FINAL DRAINAGE REPORT

FOR

LOT 1 CROSSROADS MIXED USE FILING NO. 2 EL PASO COUNTY, COLORADO

JULY 2023

Prepared for:
Crossroads Development Company, LLC
Mr. Danny Mientka
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Colorado Springs, Colorado Springs 80903

Prepared by:

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Project #18-005
PCD Filing No.: PPR2311

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FOR
LOT 1 CROSSROADS MIXED USE FILING NO. 2

DRAINAGE PLAN STATEMENTS

ENGINEERS STATEMENT

The attached drainage plan and report was 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 the 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.

Virgil A. Sanchez, P.E. #37160
For and on Behalf of M&S Civil Consultants, Inc

COLORADO REGISTERED 37160 08/02/23 PROFESSIONAL ENGINEER

DEVELOPER'S STATEMENT

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

BY:_____
Danny Mientka –Owner

DATE: 08/02/23

ADDRESS: Crossroads Development Company, LLC
90 South Cascade Avenue, Suite 1500
Colorado Springs, CO 80903

EL PASO COUNTY'S STATEMENT

Filed in accordance with the requirements of El Paso County Land Development Code, Drainage Criteria Manual Volumes 1 and 2, and the Engineering Manual, as amended.

BY:_____ DATE:_____

Approved
By: Gilbert LaForce, P.E.
Engineering Manager
Date: 10/05/2023 4:17:32 PM
El Paso County Department of Public Works

istrator

CONDITIONS:

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APPENDIX

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Purpose

This Final Drainage Report for Crossroads Mixed Use Filing No. 2, Lot 1 is in support of the Final Plat, Preliminary Plan, and Construction Drawings of the subject site. This report functions to identify the existing and proposed runoff patterns and recommend proposed drainage improvements which are intended to safely convey runoff through the proposed development, while minimizing impacts to downstream facilities and adjacent properties.

The Final Plat and Construction Drawings for this site will be submitted concurrently with this report. The phase two (2) development of Lot 1 is a portion of the Crossroads Mixed Use Filing No. 2 development.

Project Location and Description

The subject site is located in the south half of Section 8, Township 14 South, Range 65 West of the 6th P.M. in El Paso County, Colorado. The 0.794-acre site is currently undeveloped. The site is bound to the west by the undeveloped Tract D, to the north by Central Rail Point, south by Highway 24, and to the east by Tract C Crossroads Mixed Use Filing No. 2. The proposed site will be developed as the second phase of Crossroads Mixed Use Filing No.2 into one (1) commercial lot, with one (1) parking lot and one (1) private roadway.

The majority of the existing site is covered with native grasses with fair to good cover. Known earthwork operations for “borrow material” have occurred over a small area of the eastern portion of the site in early to mid-2019, but have since stabilized. Generally, the site slopes from east to west slightly greater than 1% with some localized depressions. Some of these may be the results of previous earthwork activities. The site lies within the Sand Creek Drainage Basin. No existing drainage facilities or improvements are on-site, however, surrounding drainage facilities are planned and will connect on-site. No known irrigation systems or wells are present.

Soils

Soils in the project area have been determined to be Blakeland Loamy Sand (8) and Blendon Sandy Loam (10), which are characterized to be part of Hydrologic Soil Types "A" & "B" as determined from the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) “Web Soils Survey”. A soils map illustrating the site location and soil types is provided in the appendix of this report.

Floodplain Statement

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Nos. 08041C0754 G & 08041C0752 G, effective date December 7th, 2018, none of the site lies within a designated floodplain. A copy of these annotated maps can be found in the appendix. The Sand Creek East Fork Channel is located to the northwest of the adjacent Meadowbrook Crossing subdivision.

Previous Studies

The area which encompasses Crossroads Mixed Use Filing No. 2, Lot 1 has been previously studied. Below is a short outline of the assumptions regarding the lands of the subject site and those based upon the previously assembled and approved drainage reports and how the assumptions within them impact the subject site.

"Crossroads Mixed Use Filing No.2 Final Drainage Report, prepared by M&S Civil Consultants, Inc., dated May 2023.

- Establishes all historic, existing, and future drainage patterns and detailed drainage information for the subject site and adjacent properties.

"Crossroads Mixed Use Filing No.1 Final Drainage Report, prepared by M&S Civil Consultants, Inc., dated February 2021, revised February 2022.

- Establishes all historic, existing, and future drainage patterns and detailed drainage information for the subject site and adjacent properties.

"Sand Creek Drainage Basin Planning Study, Preliminary Design Report", prepared by Kiowa Engineering Corporation, dated January 1993, revised March 1996.

- Establishes that the subject site falls within the East Fork Sand Creek Drainage Basin, a portion of the larger Sand Creek Watershed
- Establishes that there are no requirements for major infrastructure improvements and no drainage-improvement related reimbursements with the development of this parcel
- Drainage fees shall be required to plat the subdivision

"Claremont Business Park Filing No.2 prepared by Matrix Design Group, revised November 2006

- Establishes the drainage patterns of off-site Basins 0S-4 and E2 which are to be conveyed within the Meadowbrook Rights of Way
- Established up-gradient off-site drainage to be directed under Meadowbrook north to off-site East Fork Sand Creek Channel, and away from the subject site

"Final Drainage Report, Lot 1 24/94 Business Park Filing No.1 prepared by Core Engineering Group, dated July 14, 2016

- The development of the 24/94 Business Park FDR shows future curb inlets along the future Meadowbrook Parkway extension on the south and west corners of the intersection to capture runoff from up-gradient watersheds in addition to a proposed inlet which was to be located above the intersection at the northwest corner of the subject site.
- Establishes that flows from the parcel upstream of the convenience store (29/94 FDR Basin OS4) EX-B now to be collected by the extension of a 36" RCP along the south side of Meadowbrook Parkway. Runoff within the right of way/roadway separated as Basin EX-A2.
- Continues assumption that flows from Newt Drive be conveyed north to East Fork Sand Creek.

- Evaluated pre-development drainage patterns for subject site including direct discharge flow rates to the CDOT rights of way of 1.9 and 14.5 cfs for the 5 and 100 year events, respectively. (Basin EX-E).

"Preliminary and Final Drainage Report Meadowbrook Crossing Filing No. 1 and Filing 2, El Paso County, Colorado prepared by Kiowa Engineering Corporation, dated July 25, 2017

- Proposed the installation of a future 10' Type R inlet at the southeast corner of Newt Drive and Meadowbrook Parkway with the extension of Meadowbrook Parkway to the west (along the northern boundary of the subject site). The inlet was to function to collect off-site runoff from a portion of the south half of Meadowbrook Parkway and Newt Drive north of Hwy 24. Intercepted runoff would be conveyed via a proposed 24" storm sewer to the existing storm sewer system within the Meadowbrook Crossings development.
- Proposed the installation of a 10' Type R inlet at the west end of future Meadowbrook Parkway. The inlet was to collect runoff from the north half of the future roadway. An 18" storm drain was proposed to convey collected runoff to the existing water quality pond located within the Meadowbrook Crossings Development. The report indicates a separate forebay or the modification of an existing forebay would be required.
- Shifted the location of the existing 10' Type R curb inlet to be installed upstream of the intersection of Newt Drive (as shown with the 24/94 Business Park FDR), flows in excess of the inlet capacity are to continue within the future Meadowbrook.

"Final Drainage Report for Meadowbrook Dirt Borrow Site, El Paso County Colorado, prepared by M&S Civil Consultants, November 2018.

- Evaluated on-site drainage patterns
- Excluded off-site runoff impacts from areas to the east of site.
- Allowed site to be utilized as a "borrow site" for off-site earthwork activities.

Hydrologic Calculations

Hydrologic calculations were performed using the El Paso County and City of Colorado Springs Storm Drainage Design Criteria manual and where applicable the Mile High Flood District Manual. The Rational Method was used to estimate stormwater runoff anticipated from design storms with 5-year and 100-year recurrence intervals.

Hydraulic Calculations

Hydraulic calculations were estimated using the Manning's Formula and the methods described in the El Paso County and City of Colorado Springs Storm Drainage Design Criteria manual. Storm drains were designed using parameters and criteria summarized in Chapter 8 of El Paso County's Drainage Criteria Manual Vol. 1 and the City of Colorado Springs Drainage Criteria Manuals. Parameters such as Manning's values of 0.13 were used for concrete pipe flow, and design considerations for minimum freeboard and maximum velocities were applied. The relevant data sheets are included in the appendix of this report. Hydraulic grade line calculations for the storm system in the proposed condition are provided in the Appendix of this Final Drainage report.

Drainage Criteria

This drainage analysis has been prepared in accordance with current El Paso County Drainage Criteria Manual and, where applicable, City of Colorado Springs and Mile High Flood District Criteria Manuals. Calculations were performed to determine runoff quantities for the 5-year and 100-year frequency storms for developed conditions using the Rational Method as required for basins having areas less than 100 acres. See Appendix for supporting calculations.

Existing Drainage Characteristics

The subject lots and surrounding areas had been utilized as a "borrow site" to provide surplus earthwork to off-site developments in the area. This recent grading effort occurred during the spring and summer of 2019. The site and surrounding areas have been since been graded during the development of Crossroads Mixed Use Filing No. 2. At the request of El Paso County, an existing conditions drainage analysis has been provided to show the changes to the topography and drainage patterns as a result of this effort. Only the development coefficients for the undeveloped Tracts B, C, and D have changed between the proposed conditions analysis for the Final Drainage Report for Crossroads Mixed Use Filing No. 2 FDR/MDDP (CMU2 FDR) by M&S Civil Consultants, Inc (see appendix) and the existing conditions analysis for the subject site. The purpose of this change is to illustrate the existing condition without the development of the future Tracts B, C, and D as proposed, but not planned out entirely in the CMU2 FDR.

In the existing condition, vegetation remains sparse, consisting primarily of graded soils and weeds with good to fair cover. Areas disturbed by grading activities were reseeded and have since stabilized. Ultimately, all runoff from the site is conveyed to the west towards existing drainage facilities located under Southern Rail Point and ultimately the East Fork of Sand Creek. This section only discusses the changes in basin geometry and drainage pattern and provides a direct comparison of the proposed conditions from CMU2 FDR versus the existing conditions of the subject lot, utilizing the same (design) points, which have remained undisturbed.

Design Point 1*

Off-site **Basin E2 (Claremont Business Park Filing No.2)** consists of a reported 3.86 acres of development located along the southeastern half of existing Meadowbrook Parkway some 1200' northeast of the subject site. Runoff produced by the off-site development (CBPF2 Lot 46) is conveyed to Meadowbrook Parkway at flow rates of Q5=15.1 and Q100=28.6 cfs in the 5 and 100-year storm events respectively. The collected flows combine with runoff from **Basin EX-A2 (Lot 1 24/94 Business Park Filing No.1)** (Q5=2.5, Q100=4.5 cfs) which consists of 0.59 acres of the southeastern half of Meadowbrook Parkway located immediately east of existing Newt Drive. The collected flows from the two basins culminate at **Design Point 1** at peak rates of Q5=14.2 and Q100=26.5 cfs. An existing 10' CDOT Type R at-grade inlet (**Inlet 1**) intercepts flows of Q5=8.4 and Q100=11.1 cfs, with subsequent by-pass flows of 5.8 and 15.4 cfs in the 5 and 100 year events. Surface flows continue west within the south half of existing Meadowbrook Parkway. Flows at **DP1** are consistent with proposed flows at this location from the CMU2 FDR.

Design Point 2*

Off-site **Basin OS-A (Meadowbrook Crossing Filing 1 and 2)** consists of 1.29 acres of the northern half of existing Meadowbrook Parkway located immediately east of existing Newt Drive. Runoff produced within this basin totals Q5=3.1 and Q100=6.0 cfs. An existing 10' CDOT Type R

at-grade inlet (**Inlet 2**) collects runoff of Q5=3.1 and Q100=5.3 cfs, with subsequent by-pass flows in only the 100-year event of 0.7 cfs. Runoff leaving the design point continues west within the north half of existing Meadowbrook Parkway.

Design Point 3*

In accordance with the assumptions outlined within the Meadowbrook Subdivision Final Drainage Report, an off-site public storm sewer pipe and inlet constructed at the southwest corner of the roundabout aids in collecting runoff from a portion of the off-site watershed located to the east of the site.

Off-site **Basin OS-1** consists of approximately 1.40 acres of existing Newt Drive that is retrofitted with a raised median as part of an intersection conversion to a roundabout. Runoff produced within the basin (Q5=6.4 and Q100=11.5 cfs) combines with flow-by from **DP1** at peak rates of Q5=10.2 and Q100=23.3 cfs at an existing public 10' at-grade inlet (**Inlet 3**: Q5=6.7, Q100=9.8 cfs intercepted; Q5=3.5, Q100=13.5 cfs flow by) located at **DP3**. An existing public 24" storm sewer (**PR1**) conveys water across the intersection to the existing 42" storm sewer with Meadowbrook Crossings in accordance with that subdivision's drainage report. Runoff in excess of the inlet capacity continues westward via the curb and gutter of existing Meadowbrook Parkway.

Design Point 4*

Off-site **Basin A** consists of 1.67 acres of the north half of existing Meadowbrook Parkway. Runoff within this basin (Q5=6.5 and Q100=11.6 cfs) combines with flow by from **DP2** for total flows of 6.5 and 12.4 cfs in the 5 year and 100-year events, respectively. An existing 15' at-grade inlet (**Inlet 4:** Q5=6.5, Q100=10.6 cfs intercepted; Q5=0.0, Q100=1.8 cfs flow by) is located at the west end of the roadway. This inlet conveys intercepted flows to **PR1.5**, an existing 24" RCP public storm sewer. Flow by from the 100-year event continues west to downstream infrastructure.

Design Point 4.5*

1.8 cfs of flow by in the 100-year event continues west from **DP4** towards off-site **Inlet 4.5**, a **NEENAH R-2501 Type C Grate** lid and frame at the low point of the cul-de-sac. Supporting calculations for this non-standard inlet are provided in the CMU2 FDR Appendix. This inlet reaches a maximum depth of 0.5' in order to convey this flow underneath the roadway via an existing public 24" storm sewer (**PR2**). The NEENAH inlet is to be removed and replaced with a standard CDOT 5' Type R inlet when the roadway cul-de-sac is removed and the roadway is extended to the west with future development. In the case of inlet clogging, overflow collects at **DP5**, which has an additional 13.3 cfs capacity.

Design Point 5*

Off-site **Basin B** consists of 1.48 acres of the southern half of existing Meadowbrook Parkway. Runoff produced within this basin (Q5=5.8 and Q100=10.3 cfs) combines with flow-by leaving **DP3** at peak flowrates of Q5=9.9, Q100=25.8 cfs. An existing public 15' sump inlet (**Inlet 5:** Q5=10.1, Q100=26.3 cfs intercepted; no flow by) located at west end of the roadway prevents developed flows from exiting the roadway corridor. The intercepted runoff combines with **PR2** flows in a 36" private storm sewer system (**PR3, by others**). Combined flows within the existing system are calculated to reach peak rates of 16.5 and 37.9 cfs. The storm sewer system is planned by others through the multi-family site (Lot 11) but ultimately will tie back into the system at **DP15**. In case of inlet clogging, overflows overtop the curb on the southern side onto the apartment site and are conveyed to the swale on the west side of the site.

Design Point 6

Off-site **Basin C** (Q5=0.7, Q100=5.4 cfs) consists of 2.36 acres of the northern portion of commercial Tract C located along the east side of the site. An existing private 30" storm sewer (**PR4**) collects and conveys undeveloped flows of Q5=0.7 and Q100=5.4 cfs in the 5 and 100-year storm event, respectively. Intercepted flows are conveyed west underground within the roadway tract. **PR4** was treated as a flared end pipe for rational method calculation purposes, to account for future development per the CMU2 FDR. Only the development coefficient for **Basin C** has been altered from the proposed conditions for CMU2 FDR (developed) to the existing conditions for Lot 1 (undeveloped).

Design Point 6.5

Off-site **Basin C1** (Q5=0.7, Q100=5.0 cfs) consists of 2.19 acres of the southern portion of commercial Tract C located along the east side of the site. An existing private 30" storm sewer (**PR4.5**) collects and conveys undeveloped flows of Q5=0.7 and Q100=5.0 cfs in the 5 and 100-year storm event, respectively. Intercepted flows from **PR4** and **PR4.5** are conveyed west underground within the roadway tract through **PR5-PR7** at flow rates of Q5=1.4 and Q100=10.5 cfs. Only the development coefficient for **Basin C1** has been altered from the proposed conditions for CMU2 FDR (developed) to the existing conditions for Lot 1 (undeveloped).

Design Point 7

Off-site **Basin D** consists of 2.21 acres of commercial Tract B located between existing Meadowbrook Parkway, existing Central Rail Point, existing Pacific Rail Point, and existing Southern Rail Point. **Basin D** has a private 24" storm drain at the southwest corner (**PR8**) to collect undeveloped peak flows of Q5=0.7 and Q100=5.1 cfs from this basin in the 5 and 100-year storm events, respectively. Only the development coefficient for **Basin D** has been altered from the proposed conditions for CMU2 FDR (developed) to the existing conditions for Lot 1 (undeveloped).

Design Point 8

Off-site **Basin E** (Q5=1.6, Q100=3.9 cfs) consists of 0.99 acres of a portion of commercial lots, the northern half of existing Central Rail Point and the western half of existing Pacific Rail Point. A private 10' CDOT Type R at-grade inlet (**Inlet 6:** Q5=1.6, Q100=3.9 cfs intercepted; no flow by) is located on the north side of the roadway to intercept developed and undeveloped flows from **Basin E**. Future runoff bypassing this inlet continues to downstream infrastructure. Existing flows collected from the inlet combine with **PR8** and are conveyed to a box base manhole in the center of the existing Central Rail Point via an existing private 30" (**PR9**) storm drain at flow rates of Q5=2.3 and Q100=9.1 cfs. Within the manhole, the flows from **PR9** then combine with flows from **PR7** and continue to flow through an existing private 36" (**PR10**) storm drain at flow rates of Q5=3.8 and Q100=19.6 cfs. Only the development coefficient for 0.57 acres (commercial lot portions) of **Basin E** has been altered from the proposed conditions for CMU2 FDR (developed) to the existing conditions for Lot 1 (undeveloped).

Design Point 9

On-site **Basin E1** (Q5=1.4, Q100=5.1 cfs) consists of 1.41 acres of commercial lots, and the southern half of Central Rail Point. A private 10' CDOT Type R at-grade inlet (**Inlet 7:** Q5=1.4, Q100=5.1 cfs intercepted; no flow by) is located on the south side of the Central Rail Point to intercept developed and undeveloped flows from **Basin E1**. Future runoff bypassing this inlet continues to downstream infrastructure. Existing flows collected from the inlet combine with flows from **PR10** and are conveyed south to a box base manhole on the south side of the roadway via a

private 36" (**PR11**) storm drain and continue west underground at flow rates of Q5=6.1 and Q100=29.6 cfs. **PR12**, an existing 42" private storm sewer, then directs the system south from another manhole. Pipe flows at Q5= 6.9 and Q100= 13.8 cfs from the neighboring existing apartment site (**PR11.5**, private 24" RCP) combine with flows from **PR12** in an existing private 48" storm drain (**PR12.5**) at flow rates of Q5=14.9 and Q100=46.5 cfs. Only the development coefficient for 1.20 acres (commercial lot portions) of **Basin E1** has been altered from the proposed conditions for CMU2 FDR (developed) to the existing conditions for Lot 1 (undeveloped).

Design Point 10*

Off-site **Basin G** (Q5=2.1, Q100=3.8 cfs) consists of 0.46 acres of multi-family lots and roadway located southwest of the subject site at the southwest edge of existing Southern Rail Point. A private 10' CDOT Type R sump inlet (**Inlet 8**: Q5=2.1, Q100=3.8 cfs; no flow by) located on the west side of the street functions to collect the developed runoff from **Basin G. PR13**, an existing 18" private storm sewer, directs runoff east to a box base manhole at peak flow rates of 2.1 cfs and 3.8 cfs in the minor and major storm events, respectively. In the case of inlet clogging, overflow is directed to the swale at **DP13**.

Design Point 11

Off-site **Basin G1** (Q5=2.7, Q100=4.9 cfs) consists of 0.59 acres of commercial lots and the east half of Southern Rail Point, located west of the subject site. A private 15' CDOT Type R sump inlet (**Inlet 9:** Q5=2.6, Q100=4.7 cfs intercepted; no flow by), located on the east side of existing Southern Rail Point collects the developed runoff from **Basin G1** as well as bypass flows from **DP8 and DP9**, totaling Q5=2.6 and Q100=4.7 cfs. **PR14**, an existing 30" private storm sewer, directs runoff west to an underground box base manhole at peak flow rates of 2.6 cfs and 4.7 cfs in the minor and major storm events, respectively. Flows from **PR12.5**, **PR13**, and **PR14** combine into **PR15** (Q5=18.9, Q100=53.2 cfs), a private 48" RCP, and are directed south.

Design Point 12

On-site **Basin F** consists of 2.78 acres of on-site commercial lots (Tract D and portions of Lot 1) located at the western half of the Crossroads Mixed Use Filing No.2 site. A private existing 24" storm drain (**PR16**) collects the undeveloped basin flows of Q5=0.9 and Q100=6.6 cfs at **DP12** in the 5 and 100-year events, respectively. Intercepted flows are conveyed west underground to the mainline where they combine with flows from **PR15** at a manhole junction. **PR17,** a private 48" RCP storm sewer directs the collected runoff at rates of Q5=19.3 and Q100=58.7 cfs to a manhole which joins a private 30" RCP**, PR21*** (Q5=2.1, Q100=4.2) at combined flow rates of Q5=20.8 and Q100=61.3 cfs. The collected flows are conveyed southwest via **PR18** (Private 48" RCP).

Design Point 13*

A planned off-site 2' BTM earthen swale is designed to convey developed overflow runoff from the planned apartment complex site (**Basin D-1 Overflow**: Q5=0.0, Q100=0.9 cfs, **Basin Z-1**: Q5=0.47, Q100=1.27 cfs, and **Basin A-5 Overflow**: Q5=0.9, Q100=7.8 cfs) north of the FSD pond to **DP13**. This results in a total peak flow rates of Q5=1.4, and Q100=10.4 cfs at **DP13** in the 5 and 100 year events, respectively. Overflows from the apartment site were obtained by using flow by from the "Final Drainage Report for Aura at Crossroads" MHFD inlet sheets.

Design Point 14*

A planned off-site 2' triangular earthen swale is designed to convey developed overflow runoff from the planned apartment complex site (**Basin Z-2**: Q5=0.57, Q100=1.43 cfs) north of the FSD pond and flows from **DP13** to **DP14**. This results in a total peak flow rates of Q5=2.1, and Q100=12.4 cfs at **DP14** in the 5 and 100 year events, respectively. Flows at DP14 are then conveyed south and east. Overflows from the apartment site were obtained by using flow by from the "Final Drainage Report for Aura at Crossroads" MHFD inlet sheets.

Design Point 15

Off-site **Basin J** (Q5=2.1, Q100=8.9 cfs) consists of 3.26 acres of the planned Tract for the FSD pond located southwest of the subject site. Flows within this basin reach peak runoff rates of Q5=2.1 and Q100=8.9 cfs and are generally conveyed to the planned FSD pond. A planned private 48" storm drain, **PR19*** (Q5=35.4, Q100=65.5 cfs), contains flows from the planned apartment site (**Basin A-5**). **PR19*** conveys these flows south, to the western planned concrete forebay where they combine with runoff flows from **Basin J**, **DP14**, and **PR18** within the FSD pond at **DP15**. Flows at **DP15** reach peak rates of 76.8 cfs and 184.1 cfs for the 5 and 100-year events, respectively. The peak flow rates at **DP15** are less than the planned developed flows at this location from the CMU2 FDR for the 5 and 100-year events due to the undeveloped lots upstream of **DP15**, in the existing condition for Lot 1 development. Flows from the apartment site were obtained by the "Final Drainage Report for Aura at Crossroads" MHFD inlet sheets.

Design Point 16*

Off-site **Basin OS-2** (Q5=8.7, Q100=19.6 cfs) consists of 4.98 acres. Approximately half of this basin is comprised of the paved surface of U.S. Highway 24, while the other half is comprised of the 5 foot bottom earthen swale in CDOT's Right of Way. Runoff produced within this basin (Q5=8.7 and Q100=19.6 cfs) flows from northeast to southwest, combining with outfall flows from the planned FSD pond. Flows exiting the FSD pond will be routed to the existing 5' bottom earthen swale (Planned Section A-A' Analyses) in CDOT's Right of Way at **DP16.** According to the CMU1 FDR, the FSD pond releases flows at peak rates of Q5=1.2 and Q100=11.4 cfs through a private planned 18" storm drain (**PR20**). A rip rap pad (Type L, D50=9") is provided as outlet protection. Flows from **Basin OS-2** and **PR20** combine at **DP16** at peak rates of Q5=9.9 and Q100=31.0 cfs and continue to downstream infrastructure.

*See Crossroads Mixed Use Filing No.2 FDR/MDDP ("CMU2 FDR") by M&S Civil Consultants, Inc. dated May 2023 in the appendix for pre-development conditions at these locations. See Crossroads Mixed Use Filing No.1 FDR/MDDP ("CMU1 FDR") by M&S Civil Consultants, Inc. dated February 2022 for additional predevelopment, historic, future, and full spectrum detention condition comparison for the intermediate events at these locations.

Four Step Process

Step 1 Employ Runoff Reduction Practices – Approx. 2.54 acres of the Filing No. 1 development is being set aside for a Full Spectrum Detention (FSD) Pond. Whenever possible, runoff produced within developable area containing impervious surfaces will be routed through landscaped areas or earthen swales (grass-lined where slope exceeds 2%) to minimize direct connection of impervious surfaces. In the interim, runoff will be reduced through the use of one (1) temporary sediment basin until the ground has been permanently developed.

Step 2 **Stabilize Drainageways** – The development of this site is not anticipated to have negative effects on downstream drainage ways since flows released will be below historic rates. In the interim, the site proposes one (1) temporary sedimentation basin (planned from Filing No. 2), before discharging at the southwest property corner of the site and onto an adjacent undeveloped property via sheet flow, then into an existing 24" RCP pipe lined with riprap. This ensures that in this stage of the development negative effects on the downstream drainage ways will be avoided.

In the proposed condition, a portion of Lot 1 flow is discharged off-site as surface runoff to the west and to the south. All flows from the site enter inlets and combine with off-site flows. The flows are discharged through RCP or PP pipes, where they continue to the existing FSD pond (Filing No.1) and southwest in CDOT's man-made roadside ditch until it reaches Peterson Road. The flows are then conveyed to the other side of the road, into a similar earthen channel, via a 36" CMP culvert. The drainage continues southwest in the right of way, until it reaches the East Fork Sand Creek Channel. Existing rip rap barriers are lined throughout this portion of the pathway approximately every 90-100 feet within the ditch to the channel bank. See CMU1 and CMU2 FDR/MDDP for a visual representation of this information.

Step 3 **Provide Water Quality Capture Volume (WQCV)** – The site will utilize a Full Spectrum Detention (FSD) Pond, located southwest of the subject site, for water quality. The water quality event storm shall be detained and released via the full spectrum detention (FSD) pond which will discharge the WQCV in approximately 40 hours, while reducing the 100 year peak discharge to approximately 90% of the pre-development flow rates. The pond continuously releases or infiltrates at least 97% of all of the runoff from a rainfall event that is less than or equal to a 5-year storm within 72 hours after the end of the event. It also continuously releases as quickly as practicable, but in all cases releases at least 99% of the runoff within 120 hours after the end of events greater than a 5-year storm.

Step 4 **Consider Need For Selecting Industrial And Commercial BMP's** – The proposed development will implement a Stormwater Management Plan including property housekeeping practices, spill containment procedures, and coverage of storage/handling areas. Specialized BMP's are not required since the vertical development of the commercial areas are unknown at this time.

Proposed Drainage Characteristics

The subject site will be developed into one (1) commercial lot, with one (1) parking lot and one (1) access road. The proposed development will extend Pacific Rail Point to the south and into the site to provide access to the commercial lot. The following summary generalizes the proposed drainage patterns and drainage improvements required to safely route developed runoff to downstream facilities.

Off-site flows will collect per the existing detailed drainage discussion. Runoff within the eastern half of Lot 1 will flow northwest to the existing Central Rail Point (private). Flows within the existing Central Rail Point will be conveyed west and collected by a pair of sump inlets located at the west end of the roadway, then routed southwest, underground, and combine with off-site flows until reaching the existing off-site FSD pond. Central Rail Point (private) will provide access and utility corridors for development. Private storm sewer mains, stubs, and inlets will be extended along these corridors to serve the development. Runoff within the southwestern portion of Lot 1 will flow to the southwest corner of the lot to an inlet. These flows will be conveyed southwest,

underground, and combine with off-site flows until reaching the existing off-site FSD pond. Runoff within the northwestern portion of Lot 1 will sheet flow off-site, onto Tract D and combine with undeveloped Tract D runoff, continuing to the southwest corner of the tract, until the flows reach an inlet. These flows will be conveyed southwest, underground, and combine with off-site flows until reaching the existing off-site FSD pond.

All on-site storm sewer and drainage improvements shall be private. Storm sewer pipes and inlets will be constructed along, and tie in at the southwest boundary of the proposed Central Rail Point and south of Southern Rail Point to aid in collecting runoff from the site. These facilities will connect on the west side of the subject site at the south end of Southern Rail Point. Proposed on-site flows will continue off-site through planned storm pipes, where the flows will combine with adjacent lot flows and continue through existing storm pipes to the existing FSD pond located southwest of the subject site. The planned outfall from the pond will discharge into the existing barrow ditch located within the north half of the existing CDOT Right of Way as per the CMU1 FDR/MDDP. Refer to the "Existing Detailed Drainage Discussion" of this report for all Design Points upstream of Design Point 9, since none of the upstream drainage changes in the proposed conditions. The downstream FSD pond must be installed prior (existing) to the development of Lot 1. The existing FSD will function as intended and will not require additional maintenance due to the development of Lot 1. The contractor will be responsible for any re-excavation of sediment and debris that collects in the pond depression to ensure that the pond meets the design grades following construction. The storm lines shall be cleaned and free of sediment once after final stabilization.

Proposed Detailed Drainage Discussion

Design Point 9A

Off-site **Basin E1A** (Q5=0.2, Q100=1.7 cfs) consists of 0.71 acres of a commercial lot. The undeveloped lot generally drains from south to northwest until the flows exit the basin as sheet flow at **DP9A** (Q5=0.2, Q100=1.7 cfs). The runoff from this design point is conveyed onto the southern half of Central Rail Point and combines with flows within **Basin E1C.**

Design Point 9B

On-site **Basin E1B** (Q5=1.8, Q100=3.3 cfs) consists of 0.43 acres of proposed commercial Lot 1. The basin generally drains from south to northwest until the flows exit the basin as sheet flow at **DP9B** (Q5=1.8, Q100=3.3 cfs). The runoff from this design point is conveyed onto the southern half of Central Rail Point and combines with flows within **Basin E1C.**

Design Point 9C

Off-site **Basin E1C** (Q5=1.2, Q100=2.2 cfs) consists of 0.27 acres of the southern half of Central Rail Point. Sheet flow from **DP9A, DP9B,** and **Basin E1C** combine along the southern half of Central Rail Point. These combined flows are conveyed southwest to private 10' CDOT Type R at-grade inlet (**Inlet 7:** Q5=3.3, Q100=6.2 cfs intercepted; Q5=0.0, Q100=1.5 cfs flow by) located at **DP9C** (Q5=3.3, Q100=7.7 cfs), on the south side of the Central Rail Point. Runoff bypassing this inlet continues to downstream infrastructure. Flows collected from the inlet combine with flows from private 36" storm drain, **PR10** (Q5=3.8, Q100=19.6 cfs) and are conveyed south to a box base manhole on the south side of the roadway via a private 36" (**PR11**) storm drain and continue west and south underground at flow rates of Q5=7.9 and Q100=30.4 cfs. **PR12**, an existing 42" private storm sewer, then directs the system south from another manhole. Pipe flows at peak rates of Q5=6.9 and Q100=13.8 cfs from the neighboring existing apartment site (**PR11.5**, private 24" RCP)

combine with flows from **PR12** in an existing private 48" storm drain (**PR12.5**) at flow rates of Q5=16.7 and Q100=47.4 cfs.

Design Point 10*

No changes have been made to off-site **Basin G** in the proposed conditions. Since no changes have been made, refer to the existing conditions for **DP10**.

Design Point 11

Off-site **Basin G1** (Q5=2.9, Q100=5.4 cfs) consists of 0.69 acres of commercial lots and the east half of Southern Rail Point, located west of the subject site. A private 15' CDOT Type R sump inlet (**Inlet 9:** Q5=2.9, Q100=6.7 cfs intercepted; no flow by), located on the southeast side of existing Southern Rail Point collects the runoff from **Basin G1** as well as bypass flows from **DP8 and DP9**, totaling Q5=2.9 and Q100=6.7 cfs. **PR14**, an existing 30" private storm sewer, directs these peak flows (Q5=2.9 and Q100=6.7 cfs) west to an underground box base manhole. Within the junction, flows from **PR12.5**, **PR13**, and **PR14** combine into existing **PR15** (Q5=20.8, Q100=55.8 cfs), a 48" private RCP, and are directed south.

Design Point 12A

On-site **Basin F1** consists of 0.16 acres of a southwest portion of the proposed building and drive through within commercial Lot 1. Runoff within the basin generally flows southwest towards proposed Tract D. A private proposed 5' CDOT Type R at-grade sump inlet (**Inlet 1F**) collects the basin flows of Q5=0.7 and Q100=1.2 cfs at **DP12A**. A private proposed 12" storm drain (**PR16A**) conveys the basin flows west, underground of Tract D. These flows then pass through a manhole junction that will be used further for the future development of Tract D. The flows continue into **PR16B** (Q5=0.7, Q100=1.2 cfs), a private proposed 24" storm drain, where they are conveyed southwest to the next manhole junction.

Design Point 12B

Basin F2 consists of 2.41 acres of commercial Tract D and 0.13 acres of the proposed commercial Lot 1. All runoff within **Basin F2** flows southwest to a private proposed 15' CDOT Type R sump inlet (**Inlet 2F**), where the inlet collects the basin flows of Q5=1.1 and Q100=6.1 cfs at **DP12B**. These flows enter a private proposed 18" storm drain (**PR16C**) and are conveyed northwest to a manhole junction, where they combine with flows from **PR16B**. The combined flows (Q5=1.6, Q100=7.0 cfs) continue southwest to the another manhole junction via a private proposed 24" storm drain (**PR16D**). At the manhole junction, flows within **PR16D** combine with flows from existing **PR15** at combined peak flow rates of Q5=22.0 and Q100=62.1 cfs and are conveyed southwest through a private existing 48" RCP (**PR17**). **PR17** directs the collected runoff to a manhole which joins with an existing private 30" RCP**, PR21*** (Q5=2.1, Q100=4.2) at combined peak flow rates of Q5=23.5 and Q100=64.6 cfs. The collected flows are conveyed southwest to the FSD pond via **PR18** (existing private 48" RCP).

Design Point 13*

No changes have been made to off-site **DP13*** in the proposed conditions. Since no changes have been made, refer to the existing conditions for **DP13***.

Design Point 14*

No changes have been made to off-site **DP14*** in the proposed conditions. Since no changes have been made, refer to the existing conditions for **DP14***.

Design Point 15

Off-site **Basin J** (Q5=2.1, Q100=8.9 cfs) consists of 3.26 acres of the planned Tract for the FSD pond located southwest of the subject site. Flows within this basin reach peak runoff rates of Q5=2.1 and Q100=8.9 cfs and are generally conveyed to the planned FSD pond. A planned private 48" storm drain, **PR19*** (Q5=35.4, Q100=65.5), contains flows from the planned apartment site (**Basin A-5**). **PR19*** conveys these flows south, to the western planned concrete forebay where they combine with runoff flows from **Basin J**, **DP14**, and **PR18** (modified) within the FSD pond at **DP15**. Flows at **DP15** reach peak rates of 79.7 cfs and 187.7 cfs for the 5 and 100-year events, respectively. The developed peak flow rates at **DP15** are less than the planned developed flows at this location from the CMU2 FDR for the 5 and 100-year events due to the undeveloped parcels (Tract B, Tract C, and Tract D) upstream of **DP15** in this proposed condition. Flows from the apartment site were obtained by the "Final Drainage Report for Aura at Crossroads" MHFD inlet sheets.

Design Point 16*

No changes have been made to off-site **DP16*** in the proposed conditions. Since no changes have been made, refer to the existing conditions for **DP16***.

*See Crossroads Mixed Use Filing No.2 FDR/MDDP ("CMU2 FDR") by M&S Civil Consultants, Inc. dated May 2023 in the appendix for pre-development conditions at these locations. See Crossroads Mixed Use Filing No.1 FDR/MDDP ("CMU1 FDR") by M&S Civil Consultants, Inc. dated February 2022 for additional predevelopment, historic, future, and full spectrum detention condition comparison for the intermediate events at these locations.

Water Quality Provisions and Maintenance

The off-site planned dull-spectrum detention (FSD) pond functions to provide detention and water quality for the proposed development. Refer to the CMU1 FDR/MDDP for details and calculations regarding the existing FSD pond.

Erosion Control

It is the policy of the El Paso County that M&S Civil Consultants submit a grading and erosion control plan with the drainage report. The plan includes proposed silt fence and vehicle tracking control as proposed erosion control measures. The plan also includes provisions for inlet protection, stockpiling, staging, and concrete washout areas. A stormwater management plan is provided to accompany the plans.

2023 Drainage & Bridge Fees:

Drainage fees have already been paid with Filing No. 2.

Construction Cost Estimate (Non-Reimbursable)

Item	Amount	Unit	Unit Cost	Total Cost
5' CDOT Type R Inlet	1	EA	$ 6,703.00	$ 6,703.00
15' CDOT Type R Inlet	1	EA	$ 12,858.00	$ 12,858.00
Type II MH	2	EA	$ 7,734.00	$ 15,468.00
12" SD	281	LF	$ 65.00	$ 18,265.00
18" SD	5	LF	$ 76.00	$ 380.00
24" SD	221	LF	$ 91.00	$ 20,111.00
TOTAL COST:	**$ 73,785.00**			

M & S Civil Consultants, Inc. (M & S) cannot and does not guarantee the construction cost will not vary from these opinions of probable costs. These opinions represent our best judgment as design professionals familiar with the construction industry and this development in particular. The above is only an estimate of the facility cost and drainage basin fee amounts in 2023.

Summary

The construction of this site is for the purpose of developing commercial Lot 1 in the proposed condition. The site will be graded and all disturbed areas will be seeded. Proposed post construction runoff will be discharged from the lots at **PR11** and **PR16D**. At **PR11**, the proposed runoff is 27.8 and 32.1 cfs less than the planned runoff from the CMU2 FDR for the 5 and 100-year events, respectively. At **PR16D**, the proposed runoff is 10.1 and 14.3 cfs less than the planned runoff from the CMU2 FDR for the 5 and 100-year events, respectively. This difference is due to the area adjustments of **Basin E1** and **Basin F** from the previously assumed CMU2 FDR to this site's drainage report as well as the undeveloped Tract B, Tract C, and Tract D.

The amount of runoff that reaches the planned FSD from adjacent lots and the subject site is 36.5 cfs and 45.0 cfs less than the planned flows at this location from the CMU2 FDR for the 5 and 100-year events, respectively. Thus, the runoff from the proposed site does not affect the size of the previously assumed FSD. Proposed post construction runoff will be discharged from the pond at the same rates as previously assumed for the 5 and 100-year design events from the CMU2 FDR. Thus, the development of the proposed site will not further impact the flows that are planned to be released from the FSD in the CMU2 FDR (see appendix). The construction of Crossroads Mixed Use Filing No. 2 Lot 1 shall not adversely affect adjacent or downstream property.

A future conditions map and future conditions calculations have been added to the appendix of the report for further comparison to the proposed CMU2 FDR conditions and the future conditions for the proposed Lot 1 development. The future conditions calculations and map illustrate that the flows exiting the future development of the entire Filing No.2, with the proposed Lot 1 improvements, are less than the proposed flows from the CMU2 FDR.

References

1.) "El Paso County and City of Colorado Springs Drainage Criteria Manual".

2.) "Urban Storm Drainage Criteria Manual"

3.) SCS Soils Map for El Paso County.

4.) Flood Insurance Rate Map (FIRM), Federal Emergency Management Agency, Revised date December 7th, 2018.

5.) "Final Drainage Report for Claremont Business Park Filing No. 2", dated November 2006, by Matrix Design Group, Inc.

6.) "Preliminary and Final Drainage Report Meadowbrook Crossing Filing 1 and Filing 2", dated July 25, 2017, by Kiowa Engineering Corporation.

7.) "Final Drainage Report Lot 1 24/94 Business Park Filing No. 1 on Platte Avenue and Meadowbrook Parkway", dated April 28, 2016 and revised July 14, 2016, by Core Engineering Group, LLC.

8.) "Final Drainage Report for Meadowbrook Dirt Borrow Site ", dated November 2018, by M&S Civil Consultants, Inc.

9.) "Sand Creek Drainage Basin Planning Study", revised March 1996, by Kiowa Engineering Corporation.

10.) “Final Drainage Report for Aura at Crossroads”, dated April 4th, 2022, by Harris Kocher Smith.

11.) “Final Drainage Report for Crossroads Mixed Use Filing No.1”, dated February 2022, by M&S Civil Consultants, Inc.

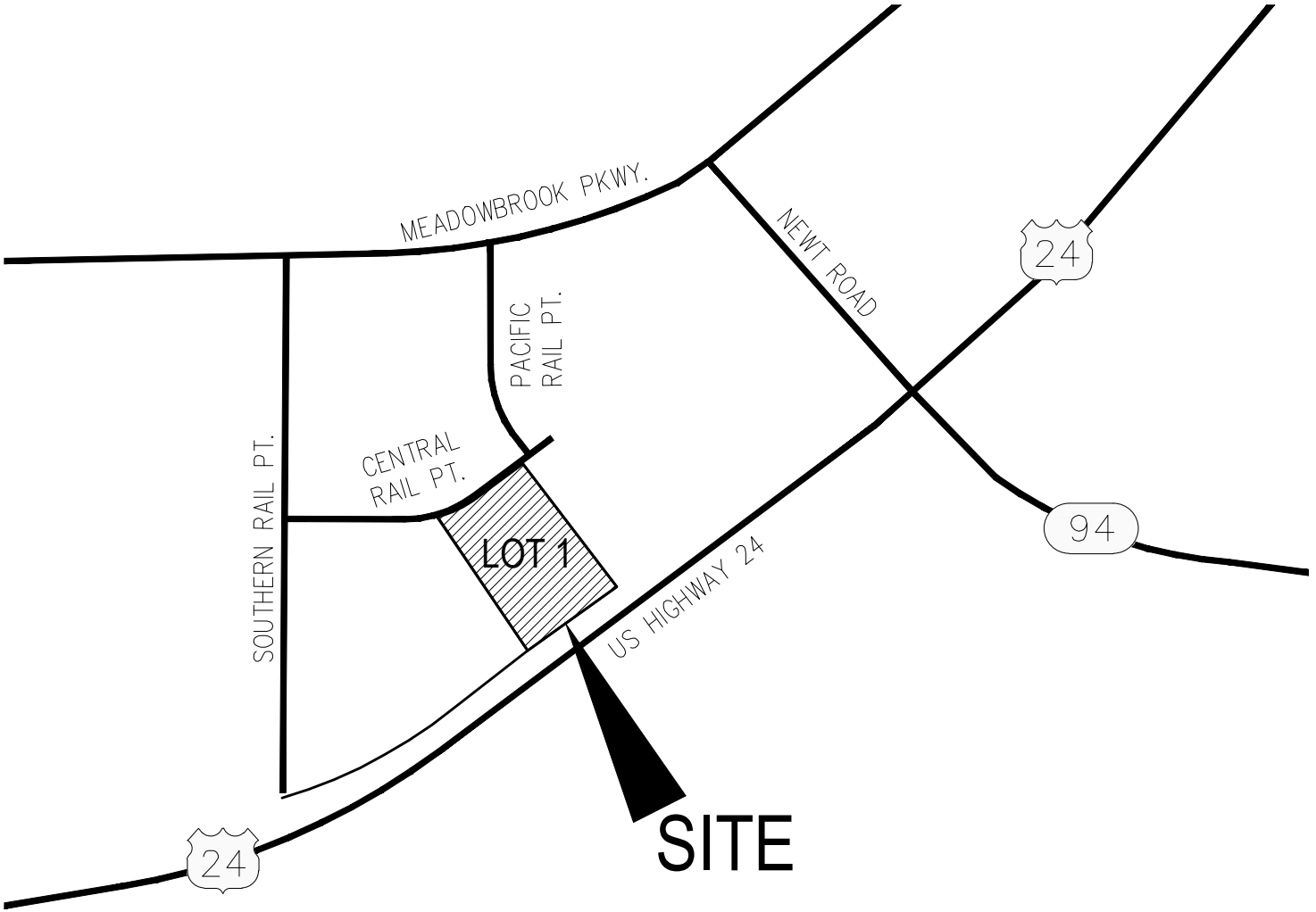
12.) “Final Drainage Report for Crossroads Mixed Use Filing No.2”, dated November 2022, by M&S Civil Consultants, Inc.

APPENDIX

VICINITY MAP

VICINITY MAP

LOT 1 - CROSSROADS MIXED USE FILING NO. 2



SCALE 1"=300'

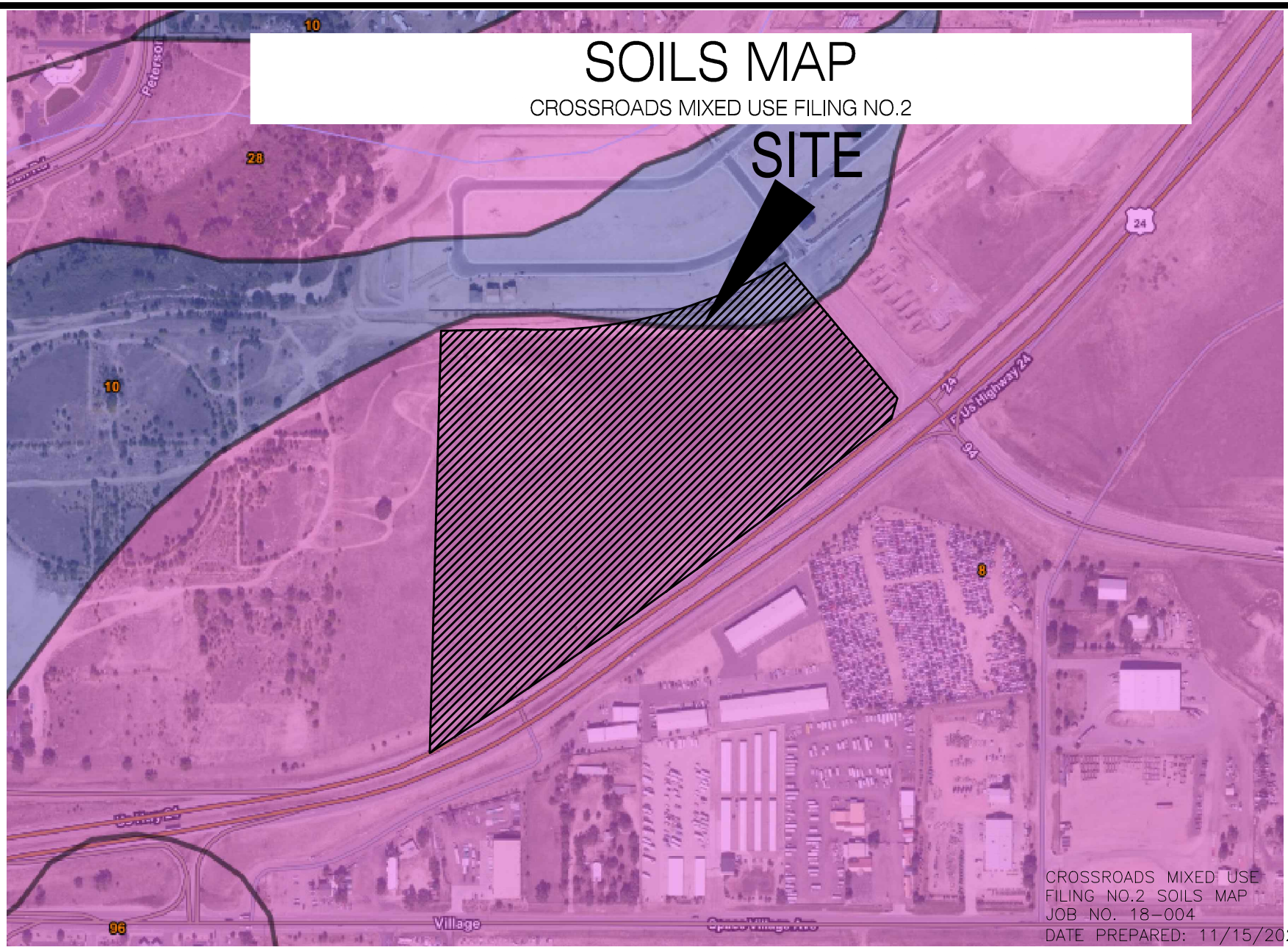
LOT 1 – CROSSROADS MIXED USE FILING NO. 2
VICINITY MAP
JOB NO. 18–005
DATE PREPARED: 8/2/2023

File: O:\18005A-CRMUR-LOT 1\The Equity Group\Documents\Exhibits\230802 VICINITY MAP Lot 1.dwg Plotstamp: 8/2/2023 10:59 AM

SOILS MAP

SOILS MAP

CROSSROADS MIXED USE FILING NO.2



1" = 300

0 150 300 600

Scale in Feet

CROSSROADS MIXED USE
FILING NO.2 SOILS MAP
JOB NO. 18-004
DATE PREPARED: 11/15/2022

Tables Hydrologic Soil Group Summary By Map Unit

Summary by Map Unit — El Paso County Area, Colorado (CO625)

Summary by Map Unit — El Paso County Area, Colorado (CO625)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	282.3	73.2%
10	Blendon sandy loam, 0 to 3 percent slopes	B	54.2	14.1%
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	A	40.7	10.6%
70	Pits, gravel	A	0.2	0.1%
96	Truckton sandy loam, 0 to 3 percent slopes	A	8.1	2.1%
Totals for Area of Interest			**385.6**	**100.0%**

CIVIL CONSULTANTS, INC.

212 N. WAHSATCH AVE., STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

SHEET 1 OF 1

File: O:\18004A-Crossroads MU-Retail\Equity Group\Dwg\Eng Exhibits\SOILS MAP.dwg Plotstamp: 11/4/2022 12:31 PM

FIRM PANELS

FLOODPLAIN MAP

CROSSROADS MIXED USE FILING NO. 2

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

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

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

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

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

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

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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

CROSSROADS MIXED USE
FILING NO. 2 FLOODPLAIN MAP
FLOODPLAIN MAP
JOB NO. 18-004
DATE PREPARED: 11/15/2022

CIVIL CONSULTANTS, INC.
212 N. WAHSATCH AVE., STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

File: O:\18004A-Crossroads MU-Retail\Equity Group\Dwg\Eng Exhibits\FLOODPLAIN.dwg Plotstamp: 11/4/2022 12:58 PM

HYDROLOGIC CALCULATIONS

CROSSROADS MIXED USE FILING NO. 2 LOT 1
FINAL DRAINAGE CALCULATIONS
(Existing Area Runoff Coefficient Summary)

			STREETS / COMMERC.			*MULTI-FAMILY/PARKLAND*			*OVERLAND / UNDEVELOPED*			*WEIGHTED*	
BASIN	**TOTAL AREA** *(Sq Ft)*	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**C_5**	**C_{100}**
EXISTING BASINS													
OS-A*		1.29	1.29	0.62	0.72	0.00	0.49	0.62	0.00	0.08	0.35	***0.62***	***0.72***
E2*		3.86	3.86	0.80	0.90	0.00	0.49	0.62	0.00	0.08	0.35	***0.80***	***0.90***
EX-A2**		0.59	0.59	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
OS-1	***60793.3017***	1.40	1.40	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
OS-2	***217071.1816***	4.98	2.49	0.90	0.96	0.00	0.49	0.62	2.49	0.08	0.35	***0.49***	***0.66***
A	***72787.0873***	1.67	1.67	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
B	***64538.8381***	1.48	1.48	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
C	***102868.78***	2.36	0.00	0.81	0.88	0.00	0.49	0.62	2.36	0.08	0.35	***0.08***	***0.35***
D	***96317.6781***	2.21	0.00	0.81	0.88	0.00	0.49	0.62	2.21	0.08	0.35	***0.08***	***0.35***
E	***42958.775***	0.99	0.41	0.90	0.96	0.00	0.81	0.88	0.57	0.08	0.35	***0.42***	***0.61***
E1	***61480.298***	1.41	0.21	0.90	0.96	0.00	0.81	0.88	1.20	0.08	0.35	***0.20***	***0.44***
F	***121217.57***	2.78	0.00	0.81	0.88	0.00	0.49	0.62	2.78	0.08	0.35	***0.08***	***0.35***
G	***20057.4496***	0.46	0.46	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
J	***142045.569***	3.26	0.00	0.90	0.96	3.26	0.16	0.41	0.00	0.08	0.35	***0.16***	***0.41***
A-5*****	***159865.2***	3.67	0.00	0.90	0.96	3.67	0.68	0.79	0.00	0.08	0.35	***0.68***	***0.79***
Z-1*****	***16117.2***	0.37	0.00	0.90	0.96	0.37	0.33	0.52	0.00	0.08	0.35	***0.33***	***0.52***
D-1*****	***33976.8***	0.78	0.00	0.90	0.96	0.78	0.62	0.75	0.00	0.08	0.35	***0.62***	***0.75***
Z-2*****	***16552.8***	0.38	0.00	0.90	0.96	0.38	0.38	0.56	0.00	0.08	0.35	***0.38***	***0.56***
G1	***25617.769***	0.59	0.59	0.90	0.96	0.00	0.16	0.41	0.00	0.08	0.35	***0.90***	***0.96***
C1	***95425.7528***	2.19	0.00	0.81	0.88	0.00	0.49	0.62	2.19	0.08	0.35	***0.08***	***0.35***

*FROM FDR FOR CLAREMONT BUSINESS PARK FILING NO. 2

**FROM FDR FOR MEADOWBROOK CROSSING FILING 1 AND FILING 2

***FROM FDR FOR LOT 1 24/94 BUSINESS PARK FILING NO. 1 ON PLATTE AVENUE AND MEADOWBROOK PARKWAY

****FROM FDR FOR AURA AT CROSSROADS, DATED OCTOBER 29TH, 2021

Calculated by: TAU

Date: 5/23/2023

Checked by: DLM

CROSSROADS MIXED USE FILING NO. 2 LOT 1
FINAL DRAINAGE REPORT
(Existing Drainage Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*		*INTENSITY #*		*TOTAL FLOWS*	
BASIN	**AREA TOTAL** *(Acres)*	C_5 *From DCM Table 5-1*	C_{100} *From DCM Table 5-1*	C_5	**Length** *(ft)*	**Height** *(ft)*	T_C *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	T_t *(min)*	**TOTAL** *(min)*	**CHECK** *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
Existing Area Drainage Summary																	
OS-A*	1.29	0.62	0.72	0.62	40	0.8	4.4	1310	1.9%	2.8	7.9	12.3	17.5	3.8	6.4	***3.1***	***6.0***
E2*	3.86	0.80	0.90	0.80	50	1	3.0	400	1.3%	2.3	2.9	6.0	12.5	4.9	8.2	***15.1***	***28.6***
EX-A2**	0.59	0.90	0.96	0.90	10	0.2	0.9	916	1.9%	2.7	5.6	6.5	15.1	4.8	8.0	***2.5***	***4.5***
OS-1	1.40	0.90	0.96	0.90	100	3	2.5	490	2.2%	3.0	2.7	5.2	13.3	5.1	8.6	***6.4***	***11.5***
OS-2	4.98	0.49	0.66	0.49	85	8	4.8	1165	1.8%	2.0	9.6	14.5	16.9	3.6	6.0	***8.7***	***19.6***
A	1.67	0.90	0.96	0.90	30	0.6	1.6	1325	0.7%	1.7	7.3	8.9	17.5	4.3	7.2	***6.5***	***11.6***
B	1.48	0.90	0.96	0.90	25	0.5	1.4	1335	0.7%	1.7	7.3	8.8	17.6	4.3	7.3	***5.8***	***10.3***
C	2.36	0.08	0.35	0.08	50	1	10.4	260	1.5%	1.2	1.4	11.8	11.7	3.9	6.5	***0.7***	***5.4***
D	2.21	0.08	0.35	0.08	50	1	10.4	200	1.5%	1.2	1.1	11.5	11.4	3.9	6.6	***0.7***	***5.1***
E	0.99	0.42	0.61	0.42	60	1.2	7.5	700	1.0%	2.0	3.8	11.4	14.2	3.9	6.6	***1.6***	***3.9***
E1	1.41	0.20	0.44	0.20	50	2.5	2.1	700	1.7%	2.6	3.8	5.9	14.2	4.9	8.2	***1.4***	***5.1***
F	2.78	0.08	0.35	0.08	50	2	8.2	400	1.7%	1.3	2.2	10.4	12.5	4.1	6.8	***0.9***	***6.6***
G	0.46	0.90	0.96	0.90	50	1	2.0	466	1.1%	2.1	2.6	5.0	12.9	5.2	8.7	***2.1***	***3.8***
J	3.26	0.16	0.41	0.16	60	0.3	16.5	134	0.5%	0.5	4.5	21.0	11.1	4.0	6.7	***2.1***	***8.9***
A-5*****	3.67	0.68	0.79	0.68	REFER TO "FDR FOR AURA AT CROSSROADS" FOR DETAILS											***8.72***	***17.06***
Z-1*****	0.37	0.33	0.52	0.33	REFER TO "FDR FOR AURA AT CROSSROADS" FOR DETAILS											***0.47***	***1.27***
D-1*****	0.78	0.62	0.75	0.62	REFER TO "FDR FOR AURA AT CROSSROADS" FOR DETAILS											***2.08***	***4.20***
Z-2*****	0.38	0.28	0.49	0.28	REFER TO "FDR FOR AURA AT CROSSROADS" FOR DETAILS											***0.57***	***1.43***
G1	0.59	0.90	0.96	0.90	50	1	2.0	466	1.1%	2.1	2.6	5.0	12.9	5.2	8.7	***2.7***	***4.9***
C1	2.19	0.08	0.35	0.08	50	1	10.4	260	1.5%	1.2	1.4	11.8	11.7	3.9	6.5	***0.7***	***5.0***

Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: TAU
Date: 5/23/2023
Checked by: DLM

*VALUES DERIVED USING DATA FROM FDR FOR CLAREMONT BUSINESS PARK FILING NO. 2

**VALUES DERIVED USING DATA FROM FDR MEADOWBROOK CROSSING FILING 1 AND FILING 2 PAGE 31

***VALUES DERIVED USING DATA FROM FDR LOT 1 24/94 BUSINESS PARK FILING NO. 1 ON PLATTE AVENUE AND MEADOWBROOK PARKWAY

****FROM FDR FOR AURA AT CROSSROADS, DATED OCTOBER 29th, 2021

CROSSROADS MIXED USE FILING NO. 2 LOT 1
FINAL DRAINAGE REPORT
(Existing Basin Routing Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*PIPE / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*		
DESIGN POINT	**CONTRIBUTING BASINS**	**CA_5**	**CA_{100}**	**C_5**	**Length** *(ft)*	**Height** *(ft)*	**T_C** *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	**T_t** *(min)*	**TOTAL** *(min)*	**I_5** *(in/hr)*	**I_{100}** *(in/hr)*	**Q_5** *(c.f.s.)*	**Q_{100}** *(c.f.s.)*	COMMENTS
EXISTING DRAINAGE BASIN ROUTING SUMMARY																	
1	**E2, EX-A2**	3.62	4.04				6.0	916	1.9%	2.7	5.6	11.6	3.9	6.6	***14.2***	***26.5***	Existing 10' CDOT Type R At-Grade Inlet (Public)
				Tc for E2 Used													
2	**OS-A**	0.80	0.93									12.3	3.8	6.4	***3.1***	***6.0***	Existing 10' CDOT Type R At-Grade Inlet (Public)
				Tc for OS-A Used													
3	**OS-1, FB-DP1**	2.73	3.69				11.6	150	1.0%	2.0	1.3	12.8	3.8	6.3	***10.2***	***23.3***	Exisating 10' CDOT Type R At-Grade Inlet (Public)
				Tc for DP1 Used													
4	**A, FB-DP2**	1.50	1.71									8.9	4.3	7.2	***6.5***	***12.4***	Existing 15' CDOT Type R At-Grade Inlet (Public)
				Tc for Basin A used													
4.5	**FB-DP4**	0.00	0.24									8.9	4.3	7.2	***0.0***	***1.8***	Existing NEENAH R-2501 MH Lid and Frame (Public)
				Tc for DP4 used													
5	**B, FB-DP3**	2.28	3.56									8.8	4.3	7.3	***9.9***	***25.8***	Existing 15' CDOT Type R Sump Inlet (Public)
				Tc for Basin B Used													
6	**C**	0.19	0.83									11.8	3.9	6.5	***0.7***	***5.4***	Planned 30" RCP or PP Storm Sewer, Rip Rap Pad (Private) Filing No.2
				Tc for Basin C Used													
6.5	**C1**	0.18	0.77									11.8	3.9	6.5	***0.7***	***5.0***	Planned 30" RCP or PP Storm Sewer, Rip Rap Pad (Private) Filing No.2
				Tc for Basin C1 Used													
7	**D**	0.18	0.77									11.5	3.9	6.6	***0.7***	***5.1***	Planned 24" RCP or PP Storm Sewer, Rip Rap Pad (Private) Filing No. 2
				Tc for Basin D Used													
8	**E**	0.42	0.60									11.4	3.9	6.6	***1.6***	***3.9***	Planned 10' CDOT Type R At-Grate Inlet (Private) Filing No. 2
				Tc for Basin E Used													
9	**E1**	0.28	0.62									5.9	4.9	8.2	***1.4***	***5.1***	Planned 10' CDOT Type R At-Grade Inlet (Private) Filing No. 2
				Tc for Basin E1 Used													
10	**G**	0.41	0.44									5.0	5.2	8.7	***2.1***	***3.8***	Planned 10' CDOT Type R Sump Inlet (Private) Filing No. 1
				Tc for Basin G Used													
11	**G1**	0.53	0.56									5.6	5.0	8.4	***2.6***	***4.7***	Planned 15' CDOT Type R Sump Inlet (Private) Filing No. 1
	FB-DP8	0.00	0.00														
	FB-DP9	0.00	0.00														
		0.53	**0.56**	Weighted Tc Used													
12	**F**	0.22	0.97									10.4	4.1	6.8	***0.9***	***6.6***	Planned 24" RCP or PP Storm Sewer (Private) Filing No. 1
				Tc for Basin F Used													
13	**Bazin Z-1**	0.12	0.20									12.8	3.8	6.3	***1.4***	***10.4***	Planned 2' Bottom Earthen Swale, Rip Rap Rundown (Private) Filing No. 1
	Basin A-5 (Overflow)	0.26	1.32														
	Basin D-1 (Overflow)	0.00	0.13														
		0.38	**1.65**	Weighted Tc Used													
14	**DP13**	0.38	1.65									11.1	4.0	6.7	***2.1***	***12.4***	Proposed Triangular Earthen Swale (Private) Filing No. 1
	Basin Z-2	0.15	0.21														
		0.53	**1.86**	Tc for Basin Z-2 Used													
15	**J**	0.52	1.34									6.3	4.8	8.1	***76.8***	***184.1***	Full Spectrum Extended Detention Basin (Private) Filing No. 1
	DP14	0.53	1.86														
	PR18	4.82	8.45														
	PR19	10.05	11.09														
		15.92	**22.73**	Weighted Tc Used													
16	**POND OUTFALL**	0.33	1.90									14.5	3.6	6.0	***9.9***	***31.0***	HISTORIC FLOW IN CDOT BARROW DITCH
	OS-2	2.44	3.26														Q5= 10.4 CFS, Q100 = 31.9 CFS
		2.77	**5.16**	Tc for Basin OS-2 Used													PER HISTORIC DRAINAGE ANALYSIS

* Intensity equations assume a minimum travel time of 5 minutes.

Overflow- obtain flows from inlet sheets provided in Background Information Section of Appendix

TAU
Date: 5/23/2023
Checked by: DLM

CROSSROADS MIXED USE FILING NO. 2 LOT 1
FINAL DRAINAGE CALCULATIONS
(Existing Storm Sewer Routing Summary)

PIPE RUN	*Contributing Pipes/Design Points*	*Equivalent CA_5*	*Equivalent CA_{100}*	*Maximum T_C*	*Intensity**		*Flow*		PIPE SIZE
					I_5	*I_{100}*	*Q_5*	*Q_{100}*	
1	**DP3 (INLET 3)**	1.78	1.55	12.8	3.8	6.3	*6.7*	*9.8*	24" SD
1.5	**DP4 (INLET 4)**	1.50	1.46	8.9	4.3	7.2	*6.5*	*10.6*	24" SD
2	**PR1.5, DP4.5 (INLET 4.5)**	1.50	1.71	9.0	4.3	7.2	*6.4*	*12.3*	24" SD
3	**PR2, DP5 (INLET 5)**	3.78	5.27	9.0	4.3	7.2	*16.2*	*37.9*	36" SD
4	**DP6**	0.19	0.83	11.8	3.9	6.5	*0.7*	*5.4*	30" SD
4.5	**DP6.5**	0.18	0.77	11.8	3.9	6.5	*0.7*	*5.0*	30" SD
5	**PR4, PR4.5**	0.36	1.59	11.8	3.9	6.5	*1.4*	*10.4*	30" SD
6	**PR5**	0.36	1.59	11.8	3.9	6.5	*1.4*	*10.4*	30" SD
7	**PR6**	0.36	1.59	11.5	3.9	6.6	*1.4*	*10.5*	30" SD
8	**DP7**	0.18	0.77	11.5	3.9	6.6	*0.7*	*5.1*	24" SD
9	**PR8, DP8 (Inlet 6)**	0.59	1.37	11.4	3.9	6.6	*2.3*	*9.1*	30" SD
10	**PR7, PR9**	0.96	2.96	11.4	3.9	6.6	*3.8*	*19.6*	36" SD
11	**PR10, DP9 (Inlet 7)**	1.24	3.59	5.9	4.9	8.3	*6.1*	*29.6*	36" SD
*11.5**	**SEE FDR FOR AURA AT CROSSROADS**	1.93	2.30	14.6	3.6	6.0	*6.9*	*13.8*	24" SD
12	**PR11**	1.24	3.59	5.9	4.9	8.3	*6.1*	*29.6*	42" SD
12.5	**PR12, PR11.5**	3.17	5.89	6.8	4.7	7.9	*14.9*	*46.5*	48" SD
13	**DP10 (Inlet 8)**	0.41	0.44	5.0	5.2	8.7	*2.1*	*3.8*	18" SD
14	**DP11 (Inlet 9)**	0.53	0.56	5.6	5.0	8.4	*2.6*	*4.7*	30" SD
15	**PR12.5, PR13, PR14**	4.12	6.89	7.3	4.6	7.7	*18.9*	*53.2*	48" SD
16	**DP12**	0.22	0.97	10.4	4.1	6.8	*0.9*	*6.6*	24" SD
17	**PR15, PR16**	4.34	7.87	8.1	4.4	7.5	*19.3*	*58.7*	48" SD
18	**PR17, PR21***	4.82	8.45	8.8	4.3	7.3	*20.8*	*61.3*	48" SD
*19**	**SEE FDR FOR AURA AT CROSSROADS**	10.05	11.09	15.0	3.5	5.9	*35.4*	*65.5*	48" SD
20	**POND OUTFALL**	PER	MHFD	WKSHT			*1.2*	*11.4*	18" SD
*21**	**SEE FDR FOR AURA AT CROSSROADS**	0.48	0.58	9.0	4.3	7.2	*2.1*	*4.2*	30" SD

*REFER TO FDR FOR AURA AT CROSSROADS FOR CONTRIBUTING PIPE FLOW DETAILS

DP - Design Point
EX - Existing Design Point
FB- Flow By from Design Point
INT- Intercepted Flow from Design Point

Calculated by: TAU
Date: 5/23/2023
Checked by: DLM

CROSSROADS MIXED USE FILING NO. 2, LOT 1
FINAL DRAINAGE CALCULATIONS
(Proposed Area Runoff Coefficient Summary)

			STREETS / COMMERC.			*MULTI-FAMILY/PARKLAND*			*OVERLAND / UNDEVELOPED*			*WEIGHTED*	
BASIN	**TOTAL AREA** *(Sq Ft)*	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**C_5**	**C_{100}**
PROPOSED BASINS													
OS-A*		1.29	1.29	0.62	0.72	0.00	0.49	0.62	0.00	0.08	0.35	***0.62***	***0.72***
E2*		3.86	3.86	0.80	0.90	0.00	0.49	0.62	0.00	0.08	0.35	***0.80***	***0.90***
EX-A2**		0.59	0.59	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
OS-1	***60793.3017***	1.40	1.40	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
OS-2	***217071.1816***	4.98	2.49	0.90	0.96	0.00	0.49	0.62	2.49	0.08	0.35	***0.49***	***0.66***
A	***72787.0873***	1.67	1.67	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
B	***64538.8381***	1.48	1.48	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
C	***102868.78***	2.36	0.00	0.81	0.88	0.00	0.49	0.62	2.36	0.08	0.35	***0.08***	***0.35***
D	***96317.6781***	2.21	0.00	0.81	0.88	0.00	0.49	0.62	2.21	0.08	0.35	***0.08***	***0.35***
E	***42958.775***	0.99	0.41	0.90	0.96	0.00	0.81	0.88	0.57	0.08	0.35	***0.42***	***0.61***
E1A	***30742.6955***	0.71	0.00	0.81	0.88	0.00	0.49	0.62	0.71	0.08	0.35	***0.08***	***0.35***
E1B	***18796.9627***	0.43	0.43	0.81	0.88	0.00	0.49	0.62	0.00	0.08	0.35	***0.81***	***0.88***
E1C	***11897.8659***	0.27	0.22	0.90	0.96	0.05	0.81	0.88	0.00	0.08	0.35	***0.88***	***0.95***
F1	***7032.0238***	0.16	0.16	0.81	0.88	0.00	0.49	0.62	0.00	0.08	0.35	***0.81***	***0.88***
F2	***110806.1163***	2.54	0.13	0.81	0.88	0.00	0.12	0.39	2.41	0.08	0.35	***0.12***	***0.38***
G	***20015.5111***	0.46	0.46	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
J	***142045.569***	3.26	0.00	0.90	0.96	3.26	0.16	0.41	0.00	0.08	0.35	***0.16***	***0.41***
A-5*	***159865.2***	3.67	0.00	0.90	0.96	3.67	0.68	0.79	0.00	0.08	0.35	***0.68***	***0.79***
Z-1*	***16117.2***	0.37	0.00	0.90	0.96	0.37	0.33	0.52	0.00	0.08	0.35	***0.33***	***0.52***
D-1*	***33976.8***	0.78	0.00	0.90	0.96	0.78	0.62	0.75	0.00	0.08	0.35	***0.62***	***0.75***
Z-2*	***16552.8***	0.38	0.00	0.90	0.96	0.38	0.38	0.56	0.00	0.08	0.35	***0.38***	***0.56***
G1	***29951.0819***	0.69	0.63	0.90	0.96	0.06	0.12	0.39	0.00	0.08	0.35	***0.84***	***0.91***
C1	***95425.7528***	2.19	0.00	0.81	0.88	0.00	0.49	0.62	2.19	0.08	0.35	***0.08***	***0.35***

*FROM FDR FOR CLAREMONT BUSINESS PARK FILING NO. 2

**FROM FDR FOR MEADOWBROOK CROSSING FILING 1 AND FILING 2

***FROM FDR FOR LOT 1 24/94 BUSINESS PARK FILING NO. 1 ON PLATTE AVENUE AND MEADOWBROOK PARKWAY

****FROM FDR FOR AURA AT CROSSROADS, DATED OCTOBER 29TH, 2021

Calculated by: TAU
Date: 5/30/2023
Checked by: DLM

CROSSROADS MIXED USE FILING NO. 2, LOT 1
FINAL DRAINAGE REPORT
(Proposed Drainage Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*		*INTENSITY #*		*TOTAL FLOWS*	
BASIN	**AREA TOTAL** *(Acres)*	C_5 *From DCM Table 5-1*	C_{100} *From DCM Table 5-1*	C_5	**Length** *(ft)*	**Height** *(ft)*	T_C *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	T_t *(min)*	**TOTAL** *(min)*	**CHECK** *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
Proposed Area Drainage Summary																	
OS-A*	1.29	0.62	0.72	0.62	40	0.8	4.4	1310	1.9%	2.8	7.9	12.3	17.5	3.8	6.4	***3.1***	***6.0***
E2*	3.86	0.80	0.90	0.80	50	1	3.0	400	1.3%	2.3	2.9	6.0	12.5	4.9	8.2	***15.1***	***28.6***
EX-A2**	0.59	0.90	0.96	0.90	10	0.2	0.9	916	1.9%	2.7	5.6	6.5	15.1	4.8	8.0	***2.5***	***4.5***
OS-1	1.40	0.90	0.96	0.90	100	3	2.5	490	2.2%	3.0	2.7	5.2	13.3	5.1	8.6	***6.4***	***11.5***
OS-2	4.98	0.49	0.66	0.49	85	8	4.8	1165	1.8%	2.0	9.6	14.5	16.9	3.6	6.0	***8.7***	***19.6***
A	1.67	0.90	0.96	0.90	30	0.6	1.6	1325	0.7%	1.7	7.3	8.9	17.5	4.3	7.2	***6.5***	***11.6***
B	1.48	0.90	0.96	0.90	25	0.5	1.4	1335	0.7%	1.7	7.3	8.8	17.6	4.3	7.3	***5.8***	***10.3***
C	2.36	0.08	0.35	0.08	50	1	10.4	260	1.5%	1.2	1.4	11.8	11.7	3.9	6.5	***0.7***	***5.4***
D	2.21	0.08	0.35	0.08	50	1	10.4	200	1.5%	1.2	1.1	11.5	11.4	3.9	6.6	***0.7***	***5.1***
E	0.99	0.42	0.61	0.42	60	1.2	7.5	700	1.0%	2.0	3.8	11.4	14.2	3.9	6.6	***1.6***	***3.9***
E1A	0.71	0.08	0.35	0.08	50	2	8.2	220	2.7%	3.3	1.2	9.5	11.5	4.2	7.1	***0.2***	***1.7***
E1B	0.43	0.81	0.88	0.81	30	2	1.5	285	2.1%	2.9	1.6	5.0	11.8	5.2	8.7	***1.8***	***3.3***
E1C	0.27	0.88	0.95	0.88	50	1	2.2	420	1.4%	2.4	2.3	5.0	12.6	5.2	8.7	***1.2***	***2.2***
F1	0.16	0.81	0.88	0.81	30	2	1.5	60	3.3%	3.7	0.3	5.0	10.5	5.2	8.7	***0.7***	***1.2***
F2	2.54	0.12	0.38	0.12	100	3.5	11.7	400	2.8%	1.7	2.2	13.9	12.8	3.8	6.3	***1.1***	***6.1***
G	0.46	0.90	0.96	0.90	50	1	2.0	466	1.1%	2.1	2.6	5.0	12.9	5.2	8.7	***2.1***	***3.8***
J	3.26	0.16	0.41	0.16	60	0.3	16.5	134	0.5%	0.5	4.5	21.0	11.1	4.0	6.7	***2.1***	***8.9***
A-5*****	3.67	0.68	0.79	0.68	REFER TO "FDR FOR AURA AT CROSSROADS" FOR DETAILS											***8.72***	***17.06***
Z-1*****	0.37	0.33	0.52	0.33	REFER TO "FDR FOR AURA AT CROSSROADS" FOR DETAILS											***0.47***	***1.27***
D-1*****	0.78	0.62	0.75	0.62	REFER TO "FDR FOR AURA AT CROSSROADS" FOR DETAILS											***2.08***	***4.20***
Z-2*****	0.38	0.38	0.56	0.38	REFER TO "FDR FOR AURA AT CROSSROADS" FOR DETAILS											***0.57***	***1.43***
G1	0.69	0.84	0.91	0.84	50	1	2.7	466	1.1%	2.1	2.6	5.2	12.9	5.1	8.6	***2.9***	***5.4***
C1	2.19	0.08	0.35	0.08	50	1	10.4	260	1.5%	1.2	1.4	11.8	11.7	3.9	6.5	***0.7***	***5.0***

Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: TAU
Date: 5/30/2023
Checked by: DLM

*VALUES DERIVED USING DATA FROM FDR FOR CLAREMONT BUSINESS PARK FILING NO. 2

**VALUES DERIVED USING DATA FROM FDR MEADOWBROOK CROSSING FILING 1 AND FILING 2 PAGE 31

***VALUES DERIVED USING DATA FROM FDR LOT 1 24/94 BUSINESS PARK FILING NO. 1 ON PLATTE AVENUE AND MEADOWBROOK PARKWAY

****FROM FDR FOR AURA AT CROSSROADS, DATED OCTOBER 29th, 2021

CROSSROADS MIXED USE FILING NO. 2, LOT 1
FINAL DRAINAGE REPORT
(Proposed Basin Routing Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*PIPE / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*		
DESIGN POINT	**CONTRIBUTING BASINS**	**CA_5**	**CA_{100}**	**C_5**	**Length (ft)**	**Height (ft)**	**T_C (min)**	**Length (ft)**	**Slope (%)**	**Velocity (fps)**	**T_t (min)**	**TOTAL (min)**	**I_5 (in/hr)**	**I_{100} (in/hr)**	**Q_5 (c.f.s.)**	**Q_{100} (c.f.s.)**	COMMENTS
PROPOSED DRAINAGE BASIN ROUTING SUMMARY																	
1	**E2, EX-A2**	3.62	4.04				6.0	916	1.9%	2.7	5.6	11.6	3.9	6.6	***14.2***	***26.5***	Existing 10' CDOT Type R At-Grade Inlet (Public)
		Tc for E2 Used															
2	**OS-A**	0.80	0.93									12.3	3.8	6.4	***3.1***	***6.0***	Existing 10' CDOT Type R At-Grade Inlet (Public)
		Tc for OS-A Used															
3	**OS-1, FB-DP1**	2.73	3.69				11.6	150	1.0%	2.0	1.3	12.8	3.8	6.3	***10.2***	***23.3***	Existing 10' CDOT Type R At-Grade Inlet (Public)
		Tc for DP1 Used															
4	**A, FB-DP2**	1.50	1.71									8.9	4.3	7.2	***6.5***	***12.4***	Existing 15' CDOT Type R At-Grade Inlet (Public)
		Tc for Basin A used															
4.5	**FB-DP4**	0.00	0.24									8.9	4.3	7.2	***0.0***	***1.8***	Existing NEENAH R-2501 MH Lid and Frame (Public)
		Tc for DP4 used															
5	**B, FB-DP3**	2.28	3.56									8.8	4.3	7.3	***9.9***	***25.8***	Existing 15' CDOT Type R Sump Inlet (Public)
		Tc for Basin B Used															
6	**C**	0.19	0.83									11.8	3.9	6.5	***0.7***	***5.4***	Planned 30" RCP or PP Storm Sewer, Rip Rap Pad (Private) Filing No. 2
		Tc for Basin C Used															
6.5	**C1**	0.18	0.77									11.8	3.9	6.5	***0.7***	***5.0***	Planned 30" RCP or PP Storm Sewer, Rip Rap Pad (Private) Filing No. 2
		Tc for Basin C1 Used															
7	**D**	0.18	0.77									11.5	3.9	6.6	***0.7***	***5.1***	Planned 24" RCP or PP Storm Sewer, Rip Rap Pad (Private) Filing No. 2
		Tc for Basin D Used															
8	**E**	0.42	0.60									11.4	3.9	6.6	***1.6***	***3.9***	Planned 10' CDOT Type R At-Grate Inlet (Private) Filing No. 2
		Tc for Basin E Used															
9A	**E1A**	0.06	0.25									9.5	4.2	7.1	***0.2***	***1.7***	Sheet Flow (Private)
		Tc for Basin E1A Used															
9B	**E1B**	0.35	0.38									5.0	5.2	8.7	***1.8***	***3.3***	Sheet Flow (Private)
		Tc for Basin E1B Used															
9C	**DP9A, DP9B, E1C**	0.65	0.88									5.0	5.2	8.7	***3.3***	***7.7***	Planned 10' CDOT Type R At-Grade Inlet (Private) Filing No. 2
		Tc for Basin E1C Used															
10	**G**	0.41	0.44									5.0	5.2	8.7	***2.1***	***3.8***	Planned 10' CDOT Type R Sump Inlet (Private) Filing No. 1
		Tc for Basin G Used															
11	**G1**	0.58	0.63									5.6	5.0	8.4	***2.9***	***6.7***	Planned 15' CDOT Type R Sump Inlet (Private) Filing No. 1
	FB-DP8	0.00	0.00														
	FB-DP9	0.00	0.17														
		0.58	**0.80**	Weighted Tc Used													
12A	**F1**	0.13	0.14									5.0	5.2	8.7	***0.7***	***1.2***	Proposed 5' CDOT Type R Sump Inlet (Private)
		Tc for Basin F1 Used															
12B	**F2**	0.30	0.96									12.8	3.8	6.3	***1.1***	***6.1***	Proposed 15' CDOT Type R Sump Inlet (Private)
		Tc for Basin F2 Used															
13	**Basin Z-1**	0.12	0.20									12.8	3.8	6.3	***1.4***	***10.4***	Planned 2' Bottom Earthen Swale, Rip Rap Rundown (Private) Filing No. 1
	Basin A-5 (Overflow)	0.26	1.32														
	Basin D-1 (Overflow)	0.00	0.13														
		0.38	**1.65**	Weighted Tc Used													
14	**DP13**	0.38	1.65									11.1	4.0	6.7	***2.1***	***12.4***	Planned Triangular Earthen Swale (Private) Filing No.1
	Basin Z-2	0.15	0.21														
		0.53	**1.86**	Tc for Basin Z-2 Used													
15	**J**	0.52	1.34									6.3	4.8	8.1	***79.7***	***187.7***	Planned Full Spectrum Extended Detention Basin (Private) Filing No.1
	DP14	0.53	1.86														
	PR18	5.44	8.90														
	PR19	10.05	11.09														
		16.54	**23.19**	Weighted Tc Used													
16	**POND OUTFALL**	0.33	1.90									14.5	3.6	6.0	***9.9***	***31.0***	HISTORIC FLOW IN CDOT BARROW DITCH
	OS-2	2.44	3.26														Q5= 10.4 CFS, Q100 = 31.9 CFS
		2.77	**5.16**	Tc for Basin OS-2 Used													PER HISTORIC DRAINAGE ANALYSIS

* Intensity equations assume a minimum travel time of 5 minutes.

Overflow- obtain flows from inlet sheets provided in Background Information Section of Appendix

TAU
Date: 5/30/2023
Checked by: DLM

CROSSROADS MIXED USE FILING NO. 2, LOT 1
FINAL DRAINAGE CALCULATIONS
(Proposed Storm Sewer Routing Summary)

PIPE RUN	*Contributing Pipes/Design Points*	*Equivalent CA_5*	*Equivalent CA_{100}*	*Maximum T_C*	*Intensity**		*Flow*		PIPE SIZE
					I_5	*I_{100}*	*Q_5*	*Q_{100}*	
1	**DP3 (INLET 3)**	1.78	1.55	12.8	3.8	6.3	***6.7***	***9.8***	24" SD
1.5	**DP4 (INLET 4)**	1.50	1.46	8.9	4.3	7.2	***6.5***	***10.6***	24" SD
2	**PR1.5, DP4.5 (INLET 4.5)**	1.50	1.71	9.0	4.3	7.2	***6.4***	***12.3***	24" SD
3	**PR2, DP5 (INLET 5)**	3.78	5.27	9.0	4.3	7.2	***16.2***	***37.9***	36" SD
4	**DP6**	0.19	0.83	11.8	3.9	6.5	***0.7***	***5.4***	30" SD
4.5	**DP6.5**	0.18	0.77	11.8	3.9	6.5	***0.7***	***5.0***	30" SD
5	**PR4, PR4.5**	0.36	1.59	11.8	3.9	6.5	***1.4***	***10.4***	30" SD
6	**PR5**	0.36	1.59	11.8	3.9	6.5	***1.4***	***10.4***	30" SD
7	**PR6**	0.36	1.59	11.5	3.9	6.6	***1.4***	***10.5***	30" SD
8	**DP7**	0.18	0.77	11.5	3.9	6.6	***0.7***	***5.1***	24" SD
9	**PR8, DP8 (Inlet 6)**	0.59	1.37	11.4	3.9	6.6	***2.3***	***9.1***	30" SD
10	**PR7, PR9**	0.96	2.96	11.4	3.9	6.6	***3.8***	***19.6***	36" SD
11	**PR10, DP9C (Inlet 7)**	1.61	3.68	5.9	4.9	8.3	***7.9***	***30.4***	36" SD
*11.5**	**SEE FDR FOR AURA AT CROSSROADS**	1.93	2.30	14.6	3.6	6.0	***6.9***	***13.8***	24" SD
12	**PR11**	1.61	3.68	5.9	4.9	8.3	***7.9***	***30.4***	42" SD
12.5	**PR12, PR11.5**	3.54	5.98	6.8	4.7	7.9	***16.7***	***47.4***	48" SD
13	**DP10 (Inlet 8)**	0.41	0.44	5.0	5.2	8.7	***2.1***	***3.8***	18" SD
14	**DP11 (Inlet 9)**	0.58	0.80	5.6	5.0	8.4	***2.9***	***6.7***	30" SD
15	**PR12.5, PR13, PR14**	4.53	7.22	7.3	4.6	7.7	***20.8***	***55.8***	48" SD
16A	**DP12A (INLET 1F)**	0.13	0.14	5.0	5.2	8.7	***0.7***	***1.2***	12" PP
16B	**PR16A (MH FOR FUTURE TIE-IN)**	0.13	0.14	5.0	5.2	8.7	***0.7***	***1.2***	24" PP
16C	**DP12B (INLET 2F)**	0.30	0.96	12.8	3.8	6.3	***1.1***	***6.1***	18" PP
16D	**PR16B, PR16C**	0.43	1.10	12.8	3.8	6.3	***1.6***	***7.0***	24" PP
17	**PR15, PR16D**	4.96	8.32	8.1	4.4	7.5	***22.0***	***62.1***	48" SD
18	**PR17, PR21***	5.44	8.90	8.8	4.3	7.3	***23.5***	***64.6***	48" SD
*19**	**SEE FDR FOR AURA AT CROSSROADS**	10.05	11.09	15.0	3.5	5.9	***35.4***	***65.5***	48" SD
20	**POND OUTFALL**	PER	MHFD	WKSHT			***1.2***	***11.4***	18" SD
*21**	**SEE FDR FOR AURA AT CROSSROADS**	0.48	0.58	9.0	4.3	7.2	***2.1***	***4.2***	30" SD

*REFER TO FDR FOR AURA AT CROSSROADS FOR CONTRIBUTING PIPE FLOW DETAILS

DP - Design Point
EX - Existing Design Point
FB- Flow By from Design Point
INT- Intercepted Flow from Design Point

Calculated by: TAU
Date: 5/30/2023
Checked by: DLM

CROSSROADS MIXED USE FILING NO. 2, LOT 1
FINAL DRAINAGE CALCULATIONS
(Future Area Runoff Coefficient Summary)

			STREETS / COMMERC.			*MULTI-FAMILY/PARKLAND*			*OVERLAND / UNDEVELOPED*			*WEIGHTED*	
BASIN	**TOTAL AREA** *(Sq Ft)*	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**C_5**	**C_{100}**
FUTURE BASINS													
OS-A*		1.29	1.29	0.62	0.72	0.00	0.49	0.62	0.00	0.08	0.35	***0.62***	***0.72***
E2*		3.86	3.86	0.80	0.90	0.00	0.49	0.62	0.00	0.08	0.35	***0.80***	***0.90***
EX-A2**		0.59	0.59	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
OS-1	***60793.3017***	1.40	1.40	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
OS-2	***217071.1816***	4.98	2.49	0.90	0.96	0.00	0.49	0.62	2.49	0.08	0.35	***0.49***	***0.66***
A	***72787.0873***	1.67	1.67	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
B	***64538.8381***	1.48	1.48	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
C	***102868.78***	2.36	2.22	0.81	0.88	0.00	0.49	0.62	0.15	0.08	0.35	***0.76***	***0.85***
D	***96317.6781***	2.21	2.21	0.81	0.88	0.00	0.49	0.62	0.00	0.08	0.35	***0.81***	***0.88***
E	***42958.775***	0.99	0.41	0.90	0.96	0.57	0.81	0.88	0.00	0.08	0.35	***0.85***	***0.91***
E1A	***30742.6955***	0.71	0.71	0.81	0.88	0.00	0.49	0.62	0.00	0.08	0.35	***0.81***	***0.88***
E1B	***18796.9627***	0.43	0.43	0.81	0.88	0.00	0.49	0.62	0.00	0.08	0.35	***0.81***	***0.88***
E1C	***11897.8659***	0.27	0.22	0.90	0.96	0.05	0.81	0.88	0.00	0.08	0.35	***0.88***	***0.95***
F1	***7032.0238***	0.16	0.16	0.81	0.88	0.00	0.49	0.62	0.00	0.08	0.35	***0.81***	***0.88***
F2	***110806.116***	2.54	2.54	0.81	0.88	0.00	0.49	0.62	0.00	0.08	0.35	***0.81***	***0.88***
G	***20015.5111***	0.46	0.46	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	***0.90***	***0.96***
J	***142045.569***	3.26	0.00	0.90	0.96	3.26	0.16	0.41	0.00	0.08	0.35	***0.16***	***0.41***
A-5**	***159865.2***	3.67	0.00	0.90	0.96	3.67	0.68	0.79	0.00	0.08	0.35	***0.68***	***0.79***
Z-1**	***16117.2***	0.37	0.00	0.90	0.96	0.37	0.33	0.52	0.00	0.08	0.35	***0.33***	***0.52***
D-1**	***33976.8***	0.78	0.00	0.90	0.96	0.78	0.62	0.75	0.00	0.08	0.35	***0.62***	***0.75***
Z-2**	***16552.8***	0.38	0.00	0.90	0.96	0.38	0.38	0.56	0.00	0.08	0.35	***0.38***	***0.56***
G1	***29951.0819***	0.69	0.63	0.90	0.96	0.06	0.12	0.39	0.00	0.08	0.35	***0.84***	***0.91***
C1	***95425.7528***	2.19	2.04	0.81	0.88	0.00	0.49	0.62	0.15	0.08	0.35	***0.76***	***0.84***

*FROM FDR FOR CLAREMONT BUSINESS PARK FILING NO. 2

**FROM FDR FOR MEADOWBROOK CROSSING FILING 1 AND FILING 2

***FROM FDR FOR LOT 1 24/94 BUSINESS PARK FILING NO. 1 ON PLATTE AVENUE AND MEADOWBROOK PARKWAY

****FROM FDR FOR AURA AT CROSSROADS, DATED OCTOBER 29TH, 2021

Calculated by: TAU
Date: 5/31/2023
Checked by: DLM

CROSSROADS MIXED USE FILING NO. 2, LOT 1
FINAL DRAINAGE REPORT
(Future Drainage Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*		*INTENSITY #*		*TOTAL FLOWS*	
BASIN	**AREA TOTAL** *(Acres)*	**C_5** *From DCM Table 5-1*	**C_{100}** *From DCM Table 5-1*	**C_5**	**Length** *(ft)*	**Height** *(ft)*	**T_C** *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	**T_t** *(min)*	**TOTAL** *(min)*	**CHECK** *(min)*	**I_5** *(in/hr)*	**I_{100}** *(in/hr)*	**Q_5** *(c.f.s.)*	**Q_{100}** *(c.f.s.)*
Future Area Drainage Summary																	
OS-A*	1.29	0.62	0.72	0.62	40	0.8	4.4	1310	1.9%	2.8	7.9	12.3	17.5	3.8	6.4	***3.1***	***6.0***
E2*	3.86	0.80	0.90	0.80	50	1	3.0	400	1.3%	2.3	2.9	6.0	12.5	4.9	8.2	***15.1***	***28.6***
EX-A2**	0.59	0.90	0.96	0.90	10	0.2	0.9	916	1.9%	2.7	5.6	6.5	15.1	4.8	8.0	***2.5***	***4.5***
OS-1	1.40	0.90	0.96	0.90	100	3	2.5	490	2.2%	3.0	2.7	5.2	13.3	5.1	8.6	***6.4***	***11.5***
OS-2	4.98	0.49	0.66	0.49	85	8	4.8	1165	1.8%	2.0	9.6	14.5	16.9	3.6	6.0	***8.7***	***19.6***
A	1.67	0.90	0.96	0.90	30	0.6	1.6	1325	0.7%	1.7	7.3	8.9	17.5	4.3	7.2	***6.5***	***11.6***
B	1.48	0.90	0.96	0.90	25	0.5	1.4	1335	0.7%	1.7	7.3	8.8	17.6	4.3	7.3	***5.8***	***10.3***
C	2.36	0.76	0.85	0.76	50	1	3.4	260	1.5%	2.4	1.4	5.0	11.7	5.2	8.7	***9.3***	***17.4***
D	2.21	0.81	0.88	0.81	50	1	2.9	200	1.5%	2.4	1.1	5.0	11.4	5.2	8.7	***9.3***	***16.9***
E	0.99	0.85	0.91	0.85	60	1.2	2.8	700	1.0%	2.0	3.8	6.7	14.2	4.7	8.0	***4.0***	***7.2***
E1A	0.71	0.81	0.88	0.81	50	2	2.3	220	2.7%	3.3	1.2	5.0	11.5	5.2	8.7	***3.0***	***5.4***
E1B	0.43	0.81	0.88	0.81	30	2	1.5	285	2.1%	2.9	1.6	5.0	11.8	5.2	8.7	***1.8***	***3.3***
E1C	0.27	0.88	0.95	0.88	50	1	2.2	420	1.4%	2.4	2.3	5.0	12.6	5.2	8.7	***1.2***	***2.2***
F1	0.16	0.81	0.88	0.81	30	2	1.5	60	3.3%	3.7	0.3	5.0	10.5	5.2	8.7	***0.7***	***1.2***
F2	2.54	0.81	0.88	0.81	100	3.5	3.5	400	2.8%	3.3	2.2	5.7	12.8	5.0	8.4	***10.3***	***18.7***
G	0.46	0.90	0.96	0.90	50	1	2.0	466	1.1%	2.1	2.6	5.0	12.9	5.2	8.7	***2.1***	***3.8***
J	3.26	0.16	0.41	0.16	60	0.3	16.5	134	0.5%	0.5	4.5	21.0	11.1	4.0	6.7	***2.1***	***8.9***
A-5*	3.67	0.68	0.79	0.68	REFER TO "FDR FOR AURA AT CROSSROADS" FOR DETAILS											***8.72***	***17.06***
Z-1*	0.37	0.33	0.52	0.33	REFER TO "FDR FOR AURA AT CROSSROADS" FOR DETAILS											***0.47***	***1.27***
D-1*	0.78	0.62	0.75	0.62	REFER TO "FDR FOR AURA AT CROSSROADS" FOR DETAILS											***2.08***	***4.20***
Z-2*	0.38	0.38	0.56	0.38	REFER TO "FDR FOR AURA AT CROSSROADS" FOR DETAILS											***0.57***	***1.43***
G1	0.69	0.84	0.91	0.84	50	1	2.7	466	1.1%	2.1	2.6	5.2	12.9	5.1	8.6	***2.9***	***5.4***
C1	2.19	0.76	0.84	0.76	50	1	3.4	260	1.5%	2.4	1.4	5.0	11.7	5.2	8.7	***8.6***	***16.1***

Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: TAU
Date: 5/31/2023
Checked by: DLM

*VALUES DERIVED USING DATA FROM FDR FOR CLAREMONT BUSINESS PARK FILING NO. 2

**VALUES DERIVED USING DATA FROM FDR MEADOWBROOK CROSSING FILING 1 AND FILING 2 PAGE 31

***VALUES DERIVED USING DATA FROM FDR LOT 1 24/94 BUSINESS PARK FILING NO. 1 ON PLATTE AVENUE AND MEADOWBROOK PARKWAY

****FROM FDR FOR AURA AT CROSSROADS, DATED OCTOBER 29th, 2021

CROSSROADS MIXED USE FILING NO. 2, LOT 1
FINAL DRAINAGE REPORT
(Future Basin Routing Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*PIPE / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*		
DESIGN POINT	**CONTRIBUTING BASINS**	**CA_5**	**CA_{100}**	**C_5**	**Length** *(ft)*	**Height** *(ft)*	**T_C** *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	**T_t** *(min)*	**TOTAL** *(min)*	**I_5** *(in/hr)*	**I_{100}** *(in/hr)*	**Q_5** *(c.f.s.)*	**Q_{100}** *(c.f.s.)*	COMMENTS
FUTURE BASIN ROUTING SUMMARY																	
1	**E2, EX-A2**	3.62	4.04				6.0	916	1.9%	2.7	5.6	11.6	3.9	6.6	***14.2***	***26.5***	Existing 10' CDOT Type R At-Grade Inlet (Public)
		Tc for E2 Used															
2	**OS-A**	0.80	0.93									12.3	3.8	6.4	***3.1***	***6.0***	Existing 10' CDOT Type R At-Grade Inlet (Public)
		Tc for OS-A Used															
3	**OS-1, FB-DP1**	2.73	3.69				11.6	150	1.0%	2.0	1.3	12.8	3.8	6.3	***10.2***	***23.3***	Existing 10' CDOT Type R At-Grade Inlet (Public)
		Tc for DP1 Used															
4	**A, FB-DP2**	1.50	1.71									8.9	4.3	7.2	***6.5***	***12.4***	Existing 15' CDOT Type R At-Grade Inlet (Public)
		Tc for Basin A used															
4.5	**FB-DP4**	0.00	0.24									8.9	4.3	7.2	***0.0***	***1.8***	Existing NEENAH R-2501 MH Lid and Frame (Public)
		Tc for DP4 used															
5	**B, FB-DP3**	2.28	3.56									8.8	4.3	7.3	***9.9***	***25.8***	Existing 15' CDOT Type R Sump Inlet (Public)
		Tc for Basin B Used															
6	**C**	1.81	2.00									5.0	5.2	8.7	***9.3***	***17.4***	Planned 30" RCP or PP Storm Sewer, Rip Rap Pad (Private) Filing No. 2
		Tc for Basin C Used															
6.5	**C1**	1.67	1.85									5.0	5.2	8.7	***8.6***	***16.1***	Planned 30" RCP or PP Storm Sewer, Rip Rap Pad (Private) Filing No. 2
		Tc for Basin C1 Used															
7	**D**	1.79	1.95									5.0	5.2	8.7	***9.3***	***16.9***	Planned 24" RCP or PP Storm Sewer, Rip Rap Pad (Private) Filing No. 2
		Tc for Basin D Used															
8	**E**	0.84	0.90									6.7	4.7	8.0	***4.0***	***7.2***	Planned 10' CDOT Type R At-Grate Inlet (Private) Filing No. 2
		Tc for Basin E Used															
9A	**E1A**	0.57	0.62									5.0	5.2	8.7	***3.0***	***5.4***	Sheet Flow (Private)
		Tc for Basin E1A Used															
9B	**E1B**	0.35	0.38									5.0	5.2	8.7	***1.8***	***3.3***	Sheet Flow (Private)
		Tc for Basin E1B Used															
9C	**DP9A, DP9B, E1C**	1.16	1.26									5.0	5.2	8.7	***6.0***	***10.9***	Planned 10' CDOT Type R At-Grade Inlet (Private) Filing No. 2
		Tc for Basin E1C Used															
10	**G**	0.41	0.44									5.0	5.2	8.7	***2.1***	***3.8***	Planned 10' CDOT Type R Sump Inlet (Private) Filing No. 1
		Tc for Basin G Used															
11	**G1**	0.58	0.63									5.6	5.0	8.4	***3.6***	***10.0***	Planned 15' CDOT Type R Sump Inlet (Private) Filing No. 1
	FB-DP8	0.01	0.16														
	FB-DP9	0.14	0.41														
		0.71	**1.19**	Weighted Tc Used													
12A	**F1**	0.13	0.14									5.0	5.2	8.7	***0.7***	***1.2***	Proposed 5' CDOT Type R Sump Inlet (Private)
		Tc for Basin F1 Used															
12B	**F2**	2.06	2.24									5.7	5.0	8.4	***10.3***	***18.7***	Proposed 15' CDOT Type C Area Inlet (Private)
		Tc for Basin F2 Used															
13	**Basin Z-1**	0.12	0.20									12.8	3.8	6.3	***1.4***	***10.4***	Planned 2' Bottom Earthen Swale, Rip Rap Rundown (Private) Filing No. 1
	Basin A-5 (Overflow)	0.26	1.32														
	Basin D-1 (Overflow)	0.00	0.13														
		0.38	**1.65**	Weighted Tc Used													
14	**DP13**	0.38	1.65									11.1	4.0	6.7	***2.1***	***12.4***	Planned Triangular Earthen Swale (Private) Filing No.1
	Basin Z-2	0.15	0.21														
		0.53	**1.86**	Tc for Basin Z-2 Used													
15	**J**	0.52	1.34									6.3	4.8	8.1	***115.5***	***231.4***	Planned Full Spectrum Extended Detention Basin (Private) Filing No.1
	DP14	0.53	1.86														
	PR18	12.84	14.29														
	PR19	10.05	11.09														
		23.94	**28.57**	Weighted Tc Used													
16	**POND OUTFALL**	0.33	1.90									14.5	3.6	6.0	***9.9***	***31.0***	HISTORIC FLOW IN CDOT BARROW DITCH
	OS-2	2.44	3.26														Q5= 10.4 CFS, Q100 = 31.9 CFS
		2.77	**5.16**	Tc for Basin OS-2 Used													PER HISTORIC DRAINAGE ANALYSIS

* Intensity equations assume a minimum travel time of 5 minutes.

Overflow- obtain flows from inlet sheets provided in Background Information Section of Appendix

TAU
Date: 5/31/2023
Checked by: DLM

CROSSROADS MIXED USE FILING NO. 2, LOT 1
FINAL DRAINAGE CALCULATIONS
(Future Storm Sewer Routing Summary)

PIPE RUN	*Contributing Pipes/Design Points*	*Equivalent CA_5*	*Equivalent CA_{100}*	*Maximum T_C*	*Intensity**		*Flow*		PIPE SIZE
					I_5	*I_{100}*	*Q_5*	*Q_{100}*	
1	**DP3 (INLET 3)**	1.78	1.55	12.8	3.8	6.3	***6.7***	***9.8***	24" SD
1.5	**DP4 (INLET 4)**	1.50	1.46	8.9	4.3	7.2	***6.5***	***10.6***	24" SD
2	**PR1.5, DP4.5 (INLET 4.5)**	1.50	1.71	9.0	4.3	7.2	***6.4***	***12.3***	24" SD
3	**PR2, DP5 (INLET 5)**	3.78	5.27	9.0	4.3	7.2	***16.2***	***37.9***	36" SD
4	**DP6**	1.81	2.00	5.0	5.2	8.7	***9.3***	***17.4***	30" SD
4.5	**DP6.5**	1.67	1.85	5.0	5.2	8.7	***8.6***	***16.1***	30" SD
5	**PR4, PR4.5**	3.47	3.85	5.0	5.2	8.7	***18.0***	***33.4***	30" SD
6	**PR5**	3.47	3.85	5.0	5.2	8.7	***18.0***	***33.4***	30" SD
7	**PR6**	3.47	3.85	5.0	5.2	8.7	***18.0***	***33.4***	30" SD
8	**DP7**	1.79	1.95	5.0	5.2	8.7	***9.3***	***16.9***	24" SD
9	**PR8, DP8 (Inlet 6)**	2.61	2.69	6.7	4.7	8.0	***12.4***	***21.4***	30" SD
10	**PR7, PR9**	6.09	6.54	6.7	4.7	8.0	***28.9***	***52.0***	36" SD
11	**PR10, DP9C (Inlet 7)**	7.11	7.39	5.9	4.9	8.3	***35.0***	***61.1***	36" SD
*11.5**	**SEE FDR FOR AURA AT CROSSROADS**	1.93	2.30	14.6	3.6	6.0	***6.9***	***13.8***	24" SD
12	**PR11**	7.11	7.39	5.9	4.9	8.3	***35.0***	***61.1***	42" SD
12.5	**PR12, PR11.5**	9.04	9.69	6.8	4.7	7.9	***42.7***	***76.8***	48" SD
13	**DP10 (Inlet 8)**	0.41	0.44	5.0	5.2	8.7	***2.1***	***3.8***	18" SD
14	**DP11 (Inlet 9)**	0.71	1.19	5.6	5.0	8.4	***3.6***	***10.0***	30" SD
15	**PR12.5, PR13, PR14**	10.17	11.33	7.3	4.6	7.7	***46.8***	***87.5***	48" SD
16A	**DP12A (INLET 1F)**	0.13	0.14	5.0	5.2	8.7	***0.7***	***1.2***	12" PP
16B	**PR16A + 1/2 DP12B FUT. DEV. TIE-IN**	1.16	1.26	5.0	5.2	8.7	***6.0***	***10.9***	24" PP
16C	**1/2 DP12B (INLET 2F)**	1.03	1.12	5.7	5.0	8.4	***5.1***	***9.4***	18" PP
16D	**PR16B, PR16C**	2.19	2.38	5.7	5.0	8.4	***10.9***	***19.9***	24" PP
17	**PR15, PR16C**	12.36	13.71	8.1	4.4	7.5	***54.9***	***102.3***	48" SD
18	**PR17, PR21***	12.84	14.29	8.8	4.3	7.3	***55.5***	***103.6***	48" SD
*19**	**SEE FDR FOR AURA AT CROSSROADS**	10.05	11.09	15.0	3.5	5.9	***35.4***	***65.5***	48" SD
20	**POND OUTFALL**	PER	MHFD	WKSHT			***1.2***	***11.4***	18" SD
*21**	**SEE FDR FOR AURA AT CROSSROADS**	0.48	0.58	9.0	4.3	7.2	***2.1***	***4.2***	30" SD

*REFER TO FDR FOR AURA AT CROSSROADS FOR CONTRIBUTING PIPE FLOW DETAILS

DP - Design Point
EX - Existing Design Point
FB- Flow By from Design Point
INT- Intercepted Flow from Design Point

Calculated by: TAU
Date: 5/31/2023
Checked by: DLM

HYDRAULIC CALCULATIONS

PROPOSED

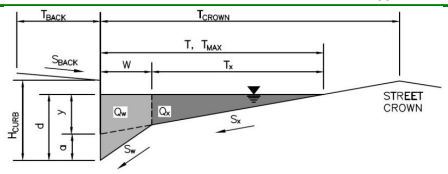
Version 4.06 Released August 2018

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

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

Project: Crossroads Mixed Use

Inlet ID: Inlet 1F



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

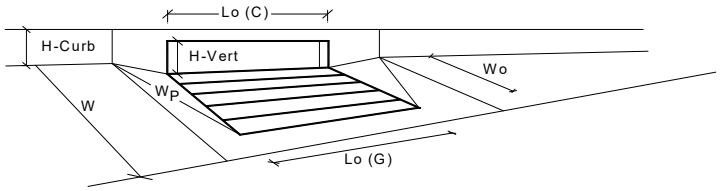
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

PROPOSED

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	4.0	4.9	inches
Grate Information			MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.17	0.24	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.51	0.62	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**1.9**	**3.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	0.7	1.2	cfs

PROPOSED

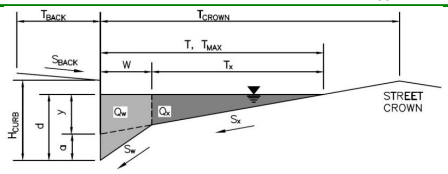
Version 4.06 Released August 2018

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

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

Project: Crossroads Mixed Use

Inlet ID: Inlet 2F



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

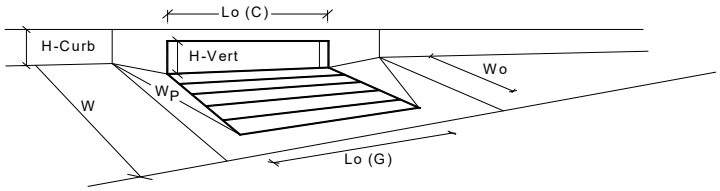
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.4	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

PROPOSED

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.0	6.5	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.25	0.38	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.47	0.61	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.72	0.82	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.8**	**12.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.1	6.1	cfs

FUTURE

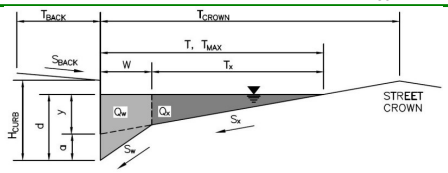
Version 4.06 Released August 2018

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

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

Project: Crossroads Mixed Use

Inlet ID: Inlet 1F



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

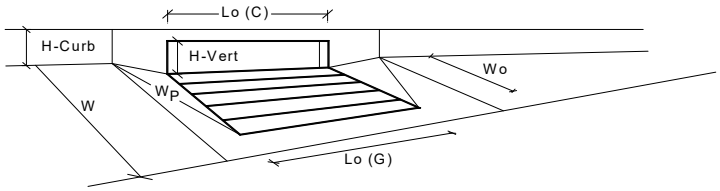
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

FUTURE

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	4.0	4.9	inches
Grate Information			MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.17	0.24	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.51	0.62	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**1.9**	**3.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	0.7	1.2	cfs

FUTURE

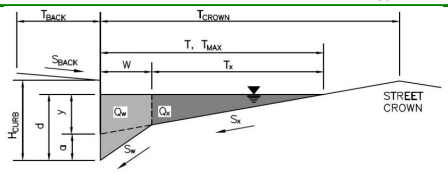
Version 4.06 Released August 2018

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

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

Project: Crossroads Mixed Use

Inlet ID: Inlet 2F



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

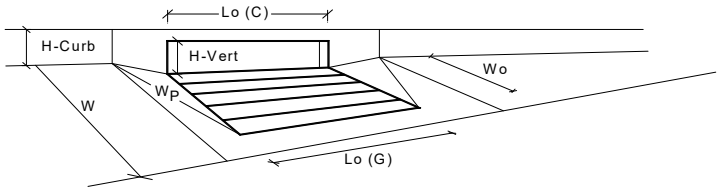
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.4	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

FUTURE

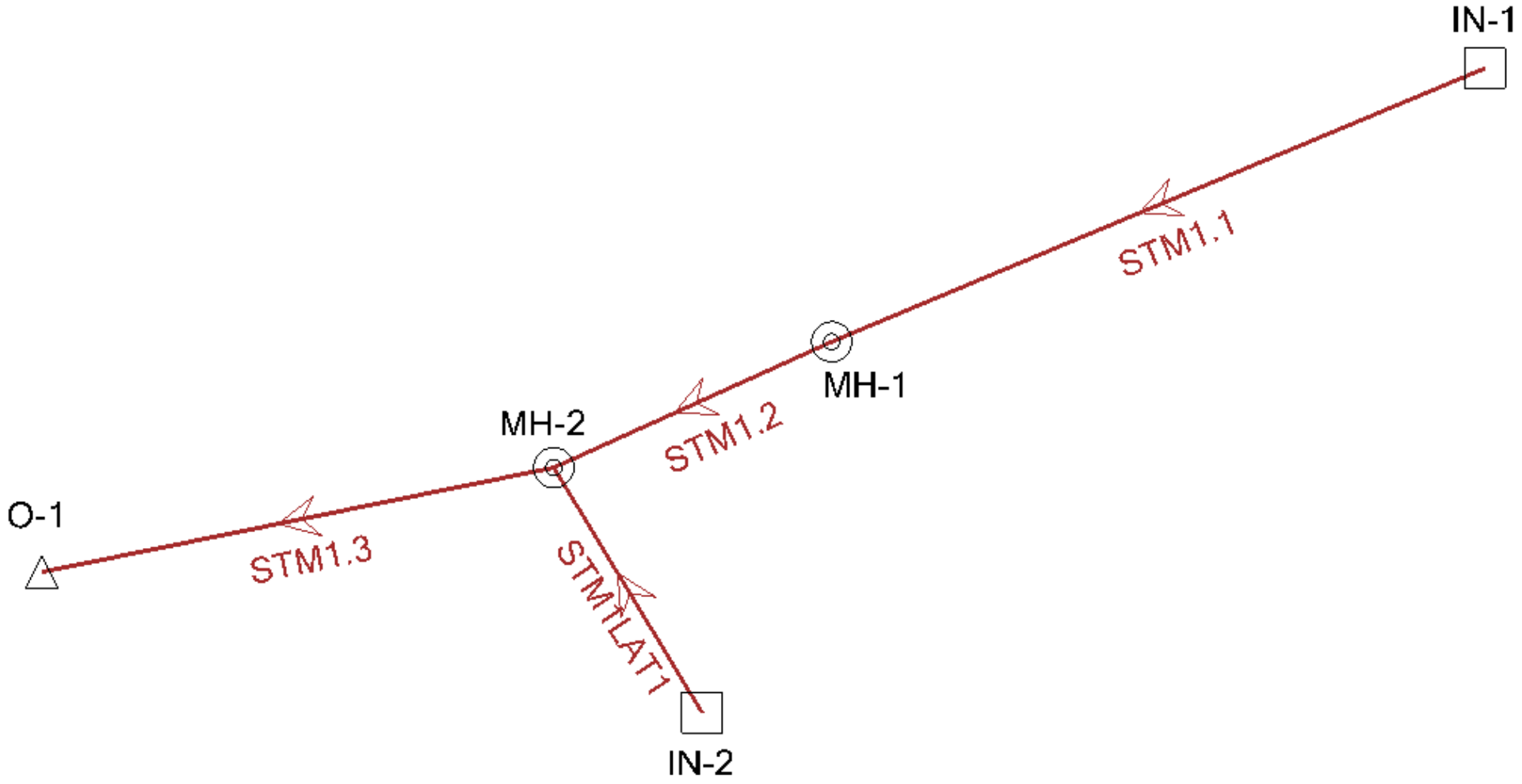
INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018

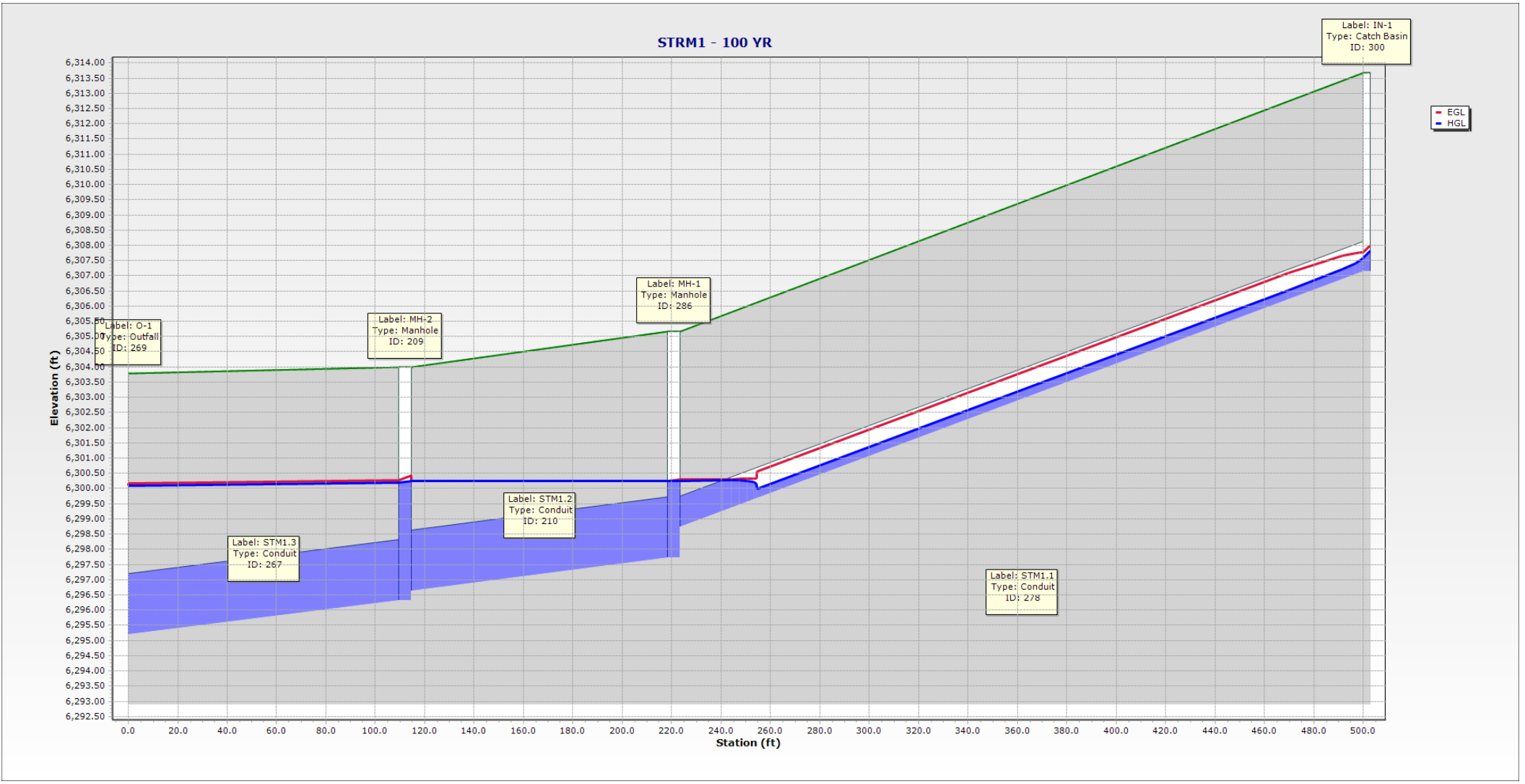


Design Information (Input)	CDOT Type R Curb Opening			
Type of Inlet	Type =	MINOR: CDOT Type R Curb Opening	MAJOR	
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.0	6.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.25	0.33	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.47	0.57	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.72	0.79	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.8**	**9.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	5.1	9.4	cfs

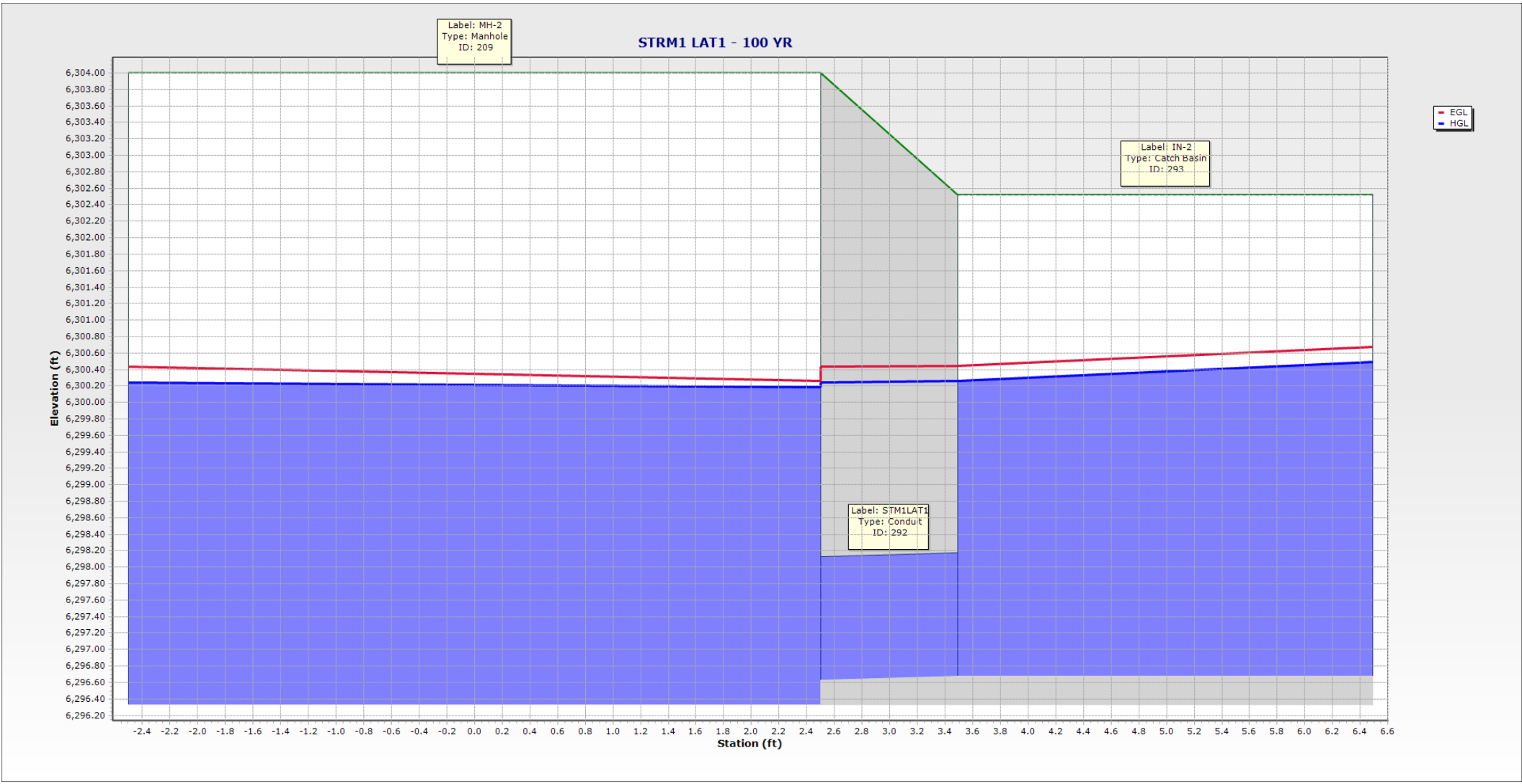
PROPOSED STORM



PROPOSED STORM



PROPOSED STORM



PROPOSED STORM

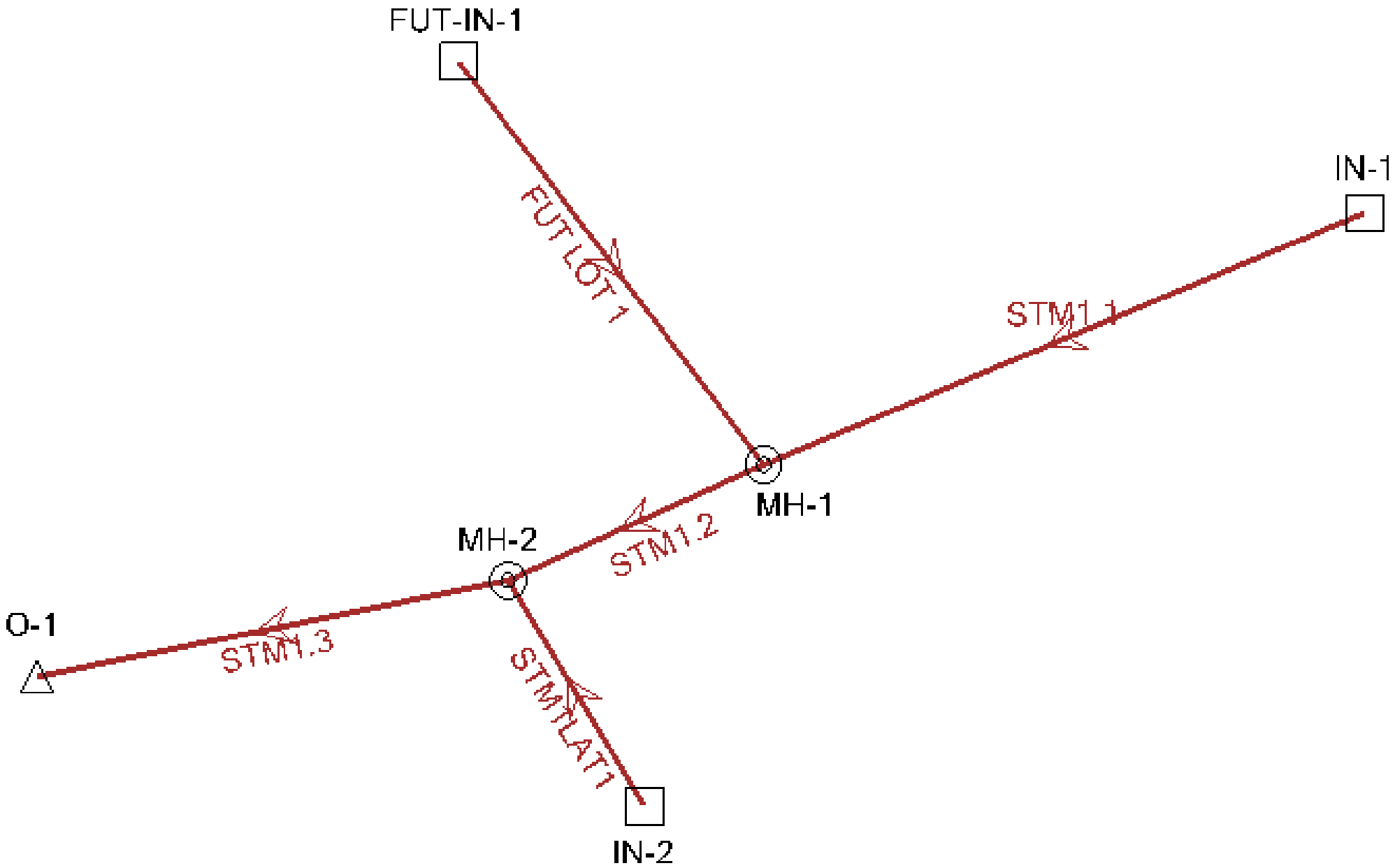
Conduit FlexTable: LOT2

Label	ID	Upstream Structure	Flow (cfs)	Flow / Capacity (Design) (%)	Length (Unified) (ft)	Velocity (ft/s)	Depth (Normal) (ft)	Depth (Critical) (ft)
STM1.2	210	MH-1	1.20	5.3	108.8	0.38	0.31	0.38
STM1.3	267	MH-2	7.00	31.0	112.1	2.23	0.76	0.94
STM1.1	278	IN-1	1.20	19.5	280.4	6.08	0.30	0.46
STM1LAT1	292	IN-2	6.10	58.0	5.0	3.45	0.82	0.95

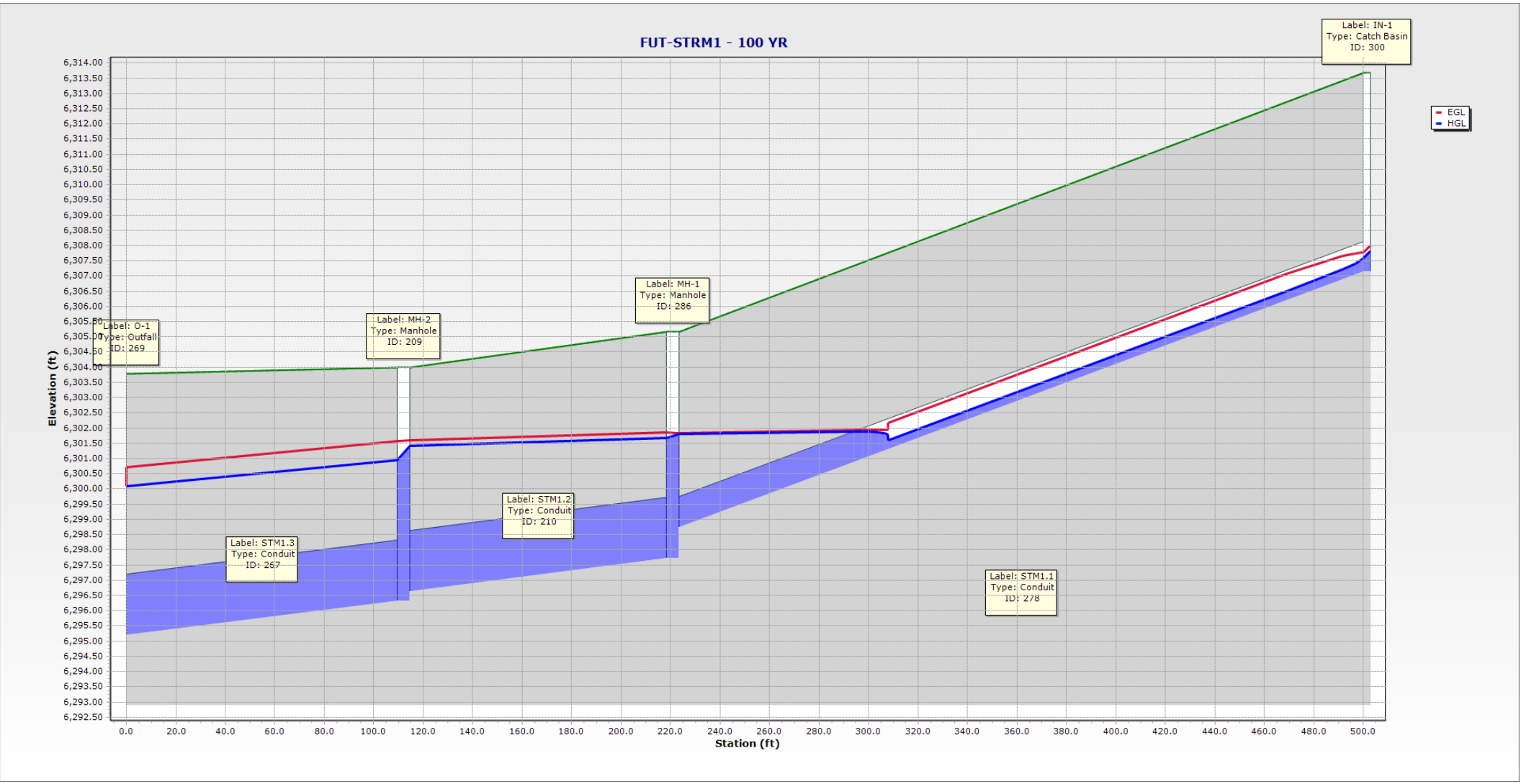
Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss (ft)	Upstream Structure Hydraulic Grade Line (In) (ft)	Upstream Structure Velocity (In-Governing) (ft/s)	Upstream Structure Headloss Coefficient	Upstream Structure Headloss (ft)
6,300.25	6,300.25	6,300.25	6,300.25	0.00	6,300.25	1.53	0.500	0.00
6,300.26	6,300.16	6,300.19	6,300.08	0.11	6,300.25	3.45	0.750	0.06
6,307.77	6,300.29	6,307.59	6,300.25	7.34	6,307.81	3.38	1.250	0.22
6,300.45	6,300.43	6,300.26	6,300.25	0.02	6,300.49	3.45	1.250	0.23

Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Conduit Description	Manning's n	Friction Slope (ft/ft)	Slope (Calculated) (ft/ft)
6,304.00	6,305.17	6,296.63	6,297.72	Circle - 24.0 in	0.013	0.000	-0.010
6,303.78	6,304.00	6,295.21	6,296.33	Circle - 24.0 in	0.013	0.001	-0.010
6,305.17	6,313.67	6,298.75	6,307.13	Circle - 12.0 in	0.013	0.027	-0.030
6,304.00	6,302.52	6,296.63	6,296.68	Circle - 18.0 in	0.013	0.003	-0.010

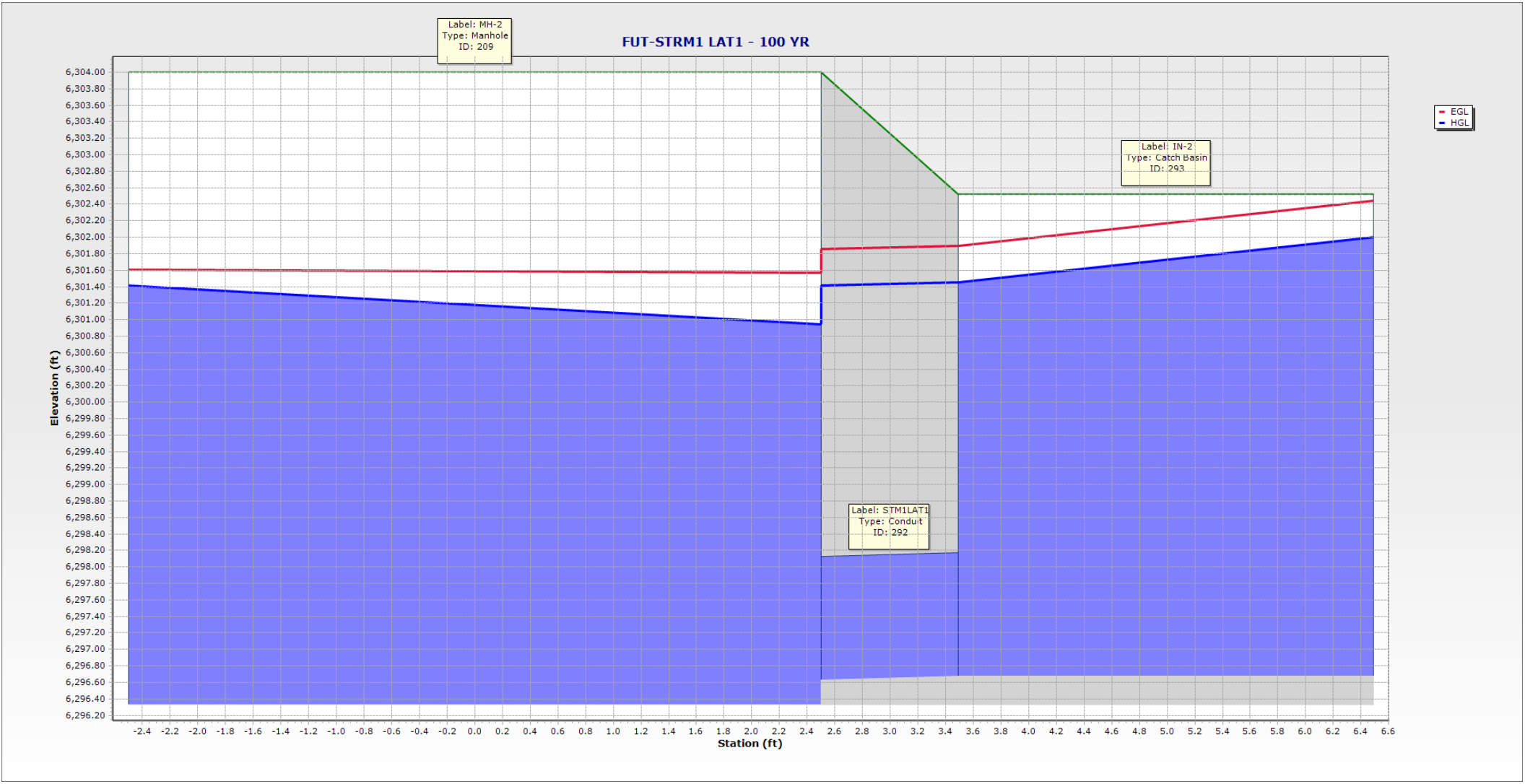
FUTURE DEVELOPMENT STORM



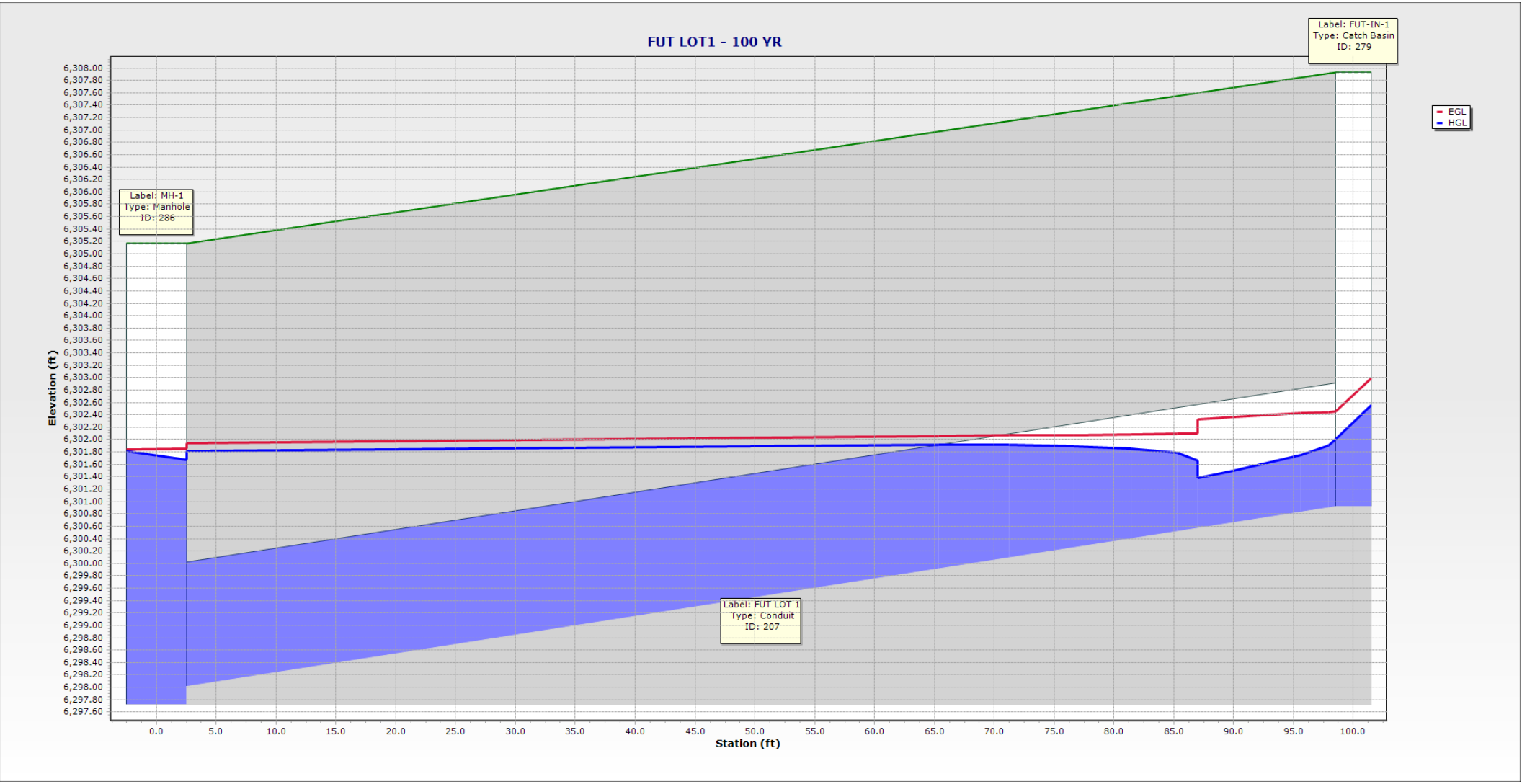
FUTURE DEVELOPMENT STORM



FUTURE DEVELOPMENT STORM



FUTURE DEVELOPMENT STORM



FUTURE DEVELOPMENT STORM

Conduit FlexTable: FUT

Label	ID	Upstream Structure	Flow (cfs)	Flow / Capacity (Design) (%)	Length (Unified) (ft)	Velocity (ft/s)	Depth (Normal) (ft)	Depth (Critical) (ft)
FUT LOT 1	207	FUT-IN-1	9.30	24.1	100.0	10.09	0.67	1.09
STM1.2	210	MH-1	10.90	48.1	108.8	3.47	0.98	1.18
STM1.3	267	MH-2	19.90	88.0	112.1	6.33	1.46	1.60
STM1.1	278	IN-1	1.20	19.5	280.4	6.08	0.30	0.46
STM1LAT1	292	IN-2	9.40	89.4	5.0	5.32	1.11	1.18

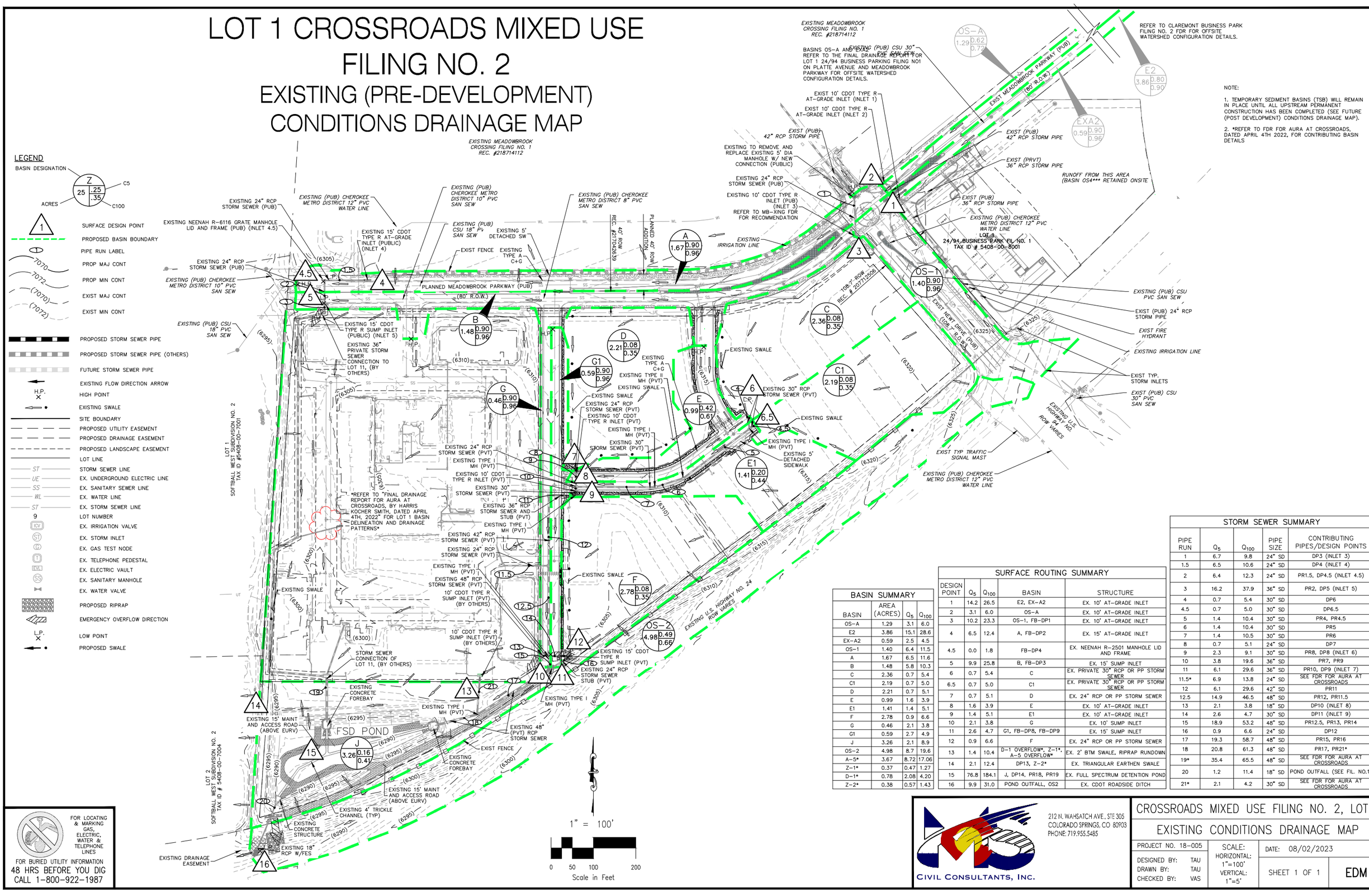
Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss (ft)	Upstream Structure Hydraulic Grade Line (In) (ft)	Upstream Structure Velocity (In-Governing) (ft/s)	Upstream Structure Headloss Coefficient	Upstream Structure Headloss (ft)
6,302.45	6,301.94	6,302.01	6,301.81	0.20	6,302.56	5.32	1.250	0.55
6,301.85	6,301.60	6,301.67	6,301.42	0.25	6,301.81	1.53	0.750	0.14
6,301.57	6,300.70	6,300.95	6,300.08	0.87	6,301.42	3.47	0.750	0.47
6,307.77	6,301.84	6,307.59	6,301.81	5.78	6,307.81	3.38	1.250	0.22
6,301.90	6,301.85	6,301.46	6,301.42	0.04	6,302.00	5.32	1.250	0.55

Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Conduit Description	Manning's n	Friction Slope (ft/ft)	Slope (Calculated) (ft/ft)
6,305.17	6,307.93	6,298.02	6,300.92	Circle - 24.0 in	0.013	0.005	-0.029
6,304.00	6,305.17	6,296.63	6,297.72	Circle - 24.0 in	0.013	0.002	-0.010
6,303.78	6,304.00	6,295.21	6,296.33	Circle - 24.0 in	0.013	0.008	-0.010
6,305.17	6,313.67	6,298.75	6,307.13	Circle - 12.0 in	0.013	0.021	-0.030
6,304.00	6,302.52	6,296.63	6,296.68	Circle - 18.0 in	0.013	0.008	-0.010

DRAINAGE MAPS

LOT 1 CROSSROADS MIXED USE FILING NO. 2

EXISTING (PRE-DEVELOPMENT) CONDITIONS DRAINAGE MAP



NOTE:

1. TEMPORARY SEDIMENT BASINS (TSB) WILL REMAIN IN PLACE UNTIL ALL UPSTREAM PERMANENT CONSTRUCTION HAS BEEN COMPLETED (SEE FUTURE (POST DEVELOPMENT) CONDITIONS DRAINAGE MAP).

2. *REFER TO FDR FOR AURA AT CROSSROADS, DATED APRIL 4TH 2022, FOR CONTRIBUTING BASIN DETAILS

BASIN SUMMARY			
BASIN	AREA (ACRES)	Q_5	Q_{100}
OS-A	1.29	3.1	6.0
E2	3.86	15.1	28.6
EX-A2	0.59	2.5	4.5
OS-1	1.40	6.4	11.5
A	1.67	6.5	11.6
B	1.48	5.8	10.3
C	2.36	0.7	5.4
C1	2.19	0.7	5.0
D	2.21	0.7	5.1
E	0.99	1.6	3.9
E1	1.41	1.4	5.1
F	2.78	0.9	6.6
G	0.46	2.1	3.8
G1	0.59	2.7	4.9
J	3.26	2.1	8.9
OS-2	4.98	8.7	19.6
A-5*	3.67	8.72	17.06
Z-1*	0.37	0.47	1.27
D-1*	0.78	2.08	4.20
Z-2*	0.38	0.57	1.43

SURFACE ROUTING SUMMARY				
DESIGN POINT	Q_5	Q_{100}	BASIN	STRUCTURE
1	14.2	26.5	E2, EX-A2	EX. 10' AT-GRADE INLET
2	3.1	6.0	OS-A	EX. 10' AT-GRADE INLET
3	10.2	23.3	OS-1, FB-DP1	EX. 10' AT-GRADE INLET
4	6.5	12.4	A, FB-DP2	EX. 15' AT-GRADE INLET
4.5	0.0	1.8	FB-DP4	EX. NEENAH R-2501 MANHOLE LID AND FRAME
5	9.9	25.8	B, FB-DP3	EX. 15' SUMP INLET
6	0.7	5.4	C	EX. PRIVATE 30" RCP OR PP STORM SEWER
6.5	0.7	5.0	C1	EX. PRIVATE 30" RCP OR PP STORM SEWER
7	0.7	5.1	D	EX. 24" RCP OR PP STORM SEWER
8	1.6	3.9	E	EX. 10' AT-GRADE INLET
9	1.4	5.1	E1	EX. 10' AT-GRADE INLET
10	2.1	3.8	G	EX. 10' SUMP INLET
11	2.6	4.7	G1, FB-DP8, FB-DP9	EX. 15' SUMP INLET
12	0.9	6.6	F	EX. 24" RCP OR PP STORM SEWER
13	1.4	10.4	D-1 OVERFLOW*, Z-1*, A-5 OVERFLOW*	EX. 2' BTM SWALE, RIPRAP RUNDOWN
14	2.1	12.4	DP13, Z-2*	EX. TRIANGULAR EARTHEN SWALE
15	76.8	184.1	J, DP14, PR18, PR19	EX. FULL SPECTRUM DETENTION POND
16	9.9	31.0	POND OUTFALL, OS2	EX. CDOT ROADSIDE DITCH

STORM SEWER SUMMARY				
PIPE RUN	Q_5	Q_{100}	PIPE SIZE	CONTRIBUTING PIPES/DESIGN POINTS
1	6.7	9.8	24" SD	DP3 (INLET 3)
1.5	6.5	10.6	24" SD	DP4 (INLET 4)
2	6.4	12.3	24" SD	PR1.5, DP4.5 (INLET 4.5)
3	16.2	37.9	36" SD	PR2, DP5 (INLET 5)
4	0.7	5.4	30" SD	DP6
4.5	0.7	5.0	30" SD	DP6.5
5	1.4	10.4	30" SD	PR4, PR4.5
6	1.4	10.4	30" SD	PR5
7	1.4	10.5	30" SD	PR6
8	0.7	5.1	24" SD	DP7
9	2.3	9.1	30" SD	PR8, DP8 (INLET 6)
10	3.8	19.6	36" SD	PR7, PR9
11	6.1	29.6	36" SD	PR10, DP9 (INLET 7)
11.5*	6.9	13.8	24" SD	SEE FDR FOR AURA AT CROSSROADS
12	6.1	29.6	42" SD	PR11
12.5	14.9	46.5	48" SD	PR12, PR11.5
13	2.1	3.8	18" SD	DP10 (INLET 8)
14	2.6	4.7	30" SD	DP11 (INLET 9)
15	18.9	53.2	48" SD	PR12.5, PR13, PR14
16	0.9	6.6	24" SD	DP12
17	19.3	58.7	48" SD	PR15, PR16
18	20.8	61.3	48" SD	PR17, PR21*
19*	35.4	65.5	48" SD	SEE FDR FOR AURA AT CROSSROADS
20	1.2	11.4	18" SD	POND OUTFALL (SEE FIL. NO.1)
21*	2.1	4.2	30" SD	SEE FDR FOR AURA AT CROSSROADS

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CIVIL CONSULTANTS, INC.
212 N. WAHSATCH AVE., STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

CROSSROADS MIXED USE FILING NO. 2, LOT 1

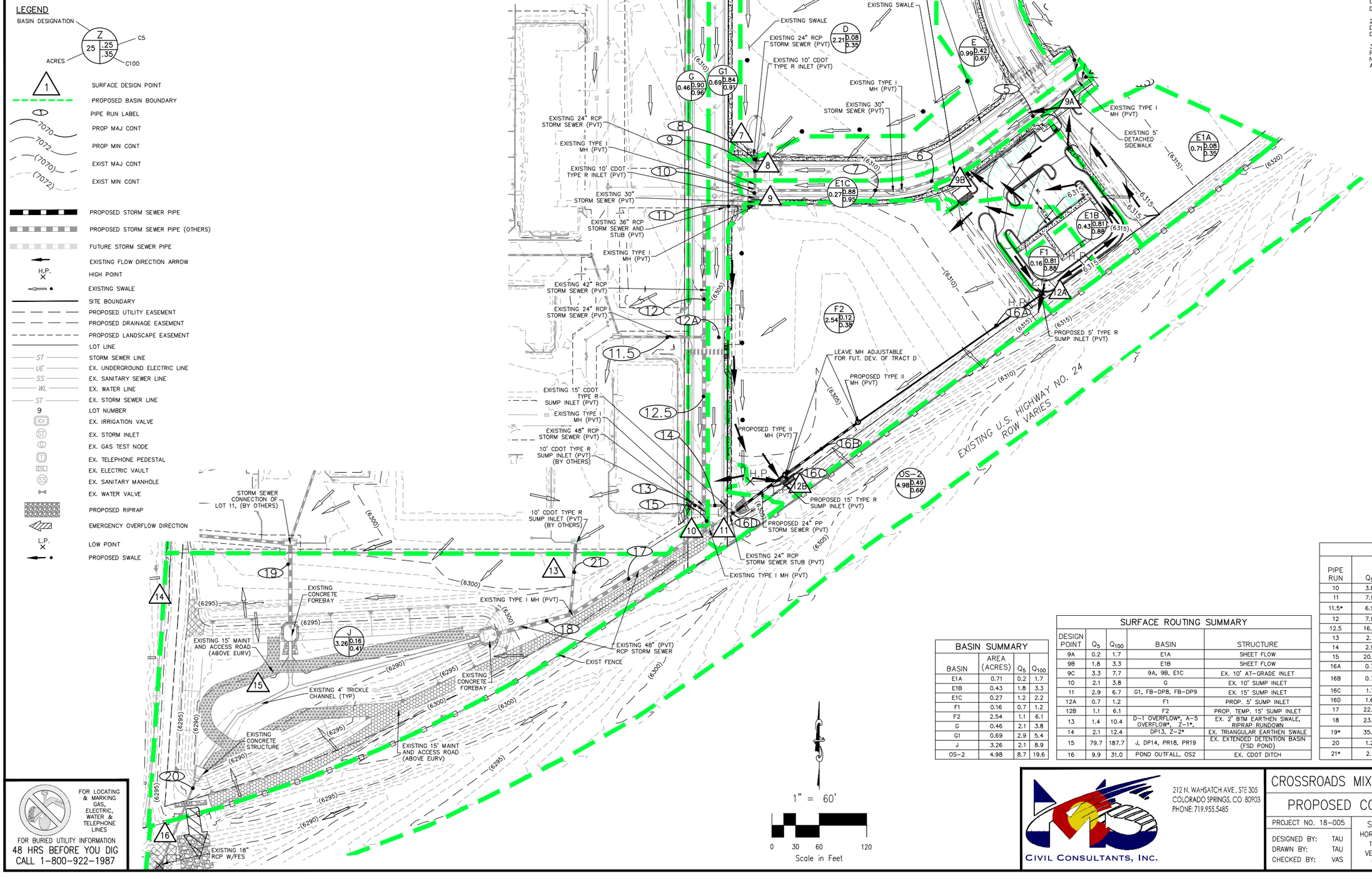
EXISTING CONDITIONS DRAINAGE MAP

PROJECT NO. 18-005
DESIGNED BY: TAU
DRAWN BY: TAU
CHECKED BY: VAS
SCALE: HORIZONTAL: 1"=100' VERTICAL: 1"=5'
DATE: 08/02/2023
SHEET 1 OF 1
EDM

File: O:\18005A-CRMXR-LOT 1\The Equity Group\Drainage\Drainage Map\18-005 EXIST DM.dwg Plotstamp: 8/2/2023 1:17 PM

LOT 1 CROSSROADS MIXED USE FILING NO. 2

PROPOSED CONDITIONS DRAINAGE MAP



NOTE:

1. TEMPORARY SEDIMENT BASINS (TSB) WILL REMAIN IN PLACE UNTIL ALL UPSTREAM PERMANENT CONSTRUCTION HAS BEEN COMPLETED (SEE POST DEVELOPMENT CONDITIONS DRAINAGE MAP).

2. *REFER TO FDR FOR AURA AT CROSSROADS, DATED APRIL 4TH 2022, FOR CONTRIBUTING BASIN DETAILS

3. BASIN F2 IS DESIGNED AS DEVELOPED IN THE PROPOSED CONDITION, IN ORDER TO PLAN FOR THE NECESSARY STORM SEWER PIPE SIZES FOR PR16B AND PR16C

BASIN SUMMARY			
BASIN	AREA (ACRES)	Q_5	Q_{100}
E1A	0.71	0.2	1.7
E1B	0.43	1.8	3.3
E1C	0.27	1.2	2.2
F1	0.16	0.7	1.2
F2	2.54	1.1	6.1
G	0.46	2.1	3.8
G1	0.69	2.9	5.4
J	3.26	2.1	8.9
OS-2	4.98	8.7	19.6

SURFACE ROUTING SUMMARY				
DESIGN POINT	Q_5	Q_{100}	BASIN	STRUCTURE
9A	0.2	1.7	E1A	SHEET FLOW
9B	1.8	3.3	E1B	SHEET FLOW
9C	3.3	7.7	9A, 9B, E1C	EX. 10' AT-GRADE INLET
10	2.1	3.8	G	EX. 10' SUMP INLET
11	2.9	6.7	G1, FB-DP8, FB-DP9	EX. 15' SUMP INLET
12A	0.7	1.2	F1	PROP. 5' SUMP INLET
12B	1.1	6.1	F2	PROP. TEMP. 15' SUMP INLET
13	1.4	10.4	D-1 OVERFLOW*, A-5 OVERFLOW*, Z-1*,	EX. 2' BTM EARTHEN SWALE, RIPRAP RUNDOWN
14	2.1	12.4	DP13, Z-2*	EX. TRIANGULAR EARTHEN SWALE
15	79.7	187.7	J, DP14, PR18, PR19	EX. EXTENDED DETENTION BASIN (FSD POND)
16	9.9	31.0	POND OUTFALL, OS2	EX. CDOT DITCH

STORM SEWER SUMMARY				
PIPE RUN	Q_5	Q_{100}	PIPE SIZE	CONTRIBUTING PIPES/DESIGN POINTS
10	3.8	19.6	36" SD	PR7, PR9
11	7.9	30.4	36" SD	PR10, DP9C (INLET 7)
11.5*	6.9	13.8	24" SD	SEE FDR FOR AURA AT CROSSROADS
12	7.9	30.4	42" SD	PR11
12.5	16.7	47.4	48" SD	PR12, PR11.5, PR12A
13	2.1	3.8	18" SD	DP10 (INLET 8)
14	2.9	6.7	30" SD	DP11 (INLET 9)
15	20.8	55.8	48" SD	PR12.5, PR13, PR14
16A	0.7	1.2	12" PP	DP12A (INLET 1F)
16B	0.7	1.2	24" PP	PR16A (MH FOR FUTURE TRACT D TIE-IN)
16C	1.1	6.1	18" PP	DP12B (INLET 2F)
16D	1.6	7.0	24" PP	PR16A, PR16B
17	22.0	62.1	48" SD	PR15, PR16C
18	23.5	64.6	48" SD	PR17, PR21*
19*	35.4	65.5	48" SD	SEE FDR FOR AURA AT CROSSROADS
20	1.2	11.4	18" SD	POND OUTFALL
21*	2.1	4.2	30" SD	SEE FDR FOR AURA AT CROSSROADS

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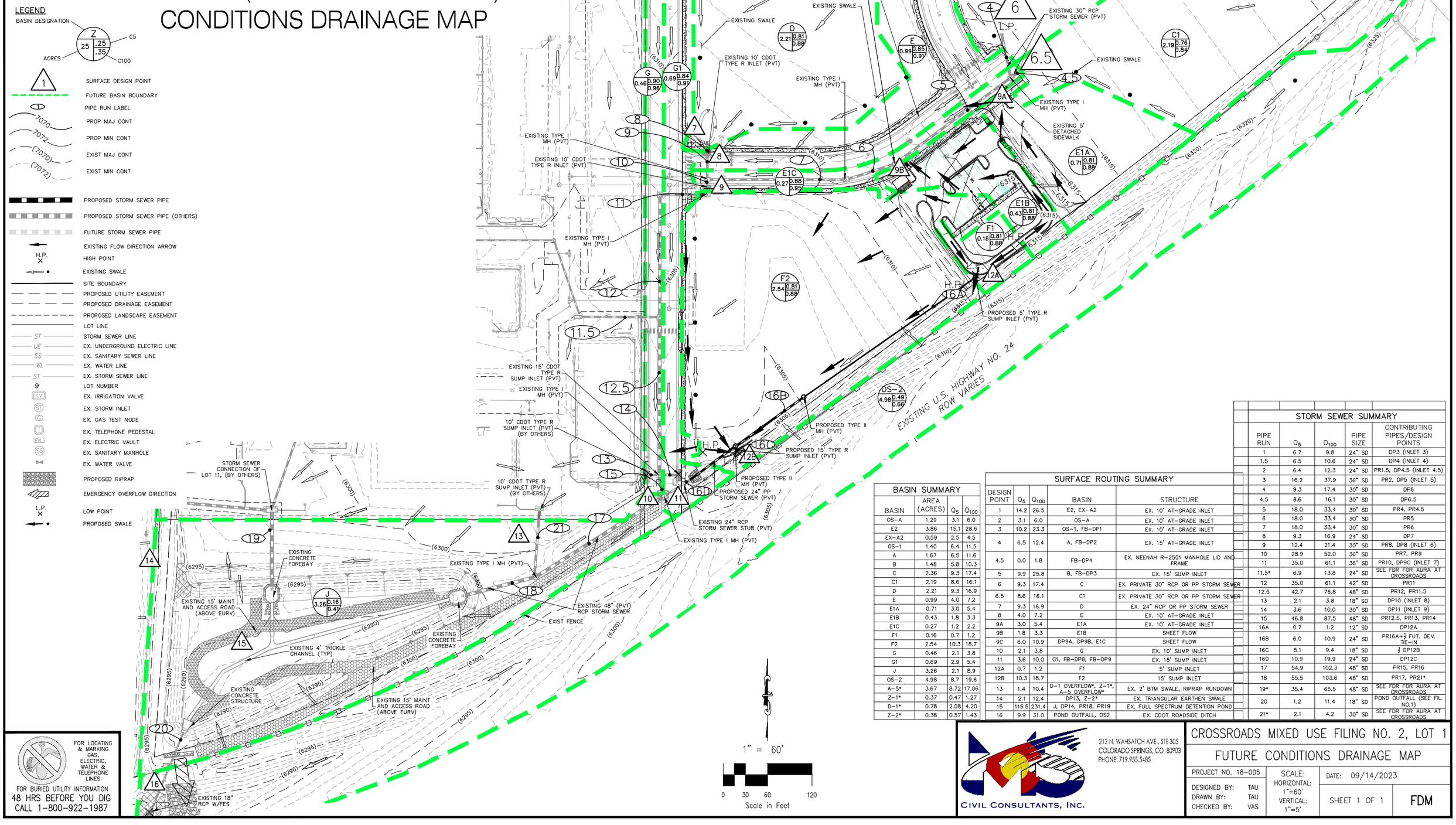
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

CROSSROADS MIXED USE FILING NO. 2, LOT 1
PROPOSED CONDITIONS DRAINAGE MAP

PROJECT NO. 18-005
DESIGNED BY: TAU
DRAWN BY: TAU
CHECKED BY: VAS
SCALE: HORIZONTAL: 1"=60' VERTICAL: 1"=5'
DATE: 09/14/2023
SHEET 1 OF 1
PDM

LOT 1 CROSSROADS MIXED USE FILING NO. 2

FUTURE (POST-DEVELOPMENT) CONDITIONS DRAINAGE MAP



BASIN SUMMARY			
BASIN	AREA (ACRES)	Q_5	Q_{100}
OS–A	1.29	3.1	6.0
E2	3.86	15.1	28.6
EX–A2	0.59	2.5	4.5
OS–1	1.40	6.4	11.5
A	1.67	6.5	11.6
B	1.48	5.8	10.3
C	2.36	9.3	17.4
C1	2.19	8.6	16.1
D	2.21	9.3	16.9
E	0.99	4.0	7.2
E1A	0.71	3.0	5.4
E1B	0.43	1.8	3.3
E1C	0.27	1.2	2.2
F1	0.16	0.7	1.2
F2	2.54	10.3	18.7
G	0.46	2.1	3.8
G1	0.69	2.9	5.4
J	3.26	2.1	8.9
OS–2	4.98	8.7	19.6
A–5*	3.67	8.72	17.06
Z–1*	0.37	0.47	1.27
D–1*	0.78	2.08	4.20
Z–2*	0.38	0.57	1.43

SURFACE ROUTING SUMMARY				
DESIGN POINT	Q_5	Q_{100}	BASIN	STRUCTURE
1	14.2	26.5	E2, EX–A2	EX. 10' AT–GRADE INLET
2	3.1	6.0	OS–A	EX. 10' AT–GRADE INLET
3	10.2	23.3	OS–1, FB–DP1	EX. 10' AT–GRADE INLET
4	6.5	12.4	A, FB–DP2	EX. 15' AT–GRADE INLET
4.5	0.0	1.8	FB–DP4	EX. NEENAH R–2501 MANHOLE LID AND FRAME
5	9.9	25.8	B, FB–DP3	EX. 15' SUMP INLET
6	9.3	17.4	C	EX. PRIVATE 30" RCP OR PP STORM SEWER
6.5	8.6	16.1	C1	EX. PRIVATE 30" RCP OR PP STORM SEWER
7	9.3	16.9	D	EX. 24" RCP OR PP STORM SEWER
8	4.0	7.2	E	EX. 10' AT–GRADE INLET
9A	3.0	5.4	E1A	EX. 10' AT–GRADE INLET
9B	1.8	3.3	E1B	SHEET FLOW
9C	6.0	10.9	DP9A, DP9B, E1C	SHEET FLOW
10	2.1	3.8	G	EX. 10' SUMP INLET
11	3.6	10.0	G1, FB–DP8, FB–DP9	EX. 15' SUMP INLET
12A	0.7	1.2	F1	5' SUMP INLET
12B	10.3	18.7	F2	15' SUMP INLET
13	1.4	10.4	D–1 OVERFLOW*, Z–1*, A–5 OVERFLOW*	EX. 2' BTM SWALE, RIPRAP RUNDOWN
14	2.1	12.4	DP13, Z–2*	EX. TRIANGULAR EARTHEN SWALE
15	115.5	231.4	J, DP14, PR18, PR19	EX. FULL SPECTRUM DETENTION POND
16	9.9	31.0	POND OUTFALL, OS2	EX. CDOT ROADSIDE DITCH

STORM SEWER SUMMARY				
PIPE RUN	Q_5	Q_{100}	PIPE SIZE	CONTRIBUTING PIPES/DESIGN POINTS
1	6.7	9.8	24" SD	DP3 (INLET 3)
1.5	6.5	10.6	24" SD	DP4 (INLET 4)
2	6.4	12.3	24" SD	PR1.5, DP4.5 (INLET 4.5)
3	16.2	37.9	36" SD	PR2, DP5 (INLET 5)
4	9.3	17.4	30" SD	DP6
4.5	8.6	16.1	30" SD	DP6.5
5	18.0	33.4	30" SD	PR4, PR4.5
6	18.0	33.4	30" SD	PR5
7	18.0	33.4	30" SD	PR6
8	9.3	16.9	24" SD	DP7
9	12.4	21.4	30" SD	PR8, DP8 (INLET 6)
10	28.9	52.0	36" SD	PR7, PR9
11	35.0	61.1	36" SD	PR10, DP9C (INLET 7)
11.5*	6.9	13.8	24" SD	SEE FDR FOR AURA AT CROSSROADS
12	35.0	61.1	42" SD	PR11
12.5	42.7	76.8	48" SD	PR12, PR11.5
13	2.1	3.8	18" SD	DP10 (INLET 8)
14	3.6	10.0	30" SD	DP11 (INLET 9)
15	46.8	87.5	48" SD	PR12.5, PR13, PR14
16A	0.7	1.2	12" SD	DP12A
16B	6.0	10.9	24" SD	PR16A+½ FUT. DEV. TIE–IN
16C	5.1	9.4	18" SD	½ DP12B
16D	10.9	19.9	24" SD	DP12C
17	54.9	102.3	48" SD	PR15, PR16
18	55.5	103.6	48" SD	PR17, PR21*
19*	35.4	65.5	48" SD	SEE FDR FOR AURA AT CROSSROADS
20	1.2	11.4	18" SD	POND OUTFALL (SEE FIL. NO.1)
21*	2.1	4.2	30" SD	SEE FDR FOR AURA AT CROSSROADS

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CROSSROADS MIXED USE FILING NO. 2, LOT 1

FUTURE CONDITIONS DRAINAGE MAP

PROJECT NO. 18–005		SCALE: HORIZONTAL: 1"=60' VERTICAL: 1"=5'	DATE: 09/14/2023	
DESIGNED BY:	TAU		SHEET 1 OF 1	FDM
DRAWN BY:	TAU			
CHECKED BY:	VAS			

File: O:\18005A–CRMUR–LOT 1\The Equity Group\Drainage\Drainage Map\18–005 FUT DM.dwg Plotstamp: 9/14/2023 12:16 PM