ICONENGINEERING, INC.

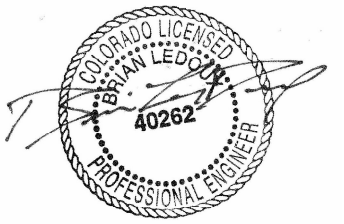
Memorandum

TO: Adam Lancaster, P.E., City Engineer, Cañon City (atlancaster@canoncity.org)

FROM: ICON Engineering Inc., Brian LeDoux, PE, CFM (bledoux@iconeng.com)

DATE: February 28th, 2019

RE: Dawson Ranch Culvert Analysis



Background and Purpose

ICON Engineering Inc. (ICON) has been placed under contract by the City of Cañon City to analyze storm drain culverts within the Dawson Ranch neighborhood area. The Dawson Ranch Home Owners Association is a financial contributor to this project.

This analysis completed the following tasks:

- reviewed previously developed materials regarding the storm drain culverts
- reviewed the effective West Branch of Forked Gulch Flood Insurance Study information including the applicable hydrology for the Dawson Ranch analysis area
- assembled Dawson Ranch area mapping and known culvert data
- observed existing field conditions following the July 23rd, 2018 event
- developed a hydrologic approach for the culvert analysis modeling
- developed a 2D culvert analysis hydraulic model
- developed preliminary culvert improvement and planning recommendations, including a scoring matrix for improvement ranking

Dawson Ranch is a planned development community located south and west of the main downtown Cañon City, Colorado area. An overview of the Dawson Ranch culvert analysis area is shown in **Figure 1** below. The study area is generally bounded by Mariposa Road on the north, Evelyn Drive on the east, Greenhorn Drive on the south, and the Bureau of Land Management (BLM) property to the west. The culverts that were included in the hydraulic modeling are illustrated in **Figure 2**.

This analysis has been completed following years of storm related damages throughout the Dawson Ranch neighborhood. Heavy summer rainstorms have typically resulted in flows that exceed the existing culvert capacities throughout the Dawson Ranch area. Damage is generally limited to sediment deposition and aggradation and the removal and rearrangement of landscaping materials, but has on occasion resulted in flooding damage to residential structures. No fatalities caused by flooding have been recorded

in the Dawson Ranch area since the neighborhood started construction approximately 20 years ago. The July 23rd 2018 storm event caused widespread damage and is considered the most damaging flooding event in Dawson Ranch to date.

Hydrology

The hydrologic basis for this analysis was taken directly from the West Branch of Forked Gulch study that was prepared for the Colorado Water Conservation Board (CWCB) in June 2008. The West Branch of Forked Gulch (WBFG) sub-basins that contribute to the Dawson Ranch culvert analysis project area were used to develop point inflow locations for the 2D hydraulic model. Point inflow locations were set at low points along the 2D model boundary, and the contributing areas to the point inflow locations were then delineated within the original WBFG sub-basin. The contributing area at each inflow point was then used to develop an inflow hydrograph based on the contributing area as a percentage of the original basin size. The original basin hydrograph for the 10-year and 100-year events were then adjusted by the percentage of the contributing basin to develop the point inflow hydrograph. The contributing sub-basins and the point inflow locations are illustrated in **Figure 3**. Inflow hydrographs are illustrated in **Figure 4**.

The remainder of the hydrology for the 2D model was based on a “rain-on-grid” approach. The rainfall values from the WBFC study (sub-basin: WBFG_03) were incorporated in the 2D model such that every cell receives the appropriate rainfall volume. This water then flows through the model based on the underlying terrain.

The initial rain-on-grid approach utilized the “excess” depth of rainfall that accounts for infiltration. However, the resulting discharges at the downstream limit of the 2D hydraulic model were significantly less than the effective WBFC discharges. In an effort to compensate for the surface storage that is inherent in a 2D model, the full rainfall depth value (i.e. without infiltration) was incorporated in the hydraulic model. The resulting discharges at the downstream end of the 2D were much closer to the WBFG study. As a result, the full rainfall depth approach has been utilized in this analysis.

The total rainfall for the 2D hydraulic model was 2.03 inches for the 10-year event, and 3.87 inches for the 100-year event. Rainfall depth and time graphs are illustrated in **Figure 4**. The effective WBFG study and resulting discharges at the downstream limit of the 2D hydraulic model are as follows:

- 10-year: WBFG study = 484 cfs; Culvert Analysis = 389 cfs
- 100-year: WBFG study = 1,459 cfs; Culvert Analysis = 1,247 cfs

For the purposes of this analysis, this ‘calibration’ approach to rainfall was considered adequate.

Hydraulics

A 2D hydraulic model for the Dawson Ranch area was developed utilizing the HEC-RAS (v. 5.0.5) software. Based on budget constraints, the 2D model includes many, but not all, of the publicly owned culverts in the Dawson Ranch area, and no private culverts. Initial meetings with the City and the HOA selected approximately half of all the public culverts for inclusion into the model and analysis. These culverts were selected based on previous flooding issues and desired improvement locations. Additional culverts were added as necessary for hydraulic continuity, bringing the total modeled culvert count to 70 culverts of the 99 culverts located within the model boundary. These culverts are illustrated in **Figure 2**.

The 2D hydraulic model incorporates the following elements:

Terrain: The terrain surface utilized in the model is based on the 2016 LiDAR data provided by the City.

Manning's n Values: Manning's n values were split out into two conditions: roadways and native vegetation/typical landscaping. Using the public right-of-way area based on parcel mapping, roadways were set to a Manning's n value of 0.02. The remaining areas consist of either native vegetation or typical landscaping and were set to a Manning's n value of 0.08.

Structures: Residential structures were incorporated into the model based on building outline data as provided by the City and as available from public sources. These structures were then built into the terrain surface and the outlines were set as cell break lines.

Break Lines: Major drainage thalwegs, roadside swale thalwegs, and structure outlines were incorporated into the model as break lines. The 2D model utilizes a 40-foot by 40-foot mesh for areas not adjacent to a thalweg or structure break line. Near all break lines, the 2D model goes to a more detailed 10-foot mesh. These detailed areas deviate from a square mesh pattern, but generally result in a mesh cell with a size of approximately 100 square feet.

Culverts: As noted, a total of 70 culverts were incorporated into the 2D hydraulic model. Initial flow path results were reviewed and a total of 5 culverts were identified that have notable discharges that overtop the associated roadway, but at a location other than where the culvert is located. These are considered 'perched' culverts and a separate hydraulic model was created in order to quantify the amount of water that overtops the roadway away from the actual culvert crossing as the associated culvert weir discharge value does not reflect the full overtopping discharge. These perched conditions were noted at culverts numbered 275, 281, 300, 340, and 432.

Based on discussions with the City and the HOA, a standard 50% blockage factor was applied to all culverts. This was done in order to reflect the commonly observed condition of culverts in the Dawson Ranch area where debris fill culverts and reduce their capacity.

Inflow: As noted in the hydrology discussion, the 2D model inflow is a combination of point inflows as the upstream model boundary and a rain-on-grid approach for the full model area. The point inflows are based on an area proportion of sub-basin discharge from the effective WBFG hydrology. The rainfall is based on the WBFG rainfall (without infiltration) for sub-basin WBFG_03

Outflow: The 2D model boundary was set with normal depth outflow conditions at major outflow locations along the model boundary.

Existing Conditions

The existing conditions inflow and rainfall were run on the 2D hydraulic model for both the 10-year and 100-year conditions. **Figure 5** illustrates the 10-year maximum depths, and **Figure 6** illustrates the 100-year maximum depths. The resulting culvert and weir discharges are provided in **Table 1**.

Proposed Culvert Recommendations

Based on the existing conditions flooding depths and patterns along with the provided reports of observed flooding issues within the Dawson Ranch area, six roadway crossing locations were identified that are recommended to be retrofitted with storm drain culverts where none currently exist. It should be noted however, that none of these proposed culverts originate in a City owned right-of-way, and only culverts 702 and 705 terminate in a City owned right-of-way. These six culverts are included in the culvert improvement prioritization scoring and recommendations as shown in **Table 2**.

These proposed culverts are illustrated in **Figure 7** and include the following:

- **Culvert 700:** This culvert would collect stormwater from the south east corner of Tanner Parkway and Cedar Ridge Drive and direct the discharge to the main drainageway that is north of Cedar Ridge Drive and downstream (north) of Tanner Parkway. The proposed culvert would collect residual discharges that are flowing in Cedar Ridge Drive and prevent them from flowing east along Tanner Parkway and ultimately to Blue Grouse Drive and beyond. The size of this culvert is reduced somewhat with the implementation of proposed culvert 702 (see below). Unfortunately, based on the size and alignment of this proposed culvert, it cannot be integrated as a culvert into the 2D hydraulic model. However, a blockage to reflect the end result of the proposed culvert has been

included in the proposed conditions modeling. Discharge for this culvert (with proposed culvert 702 in place, along with all other existing culvert improvements) is estimated at 48 cfs for the 100-year event. Slope for this culvert is estimated at 4% requiring a 42-inch diameter CMP culvert that includes a 50% blockage factor to pass the 100-year event.

- **Culvert 701:** This culvert would convey stormwater under Eagle Crest Drive along the major drainageway path that is north/west of Cedar Ridge Drive. This culvert would prevent water that is already in this drainage upstream of Eagle Crest Drive from overtopping Eagle Crest Drive which then results in the water diverting out of the drainageway and ultimately traveling eastward to Cedar Ridge Drive. Discharge for this culvert is estimated at 41 cfs for the 100-year event, with a slope of approximately 6.7% requiring a 36-inch diameter CMP culvert that includes a 50% blockage factor to pass the 100-year event.

- **Culvert 702:** This culvert would convey stormwater under Pike View Drive along the major drainageway path that is south/east of Cedar Ridge Drive. This culvert would prevent water that is already in the drainage upstream of Pike View Drive from overtopping Pike View Drive which then results in some of the water diverting out of the drainageway and ultimately traveling west/north to Cedar Ridge Drive. Discharge for this culvert is estimated at 25 cfs for the 100-year event, with a slope of approximately 6.7% requiring a 30-inch diameter CMP culvert that includes a 50% blockage factor to pass the 100-year event.

- **Culvert 703:** This culvert would convey stormwater under Pike View Drive along the minor drainageway path that is south/east of Cedar Ridge Drive (further south/east than culvert 702). This culvert would prevent water that is already in the drainage upstream of Pike View Drive from overtopping Pike View Drive which then results in some of the water diverting out of the drainageway and ultimately traveling west/north to Cedar Ridge Drive. Discharge for this culvert is estimated at 13 cfs for the 100-year event, with a slope of approximately 9.3% requiring a 24-inch diameter CMP culvert that includes a 50% blockage factor to pass the 100-year event.

- **Culvert 704:** This culvert would convey stormwater under Fox Run along the minor drainageway path that is south/east of Cedar Ridge Drive. This culvert would prevent water that is already in the drainage upstream of Fox Run from overtopping Fox Run which then results in some of the water diverting out of the drainageway and ultimately traveling east/south to the major drainage channel west of Greenhorn Drive. This additional discharge further complicates the

overtopping of Eagle Crest Drive and ultimately discharges running north along Greenhorn Drive. Discharge for this culvert is estimated at 22 cfs for the 100-year event, with a slope of approximately 8.3% requiring a 30-inch diameter CMP culvert that includes a 50% blockage factor to pass the 100-year event.

- **Culvert 705:** This culvert would convey stormwater under Eagle Crest Drive along the minor drainageway path that is south/east of Cedar Ridge Drive. This culvert would prevent water that is already in the drainage upstream of Eagle Crest Drive from overtopping Eagle Crest Drive which then results in the water diverting out of the drainageway and ultimately traveling east to Blue Grouse Drive. Discharge for this culvert is estimated at 22 cfs for the 100-year event, with a slope of approximately 5.6% requiring a 30-inch diameter CMP culvert that includes a 50% blockage factor to pass the 100-year event.

It should also be noted that the City is currently working on the installation of a culvert under Eagle Crest Loop near 124 Eagle Crest Loop. This culvert was not included in this analysis as the culvert was not yet installed at the time of this study.

Existing Culvert Improvement Recommendations

The existing conditions culvert and weir flow discharges for the existing culverts are provided in **Table 1**. In order to make a determination as to the relative performance of each culvert, a 'spread' value was calculated which is the numerical difference between the weir discharge and the total culvert discharge. Culverts with a positive 100-year event spread value (i.e. weir discharge exceeding culvert discharge) were then filtered out and scored based on the following criteria in order to provide an improvement score. This score was then used to provide a relative ranking for improvement prioritization recommendations. This information is documented in **Table 2**. The following criteria elements for each culvert were scored as noted below in order to determine improvement prioritization:

- **Spread Value 100-year:** 100-year spread values between 0 cfs and 99 cfs were given a score of 1 point; spread values between 100 cfs and 199 cfs were given a score of 2 points; spread values of 200 cfs or more were given a score of 3 points. The scoring based on this criteria element was then given a weight of 3 relative to the other scoring criteria.

- **Spread Value 10-year:** 10-year spread values less than 0 cfs were given a score of 0; spread values between 0 cfs and 25 cfs were given a score of 1 point; spread values between 26 cfs and 49 cfs were given a score of 2 points; spread values of 50 cfs or more were given a score of 3 points. The scoring based on

this criteria element was then given a weight of 3 relative to the other scoring criteria.

- **Protect Public Safety / Critical Facilities:** This criteria element was scored based on which roadway the culvert services. Major thoroughfares including Tanner Parkway and Mariposa Road were given a score of 3. Secondary roadways including Ptarmigan Trail and Wild Rose Drive were given a score of 2. The remaining neighborhood access public roadways were given a score of 1. Private roadways were given a score of 0. The scoring based on this criteria element was then given a weight of 2 relative to the other scoring criteria.

- **Protect Residential Structures:** This criteria element was scored based on the estimated flooding depth adjacent to residential structures as a result of an underperforming culvert in the 100-year event. A score of 3 was given to culverts that resulted in flooding depths of 2 feet or more on adjacent structures. A score of 2 was given for flooding depths of 1-2 feet, and a score of 1 point for less than 1 foot. Culverts without adjacent flooding on a residential structure scored 0 points. The scoring based on this criteria element was then given a weight of 2 relative to the other scoring criteria.

- **Reduce Storm Response Costs:** This criteria element was scored based on a previous response effort by the City following a flooding event. The City provided a list of culverts that have been cleaned, maintained, or otherwise addressed by City crews following a storm event. These culverts were given a score of 3 points, while culverts that have not had a previous response effort from the City scored 0 points. The scoring based on this criteria element was then given a weight of 2 relative to the other scoring criteria.

- **Known Public Complaints / Issues:** This criteria element was scored based on culvert inclusion in the 2015 HOA priority list. For culverts that were noted as issue to be addressed in the 2015 HOA list, a score of 3 was given. All other culverts were given a score of 0. The scoring based on this criteria element was then given a weight of 3 relative to the other scoring criteria.

- **Reduce Regulatory Floodplain:** This criteria element was scored based on the location of the culvert within a FEMA regulatory floodplain. Culverts in a Zone X (unshaded) floodplain scored 0; culverts in a Zone A designation scored 1; Zone X (shaded) scored 2; and culverts in a Zone AE designation scored 3 points. The scoring based on this criteria element was then given a weight of 1 relative to the other scoring criteria.

A total score was then calculated and an improvement prioritization rank was given based on highest score to lowest. Ties were broken by 100-year spread values, then by 10-year spread values, and then by engineering judgement as needed.

Improved Culvert Conditions

The proposed culvert recommendations were then incorporated into a 2D hydraulic model. Similarly, all existing culvert improvement recommendations were incorporated in a 2D hydraulic model by adding additional, similarly sized culvert barrels to cover the weir flow values. For culvert crossings that would require more than 4 parallel pipes, a box culvert was integrated into the hydraulic model. For the purposes of the improved culvert conditions hydraulic model, box culverts were assumed to have no blockage based on the increased conveyance area and improved hydraulic parameters of a concrete box verses a corrugated metal culvert. If additional blockage factors are ultimately desired, this should be addressed in the final design of each improved culvert as needed.

It should be noted that based on the physical constraints of some culvert locations, it is not possible to model the culvert such that the weir flow is completely eliminated. These locations will require additional final design such as lowering culvert inverts, providing headwalls, and potentially minor grading to effectively corral flows into the improved culverts. However, the 'Proposed and Improved' culvert conditions maximum depths as shown on **Figure 8** (10-year) and **Figure 9** (100-year) are reasonable for the purposes of illustrating adverse impacts as a result of the recommended improvements.

Figure 10 and **Figure 11** illustrate the change in depths as a result of all recommended culvert improvements. In general, the improvement to culvert crossings reduces the flood volume storage upstream of roadway crossings which in turn can result in increased peak discharges downstream. Additionally, the improvements to culvert crossings will change flow paths and resulting peak discharges downstream of improvement locations. The improvements generally keep flood water within a drainageway, or help direct floodwater back into a drainageway where flood water previously found a way to travel overland typically along a roadway. These changes to the overall drainage conditions within the Dawson Ranch area will result in adverse impacts, however, they are generally limited to existing major drainages where floodwaters and the associated impacts are expected, and help reduce flooding along roadways where floodwaters are generally less desirable and have a higher instance of negative impacts to residential structures and landscaping.

Conclusion

It is recommended that the City proceed with culvert improvements based on the prioritization rank provided in **Table 2** as funding allows. The new or improved culverts will require final design to address field conditions, but the preliminary sizing for the new or improved culverts is provided in **Table 3**.

Opportunities for non-city funding may necessitate changes to the prioritization of culvert replacements. For example, the culverts on the Storm Ridge Channel (474 and 475) exist for a private access drive and the property owner may participate financially in the culvert replacement for their own benefit. The City should consider cost-sharing opportunities such as this regardless of the prioritization of culvert replacements as presented in this memorandum.

New or improved culverts will change drainage patterns and peak discharge values. Generally, these improvements will result in higher discharges and depths within major drainageways, and a reduction of discharges and depths along roadways and adjacent to residential structures. This 'adverse impact' within major drainageways is a necessary change in order to address flooding damage in the general Dawson Ranch area.

In addition to underperforming culverts, the Dawson Ranch area is plagued by sediment and debris movement during large storm events. Sediment and debris modeling and the potential mitigation options were beyond the scope of this project. However, it should be noted that existing culverts that have required post-event response vary in slope indicating that sediment issues can and will impact culverts regardless of slope. The geomorphic setting of the Dawson Ranch area is such that sediment and debris movement is inherent to large storm events and will not be addressed merely by culvert improvements.

Alternative Mitigation Opportunity

A significant amount of flood water enters the Dawson Ranch area from the south west, originating from the WBFG_05_A and WBFG_05_B point inflow locations (see **Figure 3**). A review of the existing grades in this area indicates that it may be feasible to grade a channel in order to divert these inflows to the north and west such that they ultimately flow north into adjacent undeveloped BLM lands and bypass the developed areas of Dawson Ranch. The 100-year existing conditions model (illustrated in **Figure 6**) was revised to include flow blockages in order to model this potential diversion. The resulting maximum depths as a result of this diversion are illustrated in **Figure 12**. The change in maximum depth between the diverted conditions and the existing conditions is illustrated in **Figure 13**.

The change in maximum depth as a result of the potential diversion is generally limited to the major drainageway between Cedar Ridge Drive and Storm Ridge, but does indicate a reduction in maximum flooding depth adjacent to several structures upstream of Tanner Parkway. Based on the expected project costs and impacts to both private and BLM properties, and the relatively small benefit, this mitigation opportunity was not pursued further as part of this project. However, additional review of this opportunity may be warranted in the future if funding and properties become available for additional mitigation efforts.

Dawson Ranch Home Owners Association (HOA) Alternative

The Dawson Ranch Home Owners Association, guided by Mike Gromowski and Marvin Spencer, reviewed the January 24th, 2019 version of this culvert analysis memorandum and developed an HOA alternative that includes revisions to the culvert prioritization and improvement tables. These HOA alternative revisions were based on additional study of different situations, using past experiences, and Marv's knowledge gained during the 2015 HOA study and priority list. The HOA alternative revisions also take into account the estimated culvert improvement budget of approximately $800,000 as discussed by the Stormwater Prioritization Task Force at the February 14th, and 21st, 2019 meetings. The HOA alternative revisions to the culvert criteria scoring are indicated by red values in **Table 4**. The estimated costs shown in **Table 4** were developed by the HOA. The HOA recommended revisions to the culvert improvements are indicated by red text in **Table 5**.

Attachments:

- *Figure 1: Drainage Overview*
- *Figure 2: Culverts in 2D Hydraulic Model*
- *Figure 3: Hydrology Overview*
- *Figure 4: Point Inflow Hydrographs / Rainfall Depths*
- *Figure 5: Existing Conditions 10-year Maximum Depths*
- *Figure 6: Existing Conditions 100-year Maximum Depths*
- *Figure 7: Proposed Culverts*
- *Figure 8: Proposed and Improved Culvert Conditions 10-year Maximum Depths*
- *Figure 9: Proposed and Improved Conditions 100-year Maximum Depths*
- *Figure 10: Change in 10-year Maximum Depth – Proposed/Improved vs. Existing Conditions*
- *Figure 11: Change in 100-year Maximum Depth – Proposed/Improved vs. Existing Conditions*
- *Figure 12: Diversion Mitigation Opportunity 100-year Maximum Depths*
- *Figure 13: Change in 100-year Maximum Depth – Diversion Mitigation Opportunity vs. Existing Conditions*
- *Table 1: Existing Conditions Culvert and Weir Discharge Summary*
- *Table 2: Culvert Improvement Prioritization (by ID)*
- *Table 2: Culvert Improvement Prioritization (by rank)*
- *Table 3: Recommended Culvert Improvement Summary (by ID)*
- *Table 3: Recommended Culvert Improvement Summary (by rank)*
- *Table 4: Culvert Improvement Prioritization (HOA Alternative)*
- *Table 5: Recommended Culvert Improvement Summary (HOA Alternative)*

Legend

Culvert Ownership 2018

- Cañon City
- Cañon City Stormwater Program
- Cañon City Water District
- Private

Property Ownership

- BLM
- City of Cañon City
- Fremont County
- Dawson Ranch LLC

Effective Flood Hazard Area

- Zone AE
- Zone X (shaded)

CMP-36" CMP-36" MARIPOSA ROAD CMP-30" CMP-36" CMP-36" CMP-24" PTARMIGAN TRAIL CMP-18" CMP-30" CMP-32" CMP-30" TEMPLE CANYON ROAD HDPE-18" CMP-24" WILD ROSE DRIVE CMP-36" CMP-36" CMP-24" CMP-24" BOBWHITE LOOP CMP-18" CMP-24" CMP-24" CMP-36" CMP-36" CMP-18" HDPE-24" CMP-24" KYNDRA COURT HDPE-30" CMP-24" CMP-24" CMP-24" CMP-36" CMP-24" PVC-12" PVC-6" FORGE ROAD CMP-18" SHILOH DR CMP-15" BEAR CUB COURT BLUE GROUSE DRIVE COUGAR LOOP MOURNING DOVE DRIVE SILVERADO COURT PVC-8" CMP-24" CMP-30" WILD ROSE DRIVE OSPREY COURT N HDPE-30" CMP-18" CMP-30" CMP-30" CMP-30" CMP-24" HDPE-15" CMP-18" CEDAR RIDGE COURT PRIMROSE COURT CMP-18" CMP-12" OSPREY COURT S CMP-18" CMP-18" CMP-24" CMP-30" CMP-30" CMP-30" WILD ROSE COURT OAK LEAF COURT PVC-6" CEDAR RIDGE DRIVE CMP-36" CMP-36" RAPTOR COURT EAGLE CREST LOOP HDPE-24" CMP-24" CMP-30" CMP-30" HDPE-18" TANNER PARKWAY CMP-24" CMP-24" CMP-15" CMP-36" CMP-36" CMP-24" DI-16" CMP-30" CMP-30" CMP-24" CMP-24" EAGLE CREST DRIVE CMP-18" CMP-18" CMP-18" CMP-24" CMP-18" CMP-30" CMP-18" CMP-18" CMP-24" CMP-24 x 35 CMP-24" CMP-18" CMP-18" FOX RUN CMP-24" CMP-24" CMP-30" CMP-24" CMP-30" CMP-30" CEDAR RIDGE DRIVE PIKE VIEW DRIVE STORM RIDGE CMP-18" CMP-29 x 42 EVELYN DRIVE CMP-18" CMP-18" EAGLE DRIVE N HDPE-18" CMP-30" CMP-12" EAGLE DRIVE E CMP-15" CMP-21" EAGLE DRIVE S CMP-18" CMP-24" GREENHORN DRIVE HDPE-24" STORM COURT CMP-18" EVELYN DRIVE

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600 Feet

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Dawson Ranch Culvert Drainage Analysis

Figure 1: Drainage Overview

Dawson Ranch

CITY OF CAÑON CITY COLORADO

Legend

2D Model Culverts

Property Ownership

- BLM
- City of Cañon City
- Fremont County
- Dawson Ranch LLC

CULV000381
CULV000382
MARIPOSA ROAD
CULV000275
CULV000598
CULV000599
PTARMIGAN TRAIL
CULV000379
CULV000380
CULV000078
CULV000079
TEMPLE CANYON ROAD
CULV000280
WILD ROSE DRIVE
CULV000277
CULV000279
CULV000281
CULV000282
BOBWHITE LOOP
CULV000283
CULV000284
CULV000292
CULV000293
KYNDRA COURT
CULV000439
CULV000440
CULV000305
CULV000295
CULV000300
FORGE ROAD
SHILOH DR
COUGAR LOOP
BEAR CUB COURT
BLUE GROUSE DRIVE
MOURNING DOVE DRIVE
SILVERADO COURT
CEDAR RIDGE COURT
PRIMROSE COURT
CULV000301
CULV000298
OAK LEAF COURT
CEDAR RIDGE DRIVE
OSPREY COURT N
CULV000309
CULV000054
CULV000055
OSPREY COURT S
CULV000051
CULV000052
CULV000053
WILD ROSE COURT
EAGLE CREST LOOP
RAPTOR COURT
CULV000080
CULV000081
CULV000303
CULV000436
CULV000428
CULV000429
CULV000430
CULV000427
TANNER PARKWAY
CULV000092
CULV000304
CULV000431
CULV000093
CULV000315
CULV000432
EAGLE CREST DRIVE
CULV000422
CULV000316
CULV000421
CULV000317
CULV000339
CULV000340
CULV000426
CULV000420
CULV000419
CULV000341
CULV000418
CULV000425
CULV000435
CULV000424
CULV000343
FOX RUN
CEDAR RIDGE DRIVE
CULV000423
CULV000342
PIKE VIEW DRIVE
EVELYN DRIVE
EAGLE DRIVE N
EAGLE DRIVE E
CULV000474
CULV000475
STORM RIDGE
CULV000119
CULV000583
GREENHORN DRIVE
CULV000582
EAGLE DRIVE S
CULV000433
CULV000441
STORM COURT
CULV000434
EVELYN DRIVE

N

600 Feet

Dawson Ranch Culvert Drainage Analysis

Figure 2: Culverts in 2D Hydraulic Model

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Dawson Ranch

CITY of CAÑON CITY COLORADO

Legend

- 2D Hydraulic Model Inflow Point
- Point Inflow Contributing Area
- West Branch Forked Gulch Sub-basins
- 2D Hydraulic Model Boundary

FG_01
WBFG_01
MARIPOSA ROAD
FG_02
TEMPLE CANYON ROAD
WILD ROSE DRIVE
WBFG_02
WILD ROSE DRIVE
FORGE ROAD
FG_03
TANNER PARKWAY
WBFG_03
GREENHORN DRIVE
WBFG_04
WBFG_05_A
WBFG_05_C
WBFG_05_D
WBFG_05_B
WBFG_04_A
WBFG_04_B
WBFG_05_A
12%
WBFG_05_C
2%
WBFG_04_B
10%
WBFG_04_A
14%
WBFG_05
WBFG_05_D
17%
WBFG_05_B
50%
N
1,000
Feet

ICON ENGINEERING, INC.

Dawson Ranch Culvert Drainage Analysis

Figure 3: Hydrology Overview

Dawson Ranch

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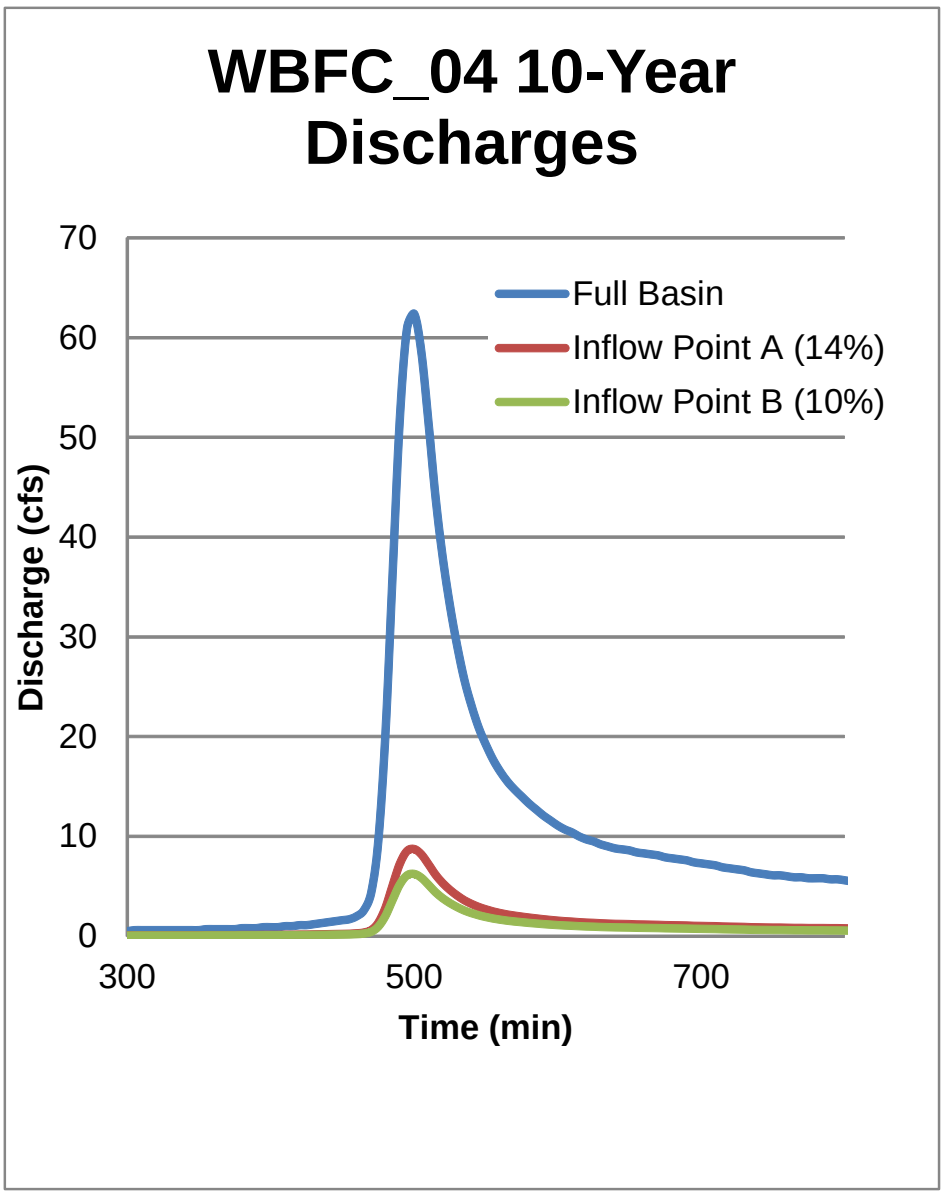

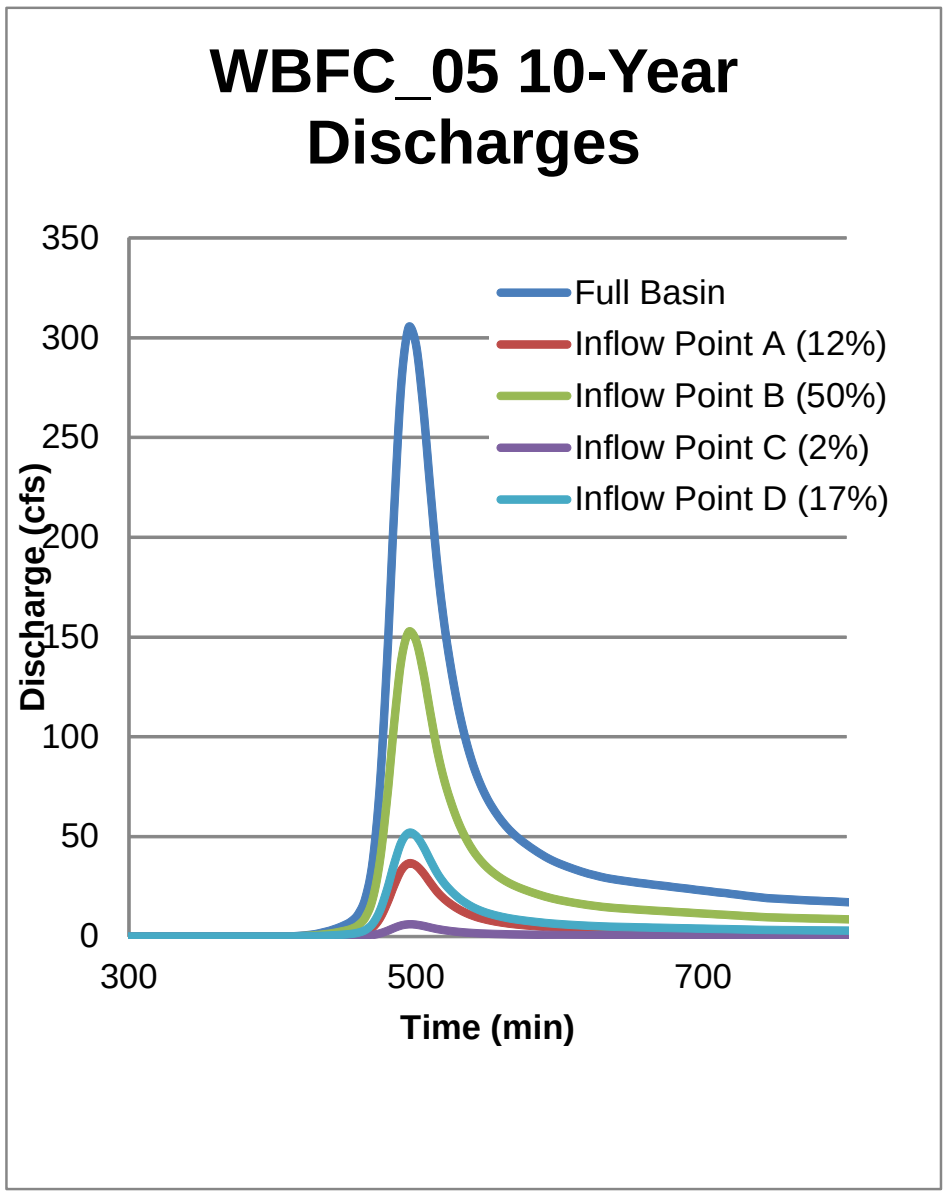

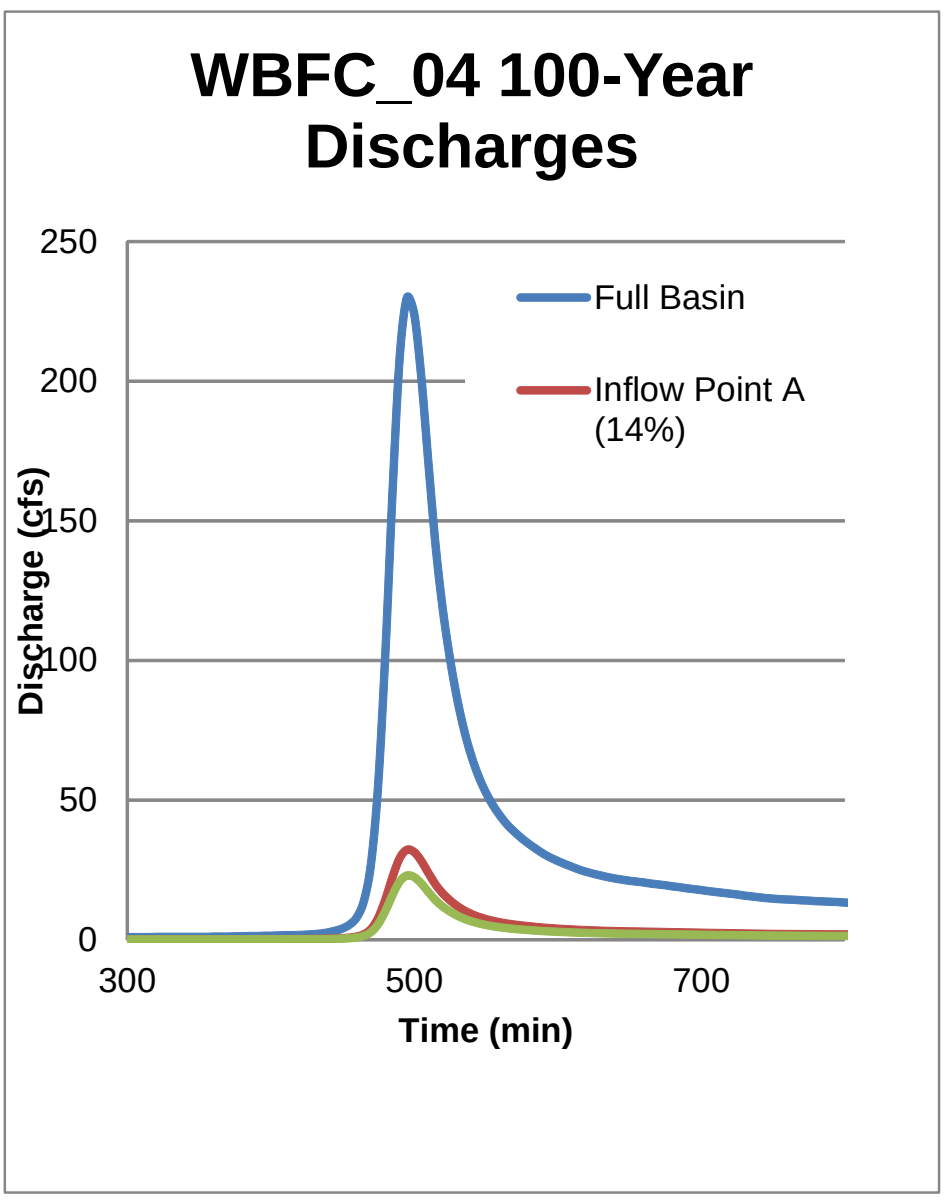

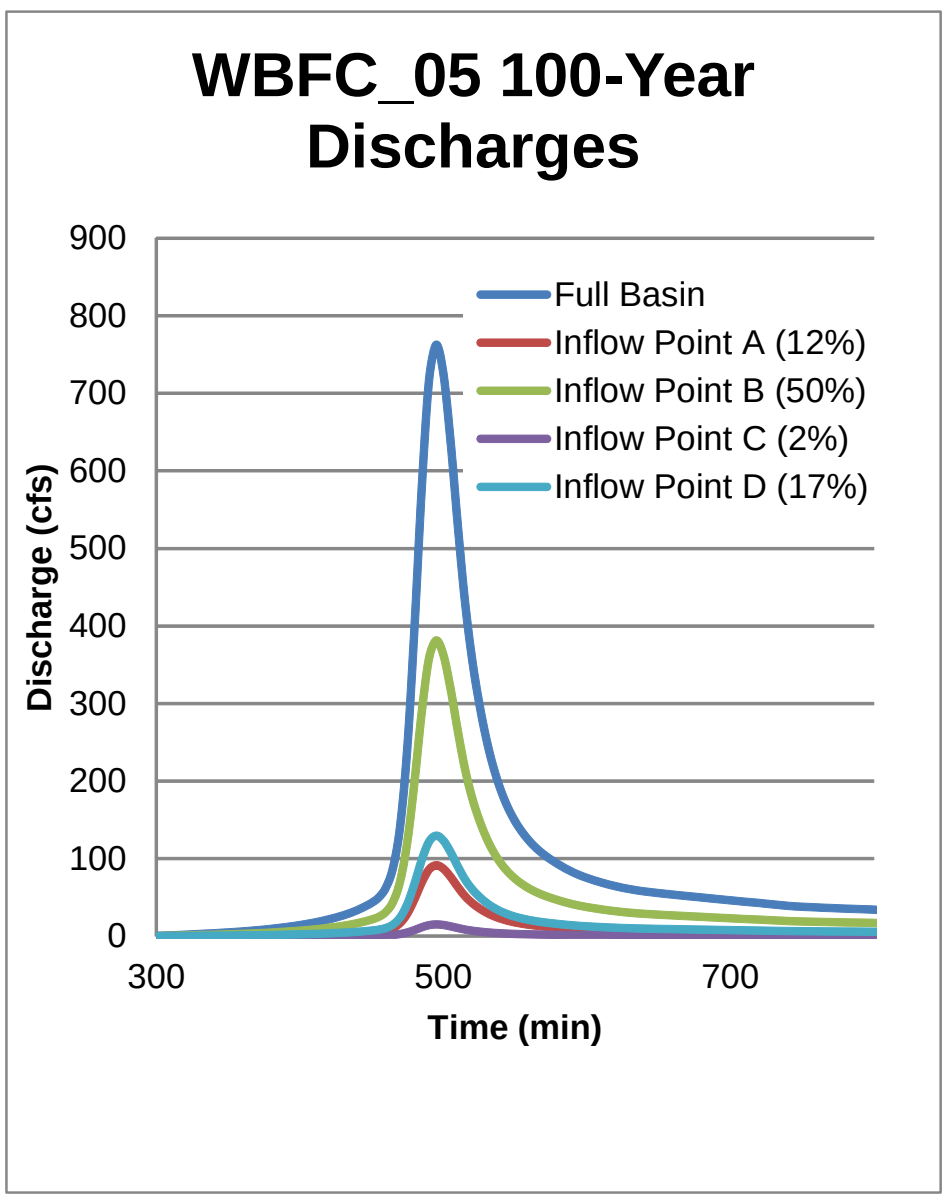

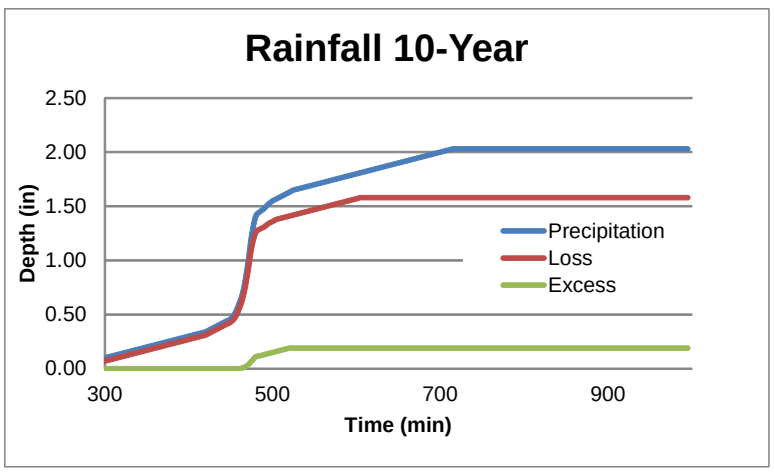

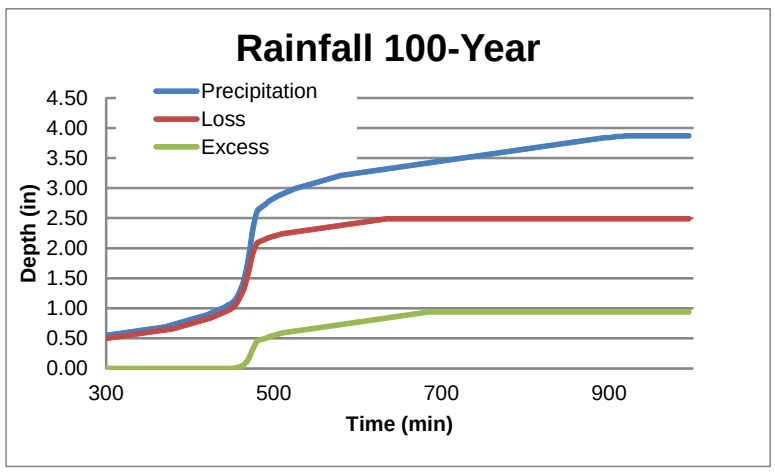

ICON ENGINEERING, INC.

Dawson Ranch Culvert Drainage Analysis

Figure 4: Point Inflow Hydrographs / Rainfall Depths

Dawson Ranch

CITY of CAÑON CITY COLORADO

Legend

2D Model Culverts

10-year Maximum Depth

- 0' - 0.5'
- 0.5' - 1'
- 1' - 2'
- 2' - 3'
- 3' - 4'
- 4' +

CULV000381
CULV000382
MARIPOSA ROAD
CULV000275
CULV000598
CULV000599
PTARMIGAN TRAIL
CULV000379
CULV000380
TEMPLE CANYON ROAD
CULV000078
CULV000079
CULV000280
WILD ROSE DRIVE
CULV000277
CULV000279
CULV000281
CULV000282
BOBWHITE LOOP
CULV000283
CULV000284
CULV000292
CULV000293
KYNDRA COURT
CULV000439
CULV000440
CULV000305
CULV000295
CULV000300
FORGE ROAD
SHILOH DR
COUGAR LOOP
BEAR CUB COURT
BLUE GROUSE DRIVE
MOURNING DOVE DRIVE
SILVERADO COURT
CEDAR RIDGE COURT
PRIMROSE COURT
CULV000309
OSPREY COURT N
CULV000054
CULV000055
OSPREY COURT S
CULV000298
CULV000301
OAK LEAF COURT
CULV000051
CULV000052
CULV000053
WILD ROSE COURT
CEDAR RIDGE DRIVE
RAPTOR COURT
EAGLE CREST LOOP
CULV000080
CULV000081
CULV000428
CULV000303
CULV000436
CULV000429
CULV000430
CULV000427
TANNER PARKWAY
CULV000092
CULV000304
CULV000431
CULV000093
CULV000315
CULV000432
EAGLE CREST DRIVE
CULV000422
CULV000316
CULV000421
CULV000317
CULV000339
CULV000426
CULV000420
CULV000419
CULV000340
CULV000341
CULV000418
CULV000425
FOX RUN
CULV000435
CULV000424
CULV000343
CULV000423
CULV000342
CEDAR RIDGE DRIVE
PIKE VIEW DRIVE
CULV000474
CULV000475
STORM RIDGE
CULV000119
CULV000583
EVELYN DRIVE
EAGLE DRIVE N
EAGLE DRIVE E
GREENHORN DRIVE
CULV000582
EAGLE DRIVE S
CULV000433
CULV000441
STORM COURT
CULV000434
600
Feet

ICON ENGINEERING, INC.

Dawson Ranch Culvert Drainage Analysis

Figure 5: Existing Conditions 10-year Maximum Depths

Dawson Ranch

CITY of CAÑON CITY COLORADO

Legend

2D Model Culverts

100-year Maximum Depth

- 0' - 0.5'
- 0.5' - 1'
- 1' - 2'
- 2' - 3'
- 3' - 4'
- 4' +

CULV000381
CULV000382
MARIPOSA ROAD
CULV000275
CULV000598
CULV000599
CULV000379
CULV000380
PTARMIGAN TRAIL
CULV000078
CULV000079
TEMPLE CANYON ROAD
CULV000280
WILD ROSE DRIVE
CULV000277
CULV000279
CULV000281
CULV000282
BOBWHITE LOOP
CULV000283
CULV000284
CULV000292
CULV000293
KYNDRA COURT
CULV000439
CULV000440
CULV000305
CULV000295
CULV000300
FORGE ROAD
SHILOH DR
WILD ROSE DRIVE
COUGAR LOOP
BEAR CUB COURT
BLUE GROUSE DRIVE
MOURNING DOVE DRIVE
SILVERADO COURT
CEDAR RIDGE COURT
PRIMROSE COURT
CULV000309
OSPREY COURT N
CULV000054
CULV000055
OSPREY COURT S
CULV000298
CULV000301
OAK LEAF COURT
CEDAR RIDGE DRIVE
CULV000051
CULV000052
CULV000053
WILD ROSE COURT
EAGLE CREST LOOP
RAPTOR COURT
CULV000080
CULV000081
CULV000303
CULV000436
CULV000428
CULV000429
CULV000430
CULV000427
TANNER PARKWAY
CULV000092
CULV000304
CULV000431
CULV000093
CULV000315
CULV000432
EAGLE CREST DRIVE
CULV000422
CULV000316
CULV000421
CULV000317
CULV000339
CULV000340
CULV000426
CULV000420
CULV000419
CULV000341
CULV000418
CULV000425
FOX RUN
CULV000435
CULV000424
CULV000343
CEDAR RIDGE DRIVE
CULV000423
CULV000342
EVELYN DRIVE
EAGLE DRIVE N
EAGLE DRIVE E
CULV000474
CULV000475
STORM RIDGE
PIKE VIEW DRIVE
CULV000119
CULV000583
EAGLE DRIVE S
GREENHORN DRIVE
CULV000582
CULV000433
CULV000441
STORM COURT
CULV000434
EVELYN DRIVE
600
Feet

ICON ENGINEERING, INC.

Dawson Ranch Culvert Drainage Analysis

Figure 6: Existing Conditions 100-year Maximum Depths

Dawson Ranch

CITY of CAÑON CITY COLORADO

ICON ENGINEERING, INC.

Dawson Ranch Culvert Drainage Analysis

Figure 7: Proposed Culverts (Existing Conditions 100-year maximum Depths)

Dawson Ranch

CITY of CAÑON CITY COLORADO

Legend

2D Model Culverts (Proposed)

2D Model Culverts

10-year Maximum Depth

0' - 0.5'

0.5' - 1'

1' - 2'

2' - 3'

3' - 4'

4' +

CULV000381
CULV000382
MARIPOSA ROAD
CULV000275
CULV000598
CULV000599
PTARMIGAN TRAIL
CULV000379
CULV000380
CULV000078
CULV000079
TEMPLE CANYON ROAD
CULV000280
WILD ROSE DRIVE
CULV000277
CULV000279
CULV000281
BOBWHITE LOOP
CULV000282
CULV000283
CULV000284
CULV000292
CULV000293
KYNDRA COURT
CULV000439
CULV000440
CULV000305
CULV000295
CULV000300
FORGE ROAD
SHILOH DR
COUGAR LOOP
BEAR CUB COURT
BLUE GROUSE DRIVE
MOURNING DOVE DRIVE
SILVERADO COURT
PRIMROSE COURT
CEDAR RIDGE COURT
CULV000309
OSPREY COURT N
CULV000054
CULV000055
OSPREY COURT S
CULV000298
CULV000301
OAK LEAF COURT
CULV000051
CULV000052
CULV000053
WILD ROSE COURT
CEDAR RIDGE DRIVE
CULV000700
CULV000080
CULV000081
RAPTOR COURT
EAGLE CREST LOOP
CULV000428
CULV000303
CULV000436
CULV000429
CULV000430
CULV000427
TANNER PARKWAY
CULV000092
CULV000304
CULV000431
CULV000093
CULV000315
CULV000432
EAGLE CREST DRIVE
CULV000422
CULV000316
CULV000701
CULV000317
CULV000705
CULV000421
CULV000339
CULV000340
CULV000426
CULV000419
CULV000341
CULV000418
CULV000425
CULV000704
FOX RUN
CULV000435
CULV000424
CULV000343
CULV000702
CULV000423
CULV000342
EVELYN DRIVE
EAGLE DRIVE N
EAGLE DRIVE E
CULV000474
CULV000475
STORM RIDGE
PIKE VIEW DRIVE
CULV000703
CULV000583
CULV000119
GREENHORN DRIVE
CULV000582
EAGLE DRIVE S
CULV000433
CULV000441
STORM COURT
CULV000434
600
Feet

Dawson Ranch Culvert Drainage Analysis

Figure 8: Proposed and Improved Culvert Conditions 10-year Maximum Depths

ICON ENGINEERING, INC.

Dawson Ranch

CITY of CAÑON CITY COLORADO

Legend

2D Model Culverts (Proposed)

2D Model Culverts

100-year Maximum Depth

0' - 0.5'

0.5' - 1'

1' - 2'

2' - 3'

3' - 4'

4' +

CULV000381
CULV000382
MARIPOSA ROAD
CULV000275
CULV000598
CULV000599
PTARMIGAN TRAIL
CULV000379
CULV000380
CULV000078
CULV000079
TEMPLE CANYON ROAD
CULV000280
WILD ROSE DRIVE
CULV000277
CULV000279
CULV000281
CULV000282
BOBWHITE LOOP
CULV000283
CULV000284
CULV000292
CULV000293
KYNDRA COURT
CULV000439
CULV000440
CULV000305
CULV000295
CULV000300
FORGE ROAD
SHILOH DR
COUGAR LOOP
BEAR CUB COURT
BLUE GROUSE DRIVE
MOURNING DOVE DRIVE
SILVERADO COURT
CEDAR RIDGE COURT
PRIMROSE COURT
CULV000301
CULV000309
OSPREY COURT N
CULV000054
CULV000055
OSPREY COURT S
CULV000298
OAK LEAF COURT
CULV000051
CULV000052
CULV000053
WILD ROSE COURT
EAGLE CREST LOOP
RAPTOR COURT
CULV000700
CEDAR RIDGE DRIVE
CULV000080
CULV000081
CULV000303
CULV000436
CULV000428
CULV000429
CULV000430
CULV000427
TANNER PARKWAY
CULV000092
CULV000304
CULV000431
CULV000093
CULV000315
EAGLE CREST DRIVE
CULV000432
CULV000422
CULV000701
CULV000316
CULV000317
CULV000705
CULV000421
CULV000339
CULV000340
CULV000426
CULV000419
CULV000341
CULV000418
CULV000425
CULV000704
FOX RUN
CULV000435
CULV000424
CULV000702
CULV000343
CEDAR RIDGE DRIVE
CULV000423
CULV000342
EVELYN DRIVE
EAGLE DRIVE N
EAGLE DRIVE E
CULV000474
CULV000475
STORM RIDGE
PIKE VIEW DRIVE
CULV000119
CULV000703
CULV000583
EAGLE DRIVE S
GREENHORN DRIVE
CULV000582
CULV000433
CULV000441
STORM COURT
CULV000434
EVELYN DRIVE
N
600
Feet

ICON ENGINEERING, INC.

Dawson Ranch Culvert Drainage Analysis

Figure 9: Proposed and Improved Culvert Conditions 100-year Maximum Depths

Dawson Ranch

CITY of CAÑON CITY COLORADO

Legend

2D Model Culverts (Proposed)

2D Model Culverts

Change in Maximum Depth

- (-4') and Less
- (-4') - (-3')
- (-3') - (-2')
- (-2') - (-1')
- (-1') - (-0.5')
- (-0.5') - (-0.1')
- (-0.1') - 0.1'
- 0.1' - 0.5'
- 0.5' - 1'
- 1' - 2'
- 2' - 3'
- 3' -4'
- 4' and Greater

CULV000381
CULV000382
MARIPOSA ROAD
CULV000275
CULV000598
CULV000599
PTARMIGAN TRAIL
CULV000379
CULV000380
CULV000078
CULV000079
TEMPLE CANYON ROAD
CULV000280
WILD ROSE DRIVE
CULV000279
CULV000277
CULV000281
CULV000282
BOBWHITE LOOP
CULV000283
CULV000284
CULV000292
CULV000293
KYNDRA COURT
CULV000439
CULV000440
CULV000305
CULV000295
CULV000300
FORGE ROAD
SHILOH DR
COUGAR LOOP
BEAR CUB COURT
BLUE GROUSE DRIVE
WILD ROSE DRIVE
MOURNING DOVE DRIVE
SILVERADO COURT
CEDAR RIDGE COURT
CULV000309
OSPREY COURT N
CULV000054
CULV000055
OSPREY COURT S
PRIMROSE COURT
CULV000298
CULV000301
OAK LEAF COURT
CULV000051
CULV000052
CULV000053
WILD ROSE COURT
CEDAR RIDGE DRIVE
CULV000700
RAPTOR COURT
EAGLE CREST LOOP
CULV000303
CULV000436
CULV000080
CULV000081
CULV000428
CULV000429
CULV000430
CULV000427
TANNER PARKWAY
CULV000092
CULV000304
CULV000431
CULV000093
CULV000315
EAGLE CREST DRIVE
CULV000432
CULV000422
CULV000316
CULV000701
CULV000317
CULV000705
CULV000421
CULV000339
CULV000340
CULV000341
CULV000426
CULV000419
CULV000418
CULV000425
CULV000704
FOX RUN
CULV000435
CULV000424
CULV000702
CULV000343
CULV000423
CEDAR RIDGE DRIVE
CULV000342
EAGLE DRIVE N
CULV000474
CULV000475
STORM RIDGE
PIKE VIEW DRIVE
CULV000119
CULV000703
CULV000583
EVELYN DRIVE
EAGLE DRIVE E
EAGLE DRIVE S
GREENHORN DRIVE
CULV000582
CULV000433
CULV000441
STORM COURT
CULV000434
EVELYN DRIVE
N
600
Feet

ICON ENGINEERING, INC.

Dawson Ranch Culvert Drainage Analysis

Figure 10: Change in 10-year Maximum Depth Proposed and Improved Culverts vs. Existing Conditions

Dawson Ranch

CITY OF CAÑON CITY COLORADO

Legend

2D Model Culverts (Proposed)

2D Model Culverts

Change in Maximum Depth

- (-4') and Less
- (-4') - (-3')
- (-3') - (-2')
- (-2') - (-1')
- (-1') - (-0.5')
- (-0.5') - (-0.1')
- (-0.1') - 0.1'
- 0.1' - 0.5'
- 0.5' - 1'
- 1' - 2'
- 2' - 3'
- 3' -4'
- 4' and Greater

CULV000381
CULV000382
MARIPOSA ROAD
CULV000275
CULV000598
CULV000599
PTARMIGAN TRAIL
CULV000379
CULV000380
CULV000078
CULV000079
TEMPLE CANYON ROAD
CULV000280
WILD ROSE DRIVE
CULV000277
CULV000279
CULV000281
CULV000282
BOBWHITE LOOP
CULV000283
CULV000284
CULV000292
CULV000293
KYNDRA COURT
CULV000439
CULV000440
CULV000305
CULV000295
CULV000300
FORGE ROAD
SHILOH DR
COUGAR LOOP
BEAR CUB COURT
BLUE GROUSE DRIVE
WILD ROSE DRIVE
MOURNING DOVE DRIVE
SILVERADO COURT
PRIMROSE COURT
CEDAR RIDGE COURT
CULV000301
CULV000309
OSPREY COURT N
CULV000054
CULV000055
OSPREY COURT S
CULV000298
OAK LEAF COURT
CULV000051
CULV000052
CULV000053
WILD ROSE COURT
EAGLE CREST LOOP
RAPTOR COURT
CULV000700
CEDAR RIDGE DRIVE
CULV000080
CULV000081
CULV000303
CULV000436
CULV000428
CULV000429
CULV000430
CULV000427
TANNER PARKWAY
CULV000092
CULV000304
CULV000431
CULV000093
CULV000315
EAGLE CREST DRIVE
CULV000432
CULV000422
CULV000316
CULV000701
CULV000317
CULV000705
CULV000421
CULV000339
CULV000340
CULV000426
CULV000419
CULV000341
CULV000418
CULV000425
CULV000704
FOX RUN
CULV000435
CULV000424
CULV000343
CULV000702
CULV000423
CULV000342
CULV000474
CULV000475
STORM RIDGE
PIKE VIEW DRIVE
EAGLE DRIVE N
EAGLE DRIVE E
CULV000119
CULV000703
CULV000583
EVELYN DRIVE
GREENHORN DRIVE
CULV000433
CULV000582
EAGLE DRIVE S
CULV000441
STORM COURT
CULV000434
EVELYN DRIVE
N
600
Feet

ICON ENGINEERING, INC.

Dawson Ranch Culvert Drainage Analysis

Figure 11: Change in 100-year Maximum Depth Proposed and Improved Culverts vs. Existing Conditions

Dawson Ranch

CITY of CAÑON CITY COLORADO

Legend

2D Model Culverts

100-year Maximum Depth with Diversion

- 0' - 0.5'
- 0.5' - 1'
- 1' - 2'
- 2' - 3'
- 3' - 4'
- 4' +

CULV000381
CULV000382
MARIPOSA ROAD
CULV000275
CULV000598
CULV000599
PTARMIGAN TRAIL
CULV000379
CULV000380
TEMPLE CANYON ROAD
CULV000078
CULV000079
CULV000280
WILD ROSE DRIVE
CULV000277
CULV000279
CULV000281
CULV000282
BOBWHITE LOOP
CULV000283
CULV000284
CULV000292
CULV000293
KYNDRA COURT
CULV000439
CULV000440
CULV000305
CULV000295
CULV000300
FORGE ROAD
SHILOH DR
COUGAR LOOP
BEAR CUB COURT
BLUE GROUSE DRIVE
MOURNING DOVE DRIVE
SILVERADO COURT
PRIMROSE COURT
CEDAR RIDGE COURT
CULV000309
OSPREY COURT N
CULV000054
CULV000055
OSPREY COURT S
CULV000298
CULV000301
CULV000051
CULV000052
CULV000053
WILD ROSE COURT
OAK LEAF COURT
CEDAR RIDGE DRIVE
EAGLE CREST LOOP
RAPTOR COURT
CULV000080
CULV000081
CULV000428
CULV000303
CULV000436
CULV000429
CULV000430
CULV000427
TANNER PARKWAY
CULV000092
CULV000304
CULV000431
CULV000093
CULV000315
EAGLE CREST DRIVE
CULV000432
CULV000422
CULV000316
CULV000317
CULV000421
CULV000339
CULV000426
CULV000419
CULV000340
CULV000341
CULV000418
CULV000425
FOX RUN
CULV000435
CULV000424
CULV000343
CEDAR RIDGE DRIVE
CULV000423
CULV000342
EVELYN DRIVE
EAGLE DRIVE N
EAGLE DRIVE E
CULV000474
CULV000475
STORM RIDGE
PIKE VIEW DRIVE
CULV000119
CULV000583
GREENHORN DRIVE
CULV000582
EAGLE DRIVE S
CULV000433
CULV000441
STORM COURT
CULV000434
EVELYN DRIVE

Conceptual Diversion Channel

600 Feet

ICON ENGINEERING, INC.

Dawson Ranch Culvert Drainage Analysis

Figure 12: Diversion Mitigation Opportunity
100-year Maximum Depths

Dawson Ranch

CITY of CAÑON CITY COLORADO

Legend

2D Model Culverts

Change in Maximum Depth

- (-4') and Less
- (-4') - (-3')
- (-3') - (-2')
- (-2') - (-1')
- (-1') - (-0.5')
- (-0.5') - (-0.1')
- (-0.1') - 0.1'
- 0.1' - 0.5'
- 0.5' - 1'
- 1' - 2'
- 2' - 3'
- 3' -4'
- 4' and Greater

CULV000381
CULV000382
MARIPOSA ROAD
CULV000275
CULV000598
CULV000599
PTARMIGAN TRAIL
CULV000379
CULV000380
CULV000078
CULV000079
TEMPLE CANYON ROAD
CULV000280
WILD ROSE DRIVE
CULV000277
CULV000279
CULV000281
CULV000282
BOBWHITE LOOP
CULV000283
CULV000284
CULV000292
CULV000293
KYNDRA COURT
CULV000439
CULV000440
CULV000305
CULV000295
CULV000300
FORGE ROAD
SHILOH DR
WILD ROSE DRIVE
COUGAR LOOP
BEAR CUB COURT
BLUE GROUSE DRIVE
MOURNING DOVE DRIVE
SILVERADO COURT
PRIMROSE COURT
CEDAR RIDGE COURT
CULV000301
CULV000298
OAK LEAF COURT
CEDAR RIDGE DRIVE
OSPREY COURT N
CULV000309
CULV000054
CULV000055
OSPREY COURT S
CULV000051
CULV000052
CULV000053
WILD ROSE COURT
EAGLE CREST LOOP
RAPTOR COURT
CULV000428
CULV000429
CULV000430
CULV000427
TANNER PARKWAY
CULV000092
CULV000303
CULV000304
CULV000436
CULV000080
CULV000081
CULV000431
CULV000093
CULV000315
CULV000432
EAGLE CREST DRIVE
CULV000422
CULV000316
CULV000421
CULV000317
CULV000339
CULV000340
CULV000341
CULV000426
CULV000420
CULV000419
CULV000418
CULV000425
CULV000424
CULV000423
FOX RUN
CULV000343
CULV000342
EVELYN DRIVE
EAGLE DRIVE N
EAGLE DRIVE E
CULV000435
CEDAR RIDGE DRIVE
PIKE VIEW DRIVE
CULV000474
CULV000475
STORM RIDGE
CULV000119
CULV000583
EAGLE DRIVE S
GREENHORN DRIVE
CULV000433
CULV000582
CULV000441
STORM COURT
CULV000434
EVELYN DRIVE
Conceptual Diversion Channel
600
Feet

ICON ENGINEERING, INC.

Dawson Ranch Culvert Drainage Analysis

Figure 13: Change in 100-year Maximum Depth Diversion Mitigation Opportunity vs. Existing Conditions

Dawson Ranch

CITY of CAÑON CITY COLORADO

Dawson Ranch Culvert Analysis

Table 1: Existing Conditions Culvert and Weir Discharge Summary

								10-Year Discharge (cfs)				100-Year Discharge (cfs)			
	Culvert ID	Owner	Type	Length	Invert In	Invert Out	Slope	Culvert	Weir	Spread	Vol (ac-ft)	Culvert	Weir	Spread	Vol (ac-ft)
1	CULV000051	Cañon City Stormwater Program	CMP-30"	89.7 ft	5886.22 ft	5882.15 ft	4.5 %	21	58	-5	31	22	125	59	55
2	CULV000052	Cañon City Stormwater Program	CMP-30"	88.8 ft	5886.21 ft	5882.62 ft	4.04 %	21	--	--	--	22	--	--	--
3	CULV000053	Cañon City Stormwater Program	CMP-30"	89.3 ft	5886.46 ft	5882.45 ft	4.5 %	21	--	--	--	22	--	--	--
4	CULV000054	Cañon City Stormwater Program	CMP-30"	109.54 ft	5828.14 ft	5820.49 ft	7 %	28	111	65	37	28	202	146	67
5	CULV000055	Cañon City Stormwater Program	CMP-30"	108.8 ft	5829.41 ft	5820.82 ft	7.9 %	18	--	--	--	28	--	--	--
6	CULV000078	Private	CMP-18"	96 ft	5593.22 ft	5588 ft	5.4 %	6	0	-26	7	6	0	-6	12
7	CULV000079	Private	CMP-32"	101 ft	5591.67 ft	5586.19 ft	5.4 %	20	--	--	--	23	--	--	--
8	CULV000080	Cañon City	CMP-36"	99.24 ft	5757.09 ft	5752.86 ft	4.25 %	39	0	-79	27	41	237	152	52
9	CULV000081	Cañon City	CMP-36"	99 ft	5756.98 ft	5752.4 ft	4.6 %	40	--	--	--	42	--	--	--
10	CULV000092	Cañon City Stormwater Program	CMP-30"	80 ft	5865.51 ft	5862.54 ft	3.7 %	15	2	-13	2	21	13	-8	4
11	CULV000093	Cañon City Stormwater Program	CMP-30"	72.5 ft	5870.31 ft	5868.46 ft	2.5 %	6	0	-6	1	15	0	-15	1
12	CULV000119	Cañon City Stormwater Program	CMP-18"	90 ft	5983.27 ft	5976.83 ft	7.2 %	0	5	5	0.5	0	119	119	1
13	CULV000277	Cañon City Stormwater Program	CMP-36"	85.2 ft	5589.42 ft	5587.59 ft	2.2 %	34	40	6	29	34	82	48	52
14	CULV000279	Cañon City Stormwater Program	CMP-36"	89.8 ft	5592.47 ft	5590.24 ft	2.5 %	31	146	115	39	31	402	371	88
15	CULV000280	Cañon City Stormwater Program	CMP-24"	80.9 ft	5573.08 ft	5571.47 ft	2 %	13	125	112	40	13	362	349	91
16	CULV000281	Cañon City Stormwater Program	CMP-24"	85.8 ft	5611.72 ft	5608.13 ft	4.2 %	13	59	46	12	13	93	80	20
17	CULV000282	Cañon City Stormwater Program	CMP-24"	84.7 ft	5623.54 ft	5622.49 ft	1.2 %	8	56	48	18	9	108	99	45
18	CULV000283	Cañon City Stormwater Program	CMP-24"	97.5 ft	5649.25 ft	5646.66 ft	2.7 %	8	0	-8	7	9	0	-9	10
19	CULV000284	Cañon City Stormwater Program	CMP-36"	192.2 ft	5670.42 ft	5661.35 ft	4.7 %	29	0	-29	17	38	0	-38	33
20	CULV000292	Cañon City Stormwater Program	CMP-36"	101.2 ft	5649.8 ft	5645.58 ft	4.2 %	36	0	-36	13	37	71	34	27
21	CULV000293	Canon City	CMP-24"	167.2	5682.31 ft	5677.53	2.9 %	10	0	-10	1	11	0	-11	2
22	CULV000295	Cañon City	CMP-24"	54.8 ft	5700.4 ft	5698.65 ft	3.2 %	0	0	0	0	0	0	0	0
23	CULV000298	Cañon City	CMP-18"	61.4 ft	5832.04 ft	5830.03 ft	3.3 %	2	0	-2	0.5	3	0	-3	0.5
24	CULV000300	Cañon City Stormwater Program	CMP-36"	86.9 ft	5693.38 ft	5688.2 ft	6 %	38	60	22	15	40	144	104	25
25	CULV000301	Cañon City	CMP-18"	55.7 ft	5763.33 ft	5762.33 ft	1.8 %	3	2	-1	2	3	9	6	4
26	CULV000303	Cañon City	CMP-24"	84.7 ft	5830.45 ft	5830.12 ft	0.4 %	11	72	61	10	12	231	219	27
27	CULV000304	Cañon City	CMP-24"	59.8 ft	5826.25 ft	5825.02 ft	2.1 %	7	38	31	6	7	83	76	13
28	CULV000305	Cañon City	CMP-24"	82.6 ft	5734 ft	5730.64 ft	4.1 %	9	6	-3	3	9	21	12	8
29	CULV000309	Cañon City Stormwater Program	CMP-30"	160.4 ft	5832.19 ft	5823.99 ft	5.1 %	23	0	-23	5	27	2	-25	9
30	CULV000315	Cañon City Stormwater Program	CMP-24"	74.9 ft	5863.78 ft	5862.12 ft	2.2 %	10	67	57	8	12	215	203	21
31	CULV000316	Cañon City	CMP-18"	61.5 ft	5866.92 ft	5864.86 ft	3.2 %	4	0	-4	0.5	5	0	-5	1
32	CULV000317	Cañon City	CMP-18"	81.3 ft	5868.53 ft	5865.4 ft	3.9 %	4	22	18	2	4	39	35	4
33	CULV000339	Cañon City Stormwater Program	CMP-30"	72.5 ft	5870.06 ft	5867.54 ft	3.5 %	18	10	-8	5	18	35	17	10
34	CULV000340	Cañon City Stormwater Program	CMP-24"	120.8 ft	5851.08 ft	5844.98 ft	5 %	12	0.5	-11.5	3	13	27	14	6
35	CULV000341	Cañon City	CMP-24 x 35	65 ft	5847.87 ft	5843.9 ft	6.1 %	5	0	-5	1	10	0	-10	1
36	CULV000342	Cañon City	CMP-24"	61 ft	5891.47 ft	5888.25 ft	5.3 %	6	0.5	-5.5	0.5	7	6	-1	1
37	CULV000343	Cañon City Stormwater Program	CMP-24"	135.2 ft	5895.37 ft	5884.49 ft	8 %	14	13	-1	3	14	42	28	6
38	CULV000379	Cañon City Water District	CMP-30"	60 ft	5580.56 ft	5579.78 ft	1.3 %	11	0	-22	7	12	3	-21	12
39	CULV000380	Cañon City Stormwater Program	CMP-30"	60.1 ft	5580.41 ft	5579.77 ft	1 %	11	--	--	--	12	--	--	--
40	CULV000381	Cañon City Stormwater Program	CMP-36"	92.6 ft	5550.32 ft	5547.53 ft	3 %	29	0	-58	12	31	0	-62	22
41	CULV000382	Cañon City Stormwater Program	CMP-36"	92.8 ft	5549.89 ft	5547.45 ft	2.6 %	29	--	--	--	31	--	--	--
42	CULV000418	Cañon City Stormwater Program	CMP-18"	94 ft	5898.56 ft	5892.85 ft	6.1 %	6	25	19	5	6	62	56	10
43	CULV000419	Cañon City	CMP-18"	58.4 ft	5897.32 ft	5895.03 ft	3.9 %	4	31	27	3	5	53	48	6
44	CULV000420	Cañon City	CMP-18"	64.9 ft	5897.17 ft	5894.35 ft	4.3 %	5	8	3	1	5	22	17	3
45	CULV000421	Cañon City Stormwater Program	CMP-24"	94.6 ft	5898.42 ft	5891.44 ft	7.4 %	14	67	53	8	14	230	216	22
46	CULV000422	Cañon City	CMP-18"	99 ft	5900.53 ft	5897.32 ft	3.2 %	5	0	-5	1	5	7	2	2
47	CULV000423	Cañon City Stormwater Program	CMP-24"	93.7 ft	5931.4 ft	5925.93 ft	5.8 %	11	0	-11	3	12	1	-11	5
48	CULV000424	Cañon City	CMP-18"	58.9 ft	5931.17 ft	5928.16 ft	5.1 %	5	24	19	2	5	40	35	4
49	CULV000425	Cañon City	CMP-18"	65.5 ft	5933.35 ft	5929.24 ft	6.3 %	2	0.5	-1.5	0.5	2	4	2	1
50	CULV000426	Cañon City Stormwater Program	CMP-24"	83 ft	5936.45 ft	5932.7 ft	4.5 %	11	23	12	4	12	98	86	10
51	CULV000427	Cañon City	HDPE-18"	59.9 ft	5909.45 ft	5907.96 ft	2.5 %	3	0	-3	0.5	3	0	-3	1
52	CULV000428	Cañon City	HDPE-24"	48.4 ft	5909.6 ft	5908.19 ft	2.9 %	8	0	-8	1	9	10	1	2
53	CULV000429	Cañon City Stormwater Program	CMP-30"	52.9 ft	5908.45 ft	5905.58 ft	5.4 %	24	86	38	30	25	142	92	53
54	CULV000430	Cañon City Stormwater Program	CMP-30"	52.9 ft	5908.46 ft	5906.22 ft	4.2 %	24	--	--	--	25	--	--	--
55	CULV000431	Cañon City	CMP-24"	73.1 ft	5761.34 ft	5760.09 ft	1.7 %	11	42	31	8	9	80	71	14
56	CULV000432	Cañon City	CMP-24"	69 ft	5771.41 ft	5770.11 ft	1.9 %	7	68	61	4	7	111	104	7
57	CULV000433	Cañon City Stormwater Program	CMP-24"	73 ft	5988.07 ft	5984.2 ft	5.3 %	3	0	-3	5	4	0	-4	1
58	CULV000434	Cañon City	CMP-18"	97 ft	6034.56 ft	6027.05 ft	7.7 %	7	0	-7	1	7	0	-7	2
59	CULV000435	Cañon City Stormwater Program	CMP-24"	95 ft	5981.12 ft	5974.84 ft	6.6 %	10	0.5	-9.5	1	11	13	2	2
60	CULV000436	Cañon City	CMP-15"	54.4 ft	5785.78 ft	5783.63 ft	3.9 %	1	0	-1	0.5	2	8	6	1
61	CULV000439	Private	HDPE-30"	80.2 ft	5741.79 ft	5738.29 ft	4.4 %	0	0	-18	15	27	35	27	42
62	CULV000440	Private	CMP-24"	194.4 ft	5710.03 ft	5704.67 ft	2.8 %	18	--	--	--	19	--	--	--
63	CULV000441	Private	CMP-24"	100.3 ft	5915.56 ft	5914.12 ft	1.4 %	12	0	-12	8	15	0	-15	13
64	CULV000474	Private	CMP-30"	20.1 ft	6013.89 ft	6013.23 ft	3.3 %	19	166	128	31	21	220	178	58
65	CULV000475	Private	CMP-30"	20 ft	6013.99 ft	6013.19 ft	4 %	19	--	--	--	21	--	--	--
66	CULV000582	Cañon City Stormwater Program	HDPE-24"	22.2 ft	5933.74 ft	5932.29 ft	6.5 %	0.5	0	-0.5	0	1	0	-1	0
67	CULV000583	Cañon City	CMP-29 x 42	20.4 ft	5906.85 ft	5906.39 ft	2.2 %	0	0	0	0	0	0	0	0
68	CULV000275	Cañon City Stormwater Program	CMP-30"	72.6 ft	5549.14 ft	5548.15 ft	1.4 %	25	194	119	54	26	634	556	69
69	CULV000598	Cañon City Stormwater Program	CMP-36"	73.2 ft	5549.11 ft	5548.17 ft	1.3 %	25	--	--	--	26	--	--	--
70	CULV000599	Cañon City Stormwater Program	CMP-36"	72.9 ft	5549.11 ft	5548.1 ft	1.4 %	25	--	--	--	26	--	--	--

Dawson Ranch Culvert Analysis

Table 2: Culvert Improvement Prioritization (by ID)

	Culvert ID	Grouping	10-Year Discharge (cfs)			100-Year Discharge (cfs)			Spread Value 100-YR Weight = x3	Spread Value 10-YR Weight = x3	Protect Public Safety / Critical Facilities Weight = x2	Protect Residential Structures Weight = x2	Reduce Storm Response Costs Weight = x2	Known Public Complaints / Issues Weight = x3	Reduce Regulatory Floodplain Weight = x1	Total Score	Improvement Prioritization Rank
			Culvert	Weir	Spread	Culvert	Weir	Spread									
1	CULV000051	3	21	58	-5	22	125	59	1	0	1	0	0	0	0	5	**35**
2	CULV000054	2	28	111	65	28	202	146	2	3	1	0	3	0	0	23	**9**
3	CULV000080	2	39	0	-79	41	237	152	2	0	3	0	3	0	3	21	**11**
4	CULV000119	1	0	5	5	0	119	119	2	1	1	2	0	3	0	24	**8**
5	CULV000275	3	25	194	119	26	634	556	3	3	3	0	0	0	3	27	**5**
6	CULV000277	1	34	40	6	34	82	48	1	1	2	2	0	0	0	14	**21**
7	CULV000279	1	31	146	115	31	402	371	3	3	2	2	0	0	3	29	**3**
8	CULV000280	1	13	125	112	13	362	349	3	3	2	0	3	0	3	31	**1**
9	CULV000281	1	13	59	46	13	93	80	1	2	2	2	0	0	0	17	**16**
10	CULV000282	1	8	56	48	9	108	99	1	2	2	0	0	0	0	13	**24**
11	CULV000292	1	36	0	-36	37	71	34	1	0	1	0	0	0	0	5	**36**
12	CULV000300	1	38	60	22	40	144	104	2	1	1	1	3	0	0	19	**14**
13	CULV000301	1	3	2	-1	3	9	6	1	0	1	0	0	0	0	5	**41**
14	CULV000303	1	11	72	61	12	231	219	3	3	3	1	0	0	0	26	**6**
15	CULV000304	1	7	38	31	7	83	76	1	2	1	0	3	0	0	17	**17**
16	CULV000305	1	9	6	-3	9	21	12	1	0	2	0	0	0	0	7	**33**
17	CULV000315	1	10	67	57	12	215	203	3	3	1	0	0	0	0	20	**12**
18	CULV000317	1	4	22	18	4	39	35	1	1	1	0	3	0	0	14	**22**
19	CULV000339	1	18	10	-8	18	35	17	1	0	1	0	0	0	0	5	**38**
20	CULV000340	1	12	0.5	-11.5	13	61	14	1	0	1	0	0	0	0	5	**39**
21	CULV000343	1	14	13	-1	14	42	28	1	0	1	0	3	0	0	11	**26**
22	CULV000418	1	6	25	19	6	62	56	1	1	1	0	3	0	0	14	**20**
23	CULV000419	1	4	31	27	5	53	48	1	2	1	1	3	0	0	19	**15**
24	CULV000420	1	5	8	3	5	22	17	1	1	1	0	3	0	0	14	**23**
25	CULV000421	1	14	67	53	14	230	216	3	3	1	1	0	0	0	22	**10**
26	CULV000422	1	5	0	-5	5	7	2	1	0	1	1	0	0	0	7	**34**
27	CULV000424	1	5	24	19	5	40	35	1	1	1	0	0	0	0	8	**28**
28	CULV000425	1	2	0.5	-1.5	2	4	2	1	0	1	0	0	0	0	5	**43**
29	CULV000426	1	11	23	12	12	98	86	1	1	1	1	3	0	0	16	**19**
30	CULV000428	1	8	0	-8	9	10	1	1	0	3	0	0	0	0	9	**27**
31	CULV000429	2	24	86	38	25	142	92	1	2	3	0	3	3	0	30	**2**
32	CULV000431	1	11	42	31	9	80	71	1	2	1	0	0	3	0	20	**13**
33	CULV000432	1	7	68	61	7	111	104	2	3	1	0	0	3	3	29	**4**
34	CULV000435	1	10	0.5	-9.5	11	13	2	1	0	1	0	0	0	0	5	**42**
35	CULV000436	1	1	0	-1	2	8	6	1	0	1	0	0	0	0	5	**40**
36	CULV000439	2	0	0	-18	27	35	27	1	0	1	0	0	0	0	5	**37**
37	CULV000474	2	19	166	128	21	220	178	2	3	0	1	0	3	0	26	**7**
38	CULV000700	1	n/a	26	26	n/a	48	48	1	2	3	1	0	0	0	17	**18**
39	CULV000701	1	n/a	21	21	n/a	41	41	1	1	1	2	0	0	0	12	**25**
40	CULV000702	1	n/a	19	19	n/a	25	25	1	1	1	0	0	0	0	8	**29**
41	CULV000703	1	n/a	7	7	n/a	13	13	1	1	1	0	0	0	0	8	**32**
42	CULV000704	1	n/a	15	15	n/a	22	22	1	1	1	0	0	0	0	8	**30**
43	CULV000705	1	n/a	17	17	n/a	21	21	1	1	1	0	0	0	0	8	**31**

Dawson Ranch Culvert Analysis

Table 2: Culvert Improvement Prioritization (by rank)

	Culvert ID	Grouping	10-Year Discharge (cfs)			100-Year Discharge (cfs)			Spread Value 100-YR Weight = x3	Spread Value 10-YR Weight = x3	Protect Public Safety / Critical Facilities Weight = x2	Protect Residential Structures Weight = x2	Reduce Storm Response Costs Weight = x2	Known Public Complaints / Issues Weight = x3	Reduce Regulatory Floodplain Weight = x1	Total Score	Improvement Prioritization Rank
			Culvert	Weir	Spread	Culvert	Weir	Spread									
8	CULV000280	1	13	125	112	13	362	349	3	3	2	0	3	0	3	31	**1**
31	CULV000429	2	24	86	38	25	142	92	1	2	3	0	3	3	0	30	**2**
7	CULV000279	1	31	146	115	31	402	371	3	3	2	2	0	0	3	29	**3**
33	CULV000432	1	7	68	61	7	111	104	2	3	1	0	0	3	3	29	**4**
5	CULV000275	3	25	194	119	26	634	556	3	3	3	0	0	0	3	27	**5**
14	CULV000303	1	11	72	61	12	231	219	3	3	3	1	0	0	0	26	**6**
37	CULV000474	2	19	166	128	21	220	178	2	3	0	1	0	3	0	26	**7**
4	CULV000119	1	0	5	5	0	119	119	2	1	1	2	0	3	0	24	**8**
2	CULV000054	2	28	111	65	28	202	146	2	3	1	0	3	0	0	23	**9**
25	CULV000421	1	14	67	53	14	230	216	3	3	1	1	0	0	0	22	**10**
3	CULV000080	2	39	0	-79	41	237	152	2	0	3	0	3	0	3	21	**11**
17	CULV000315	1	10	67	57	12	215	203	3	3	1	0	0	0	0	20	**12**
32	CULV000431	1	11	42	31	9	80	71	1	2	1	0	0	3	0	20	**13**
12	CULV000300	1	38	60	22	40	144	104	2	1	1	1	3	0	0	19	**14**
23	CULV000419	1	4	31	27	5	53	48	1	2	1	1	3	0	0	19	**15**
9	CULV000281	1	13	59	46	13	93	80	1	2	2	2	0	0	0	17	**16**
15	CULV000304	1	7	38	31	7	83	76	1	2	1	0	3	0	0	17	**17**
38	CULV000700	1	n/a	26	26	n/a	48	48	1	2	3	1	0	0	0	17	**18**
29	CULV000426	1	11	23	12	12	98	86	1	1	1	1	3	0	0	16	**19**
22	CULV000418	1	6	25	19	6	62	56	1	1	1	0	3	0	0	14	**20**
6	CULV000277	1	34	40	6	34	82	48	1	1	2	2	0	0	0	14	**21**
18	CULV000317	1	4	22	18	4	39	35	1	1	1	0	3	0	0	14	**22**
24	CULV000420	1	5	8	3	5	22	17	1	1	1	0	3	0	0	14	**23**
10	CULV000282	1	8	56	48	9	108	99	1	2	2	0	0	0	0	13	**24**
39	CULV000701	1	n/a	21	21	n/a	41	41	1	1	1	2	0	0	0	12	**25**
21	CULV000343	1	14	13	-1	14	42	28	1	0	1	0	3	0	0	11	**26**
30	CULV000428	1	8	0	-8	9	10	1	1	0	3	0	0	0	0	9	**27**
27	CULV000424	1	5	24	19	5	40	35	1	1	1	0	0	0	0	8	**28**
40	CULV000702	1	n/a	19	19	n/a	25	25	1	1	1	0	0	0	0	8	**29**
42	CULV000704	1	n/a	15	15	n/a	22	22	1	1	1	0	0	0	0	8	**30**
43	CULV000705	1	n/a	17	17	n/a	21	21	1	1	1	0	0	0	0	8	**31**
41	CULV000703	1	n/a	7	7	n/a	13	13	1	1	1	0	0	0	0	8	**32**
16	CULV000305	1	9	6	-3	9	21	12	1	0	2	0	0	0	0	7	**33**
26	CULV000422	1	5	0	-5	5	7	2	1	0	1	1	0	0	0	7	**34**
1	CULV000051	3	21	58	-5	22	125	59	1	0	1	0	0	0	0	5	**35**
11	CULV000292	1	36	0	-36	37	71	34	1	0	1	0	0	0	0	5	**36**
36	CULV000439	2	0	0	-18	27	35	27	1	0	1	0	0	0	0	5	**37**
19	CULV000339	1	18	10	-8	18	35	17	1	0	1	0	0	0	0	5	**38**
20	CULV000340	1	12	0.5	-11.5	13	61	14	1	0	1	0	0	0	0	5	**39**
35	CULV000436	1	1	0	-1	2	8	6	1	0	1	0	0	0	0	5	**40**
13	CULV000301	1	3	2	-1	3	9	6	1	0	1	0	0	0	0	5	**41**
34	CULV000435	1	10	0.5	-9.5	11	13	2	1	0	1	0	0	0	0	5	**42**
28	CULV000425	1	2	0.5	-1.5	2	4	2	1	0	1	0	0	0	0	5	**43**

Dawson Ranch Culvert Analysis

Table 3: Culvert Improvement Summary (by ID)

	Culvert ID	Grouping	Owner	Existing Culvert Conditions: Type	Length	Invert In	Invert Out	Slope	Improvement Prioritization Rank	Recommended Culvert Improvement
1	CULV000051	3	Cañon City Stormwater Program	CMP-30"	89.7 ft	5886.22 ft	5882.15 ft	4.5 %	35	box culvert: 4'Wx4'H = 388 cfs @ 4.5%
2	CULV000054	2	Cañon City Stormwater Program	CMP-30"	109.54 ft	5828.14 ft	5820.49 ft	7 %	9	box culvert: 4'Wx4'H = 484 cfs @ 7%
3	CULV000080	2	Cañon City	CMP-36"	99.24 ft	5757.09 ft	5752.86 ft	4.25 %	11	6 additional 36" CMPs or box culvert 4'Wx4'H = 377 cfs
4	CULV000119	1	Cañon City Stormwater Program	CMP-18"	90 ft	5983.27 ft	5976.83 ft	7.2 %	8	44 cfs additional capacity (head/clearance issues)
5	CULV000275	3	Cañon City Stormwater Program	CMP-30"	72.6 ft	5549.14 ft	5548.15 ft	1.4 %	5	box culvert: 10'Wx6'H = 1234 cfs @ 1.4%
6	CULV000277	1	Cañon City Stormwater Program	CMP-36"	85.2 ft	5589.42 ft	5587.59 ft	2.2 %	21	box culvert: 4'Wx4'H = 271 cfs @ 2.2%
7	CULV000279	1	Cañon City Stormwater Program	CMP-36"	89.8 ft	5592.47 ft	5590.24 ft	2.5 %	3	box culvert: 8'Wx4'H = 701 cfs @ 2.5%
8	CULV000280	1	Cañon City Stormwater Program	CMP-24"	80.9 ft	5573.08 ft	5571.47 ft	2 %	1	box culvert: 8'Wx6'H = 1111 cfs @ 2.0%
9	CULV000281	1	Cañon City Stormwater Program	CMP-24"	85.8 ft	5611.72 ft	5608.13 ft	4.2 %	16	box culvert: 4'Wx4'H = 375 cfs @ 4.2%
10	CULV000282	1	Cañon City Stormwater Program	CMP-24"	84.7 ft	5623.54 ft	5622.49 ft	1.2 %	24	box culvert: 4'Wx4'H = 200 cfs @ 1.2%
11	CULV000292	1	Cañon City Stormwater Program	CMP-36"	101.2 ft	5649.8 ft	5645.58 ft	4.2 %	36	2 additional 36" CMPs
12	CULV000300	1	Cañon City Stormwater Program	CMP-36"	86.9 ft	5693.38 ft	5688.2 ft	6 %	14	box culvert: 4'Wx4'H = 448 cfs @ 6%
13	CULV000301	1	Cañon City	CMP-18"	55.7 ft	5763.33 ft	5762.33 ft	1.8 %	41	1 additional 18" CMP
14	CULV000303	1	Cañon City	CMP-24"	84.7 ft	5830.45 ft	5830.12 ft	0.4 %	6	box culvert: 8'Wx4'H = 280 cfs @ 0.4%
15	CULV000304	1	Cañon City	CMP-24"	59.8 ft	5826.25 ft	5825.02 ft	2.1 %	17	box culvert: 4'Wx2'H = 101 cfs @ 2.1%; invert lowered 1 foot
16	CULV000305	1	Cañon City	CMP-24"	82.6 ft	5734 ft	5730.64 ft	4.1 %	33	Single 48" CMP at lowered invert
17	CULV000315	1	Cañon City Stormwater Program	CMP-24"	74.9 ft	5863.78 ft	5862.12 ft	2.2 %	12	box culvert: 4'Wx4'H = 271 cfs @ 2.2%
18	CULV000317	1	Cañon City	CMP-18"	81.3 ft	5868.53 ft	5865.4 ft	3.9 %	22	Single 42" CMP = 54 cfs @ 3.9% (includes 50% block)
19	CULV000339	1	Cañon City Stormwater Program	CMP-30"	72.5 ft	5870.06 ft	5867.54 ft	3.5 %	38	box culvert: 4'Wx2'H = 131 cfs @ 3.5%
20	CULV000340	1	Cañon City Stormwater Program	CMP-24"	120.8 ft	5851.08 ft	5844.98 ft	5 %	39	Single 48" CMP = 87 cfs @ 5.0% (includes 50% block)
21	CULV000343	1	Cañon City Stormwater Program	CMP-24"	135.2 ft	5895.37 ft	5884.49 ft	8 %	26	4 additional 24" CMPs
22	CULV000418	1	Cañon City Stormwater Program	CMP-18"	94 ft	5898.56 ft	5892.85 ft	6.1 %	20	Double 48" CMP = 192 cfs @ 6.1% (includes 50% block)
23	CULV000419	1	Cañon City	CMP-18"	58.4 ft	5897.32 ft	5895.03 ft	3.9 %	15	Double 36" CMP = 71 cfs @ 3.9% (includes 50% block)
24	CULV000420	1	Cañon City	CMP-18"	64.9 ft	5897.17 ft	5894.35 ft	4.3 %	23	4 additional 18" CMPs
25	CULV000421	1	Cañon City Stormwater Program	CMP-24"	94.6 ft	5898.42 ft	5891.44 ft	7.4 %	10	box culvert: 4'Wx4'H = 497 cfs @ 7.4%
26	CULV000422	1	Cañon City	CMP-18"	99 ft	5900.53 ft	5897.32 ft	3.2 %	34	2 additional 18" CMPs
27	CULV000424	1	Cañon City	CMP-18"	58.9 ft	5931.17 ft	5928.16 ft	5.1 %	28	3 additional 18" CMPs
28	CULV000425	1	Cañon City	CMP-18"	65.5 ft	5933.35 ft	5929.24 ft	6.3 %	43	1 additional 18" CMP
29	CULV000426	1	Cañon City Stormwater Program	CMP-24"	83 ft	5936.45 ft	5932.7 ft	4.5 %	19	box culvert: 4'Wx4'H = 387 cfs @ 4.5%
30	CULV000428	1	Cañon City	HDPE-24"	48.4 ft	5909.6 ft	5908.19 ft	2.9 %	27	2 additional 24" HDPEs
31	CULV000429	2	Cañon City Stormwater Program	CMP-30"	52.9 ft	5908.45 ft	5905.58 ft	5.4 %	2	box culvert: 4'Wx4'H = 425 cfs @ 5.4%
32	CULV000431	1	Cañon City	CMP-24"	73.1 ft	5761.34 ft	5760.09 ft	1.7 %	13	box culvert: 4'Wx2'H = 91 cfs @ 1.7%
33	CULV000432	1	Cañon City	CMP-24"	69 ft	5771.41 ft	5770.11 ft	1.9 %	4	box culvert: 4'Wx4'H = 252 cfs @ 1.9%
34	CULV000435	1	Cañon City Stormwater Program	CMP-24"	95 ft	5981.12 ft	5974.84 ft	6.6 %	42	3 additional 24" CMPs
35	CULV000436	1	Cañon City	CMP-15"	54.4 ft	5785.78 ft	5783.63 ft	3.9 %	40	2 additional 15" CMPs
36	CULV000439	2	Private	HDPE-30"	80.2 ft	5741.79 ft	5738.29 ft	4.4 %	37	no culvert improvement - detention facility
37	CULV000474	2	Private	CMP-30"	20.1 ft	6013.89 ft	6013.23 ft	3.3 %	7	box culvert: 6'Wx4'H = 562 cfs @ 3.3%
38	CULV000700	1	n/a	n/a	n/a	n/a	n/a	n/a	18	42" CMP at ~4% slope
39	CULV000701	1	n/a	n/a	n/a	n/a	n/a	n/a	25	41 cfs capacity fit to field conditions at final design
40	CULV000702	1	n/a	n/a	n/a	n/a	n/a	n/a	29	Double 36" CMP at ~1.7%
41	CULV000703	1	n/a	n/a	n/a	n/a	n/a	n/a	32	Single 36" CMP at ~5.8%
42	CULV000704	1	n/a	n/a	n/a	n/a	n/a	n/a	30	Single 36" CMP at ~6.1%
43	CULV000705	1	n/a	n/a	n/a	n/a	n/a	n/a	31	Double 36" CMP at ~3.3%

Dawson Ranch Culvert Analysis

Table 3: Culvert Improvement Summary (by rank)

	Existing Culvert Conditions									
	Culvert ID	Grouping	Owner	Type	Length	Invert In	Invert Out	Slope	Improvement Prioritization Rank	Recommended Culvert Improvement
8	CULV000280	1	Cañon City Stormwater Program	CMP-24"	80.9 ft	5573.08 ft	5571.47 ft	2 %	1	box culvert: 8'Wx6'H = 1111 cfs @ 2.0%
31	CULV000429	2	Cañon City Stormwater Program	CMP-30"	52.9 ft	5908.45 ft	5905.58 ft	5.4 %	2	box culvert: 4'Wx4'H = 425 cfs @ 5.4%
7	CULV000279	1	Cañon City Stormwater Program	CMP-36"	89.8 ft	5592.47 ft	5590.24 ft	2.5 %	3	box culvert: 8'Wx4'H = 701 cfs @ 2.5%
33	CULV000432	1	Cañon City	CMP-24"	69 ft	5771.41 ft	5770.11 ft	1.9 %	4	box culvert: 4'Wx4'H = 252 cfs @ 1.9%
5	CULV000275	3	Cañon City Stormwater Program	CMP-30"	72.6 ft	5549.14 ft	5548.15 ft	1.4 %	5	box culvert: 10'Wx6'H = 1234 cfs @ 1.4%
14	CULV000303	1	Cañon City	CMP-24"	84.7 ft	5830.45 ft	5830.12 ft	0.4 %	6	box culvert: 8'Wx4'H = 280 cfs @ 0.4%
37	CULV000474	2	Private	CMP-30"	20.1 ft	6013.89 ft	6013.23 ft	3.3 %	7	box culvert: 6'Wx4'H = 562 cfs @ 3.3%
4	CULV000119	1	Cañon City Stormwater Program	CMP-18"	90 ft	5983.27 ft	5976.83 ft	7.2 %	8	44 cfs additional capacity (head/clearance issues)
2	CULV000054	2	Cañon City Stormwater Program	CMP-30"	109.54 ft	5828.14 ft	5820.49 ft	7 %	9	box culvert: 4'Wx4'H = 484 cfs @ 7%
25	CULV000421	1	Cañon City Stormwater Program	CMP-24"	94.6 ft	5898.42 ft	5891.44 ft	7.4 %	10	box culvert: 4'Wx4'H = 497 cfs @ 7.4%
3	CULV000080	2	Cañon City	CMP-36"	99.24 ft	5757.09 ft	5752.86 ft	4.25 %	11	6 additional 36" CMPs or box culvert 4'Wx4'H = 377 cfs
17	CULV000315	1	Cañon City Stormwater Program	CMP-24"	74.9 ft	5863.78 ft	5862.12 ft	2.2 %	12	box culvert: 4'Wx4'H = 271 cfs @ 2.2%
32	CULV000431	1	Cañon City	CMP-24"	73.1 ft	5761.34 ft	5760.09 ft	1.7 %	13	box culvert: 4'Wx2'H = 91 cfs @ 1.7%
12	CULV000300	1	Cañon City Stormwater Program	CMP-36"	86.9 ft	5693.38 ft	5688.2 ft	6 %	14	box culvert: 4'Wx4'H = 448 cfs @ 6%
23	CULV000419	1	Cañon City	CMP-18"	58.4 ft	5897.32 ft	5895.03 ft	3.9 %	15	Double 36" CMP = 71 cfs @ 3.9% (includes 50% block)
9	CULV000281	1	Cañon City Stormwater Program	CMP-24"	85.8 ft	5611.72 ft	5608.13 ft	4.2 %	16	box culvert: 4'Wx4'H = 375 cfs @ 4.2%
15	CULV000304	1	Cañon City	CMP-24"	59.8 ft	5826.25 ft	5825.02 ft	2.1 %	17	box culvert: 4'Wx2'H = 101 cfs @ 2.1%; invert lowered 1 foot
38	CULV000700	1	n/a	n/a	n/a	n/a	n/a	n/a	18	42" CMP at ~4% slope
29	CULV000426	1	Cañon City Stormwater Program	CMP-24"	83 ft	5936.45 ft	5932.7 ft	4.5 %	19	box culvert: 4'Wx4'H = 387 cfs @ 4.5%
22	CULV000418	1	Cañon City Stormwater Program	CMP-18"	94 ft	5898.56 ft	5892.85 ft	6.1 %	20	Double 48" CMP = 192 cfs @ 6.1% (includes 50% block)
6	CULV000277	1	Cañon City Stormwater Program	CMP-36"	85.2 ft	5589.42 ft	5587.59 ft	2.2 %	21	box culvert: 4'Wx4'H = 271 cfs @ 2.2%
18	CULV000317	1	Cañon City	CMP-18"	81.3 ft	5868.53 ft	5865.4 ft	3.9 %	22	Single 42" CMP = 54 cfs @ 3.9% (includes 50% block)
24	CULV000420	1	Cañon City	CMP-18"	64.9 ft	5897.17 ft	5894.35 ft	4.3 %	23	4 additional 18" CMPs
10	CULV000282	1	Cañon City Stormwater Program	CMP-24"	84.7 ft	5623.54 ft	5622.49 ft	1.2 %	24	box culvert: 4'Wx4'H = 200 cfs @ 1.2%
39	CULV000701	1	n/a	n/a	n/a	n/a	n/a	n/a	25	41 cfs capacity fit to field conditions at final design
21	CULV000343	1	Cañon City Stormwater Program	CMP-24"	135.2 ft	5895.37 ft	5884.49 ft	8 %	26	4 additional 24" CMPs
30	CULV000428	1	Cañon City	HDPE-24"	48.4 ft	5909.6 ft	5908.19 ft	2.9 %	27	2 additional 24" HDPEs
27	CULV000424	1	Cañon City	CMP-18"	58.9 ft	5931.17 ft	5928.16 ft	5.1 %	28	3 additional 18" CMPs
40	CULV000702	1	n/a	n/a	n/a	n/a	n/a	n/a	29	Double 36" CMP at ~1.7%
42	CULV000704	1	n/a	n/a	n/a	n/a	n/a	n/a	30	Single 36" CMP at ~6.1%
43	CULV000705	1	n/a	n/a	n/a	n/a	n/a	n/a	31	Double 36" CMP at ~3.3%
41	CULV000703	1	n/a	n/a	n/a	n/a	n/a	n/a	32	Single 36" CMP at ~5.8%
16	CULV000305	1	Cañon City	CMP-24"	82.6 ft	5734 ft	5730.64 ft	4.1 %	33	Single 48" CMP at lowered invert
26	CULV000422	1	Cañon City	CMP-18"	99 ft	5900.53 ft	5897.32 ft	3.2 %	34	2 additional 18" CMPs
1	CULV000051	3	Cañon City Stormwater Program	CMP-30"	89.7 ft	5886.22 ft	5882.15 ft	4.5 %	35	box culvert: 4'Wx4'H = 388 cfs @ 4.5%
11	CULV000292	1	Cañon City Stormwater Program	CMP-36"	101.2 ft	5649.8 ft	5645.58 ft	4.2 %	36	2 additional 36" CMPs
36	CULV000439	2	Private	HDPE-30"	80.2 ft	5741.79 ft	5738.29 ft	4.4 %	37	no culvert improvement - detention facility
19	CULV000339	1	Cañon City Stormwater Program	CMP-30"	72.5 ft	5870.06 ft	5867.54 ft	3.5 %	38	box culvert: 4'Wx2'H = 131 cfs @ 3.5%
20	CULV000340	1	Cañon City Stormwater Program	CMP-24"	120.8 ft	5851.08 ft	5844.98 ft	5 %	39	Single 48" CMP = 87 cfs @ 5.0% (includes 50% block)
35	CULV000436	1	Cañon City	CMP-15"	54.4 ft	5785.78 ft	5783.63 ft	3.9 %	40	2 additional 15" CMPs
13	CULV000301	1	Cañon City	CMP-18"	55.7 ft	5763.33 ft	5762.33 ft	1.8 %	41	1 additional 18" CMP
34	CULV000435	1	Cañon City Stormwater Program	CMP-24"	95 ft	5981.12 ft	5974.84 ft	6.6 %	42	3 additional 24" CMPs
28	CULV000425	1	Cañon City	CMP-18"	65.5 ft	5933.35 ft	5929.24 ft	6.3 %	43	1 additional 18" CMP

Dawson Ranch Culvert Analysis

Table 4: Culvert Improvement Prioritization (HOA Alternative)

	Culvert ID	Street Near	Grouping	Spread Value 100-YR Weight = x3	Spread Value 10-YR Weight = x3	Protect Public Safety / Critical Facilities Weight = x2	Protect Residential Structures Weight = x2	Reduce Storm Response Costs Weight = x2	Known Public Complaints / Issues Weight = x3	Reduce Regulatory Floodplain Weight = x1	Total Score	Improvement Prioritization Rank	Design Notes	Cost Est.
8	CULV000280	Ptarmigan	1	3	3	2	0	3	3	3	40	**1**		$ 100,000.00
7	CULV000279	Ptarmigan	1	3	3	2	2	0	3	3	38	**2**		$ 100,000.00
14	CULV000303	Tanner	1	3	3	3	1	0	2	0	32	**3**		$ 100,000.00
12	CULV000300	Blue Grouse	1	2	1	1	3	3	3	0	32	**4**		$ 100,000.00
19	CULV000339	Eagle Crest Dr.	1	3	3	1	3	0	2	0	32	**5**	Same size as 418	$ 40,000.00
31	CULV000429	Tanner	2	1	2	3	0	3	3	0	30	**6**		$ 100,000.00
3	CULV000080	Greenhorn & Ta	2	2	0	3	0	3	3	3	30	**7**	Two more pipes	$ 50,000.00
	New	Eagle Crest Loop									29	**8**	Near Ashley Smith's Home, not included in culvert study	$ 30,000.00
33	CULV000432	Greenhorn & Ta	1	2	3	1	0	0	3	3	29	**9**		$ 100,000.00
22	CULV000418	Fox Run (Mitch)	1	1	1	1	3	3	3	0	29	**10**		$ 40,000.00
23	CULV000419	Cedar Ridge (Mit	1	1	2	1	1	3	3	0	28	**11**	Trench drain north side of Pike View and Cedar Ridge	$ 30,000.00
4	CULV000119	Cedar Ridge	1	2	2	1	2	0	3	0	27	**12**		$ 40,000.00
1	CULV000051	Eagle Crest L	3	3	3	1	0	0	2	0	26	**13**		
2	CULV000054	Eagle Crest L	2	2	3	1	0	3	0	0	23	**14**		
18	CULV000317	Eagle Crest Dr.	1	1	1	1	0	3	3	0	23	**15**		
25	CULV000421	Fox Run	1	3	3	1	1	0	0	0	22	**16**		
37	CULV000474	Storm Ridge	2	2	3	0	1	0	1	0	20	**17**		
17	CULV000315	Eagle Crest Dr	1	3	3	1	0	0	0	0	20	**18**		$ 830,000.00
6	CULV000277	Ptarmigan	1	1	1	2	2	0	2	0	20	**19**		
5	CULV000275	Mariposa	3	1	3	3	0	0	0	0	18	**20**		
38	CULV000700	Tanner	1	1	2	3	1	0	0	0	17	**21**		
32	CULV000431	Greenhorn & Ta	1	1	2	1	0	0	2	0	17	**22**		
9	CULV000281	Wild Rose	1	1	2	2	2	0	0	0	17	**23**		
15	CULV000304	Tanner	1	1	2	1	0	3	0	0	17	**24**		
29	CULV000426	Pike View	1	1	1	1	1	3	0	0	16	**25**		
24	CULV000420		1	1	1	1	0	3	0	0	14	**26**		
10	CULV000282		1	1	2	2	0	0	0	0	13	**27**		
39	CULV000701		1	1	1	1	2	0	0	0	12	**28**		
21	CULV000343		1	1	0	1	0	3	0	0	11	**29**		
30	CULV000428		1	1	0	3	0	0	0	0	9	**30**		
27	CULV000424		1	1	1	1	0	0	0	0	8	**31**		
40	CULV000702		1	1	1	1	0	0	0	0	8	**32**		
41	CULV000703		1	1	1	1	0	0	0	0	8	**33**		
42	CULV000704		1	1	1	1	0	0	0	0	8	**34**		
43	CULV000705		1	1	1	1	0	0	0	0	8	**35**		
16	CULV000305		1	1	0	2	0	0	0	0	7	**36**		
26	CULV000422		1	1	0	1	1	0	0	0	7	**37**		
11	CULV000292		1	1	0	1	0	0	0	0	5	**38**		
13	CULV000301		1	1	0	1	0	0	0	0	5	**39**		
20	CULV000340		1	1	0	1	0	0	0	0	5	**40**		
28	CULV000425		1	1	0	1	0	0	0	0	5	**41**		
34	CULV000435		1	1	0	1	0	0	0	0	5	**42**		
35	CULV000436		1	1	0	1	0	0	0	0	5	**43**		
36	CULV000439		2	1	0	1	0	0	0	0	5	**44**		

Dawson Ranch Culvert Analysis

Table 5: Culvert Improvement Summary (HOA Alternative)

	Culvert ID	Grouping	Owner	Existing Culvert Conditions: Type	Length	Invert In	Invert Out	Slope	Improvement Prioritization Rank	Recommended Culvert Improvement
8	CULV000280	1	Cañon City Stormwater Program	CMP-24"	80.9 ft	5573.08 ft	5571.47 ft	2 %	1	box culvert: 8'Wx6'H = 1111 cfs @ 2.0%
7	CULV000279	1	Cañon City Stormwater Program	CMP-36"	89.8 ft	5592.47 ft	5590.24 ft	2.5 %	2	box culvert: 8'Wx4'H = 701 cfs @ 2.5%
14	CULV000303	1	Cañon City	CMP-24"	84.7 ft	5830.45 ft	5830.12 ft	0.4 %	3	box culvert: 8'Wx4'H = 280 cfs @ 0.4%
12	CULV000300	1	Cañon City Stormwater Program	CMP-36"	86.9 ft	5693.38 ft	5688.2 ft	6 %	4	box culvert: 4'Wx4'H = 448 cfs @ 6%
19	CULV000339	1	Cañon City Stormwater Program	CMP-30"	72.5 ft	5870.06 ft	5867.54 ft	3.5 %	5	No box culvert: 4'Wx2'H = 131 cfs @ 3.5%, same as 418
31	CULV000429	2	Cañon City Stormwater Program	CMP-30"	52.9 ft	5908.45 ft	5905.58 ft	5.4 %	6	box culvert: 4'Wx4'H = 425 cfs @ 5.4%
3	CULV000080	2	Cañon City	CMP-36"	99.24 ft	5757.09 ft	5752.86 ft	4.25 %	7	2 additional 36" CMPs ~~or box culvert 4'Wx4'H = 377 cfs~~
	New								8	Culvert(s)
33	CULV000432	1	Cañon City	CMP-24"	69 ft	5771.41 ft	5770.11 ft	1.9 %	9	box culvert: 4'Wx4'H = 252 cfs @ 1.9%
22	CULV000418	1	Cañon City Stormwater Program	CMP-18"	94 ft	5898.56 ft	5892.85 ft	6.1 %	10	Double 48" CMP = 192 cfs @ 6.1% (includes 50% block)
23	CULV000419	1	Cañon City	CMP-18"	58.4 ft	5897.32 ft	5895.03 ft	3.9 %	11	Double 36" CMP = 71 cfs @ 3.9% (includes 50% block)
4	CULV000119	1	Cañon City Stormwater Program	CMP-18"	90 ft	5983.27 ft	5976.83 ft	7.2 %	12	44 cfs additional capacity (head/clearance issues)
1	CULV000051	3	Cañon City Stormwater Program	CMP-30"	89.7 ft	5886.22 ft	5882.15 ft	4.5 %	13	box culvert: 4'Wx4'H = 388 cfs @ 4.5%
2	CULV000054	2	Cañon City Stormwater Program	CMP-30"	109.54 ft	5828.14 ft	5820.49 ft	7 %	14	box culvert: 4'Wx4'H = 484 cfs @ 7%
18	CULV000317	1	Cañon City	CMP-18"	81.3 ft	5868.53 ft	5865.4 ft	3.9 %	15	Single 42" CMP = 54 cfs @ 3.9% (includes 50% block)
25	CULV000421	1	Cañon City Stormwater Program	CMP-24"	94.6 ft	5898.42 ft	5891.44 ft	7.4 %	16	box culvert: 4'Wx4'H = 497 cfs @ 7.4%
37	CULV000474	2	Private	CMP-30"	20.1 ft	6013.89 ft	6013.23 ft	3.3 %	17	box culvert: 6'Wx4'H = 562 cfs @ 3.3%
17	CULV000315	1	Cañon City Stormwater Program	CMP-24"	74.9 ft	5863.78 ft	5862.12 ft	2.2 %	18	box culvert: 4'Wx4'H = 271 cfs @ 2.2%
6	CULV000277	1	Cañon City Stormwater Program	CMP-36"	85.2 ft	5589.42 ft	5587.59 ft	2.2 %	19	box culvert: 4'Wx4'H = 271 cfs @ 2.2%
5	CULV000275	3	Cañon City Stormwater Program	CMP-30"	72.6 ft	5549.14 ft	5548.15 ft	1.4 %	20	box culvert: 10'Wx6'H = 1234 cfs @ 1.4%
38	CULV000700	1	n/a	n/a	n/a	n/a	n/a	n/a	21	42" CMP at ~4% slope
32	CULV000431	1	Cañon City	CMP-24"	73.1 ft	5761.34 ft	5760.09 ft	1.7 %	22	box culvert: 4'Wx2'H = 91 cfs @ 1.7%
9	CULV000281	1	Cañon City Stormwater Program	CMP-24"	85.8 ft	5611.72 ft	5608.13 ft	4.2 %	23	box culvert: 4'Wx4'H = 375 cfs @ 4.2%
15	CULV000304	1	Cañon City	CMP-24"	59.8 ft	5826.25 ft	5825.02 ft	2.1 %	24	box culvert: 4'Wx2'H = 101 cfs @ 2.1%; invert lowered 1 foot
29	CULV000426	1	Cañon City Stormwater Program	CMP-24"	83 ft	5936.45 ft	5932.7 ft	4.5 %	25	box culvert: 4'Wx4'H = 387 cfs @ 4.5%
24	CULV000420	1	Cañon City	CMP-18"	64.9 ft	5897.17 ft	5894.35 ft	4.3 %	26	4 additional 18" CMPs
10	CULV000282	1	Cañon City Stormwater Program	CMP-24"	84.7 ft	5623.54 ft	5622.49 ft	1.2 %	27	box culvert: 4'Wx4'H = 200 cfs @ 1.2%
39	CULV000701	1	n/a	n/a	n/a	n/a	n/a	n/a	28	41 cfs capacity fit to field conditions at final design
21	CULV000343	1	Cañon City Stormwater Program	CMP-24"	135.2 ft	5895.37 ft	5884.49 ft	8 %	29	4 additional 24" CMPs
30	CULV000428	1	Cañon City	HDPE-24"	48.4 ft	5909.6 ft	5908.19 ft	2.9 %	30	2 additional 24" HDPEs
27	CULV000424	1	Cañon City	CMP-18"	58.9 ft	5931.17 ft	5928.16 ft	5.1 %	31	3 additional 18" CMPs
40	CULV000702	1	n/a	n/a	n/a	n/a	n/a	n/a	32	Double 36" CMP at ~1.7%
41	CULV000703	1	n/a	n/a	n/a	n/a	n/a	n/a	33	Single 36" CMP at ~5.8%
42	CULV000704	1	n/a	n/a	n/a	n/a	n/a	n/a	34	Single 36" CMP at ~6.1%
43	CULV000705	1	n/a	n/a	n/a	n/a	n/a	n/a	35	Double 36" CMP at ~3.3%
16	CULV000305	1	Cañon City	CMP-24"	82.6 ft	5734 ft	5730.64 ft	4.1 %	36	Single 48" CMP at lowered invert
26	CULV000422	1	Cañon City	CMP-18"	99 ft	5900.53 ft	5897.32 ft	3.2 %	37	2 additional 18" CMPs
11	CULV000292	1	Cañon City Stormwater Program	CMP-36"	101.2 ft	5649.8 ft	5645.58 ft	4.2 %	38	2 additional 36" CMPs
13	CULV000301	1	Cañon City	CMP-18"	55.7 ft	5763.33 ft	5762.33 ft	1.8 %	39	1 additional 18" CMP
20	CULV000340	1	Cañon City Stormwater Program	CMP-24"	120.8 ft	5851.08 ft	5844.98 ft	5 %	40	Single 48" CMP = 87 cfs @ 5.0% (includes 50% block)
28	CULV000425	1	Cañon City	CMP-18"	65.5 ft	5933.35 ft	5929.24 ft	6.3 %	41	1 additional 18" CMP
34	CULV000435	1	Cañon City Stormwater Program	CMP-24"	95 ft	5981.12 ft	5974.84 ft	6.6 %	42	3 additional 24" CMPs
35	CULV000436	1	Cañon City	CMP-15"	54.4 ft	5785.78 ft	5783.63 ft	3.9 %	43	2 additional 15" CMPs
36	CULV000439	2	Private	HDPE-30"	80.2 ft	5741.79 ft	5738.29 ft	4.4 %	44	no culvert improvement - detention facility