Delete "Final". See comment letter.

PRELIMINARY/FINAL DRAINAGE REPORT FOR COPPER CHASE AT STERLING RANCH

EL PASO COUNTY, COLORADO

Engineering Review

04/11/2019 11:43:01 AM
dsdrice
JeffRice@elpasoco.com
(719) 520-7877
EPC Planning & Community Development Department

January 2019

Prepared for:

SR Land, LLC
20 Boulder Crescent, Suite 210
Colorado Springs, CO 80903

Prepared by:

M&S CIVIL CONSULTANTS, INC.
20 Boulder Crescent, Suite 110
Colorado Springs, CO 80903
(719) 955-5485

Project #09-014
DSD Project # PUDSP-19-003

PRELIMINARY/FINAL DRAINAGE REPORT FOR COPPER CHASE AT STERLING RANCH

DRAINAGE PLAN STATEMENTS

ENGINEERS STATEMENT

The attached drainage plan and report was prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the master plan of the drainage basin.

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

DEVELOPER'S STATEMENT

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

BY:___________________________________
James F Morley

TITLE:___________________________
DATE:___________________________

ADDRESS: SR Land, LLC
20 Boulder Crescent, Suite 210
Colorado Springs, CO 80903

EL PASO COUNTY'S STATEMENT

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

BY:_______________________________ DATE:____________________
Jennifer Irvine, P.E.
County Engineer / ECM Administrator

PRELIMINARY/FINAL DRAINAGE REPORT FOR COPPER CHASE AT STERLING RANCH

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APPENDIX

PRELIMINARY/FINAL DRAINAGE REPORT FOR COPPER CHASE AT STERLING RANCH

provide final date

PURPOSE

This document is the Preliminary/Final Drainage Report for Copper Chase at Sterling Ranch. This report was previously discussed, in the "Final Drainage Report for Sterling Ranch Filing No.2" prepared by MS Civil Consultants, dated March 2018. The purpose of this document is to identify and analyze the on and offsite drainage patterns and to ensure that post development runoff is routed through the site safely and in a manner that satisfies the requirements set forth by the El Paso County Drainage Criteria Manual.

GENERAL LOCATION AND DESCRIPTION

(NOT APPROVED OR CONSTRUCTED YET)

Copper Chase at Sterling Ranch is located within the Southeast quarter of Section 32 and within the Southwest quarter of Section 33, Township 12 south, Range 65 West and a portion of the Northeast quarter of Section 5, Township 13, Range 65 West, all of the 6th Principal Meridian, El Paso County, Colorado. Sterling Ranch Filing No. 2 infrastructure encompass the boundary of the site. The site is bound to the north by existing Vollmer Road, existing Alzada Drive, and existing Bynum Drive. The site is bound to the southwest by existing Marksheffel Road and to the southeast by existing Sterling Ranch Road. Copper Chase at Sterling Ranch lies within the Sand Creek Drainage Basin. Flows from this site are tributary to Sand Creek.

proposed

Copper Chase at Sterling Ranch consists of 19.674 acres and is presently undeveloped. Vegetation is sparse, consisting of native grasses. Existing site terrain generally slopes from north to southeast at grade rates that vary between 1.9% and 4.4%.

Copper Chase Sterling Ranch is currently zoned RS-5000 for Residential Sub-Urban and is proposed to be PUD Planned Unit Development. Improvements proposed for the site include paved, streets, parking, utilities, and storm drainage improvements, as normally constructed for a planned unit development.

SOILS

Soils for this project are delineated by the map in the appendix as Blakeland Loamy Sand (8) and Columbine Gravelly Sandy Loam (19). Both are characterized as Hydrologic Soil Types "A". Soils in the study area are shown as mapped by S.C.S. in the "Soils Survey of El Paso County Area". Due to recent bulk grading activities, vegetation is sparse, consisting of native grasses and weeds.

HYDROLOGIC CALCULATIONS

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

HYDRAULIC CALCULATIONS

Hydraulic calculations were estimated using the Manning's Formula and the methods described in the El Paso County and City of Colorado Springs Storm Drainage Design Criteria manual. The relevant data sheets are included in the appendix of this report.

FLOODPLAIN STATEMENT

update

No portion of this site is within a designated F.E.M.A. floodplain as determined by the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel No. 08041C0535 F, effective date March 17, 1997 and the revised panel which reflects LOMR, 08-08-O541P, dated July 23, 2009. A copy of the pre and post LOMR FIRM maps has been included in the Appendix.

DRAINAGE CRITERIA

This drainage analysis has been prepared in accordance with the current City of Colorado Springs/El Paso County Drainage Criteria Manual, Volumes I & II, dated November 1991, including subsequent updates. El Paso County has also adopted Chapter 6 and Section 3.2.1 of Chapter 13 in the City of Colorado Springs & El Paso County Drainage Criteria Manual Volumes I and II, dated May 2014. (Appendix I of the El Paso County's Engineering Criteria Manual (ECM), 2008). In addition to the ECM, the Urban Storm Drainage Criteria Manuals, Volumes 1-3, published by the Urban Drainage and Flood Control District (Volumes 1 & 2 dated January 2016, Volume 3 dated November 2010 and updates). Calculations were performed to determine runoff quantities for the 5-year and 100-year frequency storms for developed conditions using the Rational Method.

EXISTING DRAINAGE CONDITIONS

The Copper Chase at Sterling Ranch site consists of 19.674 acres and is situated west of the Sand Creek Channel. This area was previously studied in the "Sand Creek Drainage Basin Planning Study" (DBPS) prepared by Kiowa Corporation, revised March 1996. More recently the area was studied in the "Final Drainage Report for Sterling Ranch Filing No 2" prepared by MS Civil Consultants, dated March 2018 (henceforth referred to as "Sterling Ranch Filing No 2 FDR"). Copper Chase at Sterling Ranch and portions of the surrounding areas (with the exception of the existing Barbarick Subdivision), have already been bulk graded (refer to Sterling Ranch Filing No. 1, Early Onsite Grading Plan). Refer to the Final Drainage Report for Sterling Ranch Filing No 2 by MS Civil Consultants for information on historic conditions and overlot drainage patterns and analysis.

Reference MDDP.

FOUR STEP PROCESS

Step 1 Employ Runoff Reduction Practices. Roof drains will be directed to side yard swales and whenever possible to grass lined swales to aid in minimizing direct connection of impervious surfaces.

Step 2 Implement BMPs that provide a water quality capture volume with slow release. – An existing Full Spectrum Detention Facility was planned and constructed to handle tributary flows for this site (see Sterling Ranch Filing No 2 FDR, Pond W-5) which will incorporate water quality capture volumes that

This is not enough. Discuss how the site has been planned to reduce runoff. Discuss swales labeled on plans. Staff recommends utilization of LID methods.

are intended to slowly drain in 40 hours and excess urban runoff volumes that are intended to drain within 72 hours.

Step 3 Stabilize streams. – With the full spectrum detention facility in place, the runoff from the proposed residential development will be reduced to predevelopment conditions. The developed discharge from the site is less that existing and therefore is not anticipated to have negative effects on downstream drainageways.

Step 4 Implement site specific and other source control BMPs. – The proposed project will use silt fence, a vehicle tracking control pad, concrete washout area, inlet protection, temporary sediment basins, sediment control logs, mulching and reseeding to mitigate the potential for erosion across the site.

Address per ECM (industrial uses, not temporary BMPs)

PROPOSED DRAINAGE CHARACTERISTICS

General Concept Drainage Discussion

The following is a description of the onsite basins, offsite flows and the overall drainage characteristics for the development of Copper Chase at Sterling Ranch. The development of Copper Chase at Sterling Ranch consists of paved streets, parking, and lots typical of a Planned Unit Development (PUD). Surface runoff is routed via roof drains and side lot swales between the townhomes to either the back or front of the lots. Surface runoff from the back of the lots, and open spaces, is directed by swales to low points with area drainage basins. Surface runoff directed to the front of the lots is conveyed within the streets to proposed D-9 at-grade inlets or to low points equipped with proposed D-9 sump inlets. In the event of clogging or inlet failure at low points, emergency overflow routes have been designed to convey runoff to either a downstream inlet or to existing Bynum Drive or Sterling Ranch Road (see the Proposed Drainage Map for emergency overflow arrows and general drainage patterns). Runoff captured by area drainage basins or D-9 inlets is conveyed underground by a proposed private storm sewer system to the southern corner of the parcel. Ultimately, the proposed storm sewer system ties into an existing public 42" RCP stub within the right of way of existing Sterling Ranch Road. All existing storm drainage improvements within Sterling Ranch Road were constructed with the Sterling Ranch Filing No. 2 infrastructure. The proposed development results in drainage patterns and flow values that are the same or less than those in the Sterling Ranch Filing No. 2 Final Drainage Report.

The following detailed drainage discussion provides an overview of the proposed development and ensures that no major modification of the proposed improvements is necessary due to the assumptions meeting that of the previously submitted Final Drainage Report for Sterling Ranch Filing No 2. Surface flow is designated as Design Points (DP). Captured flow within the storm sewer system is designated as Pipe Runs (PR).

Detailed Drainage Discussion (Design Points)

DP1, 1.01 acres, consists of Basin B, PUD lots with runoff coefficients of 0.30 for the 5-year and 0.51 for the 100-year. Developed runoff of Q5=1.3 cfs and Q100=3.5 cfs has been calculated for DP1. The surface runoff is routed via roof drains and side lot swales between the townhomes and routed to the back of the lots. Flows from the back of the lots are conveyed southeast by a proposed swale and ultimately captured by a beehive grate area inlet. In the final design, a small private storm sewer system may be extended underneath the swale to intermittently collect runoff. Captured flows from the inlet are conveyed underground by a proposed private storm sewer system Pipe Run 1 (Q5=1.3 cfs and Q100=3.5 cfs). In the event of clogging or inlet failure, emergency overflow is routed to existing Bynum Drive.

DP2, 1.89 acres, consists of Basin C, PUD lots with runoff coefficients of 0.60 for the 5-year and 0.73 for the 100-year. Developed runoff of Q5=4.3 cfs and Q100=8.7 cfs has been calculated for DP2. The surface runoff is routed via roof drains and side lot swales between the townhomes and routed to the front of the lots. Flows from the front of the lots enter the street where they are conveyed southeast and ultimately captured by a proposed 10’ D-9 at-grade inlet. The inlet at DP2 has a captured flow of Q5=2.3 cfs and Q100=3.4 cfs and of flowby of Q5=2.0 cfs and Q100=5.3 cfs. Captured flows from the inlet combine with flows from Ripe Run 1 and are conveyed underground by a proposed private storm sewer system Pipe Run 2 (Q5=3.6 cfs and Q100=7.0 cfs). Flowby from the inlet is routed to Design Point 6.

DP3, 1.35 acres, consists of Basin D, PUD lots with runoff coefficients of 0.39 for the 5-year and 0.57 for the 100-year. Developed runoff of Q5=2.0 cfs and Q100=4.9 cfs has been calculated for DP3. The surface runoff is routed via roof drains and side lot swales between the townhomes and routed to the back of the lots. Flows from the back of the lots are conveyed southeast by a proposed swale and ultimately captured by a beehive grate area inlet. In the final design, a small private storm sewer system may be extended underneath the swale to intermittently collect runoff. Captured flows from the inlet combine with flows from Ripe Run 2 and are conveyed underground by a proposed private storm sewer system Pipe Run 3 (Q5=5.4 cfs and Q100=11.5 cfs). In the event of clogging or inlet failure, emergency overflow is routed south to Design Point 5 (DP5).

DP4, 4.43 acres, consists of Basins E, F, and offsite basin OS1, PUD lots with weighted average runoff coefficients of 0.51 for the 5-year and 0.67 for the 100-year. Developed runoff of Q5=8.2 cfs and Q100=17.9 cfs has been calculated for DP4. The surface runoff is routed via, offsite grading, roof drains and side lot swales between the townhomes and routed to the front of the lots. Flows from the front of the lots enter the street where they are conveyed southeast and ultimately captured by a proposed 10’ D-9 at-grade inlet. The inlets at DP4 has a captured flow of Q5=3.8 cfs and Q100=6.0 cfs and of flowby of Q5=4.4 cfs and Q100=11.9 cfs. Captured flows from the inlet are conveyed underground by a proposed private storm sewer system Pipe Run 4 (Q5=3.8 cfs and Q100=6.0 cfs). Flowby from the inlet is routed to Design Point 5.

DP5, 0.52 acres, consists of Basin G, PUD lots with runoff coefficients of 0.57 for the 5-year and 0.71 for the 100-year, and flowby from DP4. Developed runoff of Q5=5.4 cfs and Q100=14.0 cfs has been calculated for DP5. The surface runoff is routed via roof drains and side lot swales between the townhomes and routed to the front of the lots. Flows from the front of the lots, and flowby from DP4, enter the street where they are conveyed southeast to a low point and ultimately captured by a proposed 15’ D-9 sump inlet. All flows are captured by the sump inlet. Flows from DP5 will combine with flows from Pipe Run 3 and Pipe Run 4 and are conveyed south underground by a proposed private storm sewer system Pipe Run 5 (Q5=14.2 cfs and Q100=30.6 cfs). In the event of clogging or inlet failure, emergency overflow is routed south to DP7 in a proposed swale within Basin I.

DP6, 1.46 acres, consists of Basin H, PUD lots with runoff coefficients of 0.55 for the 5-year and 0.70 for the 100-year, and flowby from DP2. Developed runoff of Q5=4.8 and Q100=11.2 cfs has been calculated for DP6. The surface runoff is routed via roof drains and side lot swales between the townhomes and routed to the streets. Flows from the lots, and flowby from DP2, enter the streets where they are conveyed south to a low point and ultimately captured by a proposed 15’ D-9 sump inlet. All flows are captured by the sump inlet. Flows from the inlet are conveyed underground by a proposed private storm sewer system Pipe Run 9 (Q5=4.8 cfs and Q100=11.2 cfs). In the event of clogging or inlet failure, emergency overflow is routed east, ultimately into existing Sterling Ranch Road, in a proposed swale within Basin O.

DP7, 2.50 acres, consists of Basin I, PUD lots with runoff coefficients of 0.36 for the 5-year and 0.55 for the 100-year. Developed runoff of Q5=3.3 cfs and Q100=8.4 cfs has been calculated for DP7. The surface runoff is routed via roof drains and side lot swales between the townhomes and routed to the back of the lots. Flows from the back of the lots are conveyed by proposed swales and ultimately captured by a beehive grate area inlet located in the southeast corner of Basin I. In the final design, a small private storm sewer system may be extended underneath the swale to intermittently collect runoff. Captured flows from the inlet are conveyed underground by a proposed private storm sewer system Pipe Run 6 (Q5=16.9 cfs and Q100=37.7 cfs). In the event of clogging or inlet failure, emergency overflow is routed south to Design Point 9 (DP9).

DP8, 2.38 acres, consists of Basin J, PUD lots with weighted average runoff coefficients of 0.60 for the 5-year and 0.73 for the 100-year. Developed runoff of Q5=5.2 cfs and Q100=10.6 cfs has been calculated for DP8. The surface runoff is routed via roof drains and side lot swales between the townhomes and routed to the front of the lots. Flows from the front of the lots enter the street where they are conveyed southeast and ultimately captured by a proposed 10’ D-9 at-grade inlet. The inlet at DP8 has a captured flow of Q5=2.3 cfs and Q100=3.4 cfs and of flowby of Q5=2.9 cfs and Q100=7.2 cfs. Captured flows from the inlet are conveyed underground by a proposed private storm sewer system Pipe Run 7 (Q5=2.3 cfs and Q100=3.4 cfs). Flowby from the inlet is routed to Design Point 9.

DP9, 0.86 acres, consists of Basin K, PUD lots with runoff coefficients of 0.56 for the 5-year and 0.70 for the 100-year, and flowby from DP8. Developed runoff of Q5=4.6 cfs and Q100=10.7 cfs has been calculated for DP9. The surface runoff is routed via roof drains and side lot swales between the townhomes and routed to the front of the lots. Flows from the front of the lots, and flowby from DP8, enter the street where they are conveyed southeast and southwest and ultimately captured by a proposed 15’ D-9 sump inlet. All flows are captured by the sump inlet. Flows from DP9 will combine with flows from Pipe Run 6 and Pipe Run 7 and are conveyed southeast underground by a proposed private storm sewer system Pipe Run 8 (Q5=23.3 cfs and Q100=50.9 cfs). In the event of clogging or inlet failure, emergency overflow is routed south to DP10 via street grading.

DP10, 0.65 acres, consists of Basin L, PUD lots with runoff coefficients of 0.54 for the 5-year and 0.69 for the 100-year. Developed runoff of Q5=1.4 and Q100=3.0 cfs has been calculated for DP10. The surface runoff is routed via roof drains and side lot swales between the townhomes and routed to the front of the lots. Flows from the front of the lots enter the street where they are conveyed to a low point and ultimately captured by a proposed 10’ D-9 sump inlet. All flows are captured by the sump inlet. Flows from DP10 will combine with flows from Pipe Run 8 and Pipe Run 9 and are conveyed southeast underground by a proposed private storm sewer system Pipe Run 10 (Q5=28.5 cfs and Q100=62.8 cfs). In the event of clogging or inlet failure, emergency overflow is routed south in a proposed swale within Basin M to DP11.

DP11, 1.94 acres, consists of Basin M, PUD lots with runoff coefficients of 0.29 for the 5-year and 0.50 for the 100-year. Developed runoff of Q5=1.9 cfs and Q100=5.6 cfs has been calculated for DP11. The surface runoff is routed via roof drains and side lot swales between the townhomes and routed to the back of the lots. Flows from the back of the lots are conveyed southeast by a proposed swale to a low point and ultimately captured by a proposed 10' D-9 sump inlet. In the final design, a small private storm sewer system may be extended underneath the swale to intermittently collect runoff. All flows are captured by the sump inlet are conveyed underground by a proposed public storm sewer system Pipe Run 11 (Q5=29.7 cfs and Q100=66.7 cfs). Pipe Run 11 is proposed to tie into an existing 42" RCP stub adjacent to existing Sterling Ranch Road. All existing storm drainage improvements within Sterling Ranch Road were constructed with the Sterling Ranch Filing No. 2 infrastructure. The Proposed Drainage Map for Sterling Ranch Filing No. 2 anticipated a Q5=35.0 cfs and Q100=74.3 cfs (Pipe Run 50) to be captured by the existing 42" stub in service of the Copper Chase at Sterling Ranch site. Contributed flows are less than anticipated by the Sterling Ranch Filing No. 2 FDR. In the event of clogging or inlet failure, emergency overflow is routed southeast in a proposed swale, ultimately to the existing 15' CDOT Type R inlet in existing Sterling Ranch Road.

explain how

Detailed Drainage Discussion (Drainage Basins)

Basins N & O, 1.19 acres, consist of PUD lots with runoff coefficients of 0.42 & 0.20 for the 5-year and 0.59 & 0.44 for the 100-year respectfully. Developed runoff of, Q5=0.6 cfs and Q100=1.4 cfs (Basin N), and Q5=0.7 cfs and Q100=2.6 cfs (Basin O), has been calculated for the Basins. The surface runoff is routed via roof drains and side lot swales between the townhomes and routed to the back of the lots. Flows from the back of the lots are directed to existing Bynum Drive and existing Sterling Ranch Road. All existing storm drainage improvements within the two streets were constructed with The Sterling Ranch Filing No. 2 infrastructure. Combined contributed flows from Basins N & O (Q5=1.3 cfs and Q100=4.0 cfs) are less than anticipated flows by Basin FFF1 and GGG (1.67 acres, Q5=2.1 cfs and Q100=5.7 cfs) in the Proposed Drainage Map for Sterling Ranch Filing No. 2.

EROSION CONTROL

It is the policy of the El Paso County that a grading and erosion control plan be submitted with the drainage report. EPC approved "Early Grading Plan for Sterling Ranch Phase I Onsite Grading & Erosion Control", November 18, 2015. And "Early Grading Plan for Sterling Ranch Phase I Offsite Grading & Erosion Control", December 3, 2015. Grading and Erosion control operations are currently underway (August 2016). Grading and Erosion Control will cease with the final development of the site in the next 12-36 months.

CONSTRUCTION COST OPINION – COPPER CHASE AT STERLING RANCH

Drainage Facilities:

Item	Description	Quantity		Unit Cost		Cost
1.	18" ADS HP Pipe	270	LF	$30	/LF	$8,100.00
2.	24" ADS HP Pipe	604	LF	$45	/LF	$27,180.00
3.	30" ADS HP Pipe	330	LF	$60	/LF	$19,800.00
4.	36" ADS HP Pipe	105	LF	$75	/LF	$7,875.00
5.	42" RCP	175	LF	$120	/LF	$21,000.00
6.	ADS Area Inlet (Beehive Grate, Includes Basin)	3	EA	$1,500	/EA	$4,500.00
7.	10' D-9 Sump Inlet	5	EA	$3,500	/EA	$17,500.00
8.	15' D-9 Sump Inlet	3	EA	$4,300	/EA	$12,900.00
					Total $	**$118,855.00**

M & S Civil Consultants, Inc. (M & S) cannot and does not guarantee the construction cost will not vary from these opinions of probable costs. These opinions represent our best judgment as design professionals familiar with the construction industry and this development in particular. The above is only an estimate of the facility cost and drainage basin fee amounts in 2019.

DRAINAGE & BRIDGE FEES – COPPER CHASE AT STERLING RANCH

This site is within the Sand Creek Drainage Basin. The 2019 Drainage and Bridge Fees per El Paso County for the COPPER CHASE AT STERLING RANCH site are as follows:

Per Copper Chase at Sterling Ranch Site Boundary – **Total Area** **19.674 Acres**

COPPER CHASE AT STERLING RANCH FEES:

Drainage Fees:	19.674	x	64.4%	$ 18,940.00	=	$	239,970.86
Bridge Fees:	19.674	x	64.4%	$ 5,559.00	=	$	70,432.84
					Total	**$**	**310,403.70**

remove or note this is informational with this PDR.

SUMMARY

Development of this site will not adversely affect the surrounding developments per this final drainage report with no negative impacts to the neighboring developments. The proposed and existing drainage facilities will adequately convey, detain and route runoff from tributary and onsite flows to the Sand Creek Drainage channel via proposed onsite and existing offsite drainage improvements. Full Spectrum Detention and Water Quality Ponds will be used to discharge developed flows into Sand Creek per the Urban Drainage criteria flow rates, which are at or less than the historic flow. Care will be taken during construction to accommodate overland flow routes onsite and temporary drainage conditions. The development of the COPPER CHASE AT STERLING RANCH project(s) shall not adversely affect adjacent or downstream property.

REFERENCES

1.) "El Paso County and City of Colorado Springs Drainage Criteria Manual, Vol I & II".

2.) "Urban Storm Drainage Criteria Manuals, Volumes 1-3"

3.) NRSC Web Soil Survey Map for El Paso County. http://websoilsurvey.nrcs.usda.gov

4.) Flood Insurance Rate Map (FIRM), Federal Emergency Management Agency, Effective date March 17, 1997.

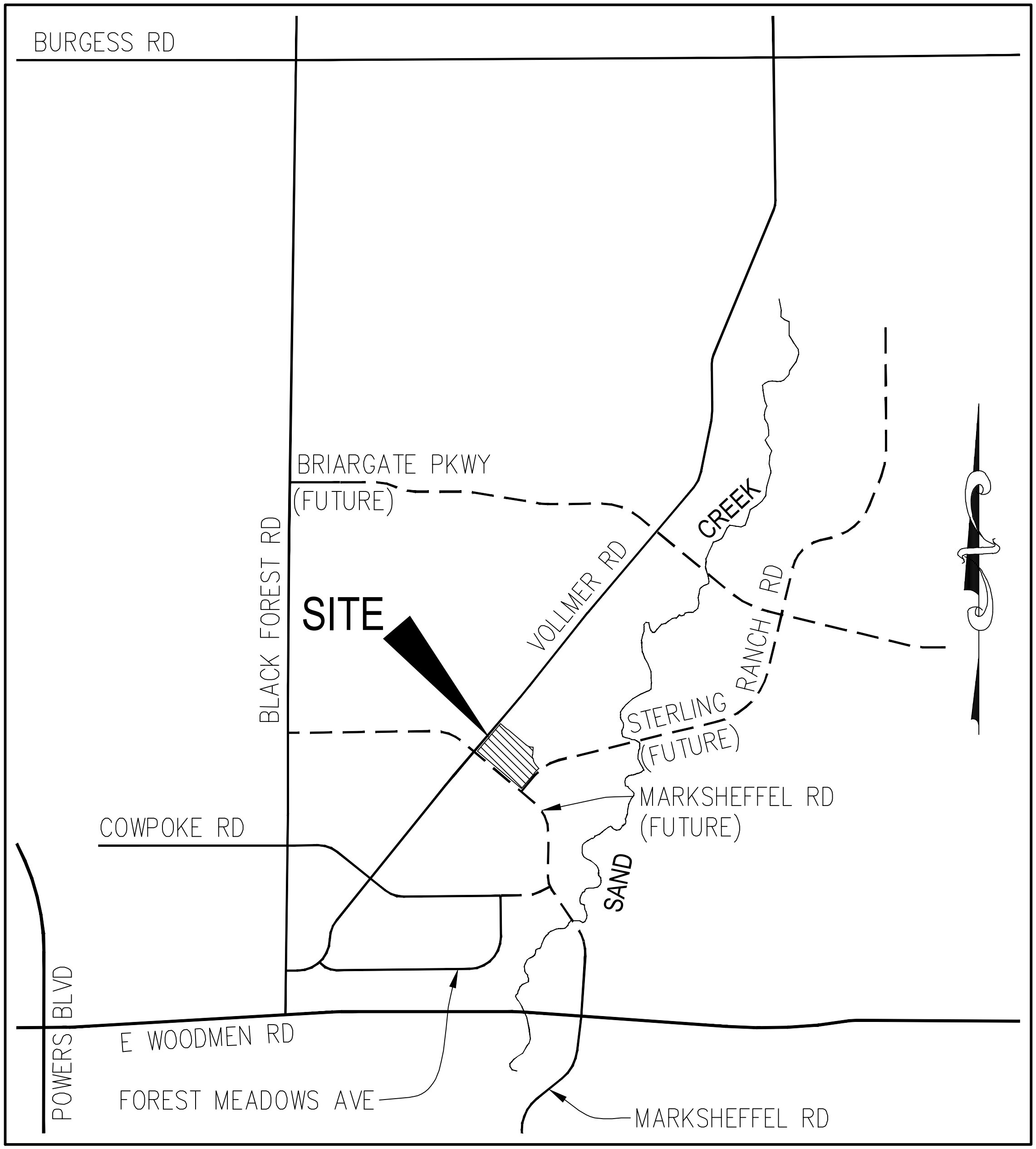
5.) "Sand Creek Drainage Basin Planning Study" (DBPS) prepared by Kiowa Corporation, revised March 1996

6.) "Final Drainage Report for Sterling Ranch Filing No. 2", dated March 2018, by M&S Civil Consultants, Inc.

MDDP?

APPENDIX

VICINITY MAP



VICINITY MAP

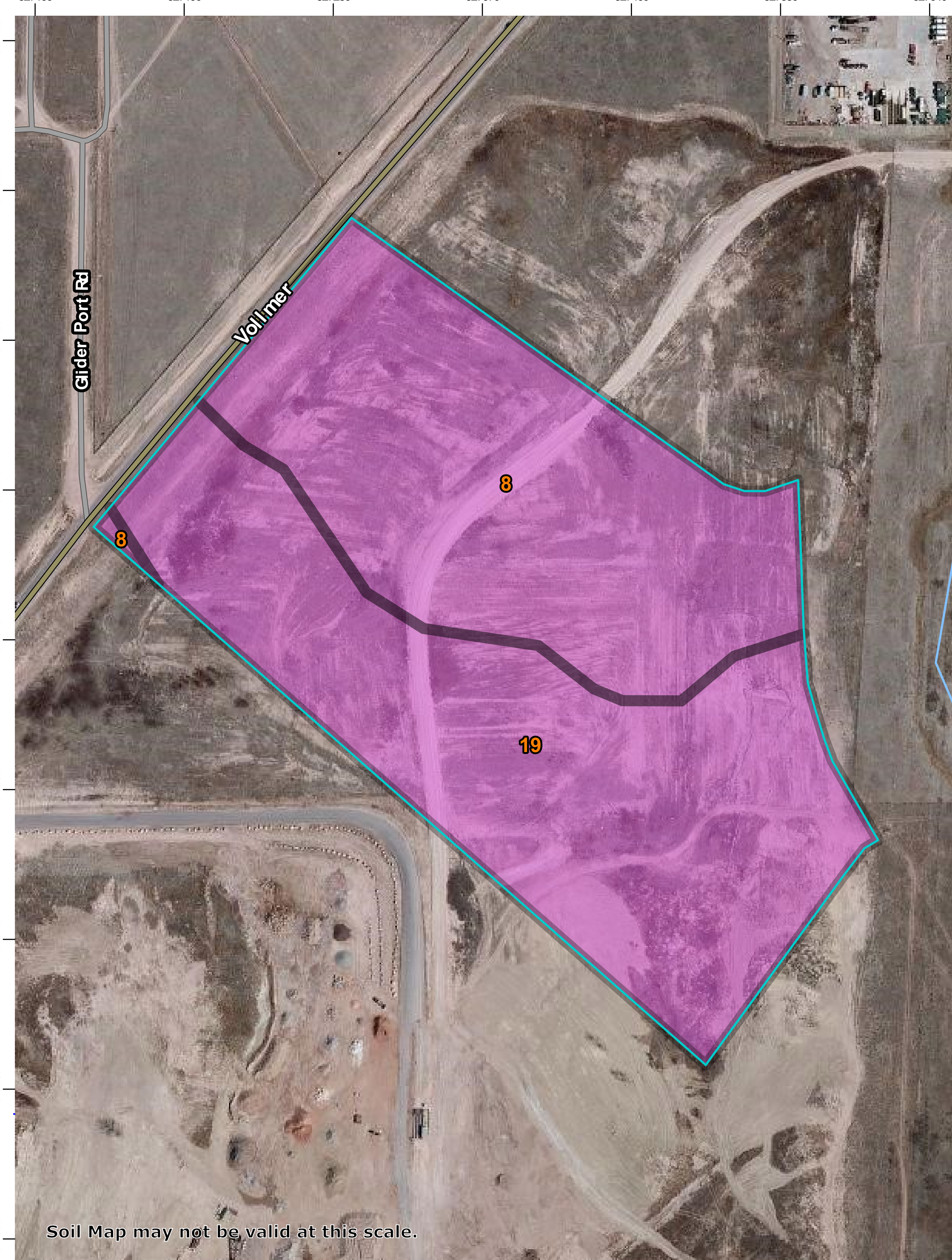
N.T.S.

SOILS MAP

104° 41' 14" W
104° 40' 50" W
38° 57' 33" N
38° 57' 8" N

527100 527190 527280 527370 527460 527550 527640

4312280 4312190 4312100 4312010 4311920 4311830 4311740 4311650 4311560



Map Scale: 1:3,670 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 14, Sep 23, 2016

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

Date(s) aerial images were photographed: Apr 15, 2011—Sep 22, 2011

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — El Paso County Area, Colorado (CO625)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
8	Blakeland loamy sand, 1 to 9 percent slopes	A	13.7	46.4%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	15.8	53.6%
Totals for Area of Interest			**29.5**	**100.0%**

Description

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

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

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

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

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

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

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

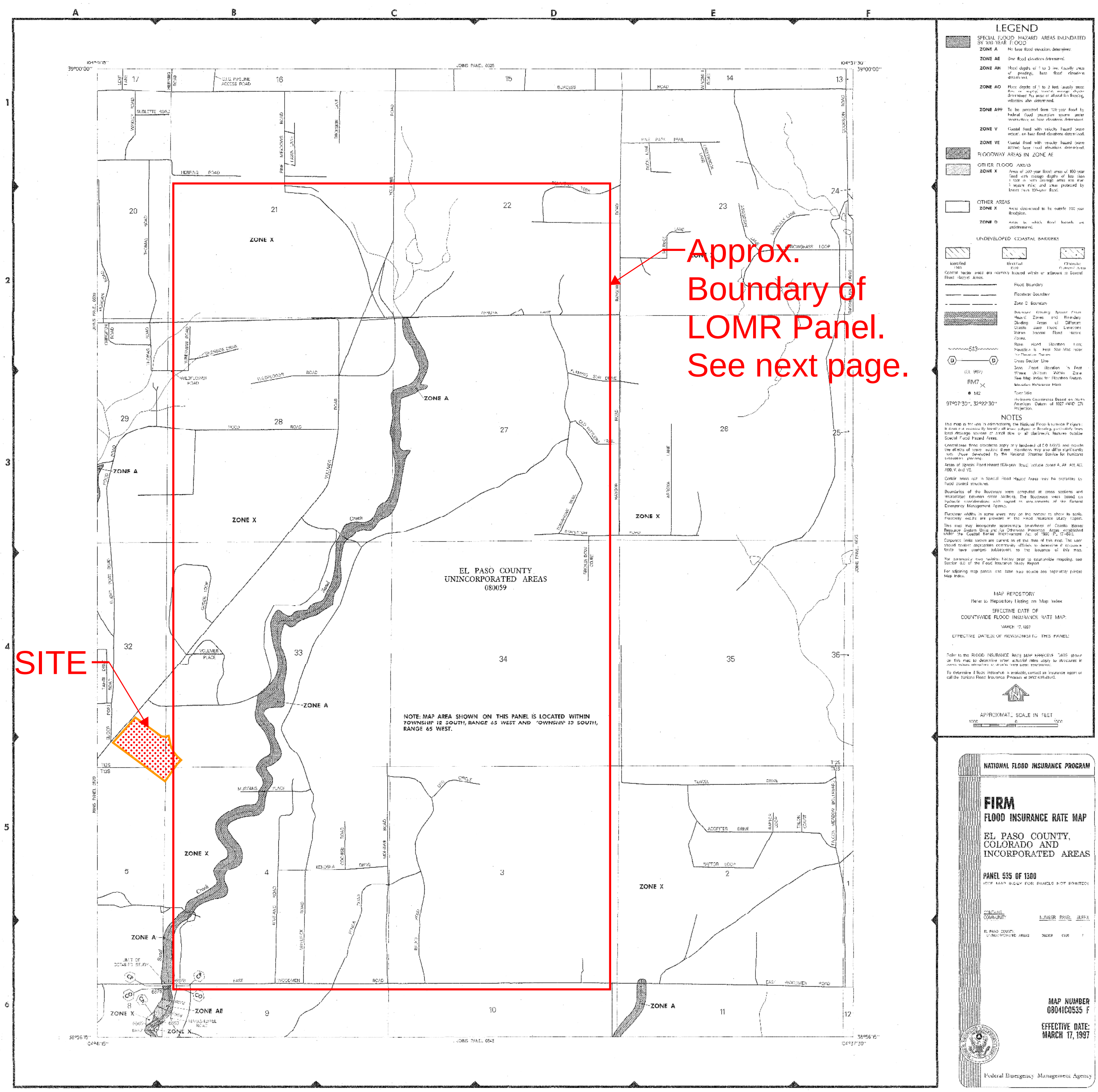
Rating Options

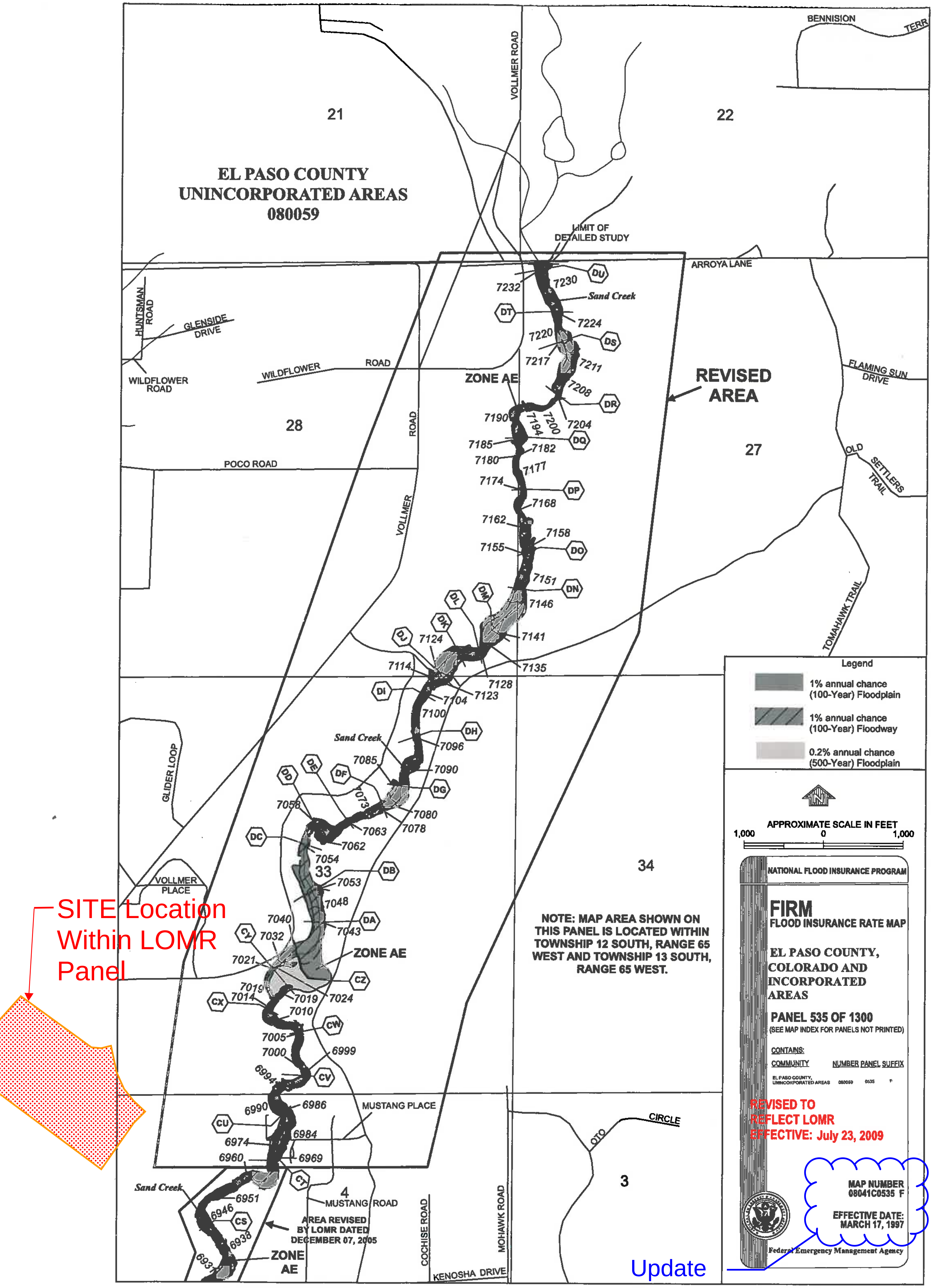
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

FIRM PANEL W/ REVISED LOMR


Approx. Boundary of LOMR Panel. See next page.
SITE
ZONE X
ZONE A
ZONE AE
EL PASO COUNTY UNINCORPORATED AREAS 080059
NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 12 SOUTH, RANGE 65 WEST AND TOWNSHIP 13 SOUTH, RANGE 65 WEST.
LEGEND
NOTES
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO AND INCORPORATED AREAS
PANEL 535 OF 1300
MAP NUMBER 08041C0535 F
EFFECTIVE DATE: MARCH 17, 1997
Federal Emergency Management Agency


EL PASO COUNTY
UNINCORPORATED AREAS
080059
21
22
28
27
33
34
3
4
VOLLMER ROAD
BENNISION
TERR
LIMIT OF DETAILED STUDY
ARROYA LANE
HUNTSMAN ROAD
GLENSIDE DRIVE
WILDFLOWER ROAD
WILDFLOWER ROAD
POCO ROAD
VOLLMER
ROAD
ZONE AE
REVISED AREA
FLAMING SUN DRIVE
OLD SETTLERS TRAIL
TOMAHAWK TRAIL
Sand Creek
GLIDER LOOP
VOLLMER PLACE
MUSTANG PLACE
MUSTANG ROAD
COCHISE ROAD
MOHAWK ROAD
KENOSHA DRIVE
OTO
CIRCLE
AREA REVISED BY LOMR DATED DECEMBER 07, 2005
ZONE AE
NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 12 SOUTH, RANGE 65 WEST AND TOWNSHIP 13 SOUTH, RANGE 65 WEST.
7232
7230
DU
DT
7224
7220
DS
7217
7211
7208
DR
7190
7194
7200
7204
7185
7182
DQ
7180
7177
7174
DP
7168
7162
7158
7155
DO
7151
DN
DM
DL
7146
DK
7141
DJ
7124
7114
7135
7128
DI
7123
7104
7100
DH
7096
7085
7090
DE
DD
DF
7073
DG
7058
7080
7078
7063
DC
7062
7054
7053
DB
7048
7040
DA
7043
CY
7032
7021
CZ
7019
7014
7019
7024
CX
7010
CW
7005
7000
6999
6994
CV
6990
6986
CU
6984
6974
6969
6960
CT
Sand Creek
6951
6946
CS
6938
6937
Legend
1% annual chance (100-Year) Floodplain
1% annual chance (100-Year) Floodway
0.2% annual chance (500-Year) Floodplain
APPROXIMATE SCALE IN FEET
1,000
0
1,000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO AND INCORPORATED AREAS
PANEL 535 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY
NUMBER
PANEL
SUFFIX
EL PASO COUNTY, UNINCORPORATED AREAS
080059
0535
F
REVISED TO REFLECT LOMR
EFFECTIVE: July 23, 2009
MAP NUMBER 08041C0535 F
EFFECTIVE DATE: MARCH 17, 1997
Federal Emergency Management Agency
SITE Location Within LOMR Panel
Update

HYDROLOGIC CALCULATIONS

COPPER CHASE AT STERLING RANCH
PRELIMINARY/FINAL DRAINAGE REPORT
(Area Runoff Coefficient Summary)

			STREETS			***DEVELOPMENT***			***OPEN SPACE / LANDSCAPING***				
BASIN	**TOTAL AREA** *(SF)*	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**C_5**	**C_{100}**
A	***8847.09***	0.20	0.05	0.90	0.96	0.06	0.78	0.86	0.09	0.08	0.35	***0.50***	***0.66***
B	***43781.2***	1.01	0.00	0.90	0.96	0.32	0.78	0.86	0.68	0.08	0.35	***0.30***	***0.51***
C	***82537.64***	1.89	0.34	0.90	0.96	1.01	0.78	0.86	0.54	0.08	0.35	***0.60***	***0.73***
D	***58700.35***	1.35	0.00	0.90	0.96	0.60	0.78	0.86	0.75	0.08	0.35	***0.39***	***0.57***
E	***92917.13***	2.13	0.41	0.90	0.96	1.02	0.78	0.86	0.70	0.08	0.35	***0.57***	***0.71***
F	***68635.21***	1.58	0.23	0.90	0.96	0.92	0.78	0.86	0.42	0.08	0.35	***0.61***	***0.73***
G	***22640.81***	0.52	0.10	0.90	0.96	0.25	0.78	0.86	0.17	0.08	0.35	***0.57***	***0.71***
H	***63653.64***	1.46	0.33	0.90	0.96	0.60	0.78	0.86	0.53	0.08	0.35	***0.55***	***0.70***
I	***108820.6***	2.50	0.00	0.90	0.96	1.00	0.78	0.86	1.50	0.08	0.35	***0.36***	***0.55***
J	***103869.6***	2.38	0.41	0.90	0.96	1.28	0.78	0.86	0.69	0.08	0.35	***0.60***	***0.73***
K	***37256.73***	0.86	0.24	0.90	0.96	0.30	0.78	0.86	0.32	0.08	0.35	***0.56***	***0.70***
L	***28409.74***	0.65	0.16	0.90	0.96	0.24	0.78	0.86	0.25	0.08	0.35	***0.54***	***0.69***
M	***84685.85***	1.94	0.00	0.90	0.96	0.58	0.78	0.86	1.36	0.08	0.35	***0.29***	***0.50***
N	***14470.74***	0.33	0.00	0.90	0.96	0.16	0.78	0.86	0.17	0.08	0.35	***0.42***	***0.59***
O	***37354.95***	0.86	0.00	0.90	0.96	0.15	0.78	0.86	0.71	0.08	0.35	***0.20***	***0.44***
OS1	***31159.13***	0.72	0.05	0.90	0.96	0.00	0.78	0.86	0.67	0.08	0.35	***0.14***	***0.39***
OS2	***45925.13***	1.05	0.07	0.90	0.96	0.00	0.78	0.86	0.98	0.08	0.35	***0.13***	***0.39***
OS3	***20436.63***	0.47	0.03	0.90	0.96	0.00	0.78	0.86	0.44	0.08	0.35	***0.13***	***0.39***

COPPER CHASE AT STERLING RANCH
PRELIMINARY/FINAL DRAINAGE REPORT
(Area Drainage Summary)

From Area Runoff Coefficient Summary				***OVERLAND***				***STREET / CHANNEL FLOW***				***Time of Travel (T_t)***		***INTENSITY ****		***TOTAL FLOWS***	
BASIN	**AREA TOTAL**	**C_5**	**C_{100}**	**C_5**	**Length**	**Height**	**T_C**	**Length**	**Slope**	**Velocity**	**T_t**	**TOTAL**	**CHECK**	**I_5**	**I_{100}**	**Q_5**	**Q_{100}**
	(Acres)	*From DCM Table 5-1*			*(ft)*	*(ft)*	*(min)*	*(ft)*	*(%)*	*(fps)*	*(min)*	*(min)*	*(min)*	*(in/hr)*	*(in/hr)*	*(c.f.s.)*	*(c.f.s.)*
A	0.20	0.50	0.66	0.50	50	1	8.6	50	3.1%	3.5	0.2	8.9	10.6	4.3	7.2	***0.4***	***1.0***
B	1.01	0.30	0.51	0.30	30	1	7.2	450	2.7%	2.4	3.1	10.2	12.7	4.1	6.9	***1.3***	***3.5***
C	1.89	0.60	0.73	0.60	50	1	10.1	550	2.9%	3.4	2.7	12.8	13.3	3.8	6.3	***4.3***	***8.7***
D	1.35	0.39	0.57	0.39	50	1	11.0	480	2.0%	2.1	3.8	14.7	12.9	3.7	6.3	***2.0***	***4.9***
E	2.13	0.57	0.71	0.57	50	1	9.3	300	3.0%	3.5	1.4	10.7	11.9	4.0	6.8	***4.9***	***10.2***
F	1.58	0.61	0.73	0.61	50	1	9.7	467	1.3%	2.3	3.4	13.1	12.9	3.8	6.3	***3.6***	***7.3***
G	0.52	0.57	0.71	0.57	50	1	11.2	55	2.5%	3.2	0.3	11.5	10.6	4.0	6.8	***1.2***	***2.5***
H	1.46	0.55	0.70	0.55	50	1	11.2	290	2.2%	3.0	1.6	12.8	11.9	3.9	6.5	***3.1***	***6.6***
I	2.50	0.36	0.55	0.36	50	1	11.2	680	2.6%	2.4	4.7	15.9	14.1	3.6	6.1	***3.3***	***8.4***
J	2.38	0.60	0.73	0.60	50	1	11.2	640	2.8%	3.3	3.2	14.4	13.8	3.6	6.1	***5.2***	***10.6***
K	0.86	0.56	0.70	0.56	50	1	11.2	210	1.3%	2.3	1.5	12.7	11.4	3.9	6.6	***1.9***	***3.9***
L	0.65	0.54	0.69	0.54	50	1	11.2	115	2.3%	3.0	0.6	11.8	10.9	4.0	6.7	***1.4***	***3.0***
M	1.94	0.29	0.50	0.29	50	1	11.2	1040	2.4%	2.3	7.5	18.6	16.1	3.4	5.7	***1.9***	***5.6***
N	0.33	0.42	0.59	0.42	30	1	7.3	0	0.0%	0.2	0.0	7.3	10.2	4.1	6.9	***0.6***	***1.4***
O	0.86	0.20	0.44	0.20	30	1	7.3	0	0.0%	0.2	0.0	7.3	10.2	4.1	6.9	***0.7***	***2.6***
OS1	0.72	0.14	0.39	0.14	50	10	5.2	0	0.0%	0.2	0.0	5.2	10.3	4.1	6.9	***0.4***	***1.9***
OS2	1.05	0.13	0.39	0.13	30	4	4.6	0	0.0%	0.2	0.0	5.0	10.2	4.1	6.9	***0.6***	***2.8***
OS3	0.47	0.13	0.39	0.13	50	1	11.2	0	0.0%	0.2	0.0	11.2	10.3	4.1	6.9	***0.3***	***1.3***

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

Calculated by: CMN
Date: 1/9/2019
Checked by: VAS

COPPER CHASE AT STERLING RANCH
PRELIMINARY/FINAL DRAINAGE REPORT
(Basin Routing Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*PIPE / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*		
DESIGN POINT	**CONTRIBUTING BASINS**	**CA_5**	**CA_{100}**	**C_5**	**Length** *(ft)*	**Height** *(ft)*	**T_C** *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	**T_t** *(min)*	**TOTAL** *(min)*	**I_5** *(in/hr)*	**I_{100}** *(in/hr)*	**Q_5** *(c.f.s.)*	**Q_{100}** *(c.f.s.)*	COMMENTS
1	**B**	0.31	0.51	0.30	50	1	7.2	450	2.7%	2.4	3.1	10.2	4.1	6.9	***1.3***	***3.5***	ADS AREA INLET (BEEHIVE GRATE)
2	**C**	1.14	1.38	0.60	50	1	10.1	550	2.9%	3.4	2.7	12.8	3.8	6.3	***4.3***	***8.7***	10' D-9 AT-GRADE INLET
3	**D**	0.53	0.77	0.39	50	1	11.0	480	2.0%	2.1	3.8	12.9	3.7	6.3	***2.0***	***4.9***	ADS AREA INLET (BEEHIVE GRATE) (TIME OF TRAVEL FROM CHECK)
4	**E, F, OS1**	2.28	2.95	TAKEN FROM BASIN E			10.7	467	1.3%	2.3	3.4	14.1	3.6	6.1	***8.2***	***17.9***	10' D-9 AT-GRADE INLET
5	**G, Flowby DP4**	1.52	2.33	TAKEN FROM DP4			14.1	55	2.5%	3.2	0.3	14.4	3.6	6.0	***5.4***	***14.0***	15' D-9 SUMP INLET
6	**H, Flowby DP2**	1.34	1.86	TAKEN FROM DP2			12.8	290	2.2%	3.0	1.6	14.4	3.6	6.0	***4.8***	***11.2***	15' D-9 SUMP INLET
7	**I**	0.90	1.38	0.36	50	1	11.2	680	2.6%	2.4	4.7	14.1	3.6	6.1	***3.3***	***8.4***	ADS AREA INLET (BEEHIVE GRATE) (TIME OF TRAVEL FROM CHECK)
8	**J**	1.42	1.73	0.60	50	1	11.2	640	2.8%	3.3	0.0	13.8	3.6	6.1	***5.2***	***10.6***	10' D-9 AT-GRADE INLET (TIME OF TRAVEL FROM CHECK)
9	**K, Flowby DP8**	1.27	1.77	TAKEN FROM DP8			13.8	100	3.3%	3.6	0.5	14.3	3.6	6.0	***4.6***	***10.7***	15' D-9 SUMP INLET
10	**L**	0.35	0.45	0.54	50	1	11.2	115	2.3%	3.0	0.6	10.9	4.0	6.7	***1.4***	***3.0***	10' D-9 SUMP INLET (TIME OF TRAVEL FROM CHECK)
11	**M**	0.56	0.97	0.29	50	1	11.2	1040	2.4%	2.3	7.5	16.1	3.4	5.7	***1.9***	***5.6***	10' D-9 SUMP INLET (TIME OF TRAVEL FROM CHECK)

Calculated by: CMN
Date: 1/9/2019
Checked by: VAS

COPPER CHASE AT STERLING RANCH
PRELIMINARY/FINAL DRAINAGE REPORT
(Storm Sewer Routing Summary)

PIPE	Contributing Pipes/Design Points	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity*		Flow	
					I_5	I_{100}	Q_5	Q_{100}
1	DP1	0.31	0.51	10.2	4.1	6.9	1.3	3.5
2	DP2, PR1	0.92	1.05	11.2	4.0	6.6	3.6	7.0
3	DP3, PR2	1.45	1.83	12.9	3.7	6.3	5.4	11.5
4	DP4	1.05	0.99	14.1	3.6	6.1	3.8	6.0
5	DP5, PR3, PR4	4.02	5.15	14.8	3.5	5.9	14.2	30.6
6	DP7, PR5	4.91	6.53	15.8	3.4	5.8	16.9	37.7
7	DP8	0.63	0.56	13.8	3.6	6.1	2.3	3.4
8	DP9, PR6, PR7	6.82	8.86	16.0	3.4	5.7	23.3	50.9
9	DP6	1.34	1.86	14.4	3.6	6.0	4.8	11.2
10	DP10, PR8, PR9	8.51	11.16	16.8	3.4	5.6	28.5	62.8
11	DP11, PR10	9.07	12.13	17.7	3.3	5.5	29.7	66.7

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

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

Calculated by: CMN
Date: 1/9/2019
Checked by: VAS

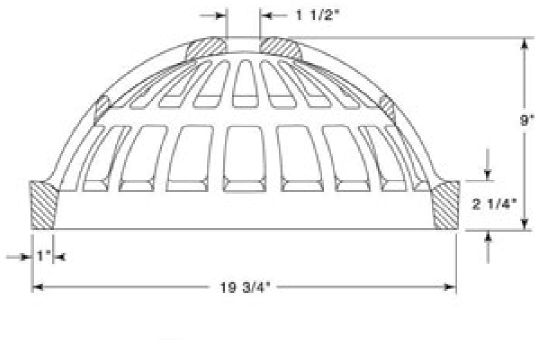
Overall Imperviousness of Copper Chase at Sterling Ranch				
Contributing Basins	***Area (Acres)***	***C_5***	***Impervious % (I)***	***(Acres)*(I)***
A	0.20	0.50	71	14.42
B	1.01	0.30	40	40.20
C	1.89	0.60	81	153.48
D	1.35	0.39	56	75.46
E	2.13	0.57	77	164.25
F	1.58	0.61	81	127.63
G	0.52	0.57	77	40.02
H	1.46	0.55	74	108.14
I	2.50	0.36	49	122.41
J	2.38	0.60	81	193.15
K	0.86	0.56	76	65.00
L	0.65	0.54	75	48.91
M	1.94	0.29	40	77.76
N	0.33	0.42	58	19.27
O	0.86	0.20	20	17.15
Totals	***19.7***			***1267.26***
Imperviousness of Site	***64.4***	**%**		

HYDRAULIC CALCULATIONS

R-4351-C NEENAH Beehive Grate Specifications

Beehive Grate

Heavy Duty



Catalog Number	Grate Type	Sq. Feet Open	Weir Perimeter Lineal Feet
R-4351-C	Beehive	1.2	5.2

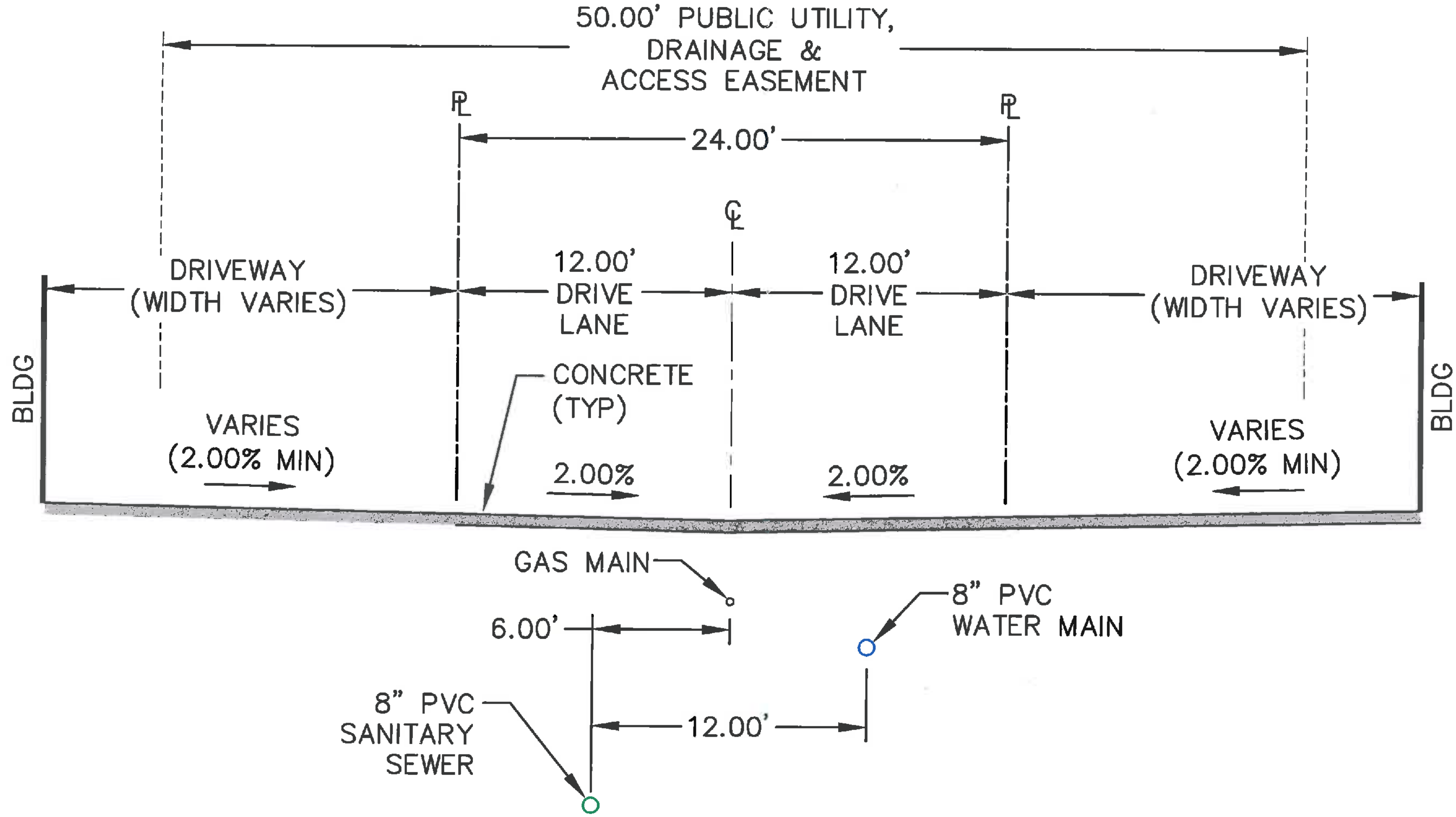
Copper Chase at Sterling Ranch
Drainage Beehive Grate Capacity (Orifice/Weir Head Required)
Design Points: **DP1, DP3, DP7**

Increment
0.085 ft

Open Area	1.20	sq ft
Glogging Factor 50%	0.60	sq ft
Non Obstr. Perm	5.2	ft

TOG EL	Head (ft)					**Orifice (cfs)**	**Weir (cfs)**
0.00	0					0	0
0.09	0.09					0.8	0.4
0.17	0.17					1.2	1.1
0.26	0.26					1.5	2.1
0.34	0.34					1.7	3.2
0.43	0.43					1.9	4.5
0.51	0.51					2.1	5.9
0.60	0.60					2.2	7.4
0.68	0.68					2.4	9.0
0.77	0.77					2.5	10.8
0.85	0.85					2.7	12.6
0.94	0.94					2.8	14.6

All beehive grate Design Points are less than 10.8 cfs.



TYPICAL SECTION – INTERNAL ACCESS ROAD [PRIVATE]

SCALE: N.T.S.

UDFCD UD-Inlet Manager

Version 4.05 Released March 2017

INLET MANAGEMENT

Worksheet Protected

	Rename	Rename	Rename	Rename	Rename	Rename
	Delete	Delete	Delete	Delete	Delete	Delete
INLET NAME	DP5	DP6	DP8	DP9	DP10	DP11
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	AREA	AREA	AREA	AREA	AREA	AREA
Hydraulic Condition	Swale	Swale	Swale	Swale	Swale	Swale
Inlet Type	User-Defined	User-Defined	User-Defined	User-Defined	User-Defined	User-Defined

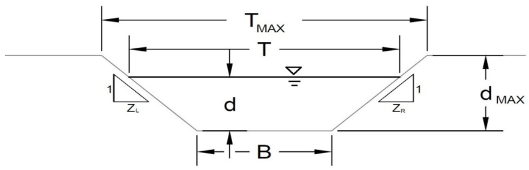
USER-DEFINED INPUT Show Input Det

User-Defined Design Flows						
Minor Q_{Known} (cfs)	5.4	4.8	5.2	4.6	1.4	1.9
Major Q_{Known} (cfs)	14.0	11.2	10.6	10.7	3.0	5.6
Bypass (Carry-Over) Flow from Upstream						
Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	0.0
Watershed Characteristics						
Subcatchment Area (acres)						
Percent Impervious						
NRCS Soil Type						
Watershed Profile						
Overland Slope (ft/ft)						
Overland Length (ft)						
Channel Slope (ft/ft)						
Channel Length (ft)						
Minor Storm Rainfall Input						
Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						
Major Storm Rainfall Input						
Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

AREA INLET IN A SWALE

COPPER CHASE AT STERLING RANCH

DP2, At-Grade Inlet



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013	
Channel Invert Slope	S_O =	0.0220	ft/ft
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	50.00	ft/ft
Right Side Slope	Z2 =	50.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- Non-Cohesive
- Cohesive
- Paved

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**24.00**	**50.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**0.24**	**0.50**	**feet**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**11.9**	**84.3**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**0.24**	**0.50**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**4.3**	**8.7**	**cfs**
Water Depth	d =	**0.16**	**0.21**	**feet**

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'

Version 4.05 Released March 2017

AREA INLET IN A SWALE

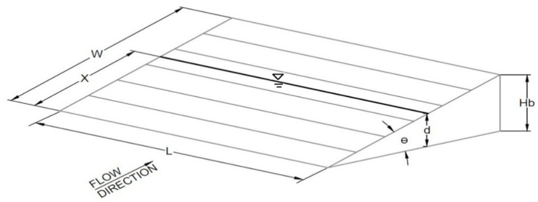
COPPER CHASE AT STERLING RANCH

DP2, At-Grade Inlet

Inlet Design Information (Input)

Type of Inlet: User-Defined — Inlet Type = User-Defined

Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	10.00	feet
Length of Grate	L =	2.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	



		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.16	0.21	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**2.3**	**3.4**	**cfs**
	Bypassed Flow, Q_b =	**2.0**	**5.3**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**53**	**39**	**%**

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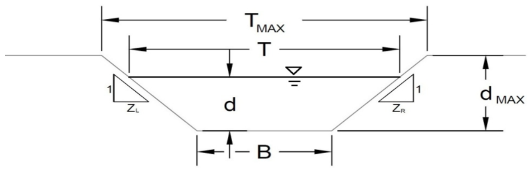
AREA INLET IN A SWALE

COPPER CHASE AT STERLING RANCH

DP4, At-Grade Inlet



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.017	
Channel Invert Slope	S_O =	0.0220	ft/ft
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	50.00	ft/ft
Right Side Slope	Z2 =	50.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- Non-Cohesive
- Cohesive
- Paved

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**24.00**	**50.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**0.24**	**0.50**	**feet**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**9.1**	**64.4**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**0.24**	**0.50**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**8.2**	**17.9**	**cfs**
Water Depth	d =	**0.23**	**0.31**	**feet**

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'

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AREA INLET IN A SWALE

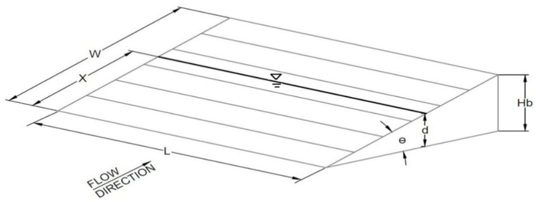
COPPER CHASE AT STERLING RANCH

DP4, At-Grade Inlet

Inlet Design Information (Input)

Type of Inlet: User-Defined — Inlet Type = User-Defined

Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	10.00	feet
Length of Grate	L =	2.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	



		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.23	0.31	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**3.8**	**6.0**	**cfs**
	Bypassed Flow, Q_b =	**4.4**	**11.9**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**47**	**33**	**%**

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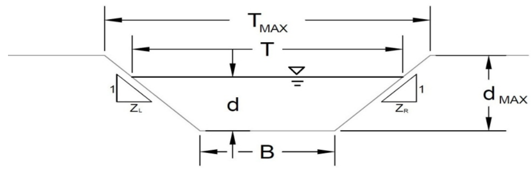
AREA INLET IN A SWALE

COPPER CHASE AT STERLING RANCH

DP5, Sump Inlet



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013	
Channel Invert Slope	S_O =	0.0010	ft/ft
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	50.00	ft/ft
Right Side Slope	Z2 =	50.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- Non-Cohesive
- Cohesive
- Paved

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**32.00**	**50.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**0.32**	**0.50**	**feet**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**5.5**	**18.0**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**0.32**	**0.50**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**5.4**	**14.0**	**cfs**
Water Depth	d =	**0.32**	**0.46**	**feet**

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'

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AREA INLET IN A SWALE

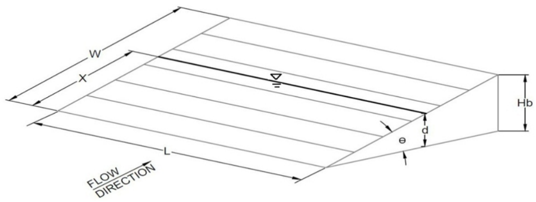
COPPER CHASE AT STERLING RANCH

DP5, Sump Inlet

Inlet Design Information (Input)

Type of Inlet: User-Defined — Inlet Type = User-Defined

Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	15.00	feet
Length of Grate	L =	2.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	



		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.32	0.46	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**8.5**	**14.6**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

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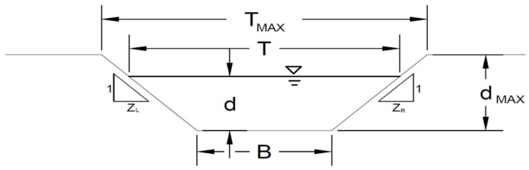
AREA INLET IN A SWALE

COPPER CHASE AT STERLING RANCH

DP6, Sump Inlet



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013	
Channel Invert Slope	S_O =	0.0010	ft/ft
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	50.00	ft/ft
Right Side Slope	Z2 =	50.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- **Non-Cohesive**
- **Cohesive**
- **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**32.00**	**50.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**0.32**	**0.50**	**feet**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**5.5**	**18.0**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**0.32**	**0.50**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**4.8**	**11.2**	**cfs**
Water Depth	d =	**0.30**	**0.42**	**feet**

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'

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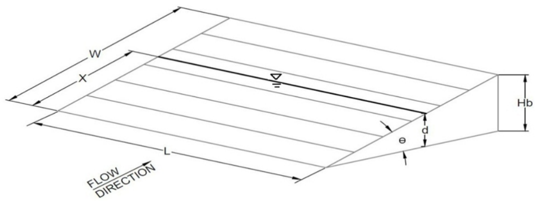
AREA INLET IN A SWALE

COPPER CHASE AT STERLING RANCH

DP6, Sump Inlet

Inlet Design Information (Input)

Type of Inlet: User-Defined — Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	15.00	feet
Length of Grate	L =	2.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.30	0.42	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**8.0**	**12.8**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

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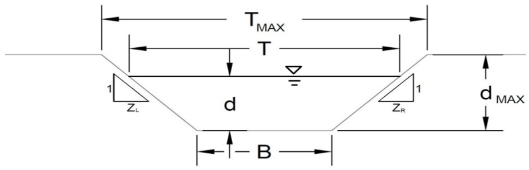
AREA INLET IN A SWALE

COPPER CHASE AT STERLING RANCH

DP8, At-Grade Inlet



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013	
Channel Invert Slope	S_O =	0.0339	ft/ft
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	50.00	ft/ft
Right Side Slope	Z2 =	50.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- Non-Cohesive
- Cohesive
- Paved

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	24.00	50.00	feet
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	0.24	0.50	feet

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	14.8	104.7	cfs
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	0.24	0.50	ft

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	5.2	10.6	cfs
Water Depth	d =	0.16	0.21	feet

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'

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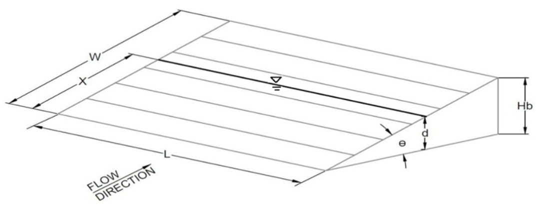
AREA INLET IN A SWALE

COPPER CHASE AT STERLING RANCH

DP8, At-Grade Inlet

Inlet Design Information (Input)

Type of Inlet	User-Defined	Inlet Type =	User-Defined



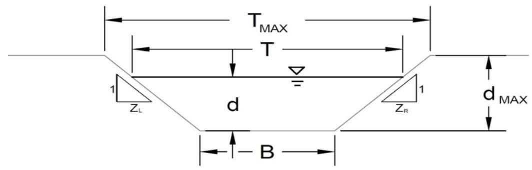
Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	10.00	feet
Length of Grate	L =	2.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.16	0.21	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**2.3**	**3.4**	**cfs**
	Bypassed Flow, Q_b =	**2.9**	**7.2**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**43**	**32**	**%**

AREA INLET IN A SWALE

COPPER CHASE AT STERLING RANCH

DP9, Sump Inlet



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E			
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013		
Channel Invert Slope	S_O =	0.0010		ft/ft
Bottom Width	B =	0.00		ft
Left Side Slope	Z1 =	50.00		ft/ft
Right Side Slope	Z2 =	50.00		ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ○ Non-Cohesive
- ○ Cohesive
- ● Paved

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**32.00**	**50.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**0.32**	**0.50**	**feet**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**5.5**	**18.0**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**0.32**	**0.50**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**4.6**	**10.7**	**cfs**
Water Depth	d =	**0.30**	**0.41**	**feet**

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'

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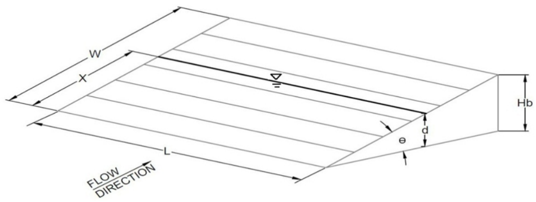
AREA INLET IN A SWALE

COPPER CHASE AT STERLING RANCH

DP9, Sump Inlet

Inlet Design Information (Input)

Type of Inlet	User-Defined	Inlet Type =	User-Defined
Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	15.00	feet
Length of Grate	L =	2.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

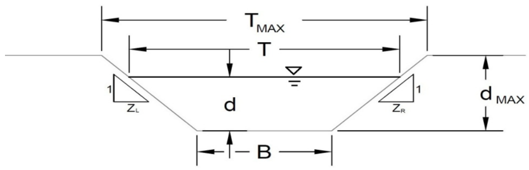


		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.30	0.41	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**7.8**	**12.5**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

AREA INLET IN A SWALE

COPPER CHASE AT STERLING RANCH

DP10, Sump Inlet



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E			
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013		
Channel Invert Slope	S_O =	0.0010		ft/ft
Bottom Width	B =	0.00		ft
Left Side Slope	Z1 =	50.00		ft/ft
Right Side Slope	Z2 =	50.00		ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- Non-Cohesive
- Cohesive
- Paved

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	32.00	50.00	feet
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	0.32	0.50	feet

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	5.5	18.0	cfs
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	0.32	0.50	ft

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	1.4	3.0	cfs
Water Depth	d =	0.19	0.26	feet

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'

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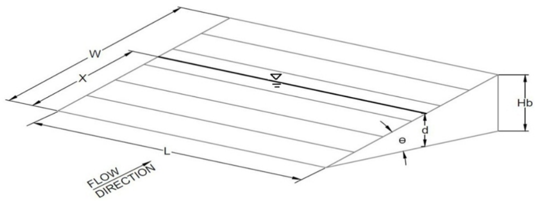
AREA INLET IN A SWALE

COPPER CHASE AT STERLING RANCH

DP10, Sump Inlet

Inlet Design Information (Input)

Type of Inlet: User-Defined — Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	10.00	feet
Length of Grate	L =	2.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.19	0.26	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**2.9**	**4.5**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

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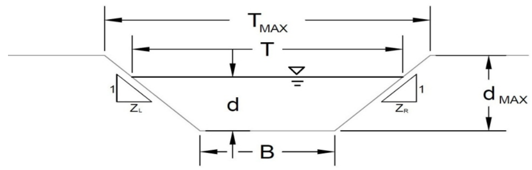
AREA INLET IN A SWALE

COPPER CHASE AT STERLING RANCH

DP11, Sump Inlet



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.022	
Channel Invert Slope	S_O =	0.0010	ft/ft
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	50.00	ft/ft
Right Side Slope	Z2 =	50.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- Non-Cohesive
- Cohesive
- Paved

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**32.00**	**50.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**0.32**	**0.50**	**feet**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**3.2**	**10.6**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**0.32**	**0.50**	**ft**

Water Depth in Channel Based On Design Peak Flow				
Design Peak Flow	Q_o =	**1.9**	**5.6**	**cfs**
Water Depth	d =	**0.26**	**0.39**	**feet**

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'

Version 4.05 Released March 2017

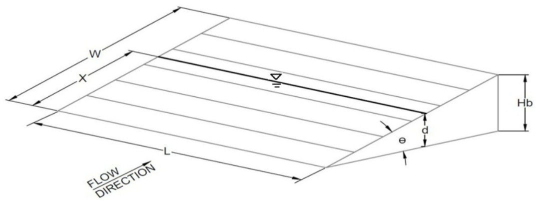
AREA INLET IN A SWALE

COPPER CHASE AT STERLING RANCH

DP11, Sump Inlet

Inlet Design Information (Input)

Type of Inlet	User-Defined	Inlet Type =	User-Defined
Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	10.00	feet
Length of Grate	L =	2.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	



		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.26	0.39	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**4.6**	**8.5**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

Provide Existing Drainage Plan

PROPOSED DRAINAGE MAP

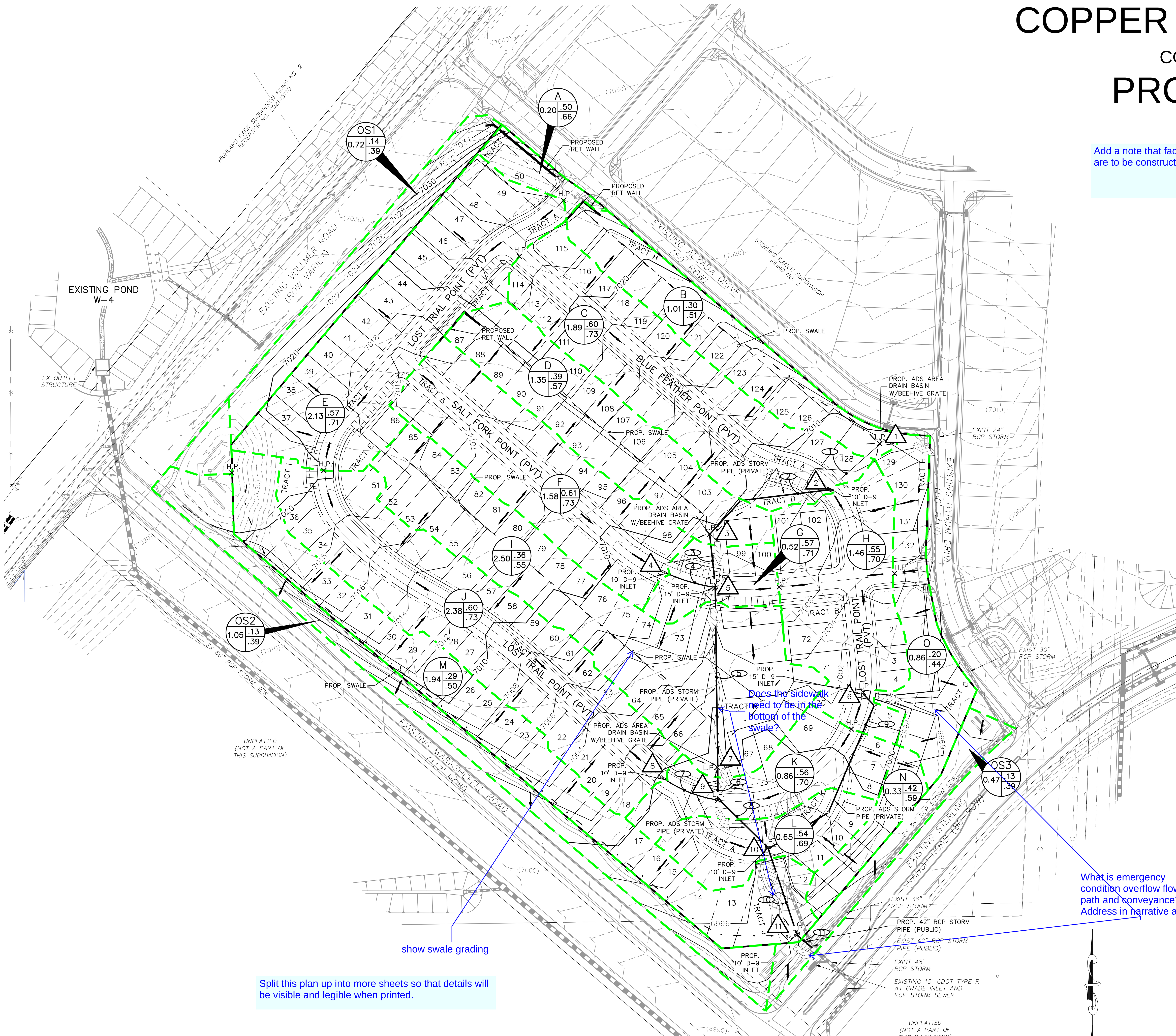
COPPER CHASE AT STERLING RANCH

COUNTY OF EL PASO, STATE OF COLORADO

PROPOSED DRAINAGE MAP

FEBRUARY 2019

Add a note that facilities listed as existing are to be constructed with SR Filing #2.



Split this plan up into more sheets so that details will be visible and legible when printed.

1" = 80'

0 40 80 160

Scale in Feet

LEGEND

- BASIN DESIGNATION (Z), ACRES (25), C5 (.25), C100 (.35)
- PIPE RUN REFERENCE LABEL
- SURFACE DESIGN POINT
- BASIN BOUNDARY
- SITE BOUNDARY
- (6920) EXISTING CONTOUR MAJOR
- 6920 PROP CONTOUR MAJOR
- 6920 PROP CONTOUR MINOR
- EXISTING TELEPHONE LINE
- EXISTING GAS LINE
- EXISTING PETROLEUM LINE
- EXISTING FENCE LINE
- PROPOSED STORM SEWER PIPE
- EXISTING STORM SEWER PIPE
- PROPOSED DRAINAGE SWALE
- EXISTING DRAINAGE SWALE
- CROSSPAN
- INLET
- EXISTING FLOW DIRECTION ARROW
- EMERGENCY OVERFLOW DIRECTION
- PROPOSED FLOW DIRECTION ARROW
- FLARED END SECTION
- H.P. HIGH POINT
- L.P. LOW POINT

BASIN SUMMARY

BASIN	AREA (ACRES)	Q_5	Q_{100}
A	0.20	0.4	1.0
B	1.01	1.3	3.5
C	1.89	4.3	8.7
D	1.35	2.0	4.9
E	2.13	4.9	10.2
F	1.58	3.6	7.3
G	0.52	1.2	2.5
H	1.46	3.1	6.6
I	2.50	3.3	8.4
J	2.38	5.2	10.6
K	0.86	1.9	3.9
L	0.65	1.4	3.0
M	1.94	1.9	5.6
N	0.33	0.6	1.4
O	0.86	0.7	2.6
OS1	0.72	0.4	1.9
OS2	1.05	0.6	2.8
OS3	0.47	0.3	1.3

DESIGN POINT SUMMARY

DESIGN POINT	Q_5	Q_{100}	BASIN	STRUCTURE
1	1.3	3.5	B	ADS AREA INLET
2	4.3	8.7	C	10' D-9 AT-GRADE INLET
3	2.0	4.9	D	ADS AREA INLET
4	8.2	17.9	E, F, OS1	10' D-9 AT-GRADE INLET
5	5.4	14.0	G, FLOWBY DP4	15' D-9 SUMP INLET
6	4.8	11.2	H, FLOWBY DP2	15' D-9 SUMP INLET
7	3.3	8.4	I	ADS AREA INLET
8	5.2	10.6	J	10' D-9 AT-GRADE INLET
9	4.6	10.7	K, FLOWBY DP8	15' D-9 SUMP INLET
10	1.4	3.0	L	10' D-9 SUMP INLET
11	1.9	5.6	M	10' D-9 SUMP INLET

STORM SEWER SUMMARY

PIPE RUN	Q_5	Q_{100}	PIPE SIZE	CONTRIBUTING PIPES & DESIGN POINTS
1	1.3	3.5	18" ADS*	DP1
2	3.6	7.0	24" ADS*	DP2, PR1
3	5.4	11.5	24" ADS*	DP3, PR2
4	3.8	6.0	18" ADS*	DP4
5	14.2	30.6	30" ADS*	DP5, PR3, PR4
6	16.9	37.7	30" ADS*	DP7, PR5
7	2.3	3.4	18" ADS*	DP8
8	23.3	50.9	36" ADS*	DP9, PR6, PR7
9	4.8	11.2	24" ADS*	DP6
10	28.5	62.8	42" RCP*	DP10, PR8, PR9
11	29.7	66.7	42" RCP	DP11, PR10

*ALL ADS STORM SEWER AND PIPE RUN 10 IS TO BE PRIVATE.

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES

FOR BURIED UTILITY INFORMATION

48 HRS BEFORE YOU DIG

CALL 1-800-922-1987

M&S CIVIL CONSULTANTS, INC.

20 BOULDER CRESCENT, SUITE 110

COLORADO SPRINGS, CO 80903

PHONE: 719.955.5485

COPPER CHASE AT STERLING RANCH

PROPOSED DRAINAGE MAP

PROJECT NO. 09-014	SCALE:	DATE: 2/9/2019	
DESIGNED BY: CMN	HORIZONTAL: 1"=80'	SHEET 1 OF 1	PDM
DRAWN BY: CMN	VERTICAL: N/A		
CHECKED BY: VAS			

File: O:\09014A\Challenger PUD\dwg\Eng Exhibits\Proposed Drainage Map PDM.dwg Plotstamp: 2/14/2019 4:24 PM