FINAL DRAINAGE REPORT
for
WESTCREEK AT WOLF RANCH SUBDIVISION FILINGS 13 and 14
(WESTCREEK III AT WOLF RANCH)
October 2020

Prepared for:

Villages at Wolf Ranch, LLC (Nor`wood Development)
111 South Tejon Street, Suite 222
Colorado Springs, CO 80903
(719) 593-2600

Prepared by:

Rockwell Consulting, Inc.
1955 N. Union Boulevard, Suite 200
Colorado Springs, CO 80909
(719) 475-2575

Project# 17-025

TABLE OF CONTENTS

WESTCREEK AT WOLF RANCH SUBDIVISION FILINGS 13 and 14
(Westcreek III at Wolf Ranch)

ENGINEER'S STATEMENT

This Drainage Report and Plan for the drainage design of Westcreek at Wolf Ranch Filings No. 13 and 14 were prepared under my direct supervision and are correct to the best of my knowledge and belief. Said drainage 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.

_____
Kent D. Rockwell, P.E.

DEVELOPER'S STATEMENT

Villages at Wolf Ranch, LLC hereby certifies that the drainage facilities for Westcreek at Wolf Ranch Filings No. 13 and 14 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 Westcreek at Wolf Ranch Filings 13 and 14, guarantee that final drainage design review will absolve Villages at Wolf Ranch, LLC. 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.

_____ _____
Name of Developer

_____ _____
Authorized Signature Date

_____ _____
Printed Name

_____ _____
Title

_____ _____
Address

CITY OF COLORADO SPRINGS

Filed in accordance with Section 7-7-906 of the code of the City of Colorado Springs, 2001, as amended.

_____ _____
CITY ENGINEER DATE

WESTCREEK AT WOLF RANCH SUBDIVISION FILINGS 13 and 14
(Westcreek III at Wolf Ranch)

PURPOSE

The purpose of this report is to identify the existing and proposed runoff patterns and drainage facilities required for Westcreek at Wolf Ranch Filings 13 and 14 (Westcreek III at Wolf Ranch Development) consisting of approximately 32.8 acres of residential development. The proposed development will be platted into two filings, Westcreek at Wolf Ranch Subdivision Filings 13 and 14.

Westcreek III at Wolf Ranch is located approximately 1,500 feet south of Research Parkway and extends north and south along the west of Tributary 4 of Cottonwood Creek. (See Figure 1-Vicinity Map). Future Tutt Boulevard will be extended along the westerly boundary line of Westcreek III at Wolf Ranch.

SUMMARY OF DATA

The sources of information used in the development of this study are listed below:

1. City of Colorado Springs Drainage Criteria Manual, May, 2014.

2. Soil Survey for El Paso County, Colorado, U.S. Department of Agriculture, Soil Conservation Service, June 1980.

3. "Flood Insurance Studies for Colorado Springs and El Paso County, Colorado", prepared by the Federal Emergency Management Agency (FEMA), 1985.

4. "Cottonwood Creek Drainage Basin Planning Study" by URS Consultants, Inc., August 1995.

5. "Cottonwood Creek Prudent Line Study" by Ayres & Associates, 1996.

6. "Preliminary/Final Drainage Report for Power Boulevard (Research Parkway to Woodmen Road" by JR Engineering, July, 2000.

7. "Preliminary/Final Drainage Report for Research Parkway (Scarborough Drive to Powers Blvd.) including Research Parkway Subdivision Filing No. 6, by JR Engineering, April, 2000.

8. "Master Development Drainage Plan for Wolf Ranch, Colorado Springs, Colorado," prepared by Kiowa Engineering, 2013.

9. "Westcreek at Wolf Ranch Subdivision Master Development Drainage Report & Final Drainage Report for Westcreek at Wolf Ranch Subdivision Filings 1, 2, 3, 4 and 5" prepared by Rockwell Minchow Consultants, Inc., dated July, 2004.

GENERAL LOCATION AND DESCRIPTION

The Westcreek III at Wolf Ranch Development is located within the northeastern portion of the City of Colorado Springs, El Paso County, Colorado. (see Vicinity Map - Figure 1). The site is within a portion of the Southwest Quarter of Section 31, Township 12 South, Range 65 West of the 6th P.M., together with a portion of the Northwest Quarter of Section 6, Township 13 South, Ranch 65 West of the 6th P.M., City of Colorado Springs, El Paso County, Colorado.

The site is bound on the west by future Tutt Boulevard, on the south and east by Cottonwood Creek and Tributary 4 of Cottonwood Creek, and by existing residential development on the north by Westcreek at Wolf Ranch Subdivision Filing No. 12 and The Recreation Center at Wolf Ranch Subdivision Filing No. 1A.

Well-established native grasses exist throughout the proposed development. The topography generally slopes from northwest to southeast. Areas along the westerly boundary line of the Westcreek III at Wolf Ranch Development 3 slopes westerly. The development will be platted in two filings with Filing No. 13 consisting of 17.526 acres containing 53 lots and Filing No. 14 consists of 15.891 acres containing 54 lots.

SOILS

According to the Soil Survey of El Paso County Area, Colorado, prepared by the U.S. Department of Agriculture Soil Conservation Service, the soils underlying the Recreation Center fall under the Stapleton/Bernal Series (Soil 85) and the Blakeland Series (Soil 8). These soils are classified as Hydrologic Group "A" and "D" soils. Since bedrock is known to exist just below the surface Hydrologic Group "D" soils were used to determine runoff coefficients.

CLIMATE

This area of El Paso County can be described as the foothills, with total precipitation amounts typical of a semi-arid region. Winters are generally cold and dry, and summers relatively warm and dry. Precipitation ranges from 12 to 14 inches per year, with the majority of this moisture occurring in the spring and summer in the form of rainfall. Thunderstorms are common during the summer months.

FLOODPLAIN STATEMENT

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) #08041C0529 G dated December 7, 2018, no portion of the Westcreek III at Wolf Ranch development lies within a designated 100-year floodplain.

DRAINAGE CRITERIA

The current City of Colorado Springs Drainage Criteria was utilized in this report. Peak runoff quantities were determined using the Rational Method for both the 5 year and 100 year storms, as required for drainage basins less than 130 acres. The Urban Drainage and Flood Control criteria, including water quality and full spectrum detention pond spreadsheets, was also used in the preparation of this report.

FOUR STEP PROCESS TO MINIMIZE ADVERSE IMPACTS OF URBANIZATION

Step 1: West Creek III at Wolf Ranch will be developed to minimize directly connected impervious areas. This will be done by directing as much of the runoff generated from impervious areas as possible to landscape areas prior to reaching streets or storm sewers. To accomplish this, approximately 12.5 acres of Unconnected Impervious Area (UIA) will be routed through approximately 7.3 acres of Receiving Pervious Area (RPA) within this development.

Step 2: The runoff collected from this development will be captured and conveyed to a proposed Extended Detention Basin (EDB). The EDB will be utilized to provide water quality capture volume for this subdivison.

Step 3: The EDB will discharge directly into Cottonwood Creek. Grade control structures have recently been constructed along Tributary #4 to stabilize the channel. The City of Colorado Springs has recently completed the construction of a detention pond just east of Tutt Boulevard along Cottonwood Creek which will provide storm water detention and also help stabilize Cottonwood Creek.

Step 4: Site specific BMP's will be utilized during construction and up to stabilization of the site to minimize off-site contaminants and to protect the downstream receiving waters.

HISTORIC DRAINAGE BASIN DESCRIPTIONS

A brief description of the historic drainage for the site is provided in this section of the report. A summary of peak historic runoff for the historic basin(s) is depicted on the Historic Drainage Plan (Exhibit 1) provided in the appendix. The historic drainage area affecting this site is defined by five historic drainage basins.

Basin A consists of 1.66 acres at the northwest corner of the proposed Westcreek III at Wolf Ranch development. Runoff rates of 0.8 cubic feet per second (cfs) and 4.3 cfs are generated from this basin during the 5 and 100 year storms, respectively. These flows sheet flow to the southwest onto the adjacent property to the west of the Westcreek III at Wolf Ranch Development.

Basin B consists of 4.63 acres along the northeast side of the proposed project. Runoff rates of 2.1 cfs and 11.6 cfs are generated from this basin during the 5 and 100 year storms, respectively. Runoff from this basin sheet flow directly into Tributary #4.

Basin C is located along the westerly boundary line of the proposed project. This 4.35 acre basin generates runoff rates of Q_5= 1.8 cfs and Q_{100} = 9.8 cfs. Runoff from this basin sheet flow southerly and then westerly onto the adjacent property to the west.

The 20.55 acre Basin D, situated in the middle of the proposed development, generates runoff rates of 6.3 cfs during the 5 year storm and 35.5 cfs during the 100 year storm. Runoff from this basin flows from north to south and exits the site along the development's southeast boundary line. These flows are then conveyed to Tributary #4 via existing earthen swales.

Basin E consists of 3.20 acres at the southern tip of the proposed project. Runoff rates of Q_5= 1.4 cfs and Q_{100} = 7.9 cfs generated from this basin exit the site along the southerly property line and enter Cottonwood Creek.

DEVELOPED DRAINAGE BASIN

A brief description of each developed drainage basin for the site is provided in this section of the report. A summary of peak-developed runoff for the basins is depicted on the Developed Drainage Plan (Exhibit 2) provided in the appendix. All proposed drainage facilities are approximate in size and may vary with actual layout and design.

Within the single-family residential development, side lot line swales will be created on the downstream lots to convey flows from the upstream lots and into the street. Swales will be constructed by the homebuilders and maintained by the homeowner to limit concentrated flows and to disperse the flows as much as possible. Individual lot drainage is the responsibility of the lot owner/builder.

Basin 1 consists of 0.72 acres of the rear yards of single-family residential development in the northwest corner of the Westcreek III at Wolf Ranch development. This basin generates runoff rates of $Q_5 = 0.8$ cfs and $Q_{100} = 2.8$ cfs. These flows will sheet flow to the west and enter the adjacent property. These flows are less than the historic flows exiting this same location from historic Basin A.

Basin 2 consists of 2.17 acres of single-family residential development on the west side of Noreen Falls Drive located toward the northwest corner of the subdivision. The basin generates runoff rates of $Q_5 = 5.9$ cfs and $Q_{100} = 12.1$ cfs. These flows approach a proposed public 15' on-grade Type R inlet at the south end of Basin 2. This proposed 15' inlet will collect runoff rates of 5.9 cfs during the 5 year storm and 10.5 cfs during the 100 year storm. Flows of 1.6 cfs will bypass these inlet during the 100 year storm and enter Basin 6 as street flows. A proposed public 18" RCP will convey these collected flows southerly.

Basin 3 consists of 1.58 acres of single-family residential development along the eastern side of Noreen Falls Drive and around the Country Creek Drive cul-de-sac. The 1.58 acre basin generates runoff rates of $Q_5 = 4.5$ cfs and $Q_{100} = 8.9$ cfs. A proposed 15' public on-grade inlet will be installed at the south end of this basin. This inlet will collect flows of 4.5 cfs during the 5 year storm and 8.5 cfs during the 100 year storm. Flow rates of 0.4 cfs will bypass this inlet during the 100 year storm and enter Basin 4 as street flows.

Total runoff rates of 10.1 cfs during the 5 year storm and 20.2 cfs during the 100 year storm reach Design Point #1 from Basins 2 and 3. A proposed 24" reinforced concrete pipe (RCP) will convey these flows southerly within Noreen Falls Drive.

Basin 4 consists of 2.44 acres of single family residential development located east of Noreen Falls Drive along the Miller Run Drive cul-de-sac. The 2.44 acre basin generates runoff rates of $Q_5 = 7.0$ cfs and $Q_{10\,0} = 14.4$ cfs. Runoff from this basin will flow westerly within Millers Run Drive and along the east side of Noreen Falls Drive to a proposed public 15' on-grade inlet at the south end of Basin 4. Including bypass flows from upstream Basin 3 total flow rates of 7.0 cfs during the 5 year storm and 14.8 cfs during the 100 year storm will reach this inlet. This inlet will collect runoff rates of 6.5 cfs during the 5 year storm and 10.3 cfs during the 100 year storm. The flow rates of $Q_5 = 0.5$ cfs and $Q_{10\,0} = 4.5$ cfs bypassing this inlet will enter Basin 5 as street flows.

Total runoff rates of 17.2 cfs during the 5 year storm and 34.8 cfs during the 100 year storm reach Design Point #2 from Basins 2, 3 and 4. A proposed 24" reinforced concrete pipe (RCP) will convey these flows southerly within Noreen Falls Drive.

Basin 5 consists of 2.04 acres of single family residential development also located along the east side of Noreen Falls Drive along the Winings Fork Way cul-de-sac. This basin generates runoff rates of $Q_5 = 5.7$ cfs and $Q_{100} = 11.6$ cfs. These flows combine with the bypass flows from Basin 4 and are conveyed southerly within the east side of Noreen Falls Drive to a proposed 15' public on-grade Type R inlet. The accumulated street flows at the south end of Basin 5 are $Q_5 = 6.2$ cfs and $Q_{100} = 16.1$ cfs. The proposed 15' inlet will collect runoff rates of 6.2 cfs during the 5 year storm and 12.4 cfs during the 100 year storm, leaving flow rates of 3.7 cfs bypassing this inlet during the 100 year storm. These bypass flows will enter Basin 8 as street flows.

Basin 6 consists of 2.42 acres of single-family residential development along the west side of Noreen Falls Drive. This basin generates runoff rates of $Q_5 = 4.9$ cfs and $Q_{100} = 10.5$ cfs. As stated above, bypass flows of 1.6 cfs during the 100 year storm enters Basin 6 from upstream Basin 2 resulting in total street flows at the south end of Basin 6 of 4.9 cfs during the 5 year storm and 12.1 cfs during the 100 year storm. A proposed 15' public on-grade inlet at the south end of Basin 6 will collect runoff rates of 4.9 cfs during the 5 year storm and 10.5 cfs during the 100 year storms. Flow rates of 1.6 cfs during the 100 year storm will bypass this inlet at enter Basin 9 as street flows.

The total flow rates of 24.2 cfs during the 5 year storm and 49.5 cfs during the 100 year storm reach Design Point #3 from Basins 2, 3, 4, 5 and 6. A proposed 30" RCP will convey these flows southerly within Noleen Falls Drive.

Basin 7 consists of 0.84 acres of the east half of Tutt Boulevard from Williams Run Drive north approximately 800 feet. The basin generates runoff rates of $Q_5 = 3.3$ cfs and $Q_{100} = 6.0$ cfs which reach a proposed public 15' on-grade Type R inlet. This proposed inlet will collect these flows and the collected flows will be conveyed easterly within Williams Run Drive within a proposed public 18" RCP to the public storm sewer system within Noreen Falls Drive.

Total flow rates of 26.6 cfs during the 5 year storm and 54.1 cfs during the 100 year storm reach Design Point #4 from Basins 2 through 7. A proposed public 30" RCP will convey these flows southerly within Noreen Falls Drive.

Basin 8 consists of 2.12 acres of single-family residential development along the east side of Noreen Falls Drive along the Williams Run Drive cul-de-sac. This basin generates runoff rates of $Q_5 = 6.0$ cfs and $Q_{100} = 12.2$ cfs. These flows combine with the bypass flows from Basin 5 resulting in total street flows of $Q_5 = 6.0$ cfs and $Q_{100} = 15.9$ cfs reaching a proposed public 15' Type R on-grade inlet at the south end of Basin 8. This inlet will collect flows of 6.0 cfs and 12.3 cfs during the 5 and 100 year storms, respectively. Runoff rates of 3.6 cfs will bypass this inlet during the 100 year storm and enter Basin 10 as street flows.

Runoff rates of 30.9 cfs during the 5 year storm and 62.7 cfs during the 100 year storm reach Design Point #5 from Basins 2 through 8. These flows are piped southerly within a proposed 30" RCP.

Basin 9 consists of 1.59 acres of single-family residential development along the west side of Noreen Falls Drive. This basin generates runoff rates of $Q_5 = 4.3$ cfs and $Q_{100} = 8.8$ cfs that are conveyed southerly along the west side of Noreen Falls Drive. The bypass flows from Basin 6 combine with these flows resulting in total street flows of 4.3 cfs during the 5 year storm and 10.4 cfs during the 100 year storm reaching the south end of Basin 9.

A proposed public 15' on-grade Type R inlet will be installed at the south end of Basin 9. This inlet will collect runoff rates of 4.3 cfs during the 5 year storm and 9.5 cfs during the 100 year storm. The bypass flows of $Q_5 = 0.0$ cfs and $Q_{100} = 0.9$ cfs will enter Basin 18 as street flows.

Basin 10 comprises a short section of the east half of Noreen Falls Drive between Williams Run Drive and Yallaly River Drive consisting of 0.19 acres. This basin generates runoff rates of $Q_5 = 0.8$ cfs and $Q_{100} = 1.5$ cfs. These flows combine with the bypass flows from Basin 8 resulting in total street flows of 0.8 cfs during the 5 year storm and 5.1 cfs during the 100 year storm reaching the south end of Basin 10.

A proposed 10' on-grade public Type R inlet will be installed at the south end of this basin. This inlet collects runoff rates of $Q_5 = 0.8$ cfs and $Q_{100} = 4.7$ cfs with bypass flows of 0.4 cfs during the 100 year storms which will enter Basin 17 as street flows.

Total runoff rates of 34.8 cfs during the 5 year storm and 70.4 cfs during the 100 year storm generated from Basin 2 through 10 reach Design Point #6. A proposed 30" RCP will convey these flows southerly within Noreen Falls Drive.

Basin 11 consists of 1.22 acres of single-family residential development at the northeast corner of Yallaly River Drive and Noreen Falls Drive. This basin generates runoff rates of $Q_5 = 3.1$ cfs and $Q_{100} = 6.7$ cfs. These flows are routed easterly within the north side of Yallaly River Drive to a proposed public 15' Type R sump inlet along the north side of Yallaly River Drive. Additional flows generated from Basin 12 reach this same sump inlet.

Basin 12 consists of 1.72 acres of single family residential development located north of Yallaly River Drive. The basin generates runoff rates of $Q_5 = 3.8$ cfs and $Q_{100} = 8.2$ cfs. These flows will also be collected within the proposed 15' Type R sump inlet to be constructed on the north side of Yallaly River Drive. A proposed public 24" RCP will convey the total collect flow rates of $Q_5 = 6.9$ cfs and $Q_{100} = 14.9$ cfs generated and collected from Basins 11 and 12.

Basin 13 consists of 0.27 acres of single-family residential development along the south side of Yallaly River Drive. This basin generates runoff rates of $Q_5 = 0.8$ cfs and $Q_{100} = 1.7$ cfs. These flows, along with the flows from Basin 14 reach a proposed public 15' Type R sump inlet at the east end of Basin 13.

Basin 14 consists of an additional 0.93 acres of single-family residential development also south of Yallaly River Drive. This basin generates runoff rates of $Q_5 = 2.2$ cfs and $Q_{100} = 4.7$ cfs. The proposed public 15' Type R sump inlet will collect the combined flow rates of $Q_5 = 3.0$ cfs and $Q_{100} = 6.4$ cfs generated from Basin 13 and 14.

Total flow rates of 9.7 cfs during the 5 year storm and 20.7 cfs during the 100 year storm reach Design Point #7 from Basins 11 through 14. A proposed public 24" RCP will convey these flows southerly.

Basin 15 consists of 0.57 acres of single-family residential development between the Yallaly Drive and Wendy Stream Drive cul-de-sacs. The basin generates runoff rates of $Q_5 = 1.3$ cfs and $Q_{100} = 2.9$ cfs. These flows are directed to the proposed Wendy Stream Drive cul-de-sac to a proposed 15' public Type R sump inlet to be constructed within the Wendy Stream Drive cul-de-sac.

Basin 16 consists of 0.68 acres just east and northeast of the Wendy Stream Drive cul-de-sac. The basin generates runoff rates of $Q_5 = 1.5$ cfs and $Q_{100} = 3.4$ cfs. These flows are also directed to the proposed Wendy Stream Drive cul-de-sac and to the proposed public 15' Type R sump inlet. This inlet collects a total of 2.8 cfs and 6.3 cfs during the 5 year and 100 year storms, respectively.

Total runoff rates of $Q_5 = 12.2$ cfs and $Q_{100} = 26.4$ cfs reach Design Point #8 from Basins 11 through 16. A proposed 24" RCP will convey these flows southerly.

Basin 17 consists of 0.88 acres of single-family residential development along the east side of Noreen Falls Drive. This basin generates runoff rates of $Q = 2.6$ cfs and $Q_{100} = 5.1$ cfs. As stated above, 0.4 cfs enters this basin from upstream Basin 10 resulting in total flow rates of $Q_5 = 2.6$ cfs and $Q_{100} = 5.5$ cfs reaching the south end of Basin 17 where a proposed public 15' on-grade Type R inlet will be installed. This inlet will collect these flows and these flows will be piped southerly within a proposed 18" RCP.

Total flow rates of $Q = 14.8$ cfs and $Q_{100} = 31.4$ cfs reach Design Point #9 from Basins 11 through 17. A proposed 24" RCP will convey these flows southerly to Design Point #10. Total flows rates of 46.5 cfs during the 5 year storm and 95.4 cfs during the 100 year storm will reach Design Point #10 from Basins 2 through 17. A proposed 42" RCP will convey these flows southwesterly within Noreen Falls Drive.

Basin 18 consists of 1.92 acres of single-family residential development along the west side of Noreen Falls Drive. Runoff rates of $Q_5 = 4.3$ cfs and $Q_{100} = 9.3$ cfs are generated from this basin. These flows combine with the bypass flows from Basin 9. Total street flows of 4.3 cfs during the 5 year storm and 10.2 cfs during the 100 year storm reach the south end of Basin 18. A proposed 15' public on-grade Type R inlet will be installed at the south end of Basin 18.

This inlet collects flows of $Q_5 = 4.3$ cfs and $Q_{100} = 9.4$ cfs. Flow rates of 0.8 cfs during the 100 year storm bypass this inlet and enter Basin 19 as street flows. A proposed 18" RCP conveys these flows to the 42" RCP in Noreen Falls Drive at Design Point #11.

The total tributary flows reaching Design Point #11 are $Q = 49.9$ cfs and $Q_{100} = 102.9$ cfs. These flows are conveyed southwesterly within Noreen Drive within the proposed 42" RCP.

Basin 19 consists of 0.76 acres of single-family residential development at the northeast corner of Noreen Falls Drive and Tutt Boulevard. Basin 19 generates runoff rates of $Q_5 = 1.9$ cfs and $Q_{100} = 4.0$ cfs. These flows along with the bypass flows from Basins 18 and 20 reach a proposed public Type R 15' sump inlet along the north side of Noreen Falls Drive just east of Tutt Boulevard. This inlet collects a total of 1.9 cfs and 5.3 cfs during the 5 and 100 year storms, respectively. These flows are conveyed to the proposed 42" RCP within a public 18" RCP.

Basin 20 consists of 1.58 acres of the east half of Tutt Boulevard and generates runoff rates of $Q_5 = 4.8$ cfs and $Q_{100} = 9.2$ cfs. These flows reach a proposed 15' public on-grade Type R inlet as the south end of Basin 20. This inlet collects runoff rates of 4.8 cfs during the 5 year storm and 8.7 cfs during the 100 year storm. The bypass flows of 0.5 cfs during the 100 year storm enter Basin 19 as street flow, as stated above. A proposed public 18" RCP will convey these collected flows to the proposed 15' public Type R on-grade inlet to be installed at the south end of Basin 21.

Total runoff rates of 50.9 cfs during the 5 year storm and 105.0 cfs during the 100 year storm reach Design Point #12.

Basin 21 consists of 1.02 acres of single-family residential development along the south side of Noreen Falls Drive. The basin generates runoff rates of $Q_5 = 2.1$ cfs and $Q_{100} = 4.7$ cfs. These flows reach a proposed 15' public Type R on-grade inlet located along the east side of Tutt Boulevard. This inlet collects the flows generated from Basin 21.

Combined flows of 6.9 cfs and 13.9 cfs are generated from Basins 20 and 21 during the 5 and 100 year storms, respectively (Design Point #13). A proposed 24" RCP will convey the collected flows from Basins 20 and 21 to the proposed public 42" RCP conveying flows southerly.

Design Point #14 is located at the entry point into the proposed detention basin located at the south end of the project. Total runoff rates of $Q_5 = 56.5$ cfs and $Q_{100} = 116.2$ cfs generated from Basins 2 through 21 reach Design Point #14.

Basin 22 consists of 0.57 acres of street and streetscape along the east side of Tutt Boulevard south of Noreen Falls Drive. The basin generates runoff rates of $Q_5 = 1.7$ cfs and $Q_{100} = 3.5$ cfs. These flows were accounted for in the "Tutt Boulevard Road Extension North of Cowpoke Road Final Drainage Report."

These flows will be collected within existing inlets which were installed as part of the City of Colorado Springs Tutt Boulevard Extension Roadway project. These flows are directed to the existing detention pond constructed as part of the Tutt Boulevard City project.

Basin 23 consists of 2.21 acres encompassing the portions of the rear lot area of the single family residential lots along the easterly property lines of Westcreek at Wolf Ranch Filing No. 14. This basin generate runoff rates of $Q_5 = 5.4$ cfs and $Q_{100} = 12.1$ cfs. The flows sheet flows across open space and then enter Tribytary #4 as sheet flows.

Basin 24 consists of 2.05 acres of rear lots of single-family residential development located just east of the Wining's Fork way cul-de-sac. This basin generates runoff rates of $Q_5 = 4.8$ cfs and $Q_{100} = 10.7$ cfs. These flows drain to the east discharging into Tributary #4 as sheet flow across backyards and native open space.

Basin 25 consists of 0.88 acres of single-family residential development along the easterly boundary line of the Westcreek III at Wolf Ranch development, between the Wendy Stream Drive cul-de-sac and the Yallaly River Drive cul-de-sac. Runoff rates of $Q_5 = 1.7$ cfs and $Q_{100} = 4.1$ cfs generated from this basin also sheet flow across landscaped area and then into Tributary #4.

Basin 26 is also located along the easterly boundary line of Westcreek III at Wolf Ranch. This 0.65 acre basin generates runoff rates of $Q_5 = 1.4$ cfs and $Q_{100} = 3.2$ cfs which sheet flow across landscaped areas and into Tributary #4.

Basin 27 comprises the proposed water quality pond to be constructed at the south end of the Westcreek III at Wolf Ranch Development. This 0.81 acre basin generates runoff rates of 0.9 cfs during the 5 year storm and 3.4 cfs during the 100 year storm. These flows enter directly into the proposed pond.

WATER QUALITY

A private Extended Detention Basin (EDB) will be utilized to provide Water Quality Capture volume for the Westcreek III at Wolf Ranch development. The pond will be constructed at the southern end of the Westcreek Filing No. 13. The required water quality capture volume for this site is 0.671 acre-feet. The EDB will not provide Full Spectrum Detention, since that will be provided in the existing downstream detention facility.

The proposed on-site area draining to the EDB consists of approximately 28.32 acres of which approximately 20.4 acres are impervious, resulting in 72.0% of on-site impervious area. A proposed 35' wide emergency spillway from the pond is being proposed. In the event the emergency spillway is reached, the flows will overtop into Cottonwood Creek to the east of the project.

A proposed downstream detention pond has recently been completed by the City just east of Tutt Boulevard along Cottonwood Creek. This pond will be designed to provide detention (FSD) for the Westcreek III at Wolf Ranch development and for additional areas to the east. Water quality calculations are provided in the Appendix of this report.

HYDRAULIC PIPE DESIGN

Pipe flows for the 5 year and 100 year storms and preliminary pipe sizes are provided in Table A in the appendix of this report. More detailed Hydraulic Grade Line (HGL) calculations will be submitted with the storm sewer construction documents as an addendum to this report along with the final storm sewer construction documents.

EROSION CONTROL

Erosion control measures will be installed per the approved grading/erosion control plans.

DRAINAGE, BRIDGE AND POND FEES

The Westcreek III at Wolf Ranch Development is within the Cottonwood Creek Drainage Basin. The 2020 Drainage, Bridge and Pond Fees are listed below.

Westcreek at Wolf Ranch Filing No. 13 Drainage Fee

	Area	$/Acre	Total Fee
Cash Portion	17.526	$ 752.00	$ 13,179.55
BRIDGE FEES	17.526	$ 1,175.00	$ 20,593.05
			$ 33,772.60

Westcreek at Wolf Ranch Filing No. 14 Drainage Fee

	Area	$/Acre	Total Fee
Cash Portion	15.891	$ 752.00	$ 11,950.03
BRIDGE FEES	15.891	$ 1,175.00	$ 18,671.93
			$ 30,621.96

DRAINAGE FACILTIES (Public Non Reimbursable)

The following drainage facilities will be required for Westcreek Filings 13 and 14. All these facilities are public non-reimbursable drainage facilities. Drainage facilities within these filings are all part of the overall Wolf Ranch Drainage system presented in the Wolf Ranch Master Development Drainage Plan.

Westcreek at Wolf Ranch Filing No. 13 (Public/Non-Reimbursable)

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
42" RCP	552	L.F.	$ 160.00	$ 88,320.00
36" RCP	0	L.F.	$ 135.00	$ 0.00
30" RCP	999	L.F.	$ 95.00	$ 94,905.00
24" RCP	723	L.F.	$ 80.00	$ 57,840.00
18" RCP	589	L.F.	$ 65.00	$ 38,285.00
10' Type R Inlet	1	Ea.	$ 8,000.00	$ 8,000.00
15' Type R Inlets	14	Ea.	$ 10,000.00	$130,000.00
Type I MH	3	Ea.	$ 9,500.00	$ 28,500.00
Type II MH	8	Ea.	$ 6,000.00	$ 48,000.00
			Sub-Total	$493,850.00
10% Eng. and Contingency				$ 49,385.00
			Grand Total	$ 543,235.00

Westcreek at Wolf Ranch Filing No. 14 (Public/Non-Reimbursable)

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
42" RCP	0	L.F.	$ 160.00	$ 0.00
36" RCP	0	L.F.	$ 135.00	$ 0.00
30" RCP	0	L.F.	$ 95.00	$ 0.00
24" RCP	495	L.F.	$ 80.00	$ 39,600.00
18" RCP	129	L.F.	$ 65.00	$ 8,385.00
15' Type R Inlets	3	Ea.	$ 10,000.00	$ 30,000.00
Type I MH	0	Ea.	$ 9,500.00	$ 0.00
Type II MH	2	Ea.	$ 6,000.00	$ 12,000.00
			Sub-Total	$ 89,985.00
10% Eng. and Contingency				$ 8,998.50
			Grand Total	$ 98,983.50

Westcreek at Wolf Ranch Filing No. 13 and 14 (Private/Non-Reimbursable) Pond Facilities

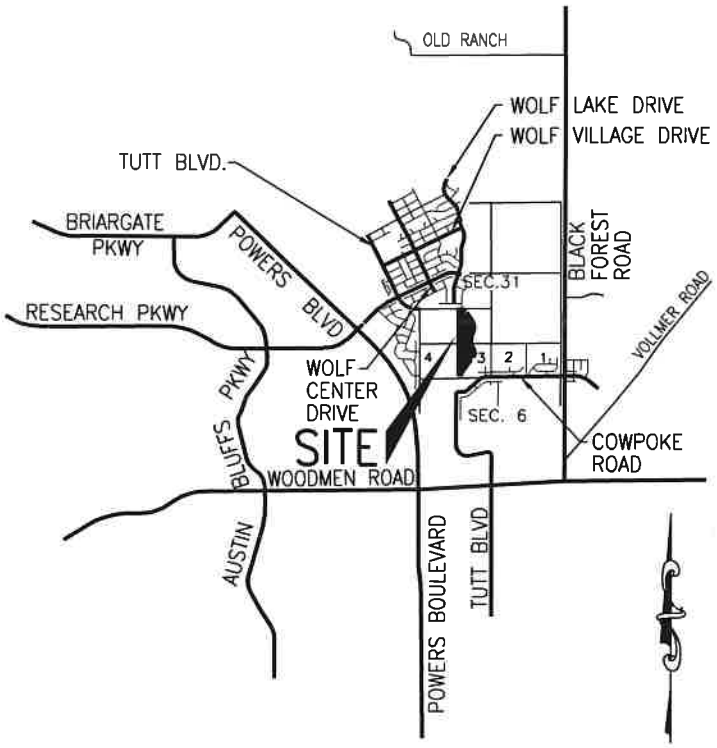
ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
Pond/Structures	1	Ea.	$ 55,000.00	$ 55,000.00
			Sub-Total	$ 55,000.00
10% Eng. and Contingency				$ 5,500.00
			Grand Total	$60,500.00

CONCLUSION

Runoff generated from Westcreek III at Wolf Ranch Development will be collected within streets, inlets and drainage pipes and conveyed to a proposed water quality pond and/or directly to Tributary #4. The conveyance of these flows to the various detention/water quality basins and Tributary #4 is consistent with the overall Wolf Ranch Master Plan and Master Development Drainage Plan and with the Cottonwood Creek Drainage Basin Planning Study. The site runoff and storm drains and appurtenances will not adversely affect the downstream and surrounding developments in properly installed and maintained.

APPENDIX

APPENDIX



Vicinity Map

NOT TO SCALE

FIGURE 1

JOB NO. 17-025

FILE: 17025fp.DWG
DATE: 5/16/17

ROCKWELL CONSULTING, Inc.
ENGINEERING • SURVEYING
1955 N. UNION BLVD., SUITE 200
COLORADO SPRINGS, CO 80909
(719) 475-2575 • FAX (719) 475-9223

Map Scale: 1:4,160 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

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—Sep 23, 2018

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	30.1	90.0%
85	Stapleton-Bernal sandy loams, 3 to 20 percent slopes	3.3	10.0%
Totals for Area of Interest		**33.5**	**100.0%**

TABLE 16.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. See "flooding" in Glossary for definition of terms as "rare," "brief," and "very brief." The symbol > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Hardness	
					In		
Alamosa: 1	C	Frequent	Brief	May-Jun	>60	---	High.
Ascalon: 2, 3	B	None	---	---	>60	---	Moderate.
Badland: 4	D	---	---	---	---	---	---
Bijou: 5, 6, 7	B	None	---	---	>60	---	Low.
Blakeland: 8	A	None	---	---	>60	---	Low.
[1]9: Blakeland part	A	None	---	---	>60	---	Low.
Fluvaquentic Haplaquolls part	D	Common	Very brief	Mar-Aug	>60	---	High.
Blendon: 10	B	None	---	---	>60	---	Moderate.
Bresser: 11, 12, 13	B	None	---	---	>60	---	Low.
Brussett: 14, 15	B	None	---	---	>60	---	Moderate.
Chaseville: 16, 17	A	None	---	---	>60	---	Low.
[1]18: Chaseville part	A	None	---	---	>60	---	Low.
Midway part	D	None	---	---	10-20	Rippable	Moderate.
Columbine: 19	A	None to rare	---	---	>60	---	Low.
Connerton: [1]20: Connerton part	B	None	---	---	>60	---	High.
Rock outcrop part	D	---	---	---	---	---	---
Cruckton: 21	B	None	---	---	>60	---	Moderate.
Cushman: 22, 23	C	None	---	---	20-40	Rippable	Moderate.
[1]24: Cushman part	C	None	---	---	20-40	Rippable	Moderate.
Kutch part	C	None	---	---	20-40	Rippable	Moderate.
Elbeth: 25, 26	B	None	---	---	>60	---	Moderate.
[1]27: Elbeth part	B	None	---	---	>60	---	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Hardness	
					In		
Razor:							
[1]75:							
Razor part-----	C	None----------	---	---	20-40	Rippable	Moderate.
Midway part----	D	None----------	---	---	10-20	Rippable	Moderate.
Rizozo:							
[1]76:							
Rizozo part----	D	None----------	---	---	4-20	Hard	Low.
Neville part---	B	None----------	---	---	>60	---	High.
Rock outcrop:							
[1]77:							
Rock outcrop part----------	D	---	---	---	---	---	---
Coldcreek part-	B	None----------	---	---	40-60	Rippable	Moderate.
Tolman part----	D	None----------	---	---	10-20	Hard	Moderate.
Sampson:							
78----------	B	None----------	---	---	>60	---	Moderate.
Satanta:							
79, 80----------	B	None----------	---	---	>60	---	Moderate.
[1]81:							
Satanta part---	B	None----------	---	---	>60	---	Moderate.
Neville part---	B	None----------	---	---	>60	---	High.
Schamber:							
[1]82:							
Schamber part--	A	None----------	---	---	>60	---	Moderate.
Razor part-----	C	None----------	---	---	20-40	Rippable	Moderate.
Stapleton:							
83, 84----------	B	None----------	---	---	>60	---	Moderate.
[1]85:							
Stapleton part-	B	None----------	---	---	>60	---	Moderate.
Bernal part----	D	None----------	---	---	8-20	Hard	Moderate.
Stoneham:							
86, 87----------	B	None----------	---	---	>60	---	Moderate.
Stroupe:							
[1]88:							
Stroupe part---	C	None----------	---	---	20-40	Hard	Moderate.
Travessilla part----------	D	None----------	---	---	6-20	Hard	Low.
Rock outcrop part----------	D	---	---	---	---	---	---
Tassel:							
89----------	D	None----------	---	---	10-20	Rippable	Low.
Terry:							
90----------	B	None----------	---	---	20-40	Rippable	Moderate.
[1]91:							
Terry part-----	B	None----------	---	---	20-40	Rippable	Moderate.
Razor part-----	C	None----------	---	---	20-40	Rippable	Moderate.

See footnote at end of table.

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

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

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

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

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

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

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

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

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

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, and Anderson Consulting Engineers, Inc. These data are current as of 2008.

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

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

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

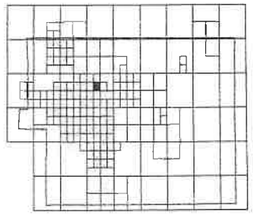
Contact FEMA Map Service Center (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map.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

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

El Paso County Vertical Datum Offset Table

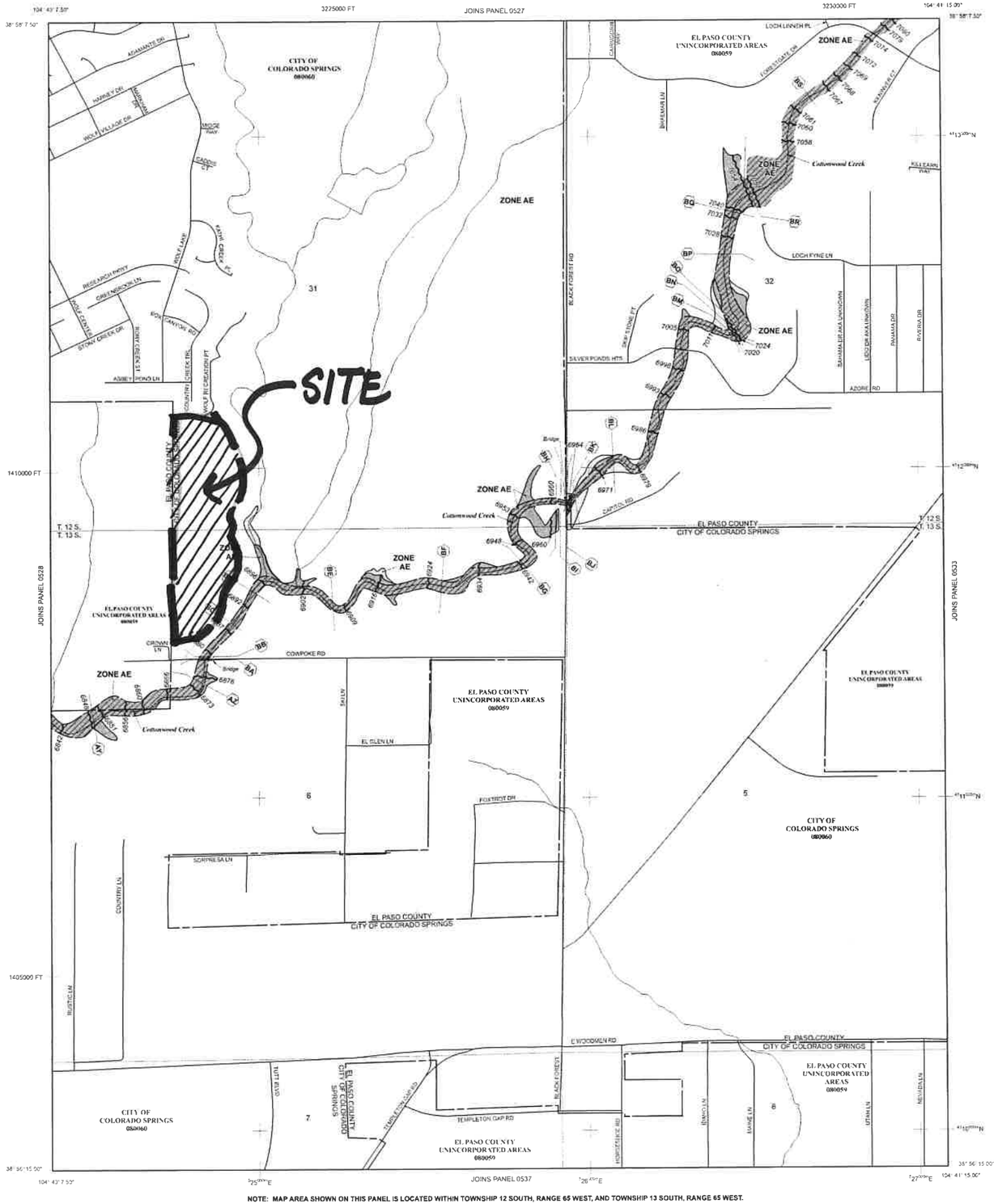
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 2.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



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

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



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 12 SOUTH, RANGE 65 WEST, AND TOWNSHIP 13 SOUTH, RANGE 65 WEST.

LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

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

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

- (A)—(A) Cross section line
- 23—23 Transect line
- 87° 07' 30.00" 32° 22' 30.00" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN 1000-meter Universal Transverse Mercator grid ticks, zone 13
- 6000000 FT 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0501), Lambert Conformal Conic Projection
- DX5510 X Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

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

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

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

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

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

PANEL 0529G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 529 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0529	G
EL PASO COUNTY	080059	0529	G

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

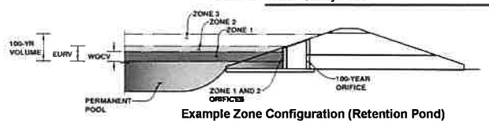
MAP NUMBER 08041C0529G

MAP REVISED DECEMBER 7, 2018

Federal Emergency Management Agency

Detention Basin Outlet Structure Design

Project: Westcreek at Wolf Ranch Filing No. 13 and 14
Basin ID: Water Quality Pond



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	4.49	0.671	Orifice Plate
Zone 2 (User)			Not Utilized
Zone 3			Not Utilized
		0.671	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 Diameter =	N/A	inches

Calculated Parameters for Underdrain

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

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

Invert of Lowest Orifice =	0.00	ft (relative to bottom of basin at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	4.49	ft (relative to bottom of basin at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	24.00	inches
Orifice Plate: Orifice Area per Row =	3.25	sq. inches (diameter = 2 inches)

Calculated Parameters for Plate

WQ Orifice Area per Row =	2.257E-02	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	2.00	4.00					
Orifice Area (sq. inches)	3.25	3.25	3.25					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to bottom of basin at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to bottom of basin at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

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

	Not Selected	Not Selected	
Overflow Weir Front Edge Height, Ho =	4.49	N/A	ft (relative to bottom of basin at Stage = 0 ft)
Overflow Weir Front Edge Length =	2.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	2.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area / total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Not Selected	Not Selected	
Height of Grate Upper Edge, H_t =	4.49	N/A	feet
Over Flow Weir Slope Length =	2.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	0.29	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	2.80	N/A	ft^2
Overflow Grate Open Area with Debris =	1.40	N/A	ft^2

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

	Not Selected	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	0.00	ft (distance below bottom of basin at Stage = 0 ft)
Circular Orifice Diameter =	42.00	42.00	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Not Selected	Not Selected	
Outlet Orifice Area =	9.62	9.62	ft^2
Outlet Orifice Centroid =	1.75	1.75	feet
Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	5.50	ft (relative to bottom of basin at Stage = 0 ft)
Spillway Crest Length =	35.00	feet
Spillway End Slopes =	3.00	H:V
Freeboard above Max Water Surface =	0.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.96	feet
Stage at Top of Freeboard =	6.46	feet
Basin Area at Top of Freeboard =	0.26	acres

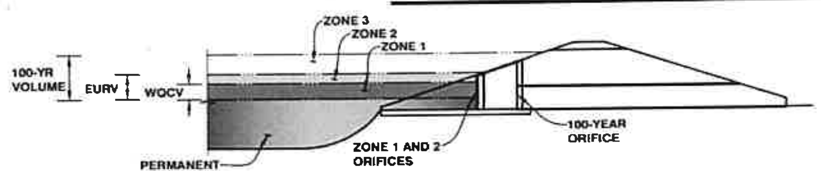
Routed Hydrograph Results

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.50	0.00
Calculated Runoff Volume (acre-ft) =	0.671	1.986	1.976	2.736	3.366	4.110	4.759	5.477	0.000
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.670	1.986	1.976	2.735	3.366	4.110	4.758	5.468	#N/A
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.27	0.45	0.86	1.09	1.37	1.91
Predevelopment Peak Q (cfs) =	0.0	0.0	0.4	7.6	12.8	24.4	30.9	38.9	54.2
Peak Inflow Q (cfs) =	12.9	38.1	37.9	52.6	64.9	79.4	92.1	105.9	#N/A
Peak Outflow Q (cfs) =	0.3	18.4	18.1	36.4	48.9	48.9	48.9	48.9	#N/A
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	4.8	3.8	2.0	1.6	1.3	#N/A
Structure Controlling Flow =	Plate	Spillway	Spillway	Spillway	N/A	N/A	N/A	N/A	#N/A
Max Velocity through Grate 1 (fps) =	N/A	3.14	3.14	3.4	3.5	3.5	3.5	3.5	#N/A
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	#N/A
Time to Drain 97% of Inflow Volume (hours) =	40	46	46	46	46	45	45	45	#N/A
Time to Drain 99% of Inflow Volume (hours) =	40	46	46	46	46	46	46	46	#N/A
Maximum Ponding Depth (ft) =	3.58	5.69	5.69	5.89	6.00	6.00	6.00	6.00	#N/A
Area at Maximum Ponding Depth (acres) =	0.19	0.25	0.25	0.26	0.26	0.26	0.26	0.26	#N/A
Maximum Volume Stored (acre-ft) =	0.487	0.949	0.947	0.998	1.029	1.029	1.029	1.029	#N/A

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

Project: Westcreek at Wolf Ranch Filing 13 and 14

Basin ID: Water Quality Pond



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	28.32	acres
Watershed Length =	2,300	ft
Watershed Slope =	0.033	ft/ft
Watershed Imperviousness =	72.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	
Water Quality Capture Volume (WQCV) =	0.671	acre-feet
Excess Urban Runoff Volume (EURV) =	1.986	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.976	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	2.736	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	3.366	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	4.110	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	4.759	acre-feet
100-yr Runoff Volume (P1 = 2.5 in.) =	5.477	acre-feet
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet
Approximate 2-yr Detention Volume =	1.876	acre-feet
Approximate 5-yr Detention Volume =	2.387	acre-feet
Approximate 10-yr Detention Volume =	2.564	acre-feet
Approximate 25-yr Detention Volume =	2.694	acre-feet
Approximate 50-yr Detention Volume =	2.976	acre-feet
Approximate 100-yr Detention Volume =	3.351	acre-feet

Optional User Input 1-hr Precipitation

1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.50	inches
	inches

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.671	acre-feet
Zone 2 Volume (User Defined - Zone 1) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.671	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	

Total detention volume is less than 100-year volume.

Depth Increment = 0.5 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)
Micropool	--	0.00	--	--	--	30	0.001		
90	--	0.50	--	--	--	4,644	0.107	1,122	0.026
91	--	1.00	--	--	--	5,479	0.126	3,644	0.084
92	--	2.00	--	--	--	6,527	0.150	9,637	0.221
93	--	3.00	--	--	--	7,504	0.172	16,718	0.384
94	--	4.00	--	--	--	8,742	0.201	24,841	0.570
95	--	5.00	--	--	--	9,884	0.227	34,154	0.784
96	--	6.00	--	--	--	11,495	0.264	44,843	1.029
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				

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

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	10-Year Event	1.75	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.50	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: Kent Rockwell
Company: Rockwell Consulting
Date: October 26, 2020
Project: Westcreek III at Wolf Ranch
Location:

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	Trib to Pond	Perimeter
Receiving Pervious Area Soil Type	Sandy Clay Loam	Sandy Clay Loam
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	28.330	6.510
Directly Connected Impervious Area (DCIA, acres)	11.990	0.000
Unconnected Impervious Area (UIA, acres)	8.370	4.190
Receiving Pervious Area (RPA, acres)	5.050	2.320
Separate Pervious Area (SPA, acres)	2.920	0.000
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C	C

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	28.330	6.510
Directly Connected Impervious Area (DCIA, %)	42.3%	0.0%
Unconnected Impervious Area (UIA, %)	29.5%	64.4%
Receiving Pervious Area (RPA, %)	17.8%	35.6%
Separate Pervious Area (SPA, %)	10.3%	0.0%
A_R (RPA / UIA)	0.603	0.554
I_a Check	0.620	0.640
f / I for WQCV Event:	0.6	0.6
f / I for 10-Year Event:	0.2	0.2
f / I for 100-Year Event:	0.2	0.2
f / I for Optional User Defined Storm CUHP:		
IRF for WQCV Event:	0.90	0.90
IRF for 10-Year Event:	0.96	0.97
IRF for 100-Year Event:	0.98	0.99
IRF for Optional User Defined Storm CUHP:		
Total Site Imperviousness: I_{total}	71.9%	64.4%
Effective Imperviousness for WQCV Event:	68.8%	57.9%
Effective Imperviousness for 10-Year Event:	70.8%	62.2%
Effective Imperviousness for 100-Year Event:	71.4%	63.5%
Effective Imperviousness for Optional User Defined Storm CUHP:		

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	5.0%	8.9%	N/A
10-Year Event CREDIT**: Reduce Detention By:	1.5%	3.5%	N/A
100-Year Event CREDIT**: Reduce Detention By:	0.6%	1.2%	N/A
User Defined CUHP CREDIT: Reduce Detention By:			

Total Site Imperviousness:	**70.5%**
Total Site Effective Imperviousness for WQCV Event:	**66.7%**
Total Site Effective Imperviousness for 10-Year Event:	**69.2%**
Total Site Effective Imperviousness for 100-Year Event:	**69.9%**
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

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: A
AREA: 1.66
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/4 Ac Residential	0	0.49	0.65	0.00%
Streets	0	0.90	0.96	0.00%
Open Space	1.66	0.15	0.50	100.00%
	0	0.00	0.00	0.00%
	1.66			100%

COMPOSITE: C5= 0.15 C100= 0.50

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	300	3.5%		19.65
Swale	0	3.0%	1.2	0.00
Tc Total:				19.65

Intensity, I (inches/hr)

I5	**I100**
3.1 in/hr	5.2 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
0.8 cfs	4.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: B
AREA: 4.63
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/4 Ac Residential	0	0.49	0.65	0.00%
Streets	0	0.90	0.96	0.00%
Open Space	4.63	0.15	0.50	100.00%
	0	0.00	0.00	0.00%
	4.63			100%

COMPOSITE: C5= 0.15 C100= 0.50

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	300	5.7%		16.73
Swale	400	4.0%	1.4	4.76
Tc Total:				21.49

Intensity, I (inches/hr)

I5	**I100**
3.0 in/hr	5.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
2.1 cfs	11.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: C
AREA: 4.35
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/4 Ac Residential	0	0.49	0.65	0.00%
Streets	0	0.90	0.96	0.00%
Open Space	4.35	0.15	0.50	100.00%
	0	0.00	0.00	0.00%
	4.35			100%

COMPOSITE: C5= 0.15 C100= 0.50

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	300	4.0%		18.80
Swale	650	4.5%	1.5	7.30
Tc Total:				26.10

Intensity, I (inches/hr)

I5	**I100**
2.7 in/hr	4.5 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.8 cfs	9.8 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: D
AREA: 20.55
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/4 Ac Residential	0	0.49	0.65	0.00%
Streets	0	0.90	0.96	0.00%
Open Space	20.55	0.15	0.50	100.00%
	0	0.00	0.00	0.00%
	20.55			100%

COMPOSITE: C5= 0.15 C100= 0.50

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	300	3.3%		20.03
Swale	1700	4.2%	1.4	19.75
Tc Total:				39.78

Intensity, I (inches/hr)

I5	**I100**
2.1 in/hr	3.5 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
6.3 cfs	35.5 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: E
AREA: 3.20
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/4 Ac Residential	0	0.49	0.65	0.00%
Streets	0	0.90	0.96	0.00%
Open Space	3.20	0.15	0.50	100.00%
	0	0.00	0.00	0.00%
	3.20			100%

COMPOSITE: C5= 0.15 C100= 0.50

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	300	4.7%		17.83
Swale	300	2.7%	1.2	4.35
Tc Total:				22.17

Intensity, I (inches/hr)

I5	**I100**
2.9 in/hr	4.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.4 cfs	7.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 1
AREA: 0.72
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Landscaping/Yard	0.57	0.15	0.50	79.17%
Building/Paving	0.15	0.90	0.96	20.83%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	0.72			100%

COMPOSITE: C5= 0.31 C100= 0.60

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	3.0%		11.94
Lot Drainage	20	3.3%	1.3	0.26
Tc Total:				12.20

Intensity, I (inches/hr)

I5	**I100**
3.8 in/hr	6.4 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
0.8 cfs	2.8 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 2
AREA: 2.17
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Ac Residential	1.56	0.49	0.65	71.89%
Streets	0.61	0.90	0.96	28.11%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	2.17			100%

COMPOSITE: C5= 0.61 C100= 0.74

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	50	8.0%		6.11
Street	400	4.0%	4.0	1.67
Tc Total:				7.77

Intensity, I (inches/hr)

I5	**I100**
4.5 in/hr	7.6 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
5.9 cfs	12.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 3
AREA: 1.58
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.85	0.49	0.65	53.80%
Streets	0.73	0.90	0.96	46.20%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	1.58			100%

COMPOSITE: C5= 0.68 C100= 0.79

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	30	3.0%		6.54
Street	670	3.8%	3.9	2.86
Tc Total:				9.40

Intensity, I (inches/hr)

I5	**I100**
4.2 in/hr	7.1 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
4.5 cfs	8.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 4
AREA: 2.44
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	1.81	0.49	0.65	74.18%
Streets	0.63	0.90	0.96	25.82%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	2.44			100%

COMPOSITE: C5= 0.60 C100= 0.73

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	16.0%		4.41
Lot Drainage	140	3.0%	2.6	0.90
Street	180	2.2%	3.0	1.01
Tc Total:				6.32

Intensity, I (inches/hr)

I5	**I100**
4.8 in/hr	8.1 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
7.0 cfs	14.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 5
AREA: 2.04
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	1.42	0.49	0.65	69.61%
Streets	0.62	0.90	0.96	30.39%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	2.04			100%

COMPOSITE: C5= 0.61 C100= 0.74

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	8.0%		5.55
Lot Drainage	100	3.0%	2.6	0.64
Street	250	2.4%	3.1	1.34
Tc Total:				7.53

Intensity, I (inches/hr)

I5	**I100**
4.6 in/hr	7.6 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
5.7 cfs	11.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 6
AREA: 2.42
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	2.08	0.49	0.65	85.95%
Streets	0.34	0.90	0.96	14.05%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	2.42			100%

COMPOSITE: C5= 0.55 C100= 0.69

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	5.0%		10.08
Street	500	2.0%	2.8	2.95
Tc Total:				13.03

Intensity, I (inches/hr)

I5	**I100**
3.7 in/hr	6.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
4.9 cfs	10.5 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 7
AREA: 0.84
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.04	0.49	0.65	4.76%
Streets	0.74	0.90	0.96	88.10%
Open Space	0.06	0.15	0.50	7.14%
	0	0.00	0.00	0.00%
	0.84			100%

COMPOSITE: C5= 0.83 C100= 0.91

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	10	3.0%		3.77
Street	750	4.0%	4.0	3.13
Tc Total:				6.90

I5	**I100**
4.7 in/hr	7.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
3.3 cfs	6.0 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 8
AREA: 2.12
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	1.50	0.49	0.65	70.75%
Streets	0.62	0.90	0.96	29.25%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	2.12			100%

COMPOSITE: C5= 0.61 C100= 0.74

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	8.0%		5.55
Lot Drainage	120	3.0%	2.6	0.77
Street	175	3.0%	3.5	0.84
Tc Total:				7.16

Intensity, I (inches/hr)

I5	**I100**
4.6 in/hr	7.8 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
6.0 cfs	12.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 9
AREA: 1.59
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	1.07	0.49	0.65	67.30%
Streets	0.52	0.90	0.96	32.70%
Open Space	0.00	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	1.59			100%

COMPOSITE: C5= 0.62 C100= 0.75

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	4.0%		6.97
Street	360	3.6%	3.8	1.58
Tc Total:				8.55

Intensity, I (inches/hr)

I5	**I100**
4.4 in/hr	7.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
4.3 cfs	8.8 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 10
AREA: 0.19
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.03	0.49	0.65	15.79%
Streets	0.16	0.90	0.96	84.21%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	0.19			100%

COMPOSITE: C5= 0.84 C100= 0.91

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	20	2.0%		3.92
Lot Drainage	0	3.0%	2.6	0.00
Street	360	3.6%	3.8	1.58
Tc Total:				5.50

Intensity, I (inches/hr)

I5	**I100**
5.0 in/hr	8.4 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
0.8 cfs	1.5 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 11
AREA: 1.22
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	1.08	0.49	0.65	88.52%
Streets	0.14	0.90	0.96	11.48%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	1.22			100%

COMPOSITE: C5= 0.54 C100= 0.69

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	12.0%		4.85
Lot Drainage	180	4.5%	3.2	0.94
Street	120	3.0%	3.5	0.58
Tc Total:				6.37

Intensity, I (inches/hr)

I5	**I100**
4.8 in/hr	8.1 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
3.1 cfs	6.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 12
AREA: 1.72
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	1.59	0.49	0.65	92.44%
Streets	0.13	0.90	0.96	7.56%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	1.72			100%

COMPOSITE: C5= 0.52 C100= 0.67

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	3.0%		7.66
Lot Drainage	180	4.5%	3.2	0.94
Street	120	1.5%	2.4	0.82
Tc Total:				9.42

Intensity, I (inches/hr)

I5	**I100**
4.2 in/hr	7.1 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
3.8 cfs	8.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 13
AREA: 0.27
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.17	0.49	0.65	62.96%
Streets	0.10	0.90	0.96	37.04%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	0.27			100%

COMPOSITE: C5= 0.64 C100= 0.76

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	50	3.0%		5.42
Street	150	3.0%	3.5	0.72
Tc Total:				6.14

Intensity, I (inches/hr)

I5	**I100**
4.9 in/hr	8.2 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
0.8 cfs	1.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 14
AREA: 0.93
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.79	0.49	0.65	84.95%
Streets	0.14	0.90	0.96	15.05%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	0.93			100%

COMPOSITE: C5= 0.55 C100= 0.70

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	3.0%		7.66
Street	160	1.5%	2.4	1.09
Tc Total:				8.75

Intensity, I (inches/hr)

I5	**I100**
4.3 in/hr	7.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
2.2 cfs	4.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 15
AREA: 0.57
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.35	0.49	0.65	61.40%
Streets	0.13	0.90	0.96	22.81%
Open Space	0.09	0.15	0.50	15.79%
	0	0.00	0.00	0.00%
	0.57			100%

COMPOSITE: C5= 0.53 C100= 0.70

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	4.0%		6.97
Swale	100	2.0%	2.1	0.79
Street	90	2.0%	2.8	0.53
Tc Total:				8.29

Intensity, I (inches/hr)

I5	**I100**
4.4 in/hr	7.4 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.3 cfs	2.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 16
AREA: 0.68
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.49	0.49	0.65	72.06%
Streets	0.1	0.90	0.96	14.71%
Open Space	0.09	0.15	0.50	13.24%
	0	0.00	0.00	0.00%
	0.68			100%

COMPOSITE: C5= 0.51 C100= 0.68

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	4.0%		6.97
Swale	100	2.0%	2.1	0.79
Street	90	2.0%	2.8	0.53
Tc Total:				8.29

Intensity, I (inches/hr)

I5	**I100**
4.4 in/hr	7.4 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.5 cfs	3.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 17
AREA: 0.88
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.47	0.49	0.65	53.41%
Streets	0.41	0.90	0.96	46.59%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	0.88			100%

COMPOSITE: C5= 0.68 C100= 0.79

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	30	3.0%		6.54
Street	440	2.8%	3.3	2.19
Tc Total:				8.73

Intensity, I (inches/hr)

I5	**I100**
4.3 in/hr	7.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
2.6 cfs	5.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 18
AREA: 1.92
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	1.47	0.49	0.65	76.56%
Streets	0.31	0.90	0.96	16.15%
Open Space	0.14	0.15	0.50	7.29%
	0	0.00	0.00	0.00%
	1.92			100%

COMPOSITE: C5= 0.53 C100= 0.69

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	4.0%		6.97
Street	440	2.0%	2.8	2.59
Tc Total:				9.56

Intensity, I (inches/hr)

I5	**I100**
4.2 in/hr	7.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
4.3 cfs	9.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 19
AREA: 0.76
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.65	0.49	0.65	85.53%
Streets	0.11	0.90	0.96	14.47%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	0.76			100%

COMPOSITE: C5= 0.55 C100= 0.69

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	3.6%		7.22
Street	120	1.5%	2.4	0.82
Tc Total:				8.03

Intensity, I (inches/hr)

I5	**I100**
4.5 in/hr	7.5 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.9 cfs	4.0 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 20
AREA: 1.58
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.19	0.49	0.65	12.03%
Streets	1.18	0.90	0.96	74.68%
Open Space	0.21	0.15	0.50	13.29%
	0	0.00	0.00	0.00%
	1.58			100%

COMPOSITE: C5= 0.75 C100= 0.86

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	30	3.0%		6.54
Street	880	3.3%	3.6	4.04
Tc Total:				10.57

Intensity, I (inches/hr)

I5	**I100**
4.0 in/hr	6.8 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
4.8 cfs	9.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 21
AREA: 1.02
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.67	0.49	0.65	65.69%
Streets	0.20	0.90	0.96	19.61%
Open Space	0.15	0.15	0.50	14.71%
	0	0.00	0.00	0.00%
	1.02			100%

COMPOSITE: C5= 0.52 C100= 0.69

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	60	3.0%		9.25
Street	220	1.5%	2.4	1.50
Tc Total:				10.74

Intensity, I (inches/hr)

I5	**I100**
4.0 in/hr	6.8 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
2.1 cfs	4.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 22
AREA: 0.57
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.00	0.49	0.65	0.00%
Streets	0.41	0.90	0.96	71.93%
Open Space	0.16	0.15	0.50	28.07%
	0	0.00	0.00	0.00%
	0.57			100%

COMPOSITE: C5= 0.69 C100= 0.83

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	30	3.0%		6.54
Street	320	3.0%	3.5	1.54
Tc Total:				8.08

Intensity, I (inches/hr)

I5	**I100**
4.4 in/hr	7.5 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.7 cfs	3.5 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 23
AREA: 2.21
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	2.21	0.49	0.65	100.00%
Streets	0	0.90	0.96	0.00%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	2.21			100%

COMPOSITE: C5= 0.49 C100= 0.65

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	10.0%		5.15
Lot Drainage	100	10.0%	4.7	0.35
Tc Total:				5.50

Intensity, I (inches/hr)

I5	**I100**
5.0 in/hr	8.4 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
5.4 cfs	12.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 24
AREA: 2.05
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	2.05	0.49	0.65	100.00%
Streets	0	0.90	0.96	0.00%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	2.05			100%

COMPOSITE: C5= 0.49 C100= 0.65

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	10.0%		5.15
Lot Drainage	220	3.0%	2.6	1.41
Street	0	2.0%	2.8	0.00
Tc Total:				6.56

Intensity, I (inches/hr)

I5	**I100**
4.8 in/hr	8.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
4.8 cfs	10.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 25
AREA: 0.88
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.73	0.49	0.65	82.95%
Streets	0	0.90	0.96	0.00%
Open Space	0.15	0.15	0.50	17.05%
	0	0.00	0.00	0.00%
	0.88			100%

COMPOSITE: C5= 0.43 C100= 0.62

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	3.0%		7.66
Lot Drainage	70	4.0%	4.0	0.29
Street	0	4.0%	4.0	0.00
Tc Total:				7.96

Intensity, I (inches/hr)

I5	**I100**
4.5 in/hr	7.5 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.7 cfs	4.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 26
AREA: 0.65
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.65	0.49	0.65	100.00%
Streets	0	0.90	0.96	0.00%
Open Space	0	0.15	0.50	0.00%
	0	0.00	0.00	0.00%
	0.65			100%

COMPOSITE: C5= 0.49 C100= 0.65

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	3.0%		7.66
Lot Drainage	0	3.0%	3.5	0.00
Street	0	3.8%	3.9	0.00
Tc Total:				7.66

Intensity, I (inches/hr)

I5	**I100**
4.5 in/hr	7.6 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.4 cfs	3.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: 27
AREA: 0.81
SOIL TYPE: D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
1/8 Acre Residential Lots	0.22	0.49	0.65	27.16%
Streets	0	0.90	0.96	0.00%
Open Space	0.59	0.15	0.50	72.84%
	0	0.00	0.00	0.00%
	0.81			100%

COMPOSITE: C5= 0.24 C100= 0.54

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	80	10.0%		7.18
Tc Total:				7.18

Intensity, I (inches/hr)

I5	**I100**
4.6 in/hr	7.8 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
0.9 cfs	3.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: DP #1
AREA: 3.75
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
				0.00%
				0.00%
Basin 2	2.17	0.61	0.74	57.87%
Basin 3	1.58	0.68	0.79	42.13%
	0.00	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	3.75			100%

COMPOSITE: C5= 0.64 C100= 0.76

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	30	3%		6.54
Street	670	4%	3.9	2.86
Tc Total:				9.40

Intensity, I (inches/hr)

I5	**I100**
4.2 in/hr	7.1 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
10.1 cfs	20.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: DP #2
AREA: 6.19
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Point #1	3.75	0.64	0.76	60.58%
Basin 4	2.44	0.60	0.73	39.42%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
				0.00%
	6.19			100%

COMPOSITE: C5= 0.62 C100= 0.75

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	50	8.0%		6.11
Street	400	4.0%	4.0	1.67
Pipe	150	2.0%	12	0.21
Tc Total:				7.98

Intensity, I (inches/hr)

I5	**I100**
4.5 in/hr	7.5 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
17.2 cfs	34.8 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: DP #3
AREA: 10.65
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Point #2	6.19	0.62	0.75	58.12%
Basin 5	2.04	0.61	0.74	19.15%
Baisn 6	2.42	0.55	0.69	22.72%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	10.65			100%

COMPOSITE: C5= 0.60 C100= 0.74

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	5.0%		10.08
Street	500	2.4%	3.1	2.69
Pipe	0	3.0%	12	0.00
Tc Total:				12.77

Intensity, I (inches/hr)

I5	**I100**
3.8 in/hr	6.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
24.2 cfs	49.5 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: DP #4
AREA: 11.49
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Point #3	10.65	0.60	0.74	92.69%
Basin 7	0.84	0.83	0.91	7.31%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
				0.00%
	11.49			100%

COMPOSITE: C5= 0.62 C100= 0.75

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	5.0%		10.08
Street	500	2.4%	3.1	2.69
Pipe	100	3.0%	12	0.14
Tc Total:				12.91

Intensity, I (inches/hr)

I5	**I100**
3.7 in/hr	6.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
26.6 cfs	54.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: DP #5
AREA: 13.61
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Point #4	11.49	0.62	0.75	84.42%
Basin 8	2.12	0.61	0.74	15.58%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	13.61			100%

COMPOSITE: C5= 0.62 C100= 0.75

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	5.0%		10.08
Street	500	2.4%	3.1	2.69
Pipe	550	3.0%	12	0.76
Tc Total:				13.54

Intensity, I (inches/hr)

I5	**I100**
3.7 in/hr	6.2 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
30.9 cfs	62.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: DP #6
AREA: 15.39
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Point #5	13.61	0.62	0.75	88.43%
Basin 9	1.59	0.62	0.75	10.33%
Basin 10	0.19	0.84	0.91	1.23%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	15.39			100%

COMPOSITE: C5= 0.62 C100= 0.75

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	5.0%		10.08
Street	500	2.4%	3.1	2.69
Pipe	800	3.0%	12	1.11
Tc Total:				13.89

Intensity, I (inches/hr)

I5	**I100**
3.6 in/hr	6.1 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
34.8 cfs	70.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: DP #7
AREA: 4.14
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Basin 11	1.22	0.54	0.69	29.47%
Basin 12	1.72	0.52	0.67	41.55%
Basin 13	0.27	0.64	0.76	6.52%
Basin 14	0.93	0.55	0.70	22.46%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	4.14			100%

COMPOSITE: C5= 0.54 C100= 0.69

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	3.0%		7.66
Street	160	1.5%	2.4	1.09
Tc Total:				8.75

Intensity, I (inches/hr)

I5	**I100**
4.3 in/hr	7.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
9.7 cfs	20.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: DP #8
AREA: 5.39
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Point #7	4.14	0.54	0.69	76.81%
Basin 15	0.57	0.53	0.70	10.58%
Basin 16	0.68	0.51	0.68	12.62%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	5.39			100%

COMPOSITE: C5= 0.53 C100= 0.69

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	3.0%		7.66
Street	160	1.5%	2.4	1.09
Pipe	320	2.0%	11.0	0.48
Tc Total:				9.24

Intensity, I (inches/hr)

I5	**I100**
4.2 in/hr	7.1 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
12.2 cfs	26.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: DP #9
AREA: 6.27
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Point #8	5.39	0.53	0.69	85.96%
Basin 17	0.88	0.68	0.79	14.04%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	6.27			100%
COMPOSITE:	C5=	0.56	C100=	0.70

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	3.0%		7.66
Street	160	1.5%	2.4	1.09
Pipe	320	2.0%	11.0	0.48
Tc Total:				9.24

Intensity, I (inches/hr)

I5	**I100**
4.2 in/hr	7.1 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
14.8 cfs	31.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: DP #10
AREA: 21.66
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Point #6	15.39	0.62	0.75	71.05%
Design Point #9	6.27	0.56	0.70	28.95%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	21.66			100%

COMPOSITE: C5= 0.60 C100= 0.74

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	5.0%		10.08
Street	500	2.4%	3.1	2.69
Pipe	1300	3.0%	12	1.81
Tc Total:				14.58

Intensity, I (inches/hr)

I5	**I100**
3.6 in/hr	6.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
46.5 cfs	95.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: DP #11
AREA: 23.58
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Point #10	21.66	0.60	0.74	91.86%
Basin 18	1.92	0.53	0.69	8.14%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	23.58			100%

COMPOSITE: C5= 0.60 C100= 0.73

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	5.0%		10.08
Street	500	2.4%	3.1	2.69
Pipe	1400	3.0%	12	1.94
Tc Total:				14.72

Intensity, I (inches/hr)

I5	**I100**
3.5 in/hr	6.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
49.9 cfs	102.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: DP #12
AREA: 24.34
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Point #11	23.58	0.60	0.73	96.88%
Basin 19	0.76	0.55	0.69	3.12%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	24.34			100%

COMPOSITE: C5= 0.59 C100= 0.73

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	5.0%		10.08
Street	500	2.4%	3.1	2.69
Pipe	1650	3.0%	12	2.29
Tc Total:				15.07

Intensity, I (inches/hr)

I5	**I100**
3.5 in/hr	5.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
50.9 cfs	105.0 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: DP #13
AREA: 2.60
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Basin 20	1.58	0.75	0.86	60.77%
Basin 21	1.02	0.52	0.69	39.23%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.60			100%
COMPOSITE:	C5=	0.66	C100=	0.79

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	60	3.0%		9.25
Street	220	1.5%	2.4	1.50
Tc Total:				10.74

Intensity, I (inches/hr)

I5	**I100**
4.0 in/hr	6.8 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
6.9 cfs	13.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek III at Wolf Ranch

BASIN: DP #14
AREA: 26.94
SOIL TYPE: B

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Point #12	24.34	0.59	0.73	90.35%
Design Point #13	2.60	0.66	0.79	9.65%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	26.94			100%

COMPOSITE: C5= 0.60 C100= 0.74

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)
Overland	100	5.0%		10.08
Street	500	2.4%	3.1	2.69
Pipe	1850	3.0%	12	2.57
Tc Total:				15.34

Intensity, I (inches/hr)

I5	**I100**
3.5 in/hr	5.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
56.5 cfs	116.2 cfs

TABLE A
Westcrrek III at Wolf Ranch
October, 2020
Manning's Pipe Flows

Pipe No.	Slope	PIPE SIZE (Inches)	Q5	5 YEAR STORM FLOW DEPTH (Ft)	5 YEAR STORM VELOCITY (fps)	Q100	100 YEAR STORM FLOW DEPTH (Ft)	100 YEAR STORM VELOCITY (fps)
1	1.5%	18"	5.9	0.72	7.00	10.5	1.03	8.11
2	1.5%	18"	4.5	0.62	6.49	8.5	0.89	7.77
3	2.0%	24"	10.1	0.78	8.98	20.2	1.15	10.76
4	1.5%	18"	6.5	0.76	7.23	10.3	1.02	8.04
5	3.0%	24"	17.2	0.93	11.95	34.8	1.47	14.02
6	1.5%	18"	6.2	0.74	7.11	12.4	1.19	8.24
7	1.5%	18"	4.9	0.65	6.65	10.5	1.03	8.11
8	3.0%	30"	24.2	1.01	12.97	49.5	1.54	15.60
9	1.5%	18"	3.3	0.52	6.06	6.0	0.72	7.11
10	3.0%	30"	26.6	1.06	13.39	54.1	1.64	15.82
11	1.5%	18"	6.0	0.72	7.11	12.3	1.18	8.23
12	3.0%	30"	30.9	1.15	13.93	62.7	1.83	16.27
13	1.5%	18"	4.3	0.60	6.61	9.5	0.96	7.95
14	1.5%	18"	0.8	0.26	3.89	4.7	0.63	6.62
15	3.0%	30"	34.8	1.24	14.28	70.4	2.03	16.49
16	1.5%	24"	6.9	0.68	7.26	14.9	1.05	8.87
17	2.0%	24"	9.7	0.76	8.83	20.7	1.17	10.81
18	2.0%	24"	9.7	0.76	8.83	20.7	1.17	10.81
19	2.0%	24"	12.2	0.86	9.38	26.4	1.39	11.30
20	1.5%	18"	2.6	0.46	5.64	5.5	0.69	6.89
21	2.0%	24"	14.8	0.96	9.87	31.4	1.61	11.57
22	1.5%	42"	46.5	1.49	11.85	95.4	2.31	14.12
23	1.5%	18"	4.3	0.60	6.51	9.4	0.95	7.94
24	1.5%	42"	49.9	1.55	12.07	102.9	2.44	14.33
25	1.5%	18"	1.9	0.39	5.14	5.3	0.68	6.78
26	1.5%	18"	4.8	0.64	6.66	8.7	0.91	7.72
27	2.5%	42"	50.9	0.36	14.63	105.0	2.08	17.54
28	2.0%	24"	6.9	0.63	8.08	13.9	0.92	9.79
29	2.5%	42"	56.5	1.44	15.09	116.2	2.22	18.02

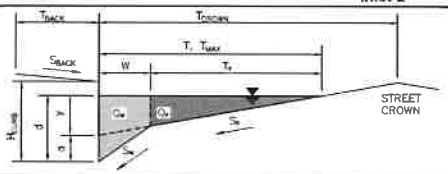
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 2



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	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} =	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.040	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} =	10.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

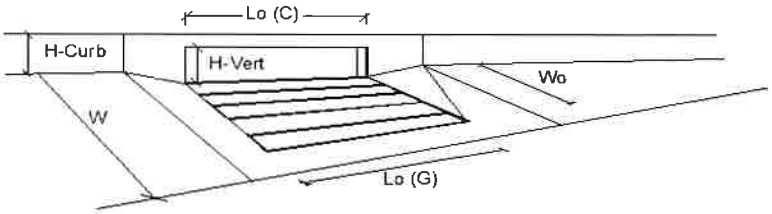
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	6.2	21.7	cfs

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)		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 =	15.00	15.00	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 =**	**5.9**	**10.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**87**	**%**

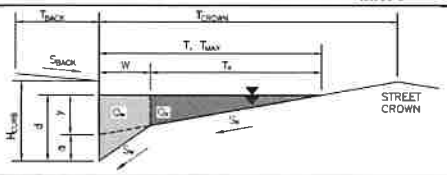
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 3



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	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} =	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.040	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} =	10.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

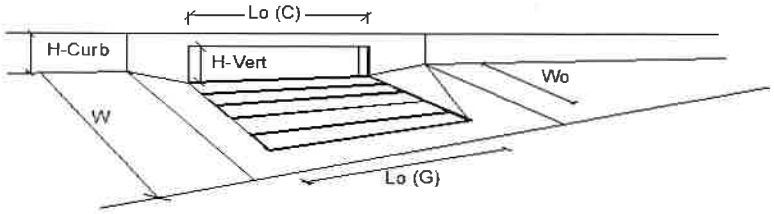
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	6.2	21.7	cfs

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)		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 =	15.00	15.00	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 =**	**4.5**	**8.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.4**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**96**	**%**

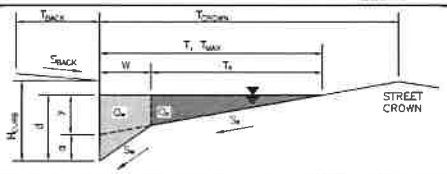
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 4



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	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} =	8.00	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	13.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)				check = yes

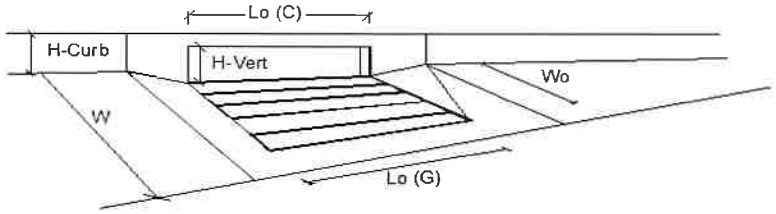
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	8.0	15.4	cfs

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)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	1.0	1.0	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 =	15.00	15.00	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 =**	**6.5**	**10.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.5**	**4.5**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**94**	**70**	**%**

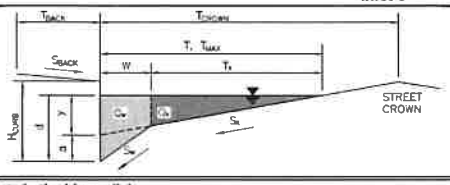
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 5



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	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} =	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.030	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} =	11.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

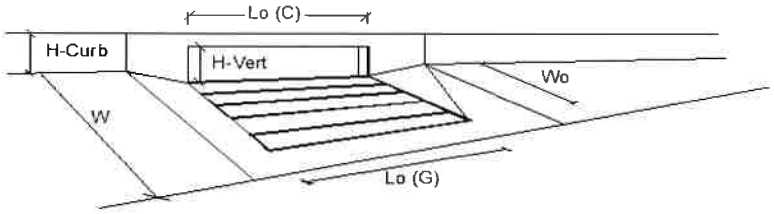
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	6.7	18.8	cfs

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)		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 =	15.00	15.00	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 =**	**6.2**	**12.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**3.7**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**77**	**%**

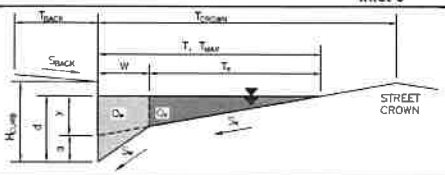
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

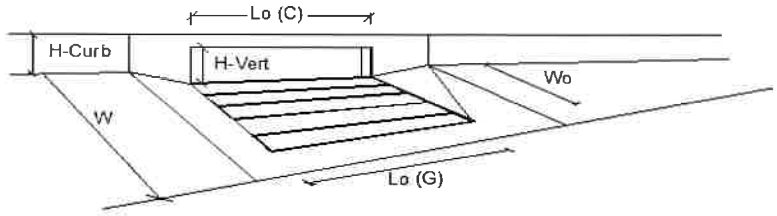
Inlet ID: Inlet 6



Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		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} =	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 =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.033		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} =	10.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	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 Spread Criterion	Q_{allow} =	5.7	19.7	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)		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 =	15.00	15.00	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 =**	**4.9**	**10.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**87**	**%**

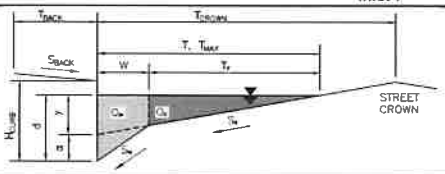
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 7



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	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} =	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.030	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} =	11.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

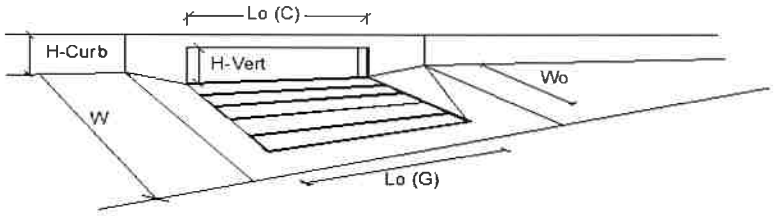
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	6.7	18.8	cfs

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)		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 =	15.00	15.00	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 =**	**3.3**	**6.0**	**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**	**%**

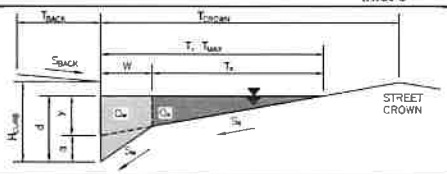
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 8



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	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} =	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.030	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} =	10.5	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

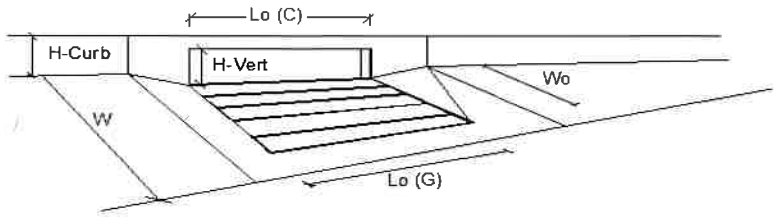
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**6.0**	**18.8**	**cfs**

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)		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 =	15.00	15.00	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 =**	**6.0**	**12.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**3.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**78**	**%**

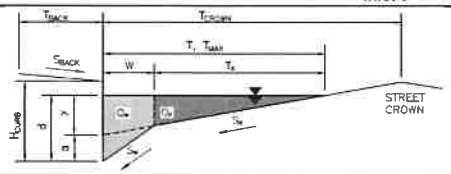
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 9



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	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} =	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.2	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

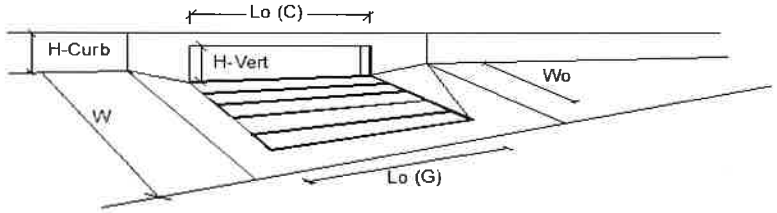
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	4.6	15.4	cfs

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)		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 =	15.00	15.00	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 =**	**4.3**	**9.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.9**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**91**	**%**

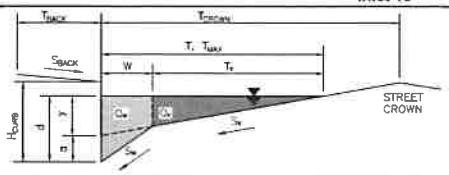
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 10



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	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} =	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 =	0.083	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} =	10.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

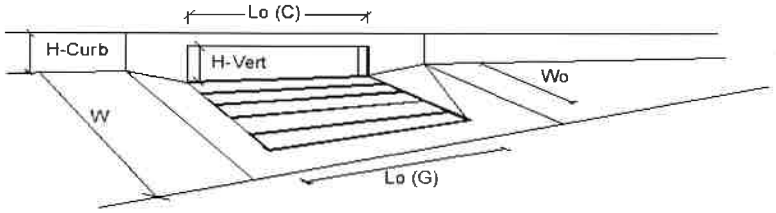
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	3.8	13.3	cfs

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)		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 =**	**0.6**	**4.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.4**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**93**	**%**

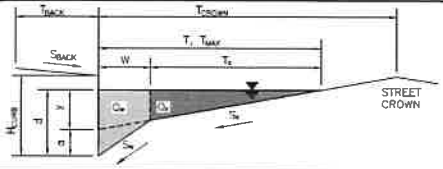
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 11-12



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	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} =	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_o =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

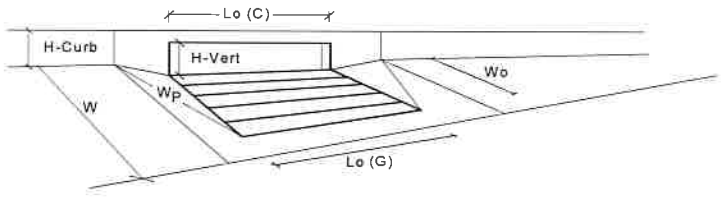
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches

Check boxes are not applicable in SUMP conditions

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.3	7.1	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.28	0.42	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.50	0.67	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.74	0.85	
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 =	6.9	14.9	cfs
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	6.9	14.9	cfs

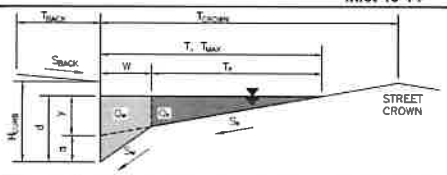
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 13-14



Gutter Geometry (Enter data in the blue cells)

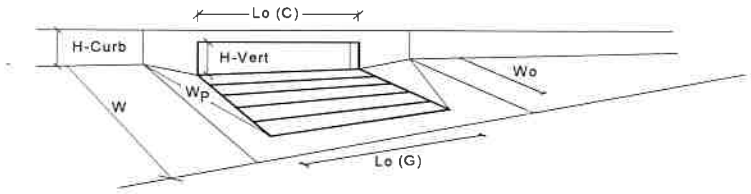
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.2	5.5	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	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} =	0.19	0.29	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.40	0.52	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.81	0.90	
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 =**	**3.0**	**6.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.0	6.4	cfs

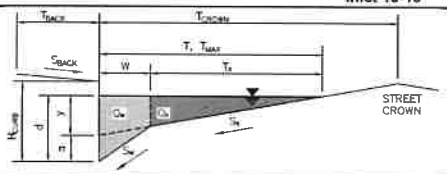
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 15-16



Gutter Geometry (Enter data in the blue cells)

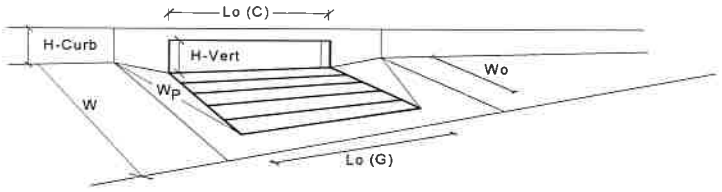
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.2	5.4	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} =	0.18	0.29	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.39	0.51	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.80	0.90	
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 =	2.8	6.3	cfs
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.8	6.3	cfs

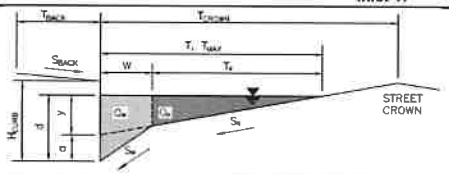
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 17



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	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} =	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_o =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

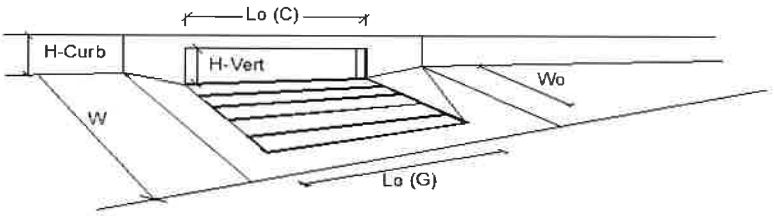
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	4.4	9.6	cfs

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)		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 =	15.00	15.00	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 =**	**2.6**	**5.5**	**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**	**%**

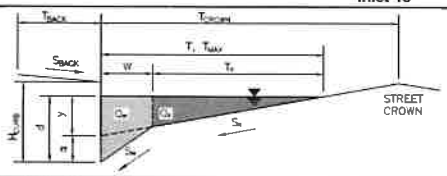
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 18



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	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} =	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

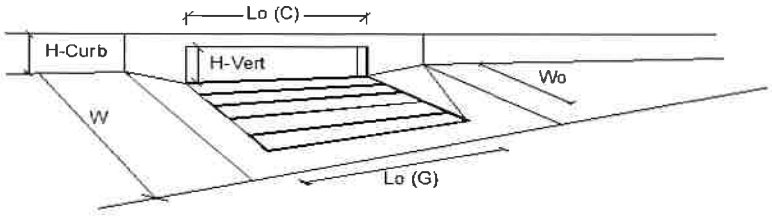
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	4.4	15.4	cfs

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)		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 =	15.00	15.00	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 =**	**4.3**	**9.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.8**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**92**	**%**

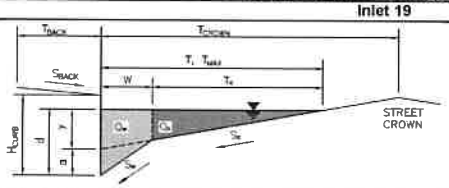
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 19



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	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} =	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

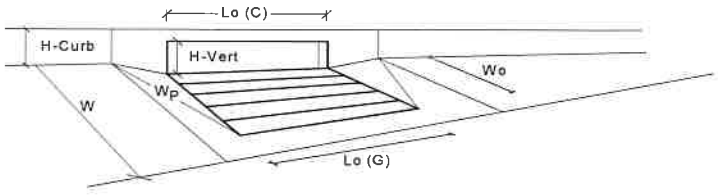
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches

Check boxes are not applicable in SUMP conditions

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	3.7	5.1	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} =	0.15	0.26	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.35	0.48	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.88	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	1.9	5.3	cfs
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.9	5.3	cfs

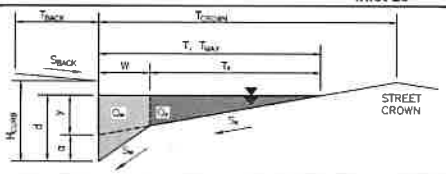
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 20



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	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} =	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.4	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

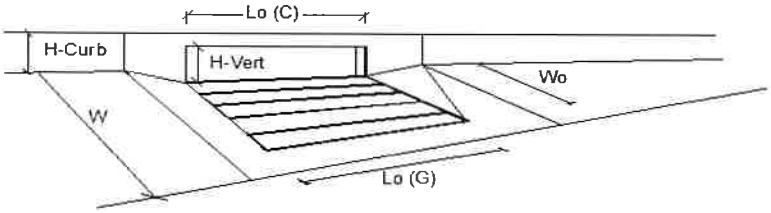
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	4.8	15.4	cfs

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)		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 =	15.00	15.00	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**	**8.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.5**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**95**	**%**

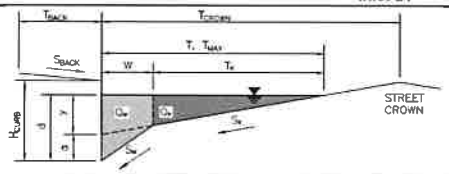
Version 4.05 Released March 2017

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

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

Project: Westcreek Phase 3 (Filings 13 and 14)

Inlet ID: Inlet 21



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	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} =	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

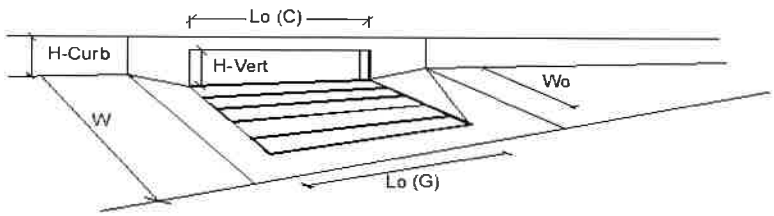
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	4.4	15.4	cfs

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

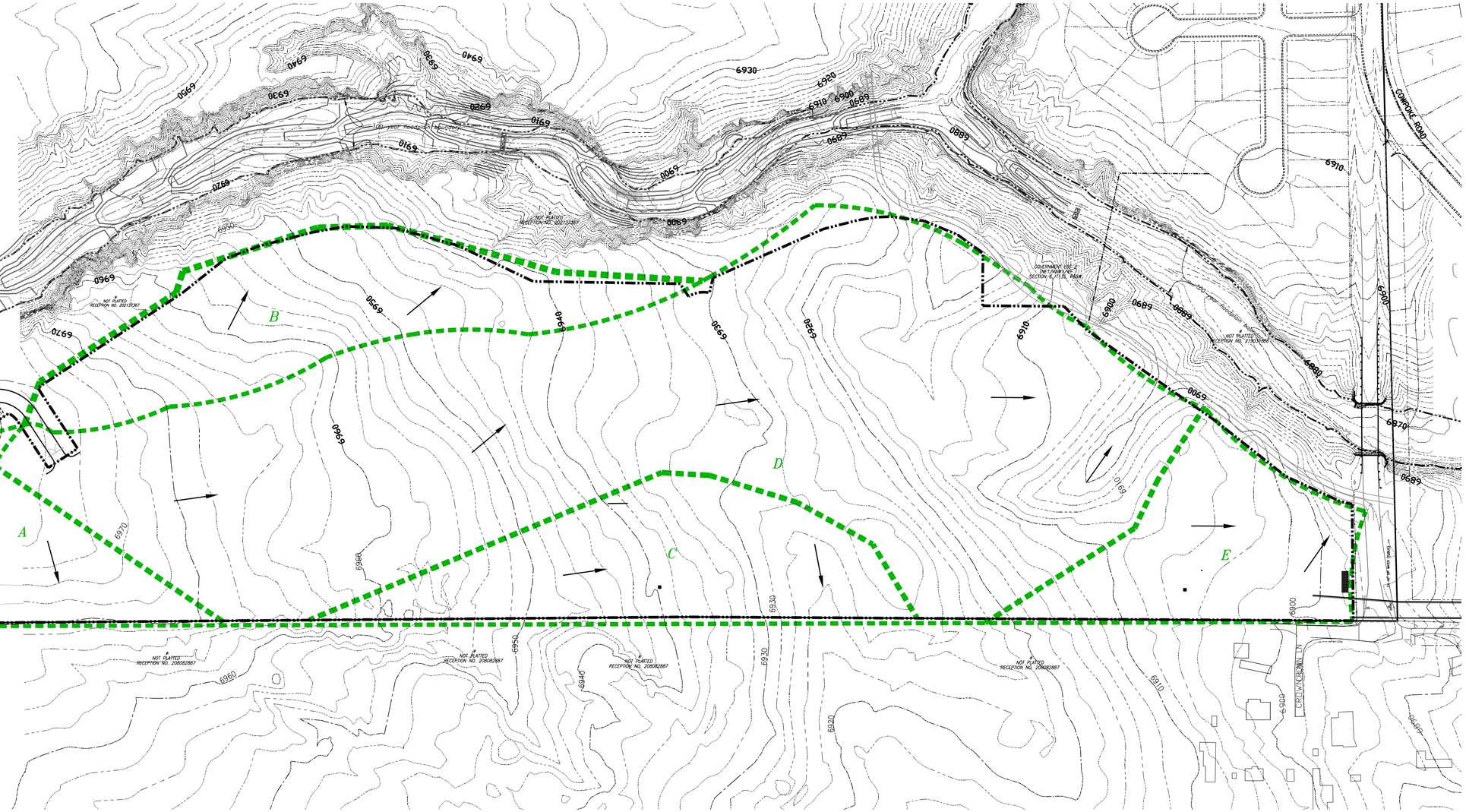
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

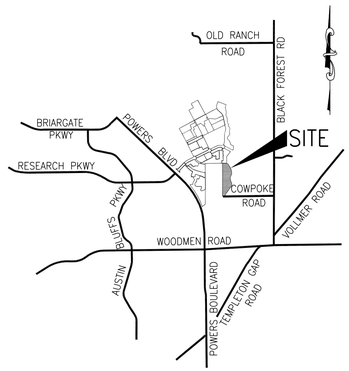
INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		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 =	15.00	15.00	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 =**	**2.1**	**4.7**	**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**	**%**





Vicinity Map

NOT TO SCALE

LEGEND

- EXISTING CONTOURS (7000)
- HISTORIC BASINS
- DIRECTION OF FLOW
- *A* DRAINAGE BASIN
- DEVELOPMENT BOUNDARY

1" = 100'

0 25 50 100 200

Scale in Feet

HISTORIC DRAINAGE BASIN TABLE

BASIN	AREA (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
A	1.66	0.8	4.3
B	4.63	2.1	11.6
C	4.35	1.8	9.8
D	20.55	6.3	35.5
E	3.20	1.4	7.9

SHEET 1 OF 1

EXHIBIT 1

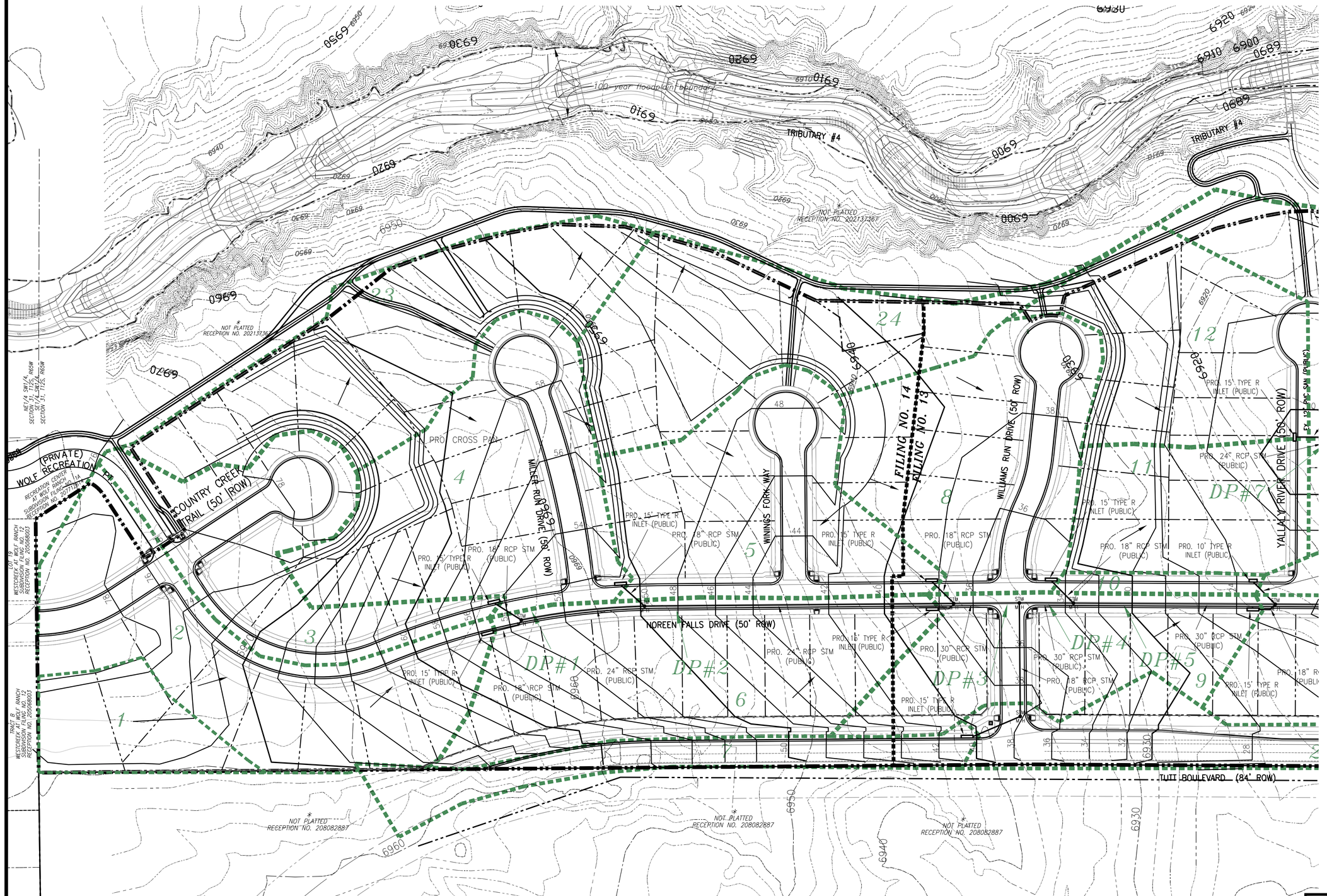
FILE: 170250EV.DWG 10/25/20

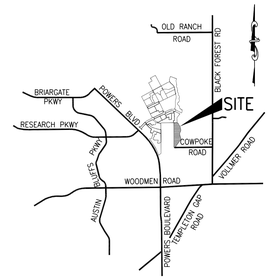
ROCKWELL CONSULTING, Inc.
ENGINEERING • SURVEYING
1955 N. UNION BLVD., SUITE 200
COLORADO SPRINGS, CO 80909
(719) 475-2575 • FAX (719) 475-9223

TITLE : (WESTCREEK FILINGS 13-14) HISTORIC DRAINAGE PLAN

WESTCREEK III AT WOLF RANCH

SCALE : 1"=100'	DRAWN BY : MM	17-025	
DATE : 10/25/20	CHECKED BY : KDR	JOB NO.	





Vicinity Map

NOT TO SCALE

DEVELOPED DRAINAGE BASIN TABLE

BASIN	AREA (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
1	0.72	0.8	2.8
2	2.17	5.9	12.1
3	1.58	4.5	8.9
4	2.44	7.0	14.4
5	2.04	5.7	11.6
6	2.42	4.9	10.5
7	0.84	3.3	6.0
8	2.12	6.0	12.2
9	1.59	4.3	8.8
10	0.19	0.8	1.5
11	1.22	3.1	6.7
12	1.72	3.8	8.2
13	0.27	0.8	1.7
14	0.93	2.2	4.7
15	0.57	1.3	2.9
16	0.68	1.5	3.4
17	0.88	2.6	5.1
18	1.92	4.3	9.3
19	0.76	1.9	4.0
20	1.58	4.8	9.2
21	1.02	2.1	4.7
22	0.57	1.7	3.5
23	2.21	5.4	12.1
24	2.05	4.8	10.7
25	0.88	1.7	4.1
26	0.65	1.4	3.2
27	0.81	0.9	3.4

DEVELOPED DESIGN POINTS

BASIN	AREA (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
DP#1	3.75	10.1	20.2
DP#2	6.19	17.2	34.8
DP#3	10.65	24.2	49.5
DP#4	11.49	26.6	54.1
DP#5	13.61	30.9	62.7
DP#6	15.39	34.8	70.4
DP#7	4.14	9.7	20.7
DP#8	5.39	12.2	26.4
DP#9	6.27	14.8	31.4
DP#10	21.66	46.5	95.4
DP#11	23.58	49.9	102.9
DP#12	24.34	50.9	105.0
DP#13	2.60	6.9	13.9
DP#14	26.94	56.5	116.2

LEGEND

- EXISTING 2' CONTOUR
- 7000 EXISTING 10' CONTOUR
- PROPOSED 2' CONTOUR
- 7000 PROPOSED 10' CONTOUR
- DIRECTION OF FLOW
- DEVELOPED BASINS
- DIRECTION OF FLOW
- PROPOSED INLET & PIPE
- 1 DRAINAGE BASIN
- DP#1 DESIGN POINT
- (1) PIPE NUMBER

NOTES

1. THIS IS A CONCEPT GRADING PLAN ONLY – NOT TO BE USED FOR CONSTRUCTION.
2. TOPSOIL TO BE STOCK PILED ON SITE AND REDISTRIBUTED AFTER OVER LOT GRADING IS COMPLETE.

APPROXIMATE FINISHED GRADING, SUBJECT TO FINAL DESIGN

1" = 60'

0 15 30 60 120

Scale in Feet

SHEET 1 OF 2

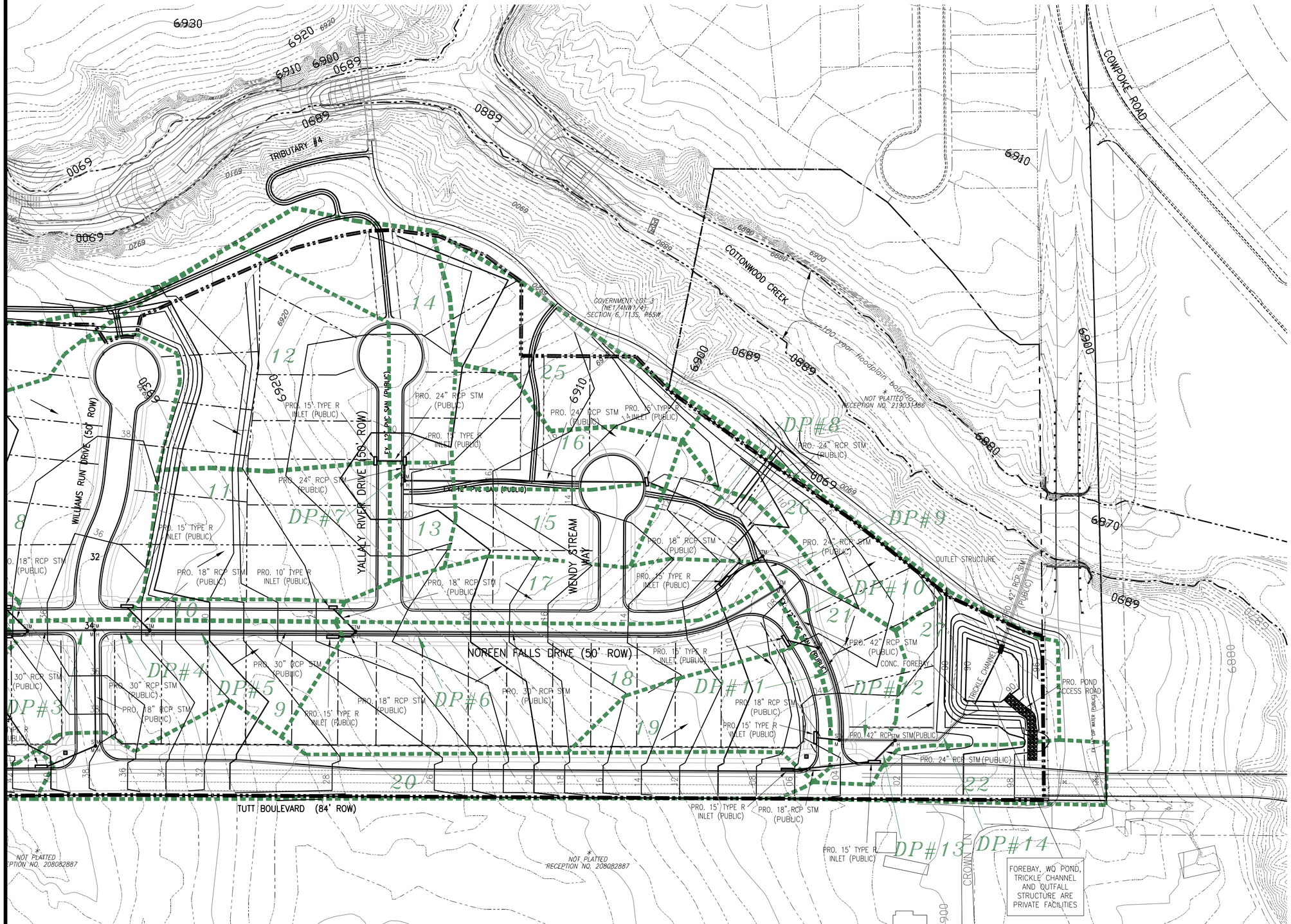
EXHIBIT 2

FILE: 17025DEV.DWG 10/25/20

ROCKWELL CONSULTING, Inc.
ENGINEERING • SURVEYING
1955 N. UNION BLVD., SUITE 200
COLORADO SPRINGS, CO 80909
(719) 475-2575 • FAX (719) 475-9223

WESTCREEK III AT WOLF RANCH (FILING NO. 13&14) DEVELOPED DRAINAGE PLAN

TITLE :			
SCALE :	1"=60'	DRAWN BY : NM	17-025
DATE :	10/25/20	CHECKED BY : KDR	JOB NO.



NOTES

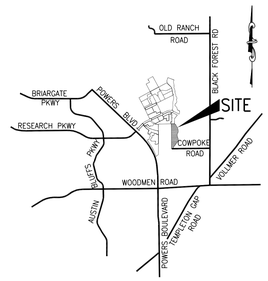
1. THIS IS A CONCEPT GRADING PLAN ONLY – NOT TO BE USED FOR CONSTRUCTION.
2. TOPSOIL TO BE STOCK PILED ON SITE AND REDISTRIBUTED AFTER OVER LOT GRADING IS COMPLETE.

APPROXIMATE FINISHED GRADING, SUBJECT TO FINAL DESIGN

1" = 60'

0 15 30 60 120

Scale in Feet



Vicinity Map

NOT TO SCALE

DEVELOPED DRAINAGE BASIN TABLE

BASIN	AREA (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
1	0.72	0.8	2.8
2	2.17	5.9	12.1
3	1.58	4.5	8.9
4	2.44	7.0	14.4
5	2.04	5.7	11.6
6	2.42	4.9	10.5
7	0.84	3.3	6.0
8	2.12	6.0	12.2
9	1.59	4.3	8.8
10	0.19	0.8	1.5
11	1.22	3.1	6.7
12	1.72	3.8	8.2
13	0.27	0.8	1.7
14	0.93	2.2	4.7
15	0.57	1.3	2.9
16	0.68	1.5	3.4
17	0.88	2.6	5.1
18	1.92	4.3	9.3
19	0.76	1.9	4.0
20	1.58	4.8	9.2
21	1.02	2.1	4.7
22	0.57	1.7	3.5
23	2.21	5.4	12.1
24	2.05	4.8	10.7
25	0.88	1.7	4.1
26	0.65	1.4	3.2
27	0.81	0.9	3.4

DEVELOPED DESIGN POINTS

BASIN	AREA (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
DP#1	3.75	10.1	20.2
DP#2	6.19	17.2	34.8
DP#3	10.65	24.2	49.5
DP#4	11.49	26.6	54.1
DP#5	13.61	30.9	62.7
DP#6	15.39	34.8	70.4
DP#7	4.14	9.7	20.7
DP#8	5.39	12.2	26.4
DP#9	6.27	14.8	31.4
DP#10	21.66	46.5	95.4
DP#11	23.58	49.9	102.9
DP#12	24.34	50.9	105.0
DP#13	2.60	6.9	13.9
DP#14	26.94	56.5	116.2

LEGEND

- EXISTING 2' CONTOUR
- 7000 EXISTING 10' CONTOUR
- PROPOSED 2' CONTOUR
- 7000 PROPOSED 10' CONTOUR
- DIRECTION OF FLOW
- DEVELOPED BASINS
- DIRECTION OF FLOW
- PROPOSED INLET & PIPE
- 1 DRAINAGE BASIN
- DP#1 DESIGN POINT

SHEET 2 OF 2

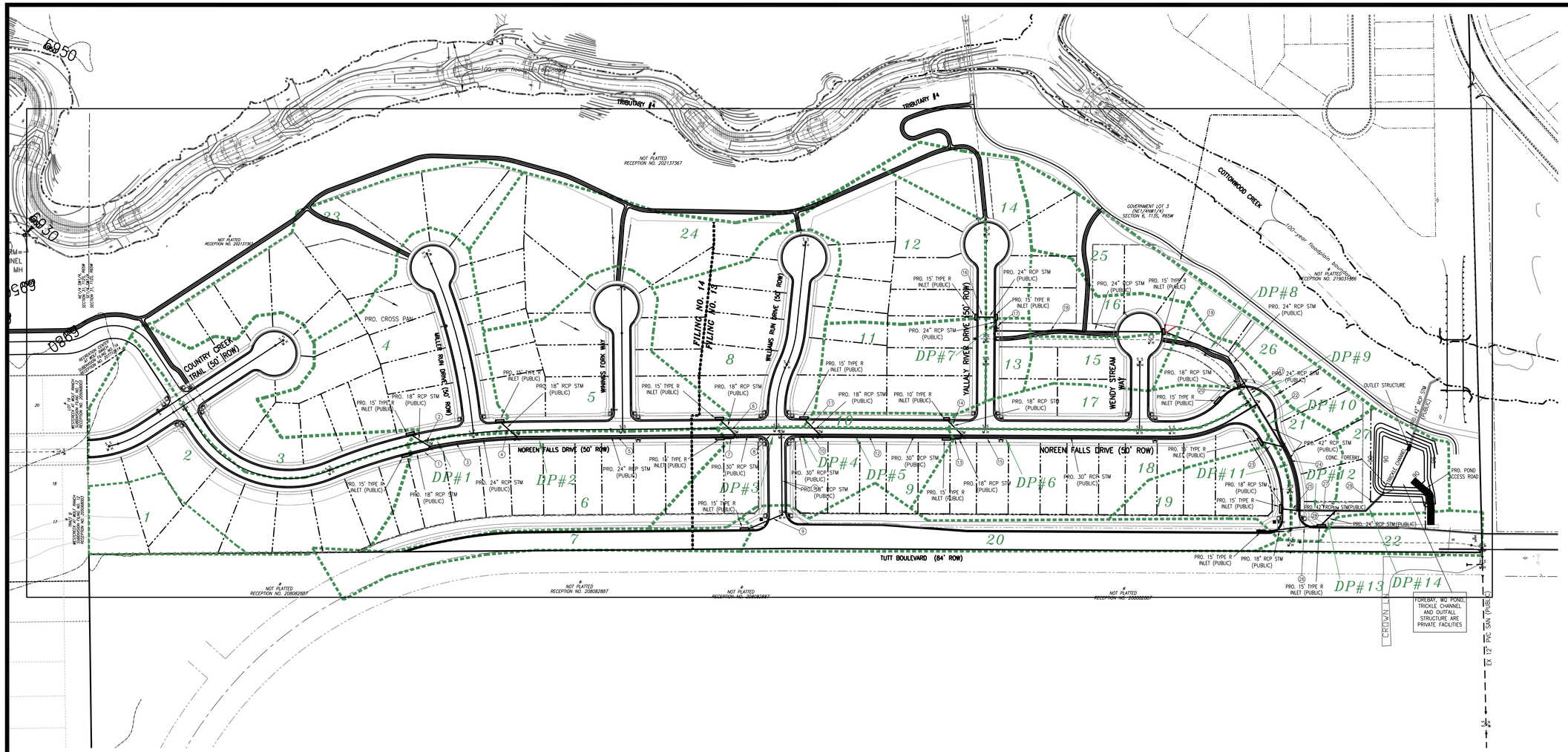
EXHIBIT 2

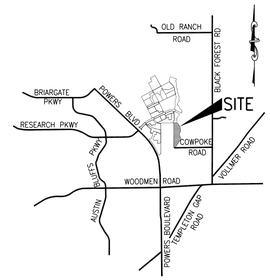
FILE: 17025DEV.DWG 10/25/20

ROCKWELL CONSULTING, Inc.
ENGINEERING • SURVEYING
1955 N. UNION BLVD., SUITE 200
COLORADO SPRINGS, CO 80909
(719) 475-2575 • FAX (719) 475-9223

TITLE : WESTCREEK III AT WOLF RANCH (FILING NO. 13&14) DEVELOPED DRAINAGE PLAN

SCALE :	1"=60'	DRAWN BY : NM	17-025 JOB NO.
DATE :	10/25/20	CHECKED BY : KDR	





Vicinity Map

NOT TO SCALE

1" = 100'

0 50 100 200

Scale in Feet

PIPE FLOWS

PIPE	Q_5(CFS)	Q_{100} (CFS)	PIPE SIZE
1	5.9	10.5	18" RCP
2	4.5	8.5	18" RCP
3	10.1	20.2	24" RCP
4	6.5	10.3	18" RCP
5	17.2	34.8	24" RCP
6	6.2	12.4	18" RCP
7	4.9	10.5	18" RCP
8	24.2	49.5	30" RCP
9	3.3	6.0	18" RCP
10	26.6	54.1	30" RCP
11	6.0	12.3	18" RCP
12	30.9	62.7	30" RCP
13	4.3	9.5	18" RCP
14	0.8	4.7	18" RCP
15	34.8	70.4	30" RCP
16	6.9	14.9	24" RCP
17	9.7	20.7	24" RCP
18	9.7	20.7	24" RCP
19	12.2	26.4	24" RCP
20	2.6	5.5	18" RCP
21	14.8	31.4	24" RCP
22	46.5	95.4	42" RCP
23	4.3	9.4	18" RCP
24	49.9	102.9	42" RCP
25	1.9	5.3	18" RCP
26	4.8	8.7	18" RCP
27	50.9	105.0	42" RCP
28	6.9	13.9	24" RCP
29	56.5	116.2	42" RCP

THE LOCATION OF EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE WAY AND MAY NOT INCLUDE ALL UTILITIES. THE EXCAVATING CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL EXISTING UTILITIES.

NOTES

1. THIS IS A CONCEPT FACILITIES PLAN ONLY – NOT TO BE USED FOR CONSTRUCTION.
2. EASEMENTS WILL BE GRANTED PRIOR TO CONSTRUCTION.

EXHIBIT 3

FILE: 17025DEV.DWG 11/4/20

ROCKWELL CONSULTING, Inc.
ENGINEERING • SURVEYING
1955 N. UNION BLVD., SUITE 200
COLORADO SPRINGS, CO 80909
(719) 475-2575 • FAX (719) 475-9223

TITLE : WESTCREEK III AT WOLF RANCH–AMENDMENT
PRELIMINARY PIPE SIZES

SCALE :	1"=100'	DRAWN BY : KDR	17-025 JOB NO.
DATE :	11/4/20	CHECKED BY : KDR	