McCune Ranch Subdivision
17480 Meridian Road North
Colorado Springs, Colorado 80924

Preliminary Drainage Report

OCTOBER 12, 2018

PREPARED FOR:
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43911
LANCE
PROFESSIONAL ENGINEER

Digitally signed by Lance VanDemark
'Date: 2018.10.12 16:00:17 -06'00

Benjamin Jenkins, P.E.	Lance VanDemark, P.E.
Project Engineer	Project Manager

Add "PCD File No. SP-18-006"

Engineer's Certification

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

_____

Lance VanDemark, P.E.
Registered Professional Engineer
State of Colorado No. 43911

Owner's Certification

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

PT McCune, LLC
Name of Developer

_____
Authorized Signature

El Paso County

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

_____ _____

Elizabeth Nijkamp **Date**
County Engineer Manager

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1.0 GENERAL LOCATION AND DESCRIPTION

The following report provides detailed drainage information for existing and proposed conditions for the McCune Ranch Subdivision project. The intent of this report is to show the routing of minor and major storms through the proposed site in accordance with El Paso County Standards. For this site, a minor flow is defined as the 5-year frequency storm and a major flow as the 100-year frequency storm. The information given in this report is intended to provide an adequately detailed analysis of on-site drainage areas and receiving facilities. This development will consist of large-lot single family residential lots, access roads, and the required infrastructure to serve them.

GENERAL LOCATION

The site is located at 17480 Meridian Road North or, more generally, at the northwest corner of Hodgen Road and Meridian Road North in unincorporated El Paso County, latitude 39°04'38" N and longitude 104°36'47" W. The subject property is undeveloped and situated in the West Half of Section 19, Township 11 South, Range 64 West of the 6th P.M., County of El Paso, State of Colorado.

The site is bounded to the south by Hodgen Road, to the east by Meridian Road North, and to the north and west by several parcels zoned primarily as Agricultural and Residential use with some Forest Land. On the east side of Median Road is Forest Green Subdivision, a low-density single-family development. On the south side of Hodgen Road is Bison Meadows Subdivision which is also a low-density single family residential subdivision. The remainder of properties surrounding the site have not yet been formally platted. The site has not been included in any previous drainage study. West Kiowa Creek flows approximately through the center of the property from the southwest corner to the northeast corner, just upstream, to the west of the

property lies the West Kiowa Creek Watershed 1-N-10 Reservoir. There are no irrigation ditches on the property.

DESCRIPTION OF PROPERTY

The existing site contains 766 acres of agricultural grazing land and dry farm land. Ground cover consists mainly of native grasses, shrubs, and several stands of evergreen trees along its northern and southern boundary. Existing wetlands are present along West Kiowa Creek and its tributaries, wetland boundaries are located roughly 50 feet to either side of the thalweg of West Kiowa Creek and the drainageway way to the south of the creek on the property. There are no existing irrigation canals or ditches on the project site nor are there any major geologic features. The property generally slopes in a northeasterly direction with slopes ranging between 1-16%. Soils consist of Alamosa loam, Brussett loam, Cruckton sandy loam, Elbeth sandy loam, Holderness loam, Kettle gravelly loamy sands, Peyton sandy loam, Peyton-Pring complex, Pring course sandy loam, Tomah-Crowford loamy sands and Tomah-Crowfoot complex. Most of the site has soils classified in Hydrologic Soil Group B; however, the property also contains a small mixture of soils from Hydrologic Soils Groups C and D located in the areas in and adjacent to West Kiowa Creek and its tributaries. A soils map prepared by Natural Resources Conservation Service is included in the Appendix.

The development of this property will consist of 143 2.5 to 5 acre single family residential lots and the requisite public roads and stormwater infrastructure to serve them. Anticipated construction activities include earthwork and paving associated with the public road development, as well as the installation of culverts and water quality ponds to convey and treat stormwater on the site. As previously discussed, West Kiowa Creek bisects the property, flowing from southwest to northeast. In addition, a major tributary of West Kiowa Creek flows north from a point halfway along the southern property boundary and intersects West Kiowa Creek in the

middle of the property. The primary access for the site will be from 3 points along Hodgen Road and 1 entry point along Meridian Road.

Replace "Watershed" with "Drainage Basin (KIKI0200)"

2.0 DRAINAGE BASINS AND SUB-BASINS

MAJOR BASIN DESCRIPTION

The site resides within the West Kiowa Creek Watershed which is located near the northern boundary of El Paso County, approximately 14.5 miles east of downtown Monument, CO. This watershed begins approximately 5 miles southwest of the McCune property and continues another 10 miles to the northeast where it outfalls into Kiowa Creek which eventually discharges into the South Platte River near Fort Morgan, CO.

update "...no major drainage studies (DBPS or MDDP)..."

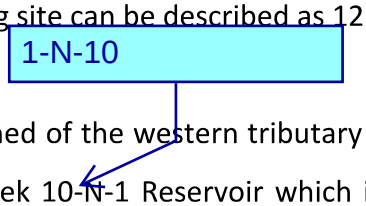
DRAINAGE STUDIES, OUTFALL SYSTEM PLANS, & SITE CONSTRAINTS

There are no major drainage studies for this area on record and no base flood elevations for this reach of West Kiowa Creek that have been established. In conjunction with the development of this site, a floodplain study is being performed on the section of West Kiowa Creek located within the property. A Letter of Map Revision will be submitted to FEMA to establish the floodplain boundary on-site. A plan showing the preliminary 100 year floodplain line is included in the appendix. The site is shown on FEMA flood maps 08041C0325F and 08041C0350F which indicate that the majority of the site is in Zone X – an area outside of the 0.2% annual chance of flood (see the accompanying exhibits in the Appendix). The areas immediately adjacent to West Kiowa Creek are designated as Zone A, which is a 100-year Flood Hazard Area in which no base flood elevations have been determined There are no known irrigation facilities located on the property at the current time.

EXISTING SUB-BASIN DESCRIPTION

Historically, the runoff from the property flows into West Kiowa Creek, which bisects the site flowing from the southwest corner of the property to the northeast corner. There are 7 on-site sub-basins and 4 off-site sub-basin that contribute flows to West Kiowa Creek. The 8 on-site sub-basins correspond to the largest defined natural drainage channels that occur on site, while the 4 off-site basins are defined by the entire West Kiowa Creek watershed that is upstream from the subject property.

As previously discussed, the site is currently undeveloped, containing mainly native grasses and shrubs, with limited forested areas along the northern and southern boundary of the site. The existing topography of the site slopes generally in a northerly direction with grades varying from 1-16%. There are no existing irrigation canals or ditches on the project site nor are there any major geologic features. The existing site can be described as 12 sub-basins as follows:



Sub-Basin A is the 915-acre watershed of the western tributary to West Kiowa Creek. This sub-basin contains the West Kiowa Creek 10-N-1 Reservoir which is located about a quarter-mile upstream of the property to the west. The sub-basin generates peak runoff of 333.53cfs in the 5-year event and peak runoff of 1034cfs in the 100-year event. Stormwater generated within the basin flows east from Southwood Drive to the subject property and discharges into West Kiowa Creek immediately to the east of the western property boundary.

Consisting of the entire West Kiowa Creek watershed that is south of Hodgen Road, Sub-Basin B encompasses 3837 acres and generates peak runoff of 226cfs in the 5-year event and peak runoff of 1419cfs in the 100-year event. Sub-Basin B begins approximately 5 miles to the southwest of the McCune property near Black Forest, CO. Stormwater generated within the basin flows from southwest to northeast.

Stormwater generated within the 101-acre sub-basin Bb has a peak runoff of 35cfs in the 5-year event and peak runoff of 122cfs in the 100-year event. Sub-Basin Bb is located at the southwest corner of the property and consists of the land immediately tributary to West Kiowa Creek on the north side of Hodgen Road.

Sub-Basin C located in the southwest corner of the property and consists of both on-site and off-site areas. This sub-basin has an area of 233-acres and generates peak runoff of 30cfs in the 5-year event and peak runoff of 175cfs in the 100-year event. This sub-basin consists of the land tributary to a minor drainage channel that crosses Hodgen Road just east of the southwest property corner.

Sub-Basin D is the 411-acre watershed of the southern tributary to West Kiowa Creek. This sub-basin contains a significant fraction of the southern half of the McCune property as well as offsite flows that overtop Hodgen Road along this drainageway. The sub-basin generates peak runoff of 63cfs in the 5-year event and peak runoff of 322cfs in the 100-year event. Stormwater generated within the basin flows north from Pole Pine Point to the subject property and discharges into West Kiowa Creek immediately near the center of the project site.

Sub-Basin E located in the southeast corner of the property and consists of an on-site watershed that discharges into West Kiowa Creek at the eastern property line. This sub-basin has an area of 115-acres and generates peak runoff of 36cfs in the 5-year event and peak runoff of 129cfs in the 100-year event. This sub-basin consists of the land tributary to a minor drainage channel that is north of Hodgen Road on the eastern side of the site.

Sub-Basin F located in the southeast corner of the property and consists of an on-site watershed that discharges into West Kiowa Creek to the east of the property. This sub-basin has an area of 45-acres and generates peak runoff of 15cfs in the 5-year event and peak runoff of 55cfs in the

100-year event. This sub-basin consists of the land tributary to a minor drainage channel that is north of Hodgen Road on the eastern side of the site.

Sub-Basin G located on the western side of the property and consists of an on-site watershed of a minor natural drainage channel that flows from west to east and discharges into West Kiowa Creek near the west of the property. This sub-basin has an area of 108 acres and generates peak runoff of 41cfs in the 5-year event and peak runoff of 144cfs in the 100-year event.

Sub-Basin H located in the northern side corner of the property and consists of an on-site watershed that discharges into West Kiowa Creek on the north side of the property. This sub-basin has an area of 122 acres and generates peak runoff of 60cfs in the 5-year event and peak runoff of 187cfs in the 100-year event. This sub-basin consists of the land tributary to a minor drainage channel that is north of West Kiowa Creek on the western side of the site.

Sub-Basin I located in the northeast corner of the property and consists of an on-site watershed that discharges into West Kiowa Creek to the east of the property. This sub-basin has an area of 38-acres and generates peak runoff of 32cfs in the 5-year event and peak runoff of 79cfs in the 100-year event. This sub-basin consists of the land tributary to a minor drainage channel that is north of West Kiowa Creek on the eastern side of the site.

Sub-Basin J located in the northeast corner of the property and consists of an on-site watershed that discharges to the north of the property in existing natural drainage channels. This sub-basin has an area of 10-acres and generates peak runoff of 4cfs in the 5-year event and peak runoff of 15cfs in the 100-year event. This sub-basin consists of the land tributary to a minor drainage channel that is north of Hodgen Road on the eastern side of the site.

Sub-Basin K located in the northeast corner of the property and consists of an on-site watershed that discharges to the north of the property in existing natural drainage channels. This sub-basin

Revise. Identify the hydrology method used (should be NRCS Curve Number methodology) with AutoCAD Storm and Sanitary 2018.

has an area of 17.8-acres and generates peak runoff of 12cfs in the 5-year event and peak runoff of 32cfs in the 100-year event. This sub-basin consists of the land tributary to a minor drainage channel that is north of Hodgen Road on the eastern side of the site.

Flow rate numbers were generated using AutoCAD Storm and Sanitary 2018 modeling software. Colorado Springs Stormwater Manual criteria was used for identifying curve numbers of the type B, C, and D NRCS Hydrologic Soil Groups as they applied to the various sub-basins. A Spreadsheet summarizing the results of calculations for the existing conditions can be found in the Appendix.

PROPOSED SUB-BASIN DESCRIPTION

In the proposed condition, stormwater runoff will generally flow from southwest to northeast as it does in the existing condition. The main difference between the existing and proposed conditions is that the flow paths of West Kiowa Creek and the various tributary drainageways will intersect the proposed public roads that will access the residential lots. All existing drainage patterns will be maintained throughout the site to the extent possible. To calculate the design flows for each of the proposed culverts that will convey runoff across the proposed roads, the existing basins were subdivided to create design points at each of the proposed crossing locations. As a result, there are 33 on-site sub-basins and 7 off-site sub-basins in the proposed condition.

In accordance with the above-mentioned drainage patterns, the proposed project will be divided into 40 sub-basins that are described as follows:

Sub-Basin A1 is an off-site sub-basin to the west of the property that consists mostly of agricultural land and has an area of 1032 acres. Sub-Basin A1 also contains West Kiowa Creek 10-N-1 Reservoir. The curve number for Sub-Basin A1 is 72.12. The basin will generate runoff of 350.24cfs and 1093.32cfs in the minor and major storms, respectively. Flows from this sub-basin

will be conveyed by a natural drainage channel through Sub-Basin A3 to West Kiowa Creek, which will convey flows off the site to the northeast.

Sub-Basin A2 is a small off-site sub-basin to the west of the property consisting of mostly of native grasslands and has an area of 37 acres. The curve number for Sub-Basin A2 is 72.00. The basin will generate runoff of 16.96cfs and 52.73cfs in the minor and major storms, respectively. Flows from this sub-basin will also be conveyed by a natural drainage channel through Sub-Basin A3 to West Kiowa Creek, which will convey flows off the site to the northeast.

Sub-Basin A3 consists of 3 large residential lots to the west of Road D on the western boundary of the site and has an area of 33.1 acres. The curve number for Sub-Basin A3 is 73.80. The basin will generate runoff of 19.27cfs and 55.77cfs in the minor and major storms, respectively. Flows from this sub-basin will be conveyed by natural drainageways and along the side of Road D from the northwest to the southeast end of the basins where flows will be treated by an 0.211 ac-ft water quality pond, Pond 1, before being intercepted by a double 6' x 16' box culvert that will convey flows under Road D to West Kiowa Creek.

Sub-Basin B1 consists of the West Kiowa Creek watershed to the south of Hodgen Road. This sub-basin has an area of 3670 acres. The curve number for Sub-Basin B1 is 60.00. The basin will generate runoff of 244.88cfs and 1426.59cfs in the minor and major storms, respectively. Flows from this sub-basin will be conveyed from the southwest to northeast in the West Kiowa Creek streambed to the bridge at Hodgen Road, Design Point 4.

Show DPs on the map.

Sub-Basin B2 consists of two large residential lots at the southwest corner of the project. This sub-basin has an area of 6.9 acres. The curve number for Sub-Basin B2 is 64.00. The basin will generate runoff of 1.84cfs and 8.85cfs in the minor and major storms, respectively. Flows from this basin will travel across the lots from south to north where they will be intercepted by an 18" RCP culvert in cul-de-sac H at Design Point 5. From the culvert flows will be conveyed across Sub-

Basin B4 to water quality pond 2. Exiting the pond, the water is then conveyed to the drainage channel entering West Kiowa Creek.

Sub-Basin B3 is an off-site sub-basin to the west of the site near the southwest corner of the property. This sub-basin has an area of 54.9 acres. The curve number for Sub-Basin B3 is 60.00. The basin will generate runoff of 5.27cfs and 37.23cfs in the minor and major storms, respectively. Flows from this sub-basin will be intercepted by a double 6' x 16' box culvert under the proposed public road along the western border of the site at Design Point 6. From the box culvert, stormwater will be conveyed by a natural drainage channel through Sub-Basin B4 to West Kiowa Creek, which will convey flows off the site to the northeast.

Sub-Basin B4 consists of 7 large residential lots, a water quality pond and West Kiowa Creek at the southwest corner of the property. This sub-basin has an area of 45.8 acres. The curve number for Sub-Basin B4 is 65.50. The basin will generate runoff of 10.06cfs and 44.27cfs in the minor and major storms, respectively. Flows from this basin will flow north from the lots on the eastern side of the sub-basin to the 0.423 ac-ft water quality pond, Pond 2, at the south west corner of the Road D and Road A. From the pond, runoff will discharge to West Kiowa Creek and will be intercepted by the 6' x 16' box culvert under Road A at Design Point 7.

Sub-Basin C1 is an off-site sub-basin to the south of Hodgen Road. This sub-basin has an area of 162.7 acres. The curve number for Sub-Basin C1 is 60.00. The basin will generate runoff of 15.09cfs and 106.32cfs in the minor and major storms, respectively. Flows from this sub-basin will be conveyed north by a natural drainage channel to Hodgen Road at Design Point 8. From Hodgen Road, in the major storm, water will overtop the road and travel across Sub-Basin C2 and Sub Basin C3 in a drainage channel to West Kiowa Creek. In a minor storm, water will pond at a low point on the south side of Hodgen Road.

Sub-Basin C2 consists of 7 large residential lots along the southern boundary of the property. This sub-basin has an area of 23 acres. The curve number for Sub-Basin C2 is 64.00. The basin will generate runoff of 4.87cfs and 23.76cfs in the minor and major storms, respectively. Stormwater from this basin will flow north across the lots to a 36" RCP culvert under cul-de-sac B at Design Point 9. From the culvert flows will be conveyed across Sub-Basin C3 in a natural drainage channel to the water quality pond 3 in Sub-Basin B4 and ultimately will discharge into West Kiowa Creek.

Sub-Basin C3 consists of 5 large residential lots in southern half of the property, just south of Road D. This sub-basin has an area of 16.1 acres. The curve number for Sub-Basin C3 is 66.50. The basin will generate runoff of 3.68cfs and 17.91cfs in the minor and major storms, respectively. Runoff from this basin will flow to the northwest across the lots to a 36" RCP culvert under Road A at Design Point 10. From the culvert runoff will flow into water quality pond 2 in Sub-Basin B4 and will be discharged into West Kiowa Creek.

Sub-Basin C4 consists of only two residential lots and a portion of West Kiowa Creek north of the southern loop of Road D. This sub-basin has an area of 23.8 acres. The curve number for Sub-Basin C4 is 66.50. The basin will generate runoff of 5.83cfs and 24.03cfs in the minor and major storms, respectively. Water quality for these 2 lots will be achieved through other means than a pond (grass swale) in the back half of the lots. Stormwater from this sub-basin will flow north across the residential lots to West Kiowa Creek.

Sub-Basin D1 is an off-site sub-basin to the south of Hodgen Road consisting of agricultural land and large residential lots. This sub-basin has an area of 201.3 acres. The curve number for Sub-Basin D1 is 60.00. The basin will generate runoff of 18.54cfs and 130.35cfs in the minor and major storms, respectively. Water will be conveyed north along a natural drainage channel to Hodgen Road at Design Point 12. Stormwater from this sub-basin will pond at a low point on the south side of Hodgen Rd. In a major storm, water will overtop the road and enter the site being

conveyed through Sub-Basin D2 in the southern tributary to West Kiowa Creek which converges with West Kiowa near the center of the property.

Sub-Basin D2 consists of 17 large residential lots and the southern tributary to West Kiowa Creek. This sub-basin has an area of 70.1 acres. The curve number for Sub-Basin D2 is 65.50. The basin will generate runoff of 16.86cfs and 73.77cfs in the minor and major storms, respectively. Stormwater from this basin will flow across the lots to a 0.304 ac-ft water quality pond, Pond 3, which discharges to the southern tributary to West Kiowa Creek where it is conveyed north to the southern loop of Road D. At Design Point 13, a 54" culvert will convey flows across Road D into Sub-Basin D5.

Sub-Basin D3 consists of 12 large residential lots at the southeast corner of the property. This sub-basin has an area of 41.2 acres. The curve number for Sub-Basin D3 is 64.00. The basin will generate runoff of 7.55cfs and 36.85cfs in the minor and major storms, respectively. Stormwater from this sub-basin will flow west across the residential lots to a natural channel that will convey flows to the north to a 24" culvert under Road F at Design Point 14. From the culvert runoff will continue to flow north through Sub-Basin D4 in a natural drainageway.

Sub-Basin D4 consists of 12 large residential lots to the south of the southern loop of Road D. This sub-basin has an area of 34.3 acres. The curve number for Sub-Basin D4 is 64.00. The basin will generate runoff of 7.47cfs and 36.45cfs in the minor and major storms, respectively. Stormwater from this sub-basin will flow across the residential lots to a natural drainage channel that will convey flows north to a 42" culvert under Road D at Design Point 15. From the culvert, runoff will continue north through Sub-Basin D6 to water quality pond 4 and then discharge to a natural drainage channel flowing to West Kiowa Creek.

Sub-Basin D5 consists of a portion of the southern tributary to West Kiowa Creek immediately to the north of the southern loop of Road D. This sub-basin has an area of 12.8 acres. The curve

number for Sub-Basin D5 is 67.20. The basin will generate runoff of 4.17cfs and 16.37cfs in the minor and major storms, respectively. Stormwater from this sub-basin generally flows south to north along the southern tributary streambed.

Sub-Basin D6 consists of 5 large residential lots and the portion of West Kiowa Creek on the northwest corner of Road G and Road D. This sub-basin has an area of 41.8 acres. The curve number for Sub-Basin D6 is 64.80. The basin will generate runoff of 8.49cfs and 39.17cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows northwest across the residential lots to a 0.504 ac-ft water quality pond, Pond 4, which will discharge to West Kiowa Creek. Flows in the creek pass through a 10'x5' RCB culvert at Design Point 17.

Update. Sub-Basin E1 includes a commercial lot. Elaborate on the commercial aspect of this sub-basin. On-site FSD should be provided on-site before releasing into the public roadside ditch.

Sub-Basin E1 consists of 4 large residential lots in the southeast corner of the property. This sub-basin has an area of 30.1 acres. The curve number for Sub-Basin E1 is 64.80. The basin will generate runoff of 6.07cfs and 27.96cfs in the minor and major storms, respectively. Stormwater from this sub-basin will flow north across the residential lots to a 24" RCP culvert under Road D at Design Point 18. From the culvert flows proceed north through Sub-Basin E4 in a natural drainage channel.

Sub-Basin E2 consists of a portion of a large residential lot at the southwest corner of cul-de-sac I and Road C. This sub-basin has an area of 2.6 acres. The curve number for Sub-Basin E2 is 64.00. The basin will generate runoff of 0.70cfs and 3.34cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows north to a 18" RCP culvert at Design Point 19 under cul-de-sac D. Form the culvert, runoff flows in a natural drainage channel to Sub-Basins E3.

Sub-Basin E3 consists of 6 large residential lots on the south side of Road F. This sub-basin has an area of 20.4 acres. The curve number for Sub-Basin E3 is 64.00. The sub-basin will generate runoff of 4.76cfs and 23.18cfs in the minor and major storms, respectively. Stormwater from this sub-

basin flows east across the lots to a natural drainage channel which conveys flows north to the 24" culvert under Road F at Design Point 20. From the culvert, runoff continues down the natural drainage channel through Sub-Basins E4.

Sub-Basin E4 consists of 5 large residential lots to the north of Road F in the southeast corner of the property. This sub-basin has an area of 18.7 acres. The curve number for Sub-Basin E4 is 64.00. The basin will generate runoff of 4.29cfs and 20.90cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows to the natural drainage channel running through the center of the sub-basin and are conveyed north to the 36" RCP culvert under Road D. From the culvert, the flows continue north through Sub-Basin E7.

Sub-Basin E5 consists of portions of 7 large residential lots south of Road D near the southern terminus of Road H. This sub-basin has an area of 13.5 acres. The curve number for Sub-Basin E5 is 64.00. The basin will generate runoff of 3.17cfs and 15.43cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed north to the 18" RCP culvert under Road D at Design Point 22. From the culvert the flows continue north through Sub-Basin E6 in a natural drainage channel.

Sub-Basin E6 consists of 6 large residential lots along the eastern boundary of the property north of Road D. This sub-basin has an area of 28.9 acres. The curve number for Sub-Basin E6 is 61.70. The basin will generate runoff of 4.61cfs and 27.59cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed north to the 0.165 ac-ft water quality pond, Pond 5. From the pond flows continue north in a natural drainage channel and are discharged to the property to the north as they were in the existing condition.

Sub-Basin E7 consists of a portion of 5 large residential lots on the eastern side of the property north of Road D. This sub-basin has an area of 9.8 acres. The curve number for Sub-Basin E7 is 64.00. The basin will generate runoff of 2.47cfs and 11.93cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed north to the 0.638 ac-ft water quality pond, Pond 6. From the pond flows continue north in a natural drainage channel and are discharged to the property to the north as they were in the existing condition.

Sub-Basin F1 consists of portions of 5 large residential lots along the eastern boundary of the project, on the east side of Road G. This sub-basin has an area of 24.0 acres. The curve number for Sub-Basin F1 is 60.00. The basin will generate runoff of 2.47cfs and 17.63cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed north to the 18" RCP culvert under Road D at Design Point 25. From the culvert the flows continue north through Sub-Basin F2.

Sub-Basin F2 consists of portions of 8 large residential lots along the eastern boundary of the project, on the east side of cul-de-sac A. This sub-basin has an area of 19.8 acres. The curve number for Sub-Basin F2 is 60.00. The basin will generate runoff of 2.36cfs and 17.09cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed north to the 0.134 ac-ft water quality pond, Pond 7. From the pond, flows continue north in a natural drainage channel and are discharged from the property to the north as they were in the existing condition.

Sub-Basin G1 consists of a portion of 3 large residential lots and off-site grassland along the western boundary of the project, on the west side of Road D. This sub-basin has an area of 25.2 acres. The curve number for Sub-Basin G1 is 68.40. The basin will generate runoff of 10.22cfs and

37.20cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed east to a 24" RCP culvert under Road D at Design Point 27. From the culvert the flows continue east through Sub-Basin G2.

Sub-Basin G2 consists of a portion of 5 large residential lots on the east side of the western loop of Road D. This sub-basin has an area of 21.2 acres. The curve number for Sub-Basin G2 is 73.40. The basin will generate runoff of 11.58cfs and 33.97cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed east to the 0.132 ac-ft water quality pond, Pond 8. From the pond flows continue east and are discharged to West Kiowa Creek.

Sub-Basin H1 consists portions of 3 large residential lots along the western boundary of the project, on the north side of Road D. This sub-basin has an area of 13.9 acres. The curve number for Sub-Basin H1 is 60.00. The basin will generate runoff of 1.66cfs and 12.05cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed southeast to the 18" RCP culvert under Road D at Design Point 29. From the culvert, the flows continue southeast through Sub-Basin H4.

Sub-Basin H2 consists portions of 6 large residential lots along the northern boundary of the project, on the north side of Road D. This sub-basin has an area of 39.1 acres. The curve number for Sub-Basin H2 is 65.70. The basin will generate runoff of 10.11cfs and 43.64cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed southeast to the 24" RCP culvert under Road D at Design Point 30. From the culvert the flows continue southeast through Sub-Basin H6.

Sub-Basin H3 consists of portions of 2 large residential lots along the northern boundary of the project. This sub-basin has an area of 5.80 acres. The curve number for Sub-Basin H2 is 66.00. The basin will generate runoff of 1.93cfs and 8.03 cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed southeast to the 18" RCP culvert under RoadDat Design Point 31. From the culvert the flows continue southeast through Sub-Basin H7.

Sub-Basin H4 consists of a portion of 4 large residential lots on the east side of the western loop of Road D. This sub-basin has an area of 27.1 acres. The curve number for Sub-Basin H4 is 74.10. The basin will generate runoff of 15.88cfs and 45.44cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed southeast to the 0.110 ac-ft water quality pond, Pond 9. From the pond, flows continue southeast and are discharged to West Kiowa Creek.

Sub-Basin H5 consists of a portion of 3 large residential lots on the east side of the western loop of Road D. This sub-basin has an area of 20.2 acres. The curve number for Sub-Basin H5 is 74.10. The basin will generate runoff of 12.14cfs and 34.69cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed southeast to the 0.051 ac-ft water quality pond, Pond 10. From the pond, flows continue southeast and are discharged to West Kiowa Creek.

Sub-Basin H6 consists of a portion of 2 large residential lots on the east side of the western loop of Road D. This sub-basin has an area of 31.6 acres. The curve number for Sub-Basin H6 is 70.35. The basin will generate runoff of 12.92cfs and 43.11cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage

channel running through the center of the sub-basin and are conveyed southeast to the 0.157 ac-ft water quality pond, Pond 11. From the pond flows continue southeast and are discharged to West Kiowa Creek.

Sub-Basin H7 consists of a portion of 3 large residential lots on the east side of the western loop of Road D. This sub-basin has an area of 25.8 acres. The curve number for Sub-Basin H7 is 62.70. The basin will generate runoff of 4.56cfs and 24.85cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed southeast to the 0.077 ac-ft water quality pond, Pond 12. From the pond flows continue southeast and are discharged to West Kiowa Creek.

Sub-Basin H8 consists of a portion of 2 large residential lots on the east side of Road H. This sub-basin has an area of 8.5 acres. The curve number for Sub-Basin H8 is 78.00. The basin will generate runoff of 7.82cfs and 19.62cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed southeast to the eastern boundary of the project and discharged onto the neighboring property as they were in the existing condition.

Sub-Basin H9 consists of a portion of 2 large residential lots on the east side of Road H. This sub-basin has an area of 6.9 acres. The curve number for Sub-Basin H9 is 60.00. The basin will generate runoff of 0.88cfs and 6.43cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed southeast to the 0.021 ac-ft water quality pond, Pond 13. From the pond flows continue southeast and are discharged from the property to the east as they were in the existing condition.

Sub-Basin I1 consists of a portion of 2 large residential lots at the northwest corner of the intersection of Road G and Road D. This sub-basin has an area of 6.8 acres. The curve number for Sub-Basin H2 is 60.00. The basin will generate runoff of 0.88cfs and 6.38cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed southeast to the 18" RCP culvert under Road G at Design Point 38. From the culvert the flows continue southeast through Sub-Basin I2.

Sub-Basin I2 consists of a portion of 3 large residential lots on the east side of Road H, north of Sub-Basin H9. This sub-basin has an area of 14.8 acres. The curve number for Sub-Basin I2 is 60.00. The basin will generate runoff of 1.92cfs and 14.01cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows across the lots to the natural drainage channel running through the center of the sub-basin and are conveyed southeast to the 0.065 ac-ft water quality pond, Pond 14. From the pond, flows continue southeast and are discharged from the property to the east as they were in the existing condition.

Sub-Basin J1 consists of portions of 2 large residential lots along the northern boundary of the project. This sub-basin has an area of 10.1 acres. The curve number for Sub-Basin J1 is 68.50. The basin will generate runoff of 4.59cfs and 16.40cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows north across the lots from the property to the north as it did in the existing condition.

Sub-Basin K1 consists of portions of 4 large residential lots along the northern boundary of the project. This sub-basin has an area of 5.80 acres. The curve number for Sub-Basin J1 is 60.00. The basin will generate runoff of 2.28cfs and 16.61cfs in the minor and major storms, respectively. Stormwater from this sub-basin flows north across the lots from the property to the north as it did in the existing condition.

Revise the name. The County has adopted Chapter 6 of the City's Drainage Criteria Manual which calls this as NRCS Curve Number Method.

Per the adopted DCM the appropriate Initial Abstraction (Ia) value is 0.10S instead of the default value of 0.20S.

3.0 DRAINAGE DESIGN CRITERIA

REGULATIONS

The hydrologic calculations in this report comply with the El Paso County Drainage Criteria Manuals. There are no previous drainage studies that cover this property.

HYDROLOGICAL CRITERIA

NRCS Type II

Since this project contains both sub-basins over 100 acres and sub-basins less than 100 acres, times of concentration and peak runoff values were calculated for the 5-year and 100-year storm events using the SCS TR-55 Hydrograph method as required by the City of Colorado Springs/El Paso County Drainage Criteria Manuals. The model utilizes the SCS Type II 24-hr rainfall distribution, the cumulative depth for the 5-year storm is 2.8 inches and cumulative depth of the 100-year storm is 4.6 inches.

Update. See City DCM Table 6-2

Basin composite runoff curve numbers were generated using the runoff curve tables and methods presented in the Colorado Springs/El Paso County Stormwater Criteria Manual. With curve values for a developed condition only listed up to a 2 acre lot size, some conservative interpolation was necessary. A summary of results for the sub-basins are included in the Appendix.

The Water Quality Capture Volume (WQCV) for each of the 14 water quality ponds proposed for this project was calculated using the UD Detention spreadsheet provided by Urban Drainage and Flood Control District. Results of the water quality pond calculations are provided in the Appendix.

Per the adopted City DCM Chapter 6 Section 2.2.2 "For flood studies or when the highest probable design flow for sizing facilities is required, it may be necessary to evaluate both thunderstorms and frontal storms to determine the appropriate design flows. It is the responsibility of the designer to determine the dominant design storm for each project. Both peak flow rates and runoff volumes should be checked..."

Update the narrative and analysis accordingly.

Expand the narrative. Note the following:
1. Culvert sizing shall be based on the rational method peak flows
2. Permanent detention facilities shall sized for full spectrum detention using UD-Detention.
3. Include the HEC-RAS analysis of West Kiowa Creek.

Why are the natural drainage ways modeled as a standard trapezoidal channel? Each one seems to vary considerably? Additionally, analysis of the drainage ways must include the velocities and froude numbers. Stabilization may be required.

FLOODPLAIN STUDY

A formal floodplain study has not been done for this site in the past. A CLOMR submittal is being submitted concurrently with this report. The floodplain line has been calculated and is shown on the plans. Please reference the preliminary FEMA CLOMR report included in this submittal.

HYDRAULIC CRITERIA

Routing of stormwater runoff and the modelling of drainageways and the proposed culverts on the site was done using AutoCAD's Storm and Sanitary Sewer Analysis 2018 software. Results of the model were used to size all the culverts proposed for this project. No changes in geometry or rerouting of natural drainageways are proposed as a part of this project, natural drainage channels were modelled as trapezoidal channels using a bottom width of 20 feet and 4:1 side slopes. Results of the routing model and culvert sizing are provided in the Appendix.

Incorrect statement. See ECM Appendix I Section I.7.1.B Development areas of low density (rural) housing (2.5 acres or larger lots). WQCV is not required, but may be considered. Sediment control BMPs for lots and roads must be provided.

Detention requirement is based on the criteria that the overall development must release at or less than historic rate. If required, then the detention facilities must be design as a full spectrum detention.

4.0 DRAINAGE FACILITY DESIGN

GENERAL CONCEPT

This project is a low density residential development with lots varying between 2.5 acres and 5 acres in size. It is anticipated that, with the low environmental impact of this development, there will not be a noticeable increase of stormwater runoff from the site. Adjoining properties and drainage facilities downstream from the site should not be affected. With this being the case, upon initial review El Paso County is not requiring detention on-site for this development. However, as all development can potentially impact the quantity and types of pollutants present in runoff, 14 water quality ponds are proposed at locations throughout the development to capture flows from the roads and residential lots. The runoff from these areas will be before

State whether or not the ponds are private and identify who will own and maintain these facilities. What type of facilities are these expected to be constructed as (EDB, SF, etc)

releasing it into West Kiowa Creek or on to the downstream properties at the historic discharge points.

SPECIFIC DETAILS

In the existing condition, the subject property is undeveloped land consisting mostly of grassland with a few forested areas near the northern and southern boundaries. Runoff from the site is collected by natural swales and channels that convey flows to West Kiowa Creek, which carries water from the site. The proposed development does not aim to change these natural drainage patterns, but rather to preserve them to the extent possible. With this philosophy in mind the following culverts were designed to convey flows where the proposed roads intersect the existing drainage channels:

Include the Hw/D

Culvert Summary Table

To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Total Drop	Average Slope	Pipe Shape	Pipe Diameter or Height	Pipe Width	Manning's Roughness	Peak Flow	Max Flow Velocity	Design Flow Capacity	Max Flow Depth / Total Depth Ratio	Max Flow Depth
	(ft)	(ft)	(ft)	(ft)	(%)		(ft)	(ft)		(cfs)	(ft/sec)	(cfs)		(ft)
Jun-BOX1-2	100.00	7318.50	7318.00	0.50	0.5000	Rectangular	6.000	16.00	0.0120	2443.27	17.49	2828.15	0.73	4.36
Jun-C2-2	60.00	7341.00	7337.00	4.00	6.6700	CIRCULAR	3.000	3.00	0.0120	138.10	28.89	186.57	0.64	1.91
Jun-D1-2	60.00	7329.00	7328.00	1.00	1.6700	CIRCULAR	4.500	4.50	0.0120	200.67	18.87	275.03	0.63	2.85
Jun-G1-2	60.00	7375.50	7373.00	2.50	4.1700	CIRCULAR	2.000	2.00	0.0120	37.13	17.43	50.03	0.64	1.28
Jun-H1-2	60.00	7391.50	7389.00	2.50	4.1700	CIRCULAR	1.500	1.50	0.0120	11.93	13.24	23.23	0.51	0.76
Jun-H2-2	60.00	7334.00	7332.00	2.00	3.3300	CIRCULAR	2.000	2.00	0.0120	43.37	16.23	44.74	0.79	1.59
Jun-H3-2	60.00	7379.50	7376.00	3.50	5.8300	CIRCULAR	1.500	1.50	0.0120	7.90	13.43	27.48	0.37	0.55
Jun-BOX2-2	100.00	7280.00	7279.50	0.50	0.5000	Rectangular	6.000	16.00	0.0120	2747.00	18.12	2828.15	0.79	4.73
Jun-I1-2	60.00	7355.50	7354.50	1.00	1.6700	CIRCULAR	1.500	1.50	0.0120	6.32	8.01	14.69	0.46	0.69
Jun-F1-2	60.00	7338.50	7335.50	3.00	5.0000	CIRCULAR	1.500	1.50	0.0120	17.40	15.50	25.45	0.61	0.91
Jun-E4-2	60.00	7337.00	7336.00	1.00	1.6700	CIRCULAR	3.000	3.00	0.0120	69.20	14.45	93.28	0.64	1.91
Jun-E5-2	60.00	7336.50	7333.00	3.50	5.8300	CIRCULAR	1.500	1.50	0.0120	15.37	15.98	27.48	0.54	0.80
Jun-D3-2	60.00	7337.50	7337.00	0.50	0.8300	CIRCULAR	3.500	3.50	0.0120	67.99	11.13	99.50	0.61	2.11
Jun-D2-2	60.00	7372.00	7370.00	2.00	3.3300	CIRCULAR	2.000	2.00	0.0120	36.51	15.87	44.74	0.69	1.37
Jun-E3-2	60.00	7369.00	7367.50	1.50	2.5000	CIRCULAR	2.000	2.00	0.0120	25.52	13.17	38.75	0.59	1.18
Jun-E1-2	60.00	7371.50	7369.50	2.00	3.3300	CIRCULAR	2.000	2.00	0.0120	27.73	14.99	44.74	0.57	1.14
Jun-E2-2	60.00	7401.00	7399.00	2.00	3.3300	CIRCULAR	1.500	1.50	0.0120	3.24	8.55	20.78	0.27	0.40
Jun-C1-2	60.00	7363.00	7360.00	3.00	5.0000	CIRCULAR	3.000	3.00	0.0120	125.63	25.26	161.57	0.66	1.98
Jun-B2-2	60.00	7375.00	7371.00	4.00	6.6700	CIRCULAR	1.500	1.50	0.0120	8.58	14.42	29.38	0.37	0.56

Provide a specific pipe run ID and label on the drainage map.

Developme[illegible]t will consist of 143 resid[illegible]ential lots varying in size between 2.5 acres and 5 acres. ce the Drainage Criteria Manual does not have curve numbers for development above 2 acre lots,

Explain how the extrapolation was done. Is this a linear extrapolation? Include the calculation in the appendix for the weighted CNs of each sub-basin. The 5 ac Type C soil CN seems low, should be around 72.

values were extrapolated from the curve numbers for smaller sized residential lots from Table 6-10 of the manual. Using this technique, curve numbers of 64 and 60 were used for developed sub-basins containing 2.5-acre lots and 5-acre lots, respectively in areas with Type B soils. Curve numbers of 75 and 68 were used for 2.5-acre lots and 5-acre lots in areas with Type C soils. By comparison, the Manual recommends a curve number of 69 for the grassland that makes up the majority of the site and curve numbers between 60 and 65 for the wooded area along the southern boundary.

Results of the hydrologic model show that in the 100 year storm event, in the existing condition 1418cfs enters the site from the West Kiowa Creek watershed at the southwest corner of the property and 2743cfs leaves the site at the northeast corner of the property. In the proposed condition 1426cfs enters the site and 2839cfs leaves the site. The minimal flow increase leaving the site of 96 CFS between existing and proposed conditions is negligible given the size of the site. This flow would be reduced further by the volume of water held in the water quality ponds, currently not part of the model. The expectation is that this development will not adversely impact the drainageways and related facilities downstream from the development, and therefore no detention ponds are being proposed.

Recognizing that all development does increases the pollutant loading in stormwater, 14 water quality ponds will be installed to collect and treat runoff from the roads and lots before it enters West Kiowa Creek protecting downstream drainage ways and riparian habitats. The following is a summary of the proposed ponds:

1. Per county criteria the subdivision must release at equal to or less than historic rate.
2. With each subsequent final drainage report the pond design shall be incorporated in the NRCS model and compared to the historic condition model to ensure release rates are equal to or less than historic rate.

WQ Pond Summary Table

Pond	Tributary Basins	Total Basin Area (acres)	5 Acre Lot Developed (acres)		2.5 Acre Lot Developed (acres)		Retail Business (acres)		Natural Area (acres)		$I_{Composite}$	Required Pond Size (acre-feet)
			5	%	9	%	92	%	2	%		
1	A2, A3	70.1	70.1								5.0	0.211
2	B2,B4,C2,C3	91.8			78.8				13.0		8.0	0.423
3	D2,D5	82.9	2.5		49.2				31.2		6.2	0.304
4	D3,D4,D6	117.3	33.4		75.5				8.4		7.4	0.504
5	E5,E6	42.4	20.2		19.3				2.9		6.6	0.165
6	E1,E2,E3,E4,E7	81.6	21.0		53.6		7.0				15.1	0.638
7	F1,F2	44.4	44.4								5.0	0.134
8	G1+G2	46.4	42.2						4.2		4.7	0.132
9	H1+H4	41.0	32.8						8.2		4.4	0.110
10	H5	20.2	14.2						6.0		4.1	0.051
11	H2,H6	70.7	38.4						32.3		3.6	0.157
12	H3,H7	31.6	20.9						10.7		4.0	0.077
13	H9	6.9	6.9								5.0	0.021
14	I1,I2	21.6	21.6								5.0	0.065

Identify what these percentages are supposed to be.
If these are percent impervious then adjust per ECM Appendix L Table 3-1:
Single-family 5ac Lots = 7% imperviousness
Single-amily 2.5ac Lots = 11% imperviousness
Commercial Areas = 95%

5.0 CONSTRUCTION PHASING

Due to the size and scope of this project, the site has been broken into sections that will be built one at a time. There are currently 4 land releases planned as shown on the Lot Release Exhibit in the Appendix. Culverts and water quality ponds will be installed according to these releases. Stormwater will flow through historic conveyances in areas of the project where construction has not started.

6.0 CONCLUSIONS

This report has been prepared in accordance with El Paso County stormwater criteria. It outlines the routing of the 5-Year and 100-year storm events through the project's drainage system. The proposed drainage facilities were designed to convey and treat stormwater flows in accordance with the requirements presented by El Paso County and the Colorado Springs Drainage Criteria Manual. These proposed improvements provide adequate protection to this site without adverse impacts on adjoining upstream and downstream properties.

Add a section for the 4-Step Process (See Appendix I Section I.7.2.A). List each step and provide a narrative below each step discussing how the particular step was considered/implemented in the design process.

Add a section for Drainage Basin Fee and note that at this time West Kiowa Creek drainage basin is not a part of the El Paso County Drainage Basin Fee program.

7.0 REFERENCES

1. Urban Storm Drainage Criteria Manuals (Volumes 1, 2, and 3) Urban Drainage & Flood Control District.

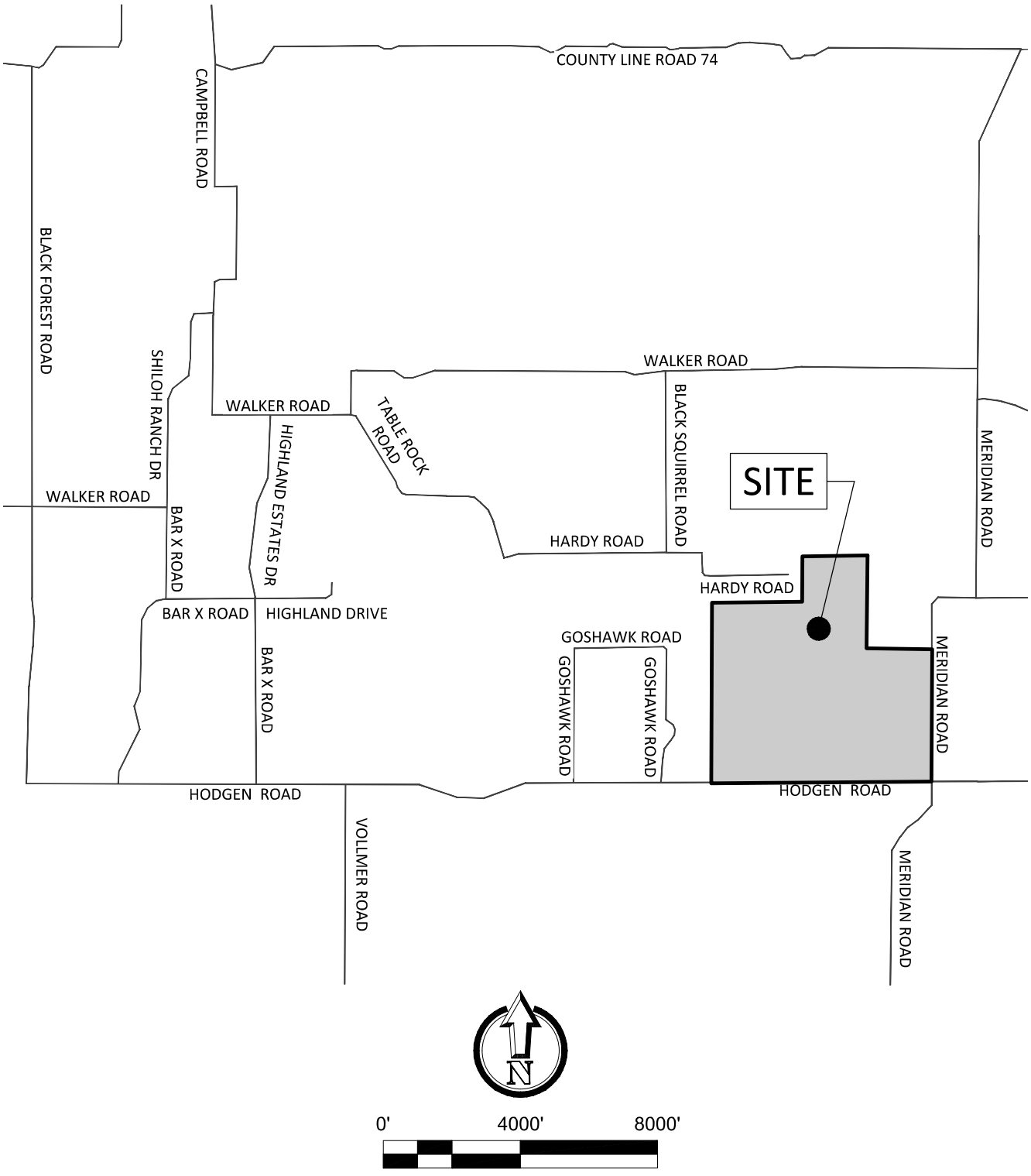
2. City of Colorado Springs Drainage Criteria Manual, Volumes 1 & 2, Stormwater Quality Policies, Procedures and Best Management Practices (BMPs), Dates May 2014.

3. Federal Emergency Management Agency, Flood Insurance Rate Map Index 08041C0507F and 08041C0530F, dated March 17, 1997.

4. Natural Resources Conservation Service, Web Soil Survey, dated October 10, 2017.

5. Entech Engineering Geotechnical Report, Dated October 2, 2018

VICINITY MAP



VICINITY MAP			
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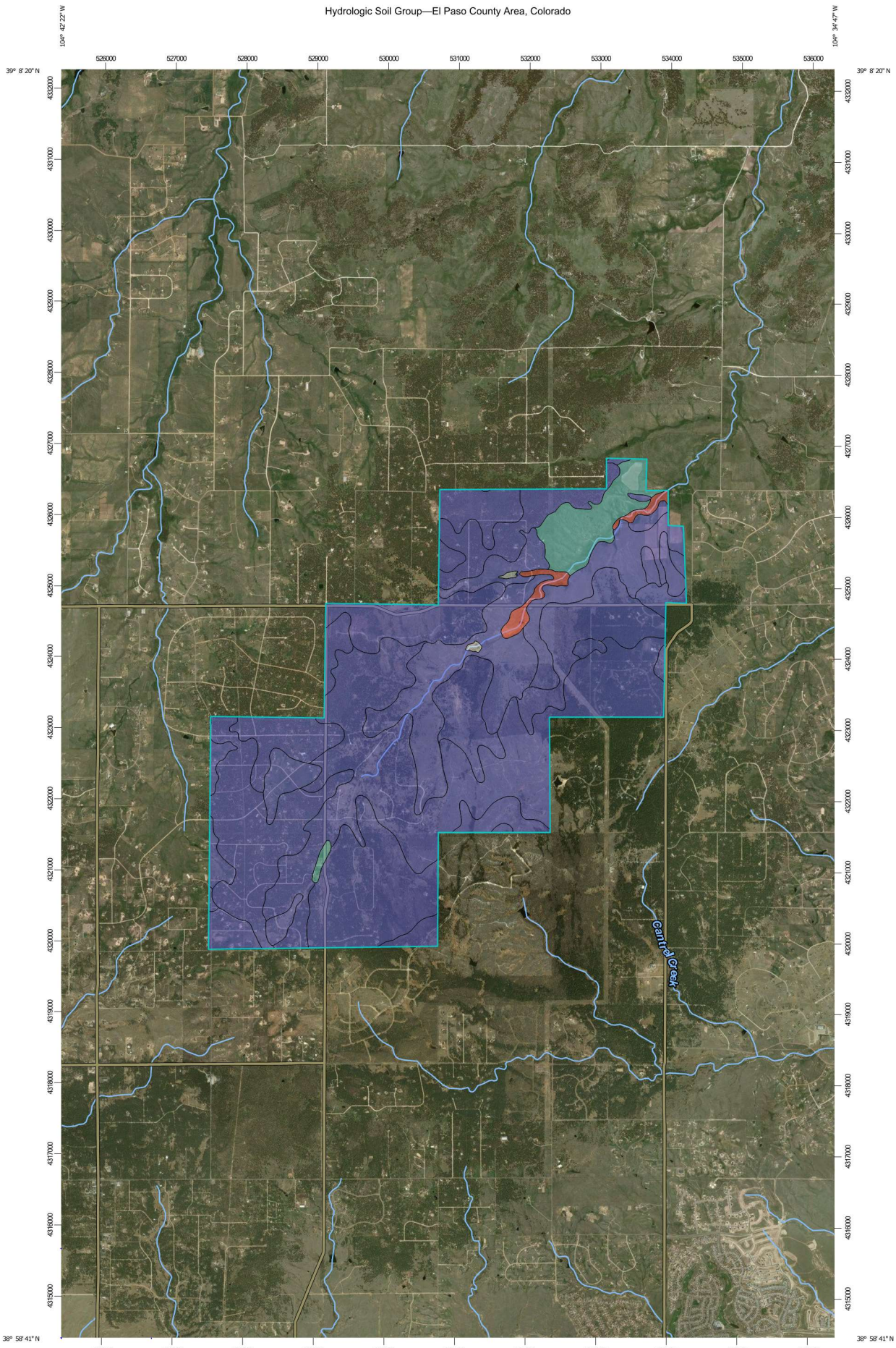
	Date: 10/04/2018	1	
	Drawn: JCP		
	Checked: LPV		
	Job No.: 49388		


104° 42' 22" W
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Cantrell Creek
Map Scale: 1:50,000 if printed on B portrait (11" x 17") sheet.
Meters
0 500 1000 2000 3000
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Feet
0 2000 4000 8000 12000
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

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Date(s) aerial images were photographed: May 22, 2016—Mar 9, 2017

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Alamosa loam, 1 to 3 percent slopes	D	80.6	1.2%
15	Brussett loam, 3 to 5 percent slopes	B	6.0	0.1%
21	Cruckton sandy loam, 1 to 9 percent slopes	B	4.7	0.1%
25	Elbeth sandy loam, 3 to 8 percent slopes	B	2,081.3	31.8%
26	Elbeth sandy loam, 8 to 15 percent slopes	B	2,075.9	31.7%
34	Holderness loam, 1 to 5 percent slopes	C	15.5	0.2%
36	Holderness loam, 8 to 15 percent slopes	C	278.7	4.3%
40	Kettle gravelly loamy sand, 3 to 8 percent slopes	B	400.4	6.1%
41	Kettle gravelly loamy sand, 8 to 40 percent slopes	B	265.1	4.0%
67	Peyton sandy loam, 5 to 9 percent slopes	B	36.3	0.6%
68	Peyton-Pring complex, 3 to 8 percent slopes	B	38.1	0.6%
71	Pring coarse sandy loam, 3 to 8 percent slopes	B	26.0	0.4%
92	Tomah-Crowfoot loamy sands, 3 to 8 percent slopes	B	661.6	10.1%
93	Tomah-Crowfoot complex, 8 to 15 percent slopes	B	574.4	8.8%
111	Water		10.0	0.2%
Totals for Area of Interest			**6,554.4**	**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.

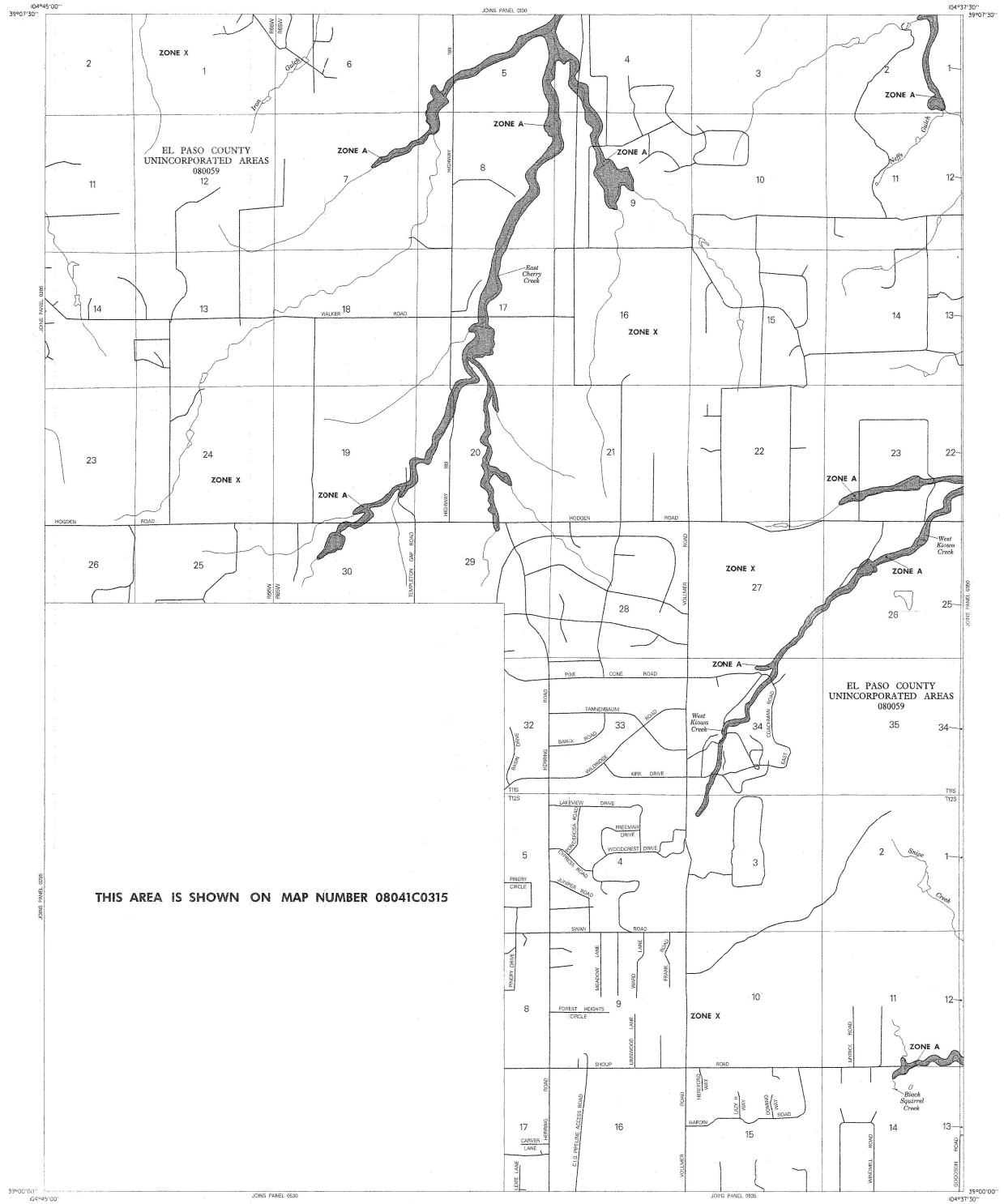
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR 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 A99** To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
- **ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- **ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- **ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- **ZONE X** Areas determined to be outside 500-year floodplain.
- **ZONE D** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Identified 1982 | Identified 1990 | Otherwise Protected Areas

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

- Flood Boundary
- Floodway Boundary
- Zone D Boundary
- Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
- 513 — Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum.
- D — D — Cross Section Line
- (EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.
- RM7 X — Elevation Reference Mark
- M2 — River Mile
- 97°07'30", 32°22'30" — Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

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, or all planimetric features outside Special Flood Hazard Areas.

Coastal base flood elevations apply only landward of 0.0 (NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

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 Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and /or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1990 (PL 101-591).

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see Section 8.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index

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

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

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actuarial rates apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET
2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

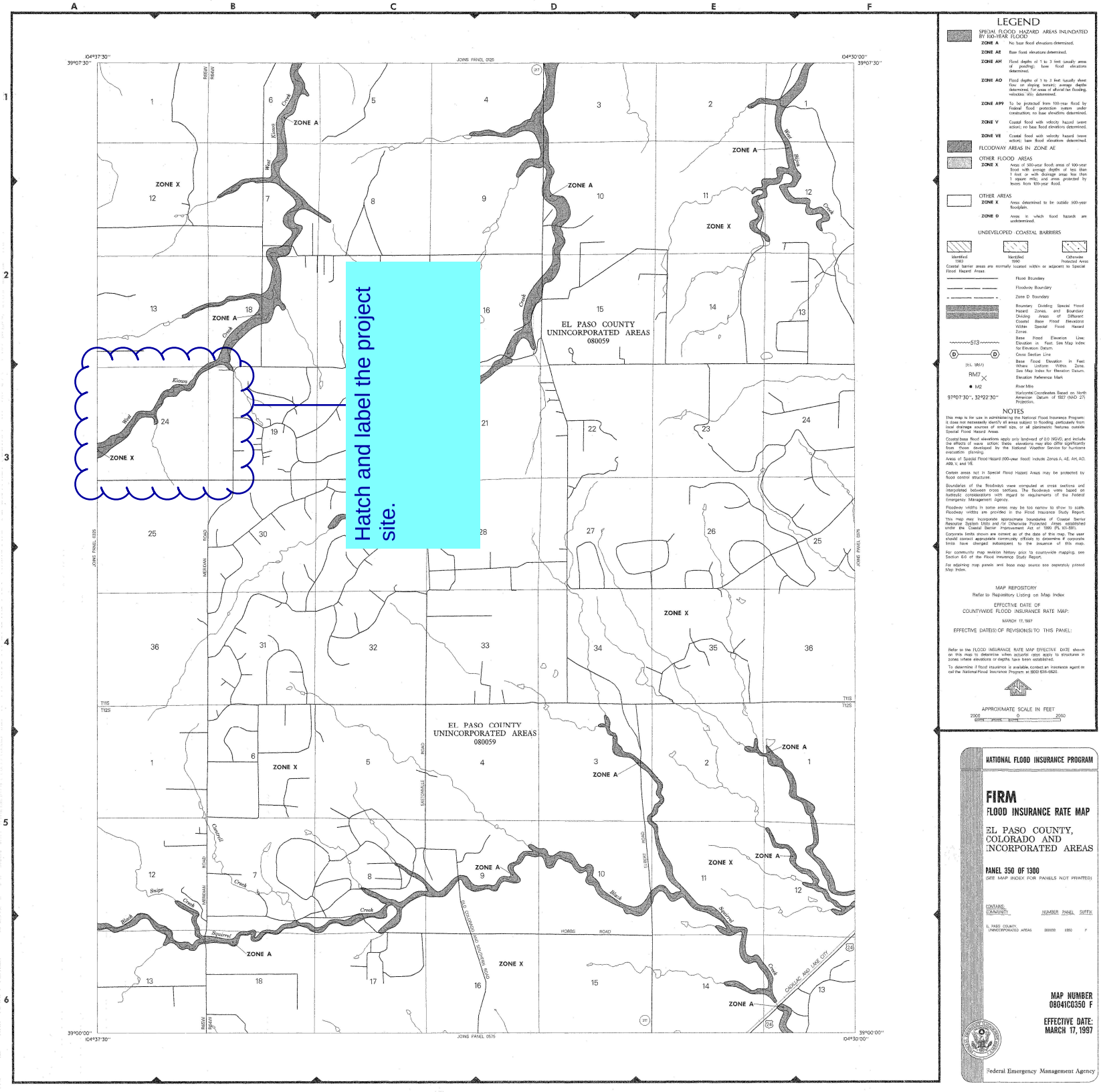
PANEL 325 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY UNINCORPORATED AREAS	080059	0325	F

MAP NUMBER
08041C0325 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR 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 A99** To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
- **ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- **ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- **ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- **ZONE X** Areas determined to be outside 500-year floodplain.
- **ZONE D** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Identified 1983 | Identified 1990 | Otherwise Protected Area

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

- Flood Boundary
- Floodway Boundary
- Zone D Boundary
- Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
- 513 — Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum.
- D — D — Cross Section Line
- (EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.
- RM7 — Elevation Reference Mark
- M2 — River Mile
- 97°07'30", 32°22'30" — Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

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, or all planimetric features outside Special Flood Hazard Areas.

Coastal base flood elevations apply only landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

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This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and /or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1990 (PL 101-591).

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index

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

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

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actuarial rates apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET
2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 350 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0350	F

MAP NUMBER
08041C0350 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

STORM MODEL OUTPUTS

EXISTING CONDITION 5 YEAR

Provide the schematic diagram for the existing and proposed model.

Provide titles (typical all)

SN	Element ID	Description	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Channel Type	Channel Height	Channel Width	Left Overbank Manning's Roughness	Channel Manning's Roughness	Right Overbank Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow	Flap Gate	Lengthening Factor	Peak Flow	Time of Peak Flow Occurrence	Max Flow Velocity	Travel Time	Design Flow Capacity	Max Flow / Design Flow Ratio	Max Flow Depth / Total Depth Ratio	Total Time Surcharged	Max Flow Depth	Reported Condition
					(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(ft)	(ft)							(cfs)			(cfs)	(days hh:mm)	(ft/sec)	(min)	(cfs)			(min)	(ft)	
1	64		B2	ABC	2473.30	7375.00	0.00	7320.00	0.00	55.00	2.2200	Trapezoidal	10.000	100.00	0.0000	0.0350	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	225.68	0 13:18	6.72	6.13	12341.57	0.02	0.13	0.00	1.33	Calculated
2	64		ABC	GHD	2839.57	7320.00	0.00	7300.00	0.00	20.00	0.7000	Trapezoidal	10.000	100.00	0.0000	0.0350	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	476.65	0 12:48	5.68	8.33	6945.70	0.07	0.27	0.00	2.73	Calculated
3	64		GHD	NUL	1717.53	7300.00	0.00	7285.00	0.00	15.00	0.8700	Trapezoidal	10.000	100.00	0.0000	0.0350	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	575.94	0 12:46	6.44	4.44	7734.30	0.07	0.29	0.00	2.85	Calculated
4	64		NUL	EFI	1277.36	7285.00	0.00	7265.00	0.00	20.00	1.5700	Trapezoidal	10.000	100.00	0.0000	0.0350	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	575.71	0 12:48	7.91	2.69	10355.85	0.06	0.24	0.00	2.44	Calculated
5	64		EFI	Out-01	70.66	7265.00	0.00	7260.00	0.00	5.00	7.0800	Trapezoidal	10.000	100.00	0.0000	0.0320	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	619.14	0 12:46	14.55	0.08	24079.28	0.03	0.16	0.00	1.61	Calculated
6	BR1		B1	B2	492.55	7380.00	0.00	7375.00	0.00	5.00	1.0200	Trapezoidal	10.000	100.00	0.0000	0.0350	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	225.97	0 13:15	5.13	1.60	8338.49	0.03	0.17	0.00	1.66	Calculated

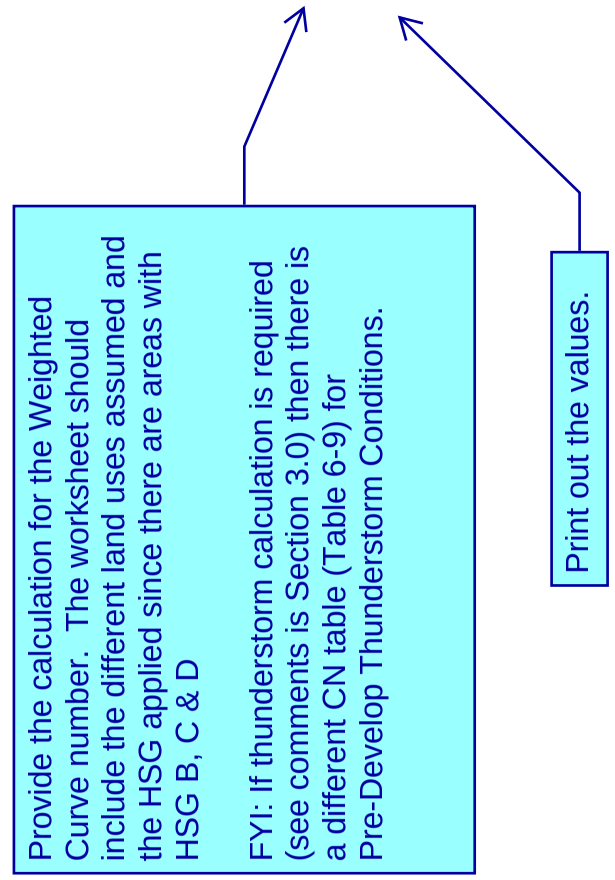
Identify/label these channels on the drainage map.

Provide the lag time calculation worksheet.

SN	Element ID	X Coordinate	Y Coordinate	Description	Invert Elevation	Boundary Type	Flap Gate	Fixed Water Elevation	Peak Inflow	Peak Lateral Inflow	Maximum HGL Depth Attained	Maximum HGL Elevation Attained
					(ft)			(ft)	(cfs)	(cfs)	(ft)	(ft)
1	Out-01	8374.32	12780.61		7260.00	NORMAL	NO		619.14	0.00	1.61	7261.61

SN	Element ID	Description	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period	Rainfall Depth	Rainfall Distribution
									(years)	(inches)	
1	Rain Gage-01		Time Series	TS-01	Cumulative	inches	Colorado	El Paso	5	2.8	SCS Type II 24-hr

SN	Element ID	Description	Area	Drainage Node ID	Weighted Curve Number	Rain Gage ID	Total Precipitation	Total Runoff	Peak Runoff	Time of Concentration
			(acres)				(inches)	(inches)	(cfs)	(days hh:mm:ss)
1	A		915.40	ABC	72.24	Rain Gage-01	2.80	0.70	333.53	0 00:52:35
2	B		3836.70	B1	60.00	Rain Gage-01	2.80	0.26	226.62	0 01:28:25
3	Bb		100.60	ABC	69.75	Rain Gage-01	2.80	0.60	35.39	0 00:39:51
4	C		232.70	ABC	62.00	Rain Gage-01	2.80	0.32	30.39	0 00:41:04
5	D		410.90	GHD	63.38	Rain Gage-01	2.80	0.36	63.02	0 00:44:19
6	E		114.80	EFI	69.00	Rain Gage-01	2.80	0.57	35.95	0 00:42:20
7	F		44.50	EFI	69.00	Rain Gage-01	2.80	0.57	15.28	0 00:37:04
8	G		107.60	GHD	69.50	Rain Gage-01	2.80	0.59	41.45	0 00:33:54
9	H		121.80	GHD	72.00	Rain Gage-01	2.80	0.69	59.61	0 00:33:38
10	I		37.50	EFI	79.00	Rain Gage-01	2.80	1.04	32.10	0 00:31:46
11	J		10.10	OS-J	69.50	Rain Gage-01	2.80	0.59	4.31	0 00:29:14
12	K		17.80	OS-K	76.00	Rain Gage-01	2.80	0.88	11.76	0 00:34:33



STORM MODEL OUTPUTS

PROPOSED CONDITION 5 YEAR

Provide a title. (typical all)

SN	Element ID	Description	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Pipe Shape	Pipe Diameter or Height	Pipe Width	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow	Flap Gate	Lengthening Factor	Peak Flow	Time of Peak Flow Occurrence	Max Flow Velocity	Travel Time	Design Flow Capacity	Max Flow / Design Flow Ratio	Max Flow Depth / Total Depth Ratio	Total Time Surcharged	Max Flow Depth	Reported Condition
					(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(ft)	(ft)					(cfs)			(cfs)	(days hh:mm)	(ft/sec)	(min)	(cfs)			(min)	(ft)	
1	Link-06		Jun-BOX1-1	Jun-BOX1-2	100.00	7318.50	0.00	7318.00	0.00	0.50	0.5000	Rectangular	6.000	16.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	525.07	0 12:48	10.48	0.16	2828.15	0.19	0.26	0.00	1.56	Calculated
2	Link-07		Jun-C2-1	Jun-C2-2	60.00	7341.00	0.00	7337.00	0.00	4.00	6.6700	CIRCULAR	3.000	3.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	20.68	0 12:35	17.38	0.06	186.57	0.11	0.22	0.00	0.67	Calculated
3	Link-08		Jun-D1-1	Jun-D1-2	60.00	7329.00	0.00	7328.00	0.00	1.00	1.6700	CIRCULAR	4.500	4.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	34.15	0 12:30	11.78	0.08	275.03	0.12	0.24	0.00	1.07	Calculated
4	Link-11		Jun-G1-1	Jun-G1-2	60.00	7375.50	0.00	7373.00	0.00	2.50	4.1700	CIRCULAR	2.000	2.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	10.06	0 12:15	12.46	0.08	50.03	0.20	0.30	0.00	0.61	Calculated
5	Link-16		Jun-H1-1	Jun-H1-2	60.00	7391.50	0.00	7389.00	0.00	2.50	4.1700	CIRCULAR	1.500	1.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	1.66	0 12:20	7.64	0.13	23.23	0.07	0.18	0.00	0.27	Calculated
6	Link-17		Jun-H2-1	Jun-H2-2	60.00	7334.00	0.00	7332.00	0.00	2.00	3.3300	CIRCULAR	2.000	2.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	9.97	0 12:20	11.47	0.09	44.74	0.22	0.32	0.00	0.64	Calculated
7	Link-18		Jun-H3-1	Jun-H3-2	60.00	7379.50	0.00	7376.00	0.00	3.50	5.8300	CIRCULAR	1.500	1.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	1.92	0 12:15	8.96	0.11	27.48	0.07	0.18	0.00	0.27	Calculated
8	Link-19		Jun-BOX2-1	Jun-BOX2-2	100.00	7280.00	0.00	7279.50	0.00	0.50	0.5000	Rectangular	6.000	16.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	604.29	0 12:53	11.02	0.15	2828.15	0.21	0.29	0.00	1.71	Calculated
9	Link-20		Jun-I1-1	Jun-I1-2	60.00	7355.50	0.00	7354.50	0.00	1.00	1.6700	CIRCULAR	1.500	1.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	0.86	0 12:20	4.55	0.22	14.69	0.06	0.16	0.00	0.25	Calculated
10	Link-21		Jun-F1-1	Jun-F1-2	60.00	7338.50	0.00	7335.50	0.00	3.00	5.0000	CIRCULAR	1.500	1.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	2.45	0 12:30	9.12	0.11	25.45	0.10	0.21	0.00	0.31	Calculated
11	Link-22		Jun-E4-1	Jun-E4-2	60.00	7337.00	0.00	7336.00	0.00	1.00	1.6700	CIRCULAR	3.000	3.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	13.53	0 12:28	9.40	0.11	93.28	0.15	0.26	0.00	0.77	Calculated
12	Link-23		Jun-E5-1	Jun-E5-2	60.00	7336.50	0.00	7333.00	0.00	3.50	5.8300	CIRCULAR	1.500	1.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	3.14	0 12:20	10.32	0.10	27.48	0.11	0.23	0.00	0.34	Calculated
13	Link-24		Jun-D3-1	Jun-D3-2	60.00	7337.50	0.00	7337.00	0.00	0.50	0.8300	CIRCULAR	3.500	3.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	13.12	0 12:28	7.17	0.14	99.50	0.13	0.25	0.00	0.86	Calculated
14	Link-25		Jun-D2-1	Jun-D2-2	60.00	7372.00	0.00	7370.00	0.00	2.00	3.3300	CIRCULAR	2.000	2.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	7.48	0 12:30	10.56	0.09	44.74	0.17	0.28	0.00	0.55	Calculated
15	Link-26		Jun-E3-1	Jun-E3-2	60.00	7369.00	0.00	7367.50	0.00	1.50	2.5000	CIRCULAR	2.000	2.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	5.05	0 12:20	8.54	0.12	38.75	0.13	0.24	0.00	0.49	Calculated
16	Link-27		Jun-E1-1	Jun-E1-2	60.00	7371.50	0.00	7369.50	0.00	2.00	3.3300	CIRCULAR	2.000	2.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	6.01	0 12:30	9.93	0.10	44.74	0.13	0.25	0.00	0.49	Calculated
17	Link-28		Jun-E2-1	Jun-E2-2	60.00	7401.00	0.00	7399.00	0.00	2.00	3.3300	CIRCULAR	1.500	1.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	0.69	0 12:15	5.46	0.18	20.78	0.03	0.12	0.00	0.19	Calculated
18	Link-29		Jun-C1-1	Jun-C1-2	60.00	7363.00	0.00	7360.00	0.00	3.00	5.0000	CIRCULAR	3.000	3.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	18.55	0 12:32	15.20	0.07	161.57	0.11	0.23	0.00	0.68	Calculated
19	Link-30		Jun-B2-1	Jun-B2-2	60.00	7375.00	0.00	7371.00	0.00	4.00	6.6700	CIRCULAR	1.500	1.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	1.84	0 12:15	9.27	0.11	29.38	0.06	0.17	0.00	0.25	Calculated

Revise. Culvert sizing shall be based on the rational method peak flows for a conservative sizing. Exception is if the sub-basin tributary to the culvert is greater than 100 acres such as the large bridge crossings.

These appear to be pipe capacity calculations. Culvert sizing must be conducted with culvert design methods.

Include the Hw/D in the summary table.

SN	Element ID	Description	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Channel Type	Channel Height	Channel Width	Left Overbank Manning's Roughness	Channel Manning's Roughness	Right Overbank Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow	Flap Gate	Lengthening Factor	Peak Flow	Time of Peak Flow Occurrence	Max Flow Velocity	Travel Time	Design Flow Capacity	Max Flow / Design Flow Ratio	Max Flow Depth / Total Depth Ratio	Total Time Surcharged	Max Flow Depth	Reported Condition
					(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(ft)	(ft)							(cfs)			(cfs)	(days hh:mm)	(ft/sec)	(min)	(cfs)			(min)	(ft)	
1	64		Jun-C2-2	Stor-B1	155.46	7337.00	0.00	7335.00	0.00	2.00	1.2900	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	20.68	0 12:35	2.25	1.15	8213.74	0.00	0.04	0.00	0.42	Calculated
2	Link-01		Jun-C1-2	Jun-C2-1	861.57	7360.00	0.00	7341.00	0.00	19.00	2.2100	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	18.44	0 12:37	2.58	5.57	10753.92	0.00	0.03	0.00	0.34	Calculated
3	Link-02		Jun-F1-2	Stor-F2	703.81	7335.50	0.00	7308.00	0.00	27.50	3.9100	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	2.41	0 12:33	1.43	8.20	14314.43	0.00	0.01	0.00	0.08	Calculated
4	Link-03		Jun-E4-2	Stor-E7	712.94	7336.00	0.00	7316.00	0.00	20.00	2.8100	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	13.43	0 12:32	2.48	4.79	12128.97	0.00	0.03	0.00	0.26	Calculated
5	Link-04		Jun-E5-2	Stor-E6	858.58	7333.00	0.00	7303.00	0.00	30.00	3.4900	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	2.94	0 12:25	1.52	9.41	13536.48	0.00	0.01	0.00	0.10	Calculated
6	Link-05		Jun-D3-2	Stor-D5	1418.47	7337.00	0.00	7291.00	0.00	46.00	3.2400	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	12.83	0 12:35	2.57	9.20	13040.80	0.00	0.02	0.00	0.24	Calculated
7	Link-13		Stor-G2	Jun-CONF1	800.00	7331.00	0.00	7311.50	0.00	19.50	2.4400	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	20.72	0 12:25	2.80	4.76	11305.97	0.00	0.03	0.00	0.35	Calculated
8	Link-15		Stor-H4	Jun-CONF1	373.25	7327.00	0.00	7311.50	0.00	15.50	4.1500	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	16.32	0 12:21	2.99	2.08	14757.11	0.00	0.03	0.00	0.26	Calculated
9	Link-31		Jun-BOX1-2	Jun-CONF1	866.29	7318.00	0.00	7311.50	0.00	6.50	0.7500	Trapezoidal	10.000	110.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	524.68	0 12:50	5.13	2.81	7622.13	0.07	0.25	0.00	2.55	Calculated
10	Link-37		Jun-H2-2	Stor-H6	586.28	7332.00	0.00	7307.00	0.00	25.00	4.2600	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	9.92	0 12:25	2.51	3.89	14953.84	0.00	0.02	0.00	0.19	Calculated
11	Link-39		Jun-BOX2-2	Jun-CONF4	340.25	7279.50	0.00	7276.00	0.00	3.50	1.0300	Trapezoidal	10.000	110.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	604.25	0 12:54	5.97	0.95	8924.55	0.07	0.25	0.00	2.52	Calculated
12	Link-40		Jun-CONF1	Jun-CONF2	1071.31	7311.50	0.00	7300.00	0.00	11.50	1.0700	Trapezoidal	10.000	110.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	545.06	0 12:51	5.87	3.04	9116.81	0.06	0.24	0.00	2.36	Calculated
13	Link-41		Jun-CONF2	Jun-CONF3	736.36	7300.00	0.00	7292.00	0.00	8.00	1.0900	Trapezoidal	10.000	110.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	576.67	0 12:52	6.00	2.05	9171.73	0.06	0.24	0.00	2.42	Calculated
14	Link-42		Jun-CONF3	Jun-BOX2-1	1308.67	7292.00	0.00	7280.00	0.00	12.00	0.9200	Trapezoidal	10.000	110.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	586.58	0 12:54	5.69	3.83	8426.11	0.07	0.26	0.00	2.56	Calculated
15	Link-43		Jun-B2-2	Stor-B1	1548.66	7371.00	0.00	7335.00	0.00	36.00	2.3200	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	1.25	0 12:30	1.02	25.30	11041.00	0.00	0.01	0.00	0.06	Calculated
16	Link-45		Jun-H1-2	Stor-H4	1249.62	7389.00	0.00	7327.00	0.00	62.00	4.9600	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	1.40	0 12:33	1.27	16.40	16130.29	0.00	0.01	0.00	0.06	Calculated
17	Link-46		Jun-G1-2	Stor-G2	1241.36	7373.00	0.00	7331.00	0.00	42.00	3.3800	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	9.58	0 12:22	2.38	8.69	13320.21	0.00	0.02	0.00	0.20	Calculated
18	Link-47		Stor-A1	Jun-BOX1-1	850.75	7340.00	0.00	7318.50	0.00	21.50	2.5300	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	34.47	0 12:25	3.39	4.18	11512.08	0.00	0.05	0.00	0.47	Calculated
19	Link-48		Jun-D1-2	Jun-CONF2	1270.02	7328.00	0.00	7300.00	0.00	28.00	2.2000	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	33.85	0 12:33	3.25	6.51	10752.49	0.00	0.05	0.00	0.48	Calculated
20	Link-49		Jun-D2-2	Jun-D3-1	1169.72	7370.00	0.00	7337.50	0.00	32.50	2.7800	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	7.30	0 12:34	1.99	9.80	12070.80	0.00	0.02	0.00	0.18	Calculated
21	Link-50		Jun-E3-2	Jun-E4-1	1141.92	7367.50	0.00	7337.00	0.00	30.50	2.6700	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	4.65	0 12:28	1.68	11.33	11834.98	0.00	0.01	0.00	0.14	Calculated
22	Link-51		Jun-E1-2	Jun-E4-1	1032.69	7369.50	0.00	7337.00	0.00	32.50	3.1500	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	5.89	0 12:34	1.90	9.06	12846.71	0.00	0.02	0.00	0.15	Calculated
23	Link-52		Jun-E2-2	Jun-E3-1	974.31	7399.00	0.00	7369.00	0.00	30.00	3.0800	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	0.50	0 12:30	0.76	21.37	12707.13	0.00	0.00	0.00	0.03	Calculated
24	Link-53		Jun-I1-2	Stor-I2	461.48	7354.50	0.00	7319.00	0.00	35.50	7.6900	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	0.84	0 12:23	1.16	6.63	20085.06	0.00	0.00	0.00	0.04	Calculated
25	Link-54		Stor-B1	Jun-BOX1-1	295.68	7335.00	0.00	7318.50	0.00	16.50	5.5800	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	31.15	0 12:34	4.17	1.18	17106.70	0.00	0.03	0.00	0.35	Calculated
26	Link-55		Stor-D1	Jun-D1-1	196.14	7331.00	0.00	7329.00	0.00	2.00	1.0200	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	16.72	0 12:25	1.94	1.69	7312.52	0.00	0.04	0.00	0.40	Calculated
27	Link-56		Stor-E7	Out-01	1915.96	7316.00	0.00	7274.00	0.00	42.00	2.1900	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	13.88	0 12:42	2.38	13.42	10721.78	0.00	0.03	0.00	0.28	Calculated
28	Link-57		Stor-F2	Out-01	1886.42	7308.00	0.00	7274.00	0.00	34.00	1.8000	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	3.68	0 12:46	1.37	22.95	9722.00	0.00	0.01	0.00	0.14	Calculated
29	Link-58		Jun-CONF4	Out-01	179.25	7276.00	0.00	7274.00	0.00	2.00	1.1200	Trapezoidal	10.000	110.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	609.36	0 12:54	6.15	0.49	9294.73	0.07	0.25	0.00	2.48	Calculated
30	Link-59		Stor-H7	Jun-BOX2-1	297.63	7301.00	0.00	7280.00	0.00	21.00	7.0600	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	6.09	0 12:25	2.41	2.06	19235.64	0.00	0.01	0.00	0.12	Calculated
31	Link-60		Stor-D5	Jun-BOX2-1	393.31	7291.00	0.00	7280.00	0.00	11.00	2.8000	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	20.61	0 12:35	2.88	2.28	12110.56	0.00	0.03	0.00	0.34	Calculated
32	Link-61		Stor-E6	Jun-CONF4	601.36	7303.00	0.00	7276.00	0.00	27.00	4.4900	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	7.28	0 12:26	2.27	4.42	15344.40	0.00	0.02	0.00	0.16	Calculated
33	Link-62		Stor-H6	Jun-CONF3	219.51	7307.00	0.00	7292.00	0.00	15.00	6.8300	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	22.53	0 12:24	3.93	0.93	18930.14	0.00	0.03	0.00	0.27	Calculated
34	Link-63		Stor-H5	Jun-CONF2	732.18	7318.00	0.00	7300.00	0.00	18.00	2.4600	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	11.87	0 12:22	2.27	5.38	11354.36	0.00	0.03	0.00	0.25	Calculated
35	Link-64		Stor-I2	Out-01	1449.26	7319.00	0.00	7274.00	0.00	45.00	3.1100	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	2.15	0 12:33	1.31	18.44	12760.52	0.00	0.01	0.00	0.08	Calculated
36	Link-65		Stor-H9	Out-01	1543.09	7311.00	0.00	7274.00	0.00	37.00	2.4000	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	0.58	0 12:42	0.75	34.29	11213.48	0.00	0.00	0.00	0.04	Calculated
37	Link-66		Jun-H3-2	Stor-H7	1205.71	7376.00	0.00	7301.00	0.00	75.00	6.2200	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	1.64	0 12:25	1.49	13.49	18061.12	0.00	0.01	0.00	0.06	Calculated
38	Link-68		Jun-A1	Jun-BOX1-1	1609.87	7340.00	0.00	7318.50	0.00	21.50	1.3400	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	347.76	0 12:41	5.90	4.55	8368.72	0.04	0.21	0.00	2.09	Calculated
39	Link-69		Jun-A2	Stor-A1	991.55	7393.00	0.00	7340.00	0.00	53.00	5.3500	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	16.72	0 12:26	3.29	5.02	16742.33	0.00	0.02	0.00	0.24	Calculated
40	Link-70		Jun-B3	Jun-BOX1-1	1801.86	7334.00	0.00	7318.50	0.00	15.50	0.8600	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	226.14	0 13:17	4.43	6.78	6716.46	0.03	0.19	0.00	1.87	Calculated
41	Link-72		64	Jun-B3	2137.84	7385.00	0.00	7334.00	0.00	51.00	2.3900	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	223.99	0 13:12	6.27	5.68	11184.92	0.02	0.14	0.00	1.40	Calculated
42	Link-73		Jun-C1	Jun-C1-1	799.51	7387.00	0.00	7363.00	0.00	24.00	3.0000	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	14.96	0 12:36	2.63	5.07	12546.69	0.00	0.03	0.00	0.27	Calculated

SN	Element ID	X Coordinate	Y Coordinate	Description	Invert Elevation	Boundary Type	Flap Gate	Fixed Water Elevation	Peak Inflow	Peak Lateral Inflow	Maximum HGL Depth Attained	Maximum HGL Elevation Attained
					(ft)			(ft)	(cfs)	(cfs)	(ft)	(ft)
1	Out-01	50058.35	50032.02		7274.00	NORMAL	NO		626.77	0.00	2.48	7276.48

SN	Element ID	Description	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period	Rainfall Depth	Rainfall Distribution
									(years)	(inches)	
1	Rain Gage-01		Time Series	TS-01	Cumulative	inches	Colorado	El Paso	5	2.8	SCS Type II 24-hr

SN	Element ID	Description	Area	Drainage Node ID	Weighted Curve Number	Rain Gage ID	Total Precipitation	Total Runoff	Peak Runoff	Time of Concentration
			(acres)				(inches)	(inches)	(cfs)	(days hh:mm:ss)
1	A1		1031.70	Jun-A1	72.12	Rain Gage-01	2.80	0.70	350.24	0 00:57:07
2	A2		37.00	Jun-A2	72.00	Rain Gage-01	2.80	0.69	16.96	0 00:36:58
3	A3		33.10	Stor-A1	73.80	Rain Gage-01	2.80	0.77	19.27	0 00:32:30
4	B1		3670.50	64	60.00	Rain Gage-01	2.80	0.26	224.88	0 01:22:47
5	B2		6.90	Jun-B2-1	64.00	Rain Gage-01	2.80	0.38	1.84	0 00:22:16
6	B3		54.90	Jun-B3	60.00	Rain Gage-01	2.80	0.26	5.27	0 00:38:21
7	B4		45.80	Stor-B1	65.50	Rain Gage-01	2.80	0.44	10.06	0 00:39:45
8	C1		162.70	Jun-C1	60.00	Rain Gage-01	2.80	0.26	15.09	0 00:40:37
9	C2		23.00	Jun-C1-1	64.00	Rain Gage-01	2.80	0.38	4.87	0 00:31:25
10	C3		16.10	Jun-C2-1	64.00	Rain Gage-01	2.80	0.38	3.68	0 00:28:09
11	C4		23.80	Jun-CONF1	66.50	Rain Gage-01	2.80	0.47	5.83	0 00:40:37
12	D1		201.30	Jun-D1-1	60.00	Rain Gage-01	2.80	0.26	18.54	0 00:41:07
13	D2		70.10	Stor-D1	65.50	Rain Gage-01	2.80	0.44	16.86	0 00:35:00
14	D3		41.20	Jun-D2-1	64.00	Rain Gage-01	2.80	0.38	7.55	0 00:38:52
15	D4		34.30	Jun-D3-1	64.00	Rain Gage-01	2.80	0.38	7.47	0 00:30:08
16	D5		12.80	Jun-CONF2	67.20	Rain Gage-01	2.80	0.50	4.17	0 00:30:17
17	D6		41.80	Stor-D5	64.80	Rain Gage-01	2.80	0.41	8.49	0 00:39:06
18	E1		30.10	Jun-E1-1	64.80	Rain Gage-01	2.80	0.41	6.07	0 00:39:36
19	E2		2.60	Jun-E2-1	64.00	Rain Gage-01	2.80	0.38	0.70	0 00:22:12
20	E3		20.40	Jun-E3-1	64.00	Rain Gage-01	2.80	0.38	4.76	0 00:27:12
21	E4		18.70	Jun-E4-1	64.00	Rain Gage-01	2.80	0.38	4.29	0 00:27:57
22	E5		13.50	Jun-E5-1	64.00	Rain Gage-01	2.80	0.38	3.17	0 00:26:58
23	E6		28.90	Stor-E6	61.70	Rain Gage-01	2.80	0.31	4.61	0 00:28:04
24	E7		9.80	Stor-E7	64.00	Rain Gage-01	2.80	0.38	2.47	0 00:24:19
25	F1		24.60	Jun-F1-1	60.00	Rain Gage-01	2.80	0.26	2.47	0 00:35:34
26	F2		19.80	Stor-F2	60.00	Rain Gage-01	2.80	0.26	2.36	0 00:27:03
27	G1		25.20	Jun-G1-1	68.40	Rain Gage-01	2.80	0.54	10.22	0 00:26:37
28	G2		21.20	Stor-G2	73.40	Rain Gage-01	2.80	0.76	11.58	0 00:34:07
29	H1		13.90	Jun-H1-1	60.00	Rain Gage-01	2.80	0.26	1.66	0 00:26:51
30	H2		39.10	Jun-H2-1	65.70	Rain Gage-01	2.80	0.44	10.11	0 00:32:45
31	H3		5.80	Jun-H3-1	66.00	Rain Gage-01	2.80	0.45	1.93	0 00:23:55
32	H4		27.10	Stor-H4	74.10	Rain Gage-01	2.80	0.79	15.88	0 00:33:22
33	H5		20.20	Stor-H5	74.10	Rain Gage-01	2.80	0.79	12.14	0 00:32:12
34	H6		31.60	Stor-H6	70.35	Rain Gage-01	2.80	0.62	12.92	0 00:35:09
35	H7		25.80	Stor-H7	62.70	Rain Gage-01	2.80	0.34	4.56	0 00:30:48
36	H8		8.50	Jun-CONF4	78.00	Rain Gage-01	2.80	0.99	7.82	0 00:25:27
37	H9		6.90	Stor-H9	60.00	Rain Gage-01	2.80	0.26	0.88	0 00:24:00
38	I1		6.80	Jun-I1-1	60.00	Rain Gage-01	2.80	0.26	0.88	0 00:23:49
39	I2		14.80	Stor-I2	60.00	Rain Gage-01	2.80	0.26	1.92	0 00:23:29
40	J1		10.10	Jun-J1	68.50	Rain Gage-01	2.80	0.55	4.59	0 00:22:52
41	K1		17.80	Jun-K1	60.00	Rain Gage-01	2.80	0.26	2.28	0 00:23:58

STORM MODEL OUTPUTS

EXISTING CONDITION 100 YEAR

SN	Element ID	Description	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Channel Type	Channel Height	Channel Width	Left Overbank Manning's Roughness	Channel Manning's Roughness	Right Overbank Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow	Flap Gate	Lengthening Factor	Peak Flow	Time of Peak Flow Occurrence	Max Flow Velocity	Travel Time	Design Flow Capacity	Max Flow / Design Flow Ratio	Max Flow Depth / Total Depth Ratio	Total Time Surcharged	Max Flow Depth	Reported Condition
					(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(ft)	(ft)							(cfs)			(cfs)	(days hh:mm)	(ft/sec)	(min)	(cfs)			(min)	(ft)	
1	64		B2	ABC	2473.30	7375.00	0.00	7320.00	0.00	55.00	2.2200	Trapezoidal	10.000	100.00	0.0000	0.0350	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	1414.90	0 13:02	11.60	3.55	12341.57	0.11	0.36	0.00	3.56	Calculated
2	64		ABC	GHD	2839.57	7320.00	0.00	7300.00	0.00	20.00	0.7000	Trapezoidal	10.000	100.00	0.0000	0.0350	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	2224.57	0 12:48	8.65	5.47	6945.70	0.32	0.59	0.00	5.91	Calculated
3	64		GHD	NUL	1717.53	7300.00	0.00	7285.00	0.00	15.00	0.8700	Trapezoidal	10.000	100.00	0.0000	0.0350	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	2606.31	0 12:44	9.73	2.94	7734.30	0.34	0.61	0.00	6.05	Calculated
4	64		NUL	EFI	1277.36	7285.00	0.00	7265.00	0.00	20.00	1.5700	Trapezoidal	10.000	100.00	0.0000	0.0350	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	2605.78	0 12:45	12.05	1.77	10355.85	0.25	0.53	0.00	5.27	Calculated
5	64		EFI	Out-01	70.66	7265.00	0.00	7260.00	0.00	5.00	7.0800	Trapezoidal	10.000	100.00	0.0000	0.0320	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	2743.01	0 12:43	22.55	0.05	24079.28	0.11	0.36	0.00	3.55	Calculated
6	BR1		B1	B2	492.55	7380.00	0.00	7375.00	0.00	5.00	1.0200	Trapezoidal	10.000	100.00	0.0000	0.0350	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	1416.87	0 13:00	8.72	0.94	8338.49	0.17	0.43	0.00	4.35	Calculated

SN	Element ID	X Coordinate	Y Coordinate	Description	Invert Elevation	Boundary Type	Flap Gate	Fixed Water Elevation	Peak Inflow	Peak Lateral Inflow	Maximum HGL Depth Attained	Maximum HGL Elevation Attained
					(ft)			(ft)	(cfs)	(cfs)	(ft)	(ft)
1	Out-01	8374.32	12780.61		7260.00	NORMAL	NO		2743.01	0.00	3.55	7263.55

SN	Element ID	Description	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period	Rainfall Depth	Rainfall Distribution
									(years)	(inches)	
1	Rain Gage-01		Time Series	TS-01	Cumulative	inches	Colorado	El Paso	100	4.6	SCS Type II 24-hr

SN	Element ID	Description	Area	Drainage Node ID	Weighted Curve Number	Rain Gage ID	Total Precipitation	Total Runoff	Peak Runoff	Time of Concentration
			(acres)				(inches)	(inches)	(cfs)	(days hh:mm:ss)
1	A		915.40	ABC	72.24	Rain Gage-01	4.60	1.91	1033.95	0 00:52:35
2	B		3836.70	B1	60.00	Rain Gage-01	4.60	1.07	1418.53	0 01:28:25
3	Bb		100.60	ABC	69.75	Rain Gage-01	4.60	1.73	122.14	0 00:39:51
4	C		232.70	ABC	62.00	Rain Gage-01	4.60	1.20	175.00	0 00:41:04
5	D		410.90	GHD	64.90	Rain Gage-01	4.60	1.39	354.65	0 00:44:19
6	E		114.80	EFI	69.00	Rain Gage-01	4.60	1.67	129.05	0 00:42:20
7	F		44.50	EFI	69.00	Rain Gage-01	4.60	1.67	54.82	0 00:37:04
8	G		107.60	GHD	69.50	Rain Gage-01	4.60	1.71	144.23	0 00:33:54
9	H		121.80	GHD	72.25	Rain Gage-01	4.60	1.91	187.00	0 00:33:38
10	I		37.50	EFI	79.00	Rain Gage-01	4.60	2.46	78.56	0 00:31:46
11	J		10.10	OS-J	69.50	Rain Gage-01	4.60	1.71	14.89	0 00:29:14
12	K		17.80	OS-K	76.00	Rain Gage-01	4.60	2.21	31.51	0 00:34:33

STORM MODEL OUTPUTS

PROPOSED CONDITION 100 YEAR

SN	Element ID	Description	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Pipe Shape	Pipe Diameter or Height	Pipe Width	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow	Flap Gate	Lengthening Factor	Peak Flow	Time of Peak Flow Occurrence	Max Flow Velocity	Travel Time	Design Flow Capacity	Max Flow / Design Flow Ratio	Max Flow Depth / Total Depth Ratio	Total Time Surcharged	Max Flow Depth	Reported Condition
					(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(ft)	(ft)					(cfs)			(cfs)	(days hh:mm)	(ft/sec)	(min)	(cfs)			(min)	(ft)	
1	Link-06		Jun-BOX1-1	Jun-BOX1-2	100.00	7318.50	0.00	7318.00	0.00	0.50	0.5000	Rectangular	6.000	16.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	2443.27	0 12:47	17.49	0.10	2828.15	0.86	0.73	0.00	4.36	Calculated
2	Link-07		Jun-C2-1	Jun-C2-2	60.00	7341.00	0.00	7337.00	0.00	4.00	6.6700	CIRCULAR	3.000	3.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	138.10	0 12:27	28.89	0.03	186.57	0.74	0.64	0.00	1.91	Calculated
3	Link-08		Jun-D1-1	Jun-D1-2	60.00	7329.00	0.00	7328.00	0.00	1.00	1.6700	CIRCULAR	4.500	4.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	200.67	0 12:25	18.87	0.05	275.03	0.73	0.63	0.00	2.85	Calculated
4	Link-11		Jun-G1-1	Jun-G1-2	60.00	7375.50	0.00	7373.00	0.00	2.50	4.1700	CIRCULAR	2.000	2.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	37.13	0 12:15	17.43	0.06	50.03	0.74	0.64	0.00	1.28	Calculated
5	Link-16		Jun-H1-1	Jun-H1-2	60.00	7391.50	0.00	7389.00	0.00	2.50	4.1700	CIRCULAR	1.500	1.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	11.93	0 12:15	13.24	0.08	23.23	0.51	0.51	0.00	0.76	Calculated
6	Link-17		Jun-H2-1	Jun-H2-2	60.00	7334.00	0.00	7332.00	0.00	2.00	3.3300	CIRCULAR	2.000	2.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	43.37	0 12:20	16.23	0.06	44.74	0.97	0.79	0.00	1.59	Calculated
7	Link-18		Jun-H3-1	Jun-H3-2	60.00	7379.50	0.00	7376.00	0.00	3.50	5.8300	CIRCULAR	1.500	1.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	7.90	0 12:15	13.43	0.07	27.48	0.29	0.37	0.00	0.55	Calculated
8	Link-19		Jun-BOX2-1	Jun-BOX2-2	100.00	7280.00	0.00	7279.50	0.00	0.50	0.5000	Rectangular	6.000	16.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	2747.00	0 12:48	18.12	0.09	2828.15	0.97	0.79	0.00	4.73	Calculated
9	Link-20		Jun-I1-1	Jun-I1-2	60.00	7355.50	0.00	7354.50	0.00	1.00	1.6700	CIRCULAR	1.500	1.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	6.32	0 12:15	8.01	0.12	14.69	0.43	0.46	0.00	0.69	Calculated
10	Link-21		Jun-F1-1	Jun-F1-2	60.00	7338.50	0.00	7335.50	0.00	3.00	5.0000	CIRCULAR	1.500	1.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	17.40	0 12:20	15.50	0.06	25.45	0.68	0.61	0.00	0.91	Calculated
11	Link-22		Jun-E4-1	Jun-E4-2	60.00	7337.00	0.00	7336.00	0.00	1.00	1.6700	CIRCULAR	3.000	3.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	69.20	0 12:21	14.45	0.07	93.28	0.74	0.64	0.00	1.91	Calculated
12	Link-23		Jun-E5-1	Jun-E5-2	60.00	7336.50	0.00	7333.00	0.00	3.50	5.8300	CIRCULAR	1.500	1.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	15.37	0 12:15	15.98	0.06	27.48	0.56	0.54	0.00	0.80	Calculated
13	Link-24		Jun-D3-1	Jun-D3-2	60.00	7337.50	0.00	7337.00	0.00	0.50	0.8300	CIRCULAR	3.500	3.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	67.99	0 12:22	11.13	0.09	99.50	0.68	0.61	0.00	2.11	Calculated
14	Link-25		Jun-D2-1	Jun-D2-2	60.00	7372.00	0.00	7370.00	0.00	2.00	3.3300	CIRCULAR	2.000	2.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	36.51	0 12:25	15.87	0.06	44.74	0.82	0.69	0.00	1.37	Calculated
15	Link-26		Jun-E3-1	Jun-E3-2	60.00	7369.00	0.00	7367.50	0.00	1.50	2.5000	CIRCULAR	2.000	2.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	25.52	0 12:15	13.17	0.08	38.75	0.66	0.59	0.00	1.18	Calculated
16	Link-27		Jun-E1-1	Jun-E1-2	60.00	7371.50	0.00	7369.50	0.00	2.00	3.3300	CIRCULAR	2.000	2.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	27.73	0 12:25	14.99	0.07	44.74	0.62	0.57	0.00	1.14	Calculated
17	Link-28		Jun-E2-1	Jun-E2-2	60.00	7401.00	0.00	7399.00	0.00	2.00	3.3300	CIRCULAR	1.500	1.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	3.24	0 12:15	8.55	0.12	20.78	0.16	0.27	0.00	0.40	Calculated
18	Link-29		Jun-C1-1	Jun-C1-2	60.00	7363.00	0.00	7360.00	0.00	3.00	5.0000	CIRCULAR	3.000	3.00	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	125.63	0 12:26	25.26	0.04	161.57	0.78	0.66	0.00	1.98	Calculated
19	Link-30		Jun-B2-1	Jun-B2-2	60.00	7375.00	0.00	7371.00	0.00	4.00	6.6700	CIRCULAR	1.500	1.50	0.0120	0.5000	0.5000	0.0000	0.00	NO	1.00	8.58	0 12:15	14.42	0.07	29.38	0.29	0.37	0.00	0.56	Calculated

SN	Element ID	Description	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Channel Type	Channel Height	Channel Width	Left Overbank Manning's Roughness	Channel Manning's Roughness	Right Overbank Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow	Flap Gate	Lengthening Factor	Peak Flow	Time of Peak Flow Occurrence	Max Flow Velocity	Travel Time	Design Flow Capacity	Max Flow / Design Flow Ratio	Max Flow Depth / Total Depth Ratio	Total Time Surcharged	Max Flow Depth	Reported Condition
					(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(ft)	(ft)							(cfs)			(cfs)	(days hh:mm)	(ft/sec)	(min)	(cfs)			(min)	(ft)	
1	64		Jun-C2-2	Stor-B1	155.46	7337.00	0.00	7335.00	0.00	2.00	1.2900	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	138.05	0 12:27	4.34	0.60	8213.74	0.02	0.13	0.00	1.26	Calculated
2	Link-01		Jun-C1-2	Jun-C2-1	861.57	7360.00	0.00	7341.00	0.00	19.00	2.2100	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	125.21	0 12:27	5.06	2.84	10753.92	0.01	0.10	0.00	1.02	Calculated
3	Link-02		Jun-F1-2	Stor-F2	703.81	7335.50	0.00	7308.00	0.00	27.50	3.9100	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	17.30	0 12:26	3.02	3.88	14314.43	0.00	0.03	0.00	0.27	Calculated
4	Link-03		Jun-E4-2	Stor-E7	712.94	7336.00	0.00	7316.00	0.00	20.00	2.8100	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	68.97	0 12:23	4.47	2.66	12128.97	0.01	0.07	0.00	0.67	Calculated
5	Link-04		Jun-E5-2	Stor-E6	858.58	7333.00	0.00	7303.00	0.00	30.00	3.4900	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	14.92	0 12:18	2.79	5.13	13536.48	0.00	0.03	0.00	0.26	Calculated
6	Link-05		Jun-D3-2	Stor-D5	1418.47	7337.00	0.00	7291.00	0.00	46.00	3.2400	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	67.30	0 12:26	4.68	5.05	13040.80	0.01	0.06	0.00	0.64	Calculated
7	Link-13		Stor-G2	Jun-CONF1	800.00	7331.00	0.00	7311.50	0.00	19.50	2.4400	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	69.31	0 12:21	4.29	3.11	11305.97	0.01	0.07	0.00	0.71	Calculated
8	Link-15		Stor-H4	Jun-CONF1	373.25	7327.00	0.00	7311.50	0.00	15.50	4.1500	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	56.26	0 12:20	4.71	1.32	14757.11	0.00	0.05	0.00	0.54	Calculated
9	Link-31		Jun-BOX1-2	Jun-CONF1	866.29	7318.00	0.00	7311.50	0.00	6.50	0.7500	Trapezoidal	10.000	110.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	2442.54	0 12:48	8.03	1.80	7622.13	0.32	0.57	0.00	5.74	Calculated
10	Link-37		Jun-H2-2	Stor-H6	586.28	7332.00	0.00	7307.00	0.00	25.00	4.2600	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	43.20	0 12:21	4.33	2.26	14953.84	0.00	0.05	0.00	0.46	Calculated
11	Link-39		Jun-BOX2-2	Jun-CONF4	340.25	7279.50	0.00	7276.00	0.00	3.50	1.0300	Trapezoidal	10.000	110.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	2746.87	0 12:48	9.29	0.61	8924.55	0.31	0.56	0.00	5.63	Calculated
12	Link-40		Jun-CONF1	Jun-CONF2	1071.31	7311.50	0.00	7300.00	0.00	11.50	1.0700	Trapezoidal	10.000	110.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	2503.07	0 12:49	9.20	1.94	9116.81	0.27	0.53	0.00	5.31	Calculated
13	Link-41		Jun-CONF2	Jun-CONF3	736.36	7300.00	0.00	7292.00	0.00	8.00	1.0900	Trapezoidal	10.000	110.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	2640.65	0 12:47	9.37	1.31	9171.73	0.29	0.54	0.00	5.44	Calculated
14	Link-42		Jun-CONF3	Jun-BOX2-1	1308.67	7292.00	0.00	7280.00	0.00	12.00	0.9200	Trapezoidal	10.000	110.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	2675.56	0 12:49	8.85	2.46	8426.11	0.32	0.57	0.00	5.72	Calculated
15	Link-43		Jun-B2-2	Stor-B1	1548.66	7371.00	0.00	7335.00	0.00	36.00	2.3200	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	7.66	0 12:21	2.05	12.59	11041.00	0.00	0.02	0.00	0.19	Calculated
16	Link-45		Jun-H1-2	Stor-H4	1249.62	7389.00	0.00	7327.00	0.00	62.00	4.9600	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	11.52	0 12:21	2.85	7.31	16130.29	0.00	0.02	0.00	0.20	Calculated
17	Link-46		Jun-G1-2	Stor-G2	1241.36	7373.00	0.00	7331.00	0.00	42.00	3.3800	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	36.03	0 12:18	3.83	5.40	13320.21	0.00	0.04	0.00	0.44	Calculated
18	Link-47		Stor-A1	Jun-BOX1-1	850.75	7340.00	0.00	7318.50	0.00	21.50	2.5300	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	105.18	0 12:22	4.99	2.84	11512.08	0.01	0.09	0.00	0.89	Calculated
19	Link-48		Jun-D1-2	Jun-CONF2	1270.02	7328.00	0.00	7300.00	0.00	28.00	2.2000	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	199.72	0 12:26	5.90	3.59	10752.49	0.02	0.13	0.00	1.34	Calculated
20	Link-49		Jun-D2-2	Jun-D3-1	1169.72	7370.00	0.00	7337.50	0.00	32.50	2.7800	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	36.24	0 12:27	3.56	5.48	12070.80	0.00	0.05	0.00	0.47	Calculated
21	Link-50		Jun-E3-2	Jun-E4-1	1141.92	7367.50	0.00	7337.00	0.00	30.50	2.6700	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	25.04	0 12:21	3.12	6.10	11834.98	0.00	0.04	0.00	0.38	Calculated
22	Link-51		Jun-E1-2	Jun-E4-1	1032.69	7369.50	0.00	7337.00	0.00	32.50	3.1500	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	27.53	0 12:27	3.35	5.14	12846.71	0.00	0.04	0.00	0.38	Calculated
23	Link-52		Jun-E2-2	Jun-E3-1	974.31	7399.00	0.00	7369.00	0.00	30.00	3.0800	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	2.99	0 12:20	1.52	10.68	12707.13	0.00	0.01	0.00	0.10	Calculated
24	Link-53		Jun-I1-2	Stor-I2	461.48	7354.50	0.00	7319.00	0.00	35.50	7.6900	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	6.25	0 12:16	2.52	3.05	20085.06	0.00	0.01	0.00	0.12	Calculated
25	Link-54		Stor-B1	Jun-BOX1-1	295.68	7335.00	0.00	7318.50	0.00	16.50	5.5800	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	188.15	0 12:25	7.86	0.63	17106.70	0.01	0.10	0.00	1.00	Calculated
26	Link-55		Stor-D1	Jun-D1-1	196.14	7331.00	0.00	7329.00	0.00	2.00	1.0200	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	73.49	0 12:20	3.26	1.00	7312.52	0.01	0.09	0.00	0.95	Calculated
27	Link-56		Stor-E7	Out-01	1915.96	7316.00	0.00	7274.00	0.00	42.00	2.1900	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	75.94	0 12:27	4.35	7.34	10721.78	0.01	0.08	0.00	0.77	Calculated
28	Link-57		Stor-F2	Out-01	1886.42	7308.00	0.00	7274.00	0.00	34.00	1.8000	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	30.68	0 12:28	3.01	10.45	9722.00	0.00	0.05	0.00	0.48	Calculated
29	Link-58		Jun-CONF4	Out-01	179.25	7276.00	0.00	7274.00	0.00	2.00	1.1200	Trapezoidal	10.000	110.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	2765.51	0 12:48	9.58	0.31	9294.73	0.30	0.55	0.00	5.53	Calculated
30	Link-59		Stor-H7	Jun-BOX2-1	297.63	7301.00	0.00	7280.00	0.00	21.00	7.0600	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	32.01	0 12:20	4.54	1.09	19235.64	0.00	0.03	0.00	0.33	Calculated
31	Link-60		Stor-D5	Jun-BOX2-1	393.31	7291.00	0.00	7280.00	0.00	11.00	2.8000	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	106.01	0 12:25	5.16	1.27	12110.56	0.01	0.09	0.00	0.87	Calculated
32	Link-61		Stor-E6	Jun-CONF4	601.36	7303.00	0.00	7276.00	0.00	27.00	4.4900	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	41.68	0 12:19	4.35	2.30	15344.40	0.00	0.04	0.00	0.44	Calculated
33	Link-62		Stor-H6	Jun-CONF3	219.51	7307.00	0.00	7292.00	0.00	15.00	6.8300	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	85.83	0 12:21	6.42	0.57	18930.14	0.00	0.06	0.00	0.60	Calculated
34	Link-63		Stor-H5	Jun-CONF2	732.18	7318.00	0.00	7300.00	0.00	18.00	2.4600	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	34.11	0 12:21	3.35	3.64	11354.36	0.00	0.05	0.00	0.47	Calculated
35	Link-64		Stor-I2	Out-01	1449.26	7319.00	0.00	7274.00	0.00	45.00	3.1100	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	18.81	0 12:21	3.01	8.02	12760.52	0.00	0.03	0.00	0.30	Calculated
36	Link-65		Stor-H9	Out-01	1543.09	7311.00	0.00	7274.00	0.00	37.00	2.4000	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	5.44	0 12:24	1.80	14.29	11213.48	0.00	0.02	0.00	0.16	Calculated
37	Link-66		Jun-H3-2	Stor-H7	1205.71	7376.00	0.00	7301.00	0.00	75.00	6.2200	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	7.59	0 12:18	2.62	7.67	18061.12	0.00	0.01	0.00	0.14	Calculated
38	Link-68		Jun-A1	Jun-BOX1-1	1609.87	7340.00	0.00	7318.50	0.00	21.50	1.3400	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	1086.14	0 12:36	8.16	3.29	8368.72	0.13	0.38	0.00	3.80	Calculated
39	Link-69		Jun-A2	Stor-A1	991.55	7393.00	0.00	7340.00	0.00	53.00	5.3500	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	52.13	0 12:22	4.98	3.32	16742.33	0.00	0.05	0.00	0.48	Calculated
40	Link-70		Jun-B3	Jun-BOX1-1	1801.86	7334.00	0.00	7318.50	0.00	15.50	0.8600	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	1435.21	0 13:00	7.50	4.00	6716.46	0.21	0.49	0.00	4.86	Calculated
41	Link-72		64	Jun-B3	2137.84	7385.00	0.00	7334.00	0.00	51.00	2.3900	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	1422.56	0 12:57	10.82	3.29	11184.92	0.13	0.38	0.00	3.76	Calculated
42	Link-73		Jun-C1	Jun-C1-1	799.51	7387.00	0.00	7363.00	0.00	24.00	3.0000	Trapezoidal	10.000	100.00	0.0000	0.0400	0.0000	0.5000	0.5000	0.0000	0.00	NO	1.00	105.38	0 12:26	5.28	2.52	12546.69	0.01	0.09	0.00	0.85	Calculated

No schematic provided. Will be reviewed with the re-submittal. Update the drainage map to include the corresponding ID.

SN	Element ID	X Coordinate	Y Coordinate	Description	Invert Elevation	Boundary Type	Flap Gate	Fixed Water Elevation	Peak Inflow	Peak Lateral Inflow	Maximum HGL Depth Attained	Maximum HGL Elevation Attained
					(ft)			(ft)	(cfs)	(cfs)	(ft)	(ft)
1	Out-01	50058.35	50032.02		7274.00	NORMAL	NO		2839.65	0.00	5.54	7279.54

SN	Element ID	Description	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period	Rainfall Depth	Rainfall Distribution
									(years)	(inches)	
1	Rain Gage-01		Time Series	TS-01	Cumulative	inches	Colorado	El Paso	100	4.6	SCS Type II 24-hr

SN	Element ID	Description	Area	Drainage Node ID	Weighted Curve Number	Rain Gage ID	Total Precipitation	Total Runoff	Peak Runoff	Time of Concentration
			(acres)				(inches)	(inches)	(cfs)	(days hh:mm:ss)
1	A1		1031.70	Jun-A1	72.12	Rain Gage-01	4.60	1.90	1093.32	0 00:57:07
2	A2		37.00	Jun-A2	72.00	Rain Gage-01	4.60	1.90	52.73	0 00:36:58
3	A3		33.10	Stor-A1	73.80	Rain Gage-01	4.60	2.03	55.77	0 00:32:30
4	B1		3670.50	64	60.00	Rain Gage-01	4.60	1.07	1426.59	0 01:22:47
5	B2		6.90	Jun-B2-1	64.00	Rain Gage-01	4.60	1.33	8.85	0 00:22:16
6	B3		54.90	Jun-B3	60.00	Rain Gage-01	4.60	1.07	37.23	0 00:38:21
7	B4		45.80	Stor-B1	65.50	Rain Gage-01	4.60	1.43	44.27	0 00:39:45
8	C1		162.70	Jun-C1	60.00	Rain Gage-01	4.60	1.07	106.32	0 00:40:37
9	C2		23.00	Jun-C1-1	64.00	Rain Gage-01	4.60	1.33	23.76	0 00:31:25
10	C3		16.10	Jun-C2-1	64.00	Rain Gage-01	4.60	1.33	17.91	0 00:28:09
11	C4		23.80	Jun-CONF1	66.50	Rain Gage-01	4.60	1.50	24.03	0 00:40:37
12	D1		201.30	Jun-D1-1	60.00	Rain Gage-01	4.60	1.07	130.35	0 00:41:07
13	D2		70.10	Stor-D1	65.50	Rain Gage-01	4.60	1.43	73.77	0 00:35:00
14	D3		41.20	Jun-D2-1	64.00	Rain Gage-01	4.60	1.33	36.85	0 00:38:52
15	D4		34.30	Jun-D3-1	64.00	Rain Gage-01	4.60	1.33	36.45	0 00:30:08
16	D5		12.80	Jun-CONF2	67.20	Rain Gage-01	4.60	1.54	16.37	0 00:30:17
17	D6		41.80	Stor-D5	64.80	Rain Gage-01	4.60	1.38	39.17	0 00:39:06
18	E1		30.10	Jun-E1-1	64.80	Rain Gage-01	4.60	1.38	27.96	0 00:39:36
19	E2		2.60	Jun-E2-1	64.00	Rain Gage-01	4.60	1.33	3.34	0 00:22:12
20	E3		20.40	Jun-E3-1	64.00	Rain Gage-01	4.60	1.33	23.18	0 00:27:12
21	E4		18.70	Jun-E4-1	64.00	Rain Gage-01	4.60	1.33	20.90	0 00:27:57
22	E5		13.50	Jun-E5-1	64.00	Rain Gage-01	4.60	1.33	15.43	0 00:26:58
23	E6		28.90	Stor-E6	61.70	Rain Gage-01	4.60	1.18	27.59	0 00:28:04
24	E7		9.80	Stor-E7	64.00	Rain Gage-01	4.60	1.33	11.93	0 00:24:19
25	F1		24.60	Jun-F1-1	60.00	Rain Gage-01	4.60	1.07	17.63	0 00:35:34
26	F2		19.80	Stor-F2	60.00	Rain Gage-01	4.60	1.07	17.09	0 00:27:03
27	G1		25.20	Jun-G1-1	68.40	Rain Gage-01	4.60	1.63	37.20	0 00:26:37
28	G2		21.20	Stor-G2	73.40	Rain Gage-01	4.60	2.00	33.97	0 00:34:07
29	H1		13.90	Jun-H1-1	60.00	Rain Gage-01	4.60	1.07	12.05	0 00:26:51
30	H2		39.10	Jun-H2-1	65.70	Rain Gage-01	4.60	1.44	43.64	0 00:32:45
31	H3		5.80	Jun-H3-1	66.00	Rain Gage-01	4.60	1.46	8.03	0 00:23:55
32	H4		27.10	Stor-H4	74.10	Rain Gage-01	4.60	2.06	45.44	0 00:33:22
33	H5		20.20	Stor-H5	74.10	Rain Gage-01	4.60	2.06	34.69	0 00:32:12
34	H6		31.60	Stor-H6	70.35	Rain Gage-01	4.60	1.77	43.11	0 00:35:09
35	H7		25.80	Stor-H7	62.70	Rain Gage-01	4.60	1.24	24.85	0 00:30:48
36	H8		8.50	Jun-CONF4	78.00	Rain Gage-01	4.60	2.38	19.62	0 00:25:27
37	H9		6.90	Stor-H9	60.00	Rain Gage-01	4.60	1.07	6.43	0 00:24:00
38	I1		6.80	Jun-I1-1	60.00	Rain Gage-01	4.60	1.07	6.38	0 00:23:49
39	I2		14.80	Stor-I2	60.00	Rain Gage-01	4.60	1.07	14.01	0 00:23:29
40	J1		10.10	Jun-J1	68.50	Rain Gage-01	4.60	1.64	16.40	0 00:22:52
41	K1		17.80	Jun-K1	60.00	Rain Gage-01	4.60	1.07	16.61	0 00:23:58

WATER QUALITY POND CALCULATIONS

VERTEX®

Project McCune Ranch
Date 10/2/2018

Author: JCP
Checked by:

Pond Worksheet

Pond	Tributary Basins	Total Basin Area (acres)	5 Acre Lot Developed (acres)		2.5 Acre Lot Developed (acres)		Retail Business (acres)		Natural Area (acres)		$I_{Composite}$	Required Pond Size (acre-feet)
			5	%	9	%	92	%	2	%		
1	A2, A3	70.1	70.1								5.0	0.211
2	B2,B4,C2,C3	91.8			78.8				13.0		8.0	0.423
3	D2,D5	82.9	2.5		49.2				31.2		6.2	0.304
4	D3,D4,D6	117.3	33.4		75.5				8.4		7.4	0.504
5	E5,E6	42.4	20.2		19.3				2.9		6.6	0.165
6	E1,E2,E3,E4,E7	81.6	21.0		53.6		7.0				15.1	0.638
7	F1,F2	44.4	44.4								5.0	0.134
8	G1+G2	46.4	42.2						4.2		4.7	0.132
9	H1+H4	41.0	32.8						8.2		4.4	0.110
10	H5	20.2	14.2						6.0		4.1	0.051
11	H2,H6	70.7	38.4						32.3		3.6	0.157
12	H3,H7	31.6	20.9						10.7		4.0	0.077
13	H9	6.9	6.9								5.0	0.021
14	I1,I2	21.6	21.6								5.0	0.065

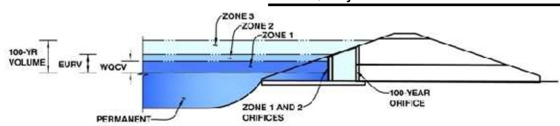
Prelim Plan shows 7.9 ac

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: McCune Ranch

Basin ID: Water Quality Pond 1



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	**EDB**			
Watershed Area =	70.10	acres		
Watershed Length =	3,207	ft		
Watershed Slope =	0.038	ft/ft		
Watershed Imperviousness =	5.00%	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) =	0.211	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	0.276	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.230	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.747	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.920	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	4.599	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	6.372	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	8.656	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet		inches
Approximate 2-yr Detention Volume =	0.215	acre-feet		
Approximate 5-yr Detention Volume =	0.718	acre-feet		
Approximate 10-yr Detention Volume =	1.075	acre-feet		
Approximate 25-yr Detention Volume =	1.268	acre-feet		
Approximate 50-yr Detention Volume =	1.278	acre-feet		
Approximate 100-yr Detention Volume =	1.895	acre-feet		

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.211	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.211	acre-feet
Initial Surcharge Volume (ISV) =	28	ft^3
Initial Surcharge Depth (ISD) =		ft
Total Available Detention Depth (H_{total}) =		ft
Depth of Trickle Channel (H_{TC}) =		ft
Slope of Trickle Channel (S_{TC}) =		ft/ft
Slopes of Main Basin Sides (S_{main}) =		H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =		

Total detention volume is less than 100-year volume.

Depth Increment = ft

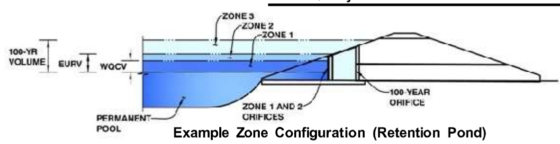
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: McCune Ranch

Basin ID: Water Quality Pond 2



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB			
Watershed Area =	91.80	acres	**Note: L / W Ratio > 8**	
Watershed Length =	24,454	ft	**L / W Ratio = 149.5**	
Watershed Slope =	0.052	ft/ft		
Watershed Imperviousness =	8.00%	percent		
Percentage Hydrologic Soil Group A =	0.0%	percent		
Percentage Hydrologic Soil Group B =	100.0%	percent		
Percentage Hydrologic Soil Groups C/D =	0.0%	percent		
Desired WQCV Drain Time =	40.0	hours		
Location for 1-hr Rainfall Depths =	User Input			
Water Quality Capture Volume (WQCV) =	0.423	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	0.678	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.456	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.722	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.844	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	5.332	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	7.502	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	10.336	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet		inches
Approximate 2-yr Detention Volume =	0.423	acre-feet		
Approximate 5-yr Detention Volume =	0.676	acre-feet		
Approximate 10-yr Detention Volume =	1.556	acre-feet		
Approximate 25-yr Detention Volume =	2.249	acre-feet		
Approximate 50-yr Detention Volume =	2.336	acre-feet		
Approximate 100-yr Detention Volume =	3.056	acre-feet		

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.423	acre-feet	
Select Zone 2 Storage Volume (Optional) =		acre-feet	**Total detention volume is less than 100-year volume.**
Select Zone 3 Storage Volume (Optional) =		acre-feet	
Total Detention Basin Volume =	0.423	acre-feet	
Initial Surcharge Volume (ISV) =	55	ft^3	
Initial Surcharge Depth (ISD) =		ft	
Total Available Detention Depth (H_{total}) =		ft	
Depth of Trickle Channel (H_{TC}) =		ft	
Slope of Trickle Channel (S_{TC}) =		ft/ft	
Slopes of Main Basin Sides (S_{main}) =		H:V	
Basin Length-to-Width Ratio ($R_{L/W}$) =			

Depth Increment = ft

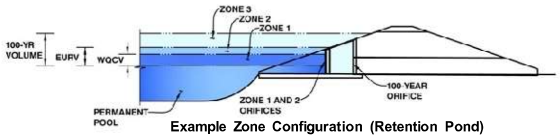
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: McCune Ranch

Basin ID: Water Quality Pond 3



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB			
Watershed Area =	82.90	acres		
Watershed Length =	3,781	ft		
Watershed Slope =	0.032	ft/ft		
Watershed Imperviousness =	6.20%	percent		
Percentage Hydrologic Soil Group A =	0.0%	percent		
Percentage Hydrologic Soil Group B =	100.0%	percent		
Percentage Hydrologic Soil Groups C/D =	0.0%	percent		
Desired WQCV Drain Time =	40.0	hours		
Location for 1-hr Rainfall Depths =	User Input			
Water Quality Capture Volume (WQCV) =	0.304	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	0.465	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.305	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.493	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.454	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	4.627	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	6.593	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	9.161	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet		inches
Approximate 2-yr Detention Volume =	0.282	acre-feet		
Approximate 5-yr Detention Volume =	0.461	acre-feet		
Approximate 10-yr Detention Volume =	1.213	acre-feet		
Approximate 25-yr Detention Volume =	1.812	acre-feet		
Approximate 50-yr Detention Volume =	1.862	acre-feet		
Approximate 100-yr Detention Volume =	2.465	acre-feet		

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.304	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.304	acre-feet
Initial Surcharge Volume (ISV) =	40	ft^3
Initial Surcharge Depth (ISD) =		ft
Total Available Detention Depth (H_{total}) =		ft
Depth of Trickle Channel (H_{TC}) =		ft
Slope of Trickle Channel (S_{TC}) =		ft/ft
Slopes of Main Basin Sides (S_{main}) =		H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =		

Total detention volume is less than 100-year volume.

Depth Increment = ft

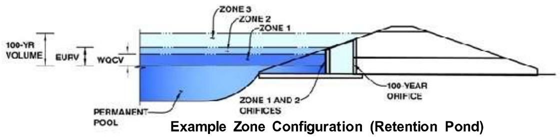
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: McCune Ranch

Basin ID: Water Quality Pond 4



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB				
Watershed Area =	117.30	acres	**Note: L / W Ratio > 8**		
Watershed Length =	6,441	ft	**L / W Ratio = 8.1**		
Watershed Slope =	0.013	ft/ft			
Watershed Imperviousness =	7.40%	percent			
Percentage Hydrologic Soil Group A =	0.0%	percent			
Percentage Hydrologic Soil Group B =	100.0%	percent			
Percentage Hydrologic Soil Groups C/D =	0.0%	percent			
Desired WQCV Drain Time =	40.0	hours			
Location for 1-hr Rainfall Depths =	User Input				
Water Quality Capture Volume (WQCV) =	0.504	acre-feet	Optional User Override 1-hr Precipitation		
Excess Urban Runoff Volume (EURV) =	0.796	acre-feet			
2-yr Runoff Volume (P1 = 1.19 in.) =	0.531	acre-feet		1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.847	acre-feet		1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	2.257	acre-feet		1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	6.724	acre-feet		2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	9.500	acre-feet		2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	13.126	acre-feet		2.52	inches
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet			inches
Approximate 2-yr Detention Volume =	0.493	acre-feet			
Approximate 5-yr Detention Volume =	0.793	acre-feet			
Approximate 10-yr Detention Volume =	1.898	acre-feet			
Approximate 25-yr Detention Volume =	2.772	acre-feet			
Approximate 50-yr Detention Volume =	2.871	acre-feet			
Approximate 100-yr Detention Volume =	3.771	acre-feet			

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.504	acre-feet	
Select Zone 2 Storage Volume (Optional) =		acre-feet	**Total detention volume is less than 100-year volume.**
Select Zone 3 Storage Volume (Optional) =		acre-feet	
Total Detention Basin Volume =	0.504	acre-feet	
Initial Surcharge Volume (ISV) =	66	ft^3	
Initial Surcharge Depth (ISD) =		ft	
Total Available Detention Depth (H_{total}) =		ft	
Depth of Trickle Channel (H_{TC}) =		ft	
Slope of Trickle Channel (S_{TC}) =		ft/ft	
Slopes of Main Basin Sides (S_{main}) =		H:V	
Basin Length-to-Width Ratio ($R_{L/W}$) =			

Depth Increment = ft

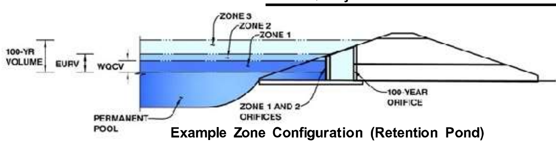
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: McCune Ranch

Basin ID: Water Quality Pond 5



Example Zone Configuration (Retention Pond)

Required Volume Calculation

			Optional User Override 1-hr Precipitation	
Selected BMP Type =	EDB			
Watershed Area =	42.40	acres		
Watershed Length =	2,393	ft		
Watershed Slope =	0.043	ft/ft		
Watershed Imperviousness =	6.60%	percent		
Percentage Hydrologic Soil Group A =	0.0%	percent		
Percentage Hydrologic Soil Group B =	100.0%	percent		
Percentage Hydrologic Soil Groups C/D =	0.0%	percent		
Desired WQCV Drain Time =	40.0	hours		
Location for 1-hr Rainfall Depths =	User Input			
Water Quality Capture Volume (WQCV) =	0.165	acre-feet		
Excess Urban Runoff Volume (EURV) =	0.254	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.168	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.270	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.768	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	2.388	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	3.393	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	4.705	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet		inches
Approximate 2-yr Detention Volume =	0.156	acre-feet		
Approximate 5-yr Detention Volume =	0.253	acre-feet		
Approximate 10-yr Detention Volume =	0.642	acre-feet		
Approximate 25-yr Detention Volume =	0.952	acre-feet		
Approximate 50-yr Detention Volume =	0.981	acre-feet		
Approximate 100-yr Detention Volume =	1.296	acre-feet		

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.165	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.165	acre-feet
Initial Surcharge Volume (ISV) =	21	ft^3
Initial Surcharge Depth (ISD) =		ft
Total Available Detention Depth (H_{total}) =		ft
Depth of Trickle Channel (H_{TC}) =		ft
Slope of Trickle Channel (S_{TC}) =		ft/ft
Slopes of Main Basin Sides (S_{main}) =		H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =		

Total detention volume is less than 100-year volume.

Depth Increment = ft

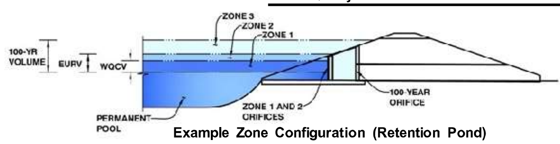
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: McCune Ranch

Basin ID: Water Quality Pond 6



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB				
Watershed Area =	81.60	acres	**Note: L / W Ratio > 8**		
Watershed Length =	5,963	ft	**L / W Ratio = 10**		
Watershed Slope =	0.026	ft/ft			
Watershed Imperviousness =	15.10%	percent			
Percentage Hydrologic Soil Group A =	0.0%	percent			
Percentage Hydrologic Soil Group B =	100.0%	percent			
Percentage Hydrologic Soil Groups C/D =	0.0%	percent			
Desired WQCV Drain Time =	40.0	hours			
Location for 1-hr Rainfall Depths =	User Input				
Water Quality Capture Volume (WQCV) =	0.638	acre-feet	Optional User Override		
Excess Urban Runoff Volume (EURV) =	1.197	acre-feet	1-hr Precipitation		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.857	acre-feet		1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.290	acre-feet		1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	2.461	acre-feet		1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	5.469	acre-feet		2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	7.372	acre-feet		2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	9.859	acre-feet		2.52	inches
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet			inches
Approximate 2-yr Detention Volume =	0.797	acre-feet			
Approximate 5-yr Detention Volume =	1.209	acre-feet			
Approximate 10-yr Detention Volume =	2.136	acre-feet			
Approximate 25-yr Detention Volume =	2.778	acre-feet			
Approximate 50-yr Detention Volume =	2.930	acre-feet			
Approximate 100-yr Detention Volume =	3.685	acre-feet			

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.638	acre-feet	
Select Zone 2 Storage Volume (Optional) =		acre-feet	**Total detention volume is less than 100-year volume.**
Select Zone 3 Storage Volume (Optional) =		acre-feet	
Total Detention Basin Volume =	0.638	acre-feet	
Initial Surcharge Volume (ISV) =	83	ft^3	
Initial Surcharge Depth (ISD) =		ft	
Total Available Detention Depth (H_{total}) =		ft	
Depth of Trickle Channel (H_{TC}) =		ft	
Slope of Trickle Channel (S_{TC}) =		ft/ft	
Slopes of Main Basin Sides (S_{main}) =		H:V	
Basin Length-to-Width Ratio ($R_{L/W}$) =			

Depth Increment = ft

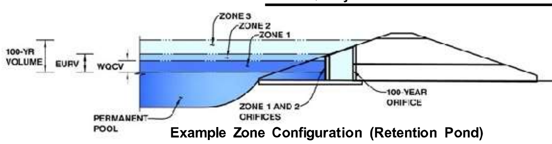
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: McCune Ranch

Basin ID: Water Quality Pond 7



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB			
Watershed Area =	44.40	acres		
Watershed Length =	3,090	ft		
Watershed Slope =	0.031	ft/ft		
Watershed Imperviousness =	5.00%	percent		
Percentage Hydrologic Soil Group A =	0.0%	percent		
Percentage Hydrologic Soil Group B =	100.0%	percent		
Percentage Hydrologic Soil Groups C/D =	0.0%	percent		
Desired WQCV Drain Time =	40.0	hours		
Location for 1-hr Rainfall Depths =	User Input			
Water Quality Capture Volume (WQCV) =	0.134	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	0.197	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.127	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.209	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.703	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	2.411	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	3.467	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	4.845	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet		inches
Approximate 2-yr Detention Volume =	0.117	acre-feet		
Approximate 5-yr Detention Volume =	0.195	acre-feet		
Approximate 10-yr Detention Volume =	0.581	acre-feet		
Approximate 25-yr Detention Volume =	0.887	acre-feet		
Approximate 50-yr Detention Volume =	0.901	acre-feet		
Approximate 100-yr Detention Volume =	1.204	acre-feet		

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.134	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.134	acre-feet
Initial Surcharge Volume (ISV) =	17	ft^3
Initial Surcharge Depth (ISD) =		ft
Total Available Detention Depth (H_{total}) =		ft
Depth of Trickle Channel (H_{TC}) =		ft
Slope of Trickle Channel (S_{TC}) =		ft/ft
Slopes of Main Basin Sides (S_{main}) =		H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =		

Total detention volume is less than 100-year volume.

Depth Increment = ft

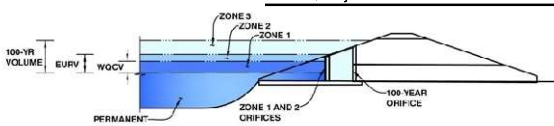
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: McCune Ranch

Basin ID: Water Quality Pond 8



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB			
Watershed Area =	46.40	acres		
Watershed Length =	3,353	ft		
Watershed Slope =	0.043	ft/ft		
Watershed Imperviousness =	4.70%	percent		
Percentage Hydrologic Soil Group A =	0.0%	percent		
Percentage Hydrologic Soil Group B =	80.0%	percent		
Percentage Hydrologic Soil Groups C/D =	20.0%	percent		
Desired WQCV Drain Time =	40.0	hours		
Location for 1-hr Rainfall Depths =	User Input			
Water Quality Capture Volume (WQCV) =	0.132	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	0.189	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.127	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.258	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.823	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	2.607	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	3.725	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	5.181	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet		inches
Approximate 2-yr Detention Volume =	0.118	acre-feet		
Approximate 5-yr Detention Volume =	0.244	acre-feet		
Approximate 10-yr Detention Volume =	0.611	acre-feet		
Approximate 25-yr Detention Volume =	0.886	acre-feet		
Approximate 50-yr Detention Volume =	0.896	acre-feet		
Approximate 100-yr Detention Volume =	1.225	acre-feet		

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.132	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.132	acre-feet
Initial Surcharge Volume (ISV) =	17	ft^3
Initial Surcharge Depth (ISD) =		ft
Total Available Detention Depth (H_{total}) =		ft
Depth of Trickle Channel (H_{TC}) =		ft
Slope of Trickle Channel (S_{TC}) =		ft/ft
Slopes of Main Basin Sides (S_{main}) =		H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =		

Total detention volume is less than 100-year volume.

Depth Increment = ft

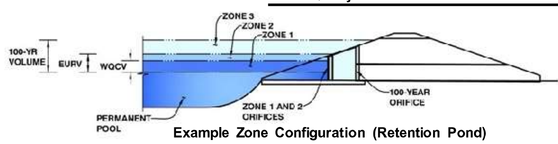
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: McCune Ranch

Basin ID: Water Quality Pond 9



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB			
Watershed Area =	41.00	acres		
Watershed Length =	3,019	ft		
Watershed Slope =	0.053	ft/ft		
Watershed Imperviousness =	4.40%	percent		
Percentage Hydrologic Soil Group A =	0.0%	percent		
Percentage Hydrologic Soil Group B =	30.0%	percent		
Percentage Hydrologic Soil Groups C/D =	70.0%	percent		
Desired WQCV Drain Time =	40.0	hours		
Location for 1-hr Rainfall Depths =	User Input			
Water Quality Capture Volume (WQCV) =	0.110	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	0.146	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.112	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.335	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.948	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	2.522	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	3.542	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	4.860	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet		inches
Approximate 2-yr Detention Volume =	0.104	acre-feet		
Approximate 5-yr Detention Volume =	0.321	acre-feet		
Approximate 10-yr Detention Volume =	0.570	acre-feet		
Approximate 25-yr Detention Volume =	0.723	acre-feet		
Approximate 50-yr Detention Volume =	0.726	acre-feet		
Approximate 100-yr Detention Volume =	1.051	acre-feet		

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.110	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.110	acre-feet
Initial Surcharge Volume (ISV) =	14	ft^3
Initial Surcharge Depth (ISD) =		ft
Total Available Detention Depth (H_{total}) =		ft
Depth of Trickle Channel (H_{TC}) =		ft
Slope of Trickle Channel (S_{TC}) =		ft/ft
Slopes of Main Basin Sides (S_{main}) =		H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =		

Total detention volume is less than 100-year volume.

Depth Increement = ft

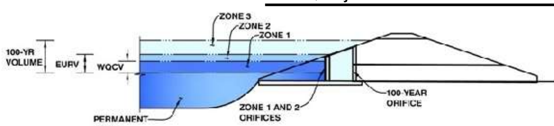
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: McCune Ranch

Basin ID: Water Quality Pond 10



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB				
Watershed Area =	20.20	acres			
Watershed Length =	1,755	ft			
Watershed Slope =	0.053	ft/ft			
Watershed Imperviousness =	4.10%	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) =	0.051	acre-feet	Optional User Override		
Excess Urban Runoff Volume (EURV) =	0.064	acre-feet	1-hr Precipitation		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.053	acre-feet	1.19	inches	
5-yr Runoff Volume (P1 = 1.5 in.) =	0.193	acre-feet	1.50	inches	
10-yr Runoff Volume (P1 = 1.75 in.) =	0.530	acre-feet	1.75	inches	
25-yr Runoff Volume (P1 = 2 in.) =	1.305	acre-feet	2.00	inches	
50-yr Runoff Volume (P1 = 2.25 in.) =	1.817	acre-feet	2.25	inches	
100-yr Runoff Volume (P1 = 2.52 in.) =	2.476	acre-feet	2.52	inches	
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet		inches	
Approximate 2-yr Detention Volume =	0.049	acre-feet			
Approximate 5-yr Detention Volume =	0.186	acre-feet			
Approximate 10-yr Detention Volume =	0.287	acre-feet			
Approximate 25-yr Detention Volume =	0.334	acre-feet			
Approximate 50-yr Detention Volume =	0.333	acre-feet			
Approximate 100-yr Detention Volume =	0.502	acre-feet			

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.051	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.051	acre-feet
Initial Surcharge Volume (ISV) =	7	ft^3
Initial Surcharge Depth (ISD) =		ft
Total Available Detention Depth (H_{total}) =		ft
Depth of Trickle Channel (H_{TC}) =		ft
Slope of Trickle Channel (S_{TC}) =		ft/ft
Slopes of Main Basin Sides (S_{main}) =		H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =		

Total detention volume is less than 100-year volume.

Depth Increement = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

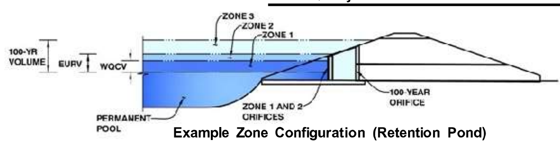
UD-Detention.xlsm, Basin 10/2/2018, 11:22 AM

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: McCune Ranch

Basin ID: Water Quality Pond 11



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	**EDB**			
Watershed Area =	70.70	acres		
Watershed Length =	2,601	ft		
Watershed Slope =	0.050	ft/ft		
Watershed Imperviousness =	3.60%	percent		
Percentage Hydrologic Soil Group A =	0.0%	percent		
Percentage Hydrologic Soil Group B =	70.0%	percent		
Percentage Hydrologic Soil Groups C/D =	30.0%	percent		
Desired WQCV Drain Time =	40.0	hours		
Location for 1-hr Rainfall Depths =	User Input	70.7		
Water Quality Capture Volume (WQCV) =	0.157	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	0.213	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.144	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.351	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.229	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	3.958	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	5.676	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	7.909	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet		inches
Approximate 2-yr Detention Volume =	0.133	acre-feet		
Approximate 5-yr Detention Volume =	0.334	acre-feet		
Approximate 10-yr Detention Volume =	0.846	acre-feet		
Approximate 25-yr Detention Volume =	1.199	acre-feet		
Approximate 50-yr Detention Volume =	1.194	acre-feet		
Approximate 100-yr Detention Volume =	1.670	acre-feet		

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.157	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.157	acre-feet
Initial Surcharge Volume (ISV) =	20	ft^3
Initial Surcharge Depth (ISD) =		ft
Total Available Detention Depth (H_{total}) =		ft
Depth of Trickle Channel (H_{TC}) =		ft
Slope of Trickle Channel (S_{TC}) =		ft/ft
Slopes of Main Basin Sides (S_{main}) =		H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =		

Total detention volume is less than 100-year volume.

Depth Increment = ft

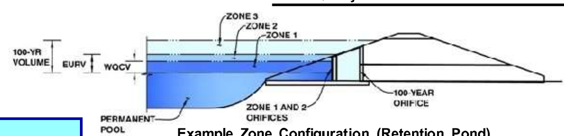
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: McCune Ranch

Basin ID: Water Quality Pond 12



Example Zone Configuration (Retention Pond)

Based on the soil map it looks like the majority tributary to Pond 12 is HSG C

Required Volume Calculation

Selected BMP Type =	**EDB**				
Watershed Area =	31.60	acres			
Watershed Length =	1,643	ft			
Watershed Slope =	0.054	ft/ft			
Watershed Imperviousness =	4.00%	percent			
Percentage Hydrologic Soil Group A =	0.0%	percent			
Percentage Hydrologic Soil Group B =	90.0%	percent			
Percentage Hydrologic Soil Groups C/D =	10.0%	percent			
Desired WQCV Drain Time =	40.0	hours			
Location for 1-hr Rainfall Depths =	User Input		70.7		
Water Quality Capture Volume (WQCV) =	0.077	acre-feet	Optional User Override 1-hr Precipitation		
Excess Urban Runoff Volume (EURV) =	0.109	acre-feet			
2-yr Runoff Volume (P1 = 1.19 in.) =	0.070	acre-feet	1.19	inches	
5-yr Runoff Volume (P1 = 1.5 in.) =	0.134	acre-feet	1.50	inches	
10-yr Runoff Volume (P1 = 1.75 in.) =	0.493	acre-feet	1.75	inches	
25-yr Runoff Volume (P1 = 2 in.) =	1.712	acre-feet	2.00	inches	
50-yr Runoff Volume (P1 = 2.25 in.) =	2.470	acre-feet	2.25	inches	
100-yr Runoff Volume (P1 = 2.52 in.) =	3.457	acre-feet	2.52	inches	
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet		inches	
Approximate 2-yr Detention Volume =	0.065	acre-feet			
Approximate 5-yr Detention Volume =	0.126	acre-feet			
Approximate 10-yr Detention Volume =	0.380	acre-feet			
Approximate 25-yr Detention Volume =	0.571	acre-feet			
Approximate 50-yr Detention Volume =	0.573	acre-feet			
Approximate 100-yr Detention Volume =	0.780	acre-feet			

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.077	acre-feet	
Select Zone 2 Storage Volume (Optional) =		acre-feet	**Total detention volume is less than 100-year volume.**
Select Zone 3 Storage Volume (Optional) =		acre-feet	
Total Detention Basin Volume =	0.077	acre-feet	
Initial Surcharge Volume (ISV) =	10	ft^3	
Initial Surcharge Depth (ISD) =		ft	
Total Available Detention Depth (H_{total}) =		ft	
Depth of Trickle Channel (H_{TC}) =		ft	
Slope of Trickle Channel (S_{TC}) =		ft/ft	
Slopes of Main Basin Sides (S_{main}) =		H:V	
Basin Length-to-Width Ratio ($R_{L/W}$) =			

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

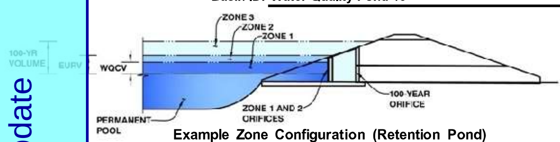
UD-Detention, Version 3.07 (February 2017)

Project: McCune Ranch

Basin ID: Water Quality Pond 13

Revise. Per UDFCD Vol 3 it notes that EDBs are best suited for tributary areas of 5 impervious acre or more.

See UDFCD DCM Vol 3 Chapter 2 Figure 2-2 for BMP Decision Tree. Review all the other pond designs and update accordingly.



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	**EDB**			
Watershed Area =	6.90	acres		
Watershed Length =	671	ft		
Watershed Slope =	0.055	ft/ft		
Watershed Imperviousness =	5.00%	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	70.7		
Water Quality Capture Volume (WQCV) =	0.021	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	0.027	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.023	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.073	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.189	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	0.453	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	0.627	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	0.852	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet		inches
Approximate 2-yr Detention Volume =	0.021	acre-feet		
Approximate 5-yr Detention Volume =	0.071	acre-feet		
Approximate 10-yr Detention Volume =	0.106	acre-feet		
Approximate 25-yr Detention Volume =	0.125	acre-feet		
Approximate 50-yr Detention Volume =	0.126	acre-feet		
Approximate 100-yr Detention Volume =	0.187	acre-feet		

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.021	acre-feet	
Select Zone 2 Storage Volume (Optional) =		acre-feet	**Total detention volume is less than 100-year volume.**
Select Zone 3 Storage Volume (Optional) =		acre-feet	
Total Detention Basin Volume =	0.021	acre-feet	
Initial Surcharge Volume (ISV) =	3	ft^3	
Initial Surcharge Depth (ISD) =		ft	
Total Available Detention Depth (H_{total}) =		ft	
Depth of Trickle Channel (H_{TC}) =		ft	
Slope of Trickle Channel (S_{TC}) =		ft/ft	
Slopes of Main Basin Sides (S_{main}) =		H:V	
Basin Length-to-Width Ratio ($R_{L/W}$) =			

Depth Increment = ft

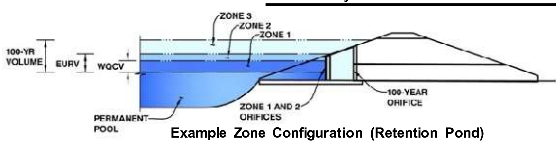
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: McCune Ranch

Basin ID: Water Quality Pond 14



Example Zone Configuration (Retention Pond)

Maps shows HSG C

Required Volume Calculation

Selected BMP Type =	**EDB**				
Watershed Area =	21.60	acres	**Note: L / W Ratio < 1**		
Watershed Length =	671	ft	**L / W Ratio = 0.5**		
Watershed Slope =	0.047	ft/ft			
Watershed Imperviousness =	5.00%	percent			
Percentage Hydrologic Soil Group A =	0.0%	percent			
Percentage Hydrologic Soil Group B =	100.0%	percent			
Percentage Hydrologic Soil Groups C/D =	0.0%	percent			
Desired WQCV Drain Time =	40.0	hours			
Location for 1-hr Rainfall Depths =	User Input		70.7		
Water Quality Capture Volume (WQCV) =	0.065	acre-feet	Optional User Override 1-hr Precipitation		
Excess Urban Runoff Volume (EURV) =	0.096	acre-feet			
2-yr Runoff Volume (P1 = 1.19 in.) =	0.062	acre-feet		1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.101	acre-feet		1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.342	acre-feet		1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	1.173	acre-feet		2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	1.686	acre-feet		2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.357	acre-feet		2.52	inches
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet			inches
Approximate 2-yr Detention Volume =	0.057	acre-feet			
Approximate 5-yr Detention Volume =	0.095	acre-feet			
Approximate 10-yr Detention Volume =	0.283	acre-feet			
Approximate 25-yr Detention Volume =	0.431	acre-feet			
Approximate 50-yr Detention Volume =	0.438	acre-feet			
Approximate 100-yr Detention Volume =	0.586	acre-feet			

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.065	acre-feet	
Select Zone 2 Storage Volume (Optional) =		acre-feet	**Total detention volume is less than 100-year volume.**
Select Zone 3 Storage Volume (Optional) =		acre-feet	
Total Detention Basin Volume =	0.065	acre-feet	
Initial Surcharge Volume (ISV) =	9	ft^3	
Initial Surcharge Depth (ISD) =		ft	
Total Available Detention Depth (H_{total}) =		ft	
Depth of Trickle Channel (H_{TC}) =		ft	
Slope of Trickle Channel (S_{TC}) =		ft/ft	
Slopes of Main Basin Sides (S_{main}) =		H:V	
Basin Length-to-Width Ratio ($R_{L/W}$) =			

Depth Increment = 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)
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PRELIMINARY 100Y FEMA FLOODPLAIN LINEWORK

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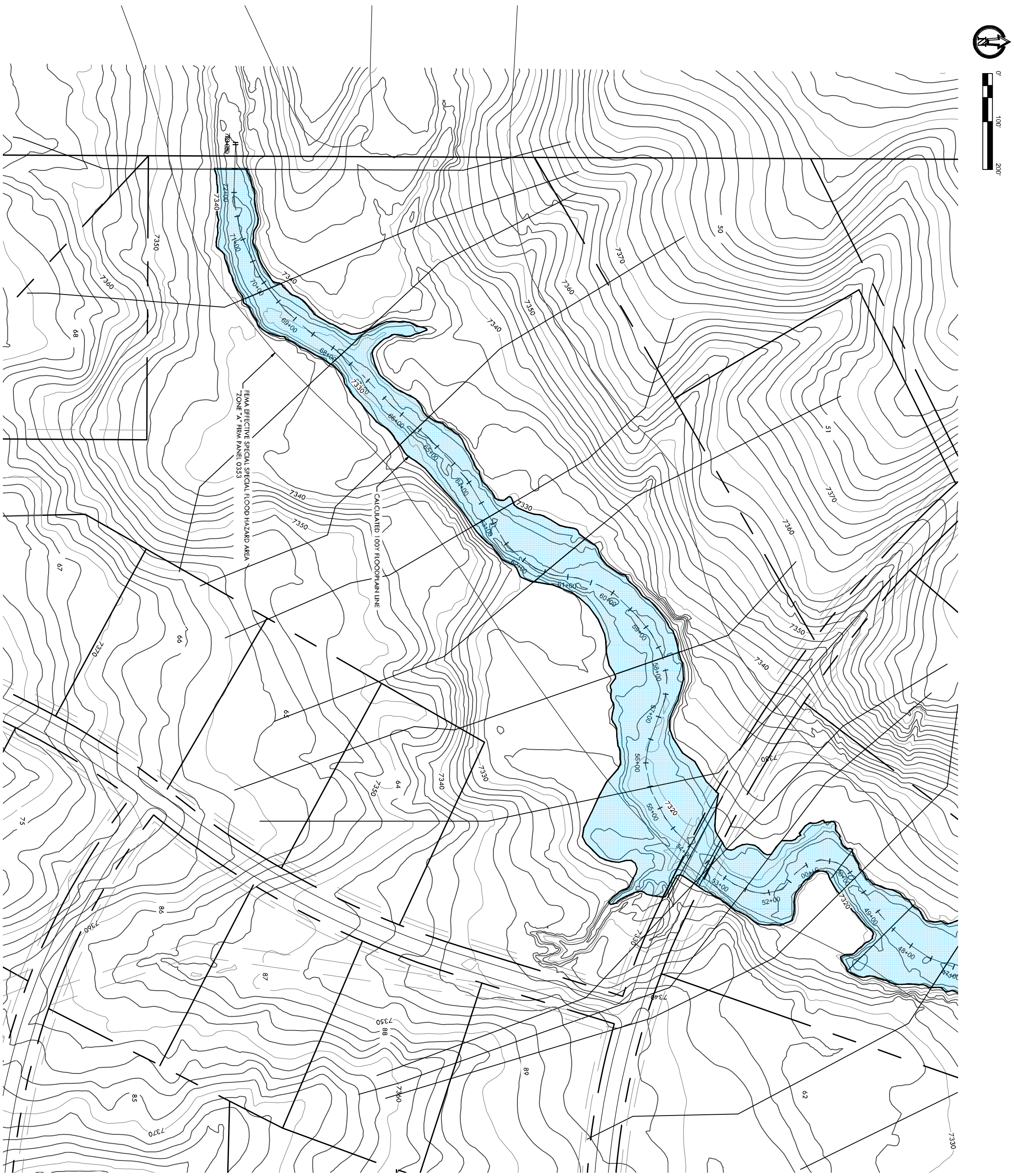

100Y FLOODPLAIN EXHIBIT

SITE: 17480 MERIDIAN ROAD
ELBERT, COLORADO 80106

FOR: PT MCCUNE, LLC
1864 WOODMORE DR, SUITE 100
MONUMENT, COLORADO 80132

NO.	REVISIONS
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DATE: 10/12/2018
DRAWN BY: JWD
CHECKED BY: JCP
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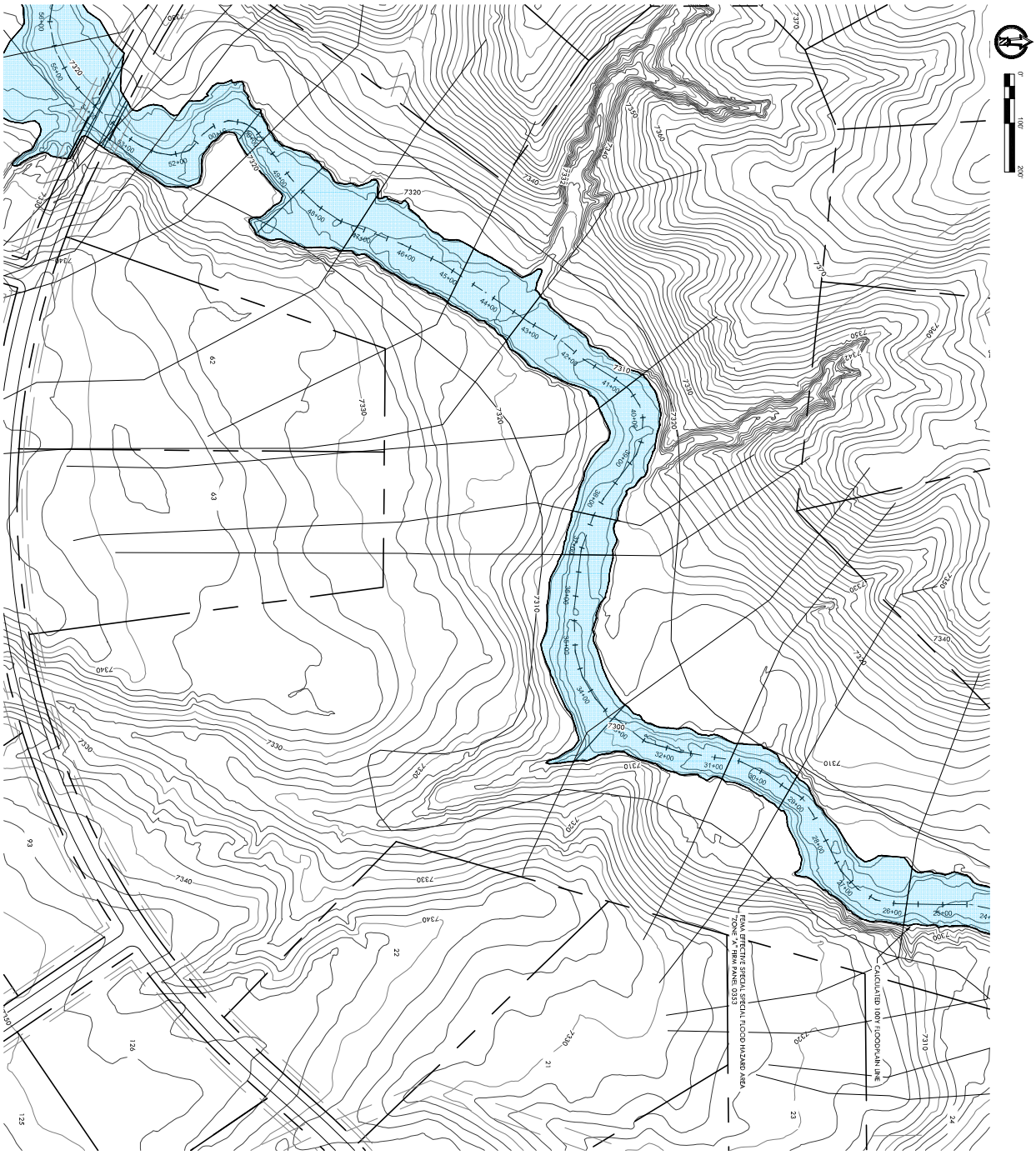

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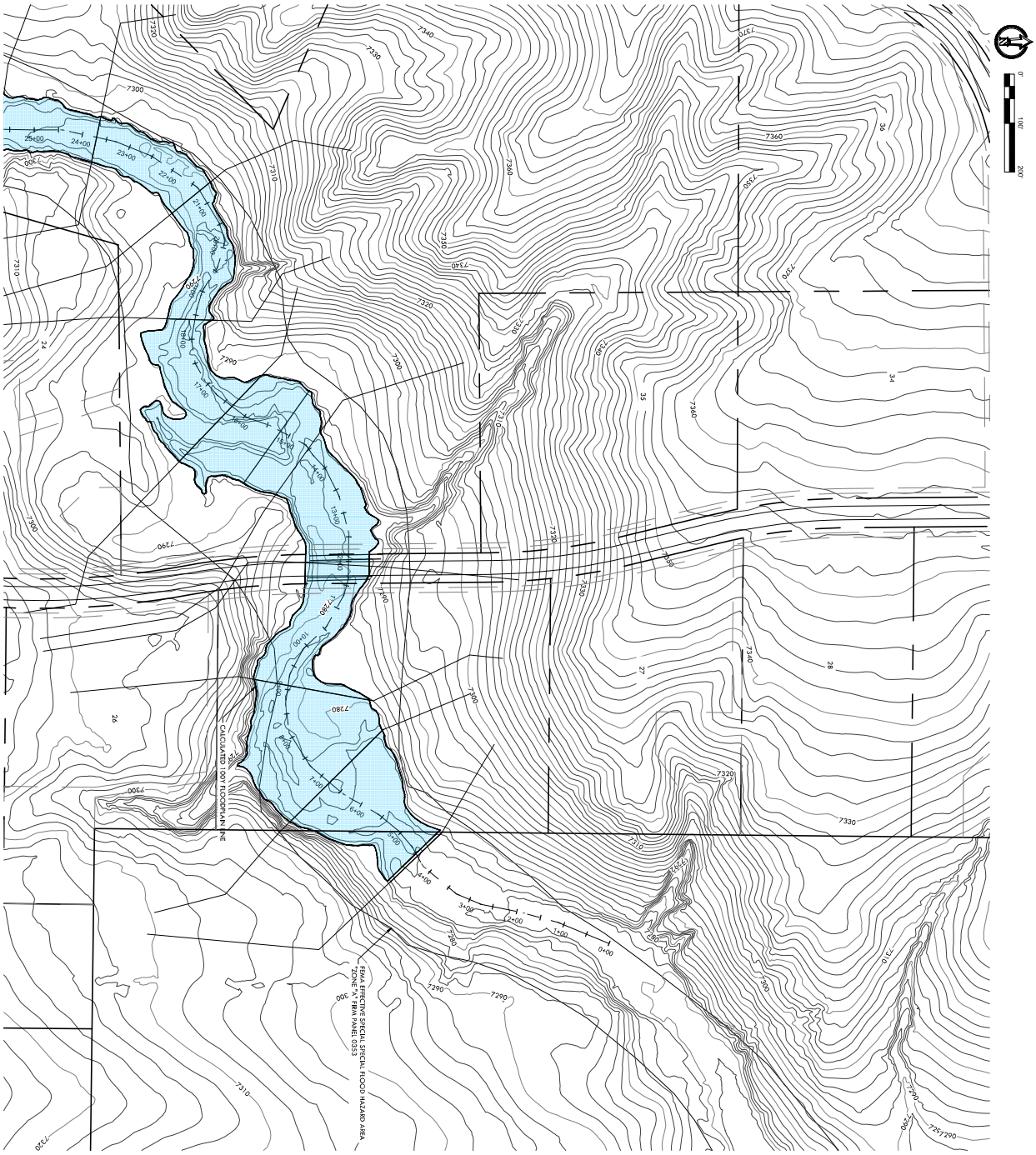

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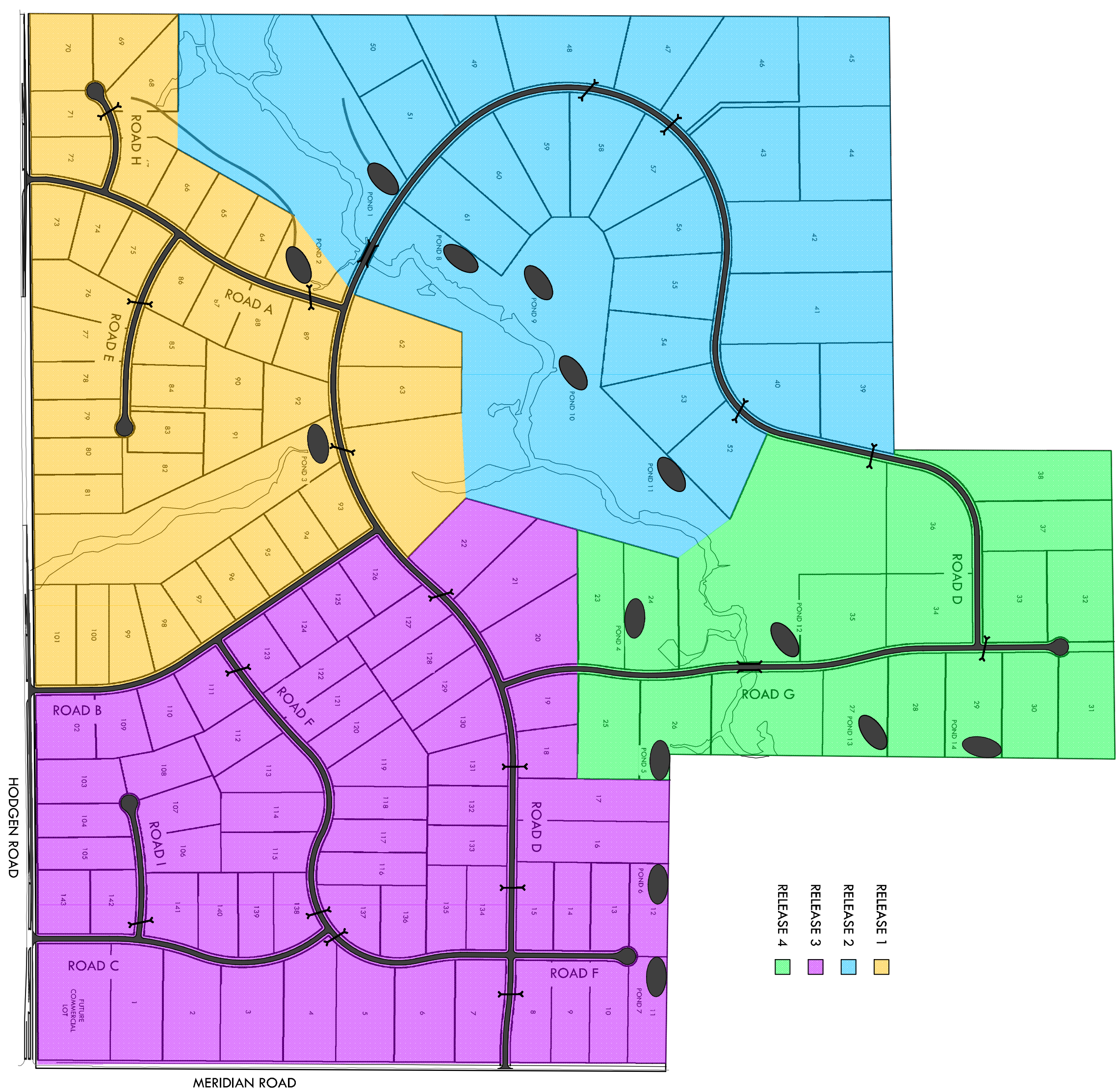
PRELIMINARY PLAN SET

MCCUNE RANCH SUBDIVISION

A PARCEL OF PROPERTY LOCATED IN SECTIONS 13 & 24, TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AND IN THE WEST HALF OF THE WEST HALF OF SECTION 19, TOWNSHIP 11 SOUTH, RANGE 64 WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO



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LOT RELEASE EXHIBIT

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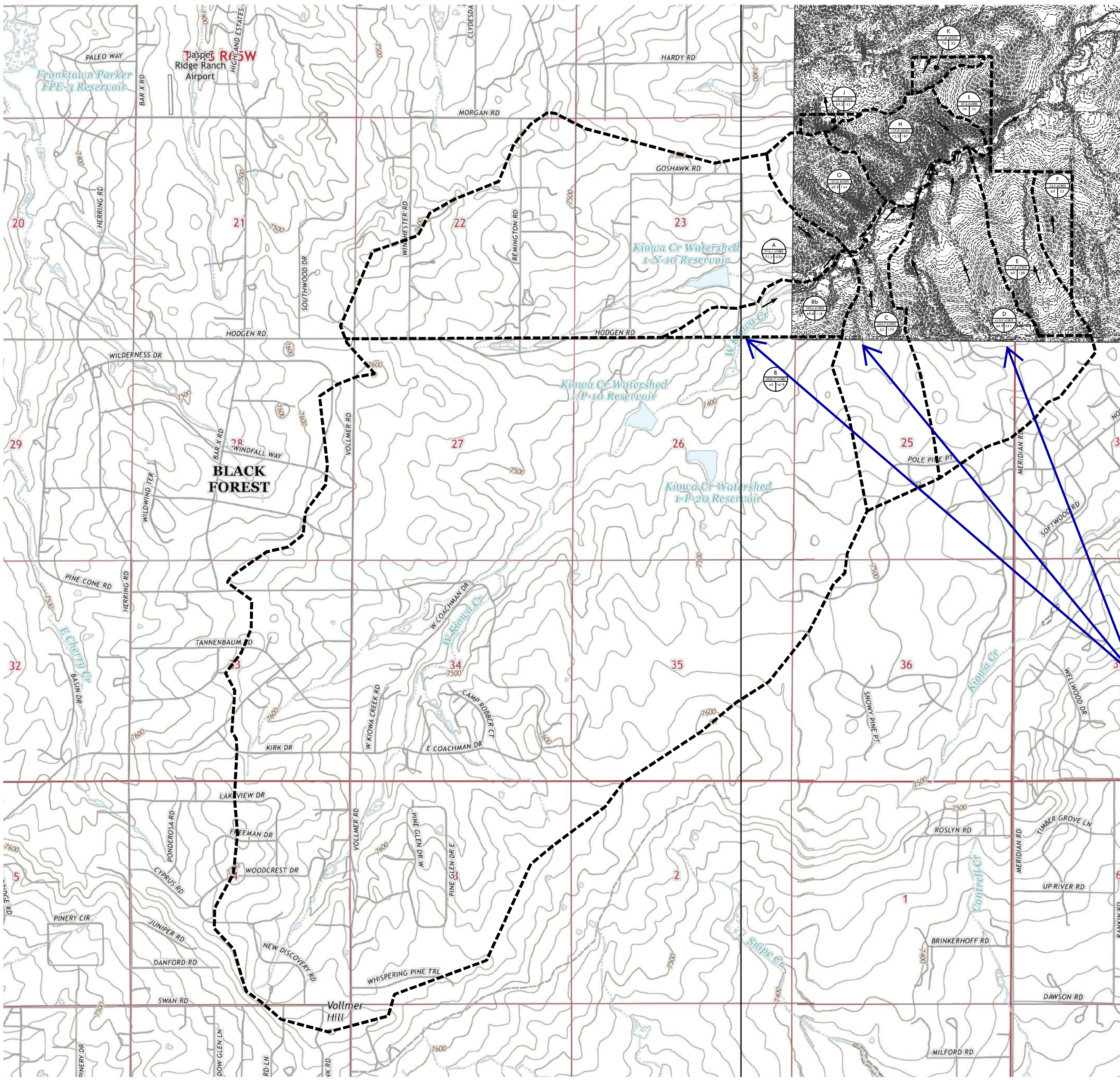
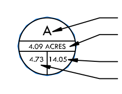
A PARCEL OF PROPERTY LOCATED IN SECTIONS 13 & 24, TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AND IN THE WEST HALF OF THE WEST HALF OF SECTION 19, TOWNSHIP 11 SOUTH, RANGE 64 WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO



EXISTING STORMWATER RUNOFF TABLE				
BASIN	BASIN AREA (ACRES)	T_C	CURVE NUMBER	Q_{100}
A	915.4	52.59	72.2	1034
B	3836.7	88.43	60.0	1419
Bb	100.6	39.85	69.8	118
C	232.7	41.08	62.0	175
D	410.9	44.33	64.9	411
E	114.8	42.34	69.0	129
F	44.5	37.08	69.0	55
G	107.6	33.90	69.5	144
H	121.8	33.64	72.3	187
I	37.5	31.77	79.0	79
J	10.1	29.24	69.5	15
K	17.8	34.56	76.0	32
	5950.4			

Expand the existing sub-basin narrative to explain how these offsite flows impact the development.
Analyze the drainage crossings (culverts, overtopping, etc) Are the crossings hydraulically adequate? Are there improvements needed offsite to mitigate any impacts these basins may cause as it enters the development? Is there additional drainage easements needed for the drainage overtopping width?

The narrative (pg 5) noted overtopping of Hodgen Road for Basin D. Does it meet criteria for overtopping depth or is there a need to mitigate?



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EXISTING DRAINAGE PLAN - OVERALL
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PRELIMINARY PLAN SET

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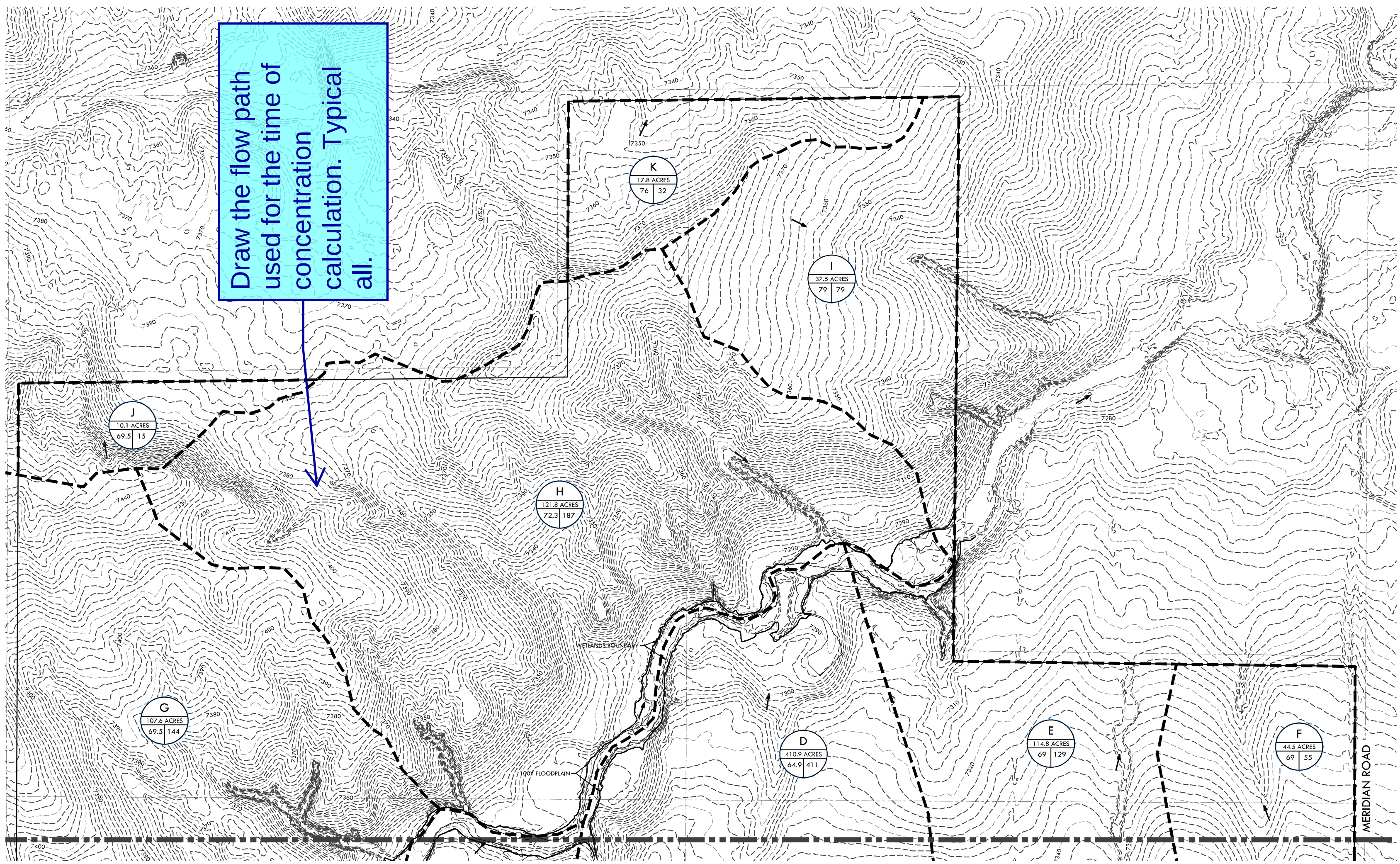
A PARCEL OF PROPERTY LOCATED IN SECTIONS 13 & 24, TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AND IN THE WEST HALF OF THE WEST HALF OF SECTION 19, TOWNSHIP 11 SOUTH, RANGE 64 WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO



MATCH LINE - SEE SHEET C1.3 - EXISTING DRAINAGE PLAN - SOUTH

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EXISTING DRAINAGE PLAN - NORTH

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ELBERT, COLORADO 80106

FOR: PT MCCUNE, LLC
1864 WOODMORE DR, SUITE 100
MONUMENT, COLORADO 80132

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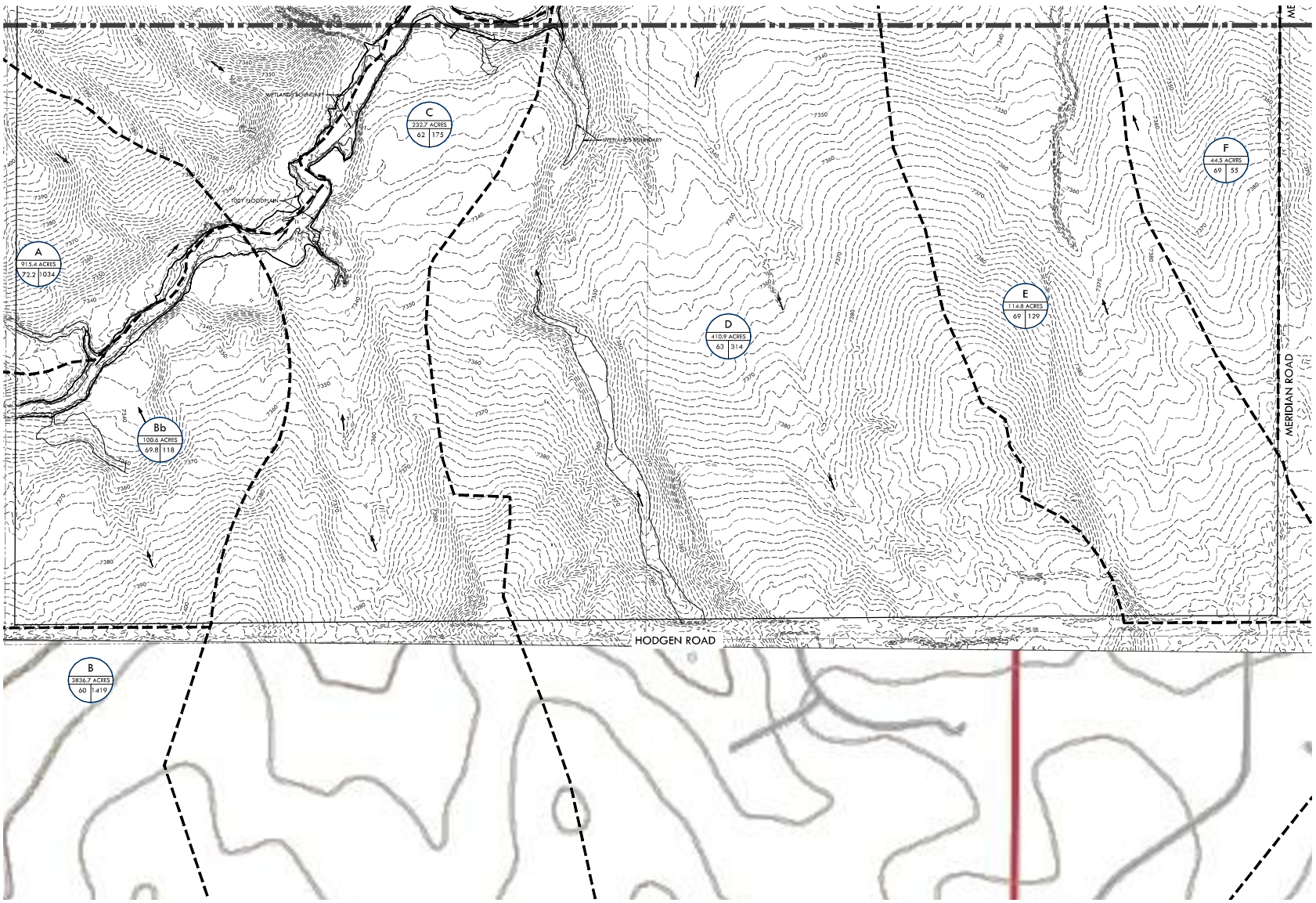
JOB #: 49388

C1.2

PRELIMINARY PLAN SET

MCCUNE RANCH SUBDIVISION

A PARCEL OF PROPERTY LOCATED IN SECTIONS 13 & 24, TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AND IN THE WEST HALF OF THE WEST HALF OF SECTION 19, TOWNSHIP 11 SOUTH, RANGE 64 WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO



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FOR: PT MCCUNE, LLC
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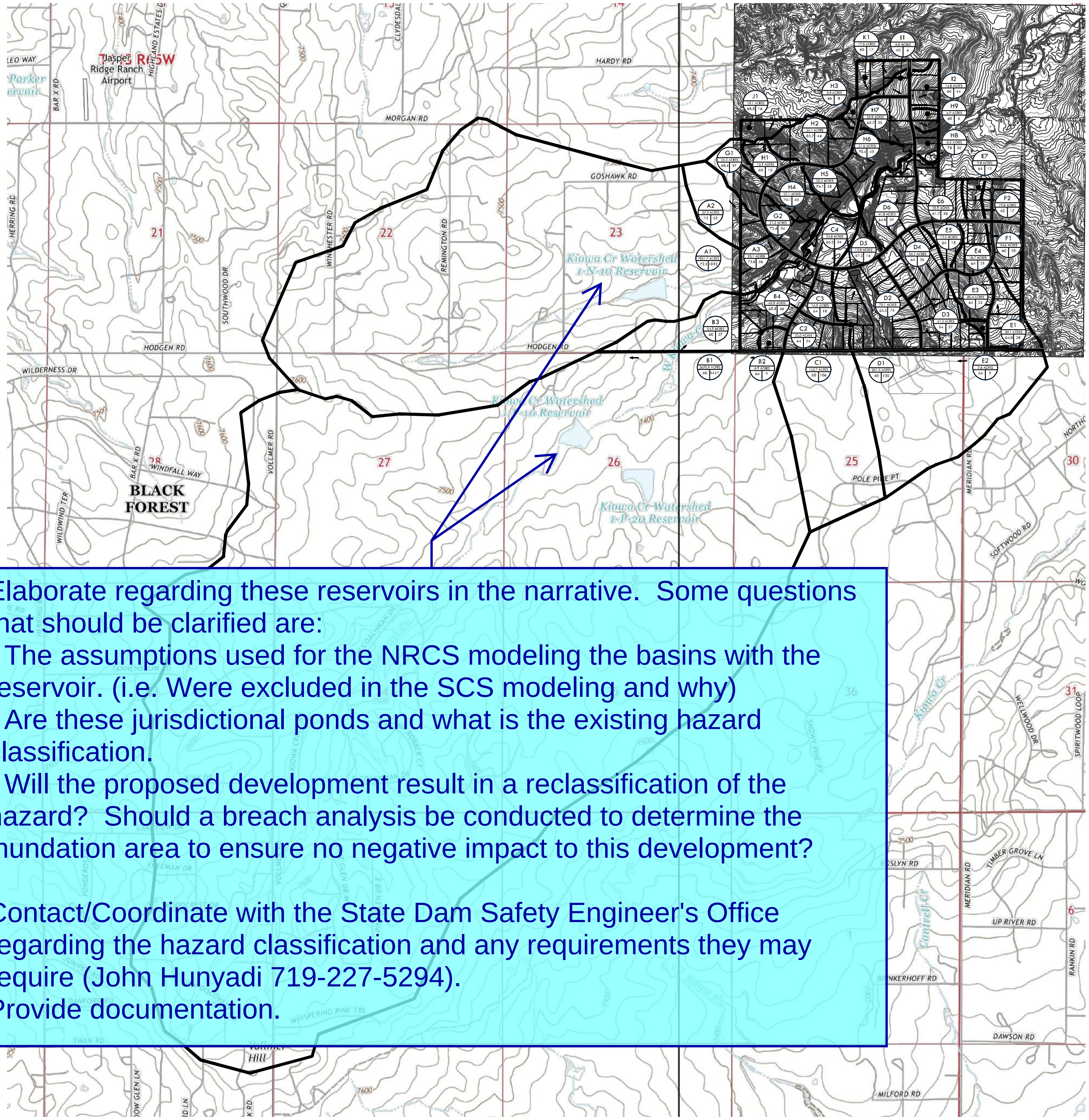
C1.3

PRELIMINARY PLAN SET

MCCUNE RANCH SUBDIVISION

A PARCEL OF PROPERTY LOCATED IN SECTIONS 13 & 24, TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AND IN THE WEST HALF OF THE WEST HALF OF SECTION 19, TOWNSHIP 11 SOUTH, RANGE 64 WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO



Elaborate regarding these reservoirs in the narrative. Some questions that should be clarified are:
- The assumptions used for the NRCS modeling the basins with the reservoir. (i.e. Were excluded in the SCS modeling and why)
- Are these jurisdictional ponds and what is the existing hazard classification.
- Will the proposed development result in a reclassification of the hazard? Should a breach analysis be conducted to determine the inundation area to ensure no negative impact to this development?

Contact/Coordinate with the State Dam Safety Engineer's Office regarding the hazard classification and any requirements they may require (John Hunyadi 719-227-5294).
Provide documentation.

PROPOSED STORMWATER RUNOFF

BASIN	DESIGN POINT	BASIN AREA (ACRES)	T_C	CURVE NUMBER	Q_{100}
A1	1	1031.7	57.1	72.1	1093
A2	2	37.0	37.0	72.0	53
A3	3	33.1	32.5	73.8	56
B1	4	3670.5	82.8	60.0	1427
B2	5	6.9	22.3	64.0	9
B3	6	54.9	38.4	60.0	37
B4	7	45.8	39.8	65.5	44
C1	8	162.7	40.6	60.0	106
C2	9	23.0	31.4	64.0	24
C3	10	16.1	28.2	64.0	18
C4	11	23.8	40.6	66.5	24
D1	12	201.3	41.1	60.0	130
D2	13	70.1	35.0	65.5	74
D3	14	41.2	38.9	64.0	37
D4	15	34.3	30.1	64.0	36
D5	16	12.8	30.3	67.2	16
D6	17	41.8	39.1	64.8	39
E1	18	30.1	39.6	64.8	28
E2	19	2.6	22.2	64.0	3
E3	20	20.4	27.2	64.0	23
E4	21	18.7	28.0	64.0	21
E5	22	13.5	27.0	64.0	15
E6	23	28.9	28.1	61.7	28
E7	24	9.8	24.3	64.0	12
F1	25	24.6	35.6	60.0	18
F2	26	19.8	27.1	60.0	17
G1	27	25.2	26.6	68.4	37
G2	28	21.2	34.1	73.4	34
H1	29	13.9	26.9	60.0	12
H2	30	39.1	32.8	65.7	44
H3	31	5.8	23.9	66.0	8
H4	32	27.1	33.4	74.1	45
H5	33	20.2	32.2	74.1	35
H6	34	31.6	35.2	70.4	43
H7	35	25.8	30.8	62.7	25
H8	36	8.5	25.5	78.0	20
H9	37	6.9	24.0	60.0	6
I1	38	6.8	23.8	60.0	6
I2	39	14.8	23.5	60.0	14
J1	40	10.1	22.9	68.5	16
K1	41	17.8	24.0	60.0	17
		5950.2			

WATER QUALITY POND SUMMARY

POND NUMBER	REQUIRED VOLUME (ACRE-FEET)
1	0.211
2	0.423
3	0.304
4	0.504
5	0.165
6	0.638
7	0.134
8	0.132
9	0.110
10	0.051
11	0.157
12	0.077
13	0.021
14	0.065

Include the required release rates.

Show the design points on the map and provide a summary table for the cumulative flows. Update the existing and proposed sub-basin narrative to include the design points.

COLORADO 811

LEGEND

- PROPERTY BOUNDARY LINE
- —5540— PROPOSED CONTOUR
- —5540— EXISTING CONTOUR
- DRAINAGE BASIN BOUNDARY

A — BASIN NAME
4.09 ACRES — DRAINAGE BASIN SIZE
4.73 — 100-YEAR RUNOFF
14.05 — CURVE NUMBER
FLOW ARROWS

VERTEX
2420 W. 26th Avenue, Suite 100-D | Denver, CO 80211
Main: 303.623.9116 | VERTEXENG.COM

PROPOSED DRAINAGE PLAN - OVERALL
SITE: 17480 MERIDIAN ROAD
ELBERT, COLORADO 80106
FOR: PT MCCUNE, LLC
1864 WOODMORE DR, SUITE 100
MONUMENT, COLORADO 80132

NO.	REVISIONS
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

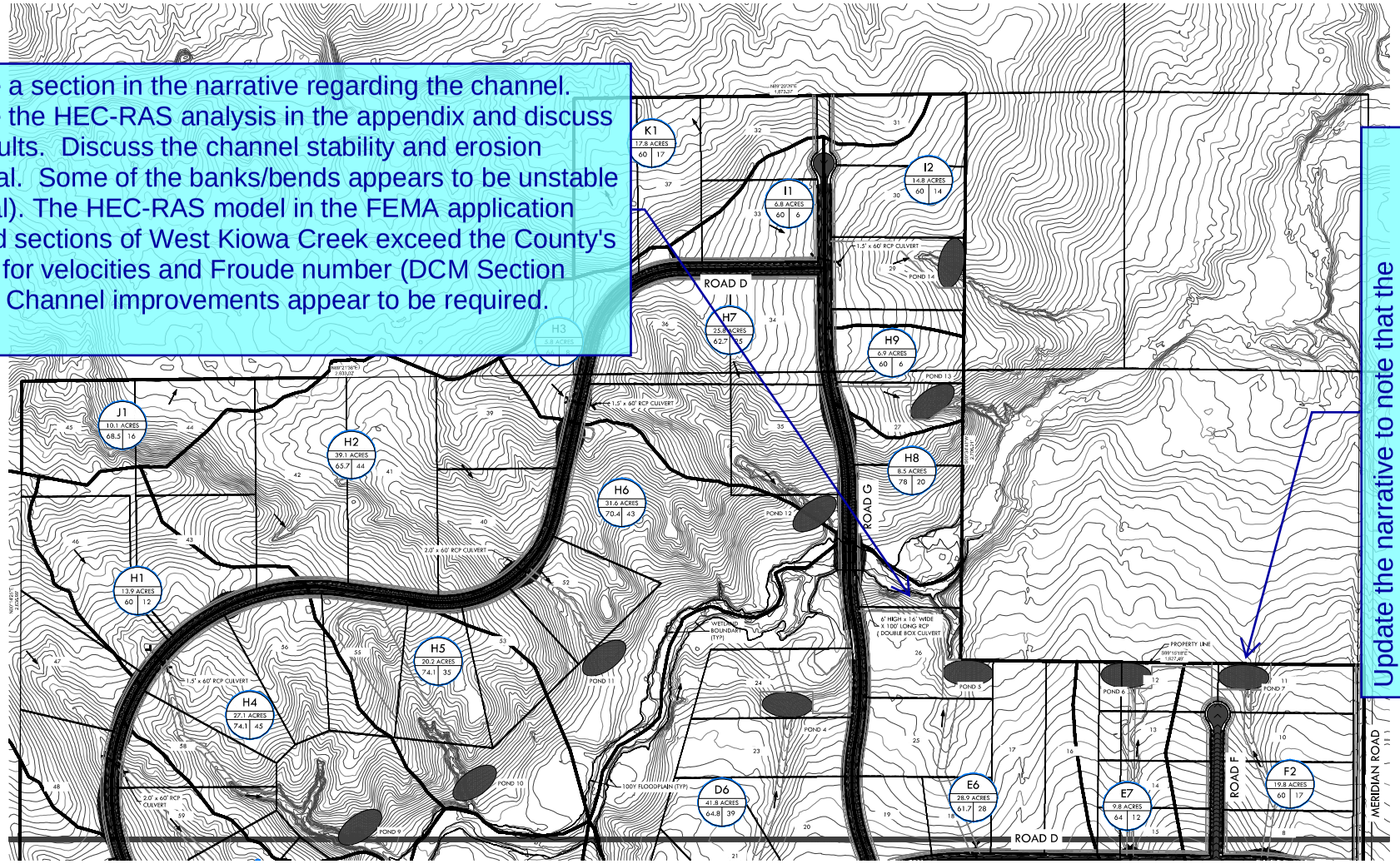
DATE: 10/12/2018
DRAWN BY: JCP
CHECKED BY: LPV
JOB #: 49388

C2.1

PRELIMINARY PLAN SET

MCCUNE RANCH SUBDIVISION

A PARCEL OF PROPERTY LOCATED IN SECTIONS 13 & 24, TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AND IN THE WEST HALF OF THE WEST HALF OF SECTION 19, TOWNSHIP 11 SOUTH, RANGE 64 WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO



MATCH LINE - SEE SHEET C2.3 - PROPOSED DRAINAGE PLAN - SOUTH

Include a section in the narrative regarding the channel. Include the HEC-RAS analysis in the appendix and discuss the results. Discuss the channel stability and erosion potential. Some of the banks/bends appears to be unstable (vertical). The HEC-RAS model in the FEMA application showed sections of West Kiowa Creek exceed the County's criteria for velocities and Froude number (DCM Section 6.5.2). Channel improvements appear to be required.

Update the narrative to note that the subsequent Final Drainage Report will analyze the segment between the pond outfall to the main channel (West Kiowa Creek). Offsite improvements may be required if the segment from the outfall to the stream is not hydraulically adequate.

VERTEX
2420 W. 26th Avenue, Suite 100-D | Denver, CO 80211
Main: 303.623.9116 | VERTEXENG.COM

PROPOSED DRAINAGE PLAN

SITE: 17480 MERIDIAN ROAD
ELBERT, COLORADO 80106

FOR: PT MCCUNE, LLC
1864 WOODMOOR DRIVE, SUITE 100
MONUMENT, COLORADO 80132

NO.	REVISIONS
1	
2	
3	
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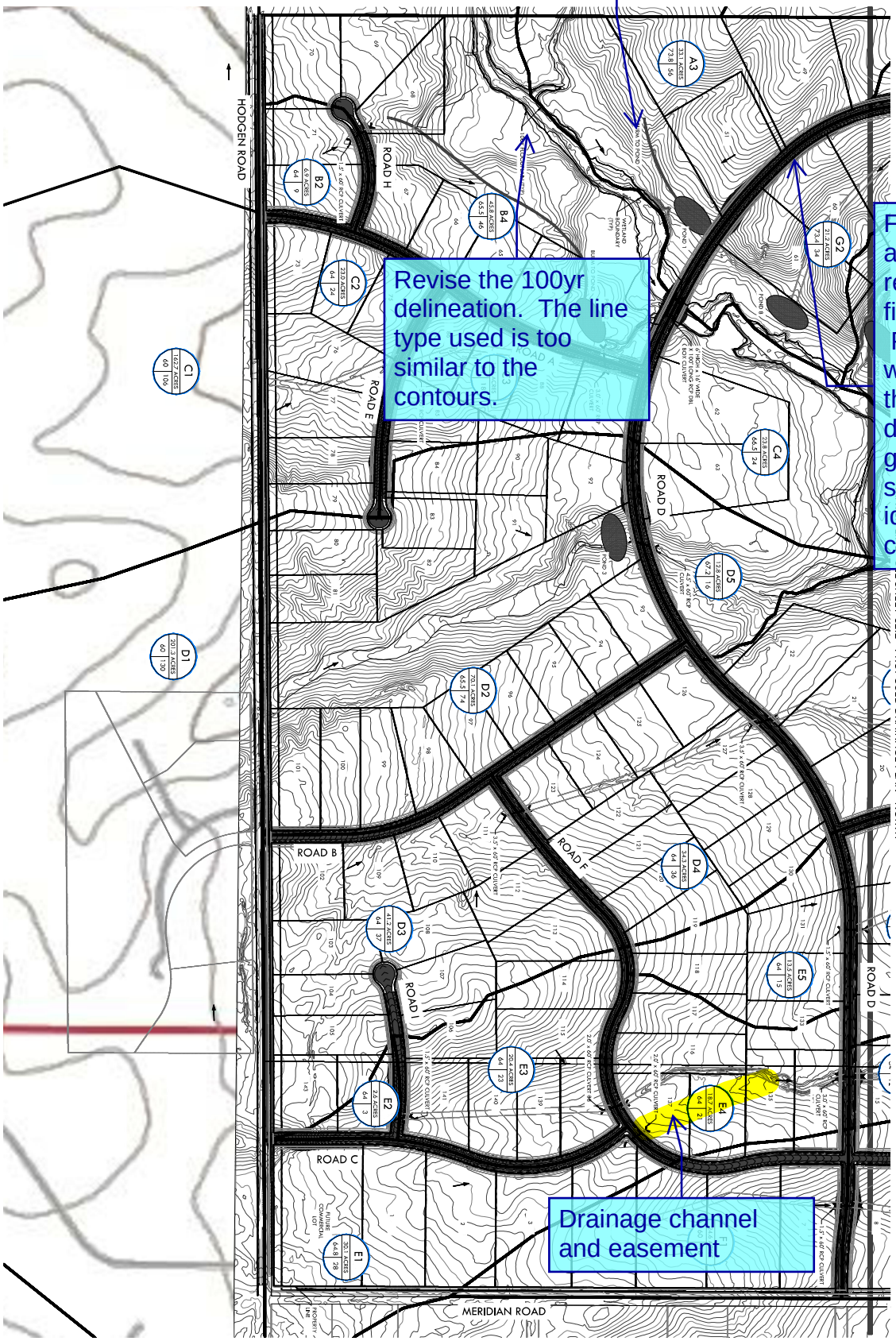
DATE: 10/12/2018
DRAWN BY: JCP
CHECKED BY: LPV
JOB #: 49388

C2.2

Spelling: Berm



Revise the 100yr delineation. The line type used is too similar to the contours.

FYI: Roadside ditch analysis will be required with each final drainage report. Part of the analysis will need to identify the lots that will need driveway culverts greater than the standard 18" dia. and identify the required culvert size.

Drainage channel and easement

PRELIMINARY PLAN SET

MCCUNE RANCH SUBDIVISION

SECTIONS 13 & 24, TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AND IN THE WEST HALF OF SECTIONS 18 & 19, TOWNSHIP 11 SOUTH, RANGE 64 WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO

COLORADO 811

NO.	REVISIONS	DATE
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

DRAWN BY: JCP
CHECKED BY: JCP
DATE: 10/12/2018
FOR 49-49388

C2.3

PROPOSED DRAINAGE PLAN - SOUTH

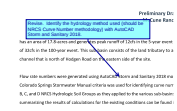
SITE: 17480 MERIDIAN ROAD
ELBERT, COLORADO 80106

FOR: PT MCCUNE, LLC
1864 WOODMORE DR, SUITE 100
MONUMENT, COLORADO 80132

VERTEX
2420 W. 26th Avenue, Suite 100-D | Denver, CO 80211
Main: 303.623.9116 | VERTEXENG.COM

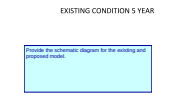
Markup Summary

dsdlaforce (47)



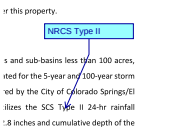
Subject: Callout
Page Label: 11
Author: dsdlaforce
Date: 11/5/2018 10:53:57 AM
Color:

Revise. Identify the hydrology method used (should be NRCS Curve Number methodology) with AutoCAD Storm and Sanitary 2018.



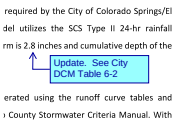
Subject: Text Box
Page Label: 37
Author: dsdlaforce
Date: 11/5/2018 11:11:16 AM
Color:

Provide the schematic diagram for the existing and proposed model.



Subject: Callout
Page Label: 23
Author: dsdlaforce
Date: 11/5/2018 11:18:27 AM
Color:

NRCS Type II



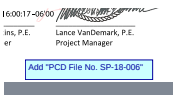
Subject: Callout
Page Label: 23
Author: dsdlaforce
Date: 11/5/2018 11:23:14 AM
Color:

Update. See City DCM Table 6-2

Subject: Callout
Page Label: 23
Author: dsdlaforce
Date: 11/5/2018 11:32:23 AM
Color:

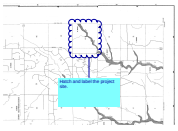
Per the adopted City DCM Chapter 6 Section 2.2.2 "For flood studies or when the highest probable design flow for sizing facilities is required, it may be necessary to evaluate both thunderstorms and frontal storms to determine the appropriate design flows. It is the responsibility of the designer to determine the dominant design storm for each project. Both peak flow rates and runoff volumes should be checked..."

Update the narrative and analysis accordingly.



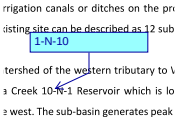
Subject: Text Box
Page Label: 1
Author: dsdlaforce
Date: 11/5/2018 9:15:32 AM
Color:

Add "PCD File No. SP-18-006"



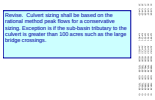
Subject: Cloud+
Page Label: 36
Author: dsdlaforce
Date: 11/5/2018 9:33:16 AM
Color:

Hatch and label the project site.



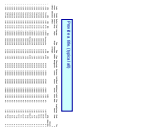
Subject: Callout
Page Label: 8
Author: dsdlaforce
Date: 11/5/2018 9:44:53 AM
Color:

1-N-10



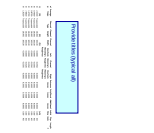
Subject: Text Box
Page Label: 43
Author: dsdlaforce
Date: 11/6/2018 9:52:20 AM
Color:

Revise. Culvert sizing shall be based on the rational method peak flows for a conservative sizing. Exception is if the sub-basin tributary to the culvert is greater than 100 acres such as the large bridge crossings.



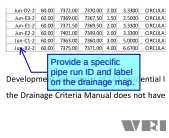
Subject: Text Box
Page Label: 43
Author: dsdlaforce
Date: 11/6/2018 9:53:31 AM
Color:

Provide a title. (typical all)



Subject: Text Box
Page Label: 38
Author: dsdlaforce
Date: 11/6/2018 9:56:15 AM
Color:

Provide titles (typical all)

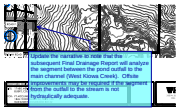


Subject: Callout
Page Label: 25
Author: dsdlaforce
Date: 11/7/2018 10:40:41 AM
Color:

Provide a specific pipe run ID and label on the drainage map.

Subject: Callout
Page Label: 38
Author: dsdlaforce
Date: 11/7/2018 11:16:05 AM
Color:

Identify/label these channels on the drainage map.



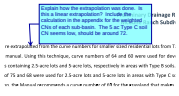
Subject: Callout
Page Label: 84
Author: dsdlaforce
Date: 11/8/2018 1:09:26 PM
Color:

Update the narrative to note that the subsequent Final Drainage Report will analyze the segment between the pond outfall to the main channel (West Kiowa Creek). Offsite improvements may be required if the segment from the outfall to the stream is not hydraulically adequate.

Subject: Callout
Page Label: 23
Author: dsdlaforce
Date: 11/8/2018 1:11:52 PM
Color:

Revise the name. The County has adopted Chapter 6 of the City's Drainage Criteria Manual which calls this as NRCS Curve Number Method.

Per the adopted DCM the appropriate Initial Abstraction (Ia) value is 0.10S instead of the default value of 0.20S.

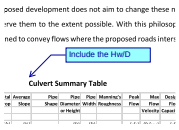


Subject: Callout
Page Label: 26
Author: dsdlaforce
Date: 11/8/2018 1:17:02 PM
Color:

Explain how the extrapolation was done. Is this a linear extrapolation? Include the calculation in the appendix for the weighted CNs of each sub-basin. The 5 ac Type C soil CN seems low, should be around 72.

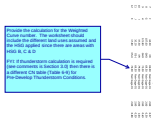
Subject: Callout
Page Label: 26
Author: dsdlaforce
Date: 11/8/2018 1:17:24 PM
Color:

1. Per county criteria the subdivision must release at equal to or less than historic rate.
2. With each subsequent final drainage report the pond design shall be incorporated in the NRCS model and compared to the historic condition model to ensure release rates are equal to or less than historic rate.



Subject: Callout
Page Label: 25
Author: dsdlaforce
Date: 11/8/2018 1:44:53 PM
Color:

Include the Hw/D



Subject: Callout
Page Label: 41
Author: dsdlaforce
Date: 11/8/2018 1:46:58 PM
Color:

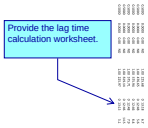
Provide the calculation for the Weighted Curve number. The worksheet should include the different land uses assumed and the HSG applied since there are areas with HSG B, C & D

FYI: If thunderstorm calculation is required (see comments is Section 3.0) then there is a different CN table (Table 6-9) for Pre-Develop Thunderstorm Conditions.

Subject: Callout
Page Label: 80
Author: dsdlaforce
Date: 11/8/2018 1:48:06 PM
Color:

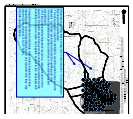
Expand the existing sub-basin narrative to explain how these offsite flows impact the development. Analyze the drainage crossings (culverts, overtopping, etc) Are the crossings hydraulically adequate? Are there improvements needed offsite to mitigate any impacts these basins may cause as it enters the development? Is there additional drainage easements needed for the drainage overtopping width?

The narrative (pg 5) noted overtopping of Hodgen Road for Basin D. Does it meet criteria for overtopping depth or is there a need to mitigate?



Subject: Callout
Page Label: 38
Author: dsdlaforce
Date: 11/8/2018 1:51:18 PM
Color:

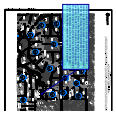
Provide the lag time calculation worksheet.



Subject: Callout
Page Label: 83
Author: dsdlaforce
Date: 11/8/2018 1:56:40 PM
Color:

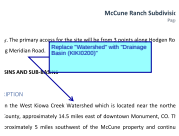
Elaborate regarding these reservoirs in the narrative. Some questions that should be clarified are:
- The assumptions used for the NRCS modeling the basins with the reservoir. (i.e. Were excluded in the SCS modeling and why)
- Are these jurisdictional ponds and what is the existing hazard classification.
- Will the proposed development result in a reclassification of the hazard? Should a breach analysis be conducted to determine the inundation area to ensure no negative impact to this development?

Contact/Coordinate with the State Dam Safety Engineer's Office regarding the hazard classification and any requirements they may require (John Hunyadi 719-227-5294). Provide documentation.



Subject: Callout
Page Label: 84
Author: dsdlaforce
Date: 11/8/2018 1:58:59 PM
Color:

Include a section in the narrative regarding the channel. Include the HEC-RAS analysis in the appendix and discuss the results. Discuss the channel stability and erosion potential. Some of the banks/bends appears to be unstable (vertical). The HEC-RAS model in the FEMA application showed sections of West Kiowa Creek exceed the County's criteria for velocities and Froude number (DCM Section 6.5.2). Channel improvements appear to be required.



Subject: Callout
Page Label: 7
Author: dsdlaforce
Date: 11/8/2018 10:39:20 AM
Color:

Replace "Watershed" with "Drainage Basin (KIKI0200)"

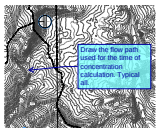
Subject: Text Box
Page Label: 28
Author: dsdlaforce
Date: 11/8/2018 10:42:16 AM
Color:

Add a section for the 4-Step Process (See Appendix I Section I.7.2.A).
List each step and provide a narrative below each step discussing how the particular step was considered/implemented in the design process.

Add a section for Drainage Basin Fee and note that at this time West Kiowa Creek drainage basin is not a part of the El Paso County Drainage Basin Fee program.

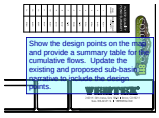
Subject: Callout
Page Label: 7
Author: dsdlaforce
Date: 11/8/2018 10:45:26 AM
Color:

update "...no major drainage studies (DBPS or MDDP)..."



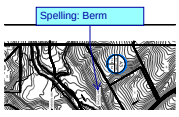
Subject: Callout
Page Label: 81
Author: dsdlaforce
Date: 11/8/2018 11:38:17 AM
Color:

Draw the flow path used for the time of concentration calculation. Typical all.



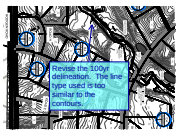
Subject: Text Box
Page Label: 83
Author: dsdlaforce
Date: 11/8/2018 11:44:52 AM
Color:

Show the design points on the map and provide a summary table for the cumulative flows. Update the existing and proposed sub-basin narrative to include the design points.



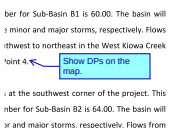
Subject: Callout
Page Label: 85
Author: dsdlaforce
Date: 11/8/2018 11:50:37 AM
Color:

Spelling: Berm



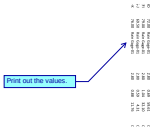
Subject: Callout
Page Label: 85
Author: dsdlaforce
Date: 11/8/2018 11:52:53 AM
Color:

Revise the 100yr delineation. The line type used is too similar to the contours.



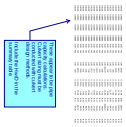
Subject: Callout
Page Label: 12
Author: dsdlaforce
Date: 11/8/2018 11:55:32 AM
Color:

Show DPs on the map.



Subject: Callout
Page Label: 41
Author: dsdlaforce
Date: 11/8/2018 12:01:05 PM
Color:

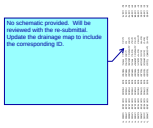
Print out the values.



Subject: Callout
Page Label: 43
Author: dsdlaforce
Date: 11/8/2018 12:31:37 PM
Color:

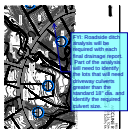
These appear to be pipe capacity calculations. Culvert sizing must be conducted with culvert design methods.

Include the Hw/D in the summary table.



Subject: Callout
Page Label: 55
Author: dsdlaforce
Date: 11/8/2018 12:50:45 PM
Color:

No schematic provided. Will be reviewed with the re-submittal. Update the drainage map to include the corresponding ID.



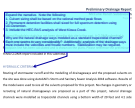
Subject: Callout
Page Label: 85
Author: dsdlaforce
Date: 11/8/2018 2:03:20 PM
Color:

FYI: Roadside ditch analysis will be required with each final drainage report. Part of the analysis will need to identify the lots that will need driveway culverts greater than the standard 18" dia. and identify the required culvert size.

Subject: Callout
Page Label: 24
Author: dsdlaforce
Date: 11/8/2018 2:09:34 PM
Color:

Incorrect statement. See ECM Appendix I Section I.7.1.B Development areas of low density (rural) housing (2.5 acres or larger lots). WQCV is not required, but may be considered. Sediment control BMPs for lots and roads must be provided.

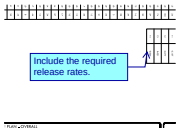
Detention requirement is based on the criteria that the overall development must release at or less than historic rate. If required, then the detention facilities must be design as a full spectrum detention.



Subject: Callout
Page Label: 24
Author: dsdlaforce
Date: 11/8/2018 2:18:51 PM
Color:

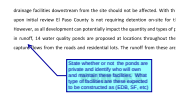
Expand the narrative. Note the following:
1. Culvert sizing shall be based on the rational method peak flows
2. Permanent detention facilities shall sized for full spectrum detention using UD-Detention.
3. Include the HEC-RAS analysis of West Kiowa Creek.

Why are the natural drainage ways modeled as a standard trapezoidal channel? Each one seems to vary considerably? Additionally, analysis of the drainage ways must include the velocities and froude numbers. Stabilization may be required.



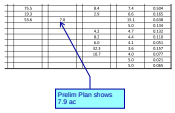
Subject: Callout
Page Label: 83
Author: dsdlaforce
Date: 11/8/2018 2:26:25 PM
Color:

Include the required release rates.



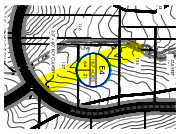
Subject: Callout
Page Label: 24
Author: dsdlaforce
Date: 11/8/2018 2:34:42 PM
Color:

State whether or not the ponds are private and identify who will own and maintain these facilities. What type of facilities are these expected to be constructed as (EDB, SF, etc)

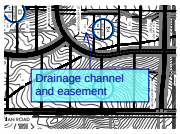


Subject: Callout
Page Label: 60
Author: dsdlaforce
Date: 11/8/2018 2:36:00 PM
Color:

Prelim Plan shows 7.9 ac

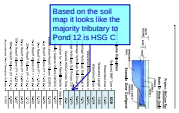


Subject: Highlight
Page Label: 85
Author: dsdlaforce
Date: 11/8/2018 2:37:55 PM
Color:



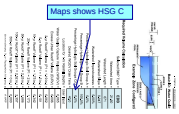
Subject: Callout
Page Label: 85
Author: dsdlaforce
Date: 11/8/2018 2:38:28 PM
Color:

Drainage channel and easement



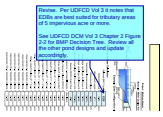
Subject: Callout
Page Label: 72
Author: dsdlaforce
Date: 11/8/2018 2:50:29 PM
Color:

Based on the soil map it looks like the majority tributary to Pond 12 is HSG C



Subject: Callout
Page Label: 74
Author: dsdlaforce
Date: 11/8/2018 2:51:36 PM
Color:

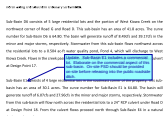
Maps shows HSG C



Subject: Callout
Page Label: 73
Author: dsdlaforce
Date: 11/8/2018 3:33:07 PM
Color:

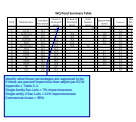
Revise. Per UDFCD Vol 3 it notes that EDBs are best suited for tributary areas of 5 impervious acre or more.

See UDFCD DCM Vol 3 Chapter 2 Figure 2-2 for BMP Decision Tree. Review all the other pond designs and update accordingly.



Subject: Callout
Page Label: 16
Author: dsdlaforce
Date: 11/8/2018 3:50:08 PM
Color:

Update. Sub-Basin E1 includes a commercial lot. Elaborate on the commercial aspect of this sub-basin. On-site FSD should be provided on-site before releasing into the public roadside ditch.



Subject: Callout
Page Label: 27
Author: dsdlaforce
Date: 11/8/2018 7:40:26 AM
Color:

Identify what these percentages are supposed to be.
If these are percent impervious then adjust per ECM Appendix L Table 3-1:
Single-family 5ac Lots = 7% imperviousness
Single-amily 2.5ac Lots = 11% imperviousness
Commercial Areas = 95%