

# PRELIMINARY DRAINAGE REPORT

FOR

## CROSSROADS MIXED USE EL PASO COUNTY, COLORADO

FEBRUARY 2021

Prepared for:  
Crossroads Metropolitan District No. 2  
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Prepared by:



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Project #18-003A  
PCD Filing No.: SP-20-011

**PRELIMINARY  
DRAINAGE REPORT  
FOR  
CROSSROADS MIXED USE**

**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

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: \_\_\_\_\_

ADDRESS: The Equity Group, 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: \_\_\_\_\_  
Jennifer Irvine, P.E.  
County Engineer / ECM Administrator

CONDITIONS:

**PRELIMINARY DRAINAGE REPORT  
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**PRELIMINARY DRAINAGE REPORT  
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**Purpose**

This preliminary drainage report for Crossroads Mixed Use is in support of a Preliminary Plan and Rezone 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.

A Final Drainage Report for this site and Construction Drawings will be submitted concurrently with the Final Plat. Individual drainage letters and/or reports shall be required with the development of each lot not otherwise clearly analyzed by the aforementioned by this Final Drainage Report for Crossroads Mixed Use.

**Project Location and Description**

The subject site is located at 0 Meadowbrook Parkway in the southwestern quarter of Section 8, Township 14 South, Range 65 West of the 6<sup>th</sup> P.M. in El Paso County, Colorado. The 29.04 Acre site is currently undeveloped. The site is bound to the west by undeveloped Softball West Subdivision Filing No.2, to the north by Meadowbrook Crossing Subdivision and south by Highway 24 and to the east by Newt Drive.

The proposed site is will be developed into ten (10) commercial lots, one (1) multifamily residential and three tracts. The development will extend Meadowbrook Parkway to the west and will include a single lane roundabout to be constructed at the intersection of the Meadowbrook Parkway and Newt Drive. The property is within the commercial aviation district overlay. A concurrent rezone application has been submitted to rezone 12.695 acres from CR to the RM-30 Zone.

The majority of the existing site is covered with native grasses with fair to good cover, the exception being portions of the future Meadowbrook Parkway corridor where exposed soils are present. Known earthwork operations to “borrow material” have occurred over a small segment of the eastern portion of the site in early and mid 2019, but have since stabilized. A few dirt paths/trails are present along the far west end of the site, likely from recreational vehicles. Generally the site slopes from east to west at slightly greater than 1% with some localized depressions and general terrain undulations near the west boundary that have slopes ranging from 1- 20%. 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 exist onsite. No known irrigation 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 7<sup>th</sup>, 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 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.

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 subsequently no drainage improvement related reimbursements with the development of this parcel
- Drainage fees shall be required to plat

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

- Establishes the drainage patterns of offsite Basins 0S4 and E2 which are to be conveyed within the Meadowbrook Rights of Way
- Established up-gradient offsite drainage to be directed under Meadowbrook north to offsite 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 out as Basin EXA2.
- Continues assumption that flows from Newt Drive be conveyed north to East Fork Sand Creek.
- Evaluated predevelopment 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 offsite 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’ft 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 onsite drainage patterns
- Excluded offsite runoff impacts from areas to the east of site.
- Allowed site to be utilized as a “borrow site” for offsite 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 Urban Storm Drainage Criteria 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. The relevant data sheets are included in the appendix of this report. Hydraulic grade line calculations shall be provided with the Final Drainage report.

## **Drainage Criteria**

This drainage analysis has been prepared in accordance with current El Paso County Drainage Criteria Manual and where applicable the 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.

## **Historic (Pre-Grading) Drainage Characteristics**

The historic drainage patterns discussed within this report reflect the site conditions prior to the approval of the 2018 Meadowbrook Dirt Borrow Site Grading and Erosion Control Plan. This 'historic condition' generally coincides with the existing condition analysis and mapping that accompanied that project's hydrologic analysis.

The following excerpt is from the existing Drainage Characteristics section of the Final Drainage Report for Meadowbrook Dirt Borrow Site, El Paso County, Colorado, by M&S Civil Consultants and adequately describes the general site characteristics prior to grading.

“Site vegetation is sparse, consisting primarily of native grasses and weeds. The parcel possesses a ridgeline that bisects the parcel, directing runoff to the south and west boundaries, with slopes varying from 1% to 20%. A few small depressions are located on site, near the west boundary. For the purposes of hydrologic analysis, the small depressions are not considered to detain runoff.”

Given the increase in breadth and scope of this study, significant consideration of the impacts of offsite drainage from the adjacent developments will be evaluated. This includes drainage from a small portion of Hwy 24 which combines with flows within existing from portions of Newt Drive. Runoff from this offsite area combines with by-pass flows from two inlets located within existing Meadowbrook Drive, prior to entering the site at its northeast corner. Runoff from these locations ultimately combines with onsite flows within the proposed Meadowbrook Parkway corridor, before discharging to downstream properties.

The detailed description of the historic (pre-grading) condition is as follows. Please refer to the historic conditions drainage map which is provided within the appendix of this report.

## Historic Conditions - Detailed Drainage Discussion

### Design Point 1

**Basin E2 (Claremont Business Park Filing No.2)** consists of a reported 3.86 developed acres of Development located along the southeastern half of existing Meadowbrook Parkway some 1200' northeast of the subject site. Runoff produced by the offsite development (CBPF2 Lot 46) is conveyed to Meadowbrook Parkway at flow rates of  $Q_5=15.1$ ,  $Q_{100}=28.6$  cfs in the 5 and 100-year storm events respectively. The collected flows combines with runoff from **Basin EX-A2 (Lot 1 24/94 Business Park Filing No.1)** ( $Q_5=2.5$ ,  $Q_{100}=4.5$  cfs) which consist 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  $Q_5=14.2$  and  $Q_{100}=26.5$  cfs. An existing 10' CDOT Type R at-grade inlet (**Inlet 1**) intercepts flows of  $Q_5=8.4$  and  $Q_{100}=11.1$  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.

### Design Point 2

**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 Newt Drive. Runoff produced within this basin totals  $Q_5=3.1$  and  $Q_{100}=6.0$  cfs. An existing 10' CDOT Type R at grade inlet (**Inlet 2**) collects runoff of  $Q_5=3.1$  and  $Q_{100}=5.3$  cfs, with subsequent by-pass flows in only the 100 year event of 0.7 cfs. Runoff leaving the design point continuing west within the north half of existing Meadowbrook Parkway.

### Design Point 3

**Basin OS-1** consists of approximately 1.28 developed acres of existing Newt Drive located along the eastern boundary of the site. Runoff produced within the basin ( $Q_5=5.8$  cfs,  $Q_{100}=10.5$  cfs) combine with flow-by from **DP1** in the intersection at peak flow rates of 9.8 cfs, and 22.5 cfs in the 5 and 100-year storm events.

Surface runoff and by-pass flows from both **DP2** and **DP3** entering **Basin A**, and the undeveloped rights of way of future Meadowbrook Parkway, at the northeast corner of the site.

### Design Point 4

**Basin A** consists of 12.88 undeveloped acres located along the northern boundary that drain from east to west across the subject site. Runoff produced by this basin ( $Q_5=1.9$  cfs,  $Q_{100}=14.2$  cfs) combine with flows from **DP2** and **DP3**. The cumulative runoff at **DP4** of  $Q_5=7.4$  cfs,  $Q_{100}=27.7$  cfs discharges onto the adjacent property (Lot 1, Softball West Subdivision 2) along the western boundary of the site, approximately 250' to south of the northern property line.

### **Design Point 5**

**Basin B** consists of 13.63 undeveloped acres located along the western side of the subject site. Runoff produced by the basin generally flows from northeast to southwest discharging onto the adjacent property (Lot 2, Softball West Subdivision 2) approximately 200' north of the southern property line. Runoff reaching the boundary at **DP5**, is estimated at 8.3 cfs and 18.2 cfs in the 5 year and 100 year events respectively.

### **Design Point 6**

**Basin C** currently consists of 5.89 undeveloped acres located along the southern boundary of the site. Runoff produced within the basin travels east to west as sheet flow before eventually discharging into the existing barrow ditch which travels along the US HWY 24 CDOT right of way. Peak runoff rates reaching the subdivision boundary at this location are calculated at 1.2 cfs and 8.5 cfs in the 5 year and 100 year events respectively.

### **Design Point 7**

**Basin OS-2** consists of 4.98 acres of a portion of the northern half of the US HWY 24 roadway and adjoining native grass lined barrow ditch. Runoff produced within the basin combines with runoff from the subject site (**DP6**) at cumulative peak runoff rates of 10.4. and 31.9 cfs in the 5 and 100 year storm events at **DP7**. A modeled hydraulic cross section of the ditch section at **DP7** calculates flow depths of 0.76 feet traveling at a velocity of approximately 3.54 feet per second. Input parameters for this analysis can be found in the Hydraulics section of the Appendix below.

Runoff from **Design Points 4 and 5** ultimately combine with the flows from **DP7** within the barrow ditch of US Hwy 24 several hundred feet downstream of the subject site. An existing 36" RCP culvert located at the interchange of HWY 24 and Peterson Road aids in conveying a portion of the runoff from the subject site and adjacent offsite areas under the roadway. Flows in excess of the culverts carrying capacity, overtop the roadway before rejoining within a subsequent drainage swale that parallels the west bound HWY 24 on-ramp. Ultimately flows discharge into the East Fork of the Sand Creek via an existing riprap rundown. Site visits conducted by M&S Civil at the time of the writing of this report, found no significant signs of erosion or deposition along the aforementioned corridor.

A Drainageway Exhibit in the appendix of this report provides and aerial illustration the aforementioned conveyance route to the channel, which will also serve to function as the emergency overflow path for the proposed site development.

### **Existing Drainage Characteristics**

The subject site has been utilized as a "borrow site" to provide surplus earthwork to offsite developments in the area. This recent grading effort occurred during the spring and summer of 2019. At the request of El Paso County, an existing condition drainage analysis has been provided to show the changes to the topography and drainage pattern as a result of this effort. As the only changes between the two conditions are onsite, the offsite drainage patterns calculations and assumptions determined with the historical analysis will remain the same. It should be noted that

the subject site was not disturbed to the full extent of the approved plan, with limited excavation primarily occurring within the eastern side of the subject site.

In the existing condition, vegetation remains sparse, consisting primarily of native grasses and weeds with good to fair cover. Areas disturbed by grading activities were reseeded and have since stabilized. In regarding to historic versus existing drainage basin delineation, the bisecting parcel ridgeline has been relocated further to the south, which results in redirecting more of the runoff to the southwestern part of the site and less to the CDOT rights of way. The few small depressions remain on site, near the west boundary. For the purposes of hydrologic analysis, these small depressions will continue to not be evaluated for their ability to detain runoff. Ultimately, all runoff from the parcel is conveyed to the west toward to existing drainage facilities located under Peterson Road and ultimately the East Fork of Sand Creek as in the historic condition.

This section only discusses the changes in basin geometry and drainage pattern and provides a direct comparison the historic versus existing conditions utilizing the same outfall (design) points, which have remained undisturbed.

#### **Design Point 4**

**Basin A** currently consists of 11.02 acres which continues to drain from east to west eventually discharging along the western boundary of the site, approximately 250' south of the northern property line. Peak runoff, post grading, is lower at an estimated 7.1 cfs and 25.5 cfs (**Design Point 2**) as compared to the historic condition flow rates of 7.4 cfs and 27.7 cfs in the 5-year and 100-year events respectively

#### **Design Point 5**

**Basin C** currently consists of 7.84 acres that drain from northeast to southwest eventually discharging along the western boundary of the site, approximately 200' north of the southern property line. Peak runoff rates at this location, are also than lower than the historic conditions with post grading flows of 5.0 cfs and 14.5 cfs at **Design Point 3** as compared to 8.3 cfs and 18.2 cfs in the 5-year and 100-year events respectively. Despite the basin currently being larger in area than in the historic condition, a decrease occurs in the peak flow rates as a result of a longer flow path to the given design point.

#### **Design Point 6**

**Basin A** consists of 3.99 undeveloped acres that drains from east to west into the US HWY 24 Right of Way at the southern boundary of the site. Peak runoff at this location is lower than the historic condition at an estimated 0.9 cfs and 6.3 cfs (**DP 6**), as compared to 1.2 cfs and 8.5 cf in the 5-year and 100-year events respectively.

#### **Design Point 7**

**Basin OS-2** consists of 4.98 acres of the northern half of the US HWY 24 roadway and adjoining native grass lined barrow ditch. Runoff produced within the basin combines with runoff from the subject site (**DP6**) at a lower cumulative peak runoff rates of 9.9 and 28.0 cfs in the 5 and 100-year storm events at **DP7**.

## **Four Step Process**

**Step 1      Employ Runoff Reduction Practices** – Approx. 2.54 acres of the proposed 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 (4) temporary sedimentation ponds until the ground has been stabilized with vegetation or permanently developed.

**Step 2      Provide Water Quality Capture Volume** – A Full Spectrum Detention Pond is proposed to reduce peak discharge rates and provide water quality treatment. In the interim stage, four (4) temporary Sedimentation Ponds are provided to collect sediment for the disturbed area this will function to maintain existing water quality levels during construction, and prior to permanent development.

**Step 3      Stabilize Drainageways** – The site will use a Full Spectrum Detention (FSD) Pond to control developed runoff that is discharging into an existing CDOT ROW roadside ditch and ultimately into Sand Creek. The FSD outlet structure will be designed to drain the water quality event storm in 40 hours, while reducing the 100 year peak discharge to approximately 90% of the predevelopment conditions. As the flow is discharged offsite, it continues southwest in CDOT's manmade roadside ditch until it reaches Peterson Road. From here, it is 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. Rip Rap barriers are lined throughout this portion of the pathway approximately every 90-100 feet to the channel. The Drainageway Exhibit provided in the Drainage Maps section of the Appendix provides a better visual representation of this information.

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 four temporary sedimentation ponds, before discharging at the southwest property corner of the site and onto an adjacent undeveloped property via riprap-lined spillways. This ensures that in this stage of the development negative effects on the downstream drainage ways will be avoided.

**Step 4      Consider Need for Industrial and Commercial BMP's** – The proposed development will implement a Stormwater Management Plan including property housekeeping practices and spill containment procedures.

## **Proposed Drainage Characteristics**

The proposed site is will be developed into ten (10) commercial lots, one (1) multifamily residential and three tracts. The proposed development will extend Meadowbrook Parkway to the west and will include a single lane roundabout to be constructed at the intersection of the Meadowbrook Parkway and Newt Drive to aid in traffic control. A proposed private looped roadway, Crossroad Heights, will extend into the site to provide access and a utility corridor to both the commercial and

residential developments. At this time, it is anticipated that the development and design of Lot 11 (by others) is planned to occur concurrently with the construction of the proposed utilities and infrastructure provided by this plan. Coordination is ongoing, as such; the routing of storm sewer main line thru the site and the planned outfall locations will be formalized with the Final Drainage Report. A separate drainage letter or report will be required for that portion of the development.

The following summary generalizes the proposed drainage patterns and drainage improvements required to safely route developed runoff to downstream facilities.

A storm sewer pipe and inlet will be constructed at the southwest corner of the newly constructed roundabout to aid in collecting runoff reaching the site from offsite watersheds. These facilities will connect to the existing system located inside the existing Meadowbrook Subdivision. Bypassed flows and developed flows within the newly constructed Meadowbrook Parkway will be collected by a pair of sump inlets located at the west end of the roadway. The drainage facilities located with the rights of way will be public all remaining onsite storm sewer and drainage improvements shall be private. A private looped roadway 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. The extension of these facilities beyond what is shown by this plan is likely with future development. Runoff collected by the infrastructure will be conveyed to a single full spectrum detention pond located in the southwest corner of the subdivision. The proposed outfall from the pond is planned to discharge to the existing barrow ditch located with the north half of the existing CDOT Right of Way. A drainage easement will be required from CDOT for the outfall and slope protection facilities that fall within the corridor. It should be noted that the storm outfall will be shaped into the existing hillside and any soil riprap protection will be buried. Runoff leaving the site and entering the CDOT corridor will discharge at less than historic rates. The previous discharge points along the west boundary of the subject site which also previously contributed to the barrow ditch will be virtually eliminated, further reducing the peak flow rates to downstream facilities.

## **Proposed Detailed Drainage Discussion**

### **Design Point 1**

**Basin E2 (Claremont Business Park Filing No.2)** consists of a reported 3.86 developed acres of Development located along the southeastern half of existing Meadowbrook Parkway some 1200' northeast of the subject site. Runoff produced by the offsite development (CBPF2 Lot 46) is conveyed to Meadowbrook Parkway at flow rates of  $Q_5=15.1$ ,  $Q_{100}=28.6$  cfs in the 5 and 100-year storm events respectively. The collected flows combines with runoff from **Basin EX-A2 (Lot 1 24/94 Business Park Filing No.1)** ( $Q_5=2.5$ ,  $Q_{100}=4.5$  cfs) which consist 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  $Q_5=14.2$  and  $Q_{100}=26.5$ . An existing 10' CDOT Type R at-grade inlet (**Inlet 1**) intercepts flows of  $Q_5=8.4$  and  $Q_{100}=11.1$ , 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.



### Design Point 2

**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 Newt Drive. Runoff produced within this basin totals  $Q_5=3.1$  and  $Q_{100}=6.0$  cfs. An existing 10' CDOT Type R at grade inlet (**Inlet 2**) collects runoff of  $Q_5=3.1$  and  $Q_{100}=5.3$  cfs, with subsequent by-pass flows in only the 100 year event of 0.7 cfs. Runoff leaving the design point continuing west within the north half of existing Meadowbrook Parkway.

### Design Point 3

**Basin OS-1** consists of approximately 1.40 acres of existing Newt Drive that will be retrofitted with new raised median as part of an intersection conversion to a roundabout. Runoff produced within the basin ( $Q_5=6.5$ ,  $Q_{100}=11.6$  cfs) will combine with flow-by from **DP1** at a proposed public 10' a-grade inlet located at DP3. A proposed public 24 storm sewer (**PR1**) will convey water across the intersection to the existing 42" storm sewer with Meadowbrook Crossings in accordance with that subdivisions drainage report. A new larger manhole may be required to make the connection to the existing line. It is important to note that this connection remains feasible as the roundabout is not anticipated to significantly increase the overall imperviousness of the area above that of the existing condition. Runoff in excess of the inlet capacity ( $Q_5=3.5$  and  $Q_{100}=13.5$  cfs) will continue westward via the curb and gutter of Proposed Meadowbrook Parkway.

← identify the flow-by flow rate.

### Design Point 4

**Basin A** consists of 1.68 acres of the north half of proposed Meadowbrook. Runoff within this basin ( $Q_5=6.5$ ,  $Q_{100}=11.6$  cfs) combines with minor flow by from **DP2**. A proposed 10' sump inlet located at west end of the roadway will prevent developed flows from leaving the roadway corridor. The inlet will convey intercept runoff of 6.5 and 19.1 (split 100 yr flows with DP5) underneath the roadway via a public 24" RCP (**PR2**).

### Design Point 5

**Basin B** consists of 1.49 acres of the south half of proposed Meadowbrook Parkway. Runoff produced within this basin ( $Q_5=5.8$ ,  $Q_{100}=10.4$  cfs) combines with flow-by leaving **DP3**. A proposed public 10' sump inlet located at west end of the roadway will prevent developed flows from leaving exiting the roadway corridor. The intercepted runoff of 9.9 cfs and 19.1 cfs in the 5 and 100 year events respectively will combine with **PR2** flows in a 36" Private storm sewer system (**PR3**). Combined flows within the proposed system are calculated to peak at 16.4 and 38.2 cfs.

### Design Point 6

**Basin C** consists of 4.61 acres of commercial lots (1-5 and portions of lot 6) located along the east side of the site. A private 36" storm drain (**PR4-PR6**) is provided to collect flows of  $Q_5=5.8$  and  $Q_{100}=10.4$  cfs at **DP6** in the 5 and 100 years respectively. Intercepted flows are conveyed west underground within a public access and utility easement.

### Design Point 7

**Basin D** consists of 2.22 acres of commercial lots located between Meadowbrook Parkway and the looped roadway. **Basin D** which includes portions of lot 9 and 10 will require a private 24" storm drain (**PR7**) to collect flows of  $Q_5=9.3$  and  $Q_{100}=17.0$  cfs in the 5 and 100 year storm event.

### Design Points 8 and 9

**Basin E** consists of 2.71 acres of commercial lots and roadway located in the central portion of the site. Two private 10' CDOT Type R at-grade inlets (**Inlets 7 and 8**) located on the north and south will each collect flows approximately 4.8 and 6.9 cfs in the minor and major storm events. Runoff collected from the inlets will be conveyed to the south side of the planned roadway via private 24" (**PR8**) and 30" (**PR9**) storm drains. A proposed 36" storm sewer (**PR10**) will convey flows to the west underground a peak flow rates of 35.0 and 60.5 cfs in the 5 and 100 year events. A drainage easement storm sewer easement may need to be provided along this portion of the alignment depending upon the building setback requirements.

### Design Point 10 and 11

**Basin G** consists of 0.94 acres of commercial lots and roadway located in the central portion of the site. Two private 10' CDOT Type R sump inlets (Inlets 7 and 8) located on the east and west side of the street function to collect the runoff from basin G as well as any by pass flows from Design DP8 and 9. Pipe Run 14 a 42" private storm sewer will direct runoff south underground at peak flow rates of 39.9 cfs and 78.1 cfs in the minor and major storm event.

### Design Point 12

**Basin F** consists of 2.57 acres of commercial lots (lot 8 and portions of lot 7) located along the southern boundary of the site. A private 24" storm drain (**PR15**) is provided to collect flows of  $Q_5=10.8$  and  $Q_{100}=19.6$  cfs at **DP12** in the 5 and 100 years respectively. Intercepted flows are conveyed west underground to the main line. **Pipe Runs 16 and 17** (private 42" storm sewer) direct the collected runoff to the concrete forebay located within the east end of a proposed full spectrum detention pond at peak flow rates of  $Q_5=49.7$  and  $Q_{100}=96.0$  cfs

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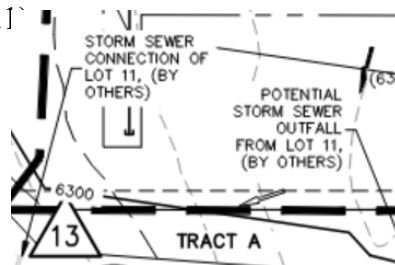
### Design Point 12

**Basin F** consists of 2.57 acres of commercial lots (lot 8 and portions of lot 7) located along the southern boundary of the site. A private 24" storm drain (**PR15**) is provided to collect flows of  $Q_5=10.8$  and  $Q_{100}=19.6$  cfs at **DP12** in the 5 and 100 years respectively. Intercepted flows are conveyed west underground to the main line. **Pipe Runs 16 and 17** (private 42" storm sewer) direct the collected runoff to the concrete forebay located within the east end of a proposed full spectrum detention pond at peak flow rates of  $Q_5=49.7$  and  $Q_{100}=96.0$  cfs

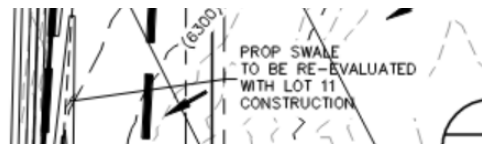
### Design Points 13

**Basin H** consists of 11.07 acres of proposed apartment site (Lot 11). Runoff produced within this basin ( $Q_5=26.2$ ,  $Q_{100}=53.8$  cfs) flows from northeast to southwest until it reaches the proposed public 42" RCP storm sewer at the design point. The cumulative flows at **Design Point 13** are  $Q_5=26.2$  and  $Q_{100}=53.8$  cfs and will be routed to the full spectrum detention pond at **Design Point 15** via **Pipe Run 18** ( $Q_5=42.1$ ,  $Q_{100}=91.1$ )

include a narrative regarding the following notes on the drainage map.



Include a narrative regarding the swale and lot 11 site plan



### Design Points 14

**Basin I** consists of 1.60 acres of proposed apartment site (Lot 11). Runoff produced within this basin ( $Q_5=3.8$ ,  $Q_{100}=7.8$  cfs) flows from north to south and collects in the proposed, grass-lined swale. The cumulative flows at **Design Point 14** are  $Q_5=3.8$  and  $Q_{100}=7.8$  cfs and will be routed to the full spectrum detention pond at **Design Point 15**.

### Design Points 15

**Basin J** consists of 3.21 acres of the proposed full spectrum detention pond. Runoff produced within this basin ( $Q_5=2.3$ ,  $Q_{100}=10.0$  cfs) flows from northeast to southwest, combining with flows from **Design Point 14**, **Pipe Run 17**, and **Pipe Run 18**. This combination of runoff collects in the proposed outlet structure of the pond. The cumulative flows at **Design Point 14** are  $Q_5=95.3$  and  $Q_{100}=199.8$  cfs, and will be routed to the existing 5' bottom earthen swale in CDOT's Right of Way at **Design Point 16** via **Pipe Run 19** ( $Q_5=1.9$ ,  $Q_{100}=8.2$ ).

### Design Points 16

**Basin OS-2** 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 ( $Q_5=8.7$ ,  $Q_{100}=19.6$  cfs) flows from northeast to southwest, combining with flows from **Design Point 15**. This combination of runoff collects in the existing swale in the right of way. The cumulative flows at **Design Point 16** are  $Q_5=9.9$  and  $Q_{100}=27.7$  cfs, which are lower than the historic rates. Flows from this design point continue to downstream infrastructure. A rip rap pad is located at the terminus of the storm sewer.  
**This should be under DP3**

In accordance with the assumptions outlined within the Meadowbrook Subdivision Final Drainage Report an offsite public storm sewer pipe and inlet will be constructed at the southwest corner of the newly constructed roundabout to aid in collecting runoff from the a portion of the offsite watersheds located to the east of the site. A new manhole may be required to connect the outfall to the existing pipe located inside the existing Meadowbrook Subdivision. As the area is already paved increases to the imperviousness of this area are not anticipated and thus should not initiate the need for

### **Water Quality Provisions and Maintenance**

The proposed full spectrum detention (FSD) pond functions to provide detention and water quality for the proposed development. This full spectrum detention pond will function to treat approximately 32.10 acres of tributary area by providing 0.857 acre-feet of storage for the water quality event, 3306 acre feet of storage at the EURV storm event, and 4.729 acre-feet of storage in the 100-year event. The 25' wide emergency spillway is designed with a foot of freeboard in the 100-year event. This spillway safely conveys flows to CDOT's Right of Way in the event of outlet clogging or failure, and will be armored with permanent erosion control fabric. The results show that the FSD pond remains functional in the 100-year event and the outlet structure is able to

update. Missing decimal point.

discharge flows to the to an existing swale and ultimately to Sand Creek. The sizing for the full spectrum detention facility has been determined using the guidelines set forth in the Urban Drainage and Flood Control District Criteria Manual. Refer to the UDFCD MHFD-Detention, Version 4.03, Excel Workbook located within the appendix of this report for calculations.

The proposed FSD pond will be privately owned and maintained by the property owner or the metropolitan district. Access to the pond shall be granted to the owner/district and El Paso County for access and maintenance of the private facility. A private maintenance agreement document shall accompany this report submittal.

### **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 since pre-development grading is being requested. The plan includes proposed silt fence, vehicle traffic control and (4) temporary sediment basins as proposed as erosion control measures. The plan also includes provisions for stockpiling and staging. A stormwater management plan is provided to accompany the plans.

FOFO3600	Fountain Creek	1991*	Fisher's Canyon	\$19,752	\$0
FOFO4000	Fountain Creek	1996	Sand Creek	\$20,387	\$8,339
FOFO4200	Fountain Creek	1977	Spring Creek	\$10,244	\$0
FOFO4600	Fountain Creek	1994*	Southwest Area	\$10,750	\$0

**2021 Drainage & Bridge Fees:**

Update. The unit cost are incorrect for Sand Creek.

x	77.4%	\$	13,775.00	=	\$ 309,513.51
x	77.4%	\$	819.00	=	<u>\$ 18,402.29</u>
<b>Total</b>					<b>\$ 327,915.80</b>

Drainage fees shall be paid at the time of platting.

**Construction Cost Estimate (Non-Reimbursable)**

Item	Amount	Unit	Unit Cost	Total Cost
10' CDOT Type R Inlet	5	EA	\$ 9,890.00	\$ 49,450.00
15' CDOT Type R Inlet	2	EA	\$ 13,002.00	\$ 26,004.00
Type II MH	8	EA	\$ 6,000.00	\$ 48,000.00
18" RCP	181	LF	\$ 69.00	\$ 12,489.00
24" RCP	184	LF	\$ 107.00	\$ 19,688.00
30" RCP	33	LF	\$ 170.00	\$ 5,610.00
42" RCP	746	LF	\$ 306.00	\$ 228,276.00
<b>Total Cost:</b>			<b>\$</b>	<b>389,517.00</b>

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 2020.

↖ revise to 2021

**Summary:**

The construction of this site is for the purposes of creating commercial lots and an apartment site. Currently, no impervious surfaces are being constructed. The site will be graded and all disturbed areas will be seeded and mulched. Post construction runoff will be discharged to downstream property at rates that are below historic discharge rates. In the historic condition, the total flows leaving the site that reach the East Fork Sand Creek Channel are 19.0 cfs and 68.1 cfs in the 5 year and 100 year storm events, respectively. Through the strategic design and placement of storm sewer infrastructure components, this overall rate is reduced to approximately 50% of historic rates at 9.9 and 27.7 cfs in the proposed condition. Erosion control measures will be implemented to prevent sediment migration. The construction of Crossroads Mixed Use shall not adversely affect adjacent or downstream property. Subsequent drainage reports will be required if and when the site is developed behind the uses defined within this report.

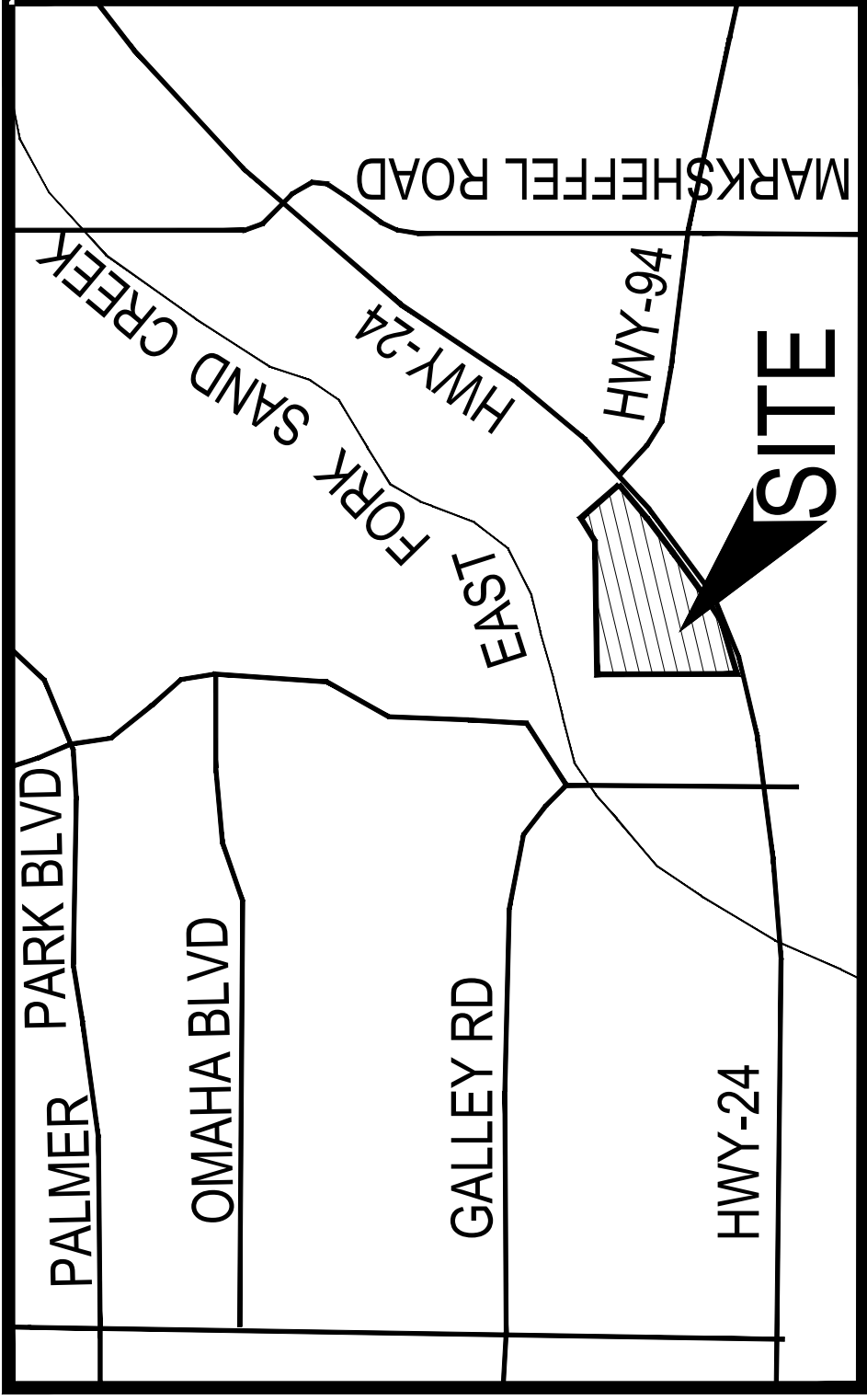
**References:**

- 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 7<sup>th</sup>, 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.

## **APPENDIX**

**VICINITY MAP**





# VICINITY MAP

N.T.S.

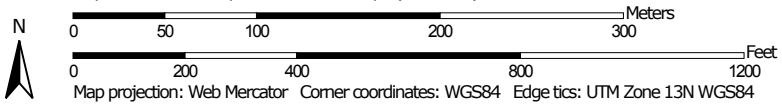
**SOILS MAP**

Soil Map—El Paso County Area, Colorado




Soil Map may not be valid at this scale.

Map Scale: 1:4,120 if printed on A landscape (11" x 8.5") sheet.



## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

### Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

### Water Features



Streams and Canals

### Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

### Background



Aerial Photography

## MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado  
Survey Area Data: Version 15, Oct 10, 2017

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

Date(s) aerial images were photographed: Jun 3, 2014—Jun 17, 2014

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

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	35.2	95.4%
10	Blendon sandy loam, 0 to 3 percent slopes	1.7	4.6%
<b>Totals for Area of Interest</b>		<b>36.9</b>	<b>100.0%</b>

## **FIRM PANELS**



**NOTES TO USERS**

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To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

**Coastal Base Flood Elevations** shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov/> or contact the National Geodetic Survey at the following address:

NGS Information Services  
NOAA, NIMS12  
National Geodetic Survey  
SSMC-3, #9202  
1315 East-West Highway  
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at <http://www.ngs.noaa.gov/>.

**Base Map** information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, City of Fountain, Bureau of Land Management, National Oceanic and Atmospheric Administration, United States Geological Survey, and Anderson Consulting Engineers, Inc. These data are current as of 2006.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

**Corporate limits** shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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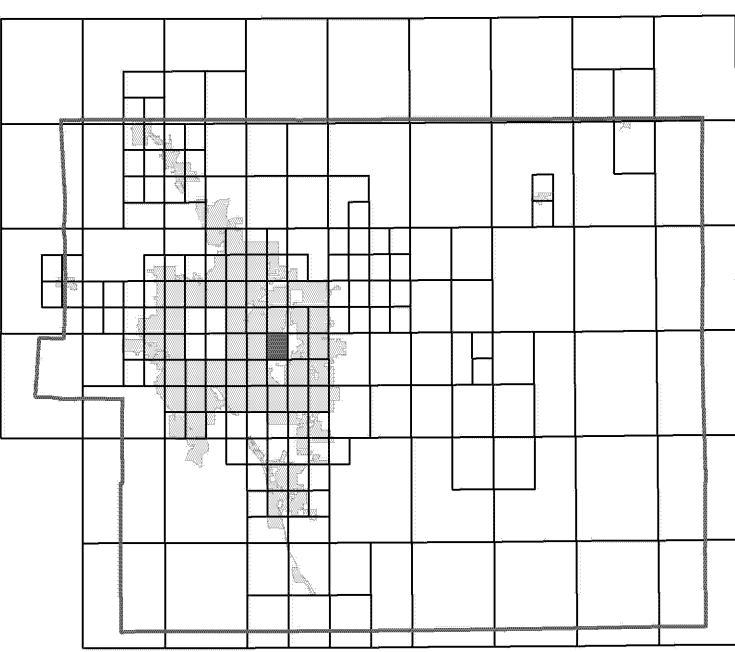
Contact **FEMA Map Service Center (MSC)** via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov/>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/nfp>.

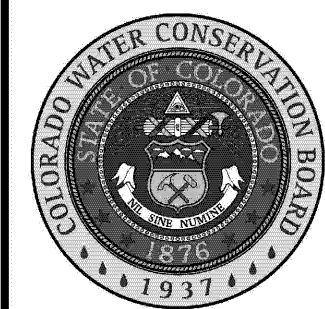
**El Paso County Vertical Datum Offset Table**

Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

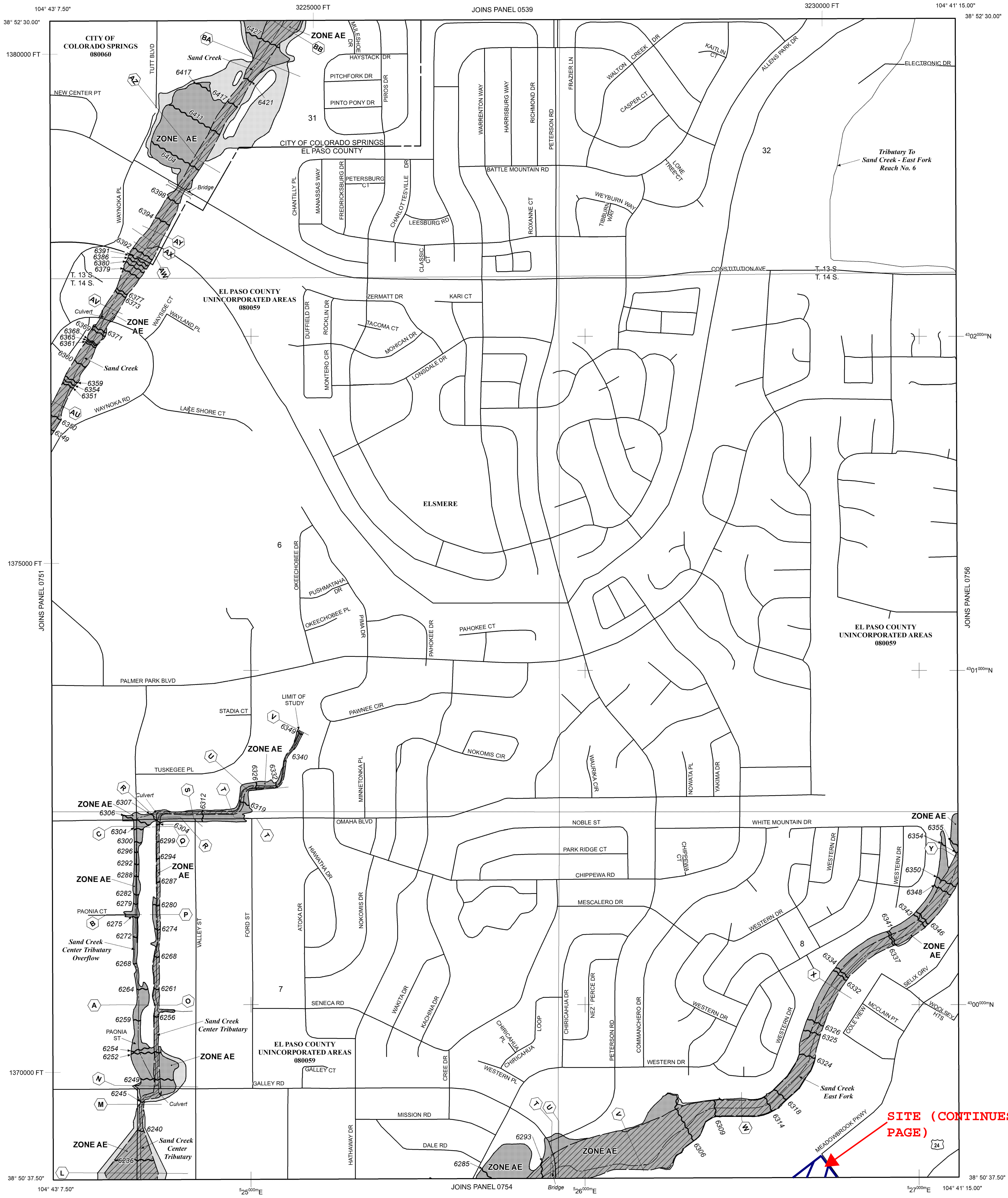
**Panel Location Map**



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).



Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 65 WEST, AND TOWNSHIP 14 SOUTH, RANGE 65 WEST.

**LEGEND**

**SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD**

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, AV, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

**FLOODWAY AREAS IN ZONE AE**  
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

**OTHER FLOOD AREAS**  
**ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot, or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

**OTHER AREAS**  
**ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.  
**ZONE D** Areas in which flood hazards are undetermined, but possible.

**COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**

**OTHERWISE PROTECTED AREAS (OPAs)**

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D Boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Base Flood Elevation line and value; elevation in feet\* (EL 987)
- Base Flood Elevation value where uniform within zone; elevation in feet\*

\* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transsect line

97° 07' 30.00" 32° 22' 30.00" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

42°55'00"N 1000-meter Universal Transverse Mercator grid ticks, zone 13

6000000 FT 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection

DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 River Mile

MAP REPOSITORIES Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP MARCH 17, 1997

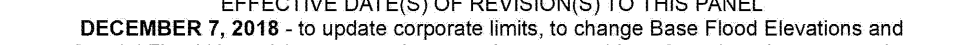
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'



**NFIP**

**PANEL 0752G**

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**FIRM**

**FLOOD INSURANCE RATE MAP**

**EL PASO COUNTY, COLORADO AND INCORPORATED AREAS**

**PANEL 752 OF 1300**

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:	COMMUNITY	NUMBER	PANEL	SUFFIX
	COLORADO SPRINGS, CITY OF	08060	0752	G
	EL PASO COUNTY	08059	0752	G

Notice: This map was released on 06/15/2020 to make a correction. This version replaces any previous versions. See the Notice to User Letter that accompanied this correction for details.

Notice to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance applications for the subject community.

**MAP NUMBER**  
**08041C0752G**

**MAP REVISED**  
**DECEMBER 7, 2018**

Federal Emergency Management Agency

SITE (CONTINUES ON NEXT PAGE)



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Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

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NGS Information Services  
NOAA, NUNCS12  
National Geodetic Survey  
SSMC-3, #9202  
1315 East-West Highway  
Silver Spring, MD 20910-3282

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Contact **FEMA Map Service Center (MSC)** via the FEMA Map Information eXchange (FIRM) 1-877-338-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov/>.

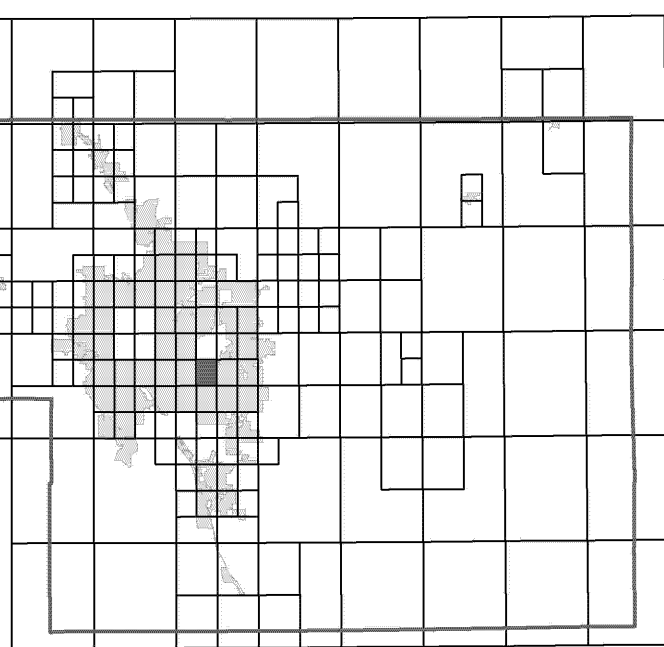
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP (1-877-338-2627)** or visit the FEMA website at <http://www.fema.gov/business/nfp>.

**El Paso County Vertical Datum Offset Table**

Flooding Source	Vertical Datum Offset (ft)

REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

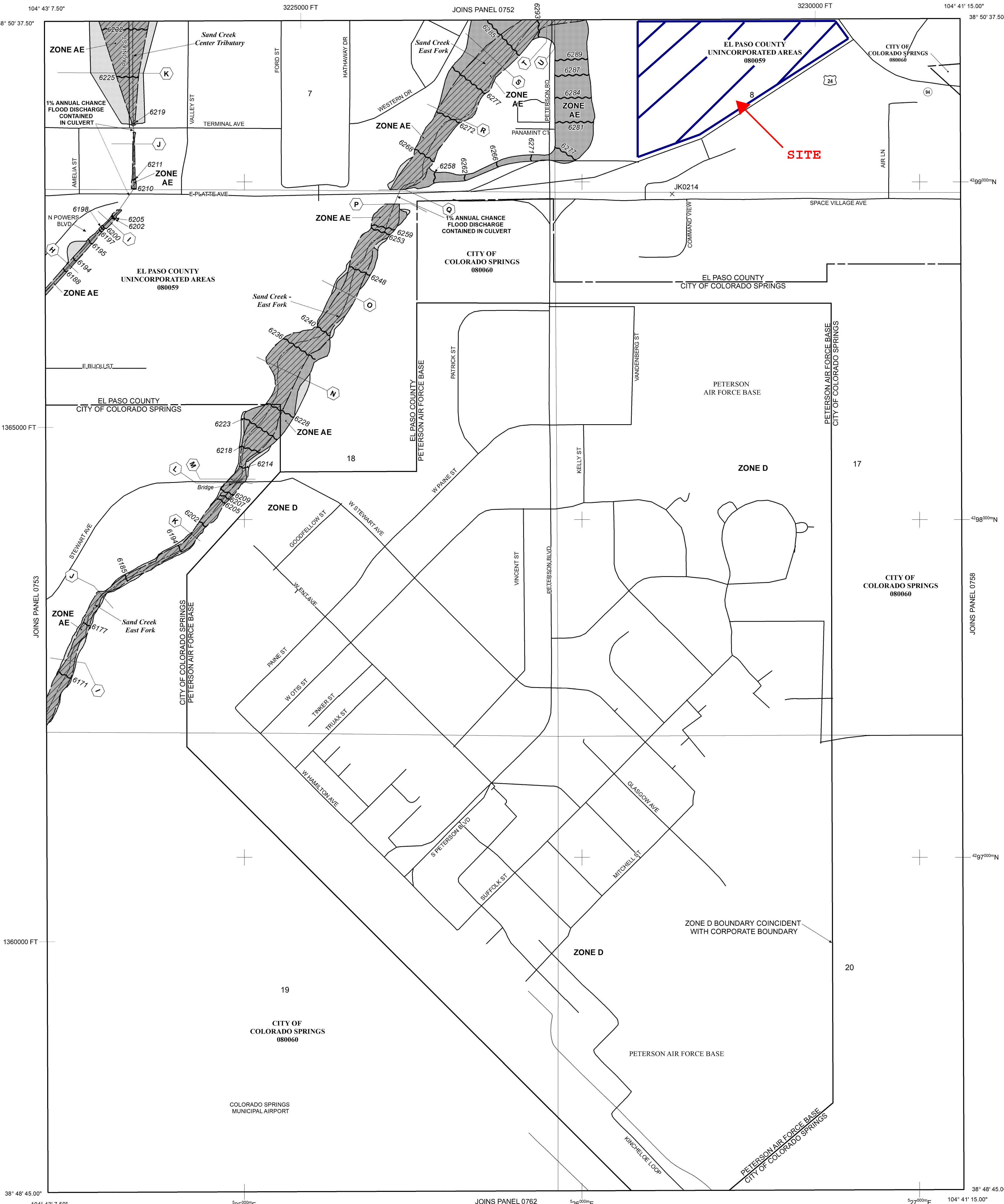
**Panel Location Map**



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).



Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 14 SOUTH, RANGE 65 WEST.

**LEGEND**

**SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD**

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

**FLOODWAY AREAS IN ZONE AE**  
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

**OTHER FLOOD AREAS**  
**ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot, or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

**OTHER AREAS**

**ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.

**ZONE D** Areas in which flood hazards are undetermined, but possible.

**COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**

**OTHERWISE PROTECTED AREAS (OPAs)**

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D Boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

**513** Base Flood Elevation line and value; elevation in feet\* (EL 987)  
Base Flood Elevation value where uniform within zone; elevation in feet\*

\* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

**A** Cross section line

**23** Transsect line

97° 07' 30.00" 22° 22' 30.00" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

4295000N 1000-meter Universal Transverse Mercator grid ticks, zone 13

6000000 FT 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection

**DX5510** Bench mark (see explanation in Notes to Users section of this FIRM panel)

**M1.5** River Mile

**MAP REPOSITORIES** Refer to Map Repositories list on Map Index

**EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP** MARCH 17, 1997

**EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL** DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

**MAP SCALE 1" = 500'**

250 0 500 1000 FEET  
150 0 150 300 METERS

**PANEL 0754G**

**FIRM**  
**FLOOD INSURANCE RATE MAP**  
**EL PASO COUNTY, COLORADO AND INCORPORATED AREAS**

**PANEL 754 OF 1300**  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:	COMMUNITY	NUMBER	PANEL	SUFFIX
	COLORADO SPRINGS, CITY OF	08060	0754	G
	EL PASO COUNTY	08059	0754	G

Notice: This map was released on 05/15/2020 to make a correction. This version replaces any previous versions. See the Notice-to-User Letter that accompanied this correction for details.

Notice to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance applications for the subject community.

**MAP NUMBER**  
**08041C0754G**

**MAP REVISED**  
**DECEMBER 7, 2018**  
Federal Emergency Management Agency



## **HYDROLOGIC CALCULATIONS**

***Crossroads Mixed Use***  
***PRELIMINARY DRAINAGE REPORT***  
***(Historic Area Runoff Coefficient Summary)***

BASIN	TOTAL AREA (SF)	TOTAL AREA (Acres)	STREETS / DEVELOPED			OVERLAND / DEVELOPED			WEIGHTED	
			AREA (Acres)	C <sub>5</sub>	C <sub>100</sub>	AREA (Acres)	C <sub>5</sub>	C <sub>100</sub>	C <sub>5</sub>	C <sub>100</sub>
<i>C</i>	256383.3	5.89	0.00	0.90	0.96	5.89	0.08	0.35	<b><i>0.08</i></b>	<b><i>0.35</i></b>
<i>A</i>	561176.6	12.88	0.00	0.90	0.96	12.88	0.08	0.35	<b><i>0.08</i></b>	<b><i>0.35</i></b>
<i>B</i>	593693.4	13.63	0.00	0.90	0.96	13.63	0.08	0.35	<b><i>0.08</i></b>	<b><i>0.35</i></b>
<i>OS-1</i>	55560.16	1.28	1.28	0.90	0.96	0.00	0.08	0.35	<b><i>0.90</i></b>	<b><i>0.96</i></b>
<i>OS-2</i>	216993.7	4.98	2.49	0.90	0.96	2.49	0.08	0.35	<b><i>0.49</i></b>	<b><i>0.66</i></b>
<i>EX-A2***</i>		0.59	0.59	0.90	0.96	0.00	0.08	0.35	<b><i>0.90</i></b>	<b><i>0.96</i></b>
<i>OS-A**</i>		1.29	1.29	0.62	0.72	0.00	0.08	0.35	<b><i>0.62</i></b>	<b><i>0.72</i></b>
<i>E2*</i>		3.86	3.86	0.80	0.90	0.00	0.08	0.35	<b><i>0.80</i></b>	<b><i>0.90</i></b>

\*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

**Crossroads Mixed Use**  
**PRELIMINARY DRAINAGE REPORT**  
**(Historic Area Drainage Summary)**

From Area Runoff Coefficient Summary				OVERLAND				STREET / CHANNEL FLOW				Time of Travel (T <sub>t</sub> )		INTENSITY ^		TOTAL FLOWS	
BASIN	AREA TOTAL (Acres)	C <sub>5</sub>	C <sub>100</sub>	C <sub>5</sub>	Length (ft)	Height (ft)	T <sub>c</sub> (min)	Length (ft)	Slope (%)	Velocity (fps)	T <sub>t</sub> (min)	TOTAL (min)	CHECK (min)	I <sub>5</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>5</sub> (c.f.s.)	Q <sub>100</sub> (c.f.s.)
		From DCM Table 5-1															
<i>C</i>	5.89	0.08	0.35	0.08	300	9	22.2	500	2.0%	1.0	8.4	30.6	14.4	2.5	4.1	1.2	8.5
<i>A</i>	12.88	0.08	0.35	0.08	300	13	19.7	1350	1.6%	0.9	25.2	44.8	19.2	1.9	3.2	1.9	14.2
<i>B</i>	13.63	0.08	0.35	0.08	300	11	20.8	750	1.7%	0.9	13.7	34.5	15.8	2.3	3.8	2.5	18.2
<i>OS-1</i>	1.28	0.90	0.96	0.90	100	3	2.5	490	2.2%	3.0	2.8	5.3	13.3	5.1	8.5	5.8	10.5
<i>OS-2</i>	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
<i>EX-A2***</i>	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
<i>OS-A**</i>	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
<i>E2*</i>	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

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

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

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

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

Calculated by: CVW  
Date: 2/23/2021  
Checked by: DLM

**Crossroads Mixed Use**  
**PRELIMINARY DRAINAGE REPORT**  
**(Historic Basin Routing Summary)**

From Area Runoff Coefficient Summary				OVERLAND				PIPE / CHANNEL FLOW				Time of Travel (T <sub>t</sub> )		INTENSITY *		TOTAL FLOWS		COMMENTS
DESIGN POINT	CONTRIBUTING BASINS	CA <sub>5</sub>	CA <sub>100</sub>	C <sub>s</sub>	Length (ft)	Height (ft)	T <sub>c</sub> (min)	Length (ft)	Slope (%)	Velocity (fps)	T <sub>t</sub> (min)	TOTAL (min)	I <sub>5</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>5</sub> (c.f.s.)	Q <sub>100</sub> (c.f.s.)		
1	E2 EX-A2	3.09	3.47				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	
		0.53	0.57															
		3.62	4.04	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	
		See Area Drainage Sheet for Input																
3	OS-1 FB-DP1	1.15	1.22				11.6	150	1.0%	2.0	1.3	12.8	3.8	6.3	9.8	22.5	END OF PAVEMENT	
		1.47	2.35															
		2.62	3.57	Tc for DP1 Used														
4	A FB-INDP5 DP3	1.03	4.51				12.8	1470	1.6%	0.9	28.0	40.8	2.0	3.4	7.4	27.7	ADJACENT PARCEL (LOT 1)	
		0.00	0.10															
		2.62	3.57															
		3.65	8.19	Tc for DP3 Used														
5	B	1.09	4.77									34.5	2.3	3.8	8.3	18.2	ADJACENT PARCEL (LOT 2)	
		See Area Drainage Sheet for Input																
6	C	0.47	2.06									30.6	2.5	4.1	1.2	8.5	DISCHARGE TO CDOT ROW	
		See Area Drainage Sheet for Input																
7	OS2 DP6	2.44	3.26									14.5	3.6	6.0	10.4	31.9	BARROW DITCH SW CORNER OF SITE/CDOT ROW	
		0.47	2.06															
		2.91	5.32	Tc for OS2 Used														

Calculated by: CVW \_\_\_\_\_  
Date: 2/23/2021 \_\_\_\_\_  
Checked by: DLM \_\_\_\_\_

***Crossroads Mixed Use  
PRELIMINARY DRAINAGE REPORT  
(Existing Area Runoff Coefficient Summary)***

BASIN	TOTAL AREA (SF)	TOTAL AREA (Acres)	STREETS / DEVELOPED			OVERLAND / DEVELOPED			WEIGHTED	
			AREA (Acres)	C <sub>5</sub>	C <sub>100</sub>	AREA (Acres)	C <sub>5</sub>	C <sub>100</sub>	C <sub>5</sub>	C <sub>100</sub>
<i>C</i>	173960	3.99	0.00	0.90	0.96	5.89	0.08	0.35	<b>0.08</b>	<b>0.35</b>
<i>A</i>	480166.8	11.02	0.00	0.90	0.96	11.02	0.08	0.35	<b>0.08</b>	<b>0.35</b>
<i>B</i>	754121.6	17.31	0.00	0.90	0.96	17.31	0.08	0.35	<b>0.08</b>	<b>0.35</b>
<i>OS-1</i>	55560.16	1.28	1.28	0.90	0.96	0.00	0.08	0.35	<b>0.90</b>	<b>0.96</b>
<i>OS-2</i>	216993.7	4.98	2.49	0.90	0.96	2.49	0.08	0.35	<b>0.49</b>	<b>0.66</b>
<i>EX-A2***</i>		0.59	0.59	0.90	0.96	0.00	0.08	0.35	<b>0.90</b>	<b>0.96</b>
<i>OS-A**</i>		1.29	1.29	0.62	0.72	0.00	0.08	0.35	<b>0.62</b>	<b>0.72</b>
<i>E2*</i>		3.86	3.86	0.80	0.90	0.00	0.08	0.35	<b>0.80</b>	<b>0.90</b>

\*FROM FDR FOR CLAREMONT BUSINESS PARK FILING NO. 2

\*\*FROM TO FDR MEADOWBROOK CROSSING FILING 1 AND FILING 2

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

**Crossroads Mixed Use**  
**PRELIMINARY DRAINAGE REPORT**  
**(Existing Area Drainage Summary)**

From Area Runoff Coefficient Summary				OVERLAND				STREET / CHANNEL FLOW				Time of Travel ( $T_t$ )		INTENSITY ^		TOTAL FLOWS	
BASIN	AREA TOTAL (Acres)	$C_5$	$C_{100}$	$C_5$	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.)
		From DCM Table 5-1															
<i>C</i>	3.99	0.08	0.35	0.08	120	2.8	15.3	555	1.5%	0.9	10.6	25.9	13.8	2.7	4.5	0.9	6.3
<i>A</i>	11.02	0.08	0.35	0.08	165	8	13.8	1730	1.3%	0.8	36.3	50.1	20.5	1.7	2.9	1.5	11.1
<i>B</i>	17.31	0.08	0.35	0.08	300	3	30.9	1390	1.2%	0.8	29.7	60.6	19.4	1.4	2.4	2.0	14.5
<i>OS-1</i>	1.28	0.90	0.96	0.90	100	3	2.5	490	2.2%	3.0	2.8	5.3	13.3	5.1	8.5	5.8	10.5
<i>OS-2</i>	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
<i>EX-A2***</i>	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
<i>OS-A**</i>	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
<i>E2*</i>	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

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

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

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

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

Calculated by: CVW \_\_\_\_\_

Date: 2/23/2021 \_\_\_\_\_

Checked by: DLM \_\_\_\_\_

**Crossroads Mixed Use**  
**PRELIMINARY DRAINAGE REPORT**  
**(Existing Basin Routing Summary)**

From Area Runoff Coefficient Summary				OVERLAND				PIPE / CHANNEL FLOW				Time of Travel (T <sub>t</sub> )		INTENSITY *		TOTAL FLOWS		COMMENTS
DESIGN POINT	CONTRIBUTING BASINS	CA <sub>5</sub>	CA <sub>100</sub>	C <sub>s</sub>	Length (ft)	Height (ft)	T <sub>c</sub> (min)	Length (ft)	Slope (%)	Velocity (fps)	T <sub>t</sub> (min)	TOTAL (min)	I <sub>5</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>5</sub> (c.f.s.)	Q <sub>100</sub> (c.f.s.)		
1	E2 EX-A2	3.09	3.47				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	
		0.53	0.57															
		3.62	4.04	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	
		See Area Drainage Sheet for Input																
3	OS-1 FB-DP1	1.15	1.22				11.6	150	1.0%	2.0	1.3	12.8	3.8	6.3	9.8	22.5	END OF PAVEMENT	
		1.47	2.35															
		2.62	3.57	Tc for DP1 Used														
4	A FB-DP2 DP3	0.88	3.86				12.8	1470	1.6%	0.9	28.0	40.8	2.0	3.4	7.1	25.5	ADJACENT PARCEL (LOT 1)	
		0.00	0.10															
		2.62	3.57															
		3.50	7.54	Tc for DP3 Used														
5	B	1.38	6.06									60.6	1.4	2.4	5.0	14.5	ADJACENT PARCEL (LOT 2)	
		See Area Drainage Sheet for Input																
6	C	0.32	1.40									25.9	2.7	4.5	0.9	6.3	DISCHARGE TO CDOT ROW	
		See Area Drainage Sheet for Input																
7	OS2 DP6	2.44	3.26									14.5	3.6	6.0	9.9	28.0	BARROW DITCH SW CORNER OF SITE/CDOT ROW	
		0.32	1.40															
		2.76	4.66	Tc for OS2 Used														

Calculated by: CVW \_\_\_\_\_  
Date: ##### \_\_\_\_\_  
Checked by: DLM \_\_\_\_\_

**CROSSROADS MIXED USE**  
**PRELIMINARY DRAINAGE CALCULATIONS**  
*(Area Runoff Coefficient Summary)*

BASIN	TOTAL AREA (Sq Ft)	TOTAL AREA (Acres)	STREETS / COMMERC.			MULTI-FAMILY/PARKLAND			OVERLAND / UNDEVELOPED			WEIGHTED	
			AREA (Acres)	C <sub>5</sub>	C <sub>100</sub>	AREA (Acres)	C <sub>5</sub>	C <sub>100</sub>	AREA (Acres)	C <sub>5</sub>	C <sub>100</sub>	C <sub>5</sub>	C <sub>100</sub>
<b>PROPOSED BASINS</b>													
<i>OS-A**</i>		1.29	1.29	0.62	0.72	0.00	0.49	0.62	0.00	0.08	0.35	<b>0.62</b>	<b>0.72</b>
<i>E2*</i>		3.86	3.86	0.80	0.90	0.00	0.49	0.62	0.00	0.08	0.35	<b>0.80</b>	<b>0.90</b>
<i>EX-A2***</i>		0.59	0.59	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	<b>0.90</b>	<b>0.96</b>
<i>OS-1</i>	<b>60793.3017</b>	1.40	1.40	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	<b>0.90</b>	<b>0.96</b>
<i>OS-2</i>	<b>216993.7096</b>	4.98	2.49	0.90	0.96	0.00	0.49	0.62	2.49	0.08	0.35	<b>0.49</b>	<b>0.66</b>
<i>A</i>	<b>72967.0787</b>	1.68	1.68	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	<b>0.90</b>	<b>0.96</b>
<i>B</i>	<b>65021.9778</b>	1.49	1.49	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	<b>0.90</b>	<b>0.96</b>
<i>C</i>	<b>200631.5748</b>	4.61	4.46	0.81	0.88	0.00	0.49	0.62	0.15	0.08	0.35	<b>0.79</b>	<b>0.86</b>
<i>D</i>	<b>96773.7602</b>	2.22	2.22	0.81	0.88	0.00	0.49	0.62	0.00	0.08	0.35	<b>0.81</b>	<b>0.88</b>
<i>E</i>	<b>118133.5827</b>	2.71	0.48	0.90	0.96	2.23	0.81	0.88	0.00	0.08	0.35	<b>0.83</b>	<b>0.89</b>
<i>F</i>	<b>112036.6061</b>	2.57	2.57	0.81	0.88	0.00	0.49	0.62	0.00	0.08	0.35	<b>0.81</b>	<b>0.88</b>
<i>G</i>	<b>40937.4999</b>	0.94	0.94	0.90	0.96	0.00	0.49	0.62	0.00	0.08	0.35	<b>0.90</b>	<b>0.96</b>
<i>H</i>	<b>482081.5171</b>	11.07	0.00	0.90	0.96	11.07	0.54	0.66	0.00	0.08	0.35	<b>0.54</b>	<b>0.66</b>
<i>I</i>	<b>69600.2016</b>	1.60	0.00	0.90	0.96	1.60	0.54	0.66	0.00	0.08	0.35	<b>0.54</b>	<b>0.66</b>
<i>J</i>	<b>139924.2472</b>	3.21	0.00	0.90	0.96	3.21	0.16	0.41	0.00	0.08	0.35	<b>0.16</b>	<b>0.41</b>



# CROSSROADS MIXED USE PRELIMINARY DRAINAGE REPORT (Area Drainage Summary)

<i>From Area Runoff Coefficient Summary</i>				<b>OVERLAND</b>				<b>STREET / CHANNEL FLOW</b>				<b>Time of Travel (T<sub>t</sub>)</b>		<b>INTENSITY #</b>		<b>TOTAL FLOWS</b>	
BASIN	AREA TOTAL (Acres)	C <sub>5</sub>	C <sub>100</sub>	C <sub>5</sub>	Length (ft)	Height (ft)	T <sub>C</sub> (min)	Length (ft)	Slope (%)	Velocity (fps)	T <sub>t</sub> (min)	TOTAL (min)	CHECK (min)	I <sub>5</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>5</sub> (c.f.s.)	Q <sub>100</sub> (c.f.s.)
		<small>From DCM Table S-1</small>															
<b>Proposed Area Drainage Summary</b>																	
<b>OS-A**</b>	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
<b>E2*</b>	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
<b>EX-A2***</b>	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
<b>OS-1</b>	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
<b>OS-2</b>	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
<b>A</b>	1.68	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>B</b>	1.49	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	10.4
<b>C</b>	4.61	0.79	0.86	0.79	50	1	3.2	260	1.5%	2.4	1.4	5.0	11.7	5.2	8.7	18.7	34.5
<b>D</b>	2.22	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	17.0
<b>E</b>	2.71	0.83	0.89	0.83	60	1.2	3.0	700	1.0%	2.0	3.8	6.9	14.2	4.7	7.9	10.5	19.1
<b>F</b>	2.57	0.81	0.88	0.81	50	0.8	3.2	300	1.3%	2.3	1.6	5.0	11.9	5.2	8.7	10.8	19.6
<b>G</b>	0.94	0.90	0.96	0.90	50	1	2.0	500	1.0%	2.0	2.7	5.0	13.1	5.2	8.7	4.4	7.8
<b>H</b>	11.07	0.54	0.66	0.54	50	1	5.7	500	1.5%	2.4	2.7	8.4	13.1	4.4	7.4	26.2	53.8
<b>I</b>	1.60	0.54	0.66	0.54	50	1	5.7	500	1.5%	2.4	2.7	8.4	13.1	4.4	7.4	3.8	7.8
<b>J</b>	3.21	0.16	0.41	0.16	50	2	7.6	0	0.0%	0.0	0.0	7.6	10.3	4.5	7.6	2.3	10.0

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

Calculated by: DLM

Date: 2/21/2021

Checked by: VAS

\*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

## CROSSROADS MIXED USE PRELIMINARY DRAINAGE REPORT (Basin Routing Summary)

From Area Runoff Coefficient Summary				OVERLAND				PIPE / CHANNEL FLOW				Time of Travel (T <sub>t</sub> )	INTENSITY *		TOTAL FLOWS		COMMENTS
DESIGN POINT	CONTRIBUTING BASINS	CA <sub>5</sub>	CA <sub>100</sub>	C <sub>s</sub>	Length (ft)	Height (ft)	T <sub>c</sub> (min)	Length (ft)	Slope (%)	Velocity (fps)	T <sub>t</sub> (min)	TOTAL (min)	I <sub>5</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>5</sub> (c.f.s.)	Q <sub>100</sub> (c.f.s.)	
<b>PROPOSED DRAINAGE BASIN ROUTING SUMMARY</b>																	
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)
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)
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	Proposed 10' CDOT Type R At-Grade Inlet (Public)
4	A, FB-DP2 (100 YR SPLIT FLOWS)	1.51	1.71									8.9	4.3	7.2	6.5	19.1	Proposed 10' CDOT Type R Sump Inlet (Public)
5	B, FB-DP3 (100YR SPLIT FLOWS)	2.29	3.57									8.9	4.3	7.2	9.9	19.1	Proposed 10' CDOT Type R Sump Inlet (Public)
6	C	3.62	3.98									5.0	5.2	8.7	18.7	34.5	Proposed 30" RCP or PP Storm Sewer (Private)
7	D	1.80	1.96									5.0	5.2	8.7	9.3	17.0	Proposed 24" RCP or PP Storm Sewer (Private)
8	1/2 E	1.12	1.21									6.9	4.7	7.9	5.2	9.5	Proposed 10' CDOT Type R At-Grade Inlet (Private)
9	1/2 E	1.12	1.21									6.9	4.7	7.9	5.2	9.5	Proposed 10' CDOT Type R At-Grade Inlet (Private)
10	1/2 G (100 YR SPLIT FLOWS)	0.42	0.45									6.9	4.7	7.9	2.0	8.8	Proposed 10' CDOT Type R Sump Inlet (Private)
11	1/2 G FB-DP8/9 (100 YR SPLIT FLOWS)	0.61	0.45									6.9	4.7	7.9	2.9	8.8	Proposed 10' CDOT Type R Sump Inlet (Private)
12	F	2.08	2.26									5.0	5.2	8.7	10.8	19.6	Proposed 30" RCP or PP Storm Sewer (Private)
13	H	5.98	7.30									8.4	4.4	7.4	26.2	53.8	Proposed 36" RCP or PP Storm Sewer (Private)
14	I	0.86	1.05									8.4	4.4	7.4	3.8	7.8	Proposed Grasslined Swale (Private)
15	J, DP14, PR17, PR 18	21.74	27.15									8.4	4.4	7.4	95.3	199.8	Full Spectrum Extended Detention Basin (Private)
16	POND OUTFALL OS-2	2.78	4.61									14.5	3.6	6.0	9.9	27.7	HISTORIC FLOW IN CDOT BARROW DITCH Q5= 10.4 CFS, Q100 = 31.9 CFS PER HISTORIC DRAINAGE ANALYSIS

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

Calculated by: DLM  
Date: 2/24/2021  
Checked by: VAS

**CROSSROADS MIXED USE  
PRELIMINARY DRAINAGE CALCULATIONS  
(Storm Sewer Routing Summary)**

PIPE RUN	Contributing Pipes/Design Points	Equivalent CA <sub>5</sub>	Equivalent CA <sub>100</sub>	Maximum T <sub>C</sub>	Intensity*		Flow		PIPE SIZE
					I <sub>5</sub>	I <sub>100</sub>	Q <sub>5</sub>	Q <sub>100</sub>	
1	INLET 3	1.78	1.55	12.8	3.8	6.3	6.7	9.8	18" SD
2	INLET 4	1.51	2.64	8.9	4.3	7.2	6.5	19.1	24" SD
3	PR2, INLET 5	3.79	5.28	8.9	4.3	7.2	16.4	38.2	36" SD
4	DP6	3.62	3.98	5.0	5.2	8.7	18.7	34.5	36" SD
5	PR4	3.62	3.98	5.0	5.2	8.7	18.7	34.5	36" SD
6	PR5	3.62	3.98	5.0	5.2	8.7	18.7	34.5	36" SD
7	DP7	1.80	1.96	5.0	5.2	8.7	9.3	17.0	24" SD
8	PR7, INLET 6	2.82	2.83	6.9	4.7	7.9	13.2	22.3	24" SD
9	PR8, INLET 7	3.85	3.71	6.9	4.7	7.9	18.0	29.2	30" SD
10	PR6, PR9	7.47	7.68	6.9	4.7	7.9	35.0	60.5	36" SD
11	PR10	7.47	7.68	6.9	4.7	7.9	35.0	60.5	36" SD
12	INLET 8	0.42	1.12	6.9	4.7	7.9	2.0	8.8	18" SD
13	INLET 9	0.61	1.12	6.9	4.7	7.9	2.9	8.8	18" SD
14	PR11, PR12, PR13	8.51	9.93	6.9	4.7	7.9	39.9	78.1	42" SD
15	DP12	2.08	2.26	5.0	5.2	8.7	10.8	19.6	24" SD
16	PR14, PR15	10.59	12.19	6.9	4.7	7.9	49.7	96.0	42" SD
17	PR16	10.59	12.19	6.9	4.7	7.9	49.7	96.0	42" SD
18	PR3, DP13	9.77	12.58	8.9	4.3	7.2	42.1	91.1	42" SD
19	POND OUTFALL	PER	MHFD	WKSHT			1.2	8.2	18" SD

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

DP - Design Point

EX - Existing Design Point

FB- Flow By from Design Point

INT- Intercepted Flow from Design Point

Calculated by: DLM

Date: 2/24/2021

Checked by: VAS

<b>Weighted Percent Imperviousness of WQ Pond 1</b>				
<b>Contributing Basins</b>	<b>Area (Acres)</b>	<b>C<sub>s</sub></b>	<b>Impervious % (I)</b>	<b>(Acres)*(I)</b>
<i>A</i>	1.68	0.90	100	167.51
<i>B</i>	1.49	0.90	100	149.27
<i>C</i>	4.61	0.79	93	428.35
<i>D</i>	2.22	0.81	95	211.05
<i>E</i>	2.71	0.83	96	260.35
<i>F</i>	2.57	0.81	95	244.34
<i>G</i>	0.94	0.90	100	93.98
<i>H</i>	11.07	0.54	75	830.03
<i>I</i>	1.60	0.54	75	119.84
<i>J</i>	3.21	0.16	7	22.49
<b>Totals</b>	<b>32.10</b>			<b>2527.20</b>
<b>Imperviousness of WQ Pond 1</b>	<b>78.7</b>	<b>%</b>		

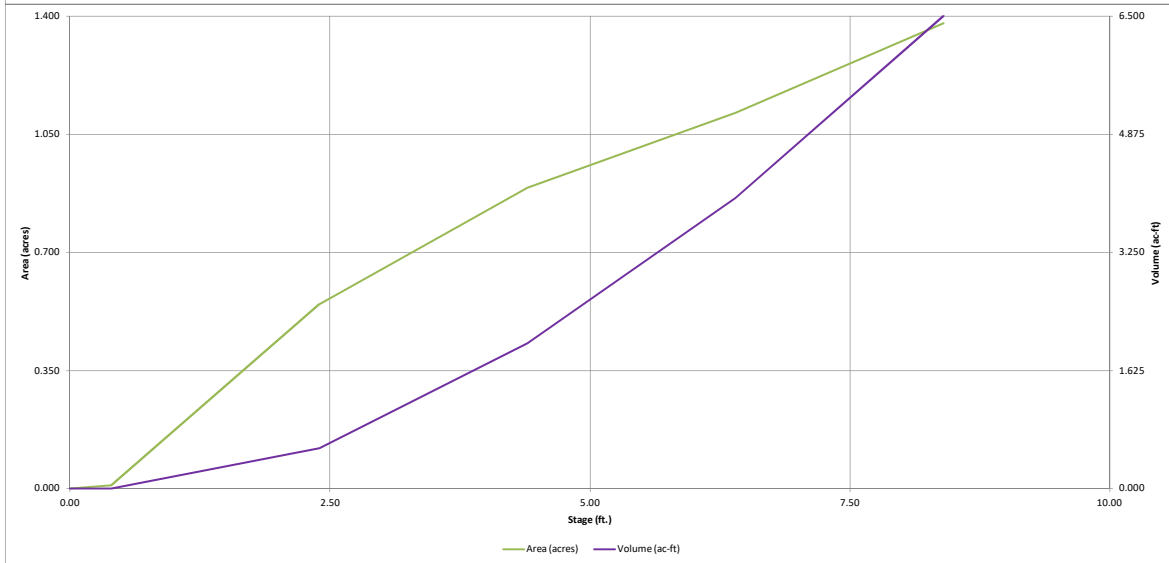
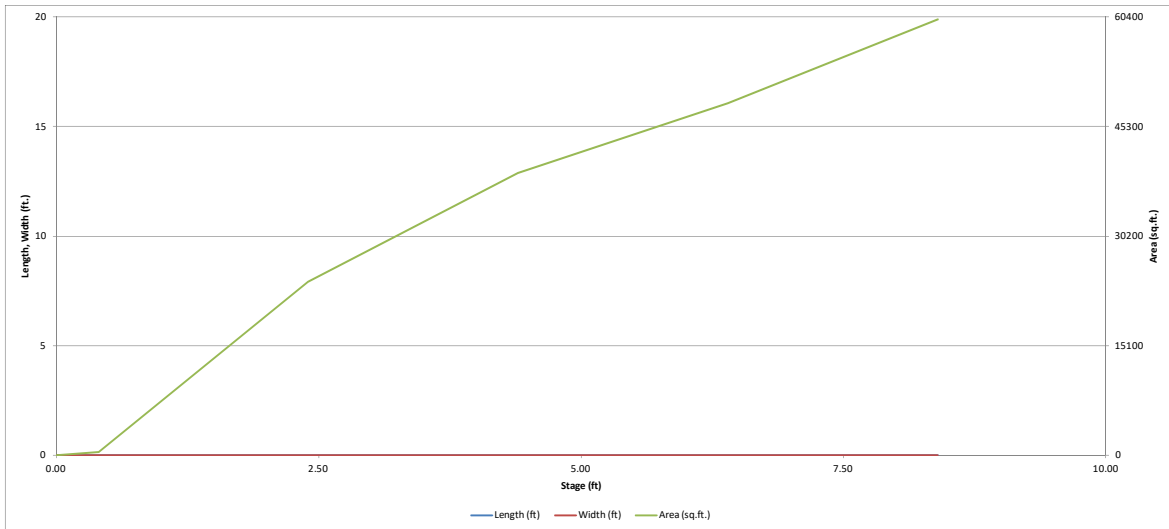
## **HYDRAULIC CALCULATIONS**

NOTICE: Staff is only providing cursory review of the hydraulic calculations with the preliminary plan. Detailed review will be conducted with the Final Drainage Report.



# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

*MHFD-Detention, Version 4.03 (May 2020)*

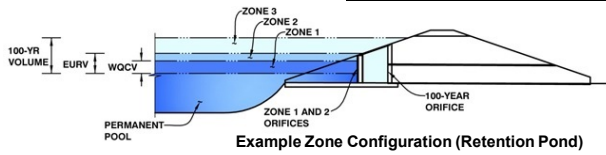


# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD- Detention, Version 4.03 (May 2020)

**Project:** \_\_\_\_\_

**Basin ID:** \_\_\_\_\_



**Example Zone Configuration (Retention Pond)**

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.91	0.857	Orifice Plate
Zone 2 (EURV)	5.76	2.449	Orifice Plate
Zone 3 (100-year)	7.03	1.424	Weir&Pipe (Restrict)
<b>Total (all zones)</b>		<b>4.729</b>	

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

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

**Calculated Parameters for Underdrain**  
 Underdrain Orifice Area =  ft<sup>2</sup>  
 Underdrain Orifice Centroid =  feet

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

Invert of Lowest Orifice =  ft (relative to basin bottom at Stage = 0 ft)  
 Depth at top of Zone using Orifice Plate =  ft (relative to basin bottom at Stage = 0 ft)  
 Orifice Plate: Orifice Vertical Spacing =  inches  
 Orifice Plate: Orifice Area per Row =  inches

**Calculated Parameters for Plate**  
 WQ Orifice Area per Row =  ft<sup>2</sup>  
 Elliptical Half-Width =  feet  
 Elliptical Slot Centroid =  feet  
 Elliptical Slot Area =  ft<sup>2</sup>

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.92	3.84					
Orifice Area (sq. inches)	4.66	4.66	12.20					

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

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

	Not Selected	Not Selected	
Invert of Vertical Orifice =	<input type="text" value="N/A"/>	<input type="text" value="N/A"/>	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	<input type="text" value="N/A"/>	<input type="text" value="N/A"/>	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	<input type="text" value="N/A"/>	<input type="text" value="N/A"/>	inches

**Calculated Parameters for Vertical Orifice**

	Not Selected	Not Selected	
Vertical Orifice Area =	<input type="text" value="N/A"/>	<input type="text" value="N/A"/>	ft <sup>2</sup>
Vertical Orifice Centroid =	<input type="text" value="N/A"/>	<input type="text" value="N/A"/>	feet

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

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.90	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	4.00	N/A	feet
Overflow Weir Gate Slope =	3.00	N/A	H:V
Horiz. Length of Weir Sides =	2.91	N/A	feet
Overflow Gate Open Area % =	70%	N/A	%, gate open area/total area
Debris Clogging % =	50%	N/A	%

**Calculated Parameters for Overflow Weir**

	Zone 3 Weir	Not Selected	
Height of Gate Upper Edge, H <sub>1</sub> =	6.87	N/A	feet
Overflow Weir Slope Length =	3.07	N/A	feet
Gate Open Area / 100-yr Orifice Area =	13.51	N/A	
Overflow Gate Open Area w/o Debris =	8.59	N/A	ft <sup>2</sup>
Overflow Gate Open Area w/ Debris =	4.29	N/A	ft <sup>2</sup>

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.25	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	7.00		inches

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

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	0.64	N/A	ft <sup>2</sup>
Outlet Orifice Centroid =	0.34	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.35	N/A	radians

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

Spillway Invert Stage =	7.25	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	25.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

**Calculated Parameters for Spillway**

Spillway Design Flow Depth =	0.98	feet
Stage at Top of Freeboard =	9.23	feet
Basin Area at Top of Freeboard =	1.38	acres
Basin Volume at Top of Freeboard =	6.50	acre-ft

**Routed Hydrograph Results**

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

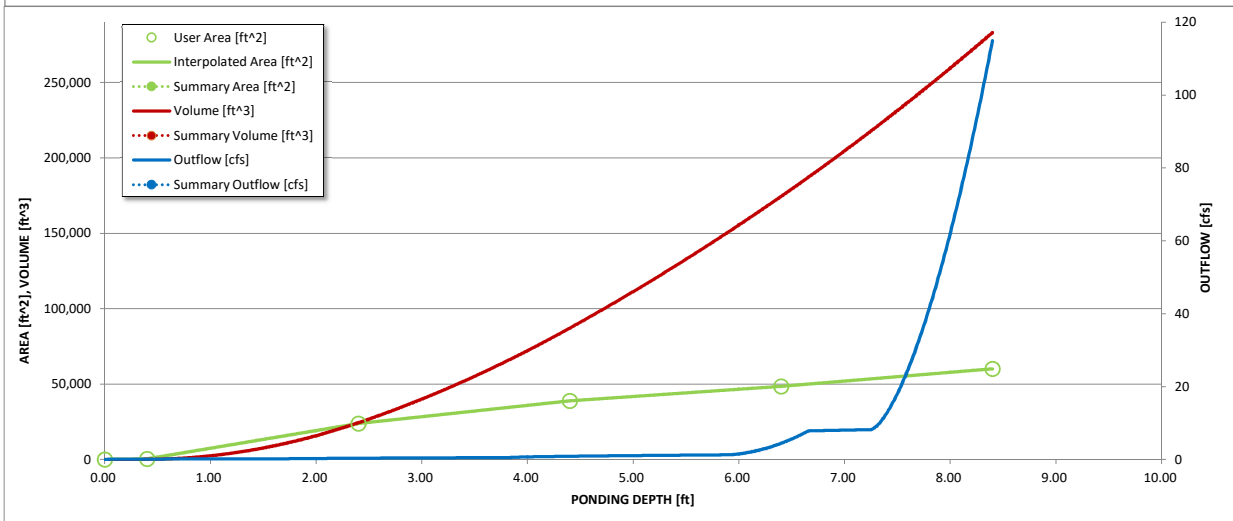
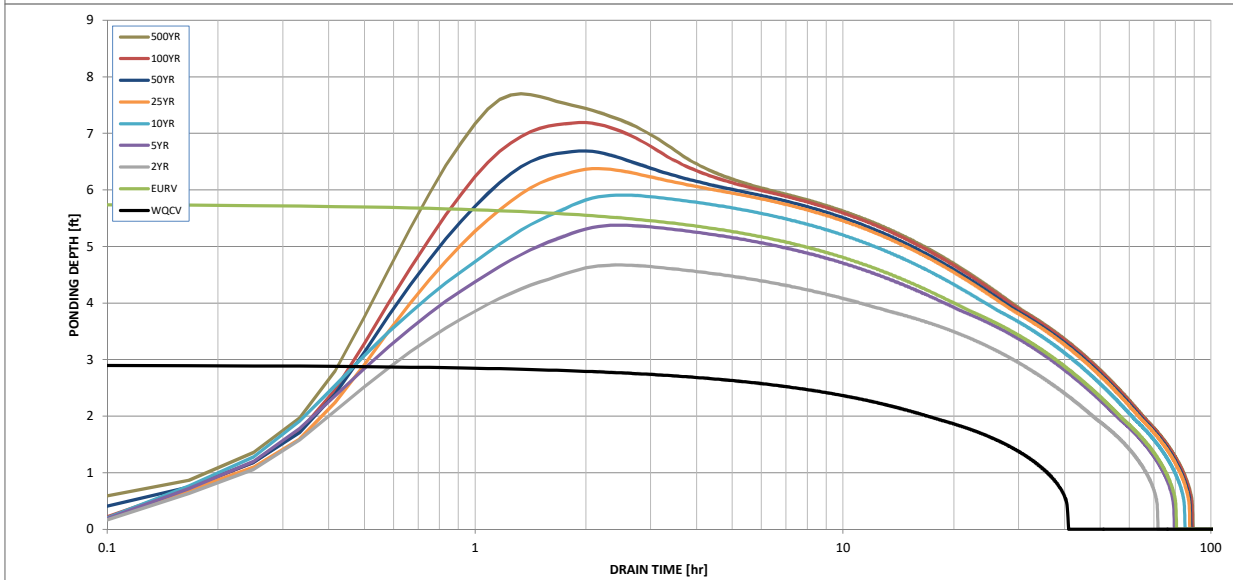
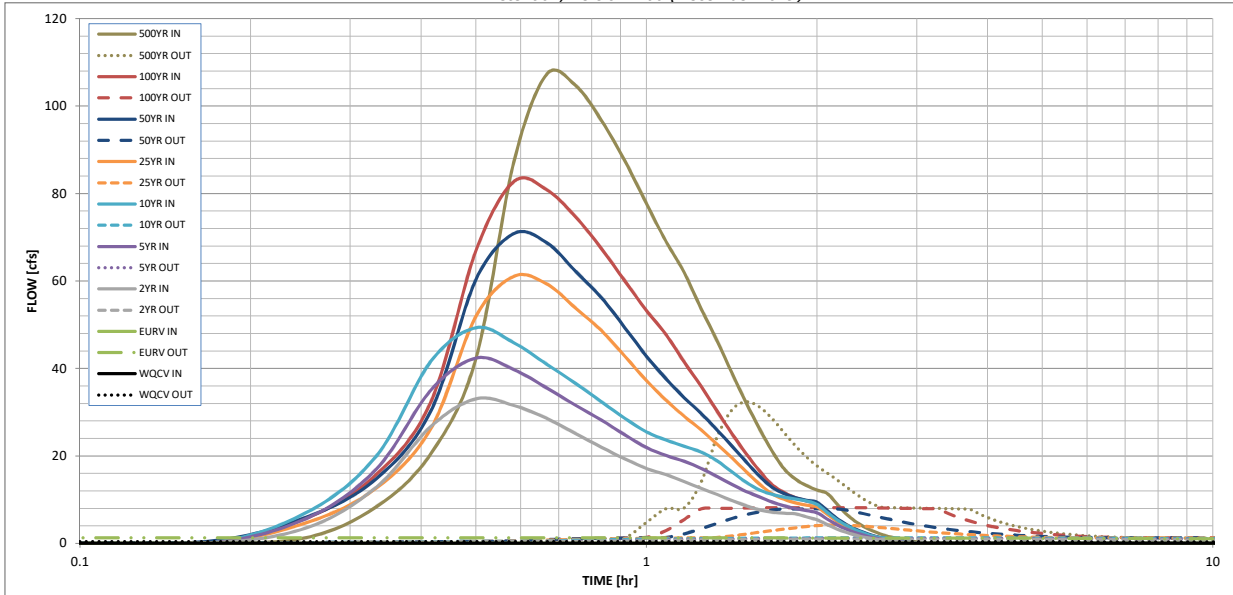
	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =									
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	0.857	3.306	2.394	3.107	3.679	4.353	5.011	5.779	7.477
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	2.394	3.107	3.679	4.353	5.011	5.779	7.477
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.2	0.3	0.4	4.0	8.1	13.5	24.8
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.00	0.01	0.01	0.13	0.25	0.42	0.77
Peak Inflow Q (cfs) =	N/A	N/A	33.0	42.4	48.3	61.1	70.9	82.7	107.3
Peak Outflow Q (cfs) =	0.4	1.2	1.0	1.2	1.3	4.2	7.9	8.2	32.3
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	3.7	2.9	1.0	1.0	0.6	1.3
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	N/A	8.0	0.3	0.7	0.8	0.8
Max Velocity through Gate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	72	66	72	76	77	77	76	73
Time to Drain 99% of Inflow Volume (hours) =	40	77	69	77	81	84	84	84	83
Maximum Ponding Depth (ft) =	2.91	5.76	4.67	5.38	5.91	6.38	6.69	7.19	7.70
Area at Maximum Ponding Depth (acres) =	0.64	1.04	0.92	1.00	1.06	1.11	1.15	1.22	1.29
Maximum Volume Stored (acre-ft) =	0.861	3.315	2.244	2.917	3.462	3.971	4.322	4.914	5.552

Revise. Must be at or below predevelopment. Unresolved.



# DETENTION BASIN OUTLET STRUCTURE DESIGN

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



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

# DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: \_\_\_\_\_

## Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.04	1.24
	0:15:00	0.00	0.00	3.44	5.59	6.92	4.65	5.86	5.67	8.32
	0:20:00	0.00	0.00	12.78	16.91	19.91	12.60	14.73	15.68	20.52
	0:25:00	0.00	0.00	26.73	35.08	41.65	26.31	30.33	32.40	42.15
	0:30:00	0.00	0.00	33.01	42.36	49.32	51.87	60.30	66.84	87.16
	0:35:00	0.00	0.00	31.50	39.75	45.90	61.06	70.86	82.69	107.26
	0:40:00	0.00	0.00	28.56	35.55	40.98	59.34	68.80	80.85	104.71
	0:45:00	0.00	0.00	25.08	31.57	36.59	53.77	62.23	74.62	96.69
	0:50:00	0.00	0.00	21.95	28.17	32.36	48.63	56.17	67.37	87.45
	0:55:00	0.00	0.00	19.27	24.80	28.59	42.77	49.30	59.91	77.73
	1:00:00	0.00	0.00	17.09	21.92	25.50	37.24	42.84	53.26	69.04
	1:05:00	0.00	0.00	15.69	20.09	23.63	32.75	37.62	47.72	61.90
	1:10:00	0.00	0.00	14.09	18.74	22.22	29.04	33.31	41.43	53.62
	1:15:00	0.00	0.00	12.53	17.12	20.86	25.93	29.66	35.88	46.28
	1:20:00	0.00	0.00	11.15	15.26	18.89	22.66	25.87	30.24	38.88
	1:25:00	0.00	0.00	9.80	13.45	16.32	19.52	22.23	25.05	32.12
	1:30:00	0.00	0.00	8.57	11.86	14.01	16.40	18.64	20.55	26.27
	1:35:00	0.00	0.00	7.62	10.63	12.22	13.58	15.38	16.61	21.13
	1:40:00	0.00	0.00	7.10	9.45	11.20	11.35	12.81	13.45	17.04
	1:45:00	0.00	0.00	6.86	8.58	10.58	10.07	11.35	11.63	14.70
	1:50:00	0.00	0.00	6.71	7.96	10.14	9.25	10.42	10.49	13.20
	1:55:00	0.00	0.00	6.04	7.49	9.66	8.72	9.82	9.70	12.18
	2:00:00	0.00	0.00	5.37	6.98	8.92	8.33	9.38	9.14	11.44
	2:05:00	0.00	0.00	4.28	5.60	7.14	6.72	7.56	7.26	9.07
	2:10:00	0.00	0.00	3.28	4.28	5.46	5.11	5.75	5.44	6.78
	2:15:00	0.00	0.00	2.52	3.28	4.17	3.89	4.37	4.10	5.10
	2:20:00	0.00	0.00	1.92	2.49	3.15	2.95	3.31	3.11	3.87
	2:25:00	0.00	0.00	1.45	1.87	2.35	2.22	2.49	2.34	2.91
	2:30:00	0.00	0.00	1.08	1.37	1.74	1.64	1.84	1.75	2.17
	2:35:00	0.00	0.00	0.79	0.99	1.28	1.20	1.34	1.29	1.60
	2:40:00	0.00	0.00	0.57	0.72	0.95	0.90	1.01	0.96	1.20
	2:45:00	0.00	0.00	0.39	0.50	0.67	0.64	0.72	0.69	0.85
	2:50:00	0.00	0.00	0.24	0.33	0.43	0.43	0.48	0.46	0.57
	2:55:00	0.00	0.00	0.13	0.20	0.25	0.26	0.29	0.28	0.34
3:00:00	0.00	0.00	0.06	0.10	0.12	0.13	0.14	0.14	0.17	
3:05:00	0.00	0.00	0.02	0.03	0.04	0.04	0.05	0.05	0.06	
3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

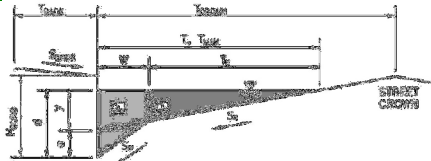


**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**

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

Project: \_\_\_\_\_  
 Inlet ID: \_\_\_\_\_ **Crossroads Mixed Use Existing Inlets**

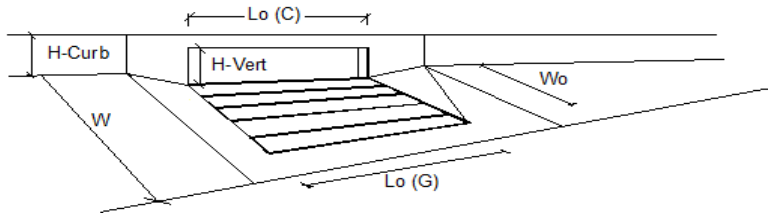
INLET 1



<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 14.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.020$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 26.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_X = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = 0.010$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> <tr> <td style="text-align: center; padding: 2px;">20.0</td> <td style="text-align: center; padding: 2px;">26.0</td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	20.0	26.0	
Minor Storm	Major Storm	ft					
20.0	26.0						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">inches</th> </tr> <tr> <td style="text-align: center; padding: 2px;">6.0</td> <td style="text-align: center; padding: 2px;">12.0</td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	6.0	12.0	
Minor Storm	Major Storm	inches					
6.0	12.0						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input type="checkbox"/> check = yes						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>WARNING: MINOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'</b>							
<b>Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'</b>							
$Q_{allow} =$	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">cfs</th> </tr> <tr> <td style="text-align: center; padding: 2px;">13.8</td> <td style="text-align: center; padding: 2px;">32.7</td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	13.8	32.7	
Minor Storm	Major Storm	cfs					
13.8	32.7						

## INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



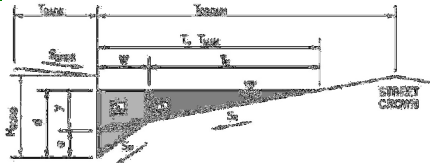
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: WARNING: Q &gt; ALLOWABLE Q FOR MINOR STORM!</b>			
Total Inlet Interception Capacity	8.4	11.1	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	5.8	15.4	cfs
Capture Percentage = $Q_c/Q_o$ =	59	42	%

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

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

Project: \_\_\_\_\_  
 Inlet ID: \_\_\_\_\_ **Crossroads Mixed Use Existing Inlets**

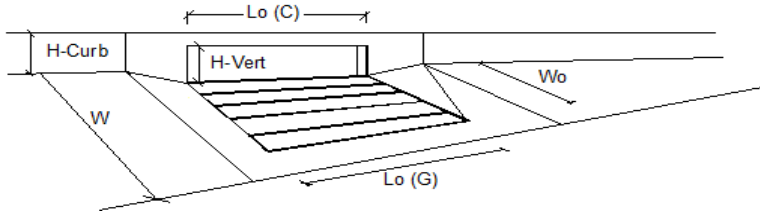
**INLET 2**



<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 14.0$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.020$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 26.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_X = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = 0.010$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> <tr> <td style="text-align: center; padding: 2px;">20.0</td> <td style="text-align: center; padding: 2px;">26.0</td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	20.0	26.0	
Minor Storm	Major Storm	ft					
20.0	26.0						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">inches</th> </tr> <tr> <td style="text-align: center; padding: 2px;">6.0</td> <td style="text-align: center; padding: 2px;">12.0</td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	6.0	12.0	
Minor Storm	Major Storm	inches					
6.0	12.0						
Allow Flow Depth at Street Crown (leave blank for no)	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="padding: 2px;">check = yes</td> </tr> </table>	<input type="checkbox"/>	<input type="checkbox"/>	check = yes			
<input type="checkbox"/>	<input type="checkbox"/>	check = yes					
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Spread Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">cfs</th> </tr> <tr> <td style="text-align: center; padding: 2px;">13.8</td> <td style="text-align: center; padding: 2px;">32.7</td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	13.8	32.7	
Minor Storm	Major Storm	cfs					
13.8	32.7						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							

## INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018

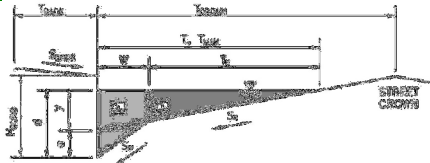


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	3.1	5.3	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	0.7	cfs
Capture Percentage = $Q_i/Q_c$ =	100	88	%

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

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

Project: \_\_\_\_\_  
 Inlet ID: \_\_\_\_\_ **Crossroads Mixed Use**  
Inlet 3

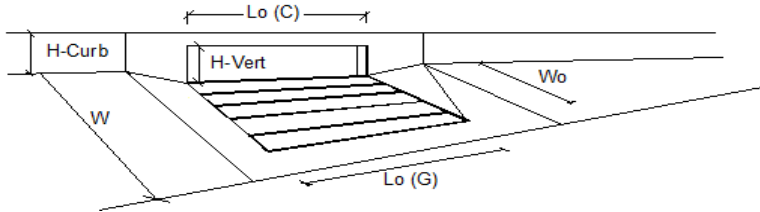


<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="7.5"/> ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/>						
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="27.0"/> ft						
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="1.00"/> ft						
Street Transverse Slope	$S_X = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = $ <input style="width: 50px;" type="text" value="0.005"/> ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.016"/>						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> <tr> <td style="padding: 2px;"><math>T_{MAX} = </math> <input style="width: 50px;" type="text" value="22.8"/></td> <td style="padding: 2px;"><input style="width: 50px;" type="text" value="27.0"/></td> <td style="padding: 2px;"></td> </tr> </table>	Minor Storm	Major Storm	ft	$T_{MAX} = $ <input style="width: 50px;" type="text" value="22.8"/>	<input style="width: 50px;" type="text" value="27.0"/>	
Minor Storm	Major Storm	ft					
$T_{MAX} = $ <input style="width: 50px;" type="text" value="22.8"/>	<input style="width: 50px;" type="text" value="27.0"/>						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">inches</th> </tr> <tr> <td style="padding: 2px;"><math>d_{MAX} = </math> <input style="width: 50px;" type="text" value="6.0"/></td> <td style="padding: 2px;"><input style="width: 50px;" type="text" value="12.0"/></td> <td style="padding: 2px;"></td> </tr> </table>	Minor Storm	Major Storm	inches	$d_{MAX} = $ <input style="width: 50px;" type="text" value="6.0"/>	<input style="width: 50px;" type="text" value="12.0"/>	
Minor Storm	Major Storm	inches					
$d_{MAX} = $ <input style="width: 50px;" type="text" value="6.0"/>	<input style="width: 50px;" type="text" value="12.0"/>						
Allow Flow Depth at Street Crown (leave blank for no)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 2px;"><input type="checkbox"/></td> <td style="padding: 2px;"><input type="checkbox"/></td> <td style="padding: 2px;">check = yes</td> </tr> </table>	<input type="checkbox"/>	<input type="checkbox"/>	check = yes			
<input type="checkbox"/>	<input type="checkbox"/>	check = yes					
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Spread Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'	$Q_{allow} = $ <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">cfs</th> </tr> <tr> <td style="padding: 2px;"><input style="width: 50px;" type="text" value="13.8"/></td> <td style="padding: 2px;"><input style="width: 50px;" type="text" value="24.4"/></td> <td style="padding: 2px;"></td> </tr> </table>	Minor Storm	Major Storm	cfs	<input style="width: 50px;" type="text" value="13.8"/>	<input style="width: 50px;" type="text" value="24.4"/>	
Minor Storm	Major Storm	cfs					
<input style="width: 50px;" type="text" value="13.8"/>	<input style="width: 50px;" type="text" value="24.4"/>						
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							



## INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018

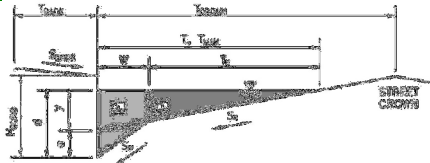


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	6.7	9.8	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	3.5	13.5	cfs
Capture Percentage = $Q_i/Q_c$ =	65	42	%

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

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

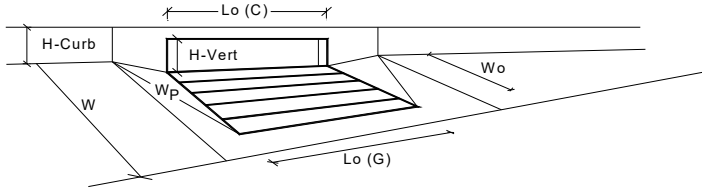
Project: \_\_\_\_\_  
 Inlet ID: \_\_\_\_\_ **Crossroads Mixed Use** **Inlet 4**



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	$T_{CROWN} = 26.0$ ft																
Gutter Width	$W = 2.00$ ft																
Street Transverse Slope	$S_X = 0.020$ ft/ft																
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = 0.083$ ft/ft																
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = 0.000$ ft/ft																
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$																
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> <th></th> </tr> </thead> <tbody> <tr> <td><math>T_{MAX} =</math></td> <td>20.8</td> <td>26.0</td> <td>ft</td> </tr> <tr> <td><math>d_{MAX} =</math></td> <td>6.0</td> <td>12.0</td> <td>inches</td> </tr> <tr> <td></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td></td> </tr> </tbody> </table>		Minor Storm	Major Storm		$T_{MAX} =$	20.8	26.0	ft	$d_{MAX} =$	6.0	12.0	inches		<input type="checkbox"/>	<input type="checkbox"/>	
	Minor Storm	Major Storm															
$T_{MAX} =$	20.8	26.0	ft														
$d_{MAX} =$	6.0	12.0	inches														
	<input type="checkbox"/>	<input type="checkbox"/>															
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm																	
Check boxes are not applicable in SUMP conditions																	
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>																	
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>	<table border="1"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> <th></th> </tr> </thead> <tbody> <tr> <td><math>Q_{allow} =</math></td> <td>SUMP</td> <td>SUMP</td> <td>cfs</td> </tr> </tbody> </table>		Minor Storm	Major Storm		$Q_{allow} =$	SUMP	SUMP	cfs								
	Minor Storm	Major Storm															
$Q_{allow} =$	SUMP	SUMP	cfs														

## INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



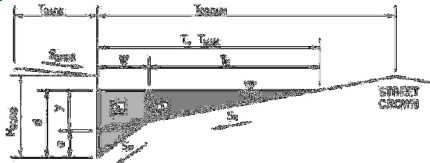
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	6.0	12.0	inches
<b>Grate Information</b>	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>	MINOR	MAJOR	
Length of a Unit Curb Opening	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	0.79	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>	MINOR	MAJOR	
<b>Q<sub>a</sub></b>	<b>9.7</b>	<b>39.1</b>	<b>cfs</b>
Q <sub>PEAK REQUIRED</sub>	6.5	19.1	cfs

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

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

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

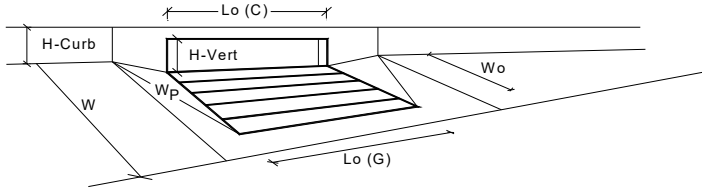
Project: \_\_\_\_\_  
 Inlet ID: \_\_\_\_\_ **Crossroads Mixed Use** **Inlet 5**



<b>Gutter Geometry (Enter data in the blue cells)</b>																	
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	$T_{CROWN} = 26.0$ ft																
Gutter Width	$W = 2.00$ ft																
Street Transverse Slope	$S_X = 0.020$ ft/ft																
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = 0.083$ ft/ft																
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = 0.000$ ft/ft																
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$																
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"></th> <th style="width: 50%; text-align: center;">Minor Storm</th> <th style="width: 50%; text-align: center;">Major Storm</th> <th style="width: 50%;"></th> </tr> </thead> <tbody> <tr> <td><math>T_{MAX} =</math></td> <td style="text-align: center;">20.8</td> <td style="text-align: center;">26.0</td> <td style="text-align: right;">ft</td> </tr> <tr> <td><math>d_{MAX} =</math></td> <td style="text-align: center;">6.0</td> <td style="text-align: center;">12.0</td> <td style="text-align: right;">inches</td> </tr> <tr> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> </tbody> </table>		Minor Storm	Major Storm		$T_{MAX} =$	20.8	26.0	ft	$d_{MAX} =$	6.0	12.0	inches		<input type="checkbox"/>	<input type="checkbox"/>	
	Minor Storm	Major Storm															
$T_{MAX} =$	20.8	26.0	ft														
$d_{MAX} =$	6.0	12.0	inches														
	<input type="checkbox"/>	<input type="checkbox"/>															
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm																	
Check boxes are not applicable in SUMP conditions																	
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>																	
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>																	
$Q_{allow} =$	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"></th> <th style="width: 50%; text-align: center;">Minor Storm</th> <th style="width: 50%; text-align: center;">Major Storm</th> <th style="width: 50%;"></th> </tr> </thead> <tbody> <tr> <td></td> <td style="text-align: center;">SUMP</td> <td style="text-align: center;">SUMP</td> <td style="text-align: right;">cfs</td> </tr> </tbody> </table>		Minor Storm	Major Storm			SUMP	SUMP	cfs								
	Minor Storm	Major Storm															
	SUMP	SUMP	cfs														

## INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



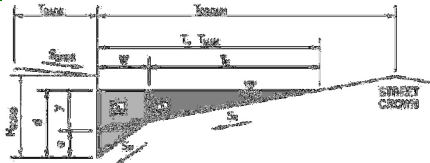
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	6.0	12.0	inches
<b>Grate Information</b>	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>	MINOR	MAJOR	
Length of a Unit Curb Opening	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.34	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	0.79	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>	MINOR	MAJOR	
<b>Q<sub>a</sub></b>	9.9	39.1	cfs
<b>Q<sub>PEAK REQUIRED</sub></b>	9.9	19.1	cfs

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

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

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

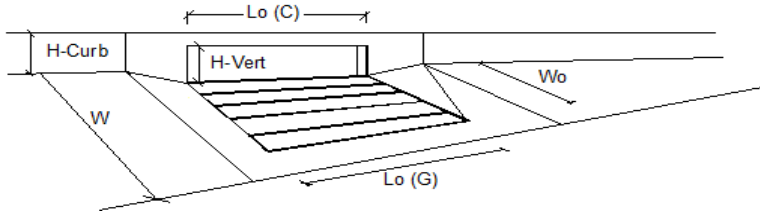
Project: \_\_\_\_\_  
 Inlet ID: \_\_\_\_\_ **Crossroads Mixed Use**  
Inlet 6



<b>Gutter Geometry (Enter data in the blue cells)</b>							
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	$T_{CROWN} = 14.5$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_X = 0.020$ ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = 0.083$ ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = 0.020$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> <tr> <td style="text-align: center; padding: 2px;">14.0</td> <td style="text-align: center; padding: 2px;">14.0</td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	14.0	14.0	
Minor Storm	Major Storm	ft					
14.0	14.0						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">inches</th> </tr> <tr> <td style="text-align: center; padding: 2px;">4.4</td> <td style="text-align: center; padding: 2px;">12.0</td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	4.4	12.0	
Minor Storm	Major Storm	inches					
4.4	12.0						
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input type="checkbox"/> check = yes						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Spread Criterion</b>							
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'							
<b>Q<sub>allow</sub></b>	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">cfs</th> </tr> <tr> <td style="text-align: center; padding: 2px;">6.4</td> <td style="text-align: center; padding: 2px;">9.6</td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	6.4	9.6	
Minor Storm	Major Storm	cfs					
6.4	9.6						

## INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018

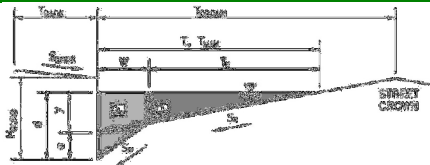


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: OK - Q &lt; Allowable Street Capacity</b>			
Total Inlet Interception Capacity	4.8	6.9	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.4	2.6	cfs
Capture Percentage = $Q_i/Q_c$ =	93	73	%

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

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

Project: \_\_\_\_\_  
 Inlet ID: \_\_\_\_\_ **Crossroads Mixed Use** **Inlet 7**

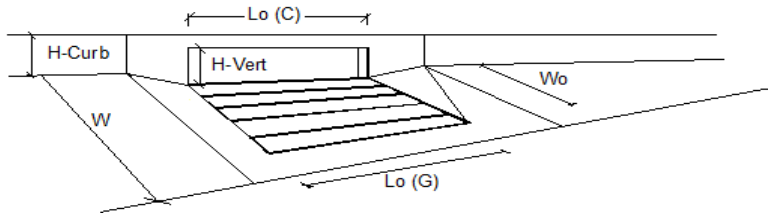


<b>Gutter Geometry (Enter data in the blue cells)</b>							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 7.5$ ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.020$						
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	$S_O = 0.010$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">ft</th> </tr> <tr> <td style="text-align: center;">14.0</td> <td style="text-align: center;">14.0</td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	14.0	14.0	
Minor Storm	Major Storm	ft					
14.0	14.0						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">inches</th> </tr> <tr> <td style="text-align: center;">4.4</td> <td style="text-align: center;">12.0</td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	4.4	12.0	
Minor Storm	Major Storm	inches					
4.4	12.0						
Allow Flow Depth at Street Crown (leave blank for no)	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>check = yes</td> </tr> </table>	<input type="checkbox"/>	<input type="checkbox"/>	check = yes			
<input type="checkbox"/>	<input type="checkbox"/>	check = yes					
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Spread Criterion</b>							
<b>WARNING: MINOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'</b>							
<b>WARNING: MAJOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'</b>							
$Q_{allow} =$	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> <th style="padding: 2px;">cfs</th> </tr> <tr> <td style="text-align: center;">4.6</td> <td style="text-align: center;">6.8</td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	4.6	6.8	
Minor Storm	Major Storm	cfs					
4.6	6.8						



## INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018

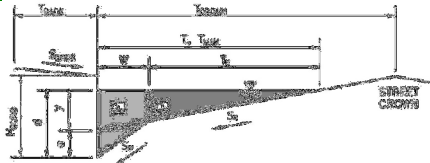


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
<b>Street Hydraulics: WARNING: Q &gt; ALLOWABLE Q FOR MINOR &amp; MAJOR STORM</b>			
Total Inlet Interception Capacity	4.8	6.9	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.4	2.6	cfs
Capture Percentage = $Q_c/Q_o$ =	92	72	%

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

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

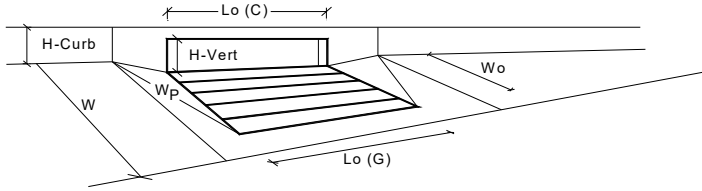
Project: \_\_\_\_\_  
 Inlet ID: \_\_\_\_\_ **Crossroads Mixed Use** **Inlet 8**



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)	$n_{STREET} = 0.016$						
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>ft</th> </tr> <tr> <td><math>T_{MAX} = 14.0</math></td> <td><math>T_{MAX} = 14.0</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	$T_{MAX} = 14.0$	$T_{MAX} = 14.0$	
Minor Storm	Major Storm	ft					
$T_{MAX} = 14.0$	$T_{MAX} = 14.0$						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>inches</th> </tr> <tr> <td><math>d_{MAX} = 4.4</math></td> <td><math>d_{MAX} = 12.0</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	inches	$d_{MAX} = 4.4$	$d_{MAX} = 12.0$	
Minor Storm	Major Storm	inches					
$d_{MAX} = 4.4$	$d_{MAX} = 12.0$						
Check boxes are not applicable in SUMP conditions	<table border="1"> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/>	<input type="checkbox"/>						
<b>MINOR STORM Allowable Capacity is based on Depth Criterion</b>							
<b>MAJOR STORM Allowable Capacity is based on Depth Criterion</b>							
	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> <th>cfs</th> </tr> <tr> <td><math>Q_{allow} = \text{SUMP}</math></td> <td><math>Q_{allow} = \text{SUMP}</math></td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	$Q_{allow} = \text{SUMP}$	$Q_{allow} = \text{SUMP}$	
Minor Storm	Major Storm	cfs					
$Q_{allow} = \text{SUMP}$	$Q_{allow} = \text{SUMP}$						

## INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



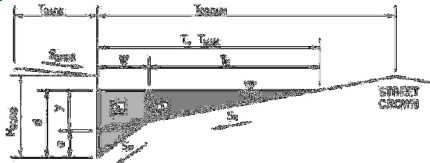
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	4.4	8.0	inches
<b>Grate Information</b>	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>	MINOR	MAJOR	
Length of a Unit Curb Opening	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>	MINOR	MAJOR	
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.20	0.50	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.41	0.75	
Curb Opening Performance Reduction Factor for Long Inlets	0.82	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>	MINOR	MAJOR	
<b>Q<sub>a</sub></b>	<b>3.3</b>	<b>16.3</b>	<b>cfs</b>
Q <sub>PEAK REQUIRED</sub>	2.0	8.8	cfs

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

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

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

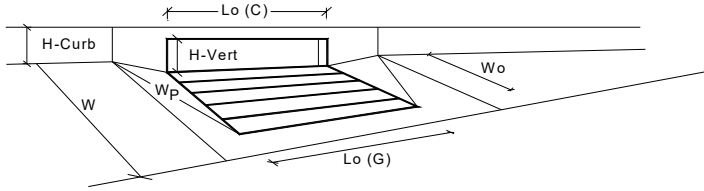
Project: \_\_\_\_\_  
 Inlet ID: \_\_\_\_\_ **Inlet 9**



<b>Gutter Geometry (Enter data in the blue cells)</b>																	
Maximum Allowable Width for Spread Behind Curb	T <sub>BACK</sub> = <input style="width: 50px;" type="text" value="7.5"/> ft																
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S <sub>BACK</sub> = <input style="width: 50px;" type="text" value="0.020"/> ft/ft																
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n <sub>BACK</sub> = <input style="width: 50px;" type="text" value="0.020"/>																
Height of Curb at Gutter Flow Line	H <sub>CURB</sub> = <input style="width: 50px;" type="text" value="6.00"/> inches																
Distance from Curb Face to Street Crown	T <sub>CROWN</sub> = <input style="width: 50px;" type="text" value="14.0"/> ft																
Gutter Width	W = <input style="width: 50px;" type="text" value="2.00"/> ft																
Street Transverse Slope	S <sub>x</sub> = <input style="width: 50px;" type="text" value="0.020"/> ft/ft																
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S <sub>w</sub> = <input style="width: 50px;" type="text" value="0.083"/> ft/ft																
Street Longitudinal Slope - Enter 0 for sump condition	S <sub>o</sub> = <input style="width: 50px;" type="text" value="0.000"/> ft/ft																
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n <sub>STREET</sub> = <input style="width: 50px;" type="text" value="0.016"/>																
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="width: 50px;"></th> <th style="width: 50px; text-align: center;">Minor Storm</th> <th style="width: 50px; text-align: center;">Major Storm</th> <th style="width: 20px;"></th> </tr> </thead> <tbody> <tr> <td>T<sub>MAX</sub> =</td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="14.0"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="14.0"/></td> <td style="text-align: center;">ft</td> </tr> <tr> <td>d<sub>MAX</sub> =</td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="4.4"/></td> <td style="text-align: center;"><input style="width: 40px;" type="text" value="12.0"/></td> <td style="text-align: center;">inches</td> </tr> <tr> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> </tbody> </table>		Minor Storm	Major Storm		T <sub>MAX</sub> =	<input style="width: 40px;" type="text" value="14.0"/>	<input style="width: 40px;" type="text" value="14.0"/>	ft	d <sub>MAX</sub> =	<input style="width: 40px;" type="text" value="4.4"/>	<input style="width: 40px;" type="text" value="12.0"/>	inches		<input type="checkbox"/>	<input type="checkbox"/>	
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	<input style="width: 40px;" type="text" value="SUMP"/>	<input style="width: 40px;" type="text" value="SUMP"/>	cfs														

## INLET IN A SUMP OR SAG LOCATION

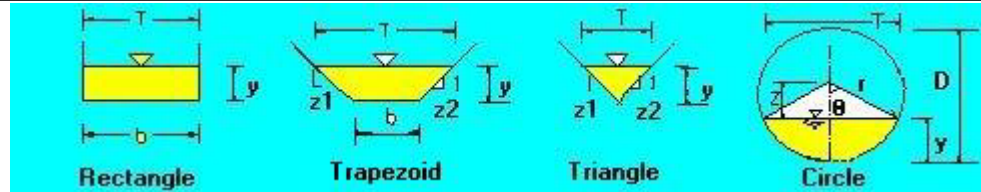
Version 4.06 Released August 2018



Design Information (Input)	MINOR	MAJOR	
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Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
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<b>Q<sub>a</sub></b>	3.3	16.3	cfs
Q <sub>PEAK REQUIRED</sub>	2.9	8.8	cfs

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

## SECTION A: CDOT Barrow Ditch

 Select Channel Type: Trapezoid ▾

 Depth from Q ▾

 Select unit system: Feet(ft) ▾

Channel slope: <input type="text" value=".018"/> <input type="text" value="ft/ft"/>	Water depth(y): <input style="color: red;" type="text" value="0.76"/> <input type="text" value="ft"/>	Bottom width(b) <input type="text" value="5"/> <input type="text" value="ft"/>
Flow velocity <input type="text" value="3.535"/> <input type="text" value="ft/s"/>	LeftSlope (Z1): <input type="text" value="4"/> <input type="text" value="to 1 (H:V)"/>	RightSlope (Z2): <input type="text" value="10"/> <input type="text" value="to 1 (H:V)"/>
Flow discharge <input type="text" value="27.7"/> <input type="text" value="ft^3/s"/>	Input n value <input type="text" value="0.035"/> <input type="button" value="or select n"/>	
<input type="button" value="Calculate!"/>	Status: <span style="color: red;">Calculation finished</span>	<input type="button" value="Reset"/>
Wetted perimeter <input type="text" value="15.76"/> <input type="text" value="ft"/>	Flow area <input type="text" value="7.84"/> <input type="text" value="ft^2"/>	Top width(T) <input type="text" value="15.63"/> <input type="text" value="ft"/>
Specific energy <input type="text" value="0.95"/> <input type="text" value="ft"/>	Froude number <input type="text" value="0.88"/>	Flow status <input type="text" value="Subcritical flow"/>
Critical depth <input type="text" value="0.72"/> <input type="text" value="ft"/>	Critical slope <input type="text" value="0.0225"/> <input type="text" value="ft/ft"/>	Velocity head <input type="text" value="0.19"/> <input type="text" value="ft"/>

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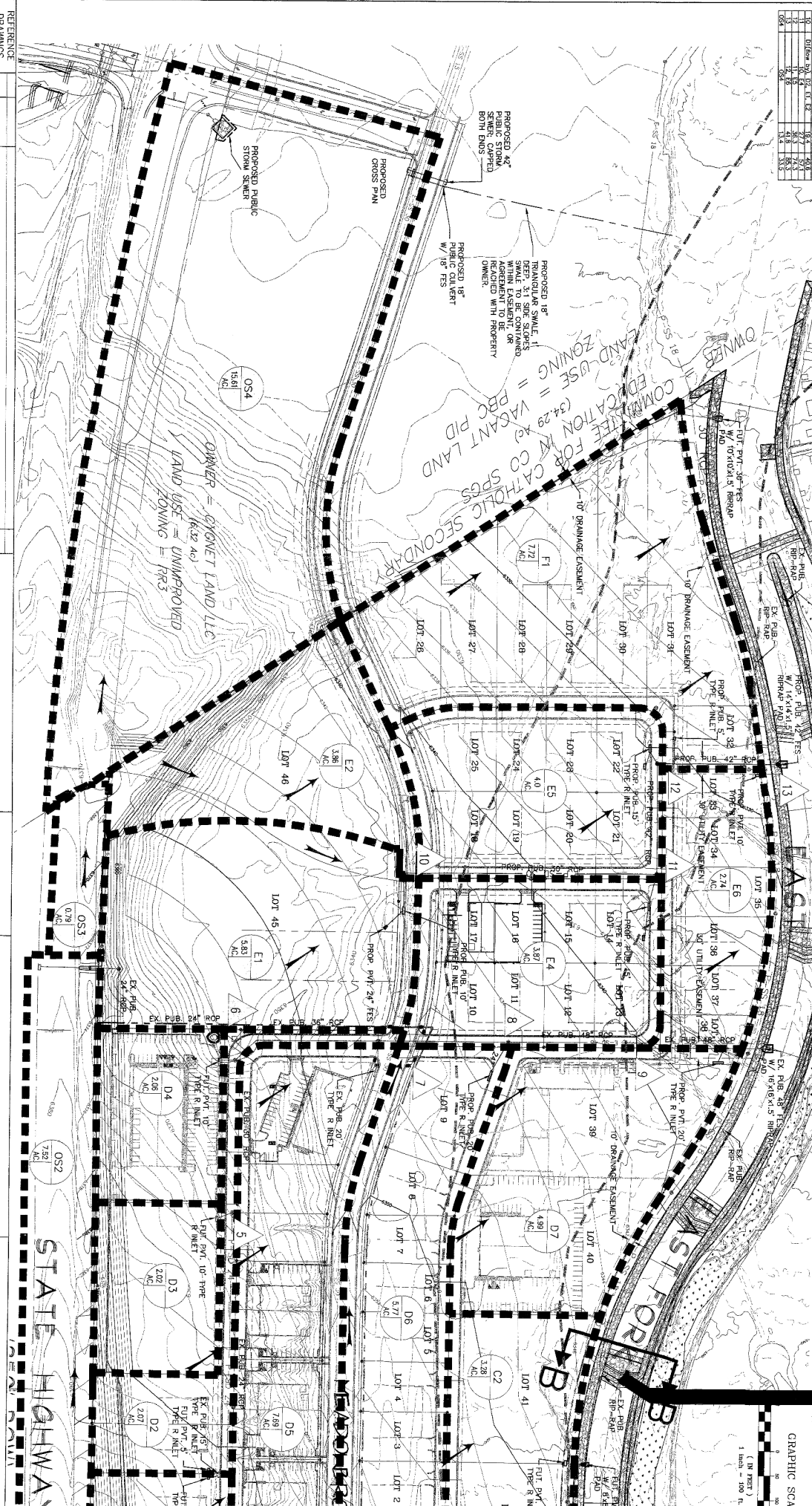
## **BACKGROUND**





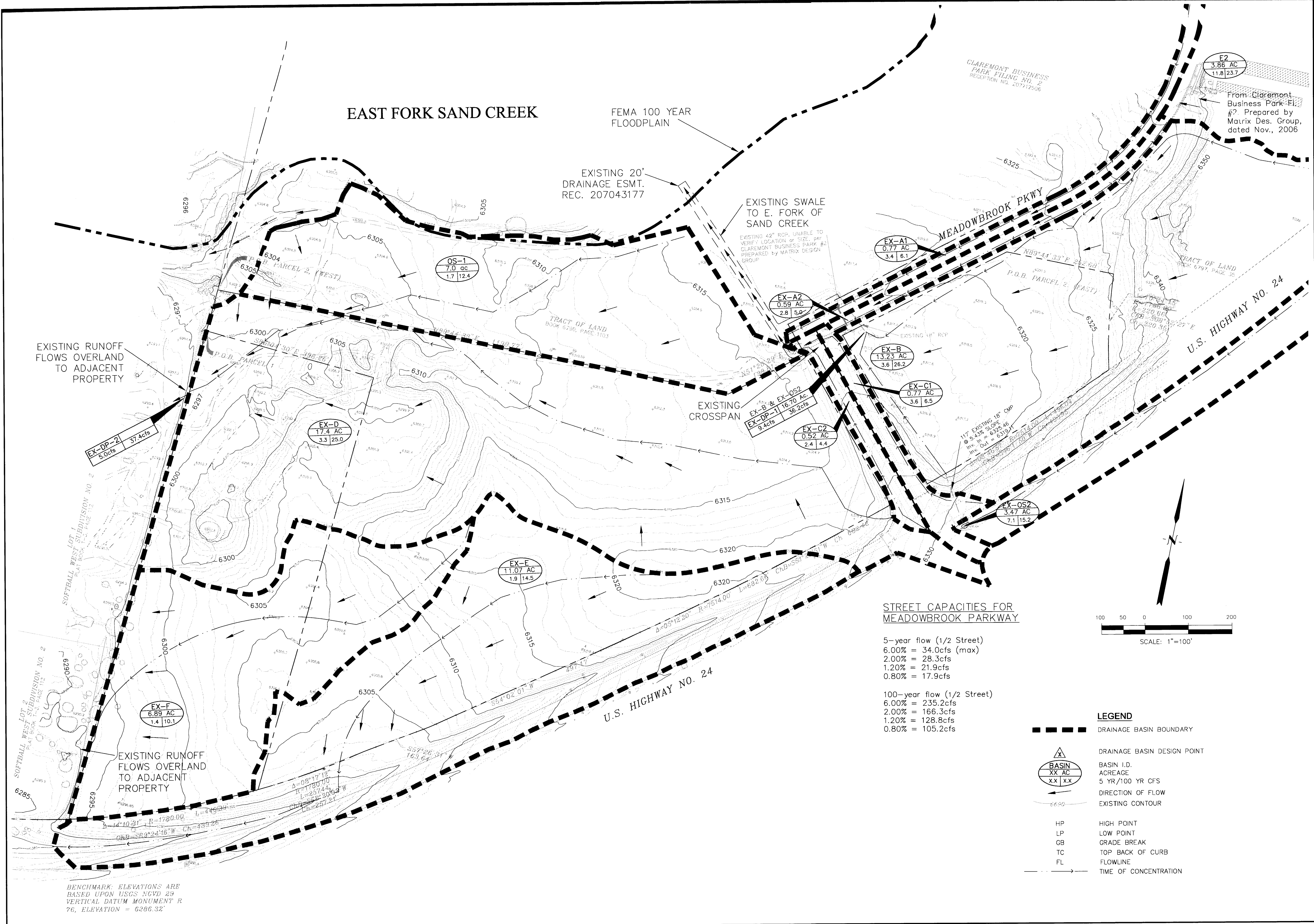
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96	12-17-17	REVISED
97	01-18-18	REVISED
98	02-18-18	REVISED
99	03-18-18	REVISED
100	04-18-18	REVISED

# DRAINAGE PLAN CLAREMONT BUSINESS PARK FILING NO. 2



<b>REFERENCE DRAWINGS</b> 1. 18" X 24" (18" X 24") 2. 18" X 24" (18" X 24") 3. 18" X 24" (18" X 24") 4. 18" X 24" (18" X 24") 5. 18" X 24" (18" X 24") 6. 18" X 24" (18" X 24") 7. 18" X 24" (18" X 24") 8. 18" X 24" (18" X 24") 9. 18" X 24" (18" X 24") 10. 18" X 24" (18" X 24") 11. 18" X 24" (18" X 24") 12. 18" X 24" (18" X 24") 13. 18" X 24" (18" X 24") 14. 18" X 24" (18" X 24") 15. 18" X 24" (18" X 24") 16. 18" X 24" (18" X 24") 17. 18" X 24" (18" X 24") 18. 18" X 24" (18" X 24") 19. 18" X 24" (18" X 24") 20. 18" X 24" (18" X 24") 21. 18" X 24" (18" X 24") 22. 18" X 24" (18" X 24") 23. 18" X 24" (18" X 24") 24. 18" X 24" (18" X 24") 25. 18" X 24" (18" X 24") 26. 18" X 24" (18" X 24") 27. 18" X 24" (18" X 24") 28. 18" X 24" (18" X 24") 29. 18" X 24" (18" X 24") 30. 18" X 24" (18" X 24") 31. 18" X 24" (18" X 24") 32. 18" X 24" (18" X 24") 33. 18" X 24" (18" X 24") 34. 18" X 24" (18" X 24") 35. 18" X 24" (18" X 24") 36. 18" X 24" (18" X 24") 37. 18" X 24" (18" X 24") 38. 18" X 24" (18" X 24") 39. 18" X 24" (18" X 24") 40. 18" X 24" (18" X 24") 41. 18" X 24" (18" X 24") 42. 18" X 24" (18" X 24") 43. 18" X 24" (18" X 24") 44. 18" X 24" (18" X 24") 45. 18" X 24" (18" X 24") 46. 18" X 24" (18" X 24") 47. 18" X 24" (18" X 24") 48. 18" X 24" (18" X 24") 49. 18" X 24" (18" X 24") 50. 18" X 24" (18" X 24") 51. 18" X 24" (18" X 24") 52. 18" X 24" (18" X 24") 53. 18" X 24" (18" X 24") 54. 18" X 24" (18" X 24") 55. 18" X 24" (18" X 24") 56. 18" X 24" (18" X 24") 57. 18" X 24" (18" X 24") 58. 18" X 24" (18" X 24") 59. 18" X 24" (18" X 24") 60. 18" X 24" (18" X 24") 61. 18" X 24" (18" X 24") 62. 18" X 24" (18" X 24") 63. 18" X 24" (18" X 24") 64. 18" X 24" (18" X 24") 65. 18" X 24" (18" X 24") 66. 18" X 24" (18" X 24") 67. 18" X 24" (18" X 24") 68. 18" X 24" (18" X 24") 69. 18" X 24" (18" X 24") 70. 18" X 24" (18" X 24") 71. 18" X 24" (18" X 24") 72. 18" X 24" (18" X 24") 73. 18" X 24" (18" X 24") 74. 18" X 24" (18" X 24") 75. 18" X 24" (18" X 24") 76. 18" X 24" (18" X 24") 77. 18" X 24" (18" X 24") 78. 18" X 24" (18" X 24") 79. 18" X 24" (18" X 24") 80. 18" X 24" (18" X 24") 81. 18" X 24" (18" X 24") 82. 18" X 24" (18" X 24") 83. 18" X 24" (18" X 24") 84. 18" X 24" (18" X 24") 85. 18" X 24" (18" X 24") 86. 18" X 24" (18" X 24") 87. 18" X 24" (18" X 24") 88. 18" X 24" (18" X 24") 89. 18" X 24" (18" X 24") 90. 18" X 24" (18" X 24") 91. 18" X 24" (18" X 24") 92. 18" X 24" (18" X 24") 93. 18" X 24" (18" X 24") 94. 18" X 24" (18" X 24") 95. 18" X 24" (18" X 24") 96. 18" X 24" (18" X 24") 97. 18" X 24" (18" X 24") 98. 18" X 24" (18" X 24") 99. 18" X 24" (18" X 24") 100. 18" X 24" (18" X 24")	
<b>REVISIONS</b> NO. DATE DESCRIPTION BY 1. 01-10-10 2. 02-10-10 3. 03-10-10 4. 04-10-10 5. 05-10-10 6. 06-10-10 7. 07-10-10 8. 08-10-10 9. 09-10-10 10. 10-10-10 11. 11-10-10 12. 12-10-10 13. 01-11-11 14. 02-11-11 15. 03-11-11 16. 04-11-11 17. 05-11-11 18. 06-11-11 19. 07-11-11 20. 08-11-11 21. 09-11-11 22. 10-11-11 23. 11-11-11 24. 12-11-11 25. 01-12-12 26. 02-12-12 27. 03-12-12 28. 04-12-12 29. 05-12-12 30. 06-12-12 31. 07-12-12 32. 08-12-12 33. 09-12-12 34. 10-12-12 35. 11-12-12 36. 12-12-12 37. 01-13-13 38. 02-13-13 39. 03-13-13 40. 04-13-13 41. 05-13-13 42. 06-13-13 43. 07-13-13 44. 08-13-13 45. 09-13-13 46. 10-13-13 47. 11-13-13 48. 12-13-13 49. 01-14-14 50. 02-14-14 51. 03-14-14 52. 04-14-14 53. 05-14-14 54. 06-14-14 55. 07-14-14 56. 08-14-14 57. 09-14-14 58. 10-14-14 59. 11-14-14 60. 12-14-14 61. 01-15-15 62. 02-15-15 63. 03-15-15 64. 04-15-15 65. 05-15-15 66. 06-15-15 67. 07-15-15 68. 08-15-15 69. 09-15-15 70. 10-15-15 71. 11-15-15 72. 12-15-15 73. 01-16-16 74. 02-16-16 75. 03-16-16 76. 04-16-16 77. 05-16-16 78. 06-16-16 79. 07-16-16 80. 08-16-16 81. 09-16-16 82. 10-16-16 83. 11-16-16 84. 12-16-16 85. 01-17-17 86. 02-17-17 87. 03-17-17 88. 04-17-17 89. 05-17-17 90. 06-17-17 91. 07-17-17 92. 08-17-17 93. 09-17-17 94. 10-17-17 95. 11-17-17 96. 12-17-17 97. 01-18-18 98. 02-18-18 99. 03-18-18 100. 04-18-18	
<b>DESIGNER</b> HENCKS & ASSOCIATES, INC. 3460 CAPITAL DRIVE COORADO SPRINGS, CO 80915-9710	
<b>DATE</b> 01-10-10	
<b>DESCRIPTION</b> CLAREMONT BUSINESS PARK	
<b>BENCHMARK DATA(ELEV.)</b> (DATUM)	
<b>DESCRIPTION/LOCATION</b> (DESCRIPTION/LOCATION)	
<b>SUBDIVIDER</b> HAMERS CONSTRUCTION INC. 3460 CAPITAL DRIVE COORADO SPRINGS, CO 80915-9710	
<b>FOR AND ON BEHALF OF</b> MATRIX DESIGN GROUP, INC.	
<b>Matrix Design Group, Inc.</b> Integrated Design Solutions 2435 Research Parkway, Suite 300 Colorado Springs, CO 80920 Phone: 719-575-0100 Fax: 719-575-0288	
<b>CLAREMONT BUSINESS PARK</b> FINAL DRAINAGE PLAN MASTER DEVELOPMENT DRAINAGE PLAN FINAL DRAINAGE PLAN FILING NO. 2	
<b>SCALE</b> 1" = 100' SHEET NO. 2 OF 2 SHEETS	





EAST FORK SAND CREEK

FEMA 100 YEAR FLOODPLAIN

EXISTING 20' DRAINAGE ESMT. REC. 207043177

EXISTING SWALE TO E. FORK OF SAND CREEK

CLAREMONT BUSINESS PARK FILING NO. 2 RECEIPT NO. 207172306

From Claremont Business Park-Filing #2 Prepared by Matrix Des. Group, dated Nov., 2006

EXISTING RUNOFF FLOWS OVERLAND TO ADJACENT PROPERTY

EXISTING CROSSSPAN

MEADOWBROOK PKWY

U.S. HIGHWAY NO. 24

EX-DP-2  
5.0cfs  
37 Acfs

EX-D  
17.4 AC  
3.3 | 25.0

EX-B & EX-OS2  
16.70 AC  
8.4cfs | 56.2cfs

EX-A1  
0.77 AC  
3.4 | 6.1

EX-A2  
0.59 AC  
2.8 | 5.0

EX-B  
13.23 AC  
3.6 | 26.2

EX-C1  
0.77 AC  
3.6 | 6.5

EX-C2  
0.52 AC  
2.4 | 4.4

EX-OS2  
3.47 AC  
7.1 | 15.2

EX-E  
11.07 AC  
1.9 | 14.3

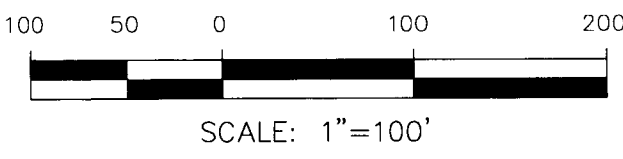
EX-F  
6.89 AC  
1.4 | 10.1

EXISTING RUNOFF FLOWS OVERLAND TO ADJACENT PROPERTY

STREET CAPACITIES FOR MEADOWBROOK PARKWAY

5-year flow (1/2 Street)  
6.00% = 34.0cfs (max)  
2.00% = 28.3cfs  
1.20% = 21.9cfs  
0.80% = 17.9cfs

100-year flow (1/2 Street)  
6.00% = 235.2cfs  
2.00% = 166.3cfs  
1.20% = 128.8cfs  
0.80% = 105.2cfs



LEGEND

- DRAINAGE BASIN BOUNDARY
- DRAINAGE BASIN DESIGN POINT
- BASIN I.D.  
ACREAGE  
5 YR/100 YR CFS
- DIRECTION OF FLOW
- EXISTING CONTOUR
- HIGH POINT
- LOW POINT
- GRADE BREAK
- TOP BACK OF CURB
- FLOWLINE
- TIME OF CONCENTRATION

BENCHMARK ELEVATIONS ARE BASED UPON USGS NGVD 29 VERTICAL DATUM MONUMENT R 76, ELEVATION = 6286.32'

**CORE ENGINEERING GROUP**  
 15004 1ST AVENUE, SUITE 30506  
 CIRCLE K STORES, INC.  
 1199 SOUTH BELLING ROAD, SUITE 160  
 COPPELL, TEXAS 75019  
 CONTACT: RICHARD L. SCHINDLER, P.E.  
 EMAIL: rich@cegi.com

DATE: \_\_\_\_\_  
 DESCRIPTION: \_\_\_\_\_  
 NO: \_\_\_\_\_  
 PREPARED FOR: Circle K Stores, Inc.  
 1199 South Belling Road, Suite 160  
 COPPELL, TEXAS 75019  
 PROJECT: 24/94 BUSINESS PARK  
 Meadowbrook Parkway & Platte Avenue  
 COLORADO SPRINGS, COLORADO  
 CONTRACT: Tim Peters

DRAWN: LAB/09/15  
 DESIGNED: LAB/09/15  
 CHECKED: RL/08/15/15

EXISTING CONDITIONS DRAINAGE PLAN  
 24/94 BUSINESS PARK  
 EL PASO COUNTY, CO

DATE: APRIL, 2016  
 PROJECT NO: 319.001  
 SHEET NUMBER: 1  
 TOTAL SHEETS: 1

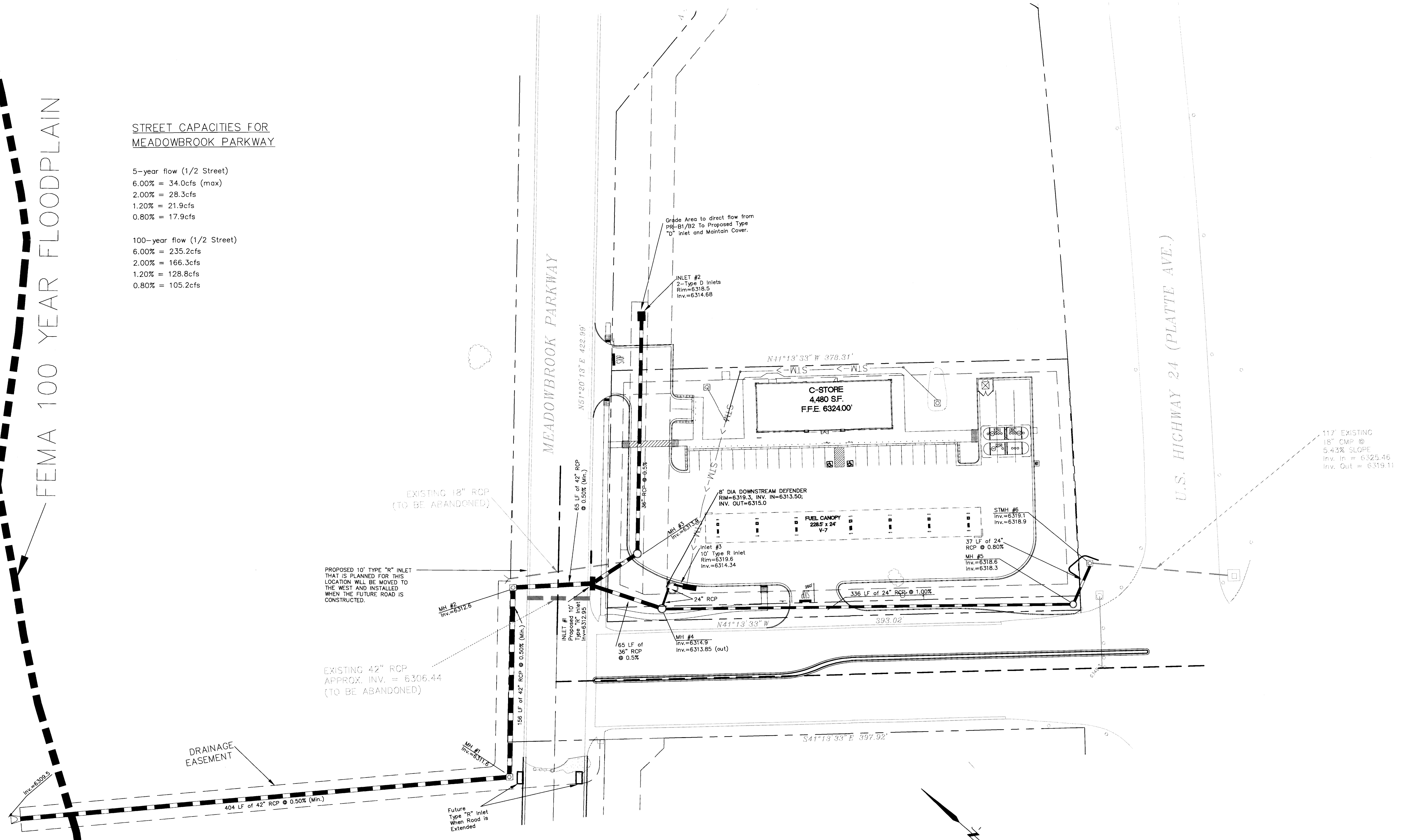
# EAST FORK SAND CREEK

FEMA 100 YEAR FLOODPLAIN

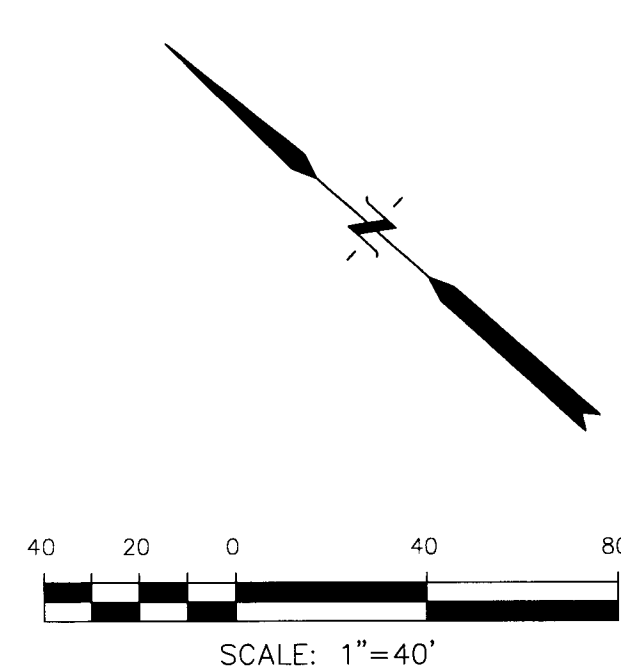
## STREET CAPACITIES FOR MEADOWBROOK PARKWAY

5-year flow (1/2 Street)  
 6.00% = 34.0cfs (max)  
 2.00% = 28.3cfs  
 1.20% = 21.9cfs  
 0.80% = 17.9cfs

100-year flow (1/2 Street)  
 6.00% = 235.2cfs  
 2.00% = 166.3cfs  
 1.20% = 128.8cfs  
 0.80% = 105.2cfs



DESIGN POINT SUMMARY TABLE			
DESIGN POINT	RUNOFF 5 YR (cfs)	RUNOFF 100 YR (cfs)	COMMENTS
INLET #2	40.1	71.9	FLOW IN PIPE
INLET #1	44.4	83.2	FLOW IN PIPE
INLET #3	7.1	12.9	ON-SITE INLET, 24" RCP TO WQ VAULT
STMH #6	7.5	15.1	FROM BASIN EX-0S2



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

DATE: \_\_\_\_\_  
 DESCRIPTION: \_\_\_\_\_  
 NO. \_\_\_\_\_

---

PREPARED FOR:  
**Circle K Stores, Inc.**  
 1199 South Bellline Road, Suite 160  
 COPOLE, CO 80109  
 (940) 453-0015  
 CONTACT: Tim Peters

PROJECT:  
**24/94 BUSINESS PARK**  
 Meadowbrook Parkway & Platte Avenue  
 COLORADO SPRINGS, COLORADO

---

DRAWN: LAB, 9/9/15  
 DESIGNED: LAB, 9/9/15  
 CHECKED: RLS, 9/10/15

PROPOSED STORM SEWER PLAN  
 LOT 1 OF 24/94 BUSINESS PARK  
 Meadowbrook Pkwy, EL PASO COUNTY, CO

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DATE:  
**JULY 2016**

PROJECT NO.  
**319.001**

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SHEET NUMBER  
**2**

TOTAL SHEETS: **2**

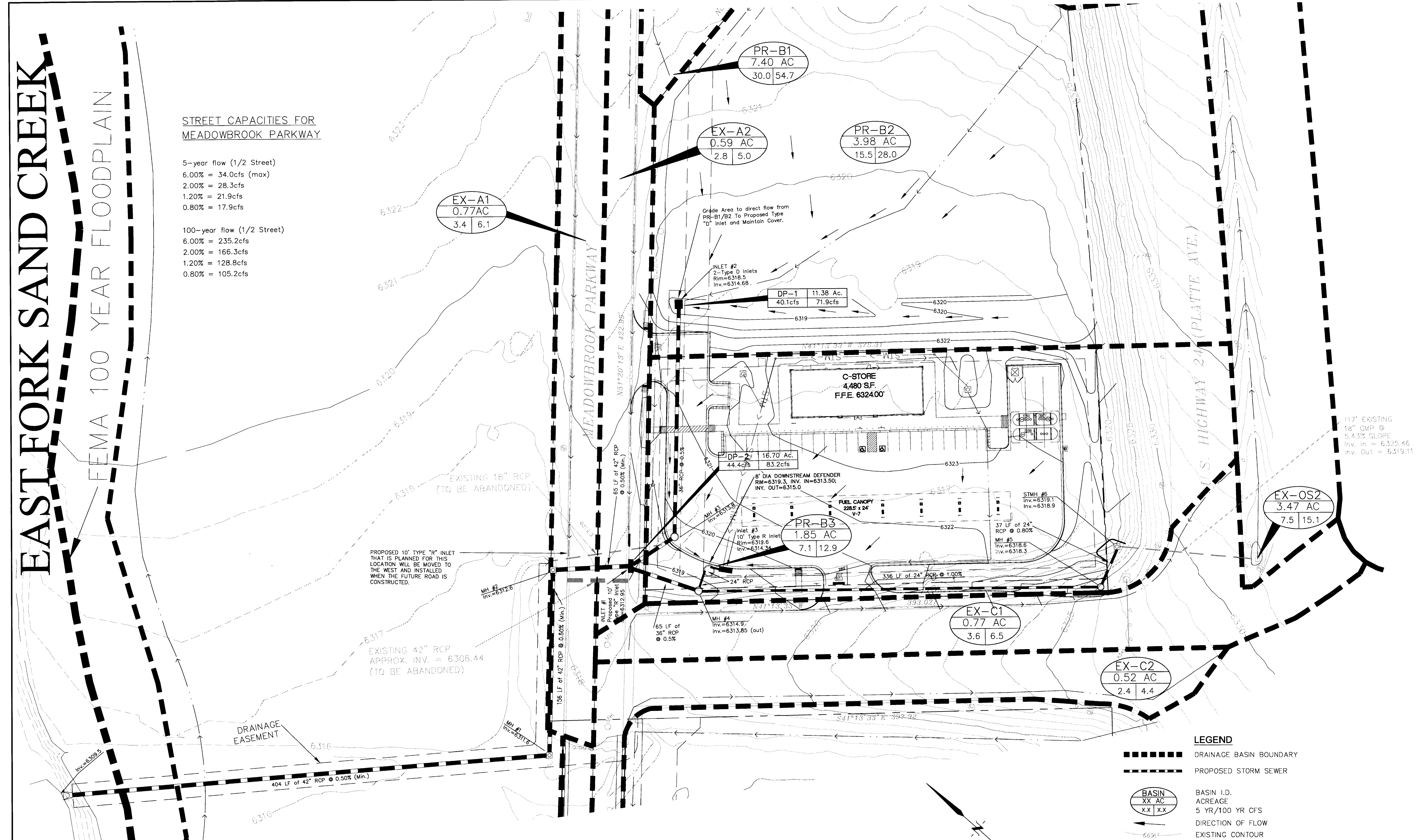


# EAST FORK SAND CREEK

FEMA 100 YEAR FLOODPLAIN

### STREET CAPACITIES FOR MEADOWBROOK PARKWAY

5-year flow (1/2 Street)	
6.00%	= 34.0cfs (max)
2.00%	= 28.3cfs
1.20%	= 21.9cfs
0.80%	= 17.9cfs
100-year flow (1/2 Street)	
6.00%	= 235.2cfs
2.00%	= 166.3cfs
1.20%	= 128.8cfs
0.80%	= 105.2cfs

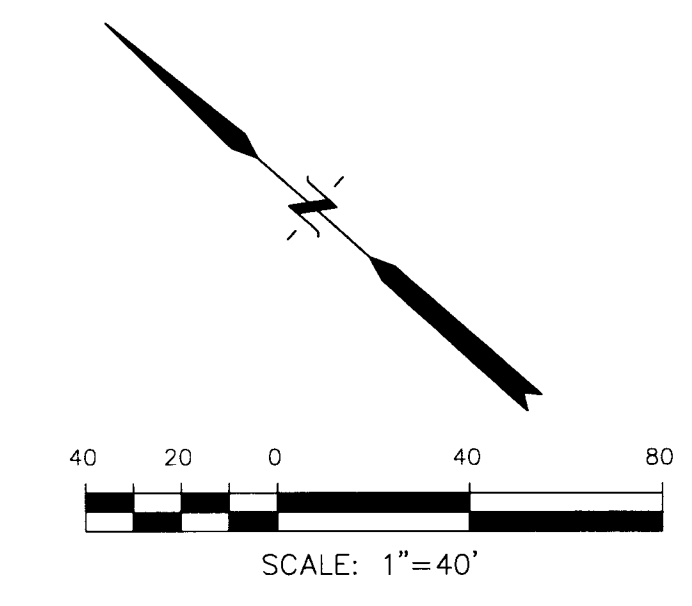


PROPOSED 10' TYPE "R" INLET THAT IS PLANNED FOR THIS LOCATION WILL BE MOVED TO THE WEST AND INSTALLED WHEN THE FUTURE ROAD IS CONSTRUCTED.

EXISTING 42" RCP APPROX. INV. = 6306.44 (TO BE ABANDONED)

DRAINAGE EASEMENT

DESIGN POINT	RUNOFF 5 YR (cfs)	RUNOFF 100 YR (cfs)	COMMENTS
DP-1	40.1	71.9	FLOW IN PIPE
DP-2	44.4	83.2	FLOW IN PIPE
INLET #3	7.1	12.9	ON-SITE INLET, 24" RCP TO WQ VAULT
STMH #6	7.5	15.1	FROM BASIN EX-OS2



- LEGEND**
- DRAINAGE BASIN BOUNDARY
  - - - - - PROPOSED STORM SEWER
  - BASIN  
XX AC  
x x | x x
  - HP HIGH POINT
  - LP LOW POINT
  - GB GRADE BREAK
  - TC TOP BACK OF CURB
  - FL FLOWLINE
  - TIME OF CONCENTRATION

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

DATE: \_\_\_\_\_

DESCRIPTION: \_\_\_\_\_

NO. \_\_\_\_\_

PREPARED FOR: Circle K Stores, Inc.  
1189 Business Parkway  
Coppell, Texas 75019  
(940) 453-0015  
CONTACT: Tim Peters

PROJECT: 24/94 BUSINESS PARK  
Meadowbrook Parkway & Platte Avenue  
COLORADO SPRINGS, COLORADO

DRAWN: LAB, 9/9/15  
DESIGNED: LAB, 9/9/15  
CHECKED: RLS, 9/10/15

**PROPOSED CONDITIONS DRAINAGE PLAN**  
**LOT 1 OF 24/94 BUSINESS PARK**  
**Meadowbrook Pkwy., EL PASO COUNTY, CO**

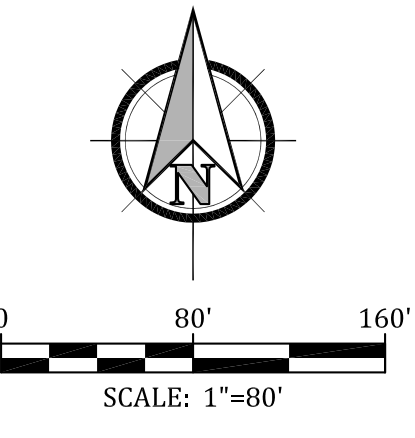
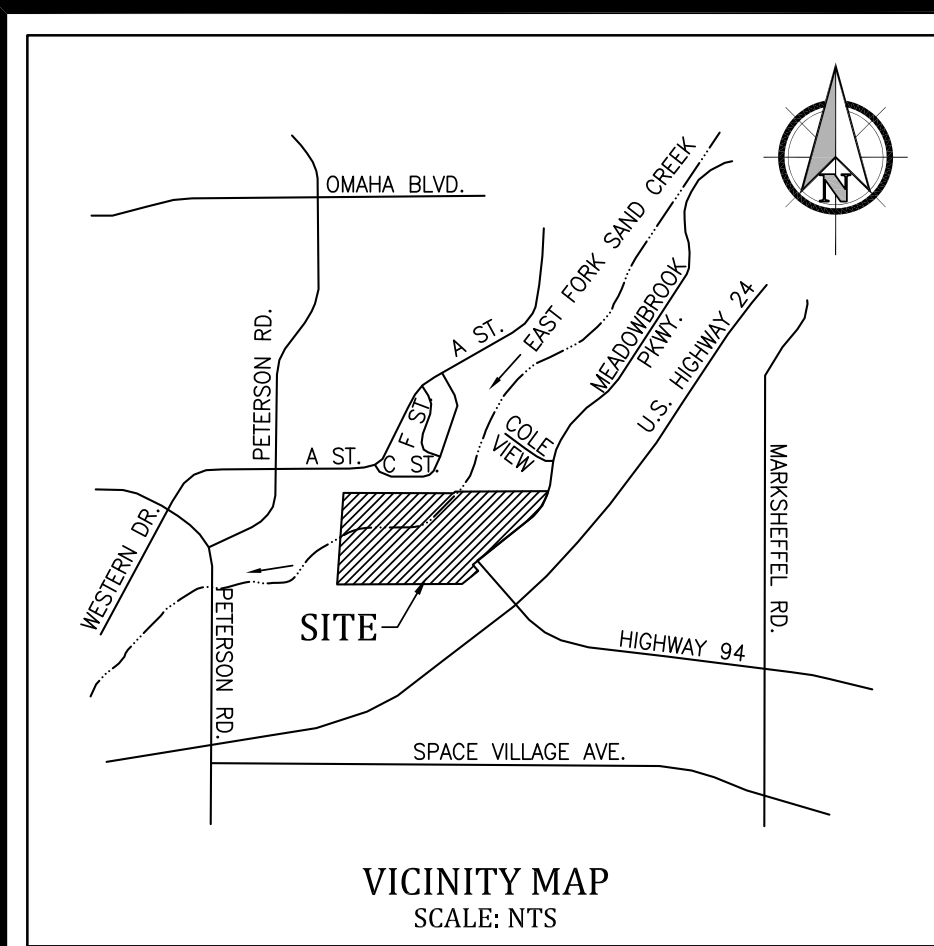
DATE: **JULY, 2016**

PROJECT NO. **319.001**

SHEET NUMBER **1**

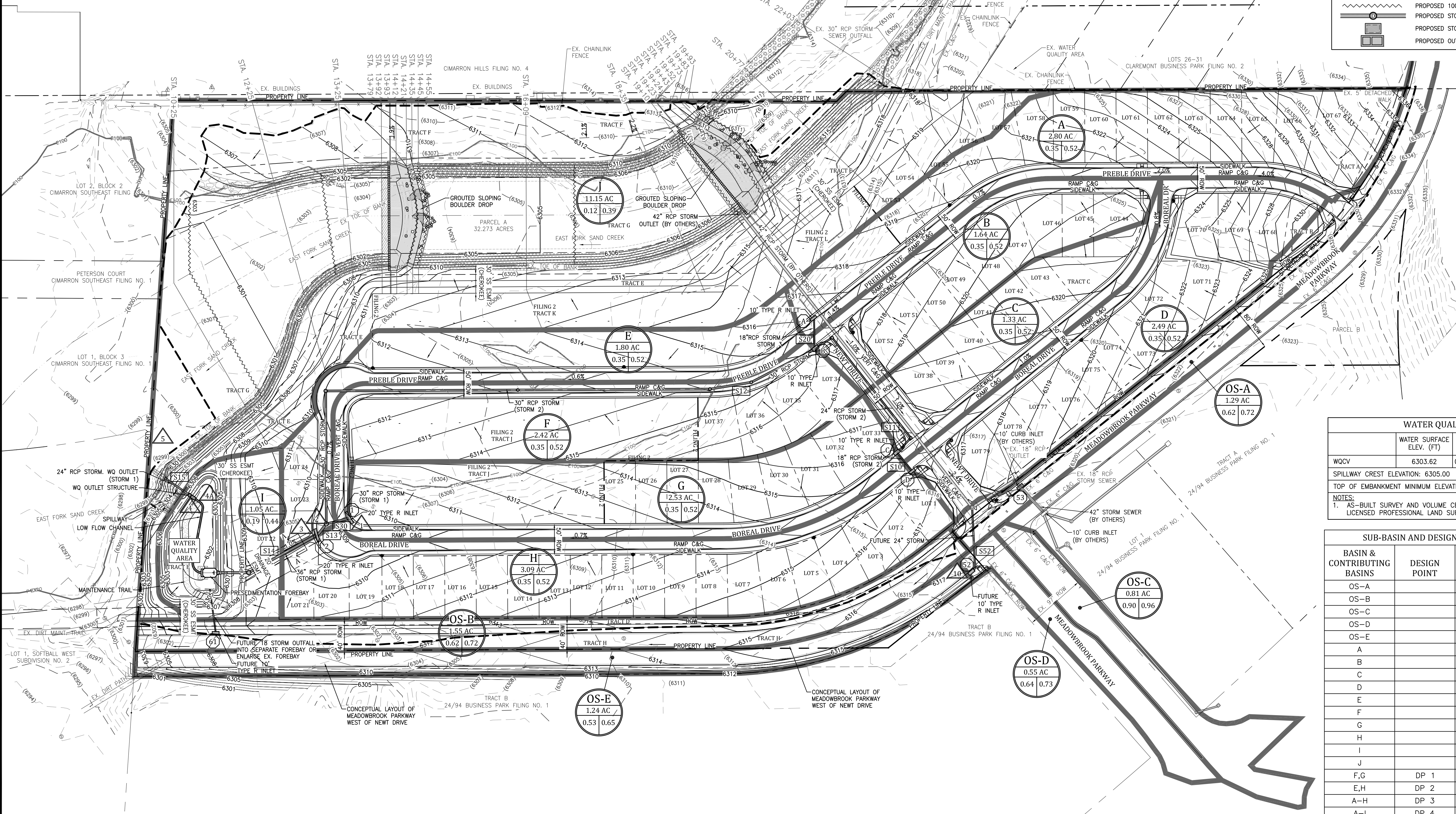
TOTAL SHEETS: **2**





**LEGEND**

<b>A</b>	PROPOSED BASIN DESIGNATION
1.84 AC	DRAINAGE BASIN ACRES
C5 RUNOFF COEF 0.76 0.83	C100 RUNOFF COEFFICIENT
	DIRECTIONAL FLOW ARROW
	DRAINAGE BASIN BOUNDARY
	HYDRAULIC STRUCTURE IDENTIFIER
	STORM SEWER IDENTIFIER
	DESIGN POINT
	STORMWATER EMERGENCY OVERFLOW PATH
	R.O.W. / PROPERTY LINE
	EXISTING EASEMENT
	EXISTING STORM SEWER
	EXISTING CONTOURS
	PROPOSED CONTOURS
	EXISTING FLOW DIRECTION AND SLOPE
	PROPOSED FLOW DIRECTION AND SLOPE
	PROPOSED CURB AND GUTTER
	EXISTING 100 YEAR FLOODPLAIN
	PROPOSED 100 YEAR FLOODPLAIN
	PROPOSED 100 YEAR BASE FLOOD ELEVATION LINE
	PROPOSED STORM SEWER PIPE AND MANHOLE
	PROPOSED STORM CURB INLET
	PROPOSED OUTLET STRUCTURE



**WATER QUALITY BASIN**

	WATER SURFACE ELEV. (FT)	REQUIRED STORAGE VOLUME	RELEASE RATE	PROVIDED STORAGE VOLUME
WQCV	6303.62	0.36 AC-FT		
SPILLWAY CREST ELEVATION: 6305.00				
TOP OF EMBANKMENT MINIMUM ELEVATION: 6306.50				

**NOTES:**  
1. AS-BUILT SURVEY AND VOLUME CERTIFICATION REQUIRED BY A LICENSED PROFESSIONAL LAND SURVEYOR, SEE GRADING NOTES.

**SUB-BASIN AND DESIGN POINT DISCHARGES**

BASIN & CONTRIBUTING BASINS	DESIGN POINT	5-YR FLOW	100-YR FLOW
OS-A		3.0 cfs	5.9 cfs
OS-B		3.5 cfs	6.9 cfs
OS-C		3.8 cfs	6.7 cfs
OS-D		1.8 cfs	3.4 cfs
OS-E		2.4 cfs	5.0 cfs
A		3.4 cfs	8.6 cfs
B		2.1 cfs	5.3 cfs
C		1.8 cfs	4.4 cfs
D		3.1 cfs	7.9 cfs
E		2.2 cfs	5.4 cfs
F		2.9 cfs	7.3 cfs
G		3.1 cfs	7.7 cfs
H		3.7 cfs	9.3 cfs
I		0.8 cfs	3.1 cfs
J		4.1 cfs	23.4 cfs
F,G	DP 1	5.9 cfs	15.0 cfs
E,H	DP 2	5.8 cfs	14.6 cfs
A-H	DP 3	19.2 cfs	48.4 cfs
A-I	DP 4	19.6 cfs	50.2 cfs
A-I, OSB	DP 4A	22.1 cfs	55.1 cfs
A-J, OSB	DP 5	26.3 cfs	77.7 cfs
OSC, OSD	DP 10	5.5 cfs	10.1 cfs

**Kiowa**  
Engineering Corporation  
7175 West Jefferson Avenue, Suite 1300  
Lakewood, Colorado 80235  
(303) 692-0369

**MEADOWBROOK SUBDIVISION  
PRELIMINARY/FINAL DRAINAGE REPORT  
DRAINAGE PLAN - PROPOSED CONDITION  
EL PASO COUNTY, COLORADO**

Project No.: 16039  
Date: July 25, 2017  
Design: ELS  
Drawn: ELS  
Check: MWE  
Revisions:

EXHIBIT  
**B**

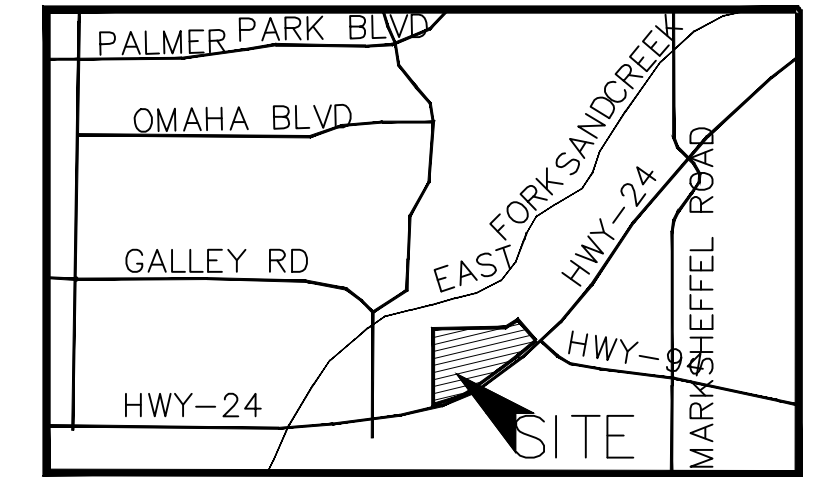
## **DRAINAGE MAPS**



# CROSSROADS MIXED USE HISTORIC CONDITIONS DRAINAGE MAP

**\*NOTES:**

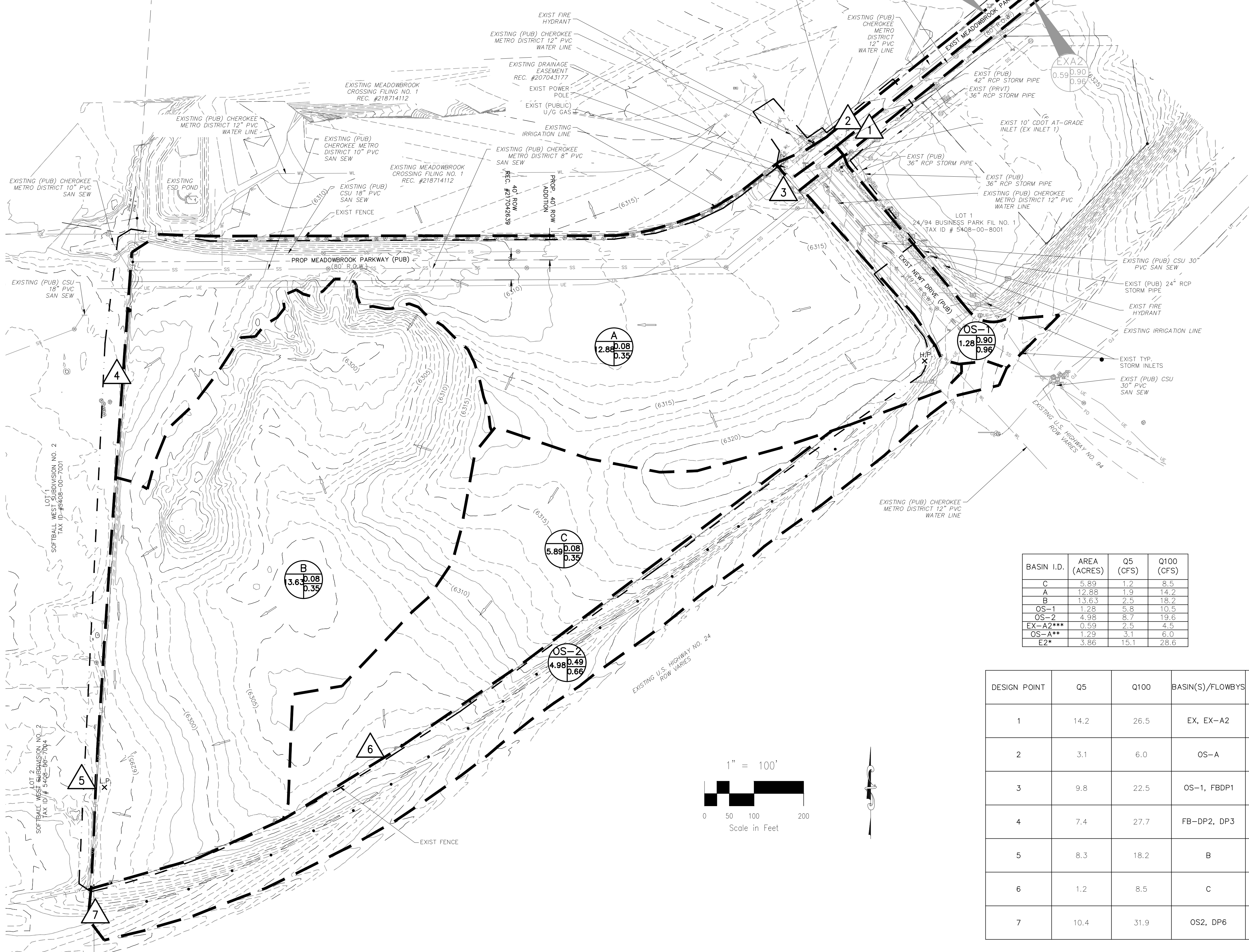
1.) NOT SHOWN IS BASIN "E2". THIS BASIN LIES TO THE EAST OF BASIN "EX-A2". DELINEATION AND HYDROLOGIC DETAILS OF THIS BASIN CAN BE FOUND IN THE "FDR FOR CLAREMONT BUSINESS PARK FILING NO. 2" ON PAGES 39 AND 41, RESPECTIVELY.



VICINITY MAP  
N.T.S.

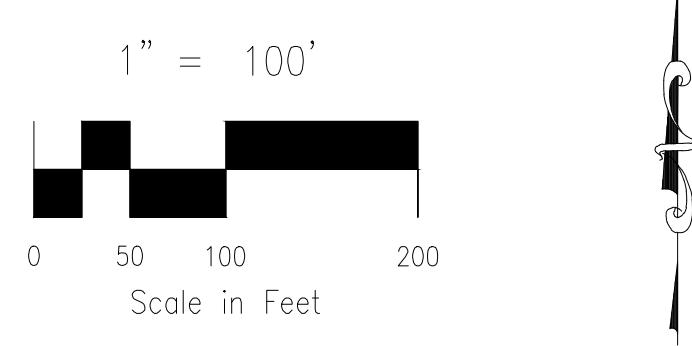
**LEGEND**

- BASIN DESIGNATION
- ACRES
- 1 SURFACE DESIGN POINT
- BASIN BOUNDARY
- EXIST MAJ CONT
- EXIST MIN CONT
- EXISTING FLOW DIRECTION ARROW
- H.P. X HIGH POINT
- L.P. X LOW POINT
- PROPOSED SWALE
- EXISTING SWALE
- CONSTRUCTION/DISTURBANCE LIMITS
- SITE BOUNDARY
- R.O.W./EASEMENT
- LOT LINE
- ST EX. STORM SEWER LINE
- UE EX. UNDERGROUND ELECTRIC LINE
- SS EX. SANITARY SEWER LINE
- WL EX. WATER LINE
- 9 LOT NUMBER
- EX. IRRIGATION VALVE
- EX. STORM INLET
- EX. GAS TEST NODE
- EX. TELEPHONE PEDESTAL
- EX. ELECTRIC VAULT
- EX. SANITARY MANHOLE
- EX. WATER VALVE



BASIN I.D.	AREA (ACRES)	Q5 (CFS)	Q100 (CFS)
C	5.89	1.2	8.5
A	12.88	1.9	14.2
B	13.63	2.5	18.2
OS-1	1.28	5.8	10.5
OS-2	4.98	8.7	19.6
EX-A2**	0.59	2.5	4.5
OS-A**	1.29	3.1	6.0
E2*	3.86	15.1	28.6

DESIGN POINT	Q5	Q100	BASIN(S)/FLOWBYS	OUTFALL
1	14.2	26.5	EX, EX-A2	EXIST 10' CDOT TYPE R AT GRADE INLET
2	3.1	6.0	OS-A	EXIST 10' CDOT TYPE R AT GRADE INLET
3	9.8	22.5	OS-1, FBPD1	END OF PAVEMENT
4	7.4	27.7	FB-DP2, DP3	DISCHARGE TO ADJACENT PARCEL (LOT 1)
5	8.3	18.2	B	DISCHARGE TO ADJACENT PARCEL (LOT2)
6	1.2	8.5	C	DISCHARGE TO CDOT ROW
7	10.4	31.9	OS2, DP6	CDOT BARROW DITCH



HISTORIC DRAINAGE MAP  
CROSSROADS MIXED USE  
JOB NO. 18-003  
DATE PREPARED: FEBRUARY 23, 2021  
DATE REVISED:



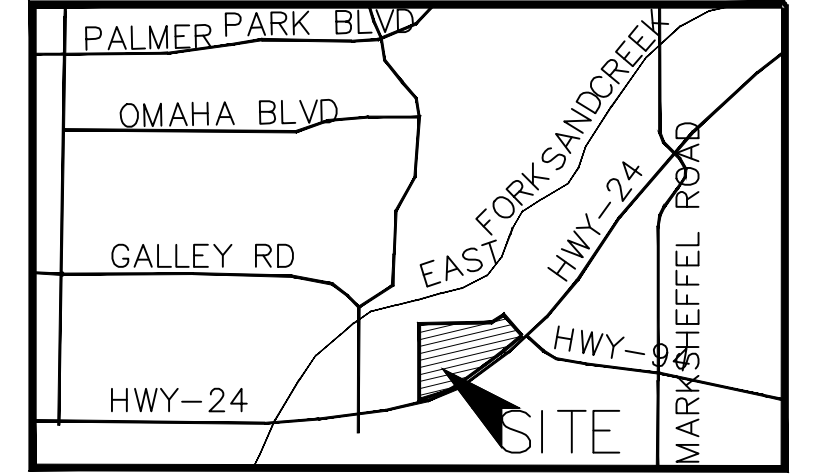
212 N. WAHSATCH AVE., STE 305  
COLORADO SPRINGS, CO 80903  
PHONE: 719.955.5485



# CROSSROADS MIXED USE EXISTING CONDITIONS DRAINAGE MAP

**\*NOTES:**

1.) NOT SHOWN IS BASIN "E2". THIS BASIN LIES TO THE EAST OF BASIN "EX-A2". DELINEATION AND HYDROLOGIC DETAILS OF THIS BASIN CAN BE FOUND IN THE "FDR FOR CLAREMONT BUSINESS PARK FILING NO. 2" ON PAGES 39 AND 41, RESPECTIVELY.



VICINITY MAP  
N.T.S.

**LEGEND**

- BASIN DESIGNATION
- ACRES
- 1 SURFACE DESIGN POINT
- BASIN BOUNDARY
- (7070) EXIST MAJ CONT
- (7072) EXIST MIN CONT
- EXISTING FLOW DIRECTION ARROW
- H.P. X HIGH POINT
- L.P. X LOW POINT
- PROPOSED SWALE
- EXISTING SWALE
- CONSTRUCTION/DISTURBANCE LIMITS
- SITE BOUNDARY
- R.O.W./EASEMENT
- LOT LINE
- ST EX. STORM SEWER LINE
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- SS EX. SANITARY SEWER LINE
- WL EX. WATER LINE
- ST EX. STORM SEWER LINE
- 9 LOT NUMBER
- (CV) EX. IRRIGATION VALVE
- (SI) EX. STORM INLET
- (G) EX. GAS TEST NODE
- (T) EX. TELEPHONE PEDESTAL
- (EV) EX. ELECTRIC VAULT
- (SM) EX. SANITARY MANHOLE
- (WV) EX. WATER VALVE

BASIN I.D.	AREA (ACRES)	Q5 (CFS)	Q100 (CFS)
C	3.99	0.9	6.3
A	11.02	1.5	11.1
B	17.31	2.0	14.5
OS-1	1.28	5.8	10.5
OS-2	4.98	8.7	19.6
EX-A2**	0.59	2.5	4.5
OS-A**	1.29	3.1	6.0
E2*	3.86	15.1	28.6

DESIGN POINT	Q5	Q100	BASIN(S)/FLOWBYS	OUTFALL
1	14.2	26.5	E2, EX-A2	EXIST 10' CDOT TYPE R AT GRADE INLET
2	3.1	6.0	OS-A	EXIST 10' CDOT TYPE R AT GRADE INLET
3	9.8	22.5	OS-1, FB-DP1	END OF PAVEMENT
4	7.1	25.5	A, FB-DP2, DP3	DISCHARGE TO ADJACENT PARCEL (LOT 1)
5	5.0	14.5	B	DISCHARGE TO ADJACENT PARCEL (LOT 2)
6	0.9	6.3	C	DISCHARGE TO CDOT ROW
7	9.9	28.0	OS2, DP6	CDOT BARROW DITCH

EXISTING DRAINAGE MAP  
CROSSROADS MIXED USE  
JOB NO. 18-003  
DATE PREPARED: FEBRUARY 23, 2021  
DATE REVISED:

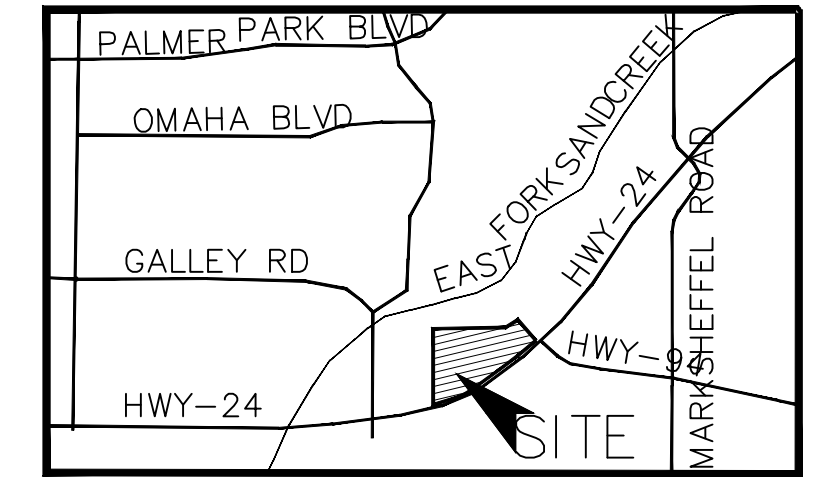




# CROSSROADS MIXED USE PROPOSED CONDITIONS DRAINAGE MAP

EXISTING MEADOWBROOK  
CROSSING FILING NO. 1  
REC. #218714112

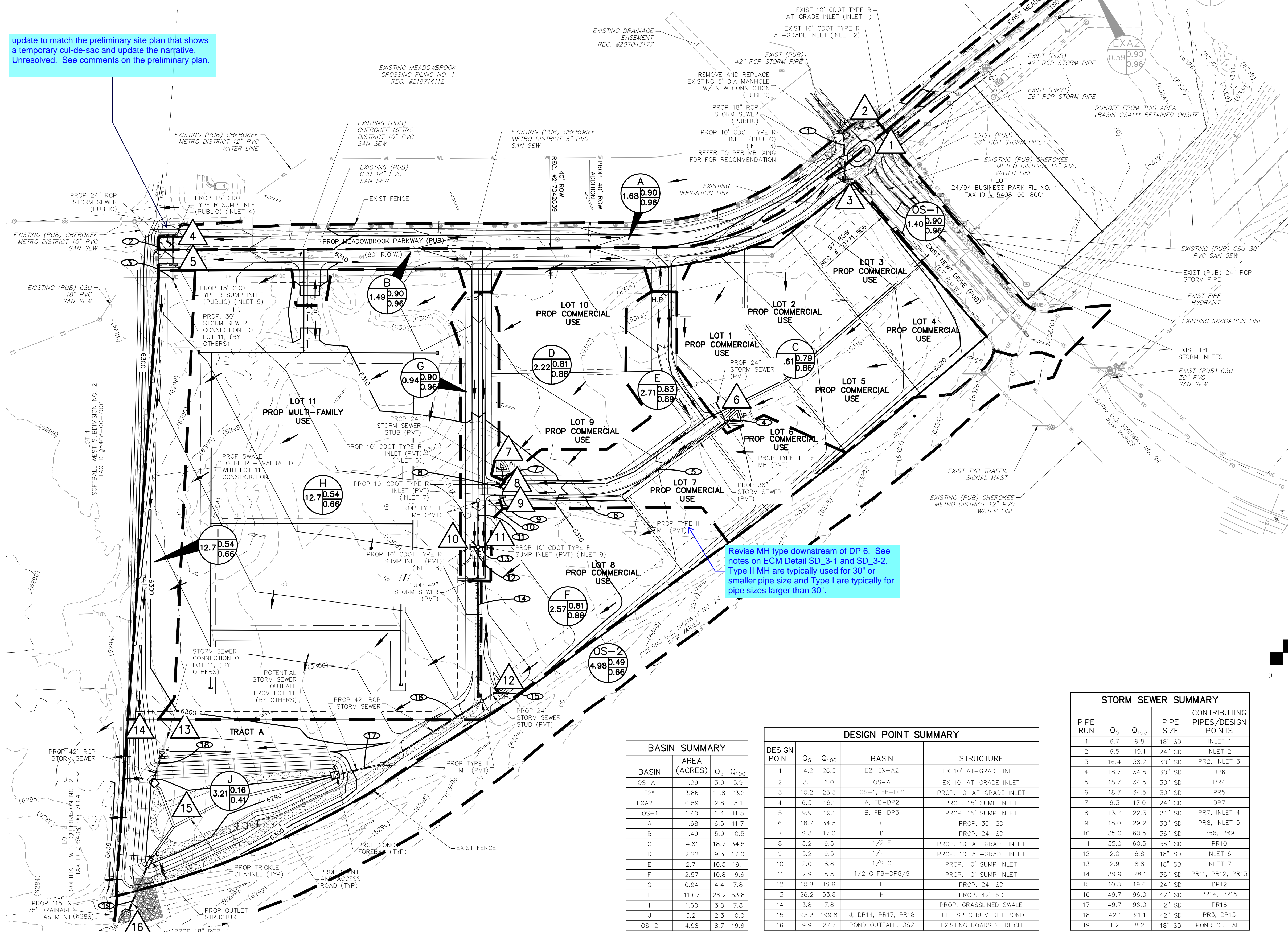
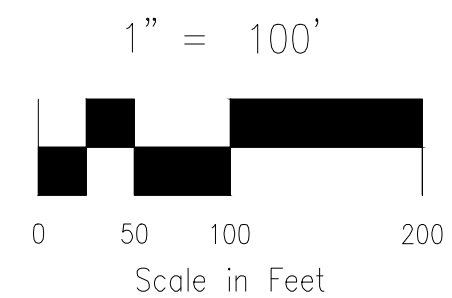
update to match the preliminary site plan that shows a temporary cul-de-sac and update the narrative. Unresolved. See comments on the preliminary plan.



VICINITY MAP  
N.T.S.

### LEGEND

- BASIN DESIGNATION
- ACRES
- 1 SURFACE DESIGN POINT
- BASIN BOUNDARY
- PROP MAJ CONT
- PROP MIN CONT
- EXIST MAJ CONT
- EXIST MIN CONT
- PROPOSED STORM SEWER PIPE
- H.P. HIGH POINT
- L.P. LOW POINT
- PROPOSED SWALE
- EXISTING SWALE
- SITE BOUNDARY
- R.O.W./EASEMENT
- LOT LINE
- ST STORM SEWER LINE
- UE EX. UNDERGROUND ELECTRIC LINE
- SS EX. SANITARY SEWER LINE
- WL EX. WATER LINE
- ST EX. STORM SEWER LINE
- 9 LOT NUMBER
- EX. IRRIGATION VALVE
- EX. STORM INLET
- EX. GAS TEST NODE
- EX. TELEPHONE PEDESTAL
- EX. ELECTRIC VAULT
- EX. SANITARY MANHOLE
- EX. WATER VALVE
- PROPOSED RIPRAP
- EMERGENCY OVERTFLOW DIRECTION



Revise MH type downstream of DP 6. See notes on ECM Detail SD\_3-1 and SD\_3-2. Type II MH are typically used for 30" or smaller pipe size and Type I are typically for pipe sizes larger than 30".

BASIN SUMMARY				
BASIN	AREA (ACRES)	Q <sub>s</sub>	Q <sub>100</sub>	
OS-A	1.29	3.0	5.9	
E2*	3.86	11.8	23.2	
EXA2	0.59	2.8	5.1	
OS-1	1.40	6.4	11.5	
A	1.68	6.5	11.7	
B	1.49	5.9	10.5	
C	4.61	18.7	34.5	
D	2.22	9.3	17.0	
E	2.71	10.5	19.1	
F	2.57	10.8	19.6	
G	0.94	4.4	7.8	
H	11.07	26.2	53.8	
I	1.60	3.8	7.8	
J	3.21	2.3	10.0	
OS-2	4.98	8.7	19.6	

DESIGN POINT SUMMARY				
DESIGN POINT	Q <sub>s</sub>	Q <sub>100</sub>	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	PROP. 10' AT-GRADE INLET
4	6.5	19.1	A, FB-DP2	PROP. 15' SUMP INLET
5	9.9	19.1	B, FB-DP3	PROP. 15' SUMP INLET
6	18.7	34.5	C	PROP. 36" SD
7	9.3	17.0	D	PROP. 24" SD
8	5.2	9.5	1/2 E	PROP. 10' AT-GRADE INLET
9	5.2	9.5	1/2 E	PROP. 10' AT-GRADE INLET
10	2.0	8.8	1/2 G	PROP. 10' SUMP INLET
11	2.9	8.8	1/2 G FB-DP8/9	PROP. 10' SUMP INLET
12	10.8	19.6	F	PROP. 24" SD
13	26.2	53.8	H	PROP. 24" SD
14	3.8	7.8	I	PROP. GRASSLINED SWALE
15	95.3	199.8	J, DP14, PR17, PR18	FULL SPECTRUM DET POND
16	9.9	27.7	OS2	EXISTING ROADSIDE DITCH

STORM SEWER SUMMARY				
PIPE RUN	Q <sub>s</sub>	Q <sub>100</sub>	PIPE SIZE	CONTRIBUTING PIPES/DESIGN POINTS
1	6.7	9.8	18" SD	INLET 1
2	6.5	19.1	24" SD	INLET 2
3	16.4	38.2	30" SD	PR2, INLET 3
4	18.7	34.5	30" SD	DP6
5	18.7	34.5	30" SD	PR4
6	18.7	34.5	30" SD	PR5
7	9.3	17.0	24" SD	DP7
8	13.2	22.3	24" SD	PR7, INLET 4
9	18.0	29.2	30" SD	PR8, INLET 5
10	35.0	60.5	36" SD	PR6, PR9
11	35.0	60.5	36" SD	PR10
12	2.0	8.8	18" SD	INLET 6
13	2.9	8.8	18" SD	INLET 7
14	39.9	78.1	36" SD	PR11, PR12, PR13
15	10.8	19.6	24" SD	DP12
16	49.7	96.0	42" SD	PR14, PR15
17	49.7	96.0	42" SD	PR16
18	42.1	91.1	42" SD	PR3, DP13
19	1.2	8.2	18" SD	POND OUTFALL

\*REFER TO FDR FOR CLAREMONT BUSINESS PARK FILING NO. 2 FOR CONTRIBUTING BASIN GEOMETRY

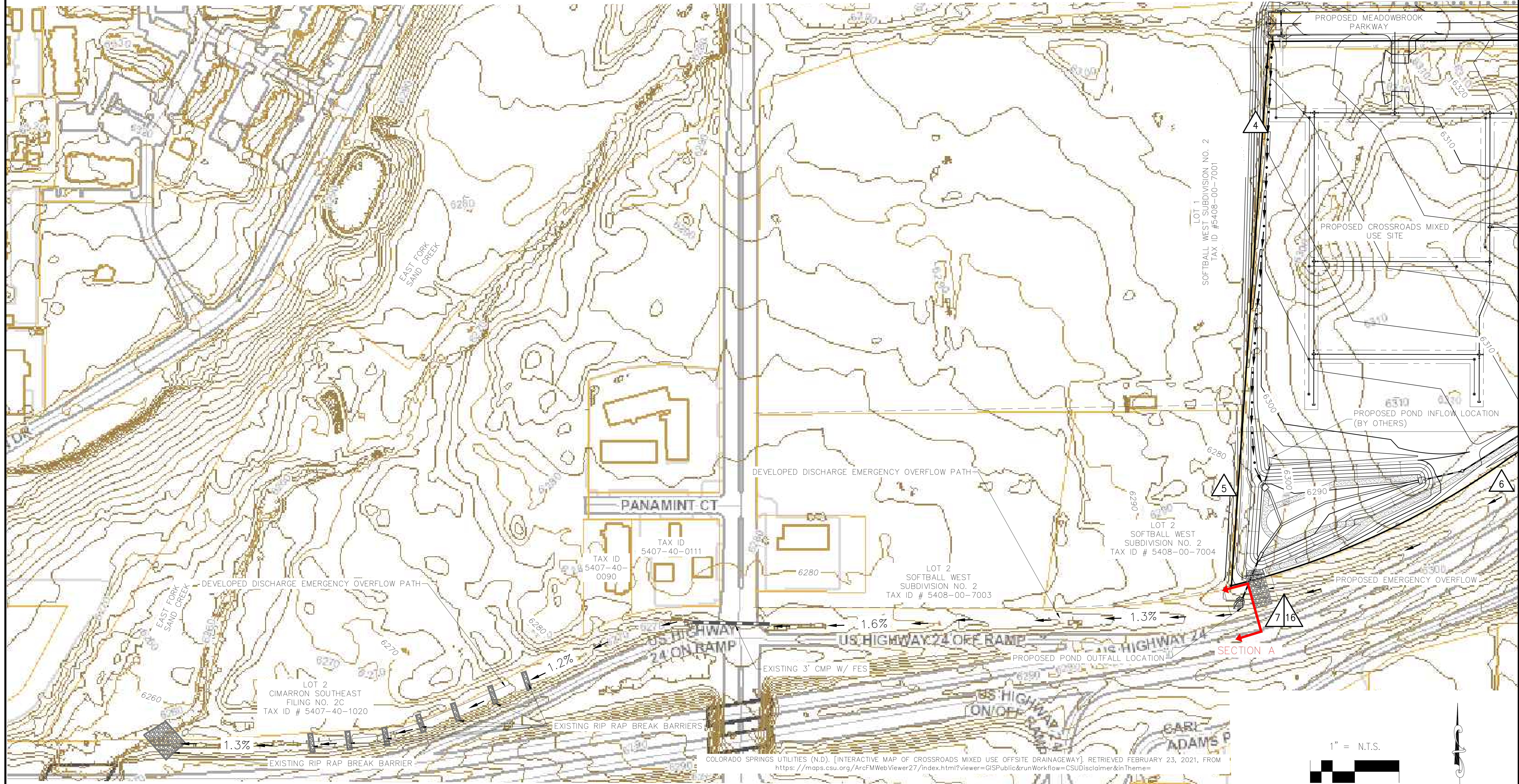


102 E PIKES PEAK AVE, SUITE 500  
COLORADO SPRINGS, CO 80903  
PHONE: 719.955.5485



# CROSSROADS MIXED USE

DRAINAGEWAY EXHIBIT  
FEBRUARY 2021



### LEGEND

- SURFACE DESIGN POINT
- SITE BOUNDARY
- EXISTING RIP RAP BARRIERS
- PROPOSED CONTOUR
- EXISTING CONTOUR
- PROPOSED WATER FITTING
- EXISTING FLOW ARROW
- EXISTING DITCH SLOPE
- EXISTING STORM SEWER AND FES
- PROPOSED STORM SEWER
- R.O.W./EASEMENT
- PROPOSED SWALE
- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED SEWER LINE
- PROPOSED WATER LINE
- PROPOSED EMERGENCY OVERFLOW DIRECTION

### HISTORIC DESIGN POINT SUMMARY

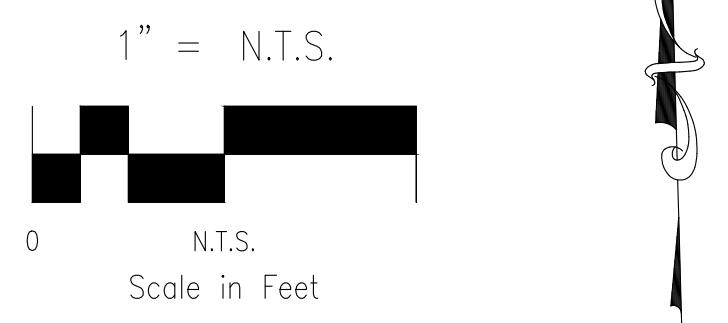
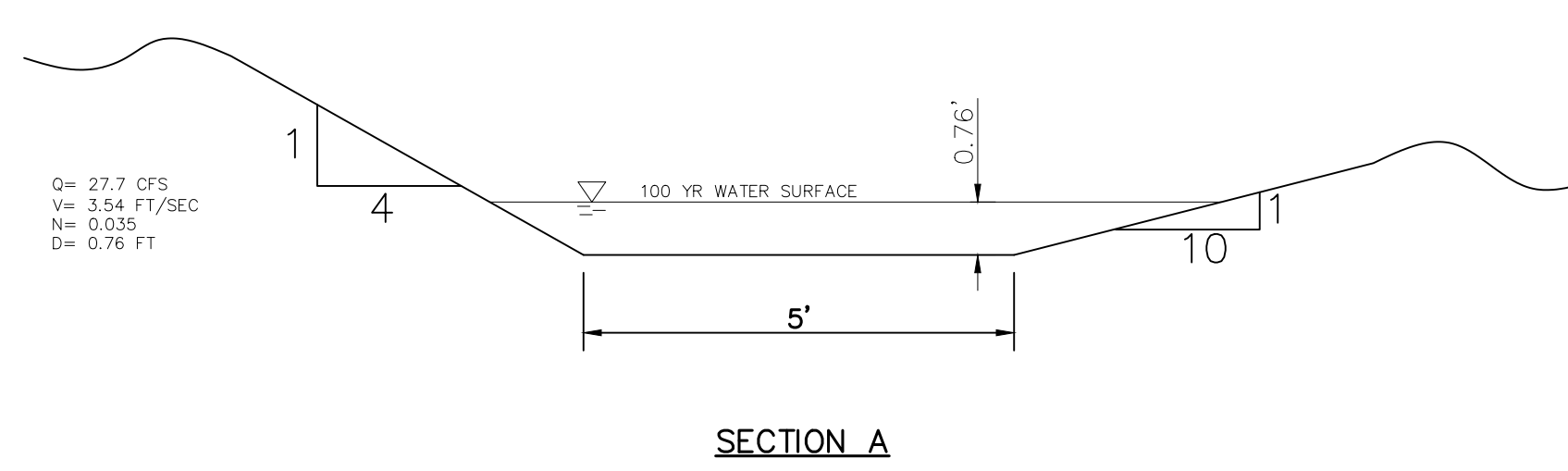
DESIGN POINT	Q5 (CFS)	Q100 (CFS)
4	7.4	27.7
5	8.3	18.2
6	1.2	8.5
7	10.4	31.9

### PROPOSED DESIGN POINT SUMMARY

DESIGN POINT	Q5 (CFS)	Q100 (CFS)
4	0.0	0.0
5	0.0	0.0
6	0.0	0.0
16	9.9	27.7

### NOTES:

1.) REFER TO DRAINAGE MAPS IN PRELIMINARY DRAINAGE REPORT FOR CROSSROADS MIXED USE FOR DETAILED ON SITE FLOWS AS WELL AS HYDROLOGIC AND HYDRAULIC ANALYSES CORRESPONDING TO CHANGES FROM HISTORIC AND EXISTING CONDITIONS



PCD FILING NO: SP-20-011

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

File: C:\18003A-Crossroads Mixed Use\Colorado Springs Equities LLC\eng\Exhibits\18-003 Drainage Way Exhibit.dwg Plotstamp: 2/24/2021 11:46 AM



# drainage V\_2 engr comments.pdf Markup Summary

dsdlaforce (17)

x. A roadway in accordance with that required to make the connection to the area shown that of the existing and Q100+13.5 cfs) will continue to flow.

Madisonbrook. Runoff within this from DP2. A proposed 10' ramp d flows from leaving the roadway 9.1 (q100 100 yr flows with DP5)

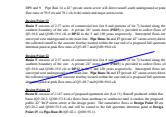
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identify the flow-by flow rate.

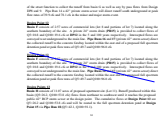


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Revise MH type downstream of DP 6. See notes on ECM Detail SD\_3-1 and SD\_3-2. Type II MH are typically used for 30" or smaller pipe size and Type I are typically for pipe sizes larger than 30".



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of 39.9 cfs and 78.1 cfs in the minor and major storm cve

Point 12  
consists of 2.57 acres of commercial lots (lot 8 and part a boundary of the site. A private 24" storm drain (PR15 1 and Q100+7.8 cfs at DP12 in the 5 and 100 years eqe d race underground to the main line. Pipe Run 16 and 17 shed runoff to the concrete forebay located within the east a pond to peak flow rates of 67.5 cfs (500) and 100 cfs.

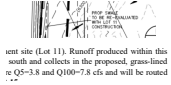
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Delete duplicate

Point 14  
consists of 1.60 acres of proposed apartment site (L- 3.8, Q100+7.8 cfs) flows from north to south and cumulative flows at Design Point 14 are Q50+5.8 a spectrum duration pond at Design Point 15.

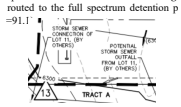
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Include a narrative regarding the swale and lot 11 site plan



sent site (Lot 11). Runoff produced within this south and collects in the proposed, grass-lined re Q05-3.8 and Q100-7.8 cfs and will be routed

**Subject:** Image  
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routed to the full spectrum detention p

**Subject:** Image  
**Page Label:** 14  
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public 42" RCP storm sewer at the design Q05-26.2 and Q100-53.8 cfs and will be r

Page 15 via Pipe Run 18 (Q05-42.1, Q100-

include a narrative regarding the following notes on the drainage map.

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include a narrative regarding the following notes on the drainage map.



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This should be under DP3

approximately 42.10 acres of tributary area b quality event, 3306 acre feet of storage at the the 100-year event. The 25' wide emergency 100-year event. This spillway safety conveyer clogging or failure, and will be armored with that the FSD pond remains functional in the 1

update. Missing decimal point.

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update. Missing decimal point.

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