PRELIMINARY DRAINAGE PLAN

LORSON RANCH EAST

JUNE 30, 2017

PUD SP-16-003

Prepared for:

Lorson, LLC
212 N. Wahsatch Ave, Suite 301
Colorado Springs, Colorado 80903
(719) 635-3200

Prepared by:

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Project No. 100.040

CORE
ENGINEERING GROUP

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ENGINEER'S STATEMENT

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

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

OWNER'S STATEMENT

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

Lorson, LLC Date

By
Jeff Mark

Title
Manager

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

FLOODPLAIN STATEMENT

To the best of my knowledge and belief, this development is located within a designated floodplain as shown on Flood Insurance Rate Map Panel No. 08041C0957 F and 08041C1000 F, dated March 17, 1997 and modified by modified per LOMR Case No. 14-08-0534P. (See Appendix A, FEMA FIRM Exhibit)

Richard L. Schindler, #33997 Date

EL PASO COUNTY

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

Jennifer Irvine Date
County Engineer/ECM Administrator

Conditions: _____

1.0 LOCATION and DESCRIPTION

Lorson Ranch East is located east of the East Tributary of Jimmy Camp Creek. The site is located on approximately 275 acres of vacant land. Future plans are to develop this site into single-family residential developments. Also included in this report and plan is the proposed layout for Lorson Ranch East which is located east of the East Tributary of Jimmy Camp Creek. The land is currently owned by Lorson LLC or its nominees for Lorson Ranch.

The site is located in the West 1/2 of Sections 14 & 23, South ½ of Section 13, and the North ½ of Section 24, Township 15 South and Range 65 West of the 6th Principal Meridian. The property is bounded on the north by un-platted land in Banning Lewis Ranch and Rolling Hills Ranch, on the east by unplatted land and a 325' electric easement in Lorson Ranch, the west by The East Tributary of Jimmy Camp Creek, and the south by unplatted land in Lorson Ranch. For reference, a vicinity map is included in Appendix A of this report.

Conformance with applicable Drainage Basin Planning Studies

There is an existing (unapproved) DBPS for Jimmy Camp Creek prepared by Wilson & Company in 1987, adopted by El Paso County, and is referenced in this report. The only major drainage improvements for this study area according to the 1987 Wilson study was the reconstruction of the East Tributary of Jimmy Camp Creek (East Tributary). In 2014 a portion of the East Tributary was reconstructed from Fontaine Boulevard south 2,800 feet in accordance with the 1987 study. This section of the East Tributary included a trapezoidal channel section with 6:1 side slopes and a sand bottom. On March 9, 2015 a new DBPS for Jimmy Camp Creek and the East Tributary was completed by Kiowa Engineering. The Kiowa Engineering DRBS has been adopted by the City of Colorado Springs and partially adopted by El Paso County for the entire Jimmy Camp Creek Basin, including the East Tributary and the full spectrum detention pond requirements. El Paso county has not approved the drainage fees detailed in the Kiowa DBPS so current county drainage/bridge fees apply to this development. Per the Kiowa DBPS the preferred channel improvements include selective channel armoring with a low flow channel for the East Tributary. All remaining channel improvements are reimbursable against drainage fees for future development within the study area. The only major infrastructure not shown in the Kiowa DBPS is the future bridge for Fontaine Boulevard and Lorson Boulevard on the East Tributary. The Fontaine Boulevard bridge is considered to be reimbursable since it is shown on the El Paso County 2060 Major Thoroughfare Plan as a Principal Arterial roadway. Lorson Boulevard bridge is not considered reimbursable.

See MDDP comments

Conformance with applicable Master Development Drainage Plans (MDDP's)

As part of this PUD/Preliminary Plan submittal for Lorson Ranch East a MDDP has been prepared in conjunction with this Preliminary Drainage report. The recommendations in the MDDP for Lorson Ranch East have been incorporated into this drainage report. The main recommendations include full spectrum detention for ponds and the East Tributary of Jimmy Camp Creek must be armored in the northern portion of the preliminary plan.

Reconstruction of the East Tributary of Jimmy Camp Creek

The Kiowa DBPS shows the East Tributary to be protected using selective armoring (soil rip rap) at the outside stream bends (500' minimum radius) and a stabilized low flow channel. The East Tributary can be divided into three different sections, south, middle, and north. The first section (south) is from the south property line east and north to design point ET-3 (see drainage map) and is roughly 2,900 feet in length. The south section is not adjacent to this preliminary plan and will be addressed in the future as adjacent development occurs. The middle section is from Design Point ET-3 north 2,800 feet to the future extension of Fontaine Boulevard. The channel for this section was reconstructed and stabilized in 2014 in accordance with the 1987 Wilson DBPS. The only infrastructure left to construct are the bridges over the creek at Fontaine Boulevard and Lorson Boulevard. LOMR Case No. 14-08-0534P was approved by FEMA for this middle section. The northern section is from Fontaine Boulevard and extends north to the north property line. The north section will be protected per the Kiowa DBPS during the first phase of development east of the East Tributary. The channel consists of a stabilized low flow

constructed?

Include approved report in Appendix.
Discuss all actual plan improvements.

channel and soil rip rap armored outer bends. Kiowa Engineering has submitted construction plans and a separate drainage report to El Paso County for this section of creek including bridges for Lorson Boulevard and Fontaine Boulevard. A CLOMR for the creek and bridge construction is currently submitted to FEMA. The 100-year flow rate for design is 4,750cfs for this section.

range?

Lorson Ranch East is located within the ***"Jimmy Camp Creek Drainage Basin"***, which is a fee basin and is part of the "Jimmy Camp Creek Drainage Basin Planning Study", prepared by Kiowa Engineering Corp., Colorado Springs, CO.

2.0 DRAINAGE CRITERIA

The supporting drainage design and calculations were performed in accordance with the City of Colorado Springs and El Paso County "Drainage Criteria Manual (DCM)", dated November, 1991, the El Paso County "Engineering Criteria Manual", Chapter 6 and Section 3.2.1 Chapter 13 of the City of Colorado Springs Drainage Criteria Manual dated May 2014, and the UDFCD "Urban Storm Drainage Criteria Manual" Volumes 1, 2 and 3 for inlet sizing and full spectrum ponds. No deviations from these published criteria are requested for this site. The proposed improvements to the Lorson Ranch Development will be in substantial compliance with the "Jimmy Camp Creek Drainage Basin Planning Study", prepared by Kiowa Engineering Corp., Colorado Springs, CO.

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

Current updates to the Drainage Criteria manual for El Paso County states the if detention is necessary, Full Spectrum Detention will be included in the design, based on this criteria, Full Spectrum Detention will be required for this development

Why?

3.0 EXISTING HYDROLOGICAL CONDITIONS

The site is currently undeveloped with native vegetation (grass with no shrubs) and moderate to steep slopes in a westerly direction the East Tributary of Jimmy Camp Creek.

Since the majority of this site will consist of import material, soil type C/D has been assumed for the hydrologic conditions. See Appendix A for SCS Soils Map.

The Soil Conservation Service (SCS) classifies the soils within the Lorson Ranch East property as Ascalon sandy loam (4%); Manzanola clay loam (17%); Midway clay loam (5%): Nelson-Tassel fine Sandy loam (50%); Razor clay loam (10%); and Wiley silt loam (13%) [3]. The sandy and silty loams are considered hydrologic soil group B soils with moderate to moderately rapid permeability. The Midway and Razor clay loams are considered hydrologic soil group C soils with slow permeability. All of these soils are susceptible to erosion by wind and water, have low bearing strength, moderate shrink-swell potential, and high frost heave potential (see table 3.1 below). The clay loams are difficult to vegetate and comprise of a small portion of the study area. These soils can be mitigated easily by limiting their use as topsoil since they comprise of a small portion of the study area. Weathered will be encountered beneath some of the site but it can be excavated using conventional techniques.

Table 3.1: SCS Soils Survey

Soil	Hydro. Group	Shrink/Swell Potential	Permeability	Surface Runoff Potential	Erosion Hazard
2-Ascalon Sandy Loam - (4%)	B	Moderate	Moderate	Slow to Medium	Moderate
3-Ascalon Sandy Loam - (9%)	B	Moderate	Moderate	Slow to Medium	Moderate
52-Manzanola Clay Loam (17%)	C	High	Slow	Medium	Moderate
54-Midway Clay Loam (5%)	C	High	Slow	Medium to Rapid	Moderate to High
56-Nelson – Tassel Fine Sandy Loam (50%)	B	Moderate	Moderately Rapid	Slow	Moderate
75-Razor Clay Loam (10%)	C	High	Slow	Medium	Moderate
108-Wiley Silt Loam (13%)	B	Moderate	Moderate	Medium	Moderate

Excerpts from the SCS "Soil Survey of El Paso County Area, Colorado" [2] are provided in ***Appendix A*** for further reference.

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

An existing electrical easement, within existing transmission towers, runs through the center of this portion of the development and will be set aside as open space. It is the intent of this master development drainage plan to utilize some of the open space under the towers for detention of storm flows.

PDR

The FMIC (irrigation canal) that runs parallel with the East Tributary through this site was decommissioned in 2006 and for the purpose of existing drainage calculations the canal was ignored and all flow was assumed to flow to the East Tributary.

canal to be filled...

Portions of the site are located within the delineated 100-year floodplain of the East Tributary of Jimmy Camp Creek per the Federal Emergency Management Agency (FEMA) Flood Rate Insurance Map (FIRM) number 08041C0957 F & 08041C1000 F, effective 17 March 1997 [2]. Floodplain along the East Tributary was modified per LOMR Case No. 14-08-0534P (see appendix). Floodplain designations include Zone AE and Zone X within the property boundary. A portion of this map is provided in ***Appendix A*** for reference.

CLOMR in progress...

The existing basins for this large site were taken from the Lorson Ranch East MDDP East of the East Tributary. A map has been included in the appendix.

Basin EX-A1
This 4.28 acre basin is in the northwest corner of the site and includes part of the East Tributary. Under existing conditions, this area contributes 1.1 cfs and 8.0 cfs to the East Tributary for 5-year and 100-year events respectively. This basin comprises of the East Tributary and will not be developed in the future.

Overall Basin EX-C flows to Design Point 2
This is the largest existing basin at 452.97 acres which includes approximately the northern half of the site. This basin is an overall existing basin including Basins EX-C1 to EX-C10. There are two offsite basins (OS-C6.1 and OS-C5.1) which flow onto the site from the north and east and are included in the flow at Design Point 2. Under existing conditions, this basin contributes 141.0 cfs and 458.0 cfs for the 5-year and 100-year events respectively at Design Point 2. Design Point 2 is located at the East Tributary and all flow is routed to the East Tributary in an existing swale that is eroded and is not armored.

Overall Basin EX-D flows to Design Point 3
Overall Basin EX-D is located adjacent to and southwest of Basin Ex-C and is 109.55 acres in size. This basin is an overall existing on-site basin. The existing runoff of 29.7cfs and 166.5cfs for the 5-year and 100-year events at Design Point 3 respectively and flows directly overland into the East Tributary.

Overall Basin EX-E flows to Design Point 4
Overall Basin EX-E is located adjacent to and southwest of Basin Ex-D and is 186.30 acres in size. Overall Basin EX-E is the second largest historic basin at 186.30 acres and includes on-site flow (Basins EX-E1 to EX-E3) and offsite flows (Basin OS-E1.1 and OS-E2.1) from the Peaceful Valley Estates subdivision to the south. Under existing conditions, this overall basin contributes 104.0 cfs and 286.0 cfs for the 5-year and 100-year events respectively at Design Point 4 and flows directly overland into the East Tributary.

4.0 DEVELOPED HYDROLOGICAL CONDITIONS

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

The time of concentration for each basin and sub-basin was developed using an overland, ditch, street and pipe flow components. The maximum overland flow length for developed conditions was limited to 100 feet. Travel time velocities ranged from 2 to 6 feet per second. The travel time calculations are included in the back of this report.
Runoff coefficients for the various land uses were obtained from the City of Colorado Springs/El Paso County Drainage Criteria Manual.

The hydrology analysis necessary for sizing the storm sewer system is preliminary only and will be finalized when the construction documents are prepared.

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

Overall Basin C
Overall Basin C includes all of the “C” basins that drain to Pond C5. This basin was included to provide sizing data to design Pond C5 in the full spectrum worksheets. The total size of this basin is 171 acres and comprises of residential development. There is runoff from a future school site which has been included for water quality in Pond C5. The future school site will be required to detain runoff to existing flow rates to several storm outfall points provided on Lamprey Drive and Fontaine Boulevard.

Overall Basin D

Overall Basin D includes all of the "D" basins that drain to Pond D2. This basin was included to provide sizing data to design Pond D2 in the full spectrum worksheets. The total size of this basin is 72 acres and comprises of residential development.

Overall Basin E

Overall Basin E is located south of Lorson Boulevard and comprises of residential development. According to the MDDP this basin drains to Pond E2 and will include more future development in Lorson Ranch. We are recommending that an interim pond be built at Pond E2 to detain runoff from development within the basin. This pond will treat runoff from Overall Basin E for water quality.

Basin A1

Basins A1 consists of flow from backyards and the East Tributary of Jimmy Camp Creek. Runoff is directed north to the East Tributary of Jimmy Camp Creek. See the appendix for detailed calculations

Basin C12

Basin C12 consists of future residential development located South of Tolt Drive and Lamprey Drive. Runoff will be directed north in the future curb/gutter to Design Point 2 in Tolt Drive. The future peak developed flow from this basin is 33.0cfs and 73.5cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C13

Basin C13 consists of future school site NE of Lamprey Drive and Fontaine Boulevard. Runoff will be directed west internally to a 30" storm sewer stub from Lamprey Drive at Design Point 6c. The peak developed flow from this basin will be required to be detained to pre-development conditions on the school site with a release rate not to exceed 7.6cfs and 40.5cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C13.1

Basin C13.1 consists of runoff from Lamprey Drive on the south side. Runoff will be directed west in the curb/gutter to Design Point 6b in Lamprey Drive where it will be collected by a Type R inlet. The developed flow from this basin is 6.4cfs and 11.5cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C14

Basin C14 consists of runoff from Fontaine Bouevard on the north side. Runoff will be directed west in the curb/gutter to Design Point 33 in Lamprey Drive where it will be collected by a Type R inlet. The developed flow from this basin is 6.6cfs and 13.6cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C14.1

Basin C14.1 consists of runoff from the future school site to Fontaine Bouevard on the north side. Runoff will be directed south internally to Design Point 19c in Fontaine Boulevard where it will be collected by a Type R inlet. The peak developed flow from this basin will be required to be detained to pre-development conditions on the school site with a release rate not to exceed 2.4cfs and 12.8cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C14.2

Basin C14.2 consists of runoff from Fontaine Bouevard on the north side. Runoff will be directed in the curb/gutter to Design Point 19c in Fontaine Boulevard where it will be collected by a Type R inlet. The developed flow from this basin is 5.8cfs and 11.7cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C15.1
Basin C15.1 consists of runoff from areas under the electric easement and residential development. Runoff will be directed west to Design Point 21 in a swale where it will be collected by a storm sewer. The developed flow from this basin is 6.9cfs and 22.1cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C15.2
Basin C15.2 consists of runoff from areas under the electric easement, MVEA substation, and residential development. Runoff will be directed west to Design Point 21 in a swale where it will be collected by a storm sewer. The developed flow from this basin is 7.6cfs and 19.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C15.3-C15.4
These basins consist of runoff from residential development. Runoff will be directed north to Design Point 23 in curb/gutter where it will be collected by a Type R inlet on Tillamook Drive. The developed flow from these basins is 9.0cfs and 20.1cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C15.5
This basin consists of runoff from residential development. Runoff will be directed north to Design Point 24 in curb/gutter. The developed flow from these basins is 5.9cfs and 13.1cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C15.6
This basin consists of runoff from residential development and Rockcastle Drive. Runoff will be directed west in Rockcastle Drive. The developed flow from these basins is 3.3cfs and 7.4cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C15.7
This basin consists of runoff from residential development and Rockcastle Drive. Runoff will be directed west in Rockcastle Drive. The developed flow from these basins is 3.9cfs and 8.8cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C15.8
Basin C15.8 consists of runoff from Fontaine Boulevard on the south side, residential lots, Rockcastle Drive, and open space under the existing electric lines. Runoff will be directed north in the curb/gutter to Design Point 20 in Fontaine Boulevard where it will be collected by a Type R inlet. The developed flow from this basin is 5.2cfs and 13.4cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C15.9
Basin C15.9 consists of runoff from Fontaine Boulevard on the south side. Runoff will be directed west in the curb/gutter. The developed flow from this basin is 4.9cfs and 11.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C15.10
Basin C15.10 consists of runoff from Fontaine Boulevard on the south side, and residential lots. Runoff will be directed west in the curb/gutter to Design Point 29 at the SE corner of the Fontaine Boulevard/Lamprey Drive intersection where it will be collected by a Type R inlet. The developed flow from this basin is 1.2cfs and 2.7cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C15.11
These basins consist of runoff from residential development and Vedder/Rockcastle Drive. Runoff will be directed north to Design Point 25 in curb/gutter where it will be collected by a Type R inlet on Rockcastle Drive. The developed flow from these basins is 6.1cfs and 13.7cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C15.12
This basin consists of runoff from residential development and Rockcastle Drive. Runoff will be directed west in Rockcastle Drive to Design Point 25 where it will be collected by a Type R inlet. The developed flow from these basins is 1.2cfs and 2.6cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C15.13
Basin C15.13 consists of runoff from residential development and Vedder/Rockcastle Drive. Runoff will be directed north to Design Point 26 in curb/gutter where it will be collected by a Type R inlet on Rockcastle Drive. The developed flow from this basin is 4.5cfs and 10.1cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C15.14
These basins consist of runoff from residential development and Lamprey Drive. Runoff will be directed north to Design Point 29 in curb/gutter where it will be collected by a Type R inlet on Lamprey Drive. The developed flow from this basin is 2.9cfs and 6.4cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C15.15
These basins consist of runoff from residential development and Lamprey Drive. Runoff will be directed north to Design Point 30 in curb/gutter where it will be collected by a Type R inlet on Lamprey Drive. The developed flow from this basin is 7.2cfs and 16.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C16.1
Basin C16.1 consists of residential development located NE of Yamhill and Lamprey Drive. Runoff is directed southwest in curb/gutter in Mumford Drive and then south to Design Point 3 to a proposed Type “R” inlet in Yamhill Drive. The peak developed flow from this basin is 6.0cfs and 13.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C16.2
Basin C16.2 consists of residential development and Lamprey Drive. Runoff is directed west in curb/gutter in Lamprey Drive and to Design Point 3 to a proposed Type “R” inlet in Yamhill Drive. The peak developed flow from this basin is 3.6cfs and 7.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C16.3
Basin C16.3 consists of residential development located NE of Shavers Drive and Lamprey Drive. Runoff is directed southwest in curb/gutter in Mumford Drive and then south to Design Point 6a to a proposed Type “R” inlet in Shavers Drive. The peak developed flow from this basin is 3.6cfs and 7.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C16.4
Basin C16.4 consists of residential development located east of Shavers Drive on Lamprey Drive. Runoff is directed west in curb/gutter in Lamprey Drive and to Design Point 8 to a proposed Type “R” inlet in Shavers Drive. The peak developed flow from this basin is 1.7cfs and 3.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C16.5, C16.6, C16.7, C16.8, C16.9, C16.10
Basin C16.5-C16.10 consists of residential development located NE of Yamhill Drive and Lamprey Drive. Runoff is directed southwest in curb/gutter in Mumford Drive to Design Point 4 in Mumford Drive. See the appendix for detailed calculations for these basins.

Basin C16.11, C16.12, C16.13
Basin C16.11-C16.13 consists of residential development located NE of Napa Drive and Lamprey Drive. Runoff is directed southwest in curb/gutter in Mumford Drive to Type "R" inlet at Design Point 6 in Mumford Drive. See the appendix for detailed calculations for these basins.

Basin C16.14 & C16.15
Basin C16.14 & C16.15 consist of residential development located north of Shavers Drive and Lamprey Drive. Runoff is directed southwest in curb/gutter in Mumford Drive to Design Point 6a and Design Point 7 to a proposed Type "R" inlet in Shavers Drive. See the appendix for detailed calculations.

Basin C16.16 & C16.17
Basin C16.16 & C16.17 consist of residential development located NE of Clarion Drive and Lamprey Drive. Runoff is directed southwest in curb/gutter in Lamprey Drive to a proposed Type "R" inlet in Clarion Drive at Design Point 10. See the appendix for detailed calculations.

Basin C16.18
Basin C16.18 consists of residential development located North of Clarion Drive and Mumford Drive. Runoff is directed south in curb/gutter in Mumford Drive to Design Point 10a to a proposed Type "R" inlet in Mumford Drive. The peak developed flow from this basin is 5.5cfs and 12.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C16.19
Basin C16.19 consists of residential development located on Clarion Drive. Runoff is directed southwest in curb/gutter in Clarion Drive to Design Point 16 to a proposed Type "R" inlet in Wacissa Drive. The peak developed flow from this basin is 3.1cfs and 6.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C16.20, C16.21
Basins C16.20 and C16.21 consist of residential development located on Nash and Wacissa Drive. Runoff is directed southwest in curb/gutter in Nash and Wacissa Drive to Design Point 12a to a proposed Type "R" inlet in Nash Drive. See the appendix for detailed calculations

Basin C16.22 & C16.23
Basins C16.22 & C16.23 consist of residential development located on Nash Drive. Runoff is directed southwest in curb/gutter in Nash Drive to Design Point 12 to a proposed Type "R" inlet in Nash Drive. See the appendix for detailed calculations

Basin C16.25
Basins C16.25 consists of residential development located on Wacissa Drive. Runoff is directed south in curb/gutter in Wacissa Drive to Design Point 17 to a proposed Type "R" inlet in Wacissa Drive. See the appendix for detailed calculations

Basin C16.26
Basins C16.26 consists of residential development located on Mumford Drive. Runoff is directed north in curb/gutter in Mumford Drive to Design Point 10b to a proposed Type "R" inlet at Mumford/Clarion Drive. See the appendix for detailed calculations

Basin C16.27
Basins C16.27 consists of residential development located on Mumford Drive. Runoff is directed north in curb/gutter in Mumford Drive to Design Point 10c to a proposed Type "R" inlet at Mumford/Clarion Drive. See the appendix for detailed calculations

Basin C16.28 & C16.29
Basins C16.28 & C16.29 consist of residential development located on Clarion, Wacissa, Zealand, Ballona Drive. Runoff is directed northwest in curb/gutter in Wacissa Drive to Design Point 16 to a proposed Type "R" inlet in Wacissa Drive. See the appendix for detailed calculations

Basin C16.30
Basins C16.30 consists of residential development located on Wacissa and Tarbell Drive. Runoff is directed south in curb/gutter in Wacissa Drive to Design Point 14 to a proposed Type "R" inlet in Wacissa Drive. See the appendix for detailed calculations

Basin C16.31
Basins C16.31 consists of backyards of houses on Wacissa Drive, East Tributary, and open space. Runoff is directed overland to the East Tributary. Water quality for the backyards is provided by the 150' wide existing open space/buffer between the lots and the East Tributary. See the appendix for detailed calculations

Basin C16.32
Basins C16.32 consists of residential development located on Wacissa and Mumford Drive. Runoff is directed north in curb/gutter in Wacissa Drive to Design Point 17 to a proposed Type "R" inlet. See the appendix for detailed calculations

Basin C16.33
Basins C16.33 consist of flow from Lamprey Drive and Fontaine Boulevard. Runoff is directed in curb/gutter in to a proposed Type "R" inlet in the NE corner of Fontaine Boulevard and Lamprey Drive at Design Point 33. See the appendix for detailed calculations

Basin C16.34
Basins C16.34 consists of flow from Lamprey Drive and the adjacent backyards. Runoff is directed south in curb/gutter in to a proposed Type "R" inlet in the NW corner of Fontaine Boulevard and Lamprey Drive at Design Point 34. See the appendix for detailed calculations

Basin C16.35
Basins C16.35 consists of flow from residential development and Fontaine Boulevard. Runoff is directed south and west in curb/gutter in to a proposed Type "R" inlet in the NE corner of Fontaine Boulevard and Edisto Drive at Design Point 35. See the appendix for detailed calculations

Basin C16.36
Basins C16.36 consists of flow from residential development and Pond C5. Runoff is directly tributary to Pond C5. See the appendix for detailed calculations

Basin C17.1
Basin C17.1 consists of residential development located in Weiser and Matta Drives. Runoff is directed northwest in curb/gutter to Design Point 38 to a proposed Type "R" inlet in Matta Drive. The peak developed flow from this basin is 5.9cfs and 13.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C17.1a
Basin C17.1a consists of residential development located in Weiser, Pigeon, and Aliso Drives. Runoff is directed north in curb/gutter to Design Point 28 to a proposed Type "R" inlet in Weiser Drive. The peak developed flow from this basin is 5.3cfs and 11.8cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C17.2
Basin C17.2 consists of residential development located in Chaplin, Pigeon, Aliso, and Matta Drives. Runoff is directed north in curb/gutter to Design Point 39 to a proposed Type "R" inlet in Matta Drive. The peak developed flow from this basin is 8.6cfs and 19.1cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C17.3
Basin C17.3 consists of residential development located in Lamine and Matta Drives. Runoff is directed north in curb/gutter to Design Point 40 to a proposed Type "R" inlet in Lamine Drive. The peak developed flow from this basin is 4.5cfs and 10.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C17.4
Basin C17.4 consists of residential development located in Matta Drive. Runoff is directed west in curb/gutter to Design Point 40 to a proposed Type "R" inlet in Lamine Drive. The peak developed flow from this basin is 3.2cfs and 7.1cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C17.5
Basin C17.5 consists of residential development and Fontaine Boulevard. Runoff is directed west in curb/gutter to Design Point 40 to a proposed Type "R" inlet in Lamine Drive. The peak developed flow from this basin is 6.7cfs and 22.1cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C17.6
Basin C17.6 consists of residential development located in Lamine Drive. Runoff is directed north in curb/gutter to Design Point 41 to a proposed Type "R" inlet in Lamine Drive. The peak developed flow from this basin is 1.9cfs and 6.1cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C17.7
Basin C17.7 consists of backyards of houses on Lamine Drive, East Tributary, and open space. Runoff is directed overland to the East Tributary. Water quality for the backyards is provided by the existing open space/buffer between the lots and the East Tributary. See the appendix for detailed calculations

Basin C17.8
Basin C17.8 consists of residential development and Fontaine Boulevard on the north side. Runoff is directed west in curb/gutter to Design Point 42 to a proposed Type "R" inlet in Fontaine Boulevard. The peak developed flow from this basin is 3.2cfs and 7.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C17.9
Basin C17.9 consists of existing residential development in Meadows 3 and Fontaine Boulevard. Runoff is directed in curb/gutter to Design Point 47 to a proposed Type "R" inlet in Fontaine Boulevard on the south side. The peak developed flow from this basin is 7.8cfs and 13.9cfs for the 5/100-year storm event. See the appendix for detailed calculations. This basin will flow north to existing Pond B1. Pond B1 has been sized for this flow per the Pioneer Landing Filing No. 2 Final drainage report.

Basin C17.10
Basin C17.10 consists of existing residential development in Pioneer Landing and Fontaine Boulevard. Runoff is directed in curb/gutter to Design Point 48 to a proposed Type "R" inlet in Fontaine Boulevard on the north side. The peak developed flow from this basin is 8.9cfs and 16.0cfs for the 5/100-year storm event. See the appendix for detailed calculations. This basin will flow north to existing Pond B1. Pond B1 has been sized for this flow per the Pioneer Landing Filing No. 2 final drainage report.

Basin D1.1 & D1.2
Basin D1.1 & D1.2 consists of residential development, Saco Drive, Weiser Drive, and Lamprey Drive. Runoff is directed south and west in curb/gutter to Design Point 50 to a proposed Type "R" inlet in Saco Drive on the south side. See the appendix for detailed calculations.

Basin D1.3
Basin D1.3 consists of residential development, Saco Drive, and Lamine Drive. Runoff is directed west and north in curb/gutter to Design Point 56 to a proposed Type "R" inlet in Lamine Drive. See the appendix for detailed calculations. The peak developed flow from this basin is 1.7cfs and 3.8cfs for the 5/100-year storm event.

Basin D1.4 & D1.5
Basin D1.4 & D1.5 consists of residential development. Runoff is directed south in curb/gutter to Design Point 52 in Chaplin Drive. See the appendix for detailed calculations.

Basin D1.6
Basin D1.6 consists of residential development, Yuba Drive, and Chaplin Drive. Runoff is directed south and west in curb/gutter to Design Point 53 to a proposed Type "R" inlet in Yuba Drive. See the appendix for detailed calculations. The peak developed flow from this basin is 8.4cfs and 18.7cfs for the 5/100-year storm event.

Basin D1.7
Basin D1.7 consists of residential development and Lamine Drive. Runoff is directed south in curb/gutter to Design Point 54 in Lamine Drive. See the appendix for detailed calculations. The peak developed flow from this basin is 7.0cfs and 15.5cfs for the 5/100-year storm event.

Basin D1.8
Basin D1.8 consists of residential development, Chaplin Drive, and Yuba Drive. Runoff is directed south and west in curb/gutter to Design Point 53 in Yuba Drive. See the appendix for detailed calculations. The peak developed flow from this basin is 3.2cfs and 7.1cfs for the 5/100-year storm event.

Basin D1.9 & D1.10
Basin D1.9 & D1.10 consists of residential development, Saco Drive, Lamine Drive, and Yuba Drive. Runoff is directed west in curb/gutter to Design Point 55 in Lamine Drive. See the appendix for detailed calculations.

Basin D1.11
Basin D1.11 consists of residential development and Lamine Drive. Runoff is directed south in curb/gutter to Design Point 56 to a proposed Type "R" inlet in Lamine Drive. See the appendix for detailed calculations. The peak developed flow from this basin is 2.6cfs and 5.8cfs for the 5/100-year storm event.

Basin D1.12
Basin D1.12 consists of residential development and Pond D2. Runoff is directly tributary to Pond D2. See the appendix for detailed calculations. The peak developed flow from this basin is 3.9 cfs and 15.4cfs for the 5/100-year storm event.

Basin D2.1 & D2.3
Basin D2.1 & D2.3 consists of residential development, open space under the electric easement, Vedder Drive, Lamprey Drive, and Lorson Boulevard. Runoff is directed south and west in curb/gutter to Design Point 59d in Lamprey Drive. See the appendix for detailed calculations.

Basin D2.2
Basin D2.2 consists of residential development and Tillamook Drive. Runoff is directed south in curb/gutter to Design Point 59a. See the appendix for detailed calculations. The peak developed flow from this basin is 2.1cfs and 4.7cfs for the 5/100-year storm event.

Basin D2.4
Basin D2.4 consists of residential development, Lorson Boulevard, and open space area under the electric easement. Runoff is directed west in curb/gutter in Lorson Boulevard to Design Point 59f. See the appendix for detailed calculations. The peak developed flow from this basin is 3.6cfs and 11.9cfs for the 5/100-year storm event.

Basin D2.5
Basin D2.5 consists of residential development, Skuna Drive, and Witcher Drive. Runoff is directed north in curb/gutter to Lorson Boulevard to Design Point 59f. See the appendix for detailed calculations. The peak developed flow from this basin is 8.8cfs and 19.6cfs for the 5/100-year storm event.

Basin D2.6 & D2.7
Basin D2.6 & D2.7 consists of residential development, Skuna Drive, Abita Drive, Witcher Drive, and Yocona Drive. Runoff is directed west in curb/gutter to Design Point 61 in Witcher Drive. See the appendix for detailed calculations.

Basin D2.8
Basin D2.8 consists of residential development, Volga Drive, and Witcher Drive. Runoff is directed west and south in curb/gutter to Design Point 62 in Volga Drive. The peak developed flow from this basin is 7.7cfs and 17.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.9
Basin D2.9 consists of residential development, Volga Drive, Trappe Drive, and Witcher Drive. Runoff is directed west and north in curb/gutter to Design Point 60 in Trappe Drive. The peak developed flow from this basin is 5.5cfs and 12.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.10
Basin D2.10 consists of Trappe Drive and adjacent areas. Runoff is directed north in curb/gutter in Trappe Drive to Design Point 64. See the appendix for detailed calculations. The peak developed flow from this basin is 1.9cfs and 5.0cfs for the 5/100-year storm event.

Basin D2.11
Basin D2.11 consists of runoff from Lorson Boulevard on the south side. Runoff is directed west in curb/gutter to Design Point 65a in Lorson Boulevard. The peak developed flow from this basin is 2.0cfs and 3.6cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.12
Basin D2.12 consists of runoff from residential development and Lorson Boulevard on the south side. Runoff is directed west in curb/gutter to Design Point 60 in Trappe Drive. The peak developed flow from this basin is 5.4cfs and 12.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.13
Basin D2.13 consists of runoff from Lorson Boulevard on the north side. Runoff is directed west in curb/gutter to Design Point 65b in Lorson Boulevard. The peak developed flow from this basin is 4.0cfs and 9.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin E1.1
Basin E1.1 consists of residential development and Skuna Drive. Runoff is directed south in curb/gutter in Skuna Drive to Design Point 66a. See the appendix for detailed calculations. The peak developed flow from this basin is 3.2cfs and 7.0cfs for the 5/100-year storm event.

Basin E1.2
Basin E1.2 consists of residential development, open space under the electric easement, Horton Drive, and Yocona Drive. Runoff is directed south in curb/gutter to Design Point 66d in Horton Drive. The peak developed flow from this basin is 7.3cfs and 16.1cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin E1.3
Basin E1.3 consists of residential development and open space under the electric easement. Runoff is directed south in a swale to Design Point 67b next to Trappe Drive. The peak developed flow from this basin is 4.7cfs and 21.7cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin E1.4
Basin E1.4 consists of residential development, Horton Drive, and Trappe Drive. Runoff is directed southwest in curb/gutter to Design Point 68 in Trappe Drive. The peak developed flow from this basin is 1.3cfs and 2.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin E1.5
Basin E1.5 consists of residential development, Horton Drive, Volga Drive, and Trappe Drive. Runoff is directed southwest in curb/gutter to Design Point 68 in Trappe Drive. The peak developed flow from this basin is 4.1cfs and 9.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin E1.6
Basin E1.6 consists of residential development and Trappe Drive. Runoff is directed north in curb/gutter to Design Point 69 in Trappe Drive. The peak developed flow from this basin is 4.5cfs and 10.1cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin E1.7
Basin E1.7 consists of residential development and Trappe Drive. Runoff is directed north in curb/gutter to Design Point 70 in Trappe Drive. See the appendix for detailed calculations. The peak developed flow from this basin is 4.7cfs and 13.3cfs for the 5/100-year storm event.

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

5.0 HYDRAULIC SUMMARY

The sizing of the hydraulic structures and detentions ponds were prepared by using the *StormSewers* and *Hydrographs* computer software programs developed by Intellisolve, which conforms to the methods outlined in the "City of Colorado Springs/El Paso County Drainage Criteria Manual". Street capacities and Inlets were sized by Denver Urban Drainage's xcel spreadsheet UD-Inlet.

It is the intent of this drainage report to use the proposed curb/gutter and storm sewer in the streets to convey runoff to detention and water quality ponds then to the East Tributary of Jimmy Camp Creek. Inlet size and location are preliminary only as shown on the storm sewer layout in the appendix. See Appendix C for detailed hydraulic calculations and the storm sewer model.

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

	Residential Local		Residential Collector		Principal Arterial	
Street Slope	5-year	100-year	5-year	100-year	5-year	100-year
0.5%	6.3	26.4	9.7	29.3	9.5	28.5
0.6%	6.9	28.9	10.6	32.1	10.4	31.2
0.7%	7.5	31.2	11.5	34.6	11.2	33.7
0.8%	8.0	33.4	12.3	37.0	12.0	36.0
0.9%	8.5	35.4	13.0	39.3	12.7	38.2
1.0%	9.0	37.3	13.7	41.4	13.4	40.2
1.4%	10.5	44.1	16.2	49.0	15.9	47.6
1.8%	12.0	45.4	18.4	50.4	18.0	50.4
2.2%	13.3	42.8	19.4	47.5	19.5	47.5
2.6%	14.4	40.7	18.5	45.1	18.5	45.1
3.0%	15.5	39.0	17.7	43.2	17.8	43.2
3.5%	16.7	37.2	16.9	41.3	17.0	41.3
4.0%	17.9	35.7	16.2	39.7	16.3	29.7
4.5%	19.0	34.5	15.7	38.3	15.7	38.3
5.0%	19.9	33.4	15.2	37.1	15.2	37.1

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

Design Point 1

Design Point 1 is located at the East Tributary of Jimmy Camp Creek on the north property line. A swale along the north property line will re-direct offsite runoff from Basin OS-C11 westward to the East Tributary so the lots are not burdened with offsite flows. The swale is a "V" swale, 2.5' deep, and at a minimum slope of 1%, and conveys the runoff from the 100-year storm event of 21cfs at a depth of 1.3' deep. The total flow is 9.4cfs and 21cfs in the 5/100-year storm events

Design Point 2
Design Point 2 is located at the south side of the intersection of Tolt Drive and Lamprey Drive.

This design point is sized to accommodate future flows from Basin C12 when it is developed as residential lots per the MDDP. A 30" RCP will be stubbed to this area to collect the flows. Future development will be required to construct storm sewer and inlets to collect runoff.. Flow from upstream tributary areas (non-developed) are calculated in Basin C12-ex. Detention Pond C2 and Pond C3 will need to be partially constructed to reduce the runoff from Basin C12-ex to 24.9cfs and 41.8cfs in the 5 & 100-year storm events

(5-year storm)
Tributary Basins: C12 **Inlet/MH Number:** n/a
Upstream flowby: 0 **Total Street Flow:**

Flow Intercepted: 33.0 cfs **Flow Bypassed:**
Inlet Size: n/a – storm sewer installed in future development

Street Capacity:

You can't detain undeveloped areas without a complete downstream channel flow analysis.

(100-year storm)
Tributary Basins: C12 **Inlet/MH Number:** n/a
Upstream flowby: 0 **Total Street Flow:**

Flow Intercepted: 40.5 cfs **Flow Bypassed:** 33.0 cfs to Inlet 6b
Inlet Size: n/a – storm sewer installed in future development

Comments: Street slope = 0.9%, capacity = 39.3cfs (half street) is okay

Design Point 3
Design Point 3 is located at the SE corner of Yamhill Drive and Mumford Drive

(5-year storm)
Tributary Basins: C16.1 & C16.2 **Inlet/MH Number:** Inlet DP3
Upstream flowby: 0cfs **Total Street Flow:** 8.9cfs

Flow Intercepted: 8.9 cfs **Flow Bypassed:** 0
Inlet Size: 10' Type R Inlet, sump

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

(100-year storm)
Tributary Basins: C16.1 & C16.2 **Inlet/MH Number:** Inlet DP3
Upstream flowby: 0 **Total Street Flow:** 20.1cfs

Flow Intercepted: 20.1 cfs **Flow Bypassed:** 0
Inlet Size: 15' Type R Inlet, sump

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

Design Point 4
Design Point 4 is located at the NW corner of Yamhill and Mumford Drive

(5-year storm)
Tributary Basins: C16.5 - C16.10 **Inlet/MH Number:** Inlet DP4
Upstream flowby: 0 **Total Street Flow:** 10.47cfs

Flow Intercepted: 9.67 cfs **Flow Bypassed:** 0.8cfs to Inlet DP6
Inlet Size: 15' Type R Inlet, on-grade

Street Capacity: Street slope = 1.0%, capacity = 9.0cfs, inlet needed

(100-year storm)
Tributary Basins: C16.5 - C16.10 **Inlet/MH Number:** Inlet DP4
Upstream flowby: 0 **Total Street Flow:** 21.88cfs

Flow Intercepted: 14.98 cfs **Flow Bypassed:** 6.9cfs to Inlet DP6
Inlet Size: 15' Type R Inlet, on-grade

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

Design Point 5
Design Point 5 is located at the SW corner of Yamhill and Mumford Drives. This is a small drainage basin that needs a 5' Type R inlet to drain the curb. The total flow is 0.3cfs and 0.6cfs in the 5/100 year storm events. For this report the tributary basin wasn't calculated but will need to be verified in the final drainage report.

Design Point 6
Design Point 6 is located at the NW corner of Napa Drive and Mumford Drive

(5-year storm)
Tributary Basins: C16.10-C16.13 **Inlet/MH Number:** Inlet DP6a
Upstream flowby: 0.8cfs **Total Street Flow:** 12.82cfs

Flow Intercepted: 11.05cfs **Flow Bypassed:** 1.77cfs to Inlet DP6a
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 2.5%, capacity = 14.1cfs, inlet needed

(100-year storm)
Tributary Basins: C16.10-C16.13 **Inlet/MH Number:** Inlet DP6a
Upstream flowby: 6.9cfs **Total Street Flow:** 32.62cfs

Flow Intercepted: 17.87cfs **Flow Bypassed:** 14.75cfs to Inlet DP6a
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 2.5%, capacity = 40.7cfs (half street) is okay

Design Point 6a
Design Point 6a is located at the SW corner of Shavers Drive and Mumford Drive

(5-year storm)
Tributary Basins: C16.15 **Inlet/MH Number:** Inlet DP6a
Upstream flowby: 1.77cfs **Total Street Flow:** 6.61cfs

Flow Intercepted: 5.71cfs **Flow Bypassed:** 0.9 cfs to Inlet DP8
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 9.0cfs, inlet needed

(100-year storm)
Tributary Basins: C16.15 **Inlet/MH Number:** Inlet DP6a
Upstream flowby: 14.75cfs **Total Street Flow:** 24.87cfs

Flow Intercepted: 11.17cfs **Flow Bypassed:** 13.7cfs to Inlet DP8
Inlet Size: 10' type R, on-grade

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

Design Point 6c
Design Point 6c is located at the east side of the intersection of Clarion Drive and Lamprey Drive at a low point. A 30" RCP will be stubbed to the school site to collect the flows from Basin C13 (school site). The school site will be required to construct on-site storm sewer/inlets and on-site detention ponds to collect/detain runoff. Water quality for Basin C13 will be provided in Pond C5. Runoff rates from this basin are required to be reduced to pre-developed flows of 7.6cfs in the 5-year and 40.5cfs in the 100-year storm events to the 30" RCP stub.

Design Point 6b
Design Point 6b is located at the east side of the intersection of Clarion Drive and Lamprey Drive at a low point in Lamprey Drive.

(5-year storm)
Tributary Basins: C13.1 **Inlet/MH Number:** Inlet DP6b
Upstream flowby: 0 cfs **Total Street Flow:** 6.8cfs

Flow Intercepted: 6.8cfs **Flow Bypassed:**
Inlet Size: 15' type R, sump

Street Capacity: Street slope = 1.5%, capacity = 11cfs

(100-year storm)
Tributary Basins: C13.1 **Inlet/MH Number:** Inlet DP6b
Upstream flowby: 33.0cfs **Total Street Flow:** 40.5cfs

Flow Intercepted: 20.3cfs **Flow Bypassed:** 20.2cfs to Inlet DP16
Inlet Size: 15' type R, sump

Street Capacity: Street slope = 1.5%, capacity = 44.1cfs (half street) is okay

Design Point 7

Design Point 7 is a small drainage basin (C16.14) that needs a 5' Type R inlet to drain the curb in the NW corner of Shavers Drive and Lamprey Drive. The total flow is 0.3cfs and 0.6cfs in the 5/100 year storm events. There are no bypass flows for this inlet.

Design Point 8

Design Point 8 is located at the NE corner of Shavers Drive and Lamprey Drive

(5-year storm)
Tributary Basins: C16.3-C16.4 **Inlet/MH Number:** Inlet DP8
Upstream flowby: 0.9cfs **Total Street Flow:** 6.2cfs

Flow Intercepted: 6.20cfs **Flow Bypassed:** 0
Inlet Size: 10' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 9.0cfs, inlet needed

(100-year storm)
Tributary Basins: C16.3-C16.4 **Inlet/MH Number:** Inlet DP8
Upstream flowby: 13.7cfs **Total Street Flow:** 25.2cfs

Flow Intercepted: 16.3cfs **Flow Bypassed:** 8.9cfs to Inlet DP10
Inlet Size: 10' type R, sump

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

Design Point 9

Design Point 9 is located at the intersection of Shavers Drive and Lamprey Drive and is the flow in the storm sewer. The total flow in the storm sewer is 75.68cfs/105.3cfs in the 5/100 year storm events.

Design Point 10

Design Point 10 is located at the NE corner of Clarion Drive and Mumford Drive

(5-year storm)
Tributary Basins: C16.16-C16.17 **Inlet/MH Number:** Inlet DP10
Upstream flowby: 0 cfs **Total Street Flow:** 6.0cfs

Flow Intercepted: 6.0cfs **Flow Bypassed:** 0 cfs
Inlet Size: 10' type R, sump

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

(100-year storm)
Tributary Basins: C16.16-C16.17 **Inlet/MH Number:** Inlet DP10
Upstream flowby: 8.9cfs **Total Street Flow:** 12.5cfs

Flow Intercepted: 12.5cfs **Flow Bypassed:** 8.5cfs to Inlet DP10a
Inlet Size: 10' type R, sump

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

Design Point 10a
Design Point 10a is located at the NW corner of Clarion Drive and Mumford Drive

(5-year storm)
Tributary Basins: C16.18 **Inlet/MH Number:** Inlet DP10a
Upstream flowby: **Total Street Flow:** 5.7cfs

Flow Intercepted: 5.7cfs **Flow Bypassed:** 0 cfs
Inlet Size: 15' type R, sump

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

(100-year storm)
Tributary Basins: C16.18 **Inlet/MH Number:** Inlet DP10a
Upstream flowby: 8.5cfs **Total Street Flow:** 20.7cfs

Flow Intercepted: 20.7cfs **Flow Bypassed:** 0cfs
Inlet Size: 15' type R, sump

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

Design Point 10b
Design Point 10b is located at the SE corner of Clarion Drive and Mumford Drive

(5-year storm)
Tributary Basins: C16.26 **Inlet/MH Number:** Inlet DP10b
Upstream flowby: **Total Street Flow:** 3.2cfs

Flow Intercepted: 3.2cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 0.7%, capacity = 7.5cfs

(100-year storm)
Tributary Basins: C16.26 **Inlet/MH Number:** Inlet DP10b
Upstream flowby: **Total Street Flow:** 6.9cfs

Flow Intercepted: 6.9cfs **Flow Bypassed:** 0
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 0.7%, capacity = 31.2cfs (half street) is okay

Design Point 10c
Design Point 10c is located at the SW corner of Clarion Drive and Mumford Drive

(5-year storm)
Tributary Basins: C16.27 **Inlet/MH Number:** Inlet DP10c
Upstream flowby: **Total Street Flow:** 0.6cfs

Flow Intercepted: 0.6cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 0.7%, capacity = 7.5cfs

(100-year storm)
Tributary Basins: C16.27 **Inlet/MH Number:** Inlet DP10c
Upstream flowby: 0 **Total Street Flow:** 1.3cfs

Flow Intercepted: 1.3cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 0.7%, capacity = 31.2cfs (half street) is okay

Design Point 11
Design Point 11 is located at the east side of Clarion Drive and Mumford Drive and is the flow in the storm sewer. The total flow in the storm sewer is 105.5cfs/154.8cfs in the 5/100 year storm events.

Design Point 12
Design Point 12 is located east of Wacissa Drive on the north side of Nash Drive.

(5-year storm)
Tributary Basins: C16.22-C16.23 **Inlet/MH Number:** Inlet DP12
Upstream flowby: **Total Street Flow:** 8.0cfs

Flow Intercepted: 6.43cfs **Flow Bypassed:** 1.6cfs to Inlet DP13
Inlet Size: 10' type R, on-grade

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

(100-year storm)
Tributary Basins: C16.22-C16.23 **Inlet/MH Number:** Inlet DP12
Upstream flowby: **Total Street Flow:** 16.65cfs

Flow Intercepted: 9.35cfs **Flow Bypassed:** 7.3cfs to Inlet DP13
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 35.4cfs (half street) is okay

Design Point 12a

Design Point 12a is located east of Wacissa Drive on the south side of Nash Drive.

(5-year storm)

Tributary Basins: C16.20-C16.21 **Inlet/MH Number:** Inlet DP12a
Upstream flowby: **Total Street Flow:** 8.78cfs

Flow Intercepted: 6.78cfs **Flow Bypassed:** 2.0cfs to Inlet DP13
Inlet Size: 10' type R, on-grade

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

(100-year storm)

Tributary Basins: C16.20-C16.21 **Inlet/MH Number:** Inlet DP12a
Upstream flowby: **Total Street Flow:** 18.28cfs

Flow Intercepted: 9.78cfs **Flow Bypassed:** 8.5cfs to Inlet DP13
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 35.4cfs (half street) is okay

Design Point 13

Design Point 13 is located in the SE corner of Wacissa Drive and Nash Drive.

(5-year storm)

Tributary Basins: C16.24 **Inlet/MH Number:** Inlet DP13
Upstream flowby: 3.6cfs **Total Street Flow:** 8.35cfs

Flow Intercepted: 6.55cfs **Flow Bypassed:** 1.8cfs to Inlet DP16
Inlet Size: 10' type R, on-grade

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

(100-year storm)

Tributary Basins: C16.24 **Inlet/MH Number:** Inlet DP13
Upstream flowby: 15.8cfs **Total Street Flow:** 25.48cfs

Flow Intercepted: 11.28cfs **Flow Bypassed:** 14.2cfs to Inlet DP16
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 35.4cfs (half street) is okay

Design Point 14
Design Point 14 is located in the NW of Wacissa Drive and Nash Drive.

(5-year storm)
Tributary Basins: C16.30 **Inlet/MH Number:** Inlet DP14
Upstream flowby: 0cfs **Total Street Flow:** 7.05cfs

Flow Intercepted: 5.95cfs **Flow Bypassed:** 1.1cfs to Inlet DP17
Inlet Size: 10' type R, on-grade

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

(100-year storm)
Tributary Basins: C16.30 **Inlet/MH Number:** Inlet DP14
Upstream flowby: 0cfs **Total Street Flow:** 14.44cfs

Flow Intercepted: 8.74cfs **Flow Bypassed:** 5.7cfs to Inlet DP17
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 35.4cfs (half street) is okay

Design Point 15
Design Point 15 is located in the SW of Wacissa Drive and Nash Drive and is the flow in the storm sewer. The total flow in the storm sewer is 25.69cfs/39.15cfs in the 5/100 year storm events.

Design Point 16
Design Point 16 is located in the SE corner of Wacissa Drive and Clarion Drive.

(5-year storm)
Tributary Basins: C16.19, C16.28, C16.29 **Inlet/MH Number:** Inlet DP16
Upstream flowby: 1.8cfs **Total Street Flow:** 12.8cfs

Flow Intercepted: 12.8cfs **Flow Bypassed:** 0
Inlet Size: 25' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 9.0cfs, almost half of street flow is from the south. Capacity okay.

(100-year storm)
Tributary Basins: C16.19, C16.28, C16.29 **Inlet/MH Number:** Inlet DP16
Upstream flowby: 34.4cfs **Total Street Flow:** 57.3cfs

Flow Intercepted: 37.4cfs **Flow Bypassed:** 19.9cfs to Inlet DP17
Inlet Size: 25' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 35.4cfs (half street)

Design Point 17
Design Point 17 is located in the SW corner of Wacissa Drive and Clarion Drive.

(5-year storm)
Tributary Basins: C16.25+C16.32 **Inlet/MH Number:** Inlet DP17
Upstream flowby: 1.10cfs **Total Street Flow:** 3.9cfs

Flow Intercepted: 3.9cfs **Flow Bypassed:**
Inlet Size: 25' type R, sump

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

(100-year storm)
Tributary Basins: C16.25+C16.32 **Inlet/MH Number:** Inlet DP17
Upstream flowby: 25.6cfs **Total Street Flow:** 31.6cfs

Flow Intercepted: 31.6cfs **Flow Bypassed:** 0
Inlet Size: 25' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 35.4cfs (half street) is okay

Design Point 18
Design Point 18 is located west of Clarion Drive and Wacissa Drive and is the total flow in the pipe into Pond C5. The total pipe flow is 147.9cfs in the 5-year and 230.8cfs in the 100-year. The trapezoidal emergency overflow swale from Wacissa Drive to Pond C5 is 1.0' deep, 27' wide bottom, 4:1 side slopes, 2% slope, velocity of 7.59cfs, and has a flow depth of 0.98 feet, Q100=230cfs.

Design Point 19a
Design Point 19a is located on the south side of Fontaine Boulevard east of Rockcastle Drive and is the outflow pipe for future pond C2.3 located under the electric line easement. This 27" RCP outflow pipe will also function as the outflow pipe for interim Pond C2.3. The total allowed pipe flow is 4.0cfs in the 5-year and 46.0cfs in the 100-year which conforms to the outflow rates in the Lorson Ranch East MDDP for Pond C2.2.

Design Point 19b
Design Point 19b is located on the north side of Fontaine Boulevard east of Rockcastle Drive and is the outflow pipe for future pond C2.2 located under the electric line easement. This 24" RCP outflow pipe will also function as the outflow pipe for interim Pond C2.2. The total allowed pipe flow is 6.0cfs in the 5-year and 41.0cfs in the 100-year which conforms to the outflow rates in the Lorson Ranch East MDDP for Pond C2.2

Design Point 20a
Design Point 20a is located on the south side of Fontaine Boulevard south of Rockcastle Drive and is the outflow pipe for future pond C1 located under the electric line easement. This 18" RCP outflow pipe will also function as the outflow pipe for interim Pond C1. The total allowed pipe flow is 4.0cfs in the 5-year and 18.0cfs in the 100-year which conforms to the outflow rates in the Lorson Ranch East MDDP for Pond C1

Design Point 3f
Design Point 3f is located on the north side of Fontaine Boulevard at Rockcastle Drive and is the outflow pipe for Ponds C2.2, Pond C2.3, and Pond C1. The total allowed pipe flow is 14.0cfs in the 5-year and 105.0cfs in the 100-year which conforms to the outflow rates in the Lorson Ranch East MDDP for the ponds.

Design Point 19c
Design Point 19c is located north side of Fontaine Boulevard north of the electric substation.

(5-year storm)
Tributary Basins: C14.1, C14.2 **Inlet/MH Number:** Inlet DP19c
Upstream flowby: **Total Street Flow:** 5.6cfs

Flow Intercepted: 5.66cfs **Flow Bypassed:** 0.8cfs to Inlet DP33
Inlet Size: 10' type R**,** on-grade

Street Capacity: Street slope = 1.0%, capacity = 13.0cfs, okay

(100-year storm)
Tributary Basins: C14.1, C14.2 **Inlet/MH Number:** Inlet DP19c
Upstream flowby: **Total Street Flow:** 18.7 cfs

Flow Intercepted: 10.62cfs **Flow Bypassed:** 11.5cfs to Inlet DP33
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 40cfs (half street) is okay

Design Point 20
Design Point 20 is located south side of Fontaine Boulevard north of the electric substation.

(5-year storm)
Tributary Basins: C15.8 **Inlet/MH Number:** Inlet DP20
Upstream flowby: **Total Street Flow:** 5.2cfs

Flow Intercepted: 5.2cfs **Flow Bypassed:**
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 13.0cfs, okay

(100-year storm)
Tributary Basins: C15.8 **Inlet/MH Number:** Inlet DP20
Upstream flowby: **Total Street Flow:** 13.4cfs

Flow Intercepted: 11.3cfs **Flow Bypassed:** 2.1cfs to Inlet DP29
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 40cfs (half street) is okay

Design Point 21
Design Point 21 is located west of the electric substation and is the surface runoff collected at a 30" end section (Line 22). The total flow in the storm sewer is from Basin C15.1+Basin C15.2 for a total flow of 13.55cfs/35.92cfs in the 5/100 year storm events in the storm sewer. The trapezoidal overflow swale between the lots is 1.0' deep, 5:1 side slopes, 10' wide bottom, 1% slope, velocity of 4.29cfs, and has a flow depth of 0.76 feet.

Design Point 23
Design Point 23 is located on Tillamook Drive north of Rockcastle Drive

(5-year storm)
Tributary Basins: C15.3&C15.4 **Inlet/MH Number:** Inlet DP23
Upstream flowby: **Total Street Flow:** 8.73cfs

Flow Intercepted: 8.43cfs **Flow Bypassed:** 0.3cfs to Inlet DP25
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.1%, capacity = 9.2cfs, okay

(100-year storm)
Tributary Basins: C15.3&C15.4 **Inlet/MH Number:** Inlet DP23
Upstream flowby: **Total Street Flow:** 18.69cfs

Flow Intercepted: 13.69cfs **Flow Bypassed:** 5.0cfs to Inlet DP25
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.1%, capacity = 38cfs (half street) is okay

Design Point 24
Design Point 24 is located in the south of Rockcastle Drive on Tillamook Drive and is the flow in the storm sewer. The total flow in the storm sewer is 20.64cfs/51.77cfs in the 5/100 year storm events.

Design Point 25
Design Point 25 is located on the south side of Rockcastle Drive east of Vedder Drive

(5-year storm)
Tributary Basins: C15.5,C15.6,C15.11, C15.12 **Inlet/MH Number:** Inlet DP25
Upstream flowby: 0.3cfs **Total Street Flow:** 16.0cfs

Flow Intercepted: 16.0cfs **Flow Bypassed:**
Inlet Size: 20' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 9.0cfs, okay since half flow from each side

(100-year storm)
Tributary Basins: C15.5,C15.6,C15.11, C15.12 **Inlet/MH Number:** Inlet DP25
Upstream flowby: **Total Street Flow:** 38.9cfs

Flow Intercepted: 31.7cfs **Flow Bypassed:** 7.2cfs to Inlet DP26
Inlet Size: 20' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 37.3cfs (half street) is okay since half flow from each side

Design Point 26
Design Point 26 is located on the north side of Rockcastle Drive east of Vedder Drive.

(5-year storm)
Tributary Basins: C15.7, C15.13 **Inlet/MH Number:** Inlet DP26
Upstream flowby: **Total Street Flow:** 8.4cfs

Flow Intercepted: 8.4cfs **Flow Bypassed:**
Inlet Size: 20' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 9.0cfs, okay since half of flow is from each side.

(100-year storm)
Tributary Basins: C15.7, C15.13 **Inlet/MH Number:** Inlet DP26
Upstream flowby: 7.2cfs **Total Street Flow:** 26.0cfs

Flow Intercepted: 26.0cfs **Flow Bypassed:**
Inlet Size: 20' type R, sump

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

Design Point 27
Design Point 27 is located in the north of Rockcastle Drive and Design Point 26 and is the flow in the storm sewer. The total flow in the storm sewer is 38.11cfs/92.58cfs in the 5/100 year storm events. The trapezoidal overflow swale between the lots is 1.0' deep, 4:1 side slopes, 15' wide bottom, 1% slope, velocity of 5.41cfs, and has a flow depth of 1.0 feet.

Design Point 32
Design Point 32 is located in the north of Rockcastle Drive and Design Point 27 on Fontaine Boulevard and is the flow in the storm sewer. The total flow in the storm sewer is 23.58cfs/137.5cfs in the 5/100 year storm events.

Design Point 32a
Design Point 32a is located in the west of Design Point 32 on Fontaine Boulevard and is the flow in the storm sewer. The total flow in the storm sewer is 59.01cfs/226.9cfs in the 5/100 year storm events.

Design Point 28
Design Point 28 is located on Weiser Drive north of Pigeon Drive.

(5-year storm)
Tributary Basins: C17.1a **Inlet/MH Number:** Inlet DP28
Upstream flowby: **Total Street Flow:** 5.3cfs

Flow Intercepted: 5.3cfs **Flow Bypassed:**
Inlet Size: 15' type R, on-grade

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

(100-year storm)
Tributary Basins: C17.1a **Inlet/MH Number:** Inlet DP28
Upstream flowby: **Total Street Flow:** 11.56cfs

Flow Intercepted: 10.36cfs **Flow Bypassed:** 1.2cfs to Inlet DP38
Inlet Size: 15' type R, on-grade

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

Design Point 29
Design Point 29 is located SE corner of Fontaine Boulevard and Lamprey Drive.

(5-year storm)
Tributary Basins: C15.9, C15.10, C15.14 **Inlet/MH Number:** Inlet DP29
Upstream flowby: **Total Street Flow:** 8.6cfs

Flow Intercepted: 8.6cfs **Flow Bypassed:**
Inlet Size: 10' type R, sump

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

(100-year storm)
Tributary Basins: C15.9, C15.10, C15.14 **Inlet/MH Number:** Inlet DP29
Upstream flowby: 2.1cfs **Total Street Flow:** 20.8cfs

Flow Intercepted: 16.3cfs **Flow Bypassed:** 4.5cfs to Inlet DP30
Inlet Size: 10' type R, sump

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

Design Point 30
Design Point 30 is located on Lamprey Drive south of Fontaine Boulevard in the SW corner

(5-year storm)
Tributary Basins: C15.15 **Inlet/MH Number:** Inlet DP30
Upstream flowby: **Total Street Flow:** 7.2cfs

Flow Intercepted: 7.2cfs **Flow Bypassed:**
Inlet Size: 15' type R, sump

Street Capacity: Lamprey Drive Street slope = 1.8%, capacity = 18.4cfs, okay

(100-year storm)
Tributary Basins: C15.15 **Inlet/MH Number:** Inlet DP30
Upstream flowby: 4.5cfs **Total Street Flow:** 20.1cfs

Flow Intercepted: 20.1cfs **Flow Bypassed:**
Inlet Size: 15' type R, sump

Street Capacity: Lamprey Drive Street slope = 1.8%, capacity = 50.4cfs (half street) is okay

Design Point 31
Design Point 31 is located downstream of Design Point 30 in Fontaine Boulevard and is the flow in the storm sewer. The total flow in the storm sewer (Line 12) is a total flow of 19.36cfs/42.12cfs in the 5/100 year storm events in the storm sewer.

Design Point 33
Design Point 33 is located in the northeast corner of Lamprey Drive and Fontaine Boulevard.

(5-year storm)
Tributary Basins: C16.33, C14 **Inlet/MH Number:** Inlet DP33
Upstream flowby: 0.8cfs **Total Street Flow:** 8.2cfs

Flow Intercepted: 8.2cfs **Flow Bypassed:**
Inlet Size: 15' type R, sump

Street Capacity: Fontaine street slope = 1.0%, capacity = 13.5cfs, okay

(100-year storm)
Tributary Basins: C16.33, C14 **Inlet/MH Number:** Inlet DP33
Upstream flowby: 11.5cfs **Total Street Flow:** 26.3cfs

Flow Intercepted: 20.3cfs **Flow Bypassed:** 6.0cfs to Inlet DP34
Inlet Size: 15' type R, sump

Street Capacity: Fontaine street slope = 1.0%, capacity = 40cfs (half street) is okay

Design Point 34
Design Point 34 is located northwest corner of Lamprey Drive and Fontaine Boulevard

(5-year storm)
Tributary Basins: C16.34 **Inlet/MH Number:** Inlet DP34
Upstream flowby: **Total Street Flow:** 0.9cfs

Flow Intercepted: 0.9cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

Street Capacity: Lamprey Drive street slope = 0.8%, capacity = 12.0cfs, okay

(100-year storm)
Tributary Basins: C16.34 **Inlet/MH Number:** Inlet DP34
Upstream flowby: 6.0cfs **Total Street Flow:** 8.0cfs

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

Street Capacity: Lamprey Drive street slope = 0.8%, capacity = 37.0cfs (half street) is okay

Design Point 34a
Design Point 34a is located downstream of Design Point 34 in Fontaine Boulevard and is the flow in the storm sewer. The total flow in the storm sewer (Line 3) is a total flow of 77.65cfs/272.7cfs in the 5/100 year storm events in the storm sewer.

Design Point 35
Design Point 35 is located in the NE corner of Edisto Drive and Fontaine Boulevard.

(5-year storm)
Tributary Basins: C16.35 **Inlet/MH Number:** Inlet DP35
Upstream flowby: **Total Street Flow:** 2.8cfs

Flow Intercepted: 2.8cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

Street Capacity: Fontaine Boulevard street slope = 1.0 %, capacity = 13.5cfs, okay

(100-year storm)
Tributary Basins: C16.35 **Inlet/MH Number:** Inlet DP35
Upstream flowby: **Total Street Flow:** 6.1cfs

Flow Intercepted: 6.1cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

Street Capacity: Fontaine Boulevard street slope = 1.0%, capacity = 40.0cfs (half street) is okay

Design Point 36

Design Point 36 is a small drainage basin that needs a 5' Type R inlet to drain the curb in the NW corner of Edisto Drive and Fontaine Boulevard. The total flow is 0.3cfs and 0.6cfs in the 5/100 year storm events. There are no bypass flows for this inlet.

Design Point 37

Design Point 37 is located downstream of Design Point 36 in Fontaine Boulevard just west of Edisto Drive and is the flow in the storm sewer. The total flow in the storm sewer (Line 2) is 77.41cfs/275.5cfs in the 5/100 year storm events in the storm sewer.

Design Point 38

Design Point 38 is located in the SE corner of Chaplin Drive and Matta Drive.

(5-year storm)
Tributary Basins: C17.1 **Inlet/MH Number:** Inlet DP38
Upstream flowby: **Total Street Flow:** 5.9cfs

Flow Intercepted: 5.9cfs **Flow Bypassed:**
Inlet Size: 15' type R, on-grade

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

(100-year storm)
Tributary Basins: C17.1 **Inlet/MH Number:** Inlet DP39
Upstream flowby: 1.2cfs **Total Street Flow:** 14.43cfs

Flow Intercepted: 11.83cfs **Flow Bypassed:** 2.6cfs to Inlet DP39
Inlet Size: 15' type R, on-grade

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

Design Point 39

Design Point 39 is located in the SW corner of Chaplin Drive and Matta Drive.

(5-year storm)
Tributary Basins: C17.2 **Inlet/MH Number:** Inlet DP39
Upstream flowby: **Total Street Flow:** 8.61cfs

Flow Intercepted: 8.41cfs **Flow Bypassed:** 0.2cfs to Inlet DP40
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 3.5%, capacity = 16.7cfs is okay

(100-year storm)
Tributary Basins: C17.2 **Inlet/MH Number:** Inlet DP39
Upstream flowby: 24.0cfs **Total Street Flow:** 21.53cfs

Flow Intercepted: 14.93cfs **Flow Bypassed:** 6.6cfs to Inlet DP40
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 3.5%, capacity = 37.2cfs (half street) is okay

Design Point 40

Design Point 40 is located at a low point in the SE corner of Lamine Drive and Fontaine Boulevard.

(5-year storm)

Tributary Basins: C17.3-C17.5 **Inlet/MH Number:** Inlet DP40
Upstream flowby: 0.2cfs **Total Street Flow:** 12.9cfs

Flow Intercepted: 12.9cfs **Flow Bypassed:**
Inlet Size: 20' type R, sump

Street Capacity: Street slope = 2.8%, capacity = 14.4cfs, okay

(100-year storm)

Tributary Basins: C17.3-C17.5 **Inlet/MH Number:** Inlet DP40
Upstream flowby: 6.6cfs **Total Street Flow:** 39.4cfs

Flow Intercepted: 26.0cfs **Flow Bypassed:** 13.4cfs to Inlet DP41
Inlet Size: 20' type R, sump

Street Capacity: Street slope = 2.8%, capacity = 40.7cfs (half street) is okay

Design Point 41

Design Point 41 is located at a low point in the SW corner of Lamine Drive and Fontaine Boulevard.

(5-year storm)

Tributary Basins: C17.6 **Inlet/MH Number:** Inlet DP41
Upstream flowby: **Total Street Flow:** 2.0cfs

Flow Intercepted: 2.0cfs **Flow Bypassed:**
Inlet Size: 20' type R, sump

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

(100-year storm)

Tributary Basins: C17.6 **Inlet/MH Number:** Inlet DP41
Upstream flowby: 13.4cfs **Total Street Flow:** 19.3cfs

Flow Intercepted: 19.3cfs **Flow Bypassed:**
Inlet Size: 20' type R, sump

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

Design Point 42

Design Point 42 is located on the north side of Fontaine Boulevard just east of the East Tributary of JCC north of Lamine Drive.

(5-year storm)

Tributary Basins: C17.8 **Inlet/MH Number:** Inlet DP43
Upstream flowby: **Total Street Flow:** 3.2cfs

Flow Intercepted: 2.3cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 13.0cfs, okay

(100-year storm)

Tributary Basins: C17.8 **Inlet/MH Number:** Inlet DP43
Upstream flowby: **Total Street Flow:** 7.2cfs

Flow Intercepted: 7.2cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 40cfs (half street) is okay

Design Point 43

Design Point 43 is located downstream of Design Point 42 in Fontaine Boulevard just east of Lamine Drive and is the flow in the storm sewer. The total flow in the storm sewer (Line 33) is 27.33cfs/65.94cfs in the 5/100-year storm events in the storm sewer.

Design Point 44

Design Point 44 is located on the south side of Pond C5 and is the total storm sewer flow from the south into Pond C5. The flow into Pond C5 from the south is from (Line 1+Line 33) and is 102.5cfs/339.2cfs in the 5/100-year storm events in the storm sewer.

Design Point 45

Design Point 45 is the total developed flow into Pond C5. We did not use the flow rates from the storm sewer system as in other design points because the storm system flows used fixed release rates (no hydrographs used) from the upstream ponds which results in much larger flows than using the actual hydraulic model of the ponds/storm. Therefore, we used the flow amount from the Lorson Ranch East MDDP Hydraflow hydraulic model of the storm ponds and sewer system. The hydraflow model from the MDDP has not changed and is the best representation of the actual flow entering the Pond C5. The flow into Pond C5 is 157.0cfs/484.0cfs in the 5/100-year storm events in the storm sewer.

Design Point 46

Design Point 46 is the total developed flow from Pond C5 into the East Tributary. This flow rate was taken from the Lorson Ranch East MDDP Hydraflow hydraulic model of the storm ponds and sewer system. The hydraflow model from the MDDP has not changed and is the best representation of the actual flow from Pond C5. The flow from Pond C5 are 121.0cfs/420.0cfs in the 5/100-year storm events in the storm sewer (Design Pt 7c in MDDP). The pre-developed flows entering the East Tributary at this design point are 141.0cfs/458.0cfs in the 5/100-year storm events in the storm sewer (Design Pt 2 in MDDP). The developed discharge is slightly below pre-developed conditions which conforms to the design criteria (90% of pre-developed) set by El Paso County. See Pond C5 for additional information.

Design Point 47

Design Point 47 is located in a low point in Fontaine Boulevard west of the East Tributary on the south side of Fontaine. Flows from this basin have already been included in the pond modeling (including water quality) of Pond B1 which was constructed as part of Pioneer Landing 2.

(5-year storm)

Tributary Basins: C17.9 **Inlet/MH Number:** Inlet DP47
Upstream flowby: **Total Street Flow:** 7.8cfs

Flow Intercepted: 7.8cfs **Flow Bypassed:**
Inlet Size: 10' type R, sump

Street Capacity: Street slope = 0.6%, capacity = 10.4cfs, okay

(100-year storm)

Tributary Basins: C17.9 **Inlet/MH Number:** Inlet DP47
Upstream flowby: **Total Street Flow:** 13.9cfs

Flow Intercepted: 13.9cfs **Flow Bypassed:**
Inlet Size: 10' type R, sump

Street Capacity: Street slope = 0.6%, capacity = 31.2cfs (half street) is okay

Design Point 48

Design Point 48 is located in a low point in Fontaine Boulevard west of the East Tributary on the north side of Fontaine. Flows from this basin have already been included in the pond modeling (including water quality) of Pond B1 which was constructed as part of Pioneer Landing 2.

(5-year storm)

Tributary Basins: C17.10 **Inlet/MH Number:** Inlet DP48
Upstream flowby: **Total Street Flow:** 8.9cfs

Flow Intercepted: 8.9cfs **Flow Bypassed:**
Inlet Size: 10' type R, sump

Street Capacity: Street slope = 0.6%, capacity = 10.4cfs, okay

(100-year storm)

Tributary Basins: C17.10 **Inlet/MH Number:** Inlet DP48
Upstream flowby: **Total Street Flow:** 16.0cfs

Flow Intercepted: 16.0cfs **Flow Bypassed:**
Inlet Size: 10' type R, sump

Street Capacity: Street slope = 0.6%, capacity = 31.2cfs (half street) is okay

Design Point 49

Design Point 49 is located northeast of Design Point 48 in Fontaine Boulevard and is the total flow from the Fontaine Boulevard storm sewer system entering Pond B1. According to the final drainage report for Fontaine Boulevard prepared by Pentacor Engineering in 2006 the flow in the existing 42" storm sewer (P-40) is 37.6cfs in the 5-year and 62.1cfs in the 100 year storm events. The 42" has a constructed slope of 0.4%. When combined with the flow from the two new inlets the total pipe flow will be 54.3cfs in the 5-year and 92.0cfs in the 100-year storm events downstream to Pond B1. The proposed storm sewer into Pond B1 will be a 48" RCP at 0.5% slope with a capacity of 99cfs.

Design Point 50

Design Point 50 is located on the south side of Saco Drive just east of Willapa Drive.

(5-year storm)

Tributary Basins: D1.1 & D1.2 **Inlet/MH Number:** Inlet DP50
Upstream flowby: **Total Street Flow:** 10.01cfs

Flow Intercepted: 7.34cfs **Flow Bypassed:** 2.7cfs to DP56
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 2.2%, capacity = 13.3cfs is okay

(100-year storm)

Tributary Basins: D1.1 & D1.2 **Inlet/MH Number:** Inlet DP50
Upstream flowby: **Total Street Flow:** 22.27cfs

Flow Intercepted: 10.77cfs **Flow Bypassed:** 11.5cfs to DP56
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 2.2%, capacity = 42.8cfs (half street) is okay

Design Point 51

Design Point 51 is located downstream of Design Point 50 in Saco Drive just west of Willapa Drive and is the flow in the storm sewer. The total flow in the storm sewer (Line 3) is 14.68cfs/21.60cfs in the 5/100-year storm events in the storm sewer.

Design Point 52
Design Point 52 is located on the east side of Chaplin Drive north of Yuba Drive

(5-year storm)
Tributary Basins: D1.4+D1.5 **Inlet/MH Number:** Inlet DP52
Upstream flowby: **Total Street Flow:** 15.44cfs

Flow Intercepted: 12.44cfs **Flow Bypassed:** 3.0cfs to DP53
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 3.8%, capacity = 16.9cfs is okay

(100-year storm)
Tributary Basins: D1.4+D1.5 **Inlet/MH Number:** Inlet DP52
Upstream flowby: **Total Street Flow:** 34.7cfs

Flow Intercepted: 18.8cfs **Flow Bypassed:** 15.9cfs to DP53
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 3.8%, capacity = 36cfs (half street) is okay

Design Point 53
Design Point 53 is located at Chaplin Drive and Yuba Drive on the north side of the street.

(5-year storm)
Tributary Basins: D1.6, D1.8 **Inlet/MH Number:** Inlet DP53
Upstream flowby: 3.0cfs **Total Street Flow:** 14.65cfs

Flow Intercepted: 14.05cfs **Flow Bypassed:** 0.6cfs to DP-55
Inlet Size: 20' type R, on-grade

Street Capacity: Street slope = 3.5%, capacity = 16.7cfs, okay

(100-year storm)
Tributary Basins: D1.6, D1.8 **Inlet/MH Number:** Inlet DP53
Upstream flowby: 15.9cfs **Total Street Flow:** 41.47cfs

Flow Intercepted: 25.97cfs **Flow Bypassed:** 15.50cfs to DP55
Inlet Size: 20' type R, on-grade

Street Capacity: Street slope = 3.5%, capacity = 37.2cfs (half street) flow tops crown

Design Point 54
Design Point 54 is located at Lamine Drive and Yuba Drive on the northeast corner

(5-year storm)
Tributary Basins: D1.7 **Inlet/MH Number:** Inlet DP54
Upstream flowby: **Total Street Flow:** 7.0cfs

Flow Intercepted: 7.0cfs **Flow Bypassed:**
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.2%, capacity = 10 cfs, okay

(100-year storm)
Tributary Basins: D1.7 **Inlet/MH Number:** Inlet DP54
Upstream flowby: **Total Street Flow:** 15.5cfs

Flow Intercepted: 12.6cfs **Flow Bypassed:** 3.0cfs to DP55
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.2%, capacity = 37cfs (half street)

Design Point 55a
Design Point 55a is located on the north side of Saco Drive west of Willapa Drive

(5-year storm)
Tributary Basins: D1.10 **Inlet/MH Number:** Inlet DP55a
Upstream flowby: **Total Street Flow:** 10.18cfs

Flow Intercepted: 7.38cfs **Flow Bypassed:** 2.8cfs to DP55
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 2.5%, capacity = 14.0cfs, okay

(100-year storm)
Tributary Basins: D1.10 **Inlet/MH Number:** Inlet DP55a
Upstream flowby: **Total Street Flow:** 22.63cfs

Flow Intercepted: 10.83cfs **Flow Bypassed:** 11.80cfs to DP55
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 2.5%, capacity = 40.0cfs (half street) is okay

Design Point 55
Design Point 55 is located on the east side of Lamine Drive at a low point south of Yuba Drive.

(5-year storm)
Tributary Basins: D1.9 **Inlet/MH Number:** Inlet DP55
Upstream flowby: 6.4cfs **Total Street Flow:** 7.8cfs

Flow Intercepted: 7.5cfs **Flow Bypassed:**
Inlet Size: 25' type R, sump

Street Capacity: Street slope = 1.9%, capacity = 12.0cfs, okay

(100-year storm)
Tributary Basins: D1.9 **Inlet/MH Number:** Inlet DP55
Upstream flowby: 30.3cfs **Total Street Flow:** 40.0cfs

Flow Intercepted: 31.7cfs **Flow Bypassed:** 8.3cfs to Inlet DP56
Inlet Size: 25' type R, sump

Street Capacity: Street slope = 1.9%, capacity = 45cfs (half street) is okay

Design Point 56
Design Point 56 is located on the west side of Lamine Drive at a low point south of Yuba Drive..

(5-year storm)
Tributary Basins: D1.11 **Inlet/MH Number:** Inlet DP56
Upstream flowby: 1.71cfs **Total Street Flow:** 7.2cfs

Flow Intercepted: 7.2cfs **Flow Bypassed:**
Inlet Size: 25' type R, sump

Street Capacity: Street slope = 1.9%, capacity = 12.0cfs, okay

(100-year storm)
Tributary Basins: D1.11 **Inlet/MH Number:** Inlet DP56
Upstream flowby: 19.8cfs **Total Street Flow:** 29.7cfs

Flow Intercepted: 29.7cfs **Flow Bypassed:**
Inlet Size: 25' type R, sump

Street Capacity: Street slope = 1.9%, capacity = 45cfs (half street) is okay

The trapezoidal overflow swale between the lots is sized for 150cfs, 2.0' deep, 4:1 side slopes, 8' wide bottom, 2% slope, velocity of 8.38cfs, and has a flow depth of 1.34 feet.

Design Point 57
Design Point 57 is located in the SW corner of Lamine Drive and Saco Drive in the knuckle and is the flow in the pipe to Pond D2. The total pipe flow is 63.6cfs/121.1cfs in the 5/100 year storm events.

Design Point 58

Design Point 58 is the total flow into Pond D2 from the south (Design Pt. 65c on Lorson Blvd) and the storm sewer from Lamine Drive (Design Pt. 57). The total pond inflow is 130.39cfs/241.0cfs in the 5/100-year storm events when adding the pipe flow.

Design Point 59a

Design Point 59a is located at the south end of Tillamook Drive in a cul-de-sac

(5-year storm)

Tributary Basins: D2.2 **Inlet/MH Number:** Inlet DP59a
Upstream flowby: **Total Street Flow:** 2.2cfs

Flow Intercepted: 2.2cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

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

(100-year storm)

Tributary Basins: D2.2 **Inlet/MH Number:** Inlet DP59a
Upstream flowby: **Total Street Flow:** 4.8cfs

Flow Intercepted: 4.8cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

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

Design Point 59b

Design Point 59b is located south of Lorson Boulevard under the electric easement and is the flow in the pipe from future Pond D1. The total future pipe flow (Line 27) is allowed to be 2.0/11.0cfs in the 5/100-year storm events. The pipe flow for future Pond D1 is detailed in the Lorson Ranch East MDDP.

Design Point 59c

Design Point 59c is located east of Lorson Boulevard and Lamprey Drive and is the flow in the pipe to Design Point 59e. The total pipe flow is 4.19cfs/15.61cfs in the 5/100 year storm events.

Design Point 59d
Design Point 59d is located in the northeast corner of Lorson Boulevard and Lamprey Drive.

(5-year storm)
Tributary Basins: D2.1 & D2.3 **Inlet/MH Number:** Inlet DP59d
Upstream flowby: **Total Street Flow:** 10.7cfs

Flow Intercepted: 10.7cfs **Flow Bypassed:**
Inlet Size: 15' type R, sump

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

(100-year storm)
Tributary Basins: D2.1 & D2.3 **Inlet/MH Number:** Inlet DP59d
Upstream flowby: **Total Street Flow:** 23.7cfs

Flow Intercepted: 20.3cfs **Flow Bypassed:** 3.7cfs to Inlet DP65b
Inlet Size: 15' type R, sump

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

Design Point 59e
Design Point 59e is located west of Lorson Boulevard and Lamprey Drive and is the flow in the pipe (Line 24) in Lorson Boulevard flowing west to Trappe Drive. The total pipe flow is 14.85cfs/36.14cfs in the 5/100 year storm events.

Design Point 59f
Design Point 59f is located at the SW corner of Lorson Boulevard and Skuna Drive.

(5-year storm)
Tributary Basins: D2.4 & D2.5 **Inlet/MH Number:** Inlet DP59f
Upstream flowby: **Total Street Flow:** 13.68cfs

Flow Intercepted: 8.58cfs **Flow Bypassed:** 5.1cfs to Inlet DP60
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.9%, capacity Lorson Blvd.= 18.4cfs, okay

(100-year storm)
Tributary Basins: D2.4 & D2.5 **Inlet/MH Number:** Inlet DP59f
Upstream flowby: **Total Street Flow:** 30.47cfs

Flow Intercepted: 12.37cfs **Flow Bypassed:** 18.1cfs to Inlet DP60
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.9%, capacity Lorson Blvd. = 50.4cfs (half street) is okay

Design Point 59g

Design Point 59g is located on Lorson Boulevard west of Skuna Drive and is the flow in the pipe (Line 23) in Lorson Boulevard flowing west to Trappe Drive. The total pipe flow is 23.43cfs/47.7cfs in the 5/100 year storm events.

Design Point 60

Design Point 60 is located in the SE corner of Lorson Boulevard and Trappe Drive

(5-year storm)

Tributary Basins: D2.9, D2.12 **Inlet/MH Number:** Inlet DP60
Upstream flowby: 6.1cfs **Total Street Flow:** 15.8cfs

Flow Intercepted: 15.8cfs **Flow Bypassed:**
Inlet Size: 25' type R, sump

Street Capacity: Street slope = 1.8%, capacity = 18.4cfs, okay

(100-year storm)

Tributary Basins: D2.9, D2.12 **Inlet/MH Number:** Inlet DP60
Upstream flowby: 32.1cfs **Total Street Flow:** 55.9cfs

Flow Intercepted: 31.7cfs **Flow Bypassed:** 24.2cfs to Design Point 64
Inlet Size: 25' type R, sump

Street Capacity: Street slope = 1.8%, capacity = 50.4cfs (half street) is okay since half is from Lorson Blvd and half is from Trappe Drive.

Design Point 61

Design Point 61 is located on Witcher Drive just west of Yocona Drive.

(5-year storm)

Tributary Basins: D2.6 & D2.7 **Inlet/MH Number:** Inlet DP61
Upstream flowby: **Total Street Flow:** 10.57cfs

Flow Intercepted: 7.57cfs **Flow Bypassed:** 3.0cfs to Design Point 62
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 3.1%, capacity = 15.5cfs, okay

(100-year storm)

Tributary Basins: D2.6 & D2.7 **Inlet/MH Number:** Inlet DP61
Upstream flowby: **Total Street Flow:** 23.68cfs

Flow Intercepted: 11.07cfs **Flow Bypassed:** 12.6cfs to Design Point 62
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 3.1%, capacity = 39.0cfs (half street) is okay

Design Point 62
Design Point 62 is located on the east side of Volga Drive at Magothy Drive.

(5-year storm)
Tributary Basins: D2.8 **Inlet/MH Number:** Inlet DP62
Upstream flowby: **Total Street Flow:** 10.1cfs

Flow Intercepted: 10.1cfs **Flow Bypassed:**
Inlet Size: 10' type R, sump

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

(100-year storm)
Tributary Basins: D2.8 **Inlet/MH Number:** Inlet DP62
Upstream flowby: **Total Street Flow:** 30.3cfs

Flow Intercepted: 16.3cfs **Flow Bypassed:** 14.0cfs to Design Point 60
Inlet Size: 10' type R, sump

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

Design Point 63
Design Point 63 is located in the SE corner of Magothy Drive and Volga Drive and is the flow in the pipe (Line 35) in Magothy Drive flowing west to Trappe Drive. The total pipe flow is 18.63cfs/27.38cfs in the 5/100 year storm events.

Design Point 64
Design Point 64 is located in the SW corner of Lorson Boulevard and Trappe Drive

(5-year storm)
Tributary Basins: D2.10 **Inlet/MH Number:** Inlet DP64
Upstream flowby: **Total Street Flow:** 3.2cfs

Flow Intercepted: 3.0cfs **Flow Bypassed:**
Inlet Size: 25' type R, sump

Street Capacity: Street slope = 1.8%, capacity = 18.4cfs, okay

(100-year storm)
Tributary Basins: D2.10 **Inlet/MH Number:** Inlet DP64
Upstream flowby: 24.2cfs **Total Street Flow:** 29.2cfs

Flow Intercepted: 29.2cfs **Flow Bypassed:**
Inlet Size: 25' type R, sump

Street Capacity: Street slope = 1.8%, capacity = 50.4cfs, okay

Design Point 65

Design Point 65 is located at the SW corner of Lorson Boulevard and Trappe Drive and is the flow in the pipe north (Line 30) to Design Point 65c. The total pipe flow is 37.54cfs/88.31cfs in the 5/100 year storm events.

Design Point 65a

Design Point 65a is located on the south side of Lorson Boulevard west of Trappe Drive

(5-year storm)

Tributary Basins: D2.11 **Inlet/MH Number:** Inlet DP65a
Upstream flowby: **Total Street Flow:** 2.0cfs

Flow Intercepted: 2.0cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 0.66%, capacity = 10.6 cfs, okay

(100-year storm)

Tributary Basins: D2.11 **Inlet/MH Number:** Inlet DP65a
Upstream flowby: **Total Street Flow:** 4.0cfs

Flow Intercepted: 4.0cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 0.66%, capacity = 32.1cfs (half street) is okay

Design Point 65b

Design Point 65b is located on the north side of Lorson Boulevard west of Trappe Drive

(5-year storm)

Tributary Basins: D2.13 **Inlet/MH Number:** Inlet DP65b
Upstream flowby: **Total Street Flow:** 4.2cfs

Flow Intercepted: 4.2cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 0.66%, capacity = 10.6cfs, okay

(100-year storm)

Tributary Basins: D2.13 **Inlet/MH Number:** Inlet DP65b
Upstream flowby: 3.7cfs **Total Street Flow:** 12.7cfs

Flow Intercepted: 12.7cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 0.66%, capacity = 32.1cfs (half street) is okay

Design Point 65c
Design Point 65c is located west of Lorson Boulevard and Trappe Drive and is the flow in the pipe (Line 17) north to Pond D2. The total pipe flow is 66.80cfs/119.9cfs in the 5/100 year storm events.

Design Point 66a
Design Point 66a is located at the south end of Skuna Drive in the cul-de-sac

(5-year storm)
Tributary Basins: E1.1 **Inlet/MH Number:** Inlet DP66a
Upstream flowby: **Total Street Flow:** 3.3cfs

Flow Intercepted: 3.3cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 2.5%, capacity = 14cfs, okay

(100-year storm)
Tributary Basins: E1.1 **Inlet/MH Number:** Inlet DP66a
Upstream flowby: **Total Street Flow:** 7.3cfs

Flow Intercepted: 7.3cfs **Flow Bypassed:**
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 2.5%, capacity = 40cfs (half street) is okay

Design Point 66b
Design Point 66b is located east of Horton Drive/Yocona Drive knuckle and is the flow in the pipe from future Pond E1. The total future pipe flow (Line 15) is allowed to be 12.8cfs in the 5-year and 36.3cfs in the 100-year storm events. The pipe flow is greater than the release rate of Pond E1 as detailed in the Lorson Ranch East MDDP so the pipes will be sized adequately for any possible future flows.

Design Point 66c
Design Point 66c is located east of the Horton Drive/Yocona Drive knuckle and is the flow in the pipe as it discharges into a swale flowing west to Trappe Drive. The total pipe flow (Line 14) is 16.11cfs/43.59cfs in the 5/100-year storm events.

Design Point 66d
Design Point 66d is located on the south side of the Horton Drive/Volga Drive intersection.

(5-year storm)
Tributary Basins: E1.2 **Inlet/MH Number:** Inlet DP66d
Upstream flowby: **Total Street Flow:** 7.57cfs

Flow Intercepted: 6.27fs **Flow Bypassed:** 1.3cfs to Design Pt. 68
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 2.5%, capacity = 14.0cfs, okay

(100-year storm)
Tributary Basins: E1.2 **Inlet/MH Number:** Inlet DP66d
Upstream flowby: **Total Street Flow:** 16.78cfs

Flow Intercepted: 9.48cfs **Flow Bypassed:** 7.3cfs to Design Pt. 68
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 2.5%, capacity = 40.7cfs (half street) is okay

Design Point 67a
Design Point 67a is located at the east end of Trappe Drive on the south side at the electric easement. Flow at this design point is from Basin E2-ex which includes offsite flows. A 30" storm sewer (Line 13) will extend to the ROW where the flow will be collected in double Type D inlets and swale. The total flow is 26.0cfs/92cfs in the 5/100-year storm events to the end section. The storm sewer system will collect 26.0cfs and 70.0cfs in the 5/100-year storm events and 22.0cfs in the 100-year storm event will flow to Trappe Drive and then west to Design Point 70 in the street. The diversion swale at this design point is 3.0' deep, 4:1 side slopes, 0' wide bottom, 2.0% slope, velocity of 8.08cfs, and has a flow depth of 1.88 feet.

Design Point 67b
Design Point 67b is located on the east end of Trappe Drive on the north side. Flow at this design point is from Basin E1.3 and Design Point 66c. A 30" storm (Line 8) will collect this area and convey it to Trappe Drive. The total flow at the end section is 20.0cfs/64.10cfs in the 5/100 year storm events. The storm sewer system will collect 20.0cfs and 42.0cfs in the 5/100-year storm events and 22.1cfs in the 100-year storm event will flow to Trappe Drive and then west to Design Point 68 in the street. The Basin E1.3 swale is sized for 210cfs which is the future emergency overflow from Pond E1. The swale is 3.0' deep, 4:1 side slopes, 0' wide bottom, 2.5% slope, velocity of 10.1cfs, and has a flow depth of 2.3 feet.

Design Point 68
Design Point 68 is located in the NE corner of Trappe Drive and Horton Drive.

(5-year storm)
Tributary Basins: E1.4 & E1.5 **Inlet/MH Number:** Inlet DP68
Upstream flowby: 1.3cfs **Total Street Flow:** 6.7cfs

Flow Intercepted: 6.7cfs **Flow Bypassed:**
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.15%, capacity = 14.0cfs, okay

(100-year storm)
Tributary Basins: E1.4 & E1.5 **Inlet/MH Number:** Inlet DP68
Upstream flowby: 29.4cfs **Total Street Flow:** 41.7cfs

Flow Intercepted: 19.88cfs **Flow Bypassed:** 21.8cfs to Design Pt. 69
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.15%, capacity = 43cfs (half street) is okay

Design Point 69
Design Point 69 is located on the east side of Trappe Drive south of Magothy Drive at a low point.

(5-year storm)
Tributary Basins: E1.6 **Inlet/MH Number:** Inlet DP69
Upstream flowby: **Total Street Flow:** 5.7cfs

Flow Intercepted: 5.7cfs **Flow Bypassed:**
Inlet Size: 30' type R, sump

Street Capacity: Street slope = 1.15%, capacity = 14.0cfs, okay

(100-year storm)
Tributary Basins: E1.6 **Inlet/MH Number:** Inlet DP69
Upstream flowby: 21.8cfs **Total Street Flow:** 32.2cfs

Flow Intercepted: 32.2cfs **Flow Bypassed:**
Inlet Size: 30' type R, sump

Street Capacity: Street slope = 1.15%, capacity = 43cfs (half street) is okay

Design Point 70
Design Point 70 is located on the west side of Trappe Drive south of Magothy Drive at a low point.

(5-year storm)
Tributary Basins: E1.7 **Inlet/MH Number:** Inlet DP70
Upstream flowby: **Total Street Flow:** 4.9cfs

Flow Intercepted: 4.9cfs **Flow Bypassed:**
Inlet Size: 30' type R, sump

Street Capacity: Street slope = 1.15%, capacity = 14.0cfs, okay

(100-year storm)
Tributary Basins: E1.7 **Inlet/MH Number:** Inlet DP70
Upstream flowby: 22.0cfs **Total Street Flow:** 35.7cfs

Flow Intercepted: 35.7cfs **Flow Bypassed:**
Inlet Size: 30' type R, sump

Street Capacity: Street slope = 1.15%, capacity = 43.0cfs (half street)

Design Point 71
Design Point 71 is located East of Trappe Drive and is the flow into Interim Pond E2. The total pipe flow (Line1) is 69.2cfs/209.3cfs in the 5/100 year storm events. This flow will need to be detained to release at 90% of pre-development rates. See Interim Pond E2 for flow rates.

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6.0 DETENTION AND WATER QUALITY PONDS

Detention and Storm Water Quality for Lorson Ranch East is required per El Paso County criteria. We have implemented the Full Spectrum approach for detention for Lorson Ranch East per the Denver Urban Drainage Districts specifications. There are two permanent full spectrum ponds proposed for this development. In addition to permanent ponds there are several interim detention ponds proposed under the electric transmission line easement. These interim ponds will detain existing runoff from the east to rates that can be accommodated by drainage infrastructure constructed as part of Lorson Ranch East. The interim detention ponds do not have full spectrum or water quality features and are strictly to reduce the upstream existing runoff from large tributary basins. The two full spectrum ponds (Pond C5 and Pond D2) incorporate storm water quality features and comply with the Lorson Ranch East MDDP.

The outlets need to accommodate historic flows, spillways and downstream conveyances need to accommodate developed flows.

Interim Pond Construction Requirements
Interim pond construction is only for rough grading as detailed on the Early Grading plans for Lorson Ranch East included in the Preliminary Plan submittal. Interim ponds include a 10' wide gravel access road on a 15' wide bench at a maximum 10% slope to the pond bottom. Interim pond outlets consist of a storm sewer and flared end section with a rip rap berm to prevent erosion from entering the pipe. Interim Pond E2 includes a water quality outlet structure and a sediment forebay. All interim ponds include a storm sewer outfall and an emergency overflow weir. Soil borings, embankment, key-in, slope, and compaction requirements can be found in the geotechnical report for the Lorson Ranch East Preliminary Plan.

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Full Spectrum Pond Construction Requirements
Full spectrum Ponds C5 and D2 only include rough grading of the pond shown on the Early Grading plans for Lorson Ranch East which are included in the Preliminary Plan submittal. Final construction plans for full spectrum Ponds C5 and D2 will be included in the first filing of a final plat in Lorson Ranch East. The final design will include a 10' wide gravel access road on a 15' wide bench at a maximum

How many with Phase 1?

10% slope to the pond bottom. The final design of the full spectrum ponds consist of an outlet structure, storm sewer outfall to the East Tributary, low flow channel, sediment forebays, and overflow weirs. Soil borings, embankment, key-in, slope, and compaction requirements can be found in the geotechnical report for the Lorson Ranch East Preliminary Plan.

Interim Detention Pond C1

This is an interim detention pond located east of the electric substation and detains runoff from Basin C15-ex which is a large 55-acre existing basin. Interim Pond C1 is needed in Phase 2 when lots east of Lamprey Drive, south of Fontaine Boulevard, near the substation and Rockcastle Drive are graded/developed. Timing the construction of Interim Pond C1 will be provided in the final drainage report for the adjacent lots. Interim Pond C1 reduces the size of storm sewer necessary to convey drainage east to the East Tributary of JCC. This pond was modeled in Hydraflow and does not include water quality features.

- Incoming flows: 24cfs/134cfs in the 5-year and 100-year storm event
- Detained flows: 3.0cfs/10.0cfs in the 5-year and 100-year storm event
- Pipe Outlet: 18" RCP at 0.5%
- 5-yr WSEL= 5746.80, 100-yr WSEL=5749.60
- Volume: 0.64 ac-ft storage in 5-year, 3.67 acre-ft storage in 100-year
- Spillway sized for future developed flow = 175cfs, Inv=5753.00, 50' wide, 3' deep, see MDDP
- Spillway swale to Fontaine: 205cfs, 55' btm, 0.3% slope, 2' deep, 4:1 sides, velocity=3.3cfs, flow depth=1.05'

Interim Detention Pond C2.2 + Pond C2.3

These are interim detention ponds located east on Fontaine Boulevard and detains runoff from Basin C14-ex which is a large 119-acre existing basin. Interim Pond C2 reduces the size of storm sewer necessary to convey drainage east to the East Tributary of JCC in Fontaine Boulevard. Interim Ponds C2.2+C2.3 are connected by an overflow swale at an elevation of 5752.50. Both the north and south portions of the pond each have 24" outlet pipes so runoff can enter either pond for detention. This pond was modeled in Hydraflow and does not include water quality features.

- Incoming flows: 52cfs/271cfs in the 5-year and 100-year storm event
- Detained flows: 26cfs/74.2cfs in the 5-year and 100-year storm event
- Pipe Outlet: 24" RCP at 0.5% for both the north and south basins.
- 5-yr WSEL= 5747.22, 100-yr WSEL=5752.01
- Volume: 0.82ac-ft storage in 5-year, 7.12acre-ft storage in 100-year
- Pond C2.2 spillway sized for future developed flow = 500cfs, Inv=5754.00, 60' wide, 2' deep, flow depth=1.82', see MDDP
- Pond C2.3 spillway sized for future developed flow = 280cfs, Inv=5754.00, 30' wide, 3' deep, flow depth=1.85', see MDDP

Interim Detention Pond C3

This is an interim detention pond located north of Fontaine Boulevard and detains runoff from Basin C12-ex which is a large 100-acre existing basin. Interim Pond C3 flows to Pond C2 and reduces the size of storm sewer necessary to convey drainage east to the East Tributary of JCC in Fontaine Boulevard. Interim Pond C3 is connected by an 18" storm sewer to Pond C2. This pond was modeled in Hydraflow and does not include water quality features.

- Incoming flows: 45cfs/250cfs in the 5-year and 100-year storm event
- Detained flows: 7.6cfs/19.67cfs in the 5-year and 100-year storm event
- Pipe Outlet: 18" RCP draining to Pond C2
- 5-yr WSEL= 5759.56, 100-yr WSEL=5764.10
- Volume: 1.06ac-ft storage in 5-year, 6.6 acre-ft storage in 100-year
- Spillway sized for future developed flow = 380cfs, Inv=5764.00, 20' wide, 4' deep, see MDDP

This is not acceptable. Reference DCM 2.3, 2.5.3 and Table 6-1.

Fontaine Boulevard Emergency Overflow

This section of the drainage report addresses a possible emergency overflow condition on Fontaine Boulevard in which all the upstream future ponds (Future Ponds C1, C2.1, C2.2, C2.3, C2.4, C3, C4) fail. This condition would result in all the emergency overflows discharging at the undetained developed rates to Fontaine Boulevard including the C14/C15 basins and then west downstream to the East Tributary. This condition would result in 1,260cfs of undetained developed runoff in Fontaine Boulevard. Fontaine Boulevard has been designed for this scenario which includes a 5:1 slope in the 5' wide landscape tract next to the ROW that allows the flow to remain outside the adjacent lots. This flow condition was modeled for the future buildout of Fontaine Boulevard as a principal arterial and the interim condition as a non-residential collector in a 130'ROW. The principal arterial section results in a flow depth of 1.76' at the curb flow line. The non-residential collector section results in a flow depth of 1.70' at the curb flow line.

Interim Detention Pond D1

Interim Detention Pond D1 is located south of Lorson Boulevard at the electric easement and detains runoff from Basin D1-ex which is a 17-acre existing basin. Interim Pond D1 reduces the size of storm sewer necessary to convey drainage east to the East Tributary of JCC in Lorson Boulevard. Interim Pond D1 has an 18" outlet pipe draining east to the East Tributary of JCC. This pond was modeled in Hydraflow and does not include water quality features.

- Incoming flows: 8cfs/47cfs in the 5-year and 100-year storm event
- Detained flows: 3.5cfs/11.7cfs in the 5-year and 100-year storm event
- Pipe Outlet: 18" RCP at 0.5%
- 5-yr WSEL= 5751.89, 100-yr WSEL=5753.67
- Volume: 0.11ac-ft storage in 5-year, 0.8acre-ft storage in 100-year
- Spillway sized for future developed flow = 75cfs, Inv=5760.00, 25' wide, 2' deep, flow depth=0.9', see MDDP

Interim Detention Pond E1

This is an interim detention pond located south of Lorson Boulevard and detains runoff from Basin E1-ex which is a 57-acre existing basin. Interim Pond E1 reduces the size of storm sewer necessary to convey drainage east to the East Tributary of JCC in Trappe Drive. Pond E1 has an 18" outlet pipe draining east to the East Tributary of JCC. This pond was modeled in Hydraflow and does not include water quality features.

- Incoming flows: 25cfs/142cfs in the 5-year and 100-year storm event
- Detained flows: 6.7cfs/19.0cfs in the 5-year and 100-year storm event
- Pipe Outlet: 24" RCP at 0.5%
- 5-yr WSEL= 5730.45, 100-yr WSEL=5734.21
- Volume: 0.71ac-ft storage in 5-year, 3.47acre-ft storage in 100-year
- Spillway sized for future developed flow = 210cfs, Inv=5738.00, 40' wide, 2' deep, flow depth=1.33', see MDDP

Interim Detention Pond E2

This is an interim water quality pond located south of Lorson Boulevard and west of Trappe Drive and treats runoff from the developed "E" basins which is 21acres. Interim Pond E2 is only a water quality pond. All developed upstream flows will be allowed to flow undetained through this pond because Interim Pond E1 detains existing flows significantly lower than existing rates. Pond E2's water quality will outlet into a 48" pipe draining to the East Tributary. All storm events above water quality flows will flow over an emergency overflow into existing swales flowing west to the East Tributary. This will result in developed flows entering the East Tributary slightly lower than the pre-developed conditions. Futher development within the "E" basins will match the pre-developed rates. The water quality features were modeled in the Exel spreadsheets for full spectrum for the "E" basin (21 acres) only.

- Incoming flows: 51cfs/183cfs in the 5-year and 100-year storm event
- Detained flows: 51cfs/183cfs in the 5-year and 100-year storm event. No detention required.
- Zone 1 WQCV: 1.385ac-ft, WSEL: 5695.85, Top WQ outlet structure set at 5696.20
- Pipe Outlet: 48" RCP at 0.5%,
- Outlet Structure: From full spectrum worksheets
- Spillway set at 5698, Cipoleti Wier, 15' wide, 4:1 side slopes, 5698.00 invert

Detention Pond C5 (Full Spectrum Design)

This is an on-site permanent full spectrum detention pond that includes water quality and discharges directly into the East Tributary. Pond C5 is designed in the UDCF Full Spectrum spreadsheets for Water Quality and EURV volumes only. The 5-year and 100-year flow rates are taken from the Lorson East MDDP. See MDDP (Table 6.2) for pre/post development release rates into the East Tributary at this location. Pond C5 is required to release runoff (5-yr/100-yr) so it closely mimics the pre-developed flow rates into the East Tributary. The outlet structure is a triple CDOT type D outlet in parallel and the overflow spillway is a wier set slightly above the outlet structure so it releases the 5yr/100yr storm events quickly to match pre-developed rates. The full spectrum print outs are in the appendix of this report as well as the MDDP hydraflow pond sheets. See map in appendix for watershed areas.

- Watershed Ares: 171 acres
- Watershed Imperviousness: 65%
- Hydrologic Soils Group C/D
- Zone 1 WQCV: 3.298ac-ft, WSEL: 5709.92
- Zone 2 EURV: 9.524ac-ft, WSEL: 5712.27, Top outlet structure set at 5712.60, 3'x18' triple CDOT Type D outlets in parallel.
- (5-yr): 13.01ac-ft, WSEL: 5713.47, 121cfs
- Zone 3 (100-yr): 15.56ac-ft, WSEL: 5714.32, 420cfs
- Pipe Outlet: 48" RCP at 0.5%
- Overflow Spillway: 52' wide bottom, elevation=5713, 4:1 side slopes, flow depth=1.77', 420cfs
- Pre-development release rate into East Tributary=141cfs/458cfs in the 5yr/100 yr storm at this pond outfall (Design Pt. 2, Table 6.2 in MDDP)

Detention Pond D2 (Full Spectrum Design)

This is an on-site permanent full spectrum detention pond that includes water quality and discharges directly into the East Tributary. Pond D2 is designed in the UDCF Full Spectrum spreadsheets but the pond release rates for the 5-yr.100-yr storms are taken from the Hydraflow model in the Lorson East MDDP because of the additional flow from Pond D1 entering this system and the excel spreadsheet cannot account for that flow. The full spectrum and MDDP release rates are close but the MDDP is a more accurate representation. Pond D2 is required to release runoff (5-yr/100-yr) so it closely mimics the pre-developed flow rates into the East Tributary. See MDDP (Table 6.2) for pre/post development release rates into the East Tributary at this location. The outlet structure is a standard 4'x14' full spectrum outlet structure and the overflow spillway is a weir set above the outlet structure so it releases the 5yr/100yr storm events to match pre-developed rates. The full spectrum print outs are in the

appendix of this report as well as the MDDP hydraflow pond sheets. See map in appendix for watershed areas.

- Watershed Ares: 72 acres
- Watershed Imperviousness: 65%
- Hydrologic Soils Group C/D
- Zone 1 WQCV: 1.385ac-ft, WSEL: 5697.65
- Zone 2 EURV: 4.00ac-ft, WSEL: 5699.19, Top outlet structure set at 5699.50, 4'x14' outlet.
- (5-yr): 5.61ac-ft, WSEL: 5700.07, 31.2cfs
- Zone 3 (100-yr): 8.53ac-ft, WSEL: 5701.75, 131.2cfs
- Pipe Outlet: 48" RCP at 0.5%
- Overflow Spillway: 30' wide bottom, elevation=5702.00, 4:1 side slopes, flow depth=1.96', 307cfs
- Pre-development release rate into East Tributary 29.7cfs/166.5cfs in the 5yr/100 yr storm at this pond outfall (Design Pt. 3, Table 6.2 in MDDP)

Which basins? BMP maint. agreement will be required. Address maintenance entity.

Water Quality Design

Water Quality for the "C" and "D" basins is provided in the two on-site full spectrum ponds Pond C5 and Pond D2. Pond E2 is an interim pond that will provide water quality treatment for the development of the "E" basins. Backyards draining directly to the East Tributary include a grass buffer for water quality treatment prior to entering the channel.

7.0 DRAINAGE AND BRIDGE FEES

Lorson Ranch East is located within the Jimmy Camp Creek drainage basin which is currently a fee basin in El Paso County. Current El Paso County regulations require drainage and bridge fees to be paid for platting of land as part of the plat recordation process. Lorson Ranch Metro District will be constructing the major drainage infrastructure as part of the district improvements.

Lorson Ranch Metro District will compile and submit to the county on a yearly basis the Drainage and bridge fees for the approved plats, and shall show all credits they have received for the same yearly time frame.

Lorson East contains 274.585 acres. The 274.585 acres will be assessed Drainage, Bridge and Surety fees. The 2017 drainage fees are $15,720, bridge fees are $735 and Drainage Surety fees are $7,000 per impervious acre. The drainage and bridge fees are calculated when the final plat is submitted. The fees are due at plat recordation and are calculated as follows:

The drainage costs anticipated?

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

Item	Quantity	Unit	Unit Cost	Item Total
Rip Rap	200	CY	$50/CY	$10,000
Inlets/Manholes	103	EA	$3000/EA	$309,000
18" Storm	3492	LF	$35	$122,220
24" Storm	2402	LF	$40	$96,080
30" Storm	3461	LF	$45	$155,745
36" Storm	1775	LF	$55	$97,625
42" Storm	1120	LF	$65	$72,800

48” Storm	2443	LF	$85	$207,655
54” Storm	710	LF	$100	$71,000
60” Storm	756	LF	$110	$83,160
66” Storm	396	LF	$130	$51,480
			Subtotal	$1,276,765
			Eng/Cont (15%)	$191,514
			Total Est. Cost	$1,468,279

Table 7.2: Lorson Ranch Metro District Drainage Facility Costs (non-reimbursable)

Item	Quantity	Unit	Unit Cost	Item Total
Full Spectrum Ponds and Outlet	2	LS	$150,000	$300,000
Lorson Blvd. Bridge Over East Tributary	1	LS	$1,000,000	$1,000,000
			Subtotal	$1,300,000
			Eng/Cont (15%)	$195,000
			Total Est. Cost	$1,495,000

Table 7.3: Lorson Ranch Metro District Drainage Facility Costs (Reimbursable)

Item	Quantity	Unit	Unit Cost	Item Total
E. Tributary Channel Improvements-Kiowa	1	LS	$1,000,000	$1,000,000
Fontaine Blvd. Bridge Over East Tributary-Kiowa	1	LS	$1,200,000	$1,200,000
			Subtotal	$2,200,000
Potentially (through the			Eng/Cont (15%)	$330,000
required process)			Total Est. Cost	$2,530,000

8.0 CONCLUSIONS

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

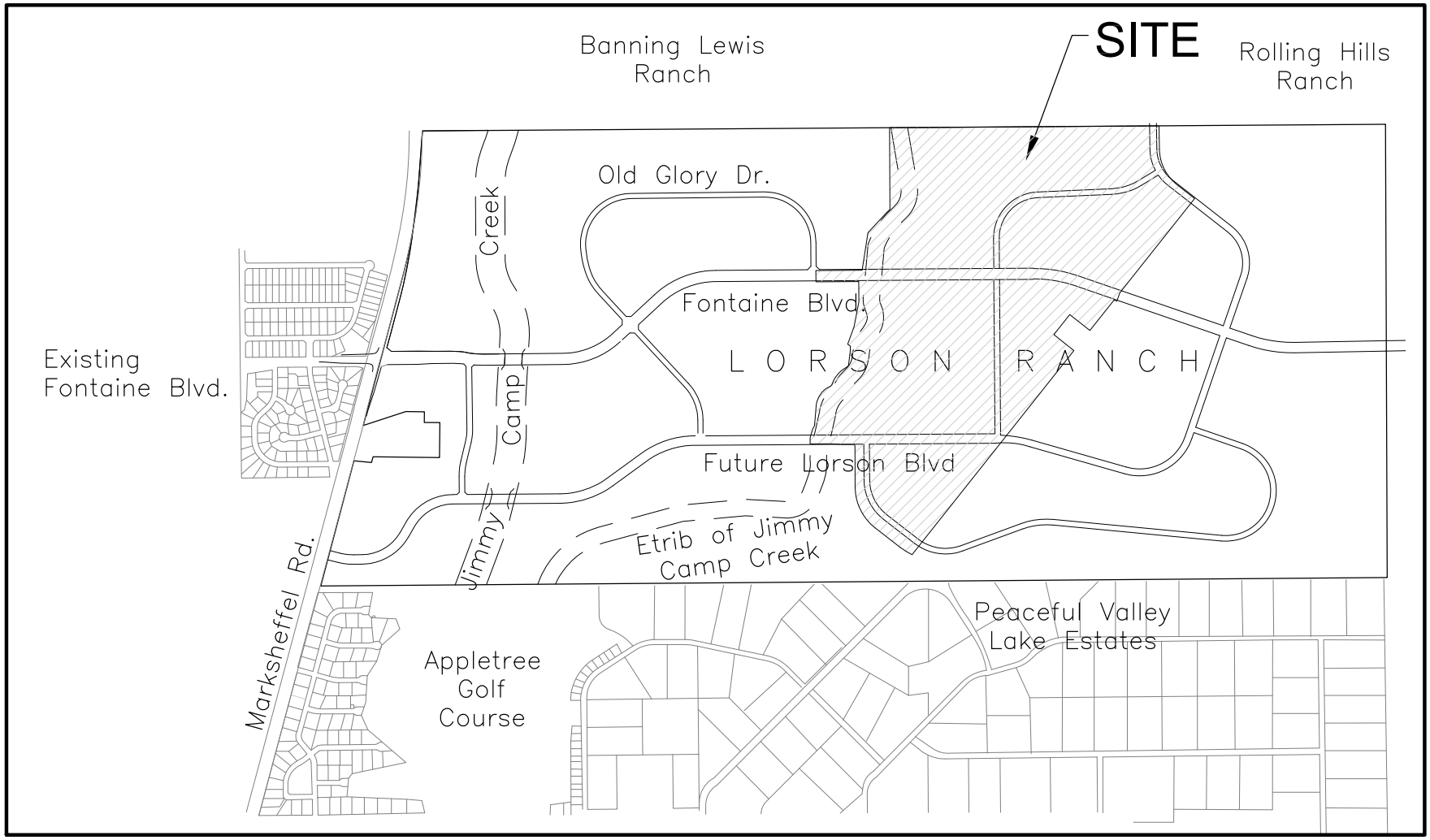
- Developed runoff will be conveyed via curb/gutter and storm sewer facilities
- The East Tributary of Jimmy Camp Creek will be reconstructed within this study area north of Fontaine Boulevard.
- Bridges over the East Tributary will be required at Lorson Boulevard and Fontaine Boulevard
- Detention and water quality for this preliminary plan area will be provided in two permanent ponds and one interim pond.

9.0 REFERENCES

1. City of Colorado Springs/El Paso County Drainage Criteria Manual DCM, dated November, 1991
2. Soil Survey of El Paso County Area, Colorado by USDA, SCS
3. Jimmy Camp Creek Drainage Basin Planning Study, Dated March 9, 2015, by Kiowa Engineering Corporation
4. City of Colorado Springs "Drainage Criteria Manual, Volume 2
5. El Paso County "Engineering Criteria Manual"
6. Lorson Ranch East MDDP, June 30, 2017 by Core Engineering.

7. Final Drainage Report for Fontaine Boulevard, Old Glory Drive, and Marksheffel Road Phase 1 Improvements, Dated February 6, 2006, Revised September 7, 2006, by Pentacor Engineering.
8. Final construction plans "Fontaine Boulevard and East Fork Jimmy Camp Creek Channel Design", Dated March 10, 2017, by Kiowa Engineering Corporation
9. El Paso County Resolution #15-042, El Paso County adoption of Chapter 6 and Section 3.2.1 of the City of Colorado Springs Drainage Criteria Manual dated May, 2014.

APPENDIX A – VICINTIY MAP, SOILS MAP, FEMA MAP



N

VICINITY MAP

NO SCALE

CORE ENGINEERING GROUP

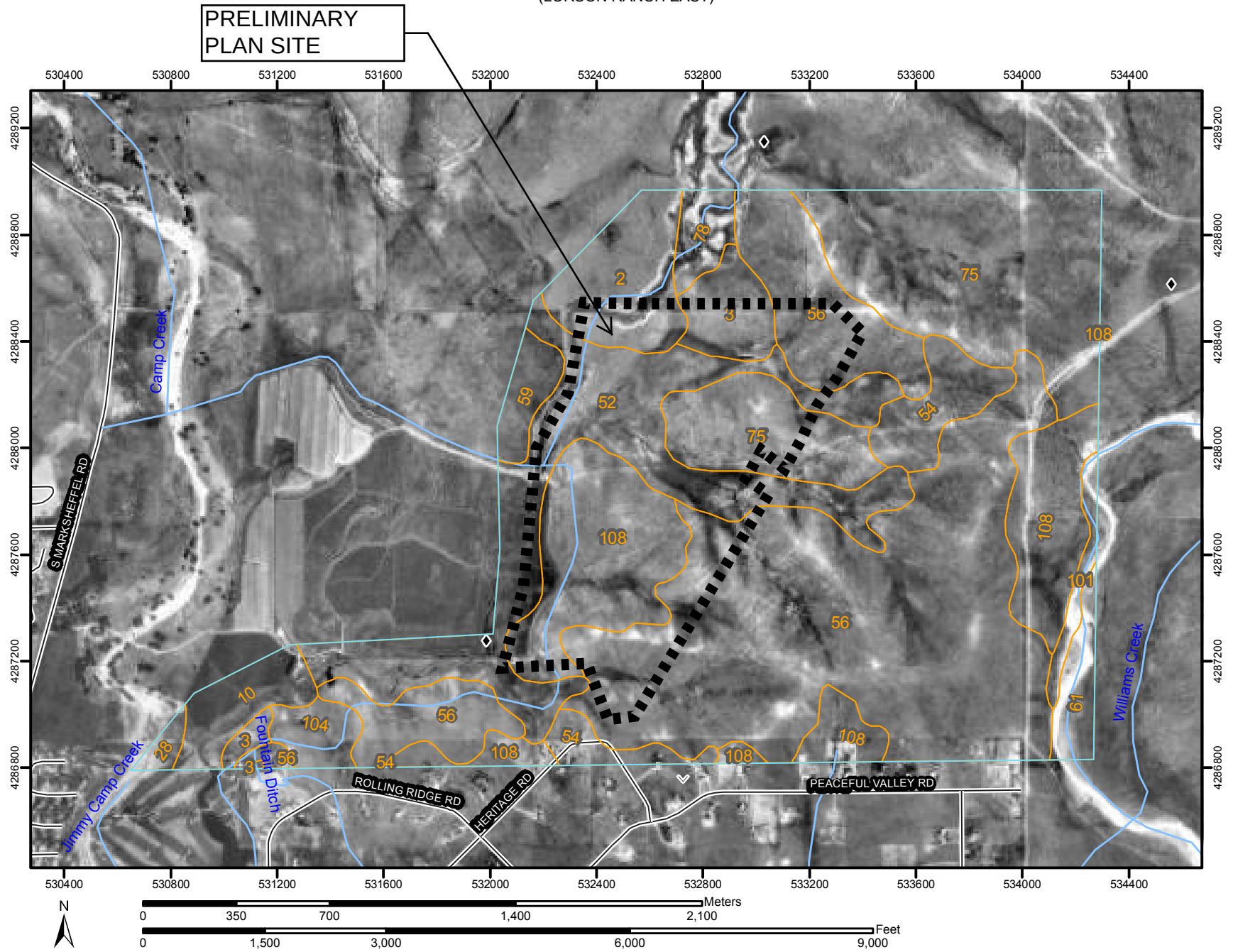
15004 1ST AVE. S.
BURNSVILLE, MN 55306
PH: 719.570.1100

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

LORSON RANCH EAST
VICINITY MAP

SCALE:	DATE:	FIGURE NO.
NTS	JUNE 30, 2017	--

Soil Map–El Paso County Area, Colorado
(LORSON RANCH EAST)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- 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
- Gully
- Short Steep Slope
- Other

Political Features

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 13N

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

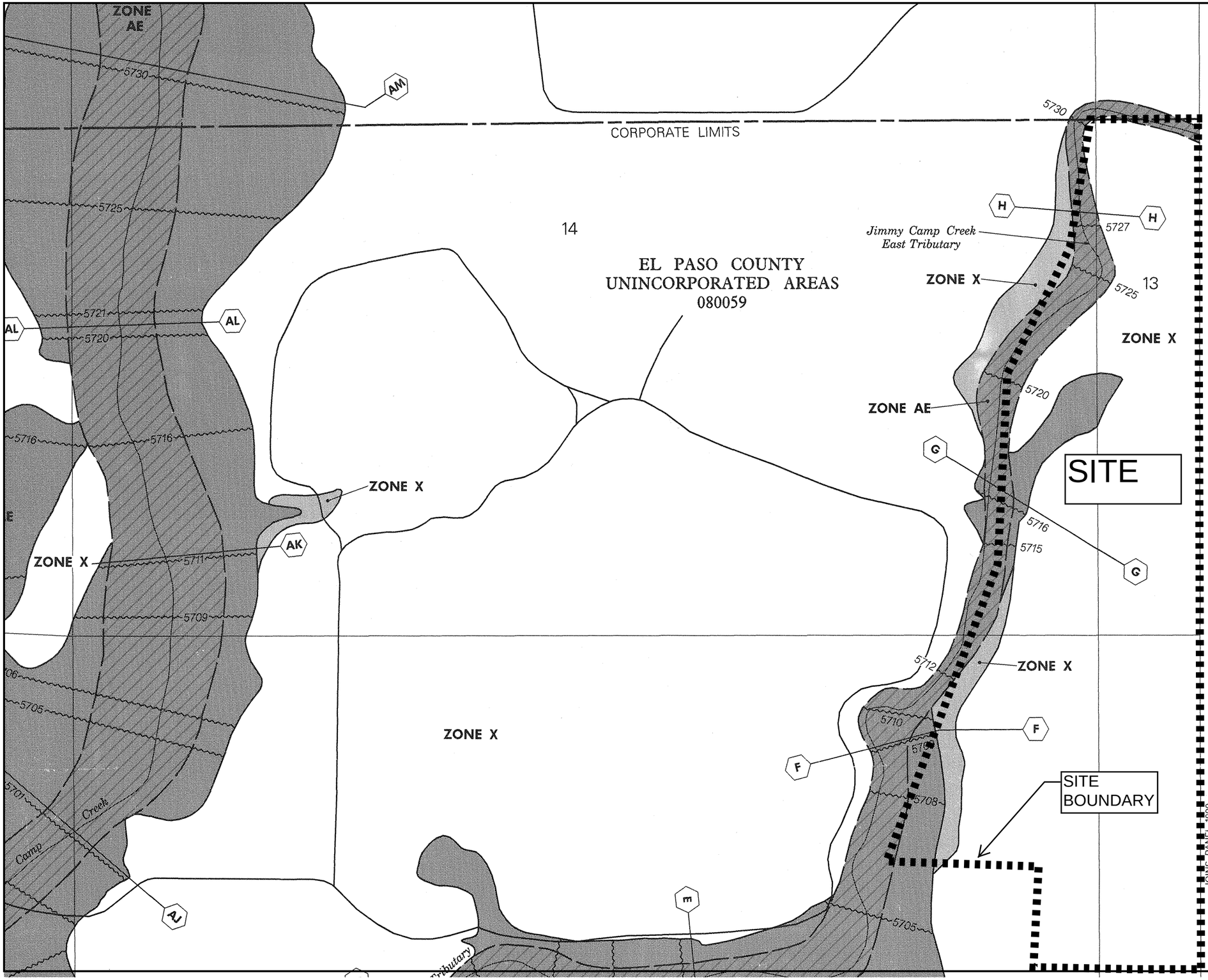
Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 5, Jan 15, 2008

Date(s) aerial images were photographed: 1999

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

El Paso County Area, Colorado (CO625)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
2	Ascalon sandy loam, 1 to 3 percent slopes	54.4	4.2%
3	Ascalon sandy loam, 3 to 9 percent slopes	32.6	2.5%
10	Blendon sandy loam, 0 to 3 percent slopes	29.0	2.2%
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	5.5	0.4%
52	Manzanola clay loam, 1 to 3 percent slopes	180.3	14.0%
54	Midway clay loam, 3 to 25 percent slopes	46.2	3.6%
56	Nelson-Tassel fine sandy loams, 3 to 18 percent slopes	476.6	37.0%
59	Nunn clay loam, 0 to 3 percent slopes	16.8	1.3%
61	Olney sandy loam, 3 to 5 percent slopes	18.8	1.5%
75	Razor-Midway complex	213.9	16.6%
78	Sampson loam, 0 to 3 percent slopes	16.4	1.3%
101	Ustic Torrifluvents, loamy	11.3	0.9%
104	Vona sandy loam, 1 to 3 percent slopes	17.4	1.4%
108	Wiley silt loam, 3 to 9 percent slopes	170.2	13.2%
Totals for Area of Interest (AOI)		1,289.3	100.0%



APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 957 OF 1300

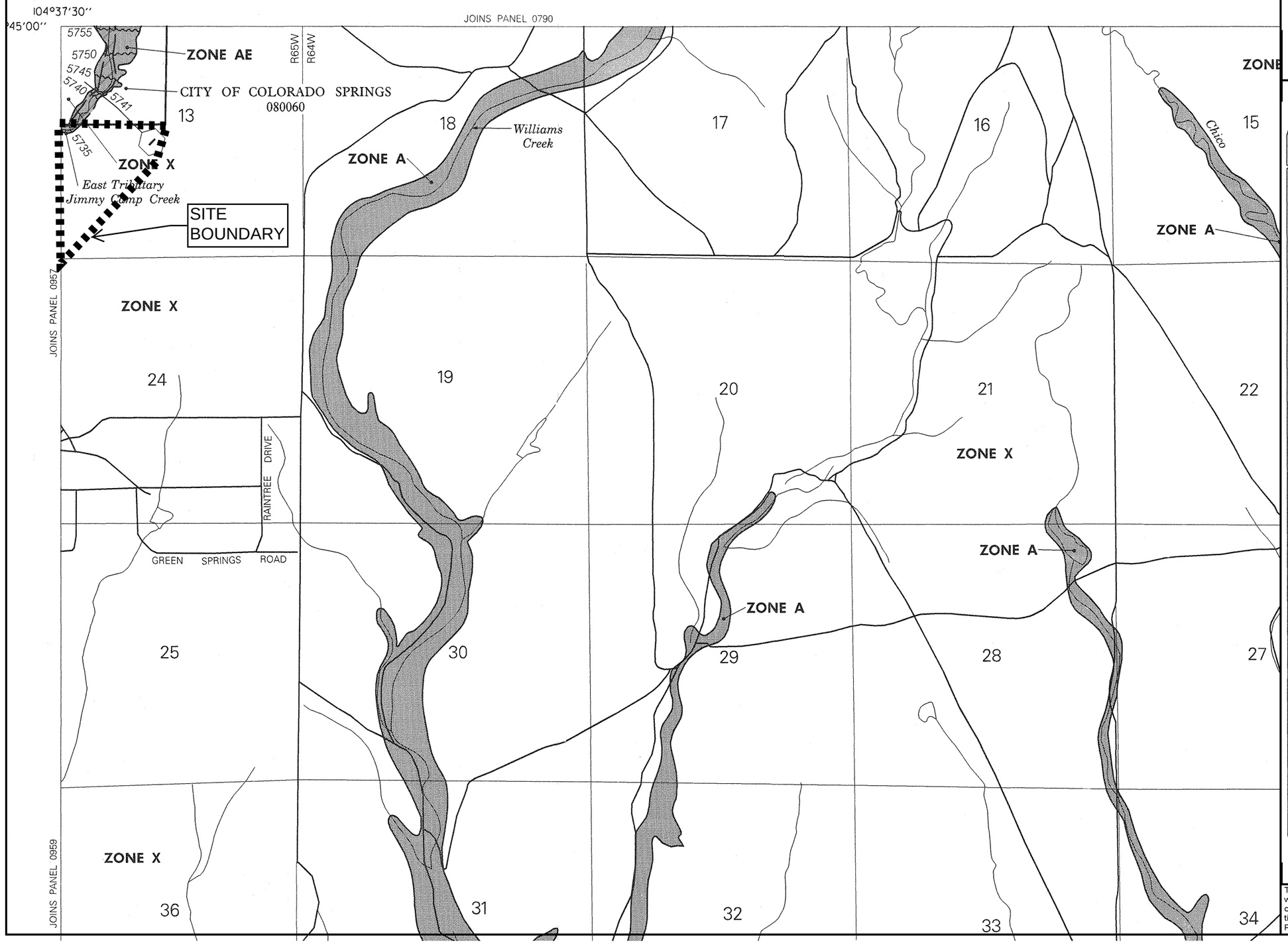
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0957	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0957	F
FOUNTAIN, CITY OF	080061	0957	F

MAP NUMBER
08041C0957 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency



APPROXIMATE SCALE IN FEET

2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 1000 OF 1300

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	1000	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	1000	F

MAP NUMBER
08041C1000 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

Legend

1% annual chance (100-Year) Floodplain

1% annual chance (100-Year) Floodway

0.2% annual chance (500-Year) Floodplain

APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

REVISED TO REFLECT LOMR EFFECTIVE: January 29, 2015

PANEL 957 OF 1300

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0957	F
EL PASO COUNTY UNINCORPORATED AREAS	080059	0957	F
FOUNTAIN, CITY OF	080061	0957	F

MAP NUMBER 08041C0957 F

EFFECTIVE DATE: MARCH 17, 1997

Federal Emergency Management Agency

JOINS PANEL 0769

104°37'30"

38°45'00"

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 15 SOUTH, RANGE 65 WEST.

CITY OF COLORADO SPRINGS 080060

13

Jimmy Camp Creek East Tribuary

5730

5731

5733

5729

REVISED AREA

5727

5725

H

5724

14

ZONE AE

5723

5722

5719

5721

5717

5711

G

5710

EL PASO COUNTY UNINCORPORATED AREAS 080059

5707

SITE

JOINS PANEL 1000

AREA REVISED BY LOMR DATED AUGUST 29, 2007.

SITE BOUNDARY

5703

5704

F

PROFILE BASELINE

23

Jimmy Camp Creek East Tribuary

5702

E

5699

ZONE AE

24

ZONE AE

5694

5693

D

5700

5701

5697

5689

5690

5692

5696

5698

E

Legend

1% annual chance (100-Year) Floodplain

1% annual chance (100-Year) Floodway

0.2% annual chance (500-Year) Floodplain

APPROXIMATE SCALE IN FEET

2,000 0 2,000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 1000 OF 1300

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	1000	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	1000	F

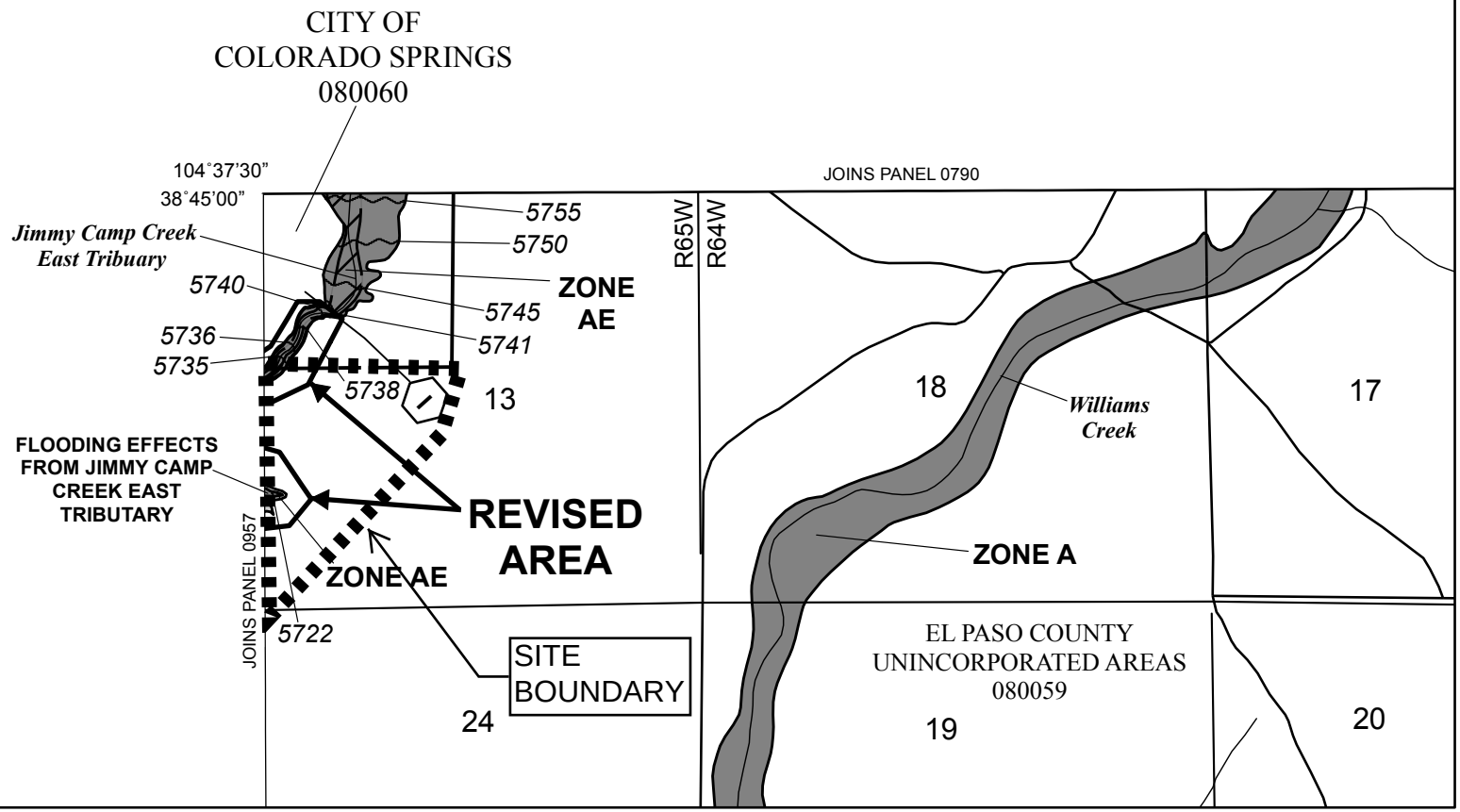
REVISED TO REFLECT LOMR EFFECTIVE: January 29, 2015

MAP NUMBER
08041C1000 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 15 SOUTH, RANGE 64 WEST AND TOWNSHIP 16 SOUTH, RANGE 65 WEST.



APPENDIX B – HYDROLOGY CALCULATIONS

CORE ENGINEERING GROUP

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

Calculated By: Leonard Beasley
Date: June, 2017
Checked By: Leonard Beasley

Job No: 100.013
Project: Lorson Ranch East MDDP
Design Storm: **5 - Year Event, Existing Conditions**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	Σ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
EX-A1			4.28	0.08	18.6	0.34	3.20	1.1													
EX-C	**DP-2**		452.97	CN = 67						SCS =		141.0									
EX-D	**DP-3**		109.55	0.12	34.7	13.15	2.26	29.7													
EX-E	**DP-4**		187.30	CN =73						SCS =		100.0									

CORE ENGINEERING GROUP

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

Calculated By: Leonard Beasley
Date: April 28, 2016
Checked By: Leonard Beasley

Job No: 100.013
Project: Lorson Ranch East MDDP
Design Storm: **100 - Year Event, Existing Conditions**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	$\sum$ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
EX-A1			4.28	0.35	18.6	1.50	5.37	8.0													
EX-C	**DP-2**		452.97	CN = 67						SCS =		458.0									
EX-D	**DP-3**		109.55	0.40	34.7	43.82	3.80	166.5													
EX-E	**DP-4**		187.30	CN = 73						SCS =		280.0									

Hydrograph Plot

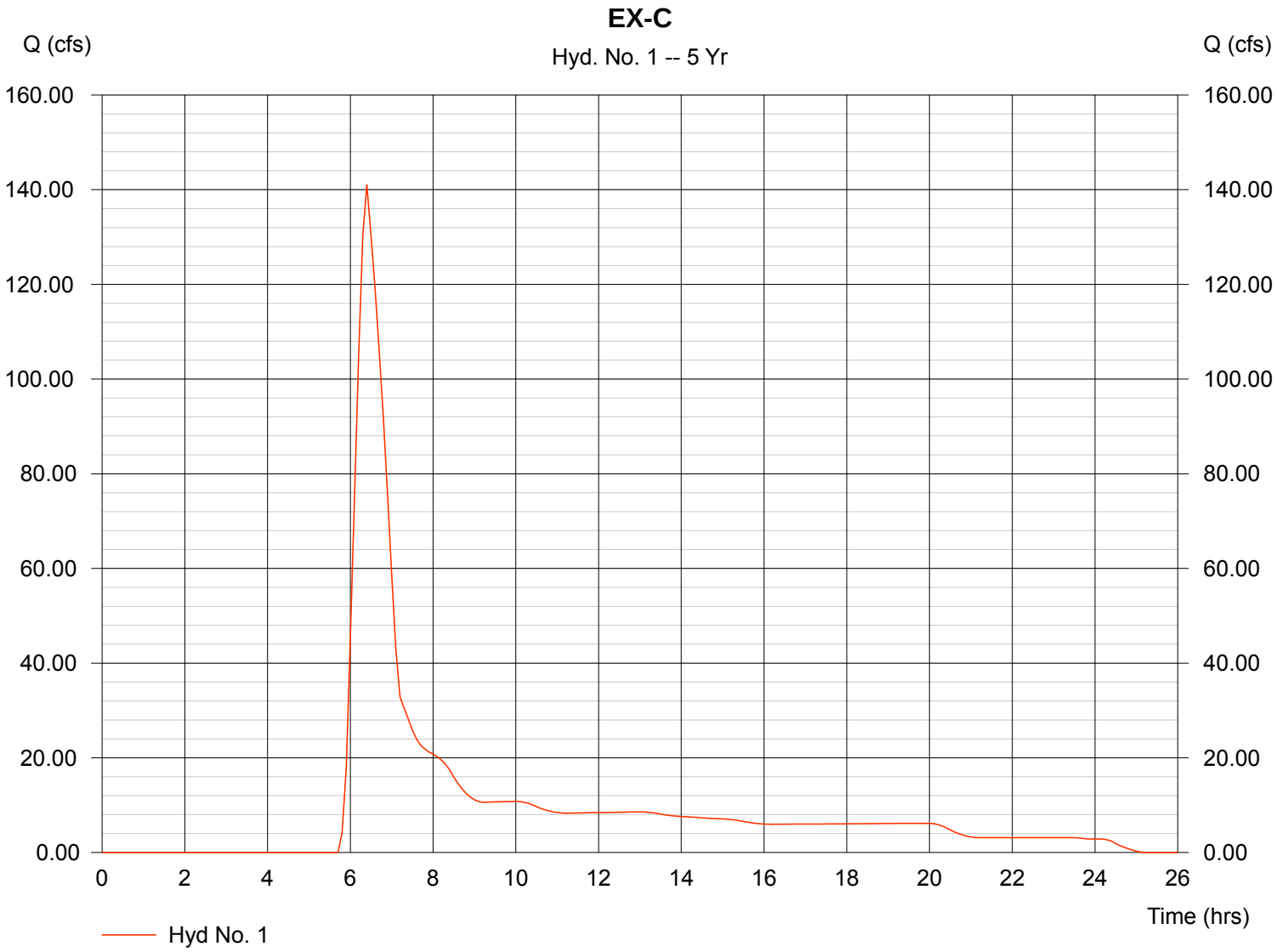
Hydraflow Hydrographs by Intelisolve | Monday, Jun 5 2017, 4:1 PM

Hyd. No. 1

EX-C

Hydrograph type	= SCS Runoff	Peak discharge	= 140.99 cfs
Storm frequency	= 5 yrs	Time interval	= 6 min
Drainage area	= 452.970 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 7400 ft
Tc method	= USER	Time of conc. (Tc)	= 49.50 min
Total precip.	= 2.80 in	Distribution	= Custom
Storm duration	= CSpring_IIA-6min.cds	Shape factor	= 484

Hydrograph Volume = 905,484 cuft



Hydrograph Plot

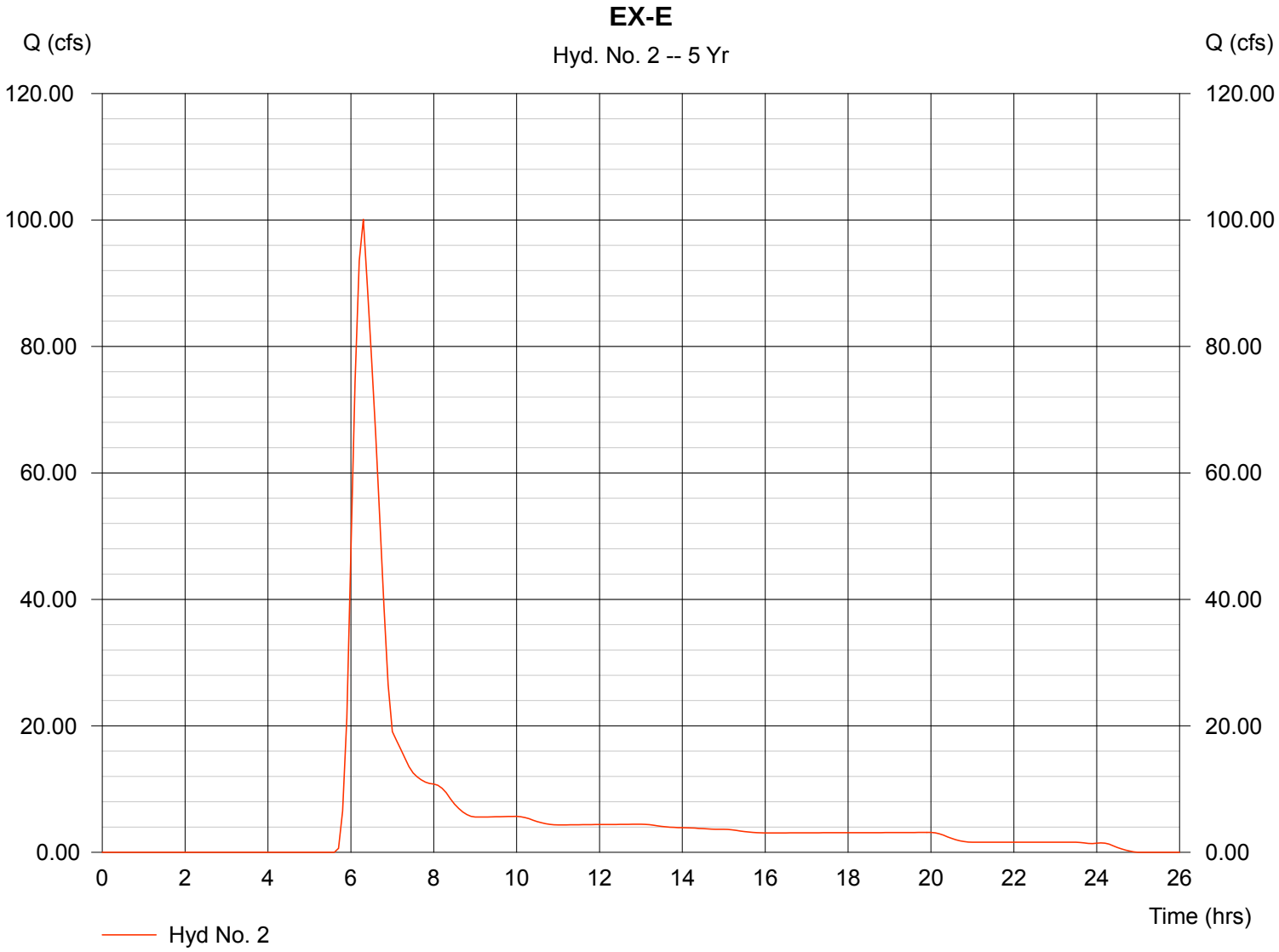
Hydraflow Hydrographs by Intelisolve | Monday, Jun 5 2017, 4:1 PM

Hyd. No. 2

EX-E

Hydrograph type	=	SCS Runoff	Peak discharge	=	100.11 cfs
Storm frequency	=	5 yrs	Time interval	=	6 min
Drainage area	=	187.300 ac	Curve number	=	73
Basin Slope	=	3.0 %	Hydraulic length	=	4150 ft
Tc method	=	USER	Time of conc. (Tc)	=	33.00 min
Total precip.	=	2.80 in	Distribution	=	Custom
Storm duration	=	CSpring_IIA-6min.cds	Shape factor	=	484

Hydrograph Volume = 513,793 cuft



Hydrograph Plot

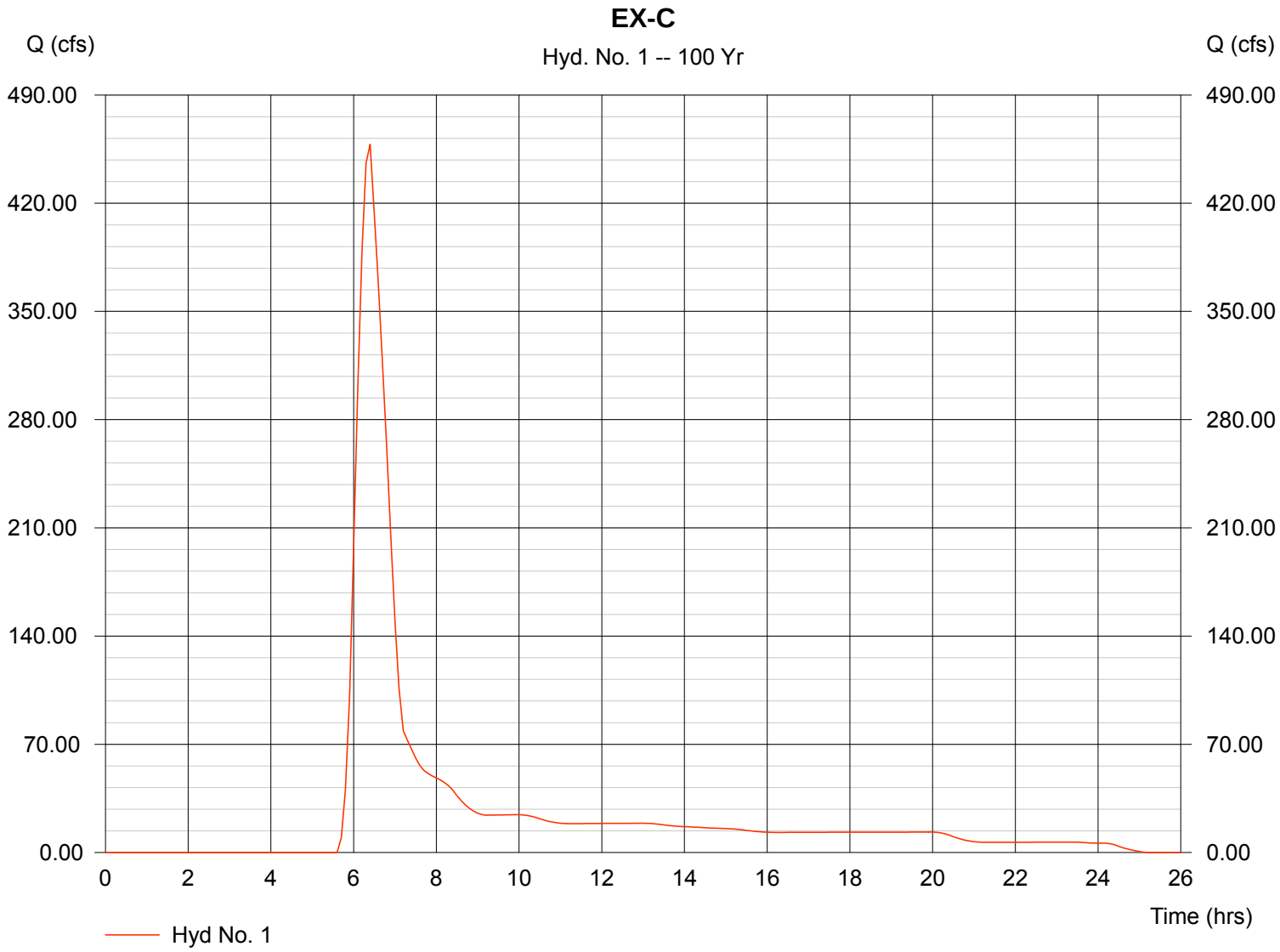
Hydraflow Hydrographs by Intelisolve | Monday, Jun 5 2017, 4:1 PM

Hyd. No. 1

EX-C

Hydrograph type	= SCS Runoff	Peak discharge	= 458.13 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 452.970 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 7400 ft
Tc method	= USER	Time of conc. (Tc)	= 49.50 min
Total precip.	= 4.40 in	Distribution	= Custom
Storm duration	= CSpring_IIA-6min.cds	Shape factor	= 484

Hydrograph Volume = 2,456,980 cuft



Hydrograph Plot

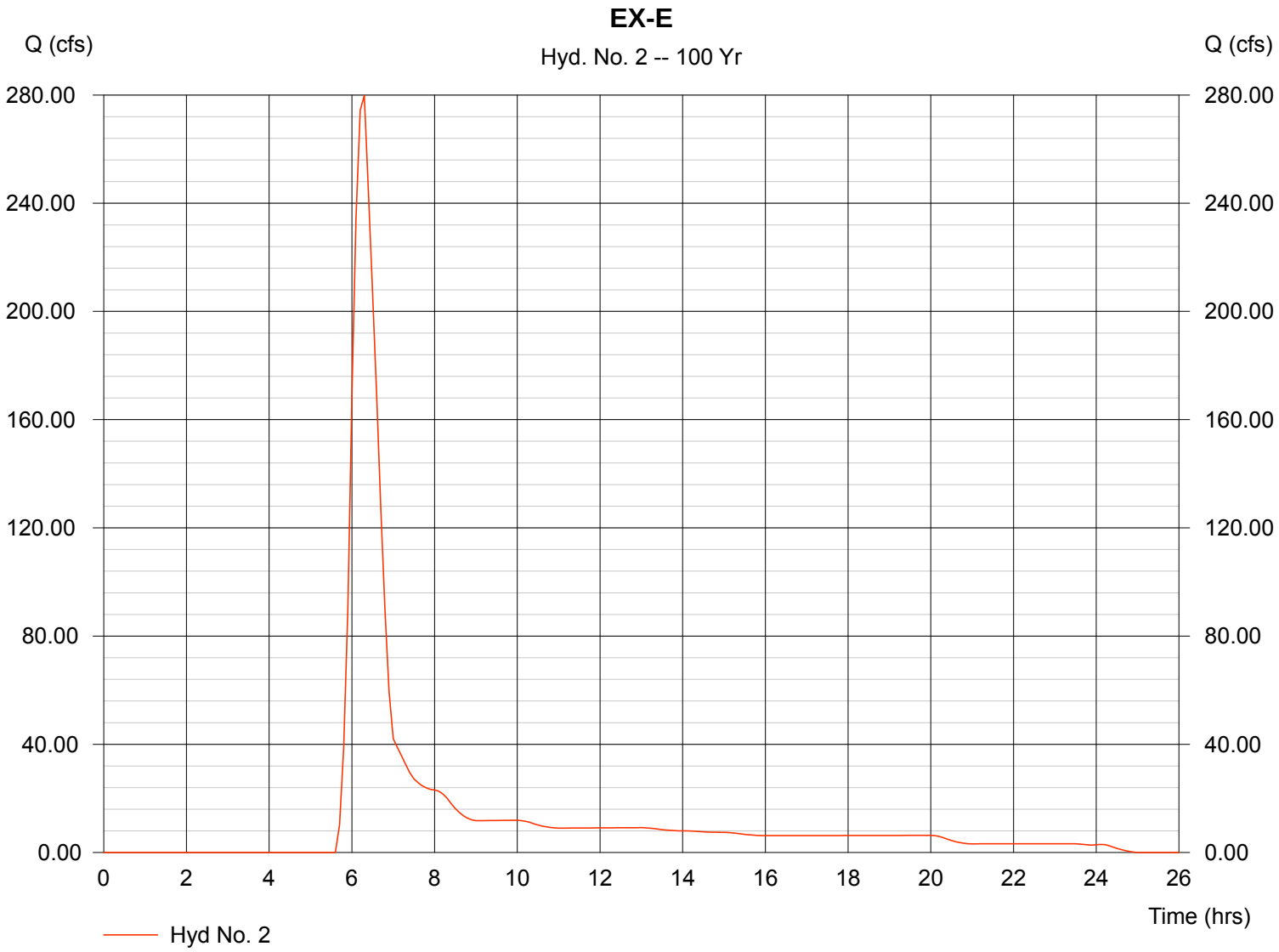
Hydraflow Hydrographs by Intelisolve | Monday, Jun 5 2017, 4:1 PM

Hyd. No. 2

EX-E

Hydrograph type	= SCS Runoff		Peak discharge	= 279.84 cfs	
Storm frequency	= 100 yrs		Time interval	= 6 min	
Drainage area	= 187.300 ac		Curve number	= 73	
Basin Slope	= 3.0 %		Hydraulic length	= 4150 ft	
Tc method	= USER		Time of conc. (Tc)	= 33.00 min	
Total precip.	= 4.40 in		Distribution	= Custom	
Storm duration	= CSpring_IIA-6min.cds		Shape factor	= 484	

Hydrograph Volume = 1,267,200 cuft



Provide runoff coefficients tables and land use/impervious percentages table used for calculations.

CORE ENGINEERING GROUP

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

Calculated By: Leonard Beasley
Date: August 16, 2016, June 30, 2017
Checked By: Leonard Beasley

Job No: 100.040
Project: Lorson Ranch East Preliminary Drainage
Design Storm: **5 - Year Event, Proposed Conditions**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	$\sum$ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
OS-C9			5.24	0.49	11.09	2.57	3.97	10.2													
C10			12.92	0.49	17.87	6.33	3.26	20.6													
OS-C11			6.48	0.49	21.69	3.18	2.97	9.4													
C12			20.52	0.49	17.56	10.05	3.28	33.0													
C13			19.21	0.16	30.35	3.07	2.46	7.6													
C13.1			1.63	0.90	8.57	1.47	4.36	6.4													
C14			2.36	0.66	9.25	1.56	4.25	6.6													
C14.1			4.10	0.16	13.89	0.66	3.64	2.4													
C14.2			1.65	0.68	5.12	1.12	5.13	5.8													
C16.1			2.68	0.49	7.55	1.31	4.55	6.0													
C16.2			1.82	0.49	10.97	0.89	3.99	3.6													
C16.3			1.78	0.49	10.35	0.87	4.08	3.6													
C16.4			0.81	0.49	8.40	0.40	4.39	1.7													
C16.5			0.50	0.49	5.63	0.25	4.99	1.2													
C16.6			1.43	0.49	10.27	0.70	4.09	2.9													
C16.7			0.54	0.49	7.60	0.26	4.54	1.2													
C16.8			0.53	0.49	6.43	0.26	4.79	1.2													
C16.9			1.60	0.49	7.62	0.78	4.54	3.6													
C16.10			0.52	0.49	6.35	0.25	4.81	1.2													
C16.11			0.38	0.49	9.76	0.19	4.17	0.8													
C16.12			1.82	0.49	6.89	0.89	4.69	4.2													
C16.13			3.62	0.49	11.45	1.77	3.93	7.0													
C16.14			0.10	0.49	5.01	0.05	5.17	0.3													
C16.15			2.28	0.49	9.77	1.12	4.16	4.7													
C16.16			1.29	0.49	13.31	0.63	3.70	2.3													
C16.17			1.64	0.49	12.39	0.80	3.81	3.1													
C16.18			2.96	0.49	12.69	1.45	3.77	5.5													
C16.19			1.65	0.49	11.98	0.81	3.86	3.1													
C16.20			2.84	0.49	10.38	1.39	4.07	5.7													
C16.21			1.78	0.49	13.36	0.87	3.69	3.2													
C16.22			2.88	0.49	14.17	1.41	3.61	5.1													
C16.23			1.46	0.49	14.05	0.72	3.62	2.6													
C16.24			2.79	0.49	17.10	1.37	3.32	4.5													
C16.25			0.43	0.49	11.04	0.21	3.98	0.8													

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

Calculated By: Leonard Beasley
Date: August 16, 2016, June 30, 2017
Checked By: Leonard Beasley

Job No: 100.040
Project: Lorson Ranch East Preliminary Drainage
Design Storm: **5 - Year Event, Proposed Conditions**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	$\sum$ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
C16.26			1.42	0.49	11.66	0.70	3.90	2.7													
C16.27			0.23	0.49	5.95	0.11	4.91	0.6													
C16.28			2.09	0.49	12.65	1.02	3.78	3.9													
C16.29			2.01	0.49	12.98	0.98	3.74	3.7													
C16.30			4.54	0.49	20.36	2.22	3.06	6.8													
C16.31			9.90	0.23	20.56	2.28	3.05	6.9													
C16.32			0.97	0.49	12.20	0.48	3.83	1.8													
C16.33			0.21	0.90	5.00	0.19	5.17	1.0													
C16.34			0.38	0.49	6.95	0.19	4.67	0.9													
C16.35			1.46	0.49	11.60	0.72	3.91	2.8													
C16.36			7.70	0.23	14.79	1.77	3.54	6.3													
C15.1			7.10	0.30	18.04	2.13	3.24	6.9													
C15.2			4.63	0.42	11.51	1.94	3.92	7.6													
C15.3			3.60	0.49	13.83	1.76	3.64	6.4													
C15.4			1.25	0.49	9.05	0.61	4.28	2.6													
C15.5			2.90	0.49	9.86	1.42	4.15	5.9													
C15.6			1.80	0.49	12.88	0.88	3.75	3.3													
C15.7			2.07	0.49	11.73	1.01	3.89	3.9													
C15.8			3.76	0.40	15.51	1.50	3.47	5.2													
C15.9			2.27	0.49	8.22	1.11	4.42	4.9													
C15.10			0.60	0.49	9.85	0.29	4.15	1.2													
C15.11			3.20	0.49	11.58	1.57	3.91	6.1													
C15.12			0.61	0.49	11.47	0.30	3.92	1.2													
C15.13			2.35	0.49	11.49	1.15	3.92	4.5													
C15.14			1.32	0.49	8.11	0.65	4.44	2.9													
C15.15			4.02	0.49	13.72	1.97	3.65	7.2													
C17.1a			2.81	0.49	12.11	1.38	3.84	5.3													
C17.1			2.68	0.49	7.69	1.31	4.52	5.9													
C17.2			4.11	0.49	9.19	2.01	4.26	8.6													
C17.3			2.21	0.49	9.78	1.08	4.16	4.5													
C17.4			1.98	0.49	17.58	0.97	3.28	3.2													
C17.5			3.72	0.49	13.41	1.82	3.69	6.7													

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

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Job No: 100.040
Project: Lorson Ranch East Preliminary Drainage
Design Storm: **5 - Year Event, Proposed Conditions**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	$\sum$ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
C17.6			1.04	0.49	13.89	0.51	3.64	1.9													
C17.7			2.68	0.49	7.62	1.31	4.54	6.0													
C17.8			1.52	0.55	12.41	0.84	3.81	3.2													
C17.9			1.73	0.90	5.65	1.56	4.99	7.8													
C17.10			2.34	0.90	9.34	2.11	4.23	8.9													
D1.1			5.09	0.49	18.38	2.49	3.22	8.0													
D1.2			1.10	0.49	6.86	0.54	4.69	2.5													
D1.3			0.86	0.49	10.65	0.42	4.03	1.7													
D1.4			2.80	0.49	12.39	1.37	3.81	5.2													
D1.5			5.15	0.49	9.43	2.52	4.22	10.6													
D1.6			5.10	0.49	16.74	2.50	3.36	8.4													
D1.7			3.50	0.49	10.40	1.72	4.07	7.0													
D1.8			1.70	0.49	12.37	0.83	3.81	3.2													
D1.9			2.20	0.49	12.70	1.08	3.77	4.1													
D1.10			5.50	0.49	13.39	2.70	3.69	9.9													
D1.11			1.40	0.49	12.38	0.69	3.81	2.6													
D1.12			4.45	0.24	14.08	1.07	3.62	3.9													
D2.1			3.14	0.49	14.87	1.54	3.53	5.4													
D2.2			1.11	0.49	11.93	0.54	3.86	2.1													
D2.3			2.80	0.27	14.09	0.76	3.61	2.7													
D2.4			3.33	0.29	13.48	0.97	3.68	3.6													
D2.5			3.93	0.49	7.40	1.93	4.58	8.8													
D2.6			2.13	0.49	10.37	1.04	4.07	4.3													
D2.7			2.98	0.49	7.22	1.46	4.62	6.7		5.11											
D2.8			3.70	0.49	9.24	1.81	4.25	7.7													
D2.9			3.15	0.49	14.83	1.54	3.54	5.5													
D2.10			0.80	0.49	6.24	0.39	4.84	1.9													
D2.11			0.40	0.90	3.68	0.36	5.63	2.0													
D2.12			2.78	0.49	11.27	1.36	3.95	5.4													
D2.13			2.51	0.49	17.67	1.23	3.28	4.0													
E1.1			1.41	0.49	7.40	0.69	4.58	3.2													

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

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Date: August 16, 2016, June 30, 2017
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Job No: 100.040
Project: Lorson Ranch East Preliminary Drainage
Design Storm: **5 - Year Event, Proposed Conditions**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	Σ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
E1.2			3.61	0.49	10.20	1.77	4.10	7.3													
E1.3			6.81	0.20	15.70	1.36	3.45	4.7		0.25											
E1.4			0.65	0.49	9.92	0.32	4.14	1.3													
E1.5			1.95	0.49	8.86	0.96	4.31	4.1													
E1.6			2.32	0.49	10.94	1.14	3.99	4.5													
E1.7			3.50	0.38	14.72	1.33	3.55	4.7													
C12a-ex			27	0.15	15.69	4.05	3.45	14													
C12-ex			73	0.15	24.19	10.95	2.80	31													
C14-ex			119	0.15	29.17	17.85	2.52	45													
C15-ex			55	0.15	22.61	8.25	2.91	24													
D1-ex			17	0.15	17.78	2.55	3.27	8													
E1-ex			57	0.15	21.72	8.55	2.97	25													
E2-ex			30	0.26	16.78	7.67	3.35	26													

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

Calculated By: Leonard Beasley
Date: August 16, 2016, June 30, 2017
Checked By: Leonard Beasley

Job No: 100.040
Project: Lorson Ranch East Preliminary Drainage
Design Storm: **100 - Year Event, Proposed Conditions**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	$\sum$ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
OS-C9			5.24	0.65	11.09	3.41	6.67	22.7													
C10			12.92	0.65	17.87	8.40	5.47	45.9													
OS-C11			6.48	0.65	21.69	4.21	4.98	21.0													
C12			20.52	0.65	17.56	13.34	5.51	73.5													
C13			19.21	0.51	30.35	9.80	4.13	40.5													
C13.1			1.63	0.96	8.57	1.56	7.32	11.5													
C14			2.36	0.81	9.25	1.91	7.13	13.6													
C14.1			4.10	0.51	13.89	2.09	6.10	12.8													
C14.2			1.65	0.82	5.12	1.35	8.62	11.7													
C16.1			2.68	0.65	7.55	1.74	7.64	13.3													
C16.2			1.82	0.65	10.97	1.18	6.70	7.9													
C16.3			1.78	0.65	10.35	1.16	6.85	7.9													
C16.4			0.81	0.65	8.40	0.53	7.37	3.9													
C16.5			0.50	0.65	5.63	0.33	8.38	2.7													
C16.6			1.43	0.65	10.27	0.93	6.87	6.4													
C16.7			0.54	0.65	7.60	0.35	7.62	2.7													
C16.8			0.53	0.65	6.43	0.34	8.05	2.8													
C16.9			1.60	0.65	7.62	1.04	7.62	7.9													
C16.10			0.52	0.65	6.35	0.34	8.08	2.7													
C16.11			0.38	0.65	9.76	0.25	6.99	1.7													
C16.12			1.82	0.65	6.89	1.18	7.87	9.3													
C16.13			3.62	0.65	11.45	2.35	6.59	15.5													
C16.14			0.10	0.65	5.01	0.07	8.67	0.6													
C16.15			2.28	0.65	9.77	1.48	6.99	10.4													
C16.16			1.29	0.65	13.31	0.84	6.21	5.2													
C16.17			1.64	0.65	12.39	1.07	6.39	6.8													
C16.18			2.96	0.65	12.69	1.92	6.33	12.2													
C16.19			1.65	0.65	11.98	1.07	6.48	6.9													
C16.20			2.84	0.65	10.38	1.85	6.84	12.6													
C16.21			1.78	0.65	13.36	1.16	6.20	7.2													
C16.22			2.88	0.65	14.17	1.87	6.05	11.3													
C16.23			1.46	0.65	14.05	0.95	6.08	5.8													
C16.24			2.79	0.65	17.10	1.81	5.58	10.1													

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

Calculated By: Leonard Beasley
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Job No: 100.040
Project: Lorson Ranch East Preliminary Drainage
Design Storm: **100 - Year Event, Proposed Conditions**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	$\sum$ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
C16.25			0.43	0.65	11.04	0.28	6.68	1.9													
C16.26			1.42	0.65	11.66	0.92	6.55	6.0													
C16.27			0.23	0.65	5.95	0.15	8.24	1.2													
C16.28			2.09	0.65	12.65	1.36	6.34	8.6													
C16.29			2.01	0.65	12.98	1.31	6.28	8.2													
C16.30			4.54	0.65	20.36	2.95	5.14	15.2													
C16.31			9.90	0.54	20.56	5.35	5.12	27.4													
C16.32			0.97	0.65	12.20	0.63	6.43	4.1													
C16.33			0.21	0.96	5.00	0.20	8.68	1.7													
C16.34			0.38	0.65	6.95	0.25	7.85	1.9													
C16.35			1.46	0.65	11.60	0.95	6.56	6.2													
C16.36			7.70	0.54	14.79	4.16	5.95	24.7													
C15.1			7.10	0.57	18.04	4.05	5.45	22.0													
C15.2			4.63	0.63	11.51	2.92	6.58	19.2													
C15.3			3.60	0.65	13.83	2.34	6.12	14.3													
C15.4			1.25	0.65	9.05	0.81	7.18	5.8													
C15.5			2.90	0.65	9.86	1.89	6.97	13.1													
C15.6			1.80	0.65	12.88	1.17	6.29	7.4													
C15.7			2.07	0.65	11.73	1.35	6.53	8.8													
C15.8			3.76	0.61	15.51	2.29	5.83	13.4													
C15.9			2.27	0.65	8.22	1.48	7.43	11.0													
C15.10			0.60	0.65	9.85	0.39	6.97	2.7													
C15.11			3.20	0.65	11.58	2.08	6.56	13.7													
C15.12			0.61	0.65	11.47	0.40	6.59	2.6													
C15.13			2.35	0.65	11.49	1.53	6.58	10.1													
C15.14			1.32	0.65	8.11	0.86	7.46	6.4													
C15.15			4.02	0.65	13.72	2.61	6.14	16.0													
C17.1a			2.81	0.65	12.11	1.83	6.45	11.8													
C17.1			2.68	0.65	7.69	1.74	7.59	13.2													
C17.2			4.11	0.65	9.19	2.67	7.15	19.1													
C17.3			2.21	0.65	9.78	1.44	6.99	10.0													

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Job No: 100.040
Project: Lorson Ranch East Preliminary Drainage
Design Storm: **100 - Year Event, Proposed Conditions**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	Σ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
C17.4			1.98	0.65	17.58	1.29	5.51	7.1													
C17.5			3.72	0.96	13.41	3.57	6.19	22.1													
C17.6			1.04	0.96	13.89	1.00	6.10	6.1													
C17.7			2.68	0.65	7.62	1.74	7.62	13.3													
C17.8			1.52	0.74	12.41	1.12	6.39	7.2													
C17.9			1.73	0.96	5.65	1.66	8.37	13.9													
C17.10			2.34	0.96	9.34	2.25	7.10	16.0													
D1.1			5.09	0.65	18.38	3.31	5.40	17.9													
D1.2			1.10	0.65	6.86	0.72	7.88	5.6													
D1.3			0.86	0.65	10.65	0.56	6.77	3.8													
D1.4			2.80	0.65	12.39	1.82	6.39	11.6			33.03										
D1.5			5.15	0.65	9.43	3.35	7.08	23.7													
D1.6			5.10	0.65	16.74	3.32	5.63	18.7			47.79										
D1.7			3.50	0.65	10.40	2.28	6.83	15.5													
D1.8			1.70	0.65	12.37	1.11	6.40	7.1													
D1.9			2.20	0.65	12.70	1.43	6.33	9.1													
D1.10			5.50	0.65	13.39	3.58	6.20	22.2													
D1.11			1.40	0.65	12.38	0.91	6.39	5.8													
D1.12			4.45	0.57	14.08	2.54	6.07	15.4													
D2.1			3.14	0.65	14.87	2.04	5.93	12.1													
D2.2			1.11	0.65	11.93	0.72	6.49	4.7													
D2.3			2.80	0.57	14.09	1.60	6.07	9.7													
D2.4			3.33	0.58	13.48	1.93	6.18	11.9													
D2.5			3.93	0.65	7.40	2.55	7.69	19.6													
D2.6			2.13	0.65	10.37	1.38	6.84	9.5													
D2.7			2.98	0.65	7.22	1.94	7.75	15.0													
D2.8			3.70	0.65	9.24	2.41	7.13	17.2													
D2.9			3.15	0.65	14.83	2.05	5.94	12.2													
D2.10			0.95	0.65	6.24	0.62	8.12	5.0													
D2.11			0.40	0.96	3.68	0.38	9.45	3.6													
D2.12			2.78	0.65	11.27	1.81	6.63	12.0													
D2.13			2.51	0.65	17.67	1.63	5.50	9.0													

CORE ENGINEERING GROUP

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

Calculated By: Leonard Beasley
Date: August 16, 2016, June 30, 2017
Checked By: Leonard Beasley

Job No: 100.040
Project: Lorson Ranch East Preliminary Drainage
Design Storm: **100 - Year Event, Proposed Conditions**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	Σ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
E1.1			1.41	0.65	7.40	0.92	7.69	7.0													
E1.2			3.61	0.65	10.20	2.35	6.88	16.1													
E1.3			6.81	0.55	15.70	3.75	5.80	21.7		0.57											
E1.4			0.65	0.65	9.92	0.42	6.95	2.9													
E1.5			1.95	0.65	8.86	1.27	7.24	9.2													
E1.6			2.32	0.65	10.94	1.51	6.71	10.1													
E1.7			3.50	0.64	14.72	2.24	5.96	13.3													
C12a-ex			27	0.50	15.69	13.50	5.80	78													
C12-ex			73	0.50	24.19	36.50	4.71	172													
C14-ex			119	0.50	29.17	59.50	4.23	252													
C15-ex			55	0.50	22.61	27.50	4.88	134													
D1-ex			17	0.50	17.78	8.50	5.48	47													
E1-ex			57	0.50	21.72	28.50	4.98	142													
E2-ex			30	0.55	16.78	16.23	5.63	91													

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Standard Form SF-1. Time of Concentration-Proposed

Calculated By: Leonard Beasley
Date: August 16, 2016, June 30, 2017
Checked By: Leonard Beasley

Job No: 100.040
Project: Lorson Ranch East Preliminary Drainage

Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)				t_c Check (urbanized Basins)		Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_t minutes	Computed t_c Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended $t_c=t_i+t_t$ (min)
OS-C9	0.49	5.24	15.0	100.00	4.18%	0.24	6.87	777.0	4.18%	3.07	4.22	11.09	877.00	14.87	11.09
C10	0.49	12.92	15.0	100.00	2.00%	0.19	8.76	904.0	4.98%	3.35	4.50				
			20.0					466.0	0.71%	1.69	4.61	17.87	1470.00	18.17	17.87
OS-C11	0.49	6.48	15.0	100.00	3.00%	0.22	7.66	2005.0	2.51%	2.38	14.06	21.73	2105.00	21.69	21.69
C12	0.49	20.52	15.0	100.00	3.00%	0.22	7.66	969.0	1.34%	1.74	9.30				
			20.0					292.0	0.60%	1.55	3.14	20.11	1361.00	17.56	17.56
C13	0.16	24.54	15.0	100.00	1.00%	0.10	16.97	1620.0	2.90%	2.55	10.57	27.54	1720.00	19.56	19.56
C13.1	0.90	1.70	20.0	55.00	15.04%	0.84	1.09	1232.0	1.65%	2.57	7.99	9.09	1287.00	17.15	9.09
C14	0.66	2.36	20.0	55.00	12.00%	0.35	2.59	1083.0	1.51%	2.46	7.34	9.94	1138.00	16.32	9.94
C14.1	0.16	4.10	15.0	100.00	1.00%	0.10	16.97	544.0	3.49%	2.80	3.24	20.21	644.00	13.58	13.58
C14.2	0.66	1.65	15.0	52.00	1.92%	0.19	4.62	807.0	1.80%	2.01	6.68	11.30	859.00	14.77	11.30
C16.1	0.49	2.68	15.0	30.00	18.33%	0.22	2.31	150.0	2.67%	2.45	1.02				
			20.0					850.0	2.82%	3.36	4.22	7.55	1030.00	15.72	7.55
C16.2	0.49	1.82	20.0	27.00	3.00%	0.11	3.98	1332.0	2.52%	3.17	6.99	10.97	1359.00	17.55	10.97
C16.3	0.49	1.78	20.0	89.00	3.37%	0.21	6.96	530.0	1.70%	2.61	3.39	10.35	619.00	13.44	10.35
C16.4	0.49	0.81	20.0	45.00	3.33%	0.15	4.97	563.0	1.87%	2.73	3.43	8.40	608.00	13.38	8.40
C16.5	0.49	0.50	20.0	30.00	3.33%	0.12	4.06	370.0	3.85%	3.92	1.57	5.63	400.00	12.22	5.63
C16.6	0.49	1.43	15.0	98.00	5.10%	0.26	6.37	238.0	3.78%	2.92	1.36				
			20.0					437.0	2.06%	2.87	2.54	10.27	773.00	14.29	10.27
C16.7	0.49	0.54	15.0	85.00	4.24%	0.22	6.30	110.0	3.18%	2.67	0.69				
			20.0					123.0	2.85%	3.38	0.61	7.60	318.00	11.77	7.60
C16.8	0.49	0.53	20.0	25.00	4.00%	0.12	3.49	488.0	1.91%	2.76	2.94	6.43	513.00	12.85	6.43
C16.9	0.49	1.60	15.0	59.00	4.24%	0.19	5.25	108.0	2.31%	2.28	0.79				
			20.0					330.0	3.03%	3.48	1.58	7.62	497.00	12.76	7.62
C16.10	0.49	0.52	20.0	28.00	2.14%	0.10	4.53	397.0	3.32%	3.64	1.82	6.35	425.00	12.36	6.35
C16.11	0.49	0.38	15.0	89.00	2.00%	0.18	8.27	75.0	2.80%	2.51	0.50				
			20.0					120.0	1.00%	2.00	1.00	9.76	284.00	11.58	9.76
C16.12	0.49	1.82	20.0	18.00	2.22%	0.08	3.59	603.0	2.32%	3.05	3.30	6.89	621.00	13.45	6.89
C16.13	0.49	3.62	15.0	30.00	18.33%	0.22	2.31	150.0	2.67%	2.45	1.02				
			20.0					1326.0	1.85%	2.72	8.12	11.45	1506.00	18.37	11.45
C16.14	0.49	0.10	20.0	33.00	2.84%	0.12	4.48	71.0	1.28%	2.26	0.52	5.01	104.00	10.58	5.01
C16.15	0.49	2.28	15.0	100.00	7.30%	0.29	5.72	183.0	4.48%	3.17	0.96				
			20.0					443.0	1.42%	2.38	3.10	9.77	726.00	14.03	9.77
C16.16	0.49	1.29	20.0	90.00	2.22%	0.19	8.03	731.0	1.33%	2.31	5.28	13.31	821.00	14.56	13.31
C16.17	0.49	1.64	20.0	84.00	2.50%	0.19	7.46	703.0	1.41%	2.37	4.93	12.39	787.00	14.37	12.39

CORE ENGINEERING GROUP

Standard Form SF-1. Time of Concentration-Proposed

Calculated By: Leonard Beasley
Date: August 16, 2016, June 30, 2017
Checked By: Leonard Beasley

Job No: 100.040
Project: Lorson Ranch East Preliminary Drainage

Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)				t_c Check (urbanized Basins)		Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_t minutes	Computed t_c Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended t_c=t_i+t_t (min)
C16.18	0.49	2.96	15.0	70.00	2.71%	0.18	6.63	112.0	2.14%	2.19	0.85				
			20.0					724.0	1.34%	2.32	5.21	12.69	906.00	15.03	12.69
C16.19	0.49	1.65	15.0	100.00	2.37%	0.20	8.28	98.0	2.37%	2.31	0.71				
			20.0					358.0	1.00%	2.00	2.98	11.98	556.00	13.09	11.98
C16.20	0.49	2.84	20.0	37.00	2.00%	0.12	5.33	786.0	1.68%	2.59	5.05	10.38	823.00	14.57	10.38
C16.21	0.49	1.78	15.0	100.00	2.43%	0.20	8.22	48.0	2.43%	2.34	0.34				
			20.0					621.0	1.16%	2.15	4.80	13.36	769.00	14.27	13.36
C16.22	0.49	2.88	15.0	100.00	2.50%	0.20	8.14	138.0	2.55%	1.41	1.63				
			20.0					512.0	0.88%	1.88	4.55	14.32	750.00	14.17	14.17
C16.23	0.49	1.46	15.0	91.00	2.09%	0.18	8.24	153.0	1.76%	1.41	1.81				
			20.0					526.0	1.20%	2.19	4.00	14.05	770.00	14.28	14.05
C16.24	0.49	2.79	20.0	89.00	2.00%	0.18	8.27	1189.0	1.14%	2.14	9.28	17.55	1278.00	17.10	17.10
C16.25	0.49	0.43	20.0	100.00	2.00%	0.19	8.76	269.0	0.97%	1.97	2.28	11.04	369.00	12.05	11.04
C16.26	0.49	1.42	20.0	84.00	2.00%	0.17	8.03	380.0	0.76%	1.74	3.63	11.66	464.00	12.58	11.66
C16.27	0.49	0.23	20.0	28.00	2.00%	0.10	4.64	132.0	0.70%	1.67	1.31	5.95	160.00	10.89	5.95
C16.28	0.49	2.09	20.0	100.00	2.30%	0.20	8.37	485.0	0.89%	1.89	4.28	12.65	585.00	13.25	12.65
C16.29	0.49	2.01	20.0	100.00	2.00%	0.19	8.76	480.0	0.90%	1.90	4.22	12.98	580.00	13.22	12.98
C16.30	0.49	4.54	15.0	100.00	8.00%	0.30	5.55	168.0	2.86%	1.41	1.99				
			20.0					1658.0	1.16%	2.15	12.83	20.36	1926.00	20.70	20.36
C16.31	0.23	9.90	10.0	100.00	3.30%	0.16	10.59	334.0	3.80%	1.41	3.95				
			15.0					1467.0	1.16%	1.62	15.13	29.67	1901.00	20.56	20.56
C16.32	0.49	0.97	20.0	60.00	2.00%	0.15	6.79	570.0	0.77%	1.75	5.41	12.20	630.00	13.50	12.20
C16.33	0.90	0.21	20.0	18.00	2.22%	0.25	1.18	194.0	0.92%	1.92	1.69	2.86	212.00	11.18	2.86
C16.34	0.49	0.38	20.0	32.00	2.00%	0.11	4.96	200.0	0.70%	1.67	1.99	6.95	232.00	11.29	6.95
C16.35	0.49	1.46	15.0	100.00	2.00%	0.19	8.76	30.0	2.00%	2.12	0.24				
			20.0					337.0	1.16%	2.15	2.61	11.60	467.00	12.59	11.60
C16.36	0.23	7.70	10.0	100.00	2.30%	0.14	11.93	111.0	0.72%	0.85	2.18				
			10.0					34.0	32.35%	5.69	0.10				
			15.0					617.0	0.50%	1.06	9.70	23.91	862.00	14.79	14.79
C15.1	0.30	7.10	15.0	100.00	4.50%	0.19	8.79	747.0	3.41%	1.41	8.83				
			15.0					600.0	1.92%	2.08	4.81	22.43	1447.00	18.04	18.04
C15.2	0.42	4.63	15.0	100.00	6.20%	0.25	6.72	604.0	1.97%	2.11	4.78	11.51	704.00	13.91	11.51
C15.3	0.49	3.60	15.0	100.00	2.05%	0.19	8.69	161.0	3.35%	1.41	1.90				
			20.0					658.0	2.87%	3.39	3.24	13.83	919.00	15.11	13.83

CORE ENGINEERING GROUP

Standard Form SF-1. Time of Concentration-Proposed

Calculated By: Leonard Beasley
Date: August 16, 2016, June 30, 2017
Checked By: Leonard Beasley

Job No: 100.040
Project: Lorson Ranch East Preliminary Drainage

Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)					t_c Check (urbanized Basins)		Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_t minutes	Computed t_c Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended t_c=t_i+t_t (min)
C15.4	0.49	1.25	15.0	91.00	7.14%	0.28	5.49	100.0	2.60%	1.41	1.18				
			20.0					406.0	2.02%	2.84	2.38	9.05	597.00	13.32	9.05
C15.5	0.49	2.90	20.0	35.00	2.00%	0.11	5.18	979.0	3.04%	3.49	4.68	9.86	1014.00	15.63	9.86
C15.6	0.49	1.80	15.0	59.00	1.36%	0.13	7.64	100.0	2.00%	2.12	0.79				
			20.0					731.0	1.87%	2.73	4.45	12.88	890.00	14.94	12.88
C15.7	0.49	2.07	20.0	39.00	2.05%	0.12	5.43	966.0	1.63%	2.55	6.31	11.73	1005.00	15.58	11.73
C15.8	0.40	3.76	15.0	100.00	7.00%	0.25	6.65	89.0	11.35%	5.05	0.29				
			15.0					463.0	0.60%	1.16	6.64				
			20.0					240.0	1.08%	2.08	1.92	15.51	892.00	14.96	15.51
C15.9	0.49	2.27	15.0	53.00	1.20%	0.12	7.55	96.0	3.02%	2.61	0.61				
			20.0					8.6	1.61%	2.54	0.06	8.22	157.55	10.88	8.22
C15.10	0.49	0.60	15.0	100.00	2.20%	0.20	8.49	37.0	2.20%	2.22	0.28				
			20.0					160.0	1.51%	2.46	1.09	9.85	297.00	11.65	9.85
C15.11	0.49	3.20	20.0	74.00	4.19%	0.21	5.90	1105.0	2.63%	3.24	5.68	11.58	1179.00	16.55	11.58
C15.12	0.49	0.61	15.0	100.00	2.16%	0.20	8.54	34.0	2.16%	2.20	0.26				
			20.0					321.0	1.00%	2.00	2.68	11.47	455.00	12.53	11.47
C15.13	0.49	2.35	20.0	52.00	2.12%	0.14	6.20	967.0	2.32%	3.05	5.29	11.49	1019.00	15.66	11.49
C15.14	0.49	1.32	20.0	33.00	1.82%	0.11	5.19	595.0	2.89%	3.40	2.92	8.11	628.00	13.49	8.11
C15.15	0.49	4.02	20.0	100.00	2.88%	0.21	7.77	1111.0	2.42%	3.11	5.95	13.72	1211.00	16.73	13.72
C17.1a	0.49	2.81	20.0	90.00	2.00%	0.18	8.31	733.0	2.58%	3.21	3.80	12.11	823.00	14.57	12.11
C17.1	0.49	2.68	15.0	28.00	18.57%	0.21	2.22	160.0	2.88%	2.55	1.05				
			20.0					530.0	1.00%	2.00	4.42	7.69	718.00	13.99	7.69
C17.2	0.49	4.11	20.0	33.00	2.00%	0.11	5.03	903.0	3.27%	3.62	4.16	9.19	936.00	15.20	9.19
C17.3	0.49	2.21	15.0	100.00	8.40%	0.31	5.46	152.0	4.47%	3.17	0.80				
			20.0					416.0	0.97%	1.97	3.52	9.78	668.00	13.71	9.78
C17.4	0.49	1.98	20.0	36.00	2.00%	0.11	5.26	1579.0	1.14%	2.14	12.32	17.58	1615.00	18.97	17.58
C17.5	0.49	3.72	15.0	66.00	7.73%	0.24	4.56	77.0	4.63%	3.23	0.40				
			20.0					1050.0	1.07%	2.07	8.46	13.41	1193.00	16.63	13.41
C17.6	0.49	1.04	20.0	94.00	1.06%	0.15	10.47	527.0	1.65%	2.57	3.42	13.89	621.00	13.45	13.89
C17.7	0.49	2.68	15.0	90.00	4.44%	0.23	6.39	107.0	0.93%	1.45	1.23	7.62	197.00	11.09	7.62
C17.8	0.55	1.52	20.0	100.00	3.00%	0.24	6.91	643.0	0.95%	1.95	5.50	12.41	743.00	14.13	12.41
C17.9	0.90	1.73	20.0	31.00	2.00%	0.32	1.60	464.0	0.91%	1.91	4.05	5.65	495.00	12.75	5.65
C17.10	0.90	2.34	20.0	45.00	2.00%	0.39	1.93	723.0	0.66%	1.62	7.42	9.34	768.00	14.27	9.34
D1.1	0.49	5.09	20.0	100.00	1.50%	0.17	9.63	1484.0	2.00%	2.83	8.74	18.38	1584.00	18.80	18.38
D1.2	0.49	1.10	15.0	65.00	7.85%	0.24	4.50	81.0	2.72%	2.47	0.55				

CORE ENGINEERING GROUP

Standard Form SF-1. Time of Concentration-Proposed

Calculated By: Leonard Beasley
Date: August 16, 2016, June 30, 2017
Checked By: Leonard Beasley

Job No: 100.040
Project: Lorson Ranch East Preliminary Drainage

Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)					t_c Check (urbanized Basins)		Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_t minutes	Computed t_c Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended t_c=t_i+t_t (min)
			20.0					309.0	2.01%	2.84	1.82	6.86	455.00	12.53	6.86
D1.3	0.49	0.86	20.0	100.00	2.60%	0.21	8.03	420.0	1.79%	2.68	2.62	10.65	520.00	12.89	10.65
D1.4	0.49	2.80	15.0	100.00	1.60%	0.18	9.43	33.0	2.42%	2.33	0.24				
			20.0					582.0	3.18%	3.57	2.72	12.39	715.00	13.97	12.39
D1.5	0.49	5.15	20.0	36.00	4.22%	0.15	4.11	1132.0	3.14%	3.54	5.32	9.43	1168.00	16.49	9.43
D1.6	0.49	5.10	20.0	90.00	1.44%	0.16	9.26	1421.0	2.51%	3.17	7.47	16.74	1511.00	18.39	16.74
D1.7	0.49	3.50	15.0	90.00	12.33%	0.33	4.56	107.0	3.74%	2.90	0.61				
			20.0					781.0	1.55%	2.49	5.23	10.40	978.00	15.43	10.40
D1.8	0.49	1.70	20.0	45.00	1.11%	0.11	7.14	1004.0	2.56%	3.20	5.23	12.37	1049.00	15.83	12.37
D1.9	0.49	2.20	20.0	50.00	2.00%	0.13	6.20	1265.0	2.63%	3.24	6.50	12.70	1315.00	17.31	12.70
D1.10	0.49	5.50	20.0	47.00	2.49%	0.14	5.59	1460.0	2.43%	3.12	7.80	13.39	1507.00	18.37	13.39
D1.11	0.49	1.40	20.0	50.00	2.00%	0.13	6.20	951.0	1.64%	2.56	6.19	12.38	1001.00	15.56	12.38
D1.12	0.24	4.45	15.0	95.00	7.16%	0.20	7.90	177.0	6.78%	3.91	0.76				
			15.0					463.0	0.50%	1.06	7.28	15.93	735.00	14.08	14.08
D2.1	0.49	3.14	15.0	100.00	2.32%	0.20	8.34	90.0	2.32%	2.28	0.66				
			20.0					897.0	1.62%	2.55	5.87	14.87	1087.00	16.04	14.87
D2.2	0.49	1.11	15.0	100.00	1.70%	0.18	9.24	167.0	3.47%	2.79	1.00				
			20.0					218.0	1.15%	2.14	1.69	11.93	485.00	12.69	11.93
D2.3	0.27	2.80	15.0	100.00	2.10%	0.14	11.73	344.0	4.77%	3.28	1.75				
			20.0					292.0	3.20%	3.58	1.36	14.84	736.00	14.09	14.09
D2.4	0.29	3.33	15.0	100.00	4.50%	0.19	8.90	386.0	6.30%	3.76	1.71				
			20.0					487.0	2.00%	2.83	2.87	13.48	973.00	15.41	13.48
D2.5	0.49	3.93	15.0	61.00	14.75%	0.29	3.54	219.0	2.19%	2.22	1.64				
			20.0					447.0	2.82%	3.36	2.22	7.40	727.00	14.04	7.40
D2.6	0.49	2.13	15.0	100.00	3.00%	0.22	7.66	20.0	2.50%	2.37	0.14				
			20.0					528.0	2.94%	3.43	2.57	10.37	648.00	13.60	10.37
D2.7	0.49	2.98	20.0	25.00	2.00%	0.10	4.38	631.0	3.44%	3.71	2.84	7.22	656.00	13.64	7.22
D2.8	0.49	3.70	15.0	35.00	15.71%	0.22	2.63	162.0	2.34%	2.29	1.18				
			20.0					665.0	1.04%	2.04	5.43	9.24	862.00	14.79	9.24
D2.9	0.49	3.15	20.0	75.00	1.87%	0.16	7.76	1342.0	2.50%	3.16	7.07	14.83	1417.00	17.87	14.83
D2.10	0.49	0.80	20.0	17.00	2.00%	0.08	3.61	392.0	1.54%	2.48	2.63	6.24	409.00	12.27	6.24
D2.11	0.90	0.40	20.0	10.00	2.00%	0.18	0.91	278.0	0.70%	1.67	2.77	3.68	288.00	11.60	3.68
D2.12	0.49	2.78	20.0	100.00	5.20%	0.26	6.39	1009.0	2.97%	3.45	4.88	11.27	1109.00	16.16	11.27
D2.13	0.49	2.51	20.0	20.00	2.00%	0.09	3.92	2334.0	2.00%	2.83	13.75	17.67	2354.00	23.08	17.67

CORE ENGINEERING GROUP

Standard Form SF-1. Time of Concentration-Proposed

Calculated By: Leonard Beasley
Date: August 16, 2016, June 30, 2017
Checked By: Leonard Beasley

Job No: 100.040
Project: Lorson Ranch East Preliminary Drainage

Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)					t_c Check (urbanized Basins)		Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_t minutes	Computed t_c Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended $t_c=t_i+t_t$ (min)
E1.1	0.49	1.41	15.0	92.00	9.24%	0.30	5.07	145.0	2.75%	2.49	0.97				
			20.0					296.0	3.31%	3.64	1.36	7.40	533.00	12.96	7.40
E1.2	0.49	3.61	15.0	100.00	6.60%	0.28	5.91	203.0	5.22%	3.43	0.99				
			20.0					563.0	2.01%	2.84	3.31	10.20	866.00	14.81	10.20
E1.3	0.20	6.81	15.0	100.00	4.80%	0.17	9.68	763.0	5.22%	3.43	3.71				
			20.0					415.0	2.24%	2.99	2.31	15.70	1278.00	17.10	15.70
E1.4	0.49	0.65	15.0	100.00	2.00%	0.19	8.76	20.0	2.00%	2.12	0.16				
			20.0					165.0	1.87%	2.73	1.01	9.92	285.00	11.58	9.92
E1.5	0.49	1.95	20.0	30.00	2.00%	0.10	4.80	729.0	2.24%	2.99	4.06	8.86	759.00	14.22	8.86
E1.6	0.49	2.32	20.0	100.00	5.12%	0.26	6.42	566.0	1.09%	2.09	4.52	10.94	666.00	13.70	10.94
E1.7	0.38	3.50	15.0	100.00	4.50%	0.21	7.91	155.0	7.95%	4.23	0.61				
			20.0					769.0	1.07%	2.07	6.20	14.72	1024.00	15.69	14.72
C12a-ex	0.15	27	7.0	300.00	4.00%	0.27	18.80	725.0	4.97%	1.56	7.74	26.54	1025.00	15.69	15.69
C12-ex	0.15	73	7.0	300.00	5.33%	0.29	17.10	2250.0	4.53%	1.49	25.17	42.27	2550.00	24.17	24.17
C14-ex	0.15	119	7.0	300.00	3.00%	0.24	20.67	3150.0	3.37%	1.29	40.86	61.53	3450.00	29.17	29.17
D15-ex	0.15	55	7.0	300.00	3.83%	0.26	19.07	1970.0	2.61%	1.13	29.03	48.11	2270.00	22.61	22.61
D1-ex	0.15	17	7.0	300.00	2.67%	0.23	21.48	1100.0	4.55%	1.49	12.28	33.76	1400.00	17.78	17.78
E1-ex	0.15	57	7.0	300.00	4.67%	0.28	17.87	1810.0	3.73%	1.35	22.31	40.18	2110.00	21.72	21.72
E2-ex	0.26	29.50	15.0	100.00	2.70%	0.15	10.93	200.0	2.70%	1.41	2.36				
C17.2	0.49	4.11	20.0	33.00	2.00%	0.11	5.03	903.0	3.27%	3.62	4.16	9.19	936.00	15.20	9.19

APPENDIX C – HYDRAULIC CALCULATIONS

Channel Report

Hydraflow Express by Intelisolve | Tuesday, Jul 4 2017, 9:15 AM

Phase 1 bypass swale to Des. Pt. 18

Trapezoidal

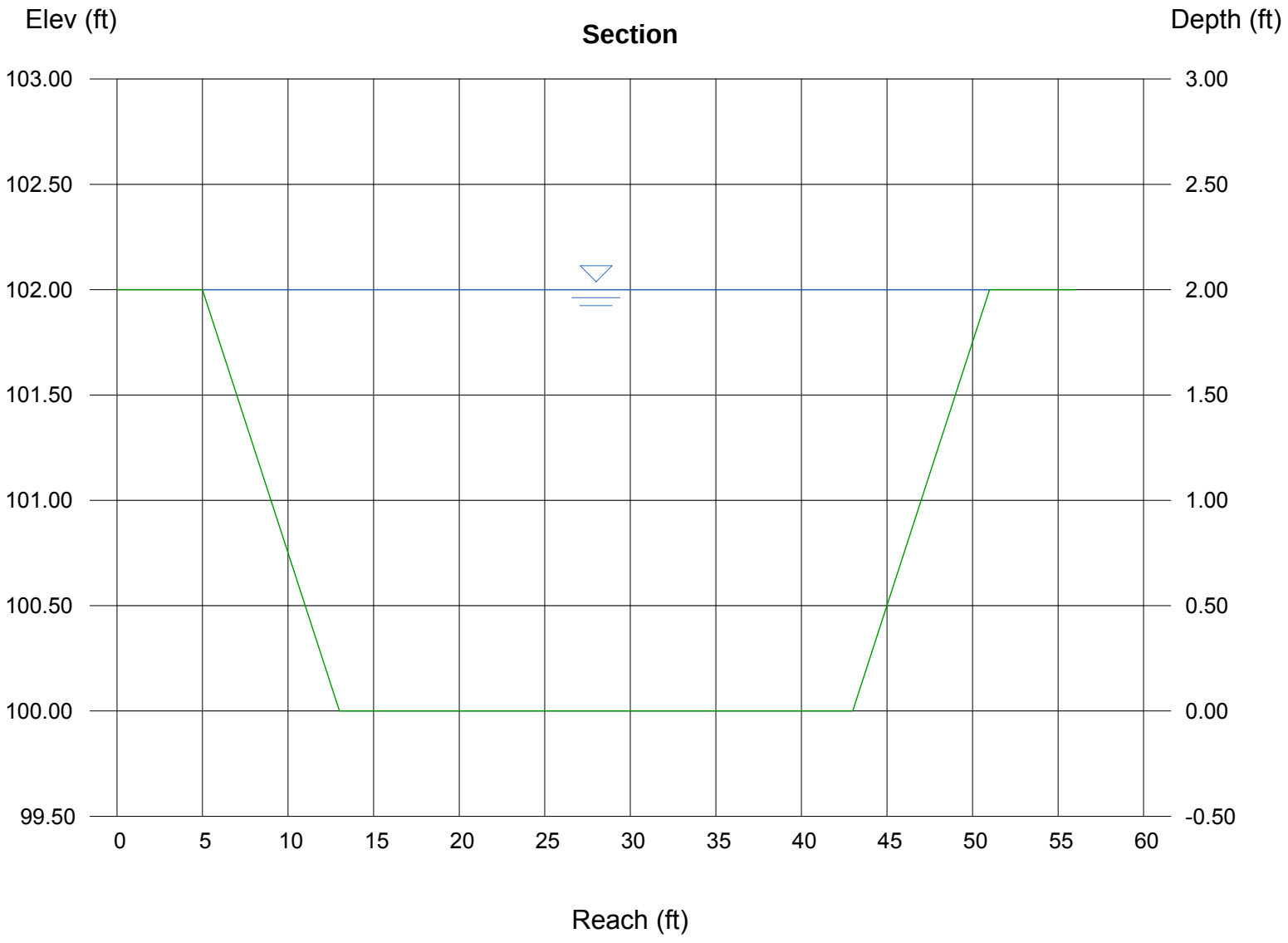
Botom Width (ft)	= 30.00
Side Slope (z:1)	= 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.10
N-Value	= 0.025

Calculations

Compute by:	Q vs Depth
No. Increments	= 10

Highlighted

Depth (ft)	= 2.00
Q (cfs)	= 198.27
Area (sqft)	= 76.00
Velocity (ft/s)	= 2.61
Wetted Perim (ft)	= 46.49
Crit Depth, Yc (ft)	= 0.94
Top Width (ft)	= 46.00
EGL (ft)	= 2.11



Channel Report

Hydraflow Express by Intelisolve

Wednesday, Aug 31 2016, 1:59 PM

Basin OS-C11 Swale - North Diversion Swale

Triangular

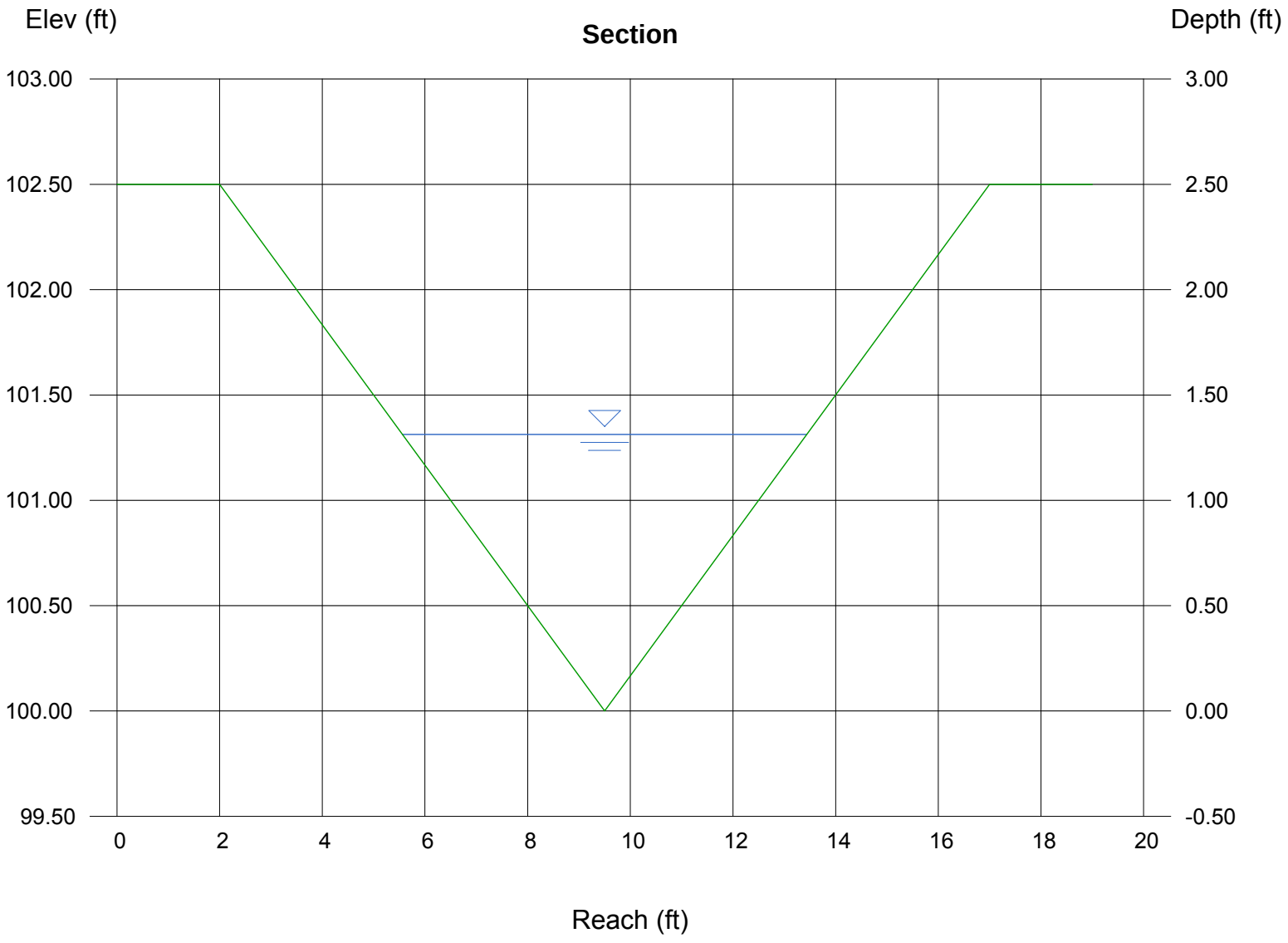
Side Slope (z:1)	= 3.00
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.025

Calculations

Compute by:	Q vs Depth
No. Increments	= 40

Highlighted

Depth (ft)	= 1.31
Q (cfs)	= 22.39
Area (sqft)	= 5.17
Velocity (ft/s)	= 4.33
Wetted Perim (ft)	= 8.30
Crit Depth, Yc (ft)	= 1.22
Top Width (ft)	= 7.88
EGL (ft)	= 1.60



Channel Report

Hydraflow Express by Intelisolve | Wednesday, Jul 5 2017, 10:7 AM

North Diversion Swale @ 7.0% slope

Triangular

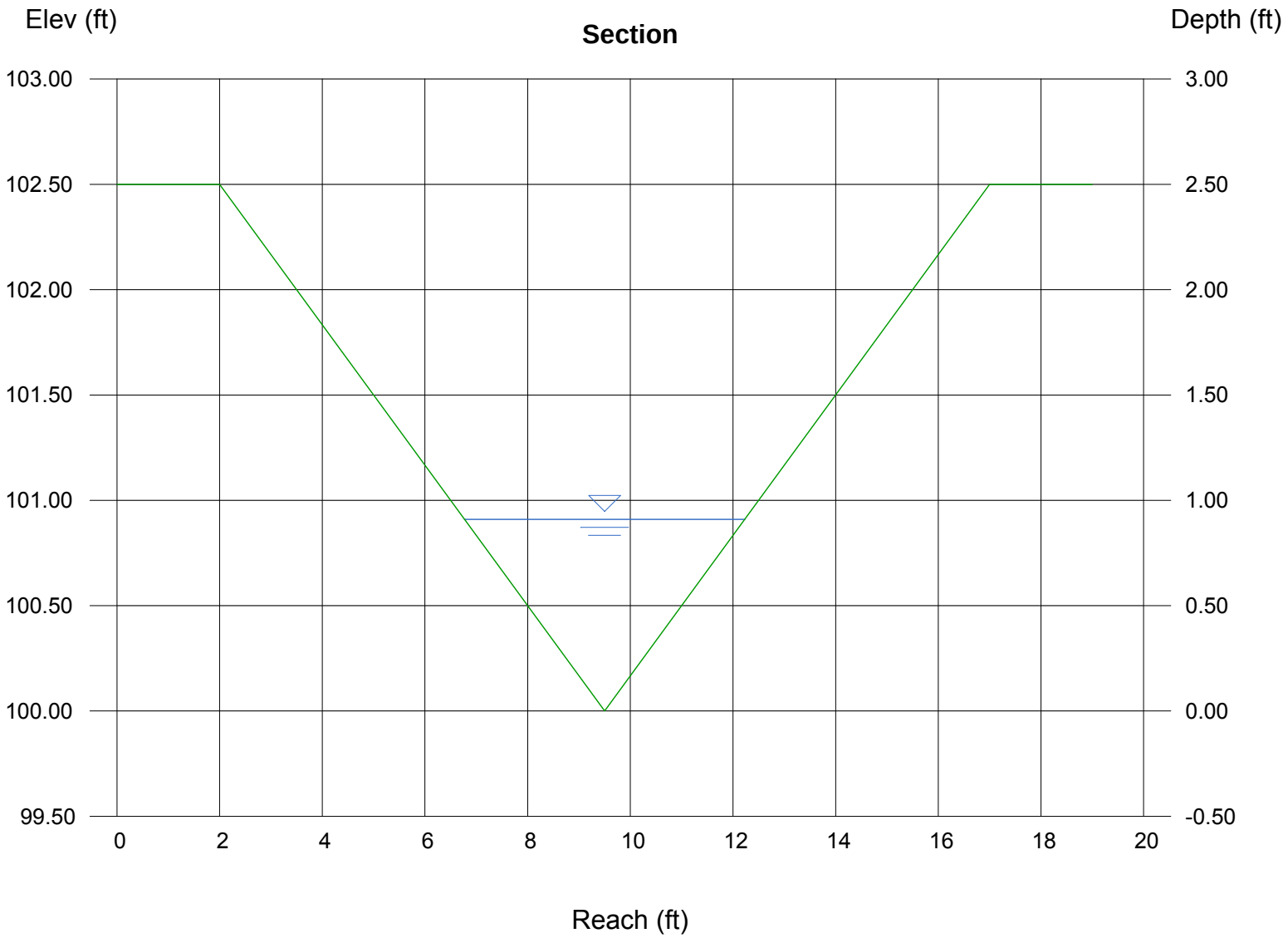
Side Slope (z:1)	= 3.00
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 100.00
Slope (%)	= 7.00
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 22.00

Highlighted

Depth (ft)	= 0.91
Q (cfs)	= 22.00
Area (sqft)	= 2.48
Velocity (ft/s)	= 8.86
Wetted Perim (ft)	= 5.76
Crit Depth, Yc (ft)	= 1.28
Top Width (ft)	= 5.46
EGL (ft)	= 2.13



Channel Report

Hydraflow Express by Intelisolve — Tuesday, Jun 27 2017, 6:8 AM

Overflow on Wacissa Drive to Pond C5 at Design Pt. 18

Trapezoidal

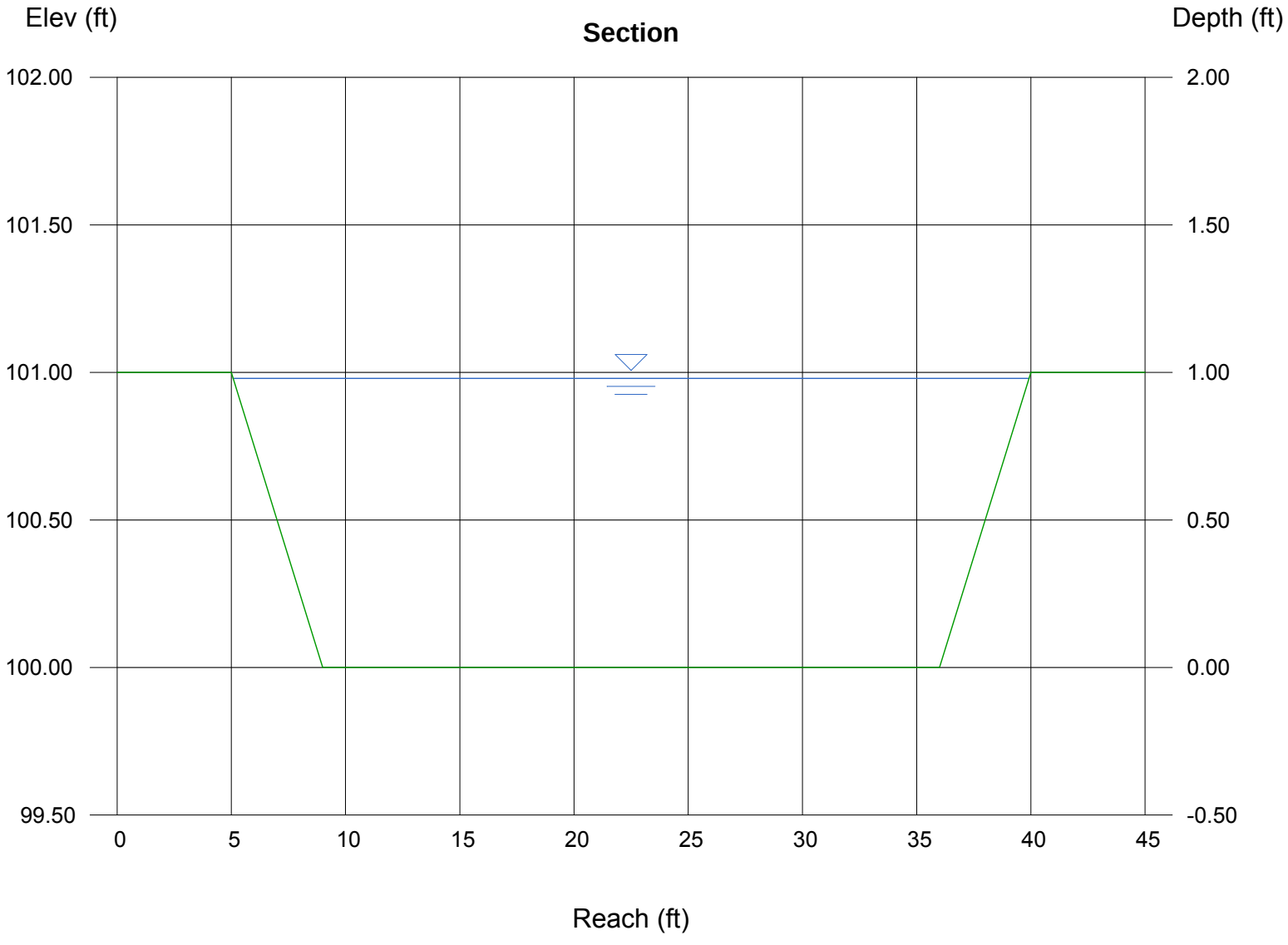
Botom Width (ft)	= 27.00
Side Slope (z:1)	= 4.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 2.00
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 230.00

Highlighted

Depth (ft)	= 0.98
Q (cfs)	= 230.00
Area (sqft)	= 30.30
Velocity (ft/s)	= 7.59
Wetted Perim (ft)	= 35.08
Crit Depth, Yc (ft)	= 1.00
Top Width (ft)	= 34.84
EGL (ft)	= 1.88



Channel Report

Hydraflow Express by Intelisolve — Friday, Sep 9 2016, 11:22 AM

Substation Swale 2 - Design Point 21

Triangular

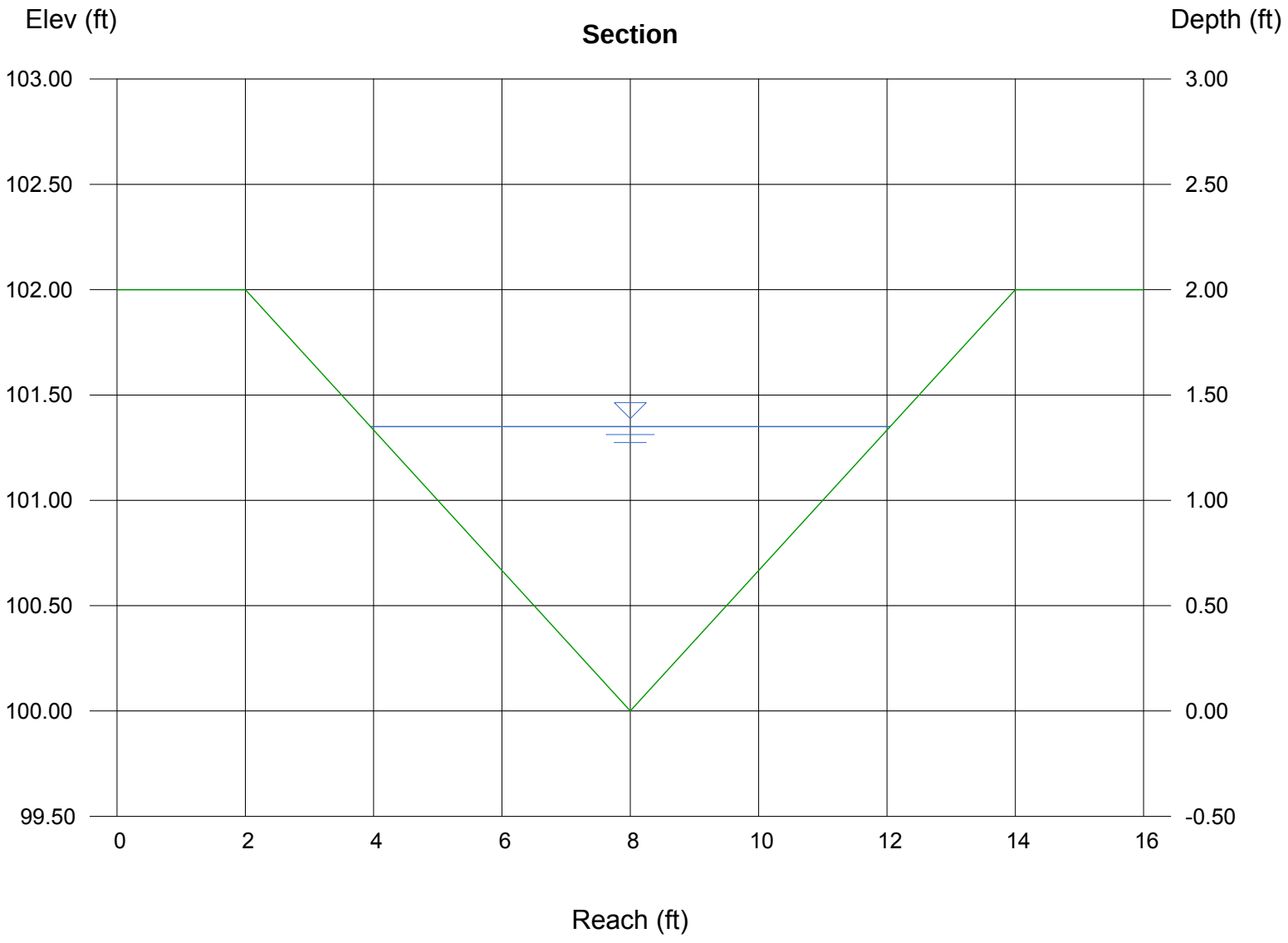
Side Slope (z:1)	= 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.025

Calculations

Compute by:	Known Depth
Known Depth (ft)	= 1.35

Highlighted

Depth (ft)	= 1.35
Q (cfs)	= 24.14
Area (sqft)	= 5.47
Velocity (ft/s)	= 4.42
Wetted Perim (ft)	= 8.54
Crit Depth, Yc (ft)	= 1.33
Top Width (ft)	= 8.10
EGL (ft)	= 1.65



Channel Report

Hydraflow Express by Intelisolve — Sunday, Mar 5 2017, 10:50 AM

Overflow Swale Substation to Tilllamook - Design Point 21

Trapezoidal

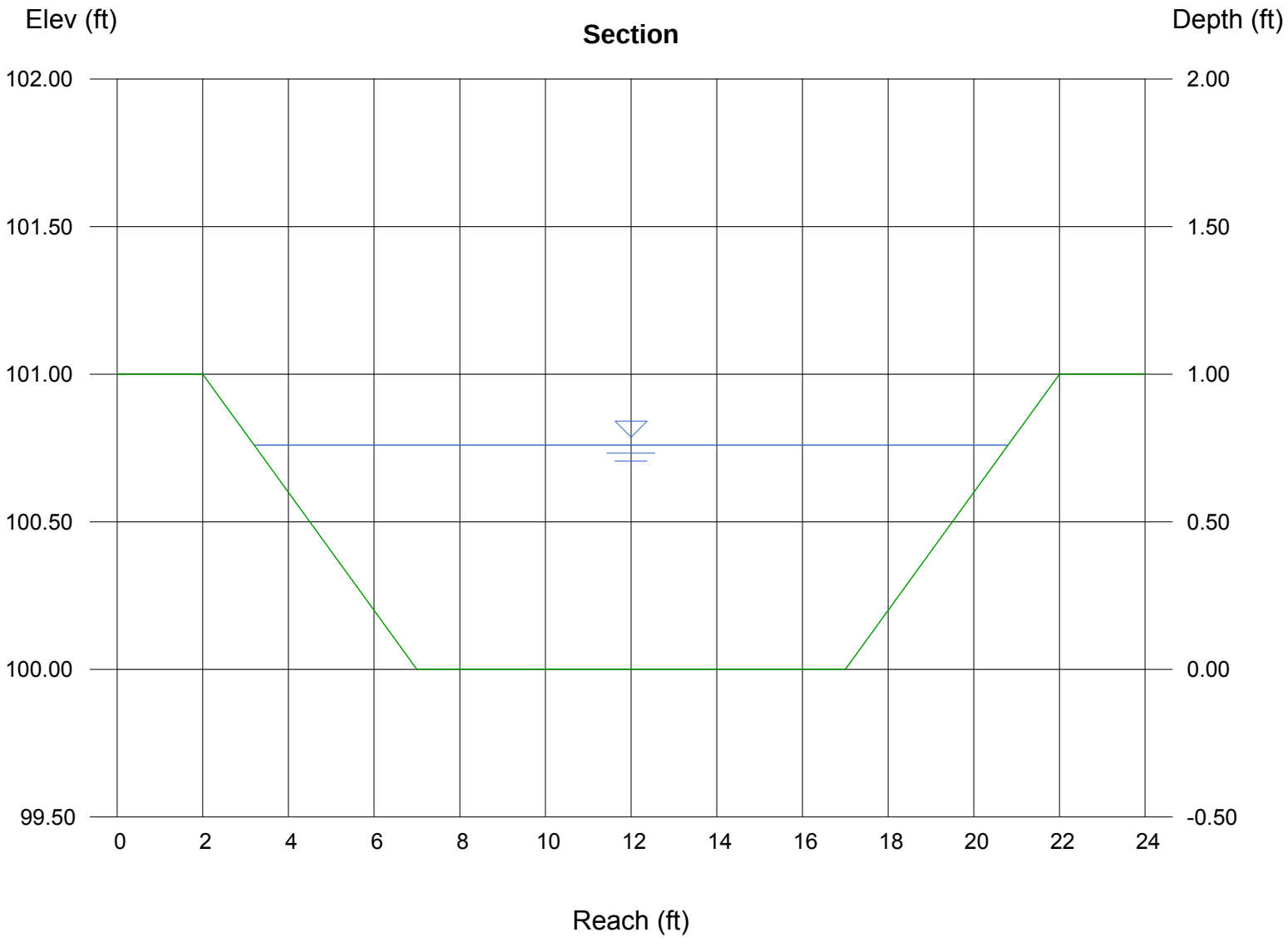
Botom Width (ft)	= 10.00
Side Slope (z:1)	= 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.024

Calculations

Compute by:	Known Q
Known Q (cfs)	= 45.00

Highlighted

Depth (ft)	= 0.76
Q (cfs)	= 45.00
Area (sqft)	= 10.49
Velocity (ft/s)	= 4.29
Wetted Perim (ft)	= 17.75
Crit Depth, Yc (ft)	= 0.76
Top Width (ft)	= 17.60
EGL (ft)	= 1.05



Channel Report

Hydraflow Express by Intelisolve — Friday, Mar 3 2017, 7:22 AM

Overflow from Rockcastle to Fontaine - Design Point 27

Trapezoidal

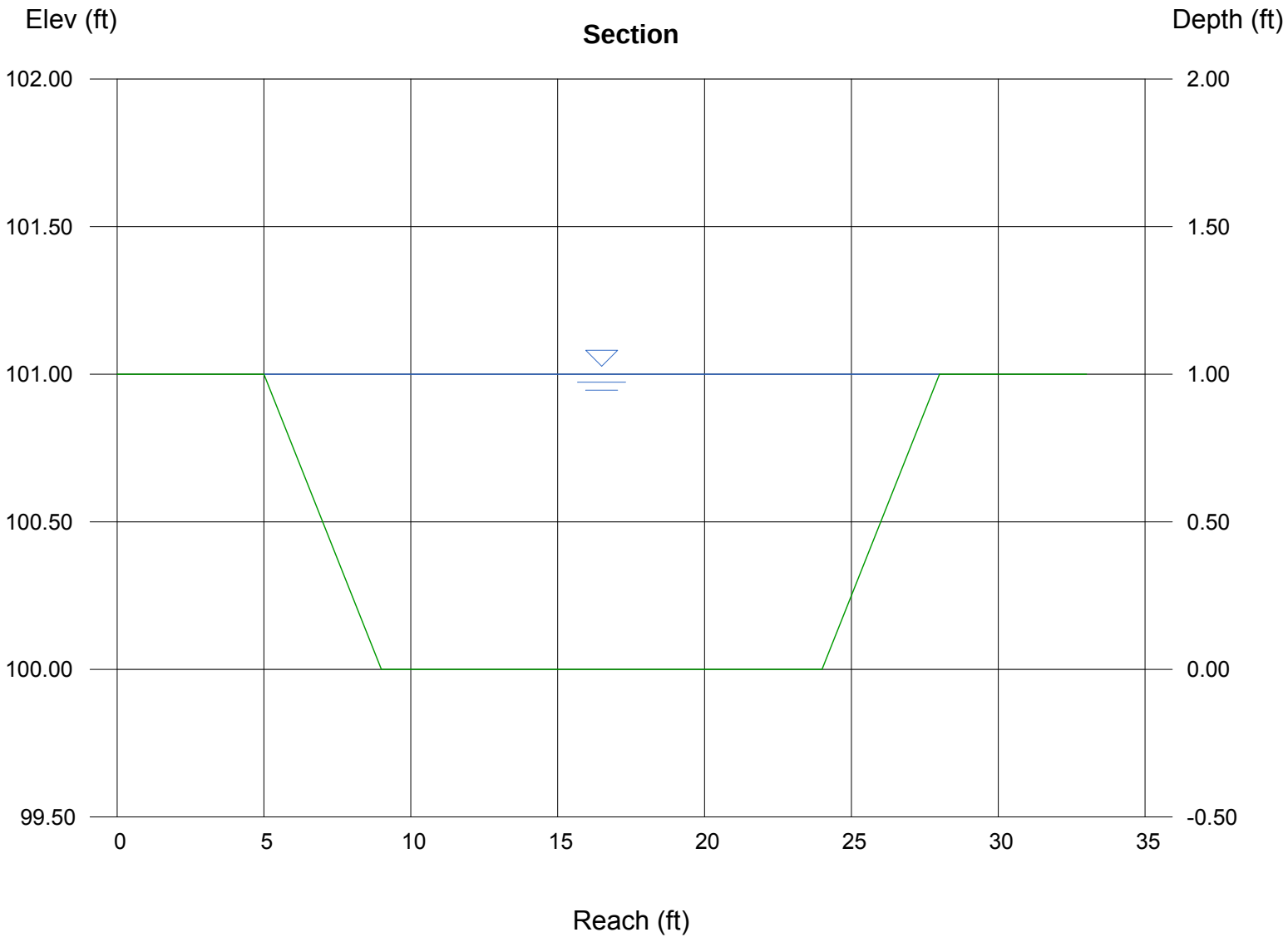
Botom Width (ft)	= 15.00
Side Slope (z:1)	= 4.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.024

Calculations

Compute by:	Q vs Depth
No. Increments	= 1

Highlighted

Depth (ft)	= 1.00
Q (cfs)	= 102.83
Area (sqft)	= 19.00
Velocity (ft/s)	= 5.41
Wetted Perim (ft)	= 23.25
Crit Depth, Yc (ft)	= 0.01
Top Width (ft)	= 23.00
EGL (ft)	= 1.46



Channel Report

Hydraflow Express by Intelisolve | Thursday, Sep 8 2016, 12:9 PM

24-inch from Des.Pt 47 to Des.Pt.48

Circular

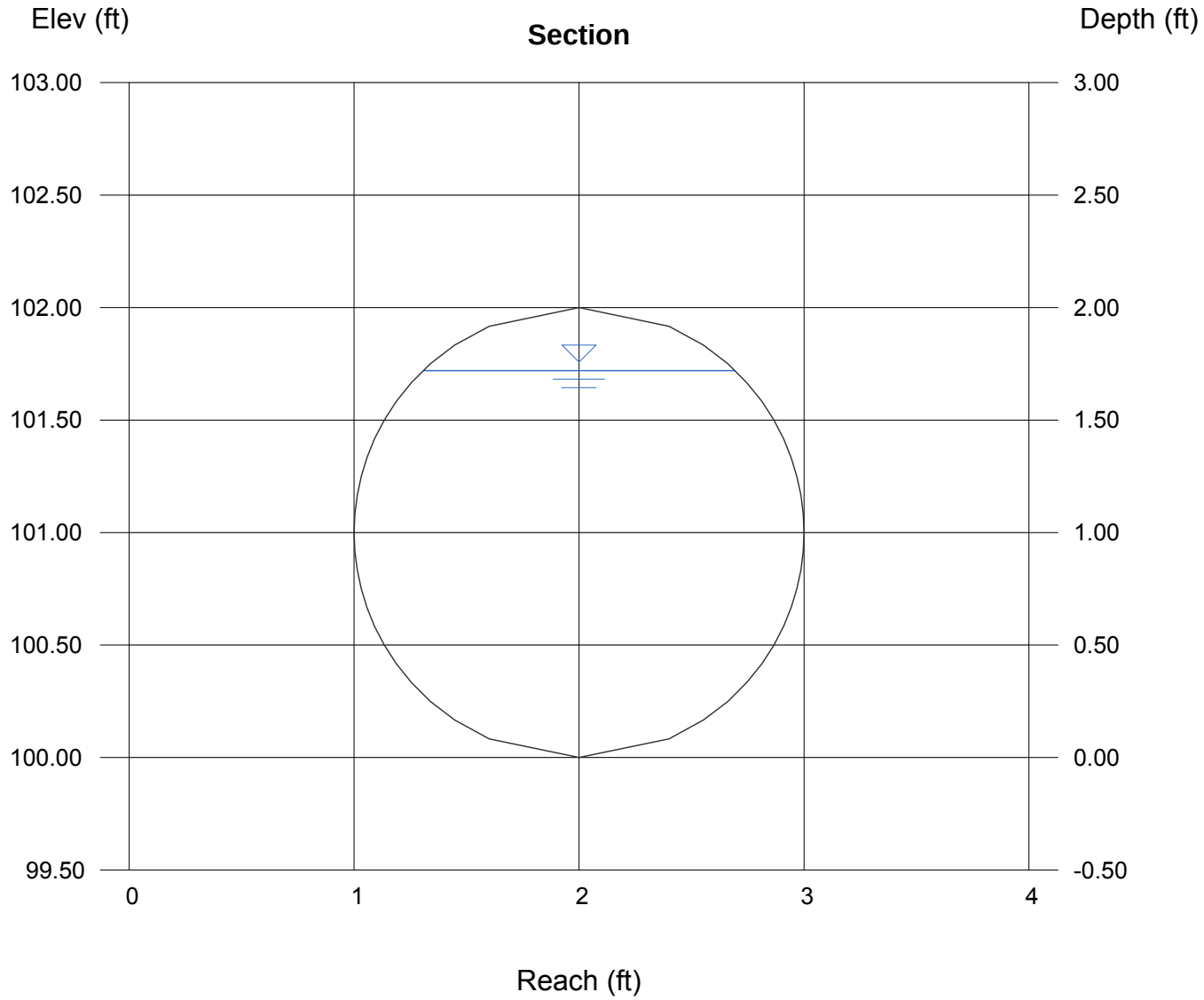
Diameter (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 16.60

Highlighted

Depth (ft)	= 1.72
Q (cfs)	= 16.60
Area (sqft)	= 2.87
Velocity (ft/s)	= 5.77
Wetted Perim (ft)	= 4.75
Crit Depth, Yc (ft)	= 1.47
Top Width (ft)	= 1.39
EGL (ft)	= 2.24



Channel Report

48-inch storm sewer at Des.Pt. 49 into Pond B1

Circular

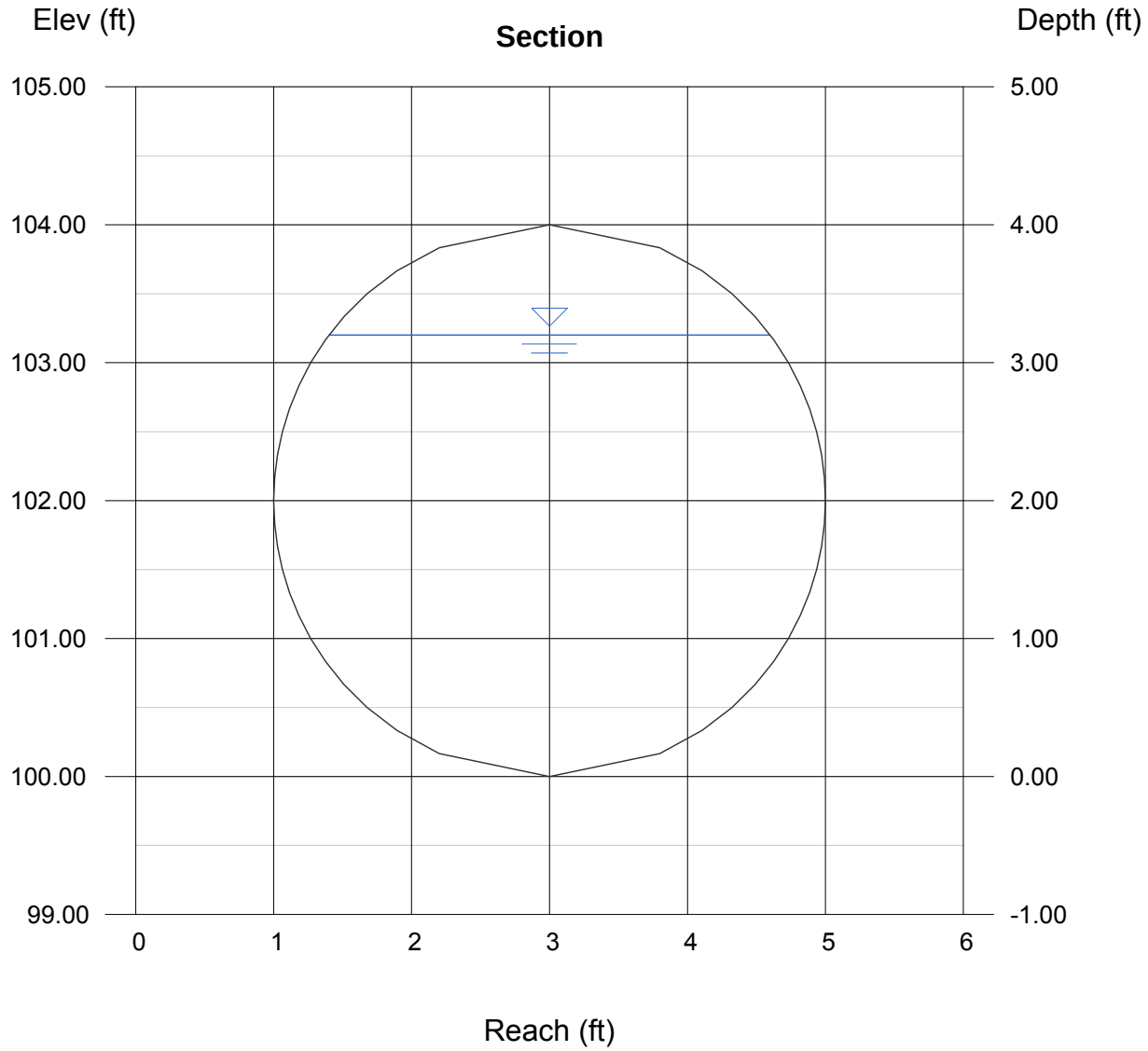
Diameter (ft)	= 4.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.013

Calculations

Compute by:	Q vs Depth
No. Increments	= 10

Highlighted

Depth (ft)	= 3.20
Q (cfs)	= 99.32
Area (sqft)	= 10.78
Velocity (ft/s)	= 9.21
Wetted Perim (ft)	= 8.86
Crit Depth, Yc (ft)	= 2.80
Top Width (ft)	= 3.20
EGL (ft)	= 4.52



Channel Report

Hydraflow Express by Intelisolve | Wednesday, Mar 8 2017, 6:4 AM

Lamine low point to Pond D2 Overflow Swale - Design Point 56

Trapezoidal

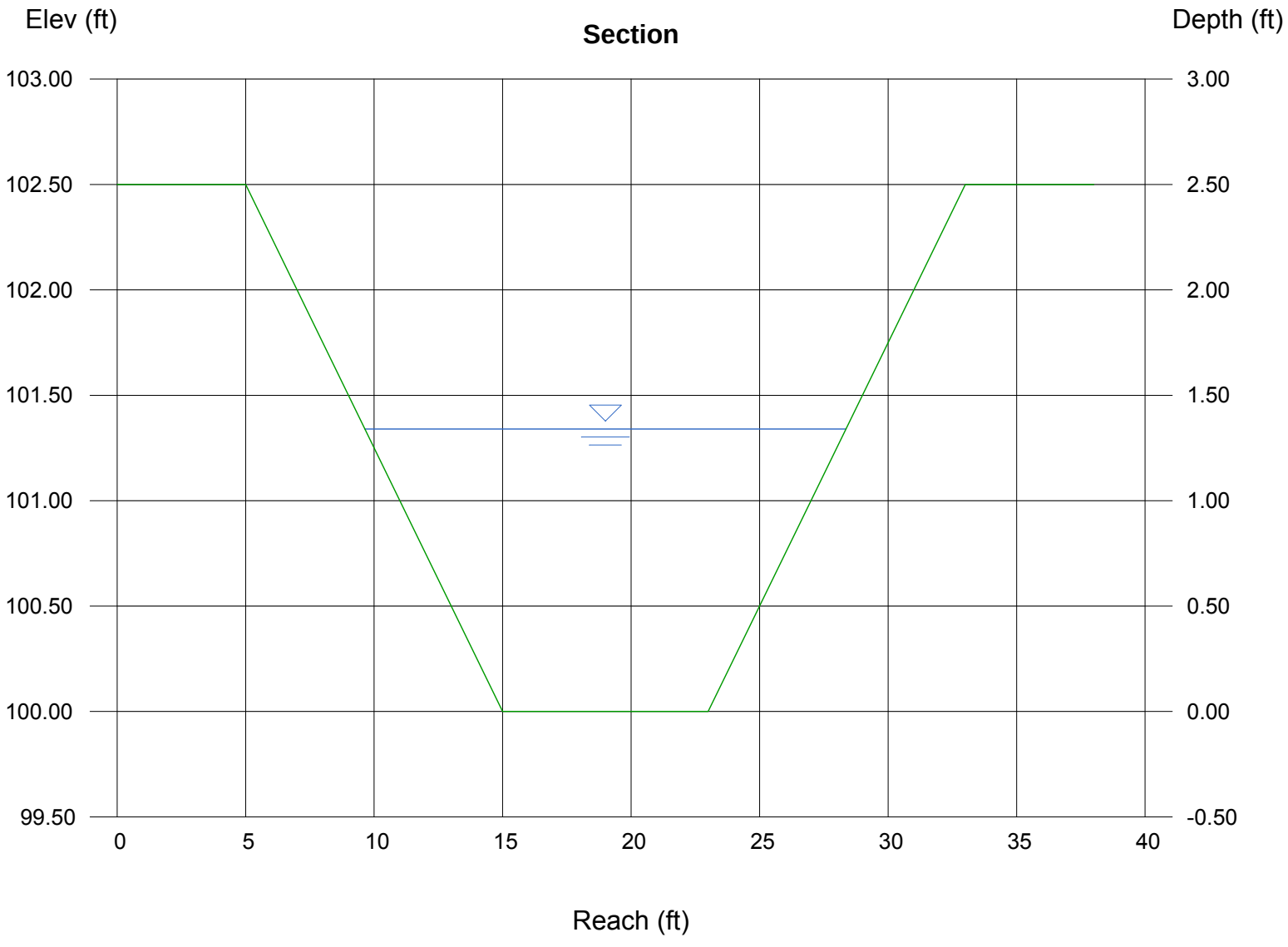
Botom Width (ft)	= 8.00
Side Slope (z:1)	= 4.00
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 100.00
Slope (%)	= 2.00
N-Value	= 0.024

Calculations

Compute by:	Known Q
Known Q (cfs)	= 150.00

Highlighted

Depth (ft)	= 1.34
Q (cfs)	= 150.00
Area (sqft)	= 17.90
Velocity (ft/s)	= 8.38
Wetted Perim (ft)	= 19.05
Crit Depth, Yc (ft)	= 1.68
Top Width (ft)	= 18.72
EGL (ft)	= 2.43



Channel Report

Hydraflow Express by Intelisolve | Tuesday, Jun 27 2017, 6:53 AM

Basin E1.3 Swale at Design Pt. 67b

Triangular

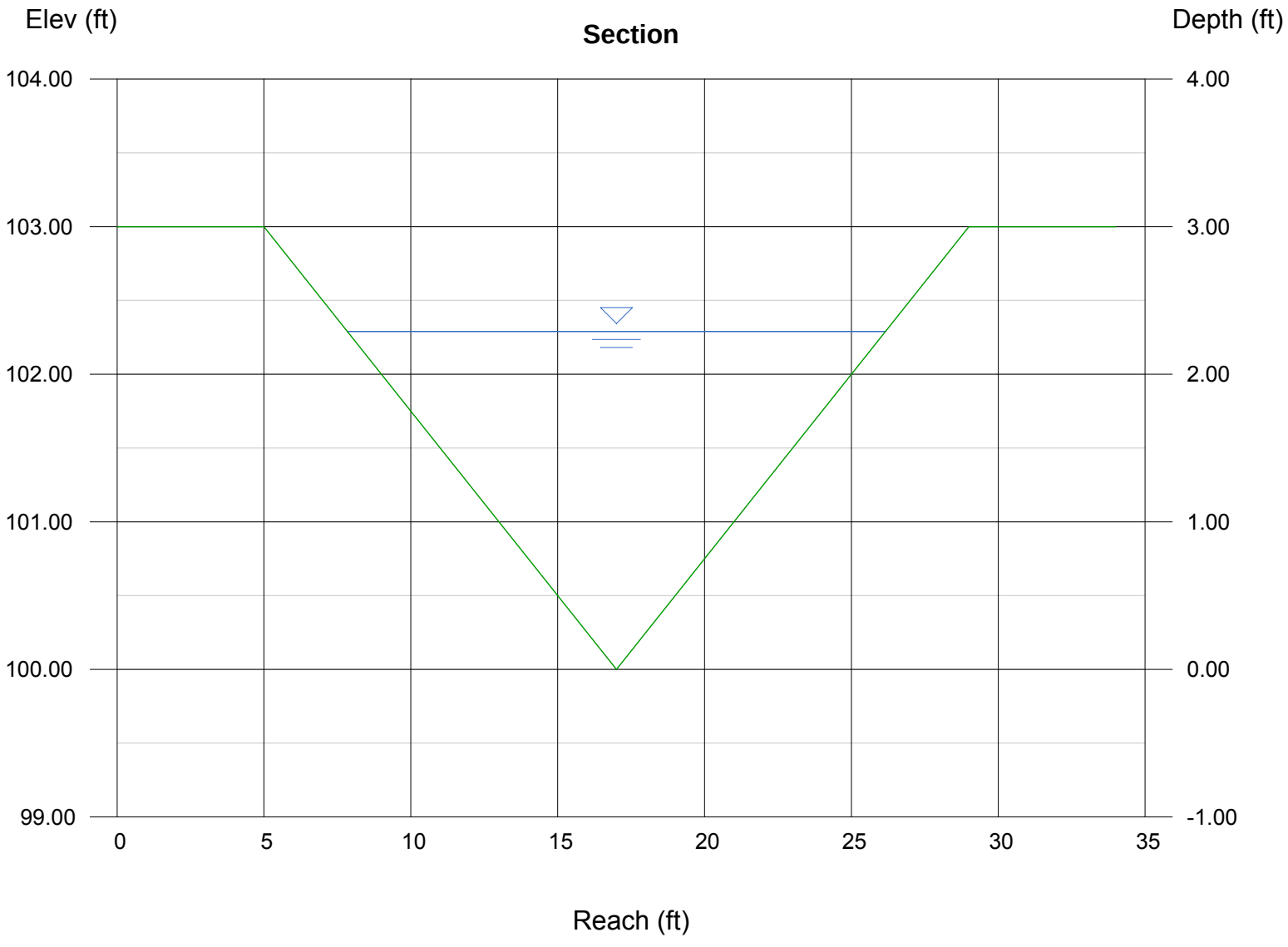
Side Slope (z:1)	= 4.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 100.00
Slope (%)	= 2.50
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 210.00

Highlighted

Depth (ft)	= 2.29
Q (cfs)	= 210.00
Area (sqft)	= 20.98
Velocity (ft/s)	= 10.01
Wetted Perim (ft)	= 18.88
Crit Depth, Yc (ft)	= 2.80
Top Width (ft)	= 18.32
EGL (ft)	= 3.85



Channel Report

Hydraflow Express by Intelisolve | Thursday, Jul 6 2017, 7:15 AM

Basin E1.3 Swale at Design Pt. 67b

Triangular

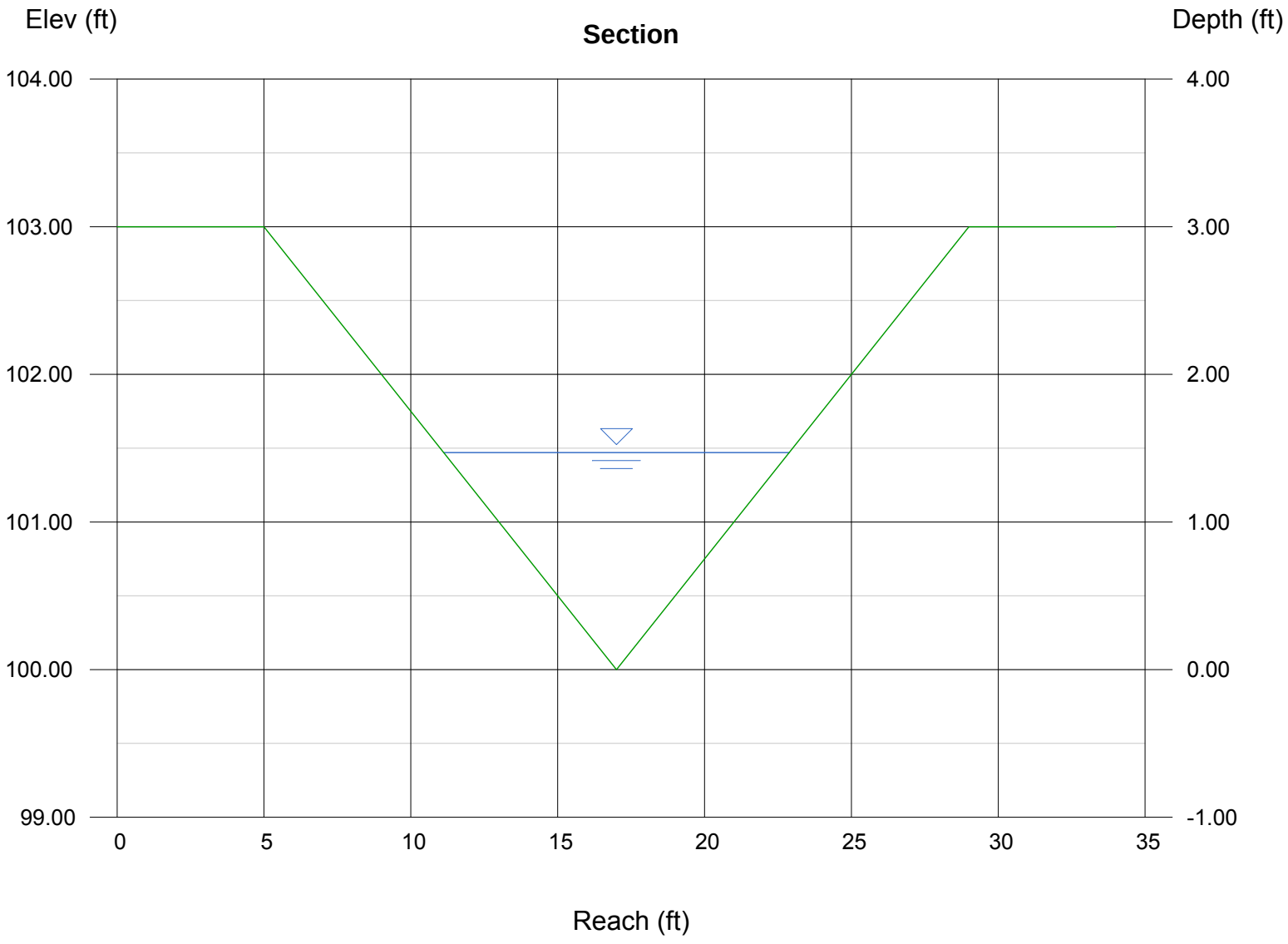
Side Slope (z:1)	= 4.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 100.00
Slope (%)	= 2.50
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 64.10

Highlighted

Depth (ft)	= 1.47
Q (cfs)	= 64.10
Area (sqft)	= 8.64
Velocity (ft/s)	= 7.42
Wetted Perim (ft)	= 12.12
Crit Depth, Yc (ft)	= 1.75
Top Width (ft)	= 11.76
EGL (ft)	= 2.33



Channel Report

Hydraflow Express by Intelisolve — Thursday, Mar 16 2017, 6:1 AM

Basin E2-ex Diversion Channel at Design Point 67a

Triangular

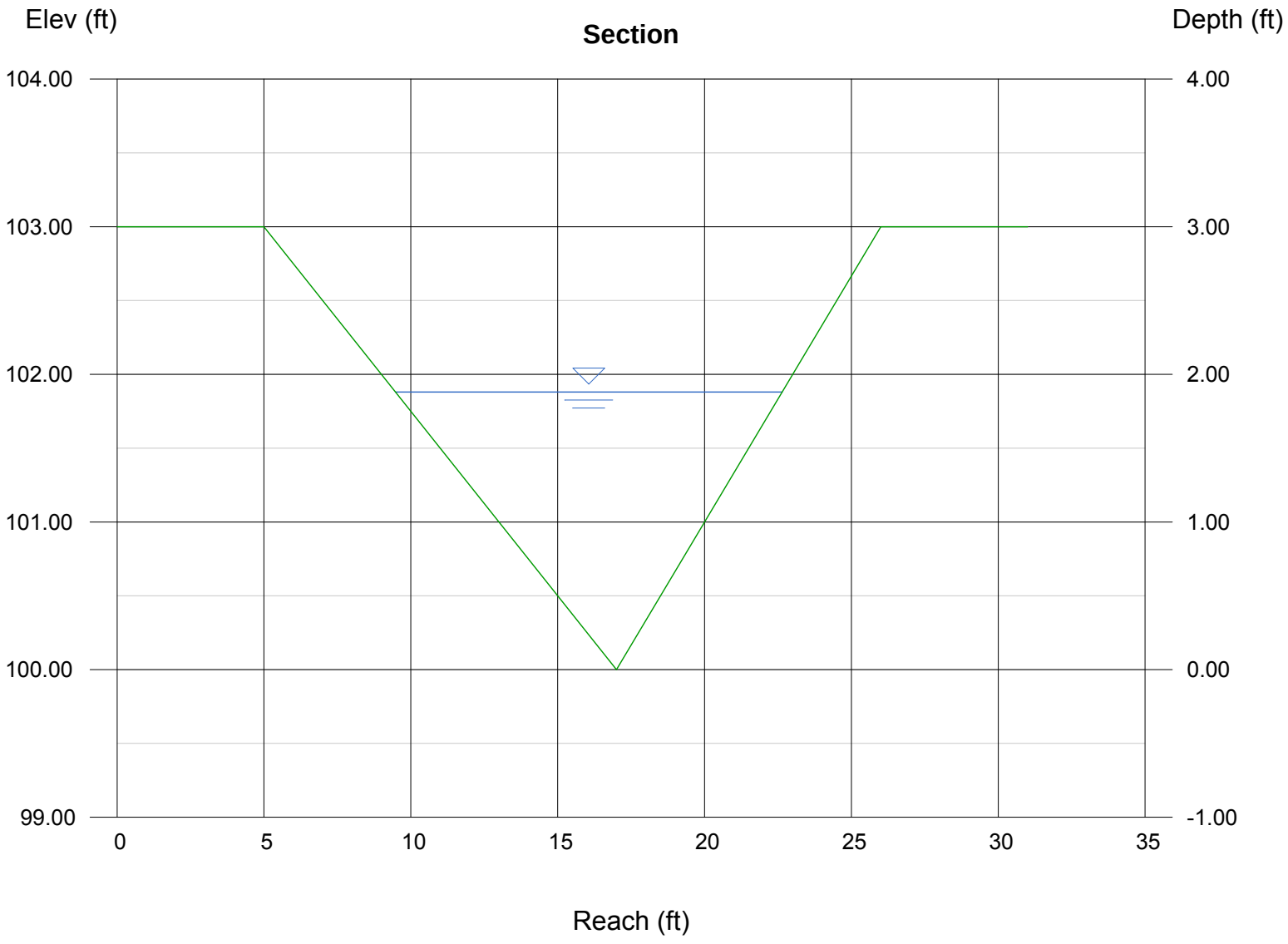
Side Slope (z:1)	= 4.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 100.00
Slope (%)	= 2.00
N-Value	= 0.024

Calculations

Compute by:	Known Q
Known Q (cfs)	= 100.00

Highlighted

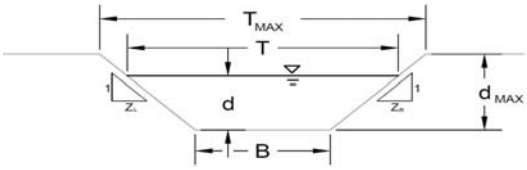
Depth (ft)	= 1.88
Q (cfs)	= 100.00
Area (sqft)	= 12.37
Velocity (ft/s)	= 8.08
Wetted Perim (ft)	= 13.70
Crit Depth, Yc (ft)	= 2.20
Top Width (ft)	= 13.16
EGL (ft)	= 2.90



AREA INLET IN A TRAPEZOIDAL GRASS-LINED CHANNEL

Lorson East Prelim Plan #100.040

Flow from Basin E2-ex into Type D inlet



Grass Type	Limiting Manning's n
A	0.06
B	0.04
C	0.033
D	0.03
E	0.024

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

	NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	B	
	Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
	Channel Invert Slope	S_O =	0.0280	ft/ft
	Bottom Width	B =	4.00	ft
Warning 01	Left Side Slope	Z1 =	0.33	ft/ft
Warning 01	Right Side Slope	Z2 =	0.33	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Sandy	5.0 fps	0.50
Non-Sandy	7.0 fps	0.80

Choose One:
- ○ Sandy
- ◉ Non-Sandy

		Minor Storm	Major Storm	
	Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	18.00	18.00 feet
	Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	3.00	3.00 feet

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
	MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	97.37	97.37 cfs
	MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	3.00	3.00 ft

Water Depth in Channel Based On Design Peak Flow

	Design Peak Flow	Q_o =	26.65	92.02 cfs
	Water Depth	d =	1.70	2.92 feet

Minor storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'

Major storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'

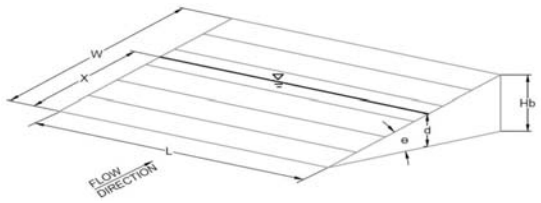
AREA INLET IN A TRAPEZOIDAL GRASS-LINED CHANNEL

Lorson East Prelim Plan #100.040

Flow from Basin E2-ex into Type D inlet

Inlet Design Information (Input)

Type of Inlet — Inlet Type = CDOT Type D (In Series & Depressed)



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	feet
Length of Grate	L =	6.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.38	
Grate Discharge Coefficient	C_d =	0.72	
Orifice Coefficient	C_o =	0.48	
Weir Coefficient	C_w =	1.53	

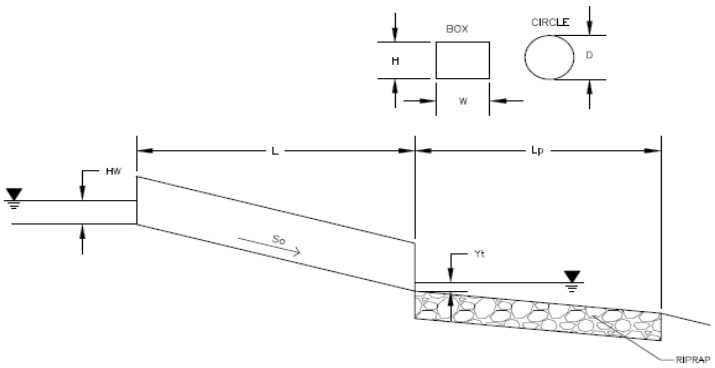
		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	2.70	3.92	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**49.56**	**59.71**	**cfs**
WARNING: Inlet Capacity is less than Q Peak for Major Storm	**Bypassed Flow, Q_b =**	**0.00**	**32.31**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**65**	**%**

Warning 01: Sideslope steepness exceeds USDCM Volume I recommendation.
Warning 02: Depth (d) exceeds USDCM Volume I recommendation.

Determination of Culvert Headwater and Outlet Protection

Project: Lorson Ranch East

Basin ID: Rip Rap sizing for outlet pipe from Pond C5 to Pond C2.2



Soil Type:
Choose One:
- (•) Sandy
- ( ) Non-Sandy

Design Information (Input):

Design Discharge	Q =	18	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	18	inches
Inlet Edge Type (Choose from pull-down list)		Square End Projection	
Box Culvert:		**OR**	
Barrel Height (Rise) in Feet	Height (Rise) =		ft
Barrel Width (Span) in Feet	Width (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	No =	1	
Inlet Elevation	Elev IN =	102	ft
Outlet Elevation **OR** Slope	Elev OUT =	100	ft
Culvert Length	L =	100	ft
Manning's Roughness	n =	0.012	
Bend Loss Coefficient	k_b =	0	
Exit Loss Coefficient	k_x =	1	
Tailwater Surface Elevation	Elev Y_t =		ft
Max Allowable Channel Velocity	V =	5	ft/s

Required Protection (Output):

Tailwater Surface Height	Y_t =	0.60	ft
Flow Area at Max Channel Velocity	A_t =	3.60	ft^2
Culvert Cross Sectional Area Available	A =	1.77	ft^2
Entrance Loss Coefficient	k_e =	0.50	
Friction Loss Coefficient	k_f =	1.54	
Sum of All Losses Coefficients	k_s =	3.04	ft
Culvert Normal Depth	Y_n =	1.12	ft
Culvert Critical Depth	Y_c =	1.45	ft
Tailwater Depth for Design	d =	1.48	ft
Adjusted Diameter **OR** Adjusted Rise	D_a =	-	ft
Expansion Factor	1/(2*tan(Θ)) =	1.85	
Flow/Diameter$^{2.5}$ **OR** Flow/(Span * Rise$^{1.5}$)	Q/D^2.5 =	6.53	$ft^{0.5}/s$
Froude Number	Fr =	-	**Pressure flow!**
Tailwater/Adjusted Diameter **OR** Tailwater/Adjusted Rise	Yt/D =	0.40	
Inlet Control Headwater	HW_I =	5.23	ft
Outlet Control Headwater	HW_O =	4.38	
Design Headwater Elevation	**HW =**	**107.23**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**3.48**	**HW/D > 1.5!**
Minimum Theoretical Riprap Size	d_{50} =	8	in
Nominal Riprap Size	d_{50} =	9	in
UDFCD Riprap Type	**Type =**	**L**	
Length of Protection	**L_p =**	**10**	**ft**
Width of Protection	**T =**	**7**	**ft**

APPENDIX D – POND AND ROUTING CALCULATIONS

Weir Report

Pond C1 Spillway for Future Flow

Trapezoidal Weir

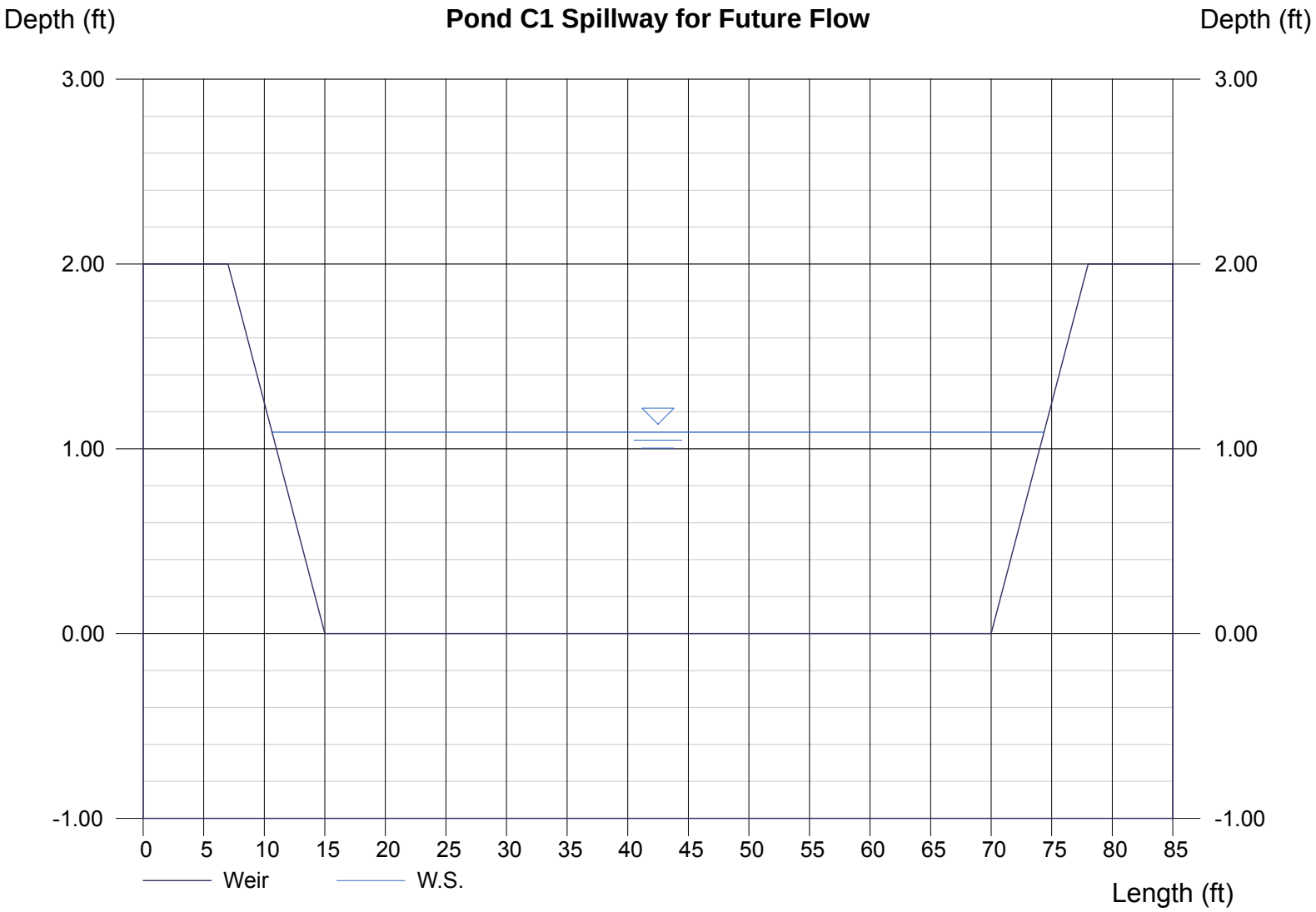
Crest	= Sharp
Bottom Length (ft)	= 55.00
Total Depth (ft)	= 2.00
Side Slope (z:1)	= 4.00

Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 205.00

Highlighted

Depth (ft)	= 1.09
Q (cfs)	= 205.00
Area (sqft)	= 64.70
Velocity (ft/s)	= 3.17
Top Width (ft)	= 63.72



Channel Report

Hydraflow Express by Intelisolve — Saturday, Mar 4 2017, 9:28 AM

Overflow Swale from Interim Pond C1 to Fontaine

Trapezoidal

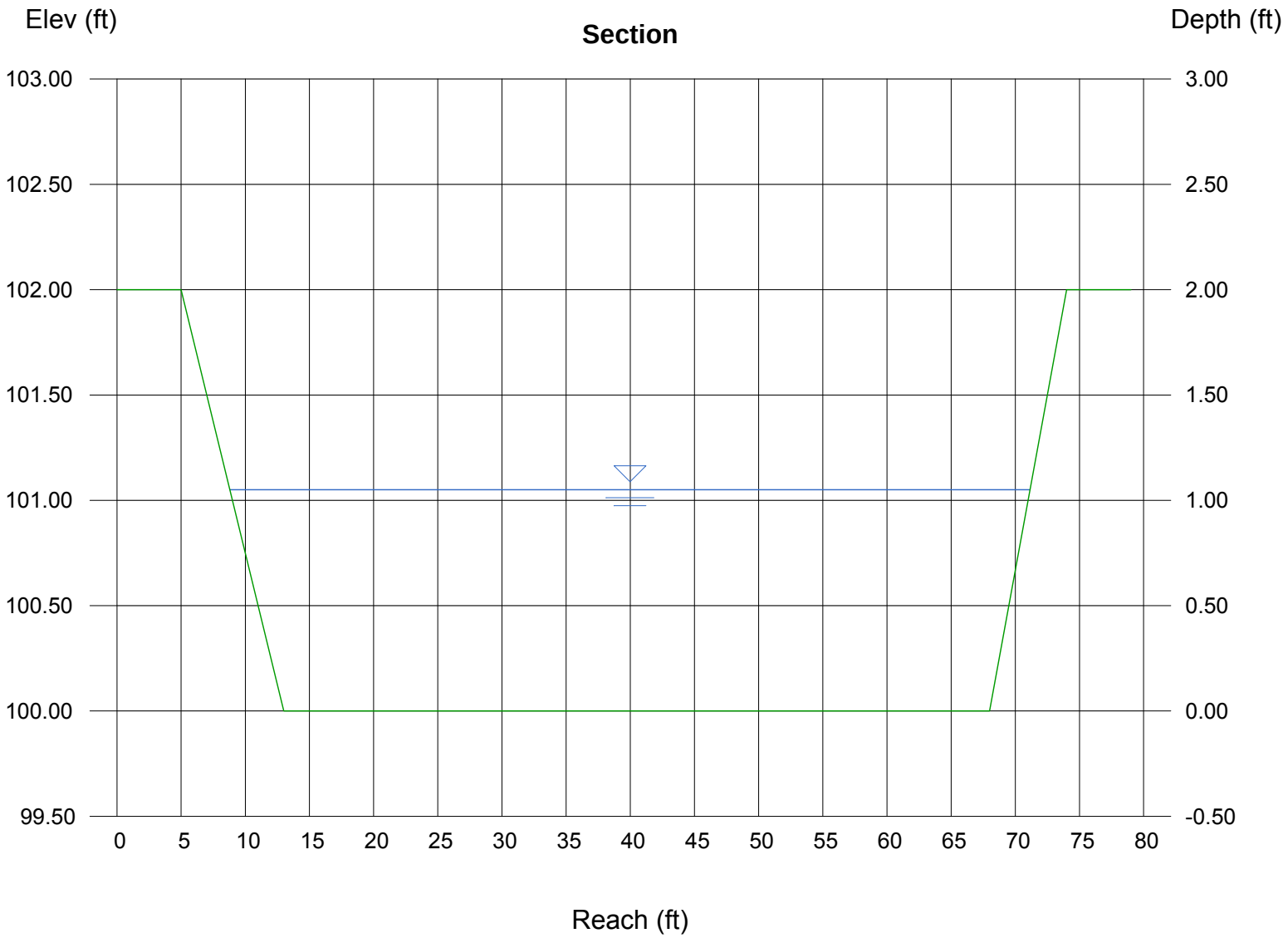
Botom Width (ft)	= 55.00
Side Slope (z:1)	= 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.30
N-Value	= 0.024

Calculations

Compute by:	Known Q
Known Q (cfs)	= 205.00

Highlighted

Depth (ft)	= 1.05
Q (cfs)	= 205.00
Area (sqft)	= 61.61
Velocity (ft/s)	= 3.33
Wetted Perim (ft)	= 62.65
Crit Depth, Yc (ft)	= 0.75
Top Width (ft)	= 62.35
EGL (ft)	= 1.22



Weir Report

Interim Pond C2.2 Spillway for future flow

Trapezoidal Weir

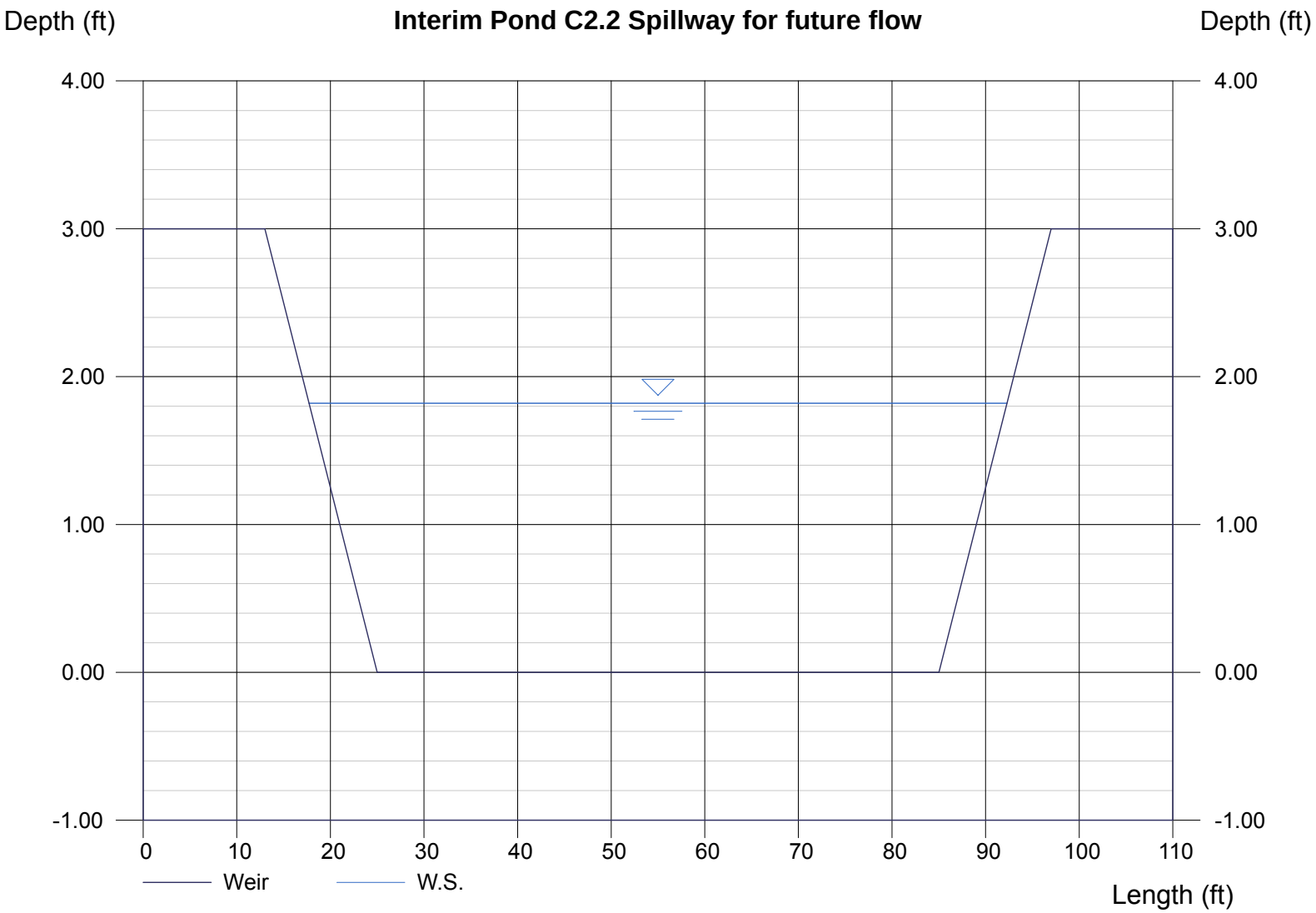
Crest	= Sharp
Bottom Length (ft)	= 60.00
Total Depth (ft)	= 3.00
Side Slope (z:1)	= 4.00

Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 500.00

Highlighted

Depth (ft)	= 1.82
Q (cfs)	= 500.00
Area (sqft)	= 122.45
Velocity (ft/s)	= 4.08
Top Width (ft)	= 74.56



Weir Report

Interim Pond C2.3 Spillway for future flow

Trapezoidal Weir

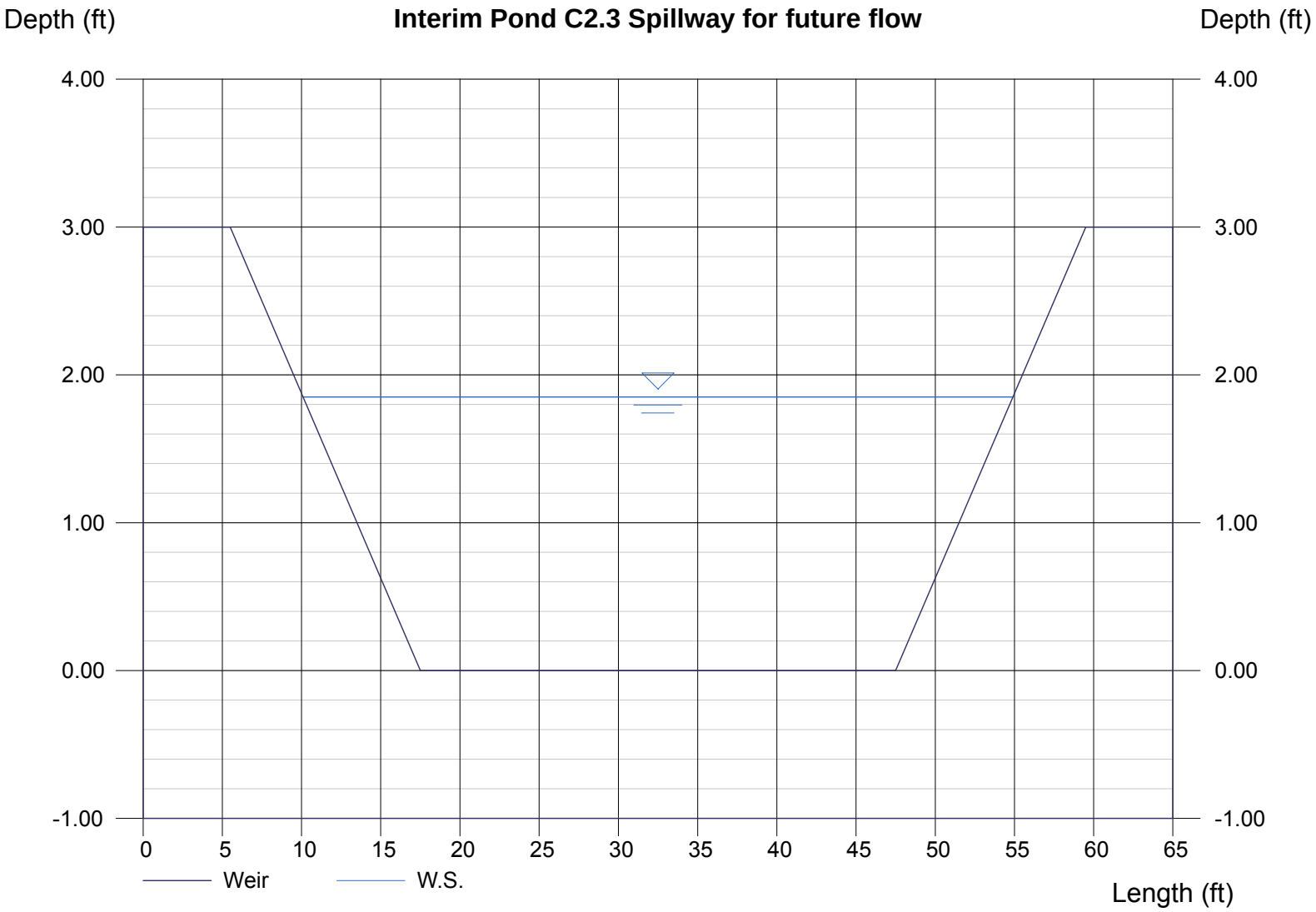
Crest	= Sharp
Bottom Length (ft)	= 30.00
Total Depth (ft)	= 3.00
Side Slope (z:1)	= 4.00

Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 280.00

Highlighted

Depth (ft)	= 1.85
Q (cfs)	= 280.00
Area (sqft)	= 69.19
Velocity (ft/s)	= 4.05
Top Width (ft)	= 44.80



Weir Report

Hydraflow Express by Intelisolve | Tuesday, Jun 27 2017, 8:16 AM

Interim Pond C3 Spillway for future flow

Trapezoidal Weir

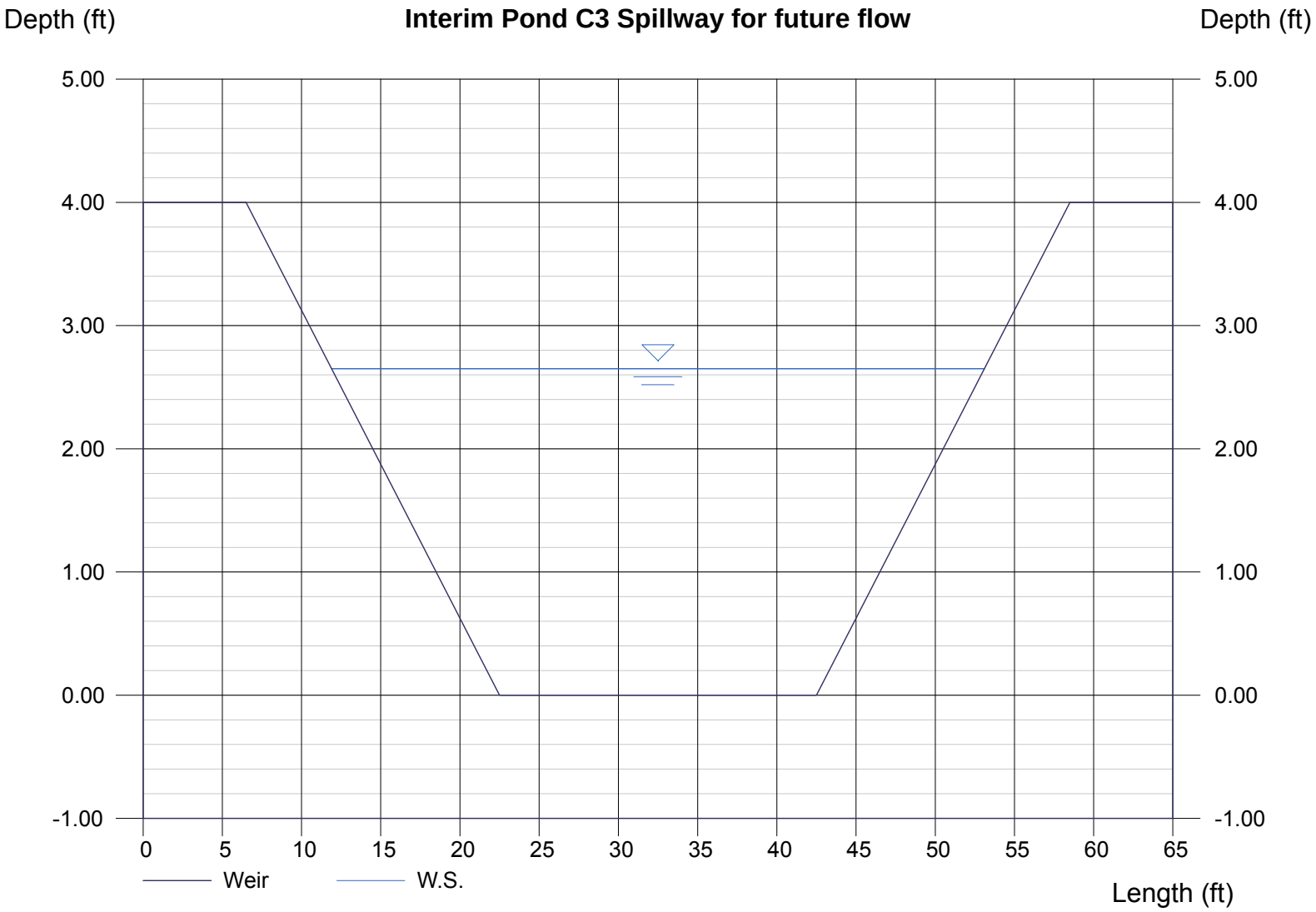
Crest	= Sharp
Bottom Length (ft)	= 20.00
Total Depth (ft)	= 4.00
Side Slope (z:1)	= 4.00

Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 380.00

Highlighted

Depth (ft)	= 2.65
Q (cfs)	= 380.00
Area (sqft)	= 81.09
Velocity (ft/s)	= 4.69
Top Width (ft)	= 41.20



Channel Report

Hydraflow Express by Intelisolve — Saturday, Jul 8 2017, 10:44 AM

Pond C3 Overflow Swale for Future Flow

Trapezoidal

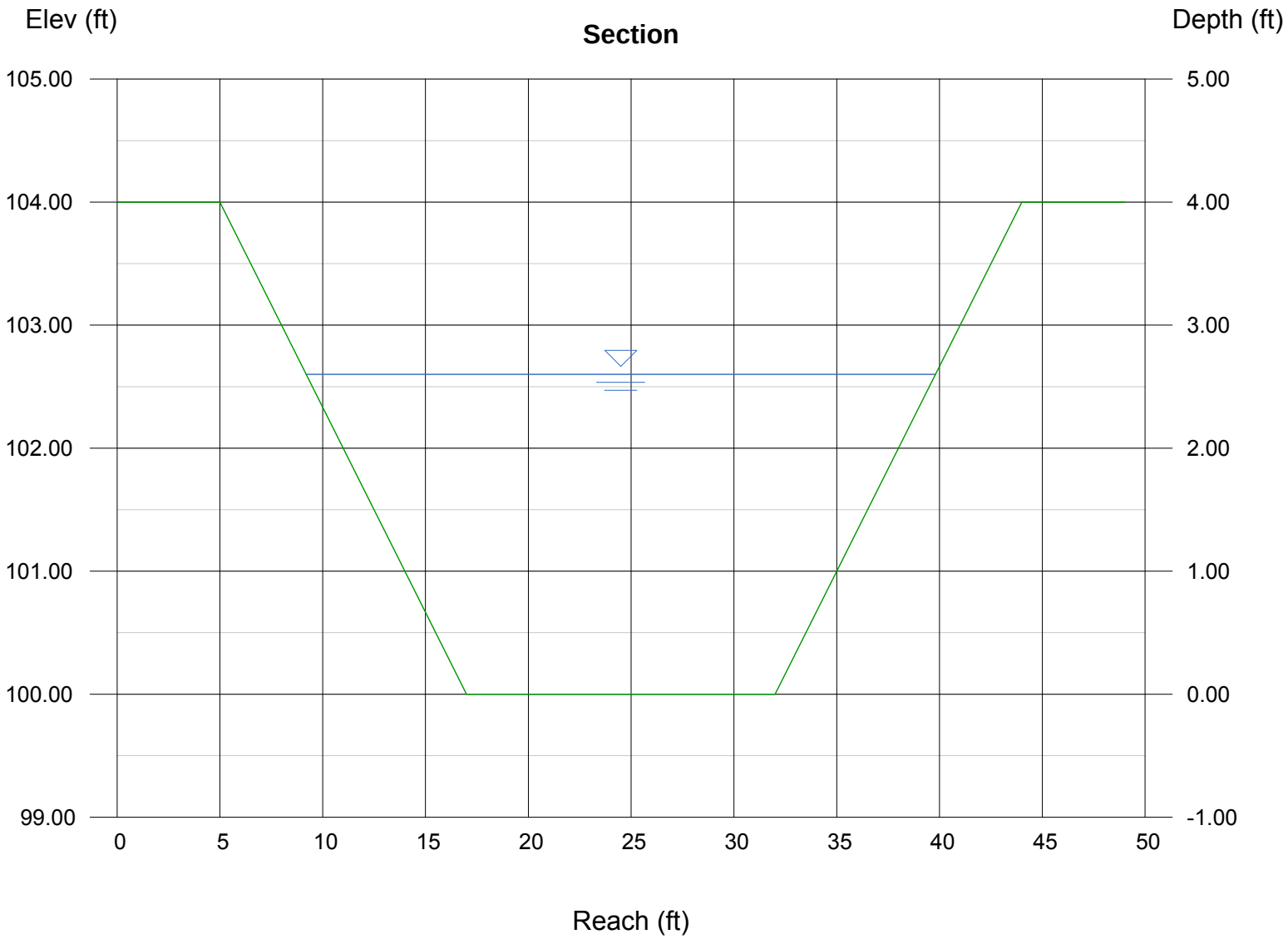
Botom Width (ft)	= 15.00
Side Slope (z:1)	= 3.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 380.00

Highlighted

Depth (ft)	= 2.60
Q (cfs)	= 380.00
Area (sqft)	= 59.28
Velocity (ft/s)	= 6.41
Wetted Perim (ft)	= 31.44
Crit Depth, Yc (ft)	= 2.31
Top Width (ft)	= 30.60
EGL (ft)	= 3.24



Channel Report

Hydraflow Express by Intelisolve — Saturday, Jul 8 2017, 10:36 AM

Pond C3 Overflow Swale for Future Flow

Trapezoidal

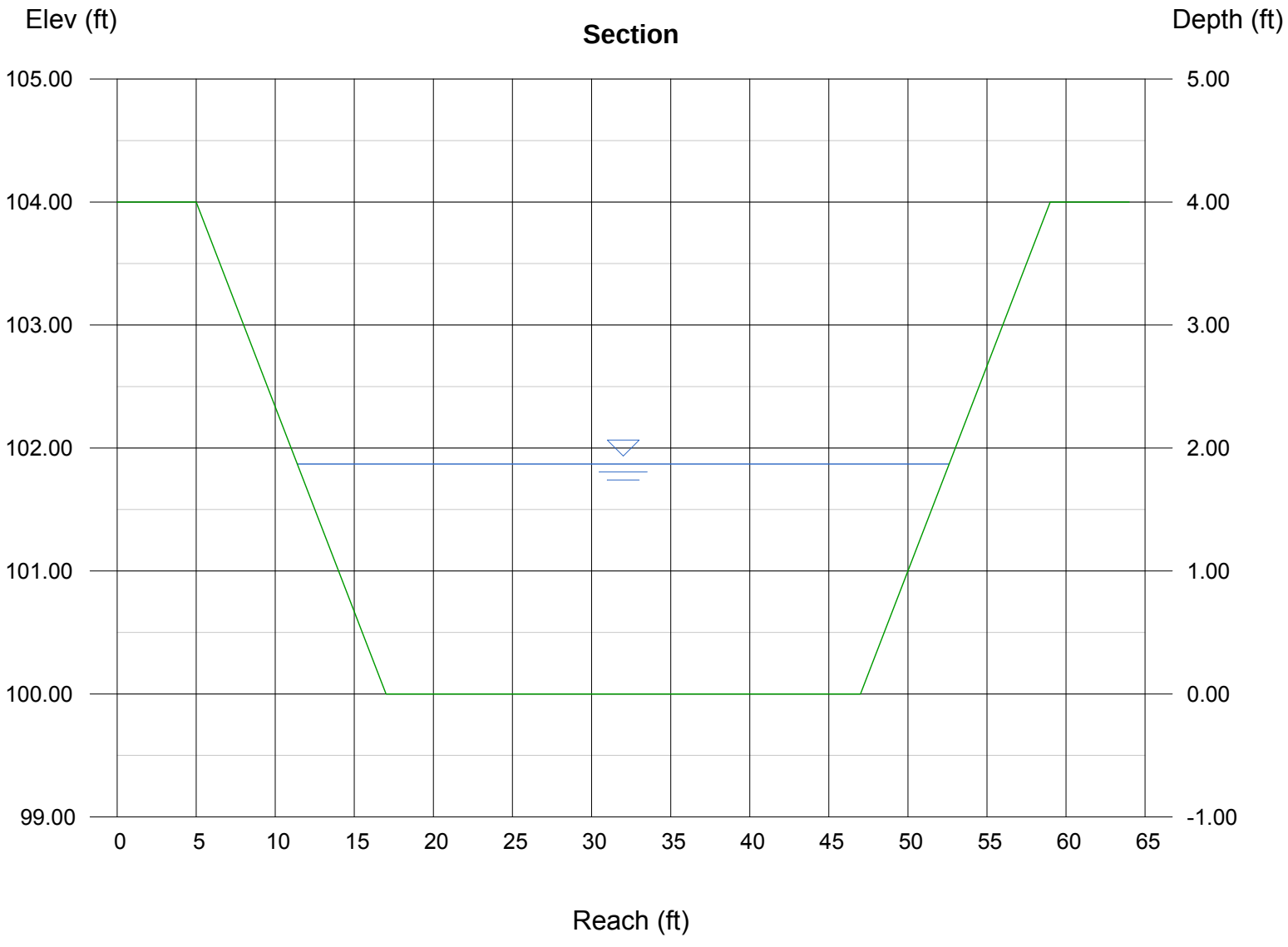
Botom Width (ft)	= 30.00
Side Slope (z:1)	= 3.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 380.00

Highlighted

Depth (ft)	= 1.87
Q (cfs)	= 380.00
Area (sqft)	= 66.59
Velocity (ft/s)	= 5.71
Wetted Perim (ft)	= 41.83
Crit Depth, Yc (ft)	= 1.62
Top Width (ft)	= 41.22
EGL (ft)	= 2.38



Weir Report

Hydraflow Express by Intelisolve | Tuesday, Jun 27 2017, 11:23 AM

Interim Pond D1 Spillway for future flow

Trapezoidal Weir

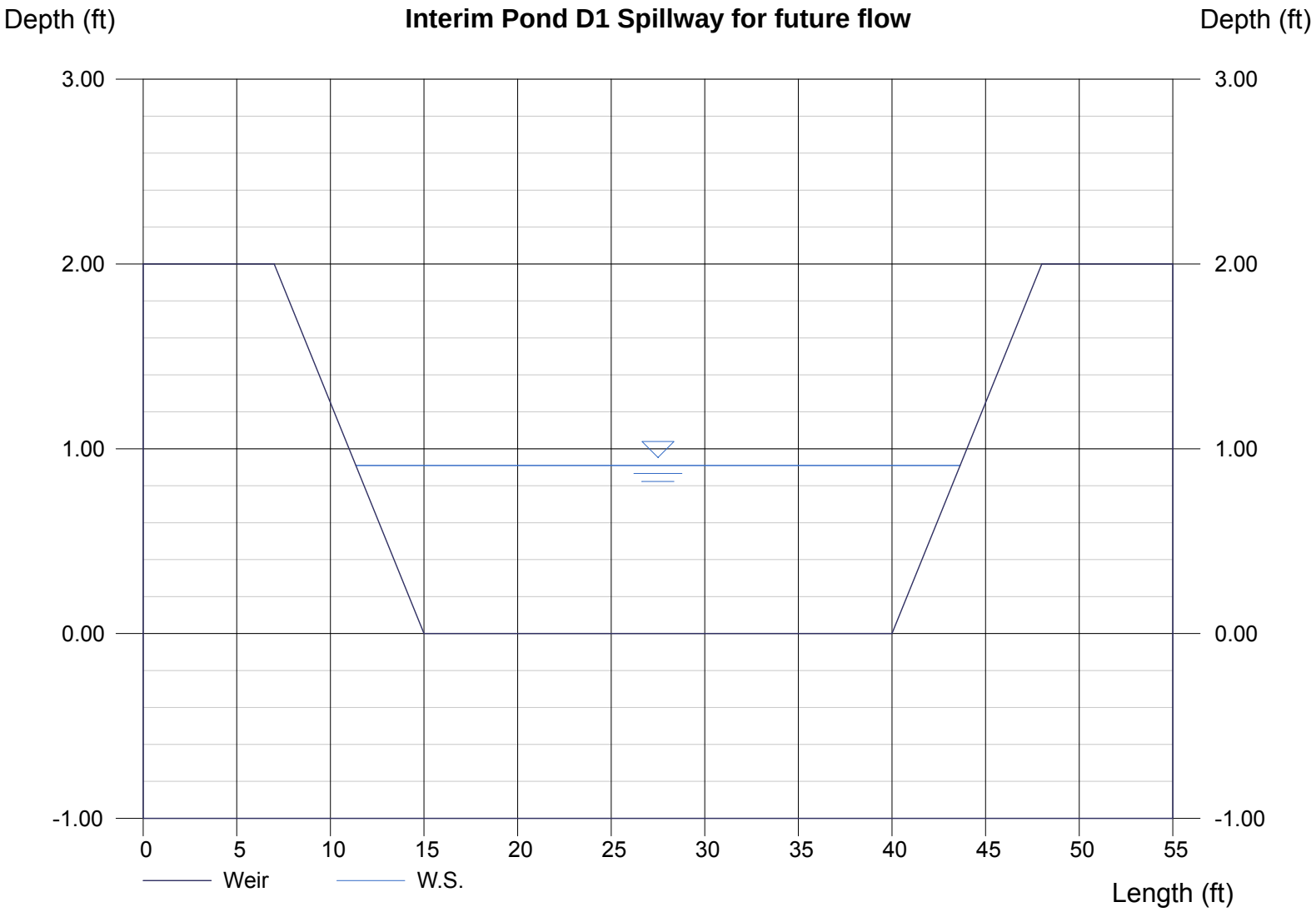
Crest	= Sharp
Bottom Length (ft)	= 25.00
Total Depth (ft)	= 2.00
Side Slope (z:1)	= 4.00

Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 75.00

Highlighted

Depth (ft)	= 0.91
Q (cfs)	= 75.00
Area (sqft)	= 26.06
Velocity (ft/s)	= 2.88
Top Width (ft)	= 32.28



Weir Report

Hydraflow Express by Intelisolve | Tuesday, Jun 27 2017, 11:37 AM

Interim Pond E1 Spillway for future flow

Trapezoidal Weir

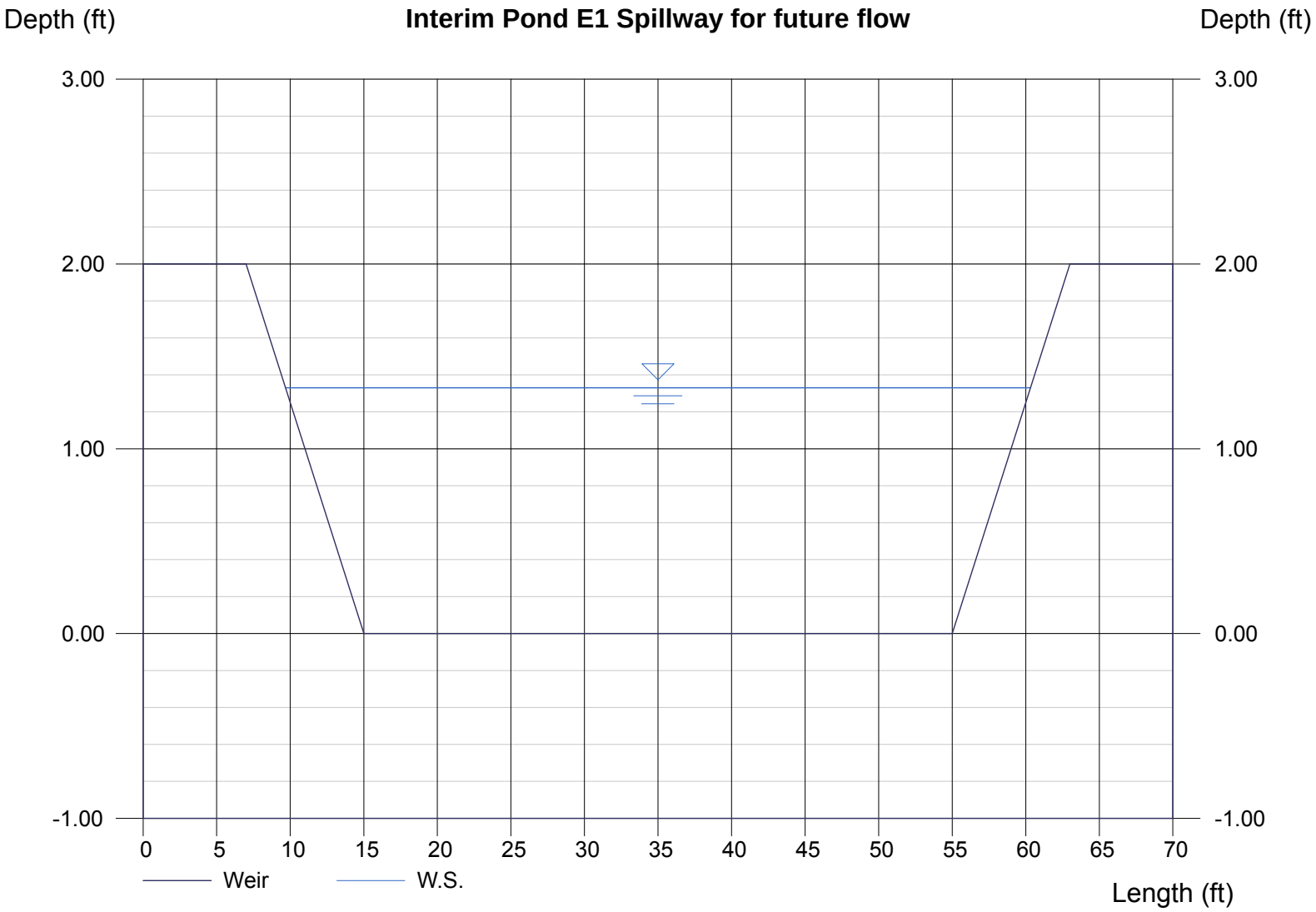
Crest	= Sharp
Bottom Length (ft)	= 40.00
Total Depth (ft)	= 2.00
Side Slope (z:1)	= 4.00

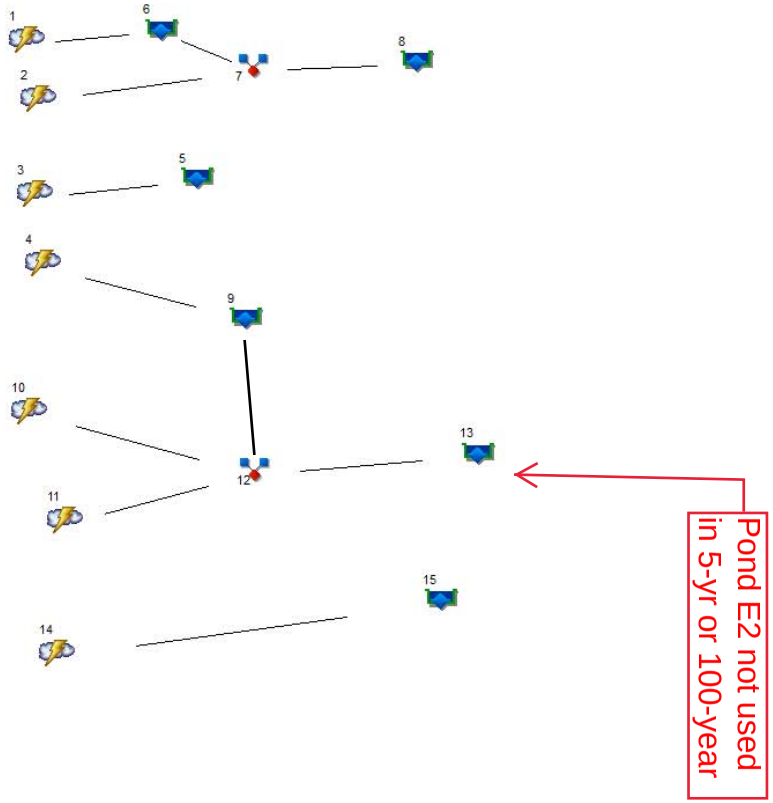
Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 210.00

Highlighted

Depth (ft)	= 1.33
Q (cfs)	= 210.00
Area (sqft)	= 60.28
Velocity (ft/s)	= 3.48
Top Width (ft)	= 50.64





Legend

Hyd.	Origin	Description
1	Rational	Basin C12-ex
2	Rational	Basin C14-ex
3	Rational	Basin C15-ex
4	Rational	Basin E1-ex
5	Reservoir	Interim Pond C1
6	Reservoir	Interim Pond C3
7	Combine	Flow into Interim Pond C2
8	Reservoir	Interim Pond C2
9	Reservoir	Interim Pond E1
10	Rational	Basin E2-ex
11	Rational	Basin E
12	Combine	Flow into Pond E2
13	Reservoir	Interim Pond E2
14	Rational	Basin D1-ex
15	Reservoir	Interim Pond D1

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	44.09	1	21	55,558	----	------	------	Basin C12-ex
2	Rational	44.48	1	28	74,723	----	------	------	Basin C14-ex
3	Rational	23.64	1	22	31,199	----	------	------	Basin C15-ex
4	Rational	25.13	1	21	31,668	----	------	------	Basin E1-ex
5	Reservoir	3.024	1	41	30,719	3	5746.81	27,990	Interim Pond C1
6	Reservoir	7.637	1	38	55,432	1	5759.56	46,200	Interim Pond C3
7	Combine	51.30	1	28	130,155	2, 6	------	------	Flow into Interim Pond C2
8	Reservoir	25.80	1	44	130,152	7	5747.22	35,855	Interim Pond C2.2+C2.3
9	Reservoir	6.659	1	36	31,640	4	5730.45	23,700	Interim Pond E1
10	Rational	25.73	1	16	24,704	----	------	------	Basin E2-ex
11	Rational	23.94	1	17	24,423	----	------	------	Basin E
12	Combine	50.69	1	17	80,767	9, 10, 11	------	------	Flow into Interim Pond E2
13	Rational	7.858	1	17	8,015	----	------	------	Basin D1-ex
14	Reservoir	3.500	1	26	8,005	13	5751.89	5,103	Interim Pond D1

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	251.79	1	21	317,251	----	------	------	Basin C12-ex
2	Rational	253.98	1	28	426,689	----	------	------	Basin C14-ex
3	Rational	134.97	1	22	178,154	----	------	------	Basin C15-ex
4	Rational	143.52	1	21	180,833	----	------	------	Basin E1-ex
5	Reservoir	9.980	1	42	178,153	3	5749.61	159,899	Interim Pond C1
6	Reservoir	19.67	1	40	317,065	1	5764.10	287,041	Interim Pond C3
7	Combine	271.88	1	28	743,753	2, 6	------	------	Flow into Interim Pond C2
8	Reservoir	74.13	1	50	743,749	7	5752.01	310,503	Interim Pond C2.2+C2.3
9	Reservoir	18.97	1	39	180,806	4	5734.21	151,403	Interim Pond E1
10	Rational	92.91	1	17	94,770	----	------	------	Basin E2-ex
11	Rational	76.86	1	17	78,401	----	------	------	Basin E
12	Combine	182.82	1	17	353,976	9, 10, 11	------	------	Flow into Pond E2
13	Rational	47.86	1	17	48,821	----	------	------	Basin D1-ex
14	Reservoir	11.79	1	30	48,810	13	5753.67	34,909	Interim Pond D1

Pond Report

Hydraflow Hydrographs by Intelisolve | Tuesday, Jun 27 2017, 9:14 AM

Pond No. 1 - Interim Pond C1

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	5746.00	25,887	0	0
1.00	5747.00	43,215	34,551	34,551
2.00	5748.00	46,801	45,008	79,559
3.00	5749.00	50,458	48,630	128,189
4.00	5750.00	54,187	52,323	180,511
5.00	5751.00	57,989	56,088	236,599
6.00	5752.00	61,862	59,926	296,525
7.00	5753.00	65,807	63,835	360,359
8.00	5754.00	69,824	67,816	428,175
9.00	5755.00	73,914	71,869	500,044
10.00	5756.00	78,000	75,957	576,001

Culvert / Orifice Structures

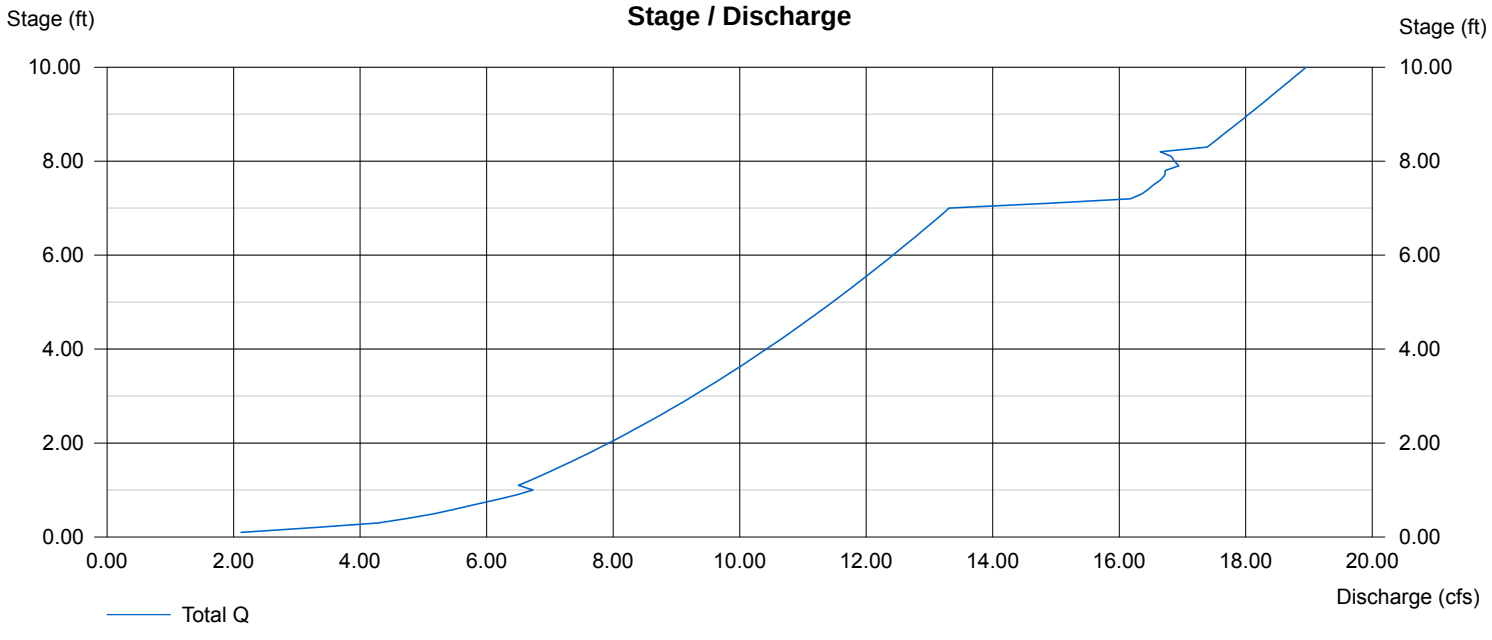
	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	18.00	0.00	0.00
Span (in)	= 18.00	18.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 5745.00	5745.00	0.00	0.00
Length (ft)	= 250.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 50.00	0.00	0.00	0.00
Crest El. (ft)	= 5753.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Ciplti	---	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



Pond Report

Hydraflow Hydrographs by Intelisolve — Tuesday, Jun 27 2017, 9:14 AM

Pond No. 4 - Interim Pond C3

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	5758.00	13,996	0	0
1.00	5759.00	33,578	23,787	23,787
2.00	5760.00	47,030	40,304	64,091
3.00	5761.00	50,549	48,790	112,881
4.00	5762.00	54,144	52,347	165,227
5.00	5763.00	57,811	55,978	221,205
6.00	5764.00	61,549	59,680	280,885
7.00	5765.00	65,000	63,275	344,159
8.00	5766.00	68,000	66,500	410,659
9.00	5767.00	72,000	70,000	480,659
10.00	5768.00	75,000	73,500	554,159

Culvert / Orifice Structures

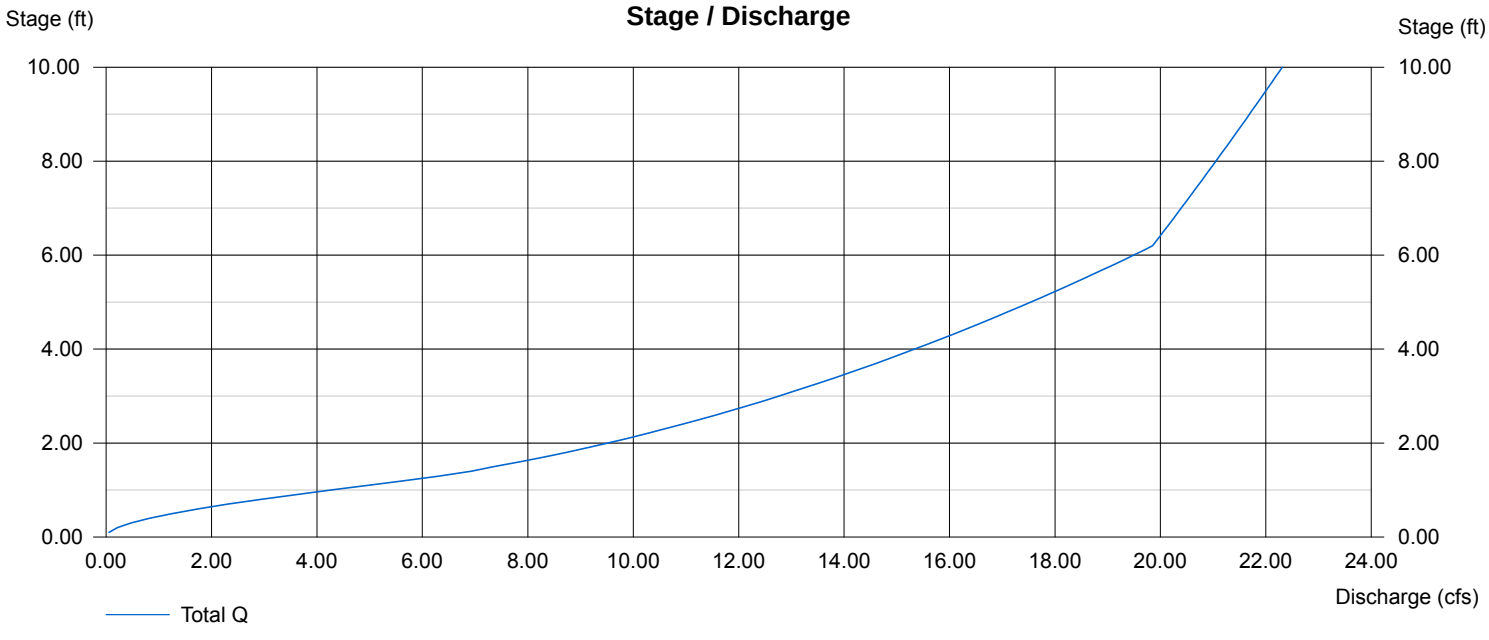
	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 5758.00	0.00	0.00	0.00
Length (ft)	= 325.00	0.00	0.00	0.00
Slope (%)	= 3.00	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



Pond Report

Hydraflow Hydrographs by Intelisolve — Tuesday, Jun 27 2017, 9:14 AM

Pond No. 2 - Interim Pond C2.2+C2.3

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	5745.00	00	0	0
1.00	5746.00	2,500	1,250	1,250
2.00	5747.00	45,993	24,247	25,497
3.00	5748.00	50,108	48,051	73,547
4.00	5749.00	54,456	52,282	125,829
5.00	5750.00	58,975	56,716	182,545
6.00	5751.00	63,696	61,336	243,880
7.00	5752.00	68,762	66,229	310,109
8.00	5753.00	73,742	71,252	381,361
9.00	5754.00	78,000	75,871	457,232
10.00	5755.00	83,000	80,500	537,732
11.00	5756.00	88,000	85,500	623,232

Culvert / Orifice Structures

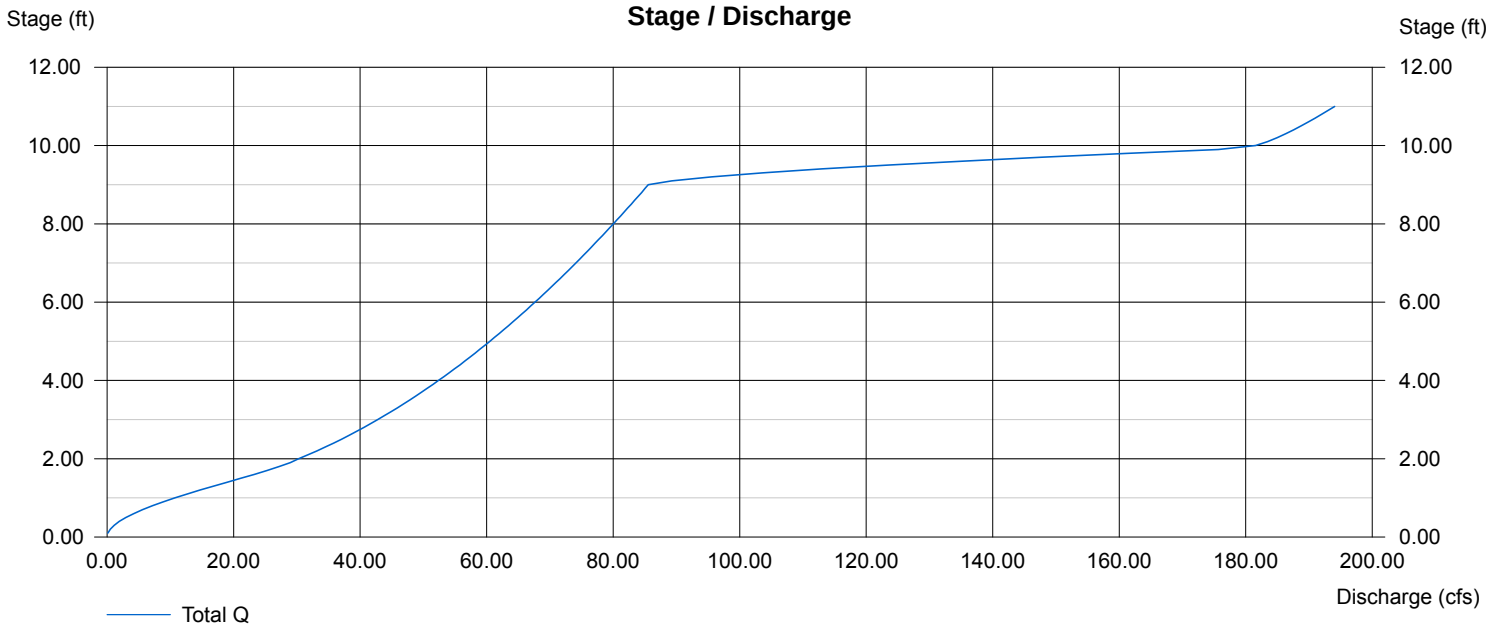
	[A]	[B]	[C]	[D]
Rise (in)	= 24.00	24.00	0.00	0.00
Span (in)	= 24.00	24.00	0.00	0.00
No. Barrels	= 2	2	0	0
Invert El. (ft)	= 5744.00	5745.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 30.00	0.00	0.00	0.00
Crest El. (ft)	= 5754.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Ciplti	---	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



Pond Report

Pond No. 3 - Interim Pond E1

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	5729.00	100	0	0
1.00	5730.00	23,061	11,581	11,581
2.00	5731.00	31,126	27,094	38,674
3.00	5732.00	33,495	32,311	70,985
4.00	5733.00	35,937	34,716	105,701
5.00	5734.00	38,452	37,195	142,895
6.00	5735.00	41,040	39,746	182,641
7.00	5736.00	43,700	42,370	225,011
8.00	5737.00	46,434	45,067	270,078
9.00	5738.00	49,241	47,838	317,916
10.00	5739.00	52,120	50,681	368,596
11.00	5740.00	55,072	53,596	422,192

Culvert / Orifice Structures

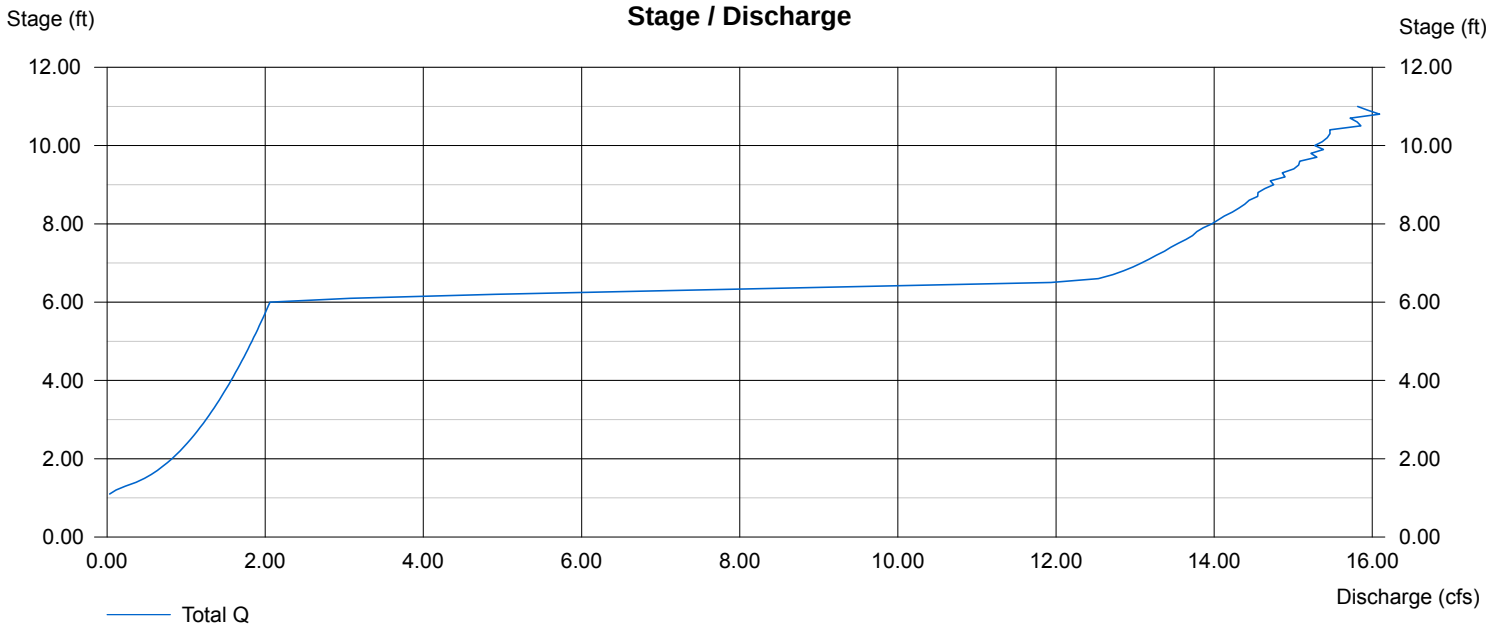
	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	6.00	0.00	0.00
Span (in)	= 18.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 5729.00	5730.00	0.00	0.00
Length (ft)	= 400.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 9.40	0.00	0.00	0.00
Crest El. (ft)	= 5735.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



Pond Report

Pond No. 6 - Interim Pond D1

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	5751.00	00	0	0
1.00	5752.00	11,500	5,750	5,750
2.00	5753.00	19,436	15,468	21,218
3.00	5754.00	21,337	20,387	41,605
4.00	5755.00	23,300	22,319	63,923
5.00	5756.00	25,329	24,315	88,238
6.00	5757.00	27,423	26,376	114,614
7.00	5758.00	29,583	28,503	143,117
8.00	5759.00	31,809	30,696	173,813
9.00	5760.00	34,100	32,955	206,767
10.00	5761.00	37,200	35,650	242,417
11.00	5762.00	40,200	38,700	281,117

Culvert / Orifice Structures

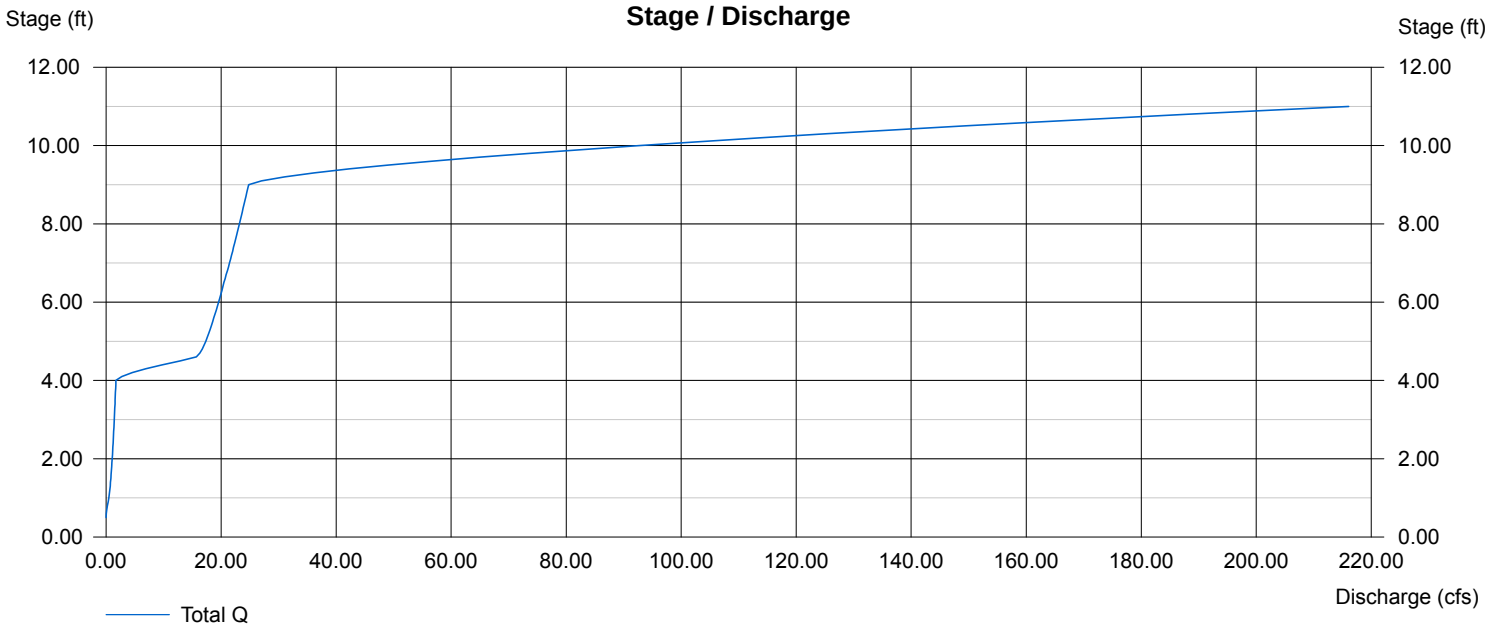
	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	6.00	0.00	0.00
Span (in)	= 18.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 5751.00	5751.50	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 9.40	20.00	0.00	0.00
Crest El. (ft)	= 5755.00	5760.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Riser	Ciplti	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.

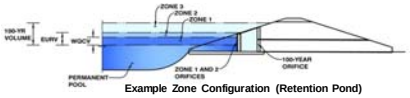


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Lorson Ranch East, Prelim Drainage Full Spectrum Design, #100.040

Basin ID: Interim Pond E2



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	21.00	acres
Watershed Length =	1,500	ft
Watershed Slope =	0.035	ft/ft
Watershed Imperviousness =	65.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	
Water Quality Capture Volume (WQCV) =	0.445	acre-feet
Excess Urban Runoff Volume (EURV) =	1.319	acre-feet
2-yr Runoff Volume (P1 = 1.16 in.) =	1.227	acre-feet
5-yr Runoff Volume (P1 = 1.44 in.) =	1.703	acre-feet
10-yr Runoff Volume (P1 = 1.68 in.) =	2.097	acre-feet
25-yr Runoff Volume (P1 = 1.92 in.) =	2.677	acre-feet
50-yr Runoff Volume (P1 = 2.16 in.) =	3.139	acre-feet
100-yr Runoff Volume (P1 = 2.42 in.) =	3.710	acre-feet
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet
Approximate 2-yr Detention Volume =	1.151	acre-feet
Approximate 5-yr Detention Volume =	1.604	acre-feet
Approximate 10-yr Detention Volume =	1.834	acre-feet
Approximate 25-yr Detention Volume =	1.956	acre-feet
Approximate 50-yr Detention Volume =	2.014	acre-feet
Approximate 100-yr Detention Volume =	2.201	acre-feet

Optional User Override 1-hr Precipitation

1.16	inches
1.44	inches
1.68	inches
1.92	inches
2.16	inches
2.42	inches
	inches

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.445	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.874	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.882	acre-feet
Total Detention Basin Volume =	2.201	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	user	acre-feet

Depth Increment = 0.2 ft

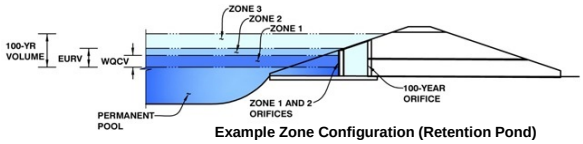
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	50	0.001		
5694.33	--	0.33	--	--	--	10,245	0.235	1,597	0.037
5695	--	1.00	--	--	--	10,700	0.246	8,608	0.198
5696	--	2.00	--	--	--	11,163	0.256	19,534	0.448
5697	--	3.00	--	--	--	11,635	0.267	31,045	0.713
5698	--	4.00	--	--	--	15,441	0.354	44,583	1.023
5699	--	5.00	--	--	--	17,153	0.394	60,880	1.398
5700	--	6.00	--	--	--	18,960	0.435	78,937	1.812
5701	--	7.00	--	--	--	20,000	0.459	98,417	2.259

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Lorson Ranch East, Prelim. Full Spectrum Design, #100.040

Basin ID: Interim Pond E2



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.98	0.445	Orifice Plate
Zone 2 (EURV)	4.80	0.874	Rectangular Orifice
Zone 3 (100-year)	6.88	0.882	Weir&Pipe (Restrict)
		2.201	Total

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

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	Underdrain Orifice Area =	N/A	ft²
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	1.674E-02	ft²
Depth at top of Zone using Orifice Plate =	2.20	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	8.00	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	2.41	sq. inches (diameter = 1-3/4 inches)	Elliptical Slot Area =	N/A	ft²

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.70	1.40					
Orifice Area (sq. inches)	2.41	2.41	2.41					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Rectangular	Not Selected		Calculated Parameters for Vertical Orifice	Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	1.98	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.09	N/A	ft²
Depth at top of Zone using Vertical Orifice =	4.80	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.08	N/A	feet
Vertical Orifice Height =	2.00	N/A	inches				
Vertical Orifice Width =	6.29		inches				

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

	Zone 3 Weir	Not Selected		Calculated Parameters for Overflow Weir	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.00	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	5.00	N/A	feet
Overflow Weir Front Edge Length =	3.00	N/A	feet	Over Flow Weir Slope Length =	6.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)	Grate Open Area / 100-yr Orifice Area =	5.80	N/A	should be ≥ 4
Horiz. Length of Weir Sides =	6.00	N/A	feet	Overflow Grate Open Area w/o Debris =	12.60	N/A	ft²
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area	Overflow Grate Open Area w/ Debris =	6.30	N/A	ft²
Debris Clogging % =	50%	N/A	%				

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

	Zone 3 Restrictor	Not Selected		Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	2.17	N/A	ft²
Outlet Pipe Diameter =	48.00	N/A	inches	Outlet Orifice Centroid =	0.54	N/A	feet
Restrictor Plate Height Above Pipe Invert =	11.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.00	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	7.00	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	1.13	feet
Spillway Crest Length =	20.00	feet	Stage at Top of Freeboard =	8.13	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.46	acres
Freeboard above Max Water Surface =		feet			

Routed Hydrograph Results

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.16	1.44	1.68	1.92	2.16	2.42	0.00
Calculated Runoff Volume (acre-ft) =	0.445	1.319	1.227	1.703	2.097	2.677	3.139	3.710	0.000
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.443	1.317	1.225	1.701	2.095	2.674	3.136	3.706	#N/A
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.12	0.33	0.77	1.02	1.33	0.00
Predevelopment Peak Q (cfs) =	0.0	0.0	0.3	2.5	7.0	16.2	21.4	27.9	0.0
Peak Inflow Q (cfs) =	7.5	22.1	20.6	28.5	35.0	44.5	52.1	61.4	#N/A
Peak Outflow Q (cfs) =	0.2	1.1	1.1	3.8	11.7	21.9	24.3	25.7	#N/A
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.5	1.7	1.4	1.1	0.9	#N/A
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	Outlet Plate 1	#N/A
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.2	0.8	1.7	1.8	1.9	#N/A
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	#N/A
Time to Drain 97% of Inflow Volume (hours) =	52	58	58	58	55	51	48	45	#N/A
Time to Drain 99% of Inflow Volume (hours) =	**55**	66	65	67	66	64	63	61	#N/A
Maximum Ponding Depth (ft) =	1.85	4.44	4.21	5.16	5.42	5.66	5.96	6.58	#N/A
Area at Maximum Ponding Depth (acres) =	0.25	0.37	0.36	0.40	0.41	0.42	0.43	0.45	#N/A
Maximum Volume Stored (acre-ft) =	0.410	1.180	1.095	1.461	1.563	1.662	1.790	2.069	#N/A

Weir Report

Hydraflow Express by Intelisolve | Tuesday, Jun 27 2017, 9:9 PM

Interim Pond E2 Spillway

Trapezoidal Weir

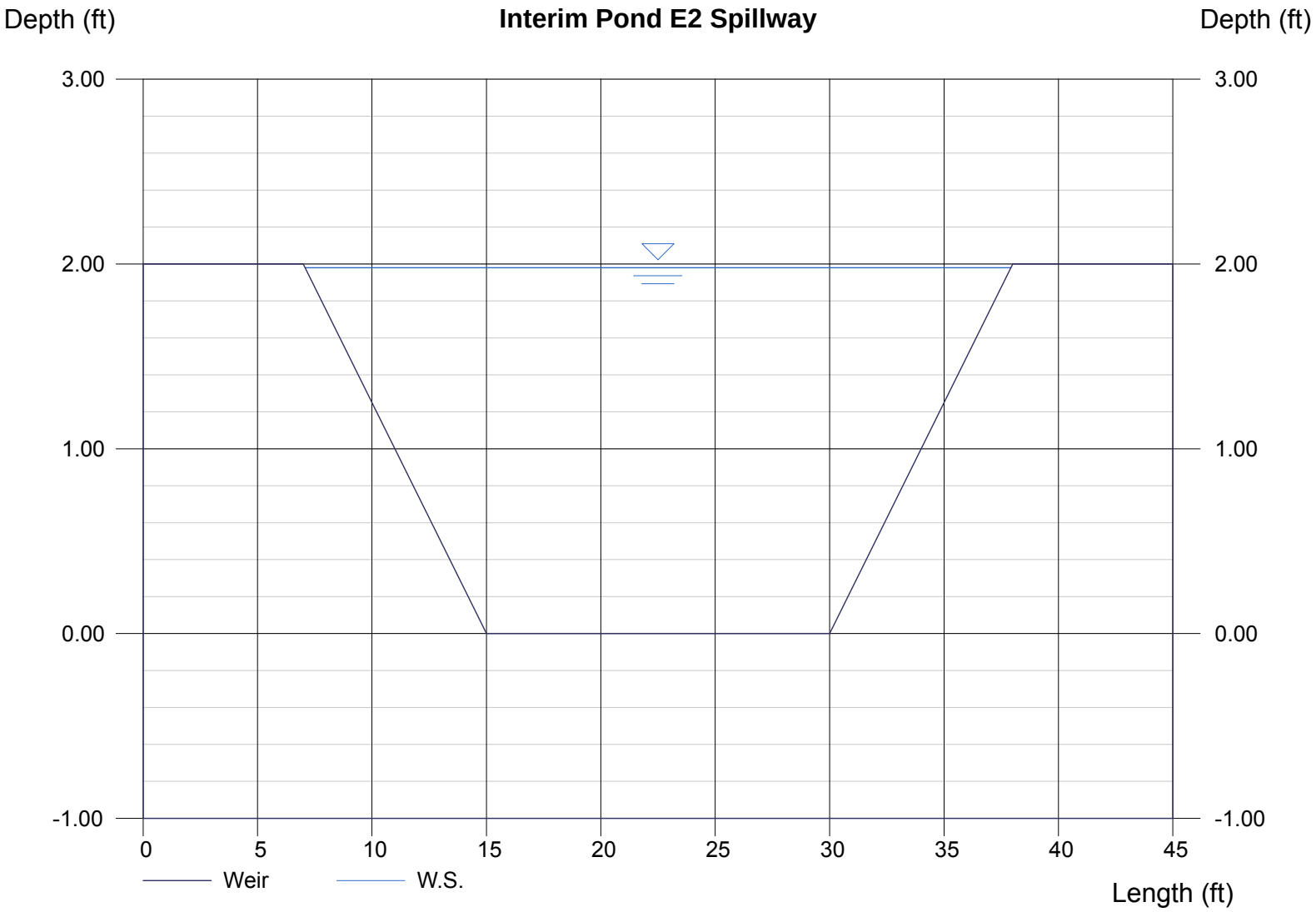
Crest	= Sharp
Bottom Length (ft)	= 15.00
Total Depth (ft)	= 2.00
Side Slope (z:1)	= 4.00

Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 183.00

Highlighted

Depth (ft)	= 1.98
Q (cfs)	= 183.00
Area (sqft)	= 45.38
Velocity (ft/s)	= 4.03
Top Width (ft)	= 30.84



Design Procedure Form: Extended Detention Basin (EDB)

UD-BMP (Version 3.06, November 2016)

Designer: Richard Schindler
Company: Core Engineering Group
Date: July 6, 2017
Project: Lorson Ranch East PDR - Pond c5 forebay design (south and north forebay same size)
Location: Tributary area =171ac, use 1/2 in north forebay and 1/2 in south forebay

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, I_a — I_a = 63.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$) — i = 0.630

C) Contributing Watershed Area — Area = 171.000 ac

D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm — d_6 = ____ in

E) Design Concept (Select EURV when also designing for flood control)

Choose One
- (●) Water Quality Capture Volume (WQCV)
- ( ) Excess Urban Runoff Volume (EURV)

F) Design Volume (WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area$)
V_{DESIGN} = 3.515 ac-ft

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN}/0.43))$)
$V_{DESIGN\ OTHER}$ = ____ ac-ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)
$V_{DESIGN\ USER}$ = 3.300 ac-ft

I) Predominant Watershed NRCS Soil Group

Choose One
- ( ) A
- ( ) B
- ( ) C / D

WQCV selected. Soil group not required.

J) Excess Urban Runoff Volume (EURV) Design Volume
For HSG A: $EURV_A = 1.68 * i^{1.28}$
For HSG B: $EURV_B = 1.36 * i^{1.08}$
For HSG C/D: $EURV_{C/D} = 1.20 * i^{1.08}$
EURV = ____ ac-f t

2. Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.)
L : W = 2.0 : 1

3. Basin Side Slopes

A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred)
Z = 0.33 ft / ft TOO STEEP (< 3)

4. Inlet

A) Describe means of providing energy dissipation at concentrated inflow locations:

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Richard Schindler
Company: Core Engineering Group
Date: July 6, 2017
Project: Lorson Ranch East PDR - Pond c5 forebay design (south and north forebay same size)
Location: Pond C5 forebay design (1/2 of total pond forebay)

5. Forebay	
A) Minimum Forebay Volume (V_{FMIN} = 3% of the WQCV)	V_{FMIN} = 0.050 ac-ft
B) Actual Forebay Volume	V_F = 0.050 ac-ft
C) Forebay Depth (D_F = 30 inch maximum)	D_F = 30.0 in
D) Forebay Discharge	
i) Undetained 100-year Peak Discharge	Q_{100} = 242.00 cfs
ii) Forebay Discharge Design Flow ($Q_F = 0.02 * Q_{100}$)	Q_F = 4.84 cfs
E) Forebay Discharge Design	Choose One: (•) Berm With Pipe; ( ) Wall with Rect. Notch; ( ) Wall with V-Notch Weir — ROUND UP TO NEAREST PIPE SIZE
F) Discharge Pipe Size (minimum 8-inches)	Calculated D_P = 12 in
G) Rectangular Notch Width	Calculated W_N = in
6. Trickle Channel	
A) Type of Trickle Channel	Choose One: (•) Concrete; ( ) Soft Bottom
F) Slope of Trickle Channel	S = 0.0040 ft / ft
7. Micropool and Outlet Structure	
A) Depth of Micropool (2.5-feet minimum)	D_M = 2.5 ft
B) Surface Area of Micropool (10 ft^2 minimum)	A_M = 345 sq ft
C) Outlet Type	Choose One: (•) Orifice Plate; ( ) Other (Describe):
D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention)	$D_{orifice}$ = 3.03 inches
E) Total Outlet Area	A_{ot} = 27.63 square inches

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Richard Schindler
Company: Core Engineering Group
Date: July 6, 2017
Project: Lorson Ranch East PDR - Pond c5 forebay design (south and north forebay same size)
Location: Tributary area =171ac, use 1/2 in north forebay and 1/2 in south forebay

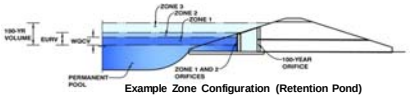
8. Initial Surcharge Volume	
A) Depth of Initial Surcharge Volume (Minimum recommended depth is 4 inches)	D_{IS} = 4 in
B) Minimum Initial Surcharge Volume (Minimum volume of 0.3% of the WQCV)	V_{IS} = 431.2 cu ft
C) Initial Surcharge Provided Above Micropool	V_s = 115.0 cu ft
9. Trash Rack	
A) Water Quality Screen Open Area: $A_t = A_{ot} * 38.5*(e^{-0.095D})$	A_t = 798 square inches
B) Type of Screen (If specifying an alternative to the materials recommended in the USDCM, indicate "other" and enter the ratio of the total open are to the total screen are for the material specified.)	*Aluminum Amico-Klemp SR Series with Cross Rods 2" O.C.*
Other (Y/N): N	
C) Ratio of Total Open Area to Total Area (only for type 'Other')	User Ratio =
D) Total Water Quality Screen Area (based on screen type)	A_{total} = 1123 sq. in.
E) Depth of Design Volume (EURV or WQCV) (Based on design concept chosen under 1E)	H= 2.12 feet
F) Height of Water Quality Screen (H_{TR})	H_{TR}= 53.44 inches
G) Width of Water Quality Screen Opening ($W_{opening}$) (Minimum of 12 inches is recommended)	$W_{opening}$ = 21.0 inches

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Lorson East MDDP (100.013)

Basin ID: Pond C5



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	171.00	acres
Watershed Length =	3,200	ft
Watershed Slope =	0.018	ft/ft
Watershed Imperviousness =	63.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	Denver - Capitol Building	
Water Quality Capture Volume (WQCV) =	3.515	acre-feet
Excess Urban Runoff Volume (EURV) =	10.382	acre-feet
2-yr Runoff Volume (P1 = 1.16 in.) =	9.641	acre-feet
5-yr Runoff Volume (P1 = 1.44 in.) =	13.459	acre-feet
10-yr Runoff Volume (P1 = 1.68 in.) =	16.659	acre-feet
25-yr Runoff Volume (P1 = 1.92 in.) =	21.433	acre-feet
50-yr Runoff Volume (P1 = 2.16 in.) =	25.205	acre-feet
100-yr Runoff Volume (P1 = 2.42 in.) =	29.878	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	41.092	acre-feet
Approximate 2-yr Detention Volume =	9.045	acre-feet
Approximate 5-yr Detention Volume =	12.678	acre-feet
Approximate 10-yr Detention Volume =	14.486	acre-feet
Approximate 25-yr Detention Volume =	15.477	acre-feet
Approximate 50-yr Detention Volume =	15.943	acre-feet
Approximate 100-yr Detention Volume =	17.508	acre-feet

Optional User Override 1-hr Precipitation

1.16	inches
1.44	inches
1.68	inches
1.92	inches
2.16	inches
2.42	inches
	inches

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	3.515	acre-feet
Zone 2 Volume (EURV - Zone 1) =	6.868	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	7.126	acre-feet
Total Detention Basin Volume =	17.508	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	user	acre-feet

Depth Increment = 0.2 ft

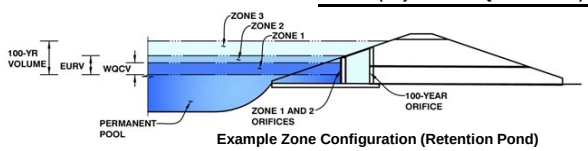
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	50	0.001		
5706.33	--	0.33	--	--	--	100	0.002	24	0.001
5707	--	1.00	--	--	--	1,000	0.023	383	0.009
5708	--	2.00	--	--	--	18,898	0.434	10,154	0.233
5709	--	3.00	--	--	--	77,432	1.778	58,507	1.343
5710	--	4.00	--	--	--	110,270	2.531	152,358	3.498
5711	--	5.00	--	--	--	115,455	2.650	265,220	6.089
5712	--	6.00	--	--	--	120,720	2.771	383,308	8.800
5713	--	7.00	--	--	--	126,045	2.894	506,690	11.632
5714	--	8.00	--	--	--	131,696	3.023	635,561	14.590
5715	--	9.00	--	--	--	136,745	3.139	769,781	17.672
5716	--	10.00	--	--	--	141,857	3.257	909,082	20.870

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Lorson East MDDP (100.013)

Basin ID: Pond C5 (only used for WQCV and EURV) Do not use for 100-yr Storm Event!!!!!!



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	4.01	3.515	Orifice Plate
Zone 2 (EURV)	6.57	6.868	Rectangular Orifice
Zone 3 (100-year)	8.95	7.126	Weir&Pipe (Restrict)
		17.508	Total

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

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

Calculated Parameters for Underdrain

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	6.396E-02	ft^2
Depth at top of Zone using Orifice Plate =	4.01	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	16.00	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	9.21	sq. inches (use rectangular openings)	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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	1.34	2.67					
Orifice Area (sq. inches)	9.21	9.21	9.21					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Rectangular	Not Selected		Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	4.01	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.78	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	6.57	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.25	N/A	feet
Vertical Orifice Height =	6.00	N/A	inches				
Vertical Orifice Width =	18.68		inches				

Calculated Parameters for Vertical Orifice

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

	Zone 3 Weir	Not Selected		Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	6.60	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	6.60	N/A	feet
Overflow Weir Front Edge Length =	18.00	N/A	feet	Over Flow Weir Slope Length =	3.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)	Grate Open Area / 100-yr Orifice Area =	3.01	N/A	should be ≥ 4
Horiz. Length of Weir Sides =	3.00	N/A	feet	Overflow Grate Open Area w/o Debris =	37.80	N/A	ft^2
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area	Overflow Grate Open Area w/ Debris =	18.90	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

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

	Zone 3 Restrictor	Not Selected		Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	12.57	N/A	ft^2
Outlet Pipe Diameter =	48.00	N/A	inches	Outlet Orifice Centroid =	2.00	N/A	feet
Restrictor Plate Height Above Pipe Invert =	48.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	3.14	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=		ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=		feet
Spillway Crest Length =		feet	Stage at Top of Freeboard =		feet
Spillway End Slopes =		H:V	Basin Area at Top of Freeboard =		acres
Freeboard above Max Water Surface =		feet			

Calculated Parameters for Spillway

Routed Hydrograph Results

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.16	1.44	1.68	1.92	2.16	2.42	3.14
Calculated Runoff Volume (acre-ft) =	3.515	10.382	9.641	13.459	16.659	21.433	25.205	29.878	41.092
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	3.517	10.386	9.640	13.467	16.663	21.449	25.222	29.902	41.123
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.02	0.14	0.37	0.85	1.12	1.46	2.19
Predevelopment Peak Q (cfs) =	0.0	0.0	2.8	23.2	63.2	145.3	191.8	249.0	374.8
Peak Inflow Q (cfs) =	63.1	181.4	168.8	233.0	286.9	364.1	424.6	497.8	660.8
Peak Outflow Q (cfs) =	1.4	7.3	7.0	30.7	77.5	132.6	154.2	163.7	171.1
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.3	1.2	0.9	0.8	0.7	0.5
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	Outlet Plate 1	N/A
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.6	1.8	3.3	3.8	4.0	4.2
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	54	53	55	54	52	50	48	45
Time to Drain 99% of Inflow Volume (hours) =	40	58	57	60	59	58	58	57	56
Maximum Ponding Depth (ft) =	3.92	6.27	6.02	6.99	7.43	7.99	8.50	9.32	10.00
Area at Maximum Ponding Depth (acres) =	2.47	2.80	2.77	2.89	2.95	3.02	3.08	3.18	3.26
Maximum Volume Stored (acre-ft) =	3.298	9.524	8.827	11.603	12.888	14.530	16.086	18.682	20.870

This table (for all ponds that receive flow from upstream ponds) needs to be recreated with Hydraflow output

Weir Report

Hydraflow Express by Intelisolve | Tuesday, Jun 27 2017, 9:47 PM

Pond C5 Spillway - btm=5713.00

Trapezoidal Weir

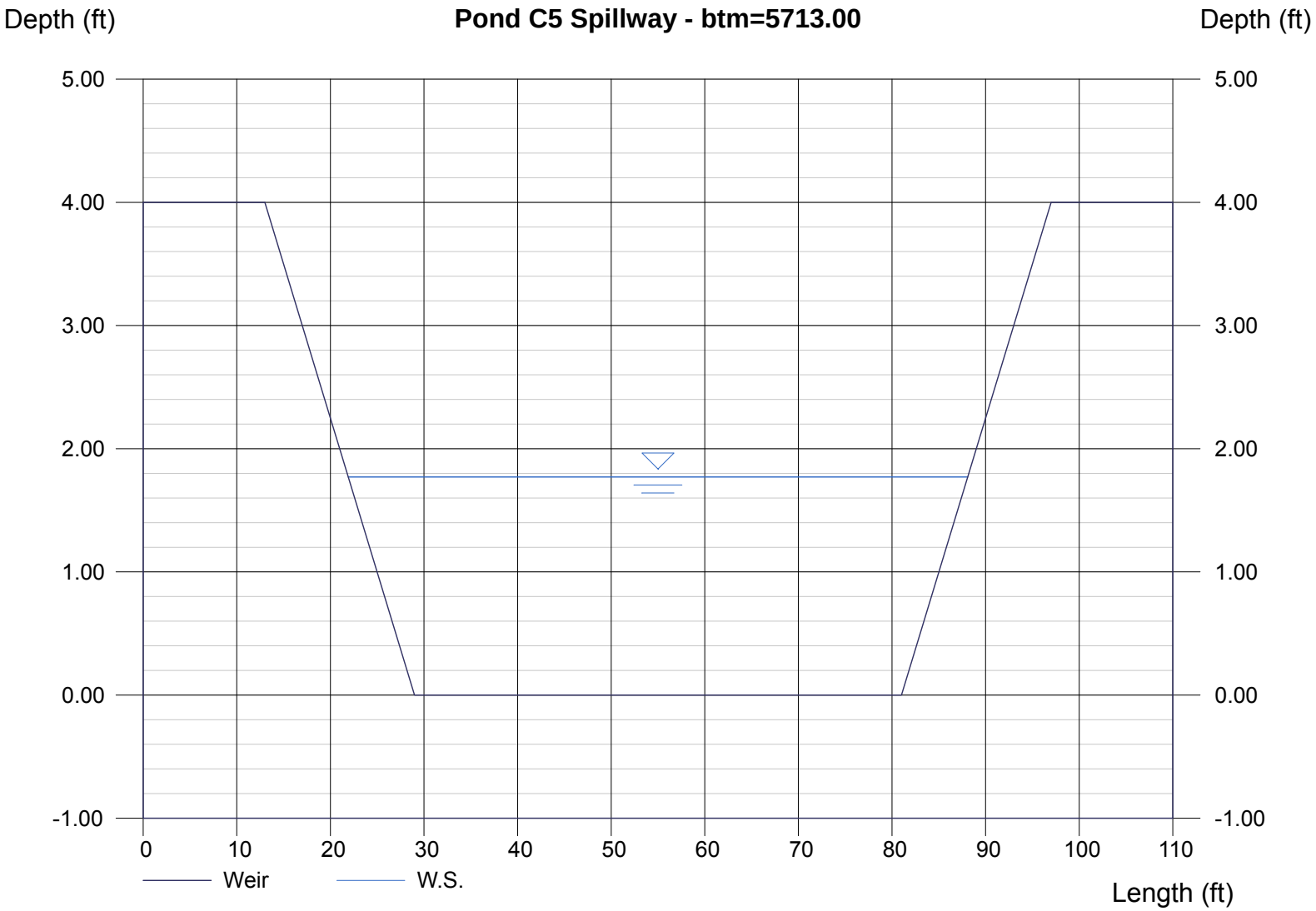
Crest	= Sharp
Bottom Length (ft)	= 52.00
Total Depth (ft)	= 4.00
Side Slope (z:1)	= 4.00

Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 420.00

Highlighted

Depth (ft)	= 1.77
Q (cfs)	= 420.00
Area (sqft)	= 104.57
Velocity (ft/s)	= 4.02
Top Width (ft)	= 66.16

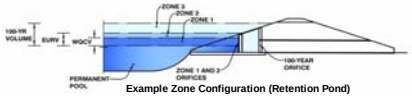


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Lorson East MDDP

Basin ID: Pond D2 - Lorson Blvd at East Tributary of JCC



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	72.00	acres
Watershed Length =	2,200	ft
Watershed Slope =	0.025	ft/ft
Watershed Imperviousness =	64.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	Denver - Capitol Building	
Water Quality Capture Volume (WQCV) =	1.502	acre-feet
Excess Urban Runoff Volume (EURV) =	4.446	acre-feet
2-yr Runoff Volume (P1 = 1.16 in.) =	4.132	acre-feet
5-yr Runoff Volume (P1 = 1.44 in.) =	5.752	acre-feet
10-yr Runoff Volume (P1 = 1.68 in.) =	7.103	acre-feet
25-yr Runoff Volume (P1 = 1.92 in.) =	9.102	acre-feet
50-yr Runoff Volume (P1 = 2.16 in.) =	10.687	acre-feet
100-yr Runoff Volume (P1 = 2.42 in.) =	12.650	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	17.372	acre-feet
Approximate 2-yr Detention Volume =	3.877	acre-feet
Approximate 5-yr Detention Volume =	5.418	acre-feet
Approximate 10-yr Detention Volume =	6.193	acre-feet
Approximate 25-yr Detention Volume =	6.612	acre-feet
Approximate 50-yr Detention Volume =	6.808	acre-feet
Approximate 100-yr Detention Volume =	7.458	acre-feet

Optional User Override 1-hr Precipitation	
1.16	inches
1.44	inches
1.68	inches
1.92	inches
2.16	inches
2.42	inches
	inches

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	1.502	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.944	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	3.012	acre-feet
Total Detention Basin Volume =	7.458	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	user	acre-feet

Depth Increment = 0.2 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	1,068	0.025		
5696.33	--	0.33	--	--	--	15,000	0.344	2,503	0.057
5697	--	1.00	--	--	--	48,988	1.125	23,599	0.542
5698	--	2.00	--	--	--	72,821	1.672	84,264	1.934
5699	--	3.00	--	--	--	76,610	1.759	159,706	3.666
5700	--	4.00	--	--	--	80,493	1.848	238,258	5.470
5701	--	5.00	--	--	--	84,486	1.940	320,747	7.363
5702	--	6.00	--	--	--	88,582	2.034	407,281	9.350
5703	--	7.00	--	--	--	92,768	2.130	497,956	11.432
5704	--	8.00	--	--	--	97,074	2.229	592,877	13.611
5705	--	9.00	--	--	--	102,033	2.342	692,431	15.896
5706	--	10.00	--	--	--	106,000	2.433	796,447	18.284

Design Procedure Form: Extended Detention Basin (EDB)

UD-BMP (Version 3.06, November 2016)

Designer: Richard Schindler
Company: Core Engineering Group
Date: July 6, 2017
Project: Lorson Ranch East PDR - Pond D2 forebay design
Location:

1. Basin Storage Volume	
A) Effective Imperviousness of Tributary Area, I_a	I_a = 63.0 %
B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)	i = 0.630
C) Contributing Watershed Area	Area = 72.000 ac
D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm	d_6 = in
E) Design Concept (Select EURV when also designing for flood control)	Choose One: (●) Water Quality Capture Volume (WQCV); ( ) Excess Urban Runoff Volume (EURV)
F) Design Volume (WQCV) Based on 40-hour Drain Time ($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area$)	V_{DESIGN}= 1.480 ac-ft
G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume ($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN}/0.43))$)	$V_{DESIGN\ OTHER}$= ac-ft
H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)	$V_{DESIGN\ USER}$= 1.390 ac-ft
I) Predominant Watershed NRCS Soil Group	Choose One: ( ) A; ( ) B; ( ) C / D — WQCV selected. Soil group not required.
J) Excess Urban Runoff Volume (EURV) Design Volume For HSG A: $EURV_A = 1.68 * i^{1.28}$ For HSG B: $EURV_B = 1.36 * i^{1.08}$ For HSG C/D: $EURV_{C/D} = 1.20 * i^{1.08}$	EURV = ac-f t
2. Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.)	L : W = 2.0 : 1
3. Basin Side Slopes	
A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred)	Z = 0.33 ft / ft TOO STEEP (< 3)
4. Inlet	
A) Describe means of providing energy dissipation at concentrated inflow locations:	

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Richard Schindler
Company: Core Engineering Group
Date: July 6, 2017
Project: Lorson Ranch East PDR - Pond D2 forebay design
Location:

5. Forebay

A) Minimum Forebay Volume (V_{FMIN} = 3% of the WQCV) — V_{FMIN} = 0.042 ac-ft

B) Actual Forebay Volume — V_F = 0.045 ac-ft

C) Forebay Depth (D_F = 30 inch maximum) — D_F = 30.0 in

D) Forebay Discharge

i) Undetained 100-year Peak Discharge — Q_{100} = 243.00 cfs

ii) Forebay Discharge Design Flow ($Q_F = 0.02 * Q_{100}$) — Q_F = 4.86 cfs

E) Forebay Discharge Design

Choose One
- (•) Berm With Pipe
- ( ) Wall with Rect. Notch
- ( ) Wall with V-Notch Weir

ROUND UP TO NEAREST PIPE SIZE

F) Discharge Pipe Size (minimum 8-inches) — Calculated D_P = 12 in

G) Rectangular Notch Width — Calculated W_N = in

6. Trickle Channel

A) Type of Trickle Channel

Choose One
- (•) Concrete
- ( ) Soft Bottom

F) Slope of Trickle Channel — S = 0.0040 ft / ft

7. Micropool and Outlet Structure

A) Depth of Micropool (2.5-feet minimum) — D_M = 2.5 ft

B) Surface Area of Micropool (10 ft^2 minimum) — A_M = 121 sq ft

C) Outlet Type

Choose One
- (•) Orifice Plate
- ( ) Other (Describe):

D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention) — $D_{orifice}$ = 3.00 inches

E) Total Outlet Area — A_{ot} = 26.85 square inches

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Richard Schindler
Company: Core Engineering Group
Date: July 6, 2017
Project: Lorson Ranch East PDR - Pond D2 forebay design
Location:

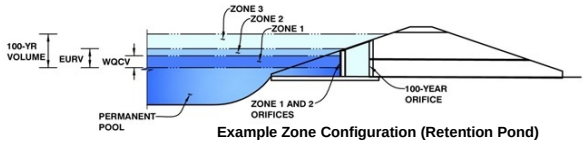
8. Initial Surcharge Volume	
A) Depth of Initial Surcharge Volume (Minimum recommended depth is 4 inches)	D_{IS} = 4 in
B) Minimum Initial Surcharge Volume (Minimum volume of 0.3% of the WQCV)	V_{IS} = 181.6 cu ft
C) Initial Surcharge Provided Above Micropool	V_s = 40.3 cu ft
9. Trash Rack	
A) Water Quality Screen Open Area: $A_t = A_{ot} * 38.5*(e^{-0.095D})$	A_t = 777 square inches
B) Type of Screen (If specifying an alternative to the materials recommended in the USDCM, indicate "other" and enter the ratio of the total open are to the total screen are for the material specified.)	*Aluminum Amico-Klemp SR Series with Cross Rods 2" O.C.*
Other (Y/N): N	
C) Ratio of Total Open Area to Total Area (only for type 'Other')	User Ratio =
D) Total Water Quality Screen Area (based on screen type)	A_{total} = 1095 sq. in.
E) Depth of Design Volume (EURV or WQCV) (Based on design concept chosen under 1E)	H= 1 feet
F) Height of Water Quality Screen (H_{TR})	H_{TR}= 40 inches
G) Width of Water Quality Screen Opening ($W_{opening}$) (Minimum of 12 inches is recommended)	$W_{opening}$ = 27.4 inches

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Lorson Ranch East MDDP

Basin ID: Pond D2 - Lorson Blvd at East Tributary of JCC



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.72	1.502	Orifice Plate
Zone 2 (EURV)	3.44	2.944	Rectangular Orifice
Zone 3 (100-year)	5.05	3.012	Weir&Pipe (Restrict)
		7.458	Total

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

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

Calculated Parameters for Underdrain

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	6.215E-02	ft^2
Depth at top of Zone using Orifice Plate =	1.72	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	6.70	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	8.95	sq. inches (use rectangular openings)	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.60	1.20					
Orifice Area (sq. inches)	8.95	8.95	8.95					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	1.72	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	3.44	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	6.00	N/A	inches
Vertical Orifice Width =	12.22		inches

Calculated Parameters for Vertical Orifice

	Zone 2 Rectangular	Not Selected	
Vertical Orifice Area =	0.51	N/A	ft^2
Vertical Orifice Centroid =	0.25	N/A	feet

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

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.50	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	4.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	14.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	3.50	N/A	feet
Over Flow Weir Slope Length =	14.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	3.12	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	39.20	N/A	ft^2
Overflow Grate Open Area w/ Debris =	19.60	N/A	ft^2

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	48.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	60.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	12.57	N/A	ft^2
Outlet Orifice Centroid =	2.00	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	3.14	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	6.00	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	30.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	3.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	1.64	feet
Stage at Top of Freeboard =	10.64	feet
Basin Area at Top of Freeboard =	2.43	acres

Routed Hydrograph Results

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.16	1.44	1.68	1.92	2.16	2.42	3.14
Calculated Runoff Volume (acre-ft) =	1.502	4.446	4.132	5.752	7.103	9.102	10.687	12.650	17.372
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	1.503	4.450	4.137	5.758	7.109	9.104	10.696	12.654	17.382
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.02	0.14	0.38	0.86	1.14	1.48	2.22
Predevelopment Peak Q (cfs) =	0.0	0.0	1.2	9.9	27.0	62.1	81.9	106.3	160.0
Peak Inflow Q (cfs) =	27.6	80.5	75.0	103.6	127.2	161.8	189.2	222.5	303.4
Peak Outflow Q (cfs) =	0.9	4.1	3.9	12.7	33.6	64.7	89.1	102.8	125.3
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.3	1.2	1.0	1.1	1.0	0.8
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.2	0.7	1.5	2.1	2.5	2.9
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	37	47	46	46	45	42	41	39	36
Time to Drain 99% of Inflow Volume (hours) =	**40**	52	52	53	53	51	50	49	47
Maximum Ponding Depth (ft) =	1.65	3.19	3.03	3.72	4.01	4.34	4.55	4.89	6.10
Area at Maximum Ponding Depth (acres) =	1.47	1.78	1.76	1.82	1.85	1.88	1.90	1.93	2.04
Maximum Volume Stored (acre-ft) =	1.385	4.002	3.719	4.938	5.488	6.084	6.481	7.131	9.533

Weir Report

Pond D2 Spillway - btm=5702

Trapezoidal Weir

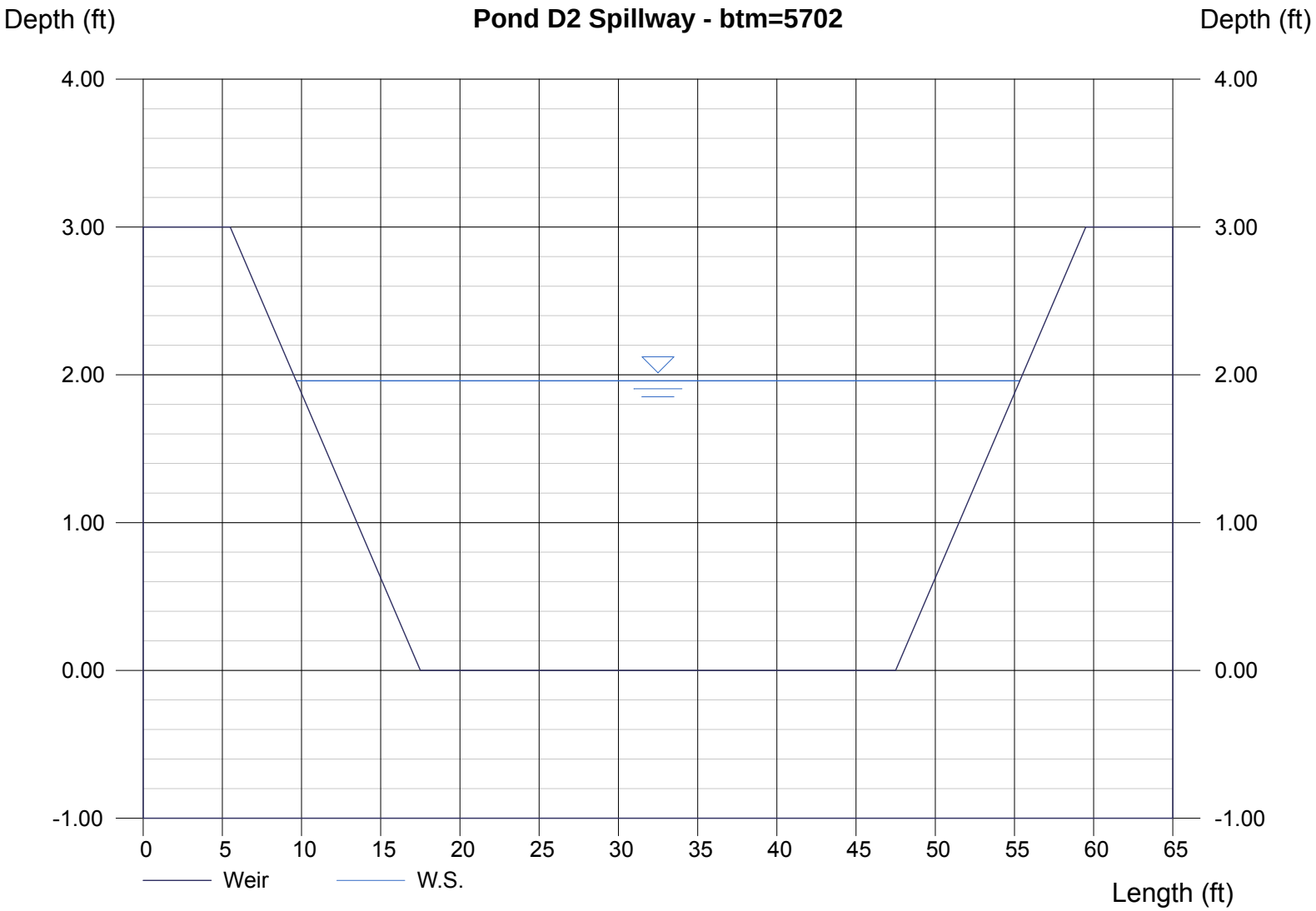
Crest	=	Sharp
Bottom Length (ft)	=	30.00
Total Depth (ft)	=	3.00
Side Slope (z:1)	=	4.00

Calculations

Weir Coeff. Cw	=	3.10
Compute by:		Known Q
Known Q (cfs)	=	307.00

Highlighted

Depth (ft)	=	1.96
Q (cfs)	=	307.00
Area (sqft)	=	74.17
Velocity (ft/s)	=	4.14
Top Width (ft)	=	45.68



Channel Report

This is not acceptable. Reference DCM 2.3, 2.5.3 and Table 6-1.

Hydraflow Express by Intelisolve

Thursday, Jun 29 2017, 5:19 PM

Fontaine Blvd, 130' ROW-principal arterial

User-defined

Invert Elev (ft)	= 97.23
Slope (%)	= 1.05
N-Value	= 0.017

Calculations

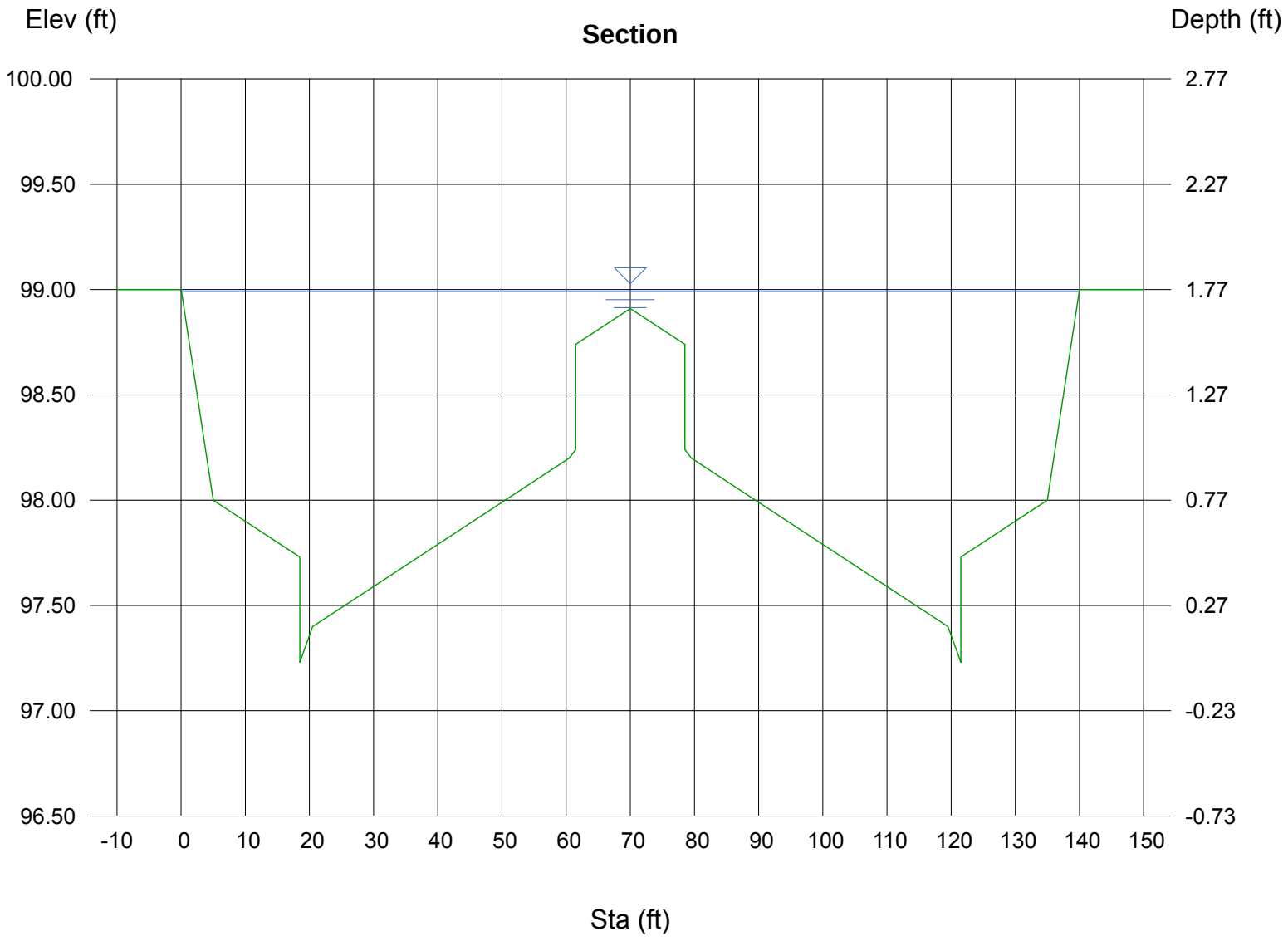
Compute by:	Known Q
Known Q (cfs)	= 1260.00

Highlighted

Depth (ft)	= 1.76
Q (cfs)	= 1260.00
Area (sqft)	= 141.52
Velocity (ft/s)	= 8.90
Wetted Perim (ft)	= 142.13
Crit Depth, Yc (ft)	= 1.77
Top Width (ft)	= 139.89
EGL (ft)	= 2.99

(Sta, El, n)-(Sta, El, n)...

(0.00, 99.00)-(0.01, 99.00, 0.024)-(5.00, 98.00, 0.024)-(18.50, 97.73, 0.024)-(18.50, 97.23, 0.013)-(20.50, 97.40, 0.013)-(60.50, 98.20, 0.016)
-(61.50, 98.24, 0.013)-(61.50, 98.74, 0.013)-(70.00, 98.91, 0.013)-(78.50, 98.74, 0.013)-(78.50, 98.24, 0.013)-(79.50, 98.20, 0.013)-(119.50, 97.40, 0.016)
-(121.50, 97.23, 0.013)-(121.50, 97.73, 0.013)-(129.00, 97.88, 0.024)-(135.00, 98.00, 0.013)-(140.00, 99.00, 0.012)



Channel Report

Hydraflow Express by Intelisolve — Thursday, Jun 29 2017, 5:18 PM

Fontaine Blvd. 52' F-F, 130' ROW (non-res collector)

User-defined

Invert Elev (ft)	= 97.23
Slope (%)	= 1.05
N-Value	= 0.017

Calculations

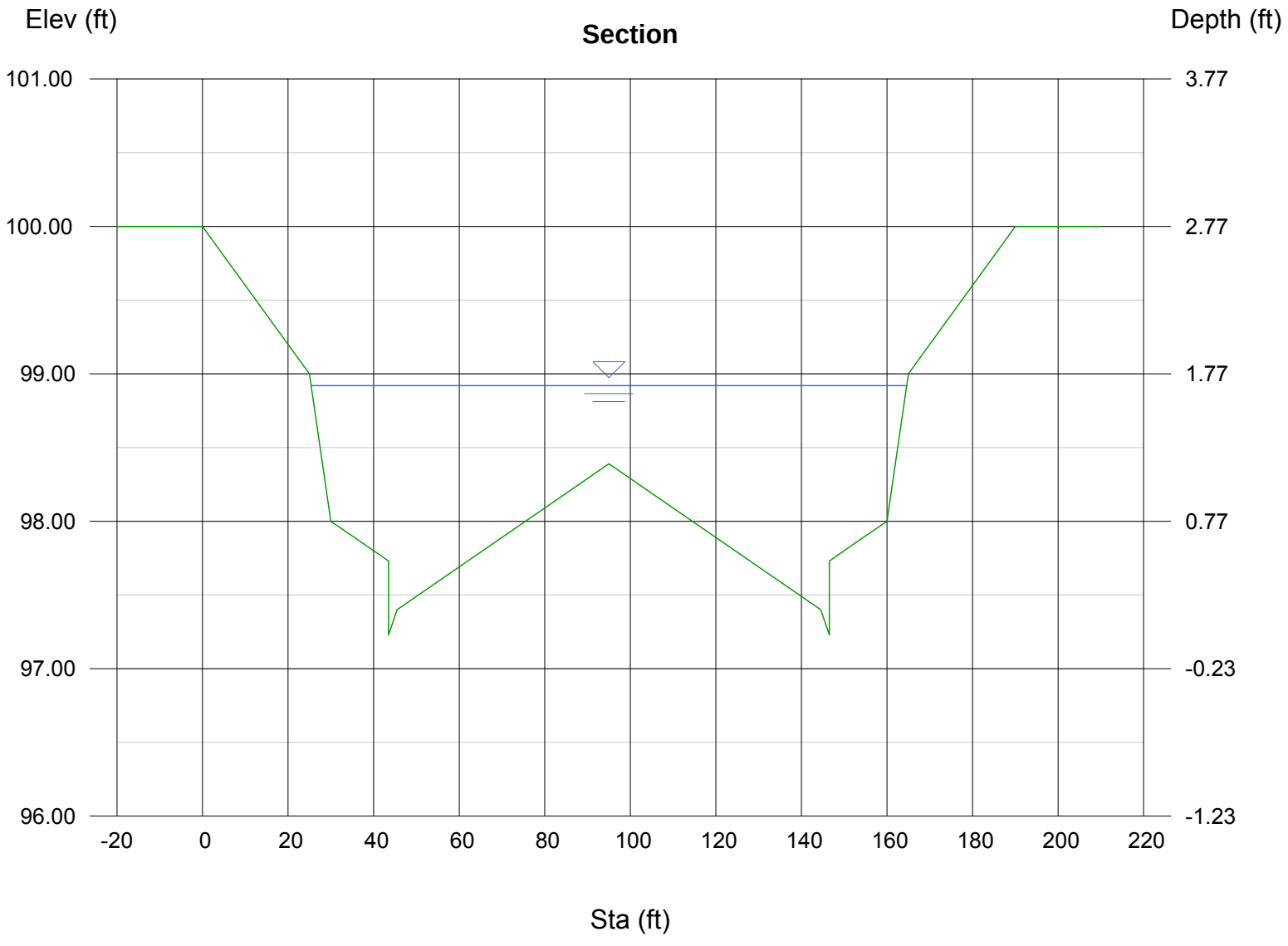
Compute by:	Known Q
Known Q (cfs)	= 1260.00

Highlighted

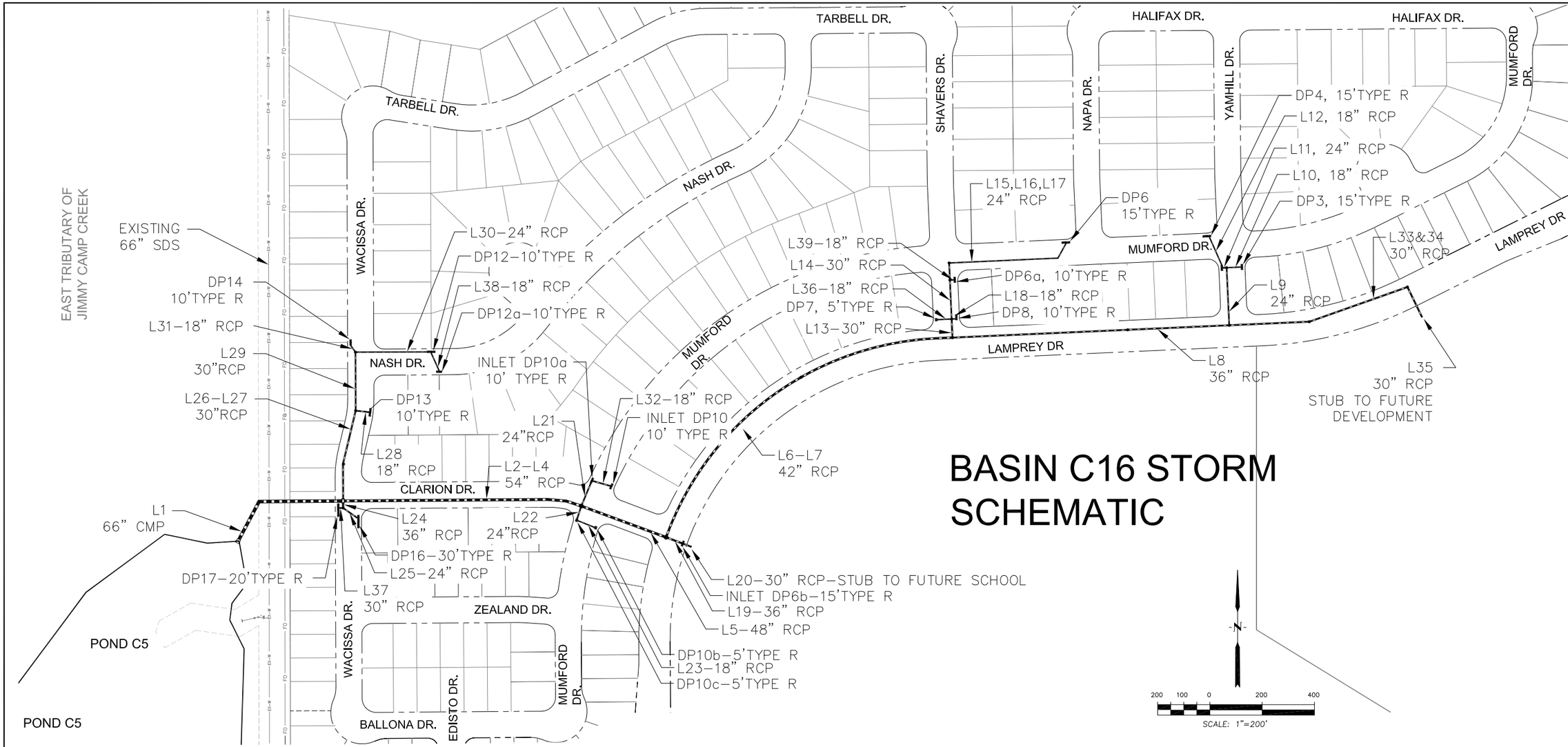
Depth (ft)	= 1.69
Q (cfs)	= 1260.00
Area (sqft)	= 140.61
Velocity (ft/s)	= 8.96
Wetted Perim (ft)	= 140.42
Crit Depth, Yc (ft)	= 2.08
Top Width (ft)	= 139.20
EGL (ft)	= 2.94

(Sta, El, n)-(Sta, El, n)...

(0.00, 100.00)-(25.00, 99.00, 0.024)-(30.00, 98.00, 0.024)-(36.00, 97.88, 0.013)-(43.50, 97.73, 0.024)-(43.50, 97.23, 0.013)-(45.50, 97.40, 0.013)
-(95.00, 98.39, 0.016)-(144.50, 97.40, 0.016)-(146.50, 97.23, 0.013)-(146.50, 97.73, 0.013)-(154.00, 97.88, 0.024)-(160.00, 98.00, 0.013)-(165.00, 99.00, 0.012)
-(190.00, 100.00, 0.012)



APPENDIX E– STORM SEWER SCHEMATIC AND HYDRAFLOW STORM SEWER CALCS



BASIN C16 STORM SCHEMATIC

CORE ENGINEERING GROUP
15004 1ST AVE. S.
BURNSVILLE, MN 55306
PH: 763.210.2100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@ceg1.com

NO. | DESCRIPTION | DATE

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

PROJECT:
LORSON RANCH EAST
EAST OF EAST TRIBUTARY
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: LAB

STORM SEWER SCHEMATIC
BASIN C16
LORSON RANCH EAST

DATE
JUNE 30, 2017

PROJECT NO.
100.040

SHEET NUMBER
1

TOTAL SHEETS: 3

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	1	147.9	66 c	249.0	5710.00	5711.25	0.502	5715.50*	5717.15*	0.30	5717.45	End
2	2	105.5	54 c	380.6	5714.10	5717.91	1.001	5717.45	5720.86	n/a	5720.86	1
3	3	105.5	54 c	42.5	5717.91	5718.34	1.011	5721.59	5721.29	n/a	5721.29	2
4	4	105.5	54 c	37.8	5718.54	5718.92	1.005	5722.02	5721.87	n/a	5721.87	3
5	5	90.12	48 c	174.0	5720.30	5722.04	1.000	5722.60	5724.85	n/a	5724.85	4
6	6	75.68	42 c	397.2	5722.60	5727.37	1.201	5725.31	5730.03	0.29	5730.03	5
7	7	75.68	42 c	300.0	5727.67	5731.27	1.200	5730.51	5733.93	0.72	5733.93	6
8	8	52.52	36 c	531.0	5732.23	5739.66	1.399	5734.52	5741.97	0.50	5741.97	7
9	9	18.79	24 c	109.2	5740.66	5741.53	0.796	5742.67	5743.31	0.25	5743.56	8
10	10	8.87	18 c	26.3	5742.03	5742.29	0.990	5743.80*	5743.99*	0.20	5744.18	9
11	11	9.92	24 c	9.8	5741.73	5741.83	1.025	5744.04*	5744.06*	0.03	5744.09	9
12	12	9.67	18 c	62.3	5742.63	5743.23	0.964	5744.09	5744.44	0.31	5744.75	11
13	13	23.16	30 c	33.6	5732.73	5733.02	0.864	5734.63	5734.63	n/a	5734.63 j	7
14	14	16.76	30 c	65.0	5733.02	5733.41	0.600	5734.90	5734.89	0.05	5734.94	13
15	15	11.05	24 c	43.0	5733.91	5734.17	0.604	5735.22	5735.35	0.20	5735.56	14
16	16	11.05	24 c	210.8	5734.47	5738.22	1.779	5735.87	5739.40	n/a	5739.40 j	15
17	17	11.05	24 c	31.9	5738.25	5738.89	2.005	5739.72	5740.07	n/a	5740.07	16
18	18	6.15	24 c	7.0	5733.52	5733.59	0.997	5735.30	5735.30	0.04	5735.33	13
19	19	14.44	36 c	23.0	5723.04	5723.27	1.000	5726.19	5726.20	0.03	5726.23	5
20	20	7.62	30 c	20.0	5723.77	5723.97	1.001	5726.24	5726.25	0.02	5726.27	19
21	21	11.62	24 c	50.5	5721.42	5721.92	0.991	5723.08	5723.13	n/a	5723.13 j	4
22	22	3.79	24 c	29.2	5721.42	5721.71	0.992	5723.25	5723.25	0.02	5723.26	4
23	23	3.21	18 c	35.8	5722.21	5722.57	1.004	5723.26	5723.26	n/a	5723.39 j	22
24	24	16.68	36 c	15.3	5715.75	5716.21	3.006	5717.68	5717.51	0.20	5717.51	1
25	25	12.81	24 c	33.7	5717.21	5717.55	1.007	5718.29	5718.90	0.25	5719.15	24
26	26	25.69	30 c	69.5	5716.10	5716.80	1.007	5717.63	5718.49	n/a	5718.49	1
27	27	25.69	30 c	103.6	5717.00	5718.04	1.004	5718.89	5719.73	n/a	5719.73	26
28	28	6.55	18 c	25.1	5719.54	5719.79	0.995	5720.40	5720.77	0.22	5721.00	27
29	29	19.14	30 c	112.8	5718.04	5719.17	1.002	5720.32	5720.63	n/a	5720.63 j	27
30	30	13.19	24 c	135.3	5719.97	5721.19	0.901	5721.10	5722.48	n/a	5722.48	29
31	31	5.95	18 c	16.1	5720.88	5721.04	0.997	5721.69	5722.05	0.35	5722.39	29
32	32	5.97	18 c	36.2	5722.42	5722.75	0.911	5723.48	5723.68	n/a	5723.68 j	21

Lorson East PDR-C16 basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
33	33	33.73	30 c	152.0	5740.16	5742.14	1.303	5742.49	5744.08	n/a	5744.08 j	8
34	34	33.73	30 c	197.6	5742.44	5745.01	1.301	5744.40	5746.95	n/a	5746.95 j	33
35	35	33.73	30 c	65.3	5745.31	5746.29	1.500	5747.27	5748.23	n/a	5748.23 j	34
36	36	0.25	18 c	26.6	5734.20	5734.34	0.525	5735.37	5735.37	0.00	5735.37	13
37	37	3.87	30 c	8.3	5717.21	5717.34	1.568	5718.00	5718.00	n/a	5718.00 j	24
38	38	6.76	18 c	31.4	5721.69	5722.00	0.989	5722.84	5722.99	n/a	5722.99	30
39	39	5.71	18 c	9.3	5734.41	5734.51	1.068	5735.25	5735.43	0.20	5735.62	14

Lorson East PDR-C16 basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	MH #19	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
2		0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
3		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
4		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
5		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
6		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
7		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
8		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
9		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
10	Inlet DP-3, 15'	8.87	0.00	8.87	0.00	Curb	6.0	15.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.000	0.46	16.85	0.59	16.85	3.00	Off
11	Inlet DP-5 (5')	0.25	0.00	0.25	0.00	Curb	6.0	5.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.000	0.17	2.70	0.30	2.70	3.00	Off
12	Inlet DP-4 (15')	10.43	0.00	9.67	0.76	Genr	0.0	0.00	0.00	0.00	0.00	0.010	2.00	0.080	0.020	0.013	0.43	15.45	0.43	15.45	0.00	17
13		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
14		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
15		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
16		0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
17	Inlet DP-6 (15')	12.07	0.76	11.05	1.78	Genr	0.0	0.00	0.00	0.00	0.00	0.025	2.00	0.083	0.020	0.013	0.40	13.90	0.40	13.90	0.00	39
18	Inlet DP-8 (10')	5.28	0.87	6.15	0.00	Curb	6.0	10.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.000	0.46	16.81	0.50	16.81	2.00	Off
19	Inlet DP6b, 15'	6.81	0.00	6.81	0.00	Curb	6.0	15.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.013	0.40	14.11	0.53	14.11	3.00	Off
20	C13-DP6c	7.62	0.00	7.62	0.00	Curb	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.000	0.55	9.81	0.55	9.81	0.00	Off
21	Inlet DP-10a, 15'	5.65	0.00	5.65	0.00	Curb	6.0	10.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.013	0.44	15.89	0.57	15.89	3.00	Off
22	Inlet DP-10c, 5'	0.58	0.00	0.58	0.00	Curb	6.0	5.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.000	0.15	1.93	0.34	1.97	3.00	Off

Lorson East PDR-C16 basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: Inlet N-Values = 0.016 ; Intensity = 503.90 / (Inlet time + 28.20) ^ 1.31; Return period = 5 Yrs. ; * Indicates Known Q added

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
23	Inlet DP-10b, 5'	3.21	0.00	3.21	0.00	Curb	6.0	5.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.000	0.42	14.79	0.55	14.79	3.00	Off
24		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
25	Inlet DP-16, 30'	10.98	1.83	12.81	0.00	Curb	6.0	30.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.013	0.39	13.54	0.52	13.54	3.00	Off
26		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
27		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
28	Inlet DP-13, 10'	4.72	3.66	6.55	1.83	Genr	6.0	6.00	0.00	0.00	0.00	0.010	2.00	0.080	0.020	0.013	0.40	14.10	0.40	14.10	0.00	25
29		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
30	Inlet DP-12, 10'	8.03	0.00	6.43	1.60	Genr	6.0	10.00	0.00	0.00	0.00	0.012	2.00	0.080	0.020	0.013	0.39	13.35	0.39	13.35	0.00	28
31	Inlet DP-14, 10'	7.06	0.00	5.95	1.11	Genr	6.0	10.00	0.00	0.00	0.00	0.010	2.00	0.080	0.020	0.013	0.38	13.15	0.38	13.15	0.00	37
32	Inlet DP10, 10'	5.97	0.00	5.97	0.00	Curb	6.0	10.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.000	0.39	6.59	0.58	6.59	3.00	Off
33		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
34		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
35	Inlet DP-2	33.73	0.00	33.73	0.00	Curb	6.0	20.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.000	0.80	33.99	0.85	33.99	2.00	Off
36	Inlet DP-7 (5')	0.25	0.00	0.25	0.00	Curb	6.0	5.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.11	1.42	0.22	1.65	2.00	Off
37	Inlet DP-17, 25'	2.76	1.11	3.87	0.00	Curb	6.0	25.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.013	0.26	6.86	0.39	6.86	3.00	Off
38	Inlet DP-12a, 10'	8.82	0.00	6.76	2.06	Genr	6.0	10.00	0.00	0.00	0.00	0.012	2.00	0.080	0.020	0.013	0.40	13.90	0.40	13.90	0.00	28
39	Inlet DP-6a (10')	4.81	1.78	5.71	0.87	Genr	0.0	0.00	0.00	0.00	0.00	0.010	2.00	0.080	0.020	0.013	0.37	12.75	0.37	12.75	0.00	18

Lorson East PDR-C16 basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: Inlet N-Values = 0.016 ; Intensity = 503.90 / (Inlet time + 28.20) ^ 1.31; Return period = 5 Yrs. ; * Indicates Known Q added

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	1	230.8	66 c	249.0	5710.00	5711.25	0.502	5714.95*	5718.89*	0.73	5719.62	End
2	2	154.4	54 c	380.6	5714.10	5717.91	1.001	5719.62	5721.48	0.30	5721.79	1
3	3	154.6	54 c	42.5	5717.91	5718.34	1.011	5722.34	5722.45	0.56	5723.01	2
4	4	154.8	54 c	37.8	5718.54	5718.92	1.005	5723.01	5723.15	0.62	5723.77	3
5	5	136.5	48 c	174.0	5720.30	5722.04	1.000	5723.77	5725.52	n/a	5725.52	4
6	6	103.9	42 c	397.2	5722.60	5727.37	1.201	5725.86	5730.49	0.41	5730.49	5
7	7	105.3	42 c	300.0	5727.67	5731.27	1.200	5730.67	5734.40	1.05	5734.40	6
8	8	71.50	36 c	531.0	5732.23	5739.66	1.399	5734.90	5742.34	0.71	5742.34	7
9	9	35.63	24 c	109.2	5740.66	5741.53	0.796	5742.66*	5745.37*	0.80	5746.17	8
10	10	20.05	18 c	26.3	5742.03	5742.29	0.990	5746.17*	5747.13*	1.00	5748.13	9
11	11	22.22	24 c	9.8	5741.73	5741.83	1.025	5747.39*	5747.49*	0.16	5747.64	9
12	12	14.98	18 c	62.3	5742.63	5743.33	1.125	5747.64*	5748.91*	0.56	5749.47	11
13	13	44.84	30 c	33.6	5732.73	5733.02	0.864	5735.23*	5735.63*	0.52	5736.15	7
14	14	34.17	30 c	65.0	5733.02	5733.41	0.600	5736.70*	5737.15*	0.08	5737.22	13
15	15	17.18	24 c	43.0	5733.91	5734.17	0.604	5737.51*	5737.76*	0.19	5737.94	14
16	16	17.78	24 c	210.8	5734.47	5738.22	1.779	5737.94	5739.71	n/a	5739.71 j	15
17	17	17.87	24 c	31.9	5738.15	5738.79	2.008	5739.99	5740.29	0.39	5740.29	16
18	18	16.30	24 c	7.0	5733.52	5733.59	0.997	5737.03*	5737.07*	0.21	5737.28	13
19	19	53.54	36 c	23.0	5723.04	5723.27	1.000	5726.78*	5726.93*	0.36	5727.28	5
20	20	38.21	30 c	20.0	5723.77	5723.97	1.001	5727.28*	5727.46*	0.47	5727.93	19
21	21	32.25	24 c	50.5	5721.42	5721.92	0.991	5723.77*	5724.79*	0.82	5725.61	4
22	22	7.98	24 c	29.2	5721.42	5721.71	0.992	5725.21*	5725.25*	0.05	5725.30	4
23	23	6.92	18 c	35.8	5722.21	5722.57	1.004	5725.30*	5725.46*	0.12	5725.58	22
24	24	54.37	36 c	15.3	5715.75	5716.21	3.006	5720.17*	5720.27*	0.37	5720.64	1
25	25	22.80	24 c	33.7	5717.31	5717.95	1.897	5720.74*	5721.08*	0.41	5721.49	24
26	26	38.85	30 c	69.5	5716.10	5716.80	1.007	5720.11*	5720.74*	0.19	5720.93	1
27	27	39.15	30 c	103.6	5717.00	5718.04	1.004	5720.93*	5721.88*	0.40	5722.27	26
28	28	9.70	18 c	25.1	5719.54	5719.79	0.995	5722.79*	5723.01*	0.23	5723.24	27
29	29	27.87	30 c	112.8	5718.04	5719.17	1.002	5722.76*	5723.28*	0.15	5723.43	27
30	30	19.15	24 c	135.3	5719.97	5721.19	0.901	5723.43*	5724.40*	0.87	5725.27	29
31	31	8.74	18 c	16.1	5720.88	5721.04	0.997	5723.55*	5723.66*	0.38	5724.04	29
32	32	12.53	18 c	36.2	5722.62	5723.05	1.186	5726.47*	5726.98*	0.39	5727.38	21

Lorson East PDR- C16 basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
33	33	39.85	30 c	152.0	5740.16	5742.14	1.303	5743.10	5744.29	0.25	5744.53	8
34	34	40.32	30 c	197.6	5742.44	5745.01	1.301	5744.71	5747.13	n/a	5747.13 j	33
35	35	40.47	30 c	65.3	5745.31	5746.29	1.500	5747.36	5748.43	n/a	5748.43	34
36	36	0.57	18 c	26.6	5734.20	5734.34	0.525	5737.45*	5737.45*	0.00	5737.45	13
37	37	31.86	30 c	8.3	5717.21	5717.34	1.568	5720.90*	5720.95*	0.65	5721.61	24
38	38	9.82	18 c	31.4	5721.69	5722.10	1.308	5725.37*	5725.64*	0.48	5726.12	30
39	39	10.16	18 c	9.3	5734.41	5734.51	1.068	5737.46*	5737.55*	0.26	5737.81	14

Lorson East PDR- C16 basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	MH #19	29.20*	16.68	0.00	45.88	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	Off
2	2	9.00*	21.30	0.00	30.30	None	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	1
3		9.00*	12.30	0.00	21.30	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	2
4		9.00*	3.30	0.00	12.30	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	3
5		9.00*	-5.70	0.00	3.30	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	4
6		0.00	-5.70	0.00	-5.70	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	5
7		0.00	-5.70	0.00	-5.70	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	6
8		0.00	-5.70	0.00	-5.70	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	7
9		-5.70	0.00	0.00	-5.70	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	8
10	Inlet DP-3, 15'	20.05	0.00	20.05	0.00	Curb	6.0	15.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.016	0.70	29.09	0.83	29.09	3.00	19
11	Inlet DP-5, 5'	0.57	0.00	0.57	0.00	Curb	6.0	5.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.21	4.65	0.34	4.65	3.00	9
12	Inlet DP-4 , 15'	14.98	0.00	14.98	0.00	Genr	6.0	10.00	2.00	4.00	2.00	0.010	2.00	0.080	0.020	0.013	0.48	17.85	0.48	17.85	0.00	17
13		0.00	0.00	0.00	0.00	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	7
14		0.00	0.00	0.00	0.00	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	13
15		-7.84	-7.84	0.00	-15.68	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	Off
16		-7.84	0.00	0.00	-7.84	None	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	15
17	Inlet DP-6, 15'	17.87	0.00	17.87	0.00	Genr	6.0	10.00	2.00	4.00	2.00	0.025	2.00	0.083	0.020	0.013	0.44	15.95	0.44	15.95	0.00	39
18	Inlet DP-8, 10'	16.30*	0.00	16.30	0.00	Genr	6.0	10.00	2.00	4.00	2.00	0.015	2.00	0.080	0.020	0.013	0.46	17.05	0.46	17.05	0.00	21
19	Inlet DP6b, 20'	20.68*	0.17	20.30	0.56	Genr	6.0	20.00	2.00	4.00	2.00	0.010	2.00	0.080	0.020	0.013	0.53	20.40	0.53	20.40	0.00	25
20	C13-DP6c	38.21	0.00	38.21	0.00	Curb	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	4.76	93.97	4.76	93.97	0.00	19
21	Inlet DP-10a, 10'	20.64*	0.00	20.64	0.00	Genr	6.0	15.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.30	9.00	0.30	9.00	0.00	28
22	Inlet DP-10c, 5'	1.31	0.00	1.31	0.00	Curb	6.0	5.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.22	3.25	0.41	3.25	3.00	4

Lorson East PDR- C16 basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: Inlet N-Values = 0.016 ; Intensity = 58.48 / (Inlet time + 7.70) ^ 0.75; Return period = 100 Yrs. ; * Indicates Known Q added

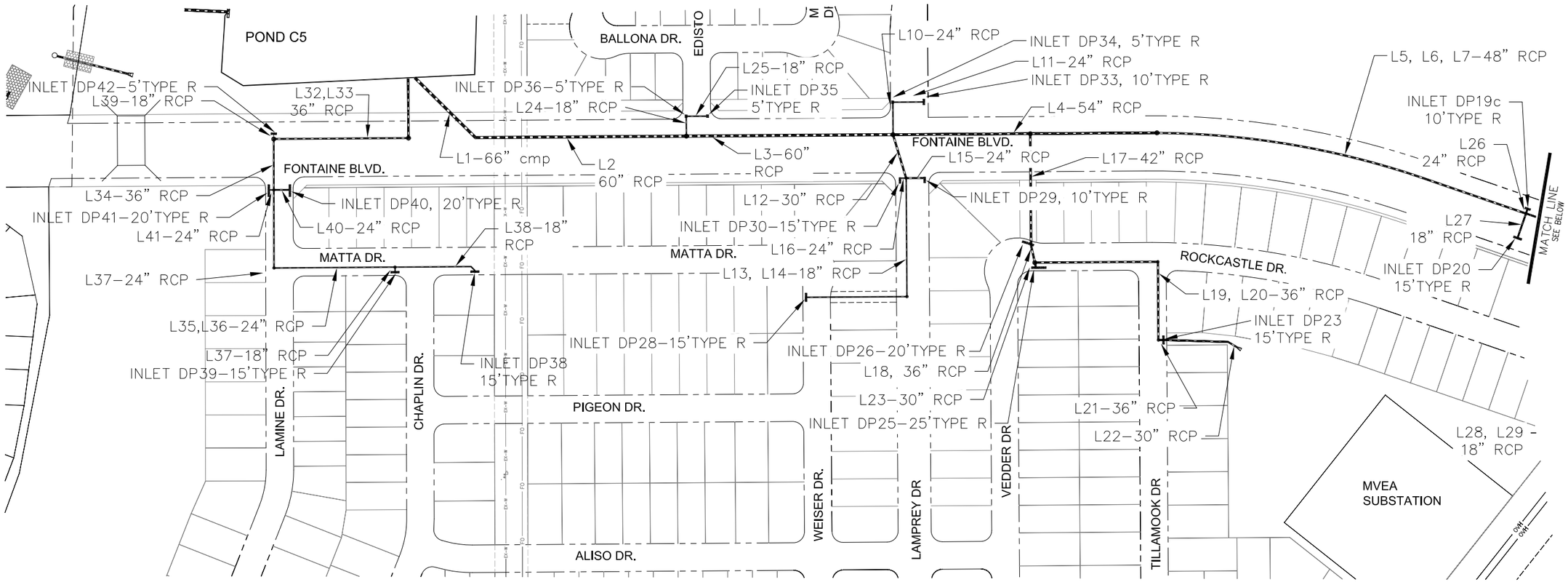
Inlet Report

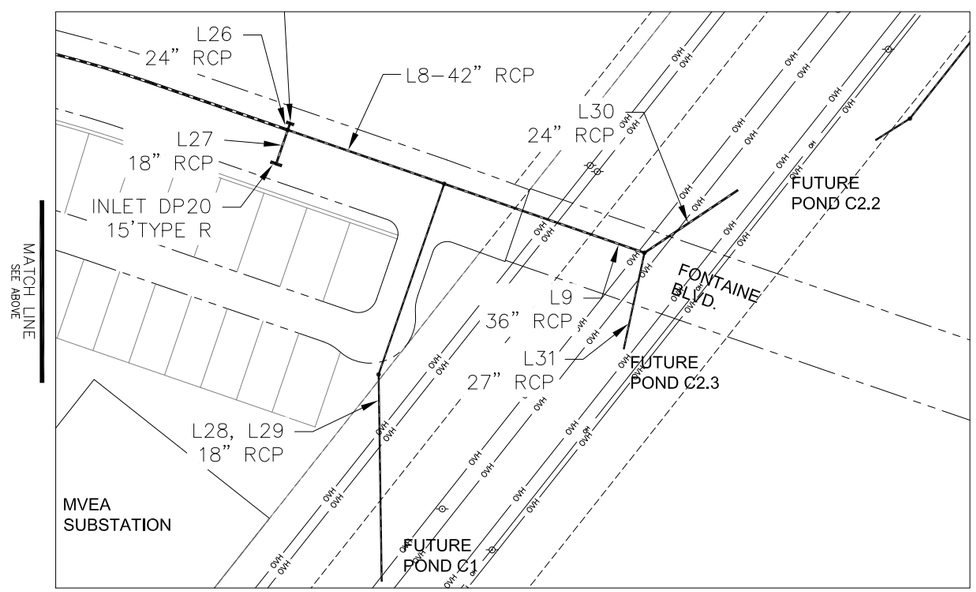
Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
23	Inlet DP-10b, 5'	6.92	0.00	6.92	0.00	Curb	6.0	5.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.61	24.74	0.74	24.74	3.00	24
24		26.10*	0.00	0.00	26.10	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	1
25	Inlet DP-16, 30'	22.80	0.56	23.35	0.00	Genr	6.0	30.00	2.00	4.00	2.00	0.020	2.00	0.080	0.020	0.013	0.49	18.60	0.49	18.60	0.00	37
26		-12.29	-27.43	0.00	-39.72	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	1
27		-12.29	-15.14	0.00	-27.43	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	26
28	DP-13, 10'	9.70	0.04	9.73	0.00	Genr	6.0	6.00	2.00	4.00	2.00	0.010	2.00	0.080	0.020	0.013	0.42	15.00	0.42	15.00	0.00	25
29		-15.14	0.00	0.00	-15.14	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	27
30	DP-12, 10'	1.46	0.00	1.46	0.00	Genr	6.0	10.00	2.00	4.00	2.00	0.012	2.00	0.080	0.020	0.013	0.24	5.90	0.24	5.90	0.00	28
31	Inlet DP-14, 10'	8.74	0.00	8.74	0.00	Genr	6.0	10.00	2.00	4.00	2.00	0.010	2.00	0.080	0.020	0.013	0.41	14.35	0.41	14.35	0.00	37
32	Inlet DP10, 10'	12.53	0.00	12.53	0.00	Curb	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.60	10.84	0.79	10.84	3.00	25
33		0.00	0.00	0.00	0.00	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	8
34		0.00	0.00	0.00	0.00	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	33
35	Inlet DP-2	40.47	0.00	40.30	0.17	Genr	6.0	6.00	2.00	4.00	2.00	0.015	2.00	0.080	0.050	0.013	0.75	13.84	0.75	13.84	0.00	19
36	Inlet DP-7, 5'	0.57	0.00	0.57	0.00	Curb	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.15	1.83	0.25	1.90	2.00	13
37	Inlet DP-17, 20'	31.86*	0.00	31.86	0.00	Curb	6.0	20.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.77	32.72	0.90	32.72	3.00	24
38	Inlet DP-12a, 10'	9.82	0.00	9.78	0.04	Genr	6.0	10.00	2.00	4.00	2.00	0.012	2.00	0.080	0.020	0.013	0.41	14.50	0.41	14.50	0.00	28
39	Inlet DP-6a, 10'	10.16	0.00	10.16	0.00	Genr	6.0	10.00	2.00	4.00	2.00	0.010	2.00	0.080	0.020	0.013	0.43	15.30	0.43	15.30	0.00	18

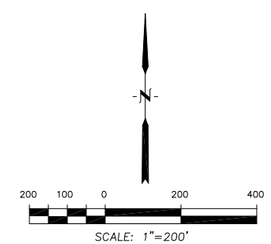
Lorson East PDR- C16 basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: Inlet N-Values = 0.016 ; Intensity = 58.48 / (Inlet time + 7.70) ^ 0.75; Return period = 100 Yrs. ; * Indicates Known Q added

BASIN C15 - C17 STORM SCHEMATIC







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PROJECT:
LORSON RANCH EAST
EAST OF EAST TRIBUTARY
EL PASO COUNTY, COLORADO

NO. | DESCRIPTION | DATE

DRAWN: RLS
DESIGNED: LAB
CHECKED: LAB

STORM SEWER SCHEMATIC
BASIN C15 - C17
LORSON RANCH EAST

DATE
JUNE 30, 2017

PROJECT NO.
100.040

SHEET NUMBER
2

TOTAL SHEETS: 3

P:\100 100.040 Drainage 100.040-storm schematic.dwg Jun 28, 2017 - 9:27am

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	L1	75.19	66 c	147.3	5709.00	5709.88	0.597	5713.23	5713.19	0.00	5713.19	End
2	L2	77.41	60 c	383.5	5710.55	5714.37	0.996	5713.34	5716.83	n/a	5716.83	1
3	L3	77.65	60 c	373.9	5714.67	5718.40	0.998	5717.59	5720.86	0.00	5720.86	2
4	L4	59.01	54 c	249.3	5718.90	5721.40	1.003	5721.66	5723.60	n/a	5723.60 j	3
5	L5	23.58	48 c	228.8	5721.90	5726.20	1.879	5724.45	5727.64	n/a	5727.64 j	4
6	L6	24.74	48 c	494.6	5726.50	5733.90	1.496	5728.10	5735.37	n/a	5735.37 j	5
7	L7	25.27	48 c	194.1	5734.00	5736.00	1.030	5735.85	5737.49	n/a	5737.49 j	6
8	L8	14.00	42 c	219.8	5736.50	5738.40	0.864	5738.00	5739.55	n/a	5739.55 j	7
9	L9	10.00	36 c	279.0	5739.90	5742.70	1.004	5740.69	5743.71	n/a	5743.71	8
10	L10	8.18	24 c	58.7	5721.70	5723.68	3.373	5722.30	5724.70	0.00	5724.70	3
11	L11	7.49	24 c	52.4	5724.38	5724.94	1.069	5725.16	5725.92	0.00	5725.92	10
12	L12	19.36	30 c	84.4	5721.30	5723.52	2.629	5722.22	5725.13	0.00	5725.13	3
13	L13	5.14	18 c	214.7	5724.72	5728.81	1.905	5725.52	5729.68	0.00	5729.68	12
14	L14	5.32	18 c	182.2	5729.11	5734.84	3.145	5729.90	5735.72	0.00	5735.72	13
15	L15	8.63	24 c	31.0	5725.08	5725.61	1.711	5725.82	5726.92	0.00	5726.92	12
16	L16	7.21	24 c	13.1	5724.61	5725.10	3.742	5725.57	5726.05	n/a	5726.05 j	12
17	L17	38.11	42 c	202.3	5722.50	5727.36	2.403	5724.26	5729.25	0.00	5729.25	4
18	L18	31.82	36 c	30.7	5728.15	5728.46	1.011	5729.74	5730.27	0.00	5730.27	17
19	L19	20.19	36 c	223.4	5728.50	5730.75	1.007	5730.94	5732.18	n/a	5732.18 j	18
20	L20	20.64	36 c	141.8	5730.95	5732.40	1.021	5732.62	5733.85	n/a	5733.85 j	19
21	L21	20.68	36 c	11.2	5732.70	5732.79	0.805	5734.29	5734.25	n/a	5734.25 j	20
22	L22	13.55	30 c	139.3	5733.40	5735.50	1.508	5734.70	5736.73	n/a	5736.73 j	21
23	L23	15.69	30 c	10.8	5729.21	5729.48	2.506	5730.90	5730.81	n/a	5730.81	18
24	L24	2.96	18 c	35.8	5719.93	5720.92	2.768	5720.35	5721.58	0.00	5721.58	2
25	L25	2.82	18 c	41.0	5721.22	5721.63	0.998	5721.78	5722.27	n/a	5722.27	24
26	L26	6.51	24 c	13.2	5741.12	5742.52	10.617	5741.52*	5745.41*	0.00	5745.41	7
27	L27	5.20	18 c	45.8	5742.58	5743.07	1.070	5743.31	5743.94	0.00	5743.94	7
28	L28	4.00	18 c	264.9	5740.45	5741.80	0.509	5741.23	5742.58	0.00	5742.58	8
29	L29	4.00	18 c	273.9	5741.90	5743.30	0.511	5742.79	5744.06	n/a	5744.06	28
30	L30	6.00	24 c	149.2	5743.71	5744.50	0.529	5744.55	5745.37	0.00	5745.37	9
31	L31	4.00	27 c	116.9	5743.49	5744.10	0.521	5744.14	5744.79	0.00	5744.79	9
32	L32	26.54	36 c	104.3	5709.00	5709.63	0.604	5711.10	5711.27	n/a	5711.27 j	End

Lorson East PDR - C15 basins | Number of lines: 41 | Run Date: 06-22-2017

NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
33	L33	27.33	36 c	243.0	5709.83	5711.30	0.605	5711.74	5712.97	n/a	5712.97 j	32
34	L34	24.96	36 c	90.4	5711.80	5712.55	0.829	5713.49	5714.14	0.00	5714.14	33
35	L35	13.90	24 c	142.7	5713.55	5717.40	2.699	5714.51	5718.72	n/a	5718.72	34
36	L36	14.34	24 c	220.6	5717.70	5723.60	2.675	5719.02	5724.94	n/a	5724.94	35
37	L37	8.69	18 c	7.0	5724.10	5724.18	1.144	5725.20	5725.31	0.00	5725.31	36
38	L38	6.03	18 c	145.3	5724.10	5727.01	2.003	5725.40	5727.95	n/a	5727.95 j	36
39	L39	3.20	18 c	17.2	5714.35	5714.58	1.340	5714.88	5715.35	0.00	5715.35	33
40	L40	12.59	24 c	27.1	5713.55	5713.76	0.776	5714.70	5715.03	0.00	5715.03	34
41	L41	1.85	24 c	11.5	5713.55	5713.70	1.303	5714.79	5714.78	0.00	5714.78	34

Lorson East PDR - C15 basins | Number of lines: 41 | Run Date: 06-22-2017

NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
2		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
3		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
4		0.00	0.00	0.00	0.00	MH	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	Off
5		0.00	0.00	0.00	0.00	MH	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	Off
6		0.00	0.00	0.00	0.00	MH	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	5
7		0.00	0.00	0.00	0.00	MH	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	6
8		0.00	0.00	0.00	0.00	MH	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	7
9		0.00	0.00	0.00	0.00	MH	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	8
10	Inlet DP-34 - 5'	0.88	0.00	0.88	0.00	Curb	6.0	5.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.013	0.24	6.23	0.37	6.23	3.00	Off
11	Inlet DP-33 - 10'	7.49	0.81	8.30	0.00	Curb	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.58	10.38	0.69	10.38	2.00	Off
12		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	Off
13		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
14	Inlet DP-28 - 15'	5.32	0.00	5.30	0.02	Genr	6.0	15.00	0.00	0.00	0.00	0.026	2.00	0.080	0.020	0.013	0.31	9.40	0.31	9.40	0.00	38
15	Inlet DP-29 - 10'	8.63	0.00	8.63	0.00	Curb	6.0	10.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.013	0.54	21.10	0.67	21.10	3.00	Off
16	Inlet DP-30 - 15'	7.21	0.00	7.21	0.00	Curb	6.0	10.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.013	0.49	18.70	0.62	18.70	3.00	Off
17	Inlet DP-26, 20'	8.49	0.00	8.49	0.00	Genr	6.0	15.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.30	4.80	0.30	4.80	0.00	Off
18		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
19		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
20		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
21	Inlet DP-23, 15'	8.68	0.00	8.43	0.25	Genr	6.0	15.00	0.00	0.00	0.00	0.011	2.00	0.080	0.020	0.013	0.40	14.05	0.40	14.05	0.00	23
22		13.55	0.00	13.55	0.00	Hdwl	0.0	0.00	15.00	6.00	3.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	Off

Lorson East PDR - C15 basins | Number of lines: 41 | Run Date: 06-22-2017

NOTES: Inlet N-Values = 0.016 ; Intensity = 68.28 / (Inlet time + 13.10) ^ 0.89; Return period = 5 Yrs. ; * Indicates Known Q added

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
23	INLET DP-25- 25'	15.69	0.25	15.94	0.00	Genr	6.0	48.21	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.013	0.30	9.00	0.30	9.00	0.00	Off
24	Inlet DP-36, 5'	0.25	0.00	0.25	0.00	Curb	6.0	5.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.17	2.71	0.30	2.71	3.00	2
25	Inlet DP-35, 5'	2.82	0.00	2.82	0.00	Curb	6.0	5.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.39	13.55	0.52	13.55	3.00	24
26	Inlet DP-19c, 10'	6.51	0.00	5.70	0.81	Genr	6.0	15.00	2.00	4.00	2.00	0.010	2.00	0.080	0.020	0.013	0.37	12.70	0.37	12.70	0.00	11
27	Inlet DP-20, 15'	5.20	0.00	5.20	0.00	Genr	6.0	15.00	2.00	4.00	2.00	0.010	2.00	0.080	0.020	0.013	0.35	11.55	0.35	11.55	0.00	15
28		0.00	0.00	0.00	0.00	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	8
29		4.00*	0.00	4.00	0.00	Grate	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.30	4.85	0.30	4.85	0.00	28
30		6.00*	0.00	6.00	0.00	Genr	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.30	4.80	0.30	4.80	0.00	9
31		4.00*	0.00	4.00	0.00	Genr	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.30	4.80	0.30	4.80	0.00	9
32		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	Off
33		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	32
34		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
35		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
36		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	35
37	Inlet DP-39, 15'	8.69	0.00	8.41	0.28	Genr	6.0	15.00	2.00	4.00	2.00	0.038	2.00	0.080	0.020	0.013	0.34	10.80	0.34	10.80	0.00	40
38	Inlet DP-38, 15'	6.03	0.02	6.05	0.00	Genr	6.0	15.00	0.00	0.00	0.00	0.011	2.00	0.080	0.020	0.013	0.36	12.05	0.36	12.05	0.00	37
39	Inlet DP-42, 10'	3.20	0.00	3.20	0.00	Curb	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.33	5.48	0.44	5.48	2.00	33
40	Inlet DP-40, 20'	12.59	0.28	12.87	0.00	Curb	6.0	20.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.42	7.13	0.52	7.13	2.00	34
41	Inlet DP-41, 20'	1.85	0.00	1.85	0.00	Curb	6.0	20.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.16	1.97	0.26	1.98	2.00	34

Lorson East PDR - C15 basins | Number of lines: 41 | Run Date: 06-22-2017

NOTES: Inlet N-Values = 0.016 ; Intensity = 68.28 / (Inlet time + 13.10) ^ 0.89; Return period = 5 Yrs. ; * Indicates Known Q added

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	L1	273.3	66 c	147.3	5709.00	5709.88	0.597	5713.89	5714.74	0.00	5714.74	End
2	L2	275.5	60 c	383.5	5710.55	5714.37	0.996	5714.99	5719.35	0.00	5719.35	1
3	L3	272.7	60 c	373.9	5714.67	5718.40	0.998	5719.42	5723.40	0.00	5723.40	2
4	L4	226.9	54 c	249.3	5718.90	5721.40	1.003	5723.40*	5726.72*	0.00	5726.72	3
5	L5	137.5	48 c	228.8	5721.90	5726.20	1.879	5728.03	5729.77	0.00	5729.77	4
6	L6	138.3	48 c	494.6	5726.50	5733.90	1.496	5729.98	5737.40	n/a	5737.40	5
7	L7	138.6	48 c	194.1	5734.00	5736.00	1.030	5737.70	5739.50	n/a	5739.50	6
8	L8	105.0	42 c	219.8	5736.50	5738.40	0.864	5740.00*	5742.40*	0.00	5742.40	7
9	L9	87.00	36 c	279.0	5739.90	5742.70	1.004	5742.90*	5747.65*	0.00	5747.65	8
10	L10	16.66	24 c	58.7	5721.70	5723.68	3.373	5725.96*	5726.28*	0.00	5726.28	3
11	L11	15.03	24 c	52.4	5724.38	5724.94	1.069	5726.36	5726.38	0.00	5726.38	10
12	L12	42.12	30 c	84.4	5721.30	5723.52	2.629	5725.25*	5726.15*	0.00	5726.15	3
13	L13	11.36	18 c	214.7	5724.72	5728.81	1.905	5726.65	5730.10	n/a	5730.10 j	12
14	L14	11.56	18 c	182.2	5729.11	5734.84	3.145	5730.20	5736.14	n/a	5736.14	13
15	L15	18.67	24 c	31.0	5725.08	5725.61	1.711	5726.74	5727.14	n/a	5727.14	12
16	L16	15.39	24 c	13.1	5724.61	5725.10	3.742	5726.85	5726.84	0.00	5726.84	12
17	L17	92.58	42 c	202.3	5722.50	5727.36	2.403	5728.45	5730.31	n/a	5730.31	4
18	L18	78.29	36 c	30.7	5728.15	5728.46	1.011	5731.15*	5731.57*	0.00	5731.57	17
19	L19	51.29	36 c	223.4	5728.50	5730.75	1.007	5732.66*	5733.98*	0.00	5733.98	18
20	L20	51.77	36 c	141.8	5730.95	5732.40	1.022	5733.98	5734.69	0.00	5734.69	19
21	L21	51.81	36 c	11.2	5732.70	5732.79	0.805	5735.10	5735.11	0.00	5735.11	20
22	L22	35.92	30 c	139.3	5733.40	5735.50	1.508	5735.49	5737.50	n/a	5737.50 j	21
23	L23	33.74	30 c	10.8	5729.21	5729.48	2.506	5732.75*	5732.82*	0.00	5732.82	18
24	L24	6.37	18 c	35.8	5719.93	5720.92	2.768	5722.14	5722.23	0.00	5722.23	2
25	L25	6.01	18 c	41.0	5721.22	5721.63	0.998	5722.29	5722.57	n/a	5722.57 j	24
26	L26	22.01	24 c	13.2	5741.12	5742.52	10.617	5741.87*	5748.38*	0.00	5748.38	7
27	L27	13.06	18 c	45.8	5742.58	5743.07	1.070	5744.08*	5744.79*	0.00	5744.79	7
28	L28	18.00	18 c	264.9	5740.45	5741.80	0.509	5742.63*	5750.42*	0.00	5750.42	8
29	L29	18.00	18 c	273.9	5741.90	5743.30	0.511	5750.42*	5758.47*	0.00	5758.47	28
30	L30	41.00	24 c	149.2	5743.71	5744.50	0.529	5747.65*	5752.56*	0.00	5752.56	9
31	L31	46.00	27 c	116.9	5743.49	5744.10	0.521	5747.92*	5750.51*	0.00	5750.51	9
32	L32	65.12	36 c	104.3	5709.00	5709.63	0.604	5711.81*	5712.81*	0.00	5712.81	End

Lorson East PDR - C15 basins | Number of lines: 41 | Run Date: 06-22-2017

NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
33	L33	65.94	36 c	243.0	5709.83	5711.30	0.605	5712.83*	5715.21*	0.00	5715.21	32
34	L34	60.45	36 c	90.4	5711.80	5712.55	0.829	5715.42*	5716.17*	0.00	5716.17	33
35	L35	31.08	24 c	142.7	5713.55	5717.40	2.699	5716.17	5719.28	n/a	5719.28 j	34
36	L36	31.58	24 c	220.6	5717.70	5723.60	2.675	5719.31	5725.49	n/a	5725.49	35
37	L37	19.13	18 c	7.0	5724.10	5724.18	1.144	5725.60*	5725.83*	0.00	5725.83	36
38	L38	13.06	18 c	145.3	5724.10	5727.01	2.003	5726.28	5728.51	0.00	5728.51	36
39	L39	7.04	18 c	17.2	5714.35	5714.58	1.340	5716.31*	5716.39*	0.00	5716.39	33
40	L40	32.43	24 c	27.1	5713.55	5713.76	0.776	5716.17*	5716.72*	0.00	5716.72	34
41	L41	5.88	24 c	11.5	5713.55	5713.70	1.303	5717.25*	5717.26*	0.00	5717.26	34

Lorson East PDR - C15 basins | Number of lines: 41 | Run Date: 06-22-2017

NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1		105.00*	0.00	0.00	105.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
2		105.00*	0.00	0.00	105.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
3		105.00*	0.00	0.00	105.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
4		105.00*	0.00	0.00	105.00	MH	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	Off
5		105.00*	525.00	0.00	630.00	MH	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	Off
6		105.00*	420.00	0.00	525.00	MH	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	5
7		105.00*	315.00	0.00	420.00	MH	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	6
8		105.00*	210.00	0.00	315.00	MH	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	7
9		87.00*	87.00	0.00	174.00	MH	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	8
10	Inlet DP-34 - 5'	1.94	6.12	8.06	0.00	Curb	6.0	5.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.013	0.67	27.40	0.80	27.40	3.00	Off
11	Inlet DP-33 - 10'	15.03	11.39	20.30	6.12	Genr	6.0	6.00	0.00	0.00	0.00	0.020	2.00	0.080	0.050	0.013	0.62	11.12	0.62	11.12	0.00	10
12		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	Off
13		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
14	Inlet DP-28 - 15'	11.56	0.00	10.36	1.20	Genr	6.0	15.00	0.00	0.00	0.00	0.026	2.00	0.080	0.020	0.013	0.38	13.25	0.38	13.25	0.00	38
15	Inlet DP-29 - 10'	18.67	1.73	16.30	4.10	Genr	6.0	10.00	0.00	0.00	0.00	0.020	2.00	0.080	0.020	0.013	0.47	17.60	0.47	17.60	0.00	16
16	Inlet DP-30 - 15'	15.39	4.10	19.49	0.00	Genr	6.0	10.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.013	0.30	9.00	0.30	9.00	0.00	Off
17	Inlet DP-26, 20'	18.18	6.91	25.10	0.00	Genr	6.0	15.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.013	0.30	4.80	0.30	4.80	0.00	Off
18		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
19		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
20		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
21	Inlet DP-23, 15'	18.56	0.00	13.69	4.87	Genr	6.0	15.00	0.00	0.00	0.00	0.011	2.00	0.080	0.020	0.013	0.50	19.10	0.50	19.10	0.00	23
22		35.92	0.00	35.92	0.00	Hdwl	0.0	0.00	15.00	6.00	3.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	Off

Lorson East PDR - C15 basins | Number of lines: 41 | Run Date: 06-22-2017

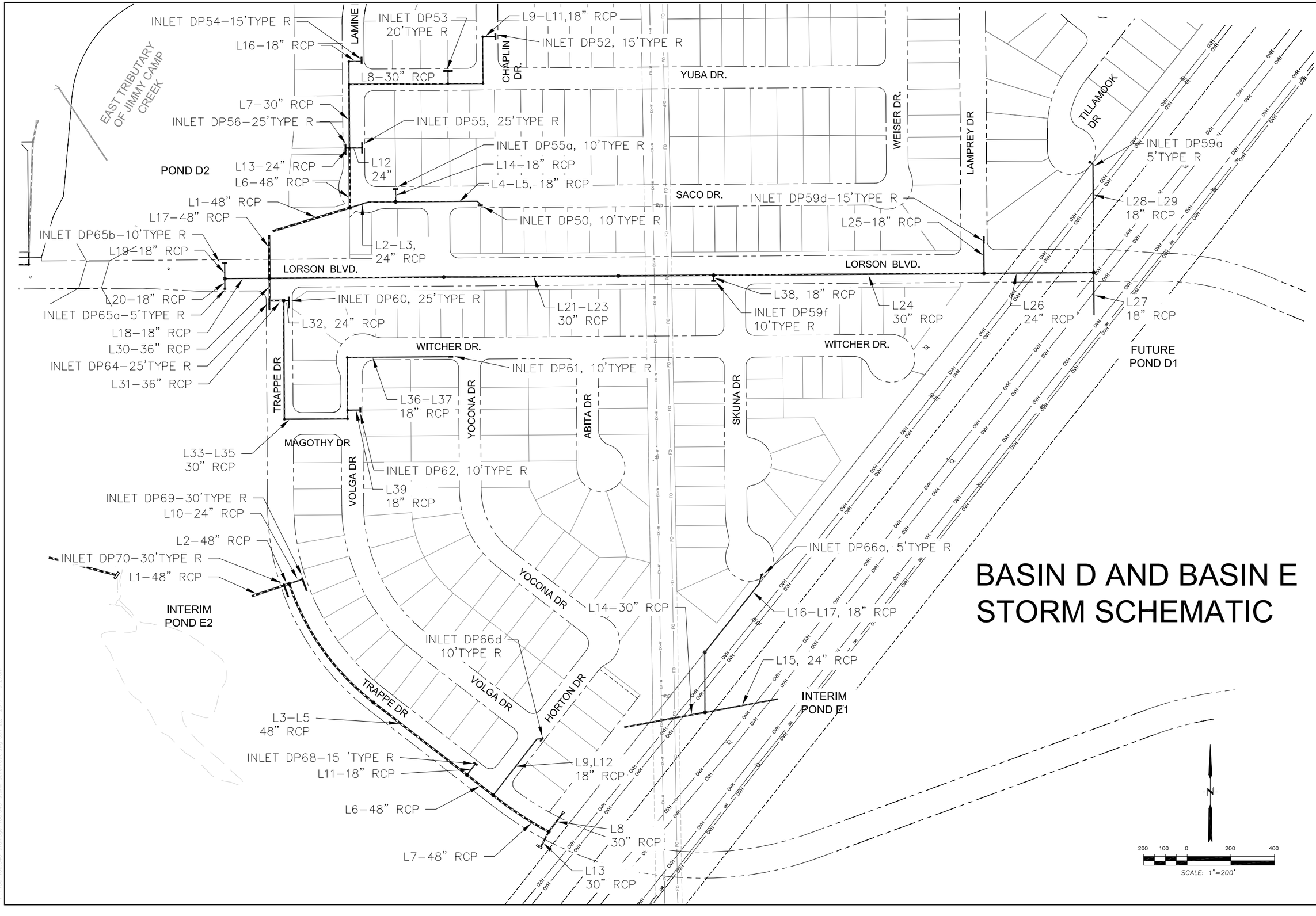
NOTES: Inlet N-Values = 0.016 ; Intensity = 58.48 / (Inlet time + 7.70) ^ 0.75; Return period = 100 Yrs. ; * Indicates Known Q added

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
23	INLET DP-25- 25'	33.74	4.87	31.70	6.91	Genr	6.0	48.21	0.00	0.00	0.00	0.020	2.00	0.080	0.020	0.013	0.57	22.65	0.57	22.65	0.00	17
24	Inlet DP-36, 5'	0.57	0.00	0.57	0.00	Curb	6.0	5.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.21	4.65	0.34	4.65	3.00	2
25	Inlet DP-35, 5'	6.01	0.00	6.01	0.00	Curb	6.0	5.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.57	22.50	0.70	22.50	3.00	24
26	Inlet DP-19c, 10'	22.01	0.00	10.62	11.39	Genr	6.0	15.00	2.00	4.00	2.00	0.010	2.00	0.080	0.020	0.013	0.54	20.80	0.54	20.80	0.00	11
27	Inlet DP-20, 15'	13.06	0.00	11.33	1.73	Genr	6.0	15.00	2.00	4.00	2.00	0.010	2.00	0.080	0.020	0.013	0.46	16.90	0.46	16.90	0.00	15
28		18.00*	18.00	0.00	36.00	None	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	8
29		18.00*	0.00	0.00	18.00	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	28
30		41.00*	0.00	0.00	41.00	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	9
31		46.00*	0.00	0.00	46.00	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	9
32		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	Off
33		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	32
34		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
35		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	Off
36		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.00	35
37	Inlet DP-39, 15'	19.13	2.43	14.93	6.62	Genr	6.0	15.00	2.00	4.00	2.00	0.038	2.00	0.080	0.020	0.013	0.44	15.80	0.44	15.80	0.00	40
38	Inlet DP-38, 15'	13.06	1.20	11.83	2.43	Genr	6.0	15.00	0.00	0.00	0.00	0.011	2.00	0.080	0.020	0.013	0.46	17.20	0.46	17.20	0.00	37
39	Inlet DP-42, 10'	7.04	0.00	7.04	0.00	Curb	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.52	9.30	0.63	9.30	2.00	33
40	Inlet DP-40, 20'	32.43	6.62	26.00	13.06	Genr	6.0	20.00	2.00	4.00	2.00	0.020	2.00	0.080	0.050	0.013	0.71	12.92	0.71	12.92	0.00	41
41	Inlet DP-41, 20'	5.88	13.06	18.94	0.00	Curb	6.0	20.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.52	9.24	0.63	9.24	2.00	34

Lorson East PDR - C15 basins | Number of lines: 41 | Run Date: 06-22-2017

NOTES: Inlet N-Values = 0.016 ; Intensity = 58.48 / (Inlet time + 7.70) ^ 0.75; Return period = 100 Yrs. ; * Indicates Known Q added



CORE
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NO. | DESCRIPTION | DATE

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CONTACT: JEFF MARK

PROJECT:
LORSON RANCH EAST
EAST OF EAST TRIBUTARY
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: LAB

STORM SEWER SCHEMATIC
BASIN D AND BASIN E
LORSON RANCH EAST

DATE
JUNE 30, 2017

PROJECT NO.
100.040

SHEET NUMBER
3

TOTAL SHEETS: 3

P:\100 100.040 Drainage 100.040-storm schematic.dwg Jun 28, 2017 - 9:27am

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	L1	63.56	48 c	185.0	5697.00	5702.09	2.751	5699.36	5704.45	n/a	5704.45	End
2	L2	14.68	24 c	45.0	5704.99	5706.84	4.106	5705.77*	5709.07*	0.07	5709.14	1
3	L3	14.68	24 c	62.6	5706.84	5709.42	4.119	5709.14	5710.78	n/a	5710.78 j	2
4	L4	7.34	18 c	186.4	5710.17	5715.01	2.597	5711.16	5716.04	0.10	5716.04	3
5	L5	7.34	18 c	10.0	5715.11	5715.38	2.700	5716.27	5716.41	0.45	5716.41	4
6	L6	48.88	48 c	137.0	5702.59	5704.23	1.197	5705.27	5706.30	n/a	5706.30 j	1
7	L7	33.79	30 c	146.0	5705.83	5708.17	1.603	5707.30	5710.11	0.42	5710.11	6
8	L8	26.49	30 c	226.5	5708.37	5713.87	2.428	5710.72	5715.59	n/a	5715.59 j	7
9	L9	12.44	18 c	78.4	5714.92	5718.39	4.425	5715.73	5719.73	0.26	5719.73	8
10	L10	12.44	18 c	83.9	5718.68	5720.50	2.168	5719.83	5721.84	0.26	5721.84	9
11	L11	12.44	18 c	24.9	5720.70	5720.98	1.123	5722.20*	5722.55*	0.00	5722.55	10
12	L12	7.80	24 c	26.0	5706.33	5707.11	2.999	5707.07	5708.10	0.00	5708.10	6
13	L13	7.29	24 c	6.0	5707.13	5707.37	4.004	5707.67*	5709.45*	0.00	5709.45	6
14	L14	7.34	18 c	26.6	5710.44	5710.86	1.577	5711.24	5712.07	0.32	5712.39	3
15	L15	14.05	18 c	29.2	5715.08	5716.06	3.360	5716.03*	5718.00*	0.00	5718.00	8
16	L16	7.30	18 c	58.9	5709.75	5710.83	1.832	5710.91	5711.86	n/a	5711.86 j	7
17	L17	66.79	48 c	100.0	5697.00	5699.50	2.500	5699.42	5701.92	n/a	5701.92	End
18	L18	5.82	18 c	101.3	5701.90	5702.93	1.017	5702.85	5703.85	n/a	5703.85 j	17
19	L19	4.16	18 c	30.6	5703.13	5703.45	1.048	5704.17	5704.23	n/a	5704.23 j	18
20	L20	1.65	18 c	20.0	5703.33	5703.73	1.995	5704.24	5704.22	n/a	5704.22 j	18
21	L21	23.43	30 c	400.0	5701.25	5715.50	3.563	5702.66	5717.12	n/a	5717.12	17
22	L22	23.43	30 c	400.0	5715.80	5726.20	2.600	5717.52	5727.82	n/a	5727.82 j	21
23	L23	23.43	30 c	217.3	5726.50	5732.50	2.762	5728.22	5734.12	n/a	5734.12 j	22
24	L24	14.85	30 c	621.3	5732.50	5743.76	1.812	5734.73	5745.05	n/a	5745.05 j	23
25	L25	10.66	18 c	67.0	5745.16	5745.96	1.192	5746.31	5747.21	0.00	5747.21	24
26	L26	4.19	24 c	248.8	5744.36	5749.00	1.865	5745.55	5749.73	n/a	5749.73 j	24
27	L27	2.00	18 c	82.0	5749.50	5749.99	0.598	5750.01	5750.53	n/a	5750.53	26
28	L28	2.19	18 c	249.0	5752.72	5762.38	3.879	5753.05	5762.94	n/a	5762.94	26
29	L29	2.19	18 c	10.0	5762.38	5762.68	3.003	5763.12	5763.25	n/a	5763.25 j	28
30	L30	37.54	36 c	51.0	5700.50	5702.03	3.000	5702.58	5703.98	n/a	5703.98 j	17
31	L31	34.39	36 c	32.0	5702.33	5702.97	2.000	5704.54	5704.84	n/a	5704.84	30
32	L32	15.76	24 c	10.0	5703.97	5704.17	1.997	5705.31	5705.58	0.00	5705.58	31

Lorson East PDR - D Basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
33	L33	18.63	24 c	274.1	5703.97	5707.51	1.291	5705.23	5709.04	0.33	5709.04	31
34	L34	18.63	24 c	143.3	5707.81	5710.70	2.017	5709.30	5712.23	0.33	5712.23	33
35	L35	18.63	24 c	19.4	5711.00	5711.30	1.548	5712.50	5712.83	0.33	5712.83	34
36	L36	7.57	18 c	120.7	5711.80	5713.30	1.242	5713.36	5714.35	n/a	5714.35 j	35
37	L37	7.57	18 c	219.8	5713.60	5719.23	2.562	5714.58	5720.28	0.00	5720.28	36
38	L38	8.58	18 c	13.6	5733.60	5733.93	2.430	5734.51	5735.05	0.00	5735.05	23
39	L39	11.06	18 c	28.3	5711.80	5712.09	1.023	5713.09	5713.38	0.00	5713.38	35

Lorson East PDR - D Basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	Off
2		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	1
3		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	2
4		0.00	0.00	0.00	0.00	None	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	3
5	Inlet DP-50, 10'	10.18	0.00	7.34	2.84	Genr	6.0	10.00	2.00	4.00	2.00	0.026	2.00	0.080	0.020	0.013	0.37	12.55	0.37	12.55	0.00	13
6		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	1
7		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	6
8		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	7
9		0.00	0.00	0.00	0.00	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	8
10		0.00	0.00	0.00	0.00	MH	6.0	15.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	11
11	Inlet DP-52, 15'	15.67	0.00	12.44	3.23	Genr	6.0	15.00	2.00	4.00	2.00	0.030	2.00	0.080	0.020	0.013	0.41	14.60	0.41	14.60	0.00	15
12	Inlet DP-55, 25'	4.20	3.60	7.80	0.00	Genr	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.30	9.00	0.30	9.00	0.00	13
13	Inlet DP-56, 25'	4.46	2.84	7.29	0.00	Genr	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.30	9.00	0.30	9.00	0.00	Off
14	Inlet DP55a, 10'	10.18	0.00	7.34	2.84	Genr	6.0	10.00	2.00	4.00	2.00	0.021	2.00	0.080	0.020	0.013	0.38	13.10	0.38	13.10	0.00	12
15	Inlet DP-53, 20'	11.50	3.23	14.05	0.69	Genr	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.30	9.00	0.30	9.00	0.00	12
16	Inlet DP-54, 15'	7.38	0.00	7.30	0.08	Genr	6.0	10.00	2.00	4.00	2.00	0.013	2.00	0.080	0.020	0.013	0.37	12.65	0.37	12.65	0.00	12
17		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	Off
18		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	17
19	Inlet DP-65b, 10'	4.16	0.00	4.16	0.00	Curb	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.38	12.95	0.38	12.95	0.00	Off
20	Inlet DP-65a, 5'	1.65	0.00	1.65	0.00	Curb	6.0	5.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.31	9.48	0.31	9.48	0.00	18
21		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	17
22		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	21

Lorson East PDR - D Basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: Inlet N-Values = 0.016 ; Intensity = 501.75 / (Inlet time + 28.20) ^ 1.31; Return period = 5 Yrs. ; * Indicates Known Q added

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
23		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	22
24		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	23
25	Inlet DP-59d, 10'	10.66	0.00	10.66	0.00	Genr	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.30	9.00	0.30	9.00	0.00	19
26		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	24
27	From Pond D1	2.00*	0.00	2.00	0.00	Hdwl	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	26
28		0.00	0.00	0.00	0.00	None	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	26
29	DP-59a	2.19	0.00	2.19	0.00	Curb	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.29	8.41	0.29	8.41	0.00	28
30	Inlet DP64, 25'	3.15	0.00	3.15	0.00	Genr	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.30	9.00	0.30	9.00	0.00	20
31		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	30
32	Inlet DP60, 25'	10.70	5.06	15.76	0.00	Genr	6.0	20.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.30	9.00	0.30	9.00	0.00	30
33		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	31
34		0.00	0.00	0.00	0.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	33
35		0.00	0.00	0.00	0.00	MH	6.0	15.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	32
36		0.00	0.00	0.00	0.00	MH	6.0	15.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	35
37	Inlet DP61, 10'	10.62	0.00	7.57	3.05	Genr	6.0	10.00	2.00	4.00	2.00	0.026	2.00	0.080	0.020	0.013	0.37	12.75	0.37	12.75	0.00	39
38	Inlet DP- 59f, 10'	13.64	0.00	8.58	5.06	Genr	6.0	6.00	2.00	4.00	2.00	0.020	2.00	0.080	0.050	0.013	0.49	8.60	0.49	8.60	0.00	32
39	Inlet DP62, 10'	8.01	3.05	11.06	0.00	Genr	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.30	4.80	0.30	4.80	0.00	35

Lorson East PDR - D Basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: Inlet N-Values = 0.016 ; Intensity = 501.75 / (Inlet time + 28.20) ^ 1.31; Return period = 5 Yrs. ; * Indicates Known Q added

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	L1	121.1	48 c	185.0	5697.00	5702.09	2.751	5700.27	5705.35	0.76	5705.35	End
2	L2	21.57	24 c	45.0	5704.99	5706.84	4.108	5706.51	5708.49	0.19	5708.49	1
3	L3	21.60	24 c	62.6	5706.84	5709.42	4.119	5708.70	5711.07	n/a	5711.07 j	2
4	L4	10.76	18 c	186.4	5710.17	5715.01	2.597	5711.44	5716.26	n/a	5716.26 j	3
5	L5	10.77	18 c	10.0	5715.11	5715.38	2.700	5716.41	5716.63	0.65	5716.63	4
6	L6	118.4	48 c	137.0	5702.59	5704.23	1.197	5705.87	5707.45	0.74	5707.45	1
7	L7	57.12	30 c	146.0	5705.83	5708.17	1.603	5708.33*	5711.16*	0.84	5712.01	6
8	L8	44.77	30 c	226.5	5708.37	5713.87	2.428	5712.82	5716.10	n/a	5716.10	7
9	L9	18.80	18 c	78.4	5714.92	5718.39	4.425	5716.10	5719.85	0.54	5719.85	8
10	L10	18.80	18 c	83.9	5718.68	5720.50	2.168	5720.18*	5722.87*	0.53	5723.40	9
11	L11	18.80	18 c	24.9	5720.70	5720.98	1.123	5723.40*	5724.20*	0.00	5724.20	10
12	L12	31.70	24 c	26.0	5706.33	5707.11	2.999	5707.72*	5709.63*	0.00	5709.63	6
13	L13	29.70	24 c	6.0	5707.13	5707.37	4.004	5708.31*	5710.76*	0.00	5710.76	6
14	L14	10.83	18 c	26.6	5710.44	5710.86	1.577	5711.48	5712.28	0.55	5712.83	3
15	L15	25.53	18 c	29.2	5715.08	5716.06	3.360	5716.58*	5718.31*	0.00	5718.31	8
16	L16	12.63	18 c	58.9	5709.75	5710.83	1.832	5713.32*	5714.17*	0.00	5714.17	7
17	L17	119.9	48 c	100.0	5697.00	5699.50	2.500	5700.26	5702.74	0.75	5702.74	End
18	L18	15.99	18 c	101.3	5701.50	5702.63	1.115	5703.35*	5705.70*	0.51	5706.21	17
19	L19	12.70	18 c	30.6	5702.93	5703.25	1.046	5706.68*	5707.12*	0.00	5707.12	18
20	L20	3.29	18 c	20.0	5702.93	5703.33	2.000	5707.42*	5707.44*	0.00	5707.44	18
21	L21	47.52	30 c	400.0	5701.25	5715.50	3.563	5703.16	5717.77	0.32	5717.77	17
22	L22	47.63	30 c	400.0	5715.80	5726.20	2.600	5717.91	5728.47	0.00	5728.47	21
23	L23	47.70	30 c	217.3	5726.50	5732.50	2.762	5728.61	5734.77	0.48	5734.77	22
24	L24	36.14	30 c	621.3	5732.50	5743.76	1.812	5735.54	5745.77	n/a	5745.77 j	23
25	L25	20.30	18 c	67.0	5745.06	5745.96	1.343	5746.56*	5749.07*	0.00	5749.07	24
26	L26	15.61	24 c	251.2	5744.56	5749.20	1.847	5746.52	5750.60	n/a	5750.60 j	24
27	L27	11.00	18 c	82.0	5750.00	5750.49	0.598	5751.50*	5752.40*	0.00	5752.40	26
28	L28	4.84	18 c	249.0	5752.72	5762.38	3.879	5753.21	5763.22	n/a	5763.22	26
29	L29	4.85	18 c	10.0	5762.38	5762.68	3.003	5763.45	5763.52	n/a	5763.52 j	28
30	L30	88.31	36 c	51.0	5700.30	5701.83	3.001	5702.74	5704.67	1.01	5704.67	17
31	L31	58.94	36 c	32.0	5701.93	5702.57	1.999	5706.12*	5706.37*	0.43	5706.80	30
32	L32	31.70	24 c	10.0	5703.97	5704.17	1.997	5706.80*	5707.00*	0.00	5707.00	31

Lorson East PDR - D Basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
33	L33	27.33	24 c	274.1	5703.87	5707.51	1.328	5706.80*	5710.81*	0.35	5711.16	31
34	L34	27.37	24 c	143.3	5707.81	5710.40	1.807	5711.16*	5713.26*	0.35	5713.61	33
35	L35	27.38	24 c	19.4	5710.70	5711.20	2.581	5713.61*	5713.90*	0.47	5714.37	34
36	L36	11.08	18 c	120.7	5711.70	5714.00	1.905	5714.94*	5716.28*	0.18	5716.47	35
37	L37	11.08	18 c	219.8	5714.20	5719.23	2.288	5716.47	5720.50	n/a	5720.50 j	36
38	L36	30.24	18 c	13.6	5733.60	5733.93	2.430	5735.10*	5736.23*	0.00	5736.23	23
39	L39	20.30	18 c	28.3	5711.80	5712.09	1.023	5714.37*	5715.43*	0.00	5715.43	35

Lorson East PDR - D Basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1		0.00	-53.15	0.00	-53.15	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	Off
2		-19.72	-31.38	0.00	-51.10	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	1
3		-19.87	-11.51	0.00	-31.38	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	2
4		-11.51	0.00	0.00	-11.51	None	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	3
5	Inlet DP-50, 10'	10.77	0.00	10.77	0.00	Genr	6.0	10.00	2.00	4.00	2.00	0.026	2.00	0.080	0.020	0.013	0.38	12.85	0.38	12.85	0.00	13
6		34.77*	-36.82	0.00	-2.05	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	1
7		-10.54	-26.28	0.00	-36.82	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	6
8		-10.56	-15.72	0.00	-26.28	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	7
9		-15.72	0.00	0.00	-15.72	MH	6.0	6.00	2.00	4.00	2.00	Sag	2.00	0.080	0.050	0.013	0.00	0.00	0.00	0.00	0.00	8
10		-15.86	0.00	0.00	-15.86	MH	6.0	15.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	11
11	Inlet DP-52, 15'	18.80	-15.86	2.94	0.00	Genr	6.0	15.00	2.00	4.00	2.00	0.030	2.00	0.080	0.020	0.013	0.26	6.75	0.26	6.75	0.00	15
12	Inlet DP-55, 25'	31.70*	0.00	31.70	0.00	Genr	6.0	10.00	2.00	4.00	2.00	0.020	2.00	0.080	0.020	0.013	0.54	20.95	0.54	20.95	0.00	13
13	Inlet DP-56, 25'	29.70*	0.00	26.00	3.70	Genr	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.30	9.00	0.30	9.00	0.00	Off
14	Inlet DP55a, 10'	10.83	0.00	10.83	0.00	Genr	6.0	10.00	2.00	4.00	2.00	0.021	2.00	0.080	0.020	0.013	0.39	13.45	0.39	13.45	0.00	12
15	Inlet DP-53, 20'	25.53	0.00	25.53	0.00	Genr	6.0	10.00	2.00	4.00	2.00	0.020	2.00	0.080	0.020	0.013	0.50	19.25	0.50	19.25	0.00	12
16	Inlet DP-54, 15'	12.63	0.00	12.63	0.00	Genr	6.0	10.00	2.00	4.00	2.00	0.013	2.00	0.080	0.020	0.013	0.44	15.85	0.44	15.85	0.00	12
17		0.00	5.53	0.00	5.53	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	Off
18		4.59*	0.00	0.00	4.59	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	17
19	Inlet DP-65b, 10'	12.70*	0.00	12.70	0.00	Curb	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.67	27.33	0.67	27.33	0.00	Off
20	Inlet DP-65a, 5'	3.29	0.00	3.29	0.00	Curb	6.0	5.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.42	15.04	0.42	15.04	0.00	18
21		-5.20	6.14	0.00	0.94	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	17
22		-6.23	12.37	0.00	6.14	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	21

Lorson East PDR - D Basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: Inlet N-Values = 0.016 ; Intensity = 1020.33 / (Inlet time + 30.10) ^ 1.34; Return period = 100 Yrs. ; * Indicates Known Q added

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
23		-6.79	19.16	0.00	12.37	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	22
24		8.16*	11.00	0.00	19.16	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	23
25	Inlet DP-59d, 10'	20.30	0.00	20.30	0.00	Genr	6.0	10.00	2.00	4.00	2.00	0.025	2.00	0.080	0.020	0.013	0.46	16.80	0.46	16.80	0.00	19
26		11.00*	0.00	0.00	11.00	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	24
27	From Pond D1	11.00*	0.00	11.00	0.00	Hdwl	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	26
28		0.00	0.00	0.00	0.00	None	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	26
29	Inlet DP-59a, 10'	4.85	0.00	4.85	0.00	Curb	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.41	14.33	0.41	14.33	0.00	28
30	Inlet DP64, 25'	30.96*	-23.46	7.50	0.00	Genr	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.30	9.00	0.30	9.00	0.00	20
31		0.00	-23.46	0.00	-23.46	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	30
32	Inlet DP60, 25'	31.70*	-2.03	29.67	0.00	Genr	6.0	20.00	2.00	4.00	2.00	0.020	2.00	0.080	0.020	0.013	0.53	20.45	0.53	20.45	0.00	30
33		-11.57	-11.89	0.00	-23.46	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	31
34		-11.89	0.00	0.00	-11.89	MH	6.0	10.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	33
35		-11.93	-11.97	0.00	-23.90	MH	6.0	15.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	32
36		-11.97	0.00	0.00	-11.97	MH	6.0	15.00	2.00	4.00	2.00	Sag	2.00	0.080	0.020	0.013	0.00	0.00	0.00	0.00	0.00	35
37	Inlet DP61, 10'	11.08	0.00	11.08	0.00	Genr	6.0	10.00	2.00	4.00	2.00	0.026	2.00	0.080	0.020	0.013	0.38	13.00	0.38	13.00	0.00	39
38	Inlet DP- 59f, 10'	30.24	0.00	12.37	17.87	Genr	6.0	6.00	2.00	4.00	2.00	0.020	2.00	0.080	0.050	0.013	0.65	11.72	0.65	11.72	0.00	32
39	Inlet DP62, 10'	20.30*	0.00	16.30	4.00	Genr	6.0	6.00	2.00	4.00	2.00	0.020	2.00	0.080	0.050	0.013	0.56	10.04	0.56	10.04	0.00	32

Lorson East PDR - D Basins | Number of lines: 39 | Run Date: 06-22-2017

NOTES: Inlet N-Values = 0.016 ; Intensity = 1020.33 / (Inlet time + 30.10) ^ 1.34; Return period = 100 Yrs. ; * Indicates Known Q added

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	L1	69.17	48 c	76.0	5700.00	5701.90	2.500	5702.64	5704.36	0.00	5704.36	End
2	L2	64.30	48 c	15.0	5702.20	5702.58	2.533	5705.08	5704.95	n/a	5704.95	1
3	L3	58.57	48 c	169.5	5702.68	5704.38	1.003	5705.68	5706.64	n/a	5706.64 j	2
4	L4	58.57	48 c	169.5	5704.58	5706.30	1.015	5707.30	5708.56	n/a	5708.56 j	3
5	L5	58.57	48 c	269.4	5706.50	5709.20	1.002	5709.22	5711.46	n/a	5711.46 j	4
6	L6	52.75	48 c	76.4	5709.30	5710.10	1.047	5712.18	5712.25	n/a	5712.25 j	5
7	L7	46.48	48 c	152.3	5710.30	5711.83	1.005	5712.95	5713.85	n/a	5713.85 j	6
8	L8	20.00	30 c	52.5	5713.89	5716.03	4.072	5714.73*	5718.59*	0.00	5718.59	7
9	L9	6.27	18 c	149.4	5712.40	5716.67	2.859	5713.02	5717.63	n/a	5717.63	6
10	L10	5.72	24 c	29.3	5705.76	5706.34	1.981	5706.33	5707.39	0.00	5707.39	2
11	L11	5.82	18 c	31.3	5712.00	5713.31	4.180	5712.53	5714.71	0.00	5714.71	5
12	L12	6.27	18 c	21.4	5716.75	5717.46	3.315	5717.86	5718.42	n/a	5718.42 j	9
13	L13	26.48	30 c	35.2	5713.30	5713.66	1.025	5714.75	5715.62	0.00	5715.62	7
14	L14	16.11	30 c	189.0	5724.00	5726.29	1.212	5725.42	5727.63	n/a	5727.63 j	End
15	L15	12.80	24 c	165.6	5726.90	5727.90	0.604	5728.17	5729.17	0.17	5729.34	14
16	L16	3.31	18 c	142.8	5727.30	5728.90	1.120	5728.14	5729.59	n/a	5729.59 j	14
17	L17	3.31	18 c	220.3	5728.90	5739.48	4.802	5729.81	5740.17	n/a	5740.17 j	16

Lorson East PDR - E Basins | Number of lines: 17 | Run Date: 06-22-2017

NOTES: c = cir; e = ellip; b = box; Return period = 5 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	Inlet DP70, 30'	4.87	0.00	4.87	0.00	Genr	0.0	0.00	0.00	0.00	0.00	0.020	2.00	0.080	0.020	0.013	0.31	9.60	0.31	9.60	0.00	Off
2		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
3	Pipe Curve	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
4		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
5		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
6		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
7		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
8	Basin E1.3 + Pond	20.00*	0.00	20.00	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
9		1.00*	0.00	0.00	1.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
10	Inlet DP-69, 30'	4.73	1.00	5.72	0.00	Curb	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.000	0.46	8.10	0.57	8.10	2.00	Off
11	Inlet DP68, 10'	5.48	1.34	5.82	1.00	Genr	0.0	0.00	0.00	0.00	0.00	0.012	2.00	0.080	0.050	0.013	0.42	7.22	0.42	7.22	0.00	10
12	Inlet DP66d, 10'	7.61	0.00	6.27	1.34	Genr	0.0	0.00	0.00	0.00	0.00	0.020	2.00	0.080	0.050	0.013	0.40	6.82	0.40	6.82	0.00	11
13	from Basin E2-ex	26.48	0.00	26.48	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
14		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
15	from Pond E1	12.80*	0.00	12.80	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
16		1.00*	0.00	0.00	1.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
17	Inlet 66a, 5'	3.31	0.00	3.31	0.00	Curb	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.000	0.34	5.60	0.45	5.60	2.00	Off

Lorson East PDR - E Basins | Number of lines: 17 | Run Date: 06-22-2017

NOTES: Inlet N-Values = 0.016 ; Intensity = 501.75 / (Inlet time + 28.20) ^ 1.31; Return period = 5 Yrs. ; * Indicates Known Q added

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	L1	209.3	48 c	76.0	5700.00	5701.90	2.500	5703.88	5705.77	n/a	5705.77	End
2	L2	173.6	48 c	15.0	5702.20	5702.58	2.533	5707.20*	5707.42*	0.00	5707.42	1
3	L3	141.4	48 c	169.5	5702.78	5704.48	1.002	5708.42*	5710.06*	0.00	5710.06	2
4	L4	141.4	48 c	169.5	5704.48	5706.20	1.015	5710.06*	5711.71*	0.00	5711.71	3
5	L5	141.4	48 c	269.4	5706.40	5709.10	1.002	5711.71*	5714.32*	0.79	5715.10	4
6	L6	121.5	48 c	76.4	5709.30	5710.07	1.009	5715.62*	5716.16*	0.58	5716.74	5
7	L7	112.0	48 c	152.3	5710.30	5711.83	1.005	5716.96*	5717.89*	0.49	5718.38	6
8	L8	42.00	30 c	52.5	5714.93	5715.46	1.008	5718.48*	5719.03*	0.00	5719.03	7
9	L9	9.48	18 c	149.4	5712.40	5716.67	2.859	5717.75*	5718.97*	0.09	5719.06	6
10	L10	32.20	24 c	29.3	5705.76	5706.34	1.981	5708.75*	5709.35*	0.00	5709.35	2
11	L11	19.88	18 c	31.3	5712.00	5713.31	4.180	5715.10*	5716.23*	0.00	5716.23	5
12	L12	9.48	18 c	21.4	5716.75	5717.46	3.315	5719.06*	5719.23*	0.00	5719.23	9
13	L13	70.00	30 c	35.2	5713.33	5713.69	1.015	5718.38*	5719.41*	0.00	5719.41	7
14	L14	43.59	30 c	189.0	5724.00	5726.30	1.216	5726.21	5728.50	n/a	5728.50	End
15	L15	36.30	24 c	165.6	5726.90	5727.90	0.604	5728.90*	5733.17*	0.62	5733.79	14
16	L16	7.29	18 c	142.8	5727.30	5728.90	1.120	5729.65	5730.27	0.00	5730.27	14
17	L17	7.29	18 c	220.3	5728.90	5739.48	4.802	5730.29	5740.51	n/a	5740.51 j	16

Lorson East PDR - E Basins | Number of lines: 17 | Run Date: 06-22-2017

NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	Inlet DP70, 30'	13.72	22.02	35.74	0.00	Genr	0.0	0.00	0.00	0.00	0.00	0.020	2.00	0.080	0.020	0.013	0.56	21.95	0.56	21.95	0.00	Off
2		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
3	Pipe Curve	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
4		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
5		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
6		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
7		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
8	Basin E1.3	64.16*	0.00	42.00	22.16	Genr	0.0	0.00	0.00	0.00	0.00	0.012	2.00	0.080	0.020	0.013	0.73	30.40	0.73	30.40	0.00	11
9		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
10	Inlet DP-69, 30'	10.46	21.74	32.20	0.00	Curb	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.000	2.47	48.22	2.58	48.22	2.00	Off
11	Inlet DP68, 10'	12.12	29.50	19.88	21.74	Genr	0.0	0.00	0.00	0.00	0.00	0.012	2.00	0.080	0.050	0.013	0.79	14.60	0.79	14.60	0.00	10
12	Inlet DP66d, 10'	16.82	0.00	9.48	7.34	Genr	0.0	0.00	0.00	0.00	0.00	0.020	2.00	0.080	0.050	0.013	0.53	9.34	0.53	9.34	0.00	11
13	From Basin E2-ex	92.02	0.00	70.00	22.02	Genr	0.0	0.00	0.00	0.00	0.00	0.010	2.00	0.080	0.050	0.013	1.08	20.42	1.08	20.42	0.00	1
14		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
15	from Pond E1	36.30*	0.00	36.30	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
16		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	Off
17	Inlet 66a, 5'	7.29	0.00	7.29	0.00	Curb	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.050	0.000	0.54	9.52	0.64	9.52	2.00	Off

Lorson East PDR - E Basins | Number of lines: 17 | Run Date: 06-22-2017

NOTES: Inlet N-Values = 0.016 ; Intensity = 1020.33 / (Inlet time + 30.10) ^ 1.34; Return period = 100 Yrs. ; * Indicates Known Q added

DESIGN POINT SUMMARY TABLE				
DESIGN POINT	BASIN	DRAINAGE AREA (AC)	RUNOFF 5 YR (CFS)	RUNOFF 100 YR (CFS)
2	EX–C	452.97	206.3	571.6
3	EX–D	109.55	26.2	168.4
4	EX–E	186.30	91.8	266.5

EAST TRIBUTARY FEMA FLOW DATA			EAST TRIBUTARY DBPS FLOW DATA	
DESIGN POINT	RUNOFF 10 YR (CFS)	RUNOFF 100 YR (CFS)	RUNOFF 2 YR (CFS)	RUNOFF 100 YR (CFS)
ET1	2400	4750	100	4220
ET2	2600	5200	110	4530
ET3	2800	5500	110	4570
ET4	2800	5500	120	4600

LEGEND

- BASIN BOUNDARY–MAJOR
- BASIN DESIGN POINT
- BASIN I.D. / ACREAGE / 5 YR/100 YR CFS
- DIRECTION OF FLOW
- EXISTING CONTOUR
- TIME OF CONCENTRATION
- PRELIMINARY PLAN SITE AREA
- 100–YR FLOODPLAIN

UNPLATTED-BANNING LEWIS RANCH

UNPLATTED-ROLLING HILLS RANCH

EAST TRIBUTARY OF JIMMY CAMP CREEK

EX–A1 4.28 AC 1.1 | 8.0

ET1

PIONEER LANDING FILING NO. 2

OLD GLORY DR

FONTAINE BLVD

EX–C 452.97 AC 141.0/458.0

EXISTING 325' ELECTRICAL TRANSMISSION LINE ESMT

MVEA SUBSTATION SITE

MEADOWS FILING NO. 3

EAST TRIBUTARY OF JIMMY CAMP CREEK

ALLEGIANT

EX–D 109.55 AC 29.7/166.5

MEADOWS FILING NO. 4

ET2

ABANDONED FMIC CHANNEL

EXISTING 100 YR FLOOD PLAIN

ET3

ET4

Provide DP for channel flow comparison

EX–E 186.30 AC 104.0/286.0

EXISTING SDS

UNPLATTED

APPLETREE GOLF COURSE

APPLE RIDGE SUB.

APPLETREE SUB. NO. 3

PEACEFUL VALLEY LAKE ESTATES 1st FILING

HERITAGE RD

PEACEFUL VALLEY RD

PEACEFUL VALLEY LAKE ESTATES 1st FILING

RAINTREE DR

UNPLATTED

N

400 200 0 400 800

SCALE: 1"=400'

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

NO. | DESCRIPTION | DATE

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

PROJECT:
LORSON RANCH EAST
EAST OF THE EAST TRIBUTARY
EL PASO COUNTY, COLORADO

DRAWN: LJA
DESIGNED: LAB
CHECKED: RLS

EXISTING CONDITIONS
LORSON RANCH EAST
EAST OF ETRIB OF JIMMY CAMP CREEK

DATE: JUNE 30, 2017

PROJECT NO. 100.040

SHEET NUMBER 1

TOTAL SHEETS: 1

LEGEND

BASIN BOUNDARY–MAJOR

BASIN I.D.
ACREAGE
5 YR/100 YR CFS

DIRECTION OF FLOW

6690 EXISTING CONTOUR

6690 PROPOSED CONTOUR

PRELIMINARY PLAN SITE AREA

NOTE:

1. OVERALL BASIN "C" FLOWS TO FULL SPECTRUM DETENTION POND C5 AND OVERALL BASIN "D" FLOWS TO FULL SPECTRUM DETENTION POND D2

2. EXISTING DRAINAGE BASINS EAST OF THE POWERLINE EASEMENT WILL BE ROUTED TO FUTURE PONDS UNDER THE POWERLINE EASEMENT PER THE LORSON RANCH MDDP FOR AREAS EAST OF THE EAST TRIBUTARY.

3. INTERIM PONDS ARE REQUIRED TO BE CONSTRUCTED TO REDUCE EXISTNG FLOW DRAINING WEST UNDER THE ELECTRIC EASEMENT TO RATES THAT CAN BE ACCOMODATED BY THE PROPOSED STORM SEWER/STREETS. INTERIM POND CONSTRUCTION CAN BE PHASED BASED ON DOWNSTREAM DEVELOPMENT.

UNPLATTED-
BANNING
LEWIS
RANCH

EAST TRIBUTARY OF
JIMMY CAMP CREEK

UNPLATTED-
ROLLING
HILLS
RANCH

PIONEER
LANDING
FILING
NO. 2

OLD GLORY DR

OVERALL BASIN "C"
171 acres
TO POND C5

POND
C5

FUTURE
SCHOOL
SITE

FONTAINE BLVD

C12a–ex
27ac
14 | 78

C12–ex
73ac
31 | 172

EXISTING 325' ELECTRICAL
TRANSMISSION LINE ESMT

INTERIM
POND C3

INTERIM
POND
C2.2

C14–ex
119ac
45 | 252

INTERIM
POND C2.3

MVEA
SUBSTATION

INTERIM
POND C1

MEADOWS
FILING
NO. 3

EAST TRIBUTARY OF
JIMMY CAMP CREEK

OLD GLORY DR

ALLEGIANT

OVERALL BASIN "D"
72 acres
TO POND D2

LAMPREY DR

C15–ex
55ac
24 | 134

POND
D2

LORSON BLVD

INTERIM
POND D1

D1–ex
17ac
8 | 47

UNPLATTED
LORSON RANCH

E
21.0ac
24.9 | 68.7

INTERIM
POND E1

TRAPPE DR

EAST TRIBUTARY OF
JIMMY CAMP CREEK

Provide DP for
channel flow
comparison

INTERIM
POND E2

E1–ex
57ac
25 | 142

EXISTING SDS

E2–ex
30ac
26 | 91

UNPLATTED

UNPLATTED
APPLETREE
GOLF
COURSE

APPLE
RIDGE
SUB.

APPLETREE SUB. NO. 3

PEACEFUL VALLEY
LAKE ESTATES
1st FILING

HERITAGE RD

PEACEFUL VALLEY RD

PEACEFUL VALLEY
LAKE ESTATES
1st FILING

RAINTREE DR

N

400 200 0 400 800
SCALE: 1"=400'

CORE ENGINEERING GROUP
15004 1ST AVENUE S.
BURNSVILLE, MN 55306
PH: 719.570.1100
CONTACT: RICHARD L SCHINDLER, P.E.
EMAIL: rlsc@ecg1.com

NO. | DESCRIPTION | DATE

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

PROJECT:
LORSON RANCH EAST
EAST OF THE EAST TRIBUTARY
EL PASO COUNTY, COLORADO

DRAWN: LJA
DESIGNED: LAB
CHECKED: RLS

OVERALL DEVELOPED CONDITIONS
LORSON RANCH EAST
EAST OF ETRIB OF JIMMY CAMP CREEK

DATE:
JUNE 30, 2017

PROJECT NO.
100.040

SHEET NUMBER
1

TOTAL SHEETS: 1

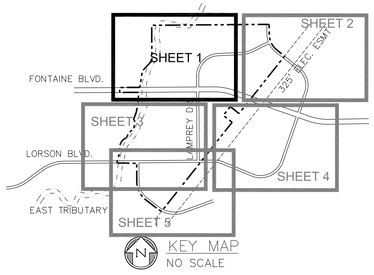
Adjust missing label

RUNOFF SUMMARY

DESIGN POINT	5 YEAR	100 YEAR	NOTES
1	9.4	21.0	FLOW IN SWALE
6a	6.61	24.87	STREET FLOW
6c	7.6	40.5	FLOW IN STM SWR TO SCHOOL
6b	6.8	20.2	STREET FLOW
7	0.3	0.6	STREET FLOW
8	6.2	25.2	STREET FLOW
9	75.68	105.3	FLOW IN STM SWR
10	6.0	12.5	STREET FLOW
10a	5.7	20.7	STREET FLOW
10b	3.2	6.9	STREET FLOW
10c	0.6	1.3	STREET FLOW
11	105.5	154.8	FLOW IN STM SWR
12	8.0	16.65	STREET FLOW
12a	8.78	18.28	STREET FLOW
13	8.35	25.48	STREET FLOW
14	1.1	14.44	STREET FLOW
15	25.69	39.15	FLOW IN STM SWR
16	12.8	57.3	STREET FLOW
17	3.9	31.6	STREET FLOW
18	147.9	230.8	STM SWR INTO POND C5
27	38.11	92.58	FLOW IN STM SWR
29	8.6	20.8	STREET FLOW
30	7.2	20.1	STREET FLOW
31	19.36	42.12	FLOW IN STM SWR
32	23.58	137.5	FLOW IN STM SWR
32a	59.01	226.9	FLOW IN STM SWR
33	8.2	26.3	STREET FLOW
34	0.9	8.0	STREET FLOW
34a	77.65	272.7	FLOW IN STM SWR
35	2.8	6.1	STREET FLOW
36	0.3	0.6	STREET FLOW
37	77.41	275.5	STM SWR INTO POND C5
40	12.9	39.4	STREET FLOW
41	2.0	19.3	STREET FLOW
42	3.2	7.2	STREET FLOW
43	27.33	65.94	STM SWR INTO POND C5
44	102.5	339.2	FLOW INTO POND C5 FROM SOUTH
45	157.0	484.0	TOTAL FLOW INTO POND C5
46	141.0	420.0	FLOW INTO EAST TRIBUTARY
47	7.8	13.9	STREET FLOW
48	8.9	16.0	STREET FLOW

LEGEND

- DRAINAGE MAJOR BASIN BOUNDARY
- DRAINAGE MINOR BASIN BOUNDARY (OFF-SITE)
- BASIN — BASIN I.D. / XX AC / X.X | X.X — ACREAGE, 5 YR/100 YR CFS
- DIRECTION OF FLOW
- 6690 — EXISTING CONTOUR
- 6670 — PROPOSED CONTOUR
- HP — HIGH POINT
- LP — LOW POINT
- TIME OF CONCENTRATION
- 100-YR FLOODPLAIN (FEMA)
- SITE BOUNDARY
- REVISED 100-YR FLOODPLAIN PER KIOWA CLOMR



ETRIB OF JCC

UNPLATTED BANNING LEWIS RANCH

PIONEER LANDING FILING NO. 2

60' SDS ESMT

TARBELL DR.

SHAVERS DR.

WACISSA DR.

NASH DR.

MUMFORD DR.

LAMPREY DR.

CLARION DR.

ZEALAND DR.

BALLONA DR.

PEDISTO DR.

OLD GLORY DR.

FONTAINE BLVD.

MATTA DR.

C16.30 4.54 AC 6.8 | 15.2

C16.31 9.9 AC 6.9 | 27.4

A1 4.17 AC 3.9 | 12.3

C16.15 2.28 AC 4.7 | 10.5

C16.22 2.88 AC 5.1 | 11.3

C16.20 2.84 AC 5.7 | 12.6

C16.24 2.79 AC 4.5 | 10.1

C16.14 0.10 AC 0.3 | 0.6

C16.23 1.46 AC 2.6 | 5.8

C16.21 1.78 AC 3.2 | 7.2

C16.25 0.43 AC 0.9 | 2.0

C16.19 1.65 AC 3.1 | 6.9

C16.18 2.96 AC 5.5 | 12.2

C16.17 1.64 AC 3.0 | 6.6

C13.1 1.7ac 6.4 | 11.5

C16.16 1.29 AC 2.4 | 5.4

C13 19.21ac 7.6 | 40.5

C16.29 2.01 AC 3.7 | 8.3

C16.27 0.23 AC 0.6 | 1.3

C16.32 0.97AC 1.8 | 4.1

C16.36 7.7ac 6.3 | 24.7

C16.26 1.42 AC 2.8 | 6.2

C16.28 2.09 AC 3.9 | 8.6

C16.33 0.21AC 1.1 | 2.0

C16.35 1.46 AC 2.8 | 6.2

C16.34 0.38 AC 0.9 | 1.9

C17.10 1.73ac 8.9 | 16.0

C17.9 2.34ac 7.8 | 13.9

C17.8 1.52ac 3.2 | 7.2

C17.5 3.72ac 6.7 | 22.1

C15.10 0.60ac 1.2 | 2.7

C17.4 1.98ac

POND B1

POND C5

Overflow Swale
27' btm, 1' deep, 2% slope, 4:1 sides
Access Road
66" cmp

Overflow
52' btm.
5713.00

3-CDOT Type D Outlets W/ 48" RCP

66" CMP

existing 42" RCP @ 0.4%

48" RCP @ 0.5%

24" RCP @ 0.5%

2-5' TYPE R INLETS

10' TYPE R INLET

5' TYPE R INLET

36" RCP

20' Type R

18" RCP

24" RCP

30" RCP

42" RCP

54" RCP

60" RCP

10' Type R

5' Type R

15' Type R

25' Type R

48" RCP

SEE SHEET 3

SEE SHEET 2

school site

SCALE: 1"=100'

CORE ENGINEERING GROUP
15004 1ST AVE. S.
MINNEAPOLIS, MN 55306
PH: 719.570.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@eeg1.com

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

PROJECT:
LORSON RANCH EAST
FONTAINE BLVD. - EAST TRIBUTARY OF JCC
EL PASO COUNTY, COLORADO

NO. | DESCRIPTION | DATE

DRAWN: RLS
DESIGNED: LAB
CHECKED: LAB

DEVELOPED CONDITIONS DRAINAGE PLAN - NORTHWEST AREA LORSON RANCH EAST

DATE: JUNE 30, 2017

PROJECT NO. 100.040

SHEET NUMBER 1

TOTAL SHEETS: 5

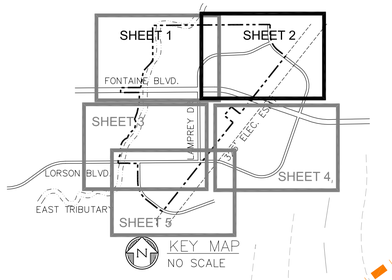
P:\100.100.040\Drainage\100.040-Backconditions.dwg, Jun 29, 2017 - 4:39pm

RUNOFF SUMMARY			
DESIGN POINT	5 YEAR	100 YEAR	NOTES
1	9.4	21.0	FLOW IN SWALE
2	33.0	40.5	FUTURE FLOW IN STM SWR
3	8.9	20.3	STREET FLOW
4	10.47	12.82	STREET FLOW
5	0.3	0.6	STREET FLOW
6	12.82	32.62	STREET FLOW
6a	6.61	24.87	STREET FLOW
6c	7.6	40.5	FLOW IN STM SWR TO SCHOOL
6b	6.8	20.2	STREET FLOW
7	0.3	0.6	STREET FLOW
8	6.2	25.2	STREET FLOW
9	75.68	105.3	FLOW IN STM SWR

RUNOFF SUMMARY			
DESIGN POINT	5 YEAR	100 YEAR	NOTES
10	6.0	12.5	STREET FLOW
10a	5.7	20.7	STREET FLOW
10b	3.2	6.9	STREET FLOW
10c	0.6	1.3	STREET FLOW
11	105.5	154.8	FLOW IN STM SWR
12	8.0	16.65	STREET FLOW
12a	8.78	18.28	STREET FLOW
13	8.35	25.48	STREET FLOW
14	1.1	14.44	STREET FLOW
15	25.69	39.15	FLOW IN STM SWR
16	12.8	57.3	STREET FLOW
17	3.9	31.6	STREET FLOW

LEGEND

- DRAINAGE MAJOR BASIN BOUNDARY
- DRAINAGE MINOR BASIN BOUNDARY (OFF-SITE)
- SITE BOUNDARY
- BASIN (XX AC, X.X | X.X) — BASIN I.D., ACREAGE, 5 YR/100 YR CFS
- DIRECTION OF FLOW
- 6690 — EXISTING CONTOUR
- 6670 — PROPOSED CONTOUR
- HP — HIGH POINT
- LP — LOW POINT
- GB — GRADE BREAK
- TC — TOP BACK OF CURB
- FL — FLOWLINE
- TIME OF CONCENTRATION
- 100-YR FLOODPLAIN (FEMA)
- REVISED 100-YR FLOODPLAIN PER KIOWA CLOMR



Rip Rap Rundown 6" d50, 12" thick

NORTH DIVERSION SWALE "V" swale, 2.5' deep, 1% slope, 3:1 sides

ETRIB OF JCC

UNPLATTED BANNING LEWIS RANCH

UNPLATTED ROLLING HILLS RANCH

FUTURE LORSON RESIDENTIAL

FUTURE LORSON RESIDENTIAL

school site

A1 4.17 AC 3.9 | 12.3

OS-C11 6.48 AC 9.4 | 21.0

C16.30 4.54 AC 6.8 | 15.2

C16.8 0.53 AC 1.2 | 2.7

C16.6 1.43 AC 2.7 | 5.9

C16.5 0.50 AC 1.1 | 2.4

C16.9 1.60 AC 3.6 | 8.0

C16.1 2.68 AC 6.0 | 13.3

C16.15 2.28 AC 4.7 | 10.5

C16.13 3.92 AC 6.8 | 15.1

C16.12 1.82 AC 4.2 | 9.3

C16.10 0.52 AC 1.2 | 2.7

C16.11 0.38 AC 0.8 | 1.8

C16.7 0.54 AC 1.2 | 2.6

C16.22 2.88 AC 5.1 | 11.3

C16.20 2.84 AC 5.7 | 12.6

C16.24 2.79 AC 4.5 | 10.1

C16.14 0.10 AC 0.3 | 0.6

C16.3 1.78 AC 3.6 | 7.9

C16.4 0.81 AC 1.7 | 3.9

C16.2 1.82 AC 3.6 | 7.9

C12 20.52 AC 33.0 | 73.5

C16.23 1.46 AC 2.6 | 5.8

C16.21 1.78 AC 3.2 | 7.2

C16.25 0.43 AC 0.9 | 2.0

C16.18 2.96 AC 5.5 | 12.2

C16.19 1.65 AC 3.1 | 6.9

C16.17 1.64 AC 3.0 | 6.6

C13.1 1.7ac 6.4 | 11.5

C16.16 1.29 AC 2.4 | 5.4

C13 19.21ac 7.6 | 40.5

C16.29 2.01 AC 3.7 | 8.3

C16.27 0.23 AC 0.6 | 1.3

C16.32 0.97AC 1.8 | 4.1

C16.26 1.42 AC 2.8 | 6.2

C16.28 2.09 AC 3.9 | 8.6

60' SDS ESMT

TARBELL DR.

NASH DR.

CLARION DR.

ZEALAND DR.

WACISSA DR.

SHAVERS DR.

NAPA DR.

YAMHILL DR.

MUMFORD DR.

HALIFAX DR.

LAMPREY DR

TOLT DR.

LORSON BLVD.

10' Type R

15' Type R

5' Type R

24" RCP

30" RCP

36" RCP

42" RCP

48" RCP

54" RCP

25' Type R

L.P.

SEE SHEET 3

SEE SHEET 4

100 50 0 100 200

SCALE: 1"=100'

CORE ENGINEERING GROUP
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MINNEAPOLIS, MN 55306
PH: 719.570.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@ceg1.com

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

NO.	DESCRIPTION	DATE

PROJECT:
LORSON RANCH EAST
FONTAINE BLVD. - EAST TRIBUTARY OF JCC
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: LAB

DEVELOPED CONDITIONS DRAINAGE PLAN - NORTHEAST AREA LORSON RANCH EAST

DATE
JUNE 30, 2017

PROJECT NO.
100.040

SHEET NUMBER
2

TOTAL SHEETS: 5

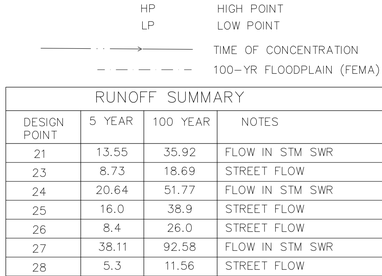
P:\100.040 Drainage\DWG\Drainage plan.dwg, 2017 6:28pm

LEGEND

- DRAINAGE MAJOR BASIN BOUNDARY
- DRAINAGE MINOR BASIN BOUNDARY (OFF-SITE)
- SITE BOUNDARY
- BASIN I.D. / ACREAGE / 5 YR/100 YR CFS
- DIRECTION OF FLOW
- 6690 EXISTING CONTOUR
- 6670 PROPOSED CONTOUR
- HP HIGH POINT
- LP LOW POINT
- TIME OF CONCENTRATION
- 100-YR FLOODPLAIN (FEMA)

RUNOFF SUMMARY

DESIGN POINT	5 YEAR	100 YEAR	NOTES
21	13.55	35.92	FLOW IN STM SWR
23	8.73	18.69	STREET FLOW
24	20.64	51.77	FLOW IN STM SWR
25	16.0	38.9	STREET FLOW
26	8.4	26.0	STREET FLOW
27	38.11	92.58	FLOW IN STM SWR
28	5.3	11.56	STREET FLOW
29	8.6	20.8	STREET FLOW
30	7.2	20.1	STREET FLOW
31	19.36	42.12	FLOW IN STM SWR
32	23.58	137.5	FLOW IN STM SWR
32a	59.01	226.9	FLOW IN STM SWR
33	8.2	26.3	STREET FLOW
34	0.9	8.0	STREET FLOW
34a	77.65	272.7	FLOW IN STM SWR
35	2.8	6.1	STREET FLOW
36	0.3	0.6	STREET FLOW
37	77.41	275.5	STM SWR INTO POND C5
38	5.9	14.43	STREET FLOW
39	8.61	21.53	STREET FLOW
40	12.9	39.4	STREET FLOW
41	2.0	19.3	STREET FLOW
42	3.2	7.2	STREET FLOW
43	27.33	65.94	STM SWR INTO POND C5
44	102.5	339.2	FLOW INTO POND C5 FROM SOUTH
45	157.0	484.0	TOTAL FLOW INTO POND C5
52	15.44	34.7	STREET FLOW
53	14.65	41.47	STREET FLOW
54	7.0	15.5	STREET FLOW
55a	10.18	22.63	STREET FLOW
55	7.8	40.4	STREET FLOW
56	7.2	29.7	STREET FLOW
59a	2.2	4.8	STREET FLOW



SEE SHEET 1
SEE SHEET 2
SEE SHEET 4
SEE SHEET 5

ETRIB OF JCC

POND D2

Overflow Swale, 8' btm, 2.5' deep, 2% slope, 4:1 sides

3-CDOT Type D Outlets W/ 48" RCP

66" CMP

60' SDS ESMT

BALLONA DR.

5' TYPE R INLET

5' Type R

5' TYPE R INLET

15' Type R

54" RCP

36" RCP

60" RCP

30" RCP

FONTAINE BLVD.

42" RCP

10' Type R

Overflow Swale 15' btm, 1' deep, 2% slope, 4:1 sides

20' Type R

ROCKCASTLE DR.

18" RCP

MATTA DR.

24" RCP

25' Type R

36" RCP

Overflow Swale, 10' btm, 1' deep, 1% slope, 5:1 sides

30" RCP

LAMINE DR.

CHAPLIN DR.

WEBSER DR.

LAMPREY DR

VEDDER DR

TILLAMOOK DR

PIGEON DR.

ALISD DR.

ROWLEY DR.

NOLIN DR.

YUBA DR.

TIFFIN DR.

25' TYPE R

48" RCP

10' Type R

C16.33 0.21AC 1.1 2.0

C16.34 0.38 AC 0.9 1.9

C16.35 1.46 AC 2.8 6.2

C17.8 1.52ac 3.2 7.2

C17.5 3.72ac 6.7 22.1

C17.4 1.98ac 3.2 7.1

C17.7 2.68 ac 6.0 13.3

C17.6 1.04 ac 1.9 6.1

C17.3 2.21 ac 4.5 10.0

C17.2 4.11ac 8.6 19.1

C17.1 2.68ac 5.9 13.2

C17.1a 2.81ac 5.3 11.8

C15.10 0.60ac 1.2 2.1

C15.14 1.32ac 2.9 6.4

C15.12 0.61ac 1.2 2.6

C15.11 3.20ac 6.1 13.7

C15.15 4.02ac 7.2 16.0

C15.13 2.35ac 4.5 10.1

C14 2.35 AC 6.6 13.6

C15.9 2.27ac 4.9 11.0

C15.7 2.07ac 3.9 8.8

C15.6 1.80ac 3.3 7.4

C15.4 1.25ac 2.6 5.8

C15.5 2.90ac 5.9 13.1

C15.3 3.60ac 6.4 14.3

D1.4 2.80 ac 5.2 11.6

D1.7 3.5ac 7.0 15.5

D1.5 5.15ac 10.6 23.7

D1.6 5.1ac 8.4 18.7

D1.8 1.7ac 3.2 7.1

D1.11 1.4ac 2.6 5.8

D1.9 2.2ac 4.1 9.1

D1.10 5.5ac 9.9 22.2

D1.12 4.45ac 3.9 15.4

D2.1 3.14ac 5.4 12.1

D2.2 1.11ac 2.1 4.7

100 50 0 100 200

SCALE: 1"=100'

CORE ENGINEERING GROUP
15004 1ST AVE. S
BURNSVILLE, MN 55306
PH: 719.570.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@eeg1.com

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

PROJECT: LORSON RANCH EAST
FONTAINE BLVD. - EAST TRIBUTARY OF JCC
EL PASO COUNTY, COLORADO

NO. | DESCRIPTION | DATE

DRAWN: RLS
DESIGNED: LAB
CHECKED: LAB

DEVELOPED CONDITIONS DRAINAGE PLAN - MIDDLE WEST AREA LORSON RANCH EAST

DATE: JUNE 30, 2017

PROJECT NO. 100.040

SHEET NUMBER 3

TOTAL SHEETS: 5

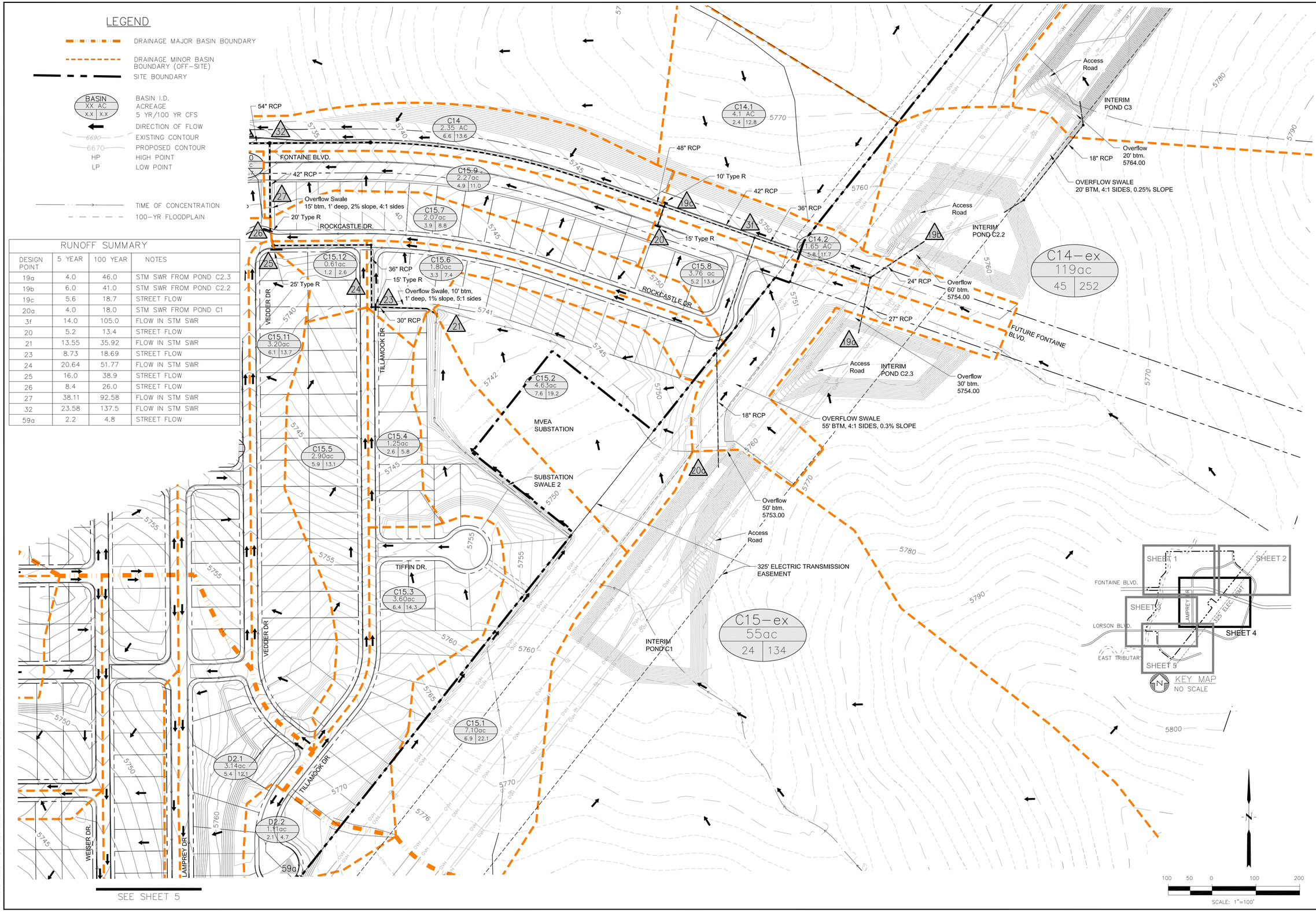
P:\100.100.040\Drainage\100.040-PreDevelopment.dwg, Jun 29, 2017 - 5:27pm

LEGEND

- DRAINAGE MAJOR BASIN BOUNDARY
- DRAINAGE MINOR BASIN BOUNDARY (OFF-SITE)
- SITE BOUNDARY
- BASIN I.D. / ACREAGE / 5 YR/100 YR CFS
- DIRECTION OF FLOW
- EXISTING CONTOUR
- PROPOSED CONTOUR
- HP HIGH POINT
- LP LOW POINT
- TIME OF CONCENTRATION
- 100-YR FLOODPLAIN

RUNOFF SUMMARY

DESIGN POINT	5 YEAR	100 YEAR	NOTES
19a	4.0	46.0	STM SWR FROM POND C2.3
19b	6.0	41.0	STM SWR FROM POND C2.2
19c	5.6	18.7	STREET FLOW
20a	4.0	18.0	STM SWR FROM POND C1
3f	14.0	105.0	FLOW IN STM SWR
20	5.2	13.4	STREET FLOW
21	13.55	35.92	FLOW IN STM SWR
23	8.73	18.69	STREET FLOW
24	20.64	51.77	FLOW IN STM SWR
25	16.0	38.9	STREET FLOW
26	8.4	26.0	STREET FLOW
27	38.11	92.58	FLOW IN STM SWR
32	23.58	137.5	FLOW IN STM SWR
59a	2.2	4.8	STREET FLOW



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

PROJECT:
LORSON RANCH EAST
FONTAINE BLVD. - EAST TRIBUTARY OF JCC
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: LAB

DEVELOPED CONDITIONS DRAINAGE PLAN - EAST AREA LORSON RANCH EAST

DATE: JUNE 30, 2017
PROJECT NO. 100.040
SHEET NUMBER 4
TOTAL SHEETS: 5

P:\100.100.040 Drainage\100.040 DevelopedConditions.dwg Jun 29, 2017 - 5:29pm

SEE SHEET 3

SEE SHEET 4

Overflow Swale, 8' btm, 2.5' deep, 2% slope, 4:1 sides

POND D2

4'x14' Outlet W/ 48" RCP

Overflow 30' btm. 5702.00

Access Road

ETRIB OF JCC

Provide DP and prelim. outlet design

CDOT Type D Outlet W/ 48" RCP

INTERIM POND E2

Existing Swale into East Trib

Overflow 15' btm. 5698.00

Access Road

Provide DP for channel flow comparison

INTERIM POND D1

Overflow 25' btm. 5760.00

Access Road

INTERIM POND E1

Overflow 40' btm. 5737.35

Basin E1.3 Swale "V" swale, 3' deep, 2.5% slope, 4:1 sides

Diversion Swale "V" swale, 3' deep, 2% slope, 4:1 sides

24" RCP FROM FUTURE POND E1

18" RCP FROM FUTURE POND D1

D1.12 4.45ac 3.9 15.4

D1.10 5.5ac 9.9 22.2

D1.3 0.86ac 1.7 3.8

D1.2 1.10ac 2.5 5.6

D1.1 5.09ac 8.0 17.9

D2.13 2.51ac 4.0 9.0

D2.11 0.40ac 2.0 3.6

D2.10 0.80ac 1.9 5.0

D2.9 3.15ac 5.5 12.2

D2.8 3.7ac 7.7 17.2

D2.7 2.98ac 6.7 15.0

D2.12 2.78ac 5.4 12.0

D2.6 2.13ac 4.3 9.5

D2.5 3.93ac 8.8 19.6

D2.4 3.33ac 3.6 11.9

D2.2 1.11ac 2.1 4.7

D2.3 2.80ac 2.7 9.7

E1.1 1.41ac 3.2 7.0

E1.2 3.61ac 7.3 16.1

E1.3 6.81ac 4.7 21.7

E1.4 0.65ac 1.3 2.9

E1.5 1.95ac 4.1 9.2

E1.6 2.32ac 4.5 10.1

E1.7 3.5ac 4.7 13.3

D1-ex 17ac 8 47

E1-ex 57ac 25 142

E2-ex 29.5ac 26.0 91.0

LAMINE DR.

WEISER DR.

LAMPREY DR.

SACO DR.

WILLAPA DR.

LORSON BLVD.

FUTURE LORSON BLVD.

WITCHER DR.

TRAPPE DR.

MAGOTHY DR.

VOLGA DR.

YOCONA DR.

ABITA DR.

SKUNA DR.

HORTON DR.

FUTURE TRAPPE DR.

FONTAINE BLVD.

LAMPREY DR.

325' ELECTRIC TRANSMISSION EASEMENT

60' SDS ESMT

EAST TRIBUTARY

SHEET 1

SHEET 2

SHEET 3

SHEET 4

SHEET 5

KEY MAP
NO SCALE

LEGEND

- DRAINAGE MAJOR BASIN BOUNDARY
- DRAINAGE MINOR BASIN BOUNDARY (OFF-SITE)
- SITE BOUNDARY
- BASIN I.D. / ACREAGE / 5 YR/100 YR CFS
- DIRECTION OF FLOW
- EXISTING CONTOUR
- PROPOSED CONTOUR
- HP HIGH POINT
- LP LOW POINT
- TIME OF CONCENTRATION
- 100-YR FLOODPLAIN (FEMA)

100 50 0 100 200

SCALE: 1"=100'

RUNOFF SUMMARY

DESIGN POINT	5 YEAR	100 YEAR	NOTES
50	10.01	22.27	STREET FLOW
51	14.68	21.6	FLOW IN STM SWR
55a	10.18	22.63	STREET FLOW
55	7.8	40.4	STREET FLOW
56	7.2	29.7	STREET FLOW
57	63.6	121.6	STM SWR INTO POND D2
58	130.39	241.0	TOTAL FLOW INTO POND D2
59a	2.2	4.8	STREET FLOW
59b	2.0	11.0	STM SWR FROM POND D1
59c	4.19	15.61	FLOW IN STM SWR
59d	10.7	23.7	STREET FLOW
59e	14.85	36.14	FLOW IN STM SWR
59f	13.68	30.47	STREET FLOW
59g	23.43	47.7	FLOW IN STM SWR
60	15.8	55.9	STREET FLOW
61	10.57	23.68	STREET FLOW
62	10.1	30.3	STREET FLOW
63	18.63	27.38	FLOW IN STM SWR
64	3.2	29.2	STREET FLOW
65	37.54	88.31	FLOW IN STM SWR
65a	2.0	4.0	STREET FLOW
65b	4.2	12.7	STREET FLOW
65c	66.8	119.9	STM SWR INTO POND D2
66a	3.3	7.3	STREET FLOW
66b	12.8	36.3	STM SWR FROM POND E1
66c	16.11	43.59	FLOW IN STM SWR
66d	7.57	16.78	STREET FLOW
67a	26.0	92.0	FLOW IN SWALE
67b	20.0	64.1	FLOW IN SWALE
68	6.7	41.7	STREET FLOW
69	5.7	32.2	STREET FLOW
70	4.9	35.7	STREET FLOW
71	69.2	209.3	SWALE INTO POND E2

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CONTACT: JEFF MARK

PROJECT:
LORSON RANCH EAST
FONTAINE BLVD. - EAST TRIBUTARY OF JCC
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: LAB

DEVELOPED CONDITIONS
DRAINAGE PLAN - SOUTH AREA
LORSON RANCH EAST

DATE
JUNE 30, 2017

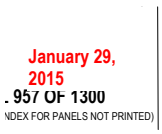
PROJECT NO.
100.040

SHEET NUMBER
5

TOTAL SHEETS: 5

Markup Summary

alex.dabdub (4)



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January 29, 2015

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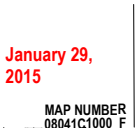

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January 29, 2015

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dsdrice (26)

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constructed?

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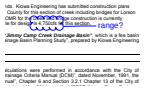
See MDDP comments



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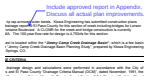

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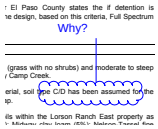
Include approved report in Appendix. Discuss all actual plan improvements.



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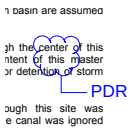

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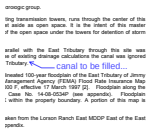

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canal to be filled...

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Date: 8/15/2017 8:55:23 AM
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CLOMR in progress...

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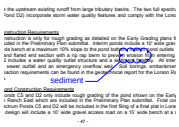
You can't detain undeveloped areas without a complete downstream channel flow analysis.



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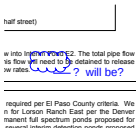
sediment



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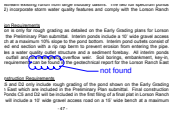
? will be?



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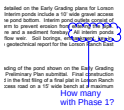

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Author: dsdrice
Date: 8/15/2017 1:14:12 PM
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How many with Phase 1?

Subject: Cloud+
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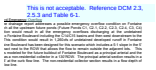
Author: dsdrice
Date: 8/15/2017 1:14:22 PM
Color:

The outlets need to accommodate historic flows; spillways and downstream conveyances need to accommodate developed flows.



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This is not acceptable. Reference DCM 2.3, 2.5.3 and Table 6-1.

Subject: Cloud+
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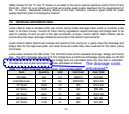
Date: 8/15/2017 1:04:56 PM
Color:

Which basins? BMP maint. agreement will be required. Address maintenance entity.



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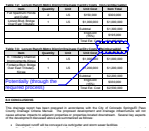
Date: 8/15/2017 1:09:10 PM
Color:

The drainage costs anticipated?



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Author: dsdrice
Date: 8/15/2017 1:07:17 PM
Color:

Potentially (through the required process)

Subject: Text Box
Page Label: 72
Lock: Unlocked
Status:
Checkmark: Unchecked
Author: dsdrice
Date: 8/15/2017 10:12:24 AM
Color:

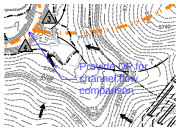
Provide runoff coefficients tables and land use/impervious percentages table used for calculations.

Subject: Cloud+
Page Label: 127
Lock: Unlocked
Status:
Checkmark: Unchecked
Author: dsdrice
Date: 8/15/2017 3:29:49 PM
Color:

This table (for all ponds that receive flow from upstream ponds) needs to be recreated with Hydraflow output

Subject: Text Box
Page Label: 135
Lock: Unlocked
Status:
Checkmark: Unchecked
Author: dsdrice
Date: 8/15/2017 11:29:28 AM
Color:

This is not acceptable. Reference DCM 2.3, 2.5.3 and Table 6-1.



Subject: Callout
Page Label: 169
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Status:
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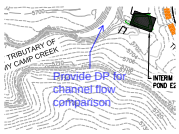
Author: dsdrice
Date: 8/15/2017 10:37:10 AM
Color:

Provide DP for channel flow comparison



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Status:
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Author: dsdrice
Date: 8/15/2017 10:36:01 AM
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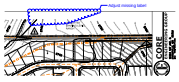
Provide DP for channel flow comparison



Subject: Cloud+
Page Label: 171
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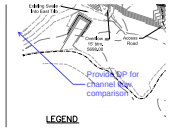
Status:
Checkmark: Unchecked
Author: dsdrice
Date: 8/15/2017 10:15:29 AM
Color:

Adjust missing label



Subject: Callout
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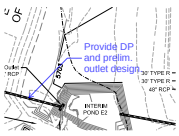
Checkmark: Unchecked
Author: dsdrice
Date: 8/15/2017 10:34:37 AM
Color:

Provide DP for channel flow comparison



Subject: Callout
Page Label: 175
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Status:
Checkmark: Unchecked
Author: dsdrice
Date: 8/15/2017 10:33:51 AM
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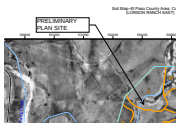
Provide DP and prelim. outlet design.

RSchindler (14)



Subject: Callout
Page Label: 58
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Checkmark: Unchecked
Author: RSchindler
Date: 6/28/2017 8:47:40 AM
Color:

PRELIMINARY PLAN SITE

Subject: Polygonal Line
Page Label: 58
Lock: Unlocked
Status:
Checkmark: Unchecked
Author: RSchindler
Date: 6/23/2017 9:14:23 AM
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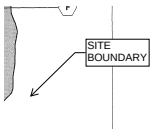

Subject: Callout
Page Label: 61
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Status:
Checkmark: Unchecked
Author: RSchindler
Date: 6/28/2017 8:49:26 AM
Color:

SITE
BOUNDARY

Subject: Polygonal Line
Page Label: 61
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Status:
Checkmark: Unchecked
Author: RSchindler
Date: 6/28/2017 8:48:13 AM
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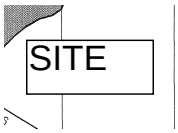

Subject: Text Box
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Author: RSchindler
Date: 6/28/2017 8:48:07 AM
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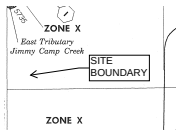
SITE



Subject: Callout
Page Label: 62
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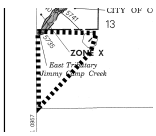
Author: RSchindler
Date: 6/28/2017 8:50:26 AM
Color:

SITE
BOUNDARY



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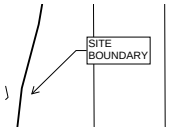
Status:
Checkmark: Unchecked
Author: RSchindler
Date: 6/28/2017 8:50:35 AM
Color:



Subject: Callout
Page Label: 63
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Status:
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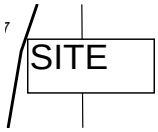
Author: RSchindler
Date: 6/28/2017 8:52:23 AM
Color:

SITE
BOUNDARY

Subject: Polygonal Line
Page Label: 63
Lock: Unlocked
Status:
Checkmark: Unchecked
Author: RSchindler
Date: 6/28/2017 8:51:48 AM
Color:



Subject: Text Box
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Lock: Unlocked
Status:
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Author: RSchindler
Date: 6/28/2017 8:52:33 AM
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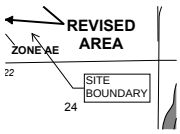
SITE



Subject: Callout
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Date: 6/28/2017 8:53:23 AM
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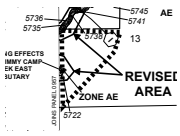
SITE
BOUNDARY



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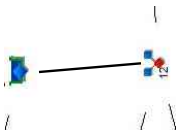
Date: 6/28/2017 8:53:15 AM
Color:



Subject: Line
Page Label: 112
Lock: Unlocked
Status:
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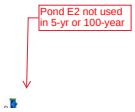
Author: RSchindler
Date: 6/27/2017 7:31:49 PM
Color:



Subject: Callout
Page Label: 112
Lock: Unlocked
Status:
Checkmark: Unchecked
Author: RSchindler
Date: 6/27/2017 7:48:18 PM
Color:

Pond E2 not used in 5-yr or 100-year