FINAL DRAINAGE REPORT FOR BANNING LEWIS RANCH FILINGS 37 & 38 (VILLAGE 3)

August 2021

Prepared for:
CLAYTON PROPERTIES GROUP II INC.
DBA OAKWOOD COLORADO SPRINGS
1290 NORTH NEWPORT ROAD
COLORADO SPRINGS, CO 80916
(719) 380-5051
Attn: Jarrod Walker

Prepared by:
CLASSIC CONSULTING ENGINEERS & SURVEYORS, LLC
619 N. CASCADE AVE. SUITE 200
COLORADO SPRINGS CO 80903
(719) 785-0790
Matt Larson E.I. &
Kyle Campbell P.E.

Job No. 2570.21

Banning Lewis Ranch Filings 37 & 38
Engineer's Statement

This report and plan for the drainage design of **Banning Lewis Ranch Filings 37 & 38** was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan has been prepared in accordance with the City of Colorado Springs Drainage Criteria Manual and is in conformity with the master plan of the drainage basin. I understand that the City of Colorado Springs does not and will not assume liability for drainage facilities designed by others. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

SIGNATURE (Affix Seal): _____

Colorado P.E. No. 29794 Date

Developer's Statement

Clayton Properties Group II Inc. dba Oakwood Homes Colorado Springs hereby certifies that the drainage facilities for **Banning Lewis Ranch Filings 37 & 38** shall be constructed according to the design presented in this report. I understand that the City of Colorado Springs does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that are submitted to the City of Colorado Springs pursuant to section 7.7.906 of the City Code; and cannot, on behalf of **Banning Lewis Ranch Filings 37 & 38,** guarantee that final drainage design review will absolve **Clayton Properties Group II Inc. dba Oakwood Homes Colorado Springs** and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

Clayton Properties Group II Inc. dba Oakwood Homes Colorado Springs
Name of Developer

_____
Authorized Signature Date

_____
Printed Name

_____
Title

1290 North Newport Rd.
Colorado Springs, CO 80916
Address:

City of Colorado Springs Statement:

Filed in accordance with Section 7.7.906 of the Code of the City of Colorado Springs, 2001, as amended.

_____ _____
For City Engineer Date

Conditions:

CLASSIC CONSULTING ENGINEERS & SURVEYORS

FINAL DRAINAGE REPORT FOR BANNING LEWIS RANCH FILINGS NO. 37 & 38

TABLE OF CONTENTS:

APPENDICES

CLASSIC CONSULTING ENGINEERS & SURVEYORS

FINAL DRAINAGE REPORT FOR BANNING LEWIS RANCH FILINGS NO. 37 & 38

PURPOSE

This document is the Final Drainage Report for Banning Lewis Ranch Filings 37 & 38. The purpose of this report is to identify onsite and offsite drainage patterns, storm sewer, inlet locations, and areas tributary to the site, and to safely route developed storm water runoff to adequate outfall facilities. A Development Plan & Final Plats for Filings 37 & 38 have been submitted concurrently with this report. The drainage analysis within this report provides slight modifications to the downstream and previously approved drainage report; "Final Drainage Report for Banning Lewis Ranch Filings 35, 36A, 36B, & 36C," by Classic Consulting Engineers & Surveyors, LLC dated October 2019 and the "Final Drainage Report for Banning Lewis Ranch Filings 26, 27, 28, & 29," by Classic Consulting Engineers & Surveyors, LLC dated December 2019. Please see these reports for additional discussion on previous drainage studies, existing conditions analysis, and downstream full spectrum detention and water quality calculations. Also, a "Final Drainage Report for Banning Lewis Ranch Filings 21, 22, 23, & 25 (Village 33)," by Classic Consulting dated December 2017 was completed for the land to the north and tributary to the proposed storm system. There are no changes to any of the previously approved documents and defined drainage patterns.

GENERAL DESCRIPTION

Banning Lewis Ranch Filing 37 is 16.844 acres of single-family (mixed-type) home lots (85 lots total) and Private roadways. Filings 38 is 21.201 total acres, consisting of 9.606 acres of open space and existing overhead electric easement on the west side of the property and 11.595 acres of single-family (mixed-type) home lots (67 lots) and Private roadways. These Filings are located in Section 22 of Township 13 South, Range 65 West of the Sixth Principal Meridian in the City of Colorado Springs, County of El Paso, State of Colorado. All of the proposed Filings are south of Dublin Blvd. and Filings 26-29, and west of Vista Del Tierra Blvd. (See Filing Exhibit in Appendix).

As the previous and downstream study provided overall tributary area imperviousness and developed flow rate calculations (including the proposed filings) as well as final pond infiltration and release rates, this report will simply discuss the proposed inlets and storm system that are within Filings 37-38.

All of the proposed Filings will have Private roadways and storm sewer to be owned and maintained by the Banning Lewis Ranch Metropolitan District #5. The downstream existing Full Spectrum Detention/Water Quality Ponds are City of Colorado Springs owned and maintained facilities.

The average soil condition of the Village 3 area reflects Hydrologic Group "A" (Blakeland Loamy Sand & Blakeland-Fluvaquentic Haplaquolls) as determined by the "Soil Survey of El Paso County Area," prepared by the National Cooperative Soil Survey (see map in Appendix). Per the Drainage Criteria Manual Group "A" soil coefficients are not to be used when overlot grading has occurred. Per the "Phases I and II Banning Lewis Ranch Master Development Drainage Plan Update," by Kiowa Engineering Corporation; Group "B" soil coefficients were used in the calculations as well as for sizing the Excess Urban Runoff Volumes.

PREVIOUS APPLICABLE DRAINAGE STUDIES

The channel improvements along the western boundary of the Banning Lewis Ranch property were installed per the construction drawings and "Banning Lewis Ranch Filing No. 2 – Major Channels & Detention Basins Preliminary/Final Drainage Report," by TCB (Turner Collie & Braden, Inc.) February 2005. A "Phases I and II Banning Lewis Ranch Master Development Drainage Plan Update," by Kiowa Engineering Corporation, revised March 19, 2013 provides the general drainage parameters for the Oakwood Homes holdings of Banning Lewis Ranch. A "Final Drainage Report for Banning Lewis Ranch – Village 3 Concept PUD," by Classic Consulting Engineers & Surveyors, LLC was approved in April 2017 to support the sanitary sewer access road and master planning of BLR Village 3. The aforementioned 'Final Drainage Report for Filings 21-25', 'Final Drainage Report for Filings 35-36C', and 'Final Drainage Report for Filings 26-29' were completed by Classic Consulting for the surrounding development and are heavily referenced as this report is in accordance with those studies and downstream pond calculations.

EXISTING DRAINAGE CONDITIONS

The proposed site is within Sand Creek Drainage Basin. An Existing Conditions Analysis was completed for the overall Village 3, including the proposed development area, with the recently approved Final Drainage Report for Filings 35, 36A, 36B, & 36C. There have been no changes and therefore an additional existing conditions analysis is not required with this report. The Existing Conditions Drainage Maps from the previous report are included in the Appendix.

PROPOSED DRAINAGE CONDITIONS

Per the current City of Colorado Springs Drainage Criteria for stormwater capacity within street sections, the following summaries of Figures 7-2, 7-5, and 7-7 applies to the overall study area: Vista Del Tierra Blvd. (Collector), Stetson Hills Blvd. (Principal Arterial), Banning Lewis Parkway (Principal Arterial), all other proposed roads are Residential. All roadways within Filings 37 & 38 are per City 'residential' classification design criteria and are Privately owned and maintained.

Street Type	*Allowable – Initial Storm (5 yr)*	*Allowable–Major Storm (100 yr)*
Residential w/Ramp Curb	1.5% street slope = 10 cfs 2% street slope = 12 cfs 3% street slope = 14 cfs 4% street slope = 16.5 cfs No curb overtopping.	1.5% street slope = 46 cfs 2% street slope = 44 cfs 3% street slope = 39 cfs 4% street slope = 36 cfs 12" maximum depth at flowline.
Residential w/Vertical Curb (6" Vertical Curb)	1.5% street slope = 13 cfs 2% street slope = 15 cfs 3% street slope = 18 cfs 4% street slope = 20.5 cfs No curb overtopping.	1.5% street slope = 45 cfs 2% street slope = 43 cfs 3% street slope = 38 cfs 4% street slope = 35 cfs 12" maximum depth at flowline.
Collector Street w/o Parking (6" Vertical Curb)	1.5% street slope = 11 cfs 2% street slope = 13 cfs 3% street slope = 16 cfs 4% street slope = 18 cfs No curb overtopping.	1.5% street slope = 62 cfs 2% street slope = 60 cfs 3% street slope = 52 cfs 4% street slope = 48 cfs Contain within R.O.W.
Principal Arterial Type II 142' R.O.W. – 6" Vertical Curb	1% street slope = 18 cfs 1.5% street slope = 22 cfs 2% street slope = 25 cfs 3% street slope = 23 cfs 4% street slope = 20.5 cfs No crown, curb overtopping or maximum allowable spread width.	1% street slope = 65 cfs 1.5% street slope = 81 cfs 2% street slope = 78 cfs 3% street slope = 68 cfs 4% street slope = 64 cfs Contain within R.O.W.

At-grade inlets and sump (low-points) were designed in a way that street capacity is not an issue anywhere within the proposed Filings or surrounding arterial and collector roadways. Street capacity has also been verified at each design point by using the UD-Inlet Excel workbook (located in Appendix) from Urban Drainage Flood Control District (UDFCD). Inlet sizing is also per the UD-Inlet Excel workbook. Drainage from individual lots are assumed to travel in side-lot swales to the street. The site use and layout of the proposed filings has not changed since the previous reports; however, the locations of '4-pack' detached home product and 'duplex' style product has changed and therefore revised calculations are provided with this Final Drainage Report. Therefore, the Site-Level Low Impact Development forms (IRF forms) included in that previous report are still applicable. As the streets on the west side of Vista Del Pico Blvd. are 'Private', the storm sewer on this side of Village 3 are also 'Private', with ownership and maintenance by the Banning Lewis Ranch Metropolitan District #5. Vista Del Pico Blvd. and the developments on the east side of roadway and Village 3 are 'Public' and as such so are the two full spectrum detention facilities with ownership and maintenance by the City of Colorado Springs. As this report is in complete adherence to the downstream and overall drainage study, the only Design Point detailed descriptions provided will be those that have slightly been modified and are within the Filings 37 & 38 areas.

Design Point DP-2 (Q_5 = 21.8 cfs, Q_{100}= 250.5 cfs) is the developed condition flow rate within the existing drainage channel (Reach 171) at the existing Tamlin Road crossing. This runoff is less with the proposed development than with the existing conditions as the directly tributary area is less. At this Design Point, dual 30" RCP Public storm pipes convey the water to the south under the existing dirt roadway to Design Point DP-3 and the Stetson Hills existing 12' x 6' Public RCB culvert. Basin CH-1 is 19.69 acres of the existing channel and undeveloped tributary area to the west of the channel and outside of the developable limits of Banning Lewis Ranch. This area shall always remain undeveloped or provide its own detention and water quality facilities prior to release of any future developed runoff into this existing channel. The existing dual 30" RCP Public storm pipes are creating a backwater and pressure release condition as they are under sized for the flow rate within the channel. This pressurized release is causing significant erosion south of existing Tamlin Rd. continuing about 600 feet downstream until the channel is back to the original designed width and side slopes to DP-3.

Therefore, we are proposing to install an open channel through existing Tamlin Rd. and eliminating the culverts and backwater condition at this location. As there is an existing water main crossing of the channel at this location (Woodmen Hills Water District) a water lowering will be installed below the improved open

channel and in accordance with the Woodmen Hills Water District. The parameters of this open channel are 11' bottom width, 1.3% grade, 4:1 side slopes for 4' vertical (min.). A Bentley Flowmaster calculation was done and included in the appendix, showing a 100-yr velocity of 6.88 ft/sec. and flow depth of 23.2". This equates to a shear stress of 1.61 psf. As such, native seed vegetation alone is not sufficient for long-term stabilization. Therefore, erosion control blanket is needed in the proposed open channel work and must cover the entire bottom and side slopes, 3' vertical (12' horizontal width of slope). Typical native seed vegetation is permitted above 3' from the channel bottom. North American Green Type SC250 Blanket (or equivalent) is required and can withstand unvegetated velocities up to 9.5 ft/sec. and shear stress of 2.5 psf. The specification sheet for this blanket is included in the Appendix of this report.

Design Point DP-3 (Q_5 = 24.4 cfs, Q_{100}= 266.7 cfs) is the Village 3 developed condition flow rate within the existing drainage channel (Reach 171) at the future Stetson Hills Blvd. road crossing and existing Public 12' x 6' box culvert. This runoff consists of the complete build-out of Village 3 and release from the two proposed Public full spectrum detention and water quality facilities serving the Village 3 development. This runoff is much lower than in the existing conditions due to the restricted release rates from those facilities. This existing box culvert passes the water under the planned/platted roadway where it continues south along its native and historic drainage pattern. This design point contains the upstream water described in DP-2 and from Basin CH-2, Pipe 66, and Pipe 65. Basin CH-2 is 16.78 acres of the existing channel and undeveloped tributary area to the west of the channel and outside of the developable limits of Banning Lewis Ranch. This area shall always remain undeveloped or provide its own detention and water quality facilities prior to release of any future developed runoff into this existing channel. This box culvert was originally installed to convey un-detained developed runoff from the entire upstream Banning Lewis Ranch development (Filing 2 design flows of Q_{10} = 354 cfs, Q_{100}= 685 cfs). Since the implementation of off-line full spectrum detention facilities, this runoff is substantially lower and thus has more than adequate capacity to pass this runoff without backwater/headwater constraints. As this runoff amount is lower with the development of Village 3, the proposed site is in accordance with the drainage criteria for the City of Colorado Springs.

Design Point 21 (Q_5 = 5.8 cfs, Q_{100}= 12.4 cfs) is the developed condition flow rate from Basin M, 2.47 acres of 4-pack type single-family lots and private roadways (Filing 37). An existing 10' Type R sump inlet, installed with Filings 26-29. will intercept this runoff and a Private 18" RCP (Pipe 24B) lateral conveys the runoff to an adjacent manhole combining with the runoff from DP-22/Pipe 24C and Pipe 4B. The emergency overflow path is to overtop the high point to the south and drain to the inlet at DP-71.

Design Point 22 (Q_5 = 2.8 cfs, Q_{100}= 5.5 cfs) is the developed condition flow rate from Basin N, 0.96 acres of duplex type single-family subdivision (Filing 37). An existing 5' Type R sump inlet, installed with Filings 26-29, intercepts this runoff and a Private 18" RCP (Pipe 24C) lateral conveys the runoff to an adjacent manhole combining with the runoff from DP-21/Pipe 24B & Pipe 4B. Pipe 5A (Private 60" RCP, Q_5 = 110.0 cfs, Q_{100}= 233.3 cfs) will convey the combined runoff to the south within Haster Grove toward the existing sump inlet at Design Point 71. The emergency overflow path is to overtop the high point to the south and drain to the inlet at DP-71.

Design Point 23 (Q_5 = 5.1 cfs, Q_{100}= 10.3 cfs) is the developed condition flow rate from Basin Q, 2.02 acres of duplex type single-family subdivision (Filing 37). An existing 10' Type R sump inlet, installed with Filings 26-29, intercepts this runoff and an existing 18" RCP (Pipe 23B) lateral conveys the runoff to an adjacent manhole combining with the runoff from Pipes 23A & 23C. The emergency overflow path is to overtop the high point to the south (Strath Point intersection) and drain south down Torrisdale View to the inlets at DP-72B & 73.

Design Point 24 (Q_5 = 2.6 cfs, Q_{100}= 5.1 cfs) is the developed condition flow rate from Basin R, 0.89 acres of 4-pack type single-family lots and Private roadway (Filing 37). An existing 5' Type R sump inlet, installed with Filings 26-29, intercepts this runoff and an existing 18" RCP (Pipe 23C) lateral conveys the runoff to an adjacent manhole combining with the runoff from Pipes 23A & 23B. Pipe 24A (Private 60"/66" RCP, Q_5 = 71.0 cfs, Q_{100}= 151.0 cfs) will convey the combined runoff to the south then east within Strath Point toward the storm main coming from Design Points 19 & 20. Pipe 4B (Private 66" RCP, Q_5 = 102.6 cfs, Q_{100}= 217.8 cfs) represents the storm system after the connection of the two large storm mains coming from the north. This connection is made at this location due to vertical and hydraulic constraints at the bottom of the basin and into the proposed Pond 171. The storm main quickly connects with the previously described sump inlets at Design Points 21 & 22 and continues south into the Vista Del Tierra Dr. roadway corridor. The emergency overflow path is to overtop the high point to the south (Strath Point intersection) and drain south down Torrisdale View to the inlets at DP-72B & 73.

Design Point 25A (Q_5 = 5.2 cfs, Q_{100}= 11.1 cfs) is the developed condition flow rate from Basin S-1, 2.20 acres of '4-pack' single-family lots and Private Mireland View (Filing 38). A proposed 10' Type R At-Grade inlet will intercept the majority of this runoff and an 18" RCP (Pipe 26A, Q_5 = 4.6 cfs, Q_{100}= 7.1 cfs) convey

the runoff south within Mireland View to a junction manhole combining with Pipes 26B & 26C. The runoff not intercepted by this inlet continues south down Mireland View to the sump inlet at DP-25B.

Design Point 25B (Q_5 = 5.7 cfs, Q_{100}= 14.1 cfs) is the developed condition flow rate from Basin S-2, 1.98 acres of duplex type single-family lots, Strath Point, and Mireland View (Filing 38) and the flow-by from the at-grade at DP-25A. A proposed 10' Type R sump inlet intercepts this runoff and a proposed 24" RCP (Pipe 26B) lateral conveys the runoff to an adjacent manhole combining with the runoff from Pipes 26A & 26C. The emergency overflow path is to overtop the high point to the south and drain south down Mireland View to the inlets at DP-74 & 75.

Design Point 30 (Q_5 = 5.2 cfs, Q_{100}= 10.9 cfs) is the developed condition flow rate from Basin T, 2.44 acres of typical single-family lots and Private Mireland View (Filing 38). A proposed 10' Type R sump inlet intercepts this runoff and a proposed 18" RCP (Pipe 26C) lateral conveys the runoff to an adjacent manhole combining with the runoff from Pipes 26A & 26B. Pipe 27 (Private 30" RCP, Q_5 = 15.1 cfs, Q_{100}= 31.4 cfs) is the outfall pipe from this junction manhole and continues south down Mireland View to a junction manhole with Pipes 28A & 28B. The emergency overflow path is to overtop the high point to the south and drain south down Mireland View to the inlets at DP-74 & 75.

Design Point 71 (Q_5 = 3.0 cfs, Q_{100}= 6.1 cfs) is the developed condition flow rate from Basin P, 1.11 acres of duplex style single-family home lots (Filing 37). An existing 5' Type R sump inlet intercepts this runoff at the end of the Haster Grove cul-de-sac and an existing Private 18" RCP (Pipe 5B) lateral conveys the runoff to an adjacent manhole combining with the runoff from Pipe 5A. Pipe 6 (Existing Public 60" RCP, Q_5 = 110.7 cfs, Q_{100}= 234.5 cfs) conveys the combined runoff to the south within Vista Del Tierra Dr. and into the proposed Pond 171 (Design Point 96). A large impact structure and shared concrete forebay (with Pipe 9) was installed with Filings 36A-36C at the bottom of the existing pond.

Design Point 72A (Q_5 = 4.4 cfs, Q_{100}= 8.4 cfs) is the developed condition flow rate from Basin Y-1, 1.26 acres of existing Vista Del Tierra Drive that drains into the proposed Filing 37 at the Castlebear Drive entrance. A proposed 10' Type R at-grade inlet will intercept a portion of this runoff and Pipe 25A (Private 18" RCP, Q_5 = 4.4 cfs, Q_{100}= 8.4 cfs) will convey the runoff to an adjacent manhole near Design Points 72B & 73.

Design Point 72B (Q_5 = 6.2 cfs, Q_{100}= 15.6 cfs) is the developed condition flow rate from Basin X, 3.40 acres of duplex type single-family subdivision, private Torrisdale View (Filing 37), and the flow-by from the inlet at DP-72A. A proposed 10' Type R sump inlet will intercept this runoff and Pipe 25B (Private 24" RCP, Q_5 = 5.7 cfs, Q_{100}= 141 cfs) will convey the runoff to an adjacent manhole combining with the runoff from Pipes 25B & 25C. The emergency overflow path for this sump inlet is to overtop the high point to the south within Torrisdale View and continue south to the inlet at DP-76.

Design Point 73 (Q_5 = 4.9 cfs, Q_{100}= 9.8 cfs) is the developed condition flow rate from Basin W, 1.87 acres of duplex type single-family subdivision and Torrisdale View (Filing 37 & 38). A proposed 10' Type R sump inlet will intercept this runoff and a Private 18" Pipe 25C will convey the runoff to an adjacent manhole combining with the runoff from Pipes 25A & 25B. Pipe 25D (Private 30" RCP, Q_5 = 14.2 cfs, Q_{100}= 29.9 cfs) will convey the combined runoff to the south to a junction manhole at the intersection of Torrisdale View and Mireland View where the runoff combines with that from Pipe 28C (Design Points 74 & 75). The emergency overflow path for this sump inlet is to overtop the high point to the south within Torrisdale View and continue south to the inlet at DP-76.

Design Point 74 (Q_5 = 4.8 cfs, Q_{100}= 9.8 cfs) is the developed condition flow rate from Basin V, 2.14 acres of duplex type single-family lots and Mireland View (Filing 38). A proposed 10' Type R sump inlet will intercept this runoff and an 18" RCP (Pipe 28A) will convey the runoff to an adjacent manhole combining with the runoff from Pipes 27 & 28B. The emergency overflow path for this sump inlet is to overtop the north-west curb return of Mireland View/Torrisdale View and continue south along Torrisdale to the sump inlet at DP-76.

Design Point 75 (Q_5 = 4.6 cfs, Q_{100}= 9.5 cfs) is the developed condition flow rate from Basin U, 2.06 acres of typical single-family lots and Mireland View (Filing 38). A proposed 10' Type R sump inlet will intercept this runoff and a Private 18" RCP (Pipe 28B) will convey the runoff to an adjacent manhole combining with the runoff from DP-74 and Pipe 27 from Design Points 25A, 25B, & 30. Pipe 28C (Private 36" RCP, Q_5 = 23.5 cfs, Q_{100}= 48.6 cfs) will convey the combined runoff to the southeast to a junction manhole at the intersection of Torrisdale View and Mireland View where the runoff combines with that from Pipe 25D (Design Points 72A, 72B, & 73). Pipe 29 (Private 42" RCP, Q_5 = 38.6 cfs, Q_{100}= 80.3 cfs) will convey the combined runoff to the southeast through an open space tract and to an existing 42" stub installed with the Filings 36A-36C development and the existing Full Spectrum Detention Pond 171.

Design Point 76 (Q_5 = 4.4 cfs, Q_{100}= 8.8 cfs) is the developed condition flow rate from Basin AA, 1.78 acres of typical and duplex type single-family lots and Torrisdale View (Filing 37). A proposed 5' Type R sump inlet intercepts this runoff at the end of the Torrisdale View cul-de-sac and Pipe 31 (Private 18" RCP) will convey the runoff south into the small proposed full spectrum detention/water quality Facility 'A'. See Design Point 97 for discussion of Pond A. The emergency overflow is to overtop the adjacent curb and walk and drain south directly into Pond A/DP-97.

Design Point 77 (Q_5 = 0.8 cfs, Q_{100}= 1.6 cfs) is the developed condition flow rate from Basin Y-2, 0.26 acres of proposed Vista Del Tierra and adjacent landscaping that drains to an existing 10' Type R At-Grade inlet (Filings 36A-36C). This at-grade inlet intercepts the entirety of this runoff and Pipe 7 (Public 18" RCP, Q_5 = 0.8 cfs, Q_{100}= 1.6 cfs) conveys it to an adjacent manhole combining with runoff from Pipe 29. This runoff is less than in the previous studies as the proposed entrance into Filing 37 (Castlebear Drive) takes on the Vista Del Tierra runoff (Basin Y-1) which was not planned for originally. The runoff still enters the same system (Pipe 30) and therefore has no negative effect on the design. Pipe 30 (Public 42" RCP, Q_5 = 38.8 cfs, Q_{100}= 80.7 cfs) conveys the combined runoff to the southeast to another junction manhole with Pipe 8 from Design Point 78. All runoff is intercepted by this at-grade inlet at this location.

Design Point 79 (Q_5 = 6.3 cfs, Q_{100}= 12.1 cfs) is the developed condition flow rate from Basin Z, 1.77 acres of proposed Vista Del Tierra Dr., Stetson Hills Blvd., and adjacent landscaping and the flow-by runoff from the proposed at-grade inlet at DP-77. This runoff drains via the Vista Del Tierra Dr. and Stetson Hills Blvd. curb to a proposed 10' Type R sump inlet. This sump inlet intercepts the entirety of this runoff and Pipe 33 (Public 30" RCP, Q_5 = 9.9 cfs, Q_{100}= 26.4 cfs) conveys the combined runoff from this inlet and Pipe 32 from Design Point 80. Pipe 33 drains to the west and discharges into the proposed Full Spectrum Detention and Water Quality Facility 'A' at Design Point 97. A concrete impact structure and forebay will be installed at the entry point of Pipe 33 into the proposed pond. The overflow route for this low point is to overtop the adjacent curb, walk, and landscaping and drain to the west into the proposed pond and downstream drainage corridor.

Design Point 96/ Existing Detention/Storm Water Quality Facility Pond 171 (Q_5 = 276.8 cfs, Q_{100}= 604.7 cfs) is the completely developed runoff into the existing Full Spectrum Detention/Storm Water Quality Facility Pond 171. With the final site plan and proposed development of Filings 37 & 38 this runoff rate

increased by approximately 0.05% which is negligible and the pond calculations are not required to be updated from the previously approved drainage report (Filings 36A-36C). Please reference that report for all applicable design information for Public Pond 171.

Design Point 97/Detention/Storm Water Quality Facility Pond 'A' (Q_5 = 13.2 cfs, Q_{100}= 32.9 cfs) is the completely developed runoff into the proposed Full Spectrum Detention/Storm Water Quality Facility Pond A, including Basin WW, 1.12 acres of the detention facility and surrounding slope/tributary area. This facility is a Public Full Spectrum Extended Detention Basin per the City of Colorado Springs and Urban Drainage and Flood Control District (UDFCD). This facility was designed with the Filings 36A-36C Final Drainage Report but will be constructed with Filings 37/38 and the extension of Vista Del Tierra Drive to future Stetson Hills Blvd. With the final design and layout of Filings 37/38 this runoff is slightly less than originally designed (Q_5 = 14.0 cfs, Q_{100}= 36.4 cfs) and therefore the pond is conservatively sized/designed. Final design and pond structure (trickle channel, impact structures w/forebays, micropool and outlet box, etc.) has been completed with this Filing 37 & 38 report and updated information is below and in the Appendix.

The facility sizing spreadsheet is located in the appendix of this report. A total of 6.03 acres of developed Banning Lewis Ranch is to drain to this facility, with a composite impervious value of 53.6%. The composite impervious value was determined using Site-Level Low Impact Development (LID) Design Effective Impervious Calculator (IRF Form) located in the Appendix of this report. A required Excess Urban Runoff Volume (EURV) of 0.348 acre-feet is required; this volume is provided under the top of outlet box opening (within the orifice plate of the outlet box, elevation 6732.50 and provided EURV of 0.35 acre-feet). This pond was not previously identified in conceptual or master drainage studies as it is needed due to the elevation of the Pond 171 bottom at the adjacent low point of Vista Del Tierra Dr. and inability to drain this low point (DP 79/80) and the proposed low point at the terminus of the cul-de-sac (Torrisdale View)/Design Point 76 into the large Pond 171.

Energy dissipation structures will be installed at all pipe entry points into the proposed detention/water quality facility. A 7' wide low flow concrete trickle channel will be installed as shown within the bottom of the pond connecting all pipe entry points to the outfall structure at a 0.50% minimum slope. Per the UDFCD sizing spreadsheet (UD-BMP), separate sizing for each forebay has been completed and is located in the Appendix of this report.

Per the City of Colorado Springs Drainage Criteria Manual Vol. 1, Chapter 6, Table 6-2, 1-hour rainfall depths were used in the UD-Detention workbook and outlet drain time calculations. These values are: 2-year = 1.19", 5-year = 1.50", 10-year = 1.75", 25-year = 2.00", 50-year = 2.25", and 100-year = 2.52". The bottom of the detention basin (lowest orifice hole) is at an elevation of 6730.00 with the EURV provided at the elevation 6732.50. A 4' wide outlet box (4' deep opening) is proposed with a top of box at this 6732.50 elevation. For a Full Spectrum facility, the outlet box orifice hole within the front plate is to drain the EURV in less than 72 hours. Per the latest UD-Detention version 3.07 spreadsheet from Urban Drainage (release February 2017) a total of (3) orifice holes are to be installed in the front plate of the outlet box with the bottom orifice hole of 1" wide x 1" high, and middle orifice of 1.5" wide x 1.5" high, and upper orifice of 3" wide x 2" high. This orifice hole sizing the overall pond outlet design meet all required drain times for all of the various storm events as shown on the UD-Detention workbook located in the Appendix of this report. A 2.5' deep concrete bottom micropool is to be installed within the wing walls of the outlet structure, with a surface area of 377 square feet (minimum required is 10 square feet). An initial surcharge depth of 4" will be provided within the micropool outlet structure. A removable trash screen of 12" in width will be placed in front of the orifice plate to help prevent the orifice holes from clogging.

A Public 18" RCP outlet Pipe 66 will convey the detained release (Q_5 = 0.24 cfs, Q_{100}= 2.0 cfs, 100-yr water surface elevation of 6732.85, UD-Detention V3.07) the existing improved channel on the west side of the overall boundary (DP-3, existing City of Colorado Springs Drainage Tract E from Banning Lewis Ranch Filing No. 2). Riprap protection at the exit point of Pipe 66 will be installed per the UD-Culvert spreadsheet located in the Appendix (Type VL riprap, D_{50} = 6", 3' width, 5' length). A 12' length riprap (Type VL, D_{50} = 6") emergency spillway located at elevation 6734.00 will pass the entire incoming 100-year storm event (36 cfs) at a flood depth of less than 1.0' in case of complete outlet box and pipe failure. The total pond volume at this spillway elevation is 1.17 acre-feet. The proposed 10' wide top of berm elevation is at 6736.00. This emergency spillway will only be utilized in the case of a complete outlet box failure. Also, a 10'-11' wide maintenance access road at 15% max. grade will be installed as shown to each structure within the pond as per the DCM.

This facility adequately treats the future development of collector/arterial roadways and the proposed Filing 37 runoff (Basin AA) west of Vista Del Tierra. This facility will be installed with the Filing 37/38 development. Per the Code of Colorado Regulations 4.2.5.1 a Jurisdictional Size Dam height is measured, either from the invert of the outlet pipe at the longitudinal centerline of the embankment (spillway elevation

= 6734.00 & 18" invert directly below is 6729.74, 4.26') or the spillway elevation compared to the existing ground at the centerline (spillway elevation = 6734.00 & existing ground 6735.00, 1.0'). A dam height of 10' or below is not considered a 'Jurisdictional' facility with the State of Colorado. Therefore, this is a non-jurisdictional size dam and additional documentation and coordination with the State Engineer, beyond the typical non-jurisdictional form, is not required for the proposed facility.

Maintenance of the Public detention/water quality structures is by the City of Colorado Springs. Aesthetic maintenance of the facility and Private structures (Pipe 31) is by the Banning Lewis Ranch Metropolitan District 1. The proposed facility is within proposed Tract A, Filing 37.

EROSION CONTROL PLAN

The City of Colorado Springs Drainage Criteria Manual specifies an Erosion Control Plan and associated cost estimate be submitted with the Final Drainage Report. We respectfully request that the Erosion Control Plan and cost estimate be submitted in conjunction with the Grading Plan and construction assurances posted prior to obtaining a grading permit.

DRAINAGE CRITERIA

Hydrologic calculations were performed using the City of Colorado Springs Drainage Criteria Manual, May 2014 (revised January 2021). The Rational Method was used to estimate stormwater runoff to the proposed inlets, storm sewer pipes, and outfall locations. The UDFCD UD-Inlet Excel workbook was used to verify street capacities, size sump inlets, and calculate interception and flow-by rates of at-grade inlets. Hydraulic grade lines (HGLs) for minor and major storm events will be provided as an Addendum to this report and with the construction drawings for the proposed filings. Preliminary pipe calculations have been included using the Bentley FlowMaster V8i for the 100-year storm event flow rates.

STORMWATER QUALITY

The City of Colorado Springs requires the Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainage ways, and implementing long-term source controls. The Four Step Process pertains to management of smaller, frequently occurring storm events, as opposed to larger storms for which drainage and flood control

infrastructure are sized. Implementation of these four steps to achieve stormwater permit requirements is required. The site adheres to this Four Step Process as follows:

1. All developed runoff from the proposed site will be collected in the proposed storm system and routed to the permanent full spectrum detention and water quality facility (Pond 171 & Pond A). Individual home roof downspouts will be directed onto pervious landscape areas per the exhibits located in the Appendix. The additional grass buffer BMP provides the following: 1) Minimize directly connected impervious areas. 2) Provides initial pollutant and sediment removal before entering the storm system. Rear yard flows of those proposed lots adjacent to public streets will be directed over a grass buffer area (both landscaped and native grasses) to provide treatment of these small rear year areas.

2. Pond 171 & Pond A provide Full Spectrum Detention and Stormwater Quality Treatment for the entirety of the proposed development. The facilities in conjunction with Step 1 implementation above will address all required Water Quality Capture Volume and Slow Release Requirements.

3. The recipient of the drainage flows from the site is Reach 171 per the Kiowa Engineering MDDP and existing Public 8' x 10' box culvert at the future Stetson Hills Blvd. crossing. The immediate downstream corridor is very well established and as the detained developed release rate is far less than historic, theoretically no additional erosion will occur.

4. A site-specific stormwater quality and erosion control plan and narrative will be submitted and approved by City Engineering prior to any disturbance within the project area. Details such as site-specific source control construction BMPs as well as permanent BMPs will be detailed in this plan and narrative to protect receiving waters. Such construction BMPs include temporary sediment basins, inlet protection, silt fence, vehicle tracking control, and concrete washout areas.

FLOODPLAIN STATEMENT

No portion of this site is located within a floodplain as determined by the Flood Insurance Rate Maps (F.I.R.M.) Map Number 08041C 0545G effective date, December 7, 2018 (See Appendix).

DRAINAGE AND BRIDGE FEES FILING NO. 37 & 38

Filings 37 & 38 lie within Sand Creek Drainage Basin boundaries. Per the current Development Plan Agreement between d.b.a. Oakwood Homes (developer) and the City, the Drainage, Pond and Bridge fee obligations to-date as well as future fee obligations will be deferred at the time of platting as the cost of required facilities exceeds the over-all fee obligations for this development. This agreement was with the previous owner and must be updated/re-approved with the recent change in ownership. A letter from the Developer acknowledging the need for the new agreement and statements on what is to be done if the new agreement is not approved is located in the Appendix of this report. However, the year 2021 drainage and bridge fees for each of the proposed Filings are as follows:

Drainage Fees <u>Filing No. 37</u>	
$18,841/acre x 16.844 acres	$ 317,357.80
Bridge Fees:	
$0/acre x 16.844 acres	$ 0.00
Pond Fees:	
$0/acre x 16.844 acres	$ 0.00
Pond Facility Fees:	
$0/acre x 16.844 acres	$ 0.00
Surcharge Fees:	
$0/acre x 16.844 acres	$ 0.00
TOTALS:	**<u>$ 317,357.80</u>**

Drainage Fees <u>Filing No. 38</u>	
$18,841/acre x 21.201 acres	$ 399,448.04
Bridge Fees:	
$0/acre x 21.201 acres	$ 0.00
Pond Fees:	
$0/acre x 21.201 acres	$ 0.00
Pond Facility Fees:	
$0/acre x 21.201 acres	$ 0.00
Surcharge Fees:	
$0/acre x 21.201 acres	$ 0.00
TOTALS:	**<u>$ 399,448.04</u>**

Fees are due prior to plat recordation. Also, prior to issuance of building permits the plat will need to be recorded and appropriate drainage facility and erosion control assurances will need to be posted.

CONSTRUCTION COST OPINION

PRIVATE Drainage Facilities Non-reimbursable (FILING NO. 37)

ITEM	DESCRIPTION	QUANTITY	UNIT COST	COST
1.	10' Type-R Inlet	8 EACH	$6,000/EA	$ 48,000.00
2.	18" RCP Storm Drain	259 LF	$55/LF	$ 14,245.00
3.	24" RCP Storm Drain	68 LF	$70/LF	$ 4,760.00
4.	30" RCP Storm Drain	227 LF	$95/LF	$ 21,565.00
5.	36" RCP Storm Drain	82 LF	$140/LF	$ 11,480.00
6.	42" RCP Storm Drain	138 LF	$170/LF	$ 23,460.00
7.	Type I Storm MH	3 EACH	$6,500/EA	$ 19,500.00
8.	Type 2 Storm MH	1 EACH	$5,300/EA	$ 5,300.00
	SUB-TOTAL			$ 148,310.00
	10% ENGINEERING			$ 14,831.00
	5% CONTINGENCIES			$ 7,415.50
	TOTAL			**$ 170,556.50**

PRIVATE Drainage Facilities Non-reimbursable (FILING NO. 38)

ITEM	DESCRIPTION	QUANTITY	UNIT COST	COST
1.	10' Type-R Inlet	3 EACH	$6,000/EA	$ 18,000.00
2.	18" RCP Storm Drain	186 LF	$55/LF	$ 10,230.00
3.	24" RCP Storm Drain	27 LF	$70/LF	$ 1,890.00
4.	30" RCP Storm Drain	627 LF	$95/LF	$ 59,565.00
5.	Type 2 Storm MH	3 EACH	$5,300/EA	$ 15,900.00
	SUB-TOTAL			$ 105,585.00
	10% ENGINEERING			$ 10,558.50
	5% CONTINGENCIES			$ 5,279.25
	TOTAL			**$ 121,422.75**

Public Drainage Facilities Non-reimbursable – FSD POND A

ITEM	DESCRIPTION	QUANTITY	UNIT COST	COST
1.	18" Impact Structure	1 EACH	$20,000/EA	$ 20,000.00
2.	30" Impact Structure	1 EACH	$30,000/EA	$ 30,000.00

3.	Trickle Channel	294 LF	$79/LF	$ 23,226.00
4.	RipRap Spillway	21 CY	$47.85/CY	$ 1,004.85
5.	Outlet Box (4' x 4')	1 EACH	$30,000/EA	$ 30,000.00
SUB-TOTAL				$ 104,230.85
10% ENGINEERING				$ 10,423.09
5% CONTINGENCIES				$ 5,211.54
TOTAL (DETENTION POND)				**$ 119,865.48**

Classic Consulting Engineers & Surveyors cannot and does not guarantee that the construction cost will not vary from these opinions of probable construction costs. These opinions represent our best judgment as design professionals familiar with the construction industry and this development in particular.

SUMMARY

The developed runoff from the proposed Banning Lewis Ranch Filings 37 & 38 is collected in a proposed Private storm sewer system and routed to the downstream storm system and two detention/water quality ponds. The construction drawings for the downstream storm system and facility (Pond 171) have been approved and the pond is approximately 85% complete as of August 2021. Pond A will be constructed with this proposed development. This report is in general conformance with all applicable master drainage studies and previous reports for the Village 3 area. All drainage facilities were sized using the current City of Colorado Springs Drainage Criteria and Urban Drainage and Flood Control District Criteria and will safely discharge storm water runoff to adequate outfalls. Therefore, the developed site runoff and proposed stormwater facilities will not adversely affect the downstream and surrounding developments.

PREPARED BY:
Classic Consulting Engineers & Surveyors, LLC

Matthew Larson, E.I.
Project Manager

Kyle Campbell, P.E.
Division Manager

mal/236689/FDR-FILING 26-29.doc

REFERENCES

1. City of Colorado Springs Drainage Criteria Manuals Volume 1 & 2, May 2014.

2. "Sand Creek Drainage Basin Planning Study," Kiowa Engineering Corp, dated March 1996.

3. "Phases 1 and II Banning Lewis Ranch Master Development Drainage Plan Update," by Kiowa Engineering Corporation dated December 6, 2012, revised March 19, 2013.

4. Drainage Criteria Manual (Volume 3) latest revision April 2008, Urban Drainage and Flood Criteria District.

5. "Final Drainage Report for Banning Lewis Ranch – Village 3 Concept PUD," by Classic Consulting Engineers and Surveyors, LLC dated March 2017.

6. "Final Drainage Report for Banning Lewis Ranch Filings 21, 22, 23, & 25 (Village 3)," by Classic Consulting Engineers and Surveyors, LLC dated December 2017.

7. "Final Drainage Report for Banning Lewis Ranch Filings 30, 32A, 32B, 33A, 33B, 34A, & 34B & Preliminary Drainage Report for Banning Lewis Ranch Filing 31 (Village 3)," by Classic Consulting Engineers & Surveyors, LLC dated March 2018

8. "Banning Lewis Ranch Filing No. 2 – Major Channels & Detention Basins Preliminary/Final Drainage Report," by TCB (Turner, Collie, & Braden Inc.), dated February 2005.

9. "Final Drainage Report for Banning Lewis Ranch Filings 35, 36A, 36B, & 36C (Village 3)," by Classic Consulting Engineers & Surveyors, LLC dated October 2019.

10. "Final Drainage Report for Banning Lewis Ranch Filings 26, 27, 28, & 29 (Village 3)," by Classic Consulting Engineers & Surveyors, LLC dated December 2019.

APPENDIX

DP-1

DP-1
FIL. 21

DP-1
FIL. 25

DP-1
FIL. 23

DP-1
FIL. 22

DP-3
FIL. 24

DP-4 FIL. 31

DP-2
FIL. 33A

DP-2
FIL. 30

DP-2
FIL. 33B

DP-6
FIL. 27

DP-6
FIL. 26

DP-6
FIL. 28

DP-2
FIL. 32A

DP-2 FIL. 32B

BANNING LEWIS PARKWAY

DP-2 FIL. 34B

DP-2
FIL. 34A

DP-6
FIL. 29

DP-5
FIL. 35

DP-7
FIL. 37

DP-7
FIL. 38

DP-5
FIL. 36C

DP-5
FIL. 36B

DP-5
FIL. 36A

N

200 100 0 200 400

SCALE: 1" = 200'

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

619 N. Cascase Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799 (Fax)

BANNING LEWIS RANCH VILLAGE 3
DEVELOPMENT PLAN FILING EXHIBIT

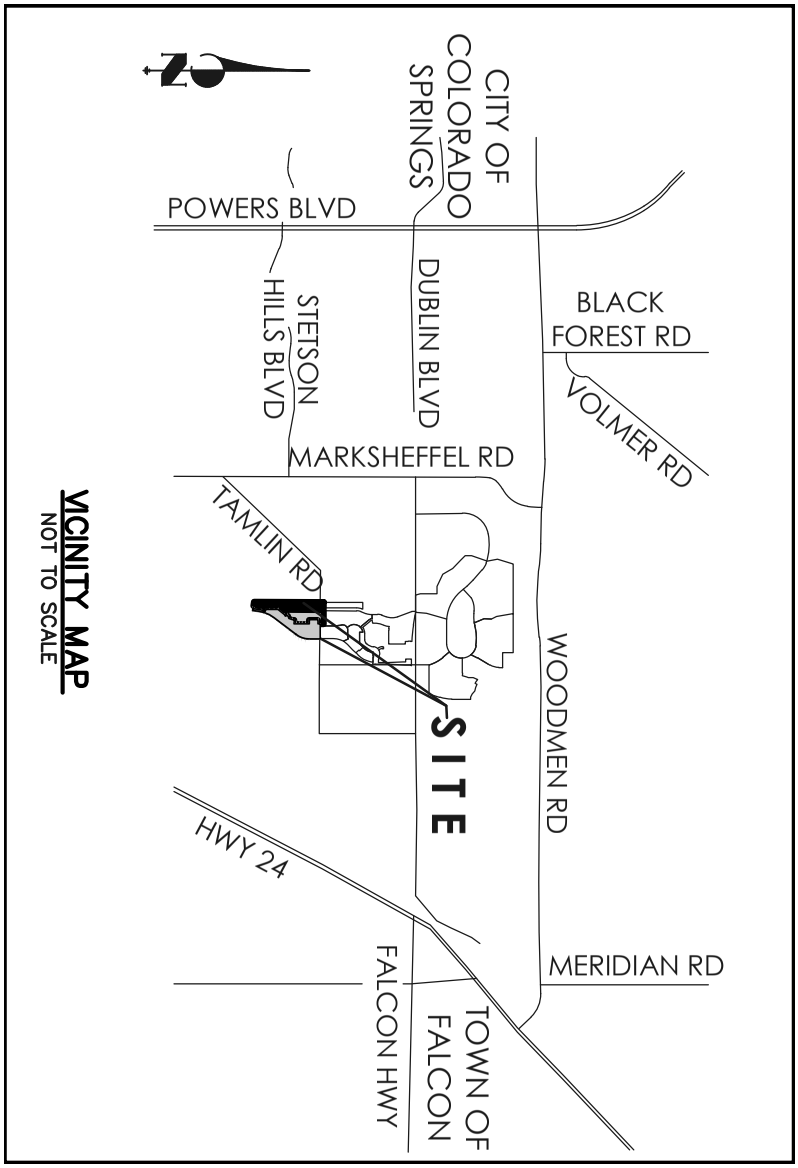
CLASSIC CONSULTING ENGINEERS & SURVEYORS

DESIGNED BY	MAL	SCALE		DATE	11/26/19
DRAWN BY	JRM	(H) 1"= 200'		SHEET	1 OF 1
CHECKED BY		(V) 1"= N/A		JOB NO.	2366.89

N:\25702\1\DRAWINGS\EXHIBITS\FILING EXHIBIT.dwg, 7/26/2021 7:28:59 AM, 1:1

VICINITY MAP

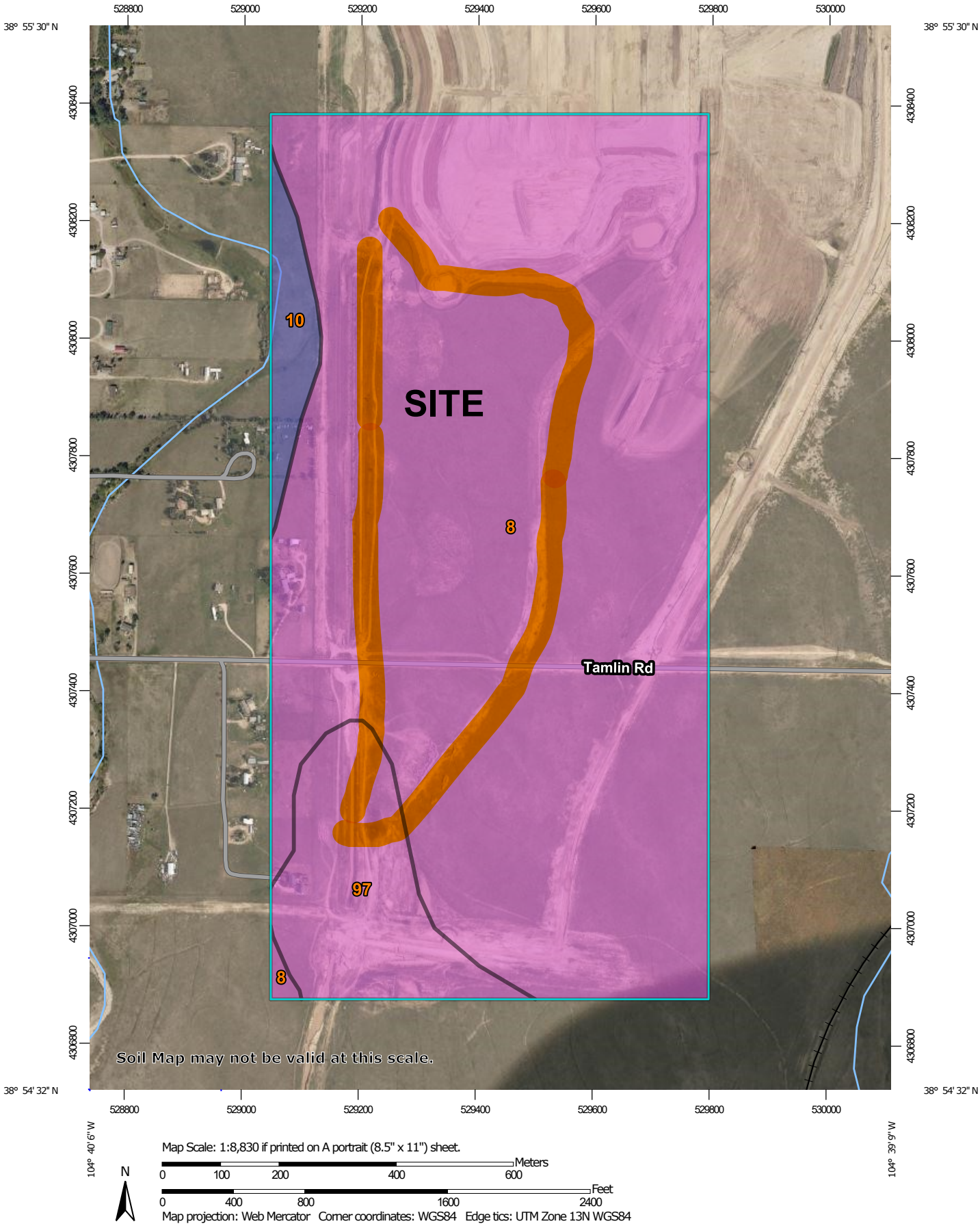
CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS



SOILS MAP (S.C.S SURVEY)

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

Hydrologic Soil Group—El Paso County Area, Colorado
(FILINGS 26-29)



Map Scale: 1:8,830 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 100 200 400 600

Feet
0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 17, Sep 13, 2019

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

Date(s) aerial images were photographed: Aug 19, 2018—Oct 20, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	245.2	87.6%
10	Blendon sandy loam, 0 to 3 percent slopes	B	8.1	2.9%
97	Truckton sandy loam, 3 to 9 percent slopes	A	26.5	9.5%
Totals for Area of Interest			**279.8**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

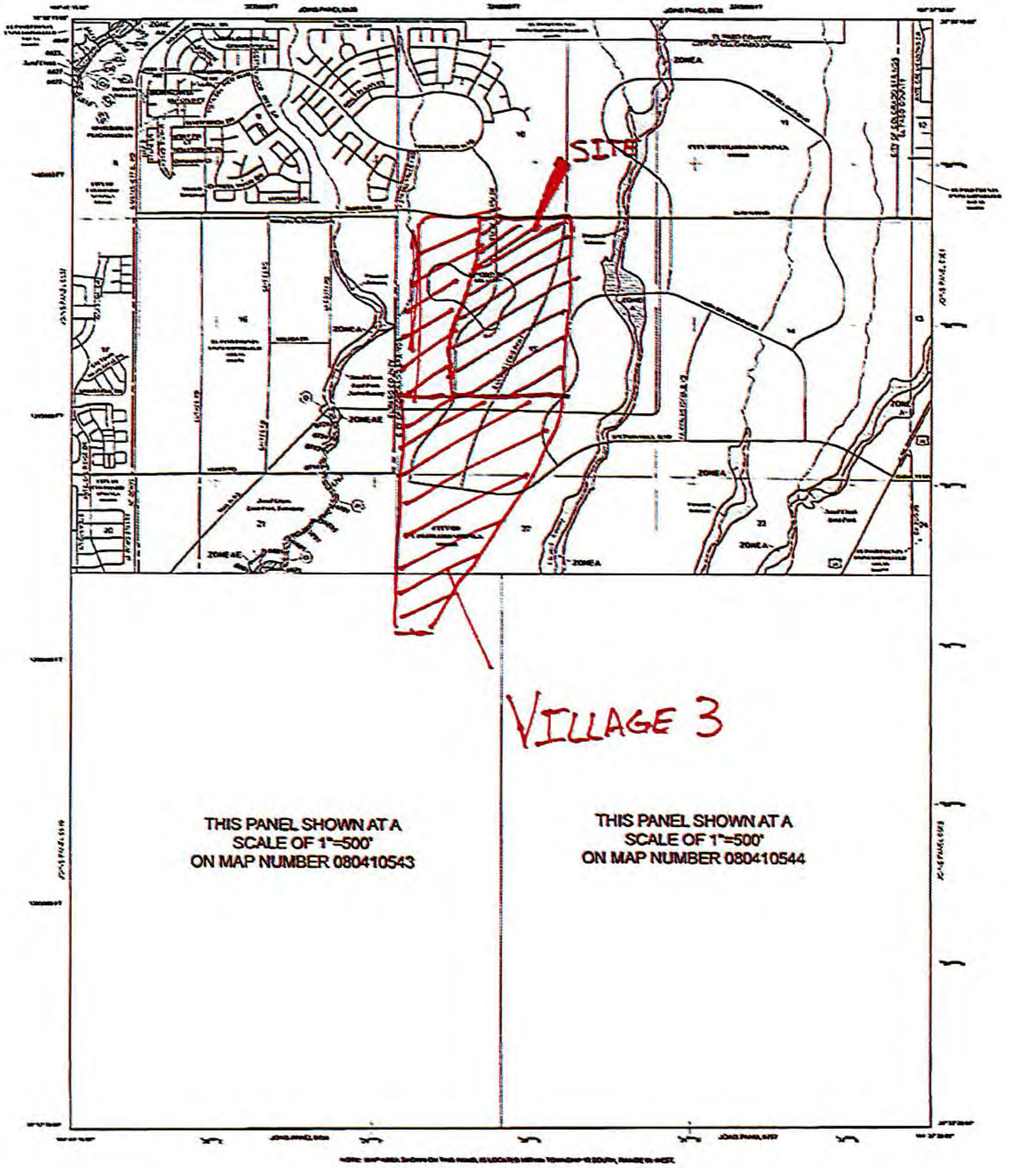
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

F.E.M.A. MAP

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

NOTES TO USERS



LEGEND

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

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

OTHER AREAS

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

MAP SCALE 1" = 1000'

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0545G

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 545 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

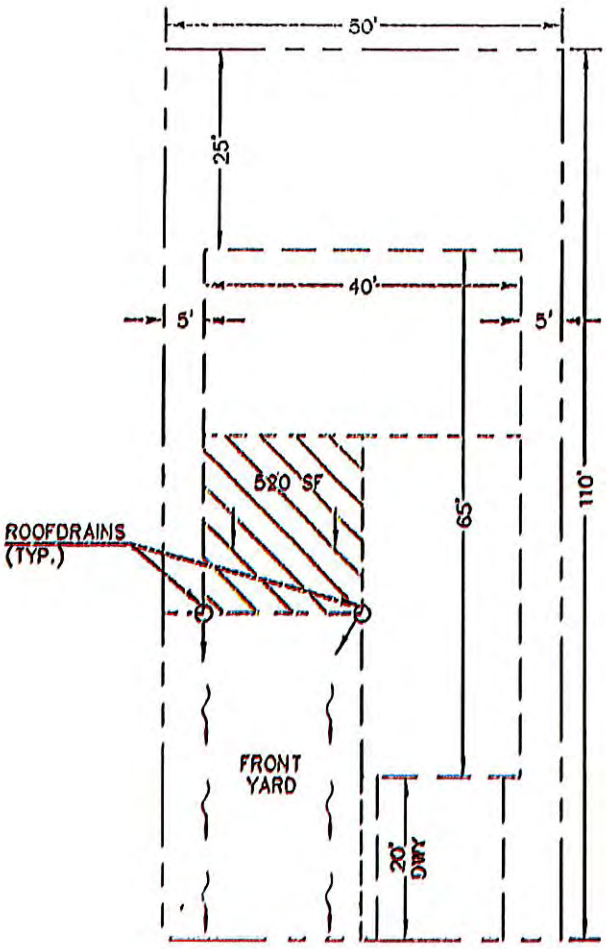
MAP NUMBER 08041C0545G

MAP REVISED DECEMBER 7, 2018

Federal Emergency Management Agency

LOT INFILTRATION EXHIBITS

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS



TYPICAL LOT (SIZE MAY VARY)

LOT SIZE: 5500 SF

40% LOT COVERAGE: 2200 SF FOOTPRINT + 20'x20' DRIVEWAY = 2600 SF IMPERVIOUSNESS

20% OF IMPERVIOUS: 20% OF 2600 SF= 520 SF MIN. TREATED AREA

10% OF IMPERVIOUS: 10% OF 2600 SF= 260 SF MIN. TREATMENT AREA

SINGLE FAMILY RESIDENTAIL
APPROACH TO SATISFYING
STEP 1
2519.00
SHEET 1 OF 1
03/22/17

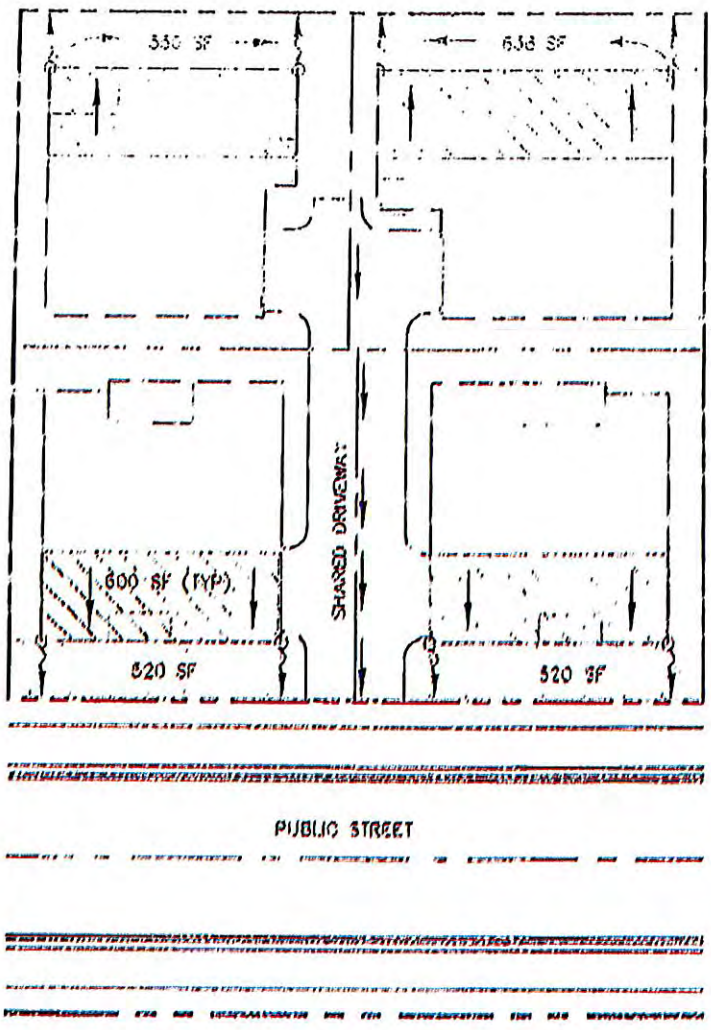
NOTE:

BOTH TREATED AREA AND TREATMENT AREA CAN BE ANY PART OF HOME/HARDSCAPE OR LOT.

DOWNSPOUTS TO BE RELEASED WITHIN LOT AREA DISTANCE TO ENSURE REQUIRED TREATMENT AREA DISTANCE IS ACHIEVED (15' MINIMUM).

SCALE
1"= 20'

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799 (Fax)



LOT SIZE: 18,648 SF (ALL 4 LOTS)

LOT COVERAGE: 11,910 SF (BUILDING FOOTPRINT + SHARED DRIVEWAY) IMPERVIOUSNESS

20% OF IMPERVIOUS: 20% OF 11,910 SF= 2,382 SF MIN. TREATED AREA

10% OF IMPERVIOUS: 10% OF 11,910 SF= 1,191 SF MIN. TREATMENT AREA

NOTE: DOWNSPOUTS TO BE DIRECTED TO ADJACENT LANDSCAPED AREAS WHERE POSSIBLE TO MINIMIZE DIRECT RELEASE ONTO SHARED DRIVEWAY

BLR FILING 18 TYPICAL 4 PACK
APPROACH TO SATISFYING STEP 1
2366.38
3/23/17

SCALE
1"= 30'

CLASSIC
CONSULTING
ENGINEERS & SURVEYORS
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799 (fax)

CALCULATIONS
DEVELOPED CONDITIONS

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY (DEVELOPED CONDITIONS)

		IMPERVIOUS AREA / STREETS			LOTS/LANDSCAPE/UNDEV. AREAS (NOT PAVEMENT)			WEIGHTED		WEIGHTED CA	
BASIN	TOTAL AREA (AC)	AREA (AC)	C(5)	C(100)	AREA (AC)	C(5)	C(100)	C(5)	C(100)	**CA(5)**	**CA(100)**
CH-1	19.69	0.00	0.90	0.96	19.69	0.12	0.38	0.12	0.38	**2.36**	**7.48**
CH-2	16.78	0.00	0.90	0.96	16.78	0.08	0.35	0.08	0.35	**1.34**	**5.87**
EX-U	2.34	0.56	0.90	0.96	1.78	0.28	0.48	0.43	0.59	**1.00**	**1.39**
EX-V	1.55	0.98	0.90	0.96	0.57	0.08	0.35	0.60	0.74	**0.93**	**1.14**
EX-X	3.21	0.45	0.90	0.96	2.76	0.17	0.41	0.27	0.49	**0.87**	**1.56**
EX-W	5.83	3.00	0.90	0.96	2.83	0.08	0.35	0.50	0.66	**2.93**	**3.87**
EX-Y	2.42	1.00	0.90	0.96	1.42	0.45	0.59	0.64	0.74	**1.54**	**1.80**
EX-Z	0.50	0.25	0.90	0.96	0.25	0.45	0.59	0.68	0.78	**0.34**	**0.39**
EX-AA	1.68	0.61	0.90	0.96	1.07	0.22	0.44	0.47	0.63	**0.78**	**1.06**
EX-BB	3.32	1.00	0.90	0.96	2.32	0.38	0.55	0.54	0.67	**1.78**	**2.24**
EX-LL1	2.36	1.07	0.90	0.96	1.29	0.36	0.53	0.60	0.72	**1.43**	**1.71**
EX-KK	3.36	0.37	0.90	0.96	2.99	0.12	0.39	0.21	0.45	**0.69**	**1.52**
EX-LL2	2.34	0.39	0.90	0.96	1.95	0.38	0.54	0.47	0.61	**1.09**	**1.43**
EX-MM	2.01	0.81	0.90	0.96	1.20	0.27	0.47	0.52	0.67	**1.05**	**1.34**
EX-NN	0.93	0.75	0.90	0.96	0.18	0.08	0.35	0.74	0.84	**0.69**	**0.78**
EX-PP2	1.78	0.38	0.90	0.96	1.40	0.45	0.59	0.55	0.67	**0.97**	**1.19**
EX-QQ	1.38	0.40	0.90	0.96	0.98	0.45	0.59	0.58	0.70	**0.80**	**0.96**
EX-RR	2.29	0.42	0.90	0.96	1.87	0.45	0.59	0.53	0.66	**1.22**	**1.51**
EX-SS	2.11	0.56	0.90	0.96	1.55	0.45	0.59	0.57	0.69	**1.20**	**1.45**
EX-TT	3.84	1.09	0.90	0.96	2.75	0.26	0.47	0.44	0.61	**1.70**	**2.34**
EX-UU	1.72	0.33	0.90	0.96	1.39	0.52	0.67	0.59	0.73	**1.02**	**1.25**
EX-VV	2.86	1.47	0.90	0.96	1.39	0.30	0.49	0.61	0.73	**1.74**	**2.09**

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY (DEVELOPED CONDITIONS)

BASIN	TOTAL AREA (AC)	IMPERVIOUS AREA / STREETS			LOTS/LANDSCAPE/UNDEV. AREAS (NOT PAVEMENT)			WEIGHTED		WEIGHTED CA	
		AREA (AC)	C(5)	C(100)	AREA (AC)	C(5)	C(100)	C(5)	C(100)	**CA(5)**	**CA(100)**
EX-WW	1.25	0.52	0.90	0.96	0.73	0.31	0.52	0.56	0.70	**0.69**	**0.88**
EX-ZZ	1.48	1.16	0.90	0.96	0.32	0.08	0.35	0.72	0.83	**1.07**	**1.23**
EX-HHH	2.35	0.60	0.90	0.96	1.75	0.50	0.65	0.60	0.73	**1.42**	**1.71**
EX-JJJ	3.10	0.77	0.90	0.96	2.33	0.47	0.64	0.58	0.72	**1.79**	**2.23**
A	1.87	0.74	0.90	0.96	1.13	0.45	0.59	0.63	0.74	**1.17**	**1.38**
B	1.50	0.44	0.90	0.96	1.06	0.45	0.59	0.58	0.70	**0.87**	**1.05**
C	2.72	0.74	0.90	0.96	1.98	0.45	0.59	0.57	0.69	**1.56**	**1.88**
D	2.33	0.59	0.90	0.96	1.74	0.45	0.59	0.56	0.68	**1.31**	**1.59**
E	0.66	0.27	0.90	0.96	0.39	0.22	0.45	0.50	0.66	**0.33**	**0.43**
F1	2.44	0.49	0.90	0.96	1.95	0.45	0.59	0.54	0.66	**1.32**	**1.62**
F2	1.22	0.16	0.90	0.96	1.06	0.45	0.59	0.51	0.64	**0.62**	**0.78**
G1	1.58	0.62	0.90	0.96	0.96	0.45	0.59	0.63	0.74	**0.99**	**1.16**
G2	1.46	0.50	0.90	0.96	0.96	0.45	0.59	0.60	0.72	**0.88**	**1.05**
H	1.91	0.52	0.90	0.96	1.39	0.45	0.59	0.57	0.69	**1.09**	**1.32**
J	1.98	0.65	0.90	0.96	1.33	0.08	0.35	0.35	0.55	**0.69**	**1.09**
K1	1.97	0.43	0.90	0.96	1.54	0.56	0.71	0.63	0.76	**1.25**	**1.51**
K2	1.18	0.20	0.90	0.96	0.98	0.56	0.71	0.62	0.75	**0.73**	**0.89**
L1	3.14	0.60	0.90	0.96	2.54	0.40	0.59	0.50	0.66	**1.56**	**2.07**
L2	1.65	0.39	0.90	0.96	1.26	0.44	0.62	0.55	0.70	**0.91**	**1.16**
M	2.47	0.56	0.90	0.96	1.91	0.45	0.63	0.55	0.70	**1.36**	**1.74**
N	0.96	0.45	0.90	0.96	0.51	0.45	0.59	0.66	0.76	**0.63**	**0.73**
P	1.11	0.36	0.90	0.96	0.75	0.45	0.59	0.60	0.71	**0.66**	**0.79**
Q	2.02	0.68	0.90	0.96	1.34	0.45	0.59	0.60	0.71	**1.22**	**1.44**
R	0.89	0.28	0.90	0.96	0.61	0.56	0.71	0.67	0.79	**0.59**	**0.70**
S-1	2.20	0.30	0.90	0.96	1.90	0.51	0.67	0.56	0.71	**1.24**	**1.56**
S-2	1.98	0.59	0.90	0.96	1.39	0.47	0.61	0.60	0.71	**1.18**	**1.41**
T	2.44	0.48	0.90	0.96	1.96	0.42	0.57	0.51	0.65	**1.26**	**1.58**
U	2.06	0.44	0.90	0.96	1.62	0.45	0.59	0.55	0.67	**1.13**	**1.38**
V	2.14	0.45	0.90	0.96	1.69	0.45	0.59	0.54	0.67	**1.17**	**1.43**
W	1.87	0.57	0.90	0.96	1.30	0.45	0.59	0.59	0.70	**1.10**	**1.31**

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY (DEVELOPED CONDITIONS)

BASIN	TOTAL AREA (AC)	IMPERVIOUS AREA / STREETS			LOTS/LANDSCAPE/UNDEV. AREAS (NOT PAVEMENT)			WEIGHTED		WEIGHTED CA	
		AREA (AC)	C(5)	C(100)	AREA (AC)	C(5)	C(100)	C(5)	C(100)	**CA(5)**	**CA(100)**
X	3.40	0.43	0.90	0.96	2.97	0.36	0.53	0.43	0.58	**1.46**	**1.99**
Y-1	1.26	1.02	0.90	0.96	0.24	0.08	0.35	0.74	0.84	**0.94**	**1.06**
Y-2	0.26	0.16	0.90	0.96	0.10	0.08	0.35	0.58	0.73	**0.15**	**0.19**
Z	1.67	1.33	0.90	0.96	0.34	0.08	0.35	0.73	0.84	**1.22**	**1.40**
AA	1.78	0.53	0.90	0.96	1.25	0.44	0.58	0.58	0.69	**1.03**	**1.23**
BB	2.98	1.18	0.90	0.96	1.80	0.35	0.55	0.57	0.71	**1.69**	**2.12**
CC	1.13	0.38	0.90	0.96	0.75	0.41	0.59	0.57	0.71	**0.65**	**0.81**
DD	1.37	0.63	0.90	0.96	0.74	0.56	0.71	0.72	0.82	**0.98**	**1.13**
EE	1.41	0.62	0.90	0.96	0.79	0.56	0.71	0.71	0.82	**1.00**	**1.16**
FF	2.20	0.71	0.90	0.96	1.49	0.48	0.65	0.62	0.75	**1.35**	**1.65**
GG	2.59	1.18	0.90	0.96	1.41	0.08	0.35	0.45	0.63	**1.17**	**1.63**
HH	1.17	0.53	0.90	0.96	0.64	0.56	0.71	0.71	0.82	**0.84**	**0.96**
JJ	3.65	1.65	0.90	0.96	2.00	0.08	0.35	0.45	0.63	**1.65**	**2.28**
KK	3.72	2.57	0.90	0.96	1.15	0.08	0.35	0.65	0.77	**2.41**	**2.87**
LL	3.14	2.52	0.90	0.96	0.62	0.08	0.35	0.74	0.84	**2.32**	**2.64**
MM	1.22	0.65	0.90	0.96	0.57	0.08	0.35	0.52	0.68	**0.63**	**0.82**
NN	4.83	2.28	0.90	0.96	2.55	0.08	0.35	0.47	0.64	**2.26**	**3.08**
PP	2.08	1.64	0.90	0.96	0.44	0.08	0.35	0.73	0.83	**1.51**	**1.73**
QQ	13.42	0.00	0.90	0.96	13.42	0.08	0.35	0.08	0.35	**1.07**	**4.70**
RR	0.36	0.15	0.90	0.96	0.21	0.45	0.59	0.64	0.74	**0.23**	**0.27**
SS	1.54	0.79	0.90	0.96	0.75	0.56	0.71	0.73	0.84	**1.13**	**1.29**
TT	0.86	0.68	0.90	0.96	0.18	0.08	0.35	0.73	0.83	**0.63**	**0.72**
UU	2.98	1.02	0.90	0.96	1.96	0.08	0.35	0.36	0.56	**1.07**	**1.67**
VV	2.64	1.72	0.90	0.96	0.92	0.08	0.35	0.61	0.75	**1.62**	**1.97**
WW	1.12	0.00	0.90	0.96	1.12	0.08	0.35	0.08	0.35	**0.09**	**0.39**

JOB NAME: **Banning Lewis Ranch Filing 37-38**
JOB NUM: **2570.21**
DATE: **7/11/2021**
CALC'D BY: **MAL**

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (DEVELOPED CONDITIONS)

BASIN	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
CH-1	2.36	7.48	0.12	40	8	4.2	1850	1.0%	3.5	8.8	13.0	3.74	6.28	**8.8**	**47.0**
CH-2	1.34	5.87	0.08	40	8	4.3	1140	1.2%	3.8	5.0	9.3	4.24	7.12	**5.7**	**41.8**
EX-U	1.00	1.39	0.08	60	2	9.6	750	1.4%	4.1	3.0	12.6	3.78	6.35	**3.8**	**8.8**
EX-V	0.93	1.14	0.08	40	1	8.6	350	1.5%	4.3	1.4	10.0	4.13	6.94	**3.8**	**7.9**
EX-X	0.87	1.56	0.45	100	3	8.2	530	1.5%	4.3	2.1	10.2	4.10	6.88	**3.6**	**10.8**
EX-W	2.93	3.87	0.08	30	6	3.8	420	2.0%	4.9	1.4	5.2	5.12	8.60	**15.0**	**33.3**
EX-Y	1.54	1.80	0.45	40	0.8	5.9	1220	2.0%	4.9	4.1	10.0	4.13	6.93	**6.4**	**12.5**
EX-Z	0.34	0.39	0.45	50	1	6.6	200	1.5%	4.3	0.8	7.4	4.58	7.70	**1.5**	**3.0**
EX-AA	0.78	1.06	0.45	50	1	6.6	750	3.3%	6.4	2.0	8.6	4.36	7.32	**3.4**	**7.7**
EX-BB	1.78	2.24	0.45	100	3	8.2	550	1.5%	4.3	2.1	10.3	4.08	6.86	**7.3**	**15.3**
EX-LL1	1.43	1.71	0.45	20	0.5	3.9	750	3.3%	6.4	2.0	5.8	4.93	8.29	**7.0**	**14.2**
EX-KK	0.69	1.52	0.08	80	2	12.2	380	2.5%	5.5	1.1	13.3	3.70	6.21	**2.6**	**9.5**
EX-LL2	1.09	1.43	0.45	100	3	8.2	330	2.9%	6.0	0.9	9.1	4.27	7.17	**4.7**	**10.2**
EX-MM	1.05	1.34	0.45	50	4	4.2	1050	1.5%	4.3	4.1	8.3	4.42	7.41	**4.6**	**9.9**

JOB NAME: **Banning Lewis Ranch Filing 37-38**
JOB NUM: **2570.21**
DATE: **7/11/2021**
CALC'D BY: **MAL**

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (DEVELOPED CONDITIONS)

BASIN	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
EX-NN	0.69	0.78	0.08	5	0.5	1.9	900	1.5%	4.3	3.5	5.4	5.05	8.47	**3.5**	**6.6**
EX-PP2	0.97	1.19	0.45	100	3	8.2	420	1.5%	4.3	1.6	9.8	4.16	6.98	**4.0**	**8.3**
EX-QQ	0.80	0.96	0.45	50	1	6.6	515	1.5%	4.3	2.0	8.6	4.35	7.31	**3.5**	**7.0**
EX-RR	1.22	1.51	0.45	100	3	8.2	530	1.5%	4.3	2.1	10.2	4.10	6.88	**5.0**	**10.4**
EX-SS	1.20	1.45	0.45	100	3	8.2	720	1.5%	4.3	2.8	11.0	3.99	6.70	**4.8**	**9.7**
EX-TT	1.70	2.34	0.12	100	4	11.2	400	2.5%	5.5	1.2	12.4	3.81	6.39	**6.5**	**14.9**
EX-UU	1.02	1.25	0.53	100	2	8.2	300	1.5%	4.3	1.2	9.4	4.23	7.10	**4.3**	**8.9**
EX-VV	1.74	2.09	0.45	90	10	5.0	820	1.0%	3.5	3.9	8.9	4.30	7.22	**7.5**	**15.1**
EX-WW	0.69	0.88	0.53	50	2	4.6	300	2.5%	5.5	0.9	5.5	5.02	8.43	**3.5**	**7.4**
EX-ZZ	1.07	1.23	0.08	10	0.5	3.4	820	1.0%	3.5	3.9	7.3	4.60	7.72	**4.9**	**9.5**
EX-HHH	1.42	1.71	0.53	100	2	8.2	180	1.5%	4.3	0.7	8.9	4.31	7.23	**6.1**	**12.4**
EX-JJJ	1.79	2.23	0.53	100	2	8.2	650	2.5%	5.5	2.0	10.1	4.11	6.90	**7.3**	**15.4**
A	1.17	1.38	0.45	50	1	6.6	800	1.5%	4.3	3.1	9.7	4.17	7.01	**4.9**	**9.6**
B	0.87	1.05	0.45	100	3	8.2	300	1.5%	4.3	1.2	9.3	4.23	7.11	**3.7**	**7.4**

JOB NAME: **Banning Lewis Ranch Filing 37-38**
JOB NUM: **2570.21**
DATE: **7/11/2021**
CALC'D BY: **MAL**

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (DEVELOPED CONDITIONS)

BASIN	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
C	1.56	1.88	0.45	100	3	8.2	420	1.9%	4.8	1.5	9.6	4.19	7.03	**6.5**	**13.2**
D	1.31	1.59	0.45	100	3	8.2	500	3.7%	6.7	1.2	9.4	4.22	7.09	**5.5**	**11.3**
E	0.33	0.43	0.08	25	4	3.7	200	3.5%	6.5	0.5	5.0	5.17	8.68	**1.7**	**3.8**
F1	1.32	1.62	0.45	100	3	8.2	600	3.0%	6.1	1.6	9.8	4.16	6.98	**5.5**	**11.3**
F2	0.62	0.78	0.45	100	3	8.2	120	1.5%	4.3	0.5	8.6	4.35	7.30	**2.7**	**5.7**
G1	0.99	1.16	0.45	100	3	8.2	280	2.0%	4.9	0.9	9.1	4.27	7.17	**4.2**	**8.3**
G2	0.88	1.05	0.45	100	3	8.2	200	2.0%	4.9	0.7	8.8	4.31	7.24	**3.8**	**7.6**
H	1.09	1.32	0.45	50	1	6.6	420	2.0%	4.9	1.4	8.0	4.46	7.49	**4.9**	**9.9**
J	0.69	1.09	0.08	60	4	7.6	540	3.3%	6.4	1.4	9.0	4.28	7.19	**3.0**	**7.8**
K1	1.25	1.51	0.56	100	2	7.8	500	2.5%	5.5	1.5	9.3	4.24	7.13	**5.3**	**10.7**
K2	0.73	0.89	0.56	100	2	7.8	200	2.5%	5.5	0.6	8.4	4.40	7.38	**3.2**	**6.6**
L1	1.56	2.07	0.56	100	2	7.8	530	2.5%	5.5	1.6	9.4	4.23	7.10	**6.6**	**14.7**
L2	0.91	1.16	0.56	100	2	7.8	190	2.5%	5.5	0.6	8.3	4.40	7.39	**4.0**	**8.5**
M	1.36	1.74	0.56	100	2	7.8	380	1.5%	4.3	1.5	9.2	4.25	7.13	**5.8**	**12.4**
N	0.63	0.73	0.45	50	1	6.6	380	1.5%	4.3	1.5	8.1	4.45	7.47	**2.8**	**5.5**
P	0.66	0.79	0.45	50	1	6.6	200	1.5%	4.3	0.8	7.4	4.58	7.70	**3.0**	**6.1**
Q	1.22	1.44	0.45	100	3	8.2	300	1.5%	4.2	1.2	9.3	4.23	7.10	**5.1**	**10.3**
R	0.59	0.70	0.56	100	2	7.8	300	1.5%	4.2	1.2	8.9	4.30	7.21	**2.6**	**5.1**

JOB NAME: **Banning Lewis Ranch Filing 37-38**
JOB NUM: **2570.21**
DATE: **7/11/2021**
CALC'D BY: **MAL**

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (DEVELOPED CONDITIONS)

BASIN	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
S-1	1.24	1.56	0.56	100	2	7.8	400	1.5%	4.3	1.6	9.3	4.24	7.11	**5.2**	**11.1**
S-2	1.18	1.41	0.56	100	2	7.8	300	1.5%	4.3	1.2	8.9	4.30	7.22	**5.1**	**10.2**
T	1.26	1.58	0.45	100	3	8.2	500	1.5%	4.3	1.9	10.1	4.11	6.90	**5.2**	**10.9**
U	1.13	1.38	0.45	100	3	8.2	480	1.5%	4.3	1.9	10.0	4.12	6.92	**4.6**	**9.5**
V	1.17	1.43	0.45	100	3	8.2	530	1.5%	4.3	2.1	10.2	4.10	6.88	**4.8**	**9.8**
W	1.10	1.31	0.45	40	0.8	5.9	650	2.0%	4.9	2.2	8.1	4.45	7.47	**4.9**	**9.8**
X	1.46	1.99	0.45	100	3	8.2	650	2.0%	4.9	2.2	10.4	4.08	6.84	**5.9**	**13.6**
Y-1	0.94	1.06	0.08	5	0.5	1.9	1250	1.5%	4.3	4.9	6.8	4.71	7.91	**4.4**	**8.4**
Y-2	0.15	0.19	0.08	5	0.5	1.9	200	1.5%	4.3	0.8	5.0	5.17	8.68	**0.8**	**1.6**
Z	1.22	1.40	0.08	5	0.5	1.9	750	1.5%	4.3	2.9	5.0	5.17	8.68	**6.3**	**12.1**
AA	1.03	1.23	0.45	100	3	8.2	280	1.5%	4.3	1.1	9.3	4.25	7.13	**4.4**	**8.8**
BB	1.69	2.12	0.56	100	2	7.8	400	1.5%	4.3	1.6	9.3	4.24	7.11	**7.2**	**15.1**
CC	0.65	0.81	0.56	100	2	7.8	200	1.5%	4.3	0.8	8.5	4.37	7.33	**2.8**	**5.9**
DD	0.98	1.13	0.56	100	2	7.8	280	1.5%	4.3	1.1	8.8	4.31	7.24	**4.2**	**8.2**
EE	1.00	1.16	0.56	100	2	7.8	280	1.5%	4.3	1.1	8.8	4.31	7.24	**4.3**	**8.4**
FF	1.35	1.65	0.56	100	2	7.8	500	1.5%	4.3	1.9	9.7	4.17	7.01	**5.7**	**11.6**

JOB NAME: **Banning Lewis Ranch Filing 37-38**
JOB NUM: **2570.21**
DATE: **7/11/2021**
CALC'D BY: **MAL**

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (DEVELOPED CONDITIONS)

BASIN	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
GG	1.17	1.63	0.08	5	0.5	1.9	1450	1.9%	4.8	5.0	6.9	4.68	7.85	**5.5**	**12.8**
HH	0.84	0.96	0.56	100	2	7.8	200	1.5%	4.3	0.8	8.5	4.37	7.33	**3.6**	**7.1**
JJ	1.65	2.28	0.56	100	2	7.8	500	1.5%	4.3	1.9	9.7	4.17	7.01	**6.9**	**16.0**
KK	2.41	2.87	0.08	10	0.5	3.4	1400	1.2%	3.8	6.1	9.5	4.20	7.06	**10.1**	**20.3**
LL	2.32	2.64	0.08	10	0.5	3.4	1400	1.2%	3.8	6.1	9.5	4.20	7.06	**9.7**	**18.6**
MM	0.63	0.82	0.08	10	0.5	3.4	420	1.5%	4.3	1.6	5.1	5.15	8.65	**3.2**	**7.1**
NN	2.26	3.08	0.08	10	0.5	3.4	750	1.0%	3.5	3.6	7.0	4.67	7.83	**10.5**	**24.1**
PP	1.51	1.73	0.08	10	0.5	3.4	650	1.0%	3.5	3.1	6.5	4.77	8.01	**7.2**	**13.8**
QQ	1.07	4.70	0.08	75	18	5.6	800	1.0%	3.5	3.8	9.4	4.22	7.09	**4.5**	**33.3**
RR	0.23	0.27	0.08	10	1	2.7	100	1.5%	4.3	0.4	5.0	5.17	8.68	**1.2**	**2.3**
SS	1.13	1.29	0.56	100	2	7.8	450	1.5%	4.3	1.7	9.5	4.21	7.06	**4.8**	**9.1**
TT	0.63	0.72	0.08	10	0.5	3.4	120	1.0%	3.5	0.6	5.0	5.17	8.68	**3.2**	**6.2**
UU	1.07	1.67	0.08	10	0.5	3.4	350	1.5%	4.3	1.4	5.0	5.17	8.68	**5.6**	**14.5**
VV	1.62	1.97	0.08	10	0.5	3.4	240	1.0%	3.5	1.1	5.0	5.17	8.68	**8.4**	**17.1**
WW	0.09	0.39	0.08	25	6	3.2	220	1.0%	3.5	1.0	5.0	5.17	8.68	**0.5**	**3.4**

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Inlet Size
					I(5)	I(100)	Q(5)	Q(100)	
DP-1	POND 96-NORTH RELEASE (FIL. 20s FDR)	9.83	75.86	47.5	1.79	3.01	17.6	228.0	EXISTING 60" RCP
DP-2	DP-1 + BASIN CH-1	12.19	83.34	47.5	1.79	3.01	21.8	250.5	EXIST. CHANNEL
DP-3	DP-2 + BASIN CH-2 + PIPE 65 + PIPE 66	14.84	96.35	52.5	1.64	2.76	24.4	265.5	EXIST. BOX CULVERT
4	BASIN EX-BB	1.78	2.24	10.3	4.08	6.86	7.3	15.3	15' Type R Sump
5	BASIN EX-Z	0.34	0.39	7.4	4.58	7.70	1.5	3.0	5' Type R Sump
6	BASIN B	0.87	1.05	9.3	4.23	7.11	3.7	7.4	5' Type R Sump
7	BASIN A	1.17	1.38	9.7	4.17	7.01	4.9	9.6	10' Type R Sump
8	BASIN C	1.56	1.88	9.6	4.19	7.03	6.5	13.2	10' Type R Sump
9	BASIN EX-AA	0.78	1.06	8.6	4.36	7.32	3.4	7.7	5' Type R Sump
10	BASIN EX-LL1 + FB DP-29	1.45	2.26	10.2	4.10	6.88	5.9	15.5	10' Type R Sump
11	BASIN D	1.31	1.59	9.4	4.22	7.09	5.5	11.3	10' Type R Sump
12	BASIN E	0.33	0.43	5.0	5.17	8.68	1.7	3.8	5' Type R Sump

JOB NAME:	*Banning Lewis Ranch Filing 37-38*
JOB NUMBER:	*2570.21*
DATE:	*07/11/21*
CALCULATED BY:	*MAL*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Inlet Size
					I(5)	I(100)	Q(5)	Q(100)	
13	BASIN EX-Y	1.54	1.80	10.0	4.13	6.93	6.4	12.5	10' Type R Sump
14A	BASIN F1	1.32	1.62	9.8	4.16	6.98	5.5	11.3	5' Type R At-Grade
14B	BASIN F2 + FB DP-14A	1.27	1.86	9.8	4.16	6.98	5.3	12.9	10' Type R Sump
15A	BASIN G1	0.99	1.16	9.1	4.27	7.17	4.2	8.3	5' Type R At-Grade
15B	BASIN G2 + FB DP-15A	1.31	1.75	9.1	4.27	7.17	5.6	12.5	10' Type R Sump
16	BASIN H	1.09	1.32	8.0	4.46	7.49	4.9	9.9	10' Type R Sump
17	BASIN RR	0.23	0.27	5.0	5.17	8.68	1.2	2.3	5' Type R Sump
18	BASIN J	0.69	1.09	9.0	4.28	7.19	3.0	7.8	5' Type R Sump
19A	BASIN K1	1.25	1.51	9.3	4.24	7.13	5.3	10.7	10' Type R At-Grade
19B	BASIN K2 + FB DP-19A	0.87	1.41	9.3	4.24	7.13	3.7	10.1	10' Type R Sump
20A	BASIN L1	1.56	2.07	9.4	4.23	7.10	6.6	14.7	10' Type R At-Grade
20B	BASIN L2 + FB DP-20A + FB DP-61	1.18	2.23	12.6	3.78	6.35	4.5	14.2	10' Type R Sump
21	BASIN M	1.36	1.74	9.2	4.25	7.13	5.8	12.4	10' Type R Sump
22	BASIN N	0.63	0.73	8.1	4.45	7.47	2.8	5.5	5' Type R Sump
23	BASIN Q	1.22	1.44	9.3	4.23	7.10	5.1	10.3	10' Type R Sump

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Inlet Size
					I(5)	I(100)	Q(5)	Q(100)	
24	BASIN R	0.59	0.70	8.9	4.30	7.21	2.6	5.1	5' Type R Sump
25A	BASIN S-1	1.24	1.56	9.3	4.24	7.11	5.2	11.1	10' Type R At-Grade
25B	BASIN S-2 + FB DP-25A	1.34	1.98	9.3	4.24	7.11	5.7	14.1	10' Type R Sump
26	1/2 BASIN EX-W	1.46	1.94	5.2	5.12	8.60	7.5	16.6	EXISTING STORM
27	BASIN EX-V	0.93	1.14	10.0	4.13	6.94	3.8	7.9	EXISTING INLETS
28	1/2 BASIN EX-W	1.46	1.94	5.2	5.12	8.60	7.5	16.6	EXISTING STORM
29	BASIN EX-X	0.87	1.56	10.2	4.10	6.88	3.6	10.8	EXISTING AT-GRADE
30	BASIN T	1.26	1.58	10.1	4.11	6.90	5.2	10.9	10' Type R Sump
34	BASIN EX-U	1.00	1.39	12.6	3.78	6.35	3.8	8.8	EXISTING 10' AT-GRADE INLET
48	At-Grade Inlet FLOW-BY (FIL 30s FDR)	0.02	0.47	9.1	4.27	7.17	0.1	3.4	SURFACE FLOW
49	At-Grade Inlet FLOW-BY (FIL 30s FDR)	0.00	0.21	6.8	4.71	7.90	0.0	1.6	SURFACE FLOW
56	BASIN EX-QQ	0.80	0.96	8.6	4.35	7.31	3.5	7.0	EX. 10' TYPE R AT-GRADE
57	BASIN EX-RR	1.22	1.51	10.2	4.10	6.88	5.0	10.4	EX. 10' TYPE R AT-GRADE
58	BASIN EX-SS + FB DP-56 + FB DP-57	1.32	2.17	11.0	3.99	6.70	5.3	14.5	EX. 15' TYPE R AT-GRADE

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Inlet Size
					I(5)	I(100)	Q(5)	Q(100)	
59	BASIN EX-LL2	1.09	1.43	9.1	4.27	7.17	4.7	10.2	EX. 10' TYPE R SUMP
60	BASIN EX-KK	0.69	1.52	13.3	3.70	6.21	2.6	9.5	EX. 10' TYPE R SUMP
61	BASIN EX-MM + FB-DP-34	1.08	1.74	12.6	3.78	6.35	4.1	11.1	EX. 15' TYPE R AT-GRADE
62	BASIN EX-NN	0.69	0.78	5.4	5.05	8.47	3.5	6.6	EX. 10' TYPE R AT-GRADE
63	BASIN EX-PP2	0.97	1.19	9.8	4.16	6.98	4.0	8.3	EX. 5' TYPE R SUMP
64	BASIN EX-TT + FB DP-58	1.70	2.86	12.4	3.81	6.39	6.5	18.3	EX. 15' TYPE R SUMP
65	BASIN EX-UU	1.02	1.25	9.4	4.23	7.10	4.3	8.9	EX. 10' TYPE R AT-GRADE
66	BASIN EX-HHH + FB DP-65	1.47	2.07	9.4	4.23	7.10	6.2	14.7	EX. 15' TYPE R SUMP
67	BASIN EX-WW + FB DP-69	0.77	1.67	9.1	4.27	7.17	3.3	12.0	EX. 10' TYPE R SUMP
68	BASIN EX-JJJ	1.79	2.23	10.1	4.11	6.90	7.3	15.4	EX. 15' TYPE R SUMP
69	BASIN EX-VV + DP-48	1.76	2.56	9.1	4.27	7.17	7.5	18.4	EX. 15' TYPE R AT-GRADE
70	BASIN EX-ZZ + DP-49	1.07	1.43	7.3	4.60	7.72	4.9	11.0	EX. 15' TYPE R AT-GRADE
71	BASIN P	0.66	0.79	7.4	4.58	7.70	3.0	6.1	5' Type R Sump
72A	BASIN Y-1	0.94	1.06	6.8	4.71	7.91	4.4	8.4	10' Type R At-Grade
72B	BASIN X + FB DP-72A	1.52	2.28	10.4	4.08	6.84	6.2	15.6	10' Type R Sump

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Inlet Size
					I(5)	I(100)	Q(5)	Q(100)	
73	BASIN W	1.10	1.31	8.1	4.45	7.47	4.9	9.8	10' Type R Sump
74	BASIN V	1.17	1.43	10.2	4.10	6.88	4.8	9.8	10' Type R Sump
75	BASIN U	1.13	1.38	10.0	4.12	6.92	4.6	9.5	10' Type R Sump
76	BASIN AA	1.03	1.23	9.3	4.25	7.13	4.4	8.8	5' Type R Sump
77	BASIN Y-2	0.15	0.19	5.0	5.17	8.68	0.8	1.6	EX. 10' TYPE R AT-GRADE
78	BASIN GG + FB DP-62	1.17	1.78	6.9	4.68	7.85	5.5	14.0	EX. 10' TYPE R AT-GRADE
79	BASIN Z + FB DP-77	1.22	1.40	5.0	5.17	8.68	6.3	12.1	EX. 10' TYPE R SUMP
80	BASIN MM + FB DP-78	0.78	1.59	6.9	4.68	7.85	3.6	12.5	EX. 10' TYPE R SUMP
81	BASIN BB	1.69	2.12	9.3	4.24	7.11	7.2	15.1	EX. 15' TYPE R SUMP
82	BASIN CC	0.65	0.81	8.5	4.37	7.33	2.8	5.9	EX. 5' TYPE R SUMP
83	BASIN EE	1.00	1.16	8.8	4.31	7.24	4.3	8.4	EX. 5' TYPE R SUMP
84	BASIN DD	0.98	1.13	8.8	4.31	7.24	4.2	8.2	EX. 5' TYPE R SUMP
85	BASIN SS	1.13	1.29	9.5	4.21	7.06	4.8	9.1	EX. 10' TYPE R AT-GRADE

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Inlet Size
					I(5)	I(100)	Q(5)	Q(100)	
86	BASIN FF + FB DP-85	1.44	2.03	9.7	4.17	7.01	6.0	14.3	EX. 15' TYPE R SUMP
87	BASIN HH	0.84	0.96	8.5	4.37	7.33	3.6	7.1	EX. 5' TYPE R SUMP
88	BASIN JJ	1.65	2.28	9.7	4.17	7.01	6.9	16.0	EX. 15' TYPE R SUMP
89	BASIN LL + FB DP-70	2.32	2.85	9.5	4.20	7.06	9.8	20.1	EX. 15' TYPE R AT-GRADE
90	BASIN UU + FB DP-89	1.30	2.63	9.5	4.20	7.06	5.5	18.6	EX. 10' TYPE R SUMP
91	BASIN KK	2.41	2.87	9.5	4.20	7.06	10.1	20.3	EX. 15' TYPE R AT-GRADE
92	BASIN TT + FB DP-91	0.91	1.70	9.5	4.20	7.06	3.8	12.0	EX. 10' TYPE R SUMP
93	BASIN NN	2.26	3.08	7.0	4.67	7.83	10.5	24.1	EX. 15' TYPE R AT-GRADE
94	BASIN VV + FB DP-93	1.91	3.20	5.0	5.17	8.68	9.8	27.8	EX. 15' TYPE R SUMP
95	BASIN PP	1.51	1.73	6.5	4.77	8.01	7.2	13.8	EX. 10' TYPE R SUMP
96	BASIN QQ + PIPE 9 + PIPE 53 + PIPE 60 + PIPE 63 + PIPE 6	80.58	104.85	15.9	3.44	5.77	276.8	604.7	POND 171
97	PIPE 31 + PIPE 33 + BASIN WW	3.12	4.61	9.3	4.25	7.13	13.2	32.9	POND A

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
1	DP-4	1.78	2.24	10.3	4.08	6.86	7.3	15.3	24"
2A	PIPE 1 + DP-5	2.12	2.62	10.3	4.08	6.86	8.7	18.0	24"
2B	DP-6	0.87	1.05	9.3	4.23	7.11	3.7	7.4	18"
2C	DP-7	1.17	1.38	9.7	4.17	7.01	4.9	9.6	18"
3A	PIPE 2A + PIPE 2B + PIPE 2C	4.17	5.05	11.2	3.96	6.64	16.5	33.5	30"
3B	DP-19A (Intercepted)	1.11	0.98	9.3	4.24	7.13	4.7	7.0	18"
3C	DP-20A (Intercepted)	1.28	1.15	9.4	4.23	7.10	5.4	8.2	18"
3D	PIPE 3A + PIPE 3B + PIPE 3C	6.55	7.19	12.7	3.77	6.33	24.7	45.4	36"
3E	DP-19B	0.87	1.41	9.3	4.24	7.13	3.7	10.1	18"
3F	DP-20B	1.18	2.23	12.6	3.78	6.35	4.5	14.2	24"
4A	PIPE 3D + PIPE 3E + PIPE 3F	8.60	10.83	12.7	3.77	6.33	32.4	68.5	36"
4B	PIPE 4A + PIPE 24A	27.92	35.31	13.5	3.67	6.17	102.6	217.8	66"

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
5A	PIPE 4B + PIPE 24B + PIPE 24C	29.91	37.78	13.5	3.68	6.18	110.0	233.3	66"
5B	DP-71	0.66	0.79	7.4	4.58	7.70	3.0	6.1	18"
6	PIPE 5A + PIPE 5B	30.57	38.57	14.0	3.62	6.08	110.7	234.5	72"
7	DP-77 (Intercepted)	0.15	0.18	5.0	5.17	8.68	0.8	1.6	18"
8	DP-78 (Intercepted)	1.03	1.02	6.9	4.68	7.85	4.8	8.0	18"
9	PIPE 30 + PIPE 8	10.64	12.93	10.6	4.04	6.78	43.0	87.6	48"
10	DP-8	1.56	1.88	9.6	4.19	7.03	6.5	13.2	24"
11	PIPE 10 + DP-9	2.34	2.94	9.6	4.19	7.03	9.8	20.6	24"
12	DP-10	1.45	2.26	10.2	4.10	6.88	5.9	15.5	24"
13	PIPE 38 + PIPE 11 + PIPE 12	8.50	11.22	11.0	3.99	6.70	33.9	75.2	42"
14	DP-11	1.31	1.59	9.4	4.22	7.09	5.5	11.3	18"
15	PIPE 14 + DP-12	1.64	2.03	9.4	4.22	7.09	6.9	14.4	24"
16	PIPE 13 + PIPE 15	10.14	13.25	11.6	3.90	6.55	39.5	86.7	42"

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
17A	DP-14A (Intercepted)	0.67	0.54	9.8	4.16	6.98	2.8	3.8	18"
17B	DP-13	1.54	1.80	10.0	4.13	6.93	6.4	12.5	24"
17C	DP-14B	1.27	1.86	9.8	4.16	6.98	5.3	12.9	24"
18A	PIPE 17A + PIPE 17B + PIPE 17C	3.48	4.20	10.0	4.13	6.93	14.4	29.1	30"
18B	DP-15A (Intercepted)	0.56	0.46	9.1	4.27	7.17	2.4	3.3	18"
19A	PIPE 18A + PIPE 18B	4.04	4.66	11.2	3.96	6.64	16.0	30.9	30"
19B	DP-15B	1.31	1.75	9.1	4.27	7.17	5.6	12.5	24"
20	DP-16	1.09	1.32	8.0	4.46	7.49	4.9	9.9	18"
21	PIPE 19A + PIPE 19B + PIPE 20	6.44	7.73	11.2	3.96	6.64	25.5	51.3	36"
22A	PIPE 16 + PIPE 21	16.58	20.97	12.4	3.80	6.38	63.1	133.9	48"
22B	DP-17	0.23	0.27	5.0	5.17	8.68	1.2	2.3	18"
22C	DP-18	0.69	1.09	9.0	4.28	7.19	3.0	7.8	18"
23A	PIPE 22A + PIPE 22B + PIPE 22C	17.50	22.33	12.6	3.78	6.35	66.2	141.7	54"

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
23B	DP-23	1.22	1.44	9.3	4.23	7.10	5.1	10.3	18"
23C	DP-24	0.59	0.70	8.9	4.30	7.21	2.6	5.1	18"
24A	PIPE 23A + PIPE 23B + PIPE 23C	19.31	24.48	13.5	3.67	6.17	71.0	151.0	60"/66"
24B	DP-21	1.36	1.74	9.2	4.25	7.13	5.8	12.4	18"
24C	DP-22	0.63	0.73	8.1	4.45	7.47	2.8	5.5	18"
25A	DP-72A (Intercepted)	0.87	0.77	9.3	4.24	7.11	3.7	5.5	18"
25B	DP-72B	1.52	2.28	10.4	4.08	6.84	6.2	15.6	24"
25C	DP-73	1.10	1.31	8.1	4.45	7.47	4.9	9.8	18"
25D	PIPE 25A + PIPE 25B + PIPE 25C	3.49	4.36	10.4	4.08	6.84	14.2	29.9	30"
26A	DP-25A (Intercepted)	1.09	1.00	9.3	4.24	7.11	4.6	7.1	18"
26B	DP-25B	1.34	1.98	9.3	4.24	7.11	5.7	14.1	24"
26C	DP-30	1.26	1.58	10.1	4.11	6.90	5.2	10.9	18"
27	PIPE 26A + PIPE 26B + PIPE 26C	3.68	4.55	10.1	4.11	6.90	15.1	31.4	30"
28A	DP-74	1.17	1.43	10.2	4.10	6.88	4.8	9.8	18"

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
28B	DP-75	1.13	1.38	10.0	4.12	6.92	4.6	9.5	18"
28C	PIPE 27 + PIPE 28A + PIPE 28B	5.97	7.36	11.4	3.93	6.61	23.5	48.6	36"
29	PIPE 25D + PIPE 28C	9.46	11.72	10.4	4.08	6.84	38.6	80.3	42"
30	PIPE 29 + PIPE 7	9.62	11.91	10.6	4.04	6.78	38.8	80.7	42"
31	DP-76	1.03	1.23	9.3	4.25	7.13	4.4	8.8	18"
32	DP-80	0.78	1.59	6.9	4.68	7.85	3.6	12.5	24"

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
33	PIPE 32 + DP-79	2.00	2.98	6.9	4.68	7.85	9.4	23.4	30"
34	DP-26	1.46	1.94	5.2	5.12	8.60	7.5	16.6	EX. 24"
35	PIPE 34 + DP-27	2.39	3.08	10.0	4.13	6.94	9.9	21.3	EX. 24"
36	DP-28	1.46	1.94	5.2	5.12	8.60	7.5	16.6	EX. 18"s
37	PIPE 36 + DP-29 (Intercepted)	2.32	2.95	10.2	4.10	6.88	9.5	20.3	EX. 30"
38	PIPE 35 + PIPE 37	4.71	6.03	10.2	4.10	6.88	19.3	41.5	EX. 36"
40	DP-81	1.69	2.12	9.3	4.24	7.11	7.2	15.1	24"
41	DP-82	0.65	0.81	8.5	4.37	7.33	2.8	5.9	18"
42	PIPE 40 + PIPE 41	2.34	2.93	9.3	4.24	7.11	9.9	20.8	24"
43	DP-83	1.00	1.16	8.8	4.31	7.24	4.3	8.4	18"
44	DP-84	0.98	1.13	8.8	4.31	7.24	4.2	8.2	18"
45	PIPE 42 + PIPE 43 + PIPE 44	4.32	5.22	10.2	4.09	6.87	17.7	35.9	30"
46	DP-85 (Intercepted)	1.05	0.91	9.5	4.21	7.06	4.4	6.4	18"

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
47	DP-86	1.44	2.03	9.7	4.17	7.01	6.0	14.3	24"
48	PIPE 46 + PIPE 47	2.49	2.94	9.7	4.17	7.01	10.4	20.6	24"
49	DP-87	0.84	0.96	8.5	4.37	7.33	3.6	7.1	18"
50	PIPE 48 + PIPE 49	3.32	3.90	9.7	4.17	7.01	13.9	27.4	30"
51	PIPE 45 + PIPE 51	7.64	9.12	10.6	4.04	6.78	30.9	61.8	36"
52	DP-88	1.65	2.28	9.7	4.17	7.01	6.9	16.0	24"
53	PIPE 51 + PIPE 52	9.29	11.40	12.0	3.86	6.47	35.8	73.8	42"
54	PIPE 110 + PIPE 113	17.19	22.37	13.3	3.70	6.22	63.6	139.1	54"
55	DP-89 (Intercepted)	2.09	1.88	9.5	4.20	7.06	8.8	13.3	24"
56	DP-91 (Intercepted)	2.12	1.88	9.5	4.20	7.06	8.9	13.3	24"
57	PIPE 54 + PIPE 55 + PIPE 56	21.40	26.14	15.5	3.47	5.82	74.2	152.2	54"
58	DP-90	1.30	2.63	9.5	4.20	7.06	5.5	18.6	24"
59	PIPE 58 + DP-92	2.22	4.33	9.5	4.20	7.06	9.3	30.6	30"

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
60	PIPE 57 + PIPE 59	23.61	30.47	15.9	3.44	5.77	81.1	175.7	54"
61	DP-93 (Intercepted)	1.97	1.85	7.0	4.67	7.83	9.2	14.5	24"
62	PIPE 61 + DP-94	3.88	5.05	7.6	4.54	7.62	17.6	38.5	30"
63	PIPE 62 + DP-95	5.39	6.78	7.9	4.49	7.54	24.2	51.1	36"
65	POND 171 OUTFALL	1.25	6.85	15.9	3.44	5.77	4.3	39.5	36"
66	POND A OUTFALL	0.06	0.28	9.3	4.25	7.13	0.2	2.0	18"
92	DP-60	0.69	1.52	13.3	3.70	6.21	2.6	9.5	EX. 18"
93	PIPE 92 + DP-59	1.78	2.95	13.3	3.70	6.21	6.6	18.3	EX. 24"
94	DP-61 (INT)	1.08	1.50	12.6	3.78	6.35	4.1	9.5	EX. 18"
95	PIPE 94 + DP-62 (INT)	1.77	2.12	12.6	3.78	6.35	6.7	13.5	EX. 24"
96	DP-56 (INT)	0.80	0.75	8.6	4.35	7.31	3.5	5.5	EX. 18"
97	DP-57 (INT)	1.10	1.00	10.2	4.10	6.88	4.5	6.9	EX. 18"

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
98	PIPE 96 + PIPE 97	1.90	1.76	10.2	4.10	6.88	7.8	12.1	EX. 18"
99	DP-58 (INT)	1.32	1.64	11.0	3.99	6.70	5.3	11.0	EX. 18"
100	PIPE 98 + PIPE 99	3.22	3.40	11.0	3.99	6.70	12.8	22.8	EX. 24"
101	PIPE 93 + PIPE 95 + PIPE 100	6.77	8.47	11.0	3.99	6.70	27.0	56.7	EX. 36"
102	DP-63	0.97	1.19	9.8	4.16	6.98	4.0	8.3	EX. 18"
103	DP-64	1.70	2.86	12.4	3.81	6.39	6.5	18.3	EX. 24"
104	PIPE 101 + PIPE 102 + PIPE 103	9.44	12.52	12.4	3.81	6.39	35.9	80.0	EX. 42"
105	DP-65 (INT)	0.97	0.89	9.4	4.23	7.10	4.1	6.3	EX. 18"

JOB NAME: *Banning Lewis Ranch Filing 37-38*
JOB NUMBER: *2570.21*
DATE: *07/11/21*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
106	PIPE 105 + DP-66	2.43	2.96	9.4	4.23	7.10	10.3	21.0	EX. 24"
107	DP-67	0.77	1.67	9.1	4.27	7.17	3.3	12.0	EX. 24"
108	DP-68	1.79	2.23	10.1	4.11	6.90	7.3	15.4	EX. 24"
109	PIPE 104 + PIPE 107 + PIPE 108	12.00	16.42	13.3	3.70	6.22	44.4	102.1	EX. 48"
110	PIPE 109 + PIPE 106	14.44	19.38	13.3	3.70	6.22	53.4	120.5	EX. 48"
111	DP-69 (INT)	1.69	1.77	9.1	4.27	7.17	7.2	12.7	EX. 24"
112	DP-70 (INT)	1.07	1.22	7.3	4.60	7.72	4.9	9.4	EX. 18"
113	PIPE 111 + PIPE 112	2.75	2.99	9.1	4.27	7.17	11.8	21.4	EX. 24"

JOB NAME:	*Banning Lewis Ranch Filing 37-38*
JOB NUMBER:	*2570.21*
DATE:	*07/11/21*
CALCULATED BY:	*MAL*

At-Grade Inlet - Flow Routing (DEVELOPED CONDITIONS)

Design Point	TOTAL						INTERCEPTED				FLOW-BY			
	CA5	CA100	I5	I100	Q5	Q100	Q5	Q100	CA5	CA100	Q5	Q100	CA5	CA100
29	0.87	1.56	4.10	6.88	3.6	10.8	3.5	7.0	0.85	1.02	0.1	3.8	0.02	0.55
34	1.00	1.39	3.78	6.35	3.8	8.8	3.7	6.3	0.98	0.99	0.1	2.5	0.02	0.40
56	0.80	0.96	4.35	7.31	3.5	7.0	3.5	5.5	0.80	0.75	0.0	1.5	0.00	0.21
57	1.22	1.51	4.10	6.88	5.0	10.4	4.5	6.9	1.10	1.00	0.5	3.5	0.12	0.50
58	1.32	2.17	3.99	6.70	5.3	14.5	5.3	11.0	1.32	1.64	0.0	3.5	0.00	0.52
61	1.08	1.74	3.78	6.35	4.1	11.1	4.1	9.5	1.08	1.50	0.0	1.6	0.00	0.24
62	0.69	0.78	5.05	8.47	3.5	6.6	3.5	5.3	0.69	0.63	0.0	1.3	0.00	0.16
65	1.02	1.25	4.23	7.10	4.3	8.9	4.1	6.3	0.97	0.89	0.2	2.6	0.05	0.36
69	1.76	2.56	4.27	7.17	7.5	18.4	7.2	12.7	1.69	1.77	0.3	5.7	0.07	0.79
70	1.07	1.43	4.60	7.72	4.9	11.0	4.9	9.4	1.07	1.22	0.0	1.6	0.00	0.21
77	0.15	0.19	5.17	8.68	0.8	1.6	0.8	1.6	0.15	0.18	0.0	0.0	0.00	0.00
78	1.17	1.78	4.68	7.85	5.5	14.0	4.8	8.0	1.03	1.02	0.7	6.0	0.14	0.77
85	1.13	1.29	4.21	7.06	4.8	9.1	4.4	6.4	1.05	0.91	0.4	2.7	0.08	0.38
89	2.32	2.85	4.20	7.06	9.8	20.1	8.8	13.3	2.09	1.88	1.0	6.8	0.23	0.97
91	2.41	2.87	4.20	7.06	10.1	20.3	8.9	13.3	2.12	1.88	1.2	7.0	0.29	0.99
93	2.26	3.08	4.67	7.83	10.5	24.1	9.2	14.5	1.97	1.85	1.3	9.6	0.28	1.23
14A	1.32	1.62	4.16	6.98	5.5	11.3	2.8	3.8	0.67	0.54	2.7	7.5	0.64	1.08
15A	0.99	1.16	4.27	7.17	4.2	8.3	2.4	3.3	0.56	0.46	1.8	5.0	0.43	0.70
19A	1.25	1.51	4.24	7.13	5.3	10.7	4.7	7.0	1.11	0.98	0.6	3.7	0.14	0.52
20A	1.56	2.07	4.23	7.10	6.6	14.7	5.4	8.2	1.28	1.15	1.2	6.5	0.28	0.92

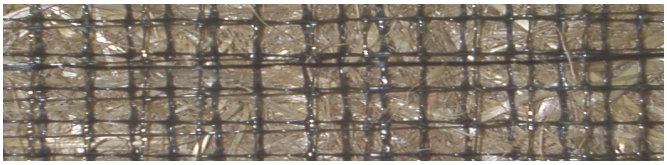
JOB NAME:	***Banning Lewis Ranch Filing 37-38***
JOB NUMBER:	***2570.21***
DATE:	***07/11/21***
CALCULATED BY:	***MAL***

FINAL DRAINAGE REPORT ~ PIPE TRAVEL TIMES

PIPE RUN	STREET / CHANNEL FLOW				
	Pipe Diameter (ft)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)
2A	2.0	400	1.0%	7.2	0.9
3A	2.5	1190	2.5%	13.2	1.5
4	3.0	540	1.5%	11.6	0.8
5	3.5	330	1.0%	10.5	0.5
6	3.5	670	1.5%	12.8	0.9
13	3.5	300	0.5%	7.4	0.7
16	3.5	600	1.5%	12.8	0.8
18A	2.5	750	1.5%	10.3	1.2
22A	4.0	90	0.5%	8.1	0.2
23A	4.0	450	0.5%	8.1	0.9
24A	4.5	800	1.5%	15.2	0.9
25	4.5	180	0.5%	8.8	0.3
27	2.5	640	1.0%	8.4	1.3
29	5.0	160	0.5%	9.4	0.3
31	1.5	300	1.0%	6.0	0.8
38	3.0	300	0.5%	6.7	0.7
42	2.0	400	1.0%	7.2	0.9
45	2.5	140	0.5%	5.9	0.4
51	3.0	550	0.5%	6.7	1.4
54	4.5	1400	0.7%	10.4	2.2
57	4.5	180	0.5%	8.8	0.3
61	2.0	270	1.0%	7.2	0.6
62	2.5	120	1.0%	8.4	0.2
104	3.5	790	2.0%	14.8	0.9

ROLLMAX™
ROLLED EROSION CONTROL

Specification Sheet
VMax® SC250® Turf Reinforcement Mat



DESCRIPTION

The composite turf reinforcement mat (C-TRM) shall be a machine-produced mat of 70% straw and 30% coconut fiber matrix incorporated into permanent three-dimensional turf reinforcement matting. The matrix shall be evenly distributed across the entire width of the matting and stitch bonded between a heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings, an ultra heavy UV stabilized, dramatically corrugated (crimped) intermediate netting with 0.5 x 0.5 inch (1.27 x 1.27 cm) openings, and covered by an heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings. The middle corrugated netting shall form prominent closely spaced ridges across the entire width of the mat. The three nettings shall be stitched together on 1.50 inch (3.81cm) centers with UV stabilized polypropylene thread to form permanent three-dimensional turf reinforcement matting. All mats shall be manufactured with a colored thread stitched along both outer edges as an overlap guide for adjacent mats.

The SC250 shall meet Type 5A, 5B, and 5C specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) FP-03 Section 713.18

Material Content		
Matrix	70% Straw Fiber	0.35 lb/sq yd (0.19 kg/sm)
	30% Coconut Fiber	0.15 lbs/sq yd (0.08 kg/sm)
Netting	Top and Bottom, UV-Stabilized Polypropylene	5 lb/1000 sq ft (2.44 kg/100 sm)
	Middle, Corrugated UV-Stabilized Polypropylene	24 lb/1000 sf (11.7 kg/100 sm)
Thread	Polypropylene, UV Stable	

Standard Roll Sizes		
Width	6.5 ft (2.0 m)	8 ft (2.44m)
Length	55.5 ft (16.9 m)	90 ft (27.4 m)
Weight ± 10%	34 lbs (15.42 kg)	70 lbs (31.8 kg)
Area	40 sq yd (33.4 sm)	80 sq. yd. (66.8 sm)

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.62 in. (15.75 mm)
Resiliency	ASTM 6524	95.2%
Density	ASTM D792	0.891 g/cm^3
Mass/Unit Area	ASTM 6566	16.13 oz/sy (548 g/sm)
UV Stability	ASTM D4355/ 1000 HR	80%
Porosity	ECTC Guidelines	99%
Stiffness	ASTM D1388	222.65 oz-in.
Light Penetration	ASTM D6567	4.1%
Tensile Strength – MD	ASTM D6818	709 lbs/ft (10.51 kN/m)
Elongation – MD	ASTM D6818	23.9%
Tensile Strength – TD	ASTM D6818	712 lbs/ft (10.56 kN/m)
Elongation – TD	ASTM D6818	36.9%
Biomass Improvement	ASTM D7322	441%

Design Permissible Shear Stress		
	Short Duration	**Long Duration**
Phase 1: Unvegetated	3.0 psf (144 Pa)	2.5 psf (120 Pa)
Phase 2: Partially Veg.	8.0 psf (383 Pa)	8.0 psf (383 Pa)
Phase 3: Fully Veg.	10.0 psf (480 Pa)	8.0 psf (383 Pa)
Unvegetated Velocity	9.5 fps (2.9 m/s)	
Vegetated Velocity	15 fps (4.6 m/s)	

Slope Design Data: C Factors

	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2.1	≥ 2:1
≤ 20 ft (6 m)	0.0010	0.0209	0.0507
20-50 ft	0.0081	0.0266	0.0574
≥ 50 ft (15.2 m)	0.0455	0.0555	0.081

Roughness Coefficients – Unveg.

Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.040
0.50 – 2.0 ft	0.040-0.012
≥ 2.0 ft (0.60 m)	0.011

NORTH AMERICAN GREEN®

Western Green
4609 E. Boonville-New Harmony Rd.
Evansville, IN 47725

nagreen.com
800-772-2040

INLET CALCULATIONS (UD-INLET)

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

Version 4.05 Released March 2017

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-21	DP-22	DP-23	DP-24	DP-25A	DP-25B
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump	In Sump	On Grade	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	5.8	2.8	5.1	2.6	5.2	5.1
Major Q_{Known} (cfs)	12.4	5.5	10.3	5.1	11.1	10.1

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	User-Defined
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	0.6
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	4.0

Watershed Characteristics

Subcatchment Area (acres)						
Percent Impervious						
NRCS Soil Type						

Watershed Profile

Overland Slope (ft/ft)						
Overland Length (ft)						
Channel Slope (ft/ft)						
Channel Length (ft)						

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**5.8**	**2.8**	**5.1**	**2.6**	**5.2**	**5.7**
Major Total Design Peak Flow, Q (cfs)	**12.4**	**5.5**	**10.3**	**5.1**	**11.1**	**14.1**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A	N/A	0.6	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A	N/A	4.0	N/A

Minor Storm (Calculated) Analysis of Flow Time

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

Major Storm (Calculated) Analysis of Flow Time

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

Version 4.05 Released March 2017

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-30	DP-71	DP-72A	DP-72B	DP-73	DP-74
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	On Grade	In Sump	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	5.2	3.0	4.4	5.9	4.9	4.8
Major Q_{Known} (cfs)	10.9	6.1	8.4	13.3	9.8	9.8

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	User-Defined	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.3	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	2.3	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)						
Percent Impervious						
NRCS Soil Type						

Watershed Profile

Overland Slope (ft/ft)						
Overland Length (ft)						
Channel Slope (ft/ft)						
Channel Length (ft)						

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**5.2**	**3.0**	**4.4**	**6.2**	**4.9**	**4.8**
Major Total Design Peak Flow, Q (cfs)	**10.9**	**6.1**	**8.4**	**15.6**	**9.8**	**9.8**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	0.3	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	2.3	N/A	N/A	N/A

Minor Storm (Calculated) Analysis of Flow T

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

Major Storm (Calculated) Analysis of Flow T

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

Version 4.05 Released March 2017

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-75	DP-76	DP-77	DP-78	DP-79	DP-80
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	On Grade	On Grade	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	4.6	4.4	0.8	5.5	6.3	2.9
Major Q_{Known} (cfs)	9.5	8.8	1.6	14.0	12.2	6.5

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	User-Defined
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	0.7
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	6.0

Watershed Characteristics

Subcatchment Area (acres)						
Percent Impervious						
NRCS Soil Type						

Watershed Profile

Overland Slope (ft/ft)						
Overland Length (ft)						
Channel Slope (ft/ft)						
Channel Length (ft)						

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**4.6**	**4.4**	**0.8**	**5.5**	**6.3**	**3.6**
Major Total Design Peak Flow, Q (cfs)	**9.5**	**8.8**	**1.6**	**14.0**	**12.2**	**12.5**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	0.0	0.7	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	0.0	6.0	N/A	N/A

Minor Storm (Calculated) Analysis of Flow T

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

Major Storm (Calculated) Analysis of Flow T

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

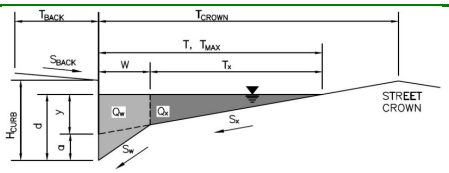
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-21



Gutter Geometry (Enter data in the blue cells)

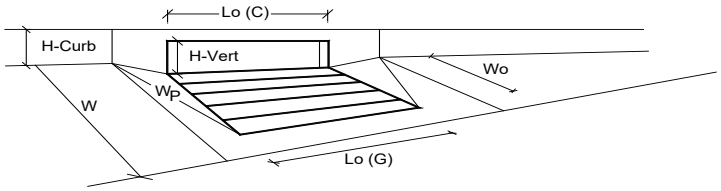
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.8	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.1	7.8	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**6.6**	**17.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	5.8	12.4	cfs

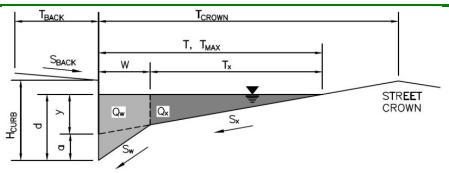
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-22



Gutter Geometry (Enter data in the blue cells)

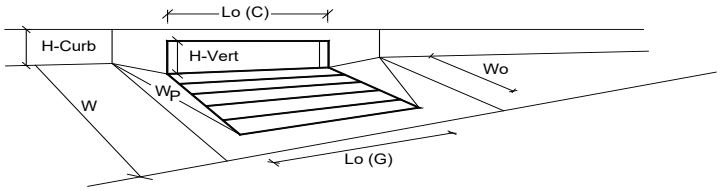
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.8	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.1	7.8	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**4.6**	**9.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	2.8	5.5	cfs

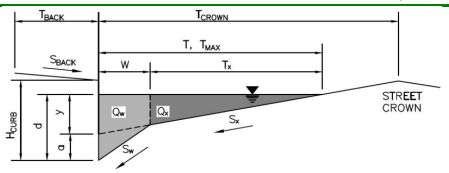
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-23



Gutter Geometry (Enter data in the blue cells)

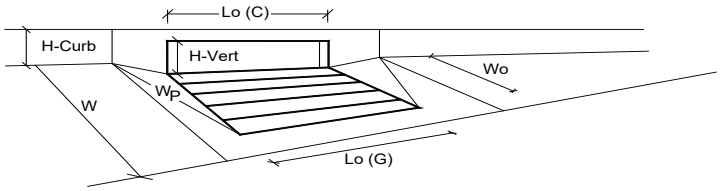
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.8	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.1	7.8	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**6.6**	**17.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	5.1	10.3	cfs

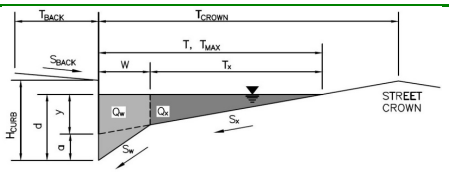
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-24



Gutter Geometry (Enter data in the blue cells)

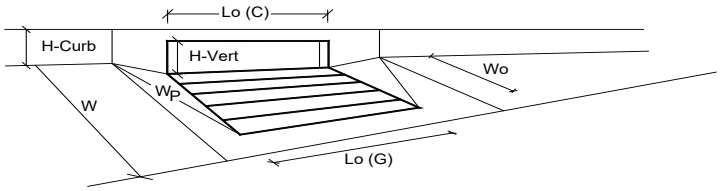
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.8	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.1	7.8	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**4.6**	**9.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	2.6	5.1	cfs

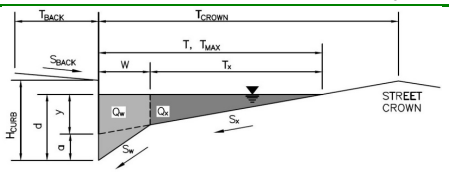
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-25A



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.8	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

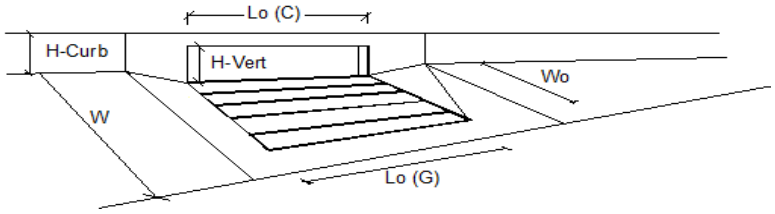
	Minor Storm	Major Storm	
Q_{allow} =	**10.7**	**45.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**4.6**	**7.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.6**	**4.0**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**89**	**64**	**%**

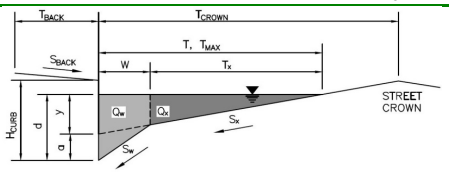
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-25B



Gutter Geometry (Enter data in the blue cells)

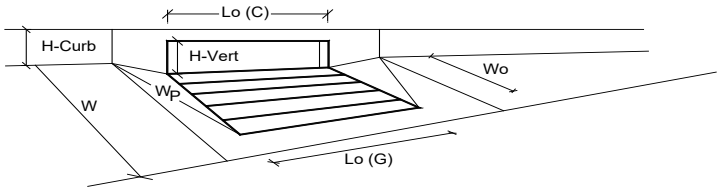
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.8	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.1	7.8	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**6.6**	**17.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	5.7	14.1	cfs

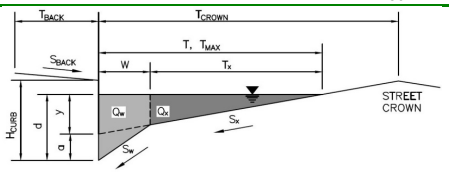
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-30



Gutter Geometry (Enter data in the blue cells)

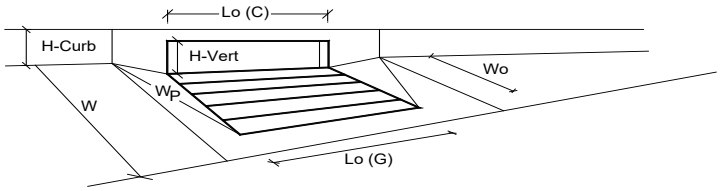
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.8	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening			
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**6.6**	**17.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	5.2	10.9	cfs

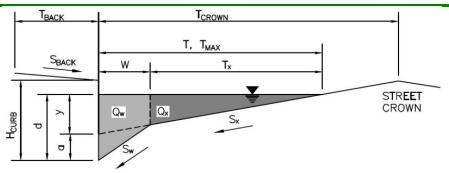
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-71



Gutter Geometry (Enter data in the blue cells)

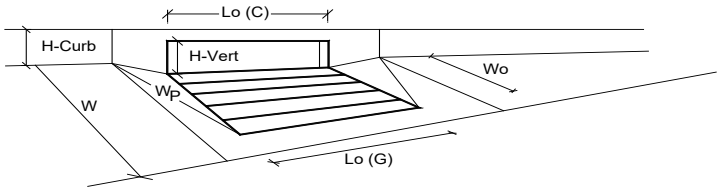
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.8	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening			
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**4.6**	**9.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.0	6.1	cfs

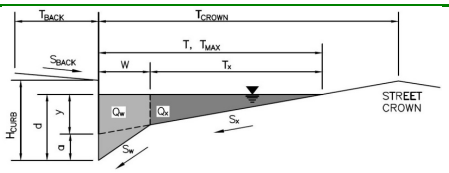
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-72A



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.8	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

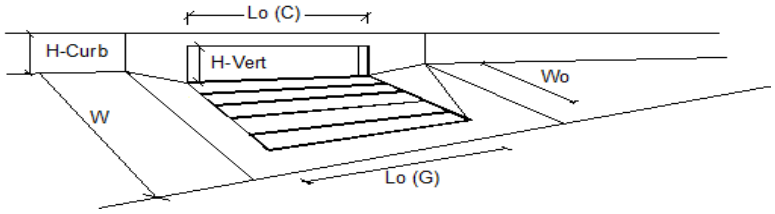
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.4**	**43.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.1**	**6.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.3**	**2.3**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**94**	**73**	**%**

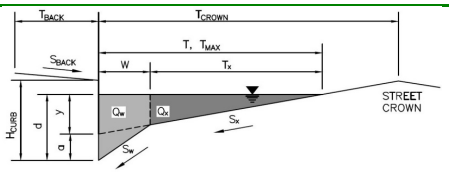
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-72B



Gutter Geometry (Enter data in the blue cells)

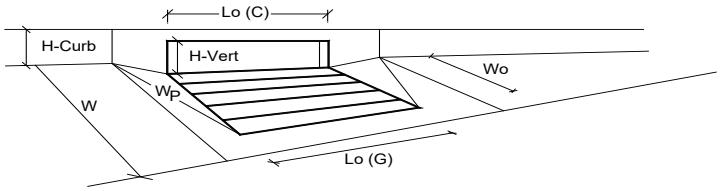
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.062	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.8	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.1	7.8	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**6.6**	**17.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	6.2	15.6	cfs

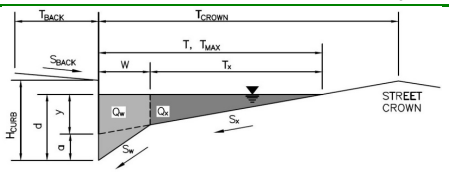
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-73



Gutter Geometry (Enter data in the blue cells)

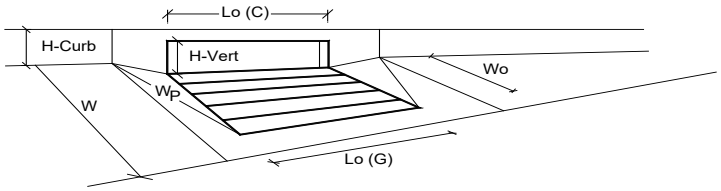
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.8	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.1	7.8	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**6.6**	**17.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	4.9	9.8	cfs

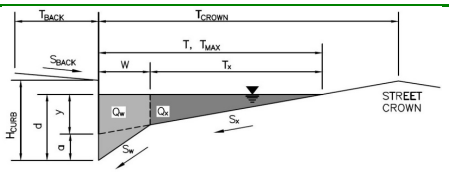
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-74



Gutter Geometry (Enter data in the blue cells)

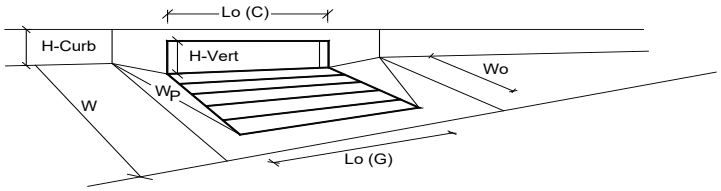
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.8	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening			
		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**6.6**	**17.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	4.8	9.8	cfs

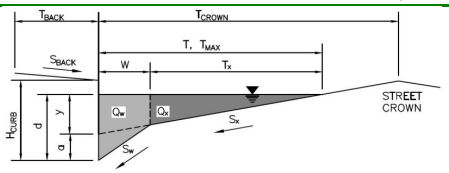
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-75



Gutter Geometry (Enter data in the blue cells)

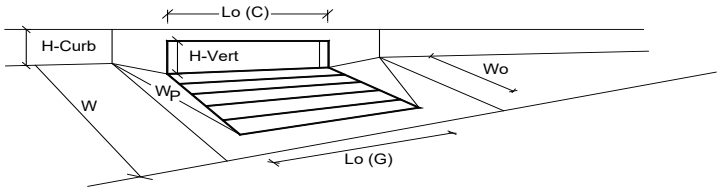
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.8	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.1	7.8	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**6.6**	**17.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	4.6	9.5	cfs

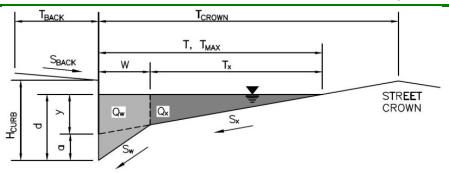
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-76



Gutter Geometry (Enter data in the blue cells)

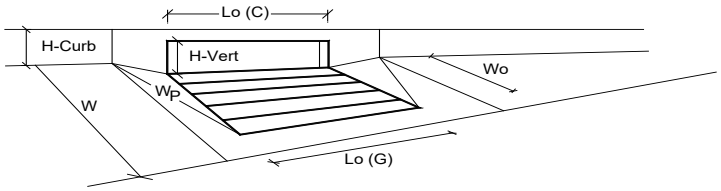
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.8	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.1	7.8	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**4.6**	**9.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	4.4	8.8	cfs

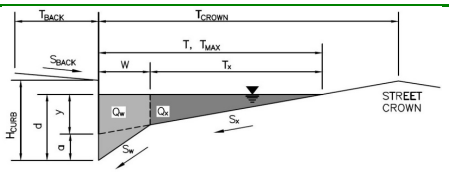
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-77



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.025	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.9	10.9	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

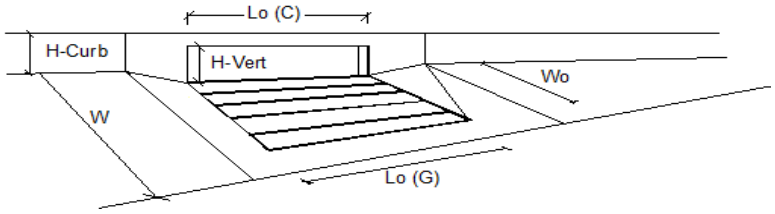
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**14.3**	**98.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**0.8**	**1.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

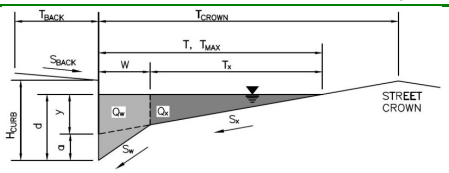
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-78



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.025	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.9	10.9	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

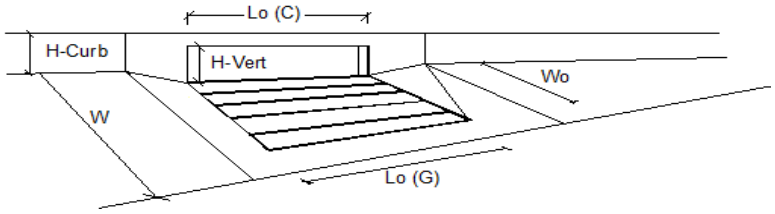
	Minor Storm	Major Storm	
Q_{allow} =	**14.3**	**98.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.8**	**8.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.7**	**6.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**87**	**57**	**%**

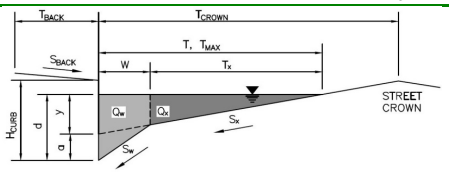
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-79



Gutter Geometry (Enter data in the blue cells)

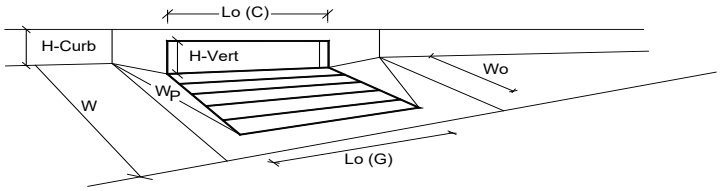
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.9	10.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.1	10.9	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.30	0.78	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.48	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**6.6**	**24.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	6.3	12.2	cfs

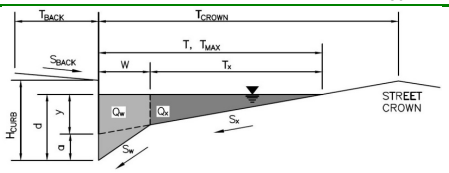
Version 4.05 Released March 2017

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

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

Project: Enter Your Project Name Here

Inlet ID: DP-80



Gutter Geometry (Enter data in the blue cells)

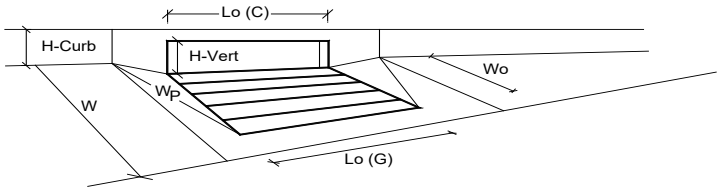
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.9	10.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	4.9	10.9	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.28	0.78	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.46	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.86	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**5.8**	**24.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	3.6	12.5	cfs

PRELIMINARY PIPE CALCULATIONS (FLOWMASTER)

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

Worksheet for DP-2 CHANNEL

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	0.013 ft/ft
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	11.00 ft
Discharge	250.00 cfs

Results	
Normal Depth	23.2 in
Flow Area	36.3 ft²
Wetted Perimeter	27.0 ft
Hydraulic Radius	16.2 in
Top Width	26.50 ft
Critical Depth	23.7 in
Critical Slope	0.012 ft/ft
Velocity	6.88 ft/s
Velocity Head	0.74 ft
Specific Energy	2.67 ft
Froude Number	1.037
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	23.2 in
Critical Depth	23.7 in
Channel Slope	0.013 ft/ft
Critical Slope	0.012 ft/ft

Worksheet for PIPE 4B

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.004	ft/ft
Normal Depth	66.0	in
Diameter	66.0	in
Discharge	217.80	cfs

Results		
Channel Slope	0.004	ft/ft
Normal Depth	66.0	in
Flow Area	23.8	ft²
Wetted Perimeter	17.3	ft
Hydraulic Radius	16.5	in
Top Width	0.00	ft
Critical Depth	49.6	in
Percent Full	100.0	%
Critical Slope	0.005	ft/ft
Velocity	9.17	ft/s
Velocity Head	1.31	ft
Specific Energy	6.81	ft
Froude Number	(N/A)	
Maximum Discharge	234.29	cfs
Discharge Full	217.80	cfs
Slope Full	0.004	ft/ft
Flow Type	SubCritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	100.0	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	66.0	in
Critical Depth	49.6	in
Channel Slope	0.004	ft/ft
Critical Slope	0.005	ft/ft

Worksheet for PIPE 5A

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Normal Depth	66.0 in
Diameter	66.0 in
Discharge	233.30 cfs

Results	
Channel Slope	0.005 ft/ft
Normal Depth	66.0 in
Flow Area	23.8 ft²
Wetted Perimeter	17.3 ft
Hydraulic Radius	16.5 in
Top Width	0.00 ft
Critical Depth	51.2 in
Percent Full	100.0 %
Critical Slope	0.005 ft/ft
Velocity	9.82 ft/s
Velocity Head	1.50 ft
Specific Energy	7.00 ft
Froude Number	(N/A)
Maximum Discharge	250.96 cfs
Discharge Full	233.30 cfs
Slope Full	0.005 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	66.0 in
Critical Depth	51.2 in
Channel Slope	0.005 ft/ft
Critical Slope	0.005 ft/ft

Worksheet for PIPE 5B

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.003 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	6.10 cfs

Results	
Channel Slope	0.003 ft/ft
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	11.5 in
Percent Full	100.0 %
Critical Slope	0.006 ft/ft
Velocity	3.45 ft/s
Velocity Head	0.19 ft
Specific Energy	1.69 ft
Froude Number	(N/A)
Maximum Discharge	6.56 cfs
Discharge Full	6.10 cfs
Slope Full	0.003 ft/ft
Flow Type	Critical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	11.5 in
Channel Slope	0.003 ft/ft
Critical Slope	0.006 ft/ft

Worksheet for PIPE 6

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.005	ft/ft
Diameter	72.0	in
Discharge	234.50	cfs

Results		
Normal Depth	48.0	in
Flow Area	20.0	ft^2
Wetted Perimeter	11.5	ft
Hydraulic Radius	21.0	in
Top Width	5.66	ft
Critical Depth	50.3	in
Percent Full	66.6	%
Critical Slope	0.004	ft/ft
Velocity	11.72	ft/s
Velocity Head	2.13	ft
Specific Energy	6.13	ft
Froude Number	1.099	
Maximum Discharge	322.12	cfs
Discharge Full	299.45	cfs
Slope Full	0.003	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	66.6	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	48.0	in
Critical Depth	50.3	in
Channel Slope	0.005	ft/ft
Critical Slope	0.004	ft/ft

Worksheet for PIPE 7

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.000	ft/ft
Normal Depth	18.0	in
Diameter	18.0	in
Discharge	1.60	cfs

Results		
Channel Slope	0.000	ft/ft
Normal Depth	18.0	in
Flow Area	1.8	ft²
Wetted Perimeter	4.7	ft
Hydraulic Radius	4.5	in
Top Width	0.00	ft
Critical Depth	5.7	in
Percent Full	100.0	%
Critical Slope	0.005	ft/ft
Velocity	0.91	ft/s
Velocity Head	0.01	ft
Specific Energy	1.51	ft
Froude Number	(N/A)	
Maximum Discharge	1.72	cfs
Discharge Full	1.60	cfs
Slope Full	0.000	ft/ft
Flow Type	SubCritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	100.0	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	18.0	in
Critical Depth	5.7	in
Channel Slope	0.000	ft/ft
Critical Slope	0.005	ft/ft

Worksheet for PIPE 23B

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	10.30 cfs

Results	
Channel Slope	0.010 ft/ft
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	14.8 in
Percent Full	100.0 %
Critical Slope	0.010 ft/ft
Velocity	5.83 ft/s
Velocity Head	0.53 ft
Specific Energy	2.03 ft
Froude Number	(N/A)
Maximum Discharge	11.08 cfs
Discharge Full	10.30 cfs
Slope Full	0.010 ft/ft
Flow Type	Critical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	14.8 in
Channel Slope	0.010 ft/ft
Critical Slope	0.010 ft/ft

Worksheet for PIPE 23C

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.002 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	5.10 cfs

Results	
Channel Slope	0.002 ft/ft
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	10.4 in
Percent Full	100.0 %
Critical Slope	0.006 ft/ft
Velocity	2.89 ft/s
Velocity Head	0.13 ft
Specific Energy	1.63 ft
Froude Number	(N/A)
Maximum Discharge	5.49 cfs
Discharge Full	5.10 cfs
Slope Full	0.002 ft/ft
Flow Type	Critical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	10.4 in
Channel Slope	0.002 ft/ft
Critical Slope	0.006 ft/ft

Worksheet for PIPE 24A

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.003 ft/ft
Normal Depth	60.0 in
Diameter	60.0 in
Discharge	151.00 cfs

Results	
Channel Slope	0.003 ft/ft
Normal Depth	60.0 in
Flow Area	19.6 ft²
Wetted Perimeter	15.7 ft
Hydraulic Radius	15.0 in
Top Width	0.00 ft
Critical Depth	42.3 in
Percent Full	100.0 %
Critical Slope	0.005 ft/ft
Velocity	7.69 ft/s
Velocity Head	0.92 ft
Specific Energy	5.92 ft
Froude Number	(N/A)
Maximum Discharge	162.43 cfs
Discharge Full	151.00 cfs
Slope Full	0.003 ft/ft
Flow Type	Critical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	60.0 in
Critical Depth	42.3 in
Channel Slope	0.003 ft/ft
Critical Slope	0.005 ft/ft

Worksheet for PIPE 24B

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.014 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	12.40 cfs

Results	
Channel Slope	0.014 ft/ft
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	16.0 in
Percent Full	100.0 %
Critical Slope	0.012 ft/ft
Velocity	7.02 ft/s
Velocity Head	0.77 ft
Specific Energy	2.27 ft
Froude Number	(N/A)
Maximum Discharge	13.34 cfs
Discharge Full	12.40 cfs
Slope Full	0.014 ft/ft
Flow Type	Critical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	16.0 in
Channel Slope	0.014 ft/ft
Critical Slope	0.012 ft/ft

Worksheet for PIPE 24C

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.003 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	5.50 cfs

Results	
Channel Slope	0.003 ft/ft
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	10.9 in
Percent Full	100.0 %
Critical Slope	0.006 ft/ft
Velocity	3.11 ft/s
Velocity Head	0.15 ft
Specific Energy	1.65 ft
Froude Number	(N/A)
Maximum Discharge	5.92 cfs
Discharge Full	5.50 cfs
Slope Full	0.003 ft/ft
Flow Type	Critical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	10.9 in
Channel Slope	0.003 ft/ft
Critical Slope	0.006 ft/ft

Worksheet for PIPE 25A

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.003 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	5.50 cfs

Results	
Channel Slope	0.003 ft/ft
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	10.9 in
Percent Full	100.0 %
Critical Slope	0.006 ft/ft
Velocity	3.11 ft/s
Velocity Head	0.15 ft
Specific Energy	1.65 ft
Froude Number	(N/A)
Maximum Discharge	5.92 cfs
Discharge Full	5.50 cfs
Slope Full	0.003 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	10.9 in
Channel Slope	0.003 ft/ft
Critical Slope	0.006 ft/ft

Worksheet for PIPE 25B

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Normal Depth	24.0 in
Diameter	24.0 in
Discharge	15.60 cfs

Results	
Channel Slope	0.005 ft/ft
Normal Depth	24.0 in
Flow Area	3.1 ft²
Wetted Perimeter	6.3 ft
Hydraulic Radius	6.0 in
Top Width	0.00 ft
Critical Depth	17.1 in
Percent Full	100.0 %
Critical Slope	0.006 ft/ft
Velocity	4.97 ft/s
Velocity Head	0.38 ft
Specific Energy	2.38 ft
Froude Number	(N/A)
Maximum Discharge	16.78 cfs
Discharge Full	15.60 cfs
Slope Full	0.005 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	24.0 in
Critical Depth	17.1 in
Channel Slope	0.005 ft/ft
Critical Slope	0.006 ft/ft

Worksheet for PIPE 25C

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.009 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	9.80 cfs

Results	
Channel Slope	0.009 ft/ft
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	14.5 in
Percent Full	100.0 %
Critical Slope	0.009 ft/ft
Velocity	5.55 ft/s
Velocity Head	0.48 ft
Specific Energy	1.98 ft
Froude Number	(N/A)
Maximum Discharge	10.54 cfs
Discharge Full	9.80 cfs
Slope Full	0.009 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	14.5 in
Channel Slope	0.009 ft/ft
Critical Slope	0.009 ft/ft

Worksheet for PIPE 25D

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Normal Depth	30.0 in
Diameter	30.0 in
Discharge	29.90 cfs

Results	
Channel Slope	0.005 ft/ft
Normal Depth	30.0 in
Flow Area	4.9 ft²
Wetted Perimeter	7.9 ft
Hydraulic Radius	7.5 in
Top Width	0.00 ft
Critical Depth	22.4 in
Percent Full	100.0 %
Critical Slope	0.006 ft/ft
Velocity	6.09 ft/s
Velocity Head	0.58 ft
Specific Energy	3.08 ft
Froude Number	(N/A)
Maximum Discharge	32.16 cfs
Discharge Full	29.90 cfs
Slope Full	0.005 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	30.0 in
Critical Depth	22.4 in
Channel Slope	0.005 ft/ft
Critical Slope	0.006 ft/ft

Worksheet for PIPE 26A

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	7.10 cfs

Results	
Channel Slope	0.005 ft/ft
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	12.4 in
Percent Full	100.0 %
Critical Slope	0.007 ft/ft
Velocity	4.02 ft/s
Velocity Head	0.25 ft
Specific Energy	1.75 ft
Froude Number	(N/A)
Maximum Discharge	7.64 cfs
Discharge Full	7.10 cfs
Slope Full	0.005 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	12.4 in
Channel Slope	0.005 ft/ft
Critical Slope	0.007 ft/ft

Worksheet for PIPE 26B

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.004 ft/ft
Normal Depth	24.0 in
Diameter	24.0 in
Discharge	14.10 cfs

Results	
Channel Slope	0.004 ft/ft
Normal Depth	24.0 in
Flow Area	3.1 ft²
Wetted Perimeter	6.3 ft
Hydraulic Radius	6.0 in
Top Width	0.00 ft
Critical Depth	16.2 in
Percent Full	100.0 %
Critical Slope	0.006 ft/ft
Velocity	4.49 ft/s
Velocity Head	0.31 ft
Specific Energy	2.31 ft
Froude Number	(N/A)
Maximum Discharge	15.17 cfs
Discharge Full	14.10 cfs
Slope Full	0.004 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	24.0 in
Critical Depth	16.2 in
Channel Slope	0.004 ft/ft
Critical Slope	0.006 ft/ft

Worksheet for PIPE 26C

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.011 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	10.90 cfs

Results	
Channel Slope	0.011 ft/ft
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	15.2 in
Percent Full	100.0 %
Critical Slope	0.010 ft/ft
Velocity	6.17 ft/s
Velocity Head	0.59 ft
Specific Energy	2.09 ft
Froude Number	(N/A)
Maximum Discharge	11.73 cfs
Discharge Full	10.90 cfs
Slope Full	0.011 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	15.2 in
Channel Slope	0.011 ft/ft
Critical Slope	0.010 ft/ft

Worksheet for PIPE 27

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.006 ft/ft
Normal Depth	30.0 in
Diameter	30.0 in
Discharge	31.40 cfs

Results	
Channel Slope	0.006 ft/ft
Normal Depth	30.0 in
Flow Area	4.9 ft²
Wetted Perimeter	7.9 ft
Hydraulic Radius	7.5 in
Top Width	0.00 ft
Critical Depth	22.9 in
Percent Full	100.0 %
Critical Slope	0.007 ft/ft
Velocity	6.40 ft/s
Velocity Head	0.64 ft
Specific Energy	3.14 ft
Froude Number	(N/A)
Maximum Discharge	33.78 cfs
Discharge Full	31.40 cfs
Slope Full	0.006 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	30.0 in
Critical Depth	22.9 in
Channel Slope	0.006 ft/ft
Critical Slope	0.007 ft/ft

Worksheet for PIPE 28A

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.009 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	9.80 cfs

Results	
Channel Slope	0.009 ft/ft
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	14.5 in
Percent Full	100.0 %
Critical Slope	0.009 ft/ft
Velocity	5.55 ft/s
Velocity Head	0.48 ft
Specific Energy	1.98 ft
Froude Number	(N/A)
Maximum Discharge	10.54 cfs
Discharge Full	9.80 cfs
Slope Full	0.009 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	14.5 in
Channel Slope	0.009 ft/ft
Critical Slope	0.009 ft/ft

Worksheet for PIPE 28B

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.008 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	9.50 cfs

Results	
Channel Slope	0.008 ft/ft
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	14.3 in
Percent Full	100.0 %
Critical Slope	0.009 ft/ft
Velocity	5.38 ft/s
Velocity Head	0.45 ft
Specific Energy	1.95 ft
Froude Number	(N/A)
Maximum Discharge	10.22 cfs
Discharge Full	9.50 cfs
Slope Full	0.008 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	14.3 in
Channel Slope	0.008 ft/ft
Critical Slope	0.009 ft/ft

Worksheet for PIPE 28C

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Normal Depth	36.0 in
Diameter	36.0 in
Discharge	48.60 cfs

Results	
Channel Slope	0.005 ft/ft
Normal Depth	36.0 in
Flow Area	7.1 ft²
Wetted Perimeter	9.4 ft
Hydraulic Radius	9.0 in
Top Width	0.00 ft
Critical Depth	27.2 in
Percent Full	100.0 %
Critical Slope	0.006 ft/ft
Velocity	6.88 ft/s
Velocity Head	0.73 ft
Specific Energy	3.73 ft
Froude Number	(N/A)
Maximum Discharge	52.28 cfs
Discharge Full	48.60 cfs
Slope Full	0.005 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	36.0 in
Critical Depth	27.2 in
Channel Slope	0.005 ft/ft
Critical Slope	0.006 ft/ft

Worksheet for PIPE 29

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.006 ft/ft
Normal Depth	42.0 in
Diameter	42.0 in
Discharge	80.30 cfs

Results	
Channel Slope	0.006 ft/ft
Normal Depth	42.0 in
Flow Area	9.6 ft²
Wetted Perimeter	11.0 ft
Hydraulic Radius	10.5 in
Top Width	0.00 ft
Critical Depth	33.6 in
Percent Full	100.0 %
Critical Slope	0.007 ft/ft
Velocity	8.35 ft/s
Velocity Head	1.08 ft
Specific Energy	4.58 ft
Froude Number	(N/A)
Maximum Discharge	86.38 cfs
Discharge Full	80.30 cfs
Slope Full	0.006 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	42.0 in
Critical Depth	33.6 in
Channel Slope	0.006 ft/ft
Critical Slope	0.007 ft/ft

Worksheet for PIPE 30

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.006 ft/ft
Normal Depth	42.0 in
Diameter	42.0 in
Discharge	80.70 cfs

Results	
Channel Slope	0.006 ft/ft
Normal Depth	42.0 in
Flow Area	9.6 ft²
Wetted Perimeter	11.0 ft
Hydraulic Radius	10.5 in
Top Width	0.00 ft
Critical Depth	33.7 in
Percent Full	100.0 %
Critical Slope	0.007 ft/ft
Velocity	8.39 ft/s
Velocity Head	1.09 ft
Specific Energy	4.59 ft
Froude Number	(N/A)
Maximum Discharge	86.81 cfs
Discharge Full	80.70 cfs
Slope Full	0.006 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	42.0 in
Critical Depth	33.7 in
Channel Slope	0.006 ft/ft
Critical Slope	0.007 ft/ft

Worksheet for PIPE 31

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.007 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	8.80 cfs

Results	
Channel Slope	0.007 ft/ft
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	13.8 in
Percent Full	100.0 %
Critical Slope	0.008 ft/ft
Velocity	4.98 ft/s
Velocity Head	0.39 ft
Specific Energy	1.89 ft
Froude Number	(N/A)
Maximum Discharge	9.47 cfs
Discharge Full	8.80 cfs
Slope Full	0.007 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	13.8 in
Channel Slope	0.007 ft/ft
Critical Slope	0.008 ft/ft

Worksheet for PIPE 32

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.003 ft/ft
Normal Depth	24.0 in
Diameter	24.0 in
Discharge	12.50 cfs

Results	
Channel Slope	0.003 ft/ft
Normal Depth	24.0 in
Flow Area	3.1 ft²
Wetted Perimeter	6.3 ft
Hydraulic Radius	6.0 in
Top Width	0.00 ft
Critical Depth	15.3 in
Percent Full	100.0 %
Critical Slope	0.006 ft/ft
Velocity	3.98 ft/s
Velocity Head	0.25 ft
Specific Energy	2.25 ft
Froude Number	(N/A)
Maximum Discharge	13.45 cfs
Discharge Full	12.50 cfs
Slope Full	0.003 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	24.0 in
Critical Depth	15.3 in
Channel Slope	0.003 ft/ft
Critical Slope	0.006 ft/ft

Worksheet for PIPE 33

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.003 ft/ft
Normal Depth	30.0 in
Diameter	30.0 in
Discharge	23.50 cfs

Results	
Channel Slope	0.003 ft/ft
Normal Depth	30.0 in
Flow Area	4.9 ft²
Wetted Perimeter	7.9 ft
Hydraulic Radius	7.5 in
Top Width	0.00 ft
Critical Depth	19.8 in
Percent Full	100.0 %
Critical Slope	0.005 ft/ft
Velocity	4.79 ft/s
Velocity Head	0.36 ft
Specific Energy	2.86 ft
Froude Number	(N/A)
Maximum Discharge	25.28 cfs
Discharge Full	23.50 cfs
Slope Full	0.003 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	30.0 in
Critical Depth	19.8 in
Channel Slope	0.003 ft/ft
Critical Slope	0.005 ft/ft

Worksheet for PIPE 66

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.002 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	5.10 cfs

Results	
Channel Slope	0.002 ft/ft
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	10.4 in
Percent Full	100.0 %
Critical Slope	0.006 ft/ft
Velocity	2.89 ft/s
Velocity Head	0.13 ft
Specific Energy	1.63 ft
Froude Number	(N/A)
Maximum Discharge	5.49 cfs
Discharge Full	5.10 cfs
Slope Full	0.002 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	10.4 in
Channel Slope	0.002 ft/ft
Critical Slope	0.006 ft/ft

POND A – IRF FORM, SIZING,
RELEASE RATES, POND DESIGN, ETC.

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.53	inches
***Minor Storm: 1-Hour Rain Depth	10-Year Event	1.75	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

Designer:	Matt Larson
Company:	Classic Consulting Engineers & Surveyors, LLC
Date:	October 3, 2019
Project:	Banning Lewis Ranch Village 3 - Filings 35-36C
Location:	POND A - Ultimate Design Flows

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	PIPE 31	PIPE 33	POND											
Receiving Pervious Area Soil Type	Sandy Loam	Sandy Loam	Sandy Loam											
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	1.940	2.970	1.120											
Directly Connected Impervious Area (DCIA, acres)	1.060	2.040	0.000											
Unconnected Impervious Area (UIA, acres)	0.130	0.000	0.000											
Receiving Pervious Area (RPA, acres)	0.570	0.000	1.120											
Separate Pervious Area (SPA, acres)	0.180	0.930	0.000											
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C	C	C											

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	1.940	2.970	1.120											
Directly Connected Impervious Area (DCIA, %)	54.6%	68.7%	0.0%											
Unconnected Impervious Area (UIA, %)	6.7%	0.0%	0.0%											
Receiving Pervious Area (RPA, %)	29.4%	0.0%	100.0%											
Separate Pervious Area (SPA, %)	9.3%	31.3%	0.0%											
A_a (RPA / UIA)	4.385	0.000	0.000											
I_a Check	0.190	1.000	1.000											
f / I for WQCV Event:	2.0	2.0	2.0											
f / I for 10-Year Event:	0.5	0.5	0.5											
f / I for 100-Year Event:	0.3	0.3	0.3											
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	0.42	1.00	1.00											
IRF for 10-Year Event:	0.80	1.00	1.00											
IRF for 100-Year Event:	0.84	1.00	1.00											
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	61.3%	68.7%	0.0%											
Effective Imperviousness for WQCV Event:	57.5%	68.7%	0.0%											
Effective Imperviousness for 10-Year Event:	60.0%	68.7%	0.0%											
Effective Imperviousness for 100-Year Event:	60.3%	68.7%	0.0%											
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	5.3%	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10-Year Event CREDIT**: Reduce Detention By:	2.2%	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	1.6%	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	53.6%
Total Site Effective Imperviousness for WQCV Event:	52.3%
Total Site Effective Imperviousness for 10-Year Event:	53.1%
Total Site Effective Imperviousness for 100-Year Event:	53.2%
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

JOB NAME: #REF!
JOB NUMBER: 2366.86
DATE: 08/10/21
CALCULATED BY: MAL

TOTAL POND A - TOP OF BERM

POND SIZING WITH PONDPACK EQUATION:
INSERT POND DESIGN SIZE INFO: (RED)

POND ELEVATION : (from lowest to highest)	**AREA (BTM to TOP):**		
6730.00		-	acres
6730.00	515	0.01	acres
6731.00	2,281	0.05	acres
6732.00	10,484	0.24	acres
6733.00	24,002	0.55	acres
6734.00	31,227	0.72	acres
6735.00	34,483	0.79	acres
6736.00	38,643	0.89	acres
		-	acres
		-	acres
		-	acres
		-	acres

PRELIMINARY SIZE:

VOLUME = 1/3{(EL2-EL1)*(A1+A2+((A1*A2)^.5))}

						CUMMULATIVE VOLUME:
-	AC-FT	from	6,730	to	6,730	
0.03	AC-FT	from	6,730	to	6,731	0.03
0.13	AC-FT	from	6,731	to	6,732	0.16
0.38	AC-FT	from	6,732	to	6,733	0.54
0.63	AC-FT	from	6,733	to	6,734	1.17
0.75	AC-FT	from	6,734	to	6,735	1.92
0.83	AC-FT	from	6,735	to	6,736	2.75
-	AC-FT	from	6,736	to	-	2.75
-	AC-FT	from	-	to	-	2.75
-	AC-FT	from	-	to	-	2.75
-	AC-FT	from	-	to	-	2.75

*SIZING IS FOR PRELIMINARY PURPOSES ONLY.

VOLUME = 2.75 AC-FT

APPROXIMATE SURFACE AREA REQUIREMENT

POND DEPTH (FT)	**POND VOLUME** AC-FT		CF	**SURFACE AREA** (SF)
4	2.75	=	######	29,918
6	2.75	=	######	19,945
8	2.75	=	######	14,959
10	2.75	=	######	11,967

JOB NAME: #REF!
JOB NUMBER: 2366.86
DATE: 08/10/21
CALCULATED BY: MAL

TOTAL POND A - SPILLWAY

POND SIZING WITH PONDPACK EQUATION:
INSERT POND DESIGN SIZE INFO: (RED)

POND ELEVATION : (from lowest to highest)	**AREA (BTM to TOP):**	
6730.00	-	acres
6730.00	515	0.01 acres
6731.00	2,281	0.05 acres
6732.00	10,484	0.24 acres
6733.00	24,002	0.55 acres
6734.00	31,227	0.72 acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres

PRELIMINARY SIZE:

VOLUME = 1/3{(EL2-EL1)*(A1+A2+((A1*A2)^.5))}

						CUMMULATIVE VOLUME:
-	AC-FT	from	6,730	to	6,730	
0.03	AC-FT	from	6,730	to	6,731	0.03
0.13	AC-FT	from	6,731	to	6,732	0.16
0.38	AC-FT	from	6,732	to	6,733	0.54
0.63	AC-FT	from	6,733	to	6,734	1.17
-	AC-FT	from	6,734	to	-	1.17
-	AC-FT	from	-	to	-	1.17
-	AC-FT	from	-	to	-	1.17
-	AC-FT	from	-	to	-	1.17
-	AC-FT	from	-	to	-	1.17
-	AC-FT	from	-	to	-	1.17

*SIZING IS FOR PRELIMINARY PURPOSES ONLY.

VOLUME = 1.17 AC-FT

APPROXIMATE SURFACE AREA REQUIREMENT

POND DEPTH (FT)	**POND VOLUME** AC-FT		CF	**SURFACE AREA** (SF)
4	1.17	=	50,982	12,745
6	1.17	=	50,982	8,497
8	1.17	=	50,982	6,373
10	1.17	=	50,982	5,098

JOB NAME: #REF!
JOB NUMBER: 2366.86
DATE: 08/10/21
CALCULATED BY: MAL

TOTAL POND A - EURV

POND SIZING WITH PONDPACK EQUATION:
INSERT POND DESIGN SIZE INFO: (RED)

POND ELEVATION : (from lowest to highest)	**AREA (BTM to TOP):**		
6730.00		-	acres
6730.00	515	0.01	acres
6731.00	2,281	0.05	acres
6732.00	10,484	0.24	acres
6732.50	22,933	0.53	acres
		-	acres
		-	acres
		-	acres
		-	acres
		-	acres
		-	acres
		-	acres

PRELIMINARY SIZE:

VOLUME = 1/3{(EL2-EL1)*(A1+A2+((A1*A2)^.5))}

						CUMMULATIVE VOLUME:
-	AC-FT	from	6,730	to	6,730	
0.03	AC-FT	from	6,730	to	6,731	0.03
0.13	AC-FT	from	6,731	to	6,732	0.16
0.19	AC-FT	from	6,732	to	6,733	0.35
-	AC-FT	from	6,733	to	-	0.35
-	AC-FT	from	-	to	-	0.35
-	AC-FT	from	-	to	-	0.35
-	AC-FT	from	-	to	-	0.35
-	AC-FT	from	-	to	-	0.35
-	AC-FT	from	-	to	-	0.35
-	AC-FT	from	-	to	-	0.35

*SIZING IS FOR PRELIMINARY PURPOSES ONLY.

VOLUME = 0.35 AC-FT

APPROXIMATE SURFACE AREA REQUIREMENT

POND DEPTH (FT)	**POND VOLUME** AC-FT		CF	**SURFACE AREA** (SF)
4	0.35	=	15,179	3,795
6	0.35	=	15,179	2,530
8	0.35	=	15,179	1,897
10	0.35	=	15,179	1,518

Design Procedure Form: Extended Detention Basin (EDB)

Designer:	**Matt Larson**
Company:	**Classic Consulting Engineers & Surveyors, LLC**
Date:	**August 15, 2021**
Project:	**Banning Lewis Ranch Village 3 - Filings 35-36C**
Location:	**POND A - FINAL DESIGN**

1. Basin Storage Volume	
A) Effective Imperviousness of Tributary Area, I_a	I_a = 53.6 %
B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)	i = 0.536
C) Contributing Watershed Area	Area = 6.030 ac
D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm	d_6 = 0.42 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}= 0.109 ac-ft
G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume ($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN}/0.43))$	$V_{DESIGN\ OTHER}$= 0.106 ac-ft
H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)	$V_{DESIGN\ USER}$= ac-ft
I) Predominant Watershed NRCS Soil Group	Choose One: ○ A ◉ B ○ C / D
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 = 0.348 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 = 4.00 ft / ft
4. Inlet	
A) Describe means of providing energy dissipation at concentrated inflow locations:	Impact Structures

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Matt Larson
Company: Classic Consulting Engineers & Surveyors, LLC
Date: August 15, 2021
Project: Banning Lewis Ranch Village 3 - Filings 35-36C
Location: POND A - FINAL DESIGN

5. Forebay

A) Minimum Forebay Volume (V_{FMIN} = 2% of the WQCV) — V_{FMIN} = 0.002 ac-ft

B) Actual Forebay Volume — V_F = 0.005 ac-ft

C) Forebay Depth (D_F = 18 inch maximum) — D_F = 12.0 in

TOTAL FOREBAY SIZING, INDIVIDUAL FOREBAY SIZING INCLUDED AS WELL

D) Forebay Discharge

i) Undetained 100-year Peak Discharge — Q_{100} = 26.40 cfs

ii) Forebay Discharge Design Flow ($Q_F = 0.02 * Q_{100}$) — Q_F = 0.53 cfs

E) Forebay Discharge Design

Choose One
- ○ Berm With Pipe
- ◉ Wall with Rect. Notch
- ○ Wall with V-Notch Weir

(flow too small for berm w/ pipe)

F) Discharge Pipe Size (minimum 8-inches) — Calculated D_P = in

G) Rectangular Notch Width — Calculated W_N = 4.3 in

6. Trickle Channel

A) Type of Trickle Channel

Choose One
- ◉ Concrete
- ○ Soft Bottom

F) Slope of Trickle Channel — S = 0.0050 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 = 377 sq ft

C) Outlet Type

Choose One
- ◉ Orifice Plate
- ○ Other (Describe):

D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention) — $D_{orifice}$ = 1.00 inches

E) Total Outlet Area — A_{ot} = 10.00 square inches

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Matt Larson
Company: Classic Consulting Engineers & Surveyors, LLC
Date: August 15, 2021
Project: Banning Lewis Ranch Village 3 - Filings 35-36C
Location: POND A - FINAL DESIGN

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} = cu ft
C) Initial Surcharge Provided Above Micropool	V_s = 125.7 cu ft
9. Trash Rack	
A) Water Quality Screen Open Area: $A_t = A_{ot} * 38.5*(e^{-0.095D})$	A_t = 350 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.)	*S.S. Well Screen with 60% Open Area*
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} = 584 sq. in.
E) Depth of Design Volume (EURV or WQCV) (Based on design concept chosen under 1E)	H= 2.5 feet
F) Height of Water Quality Screen (H_{TR})	H_{TR}= 58 inches
G) Width of Water Quality Screen Opening ($W_{opening}$) (Minimum of 12 inches is recommended)	$W_{opening}$ = 12.0 inches

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Matt Larson
Company: Classic Consulting Engineers & Surveyors, LLC
Date: August 15, 2021
Project: Banning Lewis Ranch Village 3 - Filings 35-36C
Location: POND A - FINAL DESIGN

10. Overflow Embankment	
A) Describe embankment protection for 100-year and greater overtopping:	SPILLWAY AT 4' ABOVE BOTTOM OF POND
B) Slope of Overflow Embankment (Horizontal distance per unit vertical, 4:1 or flatter preferred)	4.00
11. Vegetation	Choose One: ○ Irrigated ◉ Not Irrigated
12. Access	
A) Describe Sediment Removal Procedures	12' WIDE ACCESS ROAD W/ MIN. 30' CL RADIUS TO POND BOTTOM

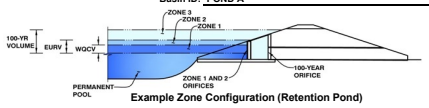
Notes:

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: BLR FILINGS 35-36C

Basin ID: POND A



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB		
Watershed Area =	6.03	acres	
Watershed Length =	600	ft	
Watershed Slope =	0.050	ft/ft	
Watershed Imperviousness =	53.60%	percent	
Percentage Hydrologic Soil Group A =	0.0%	percent	
Percentage Hydrologic Soil Group B =	100.0%	percent	
Percentage Hydrologic Soil Groups C/D =	0.0%	percent	
Desired WQCV Drain Time =	40.0	hours	
Location for 1-hr Rainfall Depths =	User Input		
Water Quality Capture Volume (WQCV) =	0.109	acre-feet	
Excess Urban Runoff Volume (EURV) =	0.347	acre-feet	
2-yr Runoff Volume (P1 = 1.19 in.) =	0.282	acre-feet	
5-yr Runoff Volume (P1 = 1.5 in.) =	0.383	acre-feet	
10-yr Runoff Volume (P1 = 1.75 in.) =	0.511	acre-feet	
25-yr Runoff Volume (P1 = 2 in.) =	0.697	acre-feet	
50-yr Runoff Volume (P1 = 2.25 in.) =	0.827	acre-feet	
100-yr Runoff Volume (P1 = 2.52 in.) =	0.998	acre-feet	
500-yr Runoff Volume (P1 = 3.1 in.) =	1.333	acre-feet	
Approximate 2-yr Detention Volume =	0.264	acre-feet	
Approximate 5-yr Detention Volume =	0.360	acre-feet	
Approximate 10-yr Detention Volume =	0.472	acre-feet	
Approximate 25-yr Detention Volume =	0.513	acre-feet	
Approximate 50-yr Detention Volume =	0.536	acre-feet	
Approximate 100-yr Detention Volume =	0.593	acre-feet	

Optional User Override 1-hr Precipitation	
1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.10	inches

Stage-Storage Calculation

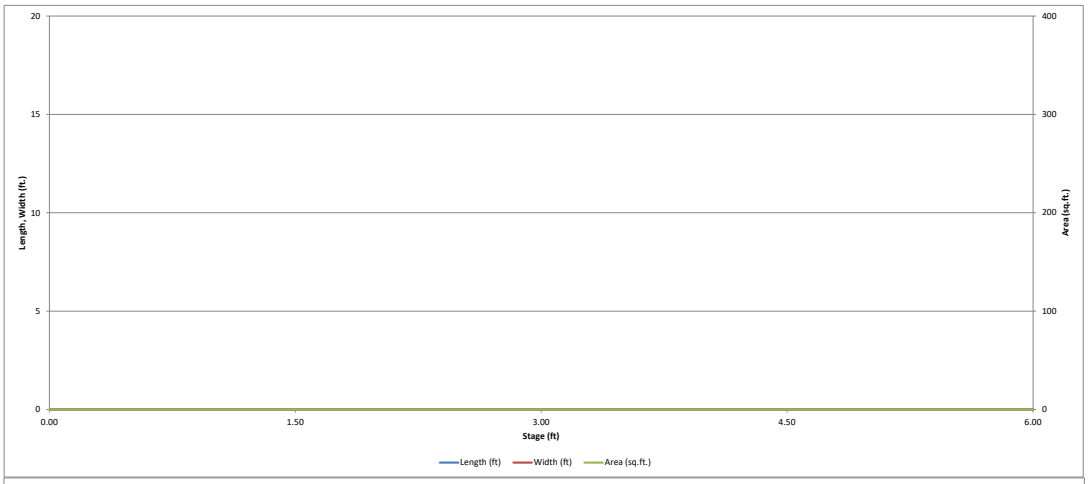
Zone 1 Volume (WQCV) =	0.109	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.239	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.246	acre-feet
Total Detention Basin Volume =	0.593	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (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

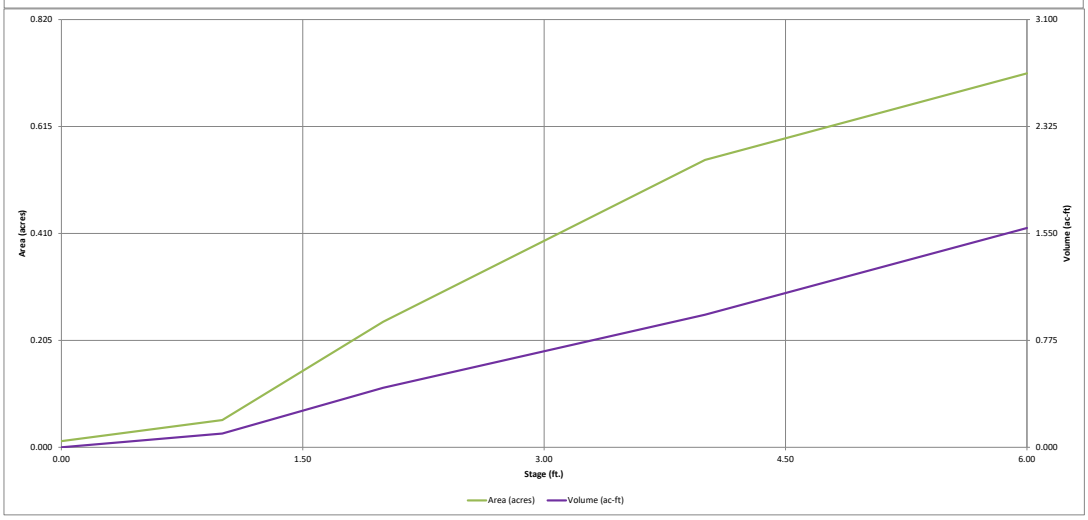
Depth Increment = 0.25 ft

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	--	--	--	515	0.012		
	--	1.00	--	--	--	2,281	0.052	4,345	0.100
	--	2.00	--	--	--	10,484	0.241	18,787	0.431
	--	3.00	--	--	--	24,002	0.551	41,866	0.961
	--	4.00	--	--	--	31,227	0.717	69,230	1.589
	--	5.00	--	--	--	34,483	0.792	100,345	2.304
	--	6.00	--	--	--	38,643	0.887	134,473	3.087

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



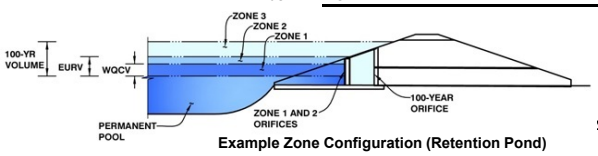


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: BLR FILINGS 35-36C

Basin ID: POND A



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.04	0.109	Orifice Plate
Zone 2 (EURV)	1.81	0.239	Orifice Plate
Zone 3 (100-year)	2.33	0.246	Weir&Pipe (Restrict)
		0.593	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 =	N/A	ft^2
Depth at top of Zone using Orifice Plate =	2.50	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	inches	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	0.80	1.60					
Orifice Area (sq. inches)	1.00	3.00	6.00					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	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 =	2.50	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	3.50	N/A	feet
Overflow Weir Front Edge Length =	4.00	N/A	feet	Over Flow Weir Slope Length =	4.12	N/A	feet
Overflow Weir Slope =	4.00	N/A	H:V (enter zero for flat grate)	Grate Open Area / 100-yr Orifice Area =	6.07	N/A	should be ≥ 4
Horiz. Length of Weir Sides =	4.00	N/A	feet	Overflow Grate Open Area w/o Debris =	10.72	N/A	ft^2
Overflow Grate Open Area % =	65%	N/A	%, grate open area/total area	Overflow Grate Open Area w/ Debris =	5.36	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 =	0.30	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	1.77	N/A	ft^2
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.75	N/A	feet
Restrictor Plate Height Above Pipe Invert =	18.00		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=	4.00	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.44	feet
Spillway Crest Length =	12.00	feet	Stage at Top of Freeboard =	5.44	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.78	acres
Freeboard above Max Water Surface =	1.00	feet			

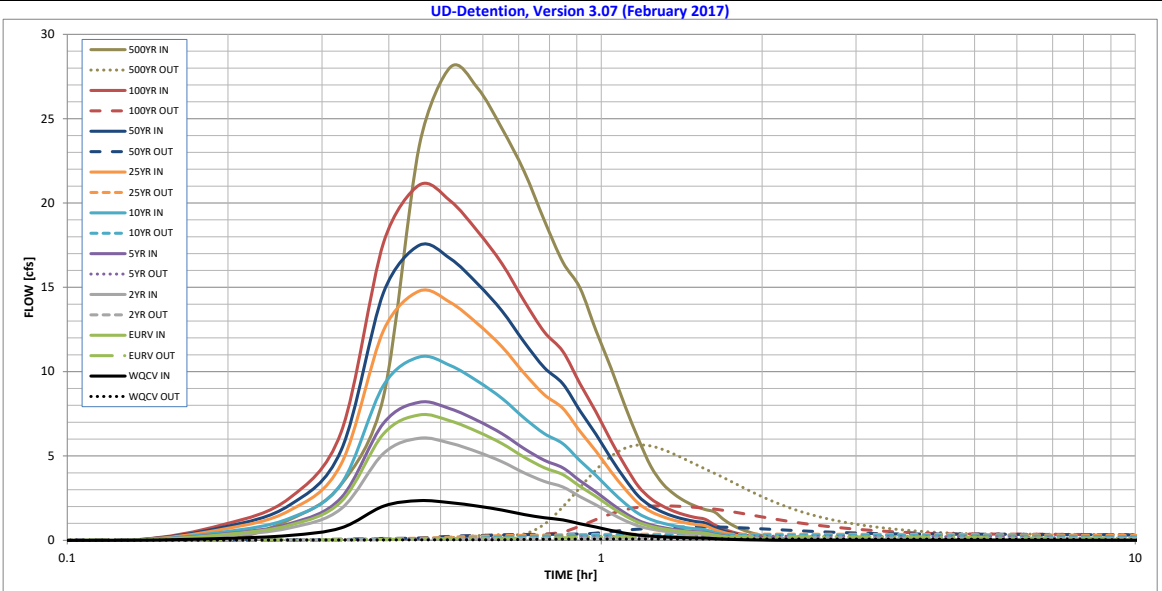
Calculated Parameters for Spillway

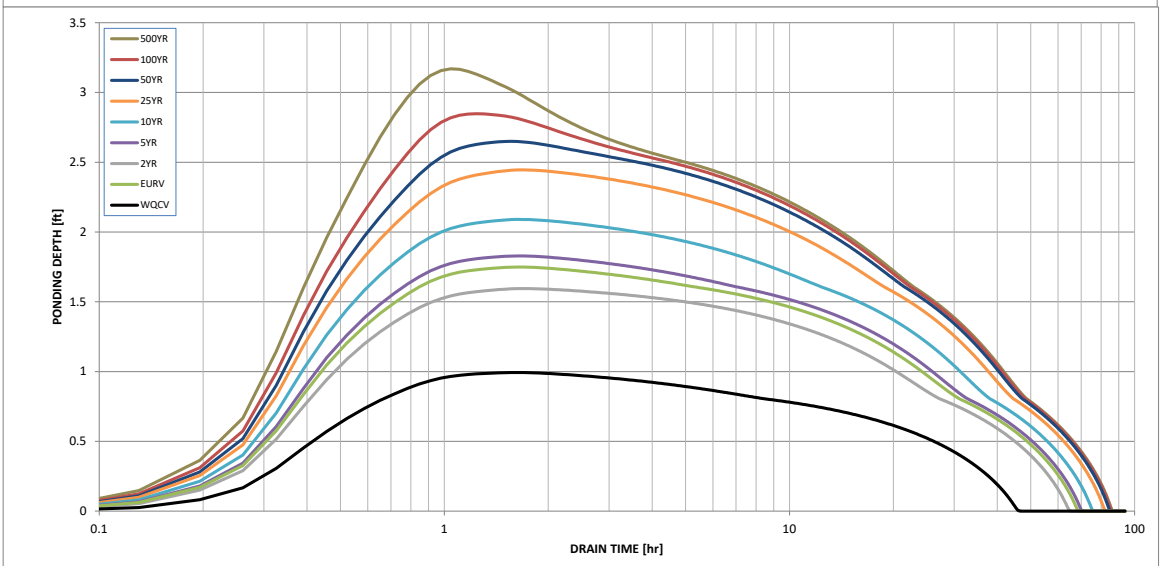
Routed Hydrograph Results

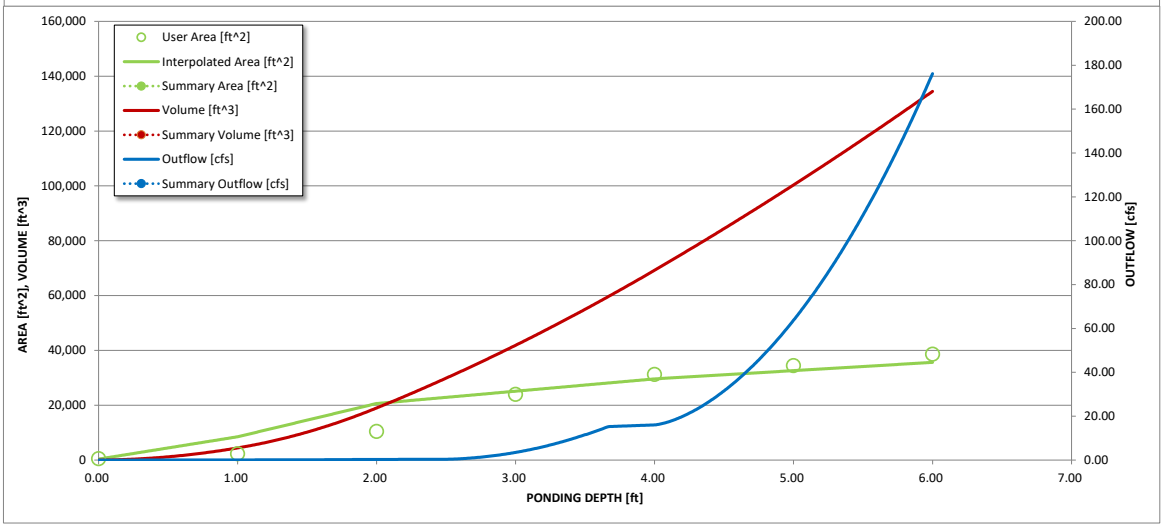
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.10
Calculated Runoff Volume (acre-ft) =	0.109	0.347	0.282	0.383	0.511	0.697	0.827	0.998	1.333
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.108	0.347	0.282	0.383	0.510	0.697	0.826	0.997	1.332
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.02	0.03	0.27	0.86	1.19	1.59	2.30
Predevelopment Peak Q (cfs) =	0.0	0.0	0.1	0.166	1.7	5.2	7.2	9.6	13.9
Peak Inflow Q (cfs) =	2.3	7.4	6.0	8.2	10.9	14.8	17.5	21.1	28.0
Peak Outflow Q (cfs) =	0.1	0.2	0.1	0.243	0.3	0.4	0.8	2.0	5.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.5	0.2	0.1	0.1	0.2	0.4
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Plate	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	0.0	0.2	0.5
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) =	42	59	56	60	63	66	67	65	60
Time to Drain 99% of Inflow Volume (hours) =	**44**	64	61	65	70	75	76	76	74
Maximum Ponding Depth (ft) =	0.99	1.75	1.59	1.83	2.09	2.44	2.65	2.85	3.17
Area at Maximum Ponding Depth (acres) =	0.19	0.40	0.36	0.42	0.48	0.52	0.54	0.56	0.59
Maximum Volume Stored (acre-ft) =	0.100	0.322	0.265	0.355	0.479	0.654	0.760	0.870	1.055

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)







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

Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename:

Storm Inflow Hydrographs **UD-Detention, Version 3.07 (February 2017)**

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

Time Interval	SOURCE	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
3.91 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:03:55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrograph Constant	0:07:49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:11:44	0.11	0.33	0.27	0.37	0.48	0.65	0.77	0.92	1.22
1.279	0:15:38	0.29	0.89	0.73	0.98	1.30	1.76	2.08	2.50	3.31
	0:19:33	0.74	2.30	1.87	2.52	3.34	4.53	5.35	6.42	8.51
	0:23:28	2.02	6.31	5.15	6.94	9.18	12.44	14.69	17.64	23.38
	0:27:22	2.35	7.43	6.05	8.18	10.87	14.78	17.49	21.07	28.04
	0:31:17	2.23	7.08	5.76	7.80	10.36	14.11	16.70	20.13	26.82
	0:35:11	2.03	6.44	5.24	7.10	9.43	12.84	15.21	18.33	24.42
	0:39:06	1.79	5.73	4.66	6.32	8.42	11.47	13.60	16.40	21.88
	0:43:01	1.53	4.93	4.00	5.44	7.25	9.91	11.76	14.20	18.98
	0:46:55	1.34	4.30	3.49	4.75	6.33	8.63	10.24	12.36	16.50
	0:50:50	1.21	3.90	3.16	4.30	5.73	7.82	9.28	11.20	14.96
	0:54:44	0.98	3.19	2.59	3.53	4.72	6.46	7.68	9.28	12.43
	0:58:39	0.78	2.59	2.10	2.87	3.84	5.28	6.28	7.61	10.22
	1:02:34	0.58	1.98	1.59	2.19	2.95	4.07	4.86	5.90	7.96
	1:06:28	0.42	1.46	1.17	1.62	2.19	3.04	3.63	4.43	6.02
	1:10:23	0.31	1.06	0.85	1.18	1.59	2.20	2.62	3.21	4.38
	1:14:17	0.25	0.83	0.67	0.92	1.23	1.70	2.03	2.47	3.35
	1:18:12	0.20	0.68	0.55	0.75	1.02	1.40	1.67	2.03	2.74
	1:22:07	0.17	0.58	0.47	0.64	0.86	1.19	1.41	1.72	2.32
	1:26:01	0.15	0.51	0.41	0.56	0.76	1.04	1.24	1.51	2.03
	1:29:56	0.14	0.46	0.37	0.51	0.68	0.94	1.12	1.35	1.83
	1:33:50	0.13	0.43	0.35	0.47	0.63	0.87	1.03	1.25	1.68
	1:37:45	0.10	0.31	0.25	0.35	0.46	0.63	0.75	0.91	1.23
	1:41:40	0.07	0.23	0.19	0.25	0.34	0.47	0.55	0.67	0.90
	1:45:34	0.05	0.17	0.14	0.19	0.25	0.34	0.41	0.49	0.66
	1:49:29	0.04	0.12	0.10	0.14	0.18	0.25	0.30	0.36	0.49
	1:53:23	0.03	0.09	0.07	0.10	0.13	0.18	0.21	0.26	0.35
	1:57:18	0.02	0.06	0.05	0.07	0.09	0.13	0.15	0.19	0.25
	2:01:13	0.01	0.04	0.03	0.05	0.06	0.09	0.11	0.13	0.18
	2:05:07	0.01	0.03	0.02	0.03	0.04	0.06	0.07	0.09	0.12
	2:09:02	0.00	0.02	0.01	0.02	0.03	0.04	0.04	0.05	0.08
	2:12:56	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.04
	2:16:51	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
	2:20:46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:24:40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:28:35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:32:29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:36:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:40:19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:44:13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:48:08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:52:02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:55:57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:59:52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:03:46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:07:41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:11:35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:19:25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:23:19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:27:14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:31:08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:38:58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:42:52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:46:47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:54:36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:58:31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:02:25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:06:20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:14:09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:18:04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:21:58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:29:47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:33:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:37:37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:41:31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

Figure 13-12c. Emergency Spillway Protection

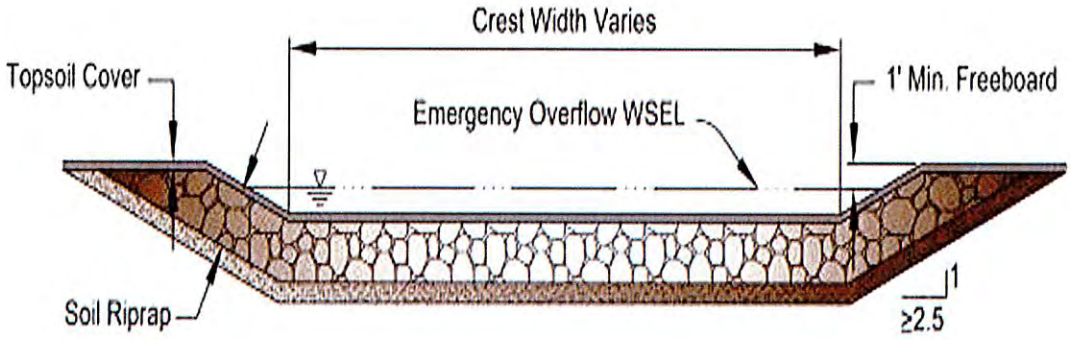
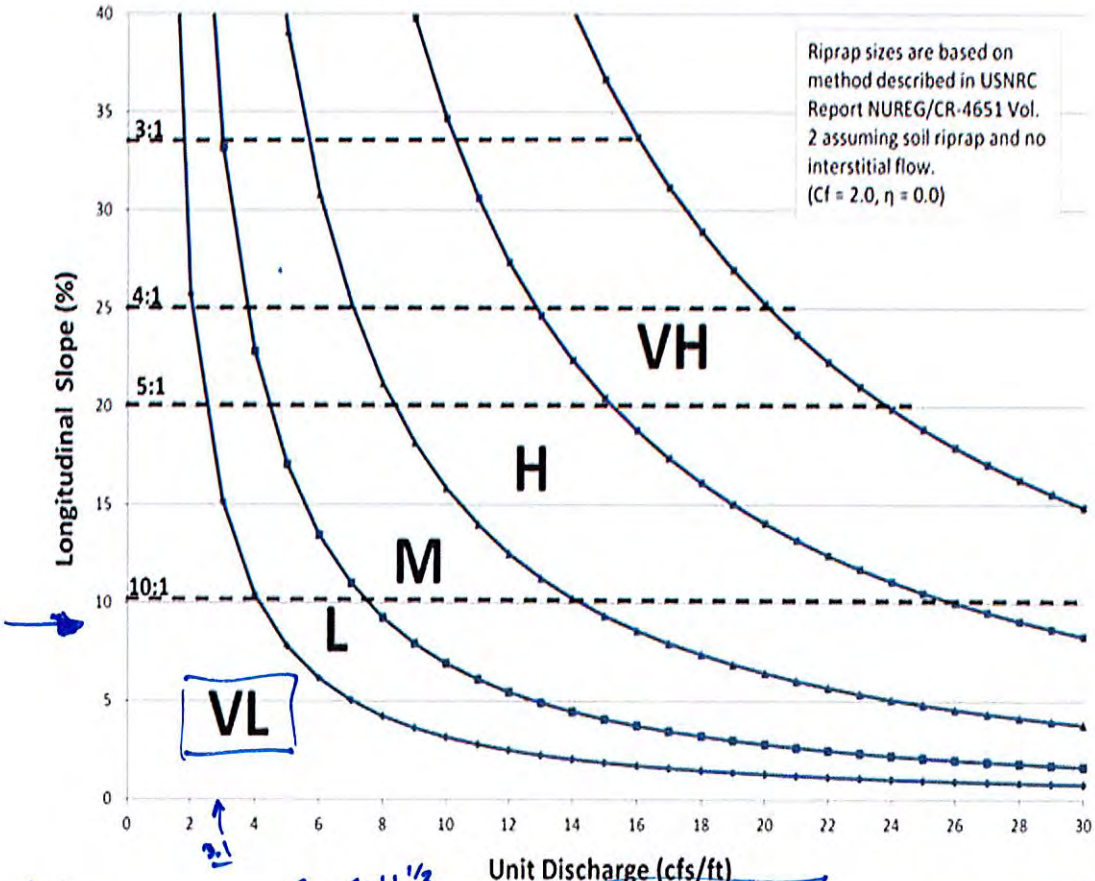


Figure 13-12d. Riprap Types for Emergency Spillway Protection



POND 'A'
$Q_{100} = 36.4$

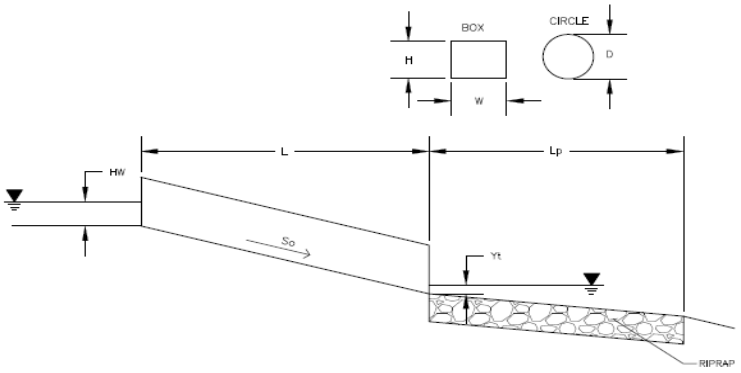
$Q = CLH^{1/2}$
$C = 3.1$
$H \approx 1'$
$L = 11.74'$

SPILLWAY
$\therefore L = 12'$

@ ELEV. = 6734.00

Determination of Culvert Headwater and Outlet Protection

Project: Banning Lewis Ranch Filing 35 through 36C
Basin ID: POND A OUTLET PIPE 18"



Soil Type:
Choose One:
- ○ Sandy
- ◉ Non-Sandy

Supercritical Flow! Using Da to calculate protection type.

Design Information (Input):

	Design Discharge	Q =	2	cfs
Circular Culvert:				
	Barrel Diameter in Inches	D =	18	inches
	Inlet Edge Type (Choose from pull-down list)		Grooved 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 =	6729.6	ft
	Outlet Elevation **OR** Slope	Elev OUT =	6729.22	ft
	Culvert Length	L =	74.9	ft
	Manning's Roughness	n =	0.013	
	Bend Loss Coefficient	k_b =	0	
	Exit Loss Coefficient	k_x =	1	
	Tailwater Surface Elevation	Elev Y_t =		ft
	Max Allowable Channel Velocity	V =	7	ft/s

Required Protection (Output):

Tailwater Surface Height	Y_t =	0.60	ft
Flow Area at Max Channel Velocity	A_t =	0.29	ft^2
Culvert Cross Sectional Area Available	A =	1.77	ft^2
Entrance Loss Coefficient	k_e =	0.20	
Friction Loss Coefficient	k_f =	1.36	
Sum of All Losses Coefficients	k_s =	2.56	ft
Culvert Normal Depth	Y_n =	0.53	ft
Culvert Critical Depth	Y_c =	0.53	ft
Tailwater Depth for Design	d =	1.02	ft
Adjusted Diameter **OR** Adjusted Rise	D_a =	1.01	ft
Expansion Factor	1/(2*tan(Θ)) =	6.70	
Flow/Diameter$^{2.5}$ **OR** Flow/(Span * Rise$^{1.5}$)	Q/D^2.5 =	0.73	$ft^{0.5}/s$
Froude Number	Fr =	1.02	**Supercritical!**
Tailwater/Adjusted Diameter **OR** Tailwater/Adjusted Rise	Yt/D =	0.59	
Inlet Control Headwater	HW_I =	0.73	ft
Outlet Control Headwater	HW_O =	0.69	
Design Headwater Elevation	**HW =**	**6,730.33**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**0.49**	
Minimum Theoretical Riprap Size	d_{50} =	1	in
Nominal Riprap Size	d_{50} =	6	in
UDFCD Riprap Type	**Type =**	**VL**	
Length of Protection	**L_p =**	**5**	**ft**
Width of Protection	**T =**	**3**	**ft**

Design Procedure Form: Extended Detention Basin (EDB)

Designer:	**Matt Larson**
Company:	**Classic Consulting Engineers & Surveyors, LLC**
Date:	**August 11, 2021**
Project:	**Banning Lewis Ranch Village 3 - Filings 35-36C**
Location:	**POND A - PIPE 31 FOREBAY**

PIPE 31 18" RCP
FOREBAY SIZING

1. Basin Storage Volume	
A) Effective Imperviousness of Tributary Area, I_a	I_a = 53.6 %
B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)	i = 0.536
C) Contributing Watershed Area	Area = 1.800 ac
D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm	d_6 = 0.42 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}= 0.032 ac-ft
G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume ($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN}/0.43))$	$V_{DESIGN\ OTHER}$= 0.032 ac-ft
H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)	$V_{DESIGN\ USER}$= ac-ft
I) Predominant Watershed NRCS Soil Group	Choose One: ○ A ◉ B ○ C / D
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 = 0.104 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 = 4.00 ft / ft
4. Inlet	
A) Describe means of providing energy dissipation at concentrated inflow locations:	Impact Structures

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Matt Larson
Company: Classic Consulting Engineers & Surveyors, LLC
Date: August 11, 2021
Project: Banning Lewis Ranch Village 3 - Filings 35-36C
Location: POND A - PIPE 31 FOREBAY

PIPE 31 18" RCP
FOREBAY SIZING

5. Forebay

A) Minimum Forebay Volume (V_{FMIN} = 2% of the WQCV) — V_{FMIN} = 0.001 ac-ft

B) Actual Forebay Volume — V_F = 0.001 ac-ft

C) Forebay Depth (D_F = 18 inch maximum) — D_F = 12.0 in

D) Forebay Discharge

i) Undetained 100-year Peak Discharge — Q_{100} = 8.80 cfs

ii) Forebay Discharge Design Flow ($Q_F = 0.02 * Q_{100}$) — Q_F = 0.18 cfs

E) Forebay Discharge Design

Choose One
- ○ Berm With Pipe
- ◉ Wall with Rect. Notch
- ○ Wall with V-Notch Weir

(flow too small for berm w/ pipe)

F) Discharge Pipe Size (minimum 8-inches) — Calculated D_P = in

G) Rectangular Notch Width — Calculated W_N = 3.0 in

6. Trickle Channel

A) Type of Trickle Channel

Choose One
- ◉ Concrete
- ○ Soft Bottom

F) Slope of Trickle Channel — S = 0.0050 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 = 250 sq ft

C) Outlet Type

Choose One
- ◉ Orifice Plate
- ○ Other (Describe):

D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention) — $D_{orifice}$ = 0.50 inches

E) Total Outlet Area — A_{ot} = 12.00 square inches

Design Procedure Form: Extended Detention Basin (EDB)

Designer:	**Matt Larson**
Company:	**Classic Consulting Engineers & Surveyors, LLC**
Date:	**August 14, 2021**
Project:	**Banning Lewis Ranch Village 3 - Filings 35-36C**
Location:	**POND A - PIPE 33 FOREBAY**

PIPE 33 30" RCP
FOREBAY SIZING

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, I_a — I_a = 53.6 %

B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$) — i = 0.536

C) Contributing Watershed Area — Area = 3.130 ac

D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm — d_6 = 0.42 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} = 0.056 ac-ft

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN}/0.43))$) — $V_{DESIGN\ OTHER}$ = 0.055 ac-ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired) — $V_{DESIGN\ USER}$ = ____ ac-ft

I) Predominant Watershed NRCS Soil Group

Choose One
- ○ A
- ◉ B
- ○ C / D

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 = 0.181 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 = 4.00 ft / ft

4. Inlet

A) Describe means of providing energy dissipation at concentrated inflow locations: Impact Structures

Design Procedure Form: Extended Detention Basin (EDB)

Designer:	**Matt Larson**
Company:	**Classic Consulting Engineers & Surveyors, LLC**
Date:	**August 14, 2021**
Project:	**Banning Lewis Ranch Village 3 - Filings 35-36C**
Location:	**POND A - PIPE 33 FOREBAY**

PIPE 33 30" RCP FOREBAY SIZING

5. Forebay

A) Minimum Forebay Volume (V_{FMIN} = 1% of the WQCV) — V_{FMIN} = 0.001 ac-ft

B) Actual Forebay Volume — V_F = 0.002 ac-ft

C) Forebay Depth (D_F = 12 inch maximum) — D_F = 12.0 in

D) Forebay Discharge

i) Undetained 100-year Peak Discharge — Q_{100} = 23.50 cfs

ii) Forebay Discharge Design Flow ($Q_F = 0.02 * Q_{100}$) — Q_F = 0.47 cfs

E) Forebay Discharge Design

Choose One
- ○ Berm With Pipe
- ◉ Wall with Rect. Notch
- ○ Wall with V-Notch Weir

(flow too small for berm w/ pipe)

F) Discharge Pipe Size (minimum 8-inches) — Calculated D_P = in

G) Rectangular Notch Width — Calculated W_N = 4.1 in

6. Trickle Channel

A) Type of Trickle Channel

Choose One
- ◉ Concrete
- ○ Soft Bottom

F) Slope of Trickle Channel — S = 0.0050 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 = 250 sq ft

C) Outlet Type

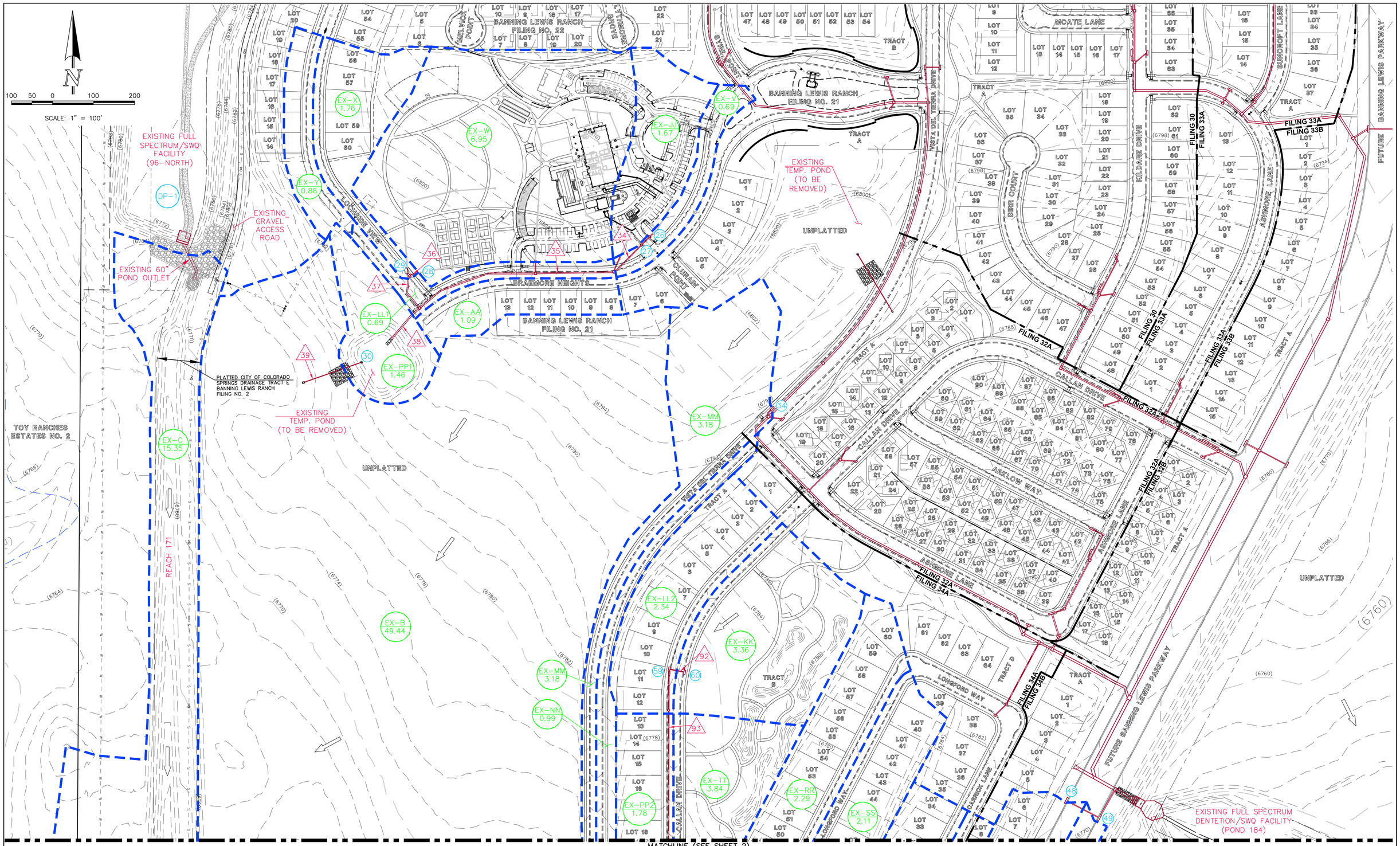
Choose One
- ◉ Orifice Plate
- ○ Other (Describe):

D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention) — $D_{orifice}$ = 0.50 inches

E) Total Outlet Area — A_{ot} = 12.00 square inches

DRAINAGE MAPS

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS



LEGEND

- EXISTING GROUND CONTOUR (6700)
- PROPOSED FINISHED CONTOUR 6700
- SUBDIVISION BOUNDARY
- LOT LINE
- PROPOSED BASIN BOUNDARY
- DIRECTION OF DRAINAGE
- EXISTING STORM SEWER
- EXISTING STORM INLET
- BASIN IDENTIFIER D
- AREA IN ACRES 1.41
- DESIGN POINT 1

KYLE R. CAMPBELL, COLORADO P.E. #29794

CLASSIC CONSULTING SM
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799(Fax)

BANNING LEWIS RANCH FILINGS 35-36C
FINAL DRAINAGE REPORT
EXISTING CONDITIONS

CLASSIC CONSULTING

DESIGNED BY	MAL	SCALE		DATE	08/21/19
DRAWN BY	MAL	(H) 1"= 100'		SHEET	1 OF 3
CHECKED BY		(V) 1"= N/A		JOB NO.	2366.86

N:\2366\DRAWINGS\DEVELOPMENT\FOR-EXISTING.dwg, 11/25/2019 3:40:13 PM, 1:1

MATCHLINE (SEE SHEET 1)

N

100 50 0 100 200

SCALE: 1" = 100'

TOY RANCHES ESTATES NO. 2

EX-C 15.35

EX-B 49.44

EX-A 9.90

EX-D 16.12

EX-E 52.82

EX-TT 3.84

EX-RR 2.29

EX-PP2 1.78

EX-SS 2.11

EX-QQ 1.38

EX-LLL 0.88

EX-VV 2.86

EX-UU 1.72

EX-HHH 2.35

EX-JJJ 2.87

EX-WW 1.25

EX-ZZ 1.48

REACH 171

DP-2

EXISTING DUAL 24" STORM PIPES FOR ROADWAY CROSSING

PLATTED CITY OF COLORADO SPRINGS DRAINAGE TRACT E BANNING LEWIS RANCH FILING NO. 2

PLATTED R.O.W. BANNING LEWIS RANCH FILING NO. 1 (BANNING LEWIS PKWY.)

CALLAN DRIVE

LONGCORD WAY

CARRICK LANE

FILING 34A

FILING 34B

TRACT A

FUTURE BANNING LEWIS PARKWAY

UNPLATTED

EXISTING FULL SPECTRUM DENTETION/SWQ FACILITY (POND 184)

EXISTING TEMPORARY FULL SPECTRUM DETENTION/ SWQ FACILITY

EXISTING 12" TEMPORARY POND OUTFALL PIPE
Q_5=2.0 CFS
Q_{100}= 8.2 CFS

EXISTING TEMPORARY SEDIMENT BASIN & FUTURE POND

MATCHLINE (SEE SHEET 3)

LEGEND

- EXISTING GROUND CONTOUR (6700)
- PROPOSED FINISHED CONTOUR 6700
- SUBDIVISION BOUNDARY
- LOT LINE
- PROPOSED BASIN BOUNDARY
- DIRECTION OF DRAINAGE
- EXISTING STORM SEWER
- EXISTING STORM INLET
- BASIN IDENTIFIER / AREA IN ACRES (D / 1.41)
- DESIGN POINT (1)

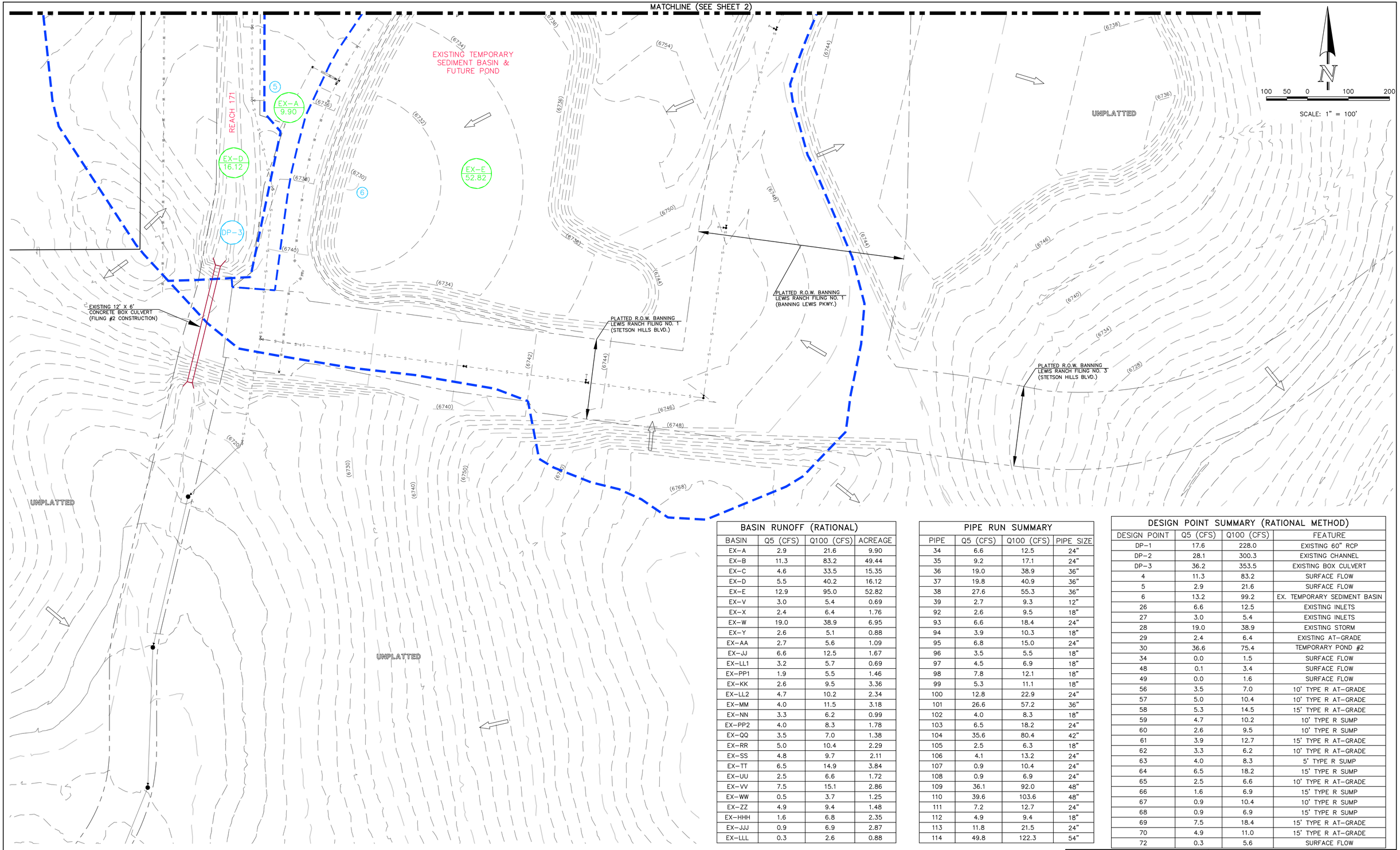
CLASSIC CONSULTING SM
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799(Fax)

BANNING LEWIS RANCH FILINGS 35-36C
FINAL DRAINAGE REPORT
EXISTING CONDITIONS

CLASSIC CONSULTING

DESIGNED BY	MAL	SCALE		DATE	08/21/19
DRAWN BY	MAL	(H) 1"= 100'		SHEET	2 OF 3
CHECKED BY		(V) 1"= N/A		JOB NO.	2366.86

MATCHLINE (SEE SHEET 2)



BASIN RUNOFF (RATIONAL)

BASIN	Q5 (CFS)	Q100 (CFS)	ACREAGE
EX-A	2.9	21.6	9.90
EX-B	11.3	83.2	49.44
EX-C	4.6	33.5	15.35
EX-D	5.5	40.2	16.12
EX-E	12.9	95.0	52.82
EX-V	3.0	5.4	0.69
EX-X	2.4	6.4	1.76
EX-W	19.0	38.9	6.95
EX-Y	2.6	5.1	0.88
EX-AA	2.7	5.6	1.09
EX-JJ	6.6	12.5	1.67
EX-LL1	3.2	5.7	0.69
EX-PP1	1.9	5.5	1.46
EX-KK	2.6	9.5	3.36
EX-LL2	4.7	10.2	2.34
EX-MM	4.0	11.5	3.18
EX-NN	3.3	6.2	0.99
EX-PP2	4.0	8.3	1.78
EX-QQ	3.5	7.0	1.38
EX-RR	5.0	10.4	2.29
EX-SS	4.8	9.7	2.11
EX-TT	6.5	14.9	3.84
EX-UU	2.5	6.6	1.72
EX-VV	7.5	15.1	2.86
EX-WW	0.5	3.7	1.25
EX-ZZ	4.9	9.4	1.48
EX-HHH	1.6	6.8	2.35
EX-JJJ	0.9	6.9	2.87
EX-LLL	0.3	2.6	0.88

PIPE RUN SUMMARY

PIPE	Q5 (CFS)	Q100 (CFS)	PIPE SIZE
34	6.6	12.5	24"
35	9.2	17.1	24"
36	19.0	38.9	36"
37	19.8	40.9	36"
38	27.6	55.3	36"
39	2.7	9.3	12"
92	2.6	9.5	18"
93	6.6	18.4	24"
94	3.9	10.3	18"
95	6.8	15.0	24"
96	3.5	5.5	18"
97	4.5	6.9	18"
98	7.8	12.1	18"
99	5.3	11.1	18"
100	12.8	22.9	24"
101	26.6	57.2	36"
102	4.0	8.3	18"
103	6.5	18.2	24"
104	35.6	80.4	42"
105	2.5	6.3	18"
106	4.1	13.2	24"
107	0.9	10.4	24"
108	0.9	6.9	24"
109	36.1	92.0	48"
110	39.6	103.6	48"
111	7.2	12.7	24"
112	4.9	9.4	18"
113	11.8	21.5	24"
114	49.8	122.3	54"

DESIGN POINT SUMMARY (RATIONAL METHOD)

DESIGN POINT	Q5 (CFS)	Q100 (CFS)	FEATURE
DP-1	17.6	228.0	EXISTING 60" RCP
DP-2	28.1	300.3	EXISTING CHANNEL
DP-3	36.2	353.5	EXISTING BOX CULVERT
4	11.3	83.2	SURFACE FLOW
5	2.9	21.6	SURFACE FLOW
6	13.2	99.2	EX. TEMPORARY SEDIMENT BASIN
26	6.6	12.5	EXISTING INLETS
27	3.0	5.4	EXISTING INLETS
28	19.0	38.9	EXISTING STORM
29	2.4	6.4	EXISTING AT-GRADE
30	36.6	75.4	TEMPORARY POND #2
34	0.0	1.5	SURFACE FLOW
48	0.1	3.4	SURFACE FLOW
49	0.0	1.6	SURFACE FLOW
56	3.5	7.0	10' TYPE R AT-GRADE
57	5.0	10.4	10' TYPE R AT-GRADE
58	5.3	14.5	15' TYPE R AT-GRADE
59	4.7	10.2	10' TYPE R SUMP
60	2.6	9.5	10' TYPE R SUMP
61	3.9	12.7	15' TYPE R AT-GRADE
62	3.3	6.2	10' TYPE R AT-GRADE
63	4.0	8.3	5' TYPE R SUMP
64	6.5	18.2	15' TYPE R SUMP
65	2.5	6.6	10' TYPE R AT-GRADE
66	1.6	6.9	15' TYPE R SUMP
67	0.9	10.4	10' TYPE R SUMP
68	0.9	6.9	15' TYPE R SUMP
69	7.5	18.4	15' TYPE R AT-GRADE
70	4.9	11.0	15' TYPE R AT-GRADE
72	0.3	5.6	SURFACE FLOW

LEGEND

- EXISTING GROUND CONTOUR (6700)
- PROPOSED FINISHED CONTOUR 6700
- SUBDIVISION BOUNDARY
- LOT LINE
- PROPOSED BASIN BOUNDARY
- DIRECTION OF DRAINAGE
- EXISTING STORM SEWER
- EXISTING STORM INLET
- BASIN IDENTIFIER D
- AREA IN ACRES 1.41
- DESIGN POINT 1

CLASSIC CONSULTING SM
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799(Fax)

BANNING LEWIS RANCH FILINGS 35-36C
FINAL DRAINAGE REPORT
EXISTING CONDITIONS

CLASSIC CONSULTING

DESIGNED BY	MAL	SCALE	DATE 08/21/19
DRAWN BY	MAL	(H) 1"= 100'	SHEET 3 OF 3
CHECKED BY		(V) 1"= N/A	JOB NO. 2366.86

N:\2366\6\DRAWINGS\DEVELOPMENT\FDR-EXISTING.dwg, 11/25/2019 3:41:04 PM, 1:1

EXISTING FULL SPECTRUM/SWQ FACILITY (96-NORTH)

DP-1

EXISTING GRAVEL ACCESS ROAD

EXISTING 60" POND OUTLET

PLATTED CITY OF COLORADO SPRINGS DRAINAGE TRACT E BANNING LEWIS RANCH FILING NO. 2

TOY RANCHES ESTATES NO. 2

REACH 171

BANNING LEWIS RANCH FILING NO. 22

BANNING LEWIS RANCH FILING NO. 21

BANNING LEWIS RANCH FILING NO. 28

BANNING LEWIS RANCH FILING NO. 27

BANNING LEWIS RANCH FILING NO. 34A

MANSE GROVE

TORRISDALE VIEW

SAVAL POINT

BRAEMORE HEIGHTS

BENNACH GROVE

HASTER GROVE

CLAIRMAR POINT

MELVICK POINT

LYTHMORE GROVE

MOATE LANE

SURCROFT LANE

BANNING LEWIS PARKWAY

KILDARE DRIVE

ARMOIRE LANE

CALLAN DRIVE

ARKLOW WAY

CAIRNRICK LANE

LONGFORD WAY

TRACT A

TRACT B

TRACT C

TRACT D

FILING 30

FILING 32A

FILING 33A

FILING 33B

FILING 34A

FUTURE BANNING LEWIS PARKWAY

UNPLATTED

EX-V 1.55

EX-W 5.83

EX-X 3.21

EX-Y 2.42

EX-Z 0.50

EX-AA 1.68

EX-BB 3.32

EX-U 2.34

EX-LL1 2.36

A 1.87

B 1.50

C 2.72

D 2.33

E 0.66

F1 2.44

F2 1.22

G1 1.58

G2 1.46

H 1.91

J 1.98

K1 1.97

K2 1.18

L1 3.14

L2 1.65

RR 0.36

CH-1 19.69

EX-MM 2.01

EX-NN 0.93

EX-LL2 2.34

EX-KK 3.36

EX-TT 3.84

EX-RR 2.29

EX-SS 2.11

EX-QQ 1.38

EX-PP2 1.78

EX-VV 2.86

EX-ZZ 1.48

MATCHLINE (SEE SHEET 2)

EXISTING FULL SPECTRUM DETENTION/SWQ FACILITY (POND 184)

N

100 50 0 100 200

SCALE: 1" = 100'

LEGEND

- EXISTING GROUND CONTOUR (6700)
- PROPOSED FINISHED CONTOUR 6700
- SUBDIVISION BOUNDARY
- LOT LINE
- PROPOSED BASIN BOUNDARY
- EXISTING STORM SEWER
- EXISTING STORM INLET
- PROPOSED STORM SEWER
- PROPOSED STORM INLET
- LOW POINT/HIGH POINT LP/HP
- DIRECTION OF DRAINAGE
- BASIN IDENTIFIER / AREA IN ACRES (D / 1.41)
- DESIGN POINT (1)
- PIPE RUN (1)

MANHOLE TYPES

TYPE II (CIRCULAR BASE) MANHOLES USED WHEN ALL INCOMING AND THE OUTGOING PIPE ARE 30" OR LESS IN SIZE. TYPE I (BOX BASE) MANHOLES ARE USED FOR ALL MAINS OVER 30" IN SIZE.

CLASSIC CONSULTING SM
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799(Fax)

BANNING LEWIS RANCH FIL. 26,27,28,&29
FINAL DRAINAGE REPORT
DEVELOPED CONDITIONS

DESIGNED BY	MAL	SCALE		DATE	09/11/19
DRAWN BY	MAL	(H) 1"= 100'		SHEET	1 OF 4
CHECKED BY		(V) 1"= N/A		JOB NO.	2366.89

MATCHLINE (SEE SHEET 1)

TOY RANCHES ESTATES NO. 2

BANNING LEWIS RANCH FILING NO. 38 TRACT C

REACH 171

EXISTING DUAL 30" STORM PIPES FOR ROADWAY CROSSING MUST BE REPLACED WITH OPEN CHANNEL. EROSION CONTROL BLANKET WITHIN CHANNEL BOTTOM AND 3.0' UP SIDE SLOPES, NATIVE SEED ON UPPER BANKS AT MIN. NORTH AMERICAN GREEN TYPE SC250 BLANKET (OR EQUIV.) 11' BOTTOM WIDTH, 4:1 SIDE SLOPES

PLATTED CITY OF COLORADO SPRINGS DRAINAGE TRACT E BANNING LEWIS RANCH FILING NO. 2

UNPLATTED

BANNING LEWIS RANCH FILING NO. 38 TRACT C

FULL SPECTRUM DETENTION/ SWQ FACILITY (POND A)

BERRIEDALE VIEW

MARELAND VIEW

STRATH POINT

TORRISDALE VIEW

RASTER GROVE

VISTA DEL TIERRA DRIVE

PROP. FILING 38 (67 LOTS)

PROP. FILING 37 (85 LOTS)

EXISTING FULL SPECTRUM DETENTION/ SWQ FACILITY (POND 171)

BANNING LEWIS RANCH FILING NO. 36C

THURLESS LANE

CASTLEBAR DRIVE

TRAMORE COURT

BANNING LEWIS RANCH FILING NO. 36

BALTIN COURT

CALLAN DRIVE

LONGSHIRE WAY

CARRICK LANE

FILING 34A

FILING 34B

TRACT A

FUTURE BANNING LEWIS PARKWAY

EXISTING FULL SPECTRUM DETENTION/SWQ FACILITY (POND 184)

UNPLATTED

BANNING LEWIS RANCH FILING NO. 36B

LEWIS PARKWAY

FUTURE BANNING

UNPLATTED

MATCHLINE (SEE SHEET 3)

N

100 50 0 100 200

SCALE: 1" = 100'

LEGEND

EXISTING GROUND CONTOUR	(6700)
PROPOSED FINISHED CONTOUR	6700
SUBDIVISION BOUNDARY	
LOT LINE	
PROPOSED BASIN BOUNDARY	
EXISTING STORM SEWER	
EXISTING STORM INLET	
PROPOSED STORM SEWER	
PROPOSED STORM INLET	
LOW POINT/HIGH POINT	LP/HP
DIRECTION OF DRAINAGE	
BASIN IDENTIFIER / AREA IN ACRES	D 1.41
DESIGN POINT	1
PIPE RUN	1

EXISTING DETENTION POND

POND 171 CONSTRUCTION DRAWINGS HAVE BEEN APPROVED BY THE CITY OF COLORADO SPRINGS. CONSTRUCTION IS APPROX. 85% COMPLETE AS OF AUGUST 2021.

MANHOLE TYPES

TYPE II (CIRCULAR BASE) MANHOLES USED WHEN ALL INCOMING AND THE OUTGOING PIPE ARE 30" OR LESS IN SIZE. TYPE I (BOX BASE) MANHOLES ARE USED FOR ALL MAINS OVER 30" IN SIZE.

STORM PIPE:

ALL STORM SEWER IS REINFORCED CONCRETE PIPE (RCP).

'PRIVATE' STORM SEWER FACILITIES WILL BE OWNED AND MAINTAINED BY THE BANNING LEWIS RANCH METROPOLITAN DISTRICT #5.

'PUBLIC' STORM SEWER FACILITIES WILL BE OWNED AND MAINTAINED BY THE CITY OF COLORADO SPRINGS

CLASSIC CONSULTING SM
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799(Fax)

BANNING LEWIS RANCH FIL. 26,27,28,&29 FINAL DRAINAGE REPORT

DEVELOPED CONDITIONS

CLASSIC CONSULTING

DESIGNED BY	MAL	SCALE		DATE	09/11/19
DRAWN BY	MAL	(H) 1"= 100'		SHEET	2 OF 4
CHECKED BY		(V) 1"= N/A		JOB NO.	2366.89

N:\25702\DRAWINGS\DEVELOPMENT\DTR--DEVELOPED--DPP.dwg, 8/14/2021 4:44:57 PM, 1:1

EXISTING DETENTION POND

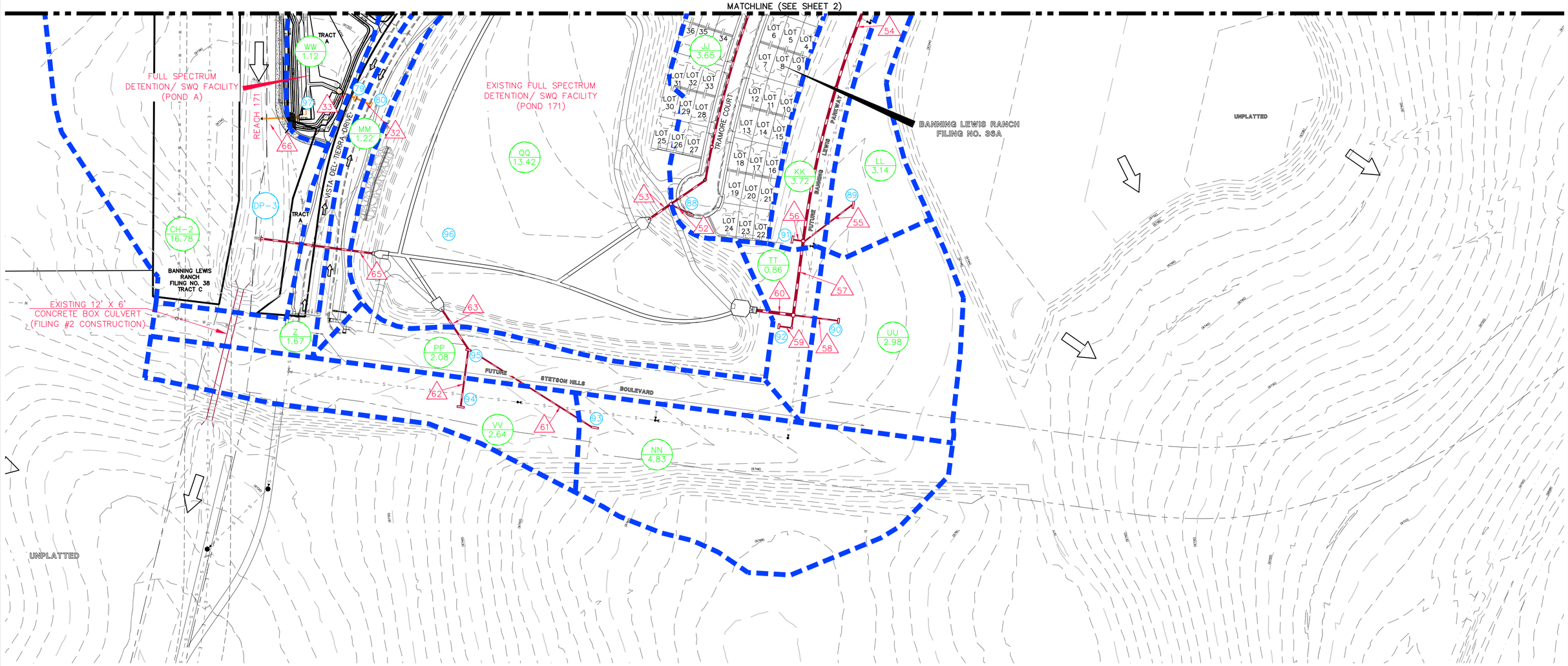
POND 171 CONSTRUCTION DRAWINGS HAVE BEEN APPROVED BY THE CITY OF COLORADO SPRINGS. CONSTRUCTION IS APPROX. 85% COMPLETE AS OF AUGUST 2021.

N

100 50 0 100 200

SCALE: 1" = 100'

MATCHLINE (SEE SHEET 2)



STORM PIPE:

ALL STORM SEWER IS REINFORCED CONCRETE PIPE (RCP).

'PRIVATE' STORM SEWER FACILITIES WILL BE OWNED AND MAINTAINED BY THE BANNING LEWIS RANCH METROPOLITAN DISTRICT #5.

'PUBLIC' STORM SEWER FACILITIES WILL BE OWNED AND MAINTAINED BY THE CITY OF COLORADO SPRINGS

MANHOLE TYPES

TYPE II (CIRCULAR BASE) MANHOLES USED WHEN ALL INCOMING AND THE OUTGOING PIPE ARE 30" OR LESS IN SIZE. TYPE I (BOX BASE) MANHOLES ARE USED FOR ALL MAINS OVER 30" IN SIZE.

LEGEND

- EXISTING GROUND CONTOUR (6700)
- PROPOSED FINISHED CONTOUR 6700
- SUBDIVISION BOUNDARY
- LOT LINE
- PROPOSED BASIN BOUNDARY
- EXISTING STORM SEWER
- EXISTING STORM INLET
- PROPOSED STORM SEWER
- PROPOSED STORM INLET
- LOW POINT/HIGH POINT LP/HP
- DIRECTION OF DRAINAGE
- BASIN IDENTIFIER D
- AREA IN ACRES 1.41
- DESIGN POINT 1
- PIPE RUN 1

CLASSIC CONSULTING SM

619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799(Fax)

BANNING LEWIS RANCH FIL. 26,27,28,&29
FINAL DRAINAGE REPORT
DEVELOPED CONDITIONS

CLASSIC CONSULTING

DESIGNED BY	MAL	SCALE		DATE	09/11/19
DRAWN BY	MAL	(H) 1"= 100'		SHEET	3 OF 4
CHECKED BY		(V) 1"= N/A		JOB NO.	2366.89

PIPE RUN SUMMARY

FILINGS 37 & 38

PIPE	Q5 (CFS)	Q100 (CFS)	PIPE SIZE	OWNERSHIP
1	7.3	15.3	24"	PRIVATE
2A	8.7	18.0	24"	PRIVATE
2B	3.7	7.4	18"	PRIVATE
2C	4.9	9.6	18"	PRIVATE
3A	16.5	33.5	30"	PRIVATE
3B	4.7	7.0	18"	PRIVATE
3C	5.4	8.2	18"	PRIVATE
3D	24.7	45.4	36"	PRIVATE
3E	3.7	10.1	18"	PRIVATE
3F	4.5	14.2	24"	PRIVATE
4A	32.4	68.5	36"	PRIVATE
4B	102.6	217.8	66"	PRIVATE
5A	110.0	233.3	66"	PRIVATE
5B	3.0	6.1	18"	PRIVATE
6	110.7	234.5	72"	PUBLIC
7	0.8	1.6	18"	PUBLIC
8	4.8	7.9	18"	PUBLIC
9	41.8	86.0	48"	PUBLIC
10	6.5	13.2	24"	PRIVATE
11	9.8	20.6	24"	PRIVATE
12	5.9	15.5	24"	PRIVATE
13	33.9	75.2	42"	PRIVATE
14	5.5	11.3	18"	PRIVATE
15	6.9	14.4	24"	PRIVATE
16	39.5	86.7	42"	PRIVATE
17A	2.8	3.8	18"	PRIVATE
17B	6.4	12.5	24"	PRIVATE
17C	5.3	12.9	24"	PRIVATE
18A	14.4	29.1	30"	PRIVATE
18B	2.4	3.3	18"	PRIVATE
19A	16.0	30.9	30"	PRIVATE
19B	5.6	12.5	24"	PRIVATE
20	4.9	9.9	18"	PRIVATE
21	25.5	51.3	36"	PRIVATE
22A	63.1	133.9	48"	PRIVATE
22B	1.2	2.3	18"	PRIVATE
22C	3.0	7.8	18"	PRIVATE
23A	66.2	141.7	54"	PRIVATE
23B	5.1	10.3	18"	PRIVATE
23C	2.6	5.1	18"	PRIVATE
24A	71.0	151.0	60"/66"	PRIVATE
24B	5.8	12.4	18"	PRIVATE
24C	2.8	5.5	18"	PRIVATE
25A	3.7	5.5	18"	PRIVATE
25B	6.2	15.6	24"	PRIVATE
25C	4.9	9.8	18"	PRIVATE
25D	14.2	29.9	30"	PRIVATE
26A	4.6	7.1	18"	PRIVATE
26B	5.7	14.1	24"	PRIVATE
26C	5.2	10.9	18"	PRIVATE
27	15.1	31.4	30"	PRIVATE
28A	4.8	9.8	18"	PRIVATE
28B	4.6	9.5	18"	PRIVATE
28C	23.5	48.6	36"	PRIVATE
29	38.6	80.3	42"	PRIVATE
30	38.8	80.7	42"	PUBLIC
31	4.4	8.8	18"	PRIVATE
32	3.6	12.5	24"	PUBLIC
33	9.4	23.4	30"	PUBLIC
34	7.5	16.6	EX. 24"	PRIVATE
35	9.9	21.3	EX. 24"	PRIVATE
36	7.5	16.6	EX. 18"	PRIVATE
37	9.5	20.3	EX. 30"	PRIVATE
38	19.3	41.5	EX. 36"	PRIVATE
40	7.2	15.1	24"	PUBLIC
41	2.8	5.9	18"	PUBLIC
42	9.9	20.8	24"	PUBLIC
43	4.3	8.4	18"	PUBLIC
44	4.2	8.2	18"	PUBLIC
45	17.7	35.9	30"	PUBLIC
46	4.4	6.4	18"	PUBLIC
47	6.0	14.3	24"	PUBLIC
48	10.4	20.6	24"	PUBLIC
49	3.6	7.1	18"	PUBLIC
50	13.9	27.4	30"	PUBLIC
51	30.9	61.8	36"	PUBLIC
52	6.9	16.0	24"	PUBLIC
53	35.8	73.8	42"	PUBLIC
54	63.6	139.1	54"	PUBLIC
55	8.8	13.3	24"	PUBLIC
56	8.9	13.3	24"	PUBLIC
57	74.2	152.2	54"	PUBLIC
58	5.5	18.6	24"	PUBLIC
59	9.3	30.6	30"	PUBLIC
60	81.1	175.1	54"	PUBLIC
61	9.2	14.5	24"	PUBLIC
62	17.6	38.5	30"	PUBLIC

FILINGS 37 & 38

PIPE RUN SUMMARY

PIPE	Q5 (CFS)	Q100 (CFS)	PIPE SIZE	OWNERSHIP
63	24.2	51.1	36"	PUBLIC
65	4.3	39.5	36"	PUBLIC
66	0.2	2.0	18"	PUBLIC
92	2.6	9.5	EX. 18"	PUBLIC
93	6.6	18.3	EX. 24"	PUBLIC
94	4.1	9.5	EX. 18"	PUBLIC
95	6.7	13.5	EX. 24"	PUBLIC
96	3.5	5.5	EX. 18"	PUBLIC
97	4.5	6.9	EX. 18"	PUBLIC
98	7.8	12.1	EX. 18"	PUBLIC
99	5.3	11.0	EX. 18"	PUBLIC
100	12.8	22.8	EX. 24"	PUBLIC
101	27.0	56.7	EX. 36"	PUBLIC
102	4.0	8.3	EX. 18"	PUBLIC
103	6.5	18.3	EX. 24"	PUBLIC
104	35.9	80.0	EX. 42"	PUBLIC
105	4.1	6.3	EX. 18"	PUBLIC
106	10.3	21.0	EX. 24"	PUBLIC
107	3.3	12.0	EX. 24"	PUBLIC
108	7.3	15.4	EX. 24"	PUBLIC
109	44.4	102.1	EX. 48"	PUBLIC
110	53.4	120.5	EX. 48"	PUBLIC
111	7.2	12.7	EX. 24"	PUBLIC
112	4.9	9.4	EX. 18"	PUBLIC
113	11.8	21.4	EX. 24"	PUBLIC

STORM PIPE:

ALL STORM SEWER IS REINFORCED CONCRETE PIPE (RCP).

'PRIVATE' STORM SEWER FACILITIES WILL BE OWNED AND MAINTAINED BY THE BANNING LEWIS RANCH METROPOLITAN DISTRICT #5.

'PUBLIC' STORM SEWER FACILITIES WILL BE OWNED AND MAINTAINED BY THE CITY OF COLORADO SPRINGS

DESIGN POINT SUMMARY (RATIONAL METHOD)

FILINGS 37 & 38

DESIGN POINT	Q5 (CFS)	Q100 (CFS)	FEATURE
DP-1	17.6	228.0	EXISTING 60" RCP
DP-2	21.8	250.5	EXISTING CHANNEL
DP-3	24.4	266.7	EXISTING BOX CULVERT
4	7.3	15.3	EXISTING 15' TYPE R SUMP
5	1.5	3.0	EXISTING 5' TYPE R SUMP
6	3.7	7.4	EXISTING 5' TYPE R SUMP
7	4.9	9.6	EXISTING 10' TYPE R SUMP
8	6.5	13.2	EXISTING 10' TYPE R SUMP
9	3.4	7.7	EXISTING 5' TYPE R SUMP
10	5.9	15.5	EXISTING 10' TYPE R SUMP
11	5.5	11.3	EXISTING 10' TYPE R SUMP
12	1.7	3.8	EXISTING 5' TYPE R SUMP
13	6.4	12.5	EXISTING 10' TYPE R SUMP
14A	5.5	11.3	EXISTING 5' TYPE R AT-GRADE
14B	5.3	12.9	EXISTING 10' TYPE R SUMP
15A	4.2	8.3	EXISTING 5' TYPE R AT-GRADE
15B	5.6	12.5	EXISTING 10' TYPE R SUMP
16	4.9	9.9	EXISTING 10' TYPE R SUMP
17	1.2	2.3	EXISTING 5' TYPE R SUMP
18	3.0	7.8	EXISTING 5' TYPE R SUMP
19A	5.3	10.7	EXISTING 10' TYPE R AT-GRADE
19B	3.7	10.1	EXISTING 10' TYPE R SUMP
20A	6.6	14.7	EXISTING 10' TYPE R AT-GRADE
20B	4.5	14.2	EXISTING 10' TYPE R SUMP
21	5.8	12.4	EXISTING 10' TYPE R SUMP
22	2.8	5.5	EXISTING 5' TYPE R SUMP
23	5.1	10.3	EXISTING 10' TYPE R SUMP
24	2.6	5.1	EXISTING 5' TYPE R SUMP
25A	5.2	11.1	PROPOSED 10' TYPE R AT-GRADE
25B	5.7	14.1	PROPOSED 10' TYPE R SUMP
26	7.5	16.6	EXISTING STORM
27	3.8	7.9	EXISTING INLETS
28	7.5	16.6	EXISTING STORM
29	3.6	10.8	EXISTING AT-GRADE
30	5.2	10.9	PROPOSED 10' TYPE R SUMP
34	3.8	8.8	SURFACE FLOW
48	0.1	3.4	SURFACE FLOW
49	0.0	1.6	SURFACE FLOW
56	3.5	7.0	EXISTING 10' TYPE R AT-GRADE
57	5.0	10.4	EXISTING 10' TYPE R AT-GRADE
58	5.3	14.5	EXISTING 15' TYPE R AT-GRADE
59	4.7	10.2	EXISTING 10' TYPE R SUMP
60	2.6	9.5	EXISTING 10' TYPE R SUMP
61	4.1	11.1	EXISTING 15' TYPE R AT-GRADE
62	3.5	6.6	EXISTING 10' TYPE R AT-GRADE
63	4.0	8.3	EXISTING 5' TYPE R SUMP
64	6.5	18.3	EXISTING 15' TYPE R SUMP
65	4.3	8.9	EXISTING 10' TYPE R AT-GRADE
66	6.2	14.7	EXISTING 15' TYPE R SUMP
67	3.3	12.0	EXISTING 10' TYPE R SUMP
68	7.3	15.4	EXISTING 15' TYPE R SUMP
69	7.5	18.4	EXISTING 15' TYPE R AT-GRADE
70	4.9	11.0	EXISTING 15' TYPE R AT-GRADE
71	3.0	6.1	EXISTING 5' TYPE R SUMP
72A	4.4	8.4	PROPOSED 10' TYPE R AT-GRADE
72B	6.2	15.6	PROPOSED 10' TYPE R SUMP
73	4.9	9.8	PROPOSED 10' TYPE R SUMP
74	4.8	9.8	PROPOSED 10' TYPE R SUMP
75	4.6	9.5	PROPOSED 10' TYPE R SUMP
76	4.4	8.8	PROPOSED 5' TYPE R SUMP
77	0.8	1.6	EXISTING 10' TYPE R AT-GRADE
78	5.5	14.0	EXISTING 10' TYPE R AT-GRADE
79	6.3	12.1	EXISTING 10' TYPE R SUMP
80	3.6	12.5	EXISTING 10' TYPE R SUMP
81	7.2	15.1	EXISTING 15' TYPE R SUMP
82	2.8	5.9	EXISTING 5' TYPE R SUMP
83	4.3	8.4	EXISTING 5' TYPE R SUMP
84	4.2	8.2	EXISTING 5' TYPE R SUMP
85	4.8	9.1	EXISTING 10' TYPE R AT-GRADE
86	6.0	14.3	EXISTING 15' TYPE R SUMP
87	3.6	7.1	EXISTING 5' TYPE R SUMP
88	6.9	16.0	EXISTING 15' TYPE R SUMP
89	9.8	20.1	EXISTING 15' TYPE R AT-GRADE
90	5.5	18.6	EXISTING 10' TYPE R SUMP
91	10.1	20.3	EXISTING 15' TYPE R AT-GRADE
92	3.8	12.0	EXISTING 10' TYPE R SUMP
93	10.5	24.1	EXISTING 15' TYPE R AT-GRADE
94	9.8	27.8	EXISTING 15' TYPE R SUMP
95	7.2	13.8	EXISTING 10' TYPE R SUMP
96	276.8	604.7	POND 171
97	13.2	32.9	POND A

FILINGS 37 & 38

BASIN RUNOFF (RATIONAL)

FILINGS 37 & 38

BASIN	Q5 (CFS)	Q100 (CFS)	ACREAGE
CH-1	8.8	47.0	19.69
CH-2	5.7	41.8	16.78
EX-U	3.8	8.8	2.34
EX-V	3.8	7.9	1.55
EX-X	3.6	10.8	3.21
EX-W	15.0	33.3	5.83
EX-Y	6.4	12.5	2.42
EX-Z	1.5	3.0	0.50
EX-AA	3.4	7.7	1.68
EX-BB	7.3	15.3	3.32
EX-LL1	7.0	14.2	2.36
EX-KK	2.6	9.5	3.36
EX-LL2	4.7	10.2	2.34
EX-MM	4.6	9.9	2.01
EX-NN	3.5	6.6	0.93
EX-PP2	4.0	8.3	1.78
EX-QQ	3.5	7.0	1.38
EX-RR	5.0	10.4	2.29
EX-SS	4.8	9.7	2.11
EX-TT	6.5	14.9	3.84
EX-UU	4.3	8.9	1.72
EX-VV	7.5	15.1	2.86
EX-WW	3.5	7.4	1.25
EX-ZZ	4.9	9.5	1.48
EX-HHH	6.1	12.4	2.35
EX-JJJ	7.3	15.4	3.10
A	4.9	9.6	1.87
B	3.7	7.4	1.50
C	6.5	13.2	2.72
D	5.5	11.3	2.33
E	1.7	3.8	0.66
F1	5.5	11.3	2.44
F2	2.7	5.7	1.22
G1	4.2	8.3	1.58
G2	3.8	7.6	1.46
H	4.9	9.9	1.91
J	3.0	7.8	1.98
K1	5.3	10.7	1.97
K2	3.2	6.6	1.18
L1	6.6	14.7	3.14
L2	4.0	8.5	1.65
M	5.8	12.4	2.47
N	2.8	5.5	0.96
P	3.0	6.1	1.11
Q	5.1	10.3	2.02
R	2.6	5.1	0.89
S-1	5.2	11.1	2.20
S-2	5.1	10.2	1.98
T	5.2	10.9	2.44
U	4.6	9.5	2.06
V	4.8	9.8	2.14
W	4.9	9.8	1.87
X	5.9	13.6	3.40
Y-1	4.4	8.4	1.26
Y-2	0.8	1.6	0.26
Z	6.3	12.1	1.67
AA	4.4	8.8	1.78
BB	7.2	15.1	2.98
CC	2.8	5.9	1.13
DD	4.2	8.2	1.37
EE	4.3	8.4	1.41
FF	5.7	11.6	2.20
GG	5.5	12.5	2.59
HH	3.6	7.1	1.17
JJ	6.9	16.0	3.65
KK	10.1	20.3	3.72
LL	9.7	18.6	3.14
MM	3.4	7.2	1.22
NN	10.5	24.1	4.83
PP	7.2	13.8	2.08
QQ	4.5	33.3	13.42
RR	1.2	2.3	0.36
SS	4.8	9.1	1.54
TT	3.2	6.2	0.86
UU	5.6	14.5	2.98
VV	8.4	17.1	2.64
WW	0.5	3.4	1.12

FILINGS 37 & 38

CLASSIC CONSULTING SM
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799(Fax)

BANNING LEWIS RANCH FIL. 26,27,28,&29
FINAL DRAINAGE REPORT
DEVELOPED CONDITIONS

CLASSIC CONSULTING

DESIGNED BY	MAL	SCALE	DATE 09/11/19
DRAWN BY	MAL	(H) 1"= 100'	SHEET 4 OF 4
CHECKED BY		(V) 1"= N/A	JOB NO. 2366.89