N/A**	cfs
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	Q_b =	**N/A**	**N/A**	cfs
Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e (based on grate carry-over)	S_e =	0.104	0.079	ft/ft
Required Length L_T to Have 100% Interception	L_T =	17.27	30.89	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	17.27	20.00	ft
Interception Capacity	Q_i =	8.9	18.3	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoef =	1.33	1.33	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.03	0.03	
Effective (Unclogged) Length	L_e =	17.34	17.34	ft
Actual Interception Capacity	Q_a =	**8.9**	**18.0**	cfs
Carry-Over Flow = $Q_{o(GRATE)}$-Q_a	Q_b =	**0.0**	**3.6**	cfs
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	Q =	**8.9**	**18.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q_b =	**0.0**	**3.6**	**cfs**
Capture Percentage = Q_a/Q_o =	C% =	**100**	**83**	**%**

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

Author: CDurham Subject: Callout Date: 5/4/2022 4:49:43 PM

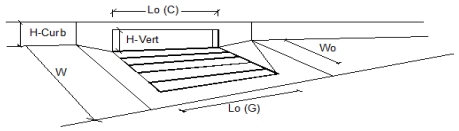
Hydrology spreadsheet has flows of 9.9 & 21.8 at DP-12

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:57:21 PM

SPREADSHEET DESIGN PTS REMOVED

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017

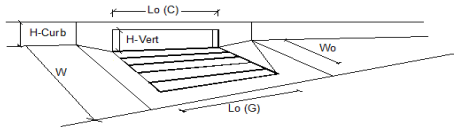


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.0**	**5.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.9**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**86**	**%**

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

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**9.3**	**14.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.6**	**7.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**94**	**68**	**%**

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

Page: 93

Author: CDurham Subject: Callout Date: 5/4/2022 4:49:16 PM

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

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:58:22 PM

CATCH/RUNBY ADDS UP THE 9.9 AND 21.8

Author: CDurham Subject: Callout Date: 5/4/2022 4:50:58 PM

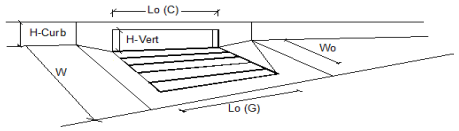
Hydrology spreadsheet has flows of 7.9 & 17.3 at DP-13

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:58:49 PM

SPREADSHEET DESIGN PTS REMOVED

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017

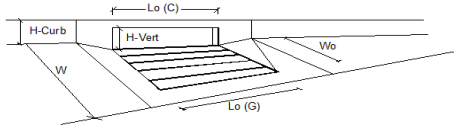


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**8.3**	**15.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.2**	**8.7**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**97**	**64**	**%**

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

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**8.4**	**16.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.3**	**10.8**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**97**	**60**	**%**

Hydrology spreadsheet has Q100 = 18.6 at DP-15

Author: CDurham Subject: Callout Date: 5/4/2022 4:51:19 PM

Hydrology spreadsheet has Q100 = 18.6 at DP-15

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:58:57 PM

SPREADSHEET DESIGN PTS REMOVED

Author: CDurham Subject: Callout Date: 5/4/2022 4:51:49 PM

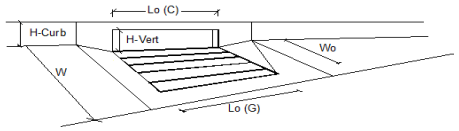
Hydrology spreadsheet has Q100=22.6 at DP-19

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:59:01 PM

SPREADSHEET DESIGN PTS REMOVED

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017

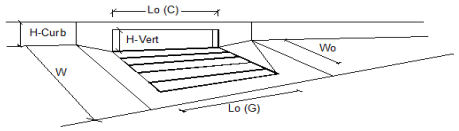


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**10.3**	**21.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**7.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**74**	**%**

Hydrology spreadsheet has Q100=22.6 at DP-19

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.6**	**10.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**87**	**%**

Hydrology spreadsheet has Q100=12.3 at DP-20a

Author: CDurham Subject: Callout Date: 5/4/2022 4:52:23 PM

Hydrology spreadsheet has Q100=12.3 at DP-20a

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:59:04 PM

SPREADSHEET DESIGN PTS REMOVED

Author: CDurham Subject: Callout Date: 5/4/2022 4:52:56 PM

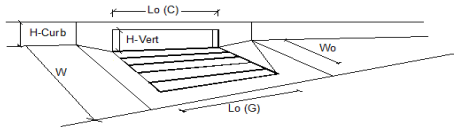
Hydrology spreadsheet has Q100=15.9 at DP-21

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:59:07 PM

SPREADSHEET DESIGN PTS REMOVED

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**7.2**	**13.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**4.4**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**75**	**%**

Hydrology spreadsheet has Q100=15.9 at DP-21

Author: CDurham Subject: Callout Date: 5/4/2022 4:53:20 PM

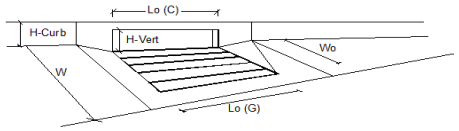
Hydrology spreadsheet has Q100=19.1 at DP-23

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:59:10 PM

SPREADSHEET DESIGN PTS REMOVED

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**8.4**	**16.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.3**	**10.4**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**97**	**61**	**%**

Hydrology spreadsheet has Q100=19.1 at DP-23

Author: CDurham Subject: Callout Date: 5/4/2022 4:58:10 PM

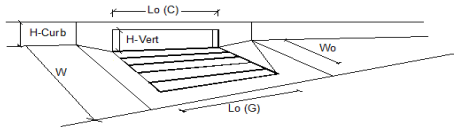
Hydrology spreadsheet has flows of 10.0 & 22.0 at DP-25

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:59:13 PM

SPREADSHEET DESIGN PTS REMOVED

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**7.2**	**11.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**2.9**	**15.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**71**	**43**	**%**

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

Author: CDurham Subject: Callout Date: 5/4/2022 4:59:17 PM

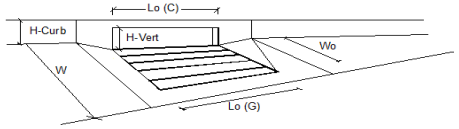
Hydrology spreadsheet has Q100=23.2 at DP-31

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:59:17 PM

SPREADSHEET DESIGN PTS REMOVED

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017

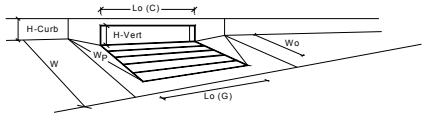


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity		MINOR	MAJOR	
Design Discharge for Half of Street (from Sheet *Inlet Management*)	Q_o =	**10.5**	**23.2**	cfs
Water Spread Width	T =	12.4	17.2	ft
Water Depth at Flowline (outside of local depression)	d =	4.5	5.6	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.477	0.346	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	5.5	15.2	cfs
Discharge within the Gutter Section W	Q_w =	5.0	8.0	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.58	0.77	sq ft
Velocity within the Gutter Section W	V_W =	8.6	10.4	fps
Water Depth for Design Condition	d_{LOCAL} =	7.5	8.6	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	Q_a =	**N/A**	**N/A**	cfs
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	Q_b =	**N/A**	**N/A**	cfs
Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e (based on grate carry-over)	S_e =	0.110	0.085	ft/ft
Required Length L_T to Have 100% Interception	L_T =	19.05	32.09	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	15.00	15.00	ft
Interception Capacity	Q_i =	9.9	15.7	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoef =	1.31	1.31	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	
Effective (Unclogged) Length	L_e =	13.03	13.03	ft
Actual Interception Capacity	Q_a =	**9.7**	**15.3**	cfs
Carry-Over Flow = $Q_{o(GRATE)}$-Q_a	Q_b =	**0.8**	**7.9**	cfs
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	Q =	**9.7**	**15.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q_b =	**0.8**	**7.9**	**cfs**
Capture Percentage = Q_a/Q_o =	C% =	**92**	**66**	**%**

Hydrology spreadsheet has Q100=23.2 at DP-31

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.6	8.4	inches
Grate Information			MINOR	MAJOR	Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	20.00	20.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.53	0.79	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.76	0.91	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**10.3**	**29.2**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	8.6	27.5	cfs

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

Author: CDurham Subject: Text Box Date: 5/4/2022 4:59:41 PM

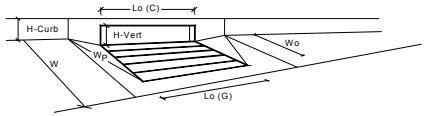
Please include DP-32 on hydrology spreadsheet to verify inlet flows

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:59:22 PM

SPREADSHEET DESIGN PTS REMOVED

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	4.6	7.7	inches
Grate Information			MINOR	MAJOR	Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	25.00	25.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.22	0.47	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.43	0.72	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.69	0.88	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**7.0**	**28.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	7.0	28.7	cfs

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

Author: CDurham Subject: Text Box Date: 5/4/2022 5:00:08 PM

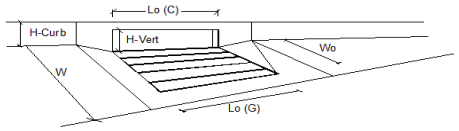
Please include DP-33 on hydrology spreadsheet to verify inlet flows

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:59:25 PM

SPREADSHEET DESIGN PTS REMOVED

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.9**	**11.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.9**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**86**	**%**

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

Author: CDurham Subject: Text Box Date: 5/4/2022 5:00:31 PM

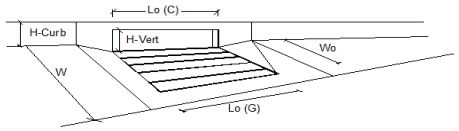
Include DP-35a on hydrology spreadsheet to verify inlet flows

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:59:28 PM

SPREADSHEET DESIGN PTS REMOVED

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.9**	**4.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.2**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**96**	**%**

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

Author: CDurham Subject: Text Box Date: 5/4/2022 5:00:56 PM

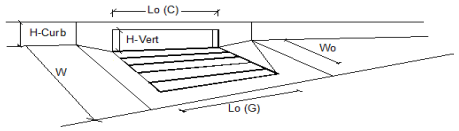
Include DP-35b on hydrology spreadsheet to verify inlet flows

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:59:35 PM

SPREADSHEET DESIGN PTS REMOVED

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.1**	**5.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**7.3**	**19.5**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**36**	**22**	**%**

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

Author: CDurham Subject: Callout Date: 5/4/2022 5:01:28 PM

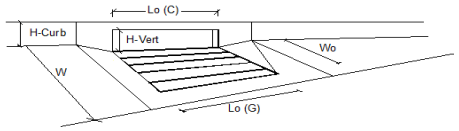
Hydrology spreadsheet has flows of 11.4 & 25.2 at DP-36

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:59:38 PM

SPREADSHEET DESIGN PTS REMOVED

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.4**	**4.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**4.0**	**11.5**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**46**	**29**	**%**

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

Author: CDurham Subject: Callout Date: 5/4/2022 5:01:57 PM

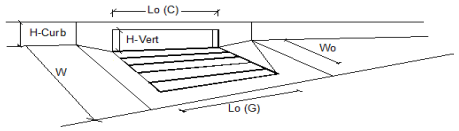
Hydrology spreadsheet has flows of 7.4 & 16.3 at DP-37

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:59:41 PM

SPREADSHEET DESIGN PTS REMOVED

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1		
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	25.00	25.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**12.7**	**27.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**7.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**79**	**%**

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

Author: CDurham Subject: Text Box Date: 5/4/2022 5:03:12 PM

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

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:59:53 PM

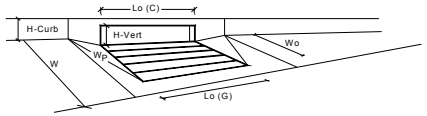
SPREADSHEET DESIGN PTS REMOVED

Author: RSchindler Subject: Text Box Date: 11/5/2021 11:55:56 AM

inlet overtops and flows to Inlet DP-43

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.6	7.9	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	20.00	20.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.30	0.49	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.53	0.74	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.76	0.89	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**10.3**	**25.1**	**cfs**
WARNING: Inlet Capacity less than Q Peak for Major Storm		$Q_{PEAK\ REQUIRED}$ =	9.3	27.7	cfs

inlet overtops and flows to Inlet DP-43

Author: CDurham Subject: Callout Date: 5/4/2022 5:06:21 PM

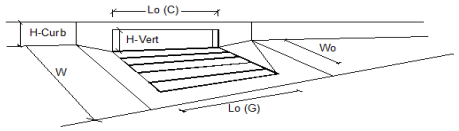
Hydrology spreadsheet has flows of 7.6 at DP-37

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 2:59:59 PM

SPREADSHEET DESIGN PTS REMOVED

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017

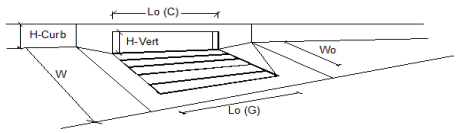


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.4**	**6.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.4**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**81**	**%**

Hydrology spreadsheet has flows of 7.6 at DP-37

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**7.7**	**20.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**6.9**	**cfs**
Capture Percentage = Q_a/Q_o =	**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.

Author: CDurham Subject: Text Box Date: 5/4/2022 5:07:36 PM

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

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:00:05 PM

SPREADSHEET DESIGN PTS REMOVED

Author: CDurham Subject: Callout Date: 5/4/2022 5:08:23 PM

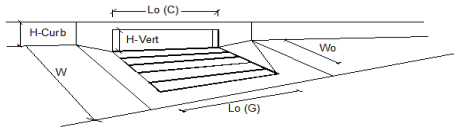
Hydrology spreadsheet has Q100=26.5 at DP-53

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:00:08 PM

SPREADSHEET DESIGN PTS REMOVED

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017

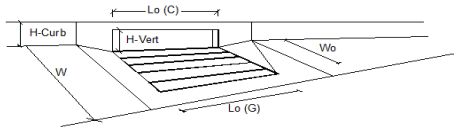


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**9.7**	**16.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.9**	**10.3**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**91**	**61**	**%**

Hydrology spreadsheet has Q100=26.5 at DP-53

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**11.7**	**24.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.1**	**13.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**99**	**64**	**%**

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

Author: CDurham Subject: Text Box Date: 5/4/2022 5:09:30 PM

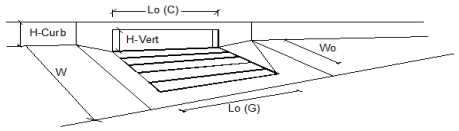
DP 54 was removed from hydrology spreadsheet. Please add back in for verification of flows at inlet.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:00:14 PM

SPREADSHEET DESIGN PTS REMOVED

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: WARNING: Q > ALLOWABLE Q FOR MINOR STORM		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**11.0**	**19.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**5.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**79**	**%**

Author: CDurham Subject: Callout Date: 5/4/2022 5:10:30 PM

Hydrology spreadsheet has Q100=24.1 at DP-57

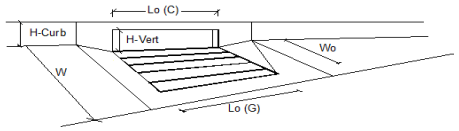
Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:00:17 PM

SPREADSHEET DESIGN PTS REMOVED

Hydrology spreadsheet has Q100=24.1 at DP-57

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.9**	**8.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**1.1**	**6.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**84**	**58**	**%**

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

Author: CDurham Subject: Text Box Date: 5/4/2022 5:11:45 PM

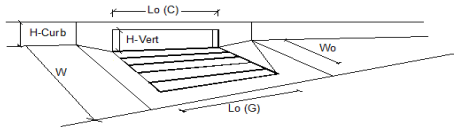
No DP 59 in hydrology spreadsheet to verify flows against. Please provide

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:00:20 PM

SPREADSHEET DESIGN PTS REMOVED

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**10.2**	**15.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**1.3**	**9.7**	**cfs**
Capture Percentage = Q_a/Q_o =	**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.

Page: 155

Author: CDurham Subject: Text Box Date: 5/4/2022 5:13:41 PM

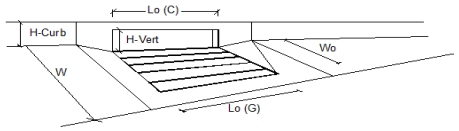
Previously there were 2 DP-63's show. Now there are none. Please provide a DP-63 in the hydrology spreadsheet for verification of flows at inlet.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:00:24 PM

SPREADSHEET DESIGN PTS REMOVED

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: WARNING: Q > ALLOWABLE Q FOR MAJOR STORM		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**9.8**	**17.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.9**	**13.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**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.

Author: CDurham Subject: Text Box Date: 5/4/2022 5:14:25 PM

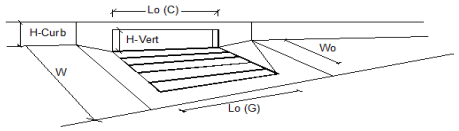
Previously there were 2 DP-64's show. Now there are none. Please provide a DP-64 in the hydrology spreadsheet for verification of flows at inlet.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:00:28 PM

SPREADSHEET DESIGN PTS REMOVED

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_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.5**	**11.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**2.7**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**81**	**%**

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

Author: CDurham Subject: Text Box Date: 5/4/2022 5:15:19 PM

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

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:00:35 PM

SPREADSHEET DESIGN PTS REMOVED

Page: 162

Author: CDurham Subject: Text Box Date: 5/4/2022 5:17:29 PM
Please include spreadsheet/table listing contributing basins and % impervious to each pond.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:17:22 PM
ADDED

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

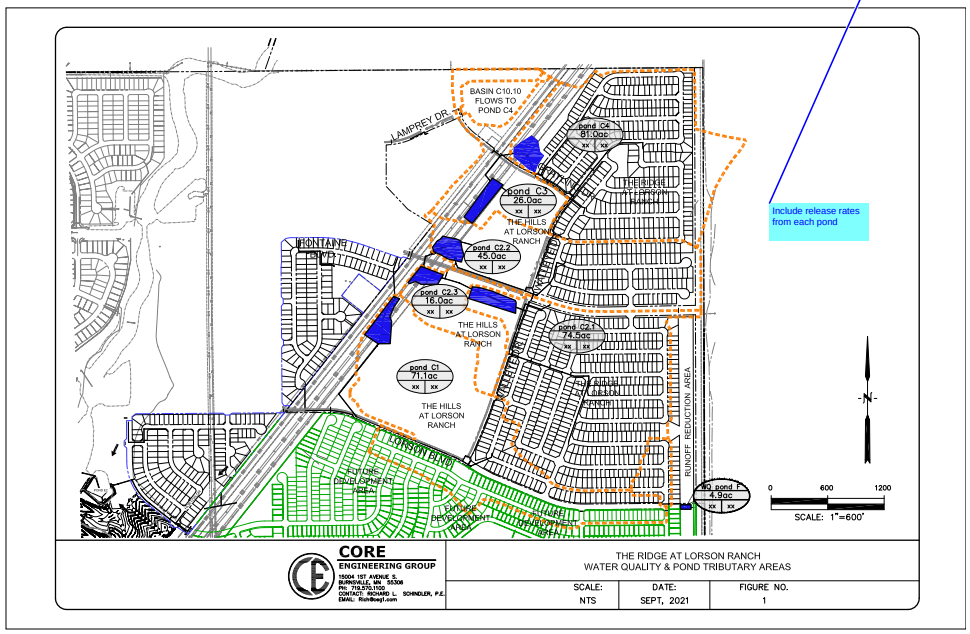
Page: 163

Author: CDurham Subject: Text Box Date: 5/4/2022 5:17:53 PM

Include release rates from each pond

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:17:28 PM

ADDED



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_6 = 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 (ft²)	--												
UIA (ft²)	4,500												
RPA (ft²)	7,250												
SPA (ft²)	--												
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 (ft²)	11,750												
L / W Ratio	0.56												
UIA / Area	0.3830												
Runoff (in)	0.00												
Runoff (ft³)	0												
Runoff Reduction (ft³)	188												

CALCULATED WQCV RESULTS

Area ID	res. Lot												
WQCV (ft³)	188												
WQCV Reduction (ft³)	188												
WQCV Reduction (%)	100%												
Untreated WQCV (ft³)	0												

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

Downstream Design Point ID	1												
DCIA (ft²)	0												
UIA (ft²)	4,500												
RPA (ft²)	7,250												
SPA (ft²)	0												
Total Area (ft²)	11,750												
Total Impervious Area (ft²)	4,500												
WQCV (ft³)	188												
WQCV Reduction (ft³)	188												
WQCV Reduction (%)	100%												
Untreated WQCV (ft³)	0												

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

Total Area (ft²)	11,750
Total Impervious Area (ft²)	4,500
WQCV (ft³)	188
WQCV Reduction (ft³)	188
WQCV Reduction (%)	100%
Untreated WQCV (ft³)	0

Page: 164

Author: CDurham Subject: Text Box Date: 5/4/2022 5:18:21 PM

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

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:17:37 PM

NOTED

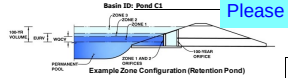
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: The Hills at Lorson Ranch

Basin ID: Pond C1

Please label as existing



Example Zone Configuration (Retention Pond)

pond bottom=5743.40

Depth Increment = 0.20 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acres)	Volume (ft^3)	Volume ($ac\text{-}ft$)
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

Watershed Information

Selected BMP Type =	EDB	
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.

		Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.306	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	4.212	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	3.975	acre-feet	1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	5.580	acre-feet	1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	6.975	acre-feet	1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	8.792	acre-feet	2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	10.293	acre-feet	2.25 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	12.175	acre-feet	2.52 inches
500-yr Runoff Volume (P1 = 3.14 in.) =	16.033	acre-feet	inches
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	

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^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio (R_{LW}) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	user	acre-feet

Author: CDurham Subject: Text Box Date: 5/4/2022 5:18:42 PM

Please label as existing

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:24:41 PM

ADDED

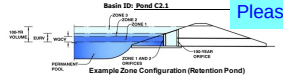
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

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

Depth Increment = 0.20 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acres)	Volume (ft^3)	Volume ($ac\text{-}ft$)
Top of Micropool	**	0.00	**	**	**	42	0.001		
5760.33	**	0.33	**	**	**	50	0.001	15	0.000
5761	**	1.00	**	**	**	1,264	0.029	455	0.010
5762	**	2.00	**	**	**	20,478	0.470	11,326	0.260
5763	**	3.00	**	**	**	41,417	0.951	42,274	0.970
5764	**	4.00	**	**	**	44,796	1.028	85,380	1.960
5765	**	5.00	**	**	**	48,239	1.107	131,898	3.028
5766	**	6.00	**	**	**	51,758	1.188	181,896	4.176
5767	**	7.00	**	**	**	55,348	1.271	235,449	5.405
5768	**	8.00	**	**	**	59,010	1.355	292,628	6.718
5769	**	9.00	**	**	**	62,743	1.440	353,505	8.115
5770	**	10.00	**	**	**	66,548	1.528	418,150	9.599
5771	**	11.00	**	**	**	70,423	1.617	486,636	11.172
5772	**	12.00	**	**	**	74,434	1.709	559,064	12.834

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.

		Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.368	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	4.414	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	4.152	acre-feet	1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	5.828	acre-feet	1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	7.285	acre-feet	1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	9.182	acre-feet	2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	10.750	acre-feet	2.25 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	12.716	acre-feet	2.52 inches
500-yr Runoff Volume (P1 = 3.14 in.) =	16.746	acre-feet	inches
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	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.368	acre-feet
Zone 2 Volume (EURV - Zone 1) =	3.045	acre-feet
Zone 3 (100yr + 1/2 WQCV - Zones 1 & 2) =	3.745	acre-feet
Total Detention Basin Volume =	8.159	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio (R_{LW}) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	user	acre-feet

Author: CDurham Subject: Text Box Date: 5/4/2022 5:21:48 PM

Please label as existing

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:24:50 PM

ADDED

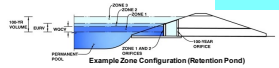
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: The Hills at Lorson Ranch

Basin ID: Pond C2.2

Please label as existing



Example Zone Configuration (Retention Pond)

micropool = 0 = 5744.00

Depth Increment = 0.20 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acres)	Volume (ft^3)	Volume ($ac\text{-}ft$)
Top of Micropool	**	0.00	**	**	**	40	0.001		
5744.33	**	0.33	**	**	**	50	0.001	15	0.000
5745	**	1.00	**	**	**	255	0.006	117	0.003
5746	**	2.00	**	**	**	6,998	0.161	3,743	0.086
5747	**	3.00	**	**	**	38,392	0.881	26,438	0.607
5748	**	4.00	**	**	**	40,927	0.940	66,098	1.517
5749	**	5.00	**	**	**	43,534	0.999	108,328	2.487
5750	**	6.00	**	**	**	46,212	1.061	153,201	3.517
5751	**	7.00	**	**	**	48,991	1.125	200,803	4.610
5752	**	8.00	**	**	**	51,837	1.190	251,217	5.767
5753	**	9.00	**	**	**	54,731	1.256	304,501	6.990
5754	**	10.00	**	**	**	58,033	1.332	360,883	8.285

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	45.00	acres
Watershed Length =	2,500	ft
Watershed Length to Centroid =	1,200	ft
Watershed Slope =	0.045	ft/ft
Watershed Imperviousness =	55.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	95.0%	percent
Percentage Hydrologic Soil Groups C/D =	5.0%	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.

		Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.827	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	2.651	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	2.510	acre-feet	1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	3.521	acre-feet	1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	4.403	acre-feet	1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	5.541	acre-feet	2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	6.487	acre-feet	2.25 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	7.671	acre-feet	2.52 inches
500-yr Runoff Volume (P1 = 3.14 in.) =	10.104	acre-feet	inches
Approximate 2-yr Detention Volume =	2.035	acre-feet	
Approximate 5-yr Detention Volume =	2.778	acre-feet	
Approximate 10-yr Detention Volume =	3.600	acre-feet	
Approximate 25-yr Detention Volume =	3.912	acre-feet	
Approximate 50-yr Detention Volume =	4.081	acre-feet	
Approximate 100-yr Detention Volume =	4.507	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.827	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.824	acre-feet
Zone 3 (100yr + 1/2 WQCV - Zones 1 & 2) =	2.269	acre-feet
Total Detention Basin Volume =	4.920	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio (R_{LW}) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	user	acre-feet

Author: CDurham Subject: Text Box Date: 5/4/2022 5:22:22 PM

Please label as existing

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:24:56 PM

ADDED

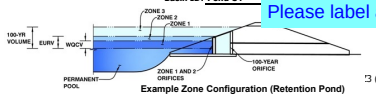
DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.02 (February 2020)

Project: The Hills at Lorson Ranch

Basin ID: Pond C4

Please label as existing



Example Zone Configuration (Retention Pond)

	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
Z3 (100+1/2WQCV)	8.40	4.225	Weir&Pipe (Restrict)
	Total (all zones)	8.692	

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	ft²
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 =	3.250E-02	ft²
Depth at top of Zone using Orifice Plate =	2.97	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	11.90	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	4.68	sq. inches (use rectangular openings)	Elliptical Slot Area =	N/A	ft²

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		Calculated Parameters for Vertical Orifi	
Invert of Vertical Orifice =	2.97	N/A	ft (relative to basin bottom at Stage = 0 ft)	Zone 2 Rectangular	Not Selected
Depth at top of Zone using Vertical Orifice =	5.41	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.68	N/A
Vertical Orifice Height =	6.00	N/A	inches	Vertical Orifice Centroid =	0.25	N/A
Vertical Orifice Width =	16.39		inches			

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

	Zone 3 Weir	Not Selected			Calculated Parameters for Overflow We	
Overflow Weir Front Edge Height, Ho =	5.50	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	Zone 3 Weir	Not Selected
Overflow Weir Front Edge Length =	6.00	N/A	feet	Overflow Weir Slope Length =	5.50	N/A
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	6.00	N/A
Horiz. Length of Weir Sides =	6.00	N/A	feet	Overflow Grate Open Area w/o Debris =	8.02	N/A
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area	Overflow Grate Open Area w/ Debris =	25.20	N/A
Debris Clogging % =	50%	N/A	%		12.60	N/A

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

	Zone 3 Restrictor	Not Selected			Calculated Parameters for Outlet Pipe w/ Flow Restriction Pla	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	Zone 3 Restrictor	Not Selected
Outlet Pipe Diameter =	24.00	N/A	inches	Outlet Orifice Centroid =	3.14	N/A
Restrictor Plate Height Above Pipe Invert =	24.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.00	N/A
					3.14	N/A

User Input: Emergency Spillway (Rectangular or Trapezoidal)

				Calculated Parameters for Spillway	
Spillway Invert Stage=	10.00	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	1.87	feet
Spillway Crest Length =	30.00	feet	Stage at Top of Freeboard =	13.00	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	1.72	acres
Freeboard above Max Water Surface =	1.13	feet	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).*

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
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 Grate 1 (fps) =	N/A	N/A	N/A	0.4	1.1	1.2	1.3	1.4
Max Velocity through Grate 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

Author: CDurham Subject: Text Box Date: 5/4/2022 5:22:55 PM

Please label as existing

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:25:15 PM

ADDED

Channel Report

Hydraflow Express by Intelisolve — Thursday, Mar 10 2022, 12:56 PM

WQ Pond low flow - 2xforebay release (2x0.35=0.7cfs)

Rectangular

Botom Width (ft)	= 3.00
Total Depth (ft)	= 0.50
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.013

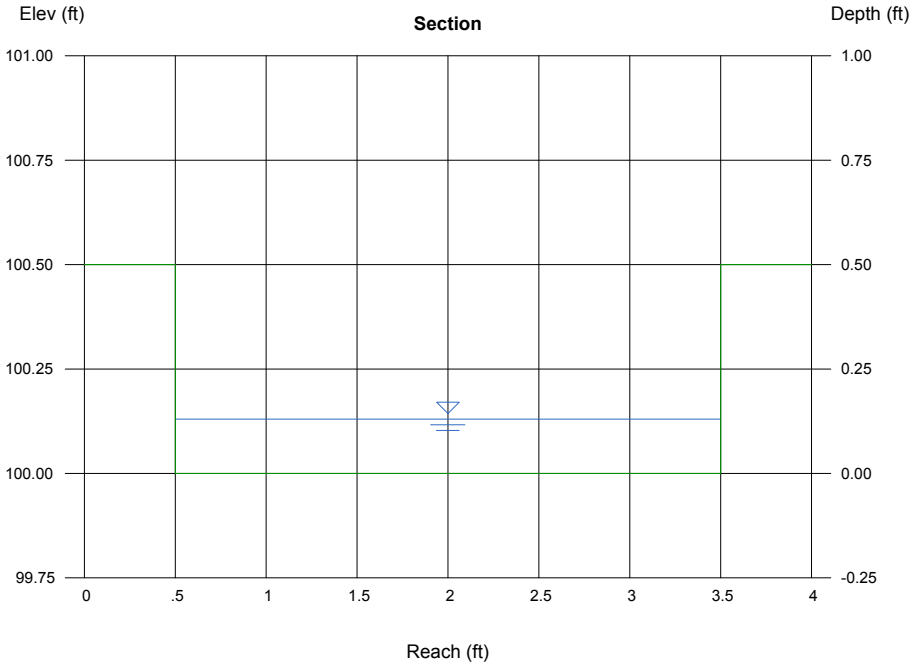
Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.70

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

Please include calculation for riprap sizing for spillway



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Author: CDurham Subject: Text Box Date: 5/4/2022 5:24:18 PM
Please include calculation for riprap sizing for spillway

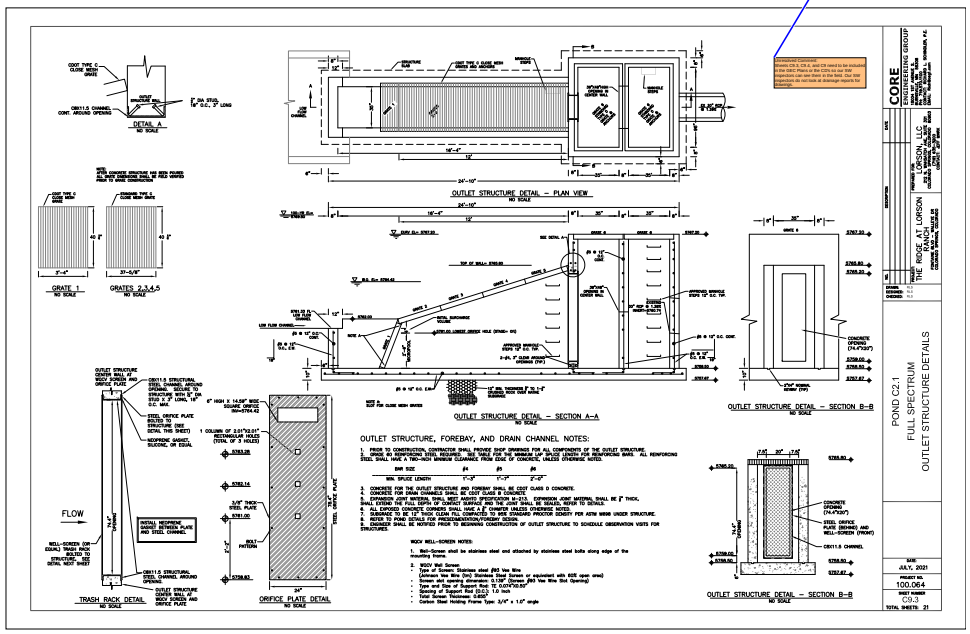
Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:26:01 PM
NO RIP RAP NEEDED SINCE SPILLWAY FLOWS OVER LEVEL GROUND AND NOT DOWN A SLOPE.

Author: Glenn Reese - EPC Stormwater Subject: SW - Textbox Date: 4/20/2022 10:36:11 AM

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.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:26:42 PM

ALL PONDS ARE CONSTRUCTED IN THE EARLY GRADING PLANS



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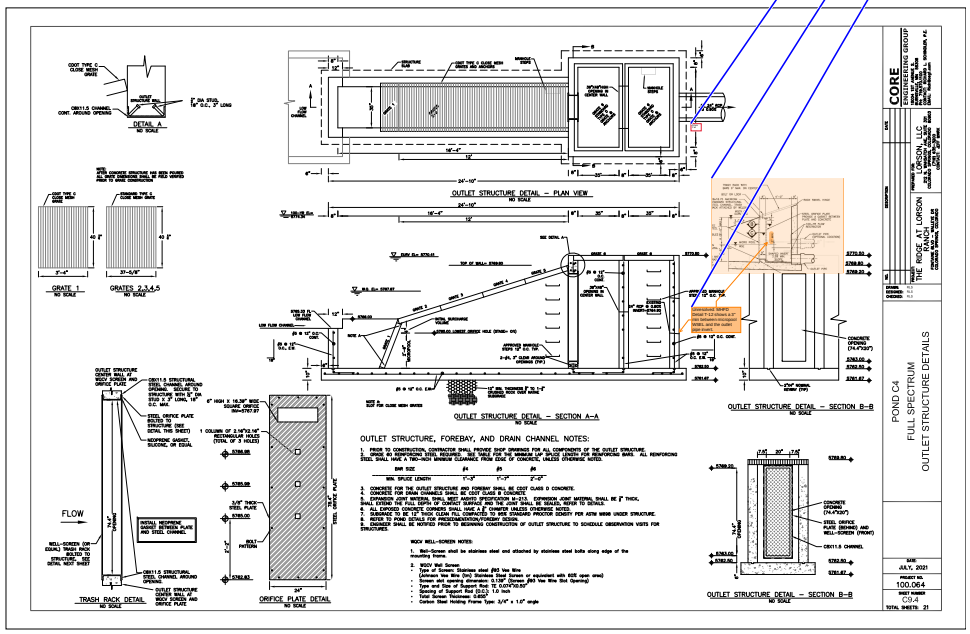
Author: RSchindler Subject: Text Box Date: 3/11/2022 7:34:44 AM -06'00'
72"

Author: Glenn Reese - EPC Stormwater Subject: Image Date: 4/20/2022 10:22:08 AM

Author: Glenn Reese - EPC Stormwater Subject: SW - Textbox with Arrow Date: 4/20/2022 10:22:08 AM
Unresolved: MHFD Detail T-12 shows a 3" min between micropool WSEL and the outlet pipe invert.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:27:23 PM
CANNOT MAINTAIN 3" SINCE OUTLET PIPE WAS CONSTRUCTED TWO YEARS AGO.



Author: Glenn Reese - EPC Stormwater Subject: SW - Textbox with Arrow Date: 4/20/2022 10:22:47 AM
Unresolved: should be 36" per pg 199 above.

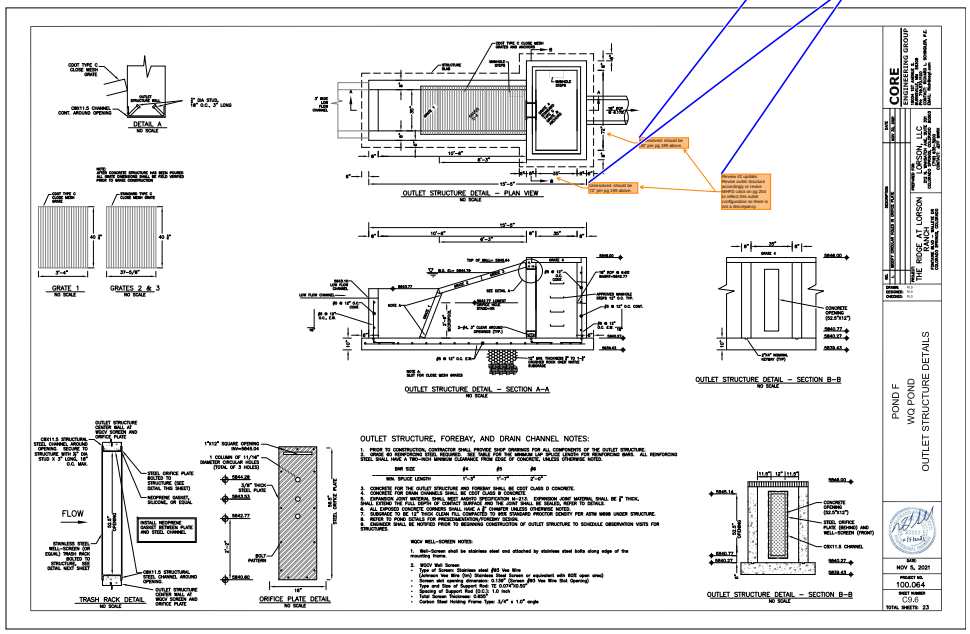
Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:27:41 PM
SPREADSHEET UPDATED

Author: Glenn Reese - EPC Stormwater Subject: SW - Textbox with Arrow Date: 4/20/2022 10:22:47 AM
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.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:27:50 PM
SPREADSHEET UPDATED

Author: Glenn Reese - EPC Stormwater Subject: SW - Textbox with Arrow Date: 4/20/2022 10:22:47 AM
Unresolved: should be 72" per pg 199 above.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:27:33 PM
SPREADSHEET UPDATED



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.

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Author: CDurham Subject: Text Box Date: 5/4/2022 5:24:50 PM
Update storm sewer calculations as flows at proposed inlets may have changed

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:28:12 PM
SPREADSHEET DESIGN POINTS REMOVED

Author: CDurham Subject: Text Box Date: 5/5/2022 12:30:43 PM
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.

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:28:45 PM
FLOW CALCS UPDATED WITH SLOPES MATCHING CD'S

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Author: CDurham Subject: Text Box Date: 5/4/2022 7:25:51 PM
L2

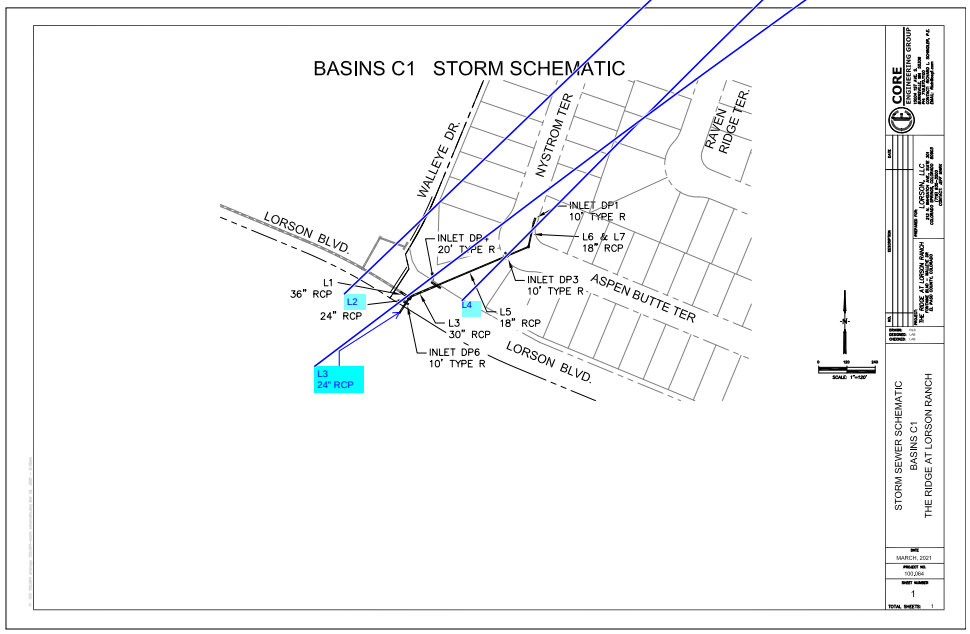
Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:33:53 PM
REVISED

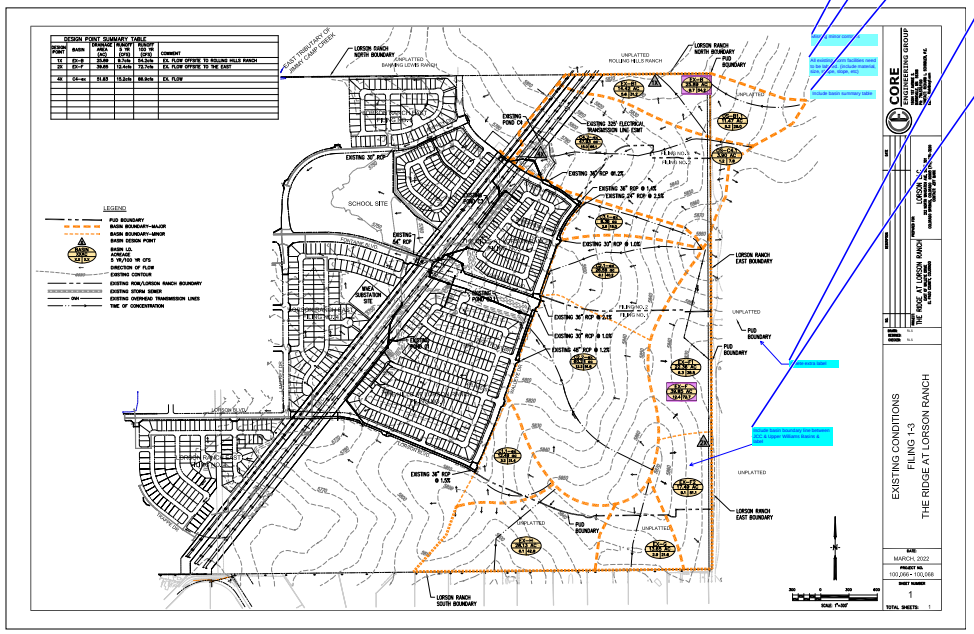
Author: CDurham Subject: Text Box Date: 5/31/2022 3:29:10 PM
L4

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:33:57 PM
REVISED

Author: CDurham Subject: Callout Date: 5/5/2022 8:40:54 AM
L3 24" RCP

Author: RSchindler Subject: Sticky Note Date: 5/31/2022 3:33:49 PM
REVISED





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Author: CDurham Subject: Text Box Date: 6/1/2022 9:31:22 AM
Missing minor contours

Author: RSchindler Subject: Sticky Note Date: 6/1/2022 9:31:25 AM
ADDED

Author: CDurham Subject: Text Box Date: 5/4/2022 5:26:29 PM
All existing storm facilities need to be labeled. (include material, size, shape, slope, etc)

Author: RSchindler Subject: Sticky Note Date: 6/1/2022 9:31:21 AM
ALL PIPES WE ARE CONNECTING TO ARE LABELED. EXISTING PONDS LABELED.

Author: CDurham Subject: Text Box Date: 5/4/2022 5:26:39 PM
Include basin summary table

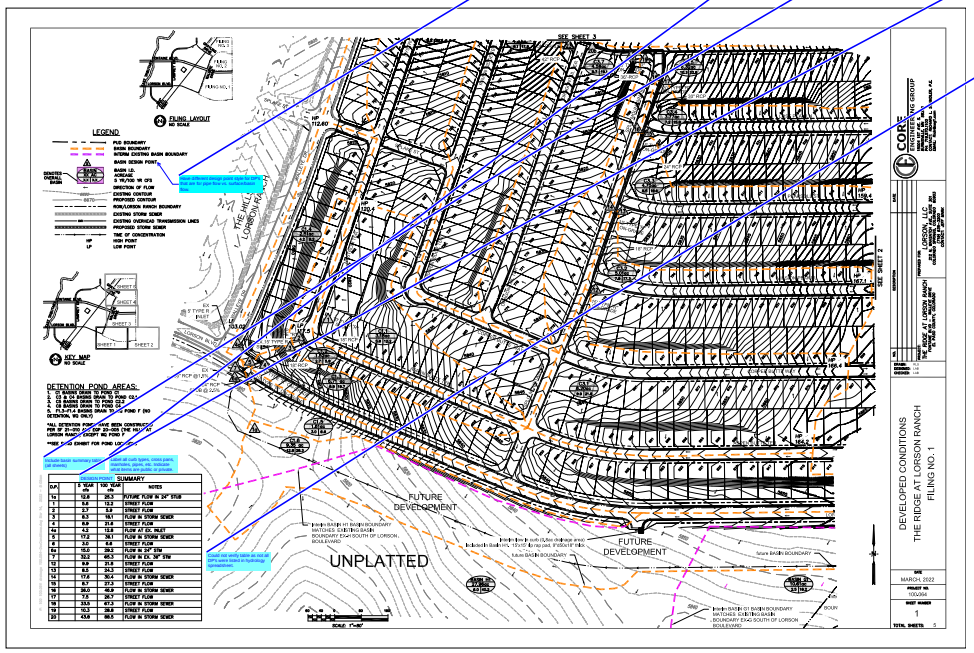
Author: RSchindler Subject: Sticky Note Date: 6/1/2022 9:31:45 AM
TABLE NOT NEEDED SINCE ALL BASINS ARE LABELED.

Author: CDurham Subject: Callout Date: 5/4/2022 5:27:39 PM
delete extra label

Author: RSchindler Subject: Sticky Note Date: 6/1/2022 9:28:57 AM
DELETED

Author: CDurham Subject: Callout Date: 5/4/2022 5:27:21 PM
Include basin boundary line between JCC & Upper Williams Basins & label

Author: RSchindler Subject: Sticky Note Date: 6/1/2022 9:28:05 AM
NOTE ADDED TO PAGE



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Author: CDurham Subject: Callout Date: 5/4/2022 5:34:21 PM
Have different design point style for DP's that are for pipe flow vs. surface/basin flow.

Author: RSchindler Subject: Sticky Note Date: 6/1/2022 1:49:06 PM
would rather not change dp style

Author: CDurham Subject: Text Box Date: 5/4/2022 5:30:55 PM
Label all curb types, cross pans, manholes, pipes, etc. Indicate what items are public or private.

Author: RSchindler Subject: Sticky Note Date: 6/1/2022 1:47:46 PM
added cross pans, pipes shown in legend, note added for all storm being public.

Author: CDurham Subject: Text Box Date: 5/4/2022 5:30:46 PM
Include basin summary table (all sheets)

Author: RSchindler Subject: Sticky Note Date: 6/1/2022 11:22:42 AM
PREFER NOT TO PUT ANOTHER TABLE ON SHEETS. EACH BASIN IS LABELED WITH AREA AND 5/100YR FLOWS

Author: CDurham Subject: Text Box Date: 5/4/2022 5:34:48 PM
DESIGN POINT

Author: RSchindler Subject: Sticky Note Date: 6/1/2022 1:47:19 PM
added

Author: CDurham Subject: Text Box Date: 5/4/2022 5:33:06 PM
Could not verify table as not all DP's were listed in hydrology spreadsheet.

Author: RSchindler Subject: Sticky Note Date: 6/1/2022 1:49:20 PM
des. pts removed from spreadsheet

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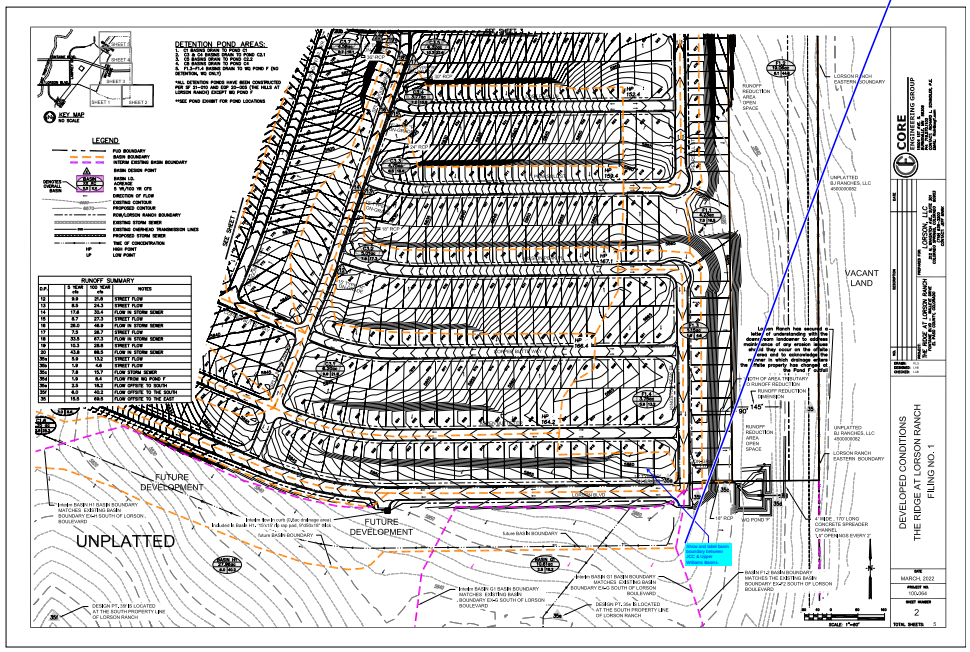
Author: CDurham Subject: Callout Date: 5/4/2022 5:36:09 PM

Show and label basin boundary between JCC & Upper Williams Basins.

Author: RSchindler Subject: Sticky Note Date: 6/1/2022 1:51:47 PM

NOTE ADDED



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Author: CDurham Subject: Callout Date: 5/4/2022 5:37:16 PM

Why was basin C4.5 removed?

Author: RSchindler Subject: Sticky Note Date: 6/1/2022 1:52:20 PM

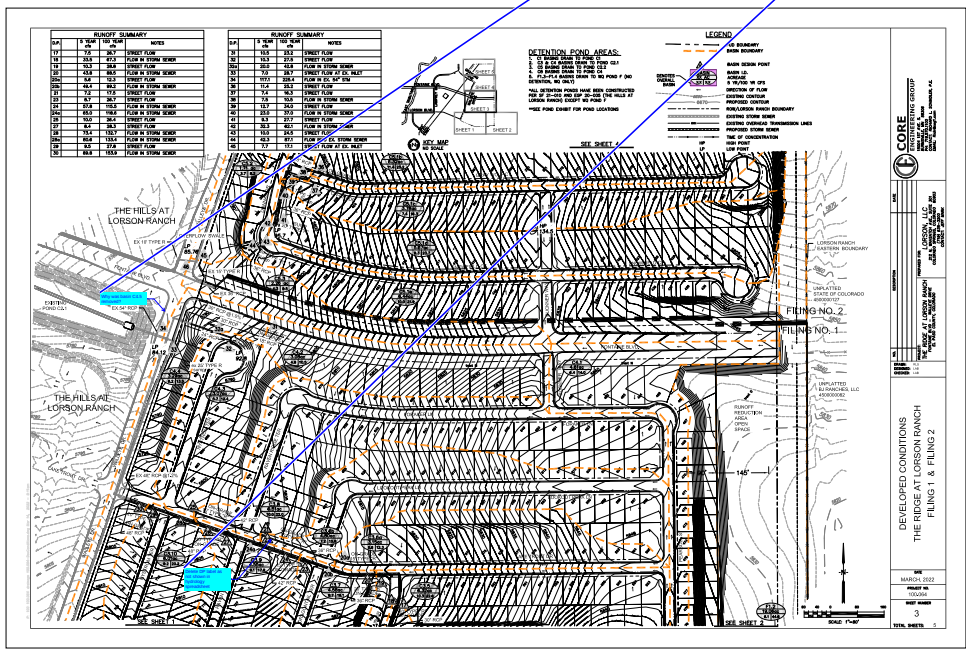
THAT IS AN OFFSITE BASIN AND NOT NECESSARY.

Author: CDurham Subject: Callout Date: 5/4/2022 5:39:32 PM

Delete DP label as not shown in hydrology spreadsheet

Author: RSchindler Subject: Sticky Note Date: 6/1/2022 1:53:39 PM

REMOVED



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Author: CDurham Subject: Callout Date: 5/4/2022 5:46:47 PM

Why were riprap pads removed? Please include back in and provide calculations for riprap sizing.

Author: RSchindler Subject: Sticky Note Date: 6/1/2022 1:54:33 PM

LORSON OWNS OFFSITE PROPERTY AND THE FLOWS WILL NOT BE CONCENTRATED. SHOULD EROSION OCCCUR AN AGREEMENT WAS SIGNED STATING LORSON WILL FIX.