

FINAL DRAINAGE PLAN SF 248

VILLAGE AT LORSON RANCH

JUNE, 2024

Prepared for:

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Project No. 100.070



CORE

ENGINEERING GROUP

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ENGINEER'S STATEMENT

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

Richard L. Schindler, P.E. #33997

Date

For and on Behalf of Core Engineering Group, LLC

OWNER'S STATEMENT

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

Lorson, LLC

Date

By
Jeff Mark

Title
Manager

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

FLOODPLAIN STATEMENT

To the best of my knowledge and belief, this development is not located within a designated floodplain as shown on Flood Insurance Rate Map Panel No. and 08041C0957 G, dated December 7, 2018. (See Appendix A, FEMA FIRM Exhibit)

Richard L. Schindler, #33997

Date

EL PASO COUNTY

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

Joshua Palmer, P.E.
County Engineer/ECM Administrator

Date

Conditions: _____

1.0 LOCATION and DESCRIPTION

Village at Lorson Ranch is located west of Jimmy Camp Creek. The site is located on approximately 9.722 acres of vacant land. This project will develop this site into a commercial development. The land for the commercial lots is currently owned by Cradlan, LLC.

The site is located in the Southeast 1/4 of Section 15, Township 15 South and Range 65 West of the 6th Principal Meridian. The site is bounded on the north by Carriage Meadows North Filing No. 1, on the west by Marksheffel Road, on the east by Carriage Meadows Drive, and the south by Fontaine Boulevard. For reference, a vicinity map is included in Appendix A of this report.

Conformance with applicable Drainage Basin Planning Studies

There is an existing (unapproved) DBPS for Jimmy Camp Creek prepared by Wilson & Company in 1987, and is referenced in this report. The only major drainage improvements for this study area according to the 1987 Wilson study was the reconstruction of the main stem of Jimmy Camp Creek. In 2006 the main stem of Jimmy Camp Creek was reconstructed in accordance with the 1987 study. There are no further improvements to be made on Jimmy Camp Creek.

Conformance with Lorson Ranch MDDP1 by Pentacor Engineering (approved November 7, 2006) and Final Drainage Report for Carriage Meadows South at Lorson Ranch Filing No. 1 (approved September 7, 2017)

Core Engineering Group has an approved MDDP for Lorson Ranch, which covers this study area for major infrastructure. The major infrastructure in the MDDP includes storm sewer in Fontaine Boulevard and relocation of the FMIC irrigation ditch which was constructed in 2006 conforming to the MDDP for Lorson Ranch. Other major infrastructure improvements constructed to serve this site include Pond G1/G2 constructed as part of Carriage Meadows South at Lorson Ranch Filing No. 1. Pond G1/G2 is an offsite full spectrum detention pond constructed in 2017 and included detention and water quality provisions that serve Village at Lorson Ranch.

The Village at Lorson Ranch is located within the “**Jimmy Camp Creek Drainage Basin**”, which is a fee basin in El Paso County. Jimmy Camp Drainage Basin will be a closed basin within Lorson Ranch within a few months and drainage fees will not be administered per agreements with the county.

2.0 DRAINAGE CRITERIA

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

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

Current updates to the Drainage Criteria manual for El Paso County states the if detention is necessary, Full Spectrum Detention will be included in the design, based on this criteria, Full Spectrum Detention will not be required for this development.

3.0 EXISTING HYDROLOGICAL CONDITIONS

This site is currently undeveloped with native vegetation (grass with no shrubs) and gentle slopes in a southerly direction to the north side of Fontaine Boulevard.

The Soil Conservation Service (SCS) classifies the soils within the Village at Lorson Ranch property as Manzanst clay loam and Ellicott loamy coarse sand. The clay loam is considered to be hydrologic soil group C and the sandy loams are considered hydrologic soil group A (see table 3.1 below). The clay loams are difficult to vegetate and comprise of the majority of the study area. These soils can be mitigated easily by limiting their use as topsoil since they this is a commercial site and most areas will be paved or landscaped with rock bedding.

Table 3.1: SCS Soils Survey for the Study Area

Soil No.	Soil	Hydro. Group	Shrink/Swell Potential	Permeability	Surface Runoff Potential	Erosion Hazard
28	Ellicott Loamy Coarse Sand (0.8%)	A	Low	Moderate	Medium	Moderate
52	Manzanst Clay Loam (2.2%)	C	High	Slow	Medium	Moderate

Excerpts from the SCS "Soil Survey of El Paso County Area, Colorado" are provided in **Appendix A** for further reference.

For the purpose of preparing hydrologic calculations for this report, the soils of each basin are assumed to be wholly comprised of the majority soil hydrologic group.

This site is not located within the delineated 100-year floodplain of the East Tributary of Jimmy Camp Creek per the Federal Emergency Management Agency (FEMA) Flood Rate Insurance Map (FIRM) number 08041C10957 G, effective December 7, 2018.

Basin EX1

This existing basin consists primarily of flows from the existing FMIC channel, a majority of these flows are from the offsite area west of the channel. Runoff from basin EX1 flows to the existing FMIC channel, then continues west toward Carriage Meadows Drive. The existing runoff from this 0.95 acre basin is 0.3cfs and 1.6cfs for the 5-year and 100-year events. No other runoff is directed to this basin.

The FMIC historically consisted of an open channel from Cottonwood Meadows to Jimmy Camp Creek (culvert under Marksheffel). Upon development of Lorson Ranch in 2007, a 48" pipe was installed from Cottonwood Meadows west and under Marksheffel Road. The 48" pipe carries FMIC water (50cfs) and stormwater to the east side of Marksheffel Road where a reconstructed open channel directs water east to Carriage Meadows Drive. In addition, this open channel section is designed to handle runoff from the full buildout of Marksheffel Road which is carried in a 30" RCP under Marksheffel Road. The 30" RCP is located directly north of the 48" FMIC pipe. Stormwater and FMIC water (113cfs & 214cfs in 5/100 year storm) travels east to Carriage Meadows Drive where a diversion structure and a box culvert effectively separate stormwater from FMIC water. The diversion structure is a 25' D-10-R inlet with a 1.5' opening and the box culvert is a 3x4 culvert with a gate to regulate or shut off flow. During times of FMIC operation, the gate is adjusted so that only the FMIC water is allowed to pass east in the FMIC channel. Additional runoff at this gate will pond up and flow into the 25' diversion structure. During times the FMIC is not operating, the gate is closed which forces all runoff into the 25' diversion structure. The outlet structure is drained by a 48" RCP that flows east under Carriage Meadows Drive. A 60" RCP at 0.95% slope continues east and outlets directly into Jimmy Camp Creek with a capacity of 270cfs. Just north of the 60" RCP, a 36" stub has been constructed to accept flows from a WQ basin in the Carriage

Meadows residential areas. This entire system is in place and has been fully operational since August, 2006.

Basin EX2

This existing basin consists of on-site undeveloped basin located approximately 100' east of Marksheffel Road, south of and adjacent to the existing FMIC channel, and north of Fontaine Boulevard. This basin has moderate slopes and flows overland south downstream to Fontaine Boulevard, then to an existing 34"x53" HERCP storm sewer that routes runoff southerly under Fontaine Boulevard. The total pre-developed flow from this 8.44 acre basin is 3.4cfs and 19.0cfs in the 5 and 100-year storm events.

Basin EX3

Basin EX3 is a self-contained basin and does not accept any offsite flows. Surface flows are FROM Marksheffel Road and are directed to an existing drainage swale that flows in a southerly-southwesterly direction to an existing 18" RCP, these flows are then routed within this existing 18" RCP to the aforementioned existing 34"x53" HERCP that flows southerly under Fountain Boulevard. The existing runoff from this 0.73 acre site is 0.4cfs and 2.4cfs for the 5-year and 100-year events. The drainage area and flows have not changed from the previous reports when the inlets/storm was designed.

Basin EX4

Basin EX4 consists of the west half of Carriage Meadows Drive, a developed north-south road. Flow is directed westerly to the existing curb and gutter, then continues southerly to an existing 5' Type "R" inlet. This inlet is located on west side of Carriage Meadows Drive, at the northwest corner of Fontaine Boulevard and Carriage Meadows Drive. Flow is routed westerly from this inlet to the aforementioned 34"x53" HERCP via an existing 30" RCP. The existing runoff from this 0.57 acre site is 2.6cfs and 4.7cfs for the 5-year and 100-year events.

4.0 DEVELOPED HYDROLOGICAL CONDITIONS

Hydrology for **Village at Lorson Ranch** drainage report was based on the City of Colorado Springs/El Paso County Drainage Criteria. Sub-basins that lie within this project were determined and the 5-year and 100-year peak discharges for the developed conditions have been presented in this report. Based on these flows, storm inlets will be added when the street capacity is exceeded.

Soil types A/B & C/D have been assumed for the developed hydrologic conditions. See Appendix A for SCS Soils Map.

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

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

Drainage for the site was divided into 8 proposed basins and 3 existing basins. Runoff coefficients for the 5/100-year events are 0.83 and 0.90 respectively. This is a commercial site, and most areas will be paved or landscaped with rock bedding. Analysis for each of the basins are briefly discussed as follows:

Basins EX1, EX3 & EX4

These offsite basins have been discussed in the existing Hydrological Conditions portion of this report, any additional discussion is not required.

Basin PR1

This basin consists of a commercial area, surface runoff will be directed to a future 10' Type "R" inlet in a sump condition at the southwest corner of this basin. Runoff from this inlet, (design point #7) will be conveyed westerly via future 18" RCP to the previously mentioned existing 34"x53" HERCP. Developed flow from this 1.24 acre basin is 5.3cfs for the 5-year storm event and 9.7cfs for the 100-year storm event. See the appendix for detailed calculations. Interim flows from this area (non-developed) will be conveyed south overland to a temporary sediment basin which flows into Inlet DP8 (5' Type R).

Basin PR2

This basin consists of a commercial area, surface runoff will be directed to a proposed 20' Type "R" inlet in a sump condition at the south-center part of this basin. Runoff from this inlet, (design point #1) will be conveyed southerly by a proposed 24" RCP, then easterly via proposed 36" RCP to the previously mentioned existing 34"x53" HERCP. Developed flow from this 2.41 acre basin is 9.4cfs for the 5-year storm event and 17.0cfs for the 100-year storm event. See the appendix for detailed calculations.

Basin PR3

This basin consists of a commercial area and street, surface runoff will be directed to a proposed 5' Type "R" inlet in a sump condition at the south-center portion of this basin. Runoff from this inlet, (design point #1a) will be conveyed southerly by a proposed 24" RCP, then easterly via proposed 36" RCP to the previously mentioned existing 34"x53" HERCP. Developed flow from this 0.11 acre basin is 0.5cfs for the 5-year storm event and 0.9cfs for the 100-year storm event. See the appendix for detailed calculations.

Basin PR4

This basin consists of a commercial area, surface runoff will be directed to a proposed continuous on-grade 10' Type "R" inlet at the southeast corner of this basin. Runoff from this inlet, (design point #4) will be conveyed easterly via proposed 18", 24", & 36" RCP to the previously mentioned existing 34"x53" HERCP. Developed flow from this 1.68 acre basin is 7.2cfs for the 5-year storm event and 13.1cfs for the 100-year storm event. See the appendix for detailed calculations.

Basin PR5

This basin consists of a fast-food type of commercial area, surface runoff from this basin is directed southerly, then easterly to a proposed 5' Type "R" inlet in a sump condition at the southeast corner of this basin. Runoff from this inlet, (design point #5) is routed by a proposed 24" RCP to the previously discussed proposed 36" RCP then continues easterly to the previously mentioned existing 34"x53" HERCP. Developed flow from this 0.39 acre basin is 1.7cfs for the 5-year storm event and 3.0cfs for the 100-year storm event. See the appendix for detailed calculations.

Basin PR6

This basin consists of a fast-food type of commercial area, surface runoff from this basin is directed easterly and southerly to a proposed 10' Type "R" inlet in a sump condition at the southeast corner of this basin. Runoff from this inlet, (design point #3) is routed southeasterly by a proposed 24" RCP to the previously discussed proposed 36" RCP then continues easterly to the existing 34"x53" HERCP. Developed flow from this 0.72 acre basin is 3.1cfs for the 5-year storm event and 5.6cfs for the 100-year storm event. See the appendix for detailed calculations.

Basin PR7

This basin consists of a fast-food type of commercial area, surface runoff from this basin is directed southerly to a future 10' Type "R" inlet in a sump condition at the south-center portion of this basin. Runoff from this inlet, (design point #8a) is routed by proposed 18" & 24" RCP's southwesterly and westerly to the existing 34"x53" HERCP. Developed flow from this 1.41 acre basin is 6.0cfs for the 5-year storm event and 11.0cfs for the 100-year storm event. See the appendix for detailed calculations.

Interim flows from this area (non-developed) will be conveyed south overland to a temporary sediment basin which flows into Inlet DP8 (5' Type R).

Basin PR8

This basin consists of parking for a future fast-food type of commercial area, surface flow from this basin is directed northerly to a proposed 5' Type "R" inlet in a sump condition at the north-center portion of this basin. This inlet will be constructed as part of the first phase of construction and stubs will be provided for future inlets for Basins PR1 and PR7. Runoff from this inlet, (design point #8) is routed westerly by proposed 24" RCP to the existing 34"x53" HERCP. Developed flow from this 0.22 acre basin is 0.9cfs for the 5-year storm event and 1.7cfs for the 100-year storm event. See the appendix for detailed calculations. Interim flows from this area (non-developed) will be conveyed directly to a temporary sediment basin which flows into Inlet DP8 (5' Type R).

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

5.0 HYDRAULIC SUMMARY

The sizing of the hydraulic structures was prepared by using the *StormSewers* 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 parking area curb/gutter and storm sewer to convey runoff to an existing storm sewer system, then to the existing detention and water quality pond G1/G2 located in Carriage Meadows South. This pond has been adequately sized to accept the developed flow from this development. See Final Drainage Report for Carriage Meadows South at Lorson Ranch Filing No. 1 prepared by Core Engineering Group, Reference SF1711, approved September 7, 2017. Flows will then outlet to the East Tributary of Jimmy Camp Creek. Inlet size and location are shown on the storm sewer layout in the appendix. See the appendix for detailed calculations and the storm sewer model.

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

Street Slope	Residential Local		Residential Collector		Principal Arterial	
	5-year	100-year	5-year	100-year	5-year	100-year
0.5%	6.3	26.4	9.7	29.3	9.5	28.5
0.6%	6.9	28.9	10.6	32.1	10.4	31.2
0.7%	7.5	31.2	11.5	34.6	11.2	33.7
0.8%	8.0	33.4	12.3	37.0	12.0	36.0
0.9%	8.5	35.4	13.0	39.3	12.7	38.2
1.0%	9.0	37.3	13.7	41.4	13.4	40.2
1.4%	10.5	44.1	16.2	49.0	15.9	47.6
1.8%	12.0	45.4	18.4	50.4	18.0	50.4
2.2%	13.3	42.8	19.4	47.5	19.5	47.5
2.6%	14.4	40.7	18.5	45.1	18.5	45.1
2.7%	14.7	40.6	18.4	45.0	18.4	45.0
3.0%	15.5	39.0	17.7	43.2	17.8	43.2
3.5%	16.7	37.2	16.9	41.3	17.0	41.3
4.0%	17.9	35.7	16.2	39.7	16.3	39.7
4.5%	19.0	34.5	15.7	38.3	15.7	38.3
5.0%	19.9	33.4	15.2	37.1	15.2	37.1

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

Design Point 1

Design Point 1 is located on the north side of Center Village and accepts developed flows from Basin PR2. The runoff will be conveyed to Design Point 1 via curb/gutter. The street capacity of Street B (Res. Local, 8.5/35.4cfs at 0.9% slope) is not exceeded.

(5-year storm)

Tributary Basins: PR2

Upstream flowby:

Inlet/MH Number: Inlet DP1

Total Street Flow: 9.4cfs

Flow Intercepted: 9.4cfs

Inlet Size: 20' type R, sump

Flow Bypassed: 0.0cfs

Street Capacity: Street slope = 0.9%, capacity = 8.0cfs, okay half flow from each side

(100-year storm)

Tributary Basins: PR2

Upstream flowby:

Inlet/MH Number: Inlet DP1

Total Street Flow: 17.0cfs

Flow Intercepted: 17.0cfs

Inlet Size: 20' type R, SUMP

Flow Bypassed: 0.0cfs

Street Capacity: Street slope = 0.9%, capacity = 35.4cfs (half street) is okay

Design Point 1a

Design Point 1a is located on the south side of Center Village and accepts developed flows from Basin PR3. The runoff will be conveyed to Design Point 1a via curb/gutter. The street capacity of Street B (Res. Local, 8.5/35.4cfs at 0.9% slope) is not exceeded.

(5-year storm)

Tributary Basins: PR3

Upstream flowby:

Inlet/MH Number: Inlet DP1a

Total Street Flow: 0.5cfs

Flow Intercepted: 0.5cfs

Inlet Size: 5' type R, sump

Flow Bypassed: 0.0cfs

Street Capacity: Street slope = 0.9%, capacity = 8.0cfs, okay half flow from each side

(100-year storm)

Tributary Basins: PR3

Upstream flowby:

Inlet/MH Number: Inlet DP1a

Total Street Flow: 0.9cfs

Flow Intercepted: 0.9cfs

Inlet Size: 5' type R, SUMP

Flow Bypassed: 0.0cfs

Street Capacity: Street slope = 0.9%, capacity = 35.4cfs (half street) is okay

Design Point 2

Design Point 2 is located on the south side of Center Village and is the total pipe flow from Des. Pts 1 & 1a. The runoff will be conveyed to Design Point 3 via a 24" storm sewer. The total pipe flow is 9.8cfs/17.8cfs in the 5/100-year storm events.

Design Point 3

Design Point 3 is located on the north side of an access street and accepts developed flows from Basin PR6. The runoff will be conveyed to Design Point 3 via curb/gutter. The street capacity of the access street (Res. Local, 8.5/35.4cfs at 0.9% slope) is not exceeded.

<u>(5-year storm)</u>	
Tributary Basins: PR6	Inlet/MH Number: Inlet DP3
Upstream flowby:	Total Street Flow: 3.1cfs
Flow Intercepted: 3.1cfs	Flow Bypassed: 0.0cfs
Inlet Size: 10' type R, sump	
Street Capacity: Street slope = 0.9%, capacity = 8.0cfs, okay	
<u>(100-year storm)</u>	
Tributary Basins: PR6	Inlet/MH Number: Inlet DP3
Upstream flowby:	Total Street Flow: 5.6cfs
Flow Intercepted: 5.6cfs	Flow Bypassed: 0.0cfs
Inlet Size: 10' type R, SUMP	
Street Capacity: Street slope = 0.9%, capacity = 35.4cfs (half street) is okay	

Design Point 3a

Design Point 3a is located on the north side of an access street and is the total pipe flow from Des. Pts 2 & 3. The runoff will be conveyed to Design Point 6 via a 24" storm sewer. The total pipe flow is 12.5cfs/22.8cfs in the 5/100-year storm events.

Design Point 4

Design Point 4 is located on the south side of an access street and accepts developed flows from Basin PR4. The runoff will be conveyed to Design Point 4 via curb/gutter. The street capacity of the access street (Res. Local, 8.5/35.4cfs at 0.9% slope) is not exceeded.

<u>(5-year storm)</u>	
Tributary Basins: PR4	Inlet/MH Number: Inlet DP4
Upstream flowby:	Total Street Flow: 7.2cfs
Flow Intercepted: 5.9cfs	Flow Bypassed: 1.3cfs to DP5
Inlet Size: 10' type R, on-grade	
Street Capacity: Street slope = 0.9%, capacity = 8.0cfs, okay	
<u>(100-year storm)</u>	
Tributary Basins: PR4	Inlet/MH Number: Inlet DP4
Upstream flowby:	Total Street Flow: 13.1cfs
Flow Intercepted: 8.1cfs	Flow Bypassed: 5.0cfs to DP5
Inlet Size: 10' type R, on-grade	
Street Capacity: Street slope = 0.9%, capacity = 35.4cfs (half street) is okay	

Design Point 5

Design Point 5 is located on the south side of an access street and accepts developed flows from Basin PR5. The runoff will be conveyed to Design Point 5 via curb/gutter. The street capacity of the access street (Res. Local, 8.5/35.4cfs at 0.9% slope) is not exceeded.

(5-year storm)

Tributary Basins: PR5
Upstream flowby: 1.3cfs from DP4

Inlet/MH Number: Inlet DP5
Total Street Flow: 1.7+1.3=3.0cfs

Flow Intercepted: 3.0cfs
Inlet Size: 5' type R, sump

Flow Bypassed: 0.0cfs

Street Capacity: Street slope = 0.9%, capacity = 8.0cfs, okay

(100-year storm)

Tributary Basins: PR5
Upstream flowby: 5.0cfs from DP4

Inlet/MH Number: Inlet DP5
Total Street Flow: 5.0+3.0=8.0cfs

Flow Intercepted: 8.0cfs
Inlet Size: 5' type R, sump

Flow Bypassed: 0.0cfs

Street Capacity: Street slope = 0.9%, capacity = 35.4cfs (half street) is okay

Design Point 5a

Design Point 5a is located on the south side of an access street and is the total pipe flow from Des. Pts 4 & 5. The runoff will be conveyed to Design Point 6 via a 24" storm sewer. The total pipe flow is 8.9cfs/16.1cfs in the 5/100-year storm events.

Design Point 6

Design Point 6 is located on the south side of an access street and is the total pipe flow from Des. Pts 3a & 5a. The runoff will be conveyed to Design Point 6 via a 24" storm sewer. The total pipe flow is 20.5cfs/37.3cfs in the 5/100-year storm events.

Design Point 7

Design Point 7 is located on the east end of an access street and accepts developed flows from Basin PR1 which will be developed in the future. The runoff will be conveyed to Design Point 7 via future curb/gutter. The street capacity of the access street (Res. Local, 8.5/35.4cfs at 0.9% slope) is not exceeded. A future inlet will be designed and the size verified before construction at this design point when the adjacent lot is developed. Interim flows from this area (non-developed) will be conveyed south overland to a temporary sediment basin which flows into Inlet DP8 (5' Type R).

(5-year storm)

Tributary Basins: PR1

Inlet/MH Number: future Inlet DP7

Upstream flowby:

Total Street Flow: 5.3cfs

Flow Intercepted: 5.3cfs

Flow Bypassed: 0.0cfs

Inlet Size: future 10' type R, sump

Street Capacity: Street slope = 0.9%, capacity = 8.0cfs, okay

(100-year storm)

Tributary Basins: PR1

Inlet/MH Number: future Inlet DP7

Upstream flowby:

Total Street Flow: 9.7cfs

Flow Intercepted: 9.7cfs

Flow Bypassed: 0.0cfs

Inlet Size: future 10' type R, SUMP

Street Capacity: Street slope = 0.9%, capacity = 35.4cfs (half street) is okay

Design Point 8

Design Point 8 is located on the east end of an access street and accepts developed flows from Basin PR8 which will be developed in the future. The runoff will be conveyed to Design Point 8 via future curb/gutter. The street capacity of the access street (Res. Local, 8.5/35.4cfs at 0.9% slope) is not exceeded. Interim flows from this area (non-developed) will be conveyed overland directly to a temporary sediment basin which flows into Inlet DP8 (5' Type R).

(5-year storm)

Tributary Basins: PR8

Inlet/MH Number: Inlet DP8

Upstream flowby:

Total Street Flow: 0.9cfs

Flow Intercepted: 0.9cfs

Flow Bypassed: 0.0cfs

Inlet Size: 5' type R, sump

Street Capacity: Street slope = 0.9%, capacity = 8.0cfs, okay

(100-year storm)

Tributary Basins: PR8

Inlet/MH Number: Inlet DP8

Upstream flowby:

Total Street Flow: 1.7cfs

Flow Intercepted: 1.7cfs

Flow Bypassed: 0.0cfs

Inlet Size: 5' type R, SUMP

Street Capacity: Street slope = 0.9%, capacity = 35.4cfs (half street) is okay

Design Point 8a

Design Point 8a is located on the east end of an access street and accepts developed flows from Basin PR7 which will be developed in the future. The runoff will be conveyed to Design Point 8a via future curb/gutter. The total surface flow is 6.0cfs/11.0cfs in the 5/100-year storm events. The street capacity of the access street (Res. Local, 8.5/35.4cfs at 0.9% slope) is not exceeded. A future inlet will be designed and the size verified before construction at this design point when the adjacent lot is developed.

Design Point 9

Design Point 9 is located on the south side of an access street and is the total pipe flow from Des. Pts 7, 8 & 8a. The runoff will be conveyed to Design Point 10 via a 24" storm sewer. The total pipe flow is 12.2cfs/22.4cfs in the 5/100-year storm events.

Design Point 10

Design Point 10 is located on the south side of an access street and is the total pipe flow from Des. Pts 6 & 9. The runoff will be conveyed to an existing 34"x53" HERCP. The total pipe flow is 31.5cfs/57.3cfs in the 5/100-year storm events. The allowable flow into the existing HERCP is 32.2cfs/59.0cfs per the Fontaine Blvd. Phase 1 FDR which designed the existing system.

6.0 DETENTION AND WATER QUALITY PONDS

Detention and Storm Water Quality for Village at Lorson Ranch will be provided for in existing Pond G1/G2 located south of Fontaine Boulevard. Pond G1/G2 is an existing full spectrum detention pond constructed in 2017 as part of the Carriage Meadows South at Lorson Ranch Filing No. 1 subdivision (SF 1711) per El Paso County criteria. Pond G1/G2 was as-built and certified on June 27, 2023 by Core Engineering Group. A copy of the certification letter, as-builts, and a pond drainage area map are located in the appendix of this report.

For additional information, see the approved Final Drainage Report and Plan for "Carriage Meadows South at Lorson Ranch Filing No. 1, SF 1711, dated 08/10/2017.

The following text was taken from the Carriage Meadows South final drainage report:

Detention Pond G1/G2 (Full Spectrum Design), (District Facility, SF1711)

This is an on-site permanent full spectrum detention pond that includes water quality. Pond G1/G2 is designed as a single pond in the UDCF Full Spectrum spreadsheets. The full spectrum print outs are in the appendix of this report. See map in appendix for watershed areas. This pond is sized to provide full spectrum and water quality for the Brownsville Subdivision No. 2 should it become a part of Lorson Ranch.

- Watershed Area: 96 acres
- Watershed Imperviousness: 79%
- Hydrologic Soils Group A, B, C/D
- Zone 1 WQCV: 2.301 ac-ft, WSEL: 5683.93
- Zone 2 EURV: 8.104 ac-ft, WSEL: 5686.29
- Zone 3 (100-yr): 12.881ac-ft, WSEL: 5687.93
- Pipe Outlet: 36" RCP at 0.4%
- 5-yr outflow = 4.2cfs, 100-yr outflow = 55.6cfs

7.0 DRAINAGE AND BRIDGE FEES

Village at Lorson Ranch is located within the Jimmy Camp Creek drainage basin which is currently a fee basin in El Paso County. Current El Paso County regulations require drainage and bridge fees to be paid for platting of land as part of the plat recordation process. Lorson Ranch initiated the closure of Jimmy Camp Creek drainage basin for drainage/bridge fees a few years ago and will be approved by El Paso County and the Pikes Peak Drainage Board before this plat is recorded. In the event the basin isn't closed Lorson Ranch has interim agreements with the county that no fees are required at this time. Therefore, no drainage fees or bridge fees are required to be paid at this time. A copy of the drainage board meeting minutes is in the appendix of this report.

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

Item	Quantity	Unit	Unit Cost	Item Total
5' Inlet	3	EA	\$5,000/EA	\$15,000
10' Inlet	4	EA	\$8,000/EA	\$32,000
20' Inlet	1	EA	\$12,000/EA	\$12,000
18" Storm	206	LF	\$180	\$37,080
24" Storm	351	LF	\$240	\$84,240
36" Storm	73	LF	\$360	\$26,280
Manholes	2	EA	\$10,000	\$20,000
			Subtotal	\$226,600
			Eng/Cont (10%)	\$22,660
			Total Est. Cost	\$249,260

8.0 FOUR STEP PROCESS

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

Step 1: Employ Runoff Reduction Practices

Village at Lorson Ranch has employed several methods of reducing runoff.

- The street configuration was laid out to minimize the length of streets. Many streets are straight and perpendicular resulting in lots with less wasted space. Landscape buffers are provided for adjacent residential development
- Utilize existing Full Spectrum Detention Outlet Structure (Pond G1/G2) which has been previously constructed and sized for runoff from this development. The full spectrum detention mimics existing storm discharges and includes water quality.

Step 2: Stabilize Drainageways

Jimmy Camp Creek is a major drainageway located east of this site. In 2006 Jimmy Camp Creek was reconstructed and stabilized per county criteria. The design included a natural sand bottom and armored sides.

Step 3: Provide Water Quality Capture Volume

Treatment of the water quality capture volume (WQCV) is required for all new developments. Village at Lorson Ranch utilizes an existing full spectrum stormwater extended detention basin outlet structure within existing Pond G1/G2 which include Water Quality Volumes and WQ outlet structures.

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

There are no industrial areas within this site. This site is commercial but will be mostly light use commercial areas such as restaurants, gas station, mini storage, etc which does not need specific BMP's.

9.0 CONCLUSIONS

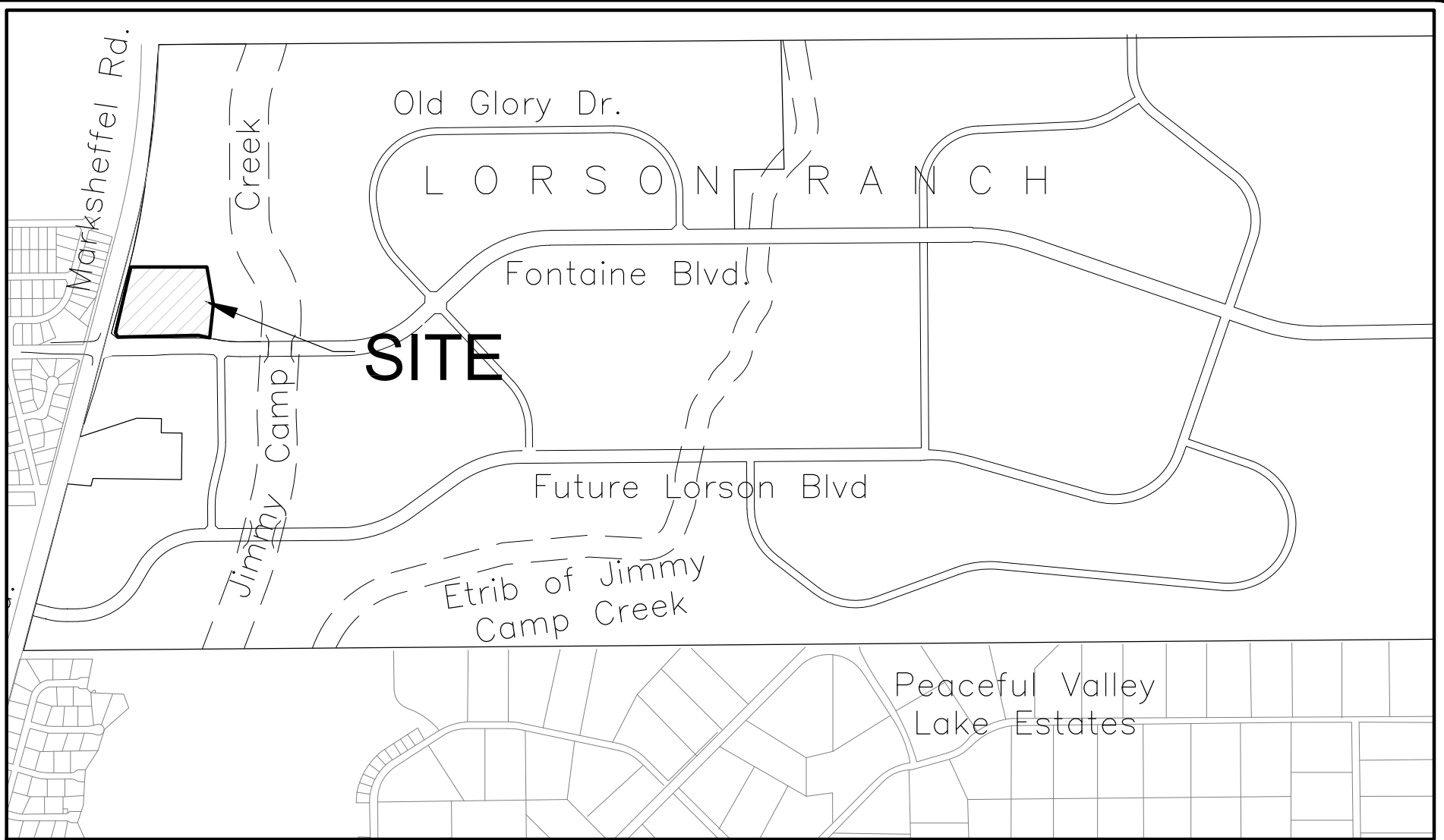
This drainage report has been prepared in accordance with the City of Colorado Springs/El Paso County Drainage Criteria Manual. The proposed development and drainage infrastructure will not cause adverse impacts to adjacent properties or properties located downstream. Several key aspects of the development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

- Developed runoff will be conveyed via curb/gutter and storm sewer facilities
- Jimmy Camp Creek has been reconstructed east of this study area
- Detention and water quality for this site will be provided in Pond G1/G2 constructed as part of Carriage Meadows South (SF1711)

10.0 REFERENCES

1. City of Colorado Springs/El Paso County Drainage Criteria Manual DCM, dated November, 1991
2. Soil Survey of El Paso County Area, Colorado by USDA, SCS
3. Jimmy Camp Creek Drainage Basin Planning Study, Dated March 9, 2015, by Kiowa Engineering Corporation
4. City of Colorado Springs "Drainage Criteria Manual, Volume 2
5. El Paso County "Engineering Criteria Manual"
6. Lorson Ranch MDDP 1, November 7, 2006 by Pentacor.
7. El Paso County Resolution #15-042, El Paso County adoption of Chapter 6 and Section 3.2.1 of the City of Colorado Springs Drainage Criteria Manual dated May, 2014.
8. Final Drainage Report for Fontaine Boulevard Phase 1 Improvements prepared by Pentacor, dated November, 2006
9. Final Drainage Report for Carriage Meadows South at Lorson Ranch Filing No. 1 prepared by Core Engineering Group, Reference SF1711, approved September 7, 2017
10. Final Drainage Report for Carriage Meadows North prepared by Core Engineering Group, Reference SF1723, approved April 12, 2018

APPENDIX A – VICINTIY MAP, SOILS MAP, FEMA MAP



VICINITY MAP

NO SCALE



CORE
ENGINEERING GROUP

15004 1ST AVE. S.
BURNSVILLE, MN 55306
PH: 719.659-7800

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

**VILLAGE AT LORSON RANCH FIL. NO. 1
VICINITY MAP**

SCALE:
NTS

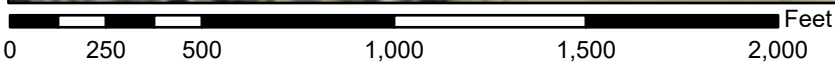
DATE:
APRIL, 2024

FIGURE NO.
--

National Flood Hazard Layer FIRMette



104°39'11"W 38°44'32"N



1:6,000

104°38'34"W 38°44'4"N

Basemap Imagery Source: USGS National Map 2023

Legend

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

- | | |
|---|---|
| <p>SPECIAL FLOOD HAZARD AREAS</p> | <ul style="list-style-type: none"> Without Base Flood Elevation (BFE)
<i>Zone A, V, A99</i> With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i> Regulatory Floodway |
| <p>OTHER AREAS OF FLOOD HAZARD</p> | <ul style="list-style-type: none"> 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i> Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i> Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i> Area with Flood Risk due to Levee <i>Zone D</i> |
| <p>OTHER AREAS</p> | <ul style="list-style-type: none"> Area of Minimal Flood Hazard <i>Zone X</i> Effective LOMRs Area of Undetermined Flood Hazard <i>Zone D</i> |
| <p>GENERAL STRUCTURES</p> | <ul style="list-style-type: none"> Channel, Culvert, or Storm Sewer Levee, Dike, or Floodwall |
| <p>OTHER FEATURES</p> | <ul style="list-style-type: none"> B 20.2 Cross Sections with 1% Annual Chance Water Surface Elevation 17.5 Coastal Transect Base Flood Elevation Line (BFE) Limit of Study Jurisdiction Boundary Coastal Transect Baseline Profile Baseline Hydrographic Feature |
| <p>MAP PANELS</p> | <ul style="list-style-type: none"> Digital Data Available No Digital Data Available Unmapped |



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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **2/16/2024 at 2:56 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

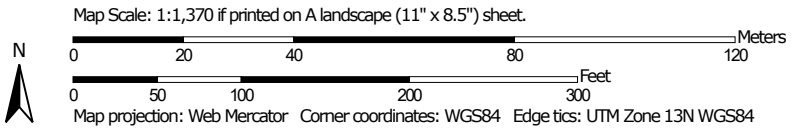
Soil Map—El Paso County Area, Colorado
(Villages at Lorson Ranch)



Soil Map may not be valid at this scale.

FONTAINE BLVD.

CARRIAGE MEADOWS DR.



El Paso County Area, Colorado

28—Ellicott loamy coarse sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 3680

Elevation: 5,500 to 6,500 feet

Mean annual precipitation: 13 to 15 inches

Mean annual air temperature: 47 to 50 degrees F

Frost-free period: 125 to 145 days

Farmland classification: Not prime farmland

Map Unit Composition

Ellicott and similar soils: 97 percent

Minor components: 3 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ellicott

Setting

Landform: Stream terraces, flood plains

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Sandy alluvium

Typical profile

A - 0 to 4 inches: loamy coarse sand

C - 4 to 60 inches: stratified coarse sand to sandy loam

Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: NoneFrequent

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7w

Hydrologic Soil Group: A

Ecological site: R069XY031CO - Sandy Bottomland

Other vegetative classification: SANDY BOTTOMLAND
(069AY031CO)

Hydric soil rating: No

Minor Components

Fluvaquentic haplaquoll

Percent of map unit: 1 percent

Landform: Swales

Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent

Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 20, Sep 2, 2022

El Paso County Area, Colorado

52—Manzanst clay loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2w4nr

Elevation: 4,060 to 6,660 feet

Mean annual precipitation: 14 to 16 inches

Mean annual air temperature: 50 to 54 degrees F

Frost-free period: 130 to 170 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Manzanst and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manzanst

Setting

Landform: Drainageways, terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Concave, linear

Parent material: Clayey alluvium derived from shale

Typical profile

A - 0 to 3 inches: clay loam

Bt - 3 to 12 inches: clay

Btk - 12 to 37 inches: clay

Bk1 - 37 to 52 inches: clay

Bk2 - 52 to 79 inches: clay

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Capacity of the most limiting layer to transmit water

(Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 15 percent

Gypsum, maximum content: 3 percent

Maximum salinity: Slightly saline (4.0 to 7.0 mmhos/cm)

Sodium adsorption ratio, maximum: 10.0

Available water supply, 0 to 60 inches: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 4c

Hydrologic Soil Group: C
Ecological site: R067BY037CO - Saline Overflow
Hydric soil rating: No

Minor Components

Ritoazul

Percent of map unit: 7 percent
Landform: Interfluves, drainageways
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY042CO - Clayey Plains
Hydric soil rating: No

Arvada

Percent of map unit: 6 percent
Landform: Interfluves, drainageways
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY033CO - Salt Flat
Hydric soil rating: No

Wiley

Percent of map unit: 2 percent
Landform: Interfluves
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY002CO - Loamy Plains
Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 20, Sep 2, 2022

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 21, Aug 24, 2023

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

Date(s) aerial images were photographed: Aug 14, 2018—Sep 23, 2018

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	0.1	1.2%
52	Manzanst clay loam, 0 to 3 percent slopes	8.5	98.8%
Totals for Area of Interest		8.6	100.0%

APPENDIX B – HYDROLOGY CALCULATIONS



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

Calculated By: Leonard Beasley
 Date: April, 2024
 Checked By: Leonard Beasley

Job No: 100.070
 Project: Village at Lorson Ranch FDR
 Design Storm: **5 - Year Event (Current)**

Street Basin or Design Point	Design Point	Direct Runoff							Total Runoff			Street		Pipe			Travel Time			Remarks	
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	$\Sigma (CA)$	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity		t_t
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec		min
EX1			0.95	0.15	40.3	0.14	2.04	0.3													
EX2			8.44	0.15	26.4	1.27	2.68	3.4													
EX3			0.73	0.15	11.1	0.11	3.98	0.4													
EX4			0.57	0.90	5.0	0.51	5.17	2.6													



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

Calculated By: Leonard Beasley
 Date: April, 2024
 Checked By: Leonard Beasley

Job No: 100.070
 Project: Village at Lorson Ranch FDR
 Design Storm: **100-Year Event (Current)**

Street Basin or Design Point	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
EX1			0.95	0.50	40.3	0.48	3.42	1.6													
EX2			8.44	0.50	26.4	4.22	4.49	19.0													
EX3			0.73	0.50	11.1	0.37	6.68	2.4													
EX4			0.57	0.96	5.0	0.55	8.68	4.7													



Standard Form SF-1. Time of Concentration-Current

Calculated By: Leonard Beasley
 Date: Feb. 15, 2024
 Checked By: Leonard Beasley

Job No: 100.070
 Project: Village at Lorson Ranch FDR

Sub-Basin Data				Initial Overland Time (ti)				Travel Time (tt)					Final tc
BASIN or DESIGN	C _s	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	ti minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	tt minutes	Computed tc Minutes	USDCM Recommended tc=ti+tt (min)
EX1	0.15	0.95	15.0	51.00	10.78%	0.15	5.59	1398.00	0.20%	0.67	34.73	40.32	40.32
EX2	0.15	8.44	7.0	226.00	3.10%	0.21	17.81	229.00	1.31%	0.80	4.76		
			15.0					284.00	0.70%	1.25	3.77	26.35	26.35
EX3	0.15	0.73	15.0	37.00	4.05%	0.09	6.58	442.00	1.20%	1.64	4.48	11.06	11.06
EX4	0.90	0.66	20.0	22.00	2.00%	0.27	1.35	462.00	1.75%	2.65	2.91	4.26	4.26



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

Calculated By: Leonard Beasley
 Date: April, 2024
 Checked By: Leonard Beasley

Job No: 100.070
 Project: Village at Lorson Ranch FDR
 Design Storm: **5 - Year Event (Developed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street				Pipe				
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	$\Sigma (CA)$	i	Q	Slope / Pipe Slope	Full Street Max Flow	Max Allow street flow	Street Velocity	Design Pipe Flow	Slope	Pipe Size	Min Pipe Flow	Pipe Velocity
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	min	cfs	%	in	cfs	fps
EX1			0.95	0.15	40.3	0.14	2.04	0.3													
EX3			0.73	0.15	11.1	0.11	3.98	0.4													
EX4			0.57	0.90	5.0	0.51	5.17	2.6													
PR1	7		1.24	0.83	5.0	1.03	5.17	5.3													
PR2	1		2.41	0.83	6.9	2.00	4.68	9.4													
PR3	1a		0.11	0.83	5.0	0.09	5.17	0.5													
(PR2-PR3)	2	2.52		0.83					6.9	2.09	4.68	9.8									
PR4	4		1.68	0.83	5.0	1.39	5.17	7.2													
PR5			0.39	0.83	5.0	0.32	5.17	1.7													
(PR4-PR5)	5a	2.07		0.83					5.0	1.72	5.17	8.9									
PR6 (PR2,PR3&PR6)	3a		0.72	0.83	5.0	0.60	5.17	3.1	7.0	2.69	4.66	12.5									
(PR2-PR6)	6	5.31		0.83					7.1	4.41	4.65	20.5									
PR7	8a		1.41	0.83	5.0	1.17	5.17	6.0													
PR8	8		0.22	0.83	5.0	0.18	5.17	0.9													
(PR1,PR7&PR8)	9	2.87							5.1	2.38	5.14	12.2									
(PR1-PR8)	10	8.18							7.1	6.79	4.64	31.5									



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

Calculated By: Leonard Beasley
 Date: April, 2024
 Checked By: Leonard Beasley

Job No: 100.070
 Project: Village at Lorson Ranch FDR Design
 Storm: **100 - Year Event (Developed)**

or Street Basin	Design Point	Direct Runoff							Total Runoff				Street				Pipe				
		Area Design	Area (A)	Runoff Coeff. (C)	t _c	CA	-	Q	t _c	Σ (CA)	-	Q	Slope / Pipe Slope	Full Street Max Flow	Max Allow street flow	Street Velocity	Design Pipe Flow	Slope	Pipe Size	Min Pipe Flow	Pipe Velocity
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	min	cfs	%	ft	cfs	fps
EX1			0.95	0.50	40.3	0.48	3.42	1.6													
EX3			0.73	0.50	11.1	0.37	6.68	2.4													
EX4			0.57	0.96	5.0	0.55	8.68	4.7													
PR1	7		1.24	0.90	5.0	1.12	8.68	9.7													
PR2	1		2.41	0.90	6.9	2.17	7.85	17.0													
PR3	1a		0.11	0.90	5.0	0.10	8.68	0.9													
(PR2-PR3)	2	2.52		0.90					7.0	2.27	7.83	17.8									
PR4	4		1.68	0.90	5.0	1.51	8.68	13.1													
PR5			0.39	0.90	5.0	0.35	8.68	3.0													
(PR4-PR5)	5a	2.07		0.90					5.0	1.86	8.66	16.1									
PR6 (PR2,PR3&PR6)	3a		0.72	0.90	5.0	0.65	8.68	5.6	7.0	2.92	7.83	22.8									
(PR2-PR6)	6	5.31		0.90					7.1	4.78	7.81	37.3									
PR7	8a		1.41	0.90	5.0	1.27	8.68	11.0													
PR8	8		0.22	0.90	5.0	0.20	8.68	1.7													
(PR1,PR7&PR8)	9	2.87							5.0	2.58	8.68	22.4									
(PR1-PR8)	10	8.18	8.18	0.90	7.1	7.36	7.79	57.3	7.1	7.36	7.79	57.3									



Standard Form SF-1. Time of Concentration-Proposed

Calculated By: Leonard Beasley
 Date: April, 2024
 Checked By: Leonard Beasley

Job No: 100.070
 Project: Village at Lorson Ranch

Sub-Basin Data				Initial Overland Time (t _i)				Travel Time (t _t)					t _c Check (urbanized Basins)		Final t _c
BASIN or DESIGN	C _s	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t _i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t _t minutes	Computed t _c Minutes	TOTAL LENGTH (L) feet	Regional t _c tc=(L/180)+10 minutes	USDCM Recommended tc=ti+tt (min)
EX1	0.15	0.95	15.0	51.00	10.78%	0.15	5.59	1398.00	0.20%	0.67	34.73	40.32			40.32
EX3	0.15	0.73	15.0	37.00	4.05%	0.09	6.58	442.00	1.20%	1.64	4.48	11.06			11.06
EX4	0.90	0.66	20.0	22.00	2.00%	0.27	1.35	462.00	1.75%	2.65	2.91	4.26			4.26
PR1	0.90	1.24	20.0	15.00	2.00%	0.22	1.12	410.00	1.22%	2.21	3.09	4.21	425.00	12.36	4.21
PR2	0.90	2.41	7.0	36.00	2.00%	0.35	1.73	114.00	1.00%	0.70	2.71				
			20.0					300.00	1.00%	2.00	2.50	6.94	450.00	12.50	6.94
PR3	0.90	0.11	20.0	22.00	2.00%	0.27	1.35	128.00	1.00%	2.00	1.07	2.42	150.00	10.83	2.42
PR4	0.90	1.68	20.0	10.00	2.00%	0.18	0.91	597.00	1.60%	2.53	3.93	4.85	607.00	13.37	4.85
PR5	0.90	0.39	20.0	10.00	1.96%	0.18	0.92	353.00	1.60%	2.53	2.33	3.24	363.00	12.02	3.24
PR6	0.90	0.72	20.0	10.00	2.00%	0.18	0.91	368.00	1.34%	2.32	2.65	3.56	378.00	12.10	3.56
PR7	0.90	1.41	20.0	15.00	2.20%	0.23	1.08	320.00	1.56%	2.50	2.14	3.22	335.00	11.86	3.22
PR8	0.90	0.22	20.0	25.00	2.00%	0.29	1.44	108.00	1.56%	2.50	0.72	2.16	133.00	10.74	2.16

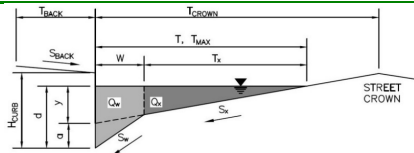
APPENDIX C – HYDRAULIC CALCULATIONS

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

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

Project: Village at Lorson Ranch

Inlet ID: Inlet DP1



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

$T_{BACK} = 5.0$ ft
 $S_{BACK} = 0.020$ ft/ft
 $n_{BACK} = 0.015$

Height of Curb at Gutter Flow Line
 Distance from Curb Face to Street Crown
 Gutter Width
 Street Transverse Slope
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)
 Street Longitudinal Slope - Enter 0 for sump condition
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$H_{CURB} = 6.00$ inches
 $T_{CROWN} = 17.0$ ft
 $W = 2.00$ ft
 $S_X = 0.020$ ft/ft
 $S_W = 0.083$ ft/ft
 $S_0 = 0.000$ ft/ft
 $n_{STREET} = 0.018$

Max. Allowable Spread for Minor & Major Storm
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm
 Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	5.5	7.0	inches
	<input type="checkbox"/>	<input type="checkbox"/>	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
 MAJOR STORM Allowable Capacity is not applicable to Sump Condition

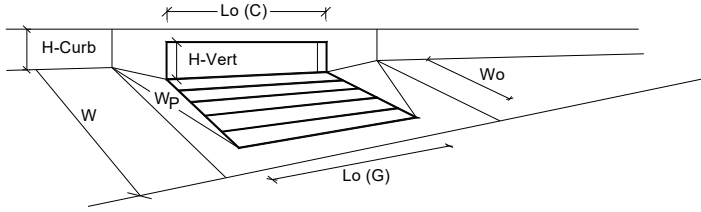
$Q_{allow} =$

Minor Storm	Major Storm
SUMP	SUMP

 cfs

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)	
Type of Inlet	CDOT Type R Curb Opening
Local Depression (additional to continuous gutter depression 'a' from above)	
Number of Unit Inlets (Grate or Curb Opening)	
Water Depth at Flowline (outside of local depression)	
Grate Information	
Length of a Unit Grate	
Width of a Unit Grate	
Open Area Ratio for a Grate (typical values 0.15-0.90)	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	
Grate Weir Coefficient (typical value 2.15 - 3.60)	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	
Curb Opening Information	
Length of a Unit Curb Opening	
Height of Vertical Curb Opening in Inches	
Height of Curb Orifice Throat in Inches	
Angle of Throat	
Side Width for Depression Pan (typically the gutter width of 2 feet)	
Clogging Factor for a Single Curb Opening (typical value 0.10)	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	
Low Head Performance Reduction (Calculated)	
Depth for Grate Midwidth	
Depth for Curb Opening Weir Equation	
Grated Inlet Performance Reduction Factor for Long Inlets	
Curb Opening Performance Reduction Factor for Long Inlets	
Combination Inlet Performance Reduction Factor for Long Inlets	
Total Inlet Interception Capacity (assumes clogged condition)	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	

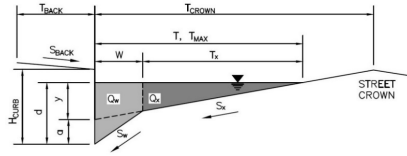
	MINOR	MAJOR	
Type =	CDOT Type R Curb Opening		
a _{local} =	3.00	3.00	inches
No =	1	1	
Ponding Depth =	5.5	6.9	inches
	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
L _o (G) =	N/A	N/A	feet
W _o =	N/A	N/A	feet
A _{ratio} =	N/A	N/A	
C _f (G) =	N/A	N/A	
C _w (G) =	N/A	N/A	
C _o (G) =	N/A	N/A	
	MINOR	MAJOR	
L _o (C) =	20.00	20.00	feet
H _{vert} =	6.00	6.00	inches
H _{throat} =	6.00	6.00	inches
Theta =	63.40	63.40	degrees
W _p =	2.00	2.00	feet
C _f (C) =	0.10	0.10	
C _w (C) =	3.60	3.60	
C _o (C) =	0.67	0.67	
	MINOR	MAJOR	
d _{Grate} =	N/A	N/A	ft
d _{Curb} =	0.29	0.41	ft
RF _{Grate} =	N/A	N/A	
RF _{Curb} =	0.75	0.84	
RF _{Combination} =	N/A	N/A	
	MINOR	MAJOR	
Q _a =	9.8	18.0	cfs
Q _{PEAK REQUIRED} =	9.4	17.0	cfs

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

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

Project: Village at Lorson Ranch

Inlet ID: Inlet DP1a



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

$T_{BACK} = 10.0$ ft
 $S_{BACK} = 0.020$ ft/ft
 $n_{BACK} = 0.020$

Height of Curb at Gutter Flow Line
 Distance from Curb Face to Street Crown
 Gutter Width
 Street Transverse Slope
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)
 Street Longitudinal Slope - Enter 0 for sump condition
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$H_{CURB} = 6.00$ inches
 $T_{CROWN} = 17.0$ ft
 $W = 2.00$ ft
 $S_X = 0.020$ ft/ft
 $S_W = 0.083$ ft/ft
 $S_0 = 0.000$ ft/ft
 $n_{STREET} = 0.016$

Max. Allowable Spread for Minor & Major Storm
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm
 Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	5.5	7.0	inches
	<input type="checkbox"/>	<input type="checkbox"/>	

[MINOR STORM Allowable Capacity is not applicable to Sump Condition](#)
[MAJOR STORM Allowable Capacity is not applicable to Sump Condition](#)

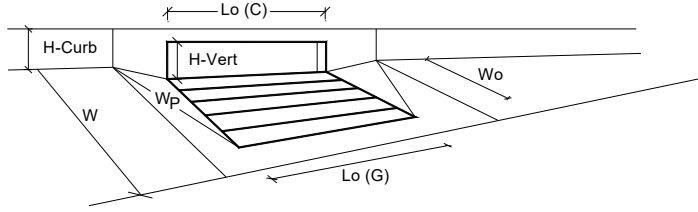
$Q_{allow} =$

Minor Storm	Major Storm
SUMP	SUMP

 cfs

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

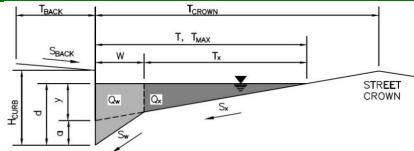


Design Information (Input)	MINOR MAJOR		
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	5.5	5.6	inches
Grate Information	MINOR	MAJOR	<input type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
Curb Opening Information	MINOR	MAJOR	
Length of a Unit Curb Opening	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
Low Head Performance Reduction (Calculated)	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.29	0.30	ft
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)	4.4	4.6	cfs
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	0.5	0.9	cfs

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

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

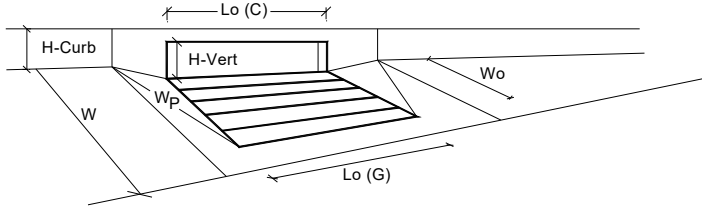
Project: Village at Lorson Ranch
Inlet ID: Inlet DP3



Gutter Geometry:					
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="10.0"/> ft				
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft				
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/>				
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches				
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft				
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft				
Street Transverse Slope	$S_X = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft				
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft				
Street Longitudinal Slope - Enter 0 for sump condition	$S_0 = $ <input style="width: 50px;" type="text" value="0.000"/> ft/ft				
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.016"/>				
Max. Allowable Spread for Minor & Major Storm	$T_{MAX} = $ <table style="display: inline-table; border: none;"><tr><td style="padding: 0 10px;">Minor Storm</td><td style="padding: 0 10px;">Major Storm</td></tr><tr><td style="border: 1px solid black; text-align: center;">17.0</td><td style="border: 1px solid black; text-align: center;">17.0</td></tr></table> ft	Minor Storm	Major Storm	17.0	17.0
Minor Storm	Major Storm				
17.0	17.0				
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	$d_{MAX} = $ <table style="display: inline-table; border: none;"><tr><td style="padding: 0 10px;">Minor Storm</td><td style="padding: 0 10px;">Major Storm</td></tr><tr><td style="border: 1px solid black; text-align: center;">5.5</td><td style="border: 1px solid black; text-align: center;">7.0</td></tr></table> inches	Minor Storm	Major Storm	5.5	7.0
Minor Storm	Major Storm				
5.5	7.0				
Check boxes are not applicable in SUMP conditions	<input type="checkbox"/> <input type="checkbox"/>				
MINOR STORM Allowable Capacity is not applicable to Sump Condition					
MAJOR STORM Allowable Capacity is not applicable to Sump Condition					
$Q_{allow} =$	<table style="display: inline-table; border: none;"><tr><td style="padding: 0 10px;">Minor Storm</td><td style="padding: 0 10px;">Major Storm</td></tr><tr><td style="border: 1px solid black; text-align: center;">SUMP</td><td style="border: 1px solid black; text-align: center;">SUMP</td></tr></table> cfs	Minor Storm	Major Storm	SUMP	SUMP
Minor Storm	Major Storm				
SUMP	SUMP				

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

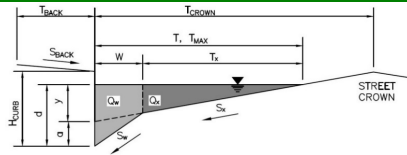


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	5.5	5.6	inches
Grate Information			
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
Curb Opening Information			
Length of a Unit Curb Opening	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
Low Head Performance Reduction (Calculated)			
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.29	0.30	ft
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	0.90	0.91	
Combination Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Summary			
Total Inlet Interception Capacity (assumes clogged condition)	6.6	6.9	cfs
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	3.1	5.6	cfs

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

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

Project: Village at Lorson Ranch
Inlet ID: Inlet DP4



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)
 Height of Curb at Gutter Flow Line
 Distance from Curb Face to Street Crown
 Gutter Width
 Street Transverse Slope
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)
 Street Longitudinal Slope - Enter 0 for sump condition
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$T_{BACK} = 10.0$ ft
 $S_{BACK} = 0.020$ ft/ft
 $n_{BACK} = 0.020$

$H_{CURB} = 6.00$ inches
 $T_{CROWN} = 19.0$ ft
 $W = 2.00$ ft
 $S_X = 0.020$ ft/ft
 $S_W = 0.083$ ft/ft
 $S_O = 0.009$ ft/ft
 $n_{STREET} = 0.016$

Max. Allowable Spread for Minor & Major Storm
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm
 Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	19.0	ft
$d_{MAX} =$	5.5	6.0	inches
	<input type="checkbox"/>	<input type="checkbox"/>	

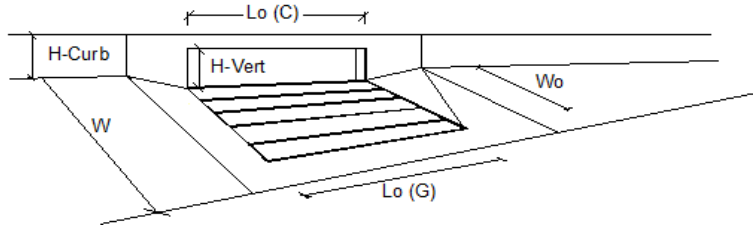
MINOR STORM Allowable Capacity is based on Depth Criterion
 MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
$Q_{allow} =$	9.7	13.1	cfs

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 7.20 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 13.10 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

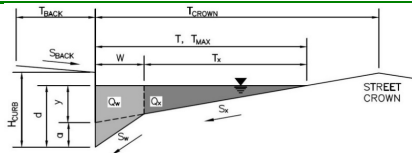


Design Information (input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	10	10.10	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity			
Total Inlet Interception Capacity	Q = 5.9	8.1	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q_s = 1.3	5.0	cfs
Capture Percentage = Q _i /Q _s	C% = 81	61	%

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

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

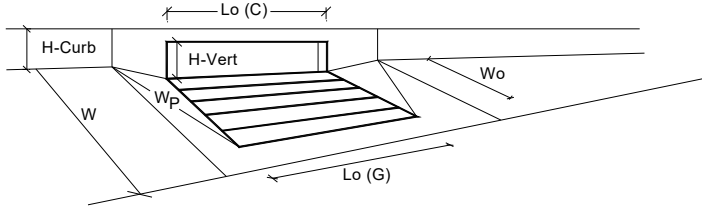
Project: Village at Lorson Ranch
Inlet ID: Inlet DP5



Gutter Geometry:							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="10.0"/> ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/>						
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft						
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft						
Street Transverse Slope	$S_X = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_0 = $ <input style="width: 50px;" type="text" value="0.000"/> ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.016"/>						
Max. Allowable Spread for Minor & Major Storm	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 2px;">Minor Storm</td> <td style="text-align: center; padding: 2px;">Major Storm</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="text-align: center; border: 1px solid black;"><input style="width: 50px;" type="text" value="17.0"/></td> <td style="text-align: center; border: 1px solid black;"><input style="width: 50px;" type="text" value="17.0"/></td> <td style="padding: 2px;"></td> </tr> </table>	Minor Storm	Major Storm	ft	<input style="width: 50px;" type="text" value="17.0"/>	<input style="width: 50px;" type="text" value="17.0"/>	
Minor Storm	Major Storm	ft					
<input style="width: 50px;" type="text" value="17.0"/>	<input style="width: 50px;" type="text" value="17.0"/>						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 2px;">Minor Storm</td> <td style="text-align: center; padding: 2px;">Major Storm</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="text-align: center; border: 1px solid black;"><input style="width: 50px;" type="text" value="5.5"/></td> <td style="text-align: center; border: 1px solid black;"><input style="width: 50px;" type="text" value="5.5"/></td> <td style="padding: 2px;"></td> </tr> </table>	Minor Storm	Major Storm	inches	<input style="width: 50px;" type="text" value="5.5"/>	<input style="width: 50px;" type="text" value="5.5"/>	
Minor Storm	Major Storm	inches					
<input style="width: 50px;" type="text" value="5.5"/>	<input style="width: 50px;" type="text" value="5.5"/>						
Check boxes are not applicable in SUMP conditions	<input type="checkbox"/> <input type="checkbox"/>						
MINOR STORM Allowable Capacity is not applicable to Sump Condition							
MAJOR STORM Allowable Capacity is not applicable to Sump Condition							
Q_{allow} =	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 2px;">Minor Storm</td> <td style="text-align: center; padding: 2px;">Major Storm</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="text-align: center; border: 1px solid black;"><input style="width: 50px;" type="text" value="SUMP"/></td> <td style="text-align: center; border: 1px solid black;"><input style="width: 50px;" type="text" value="SUMP"/></td> <td style="padding: 2px;"></td> </tr> </table>	Minor Storm	Major Storm	cfs	<input style="width: 50px;" type="text" value="SUMP"/>	<input style="width: 50px;" type="text" value="SUMP"/>	
Minor Storm	Major Storm	cfs					
<input style="width: 50px;" type="text" value="SUMP"/>	<input style="width: 50px;" type="text" value="SUMP"/>						

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



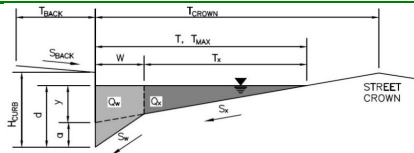
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	5.5	7.2	inches
Grate Information	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
Curb Opening Information	MINOR	MAJOR	
Length of a Unit Curb Opening	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
Low Head Performance Reduction (Calculated)	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.29	0.43	ft
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)	4.4	8.0	cfs
WARNING: Inlet Capacity < Q Peak for Major Storm	3.0	8.0	cfs

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

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

Project: Village at Lorson Ranch

Inlet ID: Inlet DP7



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

$T_{BACK} = 10.0$ ft
 $S_{BACK} = 0.020$ ft/ft
 $n_{BACK} = 0.020$

Height of Curb at Gutter Flow Line
 Distance from Curb Face to Street Crown

$H_{CURB} = 6.00$ inches
 $T_{CROWN} = 17.0$ ft

Gutter Width
 Street Transverse Slope

$W = 2.00$ ft
 $S_X = 0.020$ 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

$S_0 = 0.000$ ft/ft

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$n_{STREET} = 0.016$

Max. Allowable Spread for Minor & Major Storm

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft

Max. Allowable Depth at Gutter Flowline for Minor & Major Storm

	Minor Storm	Major Storm	
$d_{MAX} =$	5.5	7.0	inches

Check boxes are not applicable in SUMP conditions

MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

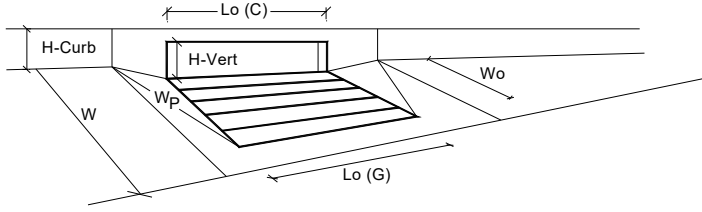
$Q_{allow} =$

Minor Storm	Major Storm
SUMP	SUMP

 cfs

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

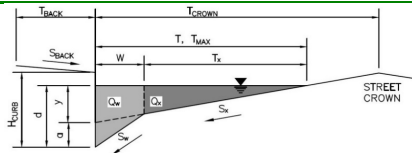


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	5.5	6.5	inches
Grate Information	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
Curb Opening Information	MINOR	MAJOR	
Length of a Unit Curb Opening	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
Low Head Performance Reduction (Calculated)	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.29	0.38	ft
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	0.90	0.96	
Combination Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)	MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	6.6	10.2	cfs
Q _{PEAK REQUIRED}	5.3	9.7	cfs

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

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

Project: Village at Lorson Ranch
Inlet ID: Inlet DP8



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)
 Height of Curb at Gutter Flow Line
 Distance from Curb Face to Street Crown
 Gutter Width
 Street Transverse Slope
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)
 Street Longitudinal Slope - Enter 0 for sump condition
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

T_{BACK}	=	10.0	ft
S_{BACK}	=	0.020	ft/ft
n_{BACK}	=	0.020	
H_{CURB}	=	6.00	inches
T_{CROWN}	=	17.0	ft
W	=	2.00	ft
S_x	=	0.020	ft/ft
S_w	=	0.083	ft/ft
S_o	=	0.000	ft/ft
n_{STREET}	=	0.016	

Max. Allowable Spread for Minor & Major Storm
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm
 Check boxes are not applicable in SUMP conditions

T_{MAX}	=	Minor Storm	Major Storm	ft
d_{MAX}	=	17.0	17.0	inches
		<input type="checkbox"/>	<input type="checkbox"/>	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
 MAJOR STORM Allowable Capacity is not applicable to Sump Condition

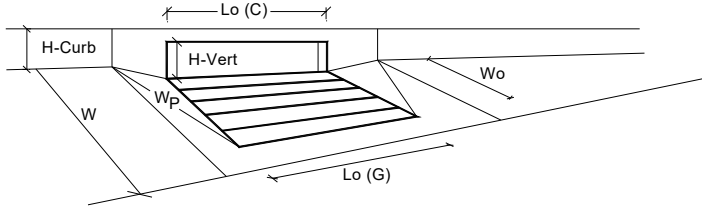
Q_{allow} =

Minor Storm	Major Storm
SUMP	SUMP

 cfs

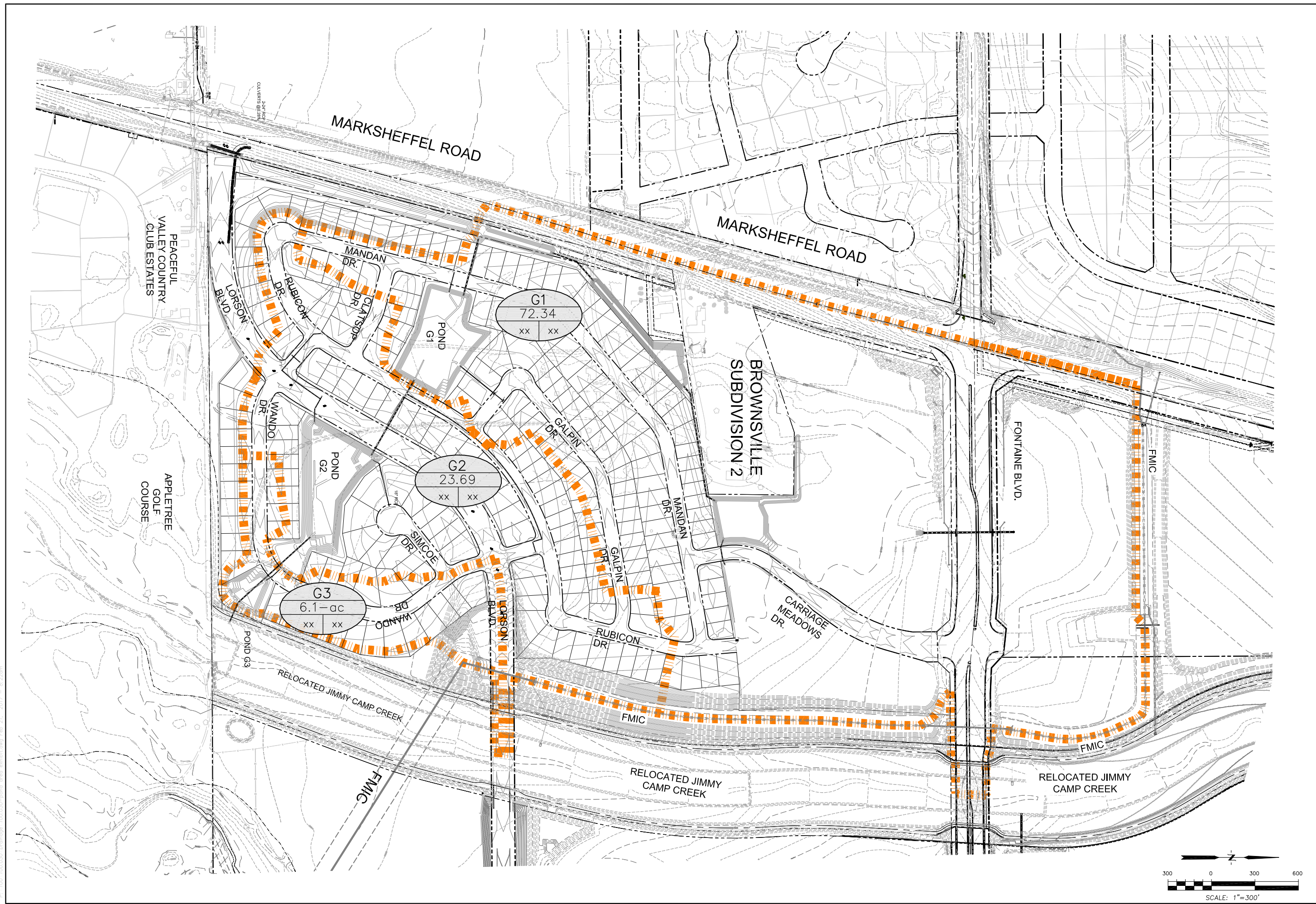
INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)




Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	5.5	5.6	inches
Grate Information	MINOR	MAJOR	<input type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
Curb Opening Information	MINOR	MAJOR	
Length of a Unit Curb Opening	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
Low Head Performance Reduction (Calculated)	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.29	0.30	ft
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)	4.4	4.6	cfs
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	0.9	1.7	cfs

APPENDIX D – POND G1/G2



P: 100.100.030 (Revised) 100.030-road area exhibit.dwg Edt. 21 - 2017 - 8:22am

 CORE ENGINEERING GROUP 15004 1ST AVE. S. BURNSVILLE, MN 55306 PH: 719.570.1100 CONTACT: RICHARD L. SCHINDLER, P.E. EMAIL: Rich@cegi.com			
NO.	DESCRIPTION	DATE	
PREPARED FOR: LORSON, LLC 212 N. WASHATCH AVE. SUITE 301 COLORADO SPRING, CO 80903 CONTACT: JEFF MARK			
PROJECT: CARRIAGE MEADOWS SOUTH FILING NO. 1 FONTAINE BLVD. - OLD GLORY DRIVE EL PASO COUNTY, COLORADO			
DRAWN: RLS		DESIGNED: LAB	
CHECKED: LAB			
DETENTION POND WATERSHEDS DRAINAGE PLAN CARRIAGE MEADOWS SOUTH			
		DATE JANUARY, 2017	
		PROJECT NO. 100.030	
		SHEET NUMBER 1	
		TOTAL SHEETS: 1	



June 27, 2023

El Paso County Planning and Community Development
2880 International Circle, Suite 110
Colorado Springs, CO 80910

RE: Carriage Meadows South Filing No. 1 (SF 17-011)
Certification Letter

Dear El Paso County PCD,

Based upon information gathered from as-built surveys and periodic visits to the project, Core Engineering Group is of the opinion that the subdivision improvements have been constructed in general conformance with the approved design plans as filed with El Paso County.

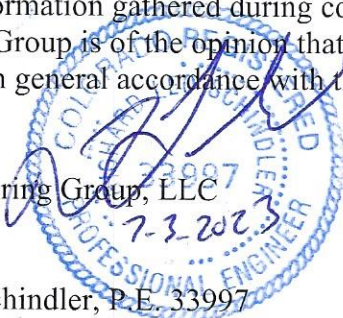
The site and adjacent properties (as affected by work performed under the County permit) appear to be stable with respect to settlement and subsidence, sloughing of cut and fill slopes, revegetation or other ground cover, and the improvements (public improvements, common development improvements, site grading and paving) visually appear to meet or exceed the minimum design requirements. There have been some service line utility trench settlements but that is currently being addressed as part of the punchlist process.

The sanitary and watermain located in the public ROW has also been completed in accordance with Widefield Water and Sanitation Districts criteria.

In addition, Core Engineering Group has verified that the Extended Detention Basin/WQ Pond G1, G2, and G3 have been constructed and certified and meet the volume and elevation requirements and have been constructed in general compliance with the approved construction plans. The outlet structure for Pond G3 did change slightly from the design so the full spectrum spreadsheet was updated for this pond and it meets the design output as shown in the approved final drainage report.

Based on information gathered during construction and post-construction, Core Engineering Group is of the opinion that the public streets and storm sewer have been constructed in general accordance with the approved construction documents.

Sincerely,
Core Engineering Group, LLC



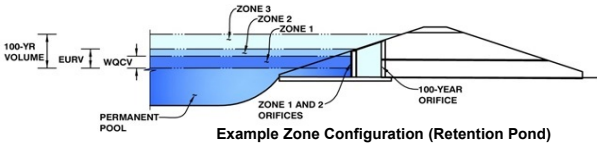
Richard L. Schindler, P.E. 33997

Pond G1/G2, G3 As-builts
Street/storm As-builts

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Carriage Meadows South at Lorson Ranch
Basin ID: Full Spectrum Pond G3 - asbuilt



	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.16	0.111	Orifice Plate
Zone 2 (EURV)	3.52	0.246	Rectangular Orifice
Zone 3 (100-year)	4.45	0.223	Weir&Pipe (Restrict)
		0.580	Total

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

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

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft ²
Underdrain Orifice Centroid =	N/A	feet

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	2.16	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	0.61	sq. inches (diameter = 7/8 inch)

Calculated Parameters for Plate

WQ Orifice Area per Row =	4.236E-03	ft ²
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft ²

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	0.70	1.45					
Orifice Area (sq. inches)	0.61	0.61	0.61					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	2.16	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	3.80	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	2.00	N/A	inches
Vertical Orifice Width =	2.00		inches

Calculated Parameters for Vertical Orifice

	Zone 2 Rectangular	Not Selected	
Vertical Orifice Area =	0.03	N/A	ft ²
Vertical Orifice Centroid =	0.08	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, H _o =	3.50	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	4.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	5.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	% grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H _t =	3.50	N/A	feet
Over Flow Weir Slope Length =	5.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	7.92	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	14.00	N/A	ft ²
Overflow Grate Open Area w/ Debris =	7.00	N/A	ft ²

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	2.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	18.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	1.77	N/A	ft ²
Outlet Orifice Centroid =	0.75	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	3.14	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =	4.56	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	30.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

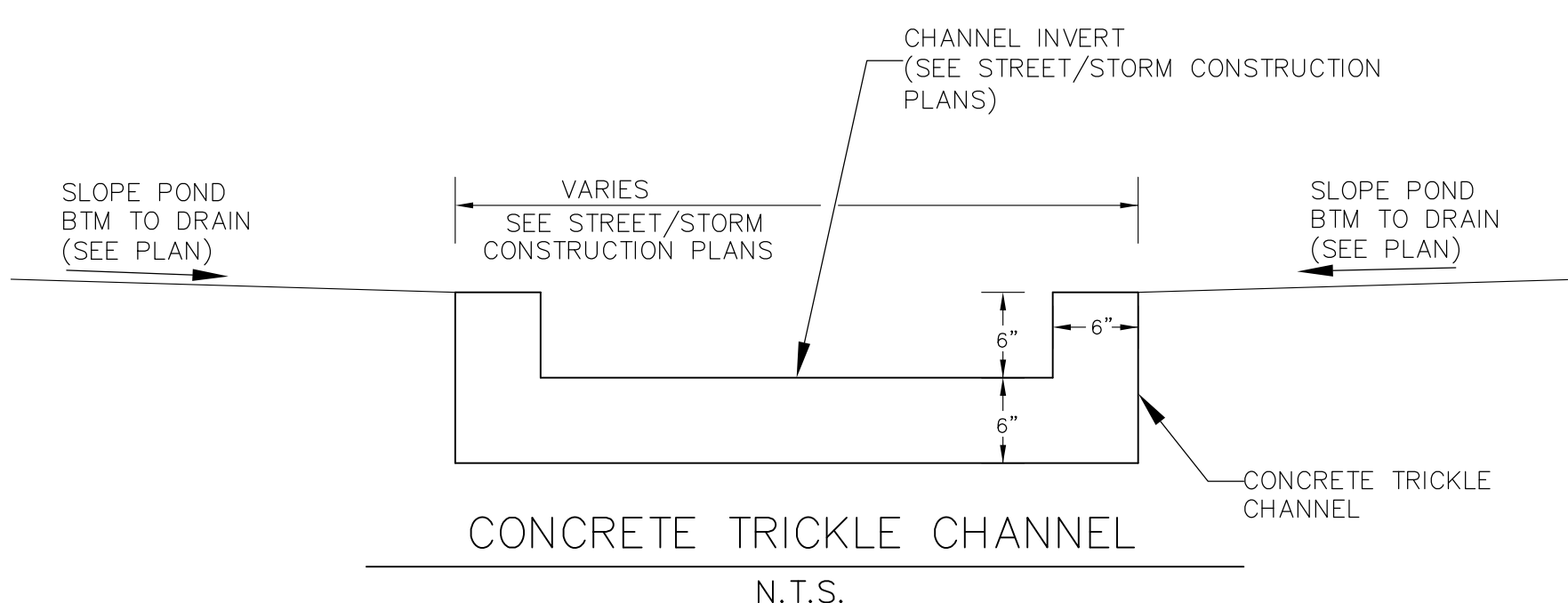
Calculated Parameters for Spillway

Spillway Design Flow Depth =	0.30	feet
Stage at Top of Freeboard =	5.86	feet
Basin Area at Top of Freeboard =	0.32	acres

asblt orifice-82.94

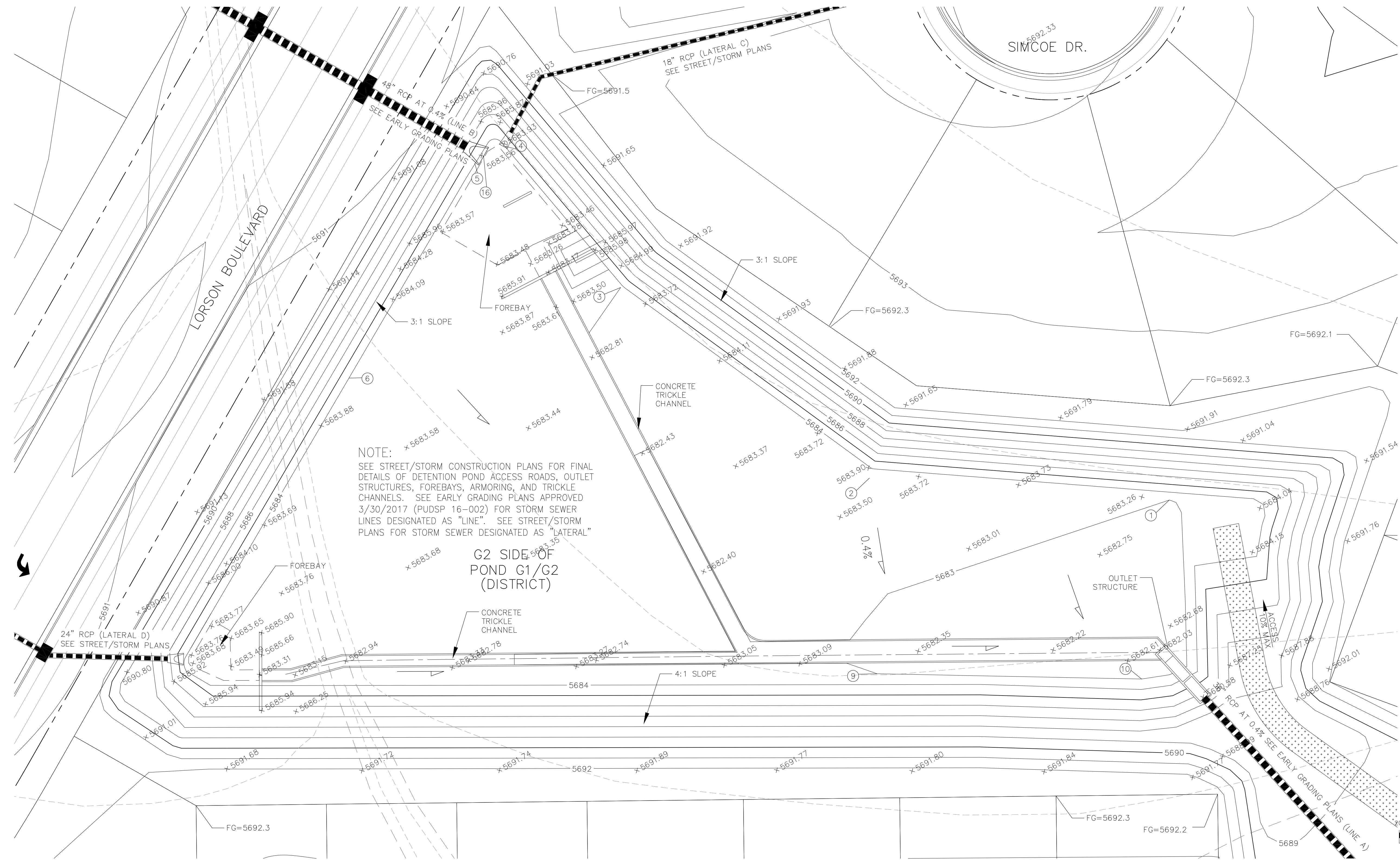
Routed Hydrograph Results

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period	0.53	1.07	1.16	1.44	1.68	1.92	2.16	2.42	0.00
One-Hour Rainfall Depth (in)									
Calculated Runoff Volume (acre-ft)	0.111	0.357	0.283	0.378	0.501	0.678	0.802	0.966	0.000
OPTIONAL Override Runoff Volume (acre-ft)									
Inflow Hydrograph Volume (acre-ft)	0.110	0.356	0.283	0.377	0.501	0.678	0.802	0.966	#N/A
Predevelopment Unit Peak Flow, q (cfs/acre)	0.00	0.00	0.01	0.02	0.17	0.57	0.80	1.08	0.00
Predevelopment Peak Q (cfs)	0.0	0.0	0.1	0.1	1.0	3.5	4.8	6.5	0.0
Peak Inflow Q (cfs)	1.7	5.4	4.3	5.8	7.6	10.3	12.1	14.6	#N/A
Peak Outflow Q (cfs)	0.1	0.2	0.2	0.2	2.4	5.5	7.4	10.2	#N/A
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	2.3	2.3	1.6	1.5	1.6	#N/A
Structure Controlling Flow	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	#N/A
Max Velocity through Grate 1 (fps)	N/A	N/A	N/A	N/A	0.1	0.4	0.5	0.7	#N/A
Max Velocity through Grate 2 (fps)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	#N/A
Time to Drain 97% of Inflow Volume (hours)	29	42	39	42	42	40	39	37	#N/A
Time to Drain 99% of Inflow Volume (hours)	31	46	43	47	47	46	45	44	#N/A
Maximum Ponding Depth (ft)	2.07	3.35	3.01	3.44	3.64	3.76	3.82	3.90	#N/A
Area at Maximum Ponding Depth (acres)	0.13	0.21	0.19	0.21	0.22	0.23	0.23	0.23	#N/A
Maximum Volume Stored (acre-ft)	0.098	0.320	0.254	0.342	0.385	0.412	0.426	0.445	#N/A



POINT TABLE				
NUMBER	NORTHING	EASTING	ELEVATION	NOTES
1	20426.91	20695.07	5683.00	POND BOTTOM
2	20435.42	20580.07	5683.19	POND BOTTOM
3	20508.55	20484.61	5683.80	POND BOTTOM
4	20562.75	20440.18	5684.00	POND BOTTOM
5	20556.24	20428.64	5684.00	POND BOTTOM
6	20473.78	20380.35	5684.00	POND BOTTOM
9	20360.30	20583.01	5683.00	POND BOTTOM

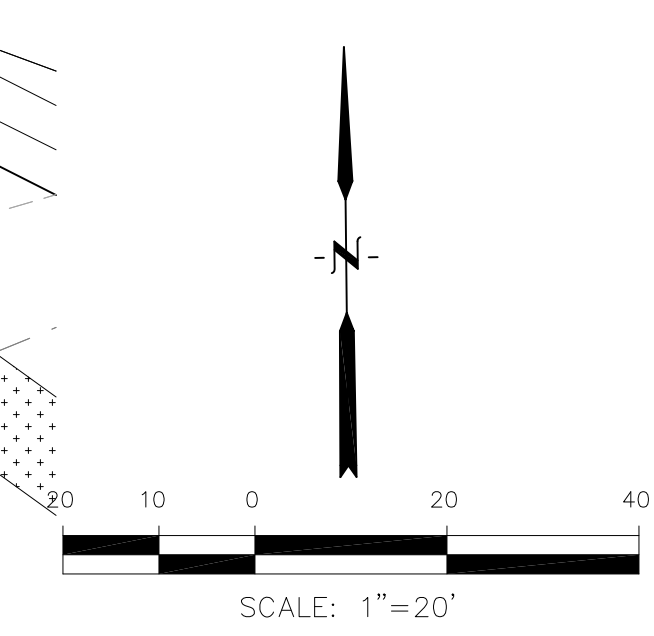
POINT TABLE				
NUMBER	NORTHING	EASTING	ELEVATION	NOTES
10	20358.26	20684.49	5683.00	POND BOTTOM
16	20558.92	20432.02	5683.55	INVERT 48" RCP



NOTE:
SEE STREET/STORM CONSTRUCTION PLANS FOR FINAL DETAILS OF DETENTION POND ACCESS ROADS, OUTLET STRUCTURES, FOREBAYS, ARMORING, AND TRICKLE CHANNELS. SEE EARLY GRADING PLANS APPROVED 3/30/2017 (PUDSP 16-002) FOR STORM SEWER LINES DESIGNATED AS "LINE". SEE STREET/STORM PLANS FOR STORM SEWER DESIGNATED AS "LATERAL"

G2 SIDE OF
POND G1/G2
(DISTRICT)

AS-BUILT
DATE: APRIL 6, 2018



CORE ENGINEERING GROUP
15004 15TH AVE. S. SUITE 301
DENVER, CO 80202
PHONE: 719.570.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@ceeg1.com

DATE: _____
DESCRIPTION: _____
NO. _____
DRAWN: RLS
DESIGNED: RLS
CHECKED: RLS

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

PROJECT:
**CARRIAGE MEADOWS SOUTH
AT LORSON RANCH FILL NO. 1**
FONTAINE BLVD. - CARRIAGE MEADOWS DR
EL PASO COUNTY, COLORADO

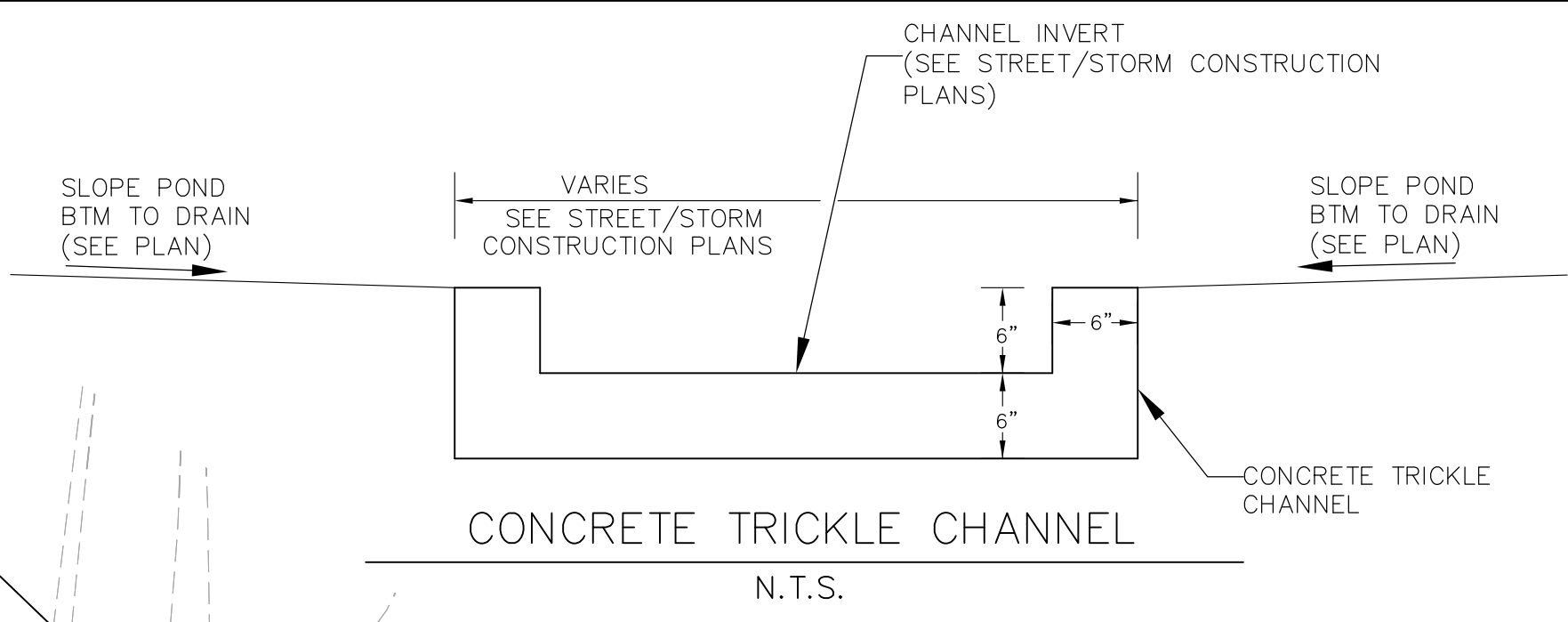
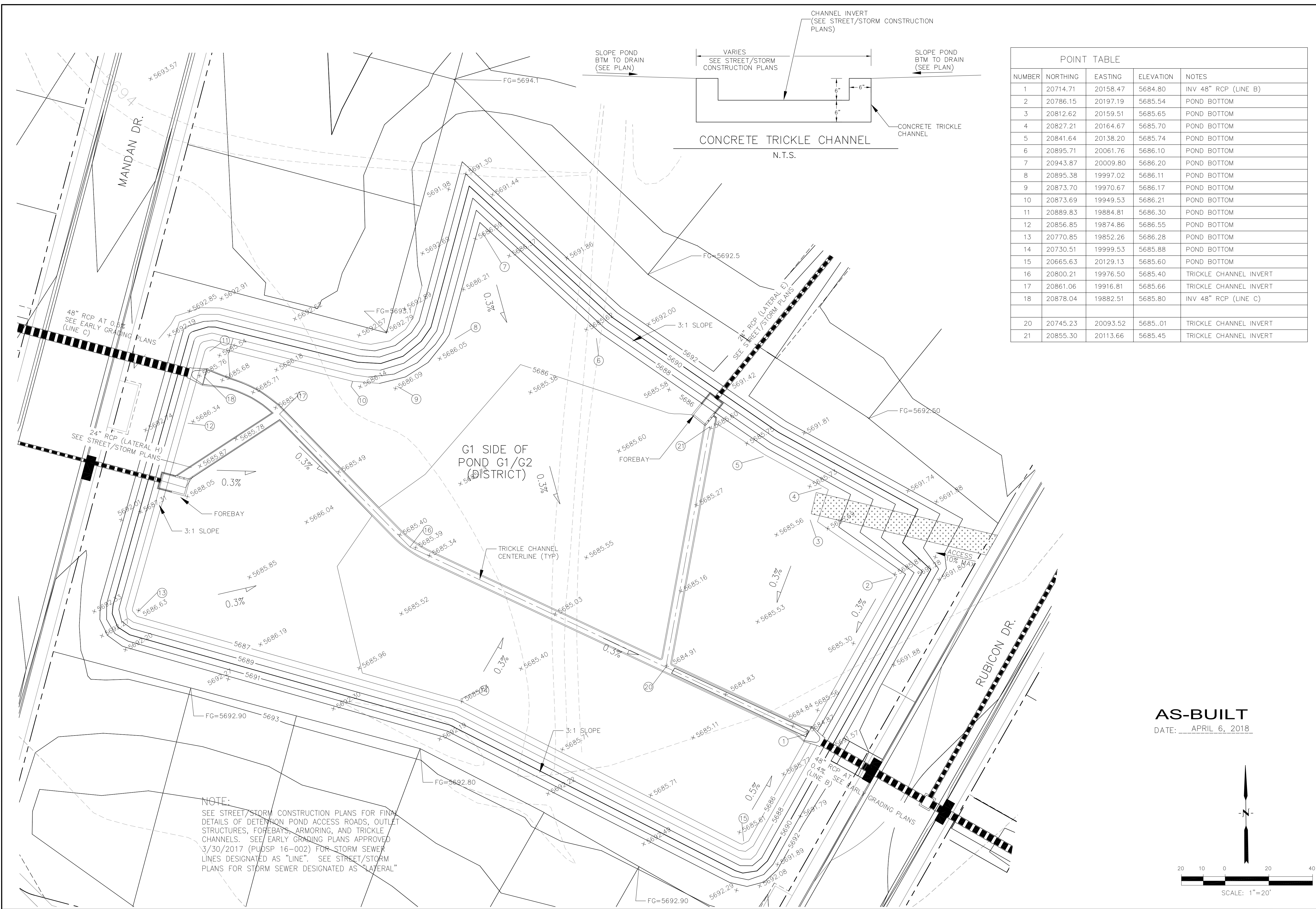
**G2 SIDE OF
DETENTION POND G1/G2 (DISTRICT)
CARRIAGE MEADOWS SOUTH**

DATE: **AUGUST 10, 2017**

PROJECT NO.: **100.030**

SHEET NUMBER: **C4.4**

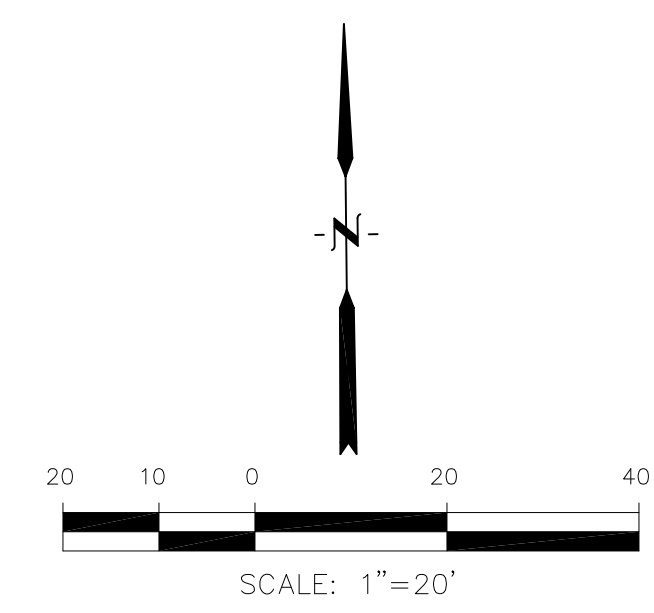
TOTAL SHEETS: **12**



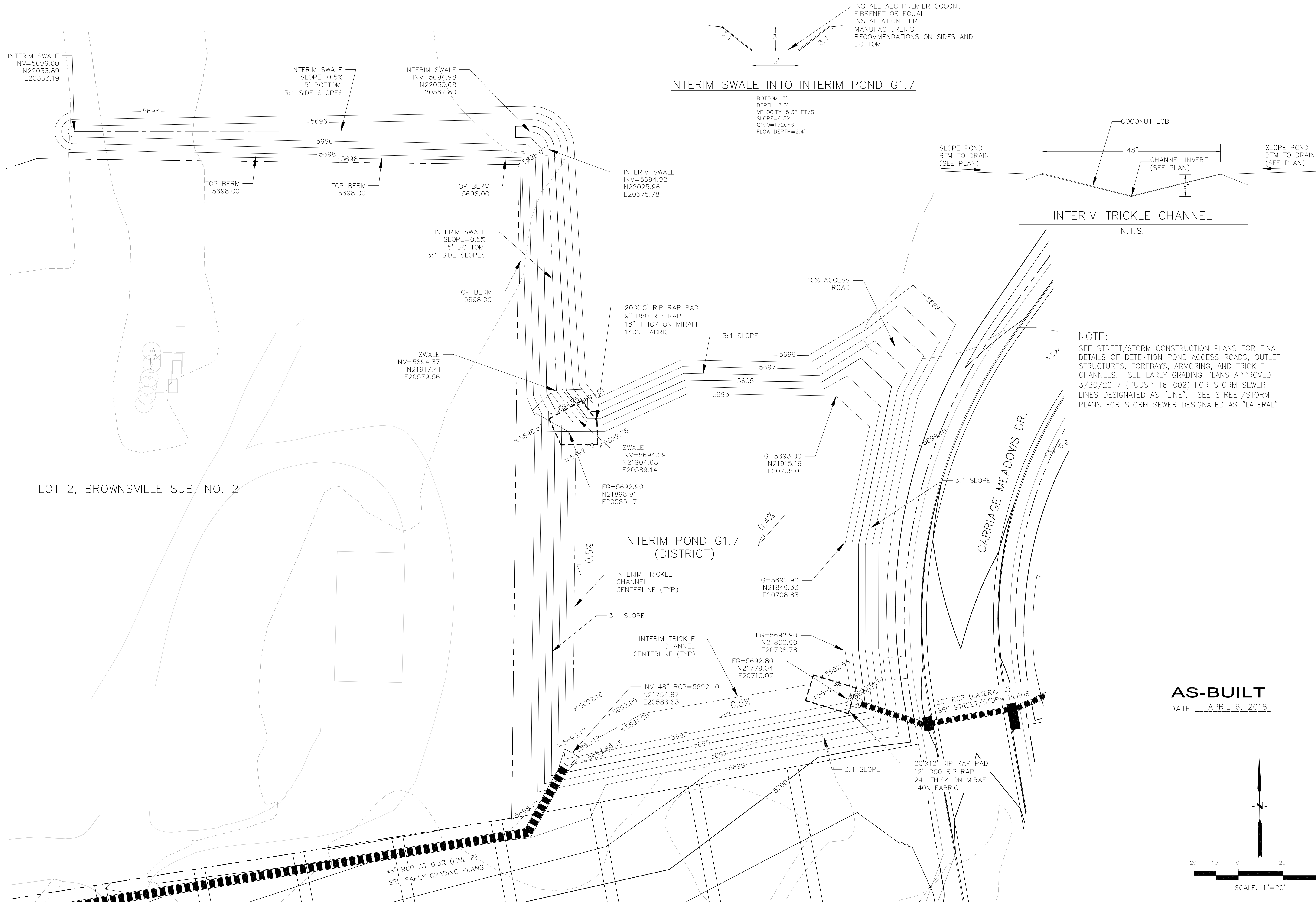
POINT TABLE				
NUMBER	NORTHING	EASTING	ELEVATION	NOTES
1	20714.71	20158.47	5684.80	INV 48" RCP (LINE B)
2	20786.15	20197.19	5685.54	POND BOTTOM
3	20812.62	20159.51	5685.65	POND BOTTOM
4	20827.21	20164.67	5685.70	POND BOTTOM
5	20841.64	20138.20	5685.74	POND BOTTOM
6	20895.71	20061.76	5686.10	POND BOTTOM
7	20943.87	20009.80	5686.20	POND BOTTOM
8	20895.38	19997.02	5686.11	POND BOTTOM
9	20873.70	19970.67	5686.17	POND BOTTOM
10	20873.69	19949.53	5686.21	POND BOTTOM
11	20889.83	19884.81	5686.30	POND BOTTOM
12	20856.85	19874.86	5686.55	POND BOTTOM
13	20770.85	19852.26	5686.28	POND BOTTOM
14	20730.51	19999.53	5685.88	POND BOTTOM
15	20665.63	20129.13	5685.60	POND BOTTOM
16	20800.21	19976.50	5685.40	TRICKLE CHANNEL INVERT
17	20861.06	19916.81	5685.66	TRICKLE CHANNEL INVERT
18	20878.04	19882.51	5685.80	INV 48" RCP (LINE C)
20	20745.23	20093.52	5685.01	TRICKLE CHANNEL INVERT
21	20855.30	20113.66	5685.45	TRICKLE CHANNEL INVERT

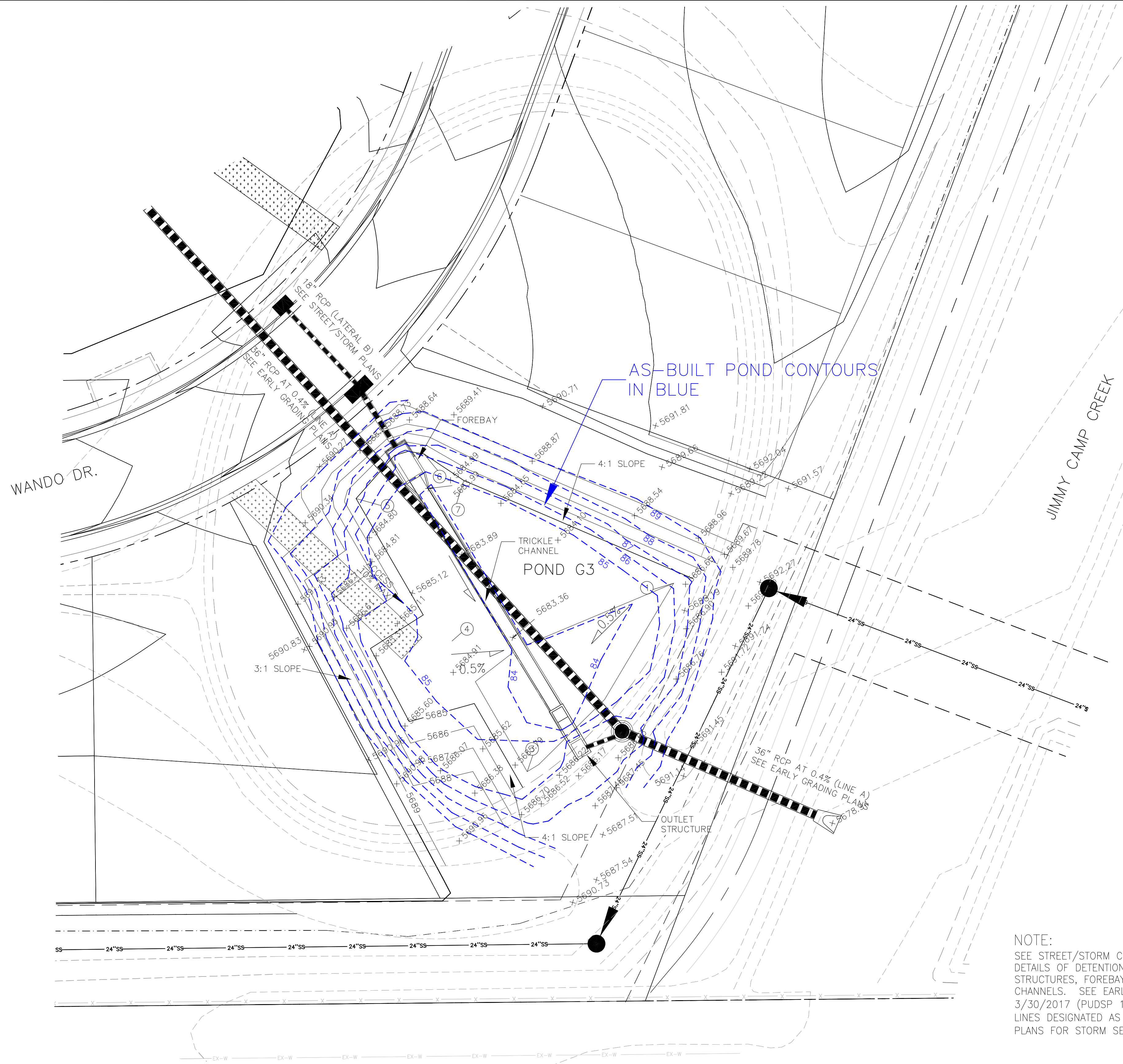
NOTE:
 SEE STREET/STORM CONSTRUCTION PLANS FOR FINAL DETAILS OF DETENTION POND ACCESS ROADS, OUTLET STRUCTURES, FOREBAYS, ARMORING, AND TRICKLE CHANNELS. SEE EARLY GRADING PLANS APPROVED 3/30/2017 (PUDSP 16-002) FOR STORM SEWER LINES DESIGNATED AS "LINE". SEE STREET/STORM PLANS FOR STORM SEWER DESIGNATED AS "LATERAL"

AS-BUILT
 DATE: APRIL 6, 2018



**G1 SIDE OF
 DETENTION POND G1/G2 (DISTRICT)
 CARRIAGE MEADOWS SOUTH**

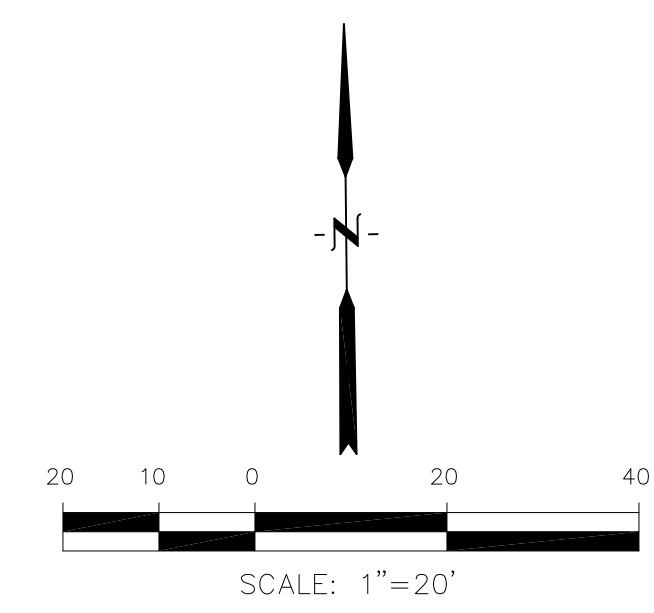




AS-BUILT POND CONTOURS
IN BLUE

POINT TABLE				
NUMBER	NORTHING	EASTING	ELEVATION	NOTES
1	20152.70	20951.65	5684	POND BOTTOM
3	20088.79	20901.93	5684	POND BOTTOM
4	20133.08	20876.39	5684.20	POND BOTTOM
5	20181.43	20843.88	5685	POND BOTTOM
6	20196.53	20866.94	5685	POND BOTTOM
7	20187.57	20880.42	5685	POND BOTTOM

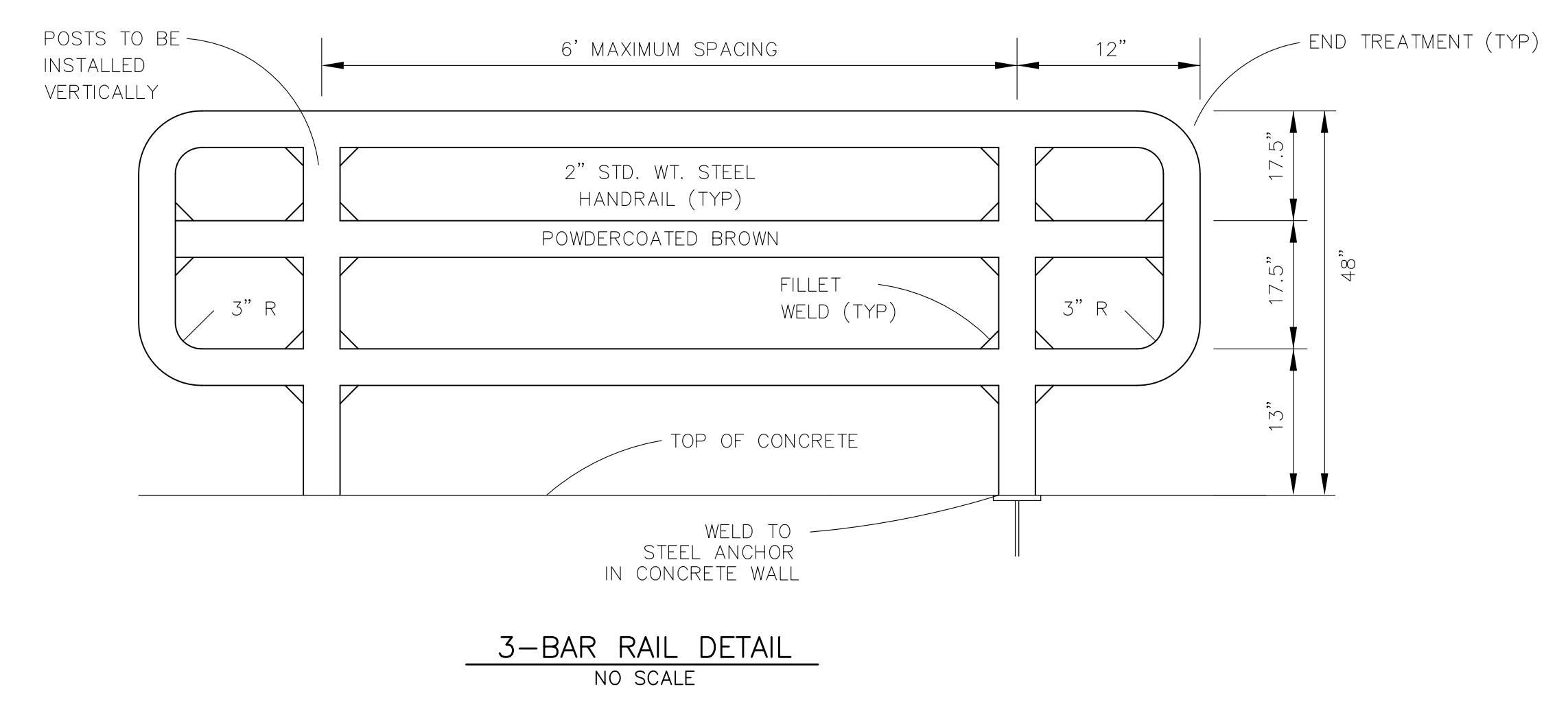
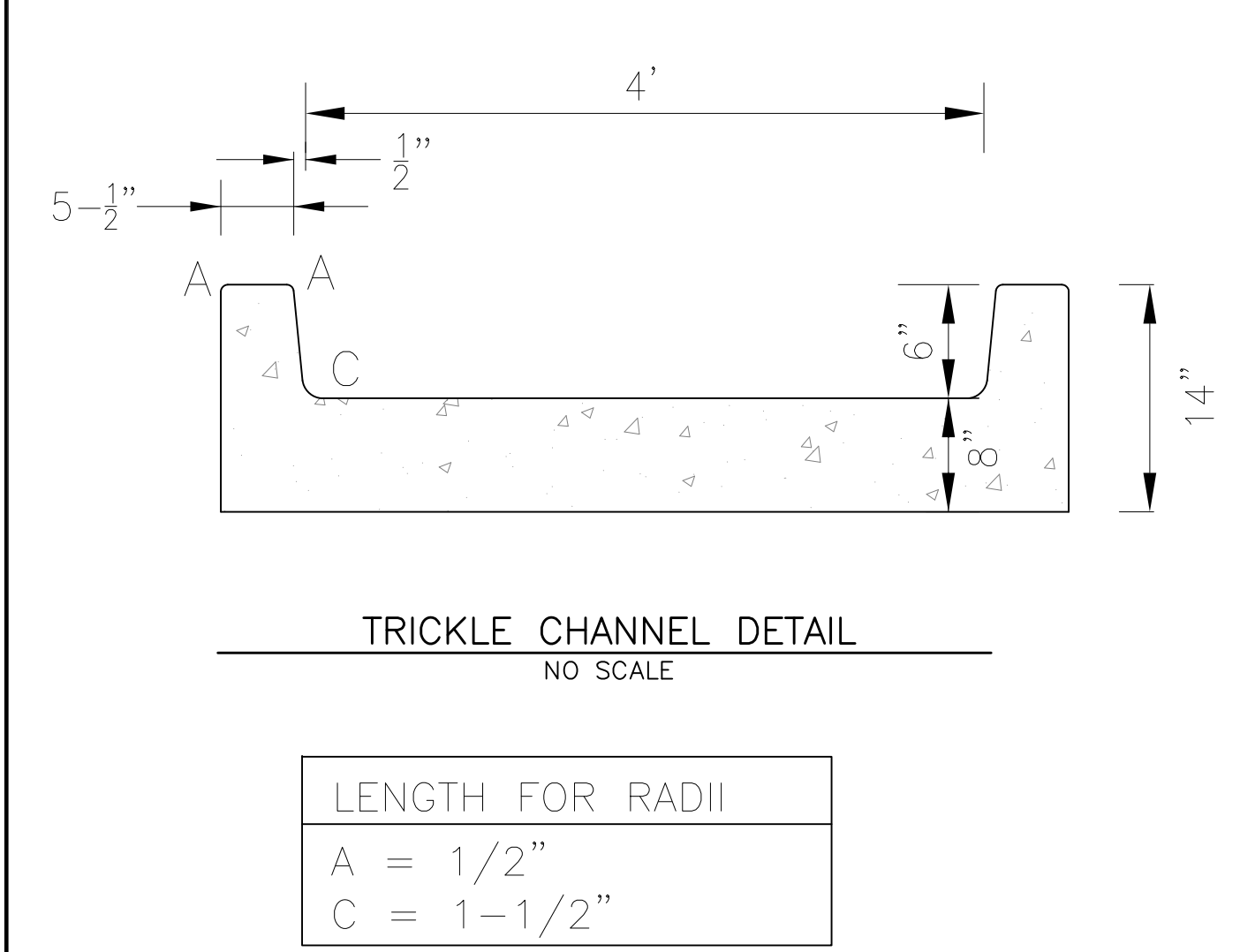
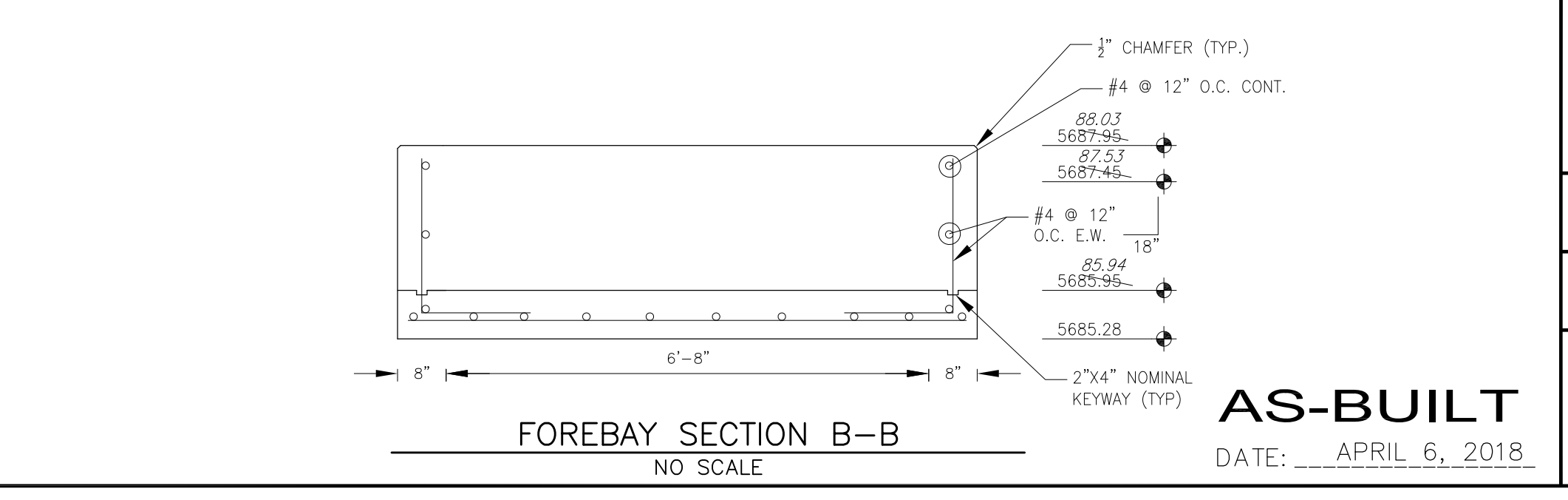
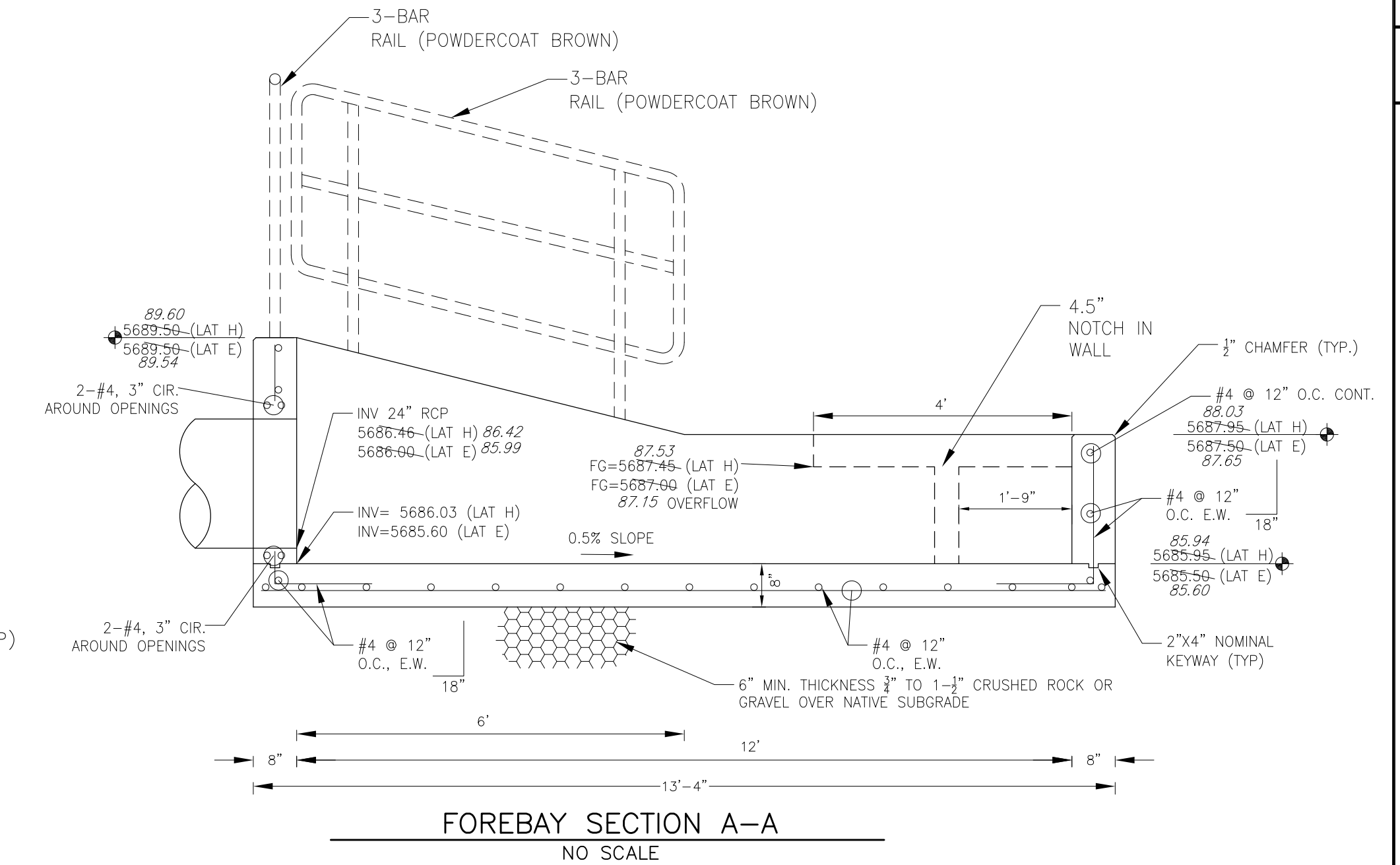
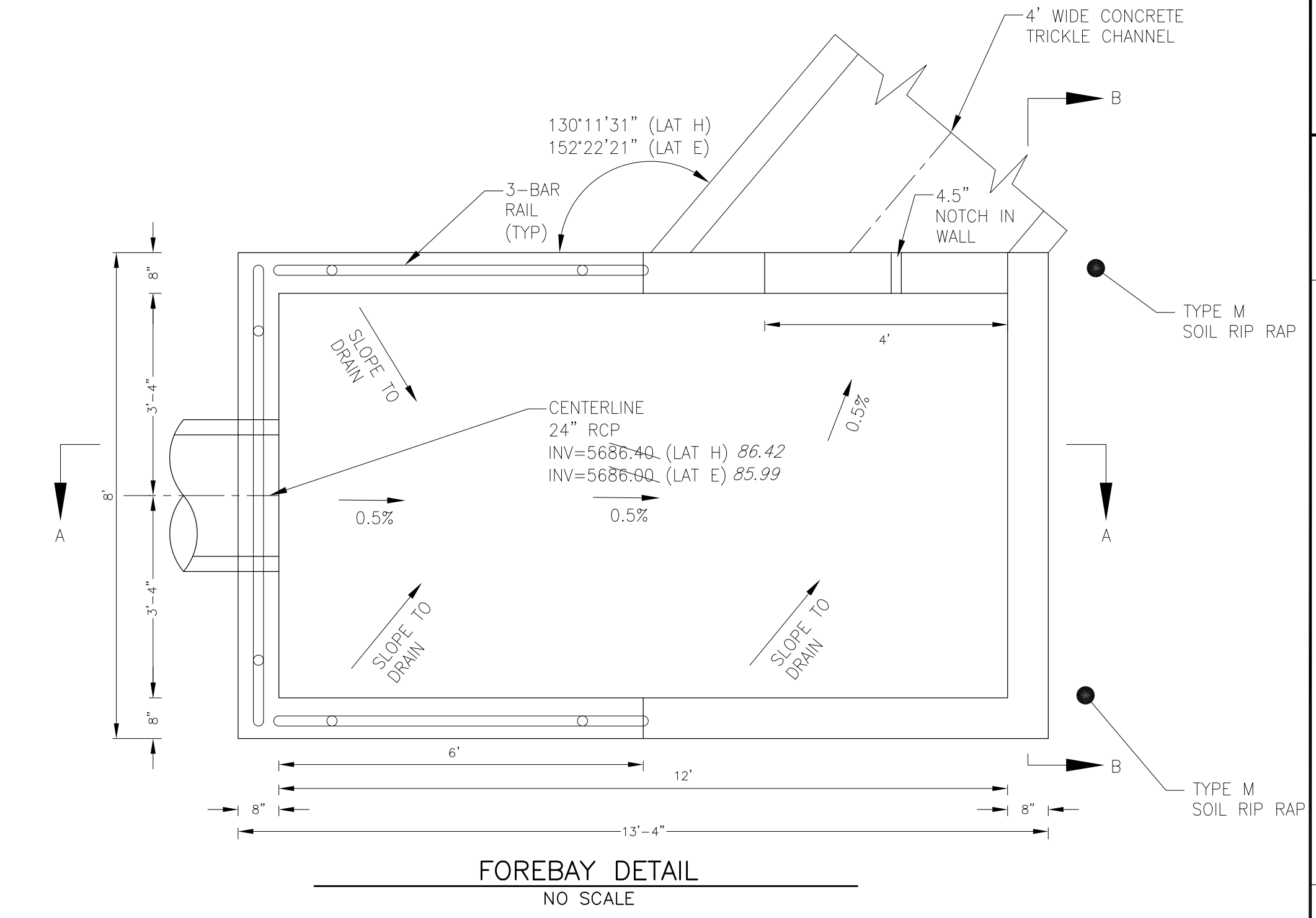
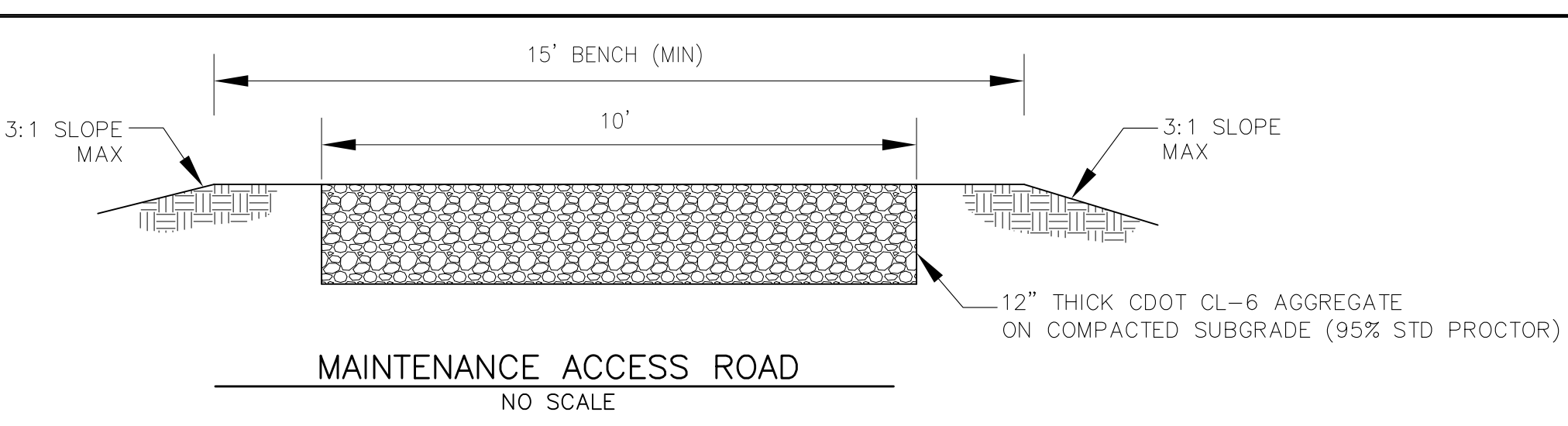
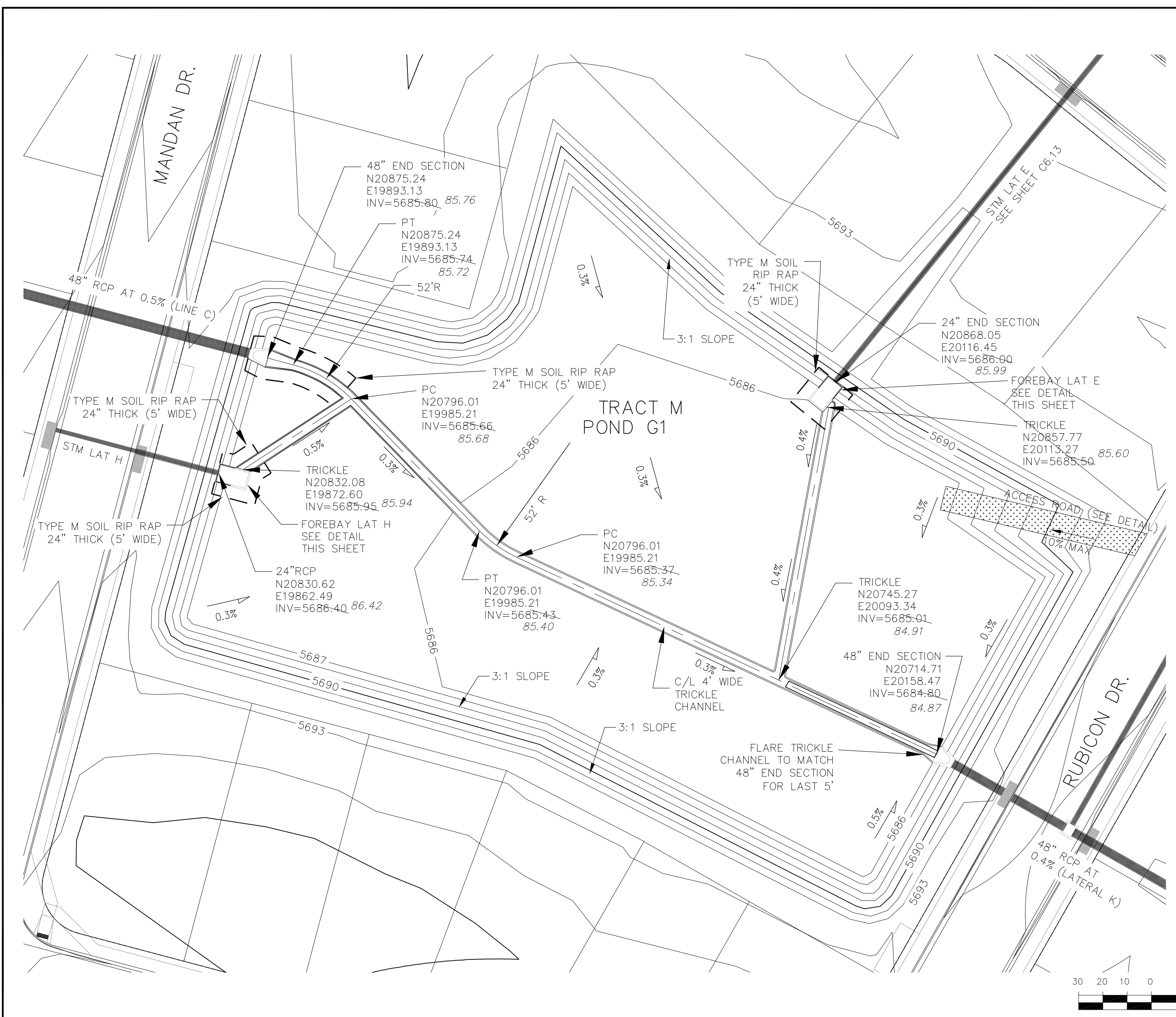
NOTE:
SEE STREET/STORM CONSTRUCTION PLANS FOR FINAL DETAILS OF DETENTION POND ACCESS ROADS, OUTLET STRUCTURES, FOREBAYS, ARMORING, AND TRICKLE CHANNELS. SEE EARLY GRADING PLANS APPROVED 3/30/2017 (PUDSP 16-002) FOR STORM SEWER LINES DESIGNATED AS "LINE". SEE STREET/STORM PLANS FOR STORM SEWER DESIGNATED AS "LATERAL"



APPLE TREE GOLF COURSE

AS-BUILT
DATE: APRIL 6, 2018

**DETENTION POND G3 (DISTRICT)
CARRIAGE MEADOWS SOUTH**



CORE ENGINEERING GROUP

15004 15TH AVE. S. SUITE 3010
DENVER, CO 80202
PHONE: 719.570.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@cegi.com

DATE

DESCRIPTION

NO.

PREPARED FOR:
LORSON, LLC
212 N. WAHSATCH AVE., SUITE 301
COLORADO SPRINGS, COLORADO 80903
CONTACT: JEFF MARK

PROJECT:
**CARRIAGE MEADOWS SOUTH
AT LORSON RANCH FILL NO. 1**
FONTAINE BLVD. - CARRIAGE MEADOWS DR
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: RLS
CHECKED: RLS

**POND G1/G2 (DISTRICT)
G1 SIDE OF POND
TRICKLE AND FOREBAY DETAILS**

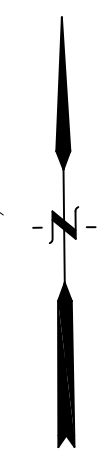
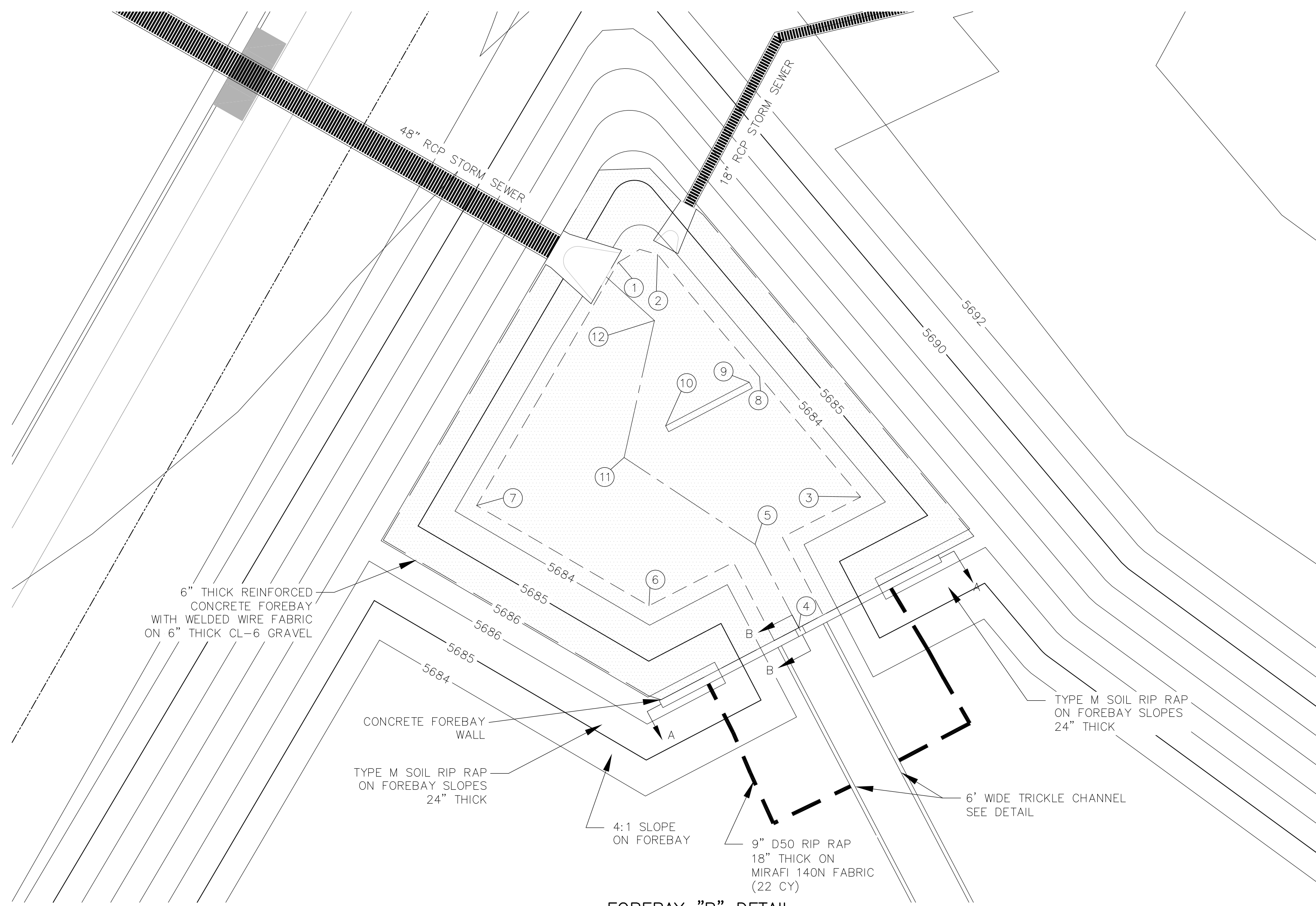
DATE
AUGUST 28, 2017

PROJECT NO.
100.030

SHEET NUMBER
C9.1

DATE
APRIL 6, 2018

TOTAL SHEETS: **39**



POINT TABLE				
NUMBER	NORTHING	EASTING	ELEVATION	NOTES
1	20560.79	20433.55	5683.54	FOREBAY BOTTOM
2	20561.80	20438.53	5683.54	FOREBAY BOTTOM
3	20530.94	20464.35	5683.54	FOREBAY BOTTOM
4	20514.32	20456.47	5683.30	FOREBAY BOTTOM
5	20524.93	20450.92	5683.35	FOREBAY BOTTOM
6	20517.12	20437.44	5683.54	FOREBAY BOTTOM
7	20529.87	20415.52	5683.54	FOREBAY BOTTOM
8	20546.23	20451.50	5683.54	FOREBAY BOTTOM
9	20545.54	20450.19	5683.53	ENERGY DISSIPATER WALL
10	20539.98	20439.55	5683.48	ENERGY DISSIPATER WALL
11	20535.97	20434.28	5683.43	FOREBAY BOTTOM
12	20553.38	20438.13	5683.50	FOREBAY BOTTOM

6" THICK REINFORCED CONCRETE FOREBAY WITH WELDED WIRE FABRIC ON 6" THICK CL-6 GRAVEL

CONCRETE FOREBAY WALL

TYPE M SOIL RIP RAP ON FOREBAY SLOPES 24" THICK

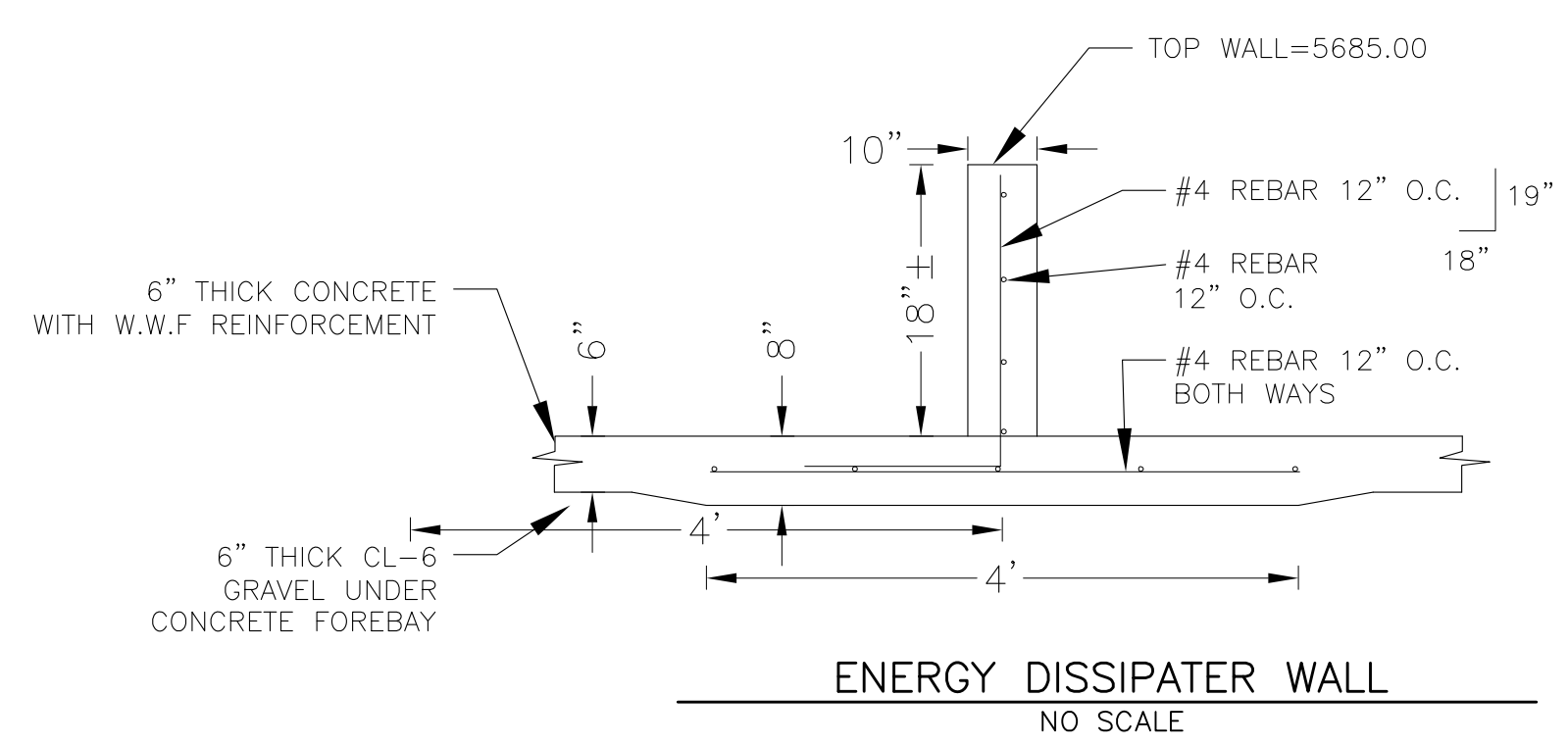
4:1 SLOPE ON FOREBAY

9" D50 RIP RAP 18" THICK ON MIRAFI 140N FABRIC (22 CY)

6" WIDE TRICKLE CHANNEL SEE DETAIL

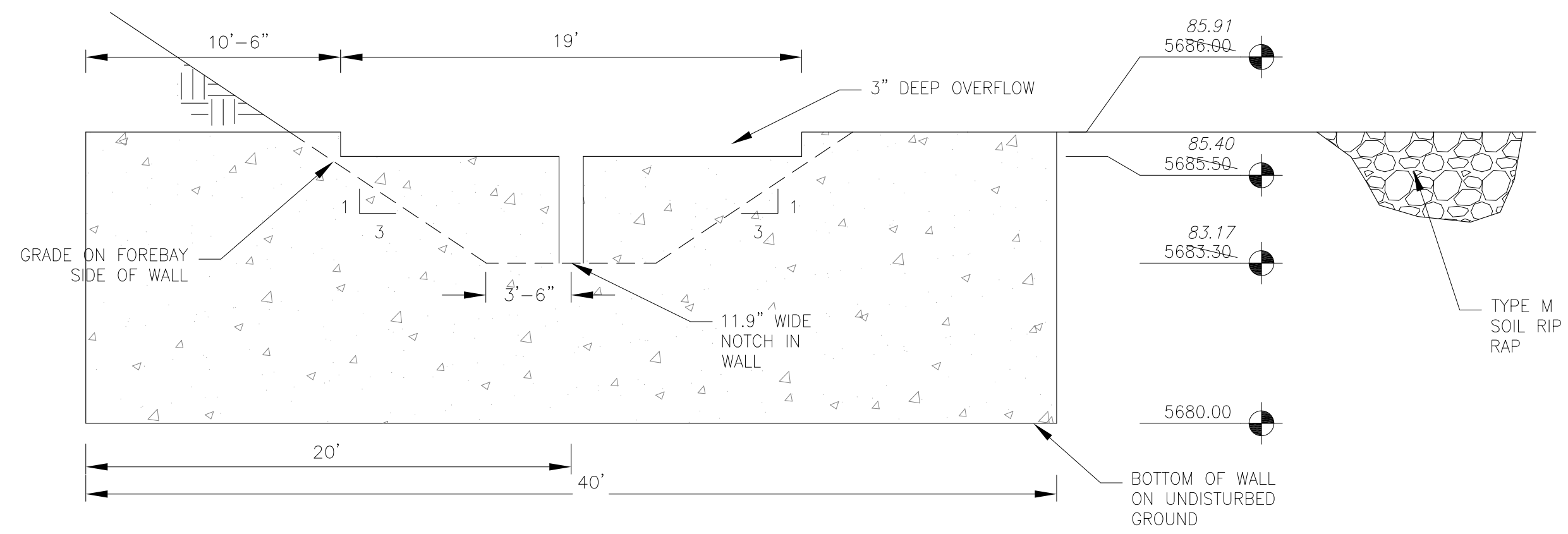
TYPE M SOIL RIP RAP ON FOREBAY SLOPES 24" THICK

FOREBAY "B" DETAIL
1"=10'

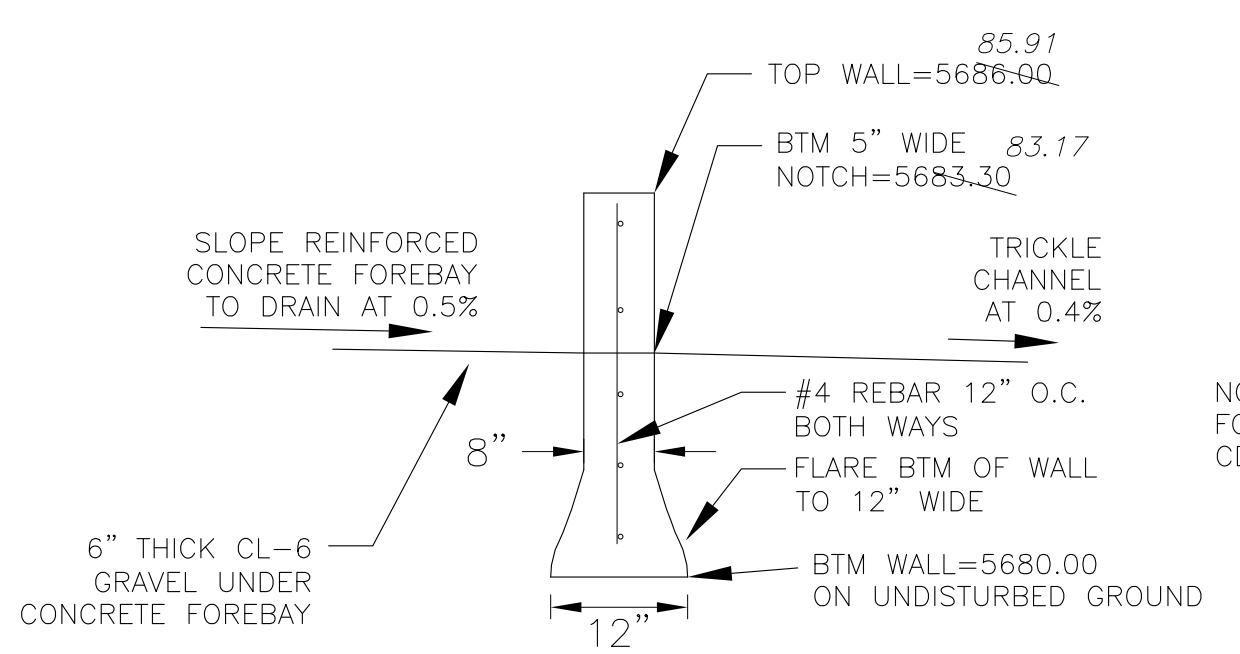


NOTE: ALL CONCRETE FOR WALL SHALL BE CDOT TYPE D

ENERGY DISSIPATER WALL
NO SCALE



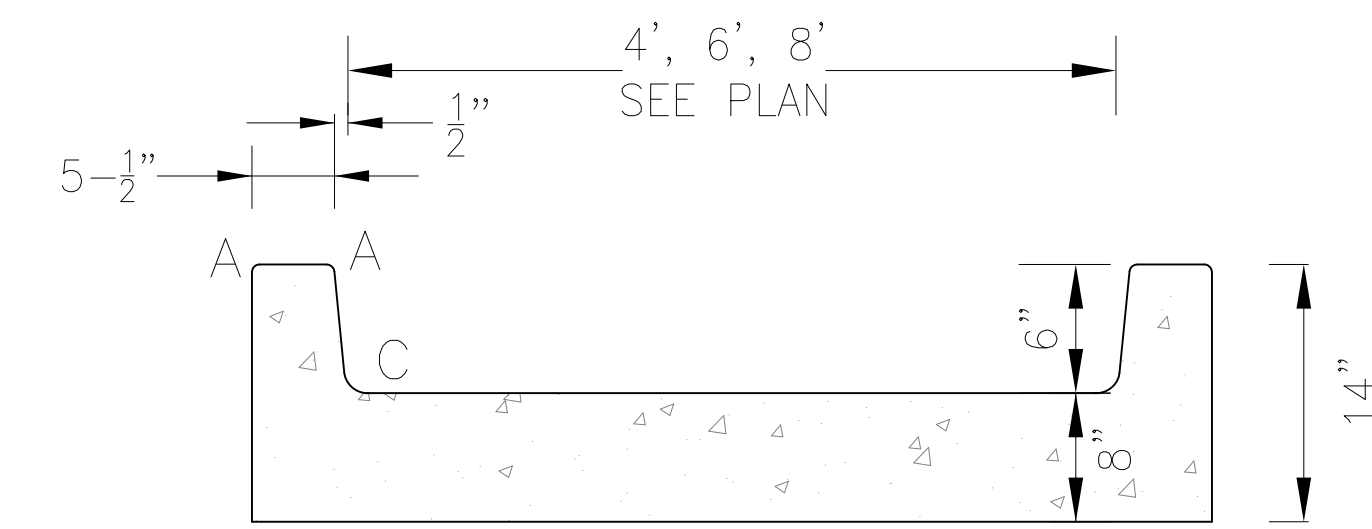
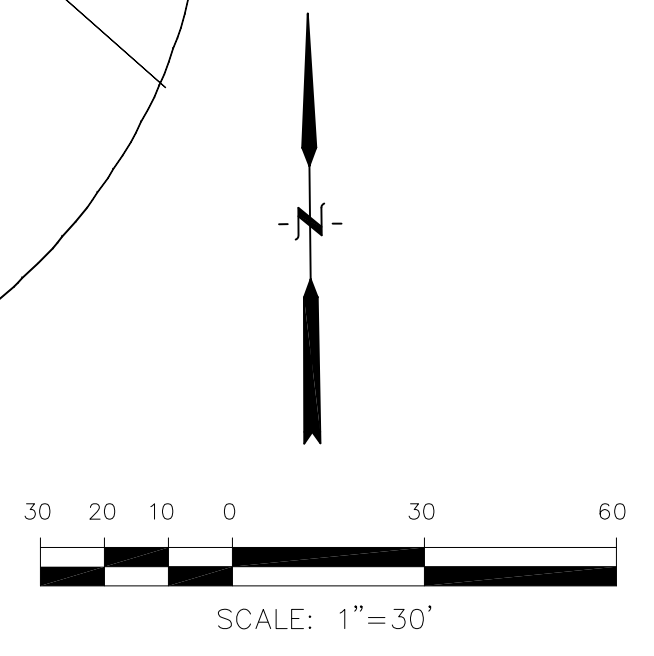
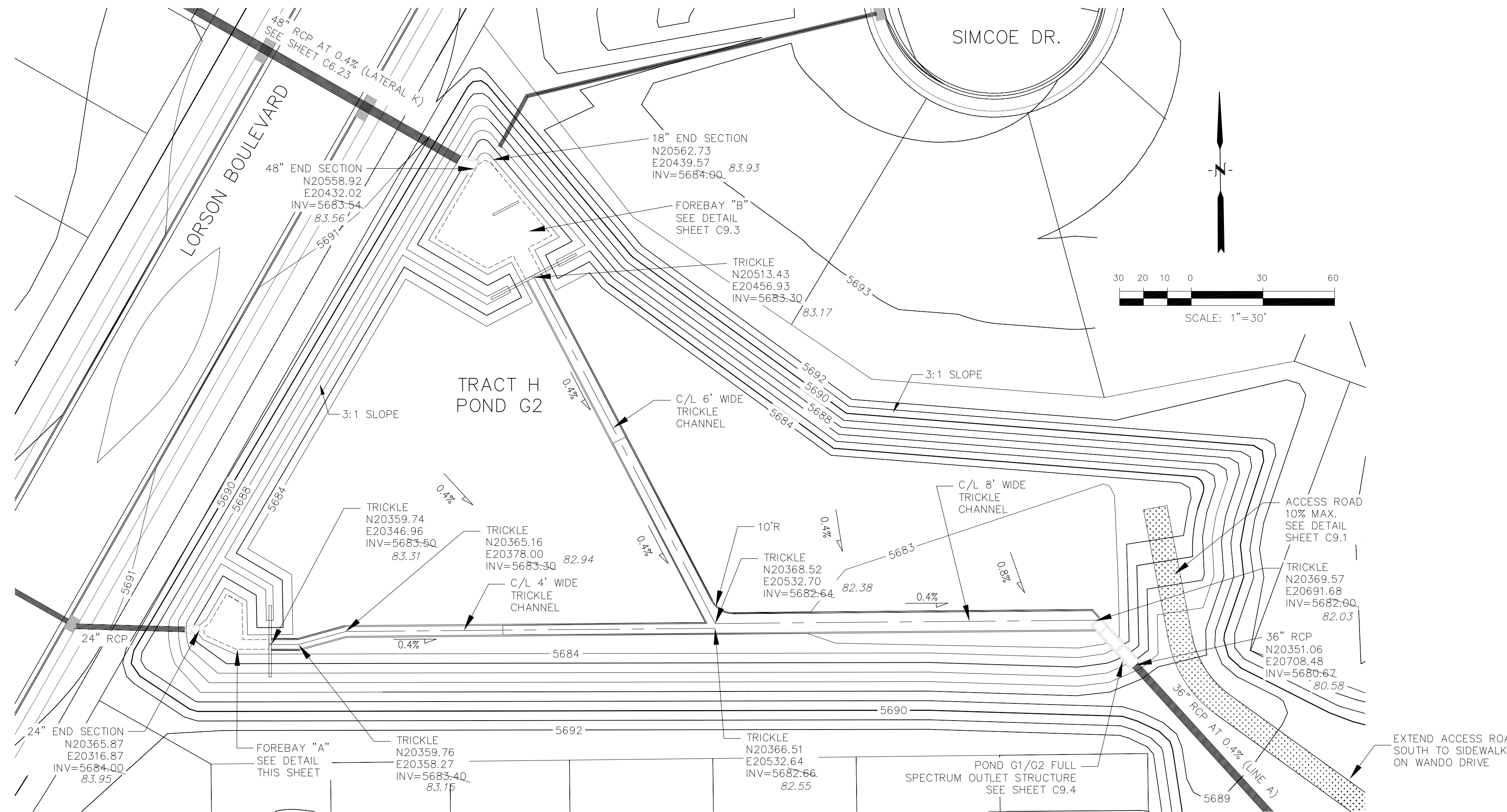
WALL SECTION A-A
1"=10'



NOTE: ALL CONCRETE FOR WALL SHALL BE CDOT TYPE D

WALL SECTION B-B
NO SCALE

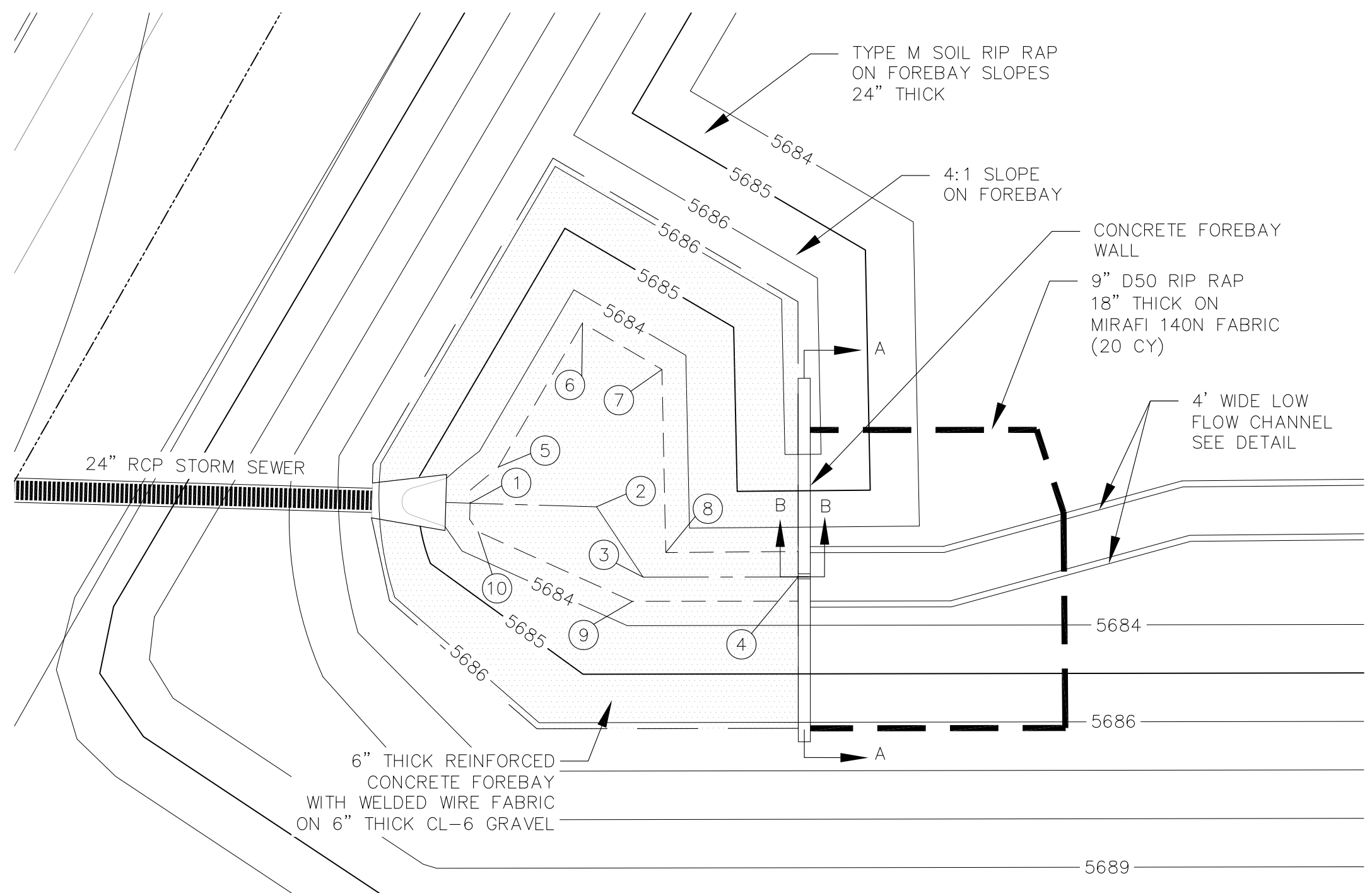
POND G1/G2 (DISTRICT)
G2 SIDE OF POND - FOREBAY "B"
TRICKLE AND FOREBAY DETAILS



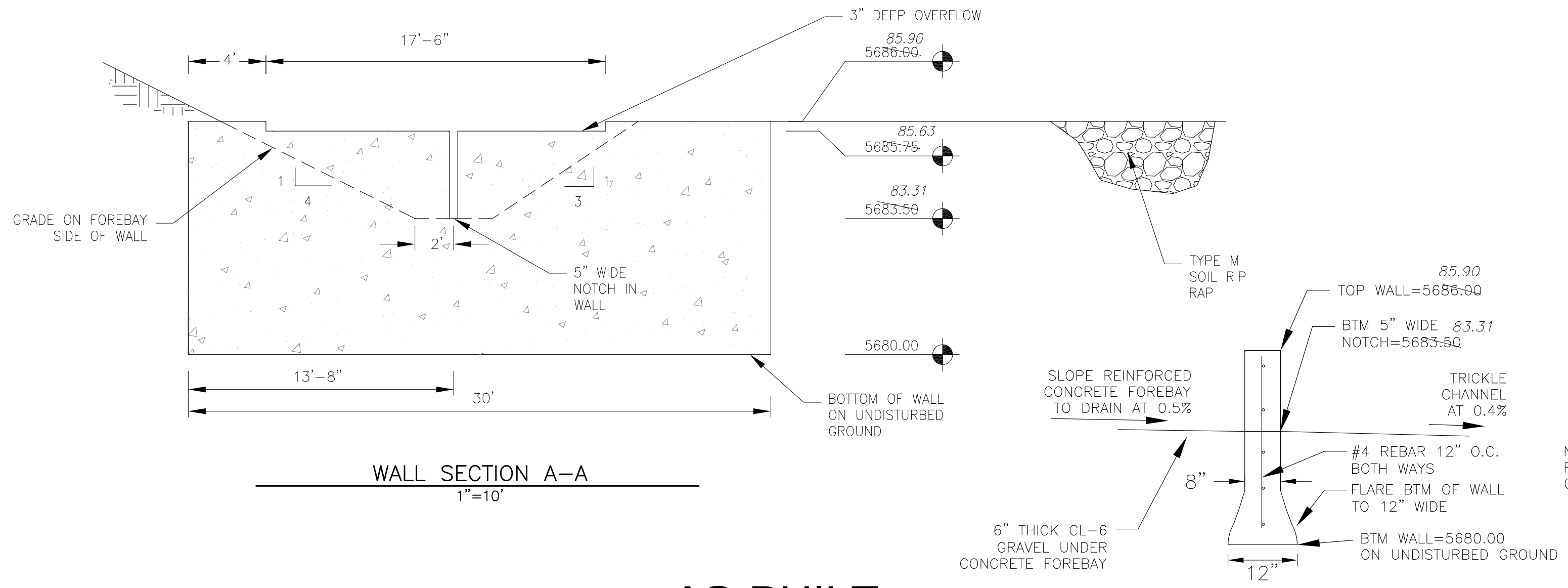
TRICKLE CHANNEL DETAIL
NO SCALE

LENGTH FOR RADII	
A	= 1/2"
C	= 1-1/2"

POINT TABLE				
NUMBER	NORTHING	EASTING	ELEVATION	NOTES
1	20365.82	20318.86	5683.65	FOREBAY BOTTOM
2	20365.52	20329.30	5683.60	FOREBAY BOTTOM
3	20359.71	20333.16	5683.57	FOREBAY BOTTOM
4	20359.74	20345.96	5683.50	FOREBAY BOTTOM
5	20368.80	20321.19	5683.67	FOREBAY BOTTOM
6	20380.69	20328.16	5683.67	FOREBAY BOTTOM
7	20376.85	20334.70	5683.66	FOREBAY BOTTOM
8	20361.75	20335.03	5683.58	FOREBAY BOTTOM
9	20357.71	20332.26	5683.58	FOREBAY BOTTOM
10	20363.46	20319.53	5683.67	FOREBAY BOTTOM



FOREBAY "A" DETAIL
1"=10'

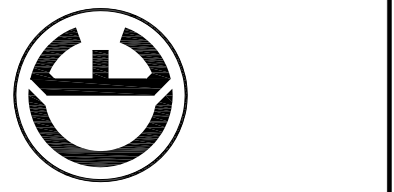


WALL SECTION A-A
1"=10'

WALL SECTION B-B
NO SCALE

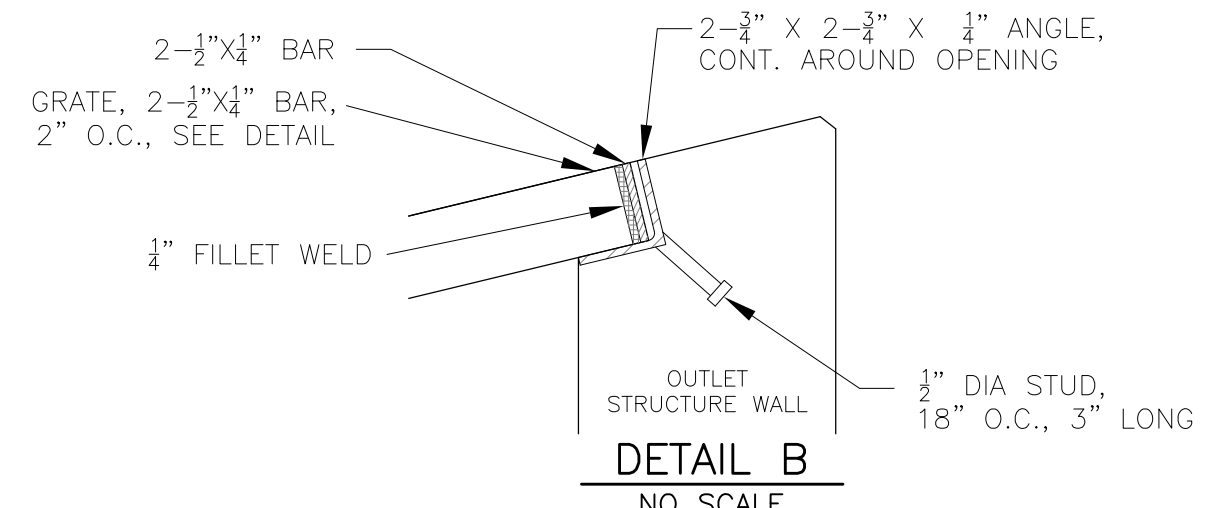
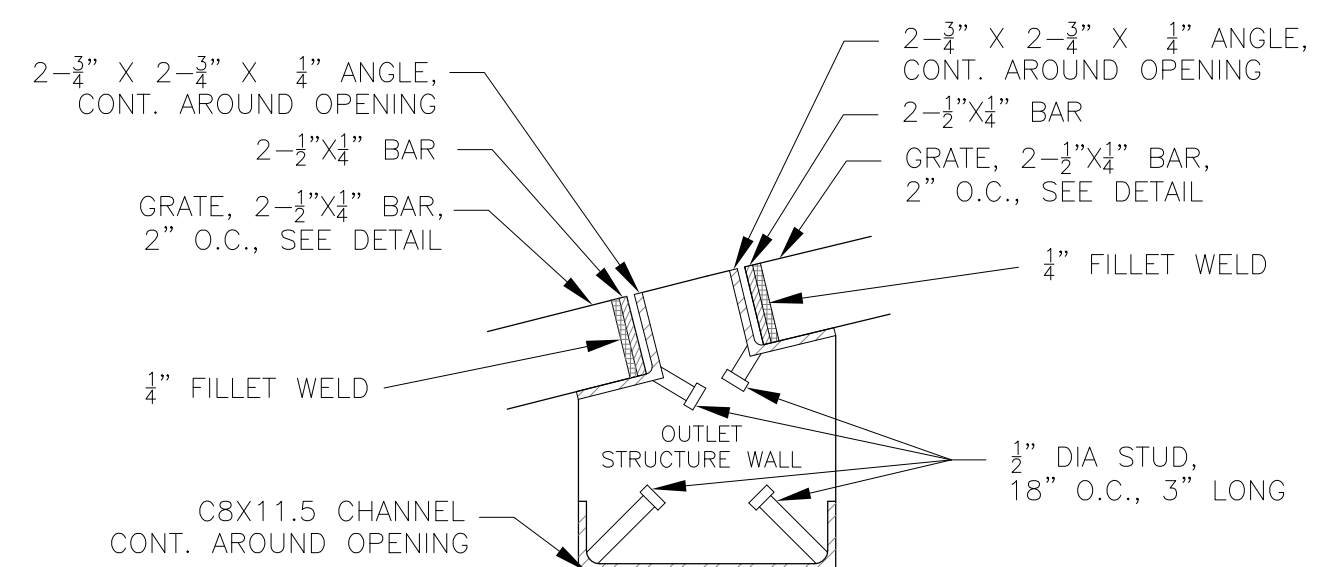
NOTE: ALL CONCRETE FOR WALL SHALL BE CDOT TYPE D

AS-BUILT
DATE: APRIL 6, 2018

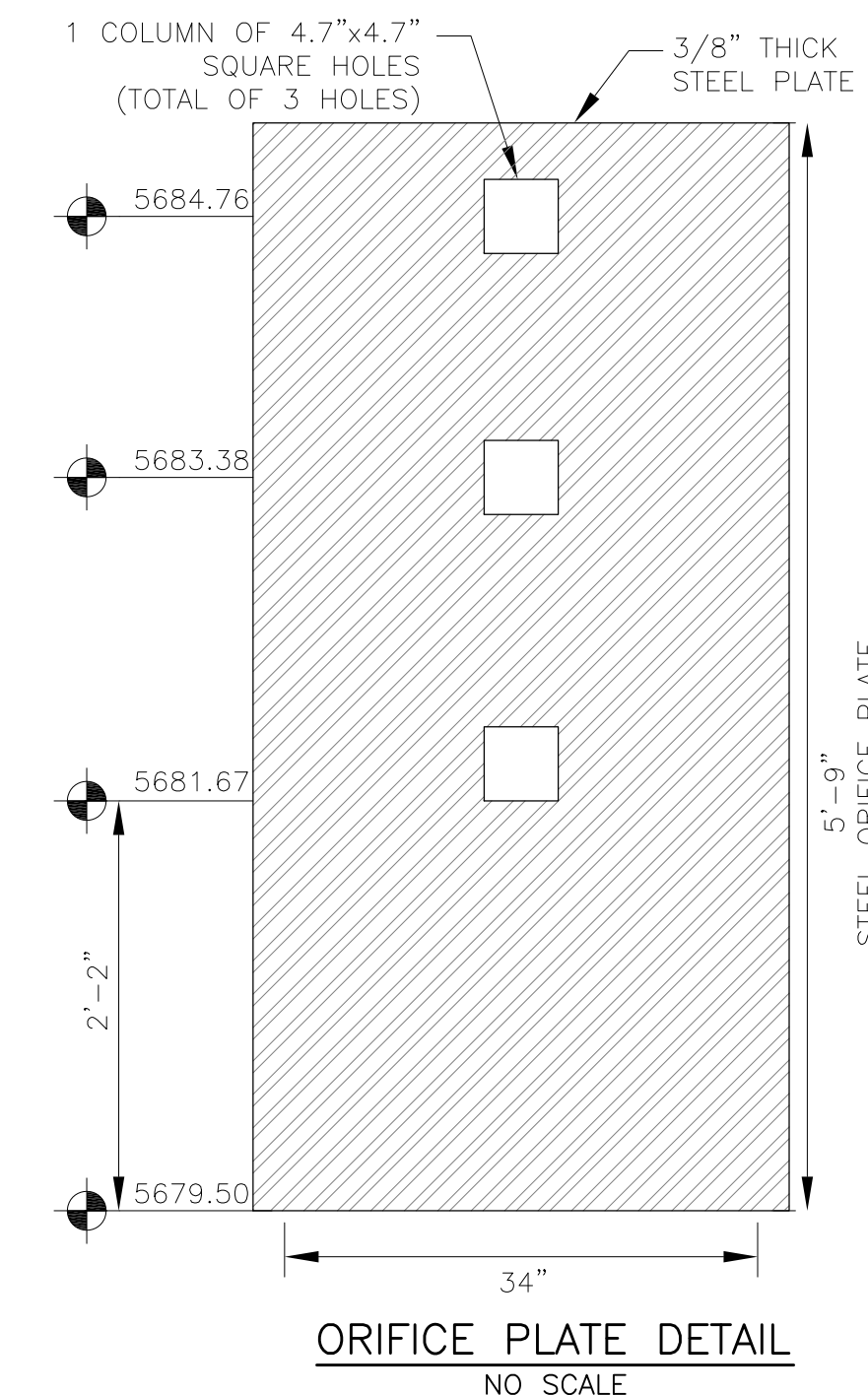
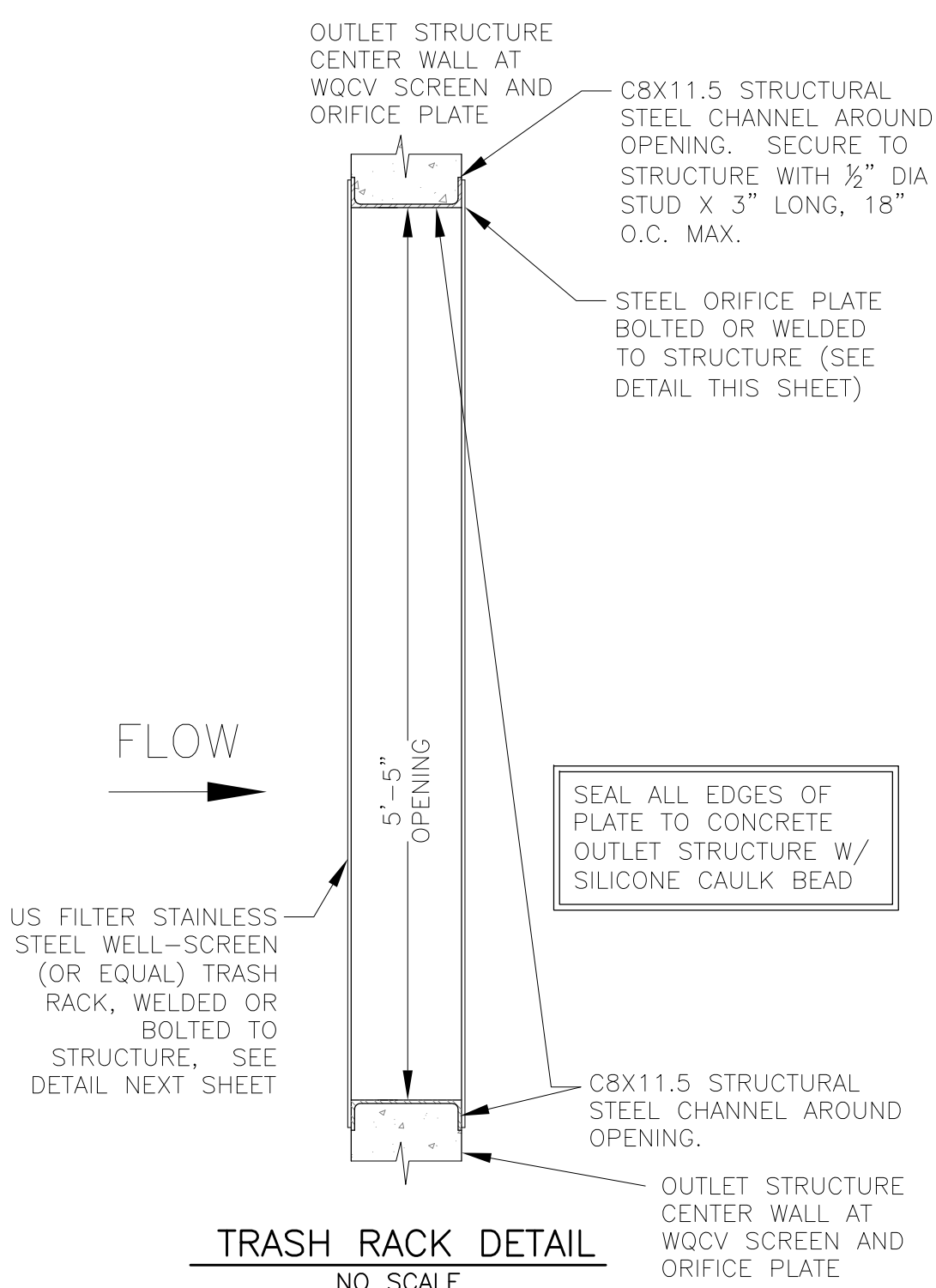
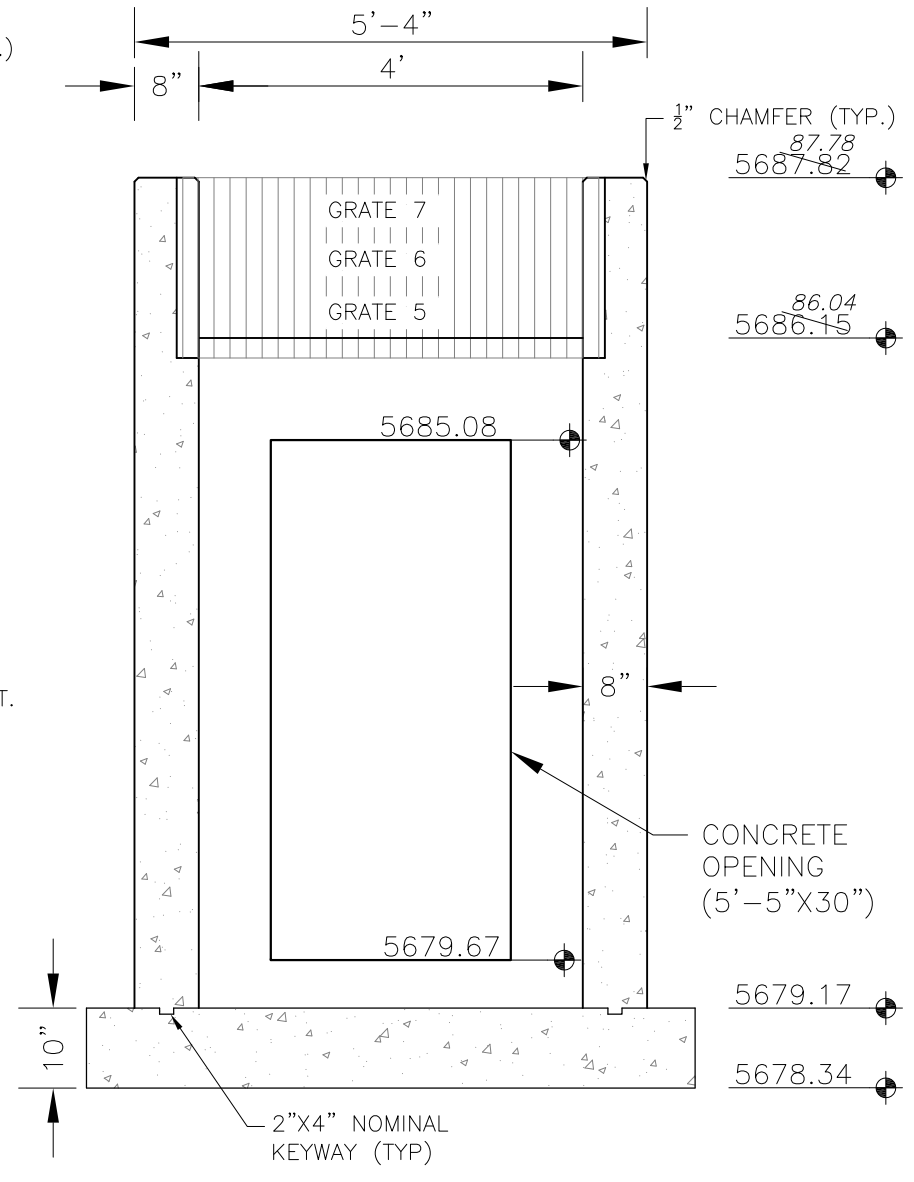
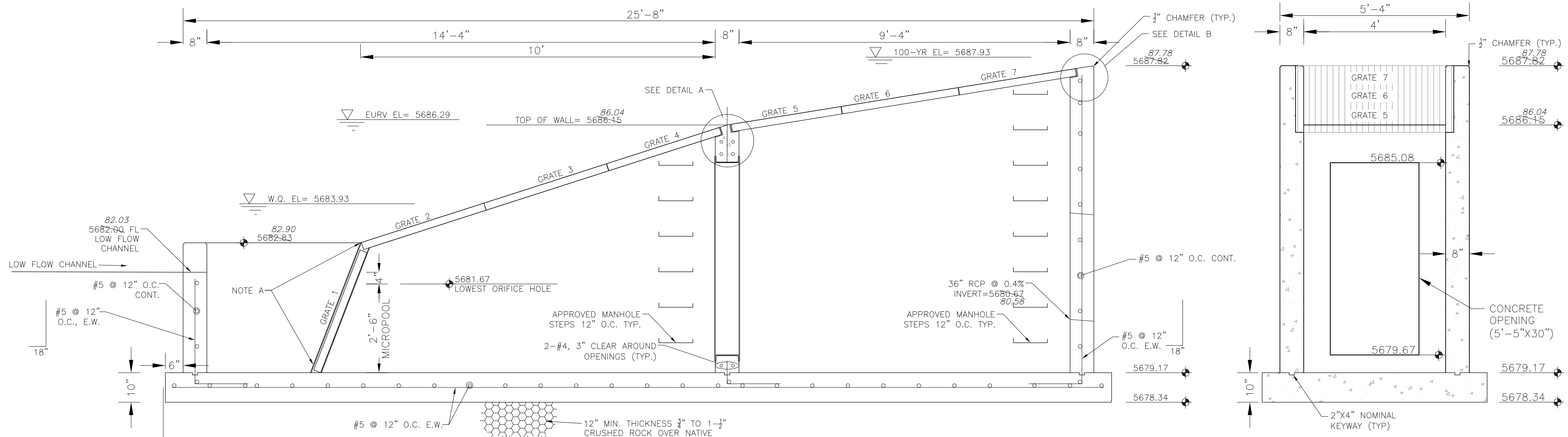
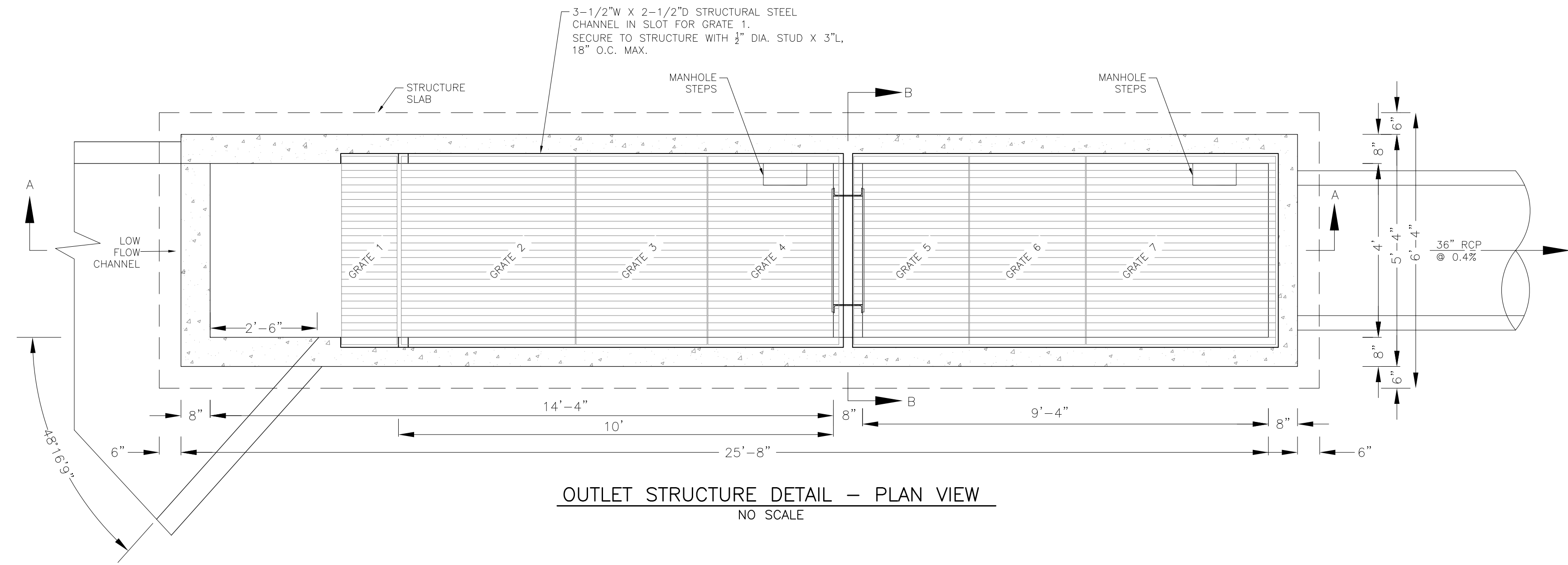
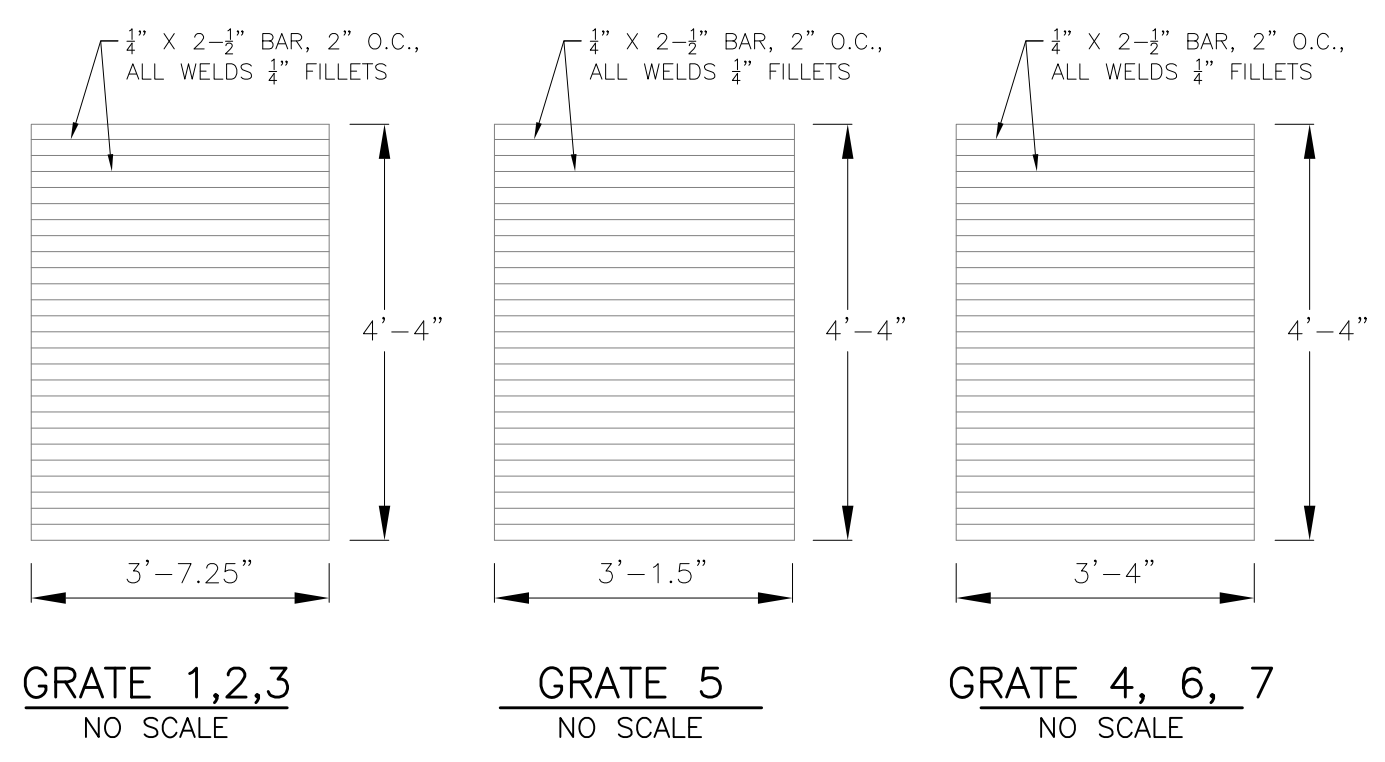


DATE: _____
DESCRIPTION: _____
NO. _____
DRAWN: RLS
DESIGNED: RLS
CHECKED: RLS
PROJECT: CARRIAGE MEADOWS SOUTH AT LORSON RANCH FILL NO. 1 FONTAINE BLVD. - CARRIAGE MEADOWS DR EL PASO COUNTY, COLORADO
PREPARED FOR: LORSON, LLC
212 N. WAHSATCH AVE., SUITE 301
COLORADO SPRINGS, COLORADO 80903
CONTACT: JEFF MARK

**POND G1/G2 (DISTRICT)
G2 SIDE OF POND
TRICKLE AND FOREBAY DETAILS**



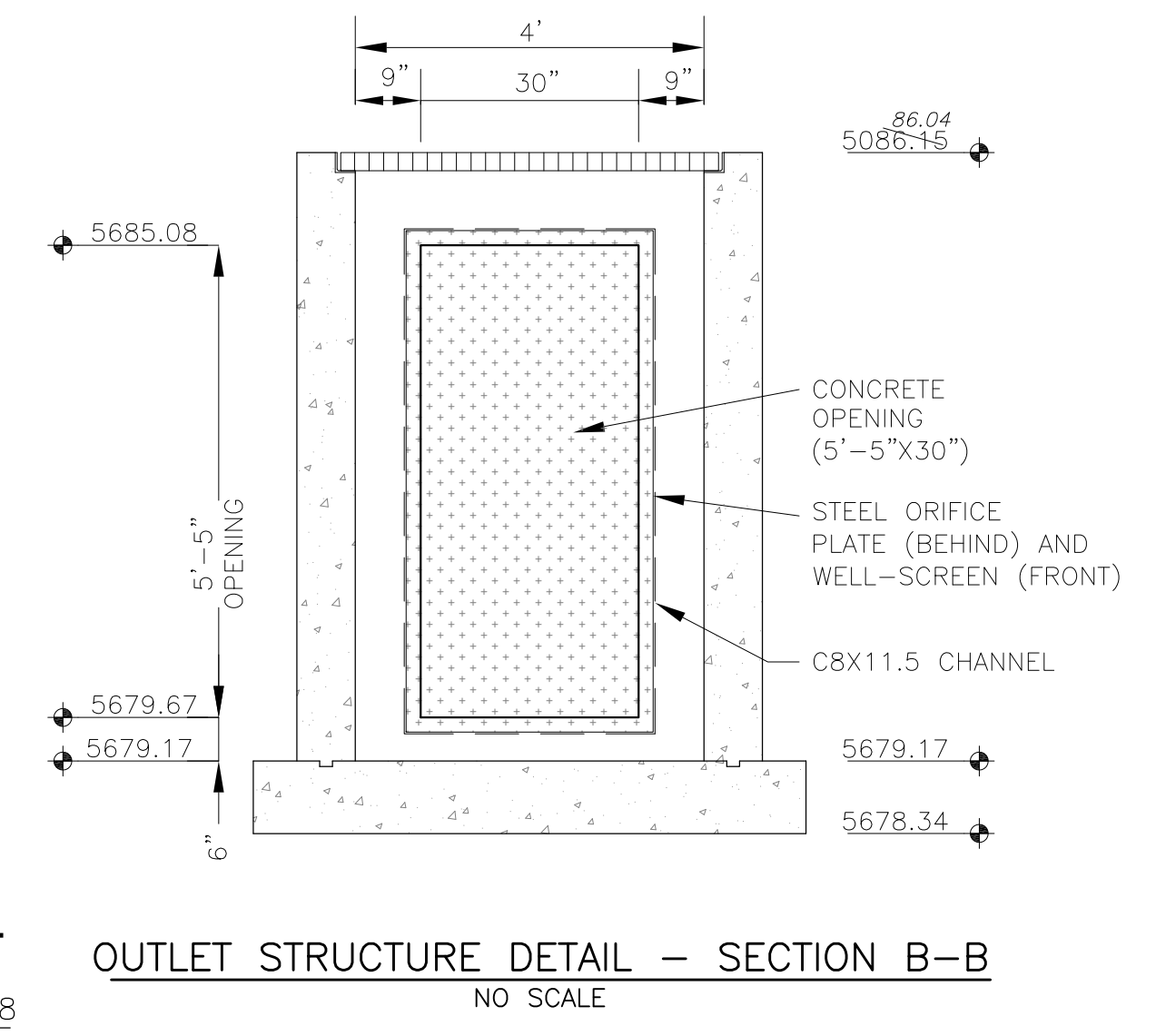
NOTE:
AFTER CONCRETE STRUCTURE HAS BEEN POURED
ALL GRATE DIMENSIONS SHALL BE FIELD VERIFIED
PRIOR TO GRATE CONSTRUCTION



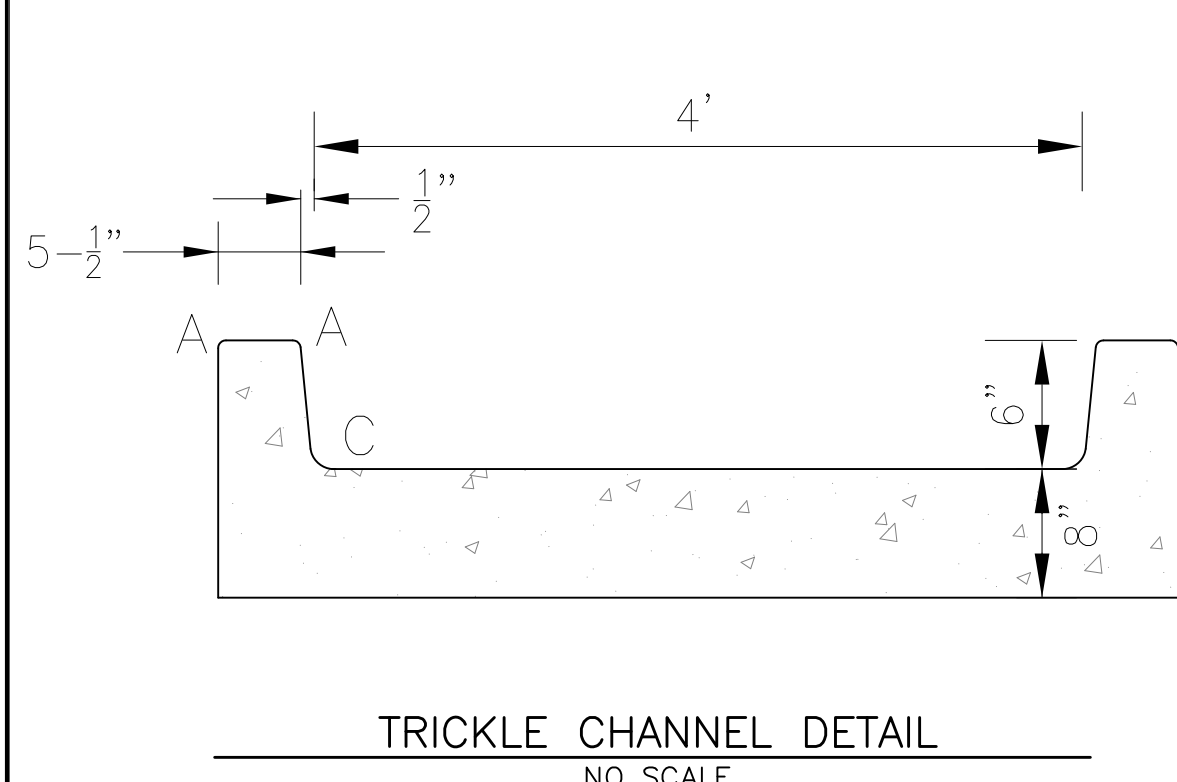
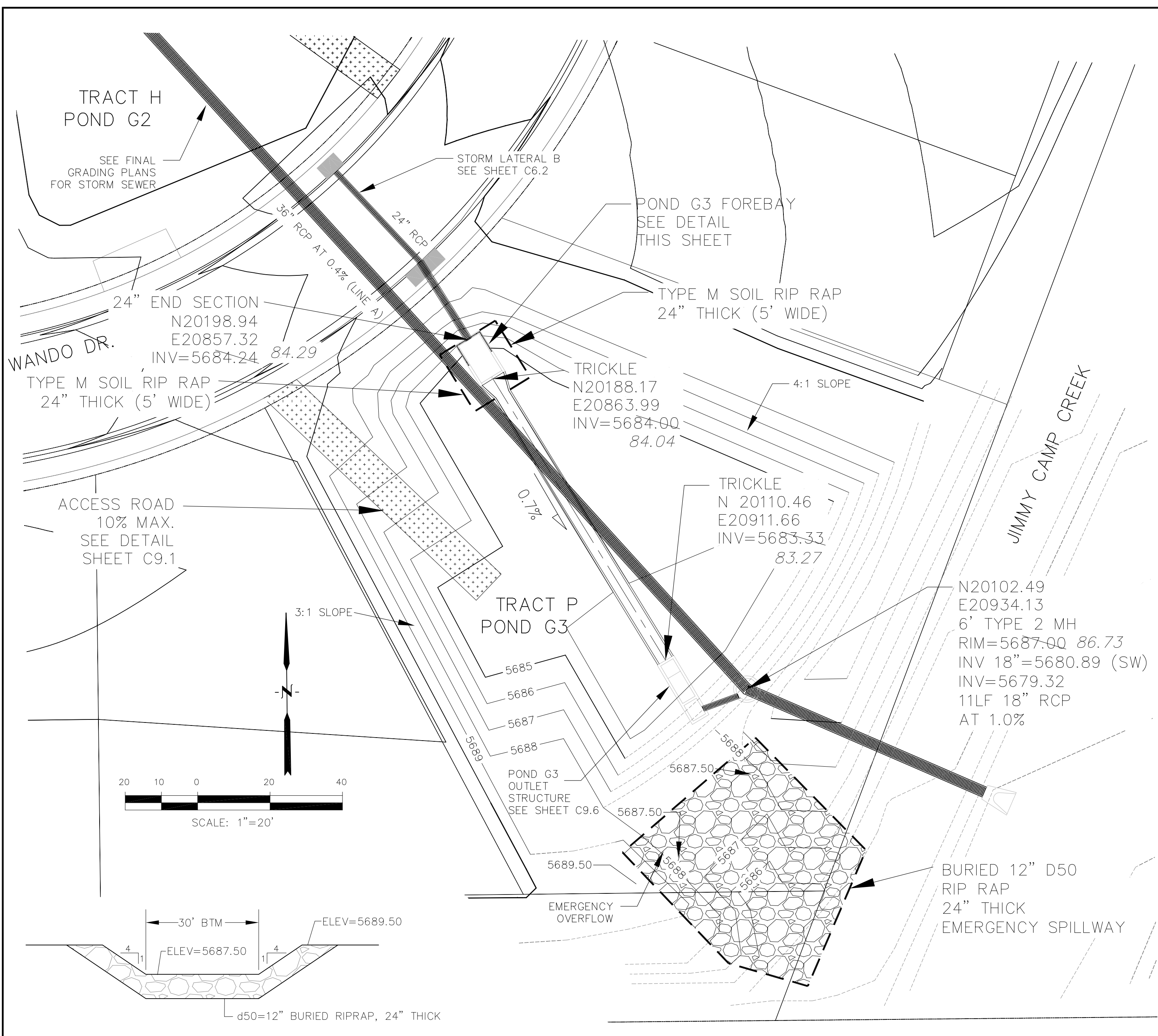
OUTLET STRUCTURE, FOREBAY, AND DRAIN CHANNEL NOTES:

- PRIOR TO CONSTRUCTION, CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR ALL COMPONENTS OF THE OUTLET STRUCTURE.
- GRADE 60 REINFORCING STEEL REQUIRED. SEE TABLE FOR THE MINIMUM LAP SPLICE LENGTH FOR REINFORCING BARS. ALL REINFORCING STEEL SHALL HAVE A TWO-INCH MINIMUM CLEARANCE FROM EDGE OF CONCRETE, UNLESS OTHERWISE NOTED.
- CONCRETE FOR THE OUTLET STRUCTURE AND FOREBAY SHALL BE CDOT CLASS D CONCRETE.
- CONCRETE FOR DRAIN CHANNELS SHALL BE CDOT CLASS B CONCRETE
- EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213. EXPANSION JOINT MATERIAL SHALL BE 1/2" THICK, SHALL EXTEND THE FULL DEPTH OF CONTACT SURFACE AND THE JOINT SHALL BE SEALED, REFER TO DETAILS.
- ALL EXPOSED CONCRETE CORNERS SHALL HAVE A 3/8" CHAMFER UNLESS OTHERWISE NOTED.
- SUBGRADE TO BE 12" THICK CLEAN FILL COMPACTED TO 95% STANDARD PROCTOR DENSITY PER ASTM M698 UNDER STRUCTURE.
- REFER TO SHEET XX FOR PRESEDIMENTATION/FOREBAY DESIGN.
- ENGINEER SHALL BE NOTIFIED PRIOR TO BEGINNING CONSTRUCTION OF OUTLET STRUCTURE TO SCHEDULE OBSERVATION VISITS FOR STRUCTURES.

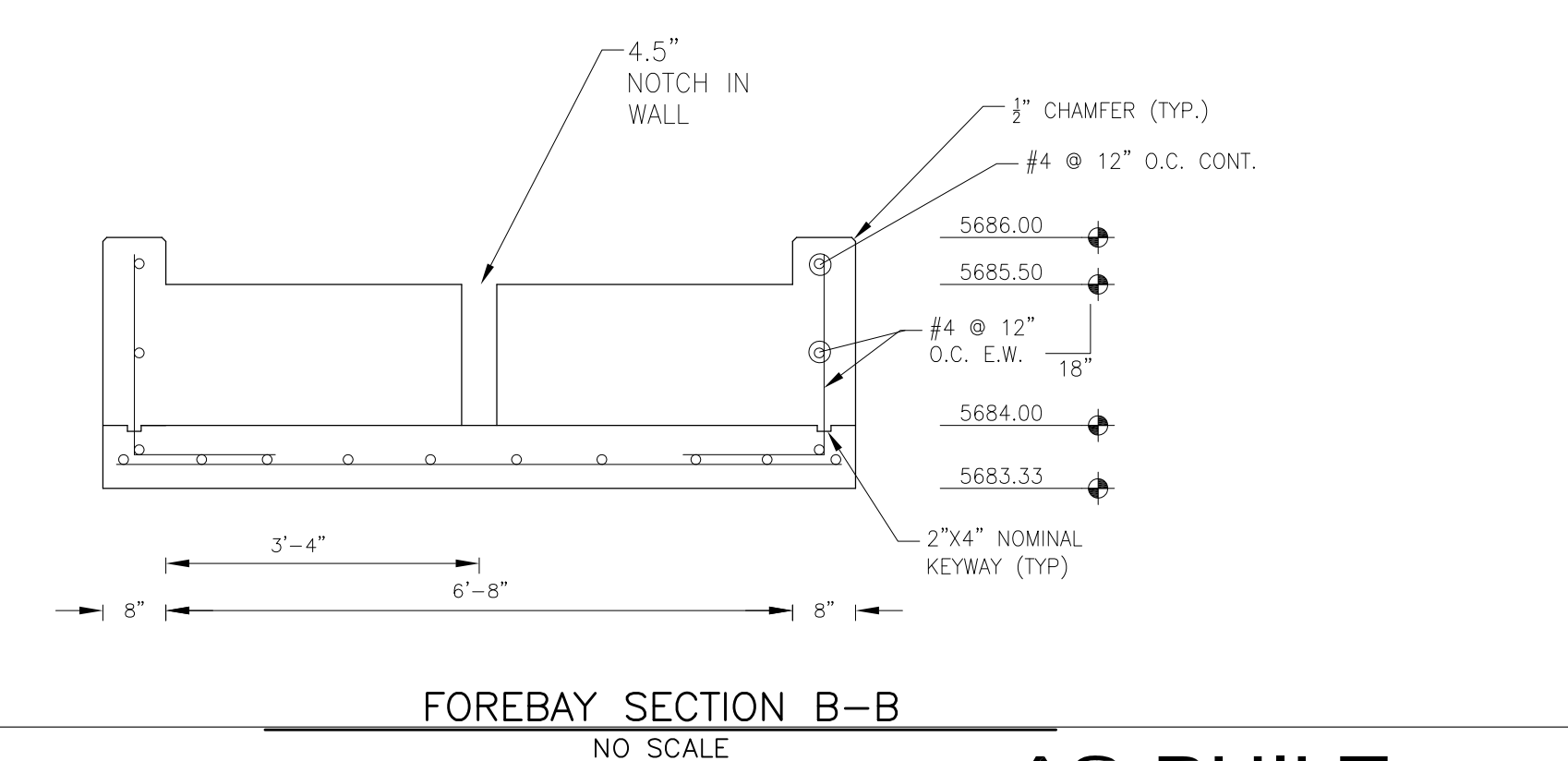
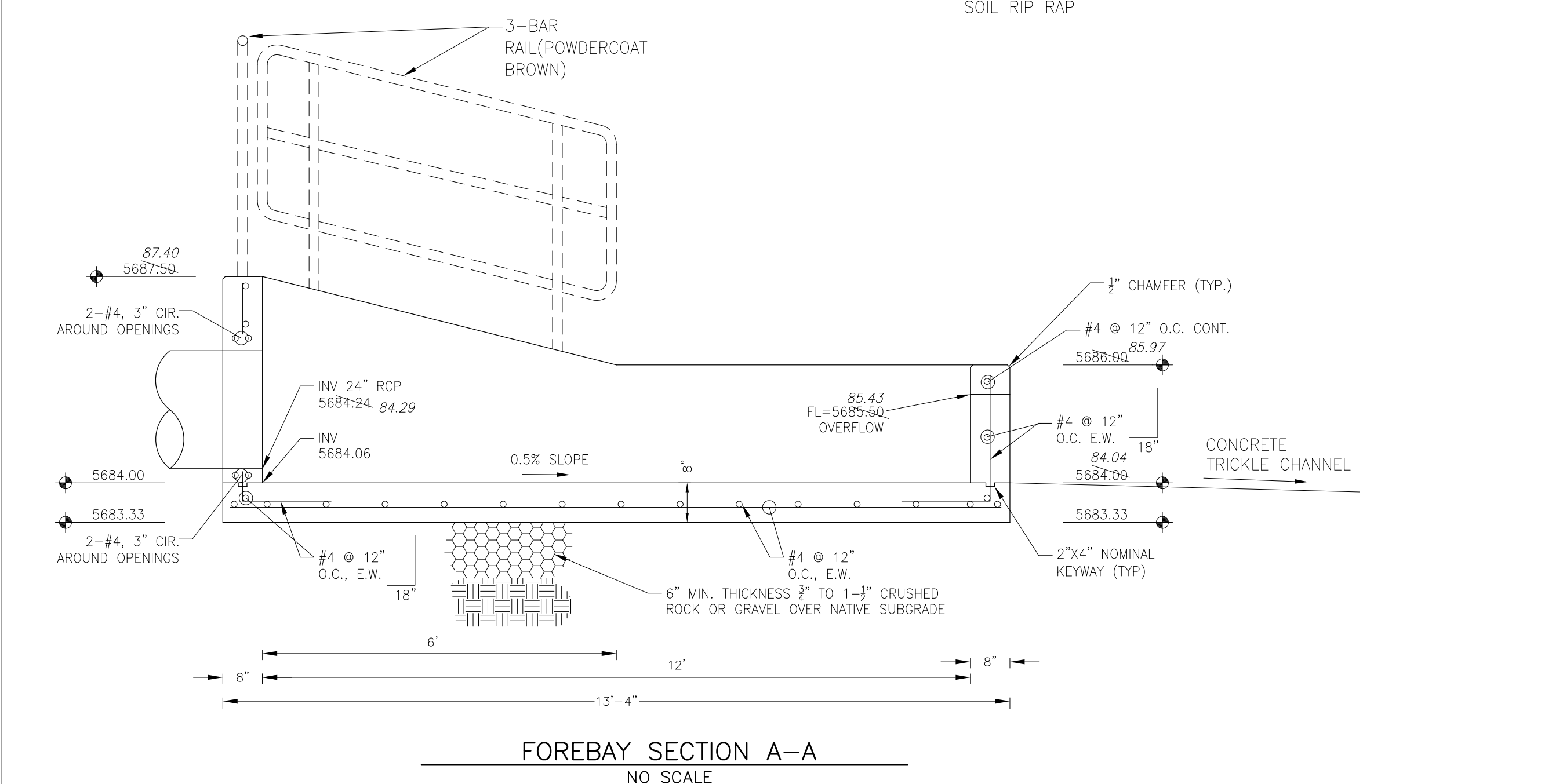
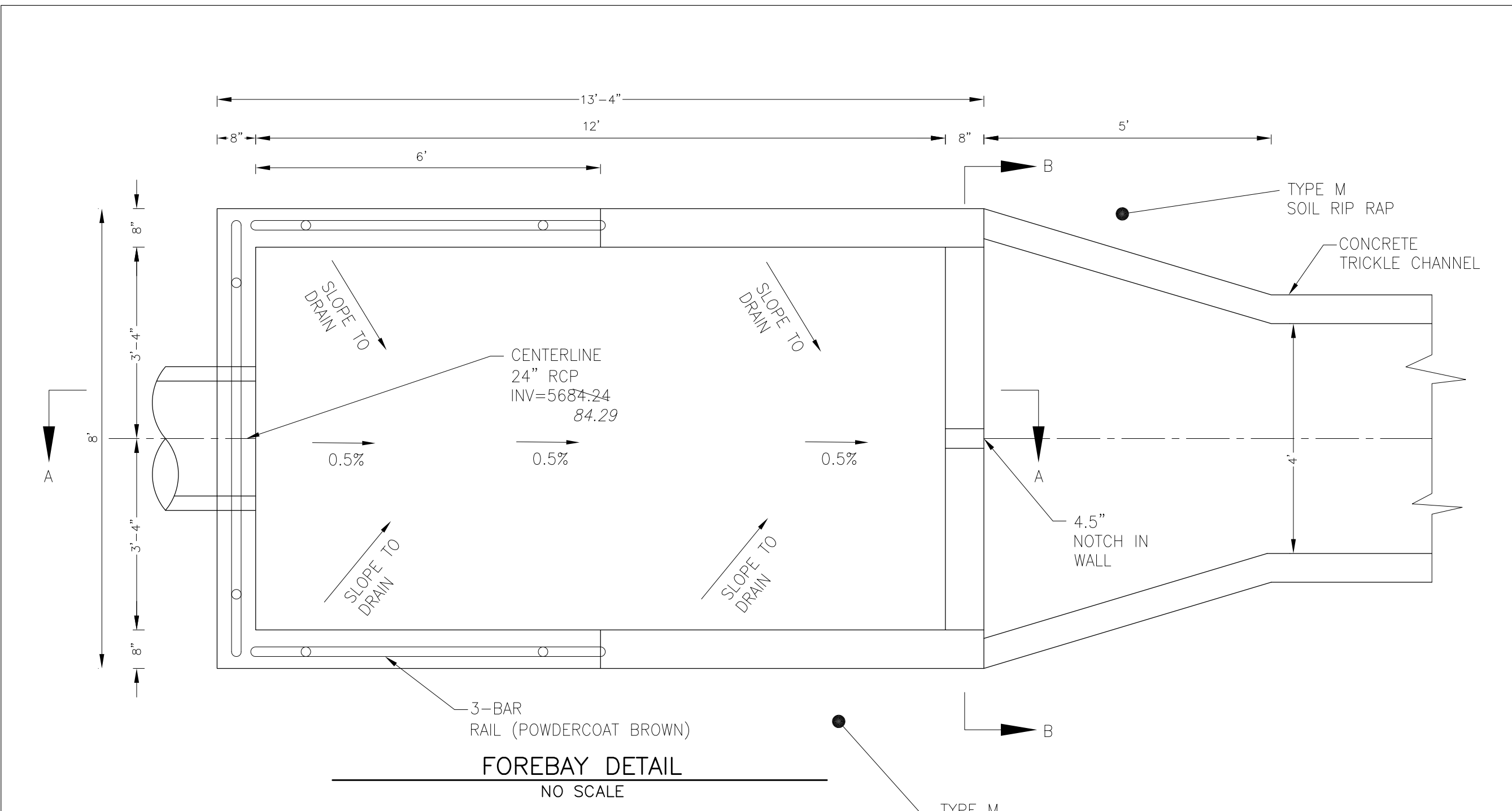
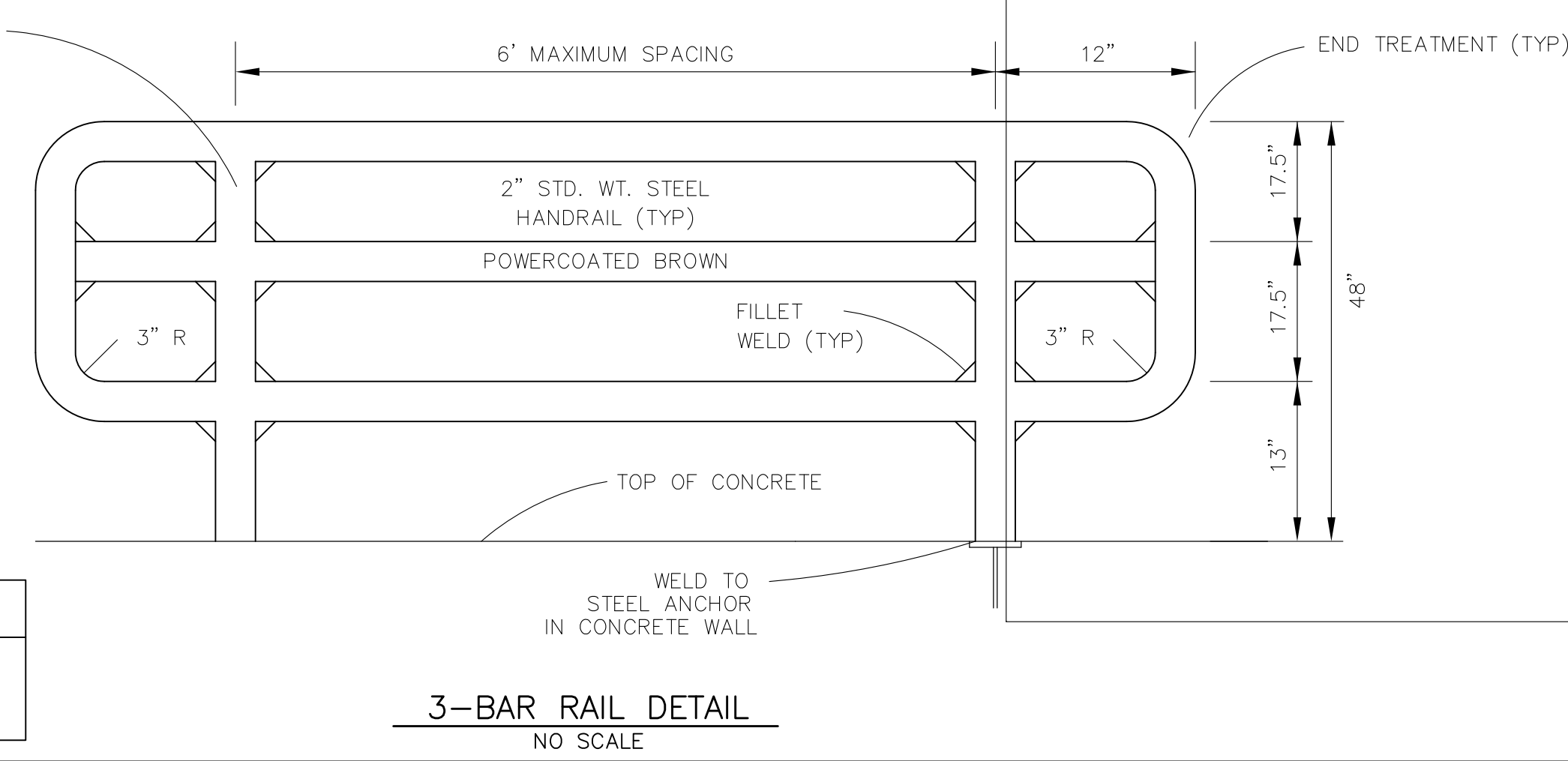
BAR SIZE	#4	#5	#6
MIN. SPLICE LENGTH	1'-3"	1'-7"	2'-0"

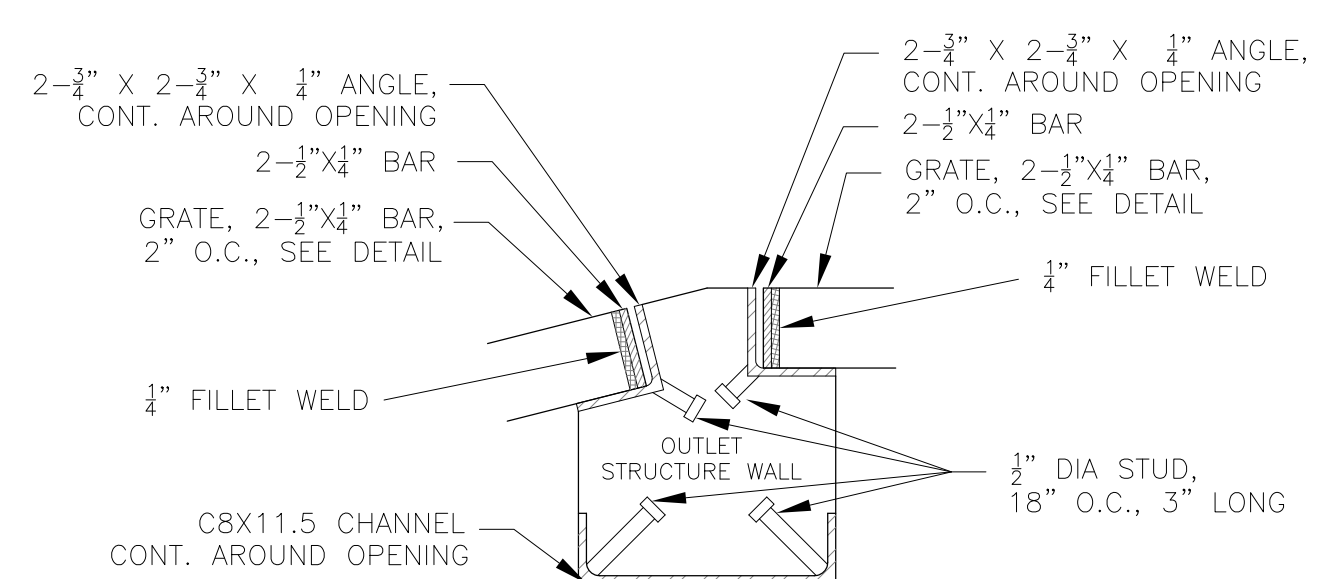


AS-BUILT
DATE: APRIL 6, 2018

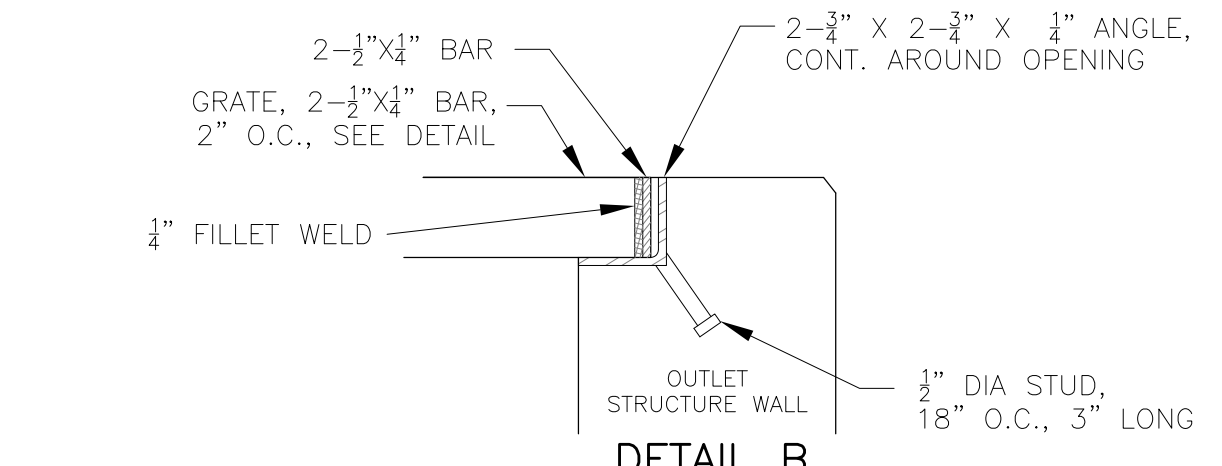


LENGTH FOR RADII	
A	= 1/2"
C	= 1-1/2"



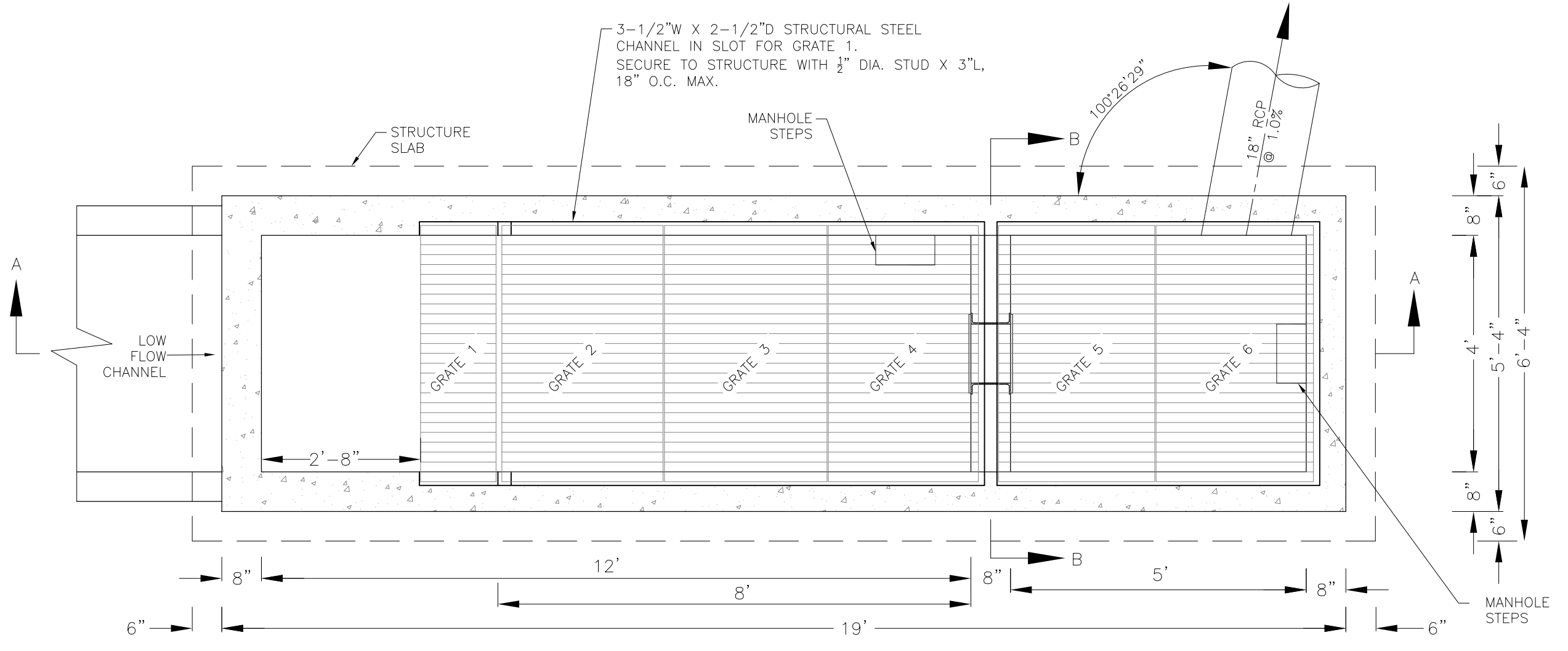
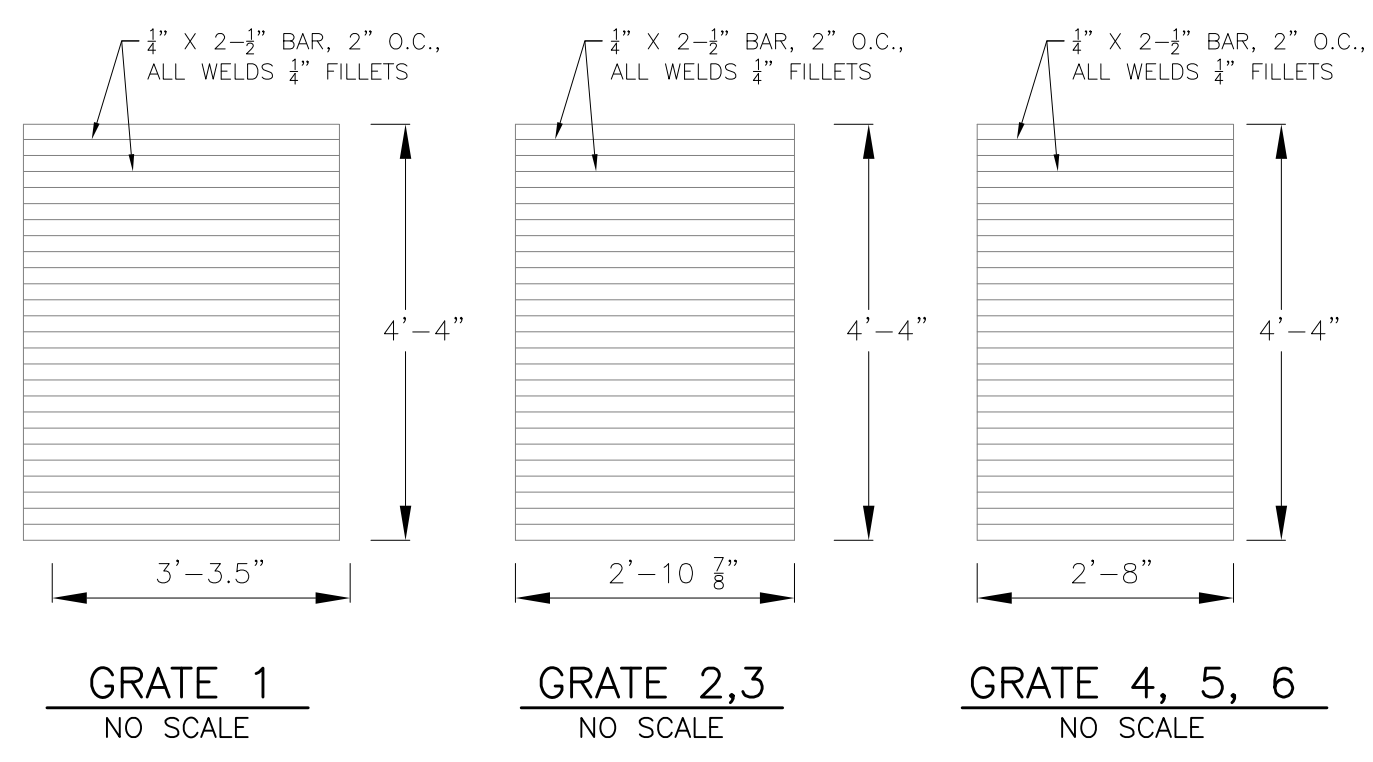


DETAIL A
NO SCALE

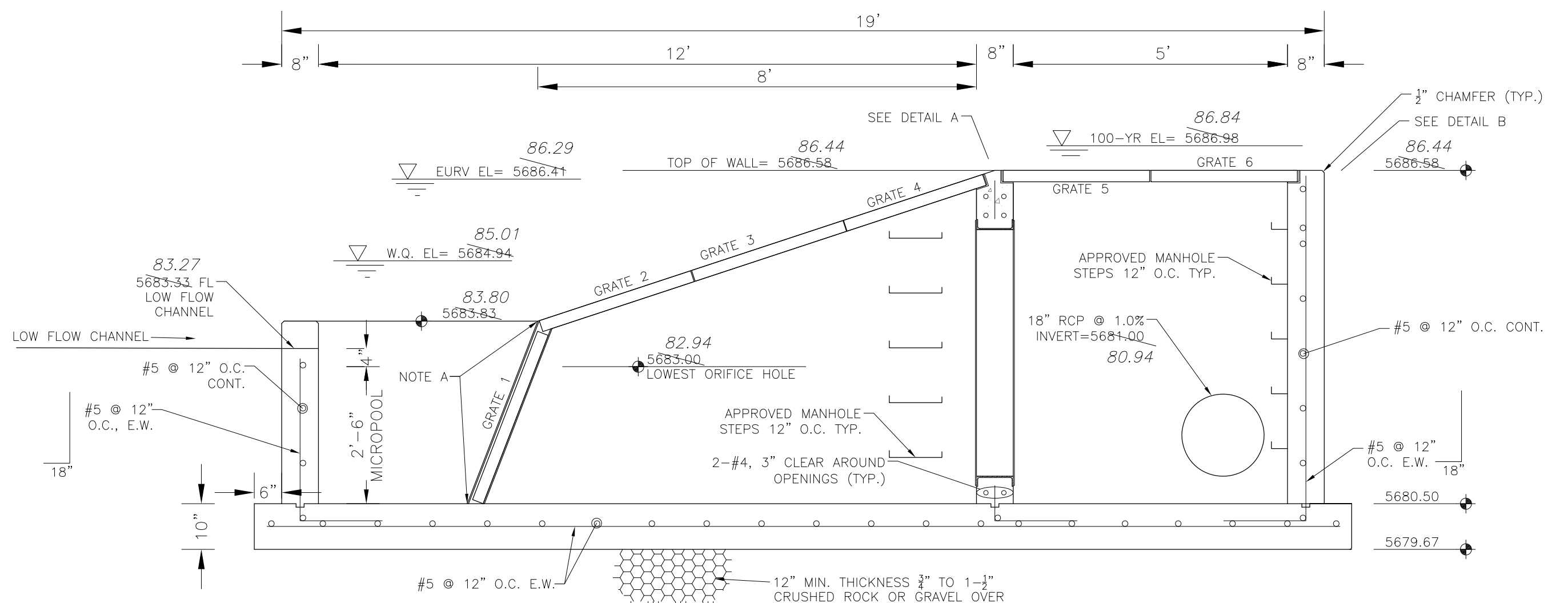


DETAIL B
NO SCALE

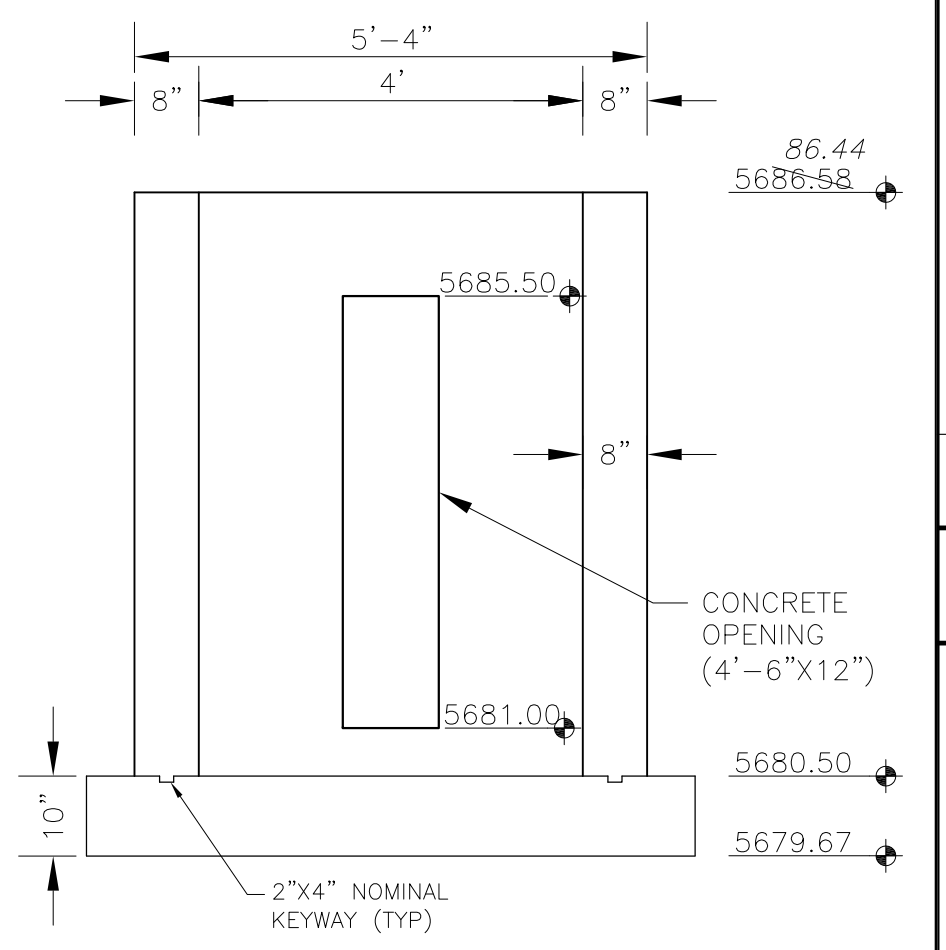
NOTE:
AFTER CONCRETE STRUCTURE HAS BEEN POURED
ALL GRATE DIMENSIONS SHALL BE FIELD VERIFIED
PRIOR TO GRATE CONSTRUCTION



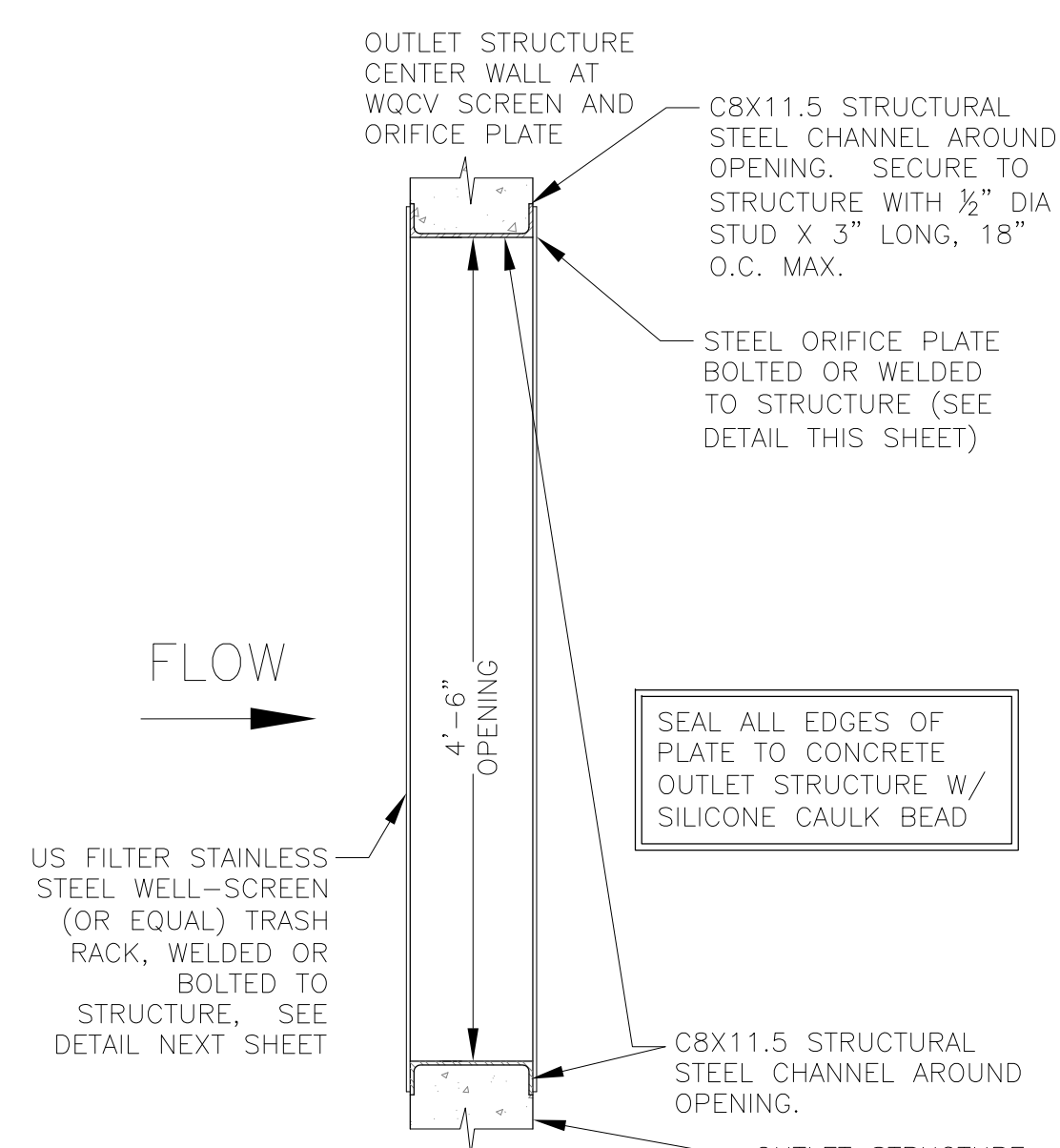
OUTLET STRUCTURE DETAIL - PLAN VIEW
NO SCALE



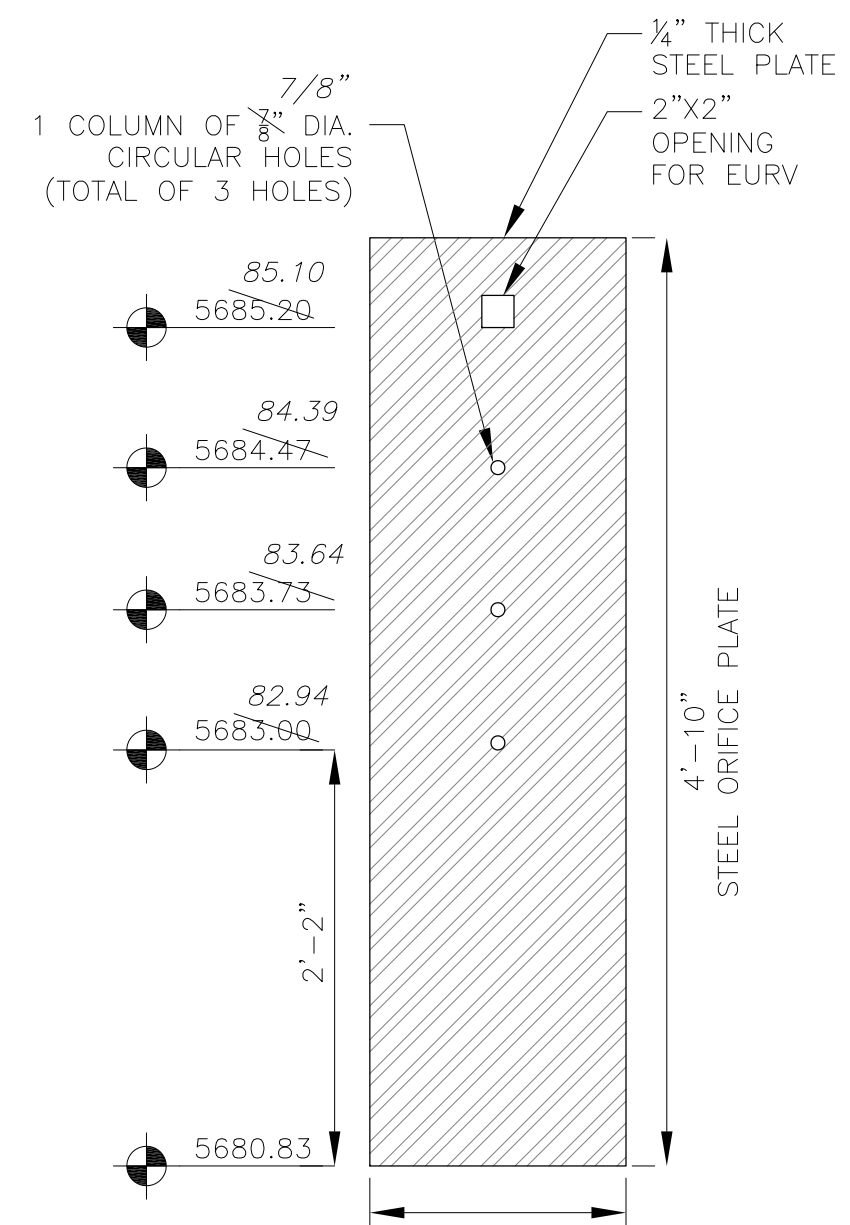
OUTLET STRUCTURE DETAIL - SECTION A-A
NO SCALE



OUTLET STRUCTURE DETAIL - SECTION B-B
NO SCALE



TRASH RACK DETAIL
NO SCALE

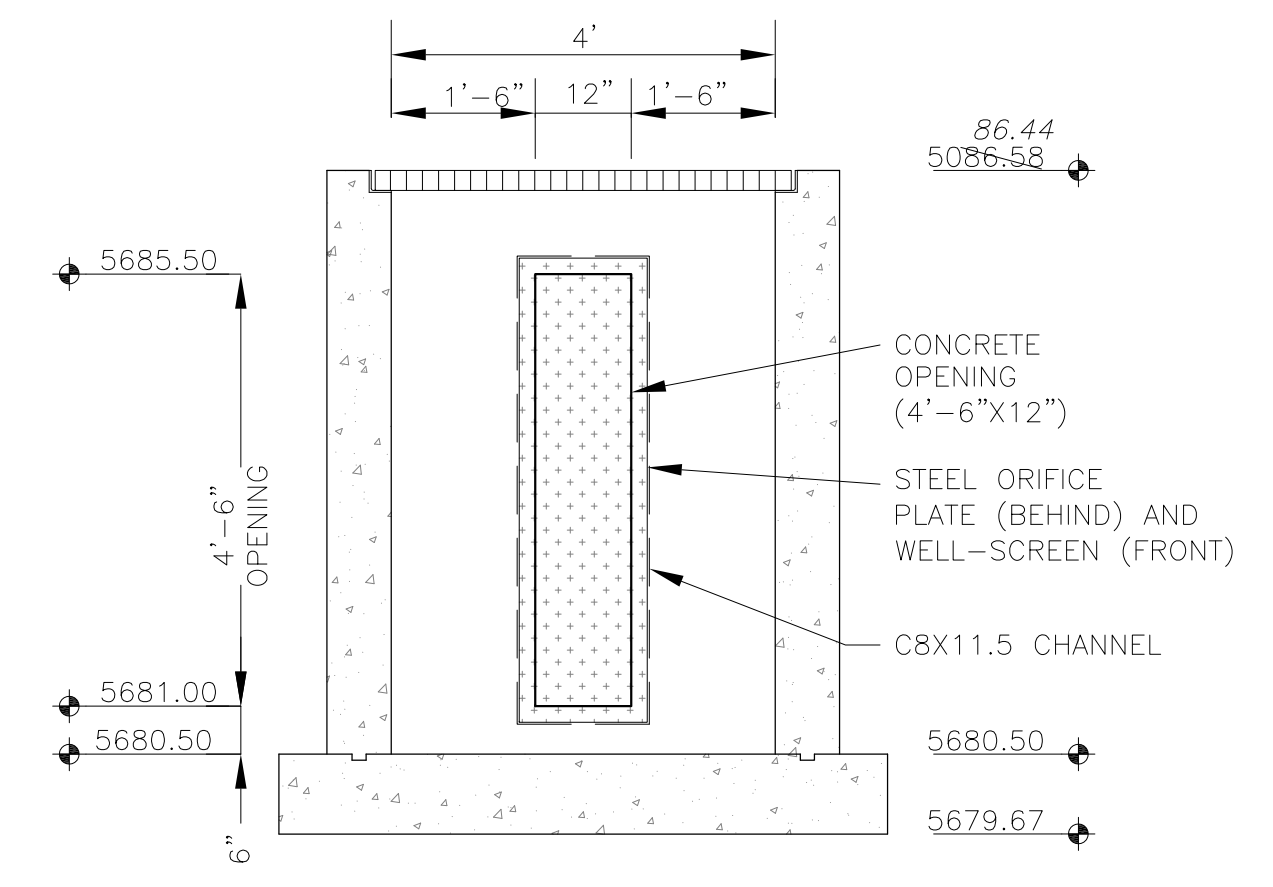


ORIFICE PLATE DETAIL
NO SCALE

OUTLET STRUCTURE, FOREBAY, AND DRAIN CHANNEL NOTES:

- PRIOR TO CONSTRUCTION, CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR ALL COMPONENTS OF THE OUTLET STRUCTURE.
- GRADE 60 REINFORCING STEEL REQUIRED. SEE TABLE FOR THE MINIMUM LAP SPLICE LENGTH FOR REINFORCING BARS. ALL REINFORCING STEEL SHALL HAVE A TWO-INCH MINIMUM CLEARANCE FROM EDGE OF CONCRETE, UNLESS OTHERWISE NOTED.
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- CONCRETE FOR DRAIN CHANNELS SHALL BE CDOT CLASS B CONCRETE
- EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213. EXPANSION JOINT MATERIAL SHALL BE 1/2" THICK, SHALL EXTEND THE FULL DEPTH OF CONTACT SURFACE AND THE JOINT SHALL BE SEALED, REFER TO DETAILS.
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- SUBGRADE TO BE 12" THICK CLEAN FILL COMPACTED TO 95% STANDARD PROCTOR DENSITY PER ASTM M698 UNDER STRUCTURE.
- REFER TO SHEET XX FOR PRESEDIMENTATION/FOREBAY DESIGN.
- ENGINEER SHALL BE NOTIFIED PRIOR TO BEGINNING CONSTRUCTION OF OUTLET STRUCTURE TO SCHEDULE OBSERVATION VISITS FOR STRUCTURES.

BAR SIZE	#4	#5	#6
MIN. SPLICE LENGTH	1'-3"	1'-7"	2'-0"



OUTLET STRUCTURE DETAIL - SECTION B-B
NO SCALE

**APPENDIX E- DRAINAGE BOARD MINUTES, STORM SEWER SCHEMATIC AND HYDRAFLOW
STORM SEWER CALCS**

Minutes
City of Colorado Springs/ El Paso County
Drainage Board Meeting Summary
January 23, 2024

The City of Colorado Springs/ El Paso County Drainage Board held its meeting at 1:30 PM, Tuesday, January 23, 2024, at Pikes Peak Regional Building in the Pikes Peak Hearing Room.

MEMBERS PRESENT: Tim McConnell (Chair), Marc Whorton (Vice Chair), Grant Petik, Brett Louk, Mark Sherwood, Scott Smith

OTHERS PRESENT: Christina Aragon (City), Erin Powers (City), Erica Schmitz (City), Amy Tuten (City), Rebecca Greenberg (City), Daniel Torres (El Paso County), Carlos Hernandez (El Paso County), Jeff Rice (El Paso County), Greg Shaner (Matrix), Jesse Sullivan (Matrix), Tina Buschar (View Homes), JM Turley (View Homes), Jeff Mark (Landhuis), Rich Wray (Kiowa), Dave Gorman (MVE)

Item 1: Meeting called to order by **Tim McConnell** at 1:31 PM.

Item 2:

- a) Approval of the November 14, 2023, Drainage Board minutes

Approval of the minutes from the November 14, 2023, Drainage Board Meeting. Motion was made by **Scott Smith** to approve the minutes of November 14, 2023, **with the amendment to remove Marc Whorton's duplicate naming in the "Members Present"**. Motion was seconded by **Mark Sherwood**.

Motion Passed 6-0

Item 3: Old Business – None.

Item 4: New Business

- a) **Partial Closure of Jimmy Camp Creek for Bull Hill/Rolling Meadows (County)** – presented by **Jeff Rice (County), Jeff Mark (Landhuis), and Rich Wray (Kiowa)**

Jeff Rice introduces the request for the closure of a portion of Jimmy Camp Creek Basin for Bull Hill, Rolling Meadows, and the remaining unplatted portions of Lorson Ranch development in unincorporated El Paso County. El Paso County supports the approval of the partial closure, but they are still reviewing to ensure this action will not significantly increase the drainage fee for the remaining parcels in the basin. *Tim McConnell* asks if this item will need to come back to Drainage Board once the determinations are made, or will it be approved administratively. *Jeff Rice* responds that could be decided by the Board whether or not they would like to have the item come back to the Board. *Jeff Mark* then states it would be preferred if the Item could be settled administratively, but agrees it is the Board's decision. *Jeff Rice* displays the map of Lorson Ranch to show the area of concern for this Item. *Jeff Mark* continues to describe the area in question and explain the background of the improvements already installed and future installments. Jeff explains this request is being brought to the Board

because the cost of the improvements is anticipated to far exceed what the basin fees would be based on the analysis. Mark Sherwood asks if they are fairly confident about the required improvements to be installed in the area. Jeff Rice answers that they are confident about the final design and associated fees. Rich Wray arrives and offers further details on the calculations of the drainage fees for the area. He then continues to explain justifications to support this request. Scott Smith asks Jeff Mark about the current status of this portion of Lorson Ranch in terms of the fees and reimbursable cost and if it's in balance. Jeff Rice responds by explaining the current status of this portion of Lorson Ranch discussing the fees and credits for the basin. Marc Whorton asks if the channel improvements have been accepted by the County. Jeff Rice confirms that the channels have been completed and accepted, and the metro district maintains it. Marc Whorton then asks when the updated DBPS will be completed, and Jeff Rice responds that it is anticipated to be completed within the year.

Marc Whorton asks if Jeff Mark would be ok with splitting up the request to close the portion of the basin with completed improvements while the County finishes their review and completes the updated DBPS. Jeff agrees the would be acceptable if the Board agrees.

Marc Whorton moves to approve the partial closure of Jimmy Camp Creek just for the remaining Lorson developments, pending confirmation that this action will not significantly raise the resulting drainage fees for the remaining parcels in the basin with the expectation that the applicant will bring the same request back to the Board for Rolling Meadows/ Bull Hill. **Scott Smith** seconds the motion.

Motion Passed 6-0

b) Sand Creek Channel Stabilization Reimbursement Request (City) – presented by Erica Schmitz (City) and Gregory Shaner (Matrix)

Erica Schmitz introduces the request for reimbursement for Sand Creek channel improvements. Erica continues providing a bit of background for the request and states that City staff is remaining neutral on this request because the reimbursement request is greater than the 10% allotted by code. *Gregory Shaner* is introduced and continues to provide background on the project and history of the site. Gregory describes the difficulties and obstacles with the project, which helps to justify why they are requesting a larger reimbursement. Grant Petik asks for clarification on some of the additional costs shown in their analysis. Gregory explains the costs depicted and discusses more details about the project. Board members and applicant discuss the cost breakdown, and Tim McConnell mentions an analysis to determine whether a fee increase is warranted. There is further discussion amongst the Board.

Tim McConnell moves to approve the \$553,188.31 channel improvements reimbursement request. **Mark Sherwood** seconds the motion.

Motion Passed 6-0

c) Sand Creek Request to Designate Reimbursable Infrastructure (City) – presented by Erica Schmitz (City)

Erica Schmitz introduces the request for channel improvements associated with the Final Plat for The Crossing at Palmer Park Filing No. 5 be designated as reimbursable. Erica adds that City staff is remaining neutral on this request but offers options for possible motions. Erica introduces *Dave Gorman*, who takes the stand to explain the background of their improvements and the reason for their request. Dave explains there has been no improved or stabilization of the channel in this area previously. *Mike Turley* asks about drainage fees in association with platting the area. *Erin Powers*

addresses Mike's question with City policy. *Scott Smith* then asks if these improvements are installed already, and Dave responds that they have not. Dave explains that plans have been reviewed by the City and this is just an estimated cost for the improvements. *Scott Smith* confirms that this is a request to improvement costs to be considered reimbursable and Dave confirms. There is further discussion between the Board and applicant describing the project and development for The Crossing at Palmer Park Filing No. 5.

Scott Smith moves to approve the request to add this reimbursable amount to the Sand Creek Drainage Basin with a request for a fee analysis of the Sand Creek Basin upon request for reimbursement. *Marc Whorton* seconds the motion.

Motion Passed 6-0

e) Housekeeping

a. February meeting cancellation

Mark Sherwood moves to approve the cancellation of the schedule meeting in February 2024. *Marc Whorton* seconds the motion.

Motion Passed 6-0

f) Open Discussion

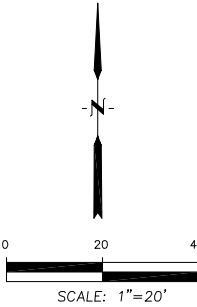
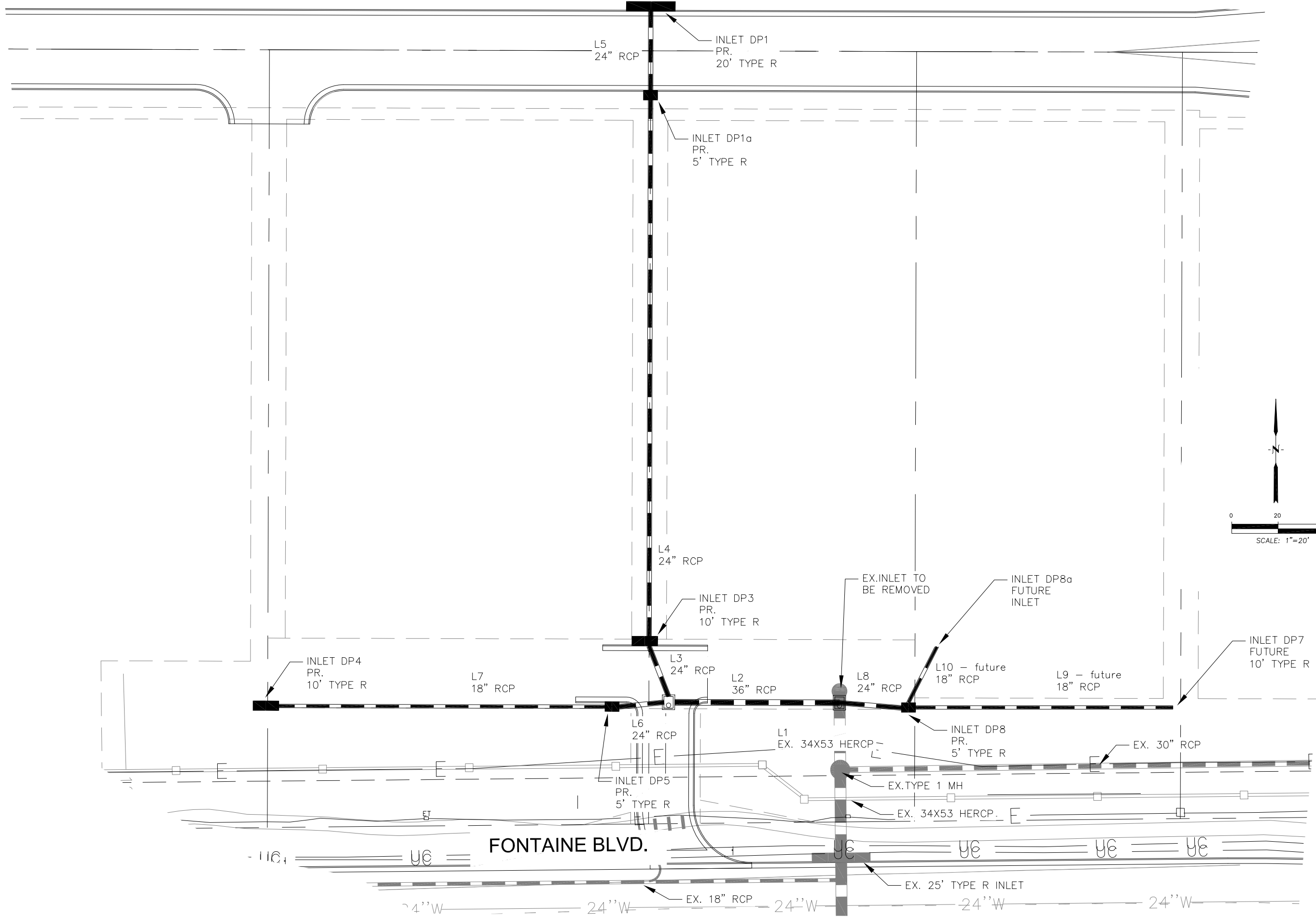
Tim McConnell asks about Gary's vacancy and the upcoming vacancies when his and Marc's terms expire in May 2024. *Erin Powers* responds explaining that the vacancies are posted and reviews the process for hiring.

Tim McConnell then asks about the financial update from the County and requests they could provide an update at the next meeting.

Tim McConnell asked about Amy's financial update and the unclaimed reimbursements, wanting more details on where the additional unclaimed funds were reallocated to. *Erin Powers* responds that she will speak with Amy to find out if the unclaimed funds will be reallocated to each individual basin versus the Interest fund.

Item 5: *Tim McConnell* - Meeting adjourned at 3:43 PM.

STORM SCHEMATIC



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

NO.	DESCRIPTION	DATE

PROJECT: VILLAGES AT LORSON RANCH
 212 N. WAHSATCH AVE., SUITE 301
 COLORADO SPRINGS, COLORADO 80903
 CONTACT: JEFF MARK

PREPARED FOR: LORSON, LLC

DRAWN: RLS
 DESIGNED: LAB
 CHECKED: LAB

STORM SEWER SCHEMATIC

VILLAGE AT LORSON RANCH

DATE	JUNE, 2024
PROJECT NO.	100.070
SHEET NUMBER	1
TOTAL SHEETS:	1

C:\Users\lrbak\OneDrive - Core Engineering Group\Documents\100.070\100.070-storm_schematic.dwg Job: 06 - 2024 - 11-22pm

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	1	31.50	34x53	Ell	28.90	5701.86	5702.05	0.657	5704.47	5703.75	0.38	5703.75	End	Manhole
2	2	20.50	36	Cir	72.76	5702.15	5702.51	0.495	5703.75	5703.96	n/a	5703.96	1	Manhole
3	3	12.50	24	Cir	26.00	5703.26	5703.52	1.001	5704.32	5704.79	0.23	5704.79	2	Manhole
4	4	9.80	24	Cir	239.29	5703.62	5706.01	0.999	5704.79	5707.13	n/a	5707.13 j	3	Manhole
5	5	9.40	24	Cir	35.00	5706.11	5706.46	1.000	5707.13	5707.56	0.44	5707.56	4	Manhole
6	6	8.90	24	Cir	22.46	5703.26	5703.38	0.535	5704.31	5704.44	n/a	5704.44	2	Manhole
7	7	5.90	18	Cir	151.60	5703.88	5704.63	0.495	5704.89	5705.64	0.34	5705.98	6	Manhole
8	8	12.20	24	Cir	28.65	5702.90	5703.19	1.012	5703.94	5704.44	0.51	5704.44	1	Manhole
9	9	5.30	18	Cir	125.20	5703.69	5704.94	0.998	5704.44	5705.83	n/a	5705.83	8	None
10	10	6.00	18	Cir	29.57	5703.69	5703.99	1.016	5704.50	5704.94	0.41	5704.94	8	None

Village 5yr

Number of lines: 10

Run Date: 3/28/2024

NOTES: Return period = 5 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	28.899	0.00	0.00	0.00	0.00	0.00	0.0	2.0	0.0	31.50	89.44	6.35	34 x 53 e	0.66	5701.86	5702.05	5704.47	5703.75	5707.84	5707.59	1
2	1	72.756	0.00	0.00	0.00	0.00	0.00	0.0	1.6	0.0	20.50	47.54	5.70	36	0.51	5702.15	5702.52	5703.75	5703.97	5707.59	5707.92	2
3	2	26.003	0.00	0.00	0.00	0.00	0.00	0.0	1.5	0.0	12.50	22.63	6.66	24	1.00	5703.26	5703.52	5704.32	5704.79	5707.92	5708.05	3
4	3	239.285	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	9.80	22.60	5.28	24	1.00	5703.62	5706.01	5704.79	5707.13	5708.05	5712.13	4
5	4	35.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	9.40	22.62	5.59	24	1.00	5706.11	5706.46	5707.13	5707.56	5712.13	5711.46	5
6	2	22.463	0.00	0.00	0.00	0.00	0.00	0.0	0.8	0.0	8.90	16.54	5.30	24	0.53	5703.26	5703.38	5704.31	5704.44	5707.92	5707.94	6
7	6	151.599	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.90	7.43	4.67	18	0.50	5703.88	5704.64	5704.89	5705.65	5707.94	5709.01	7
8	1	28.652	0.00	0.00	0.00	0.00	0.00	0.0	0.7	0.0	12.20	22.76	6.63	24	1.01	5702.90	5703.19	5703.94	5704.44	5707.59	5707.55	8
9	8	125.197	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.30	10.49	5.42	18	1.00	5703.69	5704.94	5704.44	5705.83	5707.55	5706.88	9
10	8	29.568	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.00	10.58	5.64	18	1.02	5703.69	5703.99	5704.50	5704.94	5707.55	5707.54	10

Village 5yr

Number of lines: 10

Run Date: 6/9/2024

NOTES: Intensity = 501.75 / (Inlet time + 28.20) ^ 1.31; Return period = Yrs. 5 ; c = cir e = ellip b = box

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	1	57.30	34x53	Ell	29.00	5701.86	5702.05	0.655	5704.41	5704.32	n/a	5704.32	End	Manhole
2	2	37.30	36	Cir	72.76	5702.15	5702.51	0.495	5704.32	5704.52	0.81	5705.32	1	Manhole
3	3	22.80	24	Cir	26.00	5703.26	5703.52	1.001	5705.32*	5705.59*	0.34	5705.93	2	Manhole
4	4	17.80	24	Cir	239.29	5703.62	5706.01	0.999	5705.93	5707.53	n/a	5707.53 j	3	Manhole
5	5	17.00	24	Cir	35.00	5706.11	5706.46	1.000	5707.53	5707.95	0.72	5707.95	4	Manhole
6	6	16.10	24	Cir	22.46	5703.26	5703.38	0.535	5705.32*	5705.44*	0.06	5705.50	2	Manhole
7	7	8.10	18	Cir	151.60	5703.88	5704.63	0.495	5705.50*	5706.40*	0.33	5706.73	6	Manhole
8	8	22.40	24	Cir	29.00	5702.90	5703.19	1.000	5704.52	5704.88	0.92	5704.88	1	Manhole
9	9	9.70	18	Cir	125.20	5703.69	5704.94	0.998	5704.88	5706.14	0.64	5706.14	8	None
10	10	11.00	18	Cir	29.57	5703.69	5703.99	1.016	5704.98	5705.28	0.72	5706.00	8	None

Village 100yr

Number of lines: 10

Run Date: 3/28/2024

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	29.000	0.00	0.00	0.00	0.00	0.00	0.0	1.1	0.0	57.30	89.28	7.87	34 x 53 e	0.65	5701.86	5702.05	5704.41	5704.32	5707.84	5708.48	1
2	1	72.756	0.00	0.00	0.00	0.00	0.00	0.0	0.9	0.0	37.30	47.54	7.15	36	0.51	5702.15	5702.52	5704.32	5704.51	5708.48	5708.48	2
3	2	26.003	0.00	0.00	0.00	0.00	0.00	0.0	0.8	0.0	22.80	22.63	7.26	24	1.00	5703.26	5703.52	5705.33	5705.60	5708.48	5708.71	3
4	3	239.285	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	17.80	22.60	6.31	24	1.00	5703.62	5706.01	5705.94	5707.53	5708.71	5712.17	4
5	4	35.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	17.00	22.62	6.96	24	1.00	5706.11	5706.46	5707.53	5707.95	5712.17	5711.79	5
6	2	22.463	0.00	0.00	0.00	0.00	0.00	0.0	0.6	0.0	16.10	16.54	5.13	24	0.53	5703.26	5703.38	5705.33	5705.45	5708.48	5707.92	6
7	6	151.599	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	8.10	7.43	4.58	18	0.50	5703.88	5704.64	5705.51	5706.41	5707.92	5709.01	7
8	1	29.000	0.00	0.00	0.00	0.00	0.00	0.0	0.4	0.0	22.40	22.62	8.07	24	1.00	5702.90	5703.19	5704.52	5704.88	5708.48	5708.74	8
9	8	125.197	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	9.70	10.49	6.43	18	1.00	5703.69	5704.94	5704.88	5706.14	5708.74	5706.75	9
10	8	29.568	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	11.00	10.58	6.80	18	1.02	5703.69	5703.99	5704.98	5705.28	5708.74	5705.79	10

Village 100yr

Number of lines: 10

Run Date: 6/9/2024

NOTES: Intensity = 1020.33 / (Inlet time + 30.10) ^ 1.34; Return period = Yrs. 100 ; c = cir e = ellip b = box

MAP POCKET

**EXISTING CONDITIONS
 FINAL PLAT
 VILLAGES AT LORSON RANCH**

DATE:
JUNE, 2024

PROJECT NO.
100.070

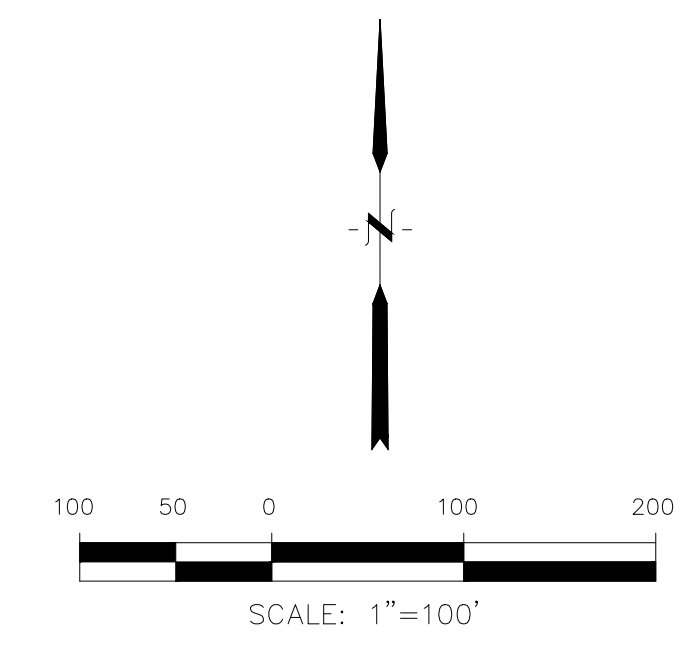
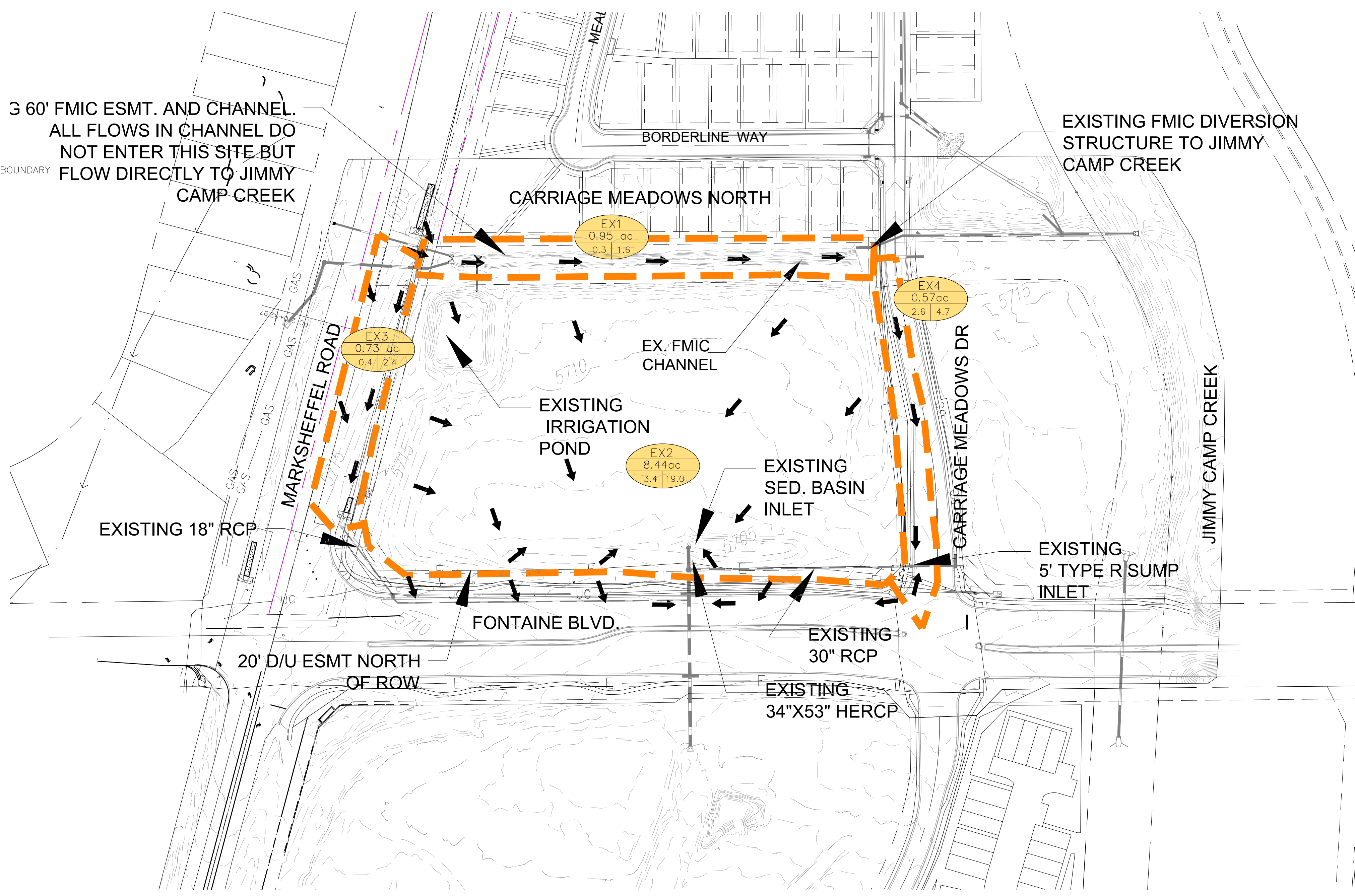
SHEET NUMBER
1

TOTAL SHEETS: **1**

LEGEND

- BASIN BOUNDARY
- BASIN DESIGN POINT
- BASIN I.D.
ACREAGE
5 YR/100 YR CFS
- DIRECTION OF FLOW
- EXISTING CONTOUR
- EXISTING ROW/LORSON RANCH BOUNDARY
- EXISTING STORM SEWER
- TIME OF CONCENTRATION

**3 60" FMIC ESMT. AND CHANNEL.
 ALL FLOWS IN CHANNEL DO
 NOT ENTER THIS SITE BUT
 FLOW DIRECTLY TO JIMMY
 CAMP CREEK**



DESIGN POINT SUMMARY			
D.P.	5 YEAR cfs	100 YEAR cfs	NOTES
1	9.4	17.0	STREET FLOW
1a	0.5	0.9	STREET FLOW
2	9.8	17.8	PIPE FLOW
3	3.1	5.6	STREET FLOW
3a	12.5	22.8	PIPE FLOW
4	7.2	13.1	STREET FLOW
5	3.0	8.0	STREET FLOW (INCLUDES BYPASS FROM DP4)
5a	8.9	16.1	PIPE FLOW
6	20.5	37.3	PIPE FLOW
7	5.3	9.7	STREET FLOW

DESIGN POINT SUMMARY			
D.P.	5 YEAR cfs	100 YEAR cfs	NOTES
8	0.9	1.7	STREET FLOW
8a	6.0	11.0	STREET FLOW
9	12.2	22.4	PIPE FLOW
10	31.5	57.3	PIPE FLOW

DETENTION POND AREAS:

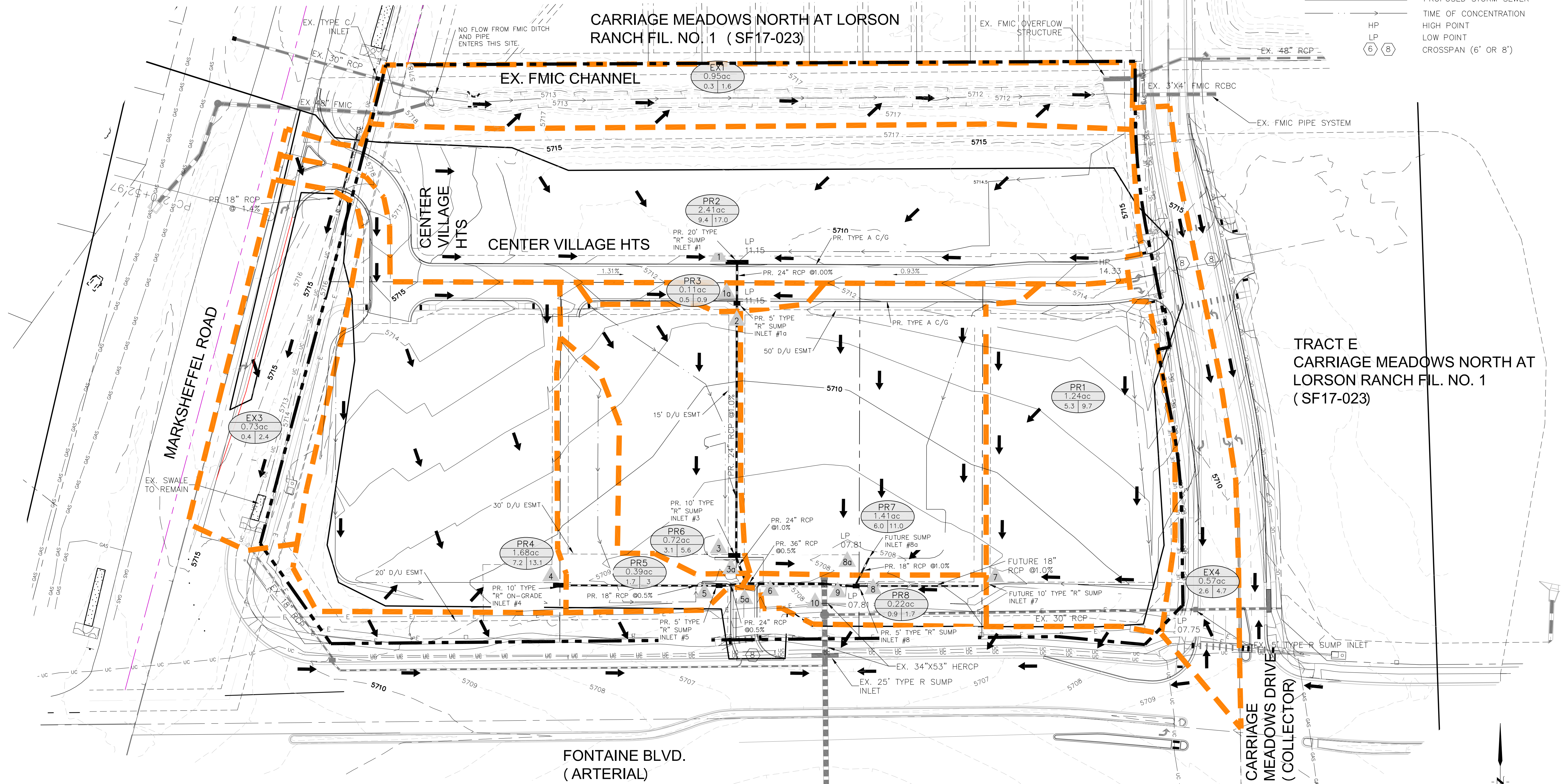
- ALL BASINS DRAIN TO POND G1/G2 LOCATED IN CARRIAGE MEADOWS SOUTH AT LORSON RANCH
- POND G1/G2 PROVIDES DETENTION AND WQ FOR THIS DEVELOPMENT
- DETENTION POND G1/G2 WAS CONSTRUCTED PER SF 17-011 (CARRIAGE MEADOWS SOUTH AT LORSON RANCH FDR, APPROVED ON SEPTEMBER 7, 2017)

NOTES:

- ALL PROPOSED STORM SEWER IS RCP ROUND PIPE AND IS A PRIVATE STORM SEWER SYSTEM UNLESS NOTED OTHERWISE.
- CURB/GUTTER IS TYPE A EXCEPT AS NOTED

LEGEND

- PLAT BOUNDARY
- BASIN BOUNDARY
- BASIN DESIGN POINT
- BASIN I.D.
- ACREAGE
- 5 YR/100 YR CFS
- DIRECTION OF FLOW
- EXISTING CONTOUR
- PROPOSED CONTOUR
- ROW/LORSON RANCH BOUNDARY
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- TIME OF CONCENTRATION
- HIGH POINT
- LOW POINT
- CROSSSPAN (6' OR 8')



CORE ENGINEERING GROUP
 15006 LESTER AVENUE, SUITE 35006
 PH: 719.570.1100
 CONTACT: RICHARD L. SCHINDLER, P.E.
 EMAIL: Rich@cegi.com

PROJECT: VILLAGES AT LORSON RANCH
PREPARED FOR: LORSON LLC
 212 NORTH WAHSATCH AVE, SUITE 301
 COLORADO SPRINGS, COLORADO 80903
 CONTACT: JEFF MARK

DESCRIPTION: DEVELOPED CONDITIONS
FINAL PLAT: VILLAGES AT LORSON RANCH
SHEET NUMBER: 1

DATE: JUNE, 2024
PROJECT NO.: 100.070
SHEET NUMBER: 1
TOTAL SHEETS: 1

