Rio Communities Master Drainage Plan

May 28, 2021

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Final Rio Communities Drainage Master Plan and Capital Improvements Plan

Prepared for:

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Executive Summary

HDR Engineering, Inc. (HDR) has prepared this Drainage Master Plan (DMP) for the City of Rio Communities (City). The Rio Communities DMP was developed to identify existing drainage issues, review, and recommend drainage infrastructure for future planned development, and recommend both viable and cost-effective solutions to improve drainage in the community. The plan is based on an extensive data collection effort and hydrologic and hydraulic assessment of prevailing conditions in Rio Communities, New Mexico, located mostly along New Mexico (NM) Highway 47, approximately 3 miles east of Belen, New Mexico.

Based on discussions with Rio Communities staff and residents, New Mexico Department of Transportation (NMDOT) staff, and the detailed analysis conducted in support of this report, a list of recommendations were developed for Rio Communities: improved flood mitigation channels, additional hydraulic structures (including culverts and roadside ditches), a proactive operations and maintenance (O&M) plan, and identified potential for joint partnership projects with NMDOT for implementing additional flood control mitigation actions in the region.

The wholistic approach to proposed improvements includes improving drainage conveyance, a proactive approach to floodplain management to maintain the natural arroyos within the community, and measures to improve driver safety within the community limits. All proposed improvements were assessed on their impact on the community, flood control improvement, emergency access improvement, and cost. This report serves as a document that will outline future projects for the Rio Communities to consider and provide an estimated cost toward future drainage planning and develop within the community.

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Abbreviations and Acronyms

CDP	census-designated place
CIP	capital improvement plan
City	City of Rio Communities
CMP	corrugated metal pipe
CN	curve number
DMP	Drainage Master Plan
GIS	geographic information system
HDR	HDR Engineering, Inc.
NM	New Mexico
NMDOT	New Mexico Department of Transportation
NMSHTD	New Mexico State Highway and Transportation Department
O&M	operations and maintenance
RCP	reinforced concrete pipe
ROW	right-of-way

1.0 Introduction

1.1 Study Background

The City of Rio Communities (City) is located along New Mexico (NM) Highway 47, approximately 3 miles east of Belen, New Mexico. The City is bounded to the west by the Rio Grande River and to the east by the Manzano Mountains. The northern limits follow the Manzano Expressway, and the southern region is bounded by the BNSF rail and town limits. The community is in Township 5N, Range 02E. Currently, there is no comprehensive drainage master plan (DMP) for the community and no historical documentation on the design behind the various drainage elements within the region. This Rio Communities DMP was developed to provide Rio Communities with a complete documentation of existing features and a planning-level analysis of area of repetitive flooding along with alternatives to mitigate historically flooding/sedimentation prone areas in the community. In addition, a study was conducted to provide a planning-level estimate of the infrastructure required for the current design of future community growth.

The DMP provides a complete list of proposed flood mitigation measures for Rio Communities' residents and businesses and property owners, supporting Rio Communities' goal of quantifying and assessing flood potential using sound scientific methodology and industry-tested technology to develop improved protection from flooding. The proposed measures will reduce flood potential during flood events and support long-term improvement of the quality and value of property within the community.

The DMP efforts included professional services such as data collection, hydrologic and hydraulic analyses, alternatives evaluation, capital improvement plan (CIP) development, and public meeting outreach.

1.2 Summary of Information Reviewed

HDR Engineering, Inc. (HDR) reviewed the following data and reports in support of developing the Rio Communities DMP and CIP:

- Geographic information system (GIS) information, including building footprints and parcel information
- GIS information including slope of ground surface, digital elevation model, digital terrain model, township, range, and sections
- Rio Communities resident complaints
- Soils data
- Survey of existing features
- Meteorological data based on current design standards

1.3 Purpose and Goals

The purpose and goals of the Rio Communities DMP are summarized as follows:

- Identify future drainage improvement projects to mitigate flooding and aid in sedimentation control
- Establish a list of alternatives for possible inclusion in a CIP
- Involve the public and stakeholders to help prepare effective, sustainable, and preferred solutions
- Limit ownership displacement or transference or costly right-of-way (ROW) purchase requirements

Analysis provided for completion of the DMP is not intended to be used at the final design level or for permitting with local or federal agencies, such as the Federal Emergency Management Agency or New Mexico Department of Transportation (NMDOT).

2.0 Description of Study Area and Drainage Issues

The DMP study area is in the mideastern portion of Valencia County and encompasses approximately 14 square miles. Rio Communities is located along three busy NM highways: NM-47, NM-304, and NM-309. BNSF railway is located at the south boundary of the City limits and study area. The BNSF railyard is in the City of Belen west of Rio Communities. Figure 1 and Figure 2 show the location and vicinity, respectively.

Rio Communities lies within the mideastern limits of the Rio Grande-Albuquerque watershed, as identified by the Natural Resources Conservation Service. The natural gradient of the community and surrounding watersheds can be classified as sloping from east to west with watersheds, outfalling into the Rio Grande River. Aerial photography indicates the off-site watersheds are composed of typical arid southwestern landscape of sparse vegetation of small brush and rangeland grasses in the lower elevations.

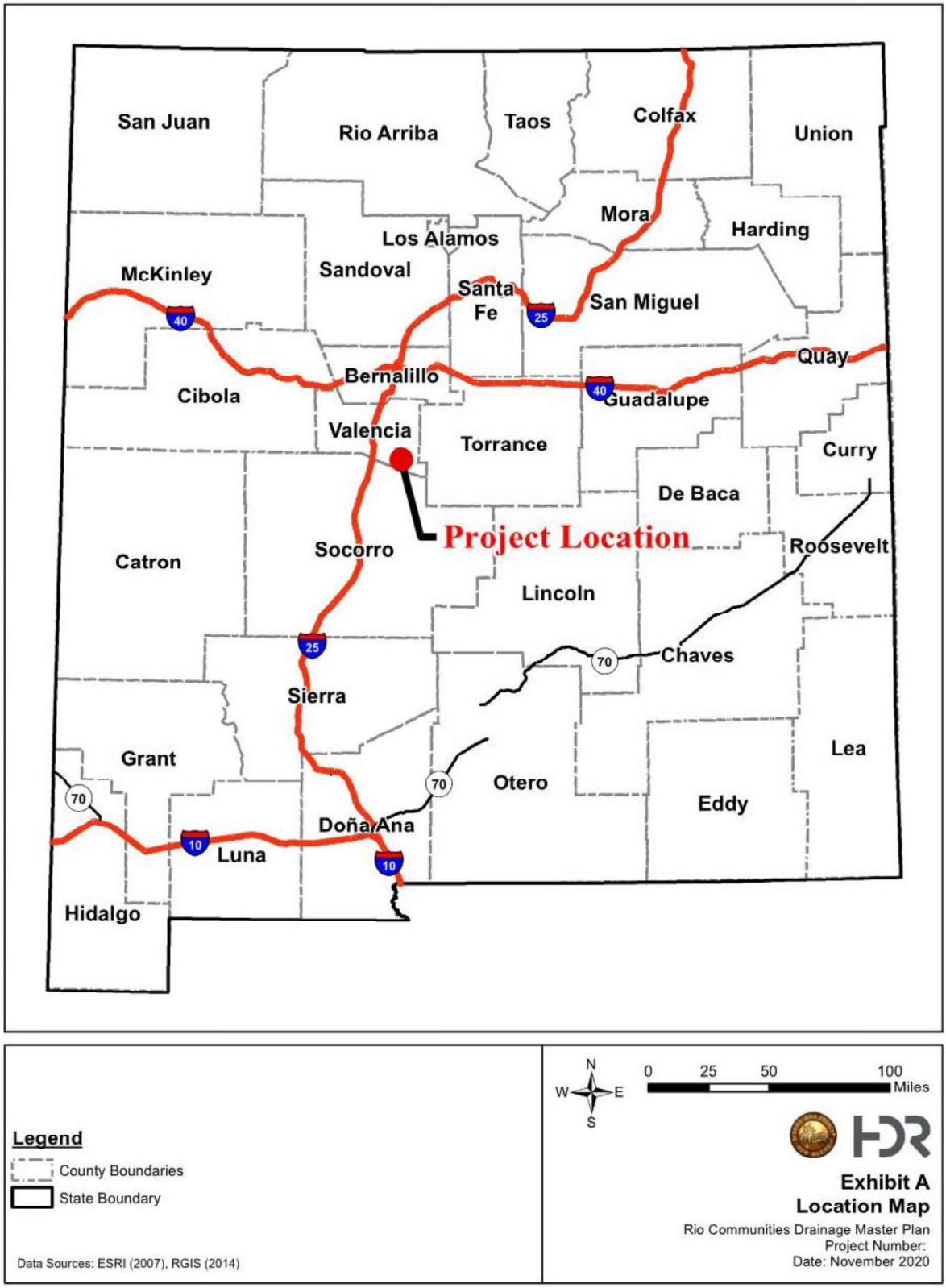


Figure 1 – Location Map

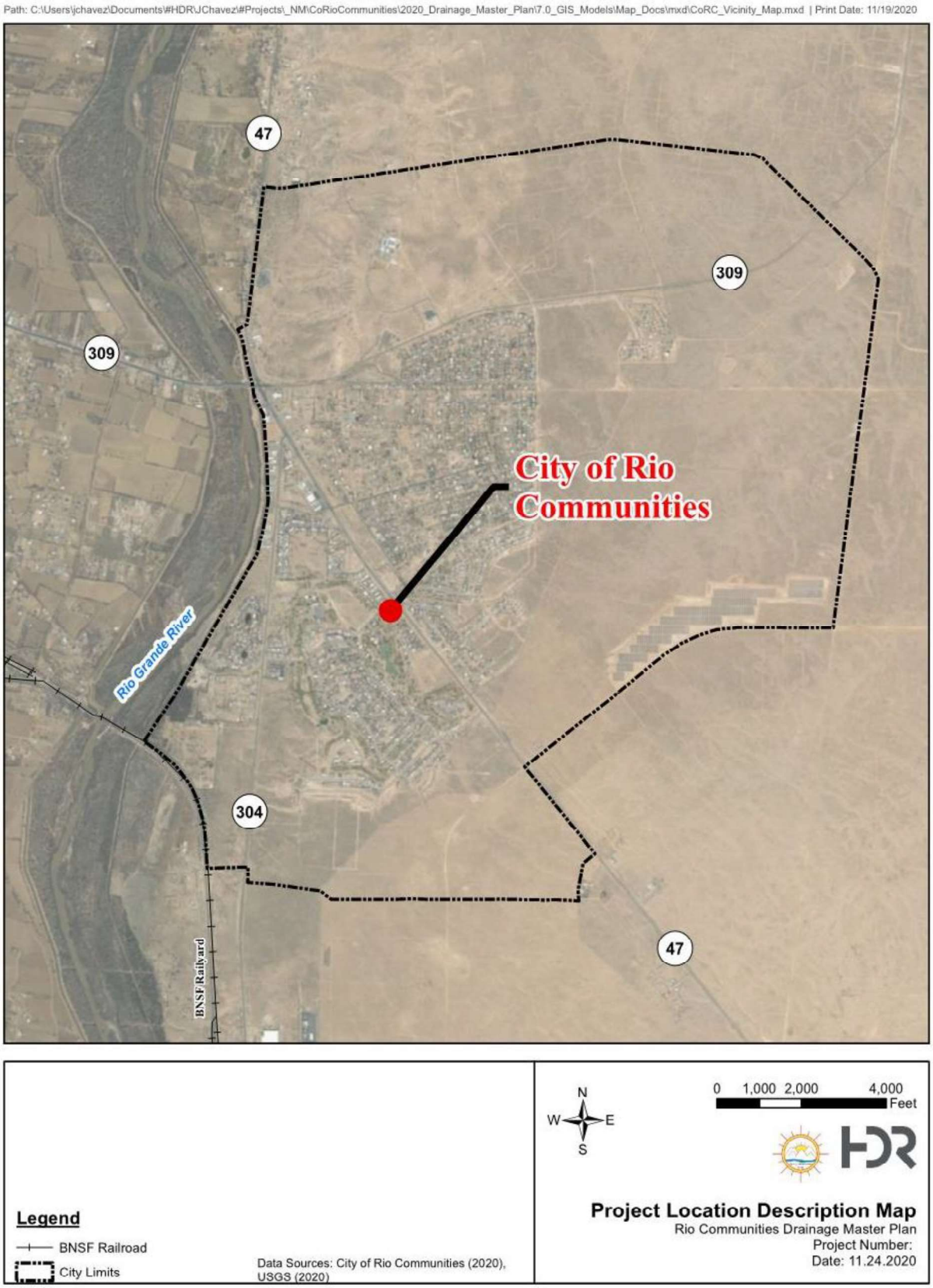


Figure 2 – Vicinity Map

3.0 Data Collection Summary

Information was obtained from a variety of sources, including (but not limited to) NMDOT, Valencia County, Mid-Region Council of Governments, and survey and field observations conducted as part of this study. The information collected includes record documents for state highways, records of flooding complaints from residents, topographic mapping, meetings with staff, and site photographs.

3.1 Geographic Information System Data

GIS data was provided by Mid-Region Council of Governments and Valencia County to assist in generating hydrologic and hydraulic models. Information obtained includes:

- Mid-Region Council of Governments Digital Elevation Model in GeoTIFF format (2010) – Project Coordinate System: NM State Plane, Central Zone NAD 1983 (1992)/HARN, North American Vertical Datum of 1988, U.S. Survey Feet, Geoid 09. Digital Terrain Model data were compiled to meet 1-foot and 2-foot contour interval data-vertical accuracy at the 95 percent confidence level
- Valencia County parcel information such as owner, address, and value (2020)

3.2 Record Documentation

Record drawings were obtained through NMDOT for past projects along NM-47 and NM-309. In addition, ROW plans were collected for determining limits and the original planning intent. Record drawing information provided existing pipe locations, sizes, and slopes to support the planning-level analysis. Additional record documents from Valencia County and Middle Rio Grande Conservancy District were collected as part of this DMP. Record drawings were not requested for private utilities.

3.3 Review of Previous Studies

At the time of this study, previous studies and drainage analyses were not readily available for reference. Future assessment in Rio Communities should incorporate new elements to complete evaluation and potential impacts on the validity of the preferred alternative(s).

3.4 Field Review

In August 2020, a field review was conducted to assess current drainage conditions, identify drainage flow paths and locations that appear to be affected by concentrated flows within Rio Communities. Assessment of the identified drainage features included documenting diameter or cross-sectional shape, material type, and existing field condition. Condition assessment was classified in three ranges as follows:

- Good – No cracks, deformations, less than 25 percent sediment/vegetation blockage, erosion identified

- Fair – Reduced capacity due to deformation, 25-50 percent sediment or blockage of the drainage feature
- Poor – Significant reduction in capacity or stability of drainage feature (greater than 50 percent), structure failure, 1 foot or more of scour

Table 1 is a listing of the identified features and their classification rating based on field review.

Table 1 – Existing Drainage Features

Drainage Feature Identification	Description	Inlet Condition	Outlet Condition	Action	Rating
CV-01	36"	Sediment - Full	Good	Clean	Poor
CV-02	36"	Debris	Debris	Clean	Fair
CV-03	30"	Debris	Good	Clean	Fair
CV-04	30"	Debris	Good	Clean	Fair
CV-05	36"	Good	Good	No Action	Good
CV-06	36"	Good	Good	No Action	Good
CV-07	36"	Good	Good	No Action	Good
CV-08	18" X 30"	Debris	Good	Clean	Fair
CV-09	18" X 30"	Debris	Good	Clean	Fair
CV-10	24"	Good	Good	Clean	Good
CV-11	24"	Good	Good	Clean	Good
CV-12	18" X 30"	Debris	Erosion	Repair	Fair
CV-13	18" X 30"	Good	Erosion	Repair	Fair
CV-14	18" X 30"	Debris	Erosion	Repair	Fair
CV-15	18" X 30"	Sediment - Partial	Erosion	Repair	Poor
CV-16	18" X 30"	Debris	Erosion	Repair	Fair
CV-17	18" X 30"	Debris	Erosion	Repair	Fair
CV-18	16" X 30"	Sediment - Partial	Debris	Clean	Poor
CV-19	24"	Erosion	Good	Repair	Fair
CV-20	24"	Good	Good	No Action	Good
CV-21	18"	Sediment - Full	Sediment - Full	To Clean	Poor
CV-22	18"	Good	Good	No Action	Good
CV-23	24"	Damaged	Good	Repair	Poor
CV-24	24"	Good	Good	No Action	Good
CV-25	24"	Good	Good	No Action	Good
CV-26	24"	Good	Sediment - Full	Clean	Poor
CV-27	24"	Sediment - Full	Sediment - Full	Clean	Poor
CV-28	18"	Sediment - Full	Sediment - Full	Clean	Poor
CV-29	24"	Sediment - Full	Sediment - Full	Clean	Poor

Table 1 – Existing Drainage Features

Drainage Feature Identification	Description	Inlet Condition	Outlet Condition	Action	Rating
CV-30	24"	Good	Good	No Action	Good
CV-31	24"	Good	Good	No Action	Good
CV-32	18"	Sediment - Full	Sediment - Full	Clean	Poor
CV-33	24"	Sediment - Full	Sediment - Full	Clean	Poor
CV-34	18"	Sediment - Full	Sediment - Full	Clean	Poor
CV-35	15"	Sediment - Partial	Damaged	Repair	Poor
CV-36	42"	Sediment - Partial	Debris	Clean	Fair
CV-37	24"	Good	Good	No Action	Good
CV-38	42"	Good	Good	No Action	Good
CV-39	16" X 20"	Damaged	Damaged	Repair	Poor
CV-40	48"	Good	Debris	Clean	Fair
CV-41	48	Good	Debris	Clean	Fair
CV-42	16" X 24"	Good	Good	No Action	Good
CV-43	32"	Good	Damaged	Repair	Poor
CV-44	32"	Good	Good	No Action	Good
CV-45	18"	Sediment - Full	Sediment - Full	Clean	Poor
CV-46	18"	Sediment - Full	Good	Clean	Poor
CV-47	36"	Good	Unknown	No Action	Good
CV-48	36"	Debris	Debris	Clean	Fair
CV-49	36"	Good	Debris	Clean	Fair
CV-50	36"	Good	Good	No Action	Good
CV-51	36"	Debris	Debris	Clean	Fair
CV-52	36"	Good	Good	No Action	Good
CV-53	24"	Debris	Debris	Clean	Fair
CV-54	18"	Damaged	Damaged	Replace	Poor
CV-55	18"	Debris	Debris	Clean	Fair
SD-01	96" X 48"	Good	Good	No Action	Good
SD-02	96" X 48"	Good	Sediment - Partial	Clean	Poor
SD-03	60"	Sediment - Partial	Sediment - Partial	Clean	Poor
SD-04	60"	Good	Good	No Action	Good
SD-05	48"	Good	Good	No Action	Good
SD-06	48"	Good	Good	No Action	Good
SD-07	48"	Good	Good	No Action	Good

Table 1 – Existing Drainage Features

Drainage Feature Identification	Description	Inlet Condition	Outlet Condition	Action	Rating
SD-08	48"	Good	Good	No Action	Good
SD-09	24"	Good	Good	No Action	Good
SD-10	24"	Good	Good	No Action	Good
SD-11	36"	Good	Good	No Action	Good
SD-12	36"	Good	Damaged	Replace	Poor
SD-13	24"	Good	Unknown	No Action	Good
SD-14	24"	Unknown	Unknown	No Action	Good
SD-15	24"	Unknown	Erosion	Repair	Fair
SD-16	12"	Good	Unknown	No Action	Good
SD-17	24"	Debris	Debris	Clean	Fair
SD-18	24"	Debris	Unknown	Clean	Fair

As shown in Table 1, there was a significant number of features in need of repair or maintenance due to sediment and debris or damage to the structure.

There is evidence of heavy off-road vehicles recreational usage in existing drainage arroyos. In effect, this usage has the potential to alter flow paths and destabilize the drainage features, potentially creating additional flooding potential for the neighboring properties. Based on the field review, there were several classifications of drainage issues including operations and maintenance, failed infrastructure, and scour and erosion. It was further observed that several drainages appeared to be well-incised channels with significant head-cutting propagating upstream toward and through the cross culverts at various access areas.

3.4.1 Incised Channels

The City of Rio Communities area encompasses steeper, undeveloped areas east of NM-47. Slope gradient of the surrounding terrain tends to decrease from east to west. In the flatter, low lying lands, several gullies/arroyos were observed. Each appear to be well incised with sandy loam in the channel bottom and channel walls that show significant signs of erosion.

The arroyo located along the Manzano Expressway was further investigated to assess the stability of the channel along the roadway embankment. The arroyo contains a single dual pipe outfall just east of the Hillandale Avenue and Manzano Expressway intersection. The pipe outfall is comprised of concrete rubble, shotcrete, and welded wire fabric. In its current state, there are signs of erosion around the perimeter and portions of the wire that appear to have deformed from original application. Figure 3 is photographic evidence of the incised arroyo and dual pipe outfall.

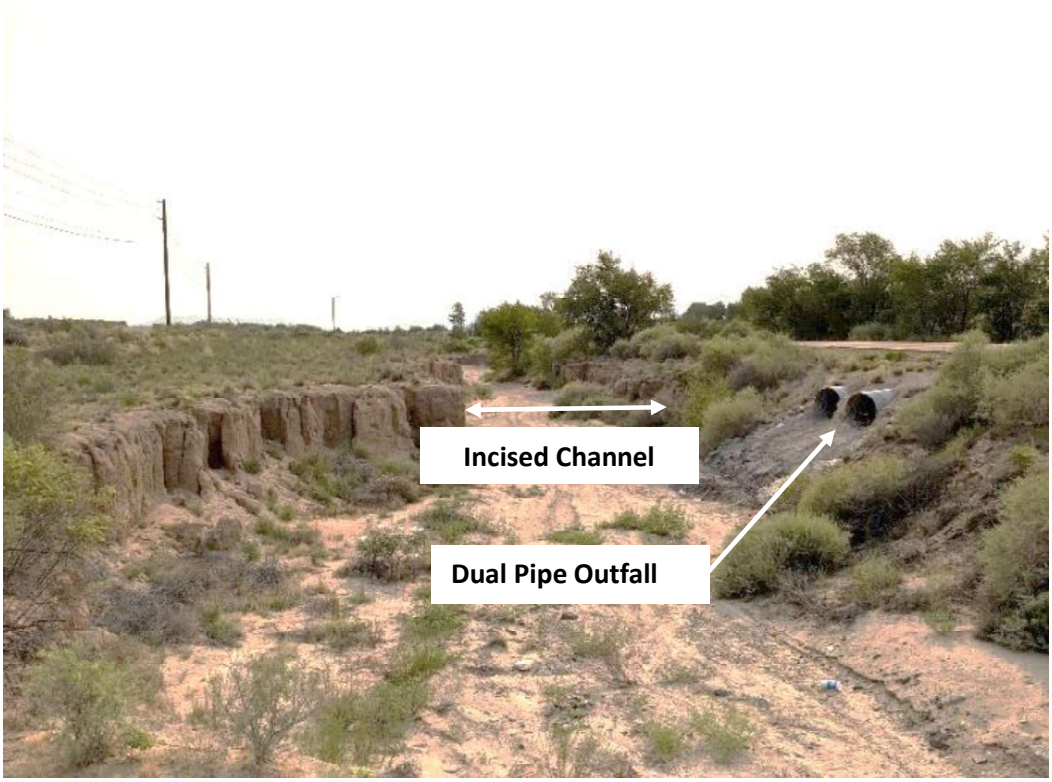


Figure 3 – New Mexico Highway 309 Outfall into Arroyo

City drainage accumulating east of NM-47 is conveyed to the west through both box and pipe culverts and then enters the City. Most stormwater is conveyed through the City in two major natural arroyos, which, for the purposes of this study, have been identified as the NM Highway 47 arroyo and NM Highway 309 arroyo. Both arroyos cross NM-47 before outfalling into the Rio Grande River. The NM Highway 47 arroyo has concrete structures with culverts at most of its local road crossings and check dams located inside its channel to control both hydraulic and sediment movement. These concrete structures and check dams are shown on Figure 4, 5, and 6, respectively.

The arroyo bed lowering and head cut propagation has not been controlled by the check dams. As shown in the photographic evidence, outlet aprons have been undermined. Field measurements indicated scour holes from 1 to 3 feet forming at various outlet aprons along the arroyo.

Figure 4 – Undermined Concrete Apron and Exposed Utility at New Mexico Highway 47 Arroyo

Figure 5 – Scour Depth at New Mexico Highway 47 Concrete Apron

Figure 6 – New Mexico Highway 47 Concrete Arroyo Check Dam

Additional information on existing drainage conditions for the study area are found in the sections below. Additional photos of existing drainage conditions for the City can be found in **Appendix E**.

3.4.1.1 Sediment and Vegetation

A lack of maintenance has created drainage issues in the Rio Communities area. Naturally occurring sediment transport in the surrounding watershed(s) have contributed to a reduced capacity of the drainage infrastructure because of clogged inlets and outlets. Additionally, inadequate maintenance of the arroyos along major highways has led to reduced conveyance capacity and an inability to properly contain and route the developing local peak discharges.

The majority of existing drainage infrastructure requires basic operations and maintenance (O&M) to ensure proper drainage and prevent further damage to surrounding areas. This O&M requires all vegetation and sediment be cleared from all existing drainage pipe, including the area surrounding the pipe inlet and outlet. As shown on Figure 7, the culvert outlet is nearly full with sediment and may cause flooding at the inlet.

Figure 7 – Culvert Outlet Plugged with Sediment

Large amounts of sediment deposits were observed within several pipe culverts; therefore, a significant reduction in the conveyance capacity of these drainage features can be expected until sufficient hydraulic upstream head flushes the sediment through the pipe and downstream or until overtopping at the crossing occurs.

The excessive vegetation at some culverts made crossings difficult to identify in the field. Figure 8 shows the inlet of an outfall pipe on the west side of NM-304. This vegetation will create similar concerns to the sediment deposits.

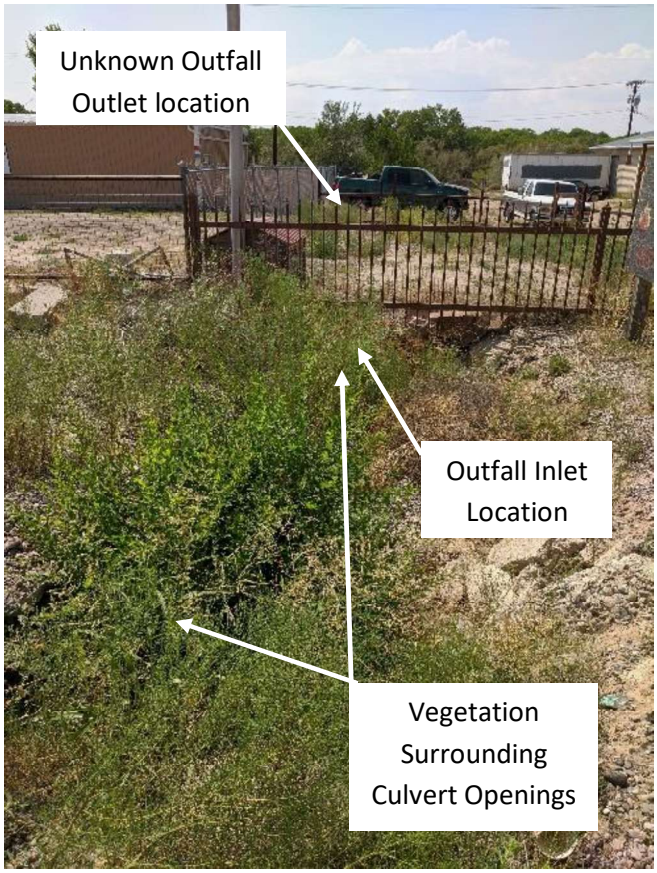


Figure 8 – Outfall Inlet

3.4.1.2 Roadside Features and Traffic

There are multiple areas within the City where roadside ditches need to be created along local roads. Figure 9 shows a natural flow path along the south side of Avenida Del Fuego where there is no apparent roadside ditch. Based on Figure 9, this flow suggests a deeper roadside ditch is required to prevent water from overtopping the roadway surface and continuing to degrade the existing asphalt pavement.

Figure 9 – Avenida Del Fuego Roadside Drainage

There was evidence of heavy off-road traffic inside the natural arroyos during some HDR field visits. This traffic may promote unnatural flow patterns within the City limits. Though all off-road traffic cannot be prevented, it is recommended that actions be taken by the City to protect both the natural flow characteristics of the surrounding area and safety of people who travel near unsafe, natural drainage conditions.

3.4.1.3 Failed Infrastructure

There are multiple culverts within the City limits that have a failed inlet or outlet. It is recommended these culverts be replaced. Figure 10 is an example of a failed culvert inlet that will impact the capacity of the crossing. Drainage will continue to bypass this culvert and degrade the surface of the roadway.

Figure 10 – Typical Damaged Culvert Inlet

There is a concrete rundown structure at the intersection of Charmartin Avenue and San Lucas Avenue that has failed. The most likely cause of failure is erosion of compacted base course beneath the structure. The erosion of this base course can be caused by inadequate protection (i.e., missing, damaged) of the soil around the structure. This structure is shown on Figure 11.

Figure 11 – Failed Concrete Rundown at San Lucas Avenue Outfall

It is recommended this structure be replaced immediately to ensure drainage is properly outfalled into the existing pond at the bottom of the structure. Failure to replace this structure in a timely manner may create additional erosion problems and, consequently, failure of surrounding roadway infrastructure.

3.4.1.4 Scour and Erosion

As shown on Figure 4 and Figure 11, there are serious erosion concerns within the City limits. The outlet locations for the NM Highway 47 arroyo concrete structure crossings are experiencing erosion at the transition from concrete to channel. The lack of a cutoff wall for the concrete structure at this transition is creating scour beneath the existing concrete pad. This scour will continue to impact the required compaction of soils beneath the concrete pad up to the point of failure.

There are elevated culverts currently protruding from its existing embankment, which suggests additional soil protection is required at these locations. An example of erosion contributed to an elevated pipe is shown on Figure 12.

Figure 12 – Perched Pipe at Goodman Avenue Outfall

The discharge from this elevated pipe will promote the erosion of soils without additional embankment protection surrounding the pipe. This erosion is impacting both the embankment the pipe protrudes from and the soils beneath the adjacent concrete structure, as shown from a different angle on Figure 13.

Figure 13 – Undermined Inlet Apron at Goodman Avenue Outfall

3.5 Survey and Mapping

The Mid-Region Council of Governments provided surface model data such as the Digital Elevation Model, Digital Terrain Model, and slope of the ground surface in the surrounding area. This data was then converted to 1-foot topographic mapping to assist in the evaluation of the hydrologic watershed, flowpaths, routing, and natural and human-made channels.

A field survey completed by CobbFendley in August 2020 provided elevation information for known drainage features within the City.

See **Appendix D** for excerpts of the survey data and historical documentation. See **Appendix E** for a photolog of the field review.

4.0 Public Involvement

To assist in the development of the DMP and Capital Projects Plan, HDR and the City have collected both written and verbal comments provided by the public. Residents shared their concerns about flooding, soil erosion, sediment transport, and site access. The following are comments/concerns collected by both HDR and the City:

- There is a private property (Johnston) flooding issue at the corner of San Lucas Avenue. The landscape at 142 San Lucas Avenue is washed into the roadway during large storm events.
- There is a flooding issue at the concrete rundown at the intersection of San Lucas Avenue and Charmartin Avenue. This flooding issue has created the failure of the concrete rundown structure at the same intersection.
- There is an off-roading degradation issue in the Highway 47 arroyo near the intersection of Damon Street and McKnight Place. It was reported this location is exposed to heavy off-road traffic that disrupts the natural drainage flow.
- There is a heavy sediment issue at the culvert crossing at the Rio Verde Apartments (2291 Highway 304). It was reported apartment staff are required to clean this culvert after every storm event.
- There is a potential private property (Baca Trust) flooding issue at an undeveloped lot at the intersection of Frederico Boulevard and Brown Drive. Based on existing contour data, the natural flowpath of the surrounding subbasin appears to flow through this private property.
- There is a potential flooding issue at the intersection of NM-47 and Western Drive. There is a natural flowpath leading to this intersection that does not appear to have a culvert crossing.
- There is a flooding issue at the inlet at the intersection of Damon Street and Fulton Avenue. This location experiences ponding after large storm events.
- It is recommended that traffic safety barrier be installed at the concrete rundown at the intersection of Damon Street and Riggs Street. This rundown descends into the Highway 47 arroyo at a minimum 9 feet depth.

Input from the public assisted HDR in identifying critical locations of concern that were considered during the alternative's investigations of the DMP.

Refer to the Existing Drainage Features and Issues Exhibit in **Appendix A** for a depiction of existing drainage features and areas of concern, as identified by residents and Rio Communities personal. Copies of the public involvement maps, record of public comments, and the resulting action items incorporated into this DMP are available in other appendices.

5.0 Federal Emergency Management Agency

The City of Rio Communities is reflected in published results for “Incorporated Areas” of Valencia County, Community Number 350086, of the existing Flood Insurance Study. Rio Communities is within the effective Flood Insurance Rate Map 0415E. The initial National Flood Insurance Program date for the community of Rio Communities was September 16, 1982. In 1982, the City of Rio Communities was a part of the City of Belen. The effective Flood Insurance Study date is August 19, 2010.

Effective mapping indicates the only regulatory floodplain within the area is a Zone A floodplain associated with the Rio Grande River. The approximate floodzone has no know associated elevations.

6.0 Hydrologic and Hydraulic Analysis

6.1 Hydrologic Analysis

Hydrologic analysis of the study area was conducted to provide an understanding of the existing runoff conditions for the entire watershed. The analysis results were used within the hydraulic analysis to influence the development of proposed DMP elements discussed in later sections of this document.

6.1.1 Design Criteria

Tables 203-1 and 203-2 of the NMDOT Drainage Design Manual (NMDOT 2018) specify that collection and conveyance systems within all Minor Arterials, Collectors, Local Roads, Interstate Highways, and Primary Arterials are to be designed and checked for the 50- and 100-year recurrence interval storm events, respectively.

Table 207-1 of the NMDOT Drainage Design Manual was referenced for development of pond sizing. Sizing includes estimates for sediment and dead storage requirements.

An initial analysis of the 10-, 25-, 50- and 100-year storm events and their respective impacts on the community was conducted. Results were presented to City staff, and a follow-up meeting will be conducted.

6.1.2 Methodology

All hydrologic analyses were performed in accordance with the NMDOT Drainage Design Manual (NMDOT 2018). Based on the subbasin size, the Natural Resource Conservation Service Simplified Peak Discharge Method was found to be the most applicable hydrologic method for evaluating the study area. The following sections describe the methodology and assumptions pertaining to the hydrologic analyses.

6.1.2.1 Off-Site and On-Site Hydrology

Generation of the hydrology for the existing condition was completed by developing a hydrologic model using the Hydrologic Engineering Center's Hydrologic Modeling System Version 4.5 (HEC-HMS) software, using the calculation methodologies discussed above. Specifically, the hydrologic model components consist of a basin model to describe the physical characteristics of the watershed, a meteorologic model to describe the characteristics of the selected rainfall data, and control specifications to define the temporal (duration and time step) elements of the model. The sections below describe the data collection, analysis, and assumptions associated with the development of each of these model components.

6.1.2.1.1 Basin Model

The basin model generated for this study consisted of contributing drainage areas (subbasins) and locations of flow confluence (junctions). This model has been prepared to compare 24-hour duration

storm for 10-, 25-, 50- and 100-year storm event frequencies. The ArcGIS Version 10.7.1 software was used to pre-process the physical data describing each subbasin. The initially developed model was refined by site reconnaissance.

6.1.2.1.1.1 Rainfall Loss

For all subbasins, the Soil Conservation Service curve number (CN) method was used as the rainfall loss method. Subbasin losses were calculated by generating representative values for CN and percentage impervious coverage. Generation of these values first required developing a land use dataset, which was completed using the ArcGIS software platform because no previously developed GIS land use data were available. Through observation of available aerial imagery within the ArcGIS software environment, land cover in the study area was identified as primarily desert shrub, residential, and commercial. In addition, data describing the study area soils was obtained from the Soil Survey Geographic database for Valencia County, New Mexico (Natural Resources Conservation Service 2020). Soils within the study area were found to consist of Hydrologic Soil Groups A, B, and C.

CN values were determined using Tables 402-2, 402-4, and 402-5 of the NMDOT Drainage Design Manual. The dominant cover type for the study area was the Desert Shrub classification. Using the relationships provided in the NMDOT Tables, equations were developed to establish a representative CN value for this cover type per a given percentage ground cover and hydrologic soil groups.

The observed land use category cover descriptions within the study area, along with their associated CN values, are presented in Table 2. Composite CN values were calculated for each subbasin.

Table 2 – Subbasins and Composite Curve Numbers

Subbasin	Composite CN
BA01	68
BA02	68
BA03	63
BA04	61
BA05	66
BA06	60
BA07	65
BA08	63
BA09	73

Note: Results for Antecedent Moisture Condition II Conditions

6.1.2.1.1.2 Hydrograph Transformation

Calculations for time of concentration were completed using the upland method for sheet flow and shallow concentrated flow types. For channel flow, time of concentration was calculated using the stream hydraulic method. These methods were chosen based on the recommended methods for use as specified in Section 402.8 of the NMDOT Drainage Design Manual (NMDOT 2018).

Flow paths extending from the most downstream point of the subbasin to the most hydraulically remote upstream point were developed through review of the available topographic data within the ArcGIS software. Flow segments were then delineated based on the criterion specified within the manual referenced above and review of the available aerial imagery. The dominant flow types found in the study area consisted of sheet flow, shallow concentrated flow, or channel flow. Determination of the flow type within each flow path was based on the overall length, changes in gradient, and aerial imagery.

Sheet flow was limited to a maximum length of 300 feet in accordance with the NMDOT Drainage Design Manual (NMDOT 2018). Shallow concentrated flow was determined to be the subsequent flow type for most subbasins. Channel flow was observed as either the secondary or tertiary flow type within subbasins where a defined conveyance was found to exist.

Velocity calculations for sheet flow and shallow concentrated flow types were completed using Figure 402-15 of the NMDOT Drainage Design Manual (NMDOT 2018). Specifically, this figure was used to build relationships for the Nearly Bare and Untilled and Paved Areas ground cover conditions. Velocity calculations for this flow type were conducted using Manning's equation. Based on review of available aerial imagery, a Manning's roughness coefficient of 0.028 was attributed to all open channel conveyance elements.

Studies conducted by Soil Conservation Service have found that, for most cases, the subbasin lag time can be approximated as 60 percent of the calculated time of concentration. Thus, for this analysis, values have been calculated under that assumption. All documentation and supporting calculations for the development of the time of concentration values for each subbasin are provided in **Appendix B**.

6.1.2.1.1.3 Hydraulic Conveyance (Routing)

To represent the hydraulic conveyance features (river, stream, or ditch) within the study area, HEC-HMS route elements were introduced into the model to properly define the potential throttling of the discharge hydrograph as it travels through the system. A route naming convention was chosen to communicate the direction of flow throughout the system. Thus, all route names contain the downstream receiving model subbasin or node name appended to the upstream model subbasin or node name where flow within the route originates.

An eight-point cross section was derived within the ArcGIS software using the available topographic data to provide the channel geometry necessary for hydraulic representation of each element. Additionally, average reach Manning's roughness values representative of the channel and left and right banks were estimated using the available aerial imagery and site reconnaissance photographs.

Locations of identified congregation of flows were represented within the model through a junction element. Inflow hydrographs from all upstream contributing model elements are collectively added at these locations, and an outflow hydrograph is generated.

6.1.2.1.2 Meteorological Model

A meteorological model was created for each of the four storm frequencies: 10-, 25-, 50-, and 100-year. Each model has associated National Oceanic and Atmospheric Administration 14 rainfall depth data for its specific storm frequency inputted up to a 24-hour duration storm (1 day). The intensity duration and position for each model is 5 minutes and 25 percent, respectively, per the direction of the NMDOT Drainage Design Manual (NMDOT 2018). Figure 14 shows inputted National Oceanic and Atmospheric Administration 14 meteorological data in the HMS model created for the 24-hour, 25-year storm event.

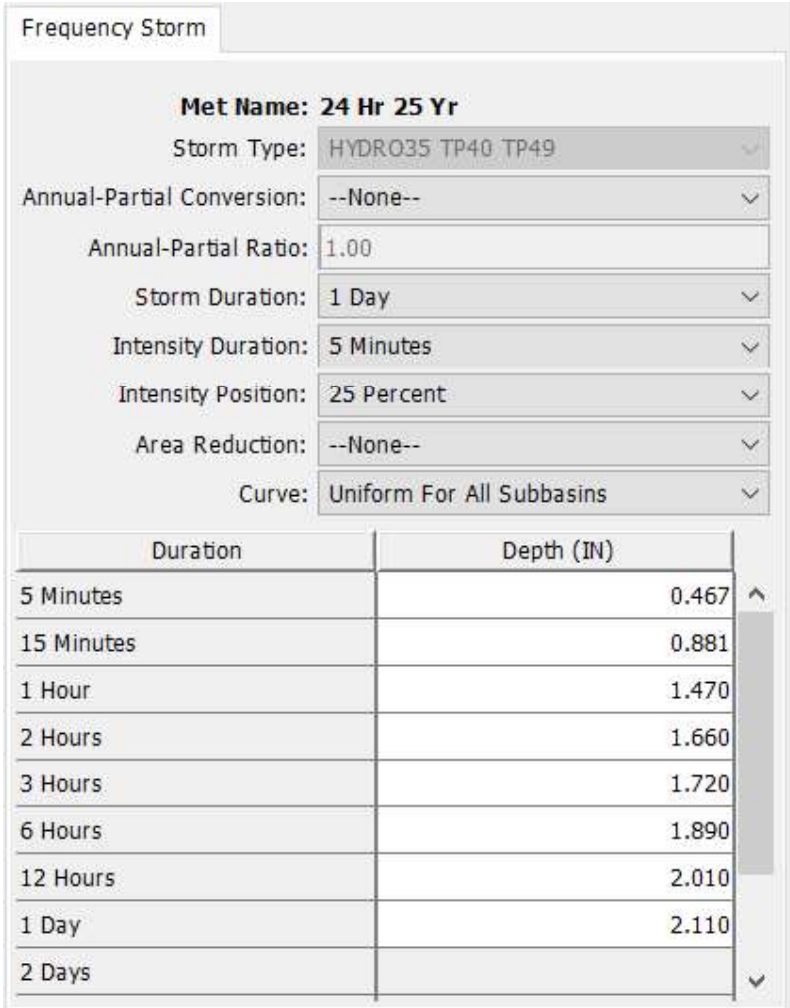


Figure 14 – HMS Meteorological Model for 25-Year Storm

6.1.2.1.3 Control Specifications

Control specifications were developed to ensure proper simulation of each model scenario. Specifically, the specifications were constructed to provide consistent simulation of the meteorological model discussed in the previous section.

To provide consistency with the selected storm duration of 24 hours, the control specification generated for use with this meteorological model was set to provide a model simulation of 24 hours. The time interval used for the simulation was 5 minutes.

6.1.2.2 Rainfall Intensity

Rainfall intensity is provided by National Oceanic and Atmospheric Administration Atlas 14 partial duration point precipitation frequency estimate values for partial storm durations of 5, 10, 15, 30, and 60 minutes. These values are used for 10-, 25-, 50-, and 100-year recurrence interval storm events.

6.1.2.3 Study Area Discharge

Resulting subbasin peak discharge and associated volume values for the study area are provided in Table 3. All basin peak discharges are based on an Antecedent Moisture Condition II condition.

Table 3 – Off-Site Analysis Results for the 100-year, 24-hour Event

Basin	Drainage Area (square miles)	Peak Discharge (cubic feet per second)	Tc (hours)	Volume (Acre-feet)
BA01	1.22	120	2.52	29.1
BA02	2.87	200	3.82	68.4
BA03	0.70	73	1.17	10.8
BA04	0.30	48	0.42	3.8
BA05	0.35	82	0.48	7.1
BA06	0.70	70	0.65	7.8
BA07	1.05	108	1.62	19.5
BA08	0.97	90	1.40	15.0
BA09	6.65	807	3.17	226.8

See **Appendix A** for exhibits of the watershed delineations, soils and land use mapping. See **Appendix B** for all hydrologic calculations and output results.

6.2 Hydraulics

A hydraulic assessment of select open and closed conveyance features within the study area was conducted to provide an understanding of the system's hydraulic constraints and deficiencies under existing conditions. Specifically, the analysis was developed to evaluate the specific conveyance features for their ability to convey the 50-year recurrence interval design storm event with the 100-year as the check storm. All analyses were conducted in accordance with NMDOT Drainage Design Manual standards.

The following sections provide a discussion of the methodology, analysis, and results from the hydraulic evaluation.

6.2.1 Methodology

6.2.1.1 Conveyance Feature Selection

Existing conveyance features were selected for evaluation based on their level of functionality within the system and ownership. Specifically, all features conveying flow from the off-site watersheds through the study area were evaluated. Additionally, several open and closed conveyances—considered to be significant conveyance components of the system—were evaluated. Privately owned conveyance features were not included in this evaluation. The Existing Drainage Features and Issues Exhibit in

Appendix A displays the hydraulic features and associated identification for which capacity evaluations were conducted.

6.2.1.2 Evaluation Criterion

All conveyance features discussed above were evaluated to assess their ability to convey the peak discharge associated with the 50-year, 24-hour recurrence interval storm.

6.2.2 Hydraulic Analysis

6.2.2.1 Closed Conveyance

Closed conveyance features included in this evaluation consisted of box culverts, circular culverts, and underground conveyance pipe. These features are primarily associated with the intersection of Manzano Expressway and NM Highway 47. Geometry of the features is based on data collection as discussed in Section 3.0.

6.2.2.1.1 Model Development

Hydraulic evaluation of all closed conveyance features was conducted using the HY-8 version 7.1 software. Input parameter categories consisted of the following data types: discharge, tailwater, roadway, culvert, and site.

Input parameters for the discharge data consisted of 50-year as design storm event and 100-year as check storm event, per NMDOT Drainage Design Manual criteria.

Tailwater input data consisted of specifying the downstream channel type and geometry. The downstream channel type was specified as irregular for all models. Representative channel cross section geometry was constructed by reviewing the best available topographic data and site reconnaissance photos. Tailwater conditions for pipes that directly outfall to the Rio Grande River are set as fee outfall, assuming noncoincidental peaks with the river. The river floodplain or modeling of the river itself is not within the scope of work contained within this document.

Roadway input consisted of roadway elevation, crest length, crest elevation, surface type, and top width. Representative roadway data were obtained through review of the available as-built information and supplemented with the best available topographic data and aerial imagery within GIS.

Culvert input data consisted of shape, material, diameter, embedment depth, roughness coefficient, inlet type, and inlet edge condition. Representative culvert data were acquired through review of available as-built information and documentation (photos and data) generated during site reconnaissance.

Input for the site category consisted of inlet station, outlet station, inlet elevation, outlet elevation, and number of barrels. Specifically, the inlet and outlet station are entered to define the length of the culvert. Available as-built information, site reconnaissance photos, and topographic GIS data were reviewed to develop the input data described above.

All input data are provided within the hydraulic calculations; see **Appendix C** for further details.

6.2.2.2 Open Channel Conveyance

All features evaluated were within the limits of the Rio Communities study area.

6.2.2.2.1 Model Development

Hydraulic evaluation of all open channel conveyance features was conducted using the Bentley FlowMaster V8i software. Similar to the closed conveyance features, various input parameters were required to develop the hydraulic model for each feature. Specifically, the input parameters consisted of the following data: channel geometry, main channel roughness coefficient, left and right overbank roughness coefficient, and channel slope.

All features discussed above were included in the HMS model. Thus, input data for these features were taken directly from the associated route data inputs for the HMS model. All input data described above are provided in **Appendix C**.

6.2.3 Results

The following sections provide the results from hydraulic analyses performed for the study. Specifically, results from the open and closed conveyance evaluations conducted are discussed.

6.2.3.1 Closed Conveyance

Tables displaying results for total discharge, culvert discharge, headwater elevation, inlet control depth, flow type, normal depth, critical depth, outlet depth, tailwater depth, outlet velocity, and tailwater velocity for each of the closed conveyance features discussed above are provided in **Appendix C**. In addition, a plot showing the performance curve for each feature is provided in the HY8 output. Table 4 lists the results from the existing hydraulic analysis.

Table 4 – Results of the Existing Hydraulics Analysis

Culvert	Description	Inlet Invert (feet)	Outlet Invert (feet)	Headwater (feet)	HW/D	Velocity Out (feet/ second)	Riprap (feet/ second)	Roadway Crown	Over-topping
CV-01	36" CMP	4869.25	4868.87	4871.94	0.90	6.38	Class A	4873.48	No
CV-02	36" CMP	4869.98	4868.83	4871.94	0.90	6.38	Class A	4873.48	No
CV-03	30" CMP	4855.58	4854.24	4858.64	1.22	5.20	Class A	4858.74	No
CV-04	30" CMP	4855.74	4853.93	4858.64	1.22	5.20	Class A	4858.74	No
CV-05	36" CMP	4902.78	4901.72	4904.50	0.63	5.66	Class A	4906.41	No
CV-06	36" CMP	4902.87	4901.56	4904.50	0.63	5.66	Class A	4906.41	No
CV-07	36" CMP	4902.91	4901.61	4904.50	0.63	5.66	Class A	4906.41	No

Table 4 – Results of the Existing Hydraulics Analysis

Culvert	Description	Inlet Invert (feet)	Outlet Invert (feet)	Headwater (feet)	HW/D	Velocity Out (feet/ second)	Riprap (feet/ second)	Roadway Crown	Over-topping
CV-08	18" X 30" CMP	4895.53	4894.74	4898.35	1.41	6.48	Class A	4898.22	Yes
CV-09	18" X 30" CMP	4895.72	4894.75	4898.35	1.41	6.48	Class A	4898.22	Yes
CV-10	24" CMP	4861.55	4859.78	4870.79	4.62	11.00	Class B	4870.55	Yes
CV-11	24" CMP	4861.63	4860.43	4870.79	4.62	11.00	Class B	4870.55	Yes
CV-12	18" X 30" CMP	4849.41	4848.84	4858.45	4.61	13.59	ED	4858.23	Yes
CV-13	18" X 30" CMP	4849.23	4848.69	4858.45	4.61	13.59	ED	4858.23	Yes
CV-14	18" X 30" CMP	4831.44	4830.86	4840.41	4.61	12.43	ED	4840.19	Yes
CV-15	18" X 30" CMP	4831.19	4830.78	4840.41	4.61	12.43	ED	4840.19	Yes
CV-16	18" X 30" CMP	4825.37	4825.08	4833.62	4.13	10.94	Class B	4833.37	Yes
CV-17	18" X 30" CMP	4825.43	4825.09	4833.62	4.13	10.94	Class B	4833.37	Yes
CV-18	16" X 30" CMP	4823.81	4823.02	4826.60	1.39	6.33	Class A	4826.31	Yes
CV-19	24" RCP	4877.75	4877.08	4880.15	1.20	10.24	Class B	4880.25	Yes
CV-20	24" RCP	4874.10	4873.08	4876.88	1.39	5.30	Class A	4876.60	Yes
CV-21	18" CMP	4870.40	4870.01	4872.71	1.54	5.03	Class A	4872.40	Yes
CV-22	18" CMP	4866.47	4865.37	4868.78	1.54	5.05	Class A	4868.47	Yes
CV-23	24" RCP	4859.78	4858.24	4862.55	1.39	6.07	Class A	4862.28	Yes
CV-24	24" RCP	4855.97	4855.16	4858.73	1.38	10.61	Class B	4858.47	Yes
CV-25	24" RCP	4854.22	4853.33	4856.98	1.38	10.48	Class B	4856.72	Yes
CV-26	24" CMP	4843.88	4840.64	4846.66	1.39	5.11	Class A	4846.38	Yes
CV-27	24" RCP	4873.41	4871.88	4876.19	1.39	6.74	Class A	4875.91	Yes
CV-28	18" CMP	4871.58	4871.20	4873.91	1.55	5.07	Class A	4873.58	Yes
CV-29	24" RCP	4867.94	4867.36	4870.70	1.38	9.97	Class A	4870.44	Yes
CV-30	24" RCP	4861.71	4861.28	4864.47	1.38	8.80	Class A	4864.21	Yes
CV-31	24" RCP	4859.43	4858.86	4862.19	1.38	9.75	Class A	4861.93	Yes
CV-32	18" CMP	4837.07	4836.12	4839.40	1.55	5.09	Class A	4839.07	Yes
CV-33	24" RCP	4824.41	4824.13	4827.19	1.39	7.64	Class A	4826.91	Yes
CV-34	18" CMP	4823.80	4822.80	4826.11	1.54	4.41	Class A	4825.80	Yes
CV-35	15" polyvinyl chloride	4820.45	4820.30	4822.54	1.67	6.18	Class A	4822.20	Yes
CV-36	42" CMP	4818.81	4816.57	4822.97	1.19	11.00	Class B	4822.81	Yes

Table 4 – Results of the Existing Hydraulics Analysis

Culvert	Description	Inlet Invert (feet)	Outlet Invert (feet)	Headwater (feet)	HW/D	Velocity Out (feet/ second)	Riprap (feet/ second)	Roadway Crown	Over-topping
CV-37	24" CMP	4820.53	4820.12	4823.38	1.43	4.86	Class A	4823.03	Yes
CV-38	42" RCP	4821.19	4819.75	4825.27	1.17	12.93	ED	4825.19	Yes
CV-39	16" X 20" CMP	4825.80	4825.23	4828.17	1.58	4.73	Class A	4827.80	Yes
CV-40	48" CMP	4825.27	4822.79	4828.07	0.70	3.16	Class A	4829.77	No
CV-41	48 CMP	4825.35	4823.23	4828.07	0.70	3.16	Class A	4829.85	No
CV-42	16" X 24" CMP	4829.10	4828.00	4832.01	1.75	5.86	Class A	4831.27	Yes
CV-43	32" CMP	4824.00	4823.00	4827.85	1.44	6.25	Class A	4827.17	Yes
CV-44	32" CMP	4820.38	4819.33	4825.70	1.99	7.97	Class A	4825.05	Yes
CV-45	18" CMP	4820.20	4819.80	4822.51	1.54	4.78	Class A	4822.20	Yes
CV-46	18" CMP	4817.80	4816.60	4820.11	1.54	4.78	Class A	4819.80	Yes
CV-47	36" RCP	4814.40	4814.30	4818.34	1.31	8.44	Class A	4817.90	Yes
CV-48	36" CMP	4815.09	4814.83	4820.33	1.75	7.97	Class A	4820.09	Yes
CV-49	36" CMP	4815.70	4815.50	4820.91	1.74	8.49	Class A	4820.70	Yes
CV-50	36" CMP	4817.38	4816.74	4822.55	1.72	9.08	Class A	4822.38	Yes
CV-51	36" CMP	4818.55	4818.41	4823.73	1.73	8.95	Class A	4823.55	Yes
CV-52	36" RCP	4821.14	4820.50	4826.23	1.70	12.06	ED	4826.14	Yes
CV-53	24" CMP	4824.22	4822.85	4828.93	2.36	7.72	Class A	4828.22	Yes
CV-54	18" CMP	4828.20	4827.30	4830.95	1.83	5.81	Class A	4830.20	Yes
CV-55	18" CMP	4861.10	4861.00	4864.97	2.58	5.54	Class A	4864.60	Yes

Notes:

ED=Energy Dissipation Required

All existing conditions HY8 models were developed to ascertain hydraulic performance including freeboard, velocities, and efficiency. Table 4 on the previous page summarizes the results. All closed storm drain pipe is modeled in StormCAD. For additional results and input parameters, reference **Appendix C**.

6.2.3.2 Ditch Review

Analysis of the potential for overtopping or breakout of flow due to insufficient capacity was conducted utilizing HEC-RAS Version 5.0.7 (RAS2D). Two-dimensional modeling provides a more robust and detailed view of potential flow patterns and areas of overtopping. Based on the review.\, two areas were noted as having the potential for such condition during larger (50-year+) storm events.

Breakout occurs near the intersection of Hillandale Avenue and Manzano Expressway. Based on available topographic data and field observations, this is due to the ditch flow line being nonexistent along the northern ROW of the Manzano Expressway. As shown on Figure 15, the ditch flowline has been damaged or eroded due to heavy vehicle traffic, and the upstream pipes on the southern ROW are damaged and insufficient in capacity to convey runoff. Any runoff off beyond nuisance flow will be conveyed to the southern ROW limits, creating a driver safety issue.

The culverts beneath Hillandale Avenue were noted as sediment laden and damaged. When modeled as such, it become apparent that additional breakout from the channel could occur during large storm events. Downstream, at the highway cross, the same is true of the inlet side. Headwaters have potential to overtop and meander downstream where they are conveyed across the roadway at the major intersection.

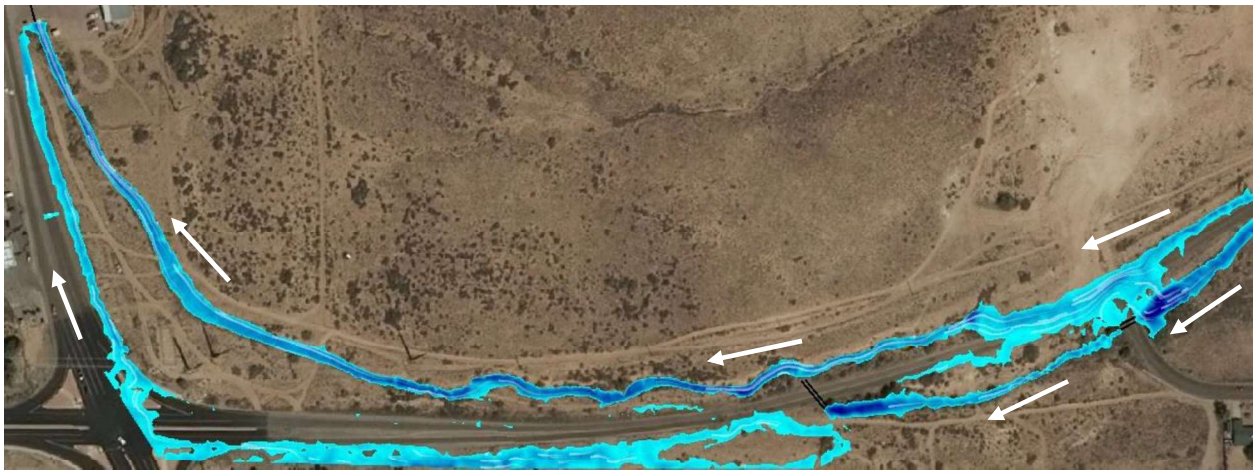


Figure 15 – Estimated Breakout Flow Depths at Manzano Expressway Intersection

An investigation of the arroyo at Highway 47 was also conducted. The investigation included a direct runoff model, which simulates a storm event over the watershed in its entirety and allows for the dispersion of overland runoff as it would occur, through the swales and naturally occurring depressions within the terrain relief. There appears to be potential for stormwater to concentrate along the outer perimeter of the properties at La Paz Avenue. See Figure 16 for a depiction of modeling results.

Figure 16 – Breakout Flows at La Paz Avenue

7.0 Capital Improvements Plan

7.1 Alternatives Development

Analysis prepared within the DMP has been developed to support mitigating existing drainage system deficiencies while developing a prioritized capital storm drainage improvement projects for the community at large, here-in known as the Capital Projects Plan of Rio Communities. The recommendations in this report are not limited to the Rio Communities census-designated place (CDP) limits. HDR identified several potential projects that, when developed in conjunction with the recommended future projects for the Capital Projects Plan, could provide a holistic approach toward flood mitigation within the region and strive to maintain safe passage along the major corridors that provide access to the community, namely Manzano Expressway and NM Highway 47. Items identified and further investigated within this report include the following:

- Regional conveyance channels – As stated previously, there are two primary conveyance channels through the community. Each drain along the major corridors is identified within the community limits. Field review also identified both incised channels, which show significant signs of erosion and deformation due to public access. HDR has developed plans to protect and restore the features.
- Regional detention facility outfalls – Field observations concluded that multiple outfalls at regional detention/retention facilities are failing. HDR has developed conceptual designs to replace and repair features.
- Hydraulic structures – Multiple structures were noted as needing repair due to scour/erosion. HDR has developed alternatives to repair.
- On-site drainage infrastructure – As discussed earlier in this report, there are currently no designated on-site drainage facilities in Rio Communities CDP limits. A system of conveyance features could be developed to contain and convey stormwater discharge within Rio Communities CDP limits.
- Joint project with NMDOT – Drainage infrastructure along the corridors has been identified as insufficient, with a history of flooding to the point of being impassable. A joint venture project with NMDOT has been identified as an opportunity for a coordinated effort between Rio Communities and NMDOT, which can lead to improved drainage infrastructure in the region and ultimately improve conditions for the Rio Communities residents and emergency services.
- Drainage guidelines – As Rio Communities continue to grow, the development of drainage policies and guidelines is suggested to provide clear and concise adopted regulations for future development and growth. Sediment and erosion are both of real consequence within the area and should be considered during the development of drainage infrastructure.

The following sections describe the recommended improvement projects, features, and locations as identified through the analysis described in this report. The recommendations were reviewed based on their feasibility, O&M requirements, and long-term stability as a solution for mitigating floodwaters

developing within the community and surrounding region. Recommendations that meet those requirements are carried forward in the Rio Communities Capital Projects Plan through the following sections. Recommendations requiring coordination with additional agencies or that are outside of the developed Rio Communities CDP limits are listed as additional opportunities to improve the overall DMP of the community and surrounding region. The Proposed Drainage Features – Overview Exhibit in **Appendix A** relates the vision of the drainage infrastructure through a graphical representation of proposed features and projects identified within this study.

7.1.1 Project 1 – Culvert Replacement and Repair

During review of existing conditions, it was noted that pipes conveying floodwaters along Manzano Expressway decrease in size from dual 36-inch to dual 30-inch pipe. The pipes were also noted as being deteriorated and damaged. The outfall of the 30-inch pipes into the well incised channel along the northern ROW limits is perched significantly above the bed floor (measured at 4 feet). The perched pipes are held in place by what can be best described as a spot repair containing shotcrete and welded wire fabric.

Replacement of the pipes is recommended to provide consistent conveyance capacity. It is further recommended to stabilize the outfall by installing pipes in a broken back configuration. See Figure 17 for a representation of the proposed configuration as depicted in the NMDOT Drop Inlet with Full Pipe Rundown Standard Detail 515-05.

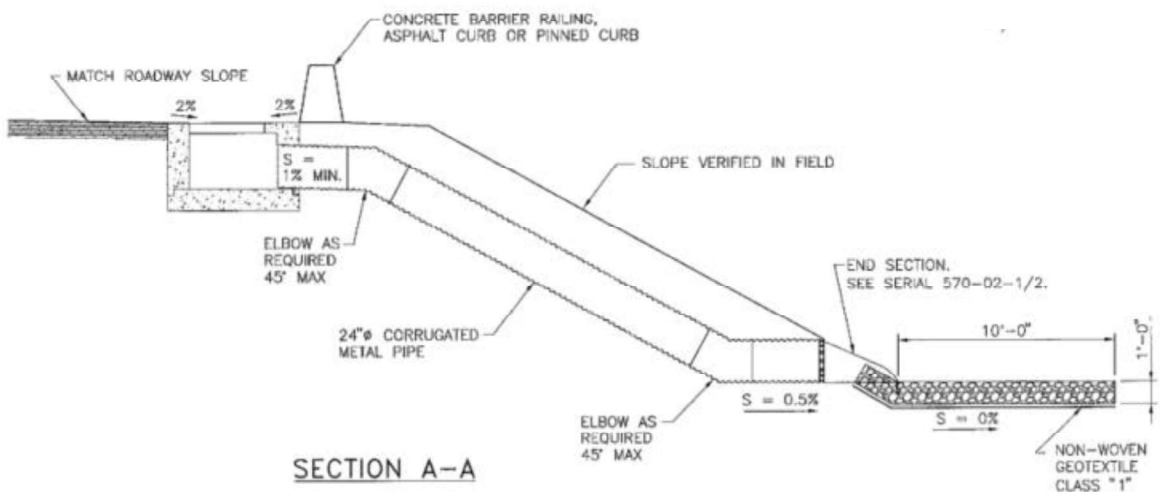


Figure 17 – Broken Back Pipe Configuration

With this configuration, the pipes can be set to outfall just above the channel floor, reducing turbulence and erosion potential. The high velocities can be dissipated within the pipe at the bend sections and provide stable outfall conditions. With the installation of the features, both the access point and the expressway access can be improved greatly. Headwater at the inlet can be controlled by constructing the inlet in a sump condition, reducing the potential for breakout of stormwater further west.

7.1.2 Project 2 – Culvert Repair and Channel Restoration

The ditch conveying off-site discharge through the community along the eastern ROW limits of NM Highway 47 appears to have been noted as unstable prior to this study, as evident in the concrete check dams identified during field reconnaissance. Reference Section 3.0 for information on scour depths and other noted features during the field work.

There are multiple outfall aprons at culvert crossings, which are no longer bearing on supporting soils. Headcut from the downstream channel has propagated upstream and through the apron. If left in current conditions or further erosion occurs, it is likely the concrete will crack and eventually fail. The aprons contain no preventative measure to contain headcuts or nick points from propagating further. HDR recommends attachment of cutoff walls on all outlet aprons. These will provide a hard point within the channel and protect supporting soils beneath the aprons. These can be attached to the existing aprons that appear to be structurally sound (no cracks or spalling). The cutoff walls can be attached via dowels with epoxy. See Figure 18 for a sample of such a configuration.

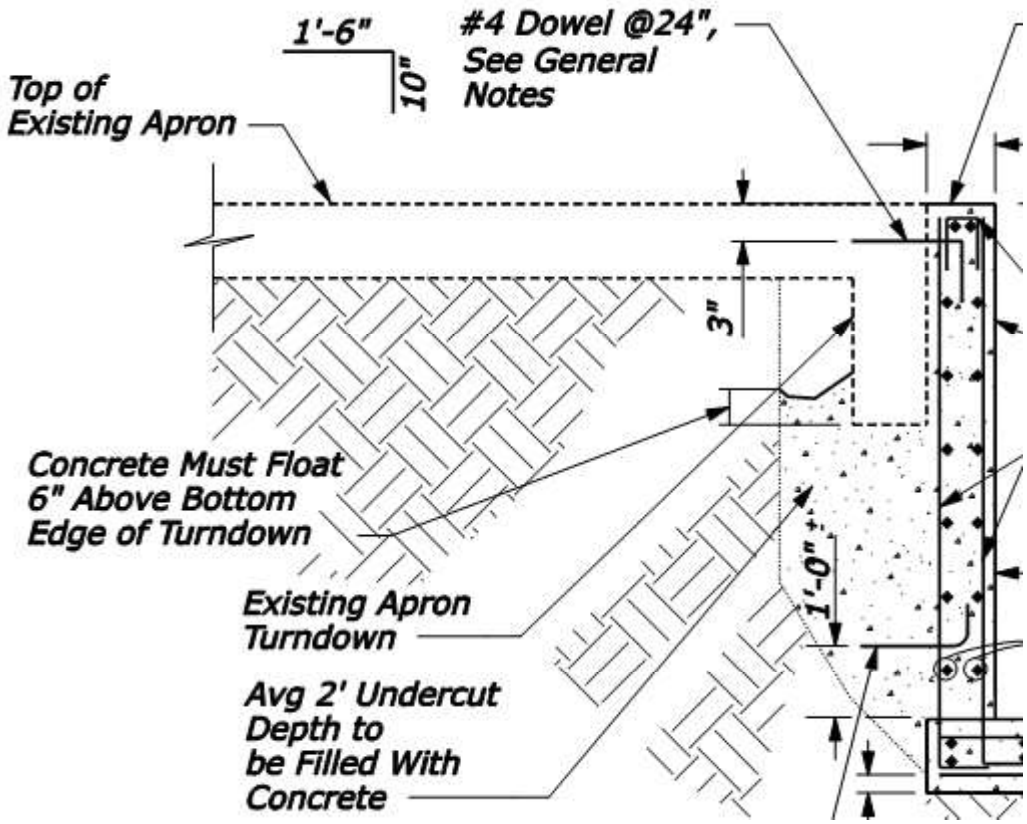


Figure 18 – Cutoff Wall Attachment

Cutoff walls with slurry backfill will provide stable foundation for the culvert outfall, as well as prevent further headcut migration.

Similarly, there was significant erosion at the 24-inch outfall pipe on the upstream side of the Goodman Avenue culvert crossing. If left unaddressed, the upstream headwall is susceptible to failure mechanisms

as noted for the downstream apron. Two options are available to repair and protect the region. Option 1 would be an extension of the headwall to the pipe with additional concrete and a pipe punch configuration for the pipe outlet. Option 2 would be a riprap mattress to protect the region and mitigate erosion potential. HDR recommends Option 2 to install a cost-effective measure that will protect the headwall and pipe without unneeded additional construction.

Lastly, there were previous check dams installed immediately downstream of the culvert outfalls. It appears these features have not operated as intended. Headcuts are still prominent in the channel and causing a high level of potential structural value at the culvert outfall aprons. HDR recommends analysis of the check dams and sediment/erosion of characteristics be conducted to set the check dams properly to raise the channel bed in a safe, effective manner that stabilizes the channel length along NM Highway 47.

7.1.3 Project 3 – Roadway Improvements

Project 2 addressed the downstream portion of the arroyo in the eastern ROW limits of NM Highway 47. Project 3 is an extension of that work to improve conditions along the upstream portion of the arroyo. As noted in the field investigation, the arroyo is highly incised and as deep as 24 feet in the region just west of Damon Street.

The arroyo appears to be encroaching into the clear zone of Damon Street and could be considered a roadside hazard. To protect motorists and provide improved on-site drainage conditions, HDR recommends installation of an 8-inch curb and gutter along the length of the hazardous area. The curb and gutter is a deterrent from off-road enthusiasts using the area to ride around in, as well as reduce potential for motorists hopping the curb and driving into the incised channel. Further protection could be in the form of guardrail.

The curb and gutter can be extended to the inlet located near the intersection of Damon Street and Goodman Avenue. This, along with valley gutters located strategically along the Damon Street alignment, will improve drainage conditions identified in the area. Street drainage capacity will be improved, and the bird bath can be removed with providing positive drainage to the inlet.

7.1.4 Project 4 – Storm Drain Improvements

Project 4 addresses direct concerns conveyed to the HDR team by the residents, as well as failed storm drain infrastructure that needs immediate repair. Repetitive flooding of the existing drainage infrastructure along San Lucas Avenue, Charmartin Avenue, and Lee Trevino Boulevard have created private property flooding and structure failure issues.

It has been reported the landscape gravel from the private property located 142 San Lucas Avenue is washed into the roadway during large storm events. Additional median drop inlets at the center of roadway would assist in capturing roadway runoff that bypasses the single median drop inlet located upstream from the private property. This would help prevent larger flows from reaching the private property location.

The concrete rundown at the intersection of San Lucas Avenue and Charmartin Avenue has failed. A replacement of the existing concrete rundown will ensure drainage is properly discharged into the existing pond without the erosion of existing roadway infrastructure. Additional soil protection measures, curb and gutter replacement, and valley gutter installation will assist with discharge capture and prevent future failure at this location.

7.1.5 Project 5 – Navajo Loop Channel

As part of the development of the CIP for Rio Communities, HDR was contracted to provide a planning-level design and assessment of a proposed drainage channel within the future sub-division development located on the southeastern limits of the community. For purposes of this report, the channel was identified as the Navajo Loop Channel. Figure 19 is the study location.

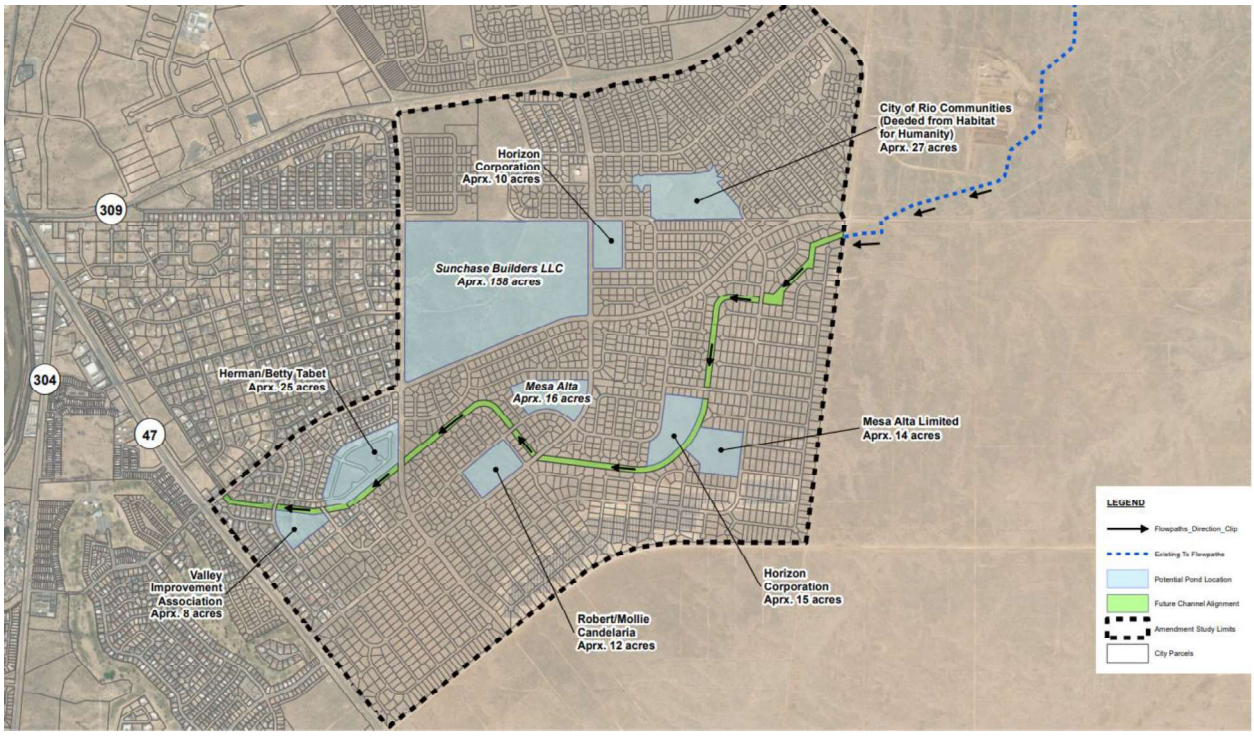


Figure 19 – Navajo Loop Channel Development

As depicted on Figure 19, the channel will convey runoff from the off-site watersheds located east of the developments as well as the runoff from the future community lots. Due to the change in land use from natural desert to 0.25-acre single family dwellings, there will be a significant increase in runoff, which will require attenuation to keep outfall peak discharge rates at or below existing conditions as defined within this report. A series of detention ponds and lateral inline weirs are recommended to provide the attenuation and safely pass both the on- and off-site storm water through the community expansion. The channel will be required box culvert or pipe culvert at future roadway crossings.

At the time of this report there are no grading plans of the pending developments. It is assumed grades will be similar in nature to the existing ground. Existing drainage patterns, watershed limits, and outfalls were maintained as best as possible given the limited data.

The existing conditions hydrologic model was modified to reflect the future conditions, assuming full build out, of large sub-division communities with 0.25-acre single family lots. The sub-divisions and their outfalls are based on drainage patterns from the previous study. Valley gutter and storm drain can be utilized for collection and conveyance through the street sections. See **Appendix A** for a map of the drainage areas and calculated peak discharge rates.

A profile of the existing grades along the proposed channel alignment indicates there are two distinct grades that will control the hydraulics of the channel. Figure 20 is the existing grade profile of the Navajo Loop Channel alignment.

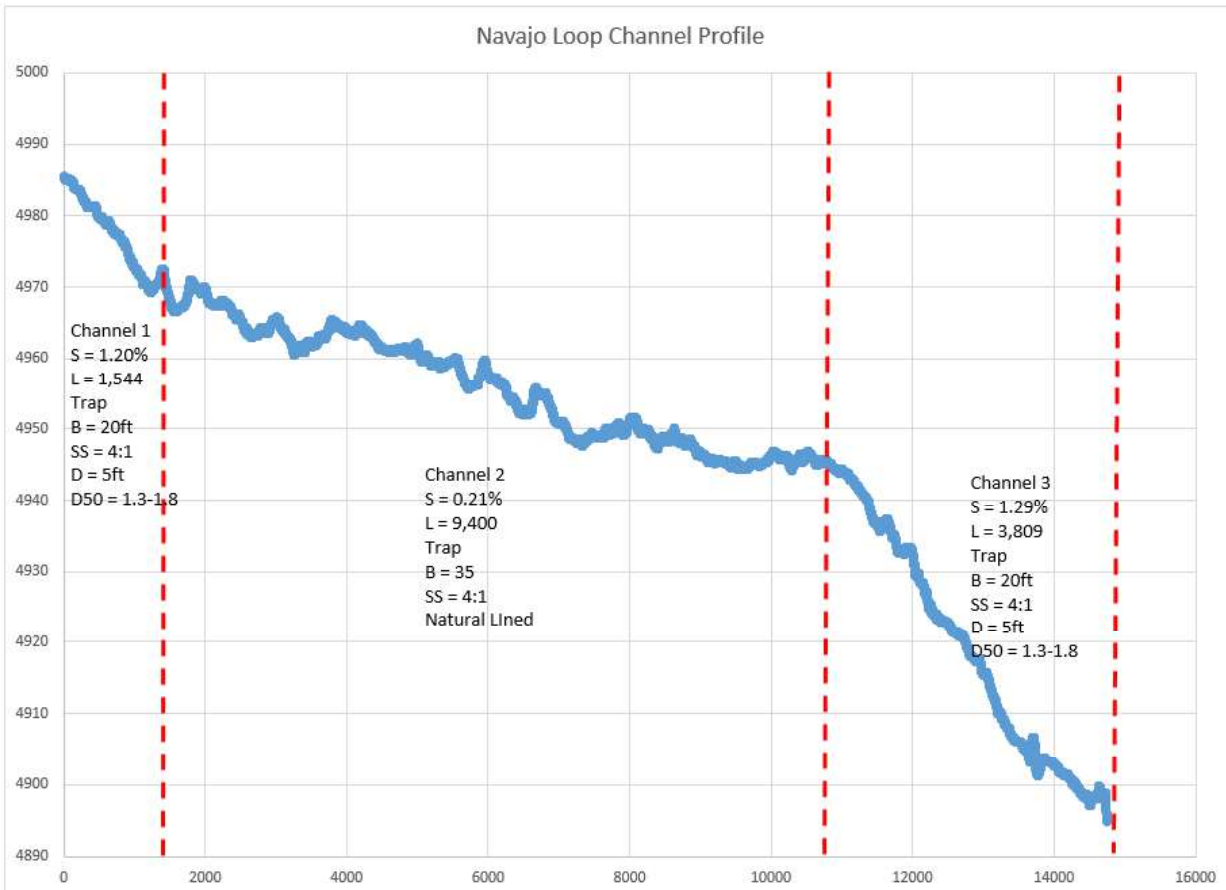


Figure 20 – Navajo Loop Channel Alignment

As shown in the profile, the Navajo Loop channel begins and terminates with steep grades, approximately 1.20 percent. The middle portion, identified as Channel 2, is 0.21 percent in grade. It is important to understand these characteristics to determine channel hydraulic performance, including shape and material.

Channel hydraulics were developed to maintain subcritical, mild flow regime conditions. Turbulent, high velocity conditions are not recommended in structures such as these. Therefore, as a baseline condition channel cross sections were developed to maintain Froude numbers between 0.6 to 0.8. Additionally, the channel lining was examined to stabilize the section and deter scour mechanisms such as shear stress and riling.

Table 5 lists the results of the channel assessment and recommendations for size, shape and channel lining materials.

Table 5 – Navajo Channel Design

Channel Section	Shape	Side Slope	Bottom Width (feet)	Height (feet)	Lining Material
Channel 1	Trapezoidal	4:1	20	5	Riprap
Channel 2	Trapezoidal	4:1	35	5	Natural Lined/Riprap
Channel 3	Trapezoidal	4:1	20	5	Riprap

Flow rates through the channels will require box culvert crossings at each roadway crossing. Box sizes are based upon NMDOT standard requirements for freeboard and hydraulic performance. **Table 6** is a listing of the recommended culvert sizing for roadway crossing along the channel alignment. Stationing of structures is based upon the profile developed by HDR for this project. See **Appendix A** for a figure depicting the location of each structure.

Table 6 – Culverts for Navajo Loop Channel

Culvert Identification	Size	Length (feet)	100-Year Flow Rate (cubic feet per second)	Outlet Velocity (feet/second)	End Treatment
C1	2- 4 feet x 12 feet	66	628	12	Riprap D50 = 1.3-1.8 feet
C2	2- 4 feet x 12 feet	66	770	7	Riprap D50 = 0.5 feet
C3	4 feet x 12 feet	66	363	9	Riprap D50 = 0.8 feet
C4	4 feet x 12 feet	66	363	9	Riprap D50 = 0.8 feet

Table 6 – Culverts for Navajo Loop Channel

Culvert Identification	Size	Length (feet)	100-Year Flow Rate (cubic feet per second)	Outlet Velocity (feet/second)	End Treatment
C5	2- 4 feet x 12 feet	66	375	9	Riprap D50 = 0.8 feet
C6	60-inch CMP	66	90	8	Riprap D50 = 0.5 feet
C7	60-inch CMP	66	90	8	Riprap D50 = 0.5 feet

During the development of the channel, it was noted that the southeastern region of the existing watershed is impacted by the footprint of the proposed development. The area impacted by future development is routed around the southern perimeter of the proposed development and collected in a region pond. The pond outfall follows existing patterns across Highway 47 and is discharged into the regional golf course with natural swales and retention/detention. All other ponds serve as mitigation of the off-site and increased flows due to development. The outfall is the existing channel paralleling NM Highway 47.

Detention ponds are sized to account for bulked flow rates for sediment and additional dead storage as outlined in the NMDOT Drainage Manual Guidance. The Natural Resources Conservation Service soils indicate fine sandy material in the watershed. This has also been evident in the field inspections. The dominant discharge that will transport this material is typically in the 5- to 10-year range in relatively undeveloped regions like the surrounding watersheds in the Rio Communities area. As the community continues to develop, storm events of the 3- to 5-year range become the predominant contributor to sediment.

The following bulking rates are recommended for the ponds and future ponds developed within the region.

f_{rural} = bulk flow for rural watershed = 1.20

f_{urban} = bulk flow for developed watersheds = 1.02

Table 7 is the estimated pond volumes required for storm water control within the region as well as recommended volumes for sediment control. Water surface elevations are based on the hydrologic analysis. See **Appendix A** for a HEC-HMS workmap of the study and **Appendix C** for results from the hydrologic assessment.

Table 7 – Navajo Loop Channel Detention Pond Results for the 100Yr Event

Pond Identification	Total Volume (acre-feet)	Total Inflow Volume (acre-feet)	Total Sediment Loading (acre-feet)	100-Year Event Water Surface (feet)	Freeboard Range (feet)
Pond 1	11.1	5.5	1.1	4964.90	2 – 2.6
Pond 2	47.6	77.7	11.4	4957.60	0.70 – 0.90
Pond 3	9.1	6.4	1.3	4947.10	1.0 – 1.9
Pond 4	4.4	1.8	0.4	4906.40	2.60 – 2.80
Pond 5	19.5	14.4	2.9	4946.75	1.25 – 1.50
Pond 6	43.0	95.8	12.5	4957.30	0.40 – 0.70
Pond 7	144.0	111.8	36.2	4920.00	0.80 – 1.50
Pond 8	42.1	37.2	7.4	4944.90	1.2 – 1.6

Notes:

1) **Freeboard range based on 10- to 20% dead storage.**

Results indicate ponds can adequately control 100-year event and sediment loading that is predicted for the watershed. Sediment loading includes bulked flow rates and dead storage as recommended by NMDOT guidelines. Pond 1 and Pond 4 contain additional capacity to account for the variability of volumes which may occur in either region, dependent up final design or conveyance of stormwater runoff in the region.

7.1.6 Project 6 - Operations and Maintenance

Project O&M addresses the necessary repetitive maintenance of existing drainage infrastructure to prevent debris, vegetation, and sediment from decreasing required design discharge capacities. Most repetitive maintenance would involve drainage pipes, specifically culverts at roadway crossings. There are some locations in the City where maintenance will be required to maintain roadside ditch shape. A few culvert and ditch re-establishment locations have been identified on the Project O&M Exhibit located in **Appendix A**.

7.1.7 Project 7 – Riggs Street Improvements

Rio Communities staff has indicated repetitive property flooding and sediment plumes have been impacting the properties immediately south of Riggs Road, in the Goulet Court area. A desktop review of historical aerial photography of the area made it very apparent that sediment plumes and flooding were indeed impacting properties. See Figure 21 for historical imagery of the area.

Figure 21 - Sediment Plumes on Riggs Street

To counteract and mitigate this phenomenon HDR is recommending a series of ditches, check dams and valley gutter to control and direct runoff to the downstream spillways conveying runoff through the cul-de-sacs. Check dams provide sediment control while the newly constructed ditches will provide conveyance capacity and direct overland flow to the existing outfalls.

7.2 Prioritization of Projects

Analysis prepared in the preceding section provides five drainage improvement alternatives with potential NMDOT partnering projects included. In support of developing a prioritized listing for purposes of project implementation over the next 15 years, the following subsections have been developed for severity of drainage problems, estimated efficacy of project, and engineering opinion of probable costs based on 2020 dollars. Per the governing scope of work, this project is strictly limited to construction estimates for large construction and their supporting brief descriptions.

7.2.1 Prioritization by Severity of Problems

Table 8 provides a matrix style review of the severity of problems based on source of floodwaters, impact on emergency services, and risks to persons or properties. Prioritization by this method suggests that projects with the greatest impact and risk should be considered for action in numerical order based upon their respective priority level.

Priority level is based on a scale of 1 being the highest and 5 being the lowest. Scores are based on a review of the following:

- Structure risk - Total number of local or critical facilities which may be impacted by floodwaters
- Impact timing – Risk factor for how quickly and how often floodwater will impact the area
- Impactof emergency services – Risk factor of impediment of emergency services reaching the area due to floodwaters
- Public Risk – Risk factor of floodwater impacting the public or local residents

Table 8 – Prioritization by Severity of Problems

Project	Priority Level	Structures at Risk	Impact Timing	Impact of Emergency Services	Public Risks
Project 1	1	Low	Immediate	Local roadways, and Manzano Expressway	Disrupts emergency services access
Project 2	2	Medium	Delayed	Local roadway access, Highway 47	Disrupts access to residential area, emergency services
Project 3	3	High	Delayed	Local access	Disrupts emergency services access
Project 4	2	High	Delayed	Local access	Disrupts emergency services access
Project 5	3	Low	Delayed/Future Development	Required to maintain access to residents	Required for future development

Table 8 – Prioritization by Severity of Problems

Project	Priority Level	Structures at Risk	Impact Timing	Impact of Emergency Services	Public Risks
Project 6	1	High	Immediate & Delayed	Minor impacts with significantly delayed impacts due to routing of floodwater	Disrupts emergency services access
Project 7	2	Medium	Delayed	Minor impacts with significantly delayed impacts due to routing of floodwater	Disrupts emergency services access

7.2.2 Prioritization by Efficacy of Project

Table 9 provides a matrix style review of the efficacy of the alternatives to assist Rio Communities through a consistent, rational, and objective process of selecting the alternatives herein. While each alternative provides benefits, the larger and more costly alternatives are less likely to be considered at this time. Considerations for future funding as part of the 15-year CIP process will govern the final relationship between selection and initiation of project alternatives. Table 9 has been prepared to guide the selection process though the following five categories 1) Organizational Strategy, 2) Project Champion(s), 3) Organizational Assessment, 4) Assessment of Resources, and 5) Parameters for Success.

Table 9 – Prioritization by Efficacy of Project

Alternatives	Organizational Strategy	Ease of Implementation	Organizational Assessment	Assessment of Resources	Parameters for Success
Project 1	Project Lead – Rio Communities & NMDOT	Medium Complexity - ROW access, Utility Management, Manzano Expressway Improvements, Traffic Control	Cross Functional Department Project & External Communications	**People:** NMDOT has limited staff, coordination required; Rio Communities' staff not identified **Time:** No issues identified **Budget:** Needs funding under CIP	**Timeframe for Completion:** Next 15 year of CIP projects **Metric of Success:** Improved roadway access, mitigation of scour potential, mitigation of flooding potential.
Project 2	Project Lead - Rio Communities & NMDOT	Medium Complexity - Stakeholder Coordination, NM-47 Improvements, Utility Management, Traffic Control	Cross Functional Department Project & External Communications	**People:** NMDOT has limited staff, coordination required; Rio communities staff not identified **Time:** No issues identified **Budget:** Needs funding under CIP	**Timeframe for Completion:** Next 15 year of CIP projects **Metric of Success**: Improved routing of floodwaters through community, stabilized conveyance features, stabilized channel
Project 3	Project Lead - Rio Communities	Light Complexity - Stakeholder Coordination, Traffic Control, Utility Management	Cross Functional Department Project	**People:** Rio Communities staff not identified **Time:** No issues identified **Budget:** Needs funding under CIP	**Timeframe for Completion:** Next 5 year of CIP projects **Metric of Success**: Improved on-site routing of floodwater, reduced residential flooding
Project 4	Partner Project: Rio Communities	Light Complexity - Stakeholder Coordination, Traffic Control, Utility Management	Cross Functional Department Project & External Communications	**People:** Rio Communities staff not identified **Time:** No issues identified **Budget:** Possible funding for small tasks	**Timeframe for Completion**: Next 5 year of CIP projects **Metric of Success:** Mitigate flooding of residential area, improved safety at damaged outfall.
Project 5	Project Lead - Rio Communities	High Complexity – ROW, Maintenance/Operations	Cross Functional Department Project & External Communications	**People**: Consultant(s) Required for development of plans for final construction. **Time:** No issues identified **Budget**: Possible funding for small tasks	**Timeframe for Completion:** Next 15 year of CIP projects **Metric of Success:** Regional flood control for the expanding community.
Project 6	Partner Project: Rio Communities	Medium Complexity -Stakeholder Coordination, Roadside Improvements, ROW access, Utility Management, Traffic Control	Cross Functional Department Project	**People:** Rio Communities staff not identified **Time:** No issues identified **Budget:** Possible funding for small tasks	**Timeframe for Completion:** Next 15 year of CIP projects **Metric of Success:** Improved performance of entire drainage system. Mitigate repetitive flooding.
Project 7	Project Lead - Rio Communities	Medium Complexity - ROW access, Utility Management, Traffic Control, Public Involvement	Cross Functional Department Project	**People:** Rio Communities staff not identified **Time:** No issues identified **Budget:** Possible funding for small tasks	**Timeframe for Completion:** Next 5 year of CIP projects **Metric of Success**: Improved on-site routing of floodwater, reduced residential flooding

7.2.3 Engineering Opinion of Probable Construction Cost

A cost estimate has been developed based on conceptual development of each proposed alternative as discussed in Section 3.0. Estimates are based on best available information regarding typical cost for construction services at the time of this report. Construction cost includes materials, services, and planning contingences. Total cost includes contingencies for construction management, mobilization and demobilization, survey, traffic control, and additional unforeseen cost, which are inherent with construction in both partially and fully developed projects.

Table 10 provides a matrix-style review of the engineering opinion of probable cost for the alternatives developed within this report. While the level of focus for this report has been developed to quantify only large construction items, a contingency of 20 percent has been utilized herein. Table 10 ranks the projects by cost for quick comparison to their respective magnitudes for future CIP development by Rio Communities. A breakdown of project cost can be found in **Appendix G.**

Table 10 – Prioritization by Engineering Opinion of Probable Construction Cost

Alternatives	Engineering Opinion of Probable Cost per NMDOT 2020 Costs
Project 1	$ 214,141
Project 2	$ 187,204
Project 3	$ 200,065
Project 4	$ 133,797
Project 5	$13,200,889
Project 6	$ 162,255
Project 7	$27,874

8.0 Additional Recommendations

Several additional recommendations were identified during development of the DMP for Rio Communities:

- O&M – Both long- and short-term O&M plans should be considered as a high priority to maintain an effective drainage and flood control plan. As identified in this report, the existing infrastructure is reduced in capacity by both sediment and vegetation. An improved O&M plan could maintain the hydraulic capacity and functionality of the recommended features.
- Sediment yield analysis – Based on the pervasive sediment deposits noted by both the current residents of Rio Communities and the field reconnaissance, it is recommended that additional analysis of the sediment yield from the contributing watershed be conducted. There are several means and methods for both cursory and detailed analysis. Chapter 6 of the NMDOT Drainage Manual Volume II – Hydraulics, Sedimentation and Erosion (November 1998) contains recommended methodologies for quantifying sediment yield rates. Developing a better understanding of those characteristics will yield a finer detail of design for the final construction of any of the recommended alternatives.
- Partnerships – As discussed previously, there appears to be additional opportunity to partner with other local agencies in the effort to improve conditions for the community and surrounding region. Shared cost ventures would benefit all interested parties in developing a regional drainage plan that promotes safe passage of roadway passengers and improved esthetics.
- Detailed Floodplain Study – Based on the findings within this report, there is potential to map floodplains within the community and develop a program for maintaining and regulating these features to provide enjoyment for the community without impacting public safety.
- Detailed mapping – All recommendations and analysis are based on best available topographic information. Light detection and ranging mapping have become cost effective and would provide further clarity to the drainage characteristics within the community and may provide further justification for addition or removal of proposed projects.
- Additional Studies – Rio Communities continues to be a forward-thinking community looking towards the future and planning the infrastructure required to get to the full vision. HDR suggest additional studies of the planned growth to determine the footprint and cost for development of a regional flood control system that controls not only stormwater but sediment which is a very significant contributor to the drainage concerns within the community.

9.0 Bibliography

Chow, V. (1959). *Open-channel Hydraulics.* New York: McGraw-Hill.

NMDOT. (2007). Drainage Design Criteria.

NMDOT. (2018, July). Drainage Design Manual. New Mexico, United States.

NMSHTD. (1995). Drainage Manual - Volume 1, Hydrology. Albuquerque: NMSHTD.

Bureau of Land Management. GIS Database, Landuse Reference, 2015

HDR Engineering, Inc. (HDR) Rio Communities Site Reconnaissance, April 2, 2014 and June 25, 2014.

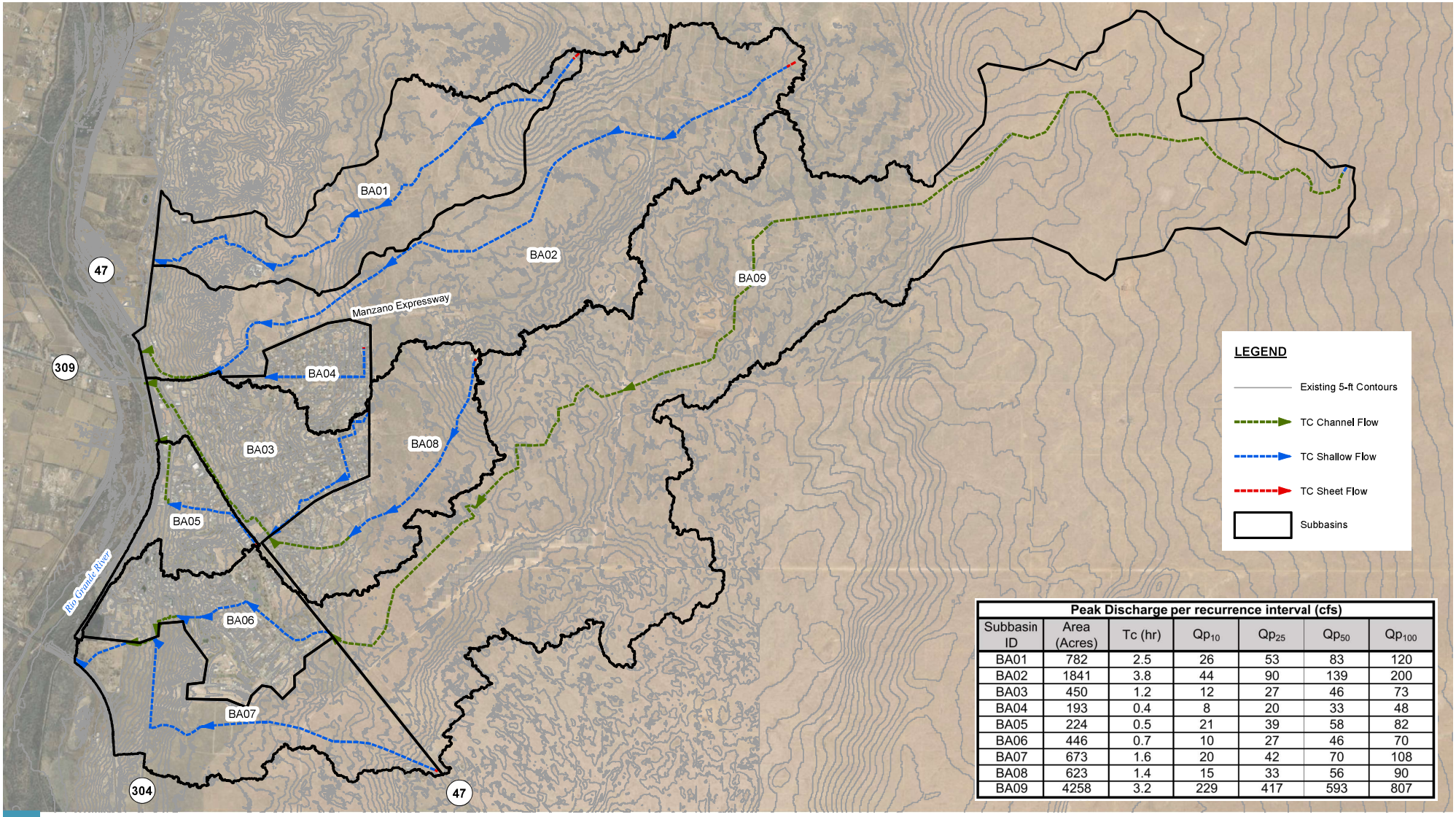
National Oceanic and Atmospheric Administration. ATLAS 14 Point Precipitation Frequency Estimates, obtained on December 17, 2013.

New Mexico State Highway and Transportation Department (NMSHTD), Interstate 25 As-Builts, 1963.

New Mexico State Highway and Transportation Department, Drainage Design Criteria, June 2007.

New Mexico State Lands, GIS Database, Landuse Reference, 2015 New Mexico Department of Transportation, Standard Specifications for Highway and Bridge Construction, 2014 Edition, Section 602.

Appendix A. Exhibits



Peak Discharge per recurrence interval (cfs)						
Subbasin ID	Area (Acres)	Tc (hr)	Qp_{10}	Qp_{25}	Qp_{50}	Qp_{100}
BA01	782	2.5	26	53	83	120
BA02	1841	3.8	44	90	139	200
BA03	450	1.2	12	27	46	73
BA04	193	0.4	8	20	33	48
BA05	224	0.5	21	39	58	82
BA06	446	0.7	10	27	46	70
BA07	673	1.6	20	42	70	108
BA08	623	1.4	15	33	56	90
BA09	4258	3.2	229	417	593	807

EXHIBIT DESCRIPTION:

The purpose of this map is to show existing drainage basins and their respective time of concentration (TC) flowpaths around the City of Rio Communities. These basins were delineated using USGS NED and 2010 MRCOG data.

N

0 1,000 2,000 Feet

EXHIBIT 1.1

EXISTING DRAINAGE BASIN DELINEATION AND TC

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\EXISTING\CORC_EXISTING_BASINS.MXD • USER: JCHAVEZ • DATE: 5/24/2021

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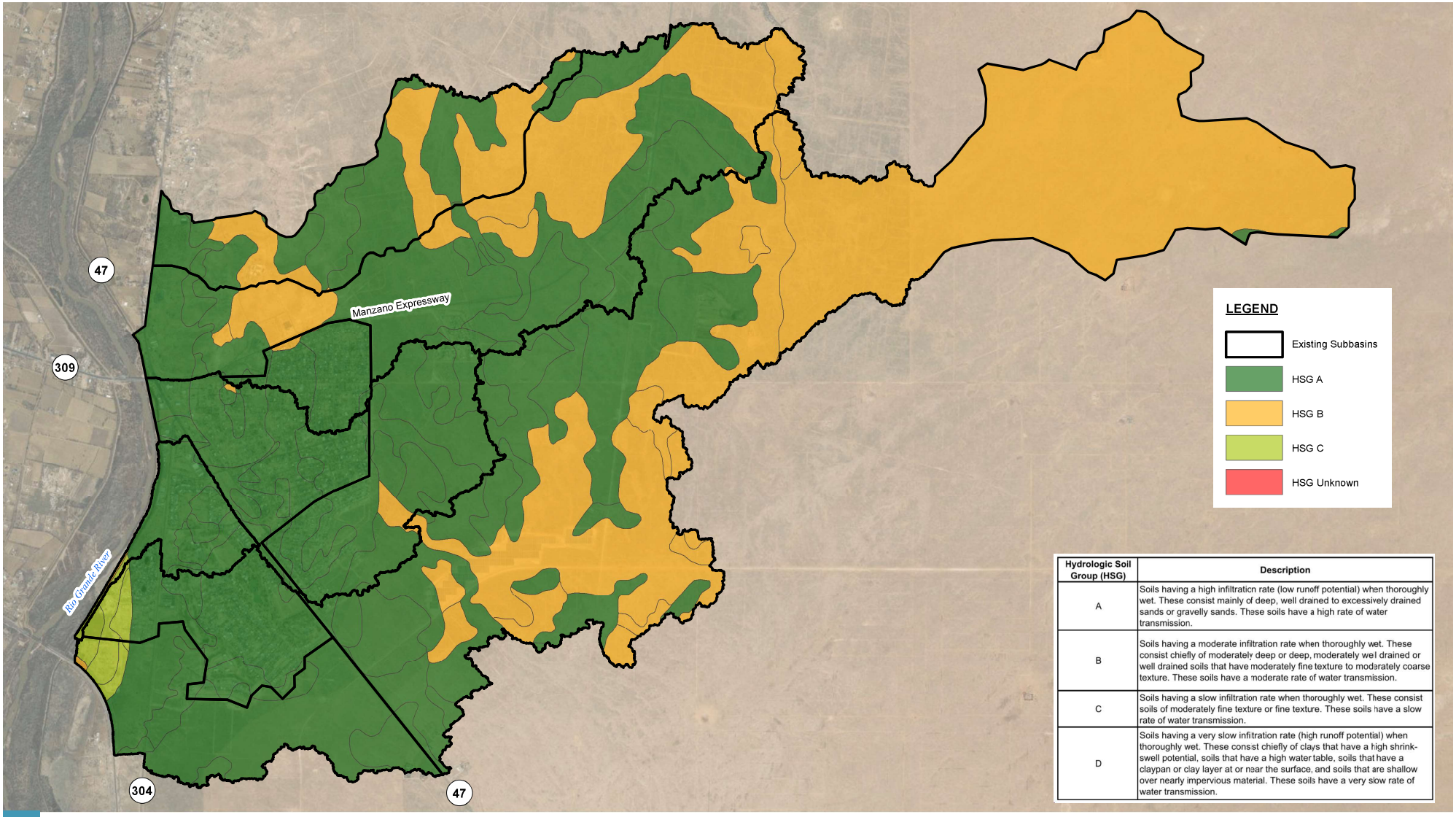

Hydrologic Soil Group (HSG)	Description
A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
B	Soils having a moderate infiltration 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.
C	Soils having a slow infiltration rate when thoroughly wet. These consist soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
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.

EXHIBIT DESCRIPTION:

The purpose of this map is to show existing hydrologic soils groups (HSG) around the City of Rio Communities. The existing basins were delineated using USGS NED and 2010 MRCOG data. This HSG information is provied from the USDA NRCE Web Soil Survey in September 2020.

N

0 1,000 2,000 Feet

EXHIBIT 1.2

EXISTING HYDROLOGIC SOILS GROUPS

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\EXISTING\CORC_EXISTING_SOILS.MXD • USER: JCHAVEZ • DATE: 5/29/2021

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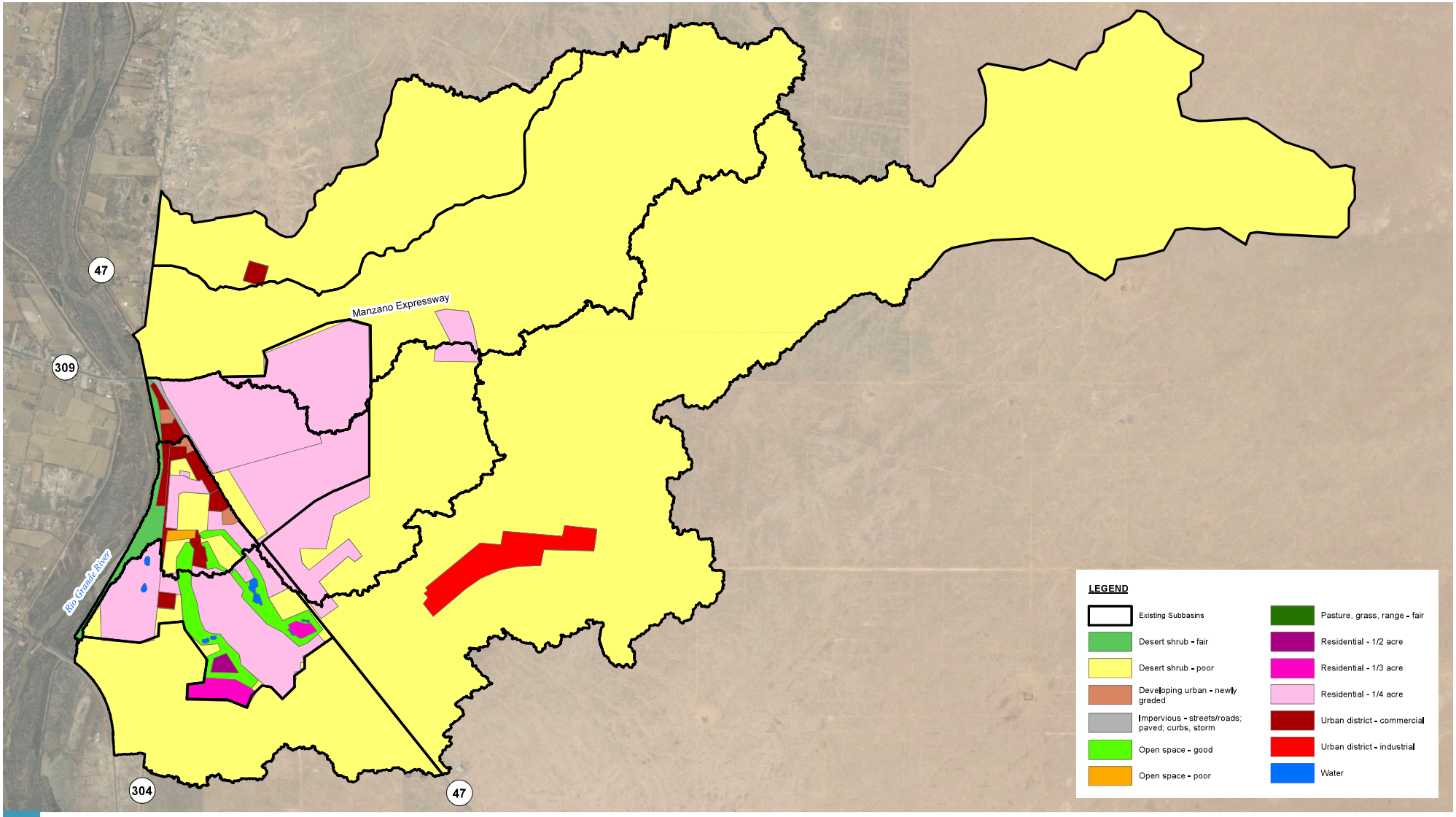

EXHIBIT DESCRIPTION:

The purpose of this map is to show existing land uses around the City of Rio Communities.

N

0 1,000 2,000 Feet

EXHIBIT 1.3

EXISTING HYDROLOGIC SOILS GROUPS

RIO COMMUNITIES DRAINAGE MASTER PLAN

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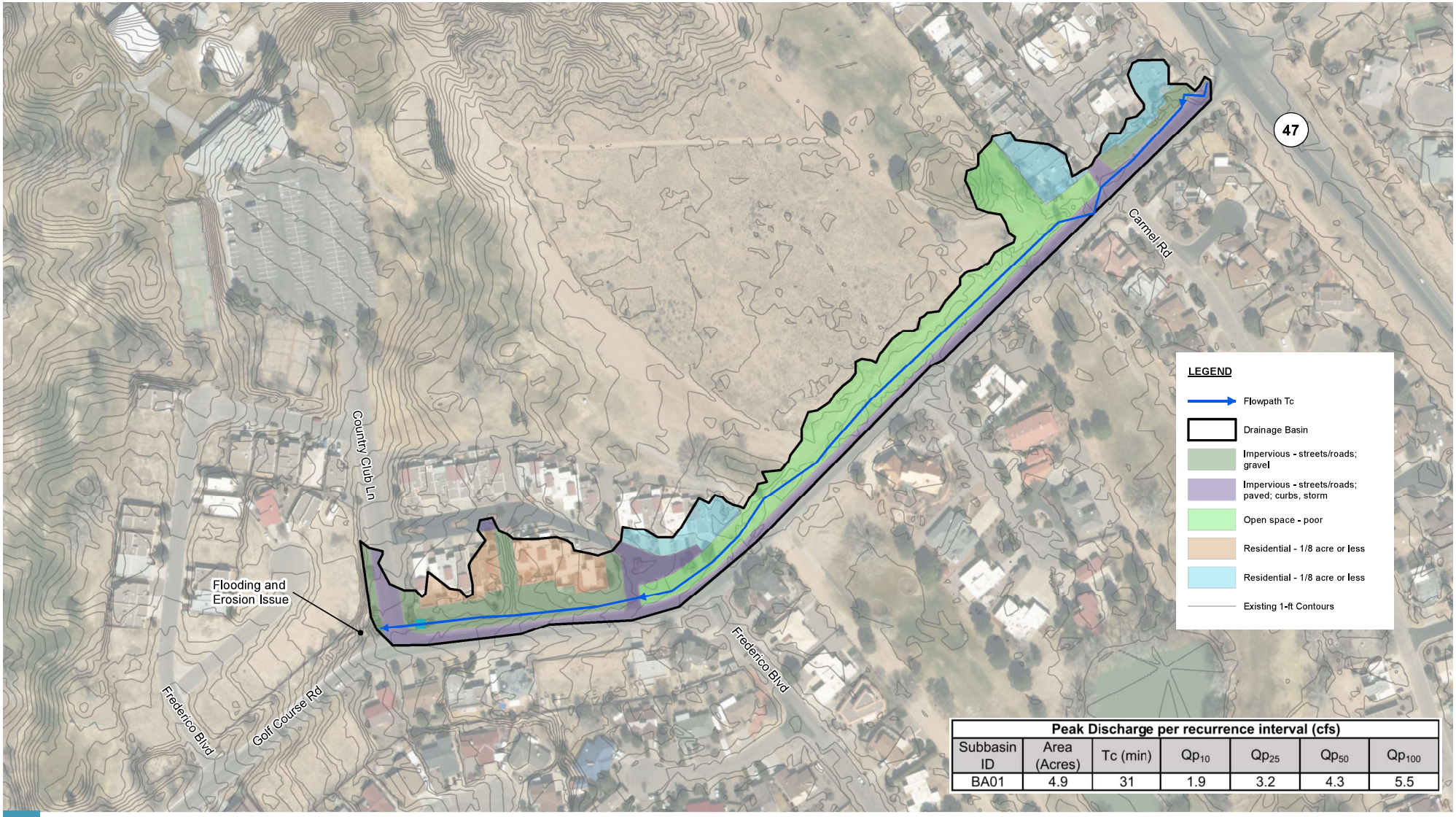

Peak Discharge per recurrence interval (cfs)						
Subbasin ID	Area (Acres)	Tc (min)	Qp_{10}	Qp_{25}	Qp_{50}	Qp_{100}
BA01	4.9	31	1.9	3.2	4.3	5.5

EXHIBIT DESCRIPTION:

The purpose of this map is to show existing drainage conditions for Country Club Ln in the City of Rio Communities.

N

0 50 100 Feet

EXHIBIT 1.4

EXISTING DRAINAGE CONDITION - COUNTRY CLUB LN

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\EXISTING\CORC_EXISTING_COUNTRY_CLUB.MXD • USER: JCHAVEZ • DATE: 5/28/2021

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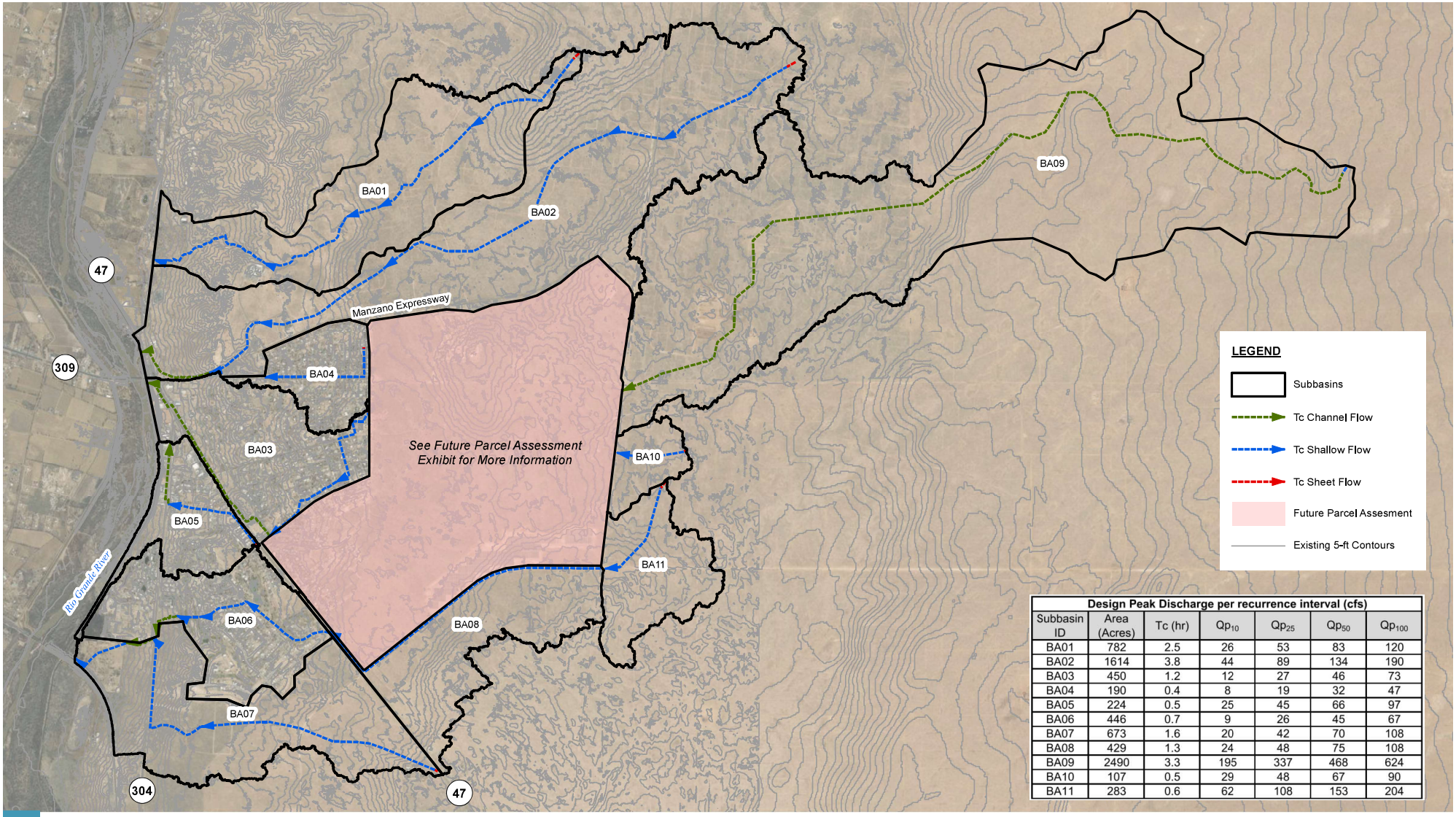

Design Peak Discharge per recurrence interval (cfs)						
Subbasin ID	Area (Acres)	Tc (hr)	Qp_{10}	Qp_{25}	Qp_{50}	Qp_{100}
BA01	782	2.5	26	53	83	120
BA02	1614	3.8	44	89	134	190
BA03	450	1.2	12	27	46	73
BA04	190	0.4	8	19	32	47
BA05	224	0.5	25	45	66	97
BA06	446	0.7	9	26	45	67
BA07	673	1.6	20	42	70	108
BA08	429	1.3	24	48	75	108
BA09	2490	3.3	195	337	468	624
BA10	107	0.5	29	48	67	90
BA11	283	0.6	62	108	153	204

EXHIBIT DESCRIPTION:

The purpose of this map is to show future drainage basins and their respective time of concentration (TC) flowpaths around the City of Rio Communities. These basins were delineated using USGS NED and 2010 MRCOG data.

N

0 1,000 2,000 Feet

EXHIBIT 1.5

FUTURE WATERSHED BASIN DELINEATION AND TC

RIO COMMUNITIES DRAINAGE MASTER PLAN

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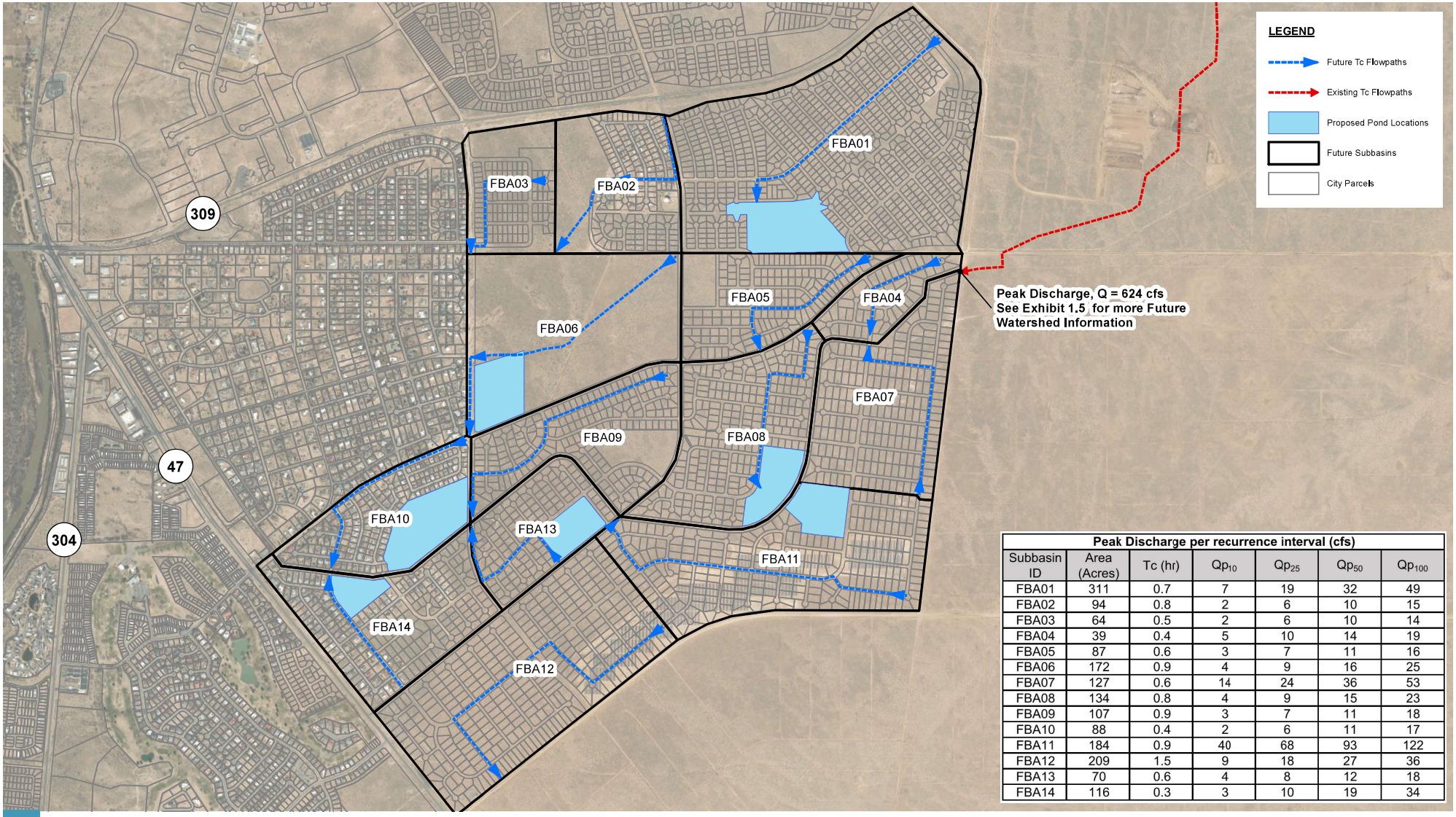


Peak Discharge per recurrence interval (cfs)						
Subbasin ID	Area (Acres)	Tc (hr)	Qp_{10}	Qp_{25}	Qp_{50}	Qp_{100}
FBA01	311	0.7	7	19	32	49
FBA02	94	0.8	2	6	10	15
FBA03	64	0.5	2	6	10	14
FBA04	39	0.4	5	10	14	19
FBA05	87	0.6	3	7	11	16
FBA06	172	0.9	4	9	16	25
FBA07	127	0.6	14	24	36	53
FBA08	134	0.8	4	9	15	23
FBA09	107	0.9	3	7	11	18
FBA10	88	0.4	2	6	11	17
FBA11	184	0.9	40	68	93	122
FBA12	209	1.5	9	18	27	36
FBA13	70	0.6	4	8	12	18
FBA14	116	0.3	3	10	19	34

EXHIBIT DESCRIPTION:

The purpose of this map is to show future drainage basins and their respective time of concentration (TC) flowpaths for a specific parcel area located within the City of Rio Communities. These basins were delineated using 2010 MRCOG data.

N

0 500 1,000 Feet

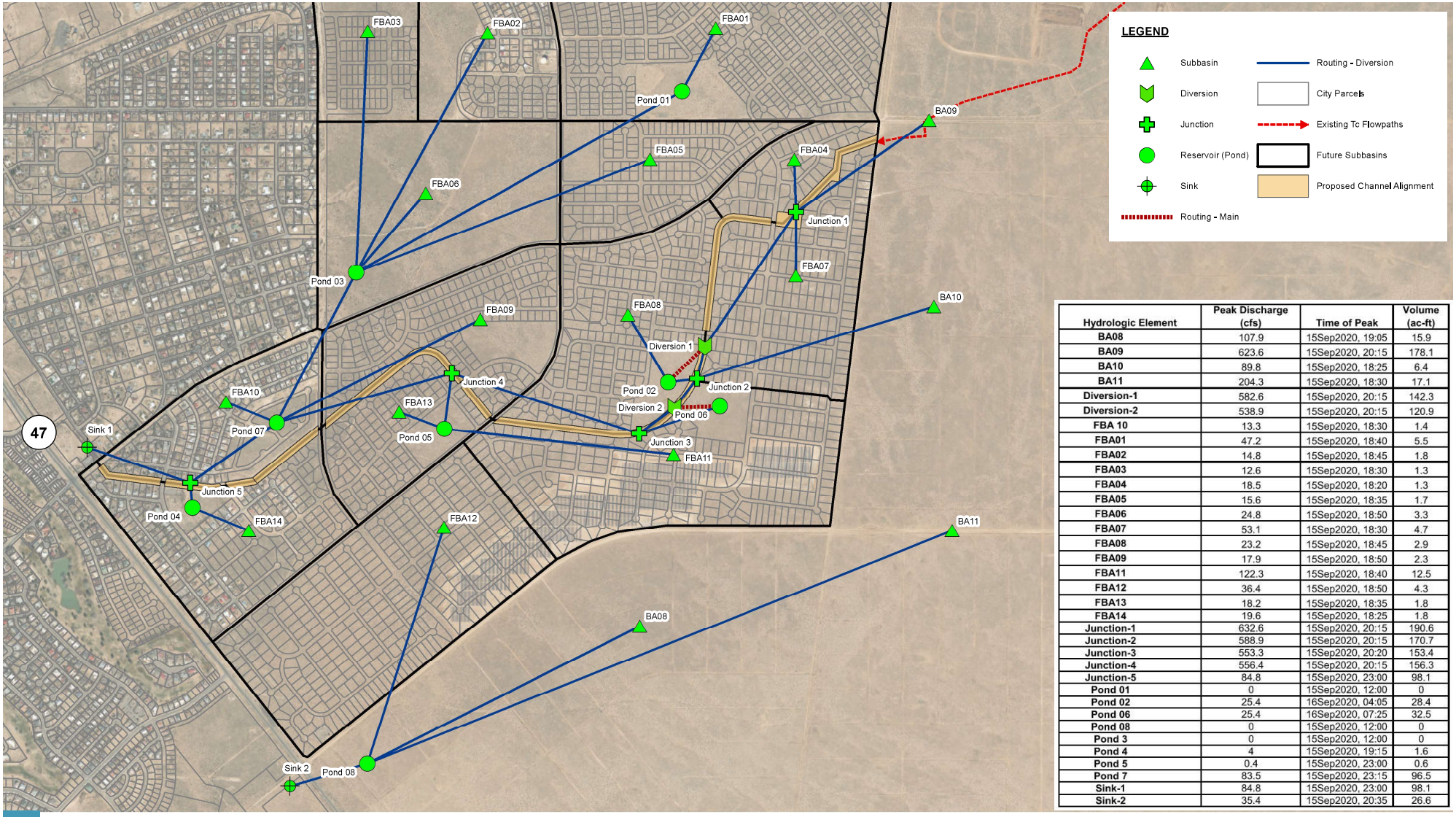
EXHIBIT 1.6

FUTURE PARCEL DRAINAGE BASIN DELINEATION AND TC

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\FUTURE_COND\CORC_FUTURE_PARCEL_BASINS.MXD • USER: JCHAVEZ • DATE: 6/14/2021

CONTRACT NO. 2020-0101



Hydrologic Element	Peak Discharge (cfs)	Time of Peak	Volume (ac-ft)
BA08	107.9	15Sep2020, 19:05	15.9
BA09	623.6	15Sep2020, 20:15	178.1
BA10	89.8	15Sep2020, 18:25	6.4
BA11	204.3	15Sep2020, 18:30	17.1
Diversion-1	582.6	15Sep2020, 20:15	142.3
Diversion-2	538.9	15Sep2020, 20:15	120.9
FBA 10	13.3	15Sep2020, 18:30	1.4
FBA01	47.2	15Sep2020, 18:40	5.5
FBA02	14.8	15Sep2020, 18:45	1.8
FBA03	12.6	15Sep2020, 18:30	1.3
FBA04	18.5	15Sep2020, 18:20	1.3
FBA05	15.6	15Sep2020, 18:35	1.7
FBA06	24.8	15Sep2020, 18:50	3.3
FBA07	53.1	15Sep2020, 18:30	4.7
FBA08	23.2	15Sep2020, 18:45	2.9
FBA09	17.9	15Sep2020, 18:50	2.3
FBA11	122.3	15Sep2020, 18:40	12.5
FBA12	36.4	15Sep2020, 18:50	4.3
FBA13	18.2	15Sep2020, 18:35	1.8
FBA14	19.6	15Sep2020, 18:25	1.8
Junction-1	632.6	15Sep2020, 20:15	190.6
Junction-2	588.9	15Sep2020, 20:15	170.7
Junction-3	553.3	15Sep2020, 20:20	153.4
Junction-4	556.4	15Sep2020, 20:15	156.3
Junction-5	84.8	15Sep2020, 23:00	98.1
Pond 01	0	15Sep2020, 12:00	0
Pond 02	25.4	16Sep2020, 04:05	28.4
Pond 06	25.4	16Sep2020, 07:25	32.5
Pond 08	0	15Sep2020, 12:00	0
Pond 3	0	15Sep2020, 12:00	0
Pond 4	4	15Sep2020, 19:15	1.6
Pond 5	0.4	15Sep2020, 23:00	0.6
Pond 7	83.5	15Sep2020, 23:15	96.5
Sink-1	84.8	15Sep2020, 23:00	98.1
Sink-2	35.4	15Sep2020, 20:35	26.6

EXHIBIT DESCRIPTION:

The purpose of this map is to show future HEC-HMS routing for specific parcel area located within the City of Rio Communities.

N

0 500 1,000 Feet

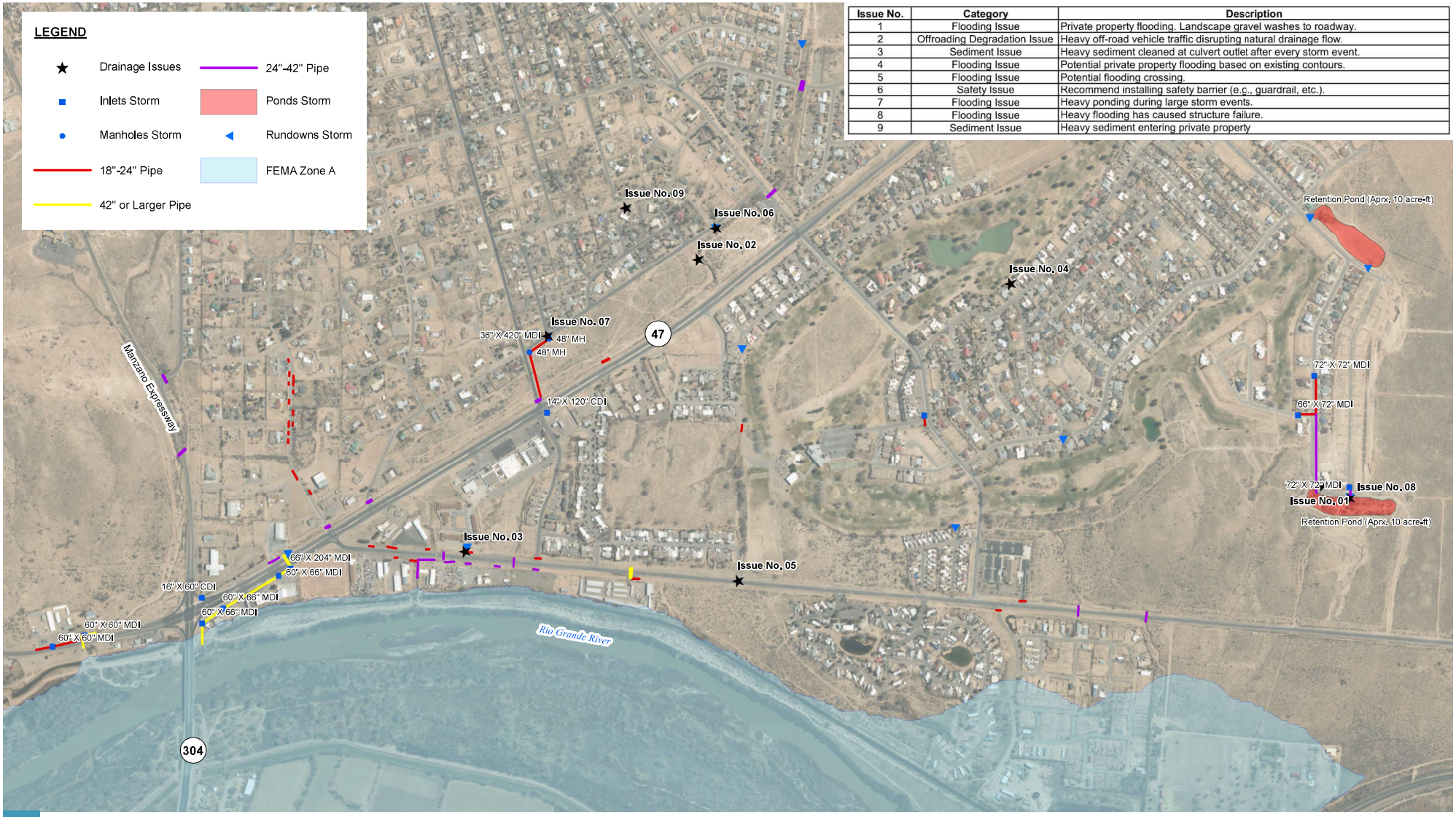
EXHIBIT 1.7

FUTURE CONDITIONS - HEC-HMS MODEL NETWORK

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\FUTURE_COND\CORC_FUTURE_PARCEL_HMS.MXD • USER: JCHAVEZ • DATE: 5/28/2021

CONTRACT NO. 2020-0101



Issue No.	Category	Description
1	Flooding Issue	Private property flooding. Landscape gravel washes to roadway.
2	Offroading Degradation Issue	Heavy off-road vehicle traffic disrupting natural drainage flow.
3	Sediment Issue	Heavy sediment cleaned at culvert outlet after every storm event.
4	Flooding Issue	Potential private property flooding based on existing contours.
5	Flooding Issue	Potential flooding crossing.
6	Safety Issue	Recommend installing safety barrier (e.g., guardrail, etc.).
7	Flooding Issue	Heavy ponding during large storm events.
8	Flooding Issue	Heavy flooding has caused structure failure.
9	Sediment Issue	Heavy sediment entering private property

EXHIBIT DESCRIPTION:

The purpose of this map is to show existing drainage features and issues indentified within the City of Rio Communities.

N

0 250 500 Feet

EXHIBIT 1.8

EXISTING DRAINAGE FEATURES AND ISSUES

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\EXISTING\CORC_EXISTING_FEATURES.MXD • USER: JCHAVEZ • DATE: 5/28/2021

CONTRACT NO. 2020-0101

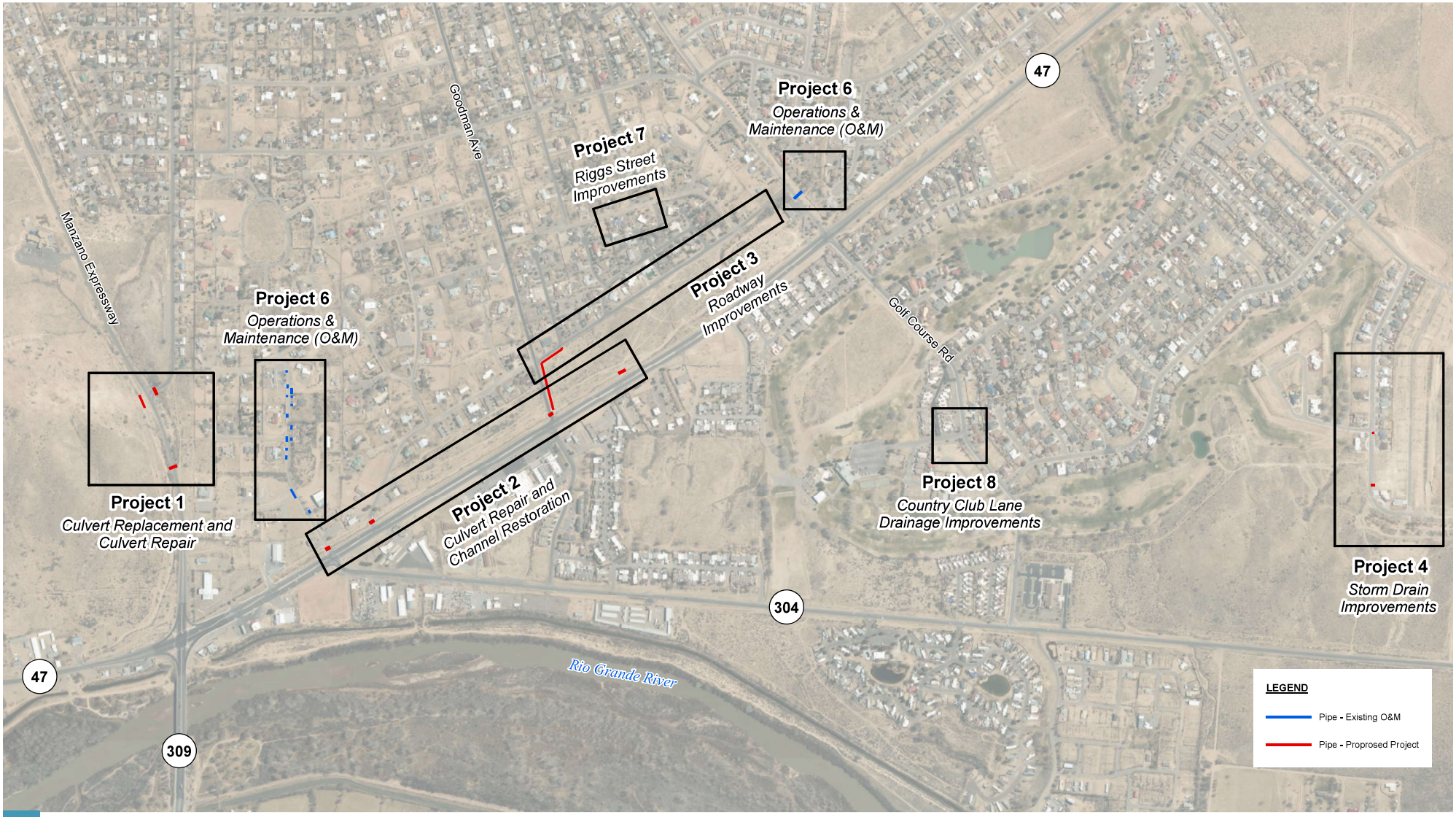


EXHIBIT DESCRIPTION:

The purpose of this map is to show an overview of the proposed drainage feature projects within the City of Rio Communities.

N

0 250 500 Feet

EXHIBIT 2.1.1

PROPOSED DRAINAGE FEATURES - OVERVIEW

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\CIP\CORC_PROPOSED_OVERVIEW_01.MXD • USER: JCHAVEZ • DATE: 6/14/2021

CONTRACT NO. 2020-0101

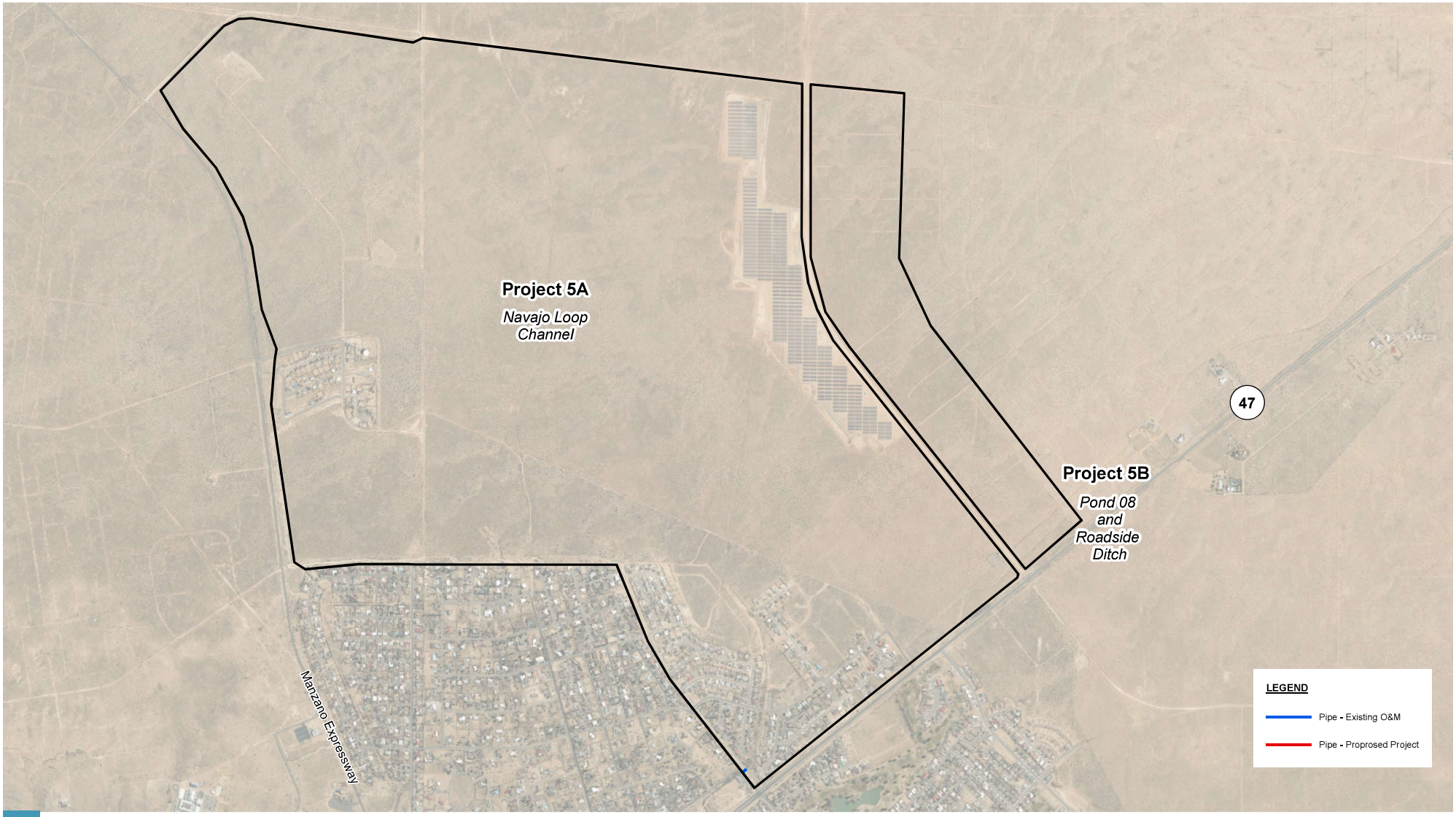


EXHIBIT DESCRIPTION:

The purpose of this map is to show an overview of the proposed drainage feature projects within the City of Rio Communities.

N

0 500 1,000 Feet

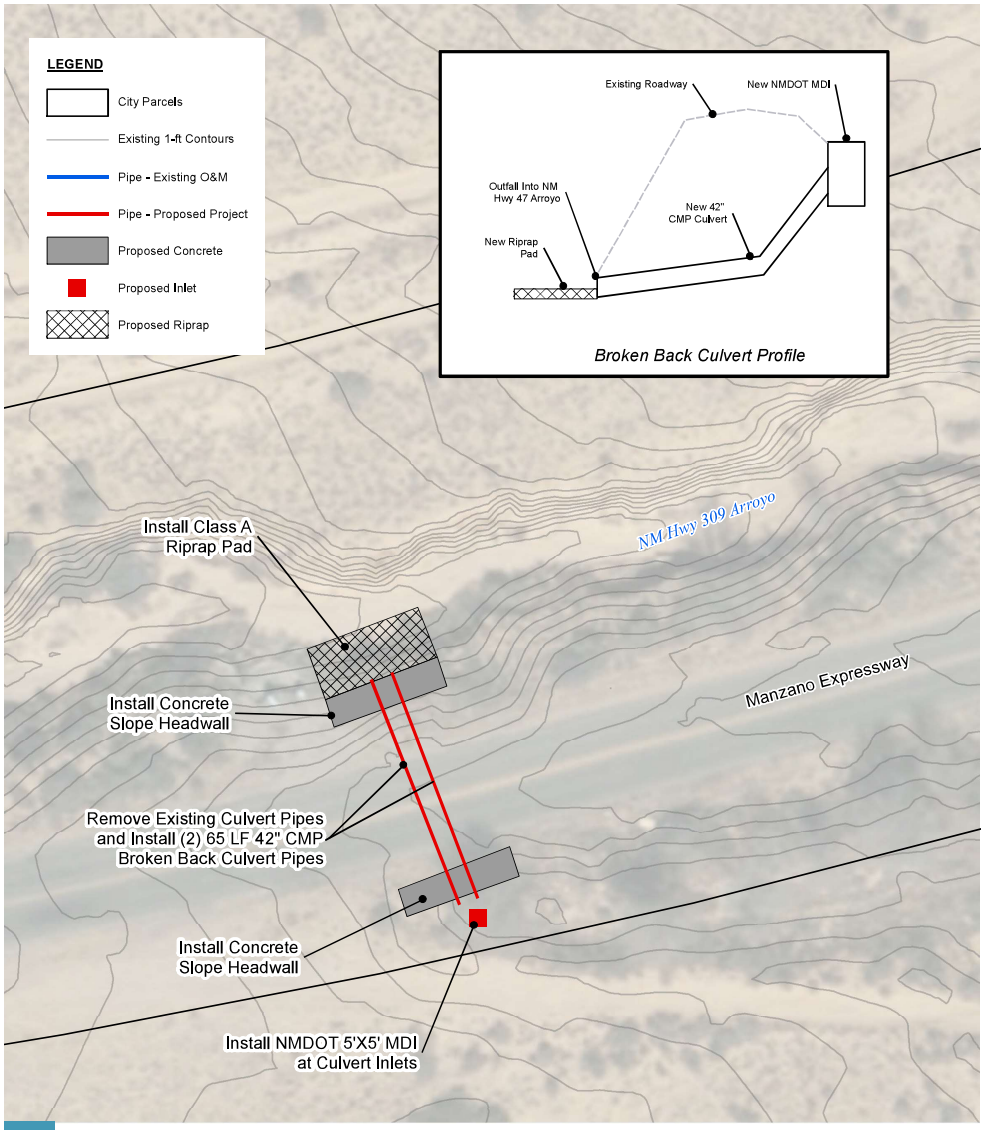
EXHIBIT 2.1.2

PROPOSED DRAINAGE FEATURES - OVERVIEW

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\CIP\CORC_PROPOSED_OVERVIEW_02.MXD • USER: JCHAVEZ • DATE: 6/14/2021

CONTRACT NO. 2020-0101



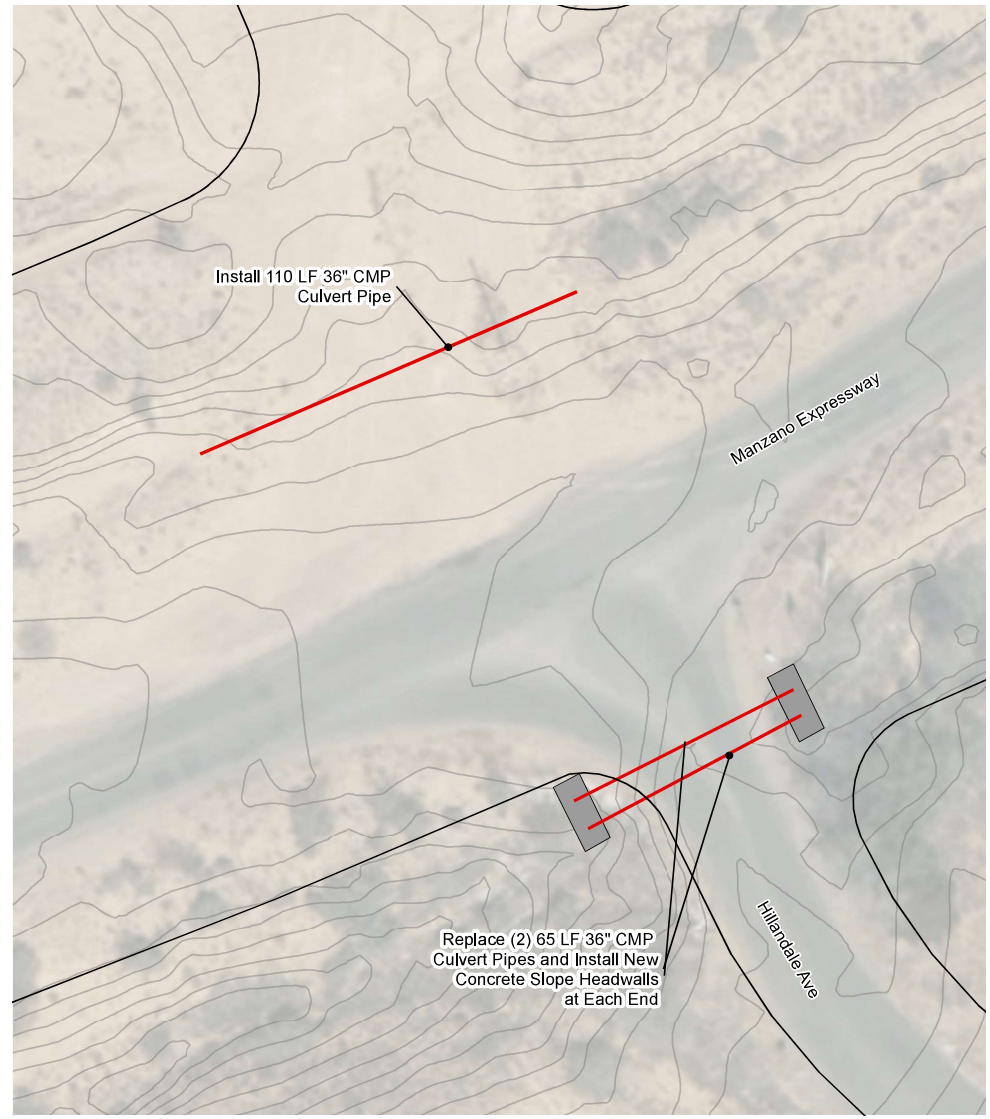


EXHIBIT DESCRIPTION:

The purpose of this map is to show proposed drainage features for Project 1 within the City of Rio Communities.

N

0 10 20 Feet

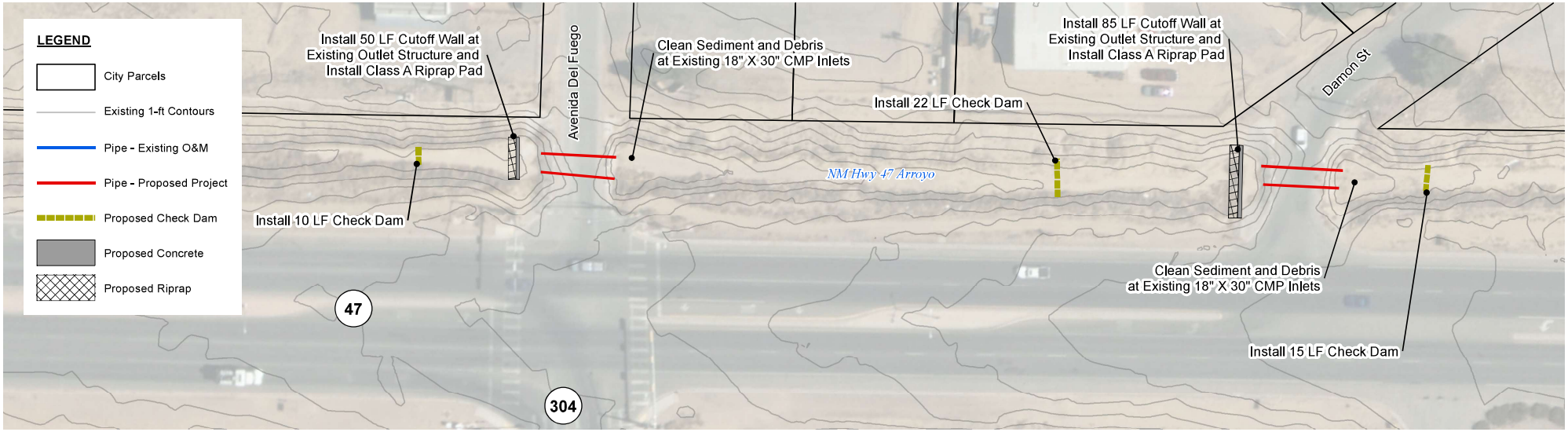
EXHIBIT 2.2

PROPOSED DRAINAGE FEATURES - PROJECT 1

RIO COMMUNITIES DRAINAGE MASTER PLAN

CONTRACT NO. 2020-0101

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\CIP\CORC_PROPOSED_P01.MXD • USER: JCHAVEZ • DATE: 5/28/2021



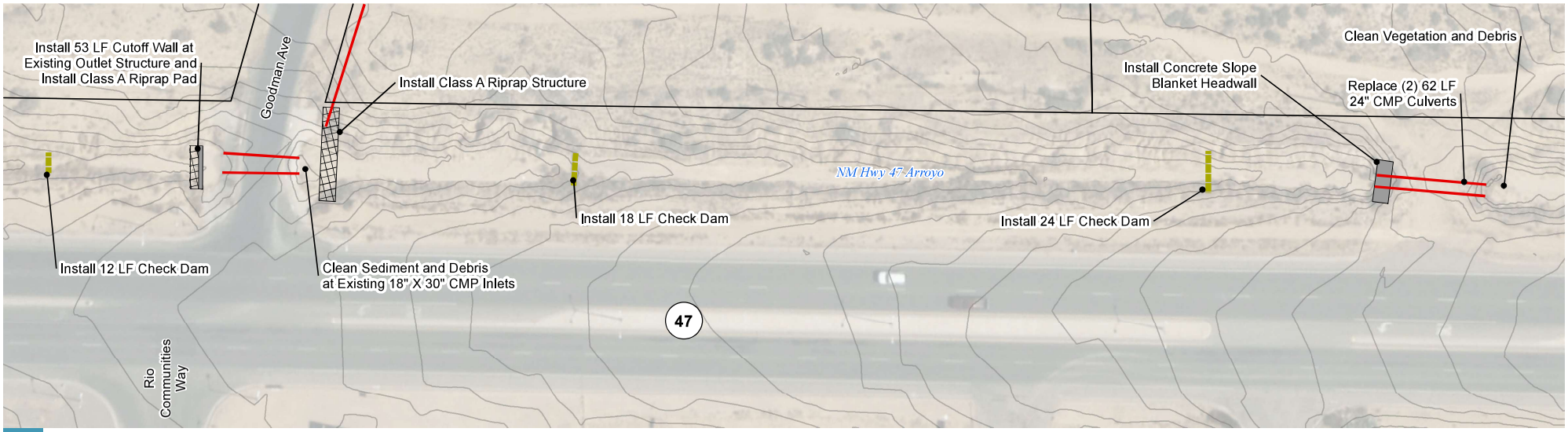


EXHIBIT DESCRIPTION:

The purpose of this map is to show proposed drainage features for Project 2 within the City of Rio Communities.

N

0 15 30 Feet

EXHIBIT 2.3

PROPOSED DRAINAGE FEATURES - PROJECT 2

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\CIP\CORC_PROPOSED_P02.MXD • USER: JCHAVEZ • DATE: 5/28/2021

CONTRACT NO. 2020-0101

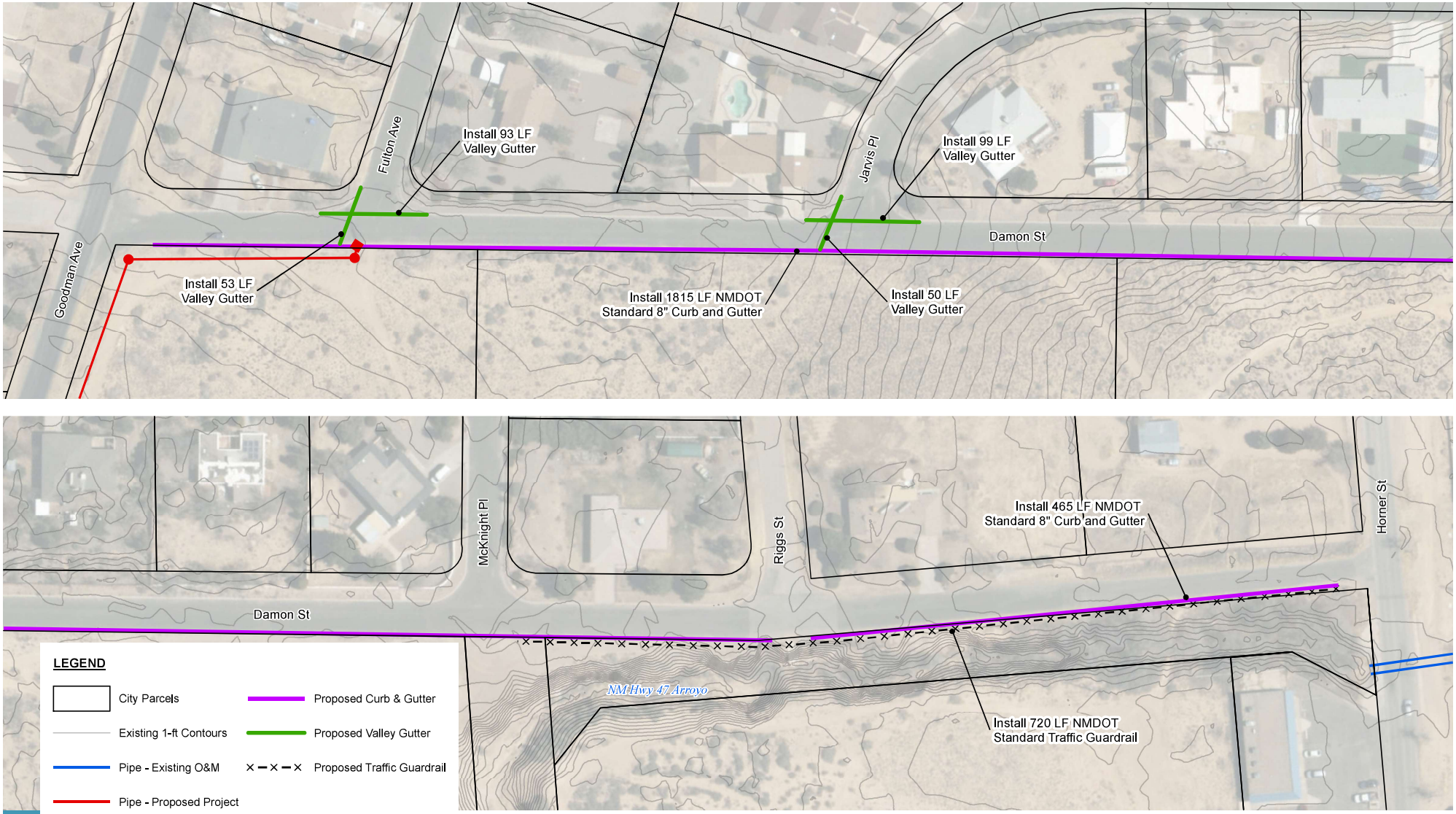


EXHIBIT DESCRIPTION:

The purpose of this map is to show proposed drainage features for Project 3 within the City of Rio Communities.

N

0 25 50 Feet

EXHIBIT 2.4

PROPOSED DRAINAGE FEATURES - PROJECT 3

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\CIP\CORC_PROPOSED_P03.MXD • USER: JCHAVEZ • DATE: 5/28/2021

CONTRACT NO. 2020-0101

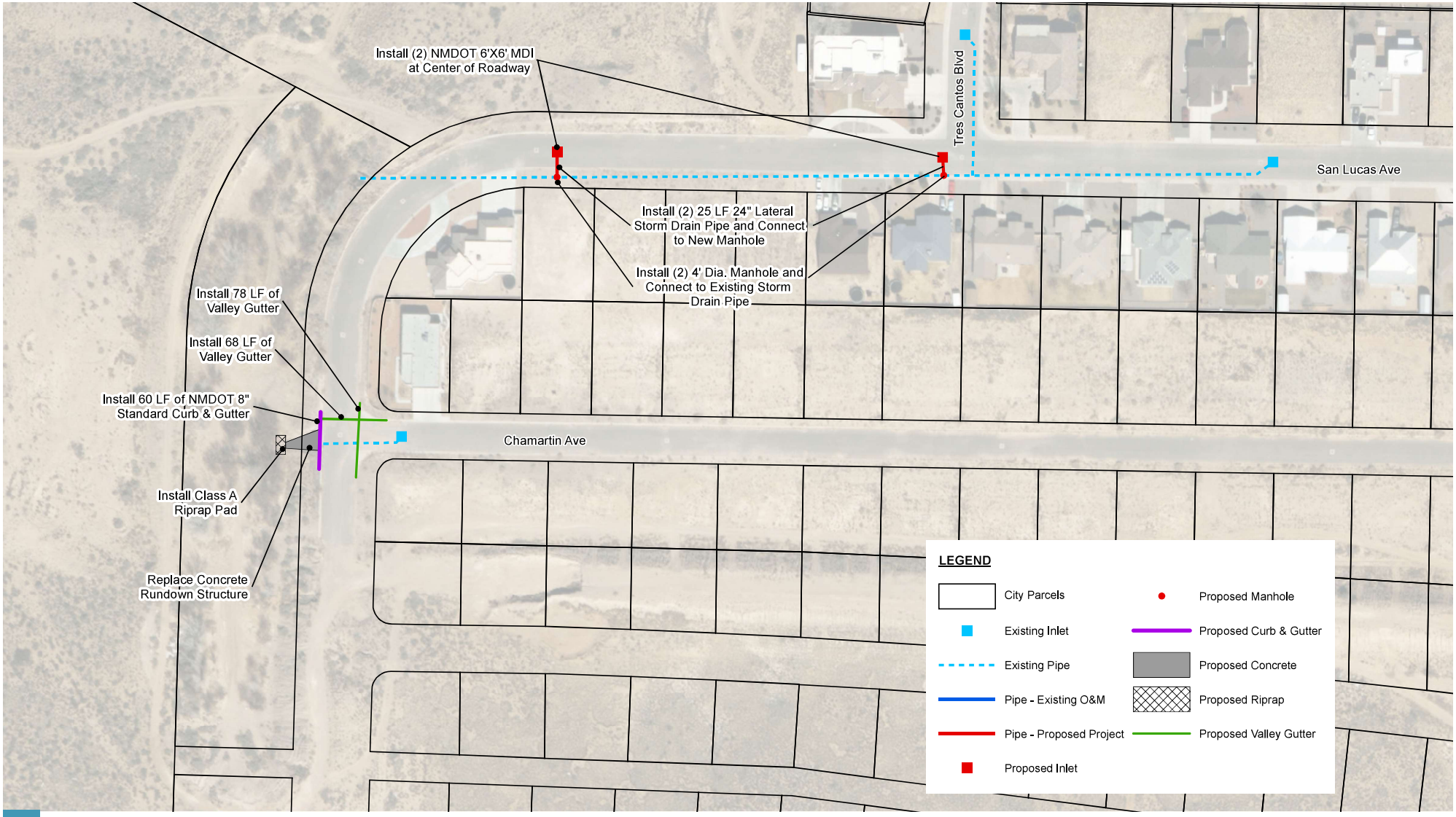


EXHIBIT DESCRIPTION:

The purpose of this map is to show proposed drainage features for Project 4 within the City of Rio Communities.

N

0 30 60 Feet

EXHIBIT 2.5

PROPOSED DRAINAGE FEATURES - PROJECT 4

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\CIP\CORC_PROPOSED_P04.MXD • USER: JCHAVEZ • DATE: 5/28/2021

CONTRACT NO. 2020-0101

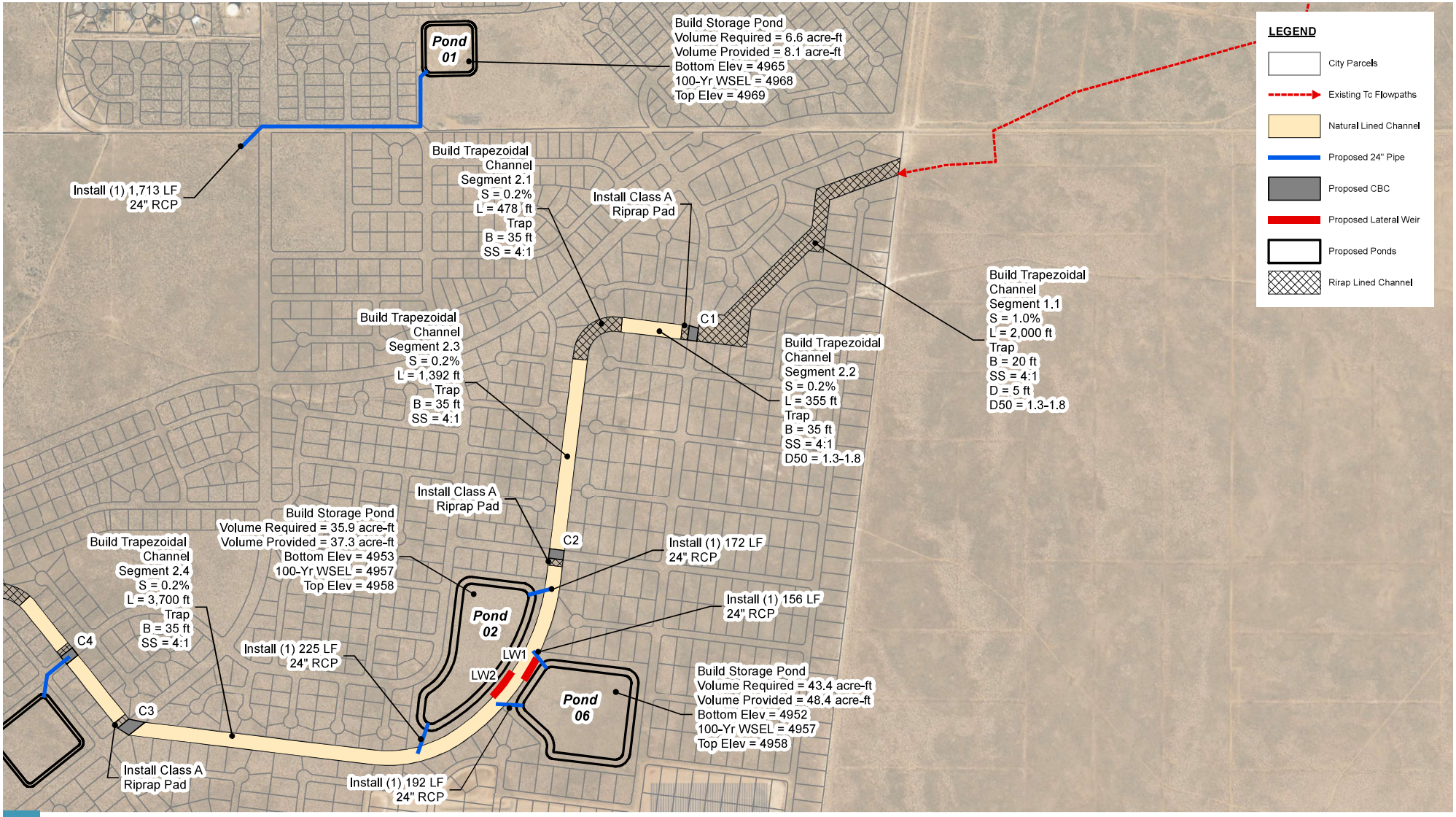


EXHIBIT DESCRIPTION:

The purpose of this map is to show future channel and pond design for a specific parcel area located within the City of Rio Communities.

N

0 250 500 Feet

EXHIBIT 2.6.1

PROPOSED DRAINAGE FEATURES - PROJECT 5A

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\CIP\CORC_FUTURE_PARCEL_CHANNEL_01.MXD • USER: JCHAVEZ • DATE: 6/14/2021

CONTRACT NO. 2020-0101

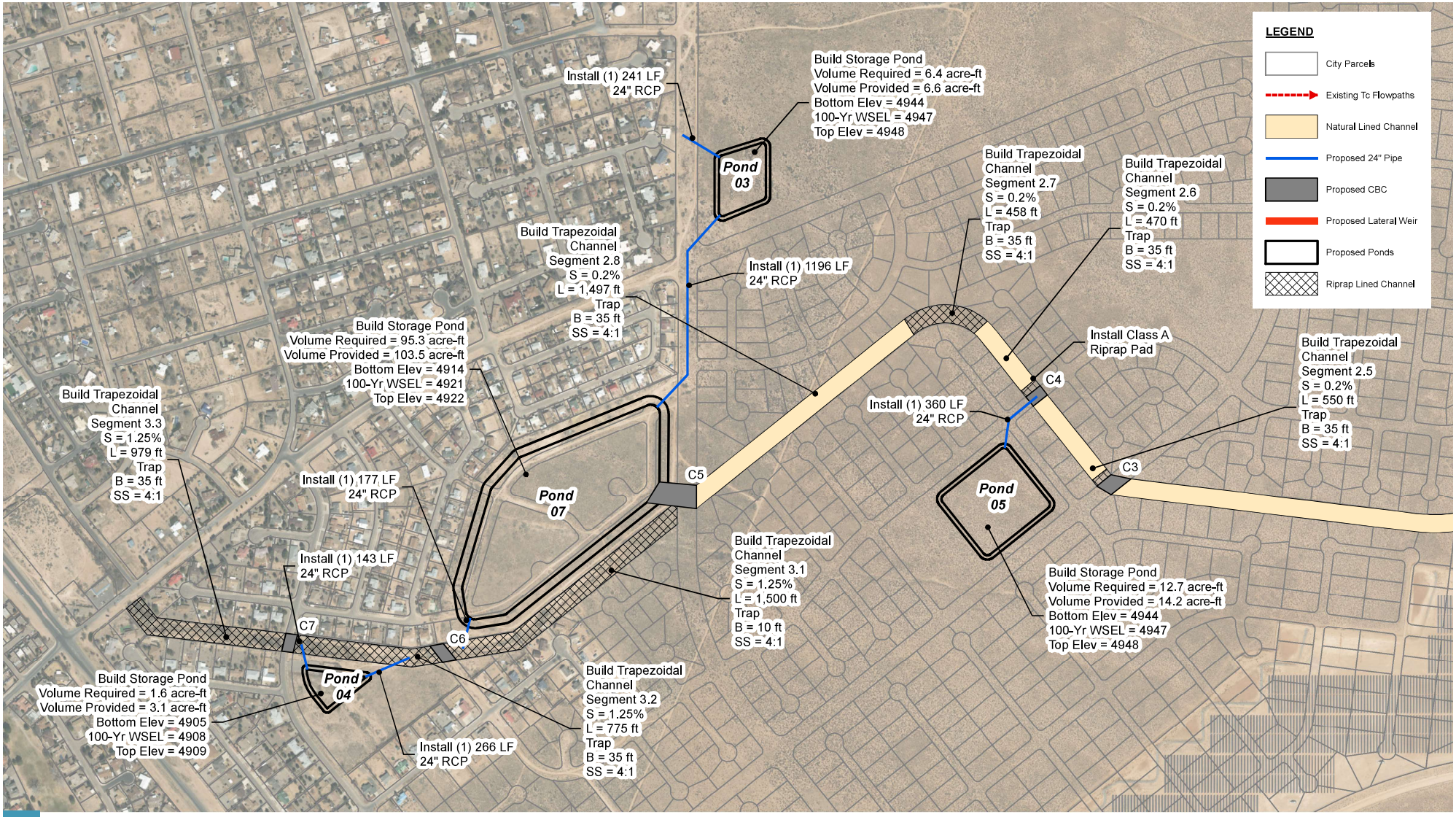


EXHIBIT DESCRIPTION:

The purpose of this map is to show future channel and pond design for a specific parcel area located within the City of Rio Communities.

N

0 250 500 Feet

EXHIBIT 2.6.2

PROPOSED DRAINAGE FEATURES - PROJECT 5A

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\CIP\CORC_FUTURE_PARCEL_CHANNEL_02.MXD • USER: JCHAVEZ • DATE: 6/14/2021

CONTRACT NO. 2020-0101

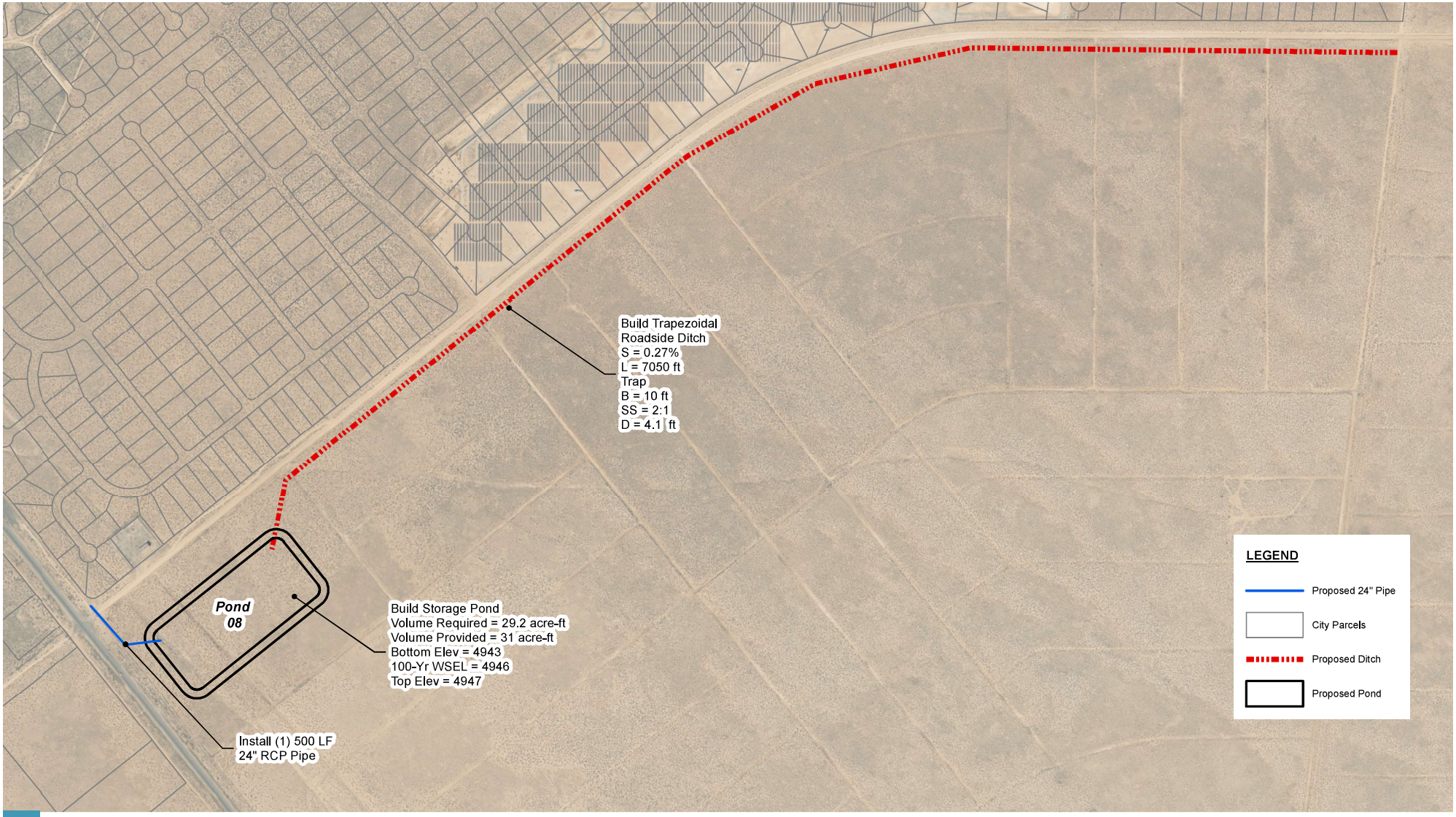


EXHIBIT DESCRIPTION:

The purpose of this map is to show future channel and pond design for a specific parcel area located within the City of Rio Communities.

N

0 250 500 Feet

EXHIBIT 2.7

PROPOSED DRAINAGE FEATURES - PROJECT 5B

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\CIP\CORC_FUTURE_PARCEL_CHANNEL_03.MXD • USER: JCHAVEZ • DATE: 6/14/2021

CONTRACT NO. 2020-0101

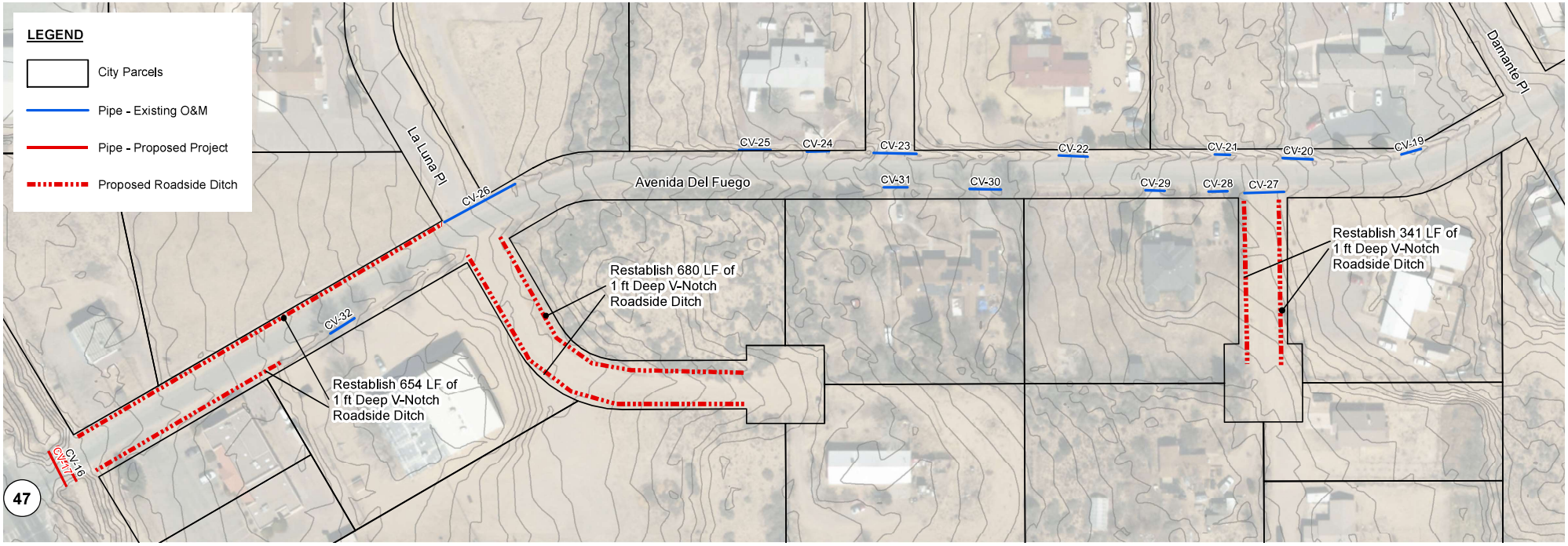


EXHIBIT DESCRIPTION:

The purpose of this map is to show proposed drainage features for Project Operations & Maintenance (O&M) within the City of Rio Communities.

N

0 50 100 Feet

EXHIBIT 2.8

PROPOSED DRAINAGE FEATURES - PROJECT 6 (O&M)

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\CIP\CORC_PROPOSED_POM.MXD • USER: JCHAVEZ • DATE: 6/14/2021

CONTRACT NO. 2020-0101

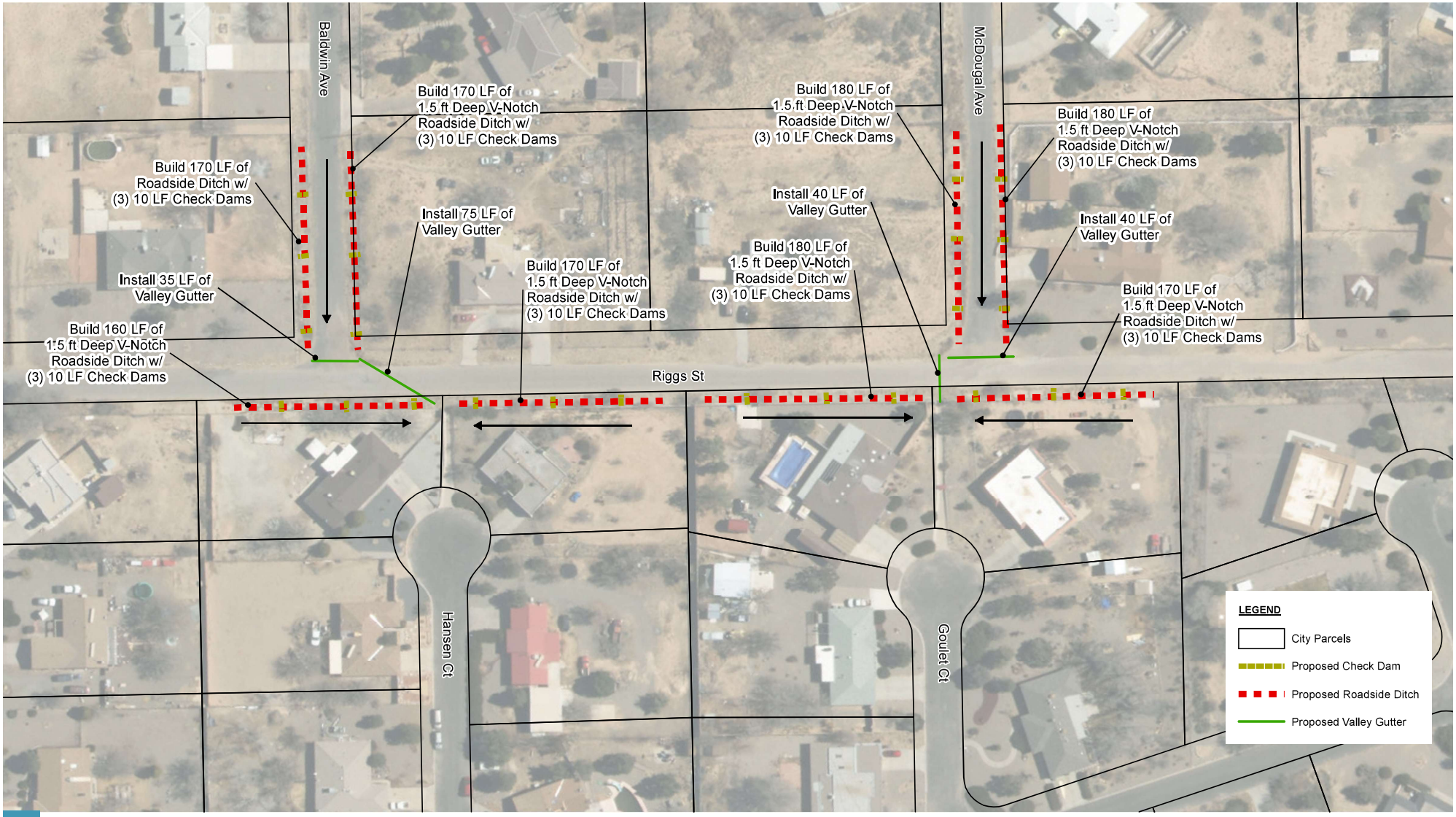


EXHIBIT DESCRIPTION:

The purpose of this map is to show proposed drainage features in the City of Rio Communities.

N

0 25 50 Feet

EXHIBIT 2.9

PROPOSED DRAINAGE FEATURES - PROJECT 7

RIO COMMUNITIES DRAINAGE MASTER PLAN

PATH: G:_NEW_GIS_STRUCTURE\PROJECTS\RIOCOMMUNITIES_CITY\2020_DMP\MAP_DOCS\MXD\FIGURES\CIP\CORC_PROPOSED_P07.MXD • USER: JCHAVEZ • DATE: 6/14/2021

CONTRACT NO. 2020-0101

Appendix B. Hydrologic Evaluation

Project:	**Rio Communities Drainage Master Plan**	Date:	**5/24/2021**
Subject:	**Hydrology - Existing Conditions**	Date:	
Task:		of:	
Job #:			

Rio Communities Hydrology - Existing Conditions

Reference: NMDOT Drainage Design Manual, July 2018

Stream Name:
Mile Post:
USGS Quadrangle:
Methodology: NRCS Simplified Peak Discharge Method (TR-55)
For basins less than 10 square miles

Peak Discharge per recurrence interval (cfs)						
Subbasin ID	Area (Acres)	Tc (hr)	Qp_{10}	Qp_{25}	Qp_{50}	Qp_{100}
BA01	782	2.5	26	53	83	120
BA02	1841	3.8	44	90	139	200
BA03	450	1.2	12	27	46	73
BA04	193	0.4	8	20	33	48
BA05	224	0.5	21	39	58	82
BA06	446	0.7	10	27	46	70
BA07	673	1.6	20	42	70	108
BA08	623	1.4	15	33	56	90
BA09	4258	3.2	229	417	593	807
	9489					

Runoff Volume per recurrence interval, Qv (ac-ft)						
Subbasin ID	Area (Acres)	Tc (hr)	Qv_{10}	Qv_{25}	Qv_{50}	Qv_{100}
BA01	782	2.5	8.5	15.2	21.7	29.1
BA02	1841	3.8	19.9	35.7	51.0	68.4
BA03	450	1.2	2.2	4.8	7.6	10.8
BA04	193	0.4	0.6	1.5	2.6	3.8
BA05	224	0.5	1.8	3.5	5.2	7.1
BA06	446	0.7	1.1	3.0	5.2	7.8
BA07	673	1.6	4.7	9.3	14.0	19.5
BA08	623	1.4	3.0	6.7	10.5	15.0
BA09	4258	3.2	82.4	131.4	177.0	226.8

Comments:
The NRCS (SCS) Simplified Peak Discharge Method outlined in the 2018 NMDOT Drainage Design Manual was used to determine design discharges and volumes for rural conditions. A weighted curve number was computed based on data pulled from USGS Web Soil Survey. NOAA 14 rainfall depths were used. Per Table 402-6 (Page 4-38), both the "Upland Method" and "Kirpich Formula" were used to determine time of concentration. The values presented in the summary tables above are maximum values determined between this workbook and HEC-HMS results. Please review the HEC-HMS results for more information.

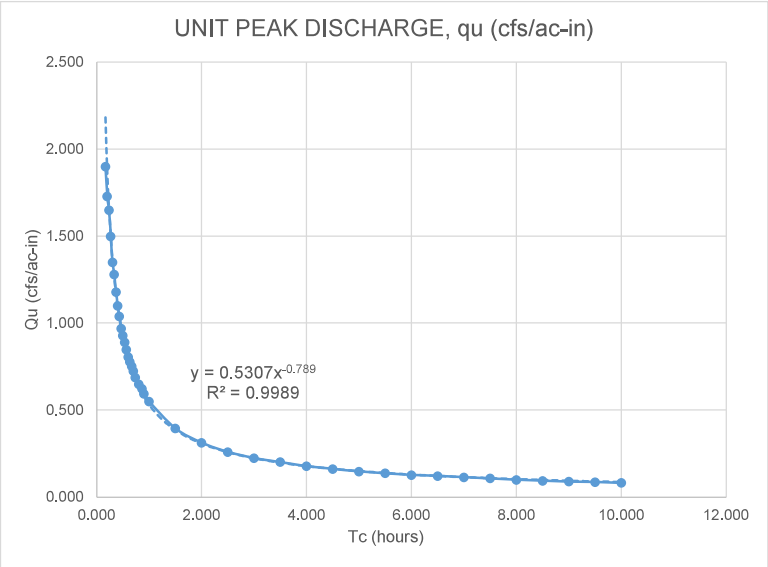
Computed: **JAC** Date: **5/24/2021**
Checked: Date:

General							24-hr:																
Subbasin ID	**Contributing Area**	**CN**	**Tc**	**Potential Max Soil Moisture Rentention, S**	**Initial Abstraction, Ia**	**Unit Peak Discharge, qu**	**NOAA Rainfall Depth**				**Direct Runoff, Qd (Figure 402-8 or Equation 404-1)**				**Runoff Volume, Qv (Equation 404-3)**				**Peak Discharge per recurrence interval, Qp (Equation 404-2)**				**Discharge (Q_{100}) to Area (ac) Ratio**
	(acre)		(min)			(cfs/acre-in)	(in)				(in)				(ac-ft)				(cfs)				
							P_{10}	P_{25}	P_{50}	P_{100}	Qd_{10}	Qd_{25}	Qd_{50}	Qd_{100}	Qv_{10}	Qv_{25}	Qv_{50}	Qv_{100}	Qp_{10}	Qp_{25}	Qp_{50}	Qp_{100}	
BA01	782	68	151	4.71	0.94	0.26	1.79	2.11	2.37	2.63	0.13	0.23	0.33	0.45	8.45	15.15	21.69	29.06	25.99	46.59	66.67	89.36	0.1
BA02	1841	68	229	4.71	0.94	0.18	1.79	2.11	2.37	2.63	0.13	0.23	0.33	0.45	19.90	35.67	51.04	68.41	44.04	78.95	112.98	151.43	0.1
BA03	450	63	70	5.87	1.17	0.47	1.79	2.11	2.37	2.63	0.06	0.13	0.20	0.29	2.19	4.82	7.59	10.85	12.35	27.19	42.78	61.16	0.1
BA04	193	61	25	6.39	1.28	1.06	1.79	2.11	2.37	2.63	0.04	0.10	0.16	0.24	0.61	1.54	2.56	3.79	7.74	19.55	32.51	48.18	0.2
BA05	224	66	29	5.15	1.03	0.94	1.79	2.11	2.37	2.63	0.10	0.19	0.28	0.38	1.82	3.49	5.16	7.08	20.61	39.48	58.35	80.00	0.4
BA06	446	60	39	6.67	1.33	0.75	1.79	2.11	2.37	2.63	0.03	0.08	0.14	0.21	1.09	3.01	5.18	7.84	9.73	26.93	46.36	70.16	0.2
BA07	673	65	97	5.38	1.08	0.36	1.79	2.11	2.37	2.63	0.08	0.17	0.25	0.35	4.68	9.33	14.05	19.51	20.40	40.68	61.24	85.04	0.1
BA08	623	63	84	5.87	1.17	0.41	1.79	2.11	2.37	2.63	0.06	0.13	0.20	0.29	3.03	6.67	10.49	15.00	14.79	32.57	51.24	73.26	0.1
BA09	4258	73	190	3.70	0.74	0.21	1.79	2.11	2.37	2.63	0.23	0.37	0.50	0.64	82.41	131.43	176.96	226.83	211.37	337.08	453.86	581.78	0.1

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

TABLE 404-1: UNIT PEAK DISCHARGE TABLE

Tc		qu
hours	**min**	**cfs/ac-in**
0.167	10	1.900
0.200	12	1.730
0.233	14	1.650
0.267	16	1.500
0.300	18	1.350
0.333	20	1.280
0.367	22	1.180
0.400	24	1.100
0.433	26	1.040
0.467	28	0.970
0.500	30	0.930
0.533	32	0.890
0.567	34	0.848
0.600	36	0.805
0.633	38	0.778
0.667	40	0.752
0.700	42	0.725
0.733	44	0.688
0.800	48	0.650
0.867	52	0.623
0.900	54	0.595
1.000	60	0.550
1.500	90	0.395
2.000	120	0.313
2.500	150	0.260
3.000	180	0.225
3.500	210	0.202
4.000	240	0.178
4.500	270	0.163
5.000	300	0.148
5.500	330	0.138
6.000	360	0.128
6.500	390	0.122
7.000	420	0.115
7.500	450	0.108
8.000	480	0.100
8.500	510	0.095
9.000	540	0.090
9.500	570	0.087
10.000	600	0.083



INPUT TABLE - TO INTERPOLATE qu FROM TABLE 404-1

Tc		qu
hours	**min**	**cfs/ac-in**
2.517	151	0.26
3.817	229	0.18
1.167	70	0.47
0.417	25	1.06
0.483	29	0.94
0.650	39	0.75
1.617	97	0.36
1.400	84	0.41
3.167	190	0.21
0.000		#DIV/0!
0.000		#DIV/0!

NOTE:

USE INPUT TABLE TO INTERPOLATE VALUES BETWEEN THOSE GIVEN IN TABLE 404-1. THE POLYNOMIAL TREND LINE EQUATION PROVIDES MINOR INACCURACIES FOR Tc > 14 MIN. AND MAJOR INACCURACIES FOR Tc < 14 MIN. PLEASE CHECK VALUES.

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA01

Cover Type and Hydrologic Condition	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
	Curve Numbers for Hydrologic Soil Group (HSG)																			
	A					B					C					D				
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89			8.735113	3.0%	92	2.8	676.5			94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre			61					75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor	491.2819	100.0%	63	63	30950.8	281.9416	97.0%	77	74.7	21836.6			85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	491.3	290.7	0.0	0.0
HSG Adjusted CN	63.0	77.5	0.0	0.0
HSG Adjusted CN x Area	30950.8	22513.1	0.0	0.0
Total Adjusted CN x Area	**53463.9**			
Total Area	**782.0**			
Area Weighted Curve Number	**68**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA02

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89			0.268136	0%	92	0.0	20.6			94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	23.16781	1.9%	61	1.2	1458.7			75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor	1165.056	98.1%	63	61.8	73353.1	652.0929	100%	77	77.0	50215.2			85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	1188.2	652.4	0.0	0.0
HSG Adjusted CN	63.0	77.0	0.0	0.0
HSG Adjusted CN x Area	74811.8	50235.8	0.0	0.0
Total Adjusted CN x Area	**125047.6**			
Total Area	**1840.6**			
Area Weighted Curve Number	**68**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA03

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm	8.297243	1.8%	98	1.81	519.90			98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business	12.97971	2.9%	89	2.57	813.30			92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	389.6423	86.8%	61	52.96	24414.62	1.489219	100.0%	75	75.0	111.7			83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded	3.723372	0.8%	77	0.64	233.30			86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor	27.41335	6.1%	63	3.85	1717.69			77					85					88		
Desert shrub - fair	6.715366	1.5%	55	0.82	420.78			72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	448.8	1.5	0.0	0.0
HSG Adjusted CN	62.7	75.0	0.0	0.0
HSG Adjusted CN x Area	28119.6	111.7	0.0	0.0
Total Adjusted CN x Area	**28231.3**			
Total Area	**450.3**			
Area Weighted Curve Number	**63**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA04

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																							
	A						B						C						D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area		Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area		Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area		Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	
Unit:	Acre	%	-	Acre	Acre		Acre	%	-	Acre	Acre		Acre	%	-	Acre	Acre		Acre	%	-	Acre	Acre	
Urban																								
Open space - poor			68						79						86						89			
Open space - fair			49						69						79						84			
Open space - good			39						61						74						80			
Impervious - parking lots, roofs, etc.			98						98						98						98			
Impervious - streets/roads; paved; curbs, storm			98						98						98						98			
Impervious - streets/roads; paved; open ditches			83						89						92						93			
Impervious - streets/roads; gravel			76						85						89						91			
Impervious - streets/roads; dirt			72						82						87						89			
Western desert urban - natural			63						77						85						88			
Western desert urban - artificial			96						96						96						96			
Urban - commercial/business			89						92						94						95			
Urban - industrial			81						88						91						93			
Residential - 1/8 acre or less			77						85						90						92			
Residential - 1/4 acre	179.3569	95.3%	61	58.2	10957.5		2.178755	44.7%	75	33.5	165.8				83						87			
Residential - 1/3 acre			57						72						81						86			
Residential - 1/2 acre			54						70						80						85			
Residential - 1 acre			51						68						79						84			
Residential - 2 acres			46						65						77						82			
Developing urban - newly graded			77						86						91						94			
Other Agricultural																								
Pasture, grass, range - poor			68						79						86						89			
Pasture, grass, range - fair			49						69						79						84			
Pasture, grass, range - good			39						61						74						80			
Meadow			30						58						71						78			
Brush - poor			48						67						77						83			
Brush - fair			35						56						70						77			
Brush - good			30						48						65						73			
Woods combination - poor			57						73						82						86			
Woods combination - fair			43						65						76						82			
Woods combination - good			32						58						72						79			
Woods - poor			45						66						77						83			
Woods - fair			36						60						73						79			
Woods - good			30						55						70						77			
Farmsteads			59						74						82						86			
Arid and Semiarid Rangelands																								
Herbaceous - poor									80						87						93			
Herbaceous - fair									71						81						89			
Herbaceous - good									62						74						85			
Oak-aspen - poor									66						74						79			
Oak-aspen - fair									48						57						63			
Oak-aspen - good									30						41						48			
Pinyon-juniper - poor									75						85						89			
Pinyon-juniper - fair									58						73						80			
Pinyon-juniper - good									41						61						71			
Sagebrush - poor									67						80						85			
Sagebrush - fair									51						63						70			
Sagebrush - good									35						47						55			
Desert shrub - poor	8.750579	4.7%	63	2.9	534.6		2.695725	55.3%	77	42.6	205.2				85						88			
Desert shrub - fair			55						72						81						86			
Desert shrub - good			49						68						79						84			
Water			98						98						98						98			

Subtotal Acres	188.1	4.9	0.0	0.0
HSG Adjusted CN	61.1	76.1	0.0	0.0
HSG Adjusted CN x Area	11492.1	371.0	0.0	0.0
Total Adjusted CN x Area	**11863.0**			
Total Area	**193.0**			
Area Weighted Curve Number	**61**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA05

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor	5.733639	2.7%	68	1.8	377.8			79					86					89		
Open space - fair			49					69					79					84		
Open space - good	21.08785	9.8%	39	3.8	1389.5			61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business	50.30792	23.5%	89	20.9	3314.8			92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	43.89009	20.5%	61	12.5	2891.9			75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded	7.91025	3.7%	77	2.8	521.2			86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor	56.20012	26.2%	63	16.5	3703.0			77			0.11043	1.5%	85	1.3	9.0			88		
Desert shrub - fair	29.23993	13.6%	55	7.5	1926.6	2.278939	100.0%	72	72.0	164.1	7.316749	98.5%	81	79.8	593.1			86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

	A	B	C	D
Subtotal Acres	214.4	2.3	7.4	0.0
HSG Adjusted CN	65.9	72.0	81.1	0.0
HSG Adjusted CN x Area	14124.9	164.1	602.0	0.0
Total Adjusted CN x Area	**14891.0**			
Total Area	**224.1**			
Area Weighted Curve Number	**66**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA06

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																								
	A						B						C						D						
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area		Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area		Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area		Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	
Unit:	Acre	%	-	Acre	Acre		Acre	%	-	Acre	Acre		Acre	%	-	Acre	Acre		Acre	%	-	Acre	Acre		
Urban																									
Open space - poor			68						79						86						89				
Open space - fair			49						69						79						84				
Open space - good	82.27284	20.7%	39	8.1	4707.6				61						74						80				
Impervious - parking lots, roofs, etc.			98						98						98						98				
Impervious - streets/roads; paved; curbs, storm			98						98						98						98				
Impervious - streets/roads; paved; open ditches			83						89						92						93				
Impervious - streets/roads; gravel			76						85						89						91				
Impervious - streets/roads; dirt			72						82						87						89				
Western desert urban - natural			63						77						85						88				
Western desert urban - artificial			96						96						96						96				
Urban - commercial/business	5.744085	1.4%	89	1.3	328.7				92						94						95				
Urban - industrial			81						88						91						93				
Residential - 1/8 acre or less			77						85						90						92				
Residential - 1/4 acre	222.9638	56.1%	61	34.2	12757.8				75				39.57747	82.3%	83	68.3	3298.6				87				
Residential - 1/3 acre	33.10399	8.3%	57	4.7	1894.2				72						81						86				
Residential - 1/2 acre	7.569116	1.9%	54	1.0	433.1				70						80						85				
Residential - 1 acre			51						68						79						84				
Residential - 2 acres			46						65						77						82				
Developing urban - newly graded			77						86						91						94				
Other Agricultural																									
Pasture, grass, range - poor			68						79						86						89				
Pasture, grass, range - fair			49						69						79						84				
Pasture, grass, range - good			39						61						74						80				
Meadow			30						58						71						78				
Brush - poor			48						67						77						83				
Brush - fair			35						56						70						77				
Brush - good			30						48						65						73				
Woods combination - poor			57						73						82						86				
Woods combination - fair			43						65						76						82				
Woods combination - good			32						58						72						79				
Woods - poor			45						66						77						83				
Woods - fair			36						60						73						79				
Woods - good			30						55						70						77				
Farmsteads			59						74						82						86				
Arid and Semiarid Rangelands																									
Herbaceous - poor									80						87						93				
Herbaceous - fair									71						81						89				
Herbaceous - good									62						74						85				
Oak-aspen - poor									66						74						79				
Oak-aspen - fair									48						57						63				
Oak-aspen - good									30						41						48				
Pinyon-juniper - poor									75						85						89				
Pinyon-juniper - fair									58						73						80				
Pinyon-juniper - good									41						61						71				
Sagebrush - poor									67						80						85				
Sagebrush - fair									51						63						70				
Sagebrush - good									35						47						55				
Desert shrub - poor	39.08688	9.8%	63	6.2	2236.5				77				8.416475	17.5%	85	14.9	701.5				88				
Desert shrub - fair	0.029761	0.0%	55	0.0	1.7				72				0.08945	0.2%	81	0.2	7.5				86				
Desert shrub - good			49						68						79						84				
Water	6.846507	1.7%	98	1.7	391.8				98						98						98				

Subtotal Acres	397.6	0.0	48.1	0.0
HSG Adjusted CN	57.2	0.0	83.3	0.0
HSG Adjusted CN x Area	22751.4	0.0	4007.6	0.0
Total Adjusted CN x Area	**26759.0**			
Total Area	**445.7**			
Area Weighted Curve Number	**60**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA07

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																							
	A					B					C					D								
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																								
Open space - poor			68					79					86					89						
Open space - fair			49					69					79					84						
Open space - good	0.357167	0.1%	39	0.0	22.5			61					74					80						
Impervious - parking lots, roofs, etc.			98					98					98					98						
Impervious - streets/roads; paved; curbs, storm			98					98					98					98						
Impervious - streets/roads; paved; open ditches			83					89					92					93						
Impervious - streets/roads; gravel			76					85					89					91						
Impervious - streets/roads; dirt			72					82					87					89						
Western desert urban - natural			63					77					85					88						
Western desert urban - artificial			96					96					96					96						
Urban - commercial/business			89					92					94					95						
Urban - industrial			81					88					91					93						
Residential - 1/8 acre or less			77					85					90					92						
Residential - 1/4 acre	1.240115	0.2%	61	0.1	78.1			75			0.654085	1.4%	83	1.2	55.6			87						
Residential - 1/3 acre	2.483576	0.4%	57	0.2	156.4			72					81					86						
Residential - 1/2 acre			54					70					80					85						
Residential - 1 acre			51					68					79					84						
Residential - 2 acres			46					65					77					82						
Developing urban - newly graded			77					86					91					94						
Other Agricultural																								
Pasture, grass, range - poor			68					79					86					89						
Pasture, grass, range - fair			49					69					79					84						
Pasture, grass, range - good			39					61					74					80						
Meadow			30					58					71					78						
Brush - poor			48					67					77					83						
Brush - fair			35					56					70					77						
Brush - good			30					48					65					73						
Woods combination - poor			57					73					82					86						
Woods combination - fair			43					65					76					82						
Woods combination - good			32					58					72					79						
Woods - poor			45					66					77					83						
Woods - fair			36					60					73					79						
Woods - good			30					55					70					77						
Farmsteads			59					74					82					86						
Arid and Semiarid Rangelands																								
Herbaceous - poor								80					87					93						
Herbaceous - fair								71					81					89						
Herbaceous - good								62					74					85						
Oak-aspen - poor								66					74					79						
Oak-aspen - fair								48					57					63						
Oak-aspen - good								30					41					48						
Pinyon-juniper - poor								75					85					89						
Pinyon-juniper - fair								58					73					80						
Pinyon-juniper - good								41					61					71						
Sagebrush - poor								67					80					85						
Sagebrush - fair								51					63					70						
Sagebrush - good								35					47					55						
Desert shrub - poor	620.982	99.3%	63	62.6	39096.1	2.125548	100.0%	77	77.0	163.7	45.42789	98.6%	85	83.8	3860.0			88						
Desert shrub - fair			55					72			0.008104	0.0%	81	0.0	0.7			86						
Desert shrub - good			49					68					79					84						
Water			98					98					98					98						

Subtotal Acres	625.1	2.1	46.1	0.0
HSG Adjusted CN	63.0	77.0	85.0	0.0
HSG Adjusted CN x Area	39353.0	163.7	3916.3	0.0
Total Adjusted CN x Area	**43433.0**			
Total Area	**673.3**			
Area Weighted Curve Number	**65**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA08

Cover Type and Hydrologic Condition	A Area	A % Area	A HSG CN	A Adjusted (% Area) HSG CN	A Adjusted (% Area) HSG CN x Area	B Area	B % Area	B HSG CN	B Adjusted (% Area) HSG CN	B Adjusted (% Area) HSG CN x Area	C Area	C % Area	C HSG CN	C Adjusted (% Area) HSG CN	C Adjusted (% Area) HSG CN x Area	D Area	D % Area	D HSG CN	D Adjusted (% Area) HSG CN	D Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	128.1279	21.3%	61	13.0	8017.5			75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor	473.8901	78.7%	63	49.6	29653.4	20.82833	100.0%	77	77.0	1603.8			85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

	A	B	C	D
Subtotal Acres	602.0	20.8	0.0	0.0
HSG Adjusted CN	62.6	77.0	0.0	0.0
HSG Adjusted CN x Area	37670.9	1603.8	0.0	0.0
Total Adjusted CN x Area	**39274.7**			
Total Area	**622.8**			
Area Weighted Curve Number	**63**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA09

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial	26.50369	1.9%	81	1.6	1678.7	78.03492	2.7%	88	2.4	6031.9			91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	6.556181	0.5%	61	0.3	415.3			75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor	1336.006	97.6%	63	61.5	84621.1	2810.49	97.3%	77	74.9	217242.9			85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	1369.1	2888.5	0.0	0.0
HSG Adjusted CN	63.3	77.3	0.0	0.0
HSG Adjusted CN x Area	86715.1	223274.8	0.0	0.0
Total Adjusted CN x Area	**309989.9**			
Total Area	**4257.6**			
Area Weighted Curve Number	**73**			

Computed: **JAC** Date: **5/20/2021**
Checked: Date:

Use this spreadsheet to import GIS data. This info will then be used to populate "Composite CN" spreadsheet.
Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA01	Wn	Desert shrub - poor	A	32038.687	7.36E-01	0.008%
BA01	Pa	Desert shrub - poor	A	2165021.1	4.97E+01	0.524%
BA01	Wk	Desert shrub - poor	A	1564798.5	3.59E+01	0.379%
BA01	Wr	Desert shrub - poor	A	304971.09	7.00E+00	0.074%
BA01	Wm	Desert shrub - poor	A	3455233.4	7.93E+01	0.836%
BA01	Bs	Desert shrub - poor	A	240405.12	5.52E+00	0.058%
BA01	Cb	Desert shrub - poor	A	1672505.7	3.84E+01	0.405%
BA01	Wn	Desert shrub - poor	A	695350.39	1.60E+01	0.168%
BA01	Cb	Desert shrub - poor	A	479363.39	1.10E+01	0.116%
BA01	Ws	Desert shrub - poor	A	24867.598	5.71E-01	0.006%
BA01	Ws	Desert shrub - poor	A	31657.532	7.27E-01	0.008%
BA01	Wk	Desert shrub - poor	A	142.77137	3.28E-03	0.000%
BA01	Wk	Desert shrub - poor	A	6.3442043	1.46E-04	0.000%
BA01	Wk	Desert shrub - poor	A	326483.07	7.50E+00	0.079%
BA01	Wk	Desert shrub - poor	A	4470177.5	1.03E+02	1.081%
BA01	Wk	Desert shrub - poor	A	5937219.1	1.36E+02	1.436%
BA01	Ma	Desert shrub - poor	B	127933.09	2.94E+00	0.031%
BA01	Md	Desert shrub - poor	B	4083641.6	9.37E+01	0.988%
BA01	Ad	Desert shrub - poor	B	2726780.6	6.26E+01	0.660%
BA01	Md	Desert shrub - poor	B	5342938.3	1.23E+02	1.293%
BA01	Md	Desert shrub - poor	B	3.7545692	8.62E-05	0.000%
BA01	Md	Desert shrub - poor	B	77.787778	1.79E-03	0.000%
BA01	Ad	Urban district - commercial	B	380501.54	8.74E+00	0.092%
BA02	Wn	Desert shrub - poor	A	4871150	1.12E+02	1.178%
BA02	Wn	Desert shrub - poor	A	4413248.2	1.01E+02	1.068%
BA02	Wn	Desert shrub - poor	A	855687.46	1.96E+01	0.207%
BA02	Pa	Desert shrub - poor	A	4736349	1.09E+02	1.146%
BA02	Wr	Desert shrub - poor	A	885803.25	2.03E+01	0.214%
BA02	Bs	Desert shrub - poor	A	1153555.7	2.65E+01	0.279%
BA02	Cb	Desert shrub - poor	A	1096743.8	2.52E+01	0.265%
BA02	Wn	Desert shrub - poor	A	253693.56	5.82E+00	0.061%
BA02	Bs	Desert shrub - poor	A	6680251.3	1.53E+02	1.616%
BA02	Bs	Desert shrub - poor	A	314111.34	7.21E+00	0.076%
BA02	Wk	Desert shrub - poor	A	5575214.2	1.28E+02	1.349%
BA02	Wk	Desert shrub - poor	A	321309.31	7.38E+00	0.078%
BA02	Wn	Desert shrub - poor	A	2958469.3	6.79E+01	0.716%
BA02	Wr	Desert shrub - poor	A	2420644.7	5.56E+01	0.586%
BA02	Bs	Desert shrub - poor	A	564961.23	1.30E+01	0.137%
BA02	Wk	Desert shrub - poor	A	1618816.4	3.72E+01	0.392%
BA02	Wk	Desert shrub - poor	A	11937171	2.74E+02	2.888%
BA02	Wn	Desert shrub - poor	A	121.43581	2.79E-03	0.000%
BA02	Wn	Desert shrub - poor	A	78.666171	1.81E-03	0.000%
BA02	Pa	Desert shrub - poor	A	2.1138989	4.85E-05	0.000%
BA02	Wn	Desert shrub - poor	A	30.36481	6.97E-04	0.000%
BA02	Bs	Desert shrub - poor	A	75.290748	1.73E-03	0.000%
BA02	Bs	Desert shrub - poor	A	0.1370409	3.15E-06	0.000%
BA02	Bs	Desert shrub - poor	A	37.300737	8.56E-04	0.000%
BA02	Wk	Desert shrub - poor	A	48.987058	1.12E-03	0.000%
BA02	Wk	Desert shrub - poor	A	11.934694	2.74E-04	0.000%
BA02	Wr	Desert shrub - poor	A	8.7026228	2.00E-04	0.000%
BA02	Wk	Desert shrub - poor	A	252.92693	5.81E-03	0.000%
BA02	Wk	Desert shrub - poor	A	14.009338	3.22E-04	0.000%
BA02	Wk	Desert shrub - poor	A	56.238789	1.29E-03	0.000%
BA02	Wn	Desert shrub - poor	A	7129.0317	1.64E-01	0.002%
BA02	Wn	Desert shrub - poor	A	7129.0317	1.64E-01	0.002%
BA02	Wn	Desert shrub - poor	A	4401.189	1.01E-01	0.001%

Computed: **JAC** Date: **5/20/2021**
Checked: Date:

Use this spreadsheet to import GIS data. This info will then be used to populate "Composite CN" spreadsheet.
Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA02	Wn	Desert shrub - poor	A	4401.189	1.01E-01	0.001%
BA02	Wn	Desert shrub - poor	A	2191.9093	5.03E-02	0.001%
BA02	Wn	Desert shrub - poor	A	2191.9093	5.03E-02	0.001%
BA02	Bs	Desert shrub - poor	A	10128.524	2.33E-01	0.002%
BA02	Bs	Desert shrub - poor	A	10128.524	2.33E-01	0.002%
BA02	Bs	Desert shrub - poor	A	410.90006	9.43E-03	0.000%
BA02	Bs	Desert shrub - poor	A	410.90006	9.43E-03	0.000%
BA02	Wk	Desert shrub - poor	A	3266.3065	7.50E-02	0.001%
BA02	Wk	Desert shrub - poor	A	3266.3065	7.50E-02	0.001%
BA02	Wk	Desert shrub - poor	A	10038.354	2.30E-01	0.002%
BA02	Wk	Desert shrub - poor	A	10038.354	2.30E-01	0.002%
BA02	Wk	Desert shrub - poor	A	4976.7094	1.14E-01	0.001%
BA02	Wk	Desert shrub - poor	A	4976.7094	1.14E-01	0.001%
BA02	Wk	Desert shrub - poor	A	3238.7374	7.44E-02	0.001%
BA02	Wk	Desert shrub - poor	A	3238.7374	7.44E-02	0.001%
BA02	Wn	Desert shrub - poor	A	16.111989	3.70E-04	0.000%
BA02	Wn	Desert shrub - poor	A	16.111989	3.70E-04	0.000%
BA02	Wn	Desert shrub - poor	A	17.549355	4.03E-04	0.000%
BA02	Wn	Desert shrub - poor	A	17.549355	4.03E-04	0.000%
BA02	Wn	Desert shrub - poor	A	17.564629	4.03E-04	0.000%
BA02	Wn	Desert shrub - poor	A	17.564629	4.03E-04	0.000%
BA02	Bs	Desert shrub - poor	A	35.686512	8.19E-04	0.000%
BA02	Bs	Desert shrub - poor	A	35.686512	8.19E-04	0.000%
BA02	Bs	Desert shrub - poor	A	0.0236904	5.44E-07	0.000%
BA02	Bs	Desert shrub - poor	A	0.0236904	5.44E-07	0.000%
BA02	Wk	Desert shrub - poor	A	25.999353	5.97E-04	0.000%
BA02	Wk	Desert shrub - poor	A	25.999353	5.97E-04	0.000%
BA02	Wk	Desert shrub - poor	A	64.211601	1.47E-03	0.000%
BA02	Wk	Desert shrub - poor	A	64.211601	1.47E-03	0.000%
BA02	Wk	Desert shrub - poor	A	5.272575	1.21E-04	0.000%
BA02	Wk	Desert shrub - poor	A	5.272575	1.21E-04	0.000%
BA02	Wk	Desert shrub - poor	A	3.2368347	7.43E-05	0.000%
BA02	Wk	Desert shrub - poor	A	3.2368347	7.43E-05	0.000%
BA02	Mn	Desert shrub - poor	B	7645.1002	1.76E-01	0.002%
BA02	MK	Desert shrub - poor	B	1597834.2	3.67E+01	0.387%
BA02	Md	Desert shrub - poor	B	935559.66	2.15E+01	0.226%
BA02	Ma	Desert shrub - poor	B	1402603.7	3.22E+01	0.339%
BA02	Ad	Desert shrub - poor	B	4482440.5	1.03E+02	1.084%
BA02	PITS	Desert shrub - poor	B	274839.96	6.31E+00	0.066%
BA02	Md	Desert shrub - poor	B	19691072	4.52E+02	4.764%
BA02	MK	Desert shrub - poor	B	2.1901502	5.03E-05	0.000%
BA02	Md	Desert shrub - poor	B	3.7545692	8.62E-05	0.000%
BA02	Md	Desert shrub - poor	B	55.072439	1.26E-03	0.000%
BA02	Md	Desert shrub - poor	B	77.787778	1.79E-03	0.000%
BA02	MK	Desert shrub - poor	B	818.24927	1.88E-02	0.000%
BA02	MK	Desert shrub - poor	B	818.24927	1.88E-02	0.000%
BA02	Md	Desert shrub - poor	B	5678.9801	1.30E-01	0.001%
BA02	Md	Desert shrub - poor	B	5678.9801	1.30E-01	0.001%
BA02	MK	Desert shrub - poor	B	0.8976251	2.06E-05	0.000%
BA02	MK	Desert shrub - poor	B	0.8976251	2.06E-05	0.000%
BA02	Md	Desert shrub - poor	B	17.741949	4.07E-04	0.000%
BA02	Md	Desert shrub - poor	B	17.741949	4.07E-04	0.000%
BA02	Wn	Residential - 1/4 acre	A	80665.627	1.85E+00	0.020%
BA02	Wn	Residential - 1/4 acre	A	1575.7628	3.62E-02	0.000%
BA02	Bs	Residential - 1/4 acre	A	426703.58	9.80E+00	0.103%
BA02	Wk	Residential - 1/4 acre	A	264.43381	6.07E-03	0.000%
BA02	Wr	Residential - 1/4 acre	A	40881.873	9.39E-01	0.010%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA02	Wk	Residential - 1/4 acre	A	459068.12	1.05E+01	0.111%
BA02	Bs	Residential - 1/4 acre	A	30.597442	7.02E-04	0.000%
BA02	Ad	Urban district - commercial	B	11680.007	2.68E-01	0.003%
BA03	Bn	Desert shrub - fair	A	60164.403	1.38E+00	0.015%
BA03	Pa	Desert shrub - fair	A	217420.18	4.99E+00	0.053%
BA03	Pa	Desert shrub - fair	A	14863.622	3.41E-01	0.004%
BA03	Pa	Desert shrub - fair	A	22.230085	5.10E-04	0.000%
BA03	Pa	Desert shrub - fair	A	25.461914	5.85E-04	0.000%
BA03	Pa	Desert shrub - fair	A	25.461914	5.85E-04	0.000%
BA03	Wm	Desert shrub - poor	A	188.27724	4.32E-03	0.000%
BA03	Cb	Desert shrub - poor	A	35449.48	8.14E-01	0.009%
BA03	Wn	Desert shrub - poor	A	11341.784	2.60E-01	0.003%
BA03	Wr	Desert shrub - poor	A	309413.42	7.10E+00	0.075%
BA03	Pa	Desert shrub - poor	A	585176.28	1.34E+01	0.142%
BA03	Wk	Desert shrub - poor	A	366.02071	8.40E-03	0.000%
BA03	Wk	Desert shrub - poor	A	213783.06	4.91E+00	0.052%
BA03	Wm	Desert shrub - poor	A	51.08958	1.17E-03	0.000%
BA03	Pa	Desert shrub - poor	A	2.1138989	4.85E-05	0.000%
BA03	Wk	Desert shrub - poor	A	11.934694	2.74E-04	0.000%
BA03	Wr	Desert shrub - poor	A	8.7026228	2.00E-04	0.000%
BA03	Wk	Desert shrub - poor	A	6.3930133	1.47E-04	0.000%
BA03	Wr	Desert shrub - poor	A	12287.167	2.82E-01	0.003%
BA03	Pa	Desert shrub - poor	A	32.681877	7.50E-04	0.000%
BA03	Pa	Desert shrub - poor	A	16513.03	3.79E-01	0.004%
BA03	Pa	Desert shrub - poor	A	17.14453	3.94E-04	0.000%
BA03	Wk	Desert shrub - poor	A	3.8048119	8.73E-05	0.000%
BA03	Wk	Desert shrub - poor	A	9467.0482	2.17E-01	0.002%
BA03	Cb	Desert shrub - poor	A	6.1221412	1.41E-04	0.000%
BA03	Bn	Developing urban - newly graded	A	65853.561	1.51E+00	0.016%
BA03	Pa	Developing urban - newly graded	A	90128.894	2.07E+00	0.022%
BA03	Cb	Developing urban - newly graded	A	493.47671	1.13E-02	0.000%
BA03	Pa	Developing urban - newly graded	A	204.71	4.70E-03	0.000%
BA03	Bn	Developing urban - newly graded	A	121.59135	2.79E-03	0.000%
BA03	Cb	Developing urban - newly graded	A	26.354704	6.05E-04	0.000%
BA03	Pa	Developing urban - newly graded	A	15.189055	3.49E-04	0.000%
BA03	Pa	Developing urban - newly graded	A	112.5154	2.58E-03	0.000%
BA03	Bn	Developing urban - newly graded	A	0.8855942	2.03E-05	0.000%
BA03	Bn	Developing urban - newly graded	A	1709.8733	3.93E-02	0.000%
BA03	Bn	Developing urban - newly graded	A	874.32247	2.01E-02	0.000%
BA03	Pa	Developing urban - newly graded	A	2.4527787	5.63E-05	0.000%
BA03	Pa	Developing urban - newly graded	A	1230.8112	2.83E-02	0.000%
BA03	Pa	Developing urban - newly graded	A	1414.9673	3.25E-02	0.000%
BA03	Pa	Developing urban - newly graded	A	0.0152132	3.49E-07	0.000%
BA03	Pa	Developing urban - newly graded	A	0.4532309	1.04E-05	0.000%
BA03	Bn	Impervious - streets/roads; paved; curbs, storm	A	101101.09	2.32E+00	0.024%
BA03	Pa	Impervious - streets/roads; paved; curbs, storm	A	166896.4	3.83E+00	0.040%
BA03	Wk	Impervious - streets/roads; paved; curbs, storm	A	42156.369	9.68E-01	0.010%
BA03	Pa	Impervious - streets/roads; paved; curbs, storm	A	44027.595	1.01E+00	0.011%
BA03	Bn	Impervious - streets/roads; paved; curbs, storm	A	3.2809405	7.53E-05	0.000%
BA03	Bn	Impervious - streets/roads; paved; curbs, storm	A	0.8855942	2.03E-05	0.000%
BA03	Bn	Impervious - streets/roads; paved; curbs, storm	A	1709.8733	3.93E-02	0.000%
BA03	Pa	Impervious - streets/roads; paved; curbs, storm	A	5.251758	1.21E-04	0.000%
BA03	Pa	Impervious - streets/roads; paved; curbs, storm	A	2.4527787	5.63E-05	0.000%
BA03	Wk	Impervious - streets/roads; paved; curbs, storm	A	2448.4181	5.62E-02	0.001%

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Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA03	Pa	Impervious - streets/roads; paved; curbs, storm	A	1845.4777	4.24E-02	0.000%
BA03	Pa	Impervious - streets/roads; paved; curbs, storm	A	1230.8112	2.83E-02	0.000%
BA03	Cb	Residential - 1/4 acre	A	179720.37	4.13E+00	0.043%
BA03	Wm	Residential - 1/4 acre	A	1845670.8	4.24E+01	0.447%
BA03	Wm	Residential - 1/4 acre	A	1.9311071	4.43E-05	0.000%
BA03	Wm	Residential - 1/4 acre	A	2162472.8	4.96E+01	0.523%
BA03	Bn	Residential - 1/4 acre	A	301852.6	6.93E+00	0.073%
BA03	Pa	Residential - 1/4 acre	A	738313.6	1.69E+01	0.179%
BA03	Ws	Residential - 1/4 acre	A	209799.86	4.82E+00	0.051%
BA03	Cb	Residential - 1/4 acre	A	522653.24	1.20E+01	0.126%
BA03	Wn	Residential - 1/4 acre	A	171979	3.95E+00	0.042%
BA03	Wr	Residential - 1/4 acre	A	126968.12	2.91E+00	0.031%
BA03	Wk	Residential - 1/4 acre	A	4678362.2	1.07E+02	1.132%
BA03	Wk	Residential - 1/4 acre	A	12230.157	2.81E-01	0.003%
BA03	Ws	Residential - 1/4 acre	A	405738.49	9.31E+00	0.098%
BA03	Wn	Residential - 1/4 acre	A	445228.04	1.02E+01	0.108%
BA03	Wr	Residential - 1/4 acre	A	66379.801	1.52E+00	0.016%
BA03	Pa	Residential - 1/4 acre	A	220780.7	5.07E+00	0.053%
BA03	Pa	Residential - 1/4 acre	A	0.5335313	1.22E-05	0.000%
BA03	Pa	Residential - 1/4 acre	A	1150962.6	2.64E+01	0.278%
BA03	Wk	Residential - 1/4 acre	A	383259.13	8.80E+00	0.093%
BA03	Wk	Residential - 1/4 acre	A	9.8224675	2.25E-04	0.000%
BA03	Wk	Residential - 1/4 acre	A	3288011.7	7.55E+01	0.795%
BA03	Wm	Residential - 1/4 acre	A	268.18682	6.16E-03	0.000%
BA03	Wm	Residential - 1/4 acre	A	35.418704	8.13E-04	0.000%
BA03	Wm	Residential - 1/4 acre	A	3.4357886	7.89E-05	0.000%
BA03	Cb	Residential - 1/4 acre	A	11.390903	2.61E-04	0.000%
BA03	Wn	Residential - 1/4 acre	A	18.286897	4.20E-04	0.000%
BA03	Wk	Residential - 1/4 acre	A	53.355692	1.22E-03	0.000%
BA03	Wr	Residential - 1/4 acre	A	7.6139937	1.75E-04	0.000%
BA03	Pa	Residential - 1/4 acre	A	28.814486	6.61E-04	0.000%
BA03	Pa	Residential - 1/4 acre	A	1.4399745	3.31E-05	0.000%
BA03	Wk	Residential - 1/4 acre	A	94.601168	2.17E-03	0.000%
BA03	Wk	Residential - 1/4 acre	A	99.570997	2.29E-03	0.000%
BA03	Wk	Residential - 1/4 acre	A	190.54505	4.37E-03	0.000%
BA03	Wk	Residential - 1/4 acre	A	24.829991	5.70E-04	0.000%
BA03	Wm	Residential - 1/4 acre	A	4420.8354	1.01E-01	0.001%
BA03	Wm	Residential - 1/4 acre	A	4420.8354	1.01E-01	0.001%
BA03	Wr	Residential - 1/4 acre	A	12287.167	2.82E-01	0.003%
BA03	Wk	Residential - 1/4 acre	A	2600.8735	5.97E-02	0.001%
BA03	Wk	Residential - 1/4 acre	A	2600.8735	5.97E-02	0.001%
BA03	Pa	Residential - 1/4 acre	A	1533.219	3.52E-02	0.000%
BA03	Pa	Residential - 1/4 acre	A	1533.219	3.52E-02	0.000%
BA03	Pa	Residential - 1/4 acre	A	16513.03	3.79E-01	0.004%
BA03	Wk	Residential - 1/4 acre	A	3.8048119	8.73E-05	0.000%
BA03	Wk	Residential - 1/4 acre	A	3086.9328	7.09E-02	0.001%
BA03	Wk	Residential - 1/4 acre	A	3086.9328	7.09E-02	0.001%
BA03	Wk	Residential - 1/4 acre	A	0.0038812	8.91E-08	0.000%
BA03	Wk	Residential - 1/4 acre	A	0.0038812	8.91E-08	0.000%
BA03	Wk	Residential - 1/4 acre	A	9467.0482	2.17E-01	0.002%
BA03	Wm	Residential - 1/4 acre	A	0.4275416	9.82E-06	0.000%
BA03	Wm	Residential - 1/4 acre	A	0.4275416	9.82E-06	0.000%
BA03	Cb	Residential - 1/4 acre	A	6.1221412	1.41E-04	0.000%
BA03	Wn	Residential - 1/4 acre	A	0.7941461	1.82E-05	0.000%
BA03	Wn	Residential - 1/4 acre	A	0.7941461	1.82E-05	0.000%
BA03	Pa	Residential - 1/4 acre	A	0.8437061	1.94E-05	0.000%
BA03	Pa	Residential - 1/4 acre	A	0.8437061	1.94E-05	0.000%
BA03	Wk	Residential - 1/4 acre	A	5.1232377	1.18E-04	0.000%

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BA03	Wk	Residential - 1/4 acre	A	5.1232377	1.18E-04	0.000%
BA03	Wk	Residential - 1/4 acre	A	0.5147595	1.18E-05	0.000%
BA03	Wk	Residential - 1/4 acre	A	0.5147595	1.18E-05	0.000%
BA03	Wk	Residential - 1/4 acre	A	3.6752307	8.44E-05	0.000%
BA03	Wk	Residential - 1/4 acre	A	3.6752307	8.44E-05	0.000%
BA03	PITS	Residential - 1/4 acre	B	64858.185	1.49E+00	0.016%
BA03	PITS	Residential - 1/4 acre	B	12.187294	2.80E-04	0.000%
BA03	Bn	Urban district - commercial	A	319648.5	7.34E+00	0.077%
BA03	Pa	Urban district - commercial	A	178038.08	4.09E+00	0.043%
BA03	Pa	Urban district - commercial	A	2542.8411	5.84E-02	0.001%
BA03	Pa	Urban district - commercial	A	54845.706	1.26E+00	0.013%
BA03	Pa	Urban district - commercial	A	2040.3228	4.68E-02	0.000%
BA03	Wk	Urban district - commercial	A	34.642213	7.95E-04	0.000%
BA03	Pa	Urban district - commercial	A	107.71759	2.47E-03	0.000%
BA03	Pa	Urban district - commercial	A	61.67613	1.42E-03	0.000%
BA03	Pa	Urban district - commercial	A	47.343357	1.09E-03	0.000%
BA03	Bn	Urban district - commercial	A	3.2809405	7.53E-05	0.000%
BA03	Bn	Urban district - commercial	A	874.32247	2.01E-02	0.000%
BA03	Pa	Urban district - commercial	A	5.251758	1.21E-04	0.000%
BA03	Wk	Urban district - commercial	A	2448.4181	5.62E-02	0.001%
BA03	Pa	Urban district - commercial	A	1845.4777	4.24E-02	0.000%
BA03	Pa	Urban district - commercial	A	577.46666	1.33E-02	0.000%
BA03	Pa	Urban district - commercial	A	577.46666	1.33E-02	0.000%
BA03	Pa	Urban district - commercial	A	32.681877	7.50E-04	0.000%
BA03	Pa	Urban district - commercial	A	115.81077	2.66E-03	0.000%
BA03	Pa	Urban district - commercial	A	115.81077	2.66E-03	0.000%
BA03	Pa	Urban district - commercial	A	1414.9673	3.25E-02	0.000%
BA03	Pa	Urban district - commercial	A	17.14453	3.94E-04	0.000%
BA03	Pa	Urban district - commercial	A	0.1887511	4.33E-06	0.000%
BA03	Pa	Urban district - commercial	A	0.1887511	4.33E-06	0.000%
BA03	Pa	Urban district - commercial	A	0.0152132	3.49E-07	0.000%
BA03	Pa	Urban district - commercial	A	0.0492645	1.13E-06	0.000%
BA03	Pa	Urban district - commercial	A	0.0492645	1.13E-06	0.000%
BA03	Pa	Urban district - commercial	A	0.0492645	1.13E-06	0.000%
BA03	Pa	Urban district - commercial	A	0.4532309	1.04E-05	0.000%
BA03	Pa	Urban district - commercial	A	0.4532309	1.04E-05	0.000%
BA04	Wn	Desert shrub - poor	A	16883.068	3.88E-01	0.004%
BA04	Wk	Desert shrub - poor	A	27630.154	6.34E-01	0.007%
BA04	Wr	Desert shrub - poor	A	30005.561	6.89E-01	0.007%
BA04	Wk	Desert shrub - poor	A	306327.34	7.03E+00	0.074%
BA04	Wn	Desert shrub - poor	A	89.692094	2.06E-03	0.000%
BA04	Wn	Desert shrub - poor	A	89.692094	2.06E-03	0.000%
BA04	Wn	Desert shrub - poor	A	62.900598	1.44E-03	0.000%
BA04	Wk	Desert shrub - poor	A	43.408557	9.97E-04	0.000%
BA04	Wk	Desert shrub - poor	A	43.408557	9.97E-04	0.000%
BA04	Ad	Desert shrub - poor	B	117425.79	2.70E+00	0.028%
BA04	Wm	Residential - 1/4 acre	A	2139243	4.91E+01	0.518%
BA04	Wn	Residential - 1/4 acre	A	167553.47	3.85E+00	0.041%
BA04	Wk	Residential - 1/4 acre	A	180145.29	4.14E+00	0.044%
BA04	Wr	Residential - 1/4 acre	A	197801.39	4.54E+00	0.048%
BA04	Wk	Residential - 1/4 acre	A	5111976.7	1.17E+02	1.237%
BA04	Wm	Residential - 1/4 acre	A	268.18682	6.16E-03	0.000%
BA04	Wn	Residential - 1/4 acre	A	18.286897	4.20E-04	0.000%
BA04	Wk	Residential - 1/4 acre	A	53.355692	1.22E-03	0.000%

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BA04	Wr	Residential - 1/4 acre	A	7.6139937	1.75E-04	0.000%
BA04	Wk	Residential - 1/4 acre	A	94.601168	2.17E-03	0.000%
BA04	Wn	Residential - 1/4 acre	A	62.900598	1.44E-03	0.000%
BA04	Wn	Residential - 1/4 acre	A	1965.4902	4.51E-02	0.000%
BA04	Wn	Residential - 1/4 acre	A	1965.4902	4.51E-02	0.000%
BA04	Wk	Residential - 1/4 acre	A	5809.9821	1.33E-01	0.001%
BA04	Wk	Residential - 1/4 acre	A	5809.9821	1.33E-01	0.001%
BA04	Wn	Residential - 1/4 acre	A	0.7941461	1.82E-05	0.000%
BA04	Wn	Residential - 1/4 acre	A	0.7941461	1.82E-05	0.000%
BA04	Wk	Residential - 1/4 acre	A	5.1232377	1.18E-04	0.000%
BA04	Wk	Residential - 1/4 acre	A	5.1232377	1.18E-04	0.000%
BA04	PITS	Residential - 1/4 acre	B	1244.7612	2.86E-02	0.000%
BA04	Ad	Residential - 1/4 acre	B	93649.63	2.15E+00	0.023%
BA04	PITS	Residential - 1/4 acre	B	12.187294	2.80E-04	0.000%
BA05	Pa	Desert shrub - fair	A	1272937.1	2.92E+01	0.308%
BA05	Pa	Desert shrub - fair	A	22.230085	5.10E-04	0.000%
BA05	Pa	Desert shrub - fair	A	6.8029611	1.56E-04	0.000%
BA05	Pa	Desert shrub - fair	A	725.09549	1.66E-02	0.000%
BA05	Mn	Desert shrub - fair	B	99270.581	2.28E+00	0.024%
BA05	Gh	Desert shrub - fair	C	163931.08	3.76E+00	0.040%
BA05	Gt	Desert shrub - fair	C	149978.78	3.44E+00	0.036%
BA05	Gh	Desert shrub - fair	C	3.7873335	8.69E-05	0.000%
BA05	Gt	Desert shrub - fair	C	0.0233573	5.36E-07	0.000%
BA05	Gh	Desert shrub - fair	C	204.27765	4.69E-03	0.000%
BA05	Gt	Desert shrub - fair	C	4597.4435	1.06E-01	0.001%
BA05	Gt	Desert shrub - fair	C	1.5463935	3.55E-05	0.000%
BA05	Gt	Desert shrub - fair	C	0.6472387	1.49E-05	0.000%
BA05	Wr	Desert shrub - poor	A	57630.657	1.32E+00	0.014%
BA05	Wr	Desert shrub - poor	A	219328.52	5.04E+00	0.053%
BA05	Cb	Desert shrub - poor	A	126527.98	2.90E+00	0.031%
BA05	Cb	Desert shrub - poor	A	90942.105	2.09E+00	0.022%
BA05	Cb	Desert shrub - poor	A	44817.526	1.03E+00	0.011%
BA05	Wk	Desert shrub - poor	A	402077.44	9.23E+00	0.097%
BA05	Cb	Desert shrub - poor	A	53495.014	1.23E+00	0.013%
BA05	Pa	Desert shrub - poor	A	320649.65	7.36E+00	0.078%
BA05	Pa	Desert shrub - poor	A	386959.47	8.88E+00	0.094%
BA05	Pa	Desert shrub - poor	A	279131.2	6.41E+00	0.068%
BA05	Wk	Desert shrub - poor	A	459448.79	1.05E+01	0.111%
BA05	Pa	Desert shrub - poor	A	3.6225096	8.32E-05	0.000%
BA05	Wk	Desert shrub - poor	A	4.0819283	9.37E-05	0.000%
BA05	Wr	Desert shrub - poor	A	346.87246	7.96E-03	0.000%
BA05	Cb	Desert shrub - poor	A	69.416215	1.59E-03	0.000%
BA05	Cb	Desert shrub - poor	A	3.7822751	8.68E-05	0.000%
BA05	Cb	Desert shrub - poor	A	3019.199	6.93E-02	0.001%
BA05	Wk	Desert shrub - poor	A	525.04448	1.21E-02	0.000%
BA05	Cb	Desert shrub - poor	A	383.95953	8.81E-03	0.000%
BA05	Pa	Desert shrub - poor	A	44.949134	1.03E-03	0.000%
BA05	Pa	Desert shrub - poor	A	315.82514	7.25E-03	0.000%
BA05	Pa	Desert shrub - poor	A	241.53682	5.54E-03	0.000%
BA05	Pa	Desert shrub - poor	A	1997.8328	4.59E-02	0.000%
BA05	Wk	Desert shrub - poor	A	9.7735939	2.24E-04	0.000%
BA05	Wk	Desert shrub - poor	A	96.755154	2.22E-03	0.000%
BA05	Cb	Desert shrub - poor	A	6.1221412	1.41E-04	0.000%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA05	Gt	Desert shrub - poor	C	6.0420433	1.39E-04	0.000%
BA05	Gt	Desert shrub - poor	C	0.3651993	8.38E-06	0.000%
BA05	Gh	Desert shrub - poor	C	204.27765	4.69E-03	0.000%
BA05	Gt	Desert shrub - poor	C	4597.4435	1.06E-01	0.001%
BA05	Gt	Desert shrub - poor	C	1.5463935	3.55E-05	0.000%
BA05	Gt	Desert shrub - poor	C	0.6472387	1.49E-05	0.000%
BA05	Bn	Developing urban - newly graded	A	42769.463	9.82E-01	0.010%
BA05	Cb	Developing urban - newly graded	A	143205.5	3.29E+00	0.035%
BA05	Wk	Developing urban - newly graded	A	41121.941	9.44E-01	0.010%
BA05	Pa	Developing urban - newly graded	A	3659.1002	8.40E-02	0.001%
BA05	Pa	Developing urban - newly graded	A	113311.37	2.60E+00	0.027%
BA05	Bn	Developing urban - newly graded	A	121.59135	2.79E-03	0.000%
BA05	Cb	Developing urban - newly graded	A	26.354704	6.05E-04	0.000%
BA05	Pa	Developing urban - newly graded	A	15.189055	3.49E-04	0.000%
BA05	Pa	Developing urban - newly graded	A	112.5154	2.58E-03	0.000%
BA05	Cb	Developing urban - newly graded	A	223.02825	5.12E-03	0.000%
BA05	Pa	Developing urban - newly graded	A	4.4079453	1.01E-04	0.000%
BA05	Pa	Developing urban - newly graded	A	0.0152132	3.49E-07	0.000%
BA05	Wr	Open space - good	A	115310.35	2.65E+00	0.028%
BA05	Wr	Open space - good	A	3668.9343	8.42E-02	0.001%
BA05	Cb	Open space - good	A	65943.235	1.51E+00	0.016%
BA05	Cb	Open space - good	A	222027.44	5.10E+00	0.054%
BA05	Cb	Open space - good	A	75101.315	1.72E+00	0.018%
BA05	Cb	Open space - good	A	72369.476	1.66E+00	0.018%
BA05	Pa	Open space - good	A	75938.68	1.74E+00	0.018%
BA05	Wk	Open space - good	A	112575.63	2.58E+00	0.027%
BA05	Wk	Open space - good	A	174254.54	4.00E+00	0.042%
BA05	Cb	Open space - good	A	26.967275	6.19E-04	0.000%
BA05	Wk	Open space - good	A	6.3405413	1.46E-04	0.000%
BA05	Wr	Open space - good	A	0.7678148	1.76E-05	0.000%
BA05	Wr	Open space - good	A	0.5179314	1.19E-05	0.000%
BA05	Cb	Open space - good	A	6.9346562	1.59E-04	0.000%
BA05	Cb	Open space - good	A	383.95953	8.81E-03	0.000%
BA05	Pa	Open space - good	A	315.82514	7.25E-03	0.000%
BA05	Wk	Open space - good	A	558.47074	1.28E-02	0.000%
BA05	Wk	Open space - good	A	96.755154	2.22E-03	0.000%
BA05	Wk	Open space - good	A	0.5067199	1.16E-05	0.000%
BA05	Wr	Open space - poor	A	29013.326	6.66E-01	0.007%
BA05	Cb	Open space - poor	A	131461.98	3.02E+00	0.032%
BA05	Pa	Open space - poor	A	84264.994	1.93E+00	0.020%
BA05	Cb	Open space - poor	A	3019.199	6.93E-02	0.001%
BA05	Pa	Open space - poor	A	1997.8328	4.59E-02	0.000%
BA05	Wr	Residential - 1/4 acre	A	73544.608	1.69E+00	0.018%
BA05	Cb	Residential - 1/4 acre	A	155157.35	3.56E+00	0.038%
BA05	Wk	Residential - 1/4 acre	A	34858.437	8.00E-01	0.008%
BA05	Wk	Residential - 1/4 acre	A	154502.54	3.55E+00	0.037%
BA05	Cb	Residential - 1/4 acre	A	48142.567	1.11E+00	0.012%
BA05	Cb	Residential - 1/4 acre	A	32577.05	7.48E-01	0.008%
BA05	Pa	Residential - 1/4 acre	A	25906.398	5.95E-01	0.006%
BA05	Pa	Residential - 1/4 acre	A	2627.5879	6.03E-02	0.001%
BA05	Pa	Residential - 1/4 acre	A	889699.87	2.04E+01	0.215%
BA05	Wk	Residential - 1/4 acre	A	120952.66	2.78E+00	0.029%
BA05	Wk	Residential - 1/4 acre	A	367877.74	8.45E+00	0.089%
BA05	Wk	Residential - 1/4 acre	A	154.5234	3.55E-03	0.000%
BA05	Cb	Residential - 1/4 acre	A	11.390903	2.61E-04	0.000%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA05	Cb	Residential - 1/4 acre	A	19.32867	4.44E-04	0.000%
BA05	Cb	Residential - 1/4 acre	A	30.023802	6.89E-04	0.000%
BA05	Pa	Residential - 1/4 acre	A	6.0678035	1.39E-04	0.000%
BA05	Wk	Residential - 1/4 acre	A	55.150525	1.27E-03	0.000%
BA05	Wk	Residential - 1/4 acre	A	99.570997	2.29E-03	0.000%
BA05	Wk	Residential - 1/4 acre	A	25.521384	5.86E-04	0.000%
BA05	Wk	Residential - 1/4 acre	A	0.5847691	1.34E-05	0.000%
BA05	Wr	Residential - 1/4 acre	A	346.87246	7.96E-03	0.000%
BA05	Cb	Residential - 1/4 acre	A	69.416215	1.59E-03	0.000%
BA05	Cb	Residential - 1/4 acre	A	223.02825	5.12E-03	0.000%
BA05	Wk	Residential - 1/4 acre	A	38.732413	8.89E-04	0.000%
BA05	Wk	Residential - 1/4 acre	A	525.04448	1.21E-02	0.000%
BA05	Pa	Residential - 1/4 acre	A	2876.7956	6.60E-02	0.001%
BA05	Pa	Residential - 1/4 acre	A	241.53682	5.54E-03	0.000%
BA05	Wk	Residential - 1/4 acre	A	558.47074	1.28E-02	0.000%
BA05	Wk	Residential - 1/4 acre	A	352.81177	8.10E-03	0.000%
BA05	Wk	Residential - 1/4 acre	A	352.81177	8.10E-03	0.000%
BA05	Wk	Residential - 1/4 acre	A	9.7735939	2.24E-04	0.000%
BA05	Cb	Residential - 1/4 acre	A	6.1221412	1.41E-04	0.000%
BA05	Wk	Residential - 1/4 acre	A	0.5067199	1.16E-05	0.000%
BA05	Wk	Residential - 1/4 acre	A	0.5147595	1.18E-05	0.000%
BA05	Wk	Residential - 1/4 acre	A	0.5147595	1.18E-05	0.000%
BA05	Wk	Residential - 1/4 acre	A	0.1277062	2.93E-06	0.000%
BA05	Wk	Residential - 1/4 acre	A	0.1277062	2.93E-06	0.000%
BA05	Wr	Urban district - commercial	A	69036.091	1.58E+00	0.017%
BA05	Cb	Urban district - commercial	A	258783.06	5.94E+00	0.063%
BA05	Wk	Urban district - commercial	A	41889.742	9.62E-01	0.010%
BA05	Wk	Urban district - commercial	A	271809.68	6.24E+00	0.066%
BA05	Wk	Urban district - commercial	A	68234.096	1.57E+00	0.017%
BA05	Pa	Urban district - commercial	A	976875.26	2.24E+01	0.236%
BA05	Pa	Urban district - commercial	A	23222.29	5.33E-01	0.006%
BA05	Pa	Urban district - commercial	A	421124.82	9.67E+00	0.102%
BA05	Pa	Urban district - commercial	A	33061.919	7.59E-01	0.008%
BA05	Wk	Urban district - commercial	A	21344.571	4.90E-01	0.005%
BA05	Wk	Urban district - commercial	A	34.642213	7.95E-04	0.000%
BA05	Pa	Urban district - commercial	A	107.71759	2.47E-03	0.000%
BA05	Pa	Urban district - commercial	A	9.5363624	2.19E-04	0.000%
BA05	Pa	Urban district - commercial	A	61.67613	1.42E-03	0.000%
BA05	Pa	Urban district - commercial	A	47.343357	1.09E-03	0.000%
BA05	Wr	Urban district - commercial	A	0.7678148	1.76E-05	0.000%
BA05	Wr	Urban district - commercial	A	0.5179314	1.19E-05	0.000%
BA05	Cb	Urban district - commercial	A	6.9346562	1.59E-04	0.000%
BA05	Cb	Urban district - commercial	A	3.7822751	8.68E-05	0.000%
BA05	Wk	Urban district - commercial	A	38.732413	8.89E-04	0.000%
BA05	Wk	Urban district - commercial	A	8.2351739	1.89E-04	0.000%
BA05	Wk	Urban district - commercial	A	8.2351739	1.89E-04	0.000%
BA05	Pa	Urban district - commercial	A	2876.7956	6.60E-02	0.001%
BA05	Pa	Urban district - commercial	A	1025.8079	2.35E-02	0.000%
BA05	Pa	Urban district - commercial	A	1025.8079	2.35E-02	0.000%
BA05	Pa	Urban district - commercial	A	725.09549	1.66E-02	0.000%
BA05	Pa	Urban district - commercial	A	44.949134	1.03E-03	0.000%
BA05	Pa	Urban district - commercial	A	4.4079453	1.01E-04	0.000%
BA05	Pa	Urban district - commercial	A	0.1887511	4.33E-06	0.000%
BA05	Pa	Urban district - commercial	A	0.1887511	4.33E-06	0.000%
BA05	Pa	Urban district - commercial	A	0.0152132	3.49E-07	0.000%
BA06	Pa	Desert shrub - fair	A	6.8029611	1.56E-04	0.000%
BA06	Pa	Desert shrub - fair	A	1289.6006	2.96E-02	0.000%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA06	Gh	Desert shrub - fair	C	8.934883	2.05E-04	0.000%
BA06	Gt	Desert shrub - fair	C	1.4975357	3.44E-05	0.000%
BA06	Gh	Desert shrub - fair	C	3.7873335	8.69E-05	0.000%
BA06	Gh	Desert shrub - fair	C	84.211946	1.93E-03	0.000%
BA06	Gh	Desert shrub - fair	C	2124.9376	4.88E-02	0.001%
BA06	Gt	Desert shrub - fair	C	1672.4165	3.84E-02	0.000%
BA06	Gt	Desert shrub - fair	C	0.6472387	1.49E-05	0.000%
BA06	Wm	Desert shrub - poor	A	131655.76	3.02E+00	0.032%
BA06	Cb	Desert shrub - poor	A	41617.249	9.55E-01	0.010%
BA06	Wn	Desert shrub - poor	A	102700.84	2.36E+00	0.025%
BA06	Pa	Desert shrub - poor	A	526660.33	1.21E+01	0.127%
BA06	Wk	Desert shrub - poor	A	886115.12	2.03E+01	0.214%
BA06	Wm	Desert shrub - poor	A	51.08958	1.17E-03	0.000%
BA06	Pa	Desert shrub - poor	A	157.65414	3.62E-03	0.000%
BA06	Pa	Desert shrub - poor	A	3.6225096	8.32E-05	0.000%
BA06	Wk	Desert shrub - poor	A	6.3930133	1.47E-04	0.000%
BA06	Wk	Desert shrub - poor	A	456.7211	1.05E-02	0.000%
BA06	Wk	Desert shrub - poor	A	4.0819283	9.37E-05	0.000%
BA06	Wm	Desert shrub - poor	A	798.32874	1.83E-02	0.000%
BA06	Wn	Desert shrub - poor	A	1121.0808	2.57E-02	0.000%
BA06	Wn	Desert shrub - poor	A	97.361413	2.24E-03	0.000%
BA06	Wn	Desert shrub - poor	A	2253.4857	5.17E-02	0.001%
BA06	Pa	Desert shrub - poor	A	2751.8134	6.32E-02	0.001%
BA06	Pa	Desert shrub - poor	A	200.69382	4.61E-03	0.000%
BA06	Pa	Desert shrub - poor	A	677.88605	1.56E-02	0.000%
BA06	Pa	Desert shrub - poor	A	211.17125	4.85E-03	0.000%
BA06	Pa	Desert shrub - poor	A	168.90544	3.88E-03	0.000%
BA06	Wk	Desert shrub - poor	A	330.7399	7.59E-03	0.000%
BA06	Wk	Desert shrub - poor	A	97.451692	2.24E-03	0.000%
BA06	Wk	Desert shrub - poor	A	3174.2831	7.29E-02	0.001%
BA06	Wk	Desert shrub - poor	A	1037.0795	2.38E-02	0.000%
BA06	Wk	Desert shrub - poor	A	275.16642	6.32E-03	0.000%
BA06	Gh	Desert shrub - poor	C	3424.9522	7.86E-02	0.001%
BA06	Gt	Desert shrub - poor	C	361439.43	8.30E+00	0.087%
BA06	Gh	Desert shrub - poor	C	84.211946	1.93E-03	0.000%
BA06	Gt	Desert shrub - poor	C	1672.4165	3.84E-02	0.000%
BA06	Gt	Desert shrub - poor	C	0.6472387	1.49E-05	0.000%
BA06	Cb	Open space - good	A	1999.168	4.59E-02	0.000%
BA06	Wn	Open space - good	A	534526.67	1.23E+01	0.129%
BA06	Cb	Open space - good	A	525790.87	1.21E+01	0.127%
BA06	Pa	Open space - good	A	503087.41	1.15E+01	0.122%
BA06	Wk	Open space - good	A	429097.95	9.85E+00	0.104%
BA06	Wk	Open space - good	A	1579539.4	3.63E+01	0.382%
BA06	Cb	Open space - good	A	26.967275	6.19E-04	0.000%
BA06	Wk	Open space - good	A	6.3405413	1.46E-04	0.000%
BA06	Wn	Open space - good	A	1121.0808	2.57E-02	0.000%
BA06	Pa	Open space - good	A	677.88605	1.56E-02	0.000%
BA06	Wk	Open space - good	A	330.7399	7.59E-03	0.000%
BA06	Wk	Open space - good	A	275.16642	6.32E-03	0.000%
BA06	Wk	Open space - good	A	6336.4434	1.45E-01	0.002%
BA06	Wk	Open space - good	A	602.58585	1.38E-02	0.000%
BA06	Wk	Open space - good	A	385.74916	8.86E-03	0.000%
BA06	Wk	Open space - good	A	0.5067199	1.16E-05	0.000%
BA06	Wn	Residential - 1/2 acre	A	206102.42	4.73E+00	0.050%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA06	Wk	Residential - 1/2 acre	A	123608.26	2.84E+00	0.030%
BA06	Cb	Residential - 1/3 acre	A	155749.74	3.58E+00	0.038%
BA06	Wn	Residential - 1/3 acre	A	375917.81	8.63E+00	0.091%
BA06	Wk	Residential - 1/3 acre	A	623241.96	1.43E+01	0.151%
BA06	Wk	Residential - 1/3 acre	A	286905.27	6.59E+00	0.069%
BA06	Wn	Residential - 1/3 acre	A	97.361413	2.24E-03	0.000%
BA06	Wk	Residential - 1/3 acre	A	97.451692	2.24E-03	0.000%
BA06	Wm	Residential - 1/4 acre	A	53289.22	1.22E+00	0.013%
BA06	Wm	Residential - 1/4 acre	A	58.858309	1.35E-03	0.000%
BA06	Wn	Residential - 1/4 acre	A	501860.54	1.15E+01	0.121%
BA06	Cb	Residential - 1/4 acre	A	226199.15	5.19E+00	0.055%
BA06	Cb	Residential - 1/4 acre	A	249860.01	5.74E+00	0.060%
BA06	Pa	Residential - 1/4 acre	A	2251783.5	5.17E+01	0.545%
BA06	Pa	Residential - 1/4 acre	A	80798.805	1.85E+00	0.020%
BA06	Pa	Residential - 1/4 acre	A	8872.39	2.04E-01	0.002%
BA06	Pa	Residential - 1/4 acre	A	2.8568099	6.56E-05	0.000%
BA06	Wk	Residential - 1/4 acre	A	5373074	1.23E+02	1.300%
BA06	Wk	Residential - 1/4 acre	A	649500.09	1.49E+01	0.157%
BA06	Wk	Residential - 1/4 acre	A	282167.75	6.48E+00	0.068%
BA06	Wk	Residential - 1/4 acre	A	64.99193	1.49E-03	0.000%
BA06	Wm	Residential - 1/4 acre	A	35.418704	8.13E-04	0.000%
BA06	Wm	Residential - 1/4 acre	A	3.4357886	7.89E-05	0.000%
BA06	Cb	Residential - 1/4 acre	A	19.32867	4.44E-04	0.000%
BA06	Cb	Residential - 1/4 acre	A	30.023802	6.89E-04	0.000%
BA06	Pa	Residential - 1/4 acre	A	6.0678035	1.39E-04	0.000%
BA06	Pa	Residential - 1/4 acre	A	28.814486	6.61E-04	0.000%
BA06	Pa	Residential - 1/4 acre	A	1.4399745	3.31E-05	0.000%
BA06	Wk	Residential - 1/4 acre	A	55.150525	1.27E-03	0.000%
BA06	Wk	Residential - 1/4 acre	A	25.521384	5.86E-04	0.000%
BA06	Wk	Residential - 1/4 acre	A	190.54505	4.37E-03	0.000%
BA06	Wk	Residential - 1/4 acre	A	0.5847691	1.34E-05	0.000%
BA06	Wk	Residential - 1/4 acre	A	24.829991	5.70E-04	0.000%
BA06	Wm	Residential - 1/4 acre	A	798.32874	1.83E-02	0.000%
BA06	Wm	Residential - 1/4 acre	A	94.269379	2.16E-03	0.000%
BA06	Wm	Residential - 1/4 acre	A	94.269379	2.16E-03	0.000%
BA06	Wn	Residential - 1/4 acre	A	2253.4857	5.17E-02	0.001%
BA06	Cb	Residential - 1/4 acre	A	16.258885	3.73E-04	0.000%
BA06	Pa	Residential - 1/4 acre	A	207.12963	4.76E-03	0.000%
BA06	Pa	Residential - 1/4 acre	A	2751.8134	6.32E-02	0.001%
BA06	Pa	Residential - 1/4 acre	A	200.69382	4.61E-03	0.000%
BA06	Pa	Residential - 1/4 acre	A	211.17125	4.85E-03	0.000%
BA06	Pa	Residential - 1/4 acre	A	1289.6006	2.96E-02	0.000%
BA06	Pa	Residential - 1/4 acre	A	2359.7728	5.42E-02	0.001%
BA06	Pa	Residential - 1/4 acre	A	168.90544	3.88E-03	0.000%
BA06	Pa	Residential - 1/4 acre	A	10745.303	2.47E-01	0.003%
BA06	Pa	Residential - 1/4 acre	A	28.624556	6.57E-04	0.000%
BA06	Pa	Residential - 1/4 acre	A	28.624556	6.57E-04	0.000%
BA06	Wk	Residential - 1/4 acre	A	3174.2831	7.29E-02	0.001%
BA06	Wk	Residential - 1/4 acre	A	1037.0795	2.38E-02	0.000%
BA06	Wk	Residential - 1/4 acre	A	6336.4434	1.45E-01	0.002%
BA06	Wk	Residential - 1/4 acre	A	0.369493	8.48E-06	0.000%
BA06	Wk	Residential - 1/4 acre	A	0.369493	8.48E-06	0.000%
BA06	Wk	Residential - 1/4 acre	A	1078.9201	2.48E-02	0.000%
BA06	Wk	Residential - 1/4 acre	A	1078.9201	2.48E-02	0.000%
BA06	Wk	Residential - 1/4 acre	A	385.74916	8.86E-03	0.000%
BA06	Wm	Residential - 1/4 acre	A	0.4275416	9.82E-06	0.000%
BA06	Wm	Residential - 1/4 acre	A	0.4275416	9.82E-06	0.000%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA06	Pa	Residential - 1/4 acre	A	0.8437061	1.94E-05	0.000%
BA06	Pa	Residential - 1/4 acre	A	0.8437061	1.94E-05	0.000%
BA06	Wk	Residential - 1/4 acre	A	0.5067199	1.16E-05	0.000%
BA06	Wk	Residential - 1/4 acre	A	0.1277062	2.93E-06	0.000%
BA06	Wk	Residential - 1/4 acre	A	0.1277062	2.93E-06	0.000%
BA06	Wk	Residential - 1/4 acre	A	3.6752307	8.44E-05	0.000%
BA06	Wk	Residential - 1/4 acre	A	3.6752307	8.44E-05	0.000%
BA06	Gh	Residential - 1/4 acre	C	791296.03	1.82E+01	0.191%
BA06	Gg	Residential - 1/4 acre	C	7975.3362	1.83E-01	0.002%
BA06	Gt	Residential - 1/4 acre	C	65362.986	1.50E+00	0.016%
BA06	Gr	Residential - 1/4 acre	C	857235.36	1.97E+01	0.207%
BA06	Gh	Residential - 1/4 acre	C	2124.9376	4.88E-02	0.001%
BA06	Pa	Urban district - commercial	A	236874.32	5.44E+00	0.057%
BA06	Pa	Urban district - commercial	A	9.5363624	2.19E-04	0.000%
BA06	Cb	Urban district - commercial	A	16.258885	3.73E-04	0.000%
BA06	Pa	Urban district - commercial	A	207.12963	4.76E-03	0.000%
BA06	Pa	Urban district - commercial	A	2359.7728	5.42E-02	0.001%
BA06	Pa	Urban district - commercial	A	10745.303	2.47E-01	0.003%
BA06	Pa	Water	A	14663.35	3.37E-01	0.004%
BA06	Pa	Water	A	21809.685	5.01E-01	0.005%
BA06	Pa	Water	A	32041.509	7.36E-01	0.008%
BA06	Pa	Water	A	36490.196	8.38E-01	0.009%
BA06	Wk	Water	A	162993.53	3.74E+00	0.039%
BA06	Wk	Water	A	14025.574	3.22E-01	0.003%
BA06	Wk	Water	A	14528.741	3.34E-01	0.004%
BA06	Wk	Water	A	1078.6699	2.48E-02	0.000%
BA06	Wk	Water	A	602.58585	1.38E-02	0.000%
BA07	Gt	Desert shrub - fair	C	0.010408	2.39E-07	0.000%
BA07	Gt	Desert shrub - fair	C	0.0233573	5.36E-07	0.000%
BA07	Gt	Desert shrub - fair	C	351.40999	8.07E-03	0.000%
BA07	Gt	Desert shrub - fair	C	1.5463935	3.55E-05	0.000%
BA07	Cb	Desert shrub - poor	A	2226062.8	5.11E+01	0.539%
BA07	Wn	Desert shrub - poor	A	824980.79	1.89E+01	0.200%
BA07	Wn	Desert shrub - poor	A	539999.52	1.24E+01	0.131%
BA07	Wr	Desert shrub - poor	A	286580.34	6.58E+00	0.069%
BA07	Pa	Desert shrub - poor	A	5177689.3	1.19E+02	1.253%
BA07	Bs	Desert shrub - poor	A	2693574	6.18E+01	0.652%
BA07	Wk	Desert shrub - poor	A	15290963	3.51E+02	3.699%
BA07	Pa	Desert shrub - poor	A	157.65414	3.62E-03	0.000%
BA07	Bs	Desert shrub - poor	A	534.82639	1.23E-02	0.000%
BA07	Wk	Desert shrub - poor	A	882.77745	2.03E-02	0.000%
BA07	Cb	Desert shrub - poor	A	437.24359	1.00E-02	0.000%
BA07	Wn	Desert shrub - poor	A	662.13023	1.52E-02	0.000%
BA07	Wn	Desert shrub - poor	A	2498.604	5.74E-02	0.001%
BA07	Pa	Desert shrub - poor	A	1693.7184	3.89E-02	0.000%
BA07	Wk	Desert shrub - poor	A	3209.7876	7.37E-02	0.001%
BA07	Wk	Desert shrub - poor	A	49.606316	1.14E-03	0.000%
BA07	Mn	Desert shrub - poor	B	92588.859	2.13E+00	0.022%
BA07	Gh	Desert shrub - poor	C	937255.45	2.15E+01	0.227%
BA07	Gg	Desert shrub - poor	C	561964.13	1.29E+01	0.136%
BA07	Gt	Desert shrub - poor	C	438719.45	1.01E+01	0.106%
BA07	Gr	Desert shrub - poor	C	39197.844	9.00E-01	0.009%

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Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA07	Gt	Desert shrub - poor	C	0.3651993	8.38E-06	0.000%
BA07	Gh	Desert shrub - poor	C	827.97839	1.90E-02	0.000%
BA07	Gg	Desert shrub - poor	C	178.85177	4.11E-03	0.000%
BA07	Gt	Desert shrub - poor	C	351.40999	8.07E-03	0.000%
BA07	Gr	Desert shrub - poor	C	341.73736	7.85E-03	0.000%
BA07	Gt	Desert shrub - poor	C	1.5463935	3.55E-05	0.000%
BA07	Cb	Open space - good	A	0.3321187	7.62E-06	0.000%
BA07	Wn	Open space - good	A	175.37248	4.03E-03	0.000%
BA07	Pa	Open space - good	A	4999.5146	1.15E-01	0.001%
BA07	Wk	Open space - good	A	10382.96	2.38E-01	0.003%
BA07	Cb	Residential - 1/3 acre	A	27962.944	6.42E-01	0.007%
BA07	Wn	Residential - 1/3 acre	A	10021.052	2.30E-01	0.002%
BA07	Wk	Residential - 1/3 acre	A	65891.434	1.51E+00	0.016%
BA07	Cb	Residential - 1/3 acre	A	437.24359	1.00E-02	0.000%
BA07	Wn	Residential - 1/3 acre	A	662.13023	1.52E-02	0.000%
BA07	Wk	Residential - 1/3 acre	A	3209.7876	7.37E-02	0.001%
BA07	Wn	Residential - 1/4 acre	A	28075.736	6.45E-01	0.007%
BA07	Pa	Residential - 1/4 acre	A	21645.088	4.97E-01	0.005%
BA07	Wk	Residential - 1/4 acre	A	56.639286	1.30E-03	0.000%
BA07	Wn	Residential - 1/4 acre	A	2498.604	5.74E-02	0.001%
BA07	Pa	Residential - 1/4 acre	A	1693.7184	3.89E-02	0.000%
BA07	Wk	Residential - 1/4 acre	A	49.606316	1.14E-03	0.000%
BA07	Gh	Residential - 1/4 acre	C	20641.655	4.74E-01	0.005%
BA07	Gg	Residential - 1/4 acre	C	2712.6312	6.23E-02	0.001%
BA07	Gr	Residential - 1/4 acre	C	3789.0757	8.70E-02	0.001%
BA07	Gh	Residential - 1/4 acre	C	827.97839	1.90E-02	0.000%
BA07	Gg	Residential - 1/4 acre	C	178.85177	4.11E-03	0.000%
BA07	Gr	Residential - 1/4 acre	C	341.73736	7.85E-03	0.000%
BA08	Wm	Desert shrub - poor	A	441024.64	1.01E+01	0.107%
BA08	Bs	Desert shrub - poor	A	5438.6428	1.25E-01	0.001%
BA08	Bs	Desert shrub - poor	A	107.0789	2.46E-03	0.000%
BA08	Wn	Desert shrub - poor	A	1789086.6	4.11E+01	0.433%
BA08	Bs	Desert shrub - poor	A	1267515.4	2.91E+01	0.307%
BA08	Wn	Desert shrub - poor	A	3301273.9	7.58E+01	0.799%
BA08	Wn	Desert shrub - poor	A	3747.6563	8.60E-02	0.001%
BA08	Bs	Desert shrub - poor	A	981875.61	2.25E+01	0.238%
BA08	Bs	Desert shrub - poor	A	1506.7267	3.46E-02	0.000%
BA08	Wk	Desert shrub - poor	A	1976245.7	4.54E+01	0.478%
BA08	Wk	Desert shrub - poor	A	988.26414	2.27E-02	0.000%
BA08	Bs	Desert shrub - poor	A	118689.71	2.72E+00	0.029%
BA08	Bs	Desert shrub - poor	A	964.69149	2.21E-02	0.000%
BA08	Wk	Desert shrub - poor	A	8193275.5	1.88E+02	1.982%
BA08	Wk	Desert shrub - poor	A	2393.1099	5.49E-02	0.001%
BA08	Wn	Desert shrub - poor	A	2503860.8	5.75E+01	0.606%
BA08	Wn	Desert shrub - poor	A	4581.8414	1.05E-01	0.001%
BA08	Bs	Desert shrub - poor	A	0.0244365	5.61E-07	0.000%
BA08	Bs	Desert shrub - poor	A	0.3506381	8.05E-06	0.000%
BA08	Wn	Desert shrub - poor	A	30.36481	6.97E-04	0.000%
BA08	Wn	Desert shrub - poor	A	20.687565	4.75E-04	0.000%
BA08	Bs	Desert shrub - poor	A	0.502279	1.15E-05	0.000%
BA08	Bs	Desert shrub - poor	A	8.4107513	1.93E-04	0.000%
BA08	Bs	Desert shrub - poor	A	37.300737	8.56E-04	0.000%
BA08	Wk	Desert shrub - poor	A	0.0578582	1.33E-06	0.000%
BA08	Wk	Desert shrub - poor	A	6.9184367	1.59E-04	0.000%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA08	Bs	Desert shrub - poor	A	0.1975879	4.54E-06	0.000%
BA08	Bs	Desert shrub - poor	A	7.454353	1.71E-04	0.000%
BA08	Wk	Desert shrub - poor	A	0.0755049	1.73E-06	0.000%
BA08	Wk	Desert shrub - poor	A	9.317726	2.14E-04	0.000%
BA08	Wk	Desert shrub - poor	A	56.238789	1.29E-03	0.000%
BA08	Wn	Desert shrub - poor	A	26.994817	6.20E-04	0.000%
BA08	Wm	Desert shrub - poor	A	3319.9994	7.62E-02	0.001%
BA08	Bs	Desert shrub - poor	A	218.66345	5.02E-03	0.000%
BA08	Bs	Desert shrub - poor	A	218.66345	5.02E-03	0.000%
BA08	Wn	Desert shrub - poor	A	2583.1746	5.93E-02	0.001%
BA08	Wn	Desert shrub - poor	A	4019.3512	9.23E-02	0.001%
BA08	Wn	Desert shrub - poor	A	4019.3512	9.23E-02	0.001%
BA08	Bs	Desert shrub - poor	A	4133.6043	9.49E-02	0.001%
BA08	Bs	Desert shrub - poor	A	4133.6043	9.49E-02	0.001%
BA08	Bs	Desert shrub - poor	A	2914.6993	6.69E-02	0.001%
BA08	Bs	Desert shrub - poor	A	530.96754	1.22E-02	0.000%
BA08	Wk	Desert shrub - poor	A	558.75421	1.28E-02	0.000%
BA08	Wk	Desert shrub - poor	A	558.75421	1.28E-02	0.000%
BA08	Bs	Desert shrub - poor	A	1128.3133	2.59E-02	0.000%
BA08	Bs	Desert shrub - poor	A	1128.3133	2.59E-02	0.000%
BA08	Wk	Desert shrub - poor	A	5110.3436	1.17E-01	0.001%
BA08	Wk	Desert shrub - poor	A	5110.3436	1.17E-01	0.001%
BA08	Wk	Desert shrub - poor	A	423.13459	9.71E-03	0.000%
BA08	Wn	Desert shrub - poor	A	4736.7676	1.09E-01	0.001%
BA08	Wn	Desert shrub - poor	A	4736.7676	1.09E-01	0.001%
BA08	Wn	Desert shrub - poor	A	239.50382	5.50E-03	0.000%
BA08	Wn	Desert shrub - poor	A	17.564629	4.03E-04	0.000%
BA08	Wn	Desert shrub - poor	A	17.564629	4.03E-04	0.000%
BA08	Wn	Desert shrub - poor	A	0.1747544	4.01E-06	0.000%
BA08	Wn	Desert shrub - poor	A	0.1747544	4.01E-06	0.000%
BA08	Bs	Desert shrub - poor	A	0.193281	4.44E-06	0.000%
BA08	Bs	Desert shrub - poor	A	0.193281	4.44E-06	0.000%
BA08	Wk	Desert shrub - poor	A	0.0180909	4.15E-07	0.000%
BA08	Wk	Desert shrub - poor	A	0.0180909	4.15E-07	0.000%
BA08	Wk	Desert shrub - poor	A	0.0308972	7.09E-07	0.000%
BA08	Wk	Desert shrub - poor	A	0.0308972	7.09E-07	0.000%
BA08	Wk	Desert shrub - poor	A	5.272575	1.21E-04	0.000%
BA08	Wk	Desert shrub - poor	A	5.272575	1.21E-04	0.000%
BA08	Wn	Desert shrub - poor	A	0.1461252	3.35E-06	0.000%
BA08	Wn	Desert shrub - poor	A	0.1461252	3.35E-06	0.000%
BA08	Md	Desert shrub - poor	B	902194.54	2.07E+01	0.218%
BA08	Md	Desert shrub - poor	B	980.72935	2.25E-02	0.000%
BA08	Md	Desert shrub - poor	B	0.7057591	1.62E-05	0.000%
BA08	Md	Desert shrub - poor	B	4.0623084	9.33E-05	0.000%
BA08	Md	Desert shrub - poor	B	2050.9813	4.71E-02	0.000%
BA08	Md	Desert shrub - poor	B	2050.9813	4.71E-02	0.000%
BA08	Md	Desert shrub - poor	B	0.0990813	2.27E-06	0.000%
BA08	Md	Desert shrub - poor	B	0.0990813	2.27E-06	0.000%
BA08	Wm	Residential - 1/4 acre	A	2212783.6	5.08E+01	0.535%
BA08	Wn	Residential - 1/4 acre	A	304589.58	6.99E+00	0.074%
BA08	Bs	Residential - 1/4 acre	A	377063.67	8.66E+00	0.091%
BA08	Pa	Residential - 1/4 acre	A	546272.55	1.25E+01	0.132%
BA08	Wk	Residential - 1/4 acre	A	2074831.6	4.76E+01	0.502%
BA08	Wk	Residential - 1/4 acre	A	2010.349	4.62E-02	0.000%
BA08	Wn	Residential - 1/4 acre	A	53030.904	1.22E+00	0.013%
BA08	Bs	Residential - 1/4 acre	A	30.597442	7.02E-04	0.000%
BA08	Wm	Residential - 1/4 acre	A	3319.9994	7.62E-02	0.001%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA08	Wn	Residential - 1/4 acre	A	2583.1746	5.93E-02	0.001%
BA08	Bs	Residential - 1/4 acre	A	2914.6993	6.69E-02	0.001%
BA08	Bs	Residential - 1/4 acre	A	530.96754	1.22E-02	0.000%
BA08	Wk	Residential - 1/4 acre	A	423.13459	9.71E-03	0.000%
BA08	Wk	Residential - 1/4 acre	A	314.56113	7.22E-03	0.000%
BA08	Wk	Residential - 1/4 acre	A	314.56113	7.22E-03	0.000%
BA08	Wn	Residential - 1/4 acre	A	239.50382	5.50E-03	0.000%
BA09	Wk	Desert shrub - poor	A	713499.6	1.64E+01	0.173%
BA09	Wn	Desert shrub - poor	A	3147135.9	7.22E+01	0.761%
BA09	Wn	Desert shrub - poor	A	534702.02	1.23E+01	0.129%
BA09	Bs	Desert shrub - poor	A	215.12302	4.94E-03	0.000%
BA09	Bs	Desert shrub - poor	A	1370683.3	3.15E+01	0.332%
BA09	Bs	Desert shrub - poor	A	2699071.5	6.20E+01	0.653%
BA09	Bn	Desert shrub - poor	A	5714733.2	1.31E+02	1.383%
BA09	Wk	Desert shrub - poor	A	719336.08	1.65E+01	0.174%
BA09	Bs	Desert shrub - poor	A	3604204.4	8.27E+01	0.872%
BA09	Wn	Desert shrub - poor	A	316.15909	7.26E-03	0.000%
BA09	Wn	Desert shrub - poor	A	1960039.7	4.50E+01	0.474%
BA09	Bs	Desert shrub - poor	A	817.48212	1.88E-02	0.000%
BA09	Bs	Desert shrub - poor	A	1177044	2.70E+01	0.285%
BA09	Wk	Desert shrub - poor	A	806539.05	1.85E+01	0.195%
BA09	Wk	Desert shrub - poor	A	29.818865	6.85E-04	0.000%
BA09	Wk	Desert shrub - poor	A	123626.8	2.84E+00	0.030%
BA09	Bs	Desert shrub - poor	A	947062.02	2.17E+01	0.229%
BA09	Wk	Desert shrub - poor	A	11304724	2.60E+02	2.735%
BA09	Bs	Desert shrub - poor	A	39.568062	9.08E-04	0.000%
BA09	Bs	Desert shrub - poor	A	4516718.3	1.04E+02	1.093%
BA09	Bs	Desert shrub - poor	A	591072.48	1.36E+01	0.143%
BA09	Bs	Desert shrub - poor	A	16659.982	3.82E-01	0.004%
BA09	Bs	Desert shrub - poor	A	720792.89	1.65E+01	0.174%
BA09	PH	Desert shrub - poor	A	82773.184	1.90E+00	0.020%
BA09	PH	Desert shrub - poor	A	207238.52	4.76E+00	0.050%
BA09	Wk	Desert shrub - poor	A	899.66452	2.07E-02	0.000%
BA09	Wk	Desert shrub - poor	A	9941456.6	2.28E+02	2.405%
BA09	Wn	Desert shrub - poor	A	517.53714	1.19E-02	0.000%
BA09	Wn	Desert shrub - poor	A	297.94362	6.84E-03	0.000%
BA09	Wn	Desert shrub - poor	A	75645.822	1.74E+00	0.018%
BA09	Wn	Desert shrub - poor	A	193.56389	4.44E-03	0.000%
BA09	Wn	Desert shrub - poor	A	7142612.9	1.64E+02	1.728%
BA09	Wn	Desert shrub - poor	A	121.43581	2.79E-03	0.000%
BA09	Wn	Desert shrub - poor	A	78.666171	1.81E-03	0.000%
BA09	Bs	Desert shrub - poor	A	0.0244365	5.61E-07	0.000%
BA09	Bs	Desert shrub - poor	A	0.3506381	8.05E-06	0.000%
BA09	Bs	Desert shrub - poor	A	75.290748	1.73E-03	0.000%
BA09	Wn	Desert shrub - poor	A	20.687565	4.75E-04	0.000%
BA09	Bs	Desert shrub - poor	A	0.502279	1.15E-05	0.000%
BA09	Bs	Desert shrub - poor	A	8.4107513	1.93E-04	0.000%
BA09	Bs	Desert shrub - poor	A	0.1370409	3.15E-06	0.000%
BA09	Wk	Desert shrub - poor	A	48.987058	1.12E-03	0.000%
BA09	Wk	Desert shrub - poor	A	0.0578582	1.33E-06	0.000%
BA09	Wk	Desert shrub - poor	A	6.9184367	1.59E-04	0.000%
BA09	Wk	Desert shrub - poor	A	252.92693	5.81E-03	0.000%
BA09	Bs	Desert shrub - poor	A	0.1975879	4.54E-06	0.000%
BA09	Bs	Desert shrub - poor	A	7.454353	1.71E-04	0.000%
BA09	Bs	Desert shrub - poor	A	534.82639	1.23E-02	0.000%
BA09	Wk	Desert shrub - poor	A	0.0755049	1.73E-06	0.000%
BA09	Wk	Desert shrub - poor	A	882.77745	2.03E-02	0.000%
BA09	Wk	Desert shrub - poor	A	456.7211	1.05E-02	0.000%

Computed: **JAC** Date: **5/20/2021**
Checked: Date:

Use this spreadsheet to import GIS data. This info will then be used to populate "Composite CN" spreadsheet.
Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA09	Wk	Desert shrub - poor	A	9.317726	2.14E-04	0.000%
BA09	Wk	Desert shrub - poor	A	14.009338	3.22E-04	0.000%
BA09	Wn	Desert shrub - poor	A	26.994817	6.20E-04	0.000%
BA09	Bs	Desert shrub - poor	A	247.93494	5.69E-03	0.000%
BA09	Bs	Desert shrub - poor	A	247.93494	5.69E-03	0.000%
BA09	Bs	Desert shrub - poor	A	8166.7459	1.87E-01	0.002%
BA09	Wn	Desert shrub - poor	A	2220.8923	5.10E-02	0.001%
BA09	Wn	Desert shrub - poor	A	2220.8923	5.10E-02	0.001%
BA09	Wn	Desert shrub - poor	A	9869.323	2.27E-01	0.002%
BA09	Bs	Desert shrub - poor	A	3460.1328	7.94E-02	0.001%
BA09	Bs	Desert shrub - poor	A	3460.1328	7.94E-02	0.001%
BA09	Bs	Desert shrub - poor	A	2.0575388	4.72E-05	0.000%
BA09	Bs	Desert shrub - poor	A	12.375622	2.84E-04	0.000%
BA09	Wk	Desert shrub - poor	A	115.85462	2.66E-03	0.000%
BA09	Wk	Desert shrub - poor	A	115.85462	2.66E-03	0.000%
BA09	Bs	Desert shrub - poor	A	8752.2743	2.01E-01	0.002%
BA09	Bs	Desert shrub - poor	A	517.96907	1.19E-02	0.000%
BA09	Bs	Desert shrub - poor	A	517.96907	1.19E-02	0.000%
BA09	Wk	Desert shrub - poor	A	5234.9773	1.20E-01	0.001%
BA09	Wk	Desert shrub - poor	A	5234.9773	1.20E-01	0.001%
BA09	Wk	Desert shrub - poor	A	3.9869657	9.15E-05	0.000%
BA09	Wk	Desert shrub - poor	A	3799.5846	8.72E-02	0.001%
BA09	Wn	Desert shrub - poor	A	2353.5106	5.40E-02	0.001%
BA09	Wn	Desert shrub - poor	A	2353.5106	5.40E-02	0.001%
BA09	Wn	Desert shrub - poor	A	13920.196	3.20E-01	0.003%
BA09	Wn	Desert shrub - poor	A	16.111989	3.70E-04	0.000%
BA09	Wn	Desert shrub - poor	A	16.111989	3.70E-04	0.000%
BA09	Wn	Desert shrub - poor	A	17.549355	4.03E-04	0.000%
BA09	Wn	Desert shrub - poor	A	17.549355	4.03E-04	0.000%
BA09	Bs	Desert shrub - poor	A	35.686512	8.19E-04	0.000%
BA09	Bs	Desert shrub - poor	A	35.686512	8.19E-04	0.000%
BA09	Wn	Desert shrub - poor	A	0.1747544	4.01E-06	0.000%
BA09	Wn	Desert shrub - poor	A	0.1747544	4.01E-06	0.000%
BA09	Bs	Desert shrub - poor	A	0.193281	4.44E-06	0.000%
BA09	Bs	Desert shrub - poor	A	0.193281	4.44E-06	0.000%
BA09	Bs	Desert shrub - poor	A	0.0236904	5.44E-07	0.000%
BA09	Bs	Desert shrub - poor	A	0.0236904	5.44E-07	0.000%
BA09	Wk	Desert shrub - poor	A	25.999353	5.97E-04	0.000%
BA09	Wk	Desert shrub - poor	A	25.999353	5.97E-04	0.000%
BA09	Wk	Desert shrub - poor	A	0.0180909	4.15E-07	0.000%
BA09	Wk	Desert shrub - poor	A	0.0180909	4.15E-07	0.000%
BA09	Wk	Desert shrub - poor	A	64.211601	1.47E-03	0.000%
BA09	Wk	Desert shrub - poor	A	64.211601	1.47E-03	0.000%
BA09	Wk	Desert shrub - poor	A	0.0308972	7.09E-07	0.000%
BA09	Wk	Desert shrub - poor	A	0.0308972	7.09E-07	0.000%
BA09	Wk	Desert shrub - poor	A	3.2368347	7.43E-05	0.000%
BA09	Wk	Desert shrub - poor	A	3.2368347	7.43E-05	0.000%
BA09	Wn	Desert shrub - poor	A	0.1461252	3.35E-06	0.000%
BA09	Wn	Desert shrub - poor	A	0.1461252	3.35E-06	0.000%
BA09	Md	Desert shrub - poor	B	1271429.7	2.92E+01	0.308%
BA09	Ma	Desert shrub - poor	B	618714.14	1.42E+01	0.150%
BA09	MK	Desert shrub - poor	B	1259279.1	2.89E+01	0.305%
BA09	Ad	Desert shrub - poor	B	598690.89	1.37E+01	0.145%
BA09	Ma	Desert shrub - poor	B	1790955.2	4.11E+01	0.433%
BA09	Ma	Desert shrub - poor	B	1769128	4.06E+01	0.428%
BA09	Ma	Desert shrub - poor	B	412123.37	9.46E+00	0.100%
BA09	ME	Desert shrub - poor	B	128.2722	2.94E-03	0.000%
BA09	ME	Desert shrub - poor	B	2740.0098	6.29E-02	0.001%

Computed: **JAC** Date: **5/20/2021**
Checked: Date:

Use this spreadsheet to import GIS data. This info will then be used to populate "Composite CN" spreadsheet.
Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA09	ME	Desert shrub - poor	B	3610.0377	8.29E-02	0.001%
BA09	ME	Desert shrub - poor	B	76070897	1.75E+03	18.403%
BA09	Md	Desert shrub - poor	B	13811638	3.17E+02	3.341%
BA09	Md	Desert shrub - poor	B	274.65629	6.31E-03	0.000%
BA09	Md	Desert shrub - poor	B	689226.55	1.58E+01	0.167%
BA09	Md	Desert shrub - poor	B	260591.09	5.98E+00	0.063%
BA09	Md	Desert shrub - poor	B	1929.5721	4.43E-02	0.000%
BA09	Md	Desert shrub - poor	B	866.47936	1.99E-02	0.000%
BA09	Md	Desert shrub - poor	B	22170984	5.09E+02	5.364%
BA09	Md	Desert shrub - poor	B	909791.4	2.09E+01	0.220%
BA09	Ma	Desert shrub - poor	B	46.745476	1.07E-03	0.000%
BA09	Ma	Desert shrub - poor	B	717961.9	1.65E+01	0.174%
BA09	MK	Desert shrub - poor	B	2.1901502	5.03E-05	0.000%
BA09	Md	Desert shrub - poor	B	55.072439	1.26E-03	0.000%
BA09	Md	Desert shrub - poor	B	0.7057591	1.62E-05	0.000%
BA09	Md	Desert shrub - poor	B	4.0623084	9.33E-05	0.000%
BA09	Ma	Desert shrub - poor	B	11227.523	2.58E-01	0.003%
BA09	Md	Desert shrub - poor	B	2207.9508	5.07E-02	0.001%
BA09	Md	Desert shrub - poor	B	2207.9508	5.07E-02	0.001%
BA09	Md	Desert shrub - poor	B	48182.832	1.11E+00	0.012%
BA09	MK	Desert shrub - poor	B	0.8976251	2.06E-05	0.000%
BA09	MK	Desert shrub - poor	B	0.8976251	2.06E-05	0.000%
BA09	Md	Desert shrub - poor	B	17.741949	4.07E-04	0.000%
BA09	Md	Desert shrub - poor	B	17.741949	4.07E-04	0.000%
BA09	Md	Desert shrub - poor	B	0.0990813	2.27E-06	0.000%
BA09	Md	Desert shrub - poor	B	0.0990813	2.27E-06	0.000%
BA09	Bs	Residential - 1/4 acre	A	12.961936	2.98E-04	0.000%
BA09	Wk	Residential - 1/4 acre	A	416.81467	9.57E-03	0.000%
BA09	Wk	Residential - 1/4 acre	A	277910.71	6.38E+00	0.067%
BA09	Wn	Residential - 1/4 acre	A	7179.5192	1.65E-01	0.002%
BA09	Bs	Residential - 1/4 acre	A	2.0575388	4.72E-05	0.000%
BA09	Bs	Residential - 1/4 acre	A	12.375622	2.84E-04	0.000%
BA09	Wk	Residential - 1/4 acre	A	3.9869657	9.15E-05	0.000%
BA09	Wk	Residential - 1/4 acre	A	24.404399	5.60E-04	0.000%
BA09	Wk	Residential - 1/4 acre	A	24.404399	5.60E-04	0.000%
BA09	Bs	Urban district - industrial	A	90644.185	2.08E+00	0.022%
BA09	Wn	Urban district - industrial	A	182809.59	4.20E+00	0.044%
BA09	Bs	Urban district - industrial	A	97001.304	2.23E+00	0.023%
BA09	Wk	Urban district - industrial	A	9298.4935	2.13E-01	0.002%
BA09	Wn	Urban district - industrial	A	730239.15	1.68E+01	0.177%
BA09	Bs	Urban district - industrial	A	8166.7459	1.87E-01	0.002%
BA09	Wn	Urban district - industrial	A	9869.323	2.27E-01	0.002%
BA09	Bs	Urban district - industrial	A	8752.2743	2.01E-01	0.002%
BA09	Wk	Urban district - industrial	A	3799.5846	8.72E-02	0.001%
BA09	Wn	Urban district - industrial	A	13920.196	3.20E-01	0.003%
BA09	Ma	Urban district - industrial	B	615993.5	1.41E+01	0.149%
BA09	Md	Urban district - industrial	B	2723797.1	6.25E+01	0.659%
BA09	Ma	Urban district - industrial	B	11227.523	2.58E-01	0.003%
BA09	Md	Urban district - industrial	B	48182.832	1.11E+00	0.012%
					9.49E+03	100%

Computed: **JAC** Date: **5/20/2021**
Checked: Date:

Use this spreadsheet to import NRCS Soil Survey Map information.

Map Unit Symbol	Map Unit Name	Rating	Acres in AOI	Percent of AOI	
Ad	Adelino fine sandy loam	B	193.1	2.03%	
Bn	Bluepoint loamy fine sand, 1 to 9 percent slopes	A	151.7	1.60%	
Bs	Bluepoint-Wink complex, hummocky	A	705.4	7.43%	
Cb	Caliza-Bluepoint complex, 1 to 25 percent slopes	A	206.3	2.17%	
Gg	Gila loam, strongly alkali	C	13.2	0.14%	
Gh	Gila loam, strongly saline and alkali	C	44.1	0.46%	
Gr	Glendale loam, strongly alkali	C	20.7	0.22%	
Gt	Glendale soils, slightly saline	C	23.6	0.25%	
Ma	Madurez loamy sand, hummocky	B	172.0	1.81%	
Md	Madurez loamy fine sand	B	1675.4	17.65%	
ME	Madurez loamy fine sand	B	1747.4	18.41%	
MK	Madurez-Wink association, undulating	B	65.7	0.69%	
Mn	Mixed alluvial land	B	4.7	0.05%	Assumed B
Pa	Pajarito loamy fine sand	A	570.3	6.01%	
PH	Pajarito fine sandy loam	A	6.7	0.07%	
PITS	Gravel and caliche pits	B	7.8	0.08%	Assumed B
Wk	Wink loamy sand	A	2544.6	26.81%	
Wm	Wink loamy sand, clayey substratum	A	285.9	3.01%	
Wn	Wink loamy sand, hummocky	A	917.5	9.67%	
Wr	Wink-Caliza complex, 1 to 15 percent slopes	A	120.7	1.27%	
Ws	Wink complex, 1 to 9 percent slopes, eroded	A	15.4	0.16%	
			9492	100.00%	

Computed: **JAC** Date: **8/31/2020**
Checked: Date:

Table 404-2: Runoff Curve Numbers
Urban

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Open space - poor	68	79	86	89
Open space - fair	49	69	79	84
Open space - good	39	61	74	80
Impervious - parking lots, roofs, etc.	98	98	98	98
Impervious - streets/roads; paved; curbs, storm	98	89	98	98
Impervious - streets/roads; paved; open ditches	83	89	92	93
Impervious - streets/roads; gravel	76	85	89	91
Impervious - streets/roads; dirt	72	82	87	89
Western desert urban - natural	63	77	85	88
Western desert urban - artificial	96	96	96	96
Urban district - commercial/business	89	92	94	95
Urban district - industrial	81	88	91	93
Residential - 1/8 acre or less	77	85	90	92
Residential - 1/4 acre	61	75	83	87
Residential - 1/3 acre	57	72	81	86
Residential - 1/2 acre	54	70	80	85
Residential - 1 acre	51	68	79	84
Residential - 2 acres	46	65	77	82
Developing urban - newly graded	77	86	91	94

Table 404-4: Runoff Curve Numbers
Other Agricultural

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Pasture, grass, range - poor	68	79	86	89
Pasture, grass, range - fair	49	69	79	84
Pasture, grass, range - good	39	61	74	80
Meadow	30	58	71	78
Brush - poor	48	67	77	83
Brush - fair	35	56	70	77
Brush - good	30	48	65	73
Woods combination - poor	57	73	82	86
Woods combination - fair	43	65	76	82
Woods combination - good	32	58	72	79
Woods - poor	45	66	77	83
Woods - fair	36	60	73	79
Woods - good	30	55	70	77
Farmsteads	59	74	82	86

Computed: **JAC** Date: **8/31/2020**
Checked: Date:

Table 404-5: Runoff Curve Numbers
Arid and Semiarid Rangelands

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Herbaceous - poor		80	87	93
Herbaceous - fair		71	81	89
Herbaceous - good		62	74	85
Oak-aspen - poor		66	74	79
Oak-aspen - fair		48	57	63
Oak-aspen - good		30	41	48
Pinyon-juniper - poor		75	85	89
Pinyon-juniper - fair		58	73	80
Pinyon-juniper - good		41	61	71
Sagebrush - poor		67	80	85
Sagebrush - fair		51	63	70
Sagebrush - good		35	47	55
Desert shrub - poor	63	77	85	88
Desert shrub - fair	55	72	81	86
Desert shrub - good	49	68	79	84

Runoff Curve Numbers
Other

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Water	98	98	98	98

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

Time of Concentration					Pg, 4-99	
Basin	**Basin Tc Segments**	**Composite Tc (min)**	**Design Tc (min)**	Tc (hr)	Lag, L (min)	
BA01	1.1, 1.2, 1.3, 1.4, 1.5	151.44	151	2.52	90.6	**Tc minimum of 10 minutes**
BA02	2.1, 2.2, 2.3, 2.4, 2.5, 2.6	229.32	229	3.82	137.4	**Page 4-43 NMDOT Drainage Manual July 2018**
BA03	3.1, 3.2, 3.3, 3.3, 3.4	69.74	70	1.17	42.0	
BA04	4.1, 4.2	25.50	25	0.42	15.0	
BA05	5.1, 5.2, 5.3	28.67	29	0.48	17.4	
BA06	6.1, 6.2, 6.3, 6.4	38.94	39	0.65	23.4	
BA07	7.1, 7.2, 7.3, 7.4, 7.5	97.12	97	1.62	58.2	
BA08	8.1, 8.2, 8.3, 8.4, 8.5	84.24	84	1.40	50.4	
BA09	9.1, 9.2, 9.3, 9.4	190.29	190	3.17	114.0	

0.6 Tc = Lag, L (Pg. 4-99)

Tc Method	Criteria	Condition		
Upland	Ungullied, overland, < 300 ft	Rural/Urban	Tc=L/(60*V), min	Sheet
Kirpich	Gullied	Rural	Tc=0.0078*(L^0.77)*(S^-0.385), min	Shallow Concentrated
Kerby	Ungullied, overland, > 300 ft	Rural	Tc=0.0828*((L*N)^0.467)*(S^-0.235), min	Shallow Concentrated
Manning's	Gullied, defined stream	Rural/Urban	V=(1.486/n)*(R^0.667)*(S^0.5)	Channel
	Ungullied, overland, < 300 ft	Rural/Urban	Tc=[(0.007*((n*L)^0.8))/((P$_2$^0.5)*(S^0.4))]*60, min	Sheet
Figure 402-15 (Page 4-47)	Ungullied, undefined stream	Urban	Tc=L/(60*V), min	Shallow Concentrated

Notes: Per Table 402-6 (Page 4-38) and Section 404.10 (Page 4-84), both the "Upland Method" and "Kirpich Equation" are to be used to determine time of concentration for **rural conditions**. The "Manning's Kinematic Equation" provided in the "Upland Method" (Page 4-43) section will be applied to all sheet flow segments (un-gullied) and the Kirpich Equation will be used for all shallow concentrated flow segments.

All equations and information in *red font* in this spreadsheet is not being used/referenced. This information is only provided for review/comparison when evaluating Tc times.

Computed: **JAC**
Checked:

Date: **5/24/2021**
Date:

BA01	
Sheet	
Basin Segment ID	1.1
Surface Description (from Upland Graph)	Rural Upland, < 300 ft Bare Ground
High Elevation, ft	5010.0
Low Elevation, ft	5008.0
Length, ft	264.1
Slope (ft/ft)	0.0076
Manning's, n	0.028
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	13.180
Shallow	
Basin Segment ID	1.2
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	5008.0
Low Elevation, ft	4960.0
Length, ft	4024.3
Slope (ft/ft)	0.0119
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	25.600
Shallow	
Basin Segment ID	1.3
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4960.0
Low Elevation, ft	4955.0
Length, ft	3924.1
Slope (ft/ft)	0.0013
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	59.396

BA02	
Sheet	
Basin Segment ID	2.1
Surface Description (from Upland Graph)	Rural Upland, < 300 ft Bare Ground
High Elevation, ft	5008.0
Low Elevation, ft	5004.0
Length, ft	300.3
Slope (ft/ft)	0.0133
Manning's, n	0.028
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	11.657
Shallow	
Basin Segment ID	2.2
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	5004.0
Low Elevation, ft	4980.0
Length, ft	4431.1
Slope (ft/ft)	0.0054
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	37.362
Shallow	
Basin Segment ID	2.3
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4980.0
Low Elevation, ft	4964.0
Length, ft	1726.1
Slope (ft/ft)	0.0093
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	14.700

BA03	
Sheet	
Basin Segment ID	3.1
Surface Description (from Upland Graph)	Rural Upland, < 300 ft Bare Ground
High Elevation, ft	4950.5
Low Elevation, ft	4950.0
Length, ft	84.3
Slope (ft/ft)	0.0059
Manning's, n	0.028
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	5.834
Shallow	
Basin Segment ID	3.2
Surface Description (from Upland Graph)	Urban Kirpich Paved
High Elevation, ft	4950.0
Low Elevation, ft	4932.0
Length, ft	3244.2
Slope (ft/ft)	0.0131
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	20.940
Shallow	
Basin Segment ID	3.3
Surface Description (from Upland Graph)	Urban Kirpich Paved
High Elevation, ft	4932.0
Low Elevation, ft	4896.0
Length, ft	2756.0
Slope (ft/ft)	0.0131
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	18.469

Computed: **JAC**
Checked:

Date: **5/24/2021**
Date:

Shallow	
Basin Segment ID	1.4
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4955.0
Low Elevation, ft	4932.0
Length, ft	1036.1
Slope (ft/ft)	0.0222
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	7.089

Shallow	
Basin Segment ID	1.5
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4932.0
Low Elevation, ft	4901.0
Length, ft	3304.3
Slope (ft/ft)	0.0094
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	24.125

Shallow	
Basin Segment ID	1.6
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4901.0
Low Elevation, ft	4823.0
Length, ft	4158.2
Slope (ft/ft)	0.0188
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	22.053
Total Travel Time, min	151.444

Shallow	
Basin Segment ID	2.4
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4964.0
Low Elevation, ft	4954.0
Length, ft	8778.3
Slope (ft/ft)	0.0011
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	115.275

Shallow	
Basin Segment ID	2.5
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4954.0
Low Elevation, ft	4906.0
Length, ft	4335.2
Slope (ft/ft)	0.0111
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	27.897

Shallow	
Basin Segment ID	2.6
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4906.0
Low Elevation, ft	4863.0
Length, ft	2396.2
Slope (ft/ft)	0.0179
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	14.674

Channel	
Basin Segment ID	2.7
Surface Description (from Upland Graph)	Rural Manning's Bare Ground
High Elevation, ft	4863
Low Elevation, ft	4806
Length, ft	2574
Slope (ft/ft)	0.0221
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	5.5
Tc=L/(60*V), min	
Tc, min	7.759
Total Travel Time, min	229.325

Channel	
Basin Segment ID	3.4
Surface Description (from Upland Graph)	Rural Manning's Bare Ground
High Elevation, ft	4894
Low Elevation, ft	4799
Length, ft	6568
Slope (ft/ft)	0.0145
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	4.5
Tc=L/(60*V), min	
Tc, min	24.502
Total Travel Time, min	69.745

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA04	
Sheet	
Basin Segment ID	4.1
Surface Description (from Upland Graph)	Urban Upland, < 300 ft Paved
High Elevation, ft	4951
Low Elevation, ft	4951
Length, ft	29
Slope (ft/ft)	0.0171
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	0.776
Shallow	
Basin Segment ID	4.2
Surface Description (from Upland Graph)	Urban Kirpich Paved
High Elevation, ft	4950.5
Low Elevation, ft	4903.0
Length, ft	3891.2
Slope (ft/ft)	0.0122
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	24.724
Total Travel Time, min	25.500

BA05	
Sheet	
Basin Segment ID	5.1
Surface Description (from Upland Graph)	Rural Upland, < 300 ft Bare Ground
High Elevation, ft	4902
Low Elevation, ft	4902
Length, ft	43
Slope (ft/ft)	0.0117
Manning's, n	0.028
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	2.577
Shallow	
Basin Segment ID	5.2
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4901.5
Low Elevation, ft	4828.0
Length, ft	3129.8
Slope (ft/ft)	0.0235
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	16.252
Channel	
Basin Segment ID	5.3
Surface Description (from Upland Graph)	Rural Manning's Bare Ground
High Elevation, ft	4828
Low Elevation, ft	4796
Length, ft	2488
Slope (ft/ft)	0.0129
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	4.2
Tc=L/(60*V), min	
Tc, min	9.844
Total Travel Time, min	28.673

BA06	
Shallow	
Basin Segment ID	6.1
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4929
Low Elevation, ft	4900
Length, ft	3005
Slope (ft/ft)	0.0097
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	22.177
Shallow	
Basin Segment ID	6.2
Surface Description (from Upland Graph)	Urban Kirpich Paved
High Elevation, ft	4900
Low Elevation, ft	4865
Length, ft	1564
Slope (ft/ft)	0.0224
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	9.706
Shallow	
Basin Segment ID	6.3
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4865
Low Elevation, ft	4836
Length, ft	729
Slope (ft/ft)	0.0398
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	4.319
Channel	
Basin Segment ID	6.4
Surface Description (from Upland Graph)	Rural Manning's Bare Ground
High Elevation, ft	4836
Low Elevation, ft	4795
Length, ft	1153
Slope (ft/ft)	0.0356
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	7.0
Tc=L/(60*V), min	
Tc, min	2.742
Total Travel Time, min	38.944

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA07	
Sheet	
Basin Segment ID	7.1
	Rural Upland, < 300 ft
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4983
Low Elevation, ft	4982
Length, ft	98
Slope (ft/ft)	0.0102
Manning's, n	0.028
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	5.287
Shallow	
Basin Segment ID	7.2
	Rural Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4982.0
Low Elevation, ft	4895.0
Length, ft	7396.7
Slope (ft/ft)	0.0118
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	41.126
Shallow	
Basin Segment ID	7.3
	Rural Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4895.0
Low Elevation, ft	4815.0
Length, ft	4573.4
Slope (ft/ft)	0.0175
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	24.377
Channel	
Basin Segment ID	7.4
	Rural Manning's
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4815
Low Elevation, ft	4800
Length, ft	930
Slope (ft/ft)	0.0161
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	4.7
Tc=L/(60*V), min	
Tc, min	3.288
Shallow	
Basin Segment ID	7.5
	Rural Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4800.0
Low Elevation, ft	4794.0
Length, ft	1837.1
Slope (ft/ft)	0.0033
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	23.046
Total Travel Time, min	97.124

BA08	
Sheet	
Basin Segment ID	8.1
	Rural Upland, < 300 ft
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4998
Low Elevation, ft	4997
Length, ft	85
Slope (ft/ft)	0.0059
Manning's, n	0.028
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	5.926
Shallow	
Basin Segment ID	8.2
	Rural Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4997.0
Low Elevation, ft	4951.0
Length, ft	2600.4
Slope (ft/ft)	0.0177
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	15.715
Shallow	
Basin Segment ID	8.3
	Rural Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4951.0
Low Elevation, ft	4945.0
Length, ft	3038.5
Slope (ft/ft)	0.0020
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	41.208
Shallow	
Basin Segment ID	8.4
	Rural Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4945.0
Low Elevation, ft	4928.0
Length, ft	1328.3
Slope (ft/ft)	0.0128
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	10.612
Channel	
Basin Segment ID	8.5
	Rural Manning's
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4928
Low Elevation, ft	4896
Length, ft	2643
Slope (ft/ft)	0.0121
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	4.1
Tc=L/(60*V), min	
Tc, min	10.775
Total Travel Time, min	84.235

BA09	
Shallow	
Basin Segment ID	9.1
	Rural Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	5114.0
Low Elevation, ft	5113.0
Length, ft	214.2
Slope (ft/ft)	0.0047
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	3.838
Channel	
Basin Segment ID	9.2
	Rural Manning's
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4950
Low Elevation, ft	4929
Length, ft	7387
Slope (ft/ft)	0.0028
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	2.0
Tc=L/(60*V), min	
Tc, min	62.150
Channel	
Basin Segment ID	9.3
	Rural Manning's
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4950
Low Elevation, ft	4929
Length, ft	7387
Slope (ft/ft)	0.0028
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	2.0
Tc=L/(60*V), min	
Tc, min	62.150
Channel	
Basin Segment ID	9.4
	Rural Manning's
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4950
Low Elevation, ft	4929
Length, ft	7387
Slope (ft/ft)	0.0028
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	2.0
Tc=L/(60*V), min	
Tc, min	62.150
Total Travel Time, min	190.287

Computed: **JAC** Date: **5/20/2021**
Checked: Date:

Flow ID	(1) Seg ID	(2) Flow Type	(3) Start Elevation (ft)	(4) End Elevation (ft)	(5) Length (ft)	(6) Slope (ft/ft)	(7) Slope (%)	(8) Velocity Equation	(9) Velocity (ft/s) from Tc Ref - Upland (if applicable)	Condition
BA01	1.1	Sheet	5010	5008	264	0.008	0.76	Bare Ground		Ungullied, overland
BA01	1.2	Shallow	5008	4960	4024	0.012	1.19	Bare Ground	1.1	Ungullied, overland
BA01	1.3	Shallow	4960	4955	3924	0.001	0.13	Bare Ground	0.4	Ungullied, overland
BA01	1.4	Shallow	4955	4932	1036	0.022	2.22	Bare Ground	1.5	Ungullied, overland
BA01	1.5	Shallow	4932	4901	3304	0.009	0.94	Bare Ground	1.0	Gullied
BA01	1.6	Shallow	4901	4823	4158	0.019	1.88	Bare Ground	1.4	Gullied
BA02	2.1	Sheet	5008	5004	300	0.013	1.33	Bare Ground		Ungullied, overland
BA02	2.2	Shallow	5004	4980	4431	0.005	0.54	Bare Ground	0.7	Ungullied, overland
BA02	2.3	Shallow	4980	4964	1726	0.009	0.93	Bare Ground	1.0	Ungullied, overland
BA02	2.4	Shallow	4964	4954	8778	0.001	0.11	Bare Ground	0.3	Gullied
BA02	2.5	Shallow	4954	4906	4335	0.011	1.11	Bare Ground	1.0	Gullied
BA02	2.6	Shallow	4906	4863	2396	0.018	1.79	Bare Ground	1.3	Gullied
BA02	2.7	Channel	4863	4806	2574	0.022	2.21	Bare Ground		Gullied
BA03	3.1	Sheet	4951	4950	84	0.006	0.59	Bare Ground		Ungullied, overland
BA03	3.2	Shallow	4950	4932	3244	0.006	0.55	Paved	1.5	Gullied
BA03	3.3	Shallow	4932	4896	2756	0.013	1.31	Paved	2.3	Gullied
BA03	3.4	Channel	4894	4799	6568	0.014	1.45	Bare Ground		Gullied
BA04	4.1	Sheet	4951.0	4950.5	29	0.017	1.71	Paved		Gullied
BA04	4.2	Shallow	4950.5	4903.0	3891	0.012	1.22	Paved	2.2	Gullied
BA05	5.1	Sheet	4902.0	4901.5	43	0.012	1.17	Bare Ground		Ungullied, overland
BA05	5.2	Shallow	4901.5	4828.0	3130	0.023	2.35	Bare Ground	1.5	Ungullied, overland
BA05	5.3	Channel	4828.0	4796.0	2488	0.013	1.29	Bare Ground		Gullied
BA06	6.1	Shallow	4929.0	4900.0	3005	0.010	0.97	Bare Ground	1.0	Gullied
BA06	6.2	Shallow	4900.0	4865.0	1564	0.022	2.24	Paved	3.0	Gullied
BA06	6.3	Shallow	4865.0	4836.0	729	0.040	3.98	Bare Ground	2.0	Gullied
BA06	6.4	Channel	4836.0	4795.0	1153	0.036	3.56	Bare Ground		Gullied
BA07	7.1	Sheet	4983.0	4982.0	98	0.010	1.02	Bare Ground		Ungullied, overland
BA07	7.2	Shallow	4982.0	4895.0	7397	0.012	1.18	Bare Ground	1.1	Gullied
BA07	7.3	Shallow	4895.0	4815.0	4573	0.017	1.75	Bare Ground	1.3	Gullied
BA07	7.4	Channel	4815.0	4800.0	930	0.016	1.61	Bare Ground		Gullied
BA07	7.5	Shallow	4800.0	4794.0	1837	0.003	0.33	Bare Ground	0.6	Ungullied, overland
BA08	8.1	Sheet	4997.5	4997.0	85	0.006	0.59	Bare Ground		Ungullied, overland
BA08	8.2	Shallow	4997.0	4951.0	2600	0.018	1.77	Bare Ground	1.3	Gullied
BA08	8.3	Shallow	4951.0	4945.0	3038	0.002	0.20	Bare Ground	0.4	Gullied
BA08	8.4	Shallow	4945.0	4928.0	1328	0.013	1.28	Bare Ground	1.1	Gullied
BA08	8.5	Channel	4928.0	4896.0	2643	0.012	1.21	Bare Ground		Gullied
BA09	9.1	Shallow	5114.0	5113.0	214	0.005	0.47	Bare Ground	0.7	Gullied
BA09	9.2	Channel	5113.0	4985.0	29010	0.004	0.44	Bare Ground		Gullied
BA09	9.3	Channel	4985.0	4950.0	7025	0.005	0.50	Bare Ground		Gullied
BA09	9.4	Channel	4950.0	4929.0	7387	0.003	0.28	Bare Ground		Gullied

Computed: **JAC** Date: **5/19/2021**
Checked: Date:

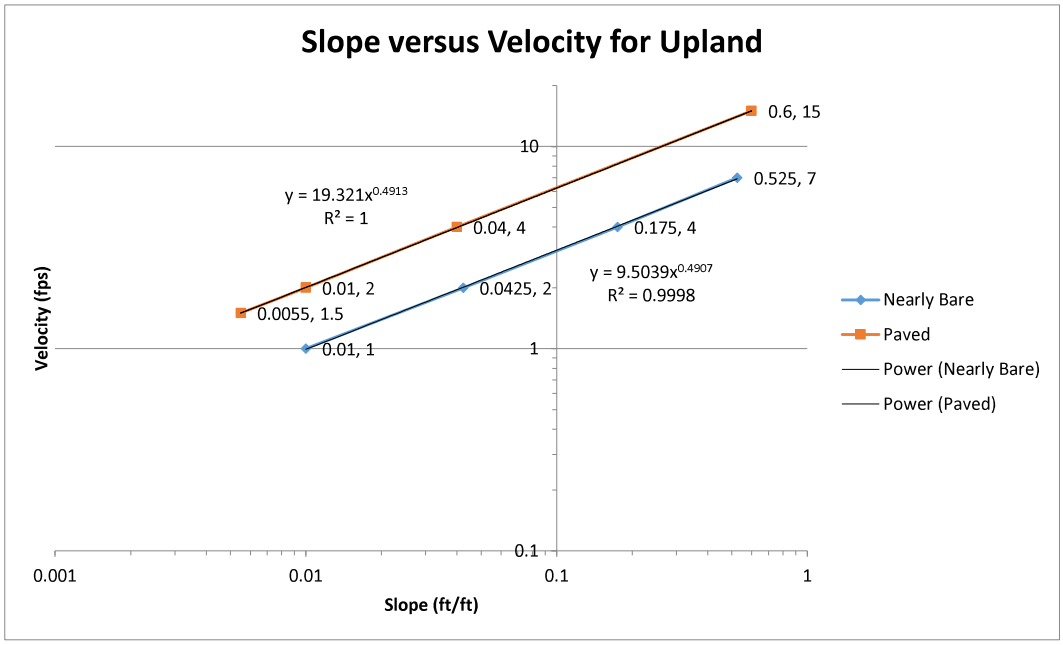
	Slope (ft/ft)	*Velocity (ft/s)*	*Chart Eq.*
Nearly bare and untilled (overland flow)	0.01	1	9.5039x^0.4907
	0.0425	2	
	0.175	4	
	0.525	7	
Pavement and small upland gullies	0.0055	1.5	19.321x^0.4913
	0.01	2	
	0.04	4	
	0.6	15	

Table 402-8 Eq. (To be used)

V=9.965x^0.5

V=20.328x^0.5

For simplicity, "Nearly Bare" and "Paved Area" were identified as majority conditions in analysis area.



Computed: **JAC** Date: **5/19/2021**
Checked: Date:

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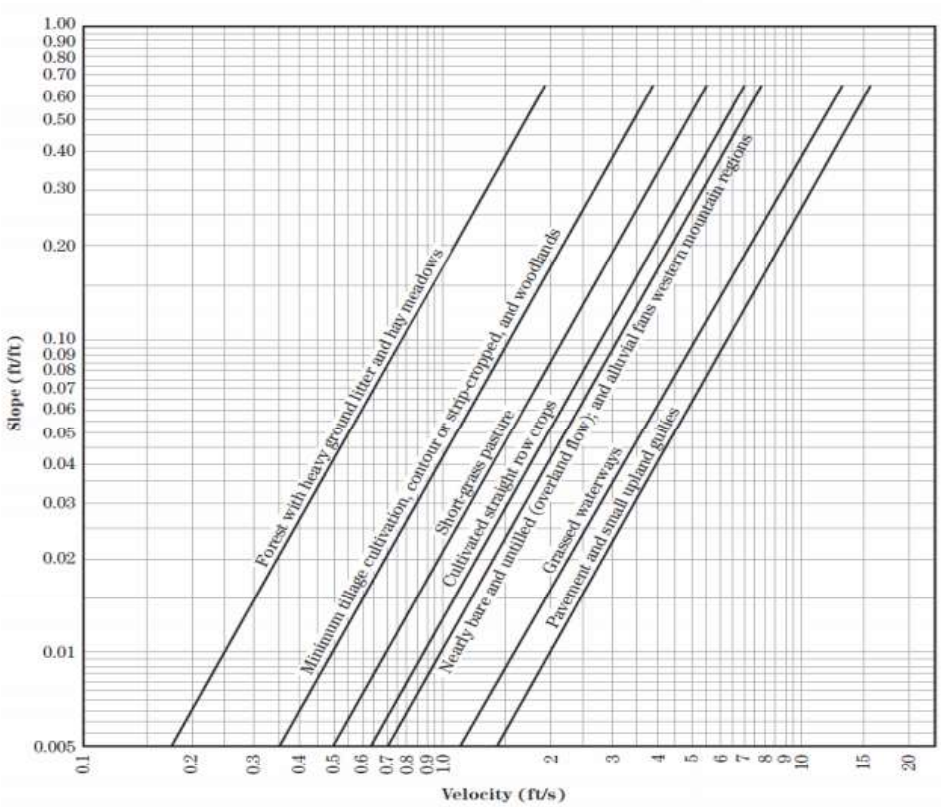

Source: NRCS, 2010, "Part 630 Hydrology, National Engineering Handbook, Chapter 15 Time of Concentration", Figure 15-4, p. 15-8.
http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=27002.wba

Figure 402-15 Velocity Versus Slope for Shallow Concentrated Flow

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Table 402-8 Equations and Assumptions Developed from Figure 402-15

Source: NRCS, 2010, "Part 630 Hydrology, National Engineering Handbook, Chapter 15 Time of Concentration", Table 15-3, p.15-8.
http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=27002.wba

Flow type	Depth (ft)	Manning's *n*	Velocity equation (ft/s)
Pavement and small upland gullies	0.2	0.025	$V = 20.328(s)^{0.5}$
Grassed waterways	0.4	0.050	$V = 16.135(s)^{0.5}$
Nearly bare and untilled (overland flow); and alluvial fans in western mountain regions	0.2	0.051	$V = 9.965(s)^{0.5}$
Cultivated straight row crops	0.2	0.058	$V = 8.762(s)^{0.5}$
Short-grass pasture	0.2	0.073	$V = 6.962(s)^{0.5}$
Minimum tillage cultivation, contour or strip-cropped, and woodlands	0.2	0.101	$V = 5.032(s)^{0.5}$
Forest with heavy ground litter and hay meadows	0.2	0.202	$V = 2.516(s)^{0.5}$

Computed: **JAC** Date: **9/15/2020**
Checked: **JEC** Date: **10/6/2020**

Precipitation information obtained from NOAA Atlas 14 at the approximate center of the project location

Latitude: 34.6465 Longitude: -106.7218

LAT: 34D38M47.4SEC LONG: 103D43M18.48SEC

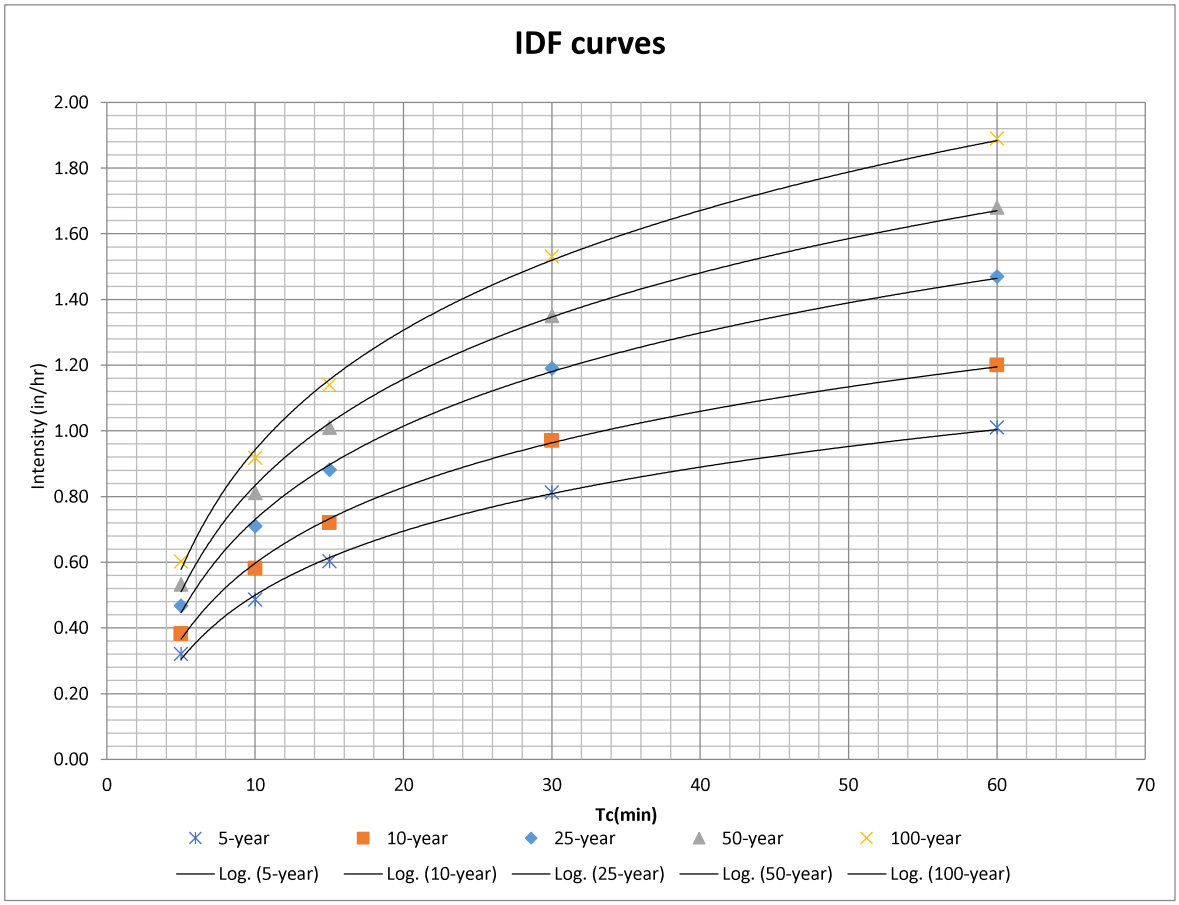
Precipitation Frequency Estimates (in/hr)

Duration		Return Interval (year)								
Time	Minutes	2	5	10	25	50	100	200	500	1000
5-min	5	0.24	0.32	0.38	0.47	0.53	0.60	0.68	0.77	0.85
10-min	10	0.36	0.49	0.58	0.71	0.81	0.92	1.03	1.18	1.30
15-min	15	0.45	0.60	0.72	0.88	1.01	1.14	1.27	1.46	1.61
30-min	30	0.61	0.81	0.97	1.19	1.35	1.53	1.72	1.97	2.16
60-min	60	0.75	1.01	1.20	1.47	1.68	1.89	2.12	2.43	2.68
2-hr	120	0.86	1.13	1.36	1.66	1.91	2.18	2.46	2.86	3.18
3-hr	180	0.91	1.18	1.41	1.72	1.97	2.24	2.53	2.93	3.26
6-hr	360	1.04	1.33	1.57	1.89	2.14	2.42	2.70	3.09	3.42
12-hr	720	1.14	1.44	1.68	2.01	2.26	2.53	2.81	3.18	3.49
24-hr	1440	1.24	1.54	1.79	2.11	2.37	2.63	2.89	3.24	3.52
2-day	2880	1.39	1.73	2.00	2.35	2.63	2.92	3.20	3.59	3.89
3-day	4320	1.50	1.85	2.13	2.50	2.79	3.09	3.38	3.78	4.09
4-day	5760	1.60	1.97	2.26	2.66	2.96	3.26	3.57	3.98	4.29
7-day	10080	1.85	2.25	2.57	2.99	3.31	3.62	3.94	4.34	4.65
10-day	14400	2.04	2.50	2.87	3.35	3.71	4.09	4.45	4.94	5.30
20-day	28800	2.52	3.06	3.47	3.99	4.38	4.75	5.11	5.56	5.89
30-day	43200	2.95	3.55	4.00	4.56	4.96	5.35	5.71	6.16	6.47
45-day	64800	3.58	4.26	4.76	5.35	5.77	6.15	6.49	6.88	7.13
60-day	86400	4.12	4.92	5.48	6.17	6.65	7.09	7.48	7.94	8.24

Computed:	JAC	Date:	9/15/2020
Checked:	JEC	Date:	10/6/2020

IDF Curve Equations

Recurrence Interval (year)	Equation
100	-2.038ln(x) + 9.9586
50	-1.792ln(x) + 8.7633
25	-1.565ln(x) + 7.6525
10	-1.276ln(x) + 6.2346
5	-1.067ln(x) + 5.2124



Computed: **JAC** Date: **8/5/2020**
Checked: Date:

NOTE: This data is imported from the NOAA 14 website (https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html).

Point precipitation frequency estimates (inches)
NOAA Atlas 14 Volume 1 Version 5
Data type: Precipitation depth
Time series type: Partial duration
Project area: Southwest
Location name (ESRI Maps): Belen
Station Name: -
Latitude: 34.6465°
Longitude: -106.7218°
Elevation (USGS): 4919.71 ft

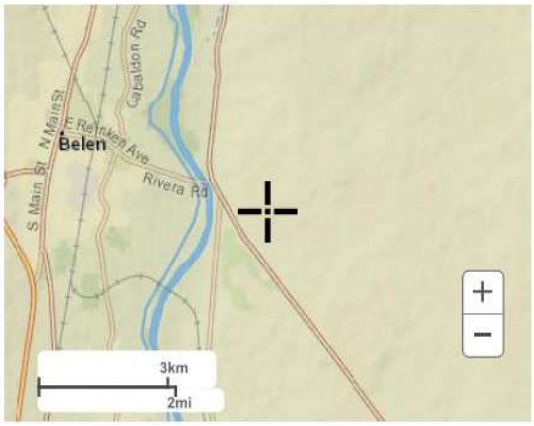
PRECIPITATION FREQUENCY ESTIMATES

by duration for ARI (years):	1	2	5	10	25	50	100	200	500	1000
5-min:	0.184	0.239	0.32	0.382	0.467	0.533	0.602	0.675	0.774	0.852
10-min:	0.28	0.363	0.486	0.581	0.71	0.811	0.917	1.03	1.18	1.3
15-min:	0.347	0.45	0.603	0.72	0.881	1.01	1.14	1.27	1.46	1.61
30-min:	0.468	0.606	0.812	0.97	1.19	1.35	1.53	1.72	1.97	2.16
60-min:	0.579	0.749	1.01	1.2	1.47	1.68	1.89	2.12	2.43	2.68
2-hr:	0.671	0.858	1.13	1.36	1.66	1.91	2.18	2.46	2.86	3.18
3-hr:	0.713	0.905	1.18	1.41	1.72	1.97	2.24	2.53	2.93	3.26
6-hr:	0.822	1.04	1.33	1.57	1.89	2.14	2.42	2.7	3.09	3.42
12-hr:	0.905	1.14	1.44	1.68	2.01	2.26	2.53	2.81	3.18	3.49
24-hr:	0.988	1.24	1.54	1.79	2.11	2.37	2.63	2.89	3.24	3.52
2-day:	1.11	1.39	1.73	2	2.35	2.63	2.92	3.2	3.59	3.89
3-day:	1.2	1.5	1.85	2.13	2.5	2.79	3.09	3.38	3.78	4.09
4-day:	1.29	1.6	1.97	2.26	2.66	2.96	3.26	3.57	3.98	4.29
7-day:	1.49	1.85	2.25	2.57	2.99	3.31	3.62	3.94	4.34	4.65
10-day:	1.64	2.04	2.5	2.87	3.35	3.71	4.09	4.45	4.94	5.3
20-day:	2.02	2.52	3.06	3.47	3.99	4.38	4.75	5.11	5.56	5.89
30-day:	2.37	2.95	3.55	4	4.56	4.96	5.35	5.71	6.16	6.47
45-day:	2.89	3.58	4.26	4.76	5.35	5.77	6.15	6.49	6.88	7.13
60-day:	3.33	4.12	4.92	5.48	6.17	6.65	7.09	7.48	7.94	8.24

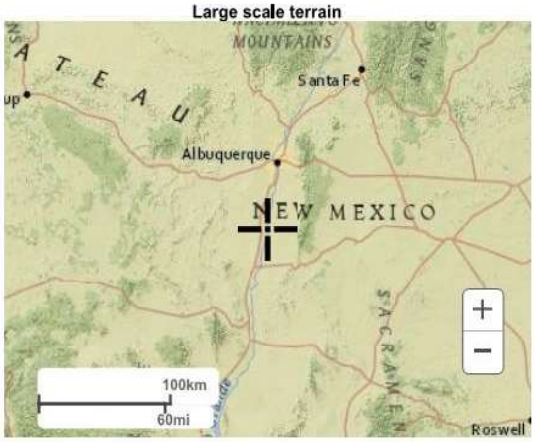
Date/time (GMT): Wed Aug 5 23:04:25 2020
pyRunTime: 0.0324950218201

8/5/2020

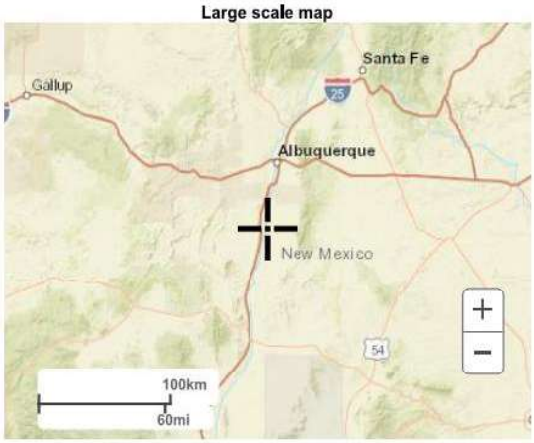
Precipitation Frequency Data Server



Large scale terrain



Large scale map



Large scale aerial

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

Using USGS Regression equations for New Mexico should be limited to:

1. Determination that the peak discharges calculated using one of the three approved hydrologic peak discharge analyses methods are within reason and supported by the exercise of judgment, and
2. For very preliminary peak discharge estimation when scoping a project
3. USGS regional regression equations may be used for design when checked against one of the hydrologic peak discharge analysis methods and approved by the NMDOT Drainage Engineer

USGS
science for a changing world

In cooperation with the New Mexico Department of Transportation

Analysis of the Magnitude and Frequency of Peak Discharge and Maximum Observed Peak Discharge in New Mexico and Surrounding Areas

Scientific Investigations Report 2008–5119

U.S. Department of the Interior
U.S. Geological Survey

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

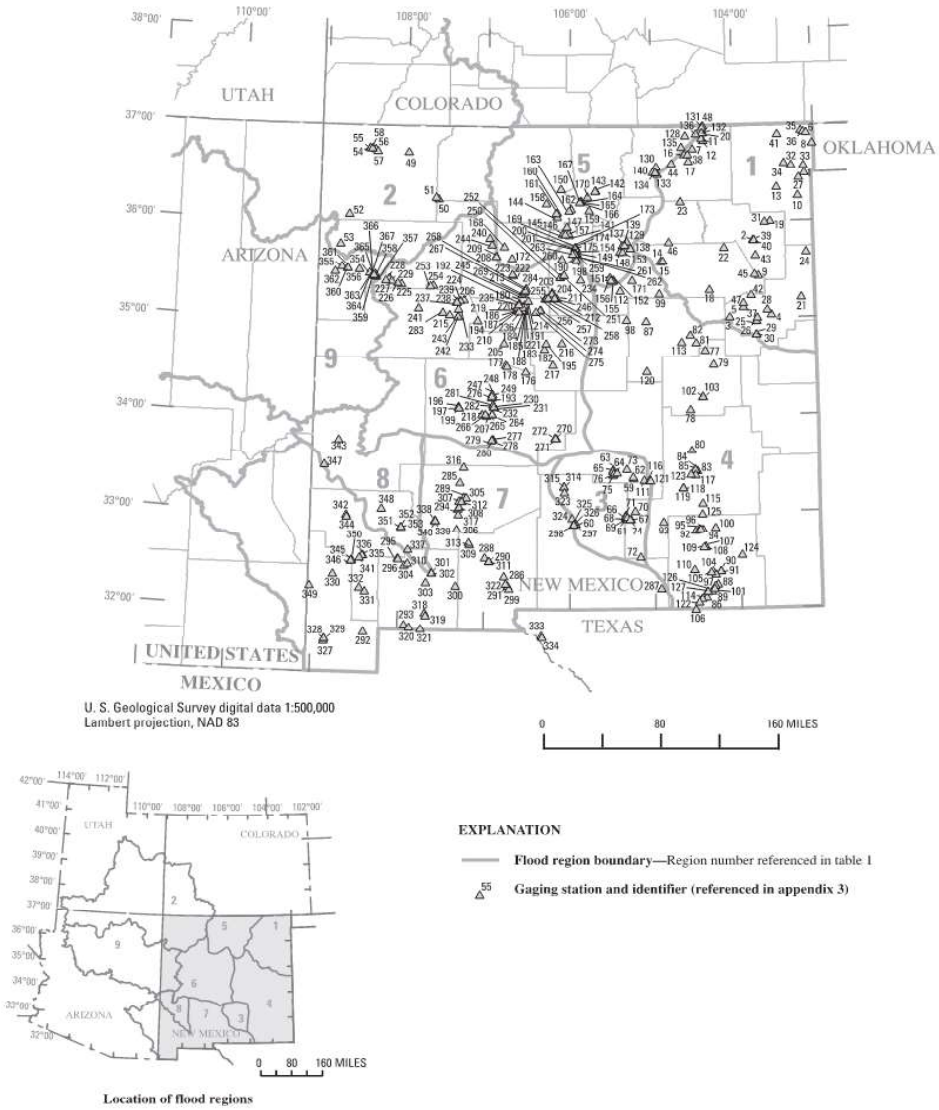
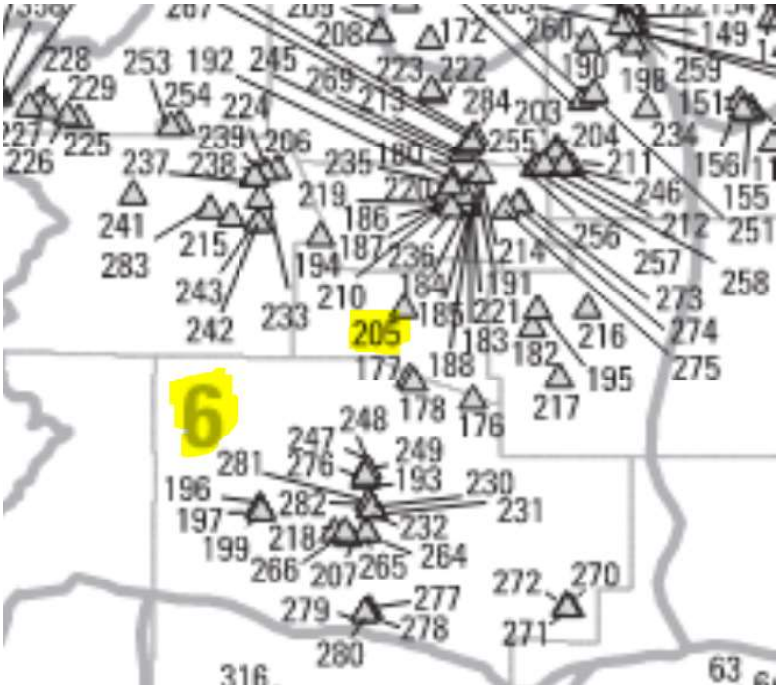


Figure 2. Flood regions and location of miscellaneous sites in New Mexico and surrounding areas.

Computed: **JAC**
Checked:

Date: **5/24/2021**
Date:

A closer look at Figure 2 indicates Map Idenifier 205 from Region 6 is most appropriate for our project area:



Appendix 3. Miscellaneous sites, maximum peak discharge, drainage area, and site elevations.—Continued

[DMS, degrees minutes seconds; NGVD 29, National Geodetic Vertical Datum of 1929]

Map identi-fier (fig. 2)	Latitude (DMS)	Longi-tude (DMS)	Miscellaneous site name	Date	Maximum peak discharge (cubic feet per second)	Drainage area (square miles)	Site elevation (feet above NGVD 29)	Region
201	354120	1055715	Arroyo Mascaras at Santa Fe, New Mexico	07/25/68	2,490	6.27	6,890	6
202	354130	1055612	Arroyo Ranchito at Santa Fe, New Mexico	08/24/57	520	0.61	7,130	6
203	351700	1061240	Arroyo Tuerto near Golden, New Mexico	09/24/55	2,000	12.9	6,480	6
204	351615	1061245	Arroyo Val Verde at Golden, New Mexico	09/24/55	987	1.40	6,580	6
205	344528	1064713	Belen Highline Canal tributary near Los Chaves, New Mexico	06/14/61	2,130	0.86	4,920	6
206	351225	1071620	Bohart Creek near Moquino, New Mexico	08/21/58	4,840	32.0	6,230	6
207	340023	1065908	Box Canyon near Socorro, New Mexico	08/01/56	6,210	24.3	5,380	6
208	353920	1065320	Cachana Arroyo near San Ysidro, New Mexico	05/14/59	1,590	5.16	6,100	6
209	353935	1065325	Cachana Arroyo tributary near San Ysidro, New Mexico	05/14/59	552	0.23	6,140	6
210	350610	1063810	Campus Wash at Albuquerque, New Mexico	08/10/63	640	7.3	5,000	6
211	351320	1060920	Canada de las Narrias (lower) near San Pedro, New Mexico	09/24/55	4,830	5.71	6,820	6
212	351335	1061055	Canada de las Narrias (upper) near San Pedro, New Mexico	09/24/55	2,200	1.53	7,010	6
213	351750	1063200	Canon del Agua at Bernalillo, New Mexico	07/19/56	5,380	3.93	5,200	6
214	351135	1062956	Canon la Cuerva near Albuquerque, New Mexico	07/27/55	1,920	2.60	6,080	6
215	350246	1072640	Encinal Arroyo near New Laguna, New Mexico	08/10/55	8,320	20.4	5,910	6
216	344530	1060539	Estancia Valley tributary No.1 near Estancia, New Mexico	07/07/52	4,660	13.2	6,180	6
217	343158	1061158	Estancia Valley tributary No.2 near Mountainair, New Mexico	07/07/52	3,560	3.35	6,410	6
218	340125	1070225	Four Mile Canyon near Socorro, New Mexico	08/08/56	1,010	16.0	6,040	6
219	350755	1063755	Hahn Arroyo above Edith Avenue at Albuquerque, New Mexico	08/10/63	4,100	8.50	5,000	6
220	350756	1063746	Hahn Arroyo at Edith Avenue at Albuquerque, New Mexico	08/11/61	935	7.60	5,000	6
221	350737	1063350	Hahn Arroyo tributary at Albuquerque, New Mexico	08/10/63	1,420	0.50	5,320	6
222	352739	1064041	Jemez River tributary at Bridge 3049 near San Ysidro, New Mexico	07/23/51	14,000	3.29	5,370	6
223	352817	1064122	Jemez River tributary at Bridge 3050 near San Ysidro, New Mexico	07/23/51	4,150	5.00	5,360	6
224	351152	1071905	Meyer Draw near Moquino, New Mexico	08/21/58	2,310	21.7	6,180	6
225	352142	1080157	Mitchell Draw tributary at Prewitt, New Mexico	08/07/59	1,020	3.00	6,790	6

Appendix 3 99

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

After reviewing the Appendix 3 table on Page 99, the following was detemined if Identifier 205:

Max Peak Dischage	Area	Area	Discharge (max) to Area (acre) Ratio
cfs	sq. mi.	acre	cfs/acre
2130	0.86	550.4	3.87

A closer look at the Region 6 Regression Equations on Page 9:

Analysis of Magnitude and Frequency of Peak Discharges 9

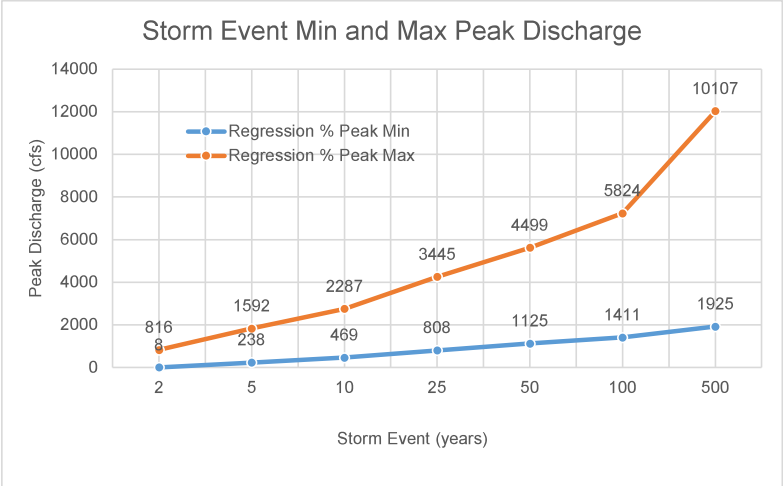
Table 2. Regional flood-frequency equations using generalized least-squares regression.

[Q, peak discharge, in cubic feet per second, for indicated recurrence interval; A, drainage area, in square miles; S, average basin slope upstream from gaging station, in percent (ft/ft*100); I24,100, maximum precipitation intensity of a storm of 24 hours duration with a recurrence interval of 100 years, in inches; Pa, mean annual precipitation (1961–90), in inches; E, average basin elevation, in feet]

Equations	Recurrence interval (years)	Average standard error of estimates			
		Regresion		Prediction	
		Log units	Percent	Log units	Percent
Central mountain-valley flood region (6)					
$Q_2 = 1.328 \times 10^2 A^{0.420}$	2	0.376	98	0.394	113
$Q_5 = 3.163 \times 10^2 A^{0.394}$	5	0.298	74	0.313	83
$Q_{10} = 4.906 \times 10^2 A^{0.383}$	10	0.269	66	0.284	73
$Q_{25} = 7.800 \times 10^2 A^{0.372}$	25	0.252	62	0.267	68
$Q_{50} = 1.051 \times 10^3 A^{0.365}$	50	0.248	60	0.265	67
$Q_{100} = 1.374 \times 10^3 A^{0.359}$	100	0.251	61	0.268	68
$Q_{500} = 2.354 \times 10^3 A^{0.348}$	500	0.273	68	0.292	76

Reviewing the overall analysis study area:

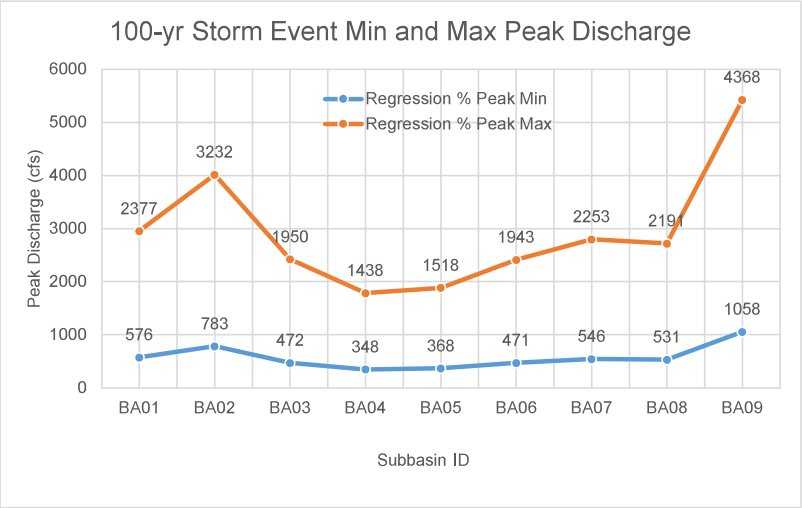
Study Area Peak Discharge Min and Max Review							
Storm Event	Area	Area	Peak Dischage	Discharge to Area (acre) Ratio	Regression %	Regression % Peak Min	Regression % Peak Max
years	acre	sq. mi.	cfs	cfs/acre		cfs	cfs
2	9489	14.83	412	23.02	98%	8	816
5	9489	14.83	915	10.37	74%	238	1592
10	9489	14.83	1378	6.89	66%	469	2287
25	9489	14.83	2127	4.46	62%	808	3445
50	9489	14.83	2812	3.37	60%	1125	4499
100	9489	14.83	3617	2.62	61%	1411	5824
500	9489	14.83	6016	1.58	68%	1925	10107



Computed: **JAC** Date: **5/24/2021**
Checked: Date:

Reviewing the basins withing analysis study area for 100-yr storm event:

Subbasin Peak Discharge Min and Max Review for 100-yr Storm Event							
Subbasin ID	Area	Area	100-yr Peak Dischage	Discharge (Q_{100}) to Area (ac) Ratio	Regression %	Regression % Peak Min	Regression % Peak Max
	acre	sq. mi.	cfs	cfs/acre		cfs	cfs
BA01	782	1.22	1476	0.53	61%	576	2377
BA02	1841	2.88	2008	0.92	61%	783	3232
BA03	450	0.70	1211	0.37	61%	472	1950
BA04	193	0.30	893	0.22	61%	348	1438
BA05	224	0.35	943	0.24	61%	368	1518
BA06	446	0.70	1207	0.37	61%	471	1943
BA07	673	1.05	1399	0.48	61%	546	2253
BA08	623	0.97	1361	0.46	61%	531	2191
BA09	4258	6.65	2713	1.57	61%	1058	4368



The values determined from the regression equations will be used to ***check*** against the approved hydrologic peak discharge analysis metholodogy used for the study area. This methodology is listed in the Summary tab of this workbook. The final values used for design will be supported by the exercise of judgement.

Project:	**Rio Communities Drainage Master Plan**	Date:	**5/24/2021**
Subject:	**Hydrology - Existing Conditions - Country Club Ln**	Date:	
Task:		of:	
Job #:			

Rio Communities Hydrology - Existing Conditions - Country Club Ln

Reference: NMDOT Drainage Design Manual, July 2018

Stream Name:
Mile Post:
USGS Quadrangle:
Methodology: NRCS SCS Unit Hydrograph Method within HEC-HMS
For urban conditions with basin sizes between 160 acres and 10 sq. miles

Peak Discharge per recurrence interval (cfs)						
Subbasin ID	Area (Acres)	Tc (min)	Qp_{10}	Qp_{25}	Qp_{50}	Qp_{100}
BA01	4.9	31	1.9	3.2	4.3	5.5

Runoff Volume, Qv (ac-ft)						
Subbasin ID	Area (Acres)	Tc (min)	Qv_{10}	Qv_{25}	Qv_{50}	Qv_{100}
BA01	4.9	31	0.2	0.3	0.3	0.4

Comments:

The NRCS (SCS) Unit Hydrograph Method within HEC-HMS (Section 405, Page 4-92) outlined in the 2018 NMDOT Drainage Design Manual was used to determine design peak discharges and volumes for urban conditions. A weighted curve number was computed based on data pulled from USGS Web Soil Survey. NOAA 14 rainfall depths were used with the peak discharge rate occuring at 6 hours. Per Table 402-6 (Page 4-38), both the "Upland Method" and "Iterative Method within the Stream Hydraulic Method" were used to determine time of concentration. The values presented in the summary tables above are maximum values determined between this workbook and HEC-HMS results. Please review the HEC-HMS results for more information.

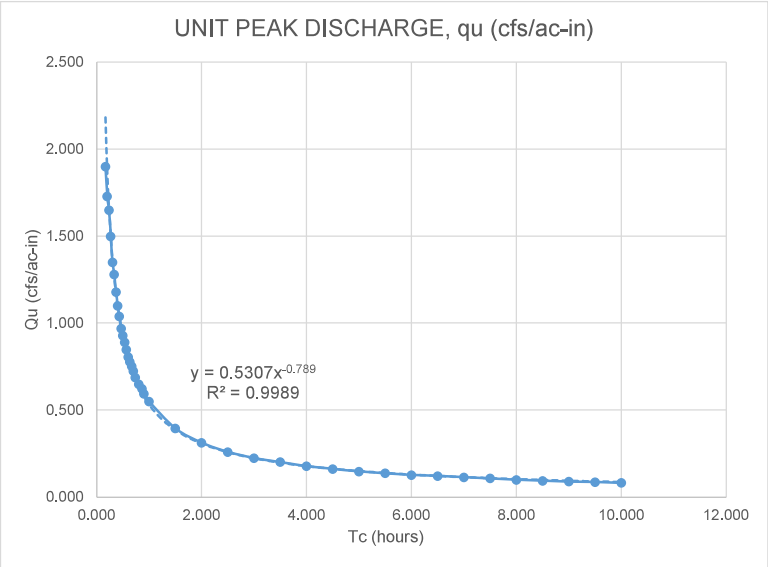
Computed: **JAC** Date: **5/24/2021**
Checked: Date:

General							24-hr:																
Subbasin ID	**Contributing Area**	**CN**	**Tc**	**Potential Max Soil Moisture Rentention, S**	**Initial Abstraction, Ia**	**Unit Peak Discharge, qu**	**NOAA Rainfall Depth**				**Direct Runoff, Qd (Figure 402-8 or Equation 404-1)**				**Runoff Volume, Qv (Equation 404-3)**				**Peak Discharge per recurrence interval, Qp (Equation 404-2)**				**Discharge (Q_{100}) to Area (ac) Ratio**
	(acre)		(min)			(cfs/acre-in)	(in)				(in)				(ac-ft)				(cfs)				
							P_{10}	P_{25}	P_{50}	P_{100}	Qd_{10}	Qd_{25}	Qd_{50}	Qd_{100}	Qv_{10}	Qv_{25}	Qv_{50}	Qv_{100}	Qp_{10}	Qp_{25}	Qp_{50}	Qp_{100}	
BA01	5	79	31	2.66	0.53	0.89	1.79	2.11	2.37	2.63	0.40	0.59	0.75	0.93	0.17	0.24	0.31	0.38	1.78	2.59	3.30	4.07	0.8

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

TABLE 404-1: UNIT PEAK DISCHARGE TABLE

Tc		qu
hours	**min**	**cfs/ac-in**
0.167	10	1.900
0.200	12	1.730
0.233	14	1.650
0.267	16	1.500
0.300	18	1.350
0.333	20	1.280
0.367	22	1.180
0.400	24	1.100
0.433	26	1.040
0.467	28	0.970
0.500	30	0.930
0.533	32	0.890
0.567	34	0.848
0.600	36	0.805
0.633	38	0.778
0.667	40	0.752
0.700	42	0.725
0.733	44	0.688
0.800	48	0.650
0.867	52	0.623
0.900	54	0.595
1.000	60	0.550
1.500	90	0.395
2.000	120	0.313
2.500	150	0.260
3.000	180	0.225
3.500	210	0.202
4.000	240	0.178
4.500	270	0.163
5.000	300	0.148
5.500	330	0.138
6.000	360	0.128
6.500	390	0.122
7.000	420	0.115
7.500	450	0.108
8.000	480	0.100
8.500	510	0.095
9.000	540	0.090
9.500	570	0.087
10.000	600	0.083



INPUT TABLE - TO INTERPOLATE qu FROM TABLE 404-1

Tc		qu
hours	**min**	**cfs/ac-in**
0.517	31.0	0.89
0.000		#DIV/0!
0.000		#DIV/0!
0.000		#DIV/0!
0.000		#DIV/0!
0.000		#DIV/0!
0.000		#DIV/0!
0.000		#DIV/0!
0.000		#DIV/0!
0.000		#DIV/0!
0.000		#DIV/0!
0.000		#DIV/0!

NOTE:

USE INPUT TABLE TO INTERPOLATE VALUES BETWEEN THOSE GIVEN IN TABLE 404-1. THE POLYNOMIAL TREND LINE EQUATION PROVIDES MINOR INACCURACIES FOR Tc > 14 MIN. AND MAJOR INACCURACIES FOR Tc < 14 MIN. PLEASE CHECK VALUES.

Computed: **JAC** Date: **10/16/2021**
Checked: Date:

BA01

Cover Type and Hydrologic Condition	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
	Curve Numbers for Hydrologic Soil Group (HSG)																			
						B					C					D				
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor	1.73	35.3%	68	23.97654297	136.7			79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm	1.20	24.4%	98	23.92089278	94.6			98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel	0.83	16.8%	76	12.77011407	65.1			85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less	1.16	23.5%	77	18.11696198	91.2			85					90					92		
Residential - 1/4 acre			61					75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor			63					77					85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	4.9	0.0	0.0	0.0
HSG Adjusted CN	78.8	0.0	0.0	0.0
HSG Adjusted CN x Area	387.6	0.0	0.0	0.0
Total Adjusted CN x Area	**387.6**			
Total Area	**4.9**			
Area Weighted Curve Number	**79**			

Computed: **JAC** Date: **10/16/2021**
Checked: Date:

Use this spreadsheet to import GIS data. This info will then be used to populate "Composite CN" spreadsheet.
Filter > Basin > then Map Unit Name > then Rating

The rating A is assumed based on offsite hydrology.

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA01	Wk	Impervious - streets/roads; gravel	A	5688.93	1.31E-01	2.654%
BA01	Wk	Impervious - streets/roads; gravel	A	27720.7	6.36E-01	12.934%
BA01	Wk	Impervious - streets/roads; gravel	A	2601.7	5.97E-02	1.214%
BA01	Wk	Impervious - streets/roads; paved; curbs, storm	A	51620.5	1.19E+00	24.086%
BA01	Wk	Impervious - streets/roads; paved; curbs, storm	A	692.459	1.59E-02	0.323%
BA01	Wk	Open space - poor	A	75567.6	1.73E+00	35.260%
BA01	Wk	Residential - 1/8 acre or less	A	8156.16	1.87E-01	3.806%
BA01	Wk	Residential - 1/8 acre or less	A	13062.4	3.00E-01	6.095%
BA01	Wk	Residential - 1/8 acre or less	A	8571.42	1.97E-01	3.999%
BA01	Wk	Residential - 1/8 acre or less	A	10221.8	2.35E-01	4.769%
BA01	Wk	Residential - 1/8 acre or less	A	10414	2.39E-01	4.859%
					4.92E+00	100.0%

Computed: **JAC** Date: **3/16/2021**
Checked: Date:

Use this spreadsheet to import NRCS Soil Survey Map information.

Map Unit Symbol	Map Unit Name	Rating	Acres in AOI	Percent of AOI
Wk	Wink loamy sand	0	4.9	100.00%
			5	100.00%

Computed: **JAC** Date: **8/31/2020**
Checked: Date:

Table 404-2: Runoff Curve Numbers
Urban

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Open space - poor	68	79	86	89
Open space - fair	49	69	79	84
Open space - good	39	61	74	80
Impervious - parking lots, roofs, etc.	98	98	98	98
Impervious - streets/roads; paved; curbs, storm	98	89	98	98
Impervious - streets/roads; paved; open ditches	83	89	92	93
Impervious - streets/roads; gravel	76	85	89	91
Impervious - streets/roads; dirt	72	82	87	89
Western desert urban - natural	63	77	85	88
Western desert urban - artificial	96	96	96	96
Urban district - commercial/business	89	92	94	95
Urban district - industrial	81	88	91	93
Residential - 1/8 acre or less	77	85	90	92
Residential - 1/4 acre	61	75	83	87
Residential - 1/3 acre	57	72	81	86
Residential - 1/2 acre	54	70	80	85
Residential - 1 acre	51	68	79	84
Residential - 2 acres	46	65	77	82
Developing urban - newly graded	77	86	91	94

Table 404-4: Runoff Curve Numbers
Other Agricultural

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Pasture, grass, range - poor	68	79	86	89
Pasture, grass, range - fair	49	69	79	84
Pasture, grass, range - good	39	61	74	80
Meadow	30	58	71	78
Brush - poor	48	67	77	83
Brush - fair	35	56	70	77
Brush - good	30	48	65	73
Woods combination - poor	57	73	82	86
Woods combination - fair	43	65	76	82
Woods combination - good	32	58	72	79
Woods - poor	45	66	77	83
Woods - fair	36	60	73	79
Woods - good	30	55	70	77
Farmsteads	59	74	82	86

Computed: **JAC** Date: **8/31/2020**
Checked: Date:

Table 404-5: Runoff Curve Numbers
Arid and Semiarid Rangelands

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Herbaceous - poor		80	87	93
Herbaceous - fair		71	81	89
Herbaceous - good		62	74	85
Oak-aspen - poor		66	74	79
Oak-aspen - fair		48	57	63
Oak-aspen - good		30	41	48
Pinyon-juniper - poor		75	85	89
Pinyon-juniper - fair		58	73	80
Pinyon-juniper - good		41	61	71
Sagebrush - poor		67	80	85
Sagebrush - fair		51	63	70
Sagebrush - good		35	47	55
Desert shrub - poor	63	77	85	88
Desert shrub - fair	55	72	81	86
Desert shrub - good	49	68	79	84

Runoff Curve Numbers
Other

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Water	98	98	98	98

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

Time of Concentration					Pg, 4-99	
Basin	**Basin Tc Segments**	**Composite Tc (min)**	**Design Tc (min)**	Tc (hr)	Lag, L (min)	
BA01	1.1, 1.2, 1.3	31.00	31	0.52	18.6	**Tc minimum of 10 minutes**
						Page 4-43 NMDOT Drainage Manual July 2018
					0.6	Tc = Lag, L (Pg. 4-99)

Tc Method	Criteria	Condition		
Upland	Ungullied, overland, < 300 ft	**Rural/Urban**	Tc=L/(60*V), min	Sheet
Kirpich	Gullied	**Rural**	Tc=0.0078*(L^0.77)*(S^-0.385), min	Shallow Concentrated
Kerby	Ungullied, overland, > 300 ft	**Rural**	Tc=0.0828*((L*N)^0.467)*(S^-0.235), min	Shallow Concentrated
Manning's	Gullied, defined stream	Rural/Urban	V=(1.486/n)*(R^0.667)*(S^0.5)	Channel
	Ungullied, overland, < 300 ft	**Rural/Urban**	Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	Sheet
Figure 402-15 (Page 4-47)	Ungullied, undefined stream	**Urban**	Tc=L/(60*V), min	Shallow Concentrated

Notes: Per Table 402-6 (Page 4-38), both the "Upland Method" and "Iterative Method within the Stream Hydraulic Method" are to be used to determine time of concentration for **urban conditions**. The "Manning's Kinematic Equation" provided in the "Upland Method" (Page 4-43) section will be applied to all sheet flow segments (no defined stream channel) as used in Example Problem 6-5 on Page Appendix 6.32. The "Figure 402-15 Velocity Versus Slope for Concentrated Flow" (Page 4-47) will be used for all shallow concentrated flow segments. See Tc Ref tab. The Iterative Method within the Stream Hydraulic Method will not be used since there aren't any identified channel segments.

After review against the Kirpich Equation, it was determined Tc times using Figure 402-15 were slightly larger than using the Kirpich Equation. The smaller Tc times provided by the Kirpich Equation will provide larger, conservative peak discharge and volume values. The Kirpich Equation will be used for Tc times for shallow concentrated flows.

All equations and information in *red font* in this spreadsheet is not being used/referenced. This information is only provided for review/comparison when evaluating Tc times.

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA01	
Sheet	
Basin Segment ID	1.1
	Urban
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4903.0
Low Elevation, ft	4902.8
Length, ft	84.6
Slope (ft/ft)	0.0024
Manning's, n	0.028
Tc=(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))*60, min	
Tc, min	8.447
Shallow	
Basin Segment ID	*1.2*
	Urban
	Figure 402-15
Surface Description (from Upland Graph)	*Bare Ground*
High Elevation, ft	*4902.8*
Low Elevation, ft	*4898.0*
Length, ft	*1375.2*
Velocity, ft/s (from Upland Graph)	*0.6*
*Tc=L/(60*V), min*	
Tc, min	*38.946*
Shallow	
Basin Segment ID	*1.3*
	Urban
	Figure 402-15
Surface Description (from Upland Graph)	*Bare Ground*
High Elevation, ft	*4898.0*
Low Elevation, ft	*4891.0*
Length, ft	*477.3*
Velocity, ft/s (from Upland Graph)	*1.2*
*Tc=L/(60*V), min*	
Tc, min	*6.659*
Shallow	
Basin Segment ID	1.2
	Urban
	Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4902.8
Low Elevation, ft	4898.0
Length, ft	1375.2
Slope (ft/ft)	0.0035
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	17.973
Shallow	
Basin Segment ID	1.3
	Urban
	Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4898.0
Low Elevation, ft	4891.0
Length, ft	477.3
Slope (ft/ft)	0.0147
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	4.579
Total Travel Time, min	30.999

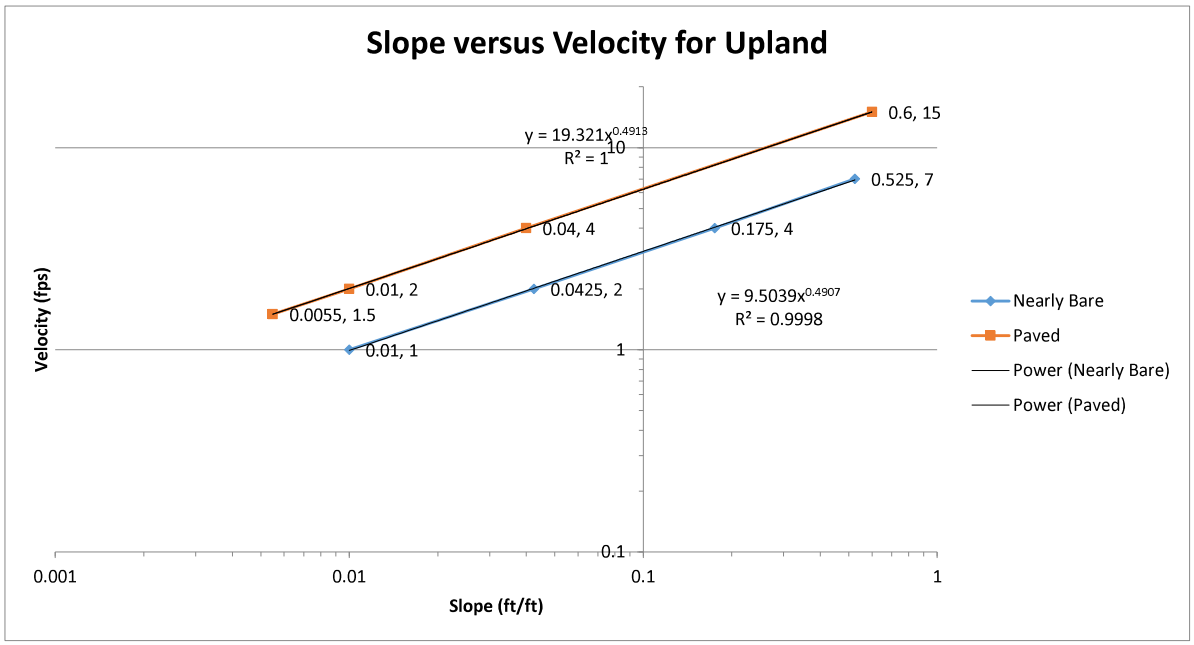
Computed: **JAC** Date: **3/16/2021**
Checked: Date:

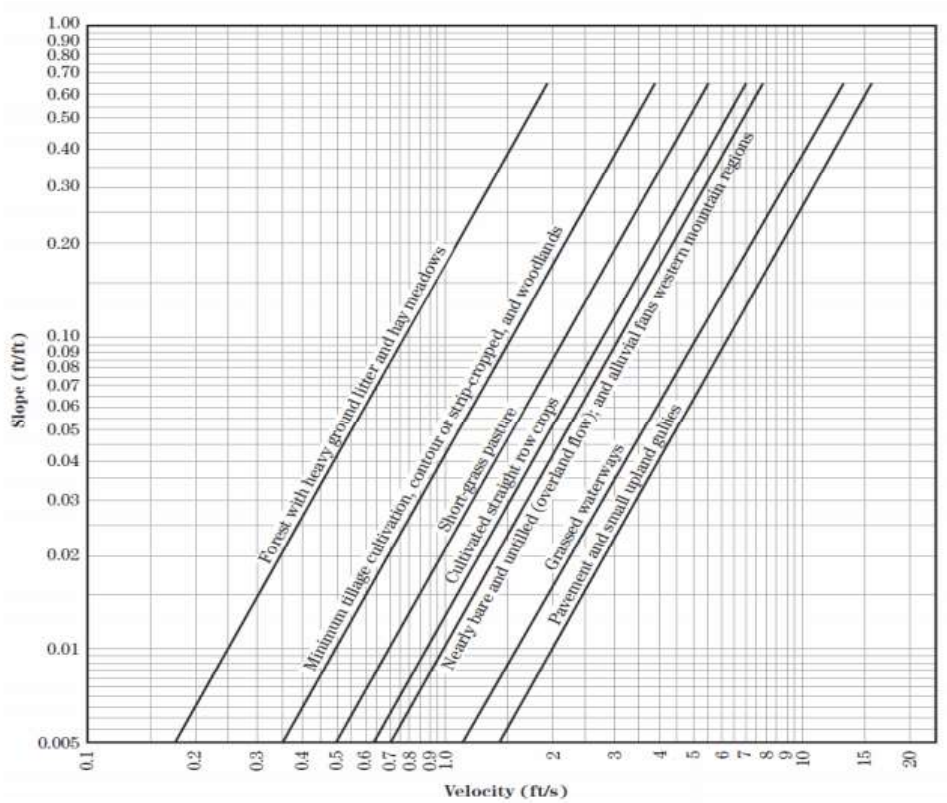
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Flow ID	**Seg ID**	**Flow Type**	**Start Elevation (ft)**	**End Elevation (ft)**	**Length (ft)**	**Slope (ft/ft)**	**Slope (%)**	**Velocity Equation**	**Velocity (ft/s)**	**Condition**
BA01	1.1	Sheet	4903	4903	85	0.002	0.24	Bare Ground		Ungullied, overland
BA01	1.2	Shallow	4903	4898	1375	0.003	0.35	Bare Ground	0.6	Gullied
BA01	1.3	Shallow	4898	4891	477	0.015	1.47	Bare Ground	1.2	Gullied

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

	Slope (ft/ft)	*Velocity (ft/s)*	*Chart Eq.*	*Table 402-8 Eq. (To be used)*
Nearly Bare	0.01	1	**9.5039x^0.4907**	**V=9.965x^0.5**
	0.0425	2		
	0.175	4		
	0.525	7		
Paved Area (Shallow Concentrated Flow)	0.0055	1.5	**19.321x^0.4913**	**V=20.328x^0.5**
	0.01	2		
	0.04	4		
	0.6	15		

For simplicity, "Nearly Bare" and "Paved Area" were identified as majority conditions in analysis area.





Source: NRCS, 2010, "Part 630 Hydrology, National Engineering Handbook, Chapter 15 Time of Concentration", Figure 15-4, p. 15-8.
http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=27002.wba

Figure 402-15 Velocity Versus Slope for Shallow Concentrated Flow

Table 402-8 Equations and Assumptions Developed from Figure 402-15

Source: NRCS, 2010, "Part 630 Hydrology, National Engineering Handbook, Chapter 15 Time of Concentration", Table 15-3, p.15-8.
http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=27002.wba

Flow type	Depth (ft)	Manning's *n*	Velocity equation (ft/s)
Pavement and small upland gullies	0.2	0.025	$V = 20.328(s)^{0.5}$
Grassed waterways	0.4	0.050	$V = 16.135(s)^{0.5}$
Nearly bare and untilled (overland flow); and alluvial fans in western mountain regions	0.2	0.051	$V = 9.965(s)^{0.5}$
Cultivated straight row crops	0.2	0.058	$V = 8.762(s)^{0.5}$
Short-grass pasture	0.2	0.073	$V = 6.962(s)^{0.5}$
Minimum tillage cultivation, contour or strip-cropped, and woodlands	0.2	0.101	$V = 5.032(s)^{0.5}$
Forest with heavy ground litter and hay meadows	0.2	0.202	$V = 2.516(s)^{0.5}$

Computed: **JAC** Date: **9/15/2020**
Checked: **JEC** Date: **10/6/2020**

Precipitation information obtained from NOAA Atlas 14 at the approximate center of the project location

Latitude: 34.6465 Longitude: -106.7218

LAT: 34D38M47.4SEC LONG: 103D43M18.48SEC

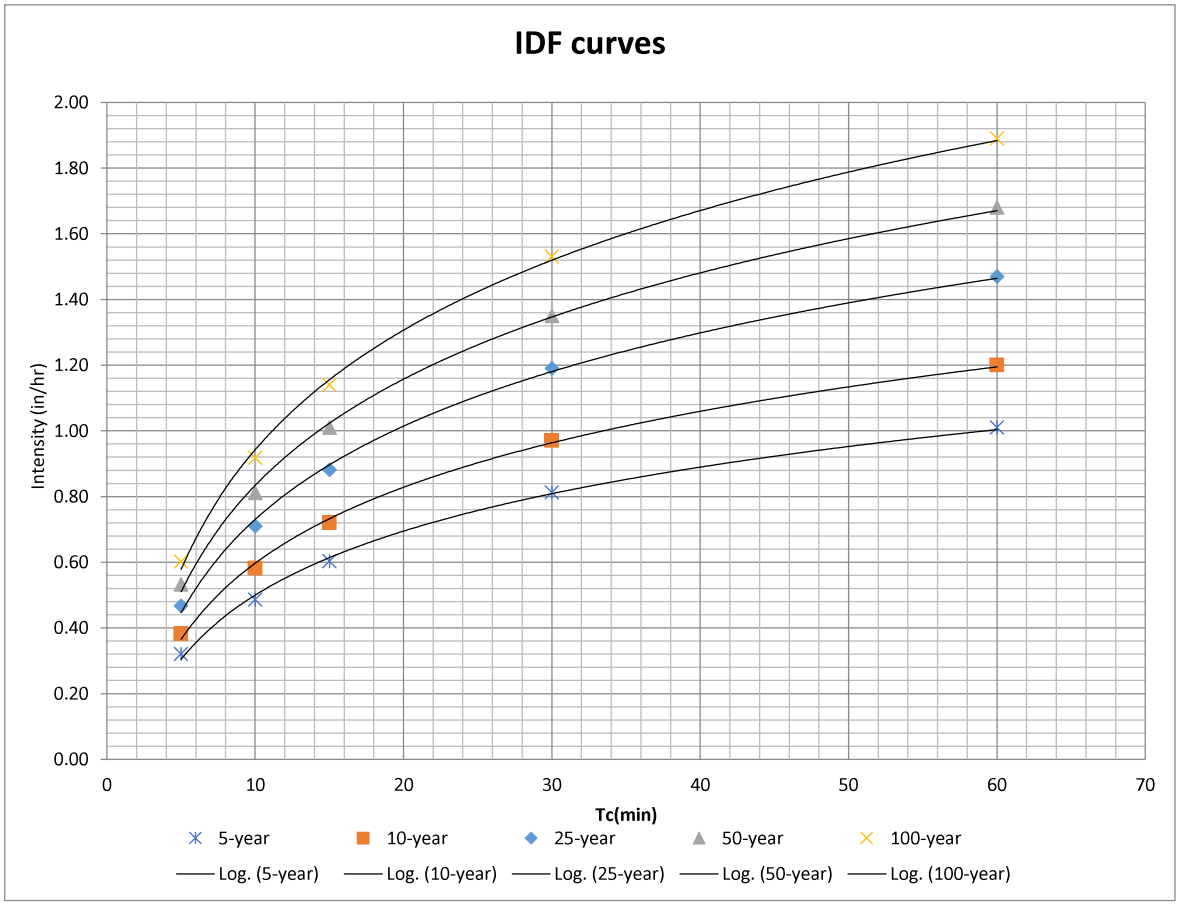
Precipitation Frequency Estimates (in/hr)

Duration		Return Interval (year)								
Time	Minutes	2	5	10	25	50	100	200	500	1000
5-min	5	0.24	0.32	0.38	0.47	0.53	0.60	0.68	0.77	0.85
10-min	10	0.36	0.49	0.58	0.71	0.81	0.92	1.03	1.18	1.30
15-min	15	0.45	0.60	0.72	0.88	1.01	1.14	1.27	1.46	1.61
30-min	30	0.61	0.81	0.97	1.19	1.35	1.53	1.72	1.97	2.16
60-min	60	0.75	1.01	1.20	1.47	1.68	1.89	2.12	2.43	2.68
2-hr	120	0.86	1.13	1.36	1.66	1.91	2.18	2.46	2.86	3.18
3-hr	180	0.91	1.18	1.41	1.72	1.97	2.24	2.53	2.93	3.26
6-hr	360	1.04	1.33	1.57	1.89	2.14	2.42	2.70	3.09	3.42
12-hr	720	1.14	1.44	1.68	2.01	2.26	2.53	2.81	3.18	3.49
24-hr	1440	1.24	1.54	1.79	2.11	2.37	2.63	2.89	3.24	3.52
2-day	2880	1.39	1.73	2.00	2.35	2.63	2.92	3.20	3.59	3.89
3-day	4320	1.50	1.85	2.13	2.50	2.79	3.09	3.38	3.78	4.09
4-day	5760	1.60	1.97	2.26	2.66	2.96	3.26	3.57	3.98	4.29
7-day	10080	1.85	2.25	2.57	2.99	3.31	3.62	3.94	4.34	4.65
10-day	14400	2.04	2.50	2.87	3.35	3.71	4.09	4.45	4.94	5.30
20-day	28800	2.52	3.06	3.47	3.99	4.38	4.75	5.11	5.56	5.89
30-day	43200	2.95	3.55	4.00	4.56	4.96	5.35	5.71	6.16	6.47
45-day	64800	3.58	4.26	4.76	5.35	5.77	6.15	6.49	6.88	7.13
60-day	86400	4.12	4.92	5.48	6.17	6.65	7.09	7.48	7.94	8.24

Computed:	JAC	Date:	9/15/2020
Checked:	JEC	Date:	10/6/2020

IDF Curve Equations

Recurrence Interval (year)	Equation
100	-2.038ln(x) + 9.9586
50	-1.792ln(x) + 8.7633
25	-1.565ln(x) + 7.6525
10	-1.276ln(x) + 6.2346
5	-1.067ln(x) + 5.2124



Computed: **JAC** Date: **8/5/2020**
Checked: Date:

NOTE: This data is imported from the NOAA 14 website (https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html).

Point precipitation frequency estimates (inches)
NOAA Atlas 14 Volume 1 Version 5
Data type: Precipitation depth
Time series type: Partial duration
Project area: Southwest
Location name (ESRI Maps): Belen
Station Name: -
Latitude: 34.6465°
Longitude: -106.7218°
Elevation (USGS): 4919.71 ft

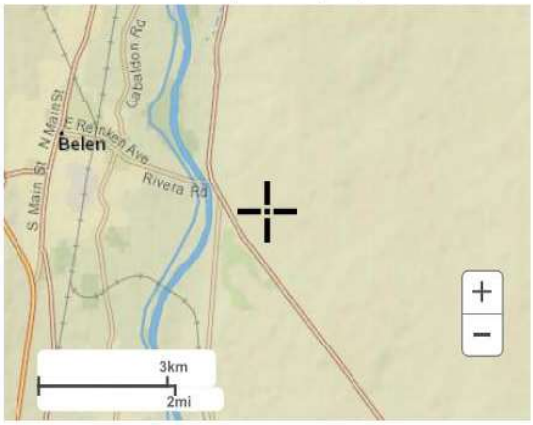
PRECIPITATION FREQUENCY ESTIMATES

by duration for ARI (years):	1	2	5	10	25	50	100	200	500	1000
5-min:	0.184	0.239	0.32	0.382	0.467	0.533	0.602	0.675	0.774	0.852
10-min:	0.28	0.363	0.486	0.581	0.71	0.811	0.917	1.03	1.18	1.3
15-min:	0.347	0.45	0.603	0.72	0.881	1.01	1.14	1.27	1.46	1.61
30-min:	0.468	0.606	0.812	0.97	1.19	1.35	1.53	1.72	1.97	2.16
60-min:	0.579	0.749	1.01	1.2	1.47	1.68	1.89	2.12	2.43	2.68
2-hr:	0.671	0.858	1.13	1.36	1.66	1.91	2.18	2.46	2.86	3.18
3-hr:	0.713	0.905	1.18	1.41	1.72	1.97	2.24	2.53	2.93	3.26
6-hr:	0.822	1.04	1.33	1.57	1.89	2.14	2.42	2.7	3.09	3.42
12-hr:	0.905	1.14	1.44	1.68	2.01	2.26	2.53	2.81	3.18	3.49
24-hr:	0.988	1.24	1.54	1.79	2.11	2.37	2.63	2.89	3.24	3.52
2-day:	1.11	1.39	1.73	2	2.35	2.63	2.92	3.2	3.59	3.89
3-day:	1.2	1.5	1.85	2.13	2.5	2.79	3.09	3.38	3.78	4.09
4-day:	1.29	1.6	1.97	2.26	2.66	2.96	3.26	3.57	3.98	4.29
7-day:	1.49	1.85	2.25	2.57	2.99	3.31	3.62	3.94	4.34	4.65
10-day:	1.64	2.04	2.5	2.87	3.35	3.71	4.09	4.45	4.94	5.3
20-day:	2.02	2.52	3.06	3.47	3.99	4.38	4.75	5.11	5.56	5.89
30-day:	2.37	2.95	3.55	4	4.56	4.96	5.35	5.71	6.16	6.47
45-day:	2.89	3.58	4.26	4.76	5.35	5.77	6.15	6.49	6.88	7.13
60-day:	3.33	4.12	4.92	5.48	6.17	6.65	7.09	7.48	7.94	8.24

Date/time (GMT): Wed Aug 5 23:04:25 2020
pyRunTime: 0.0324950218201

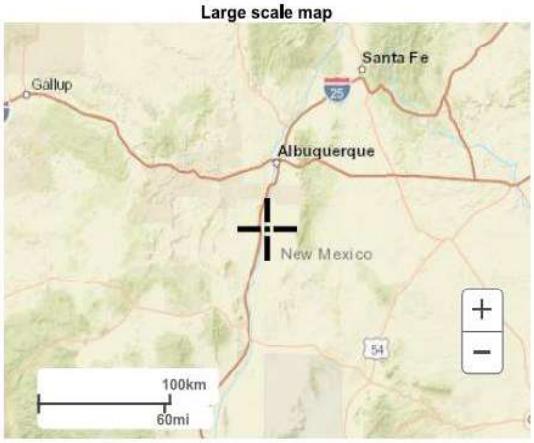
8/5/2020

Precipitation Frequency Data Server



Large scale terrain

Large scale map



Large scale aerial

Project:	**Rio Communities Drainage Master Plan**	Date:	**5/24/2021**
Subject:	**Hydrology - Future Conditions**	Date:	
Task:		of:	
Job #:			

Rio Communities Hydrology - Future Conditions

Reference: NMDOT Drainage Design Manual, July 2018

Stream Name:
Mile Post:
USGS Quadrangle:
Methodology: NRCS Simplified Peak Discharge Method (TR-55)
For basins less than 10 square miles

Design Peak Discharge per recurrence interval (cfs)						
Subbasin ID	Area (Acres)	Tc (hr)	Qp_{10}	Qp_{25}	Qp_{50}	Qp_{100}
BA01	782	2.5	26	53	83	120
BA02	1614	3.8	44	89	134	190
BA03	450	1.2	12	27	46	73
BA04	190	0.4	8	19	32	47
BA05	224	0.5	25	45	66	97
BA06	446	0.7	9	26	45	67
BA07	673	1.6	20	42	70	108
BA08	429	1.3	24	48	75	108
BA09	2490	3.3	195	337	468	624
BA10	107	0.5	29	48	67	90
BA11	283	0.6	62	108	153	204
	7688					

Design Runoff Volume per recurrence interval, Qv (ac-ft)						
Subbasin ID	Area (Acres)	Tc (hr)	Qv_{10}	Qv_{25}	Qv_{50}	Qv_{100}
BA01	782	2.5	8.5	15.2	21.7	29.1
BA02	1614	3.8	19.9	34.6	48.8	64.8
BA03	450	1.2	2.2	4.8	7.6	10.8
BA04	190	0.4	0.6	1.5	2.5	3.7
BA05	224	0.5	2.4	4.3	6.2	8.3
BA06	446	0.7	1.1	3.0	5.2	7.8
BA07	673	1.6	4.7	9.3	14.0	19.5
BA08	429	1.3	4.6	8.3	11.9	16.0
BA09	2490	3.3	68.1	106.0	140.3	178.1
BA10	107	0.5	2.5	3.9	5.1	6.5
BA11	283	0.6	6.7	10.3	13.6	17.2

A bulk factor was added to BA09 peak discharge to account for uncertain basin delineation due to alluvual fan flow from Manzano Mountains.

f_{rural} = bulk flow for rural watershed = 1.20

Comments:
The NRCS (SCS) Simplified Peak Discharge Method outlined in the 2018 NMDOT Drainage Design Manual was used to determine design discharges and volumes for rural conditions. A weighted curve number was computed based on data pulled from USGS Web Soil Survey. NOAA 14 rainfall depths were used. Per Table 402-6 (Page 4-38), both the "Upland Method" and "Kirpich Formula" were used to determine time of concentration. The values presented in the summary tables above are maximum values determined between this workbook and HEC-HMS results. Please review the HEC-HMS results for more information.

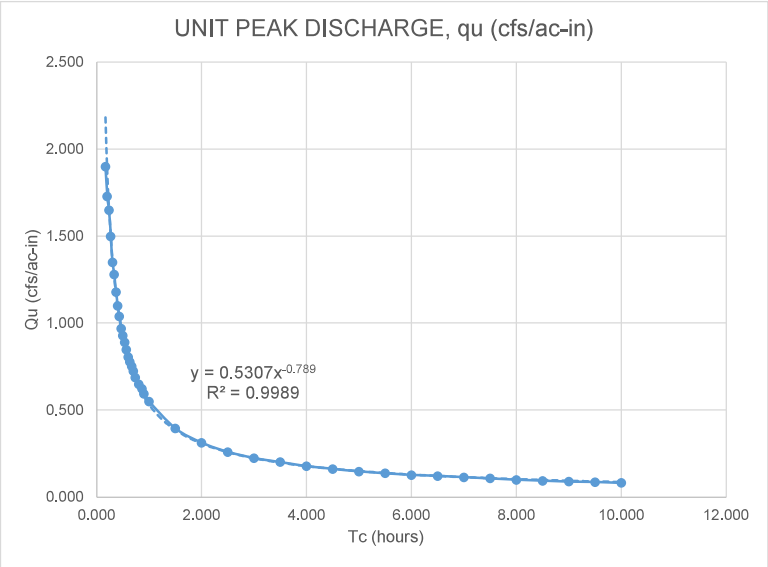
Computed: **JAC** Date: **5/24/2021**
Checked: Date:

General							24-hr:																
Subbasin ID	**Contributing Area**	**CN**	**Tc**	**Potential Max Soil Moisture Rentention, S**	**Initial Abstraction, Ia**	**Unit Peak Discharge, qu**	**NOAA Rainfall Depth**				**Direct Runoff, Qd (Figure 402-8 or Equation 404-1)**				**Runoff Volume, Qv (Equation 404-3)**				**Peak Discharge per recurrence interval, Qp (Equation 404-2)**				**Discharge (Q_{100}) to Area (ac) Ratio**
	(acre)		(min)			(cfs/acre-in)	(in)				(in)				(ac-ft)				(cfs)				
							P_{10}	P_{25}	P_{50}	P_{100}	Qd_{10}	Qd_{25}	Qd_{50}	Qd_{100}	Qv_{10}	Qv_{25}	Qv_{50}	Qv_{100}	Qp_{10}	Qp_{25}	Qp_{50}	Qp_{100}	
BA01	782	68	151	4.71	0.94	0.26	1.79	2.11	2.37	2.63	0.13	0.23	0.33	0.45	8.45	15.15	21.69	29.06	25.99	46.59	66.67	89.36	0.1
BA02	1614	69	229	4.49	0.90	0.18	1.79	2.11	2.37	2.63	0.15	0.26	0.36	0.48	19.86	34.61	48.84	64.80	43.95	76.62	108.11	143.43	0.1
BA03	450	63	70	5.87	1.17	0.47	1.79	2.11	2.37	2.63	0.06	0.13	0.20	0.29	2.19	4.82	7.59	10.85	12.35	27.19	42.78	61.16	0.1
BA04	190	61	25	6.39	1.28	1.06	1.79	2.11	2.37	2.63	0.04	0.10	0.16	0.24	0.60	1.51	2.52	3.73	7.62	19.24	32.01	47.44	0.2
BA05	224	68	32	4.71	0.94	0.87	1.79	2.11	2.37	2.63	0.13	0.23	0.33	0.45	2.42	4.34	6.21	8.33	25.33	45.41	64.98	87.09	0.4
BA06	446	60	41	6.67	1.33	0.72	1.79	2.11	2.37	2.63	0.03	0.08	0.14	0.21	1.09	3.01	5.18	7.84	9.35	25.89	44.56	67.44	0.2
BA07	673	65	97	5.38	1.08	0.36	1.79	2.11	2.37	2.63	0.08	0.17	0.25	0.35	4.68	9.33	14.05	19.51	20.40	40.68	61.24	85.04	0.1
BA08	429	68	78	4.71	0.94	0.43	1.79	2.11	2.37	2.63	0.13	0.23	0.33	0.45	4.64	8.32	11.91	15.96	24.03	43.08	61.65	82.63	0.2
BA09	2490	75	200	3.33	0.67	0.21	1.79	2.11	2.37	2.63	0.28	0.44	0.58	0.73	58.74	90.48	119.51	150.99	144.69	222.87	294.37	371.90	0.1
BA10	107	75	28	3.33	0.67	0.97	1.79	2.11	2.37	2.63	0.28	0.44	0.58	0.73	2.51	3.87	5.11	6.46	29.21	44.99	59.43	75.08	0.7
BA11	283	75	37	3.33	0.67	0.78	1.79	2.11	2.37	2.63	0.28	0.44	0.58	0.73	6.68	10.29	13.59	17.17	62.31	95.97	126.76	160.15	0.6

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

TABLE 404-1: UNIT PEAK DISCHARGE TABLE

Tc		qu
hours	**min**	**cfs/ac-in**
0.167	10	1.900
0.200	12	1.730
0.233	14	1.650
0.267	16	1.500
0.300	18	1.350
0.333	20	1.280
0.367	22	1.180
0.400	24	1.100
0.433	26	1.040
0.467	28	0.970
0.500	30	0.930
0.533	32	0.890
0.567	34	0.848
0.600	36	0.805
0.633	38	0.778
0.667	40	0.752
0.700	42	0.725
0.733	44	0.688
0.800	48	0.650
0.867	52	0.623
0.900	54	0.595
1.000	60	0.550
1.500	90	0.395
2.000	120	0.313
2.500	150	0.260
3.000	180	0.225
3.500	210	0.202
4.000	240	0.178
4.500	270	0.163
5.000	300	0.148
5.500	330	0.138
6.000	360	0.128
6.500	390	0.122
7.000	420	0.115
7.500	450	0.108
8.000	480	0.100
8.500	510	0.095
9.000	540	0.090
9.500	570	0.087
10.000	600	0.083



INPUT TABLE - TO INTERPOLATE qu FROM TABLE 404-1

Tc		qu
hours	**min**	**cfs/ac-in**
2.517	151	0.26
3.817	229	0.18
1.167	70	0.47
0.417	25	1.06
0.533	32	0.87
0.683	41	0.72
1.617	97	0.36
1.300	78	0.43
3.333	200	0.21
0.467	28	0.97
0.617	37	0.78

NOTE:

USE INPUT TABLE TO INTERPOLATE VALUES BETWEEN THOSE GIVEN IN TABLE 404-1. THE POLYNOMIAL TREND LINE EQUATION PROVIDES MINOR INACCURACIES FOR Tc > 14 MIN. AND MAJOR INACCURACIES FOR Tc < 14 MIN. PLEASE CHECK VALUES.

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA01

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																							
	A					B					C					D								
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																								
Open space - poor			68					79					86					89						
Open space - fair			49					69					79					84						
Open space - good			39					61					74					80						
Impervious - parking lots, roofs, etc.			98					98					98					98						
Impervious - streets/roads; paved; curbs, storm			98					98					98					98						
Impervious - streets/roads; paved; open ditches			83					89					92					93						
Impervious - streets/roads; gravel			76					85					89					91						
Impervious - streets/roads; dirt			72					82					87					89						
Western desert urban - natural			63					77					85					88						
Western desert urban - artificial			96					96					96					96						
Urban - commercial/business			89			8.735113	3.0%	92	2.8	676.5			94					95						
Urban - industrial			81					88					91					93						
Residential - 1/8 acre or less			77					85					90					92						
Residential - 1/4 acre			61					75					83					87						
Residential - 1/3 acre			57					72					81					86						
Residential - 1/2 acre			54					70					80					85						
Residential - 1 acre			51					68					79					84						
Residential - 2 acres			46					65					77					82						
Developing urban - newly graded			77					86					91					94						
Other Agricultural																								
Pasture, grass, range - poor			68					79					86					89						
Pasture, grass, range - fair			49					69					79					84						
Pasture, grass, range - good			39					61					74					80						
Meadow			30					58					71					78						
Brush - poor			48					67					77					83						
Brush - fair			35					56					70					77						
Brush - good			30					48					65					73						
Woods combination - poor			57					73					82					86						
Woods combination - fair			43					65					76					82						
Woods combination - good			32					58					72					79						
Woods - poor			45					66					77					83						
Woods - fair			36					60					73					79						
Woods - good			30					55					70					77						
Farmsteads			59					74					82					86						
Arid and Semiarid Rangelands																								
Herbaceous - poor								80					87					93						
Herbaceous - fair								71					81					89						
Herbaceous - good								62					74					85						
Oak-aspen - poor								66					74					79						
Oak-aspen - fair								48					57					63						
Oak-aspen - good								30					41					48						
Pinyon-juniper - poor								75					85					89						
Pinyon-juniper - fair								58					73					80						
Pinyon-juniper - good								41					61					71						
Sagebrush - poor								67					80					85						
Sagebrush - fair								51					63					70						
Sagebrush - good								35					47					55						
Desert shrub - poor	491.2831	100.0%	63	63	30950.8	281.9398	97.0%	77	74.7	21836.5			85					88						
Desert shrub - fair			55					72					81					86						
Desert shrub - good			49					68					79					84						
Water			98					98					98					98						

	A	B	C	D
Subtotal Acres	491.3	290.7	0.0	0.0
HSG Adjusted CN	63.0	77.5	0.0	0.0
HSG Adjusted CN x Area	30950.8	22513.0	0.0	0.0
Total Adjusted CN x Area	**53463.8**			
Total Area	**782.0**			
Area Weighted Curve Number	**68**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA02

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89			0.268136	0%	92	0.0	20.6			94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	0.981859	0.1%	61	0.1	61.9			75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor	961.0537	99.9%	63	62.9	60544.4	652.0928	100%	77	77.0	50215.2			85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	962.0	652.4	0.0	0.0
HSG Adjusted CN	63.0	77.0	0.0	0.0
HSG Adjusted CN x Area	60606.3	50235.8	0.0	0.0
Total Adjusted CN x Area	**110842.1**			
Total Area	**1614.4**			
Area Weighted Curve Number	**69**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA03

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm	8.297243	1.8%	98	1.81	519.90			98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business	12.97971	2.9%	89	2.57	813.30			92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	389.6423	86.8%	61	52.96	24414.62	1.489219	100.0%	75	75.0	111.7			83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded	3.723372	0.8%	77	0.64	233.30			86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor	27.4117	6.1%	63	3.85	1717.59			77					85					88		
Desert shrub - fair	6.715366	1.5%	55	0.82	420.78			72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	448.8	1.5	0.0	0.0
HSG Adjusted CN	62.7	75.0	0.0	0.0
HSG Adjusted CN x Area	28119.5	111.7	0.0	0.0
Total Adjusted CN x Area	**28231.2**			
Total Area	**450.3**			
Area Weighted Curve Number	**63**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA04

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	178.9711	96.7%	61	59.0	10929.2	2.178755	44.7%	75	33.5	165.8			83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor	6.162574	3.3%	63	2.1	376.3	2.695725	55.3%	77	42.6	205.2			85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	185.1	4.9	0.0	0.0
HSG Adjusted CN	61.1	76.1	0.0	0.0
HSG Adjusted CN x Area	11305.5	371.0	0.0	0.0
Total Adjusted CN x Area	**11676.5**			
Total Area	**190.0**			
Area Weighted Curve Number	**61**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA05

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																					
Open space - poor	5.733639	3.5%	68	2.4	337.2			79					86					89			
Open space - fair			49					69					79					84			
Open space - good	21.08785	12.9%	39	5.0	1240.1			61					74					80			
Impervious - parking lots, roofs, etc.			98					98					98					98			
Impervious - streets/roads; paved; curbs, storm			98					98					98					98			
Impervious - streets/roads; paved; open ditches			83					89					92					93			
Impervious - streets/roads; gravel			76					85					89					91			
Impervious - streets/roads; dirt			72					82					87					89			
Western desert urban - natural			63					77					85					88			
Western desert urban - artificial			96					96					96					96			
Urban - commercial/business			89					92			50.30792	87.1%	94	81.9	4645.2			95			
Urban - industrial			81					88					91					93			
Residential - 1/8 acre or less			77					85					90					92			
Residential - 1/4 acre	43.89009	26.8%	61	16.3	2580.9			75					83					87			
Residential - 1/3 acre			57					72					81					86			
Residential - 1/2 acre			54					70					80					85			
Residential - 1 acre			51					68					79					84			
Residential - 2 acres			46					65					77					82			
Developing urban - newly graded	7.91025	4.8%	77	3.7	465.2			86					91					94			
Other Agricultural																					
Pasture, grass, range - poor			68					79					86					89			
Pasture, grass, range - fair			49					69					79					84			
Pasture, grass, range - good			39					61					74					80			
Meadow			30					58					71					78			
Brush - poor			48					67					77					83			
Brush - fair			35					56					70					77			
Brush - good			30					48					65					73			
Woods combination - poor			57					73					82					86			
Woods combination - fair			43					65					76					82			
Woods combination - good			32					58					72					79			
Woods - poor			45					66					77					83			
Woods - fair			36					60					73					79			
Woods - good			30					55					70					77			
Farmsteads			59					74					82					86			
Arid and Semiarid Rangelands																					
Herbaceous - poor								80					87					93			
Herbaceous - fair								71					81					89			
Herbaceous - good								62					74					85			
Oak-aspen - poor								66					74					79			
Oak-aspen - fair								48					57					63			
Oak-aspen - good								30					41					48			
Pinyon-juniper - poor								75					85					89			
Pinyon-juniper - fair								58					73					80			
Pinyon-juniper - good								41					61					71			
Sagebrush - poor								67					80					85			
Sagebrush - fair								51					63					70			
Sagebrush - good								35					47					55			
Desert shrub - poor	56.20012	34.3%	63	21.6	3304.8			77			0.110415	0.2%	85	0.2	10.2			88			
Desert shrub - fair	29.23993	17.8%	55	9.8	1719.4	2.278939	100.0%	72	72.0	164.1	7.316749	12.7%	81	10.3	675.6			86			
Desert shrub - good			49					68					79					84			
Water			98					98					98					98			

Subtotal Acres	164.1	2.3	57.7	0.0
HSG Adjusted CN	58.8	72.0	92.3	0.0
HSG Adjusted CN x Area	9647.5	164.1	5331.0	0.0
Total Adjusted CN x Area	**15142.6**			
Total Area	**224.1**			
Area Weighted Curve Number	**68**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA06

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good	82.27284	20.7%	39	8.1	4707.6			61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business	5.744085	1.4%	89	1.3	328.7			92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	222.9638	56.1%	61	34.2	12757.8			75			39.57747	82.3%	83	68.3	3298.6			87		
Residential - 1/3 acre	33.10399	8.3%	57	4.7	1894.2			72					81					86		
Residential - 1/2 acre	7.569116	1.9%	54	1.0	433.1			70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor	39.08687	9.8%	63	6.2	2236.5			77			8.416475	17.5%	85	14.9	701.5			88		
Desert shrub - fair	0.029761	0.0%	55	0.0	1.7			72			0.08945	0.2%	81	0.2	7.5			86		
Desert shrub - good			49					68					79					84		
Water	6.846507	1.7%	98	1.7	391.8			98					98					98		

Subtotal Acres	397.6	0.0	48.1	0.0
HSG Adjusted CN	57.2	0.0	83.3	0.0
HSG Adjusted CN x Area	22751.4	0.0	4007.6	0.0
Total Adjusted CN x Area	**26759.0**			
Total Area	**445.7**			
Area Weighted Curve Number	**60**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA07

Cover Type and Hydrologic Condition	A Area	A % Area	A HSG CN	A Adjusted (% Area) HSG CN	A Adjusted (% Area) HSG CN x Area	B Area	B % Area	B HSG CN	B Adjusted (% Area) HSG CN	B Adjusted (% Area) HSG CN x Area	C Area	C % Area	C HSG CN	C Adjusted (% Area) HSG CN	C Adjusted (% Area) HSG CN x Area	D Area	D % Area	D HSG CN	D Adjusted (% Area) HSG CN	D Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good	0.357167	0.1%	39	0.0	22.5			61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	1.240115	0.2%	61	0.1	78.1			75			0.654085	1.4%	83	1.2	55.6			87		
Residential - 1/3 acre	2.483576	0.4%	57	0.2	156.4			72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor	620.982	99.3%	63	62.6	39096.1	2.125548	100.0%	77	77.0	163.7	45.42789	98.6%	85	83.8	3860.0			88		
Desert shrub - fair			55					72			0.008104	0.0%	81	0.0	0.7			86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

	A	B	C	D
Subtotal Acres	625.1	2.1	46.1	0.0
HSG Adjusted CN	63.0	77.0	85.0	0.0
HSG Adjusted CN x Area	39353.0	163.7	3916.3	0.0
Total Adjusted CN x Area	**43433.0**			
Total Area	**673.3**			
Area Weighted Curve Number	**65**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA08

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																							
	A					B					C					D								
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																								
Open space - poor			68					79					86					89						
Open space - fair			49					69					79					84						
Open space - good			39					61					74					80						
Impervious - parking lots, roofs, etc.			98					98					98					98						
Impervious - streets/roads; paved; curbs, storm			98					98					98					98						
Impervious - streets/roads; paved; open ditches			83					89					92					93						
Impervious - streets/roads; gravel			76					85					89					91						
Impervious - streets/roads; dirt			72					82					87					89						
Western desert urban - natural			63					77					85					88						
Western desert urban - artificial			96					96					96					96						
Urban - commercial/business			89					92					94					95						
Urban - industrial	0.108018	0.0%	81	0.0	6.8	0.378798	0.3%	88	0.2	29.2			91					93						
Residential - 1/8 acre or less			77					85					90					92						
Residential - 1/4 acre	0.319679	0.1%	61	0.1	20.1			75					83					87						
Residential - 1/3 acre			57					72					81					86						
Residential - 1/2 acre			54					70					80					85						
Residential - 1 acre			51					68					79					84						
Residential - 2 acres			46					65					77					82						
Developing urban - newly graded			77					86					91					94						
Other Agricultural																								
Pasture, grass, range - poor			68					79					86					89						
Pasture, grass, range - fair			49					69					79					84						
Pasture, grass, range - good			39					61					74					80						
Meadow			30					58					71					78						
Brush - poor			48					67					77					83						
Brush - fair			35					56					70					77						
Brush - good			30					48					65					73						
Woods combination - poor			57					73					82					86						
Woods combination - fair			43					65					76					82						
Woods combination - good			32					58					72					79						
Woods - poor			45					66					77					83						
Woods - fair			36					60					73					79						
Woods - good			30					55					70					77						
Farmsteads			59					74					82					86						
Arid and Semiarid Rangelands																								
Herbaceous - poor								80					87					93						
Herbaceous - fair								71					81					89						
Herbaceous - good								62					74					85						
Oak-aspen - poor								66					74					79						
Oak-aspen - fair								48					57					63						
Oak-aspen - good								30					41					48						
Pinyon-juniper - poor								75					85					89						
Pinyon-juniper - fair								58					73					80						
Pinyon-juniper - good								41					61					71						
Sagebrush - poor								67					80					85						
Sagebrush - fair								51					63					70						
Sagebrush - good								35					47					55						
Desert shrub - poor	280.9883	99.8%	63	62.9	17703.6	147.5874	99.7%	77	76.8	11368.4			85					88						
Desert shrub - fair			55					72					81					86						
Desert shrub - good			49					68					79					84						
Water			98					98					98					98						

Subtotal Acres	281.4	148.0	0.0	0.0
HSG Adjusted CN	63.0	77.0	0.0	0.0
HSG Adjusted CN x Area	17730.5	11397.6	0.0	0.0
Total Adjusted CN x Area	**29128.1**			
Total Area	**429.4**			
Area Weighted Curve Number	**68**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA09

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre			61					75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor	357.8292	100.0%	63	63.0	22543.2	2131.855	100.0%	77	77.0	164152.8			85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	357.8	2131.9	0.0	0.0
HSG Adjusted CN	63.0	77.0	0.0	0.0
HSG Adjusted CN x Area	22543.2	164152.8	0.0	0.0
Total Adjusted CN x Area	**186696.1**			
Total Area	**2489.7**			
Area Weighted Curve Number	**75**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA10

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre			61					75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor	14.70573	100.0%	63	63.0	926.5	91.84337	100.0%	77	77.0	7071.9			85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	14.7	91.8	0.0	0.0
HSG Adjusted CN	63.0	77.0	0.0	0.0
HSG Adjusted CN x Area	926.5	7071.9	0.0	0.0
Total Adjusted CN x Area	**7998.4**			
Total Area	**106.5**			
Area Weighted Curve Number	**75**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA11

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre			61					75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor	46.54598	100.0%	63	63.0	2932.4	236.6212	100.0%	77	77.0	18219.8			85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	46.5	236.6	0.0	0.0
HSG Adjusted CN	63.0	77.0	0.0	0.0
HSG Adjusted CN x Area	2932.4	18219.8	0.0	0.0
Total Adjusted CN x Area	**21152.2**			
Total Area	**283.2**			
Area Weighted Curve Number	**75**			

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA01	Wn	Desert shrub - poor	A	32038.687	7.36E-01	0.010%
BA01	Pa	Desert shrub - poor	A	2165021.1	4.97E+01	0.646%
BA01	Wk	Desert shrub - poor	A	1564798.5	3.59E+01	0.467%
BA01	Wr	Desert shrub - poor	A	304971.09	7.00E+00	0.091%
BA01	Wm	Desert shrub - poor	A	3455274.7	7.93E+01	1.032%
BA01	Bs	Desert shrub - poor	A	240405.12	5.52E+00	0.072%
BA01	Cb	Desert shrub - poor	A	1672505.7	3.84E+01	0.499%
BA01	Wn	Desert shrub - poor	A	695350.39	1.60E+01	0.208%
BA01	Cb	Desert shrub - poor	A	479363.39	1.10E+01	0.143%
BA01	Ws	Desert shrub - poor	A	24867.598	5.71E-01	0.007%
BA01	Ws	Desert shrub - poor	A	31664.307	7.27E-01	0.009%
BA01	Wk	Desert shrub - poor	A	142.77137	3.28E-03	0.000%
BA01	Wk	Desert shrub - poor	A	6.3442043	1.46E-04	0.000%
BA01	Wk	Desert shrub - poor	A	326483.23	7.50E+00	0.097%
BA01	Wk	Desert shrub - poor	A	4470177.5	1.03E+02	1.335%
BA01	Wk	Desert shrub - poor	A	5937222.4	1.36E+02	1.773%
BA01	Cb	Desert shrub - poor	A	0.752069	1.73E-05	0.000%
BA01	Ma	Desert shrub - poor	B	127933.09	2.94E+00	0.038%
BA01	Md	Desert shrub - poor	B	4083645.3	9.37E+01	1.219%
BA01	Ad	Desert shrub - poor	B	2726780.6	6.26E+01	0.814%
BA01	Md	Desert shrub - poor	B	5342938.4	1.23E+02	1.595%
BA01	Ad	Urban district - commercial	B	380501.54	8.74E+00	0.114%
BA02	Wn	Desert shrub - poor	A	4871150	1.12E+02	1.454%
BA02	Wn	Desert shrub - poor	A	1480346.2	3.40E+01	0.442%
BA02	Wn	Desert shrub - poor	A	855687.46	1.96E+01	0.255%
BA02	Pa	Desert shrub - poor	A	4736349	1.09E+02	1.414%
BA02	Wr	Desert shrub - poor	A	885803.25	2.03E+01	0.264%
BA02	Bs	Desert shrub - poor	A	1153555.7	2.65E+01	0.344%
BA02	Cb	Desert shrub - poor	A	1096743.8	2.52E+01	0.327%
BA02	Bs	Desert shrub - poor	A	4864163.9	1.12E+02	1.452%
BA02	Wk	Desert shrub - poor	A	5575214.2	1.28E+02	1.665%
BA02	Wk	Desert shrub - poor	A	321309.31	7.38E+00	0.096%
BA02	Wn	Desert shrub - poor	A	2958469.3	6.79E+01	0.883%
BA02	Wr	Desert shrub - poor	A	2420644.7	5.56E+01	0.723%
BA02	Bs	Desert shrub - poor	A	564961.23	1.30E+01	0.169%
BA02	Wk	Desert shrub - poor	A	852084.08	1.96E+01	0.254%
BA02	Wk	Desert shrub - poor	A	9178020.3	2.11E+02	2.740%
BA02	Wn	Desert shrub - poor	A	121.43581	2.79E-03	0.000%
BA02	Pa	Desert shrub - poor	A	2.1138989	4.85E-05	0.000%
BA02	Cb	Desert shrub - poor	A	0.752069	1.73E-05	0.000%
BA02	Bs	Desert shrub - poor	A	35.877632	8.24E-04	0.000%
BA02	Wk	Desert shrub - poor	A	48.987058	1.12E-03	0.000%
BA02	Wk	Desert shrub - poor	A	11.934694	2.74E-04	0.000%
BA02	Wr	Desert shrub - poor	A	8.7026228	2.00E-04	0.000%
BA02	Wk	Desert shrub - poor	A	193.15347	4.43E-03	0.000%
BA02	Wn	Desert shrub - poor	A	7129.0317	1.64E-01	0.002%
BA02	Wn	Desert shrub - poor	A	7129.0317	1.64E-01	0.002%
BA02	Bs	Desert shrub - poor	A	5983.0444	1.37E-01	0.002%
BA02	Bs	Desert shrub - poor	A	5983.0444	1.37E-01	0.002%
BA02	Wk	Desert shrub - poor	A	3266.3065	7.50E-02	0.001%
BA02	Wk	Desert shrub - poor	A	3266.3065	7.50E-02	0.001%
BA02	Wk	Desert shrub - poor	A	7788.6996	1.79E-01	0.002%
BA02	Wk	Desert shrub - poor	A	7788.6996	1.79E-01	0.002%
BA02	Wn	Desert shrub - poor	A	16.111989	3.70E-04	0.000%
BA02	Wn	Desert shrub - poor	A	16.111989	3.70E-04	0.000%
BA02	Bs	Desert shrub - poor	A	20.308598	4.66E-04	0.000%

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA02	Bs	Desert shrub - poor	A	20.308598	4.66E-04	0.000%
BA02	Wk	Desert shrub - poor	A	25.999353	5.97E-04	0.000%
BA02	Wk	Desert shrub - poor	A	25.999353	5.97E-04	0.000%
BA02	Wk	Desert shrub - poor	A	57.082333	1.31E-03	0.000%
BA02	Wk	Desert shrub - poor	A	57.082333	1.31E-03	0.000%
BA02	Mn	Desert shrub - poor	B	7645.1002	1.76E-01	0.002%
BA02	MK	Desert shrub - poor	B	1597834.2	3.67E+01	0.477%
BA02	Md	Desert shrub - poor	B	935559.66	2.15E+01	0.279%
BA02	Ma	Desert shrub - poor	B	1402603.7	3.22E+01	0.419%
BA02	Ad	Desert shrub - poor	B	4482440.5	1.03E+02	1.338%
BA02	PITS	Desert shrub - poor	B	274839.96	6.31E+00	0.082%
BA02	Md	Desert shrub - poor	B	19691150	4.52E+02	5.880%
BA02	MK	Desert shrub - poor	B	2.1901502	5.03E-05	0.000%
BA02	Md	Desert shrub - poor	B	55.072439	1.26E-03	0.000%
BA02	MK	Desert shrub - poor	B	818.24927	1.88E-02	0.000%
BA02	MK	Desert shrub - poor	B	818.24927	1.88E-02	0.000%
BA02	Md	Desert shrub - poor	B	5678.9801	1.30E-01	0.002%
BA02	Md	Desert shrub - poor	B	5678.9801	1.30E-01	0.002%
BA02	MK	Desert shrub - poor	B	0.8976251	2.06E-05	0.000%
BA02	MK	Desert shrub - poor	B	0.8976251	2.06E-05	0.000%
BA02	Md	Desert shrub - poor	B	17.741949	4.07E-04	0.000%
BA02	Md	Desert shrub - poor	B	17.741949	4.07E-04	0.000%
BA02	Wk	Residential - 1/4 acre	A	264.43381	6.07E-03	0.000%
BA02	Wr	Residential - 1/4 acre	A	40881.873	9.39E-01	0.012%
BA02	Wk	Residential - 1/4 acre	A	1623.4646	3.73E-02	0.000%
BA02	Ad	Urban district - commercial	B	11680.007	2.68E-01	0.003%
BA03	Bn	Desert shrub - fair	A	60164.403	1.38E+00	0.018%
BA03	Pa	Desert shrub - fair	A	217420.18	4.99E+00	0.065%
BA03	Pa	Desert shrub - fair	A	14863.622	3.41E-01	0.004%
BA03	Pa	Desert shrub - fair	A	22.230085	5.10E-04	0.000%
BA03	Pa	Desert shrub - fair	A	25.461914	5.85E-04	0.000%
BA03	Pa	Desert shrub - fair	A	25.461914	5.85E-04	0.000%
BA03	Wm	Desert shrub - poor	A	188.27724	4.32E-03	0.000%
BA03	Cb	Desert shrub - poor	A	35449.48	8.14E-01	0.011%
BA03	Wn	Desert shrub - poor	A	11327.346	2.60E-01	0.003%
BA03	Wr	Desert shrub - poor	A	309413.42	7.10E+00	0.092%
BA03	Pa	Desert shrub - poor	A	585176.28	1.34E+01	0.175%
BA03	Wk	Desert shrub - poor	A	366.01937	8.40E-03	0.000%
BA03	Wk	Desert shrub - poor	A	213783.06	4.91E+00	0.064%
BA03	Pa	Desert shrub - poor	A	2.1138989	4.85E-05	0.000%
BA03	Wk	Desert shrub - poor	A	11.934694	2.74E-04	0.000%
BA03	Wr	Desert shrub - poor	A	8.7026228	2.00E-04	0.000%
BA03	Wr	Desert shrub - poor	A	12287.167	2.82E-01	0.004%
BA03	Pa	Desert shrub - poor	A	32.681877	7.50E-04	0.000%
BA03	Pa	Desert shrub - poor	A	16513.03	3.79E-01	0.005%
BA03	Pa	Desert shrub - poor	A	17.14453	3.94E-04	0.000%
BA03	Wk	Desert shrub - poor	A	3.8048119	8.73E-05	0.000%
BA03	Wk	Desert shrub - poor	A	9467.0482	2.17E-01	0.003%
BA03	Cb	Desert shrub - poor	A	6.1221412	1.41E-04	0.000%
BA03	Bn	Developing urban - newly graded	A	65853.561	1.51E+00	0.020%
BA03	Pa	Developing urban - newly graded	A	90128.894	2.07E+00	0.027%
BA03	Cb	Developing urban - newly graded	A	493.47671	1.13E-02	0.000%
BA03	Pa	Developing urban - newly graded	A	204.71	4.70E-03	0.000%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA03	Bn	Developing urban - newly graded	A	121.59135	2.79E-03	0.000%
BA03	Cb	Developing urban - newly graded	A	26.354704	6.05E-04	0.000%
BA03	Pa	Developing urban - newly graded	A	15.189055	3.49E-04	0.000%
BA03	Pa	Developing urban - newly graded	A	112.5154	2.58E-03	0.000%
BA03	Bn	Developing urban - newly graded	A	0.8855942	2.03E-05	0.000%
BA03	Bn	Developing urban - newly graded	A	1709.8733	3.93E-02	0.001%
BA03	Bn	Developing urban - newly graded	A	874.32247	2.01E-02	0.000%
BA03	Pa	Developing urban - newly graded	A	2.4527787	5.63E-05	0.000%
BA03	Pa	Developing urban - newly graded	A	1230.8112	2.83E-02	0.000%
BA03	Pa	Developing urban - newly graded	A	1414.9673	3.25E-02	0.000%
BA03	Pa	Developing urban - newly graded	A	0.0152132	3.49E-07	0.000%
BA03	Pa	Developing urban - newly graded	A	0.4532309	1.04E-05	0.000%
BA03	Bn	Impervious - streets/roads; paved; curbs, storm	A	101101.09	2.32E+00	0.030%
BA03	Pa	Impervious - streets/roads; paved; curbs, storm	A	166896.4	3.83E+00	0.050%
BA03	Wk	Impervious - streets/roads; paved; curbs, storm	A	42156.369	9.68E-01	0.013%
BA03	Pa	Impervious - streets/roads; paved; curbs, storm	A	44027.595	1.01E+00	0.013%
BA03	Bn	Impervious - streets/roads; paved; curbs, storm	A	3.2809405	7.53E-05	0.000%
BA03	Bn	Impervious - streets/roads; paved; curbs, storm	A	0.8855942	2.03E-05	0.000%
BA03	Bn	Impervious - streets/roads; paved; curbs, storm	A	1709.8733	3.93E-02	0.001%
BA03	Pa	Impervious - streets/roads; paved; curbs, storm	A	5.251758	1.21E-04	0.000%
BA03	Pa	Impervious - streets/roads; paved; curbs, storm	A	2.4527787	5.63E-05	0.000%
BA03	Wk	Impervious - streets/roads; paved; curbs, storm	A	2448.4181	5.62E-02	0.001%
BA03	Pa	Impervious - streets/roads; paved; curbs, storm	A	1845.4777	4.24E-02	0.001%
BA03	Pa	Impervious - streets/roads; paved; curbs, storm	A	1230.8112	2.83E-02	0.000%
BA03	Cb	Residential - 1/4 acre	A	179720.37	4.13E+00	0.054%
BA03	Wm	Residential - 1/4 acre	A	1845670.8	4.24E+01	0.551%
BA03	Wm	Residential - 1/4 acre	A	1.9311071	4.43E-05	0.000%
BA03	Wm	Residential - 1/4 acre	A	2162473.7	4.96E+01	0.646%
BA03	Bn	Residential - 1/4 acre	A	301852.6	6.93E+00	0.090%
BA03	Pa	Residential - 1/4 acre	A	738313.6	1.69E+01	0.220%
BA03	Ws	Residential - 1/4 acre	A	209799.86	4.82E+00	0.063%
BA03	Cb	Residential - 1/4 acre	A	522653.24	1.20E+01	0.156%
BA03	Wn	Residential - 1/4 acre	A	171987.11	3.95E+00	0.051%
BA03	Wr	Residential - 1/4 acre	A	126968.12	2.91E+00	0.038%
BA03	Wk	Residential - 1/4 acre	A	4678362.2	1.07E+02	1.397%
BA03	Wk	Residential - 1/4 acre	A	12230.157	2.81E-01	0.004%
BA03	Ws	Residential - 1/4 acre	A	405738.49	9.31E+00	0.121%
BA03	Wn	Residential - 1/4 acre	A	445228.04	1.02E+01	0.133%
BA03	Wr	Residential - 1/4 acre	A	66379.801	1.52E+00	0.020%
BA03	Pa	Residential - 1/4 acre	A	220780.7	5.07E+00	0.066%
BA03	Pa	Residential - 1/4 acre	A	0.5335313	1.22E-05	0.000%
BA03	Pa	Residential - 1/4 acre	A	1150961.8	2.64E+01	0.344%
BA03	Wk	Residential - 1/4 acre	A	383259.13	8.80E+00	0.114%
BA03	Wk	Residential - 1/4 acre	A	9.8224675	2.25E-04	0.000%
BA03	Wk	Residential - 1/4 acre	A	3288010.1	7.55E+01	0.982%
BA03	Wm	Residential - 1/4 acre	A	268.18682	6.16E-03	0.000%
BA03	Wm	Residential - 1/4 acre	A	35.418704	8.13E-04	0.000%
BA03	Wm	Residential - 1/4 acre	A	2.3163814	5.32E-05	0.000%
BA03	Cb	Residential - 1/4 acre	A	11.390903	2.61E-04	0.000%
BA03	Wn	Residential - 1/4 acre	A	18.286894	4.20E-04	0.000%
BA03	Wk	Residential - 1/4 acre	A	53.355692	1.22E-03	0.000%
BA03	Wr	Residential - 1/4 acre	A	7.6139937	1.75E-04	0.000%
BA03	Pa	Residential - 1/4 acre	A	28.814486	6.61E-04	0.000%
BA03	Pa	Residential - 1/4 acre	A	1.4399745	3.31E-05	0.000%
BA03	Wk	Residential - 1/4 acre	A	94.601168	2.17E-03	0.000%
BA03	Wk	Residential - 1/4 acre	A	99.570997	2.29E-03	0.000%
BA03	Wk	Residential - 1/4 acre	A	190.54505	4.37E-03	0.000%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA03	Wk	Residential - 1/4 acre	A	23.340541	5.36E-04	0.000%
BA03	Wm	Residential - 1/4 acre	A	4420.8354	1.01E-01	0.001%
BA03	Wm	Residential - 1/4 acre	A	4420.8354	1.01E-01	0.001%
BA03	Wr	Residential - 1/4 acre	A	12287.167	2.82E-01	0.004%
BA03	Wk	Residential - 1/4 acre	A	2600.8735	5.97E-02	0.001%
BA03	Wk	Residential - 1/4 acre	A	2600.8735	5.97E-02	0.001%
BA03	Pa	Residential - 1/4 acre	A	1533.219	3.52E-02	0.000%
BA03	Pa	Residential - 1/4 acre	A	1533.219	3.52E-02	0.000%
BA03	Pa	Residential - 1/4 acre	A	16513.03	3.79E-01	0.005%
BA03	Wk	Residential - 1/4 acre	A	3.8048119	8.73E-05	0.000%
BA03	Wk	Residential - 1/4 acre	A	3086.9328	7.09E-02	0.001%
BA03	Wk	Residential - 1/4 acre	A	3086.9328	7.09E-02	0.001%
BA03	Wk	Residential - 1/4 acre	A	0.0038812	8.91E-08	0.000%
BA03	Wk	Residential - 1/4 acre	A	0.0038812	8.91E-08	0.000%
BA03	Wk	Residential - 1/4 acre	A	9467.0482	2.17E-01	0.003%
BA03	Wm	Residential - 1/4 acre	A	0.4275416	9.82E-06	0.000%
BA03	Wm	Residential - 1/4 acre	A	0.4275416	9.82E-06	0.000%
BA03	Cb	Residential - 1/4 acre	A	6.1221412	1.41E-04	0.000%
BA03	Wn	Residential - 1/4 acre	A	0.7941453	1.82E-05	0.000%
BA03	Wn	Residential - 1/4 acre	A	0.7941453	1.82E-05	0.000%
BA03	Pa	Residential - 1/4 acre	A	0.8437061	1.94E-05	0.000%
BA03	Pa	Residential - 1/4 acre	A	0.8437061	1.94E-05	0.000%
BA03	Wk	Residential - 1/4 acre	A	5.1232377	1.18E-04	0.000%
BA03	Wk	Residential - 1/4 acre	A	5.1232377	1.18E-04	0.000%
BA03	Wk	Residential - 1/4 acre	A	0.5147595	1.18E-05	0.000%
BA03	Wk	Residential - 1/4 acre	A	0.5147595	1.18E-05	0.000%
BA03	Wk	Residential - 1/4 acre	A	3.6752307	8.44E-05	0.000%
BA03	Wk	Residential - 1/4 acre	A	3.6752307	8.44E-05	0.000%
BA03	PITS	Residential - 1/4 acre	B	64858.185	1.49E+00	0.019%
BA03	PITS	Residential - 1/4 acre	B	12.187294	2.80E-04	0.000%
BA03	Bn	Urban district - commercial	A	319648.5	7.34E+00	0.095%
BA03	Pa	Urban district - commercial	A	178038.08	4.09E+00	0.053%
BA03	Pa	Urban district - commercial	A	2542.8411	5.84E-02	0.001%
BA03	Pa	Urban district - commercial	A	54845.706	1.26E+00	0.016%
BA03	Pa	Urban district - commercial	A	2040.3228	4.68E-02	0.001%
BA03	Wk	Urban district - commercial	A	34.642213	7.95E-04	0.000%
BA03	Pa	Urban district - commercial	A	107.71759	2.47E-03	0.000%
BA03	Pa	Urban district - commercial	A	61.67613	1.42E-03	0.000%
BA03	Pa	Urban district - commercial	A	47.343357	1.09E-03	0.000%
BA03	Bn	Urban district - commercial	A	3.2809405	7.53E-05	0.000%
BA03	Bn	Urban district - commercial	A	874.32247	2.01E-02	0.000%
BA03	Pa	Urban district - commercial	A	5.251758	1.21E-04	0.000%
BA03	Wk	Urban district - commercial	A	2448.4181	5.62E-02	0.001%
BA03	Pa	Urban district - commercial	A	1845.4777	4.24E-02	0.001%
BA03	Pa	Urban district - commercial	A	577.46666	1.33E-02	0.000%
BA03	Pa	Urban district - commercial	A	577.46666	1.33E-02	0.000%
BA03	Pa	Urban district - commercial	A	32.681877	7.50E-04	0.000%
BA03	Pa	Urban district - commercial	A	115.81077	2.66E-03	0.000%
BA03	Pa	Urban district - commercial	A	115.81077	2.66E-03	0.000%
BA03	Pa	Urban district - commercial	A	1414.9673	3.25E-02	0.000%
BA03	Pa	Urban district - commercial	A	17.14453	3.94E-04	0.000%
BA03	Pa	Urban district - commercial	A	0.1887511	4.33E-06	0.000%
BA03	Pa	Urban district - commercial	A	0.1887511	4.33E-06	0.000%
BA03	Pa	Urban district - commercial	A	0.0152132	3.49E-07	0.000%
BA03	Pa	Urban district - commercial	A	0.0492645	1.13E-06	0.000%
BA03	Pa	Urban district - commercial	A	0.0492645	1.13E-06	0.000%
BA03	Pa	Urban district - commercial	A	0.0492645	1.13E-06	0.000%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA03	Pa	Urban district - commercial	A	0.4532309	1.04E-05	0.000%
BA03	Pa	Urban district - commercial	A	0.4532309	1.04E-05	0.000%
BA04	Wk	Desert shrub - poor	A	27630.154	6.34E-01	0.008%
BA04	Wr	Desert shrub - poor	A	30005.561	6.89E-01	0.009%
BA04	Wk	Desert shrub - poor	A	210757.73	4.84E+00	0.063%
BA04	Wn	Desert shrub - poor	A	48.300642	1.11E-03	0.000%
BA04	Ad	Desert shrub - poor	B	117425.79	2.70E+00	0.035%
BA04	Wm	Residential - 1/4 acre	A	2139243	4.91E+01	0.639%
BA04	Wn	Residential - 1/4 acre	A	166468.83	3.82E+00	0.050%
BA04	Wk	Residential - 1/4 acre	A	180145.29	4.14E+00	0.054%
BA04	Wr	Residential - 1/4 acre	A	197801.39	4.54E+00	0.059%
BA04	Wk	Residential - 1/4 acre	A	5096268.7	1.17E+02	1.522%
BA04	Wm	Residential - 1/4 acre	A	268.18682	6.16E-03	0.000%
BA04	Wn	Residential - 1/4 acre	A	18.286894	4.20E-04	0.000%
BA04	Wk	Residential - 1/4 acre	A	53.355692	1.22E-03	0.000%
BA04	Wr	Residential - 1/4 acre	A	7.6139937	1.75E-04	0.000%
BA04	Wk	Residential - 1/4 acre	A	94.601168	2.17E-03	0.000%
BA04	Wn	Residential - 1/4 acre	A	48.300642	1.11E-03	0.000%
BA04	Wn	Residential - 1/4 acre	A	1965.4888	4.51E-02	0.001%
BA04	Wn	Residential - 1/4 acre	A	1965.4888	4.51E-02	0.001%
BA04	Wk	Residential - 1/4 acre	A	5809.9821	1.33E-01	0.002%
BA04	Wk	Residential - 1/4 acre	A	5809.9821	1.33E-01	0.002%
BA04	Wn	Residential - 1/4 acre	A	0.7941453	1.82E-05	0.000%
BA04	Wn	Residential - 1/4 acre	A	0.7941453	1.82E-05	0.000%
BA04	Wk	Residential - 1/4 acre	A	5.1232377	1.18E-04	0.000%
BA04	Wk	Residential - 1/4 acre	A	5.1232377	1.18E-04	0.000%
BA04	PITS	Residential - 1/4 acre	B	1244.7612	2.86E-02	0.000%
BA04	Ad	Residential - 1/4 acre	B	93649.63	2.15E+00	0.028%
BA04	PITS	Residential - 1/4 acre	B	12.187294	2.80E-04	0.000%
BA05	Pa	Desert shrub - fair	A	1272937.1	2.92E+01	0.380%
BA05	Pa	Desert shrub - fair	A	22.230085	5.10E-04	0.000%
BA05	Pa	Desert shrub - fair	A	6.8029611	1.56E-04	0.000%
BA05	Pa	Desert shrub - fair	A	725.09549	1.66E-02	0.000%
BA05	Mn	Desert shrub - fair	B	99270.581	2.28E+00	0.030%
BA05	Gh	Desert shrub - fair	C	163931.08	3.76E+00	0.049%
BA05	Gt	Desert shrub - fair	C	149978.78	3.44E+00	0.045%
BA05	Gh	Desert shrub - fair	C	3.7873335	8.69E-05	0.000%
BA05	Gt	Desert shrub - fair	C	0.0233573	5.36E-07	0.000%
BA05	Gh	Desert shrub - fair	C	204.27765	4.69E-03	0.000%
BA05	Gt	Desert shrub - fair	C	4597.4435	1.06E-01	0.001%
BA05	Gt	Desert shrub - fair	C	1.5463935	3.55E-05	0.000%
BA05	Gt	Desert shrub - fair	C	0.6472387	1.49E-05	0.000%
BA05	Wr	Desert shrub - poor	A	57630.657	1.32E+00	0.017%
BA05	Wr	Desert shrub - poor	A	219328.52	5.04E+00	0.065%
BA05	Cb	Desert shrub - poor	A	126527.98	2.90E+00	0.038%
BA05	Cb	Desert shrub - poor	A	90942.105	2.09E+00	0.027%
BA05	Cb	Desert shrub - poor	A	44817.526	1.03E+00	0.013%
BA05	Wk	Desert shrub - poor	A	402077.44	9.23E+00	0.120%
BA05	Cb	Desert shrub - poor	A	53495.014	1.23E+00	0.016%
BA05	Pa	Desert shrub - poor	A	320649.65	7.36E+00	0.096%
BA05	Pa	Desert shrub - poor	A	386959.47	8.88E+00	0.116%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA05	Pa	Desert shrub - poor	A	279131.2	6.41E+00	0.083%
BA05	Wk	Desert shrub - poor	A	459448.79	1.05E+01	0.137%
BA05	Pa	Desert shrub - poor	A	3.6225096	8.32E-05	0.000%
BA05	Wk	Desert shrub - poor	A	4.0819283	9.37E-05	0.000%
BA05	Wr	Desert shrub - poor	A	346.87246	7.96E-03	0.000%
BA05	Cb	Desert shrub - poor	A	69.416215	1.59E-03	0.000%
BA05	Cb	Desert shrub - poor	A	3.7822751	8.68E-05	0.000%
BA05	Cb	Desert shrub - poor	A	3019.199	6.93E-02	0.001%
BA05	Wk	Desert shrub - poor	A	525.04448	1.21E-02	0.000%
BA05	Cb	Desert shrub - poor	A	383.95953	8.81E-03	0.000%
BA05	Pa	Desert shrub - poor	A	44.949134	1.03E-03	0.000%
BA05	Pa	Desert shrub - poor	A	315.82514	7.25E-03	0.000%
BA05	Pa	Desert shrub - poor	A	241.53682	5.54E-03	0.000%
BA05	Pa	Desert shrub - poor	A	1997.8328	4.59E-02	0.001%
BA05	Wk	Desert shrub - poor	A	9.7735939	2.24E-04	0.000%
BA05	Wk	Desert shrub - poor	A	96.755154	2.22E-03	0.000%
BA05	Cb	Desert shrub - poor	A	6.1221412	1.41E-04	0.000%
BA05	Gt	Desert shrub - poor	C	6.0420433	1.39E-04	0.000%
BA05	Gt	Desert shrub - poor	C	0.3651993	8.38E-06	0.000%
BA05	Gh	Desert shrub - poor	C	204.27765	4.69E-03	0.000%
BA05	Gt	Desert shrub - poor	C	4597.4435	1.06E-01	0.001%
BA05	Gt	Desert shrub - poor	C	1.5463935	3.55E-05	0.000%
BA05	Gt	Desert shrub - poor	C	0.6472387	1.49E-05	0.000%
BA05	Bn	Developing urban - newly graded	A	42769.463	9.82E-01	0.013%
BA05	Cb	Developing urban - newly graded	A	143205.5	3.29E+00	0.043%
BA05	Wk	Developing urban - newly graded	A	41121.941	9.44E-01	0.012%
BA05	Pa	Developing urban - newly graded	A	3659.1002	8.40E-02	0.001%
BA05	Pa	Developing urban - newly graded	A	113311.37	2.60E+00	0.034%
BA05	Bn	Developing urban - newly graded	A	121.59135	2.79E-03	0.000%
BA05	Cb	Developing urban - newly graded	A	26.354704	6.05E-04	0.000%
BA05	Pa	Developing urban - newly graded	A	15.189055	3.49E-04	0.000%
BA05	Pa	Developing urban - newly graded	A	112.5154	2.58E-03	0.000%
BA05	Cb	Developing urban - newly graded	A	223.02825	5.12E-03	0.000%
BA05	Pa	Developing urban - newly graded	A	4.4079453	1.01E-04	0.000%
BA05	Pa	Developing urban - newly graded	A	0.0152132	3.49E-07	0.000%
BA05	Wr	Open space - good	A	115310.35	2.65E+00	0.034%
BA05	Wr	Open space - good	A	3668.9343	8.42E-02	0.001%
BA05	Cb	Open space - good	A	65943.235	1.51E+00	0.020%
BA05	Cb	Open space - good	A	222027.44	5.10E+00	0.066%
BA05	Cb	Open space - good	A	75101.315	1.72E+00	0.022%
BA05	Cb	Open space - good	A	72369.476	1.66E+00	0.022%
BA05	Pa	Open space - good	A	75938.68	1.74E+00	0.023%
BA05	Wk	Open space - good	A	112575.63	2.58E+00	0.034%
BA05	Wk	Open space - good	A	174254.54	4.00E+00	0.052%
BA05	Cb	Open space - good	A	26.967275	6.19E-04	0.000%
BA05	Wk	Open space - good	A	6.3405413	1.46E-04	0.000%
BA05	Wr	Open space - good	A	0.7678148	1.76E-05	0.000%
BA05	Wr	Open space - good	A	0.5179314	1.19E-05	0.000%
BA05	Cb	Open space - good	A	6.9346562	1.59E-04	0.000%
BA05	Cb	Open space - good	A	383.95953	8.81E-03	0.000%
BA05	Pa	Open space - good	A	315.82514	7.25E-03	0.000%
BA05	Wk	Open space - good	A	558.47074	1.28E-02	0.000%
BA05	Wk	Open space - good	A	96.755154	2.22E-03	0.000%
BA05	Wk	Open space - good	A	0.5067199	1.16E-05	0.000%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA05	Wr	Open space - poor	A	29013.326	6.66E-01	0.009%
BA05	Cb	Open space - poor	A	131461.98	3.02E+00	0.039%
BA05	Pa	Open space - poor	A	84264.994	1.93E+00	0.025%
BA05	Cb	Open space - poor	A	3019.199	6.93E-02	0.001%
BA05	Pa	Open space - poor	A	1997.8328	4.59E-02	0.001%
BA05	Wr	Residential - 1/4 acre	A	73544.608	1.69E+00	0.022%
BA05	Cb	Residential - 1/4 acre	A	155157.35	3.56E+00	0.046%
BA05	Wk	Residential - 1/4 acre	A	34858.437	8.00E-01	0.010%
BA05	Wk	Residential - 1/4 acre	A	154502.54	3.55E+00	0.046%
BA05	Cb	Residential - 1/4 acre	A	48142.567	1.11E+00	0.014%
BA05	Cb	Residential - 1/4 acre	A	32577.05	7.48E-01	0.010%
BA05	Pa	Residential - 1/4 acre	A	25906.398	5.95E-01	0.008%
BA05	Pa	Residential - 1/4 acre	A	2627.5879	6.03E-02	0.001%
BA05	Pa	Residential - 1/4 acre	A	889699.87	2.04E+01	0.266%
BA05	Wk	Residential - 1/4 acre	A	120952.66	2.78E+00	0.036%
BA05	Wk	Residential - 1/4 acre	A	367877.74	8.45E+00	0.110%
BA05	Wk	Residential - 1/4 acre	A	154.5234	3.55E-03	0.000%
BA05	Cb	Residential - 1/4 acre	A	11.390903	2.61E-04	0.000%
BA05	Cb	Residential - 1/4 acre	A	19.32867	4.44E-04	0.000%
BA05	Cb	Residential - 1/4 acre	A	30.023802	6.89E-04	0.000%
BA05	Pa	Residential - 1/4 acre	A	6.0678035	1.39E-04	0.000%
BA05	Wk	Residential - 1/4 acre	A	55.150525	1.27E-03	0.000%
BA05	Wk	Residential - 1/4 acre	A	99.570997	2.29E-03	0.000%
BA05	Wk	Residential - 1/4 acre	A	25.521384	5.86E-04	0.000%
BA05	Wk	Residential - 1/4 acre	A	0.5847691	1.34E-05	0.000%
BA05	Wr	Residential - 1/4 acre	A	346.87246	7.96E-03	0.000%
BA05	Cb	Residential - 1/4 acre	A	69.416215	1.59E-03	0.000%
BA05	Cb	Residential - 1/4 acre	A	223.02825	5.12E-03	0.000%
BA05	Wk	Residential - 1/4 acre	A	38.732413	8.89E-04	0.000%
BA05	Wk	Residential - 1/4 acre	A	525.04448	1.21E-02	0.000%
BA05	Pa	Residential - 1/4 acre	A	2876.7956	6.60E-02	0.001%
BA05	Pa	Residential - 1/4 acre	A	241.53682	5.54E-03	0.000%
BA05	Wk	Residential - 1/4 acre	A	558.47074	1.28E-02	0.000%
BA05	Wk	Residential - 1/4 acre	A	352.81177	8.10E-03	0.000%
BA05	Wk	Residential - 1/4 acre	A	352.81177	8.10E-03	0.000%
BA05	Wk	Residential - 1/4 acre	A	9.7735939	2.24E-04	0.000%
BA05	Cb	Residential - 1/4 acre	A	6.1221412	1.41E-04	0.000%
BA05	Wk	Residential - 1/4 acre	A	0.5067199	1.16E-05	0.000%
BA05	Wk	Residential - 1/4 acre	A	0.5147595	1.18E-05	0.000%
BA05	Wk	Residential - 1/4 acre	A	0.5147595	1.18E-05	0.000%
BA05	Wk	Residential - 1/4 acre	A	0.1277062	2.93E-06	0.000%
BA05	Wk	Residential - 1/4 acre	A	0.1277062	2.93E-06	0.000%
BA05	Wr	Urban district - commercial	A	69036.091	1.58E+00	0.021%
BA05	Cb	Urban district - commercial	A	258783.06	5.94E+00	0.077%
BA05	Wk	Urban district - commercial	A	41889.742	9.62E-01	0.013%
BA05	Wk	Urban district - commercial	A	271809.68	6.24E+00	0.081%
BA05	Wk	Urban district - commercial	A	68234.096	1.57E+00	0.020%
BA05	Pa	Urban district - commercial	A	976875.26	2.24E+01	0.292%
BA05	Pa	Urban district - commercial	A	23222.29	5.33E-01	0.007%
BA05	Pa	Urban district - commercial	A	421124.82	9.67E+00	0.126%
BA05	Pa	Urban district - commercial	A	33061.919	7.59E-01	0.010%
BA05	Wk	Urban district - commercial	A	21344.571	4.90E-01	0.006%
BA05	Wk	Urban district - commercial	A	34.642213	7.95E-04	0.000%
BA05	Pa	Urban district - commercial	A	107.71759	2.47E-03	0.000%
BA05	Pa	Urban district - commercial	A	9.5363624	2.19E-04	0.000%
BA05	Pa	Urban district - commercial	A	61.67613	1.42E-03	0.000%
BA05	Pa	Urban district - commercial	A	47.343357	1.09E-03	0.000%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA05	Wr	Urban district - commercial	A	0.7678148	1.76E-05	0.000%
BA05	Wr	Urban district - commercial	A	0.5179314	1.19E-05	0.000%
BA05	Cb	Urban district - commercial	A	6.9346562	1.59E-04	0.000%
BA05	Cb	Urban district - commercial	A	3.7822751	8.68E-05	0.000%
BA05	Wk	Urban district - commercial	A	38.732413	8.89E-04	0.000%
BA05	Wk	Urban district - commercial	A	8.2351739	1.89E-04	0.000%
BA05	Wk	Urban district - commercial	A	8.2351739	1.89E-04	0.000%
BA05	Pa	Urban district - commercial	A	2876.7956	6.60E-02	0.001%
BA05	Pa	Urban district - commercial	A	1025.8079	2.35E-02	0.000%
BA05	Pa	Urban district - commercial	A	1025.8079	2.35E-02	0.000%
BA05	Pa	Urban district - commercial	A	725.09549	1.66E-02	0.000%
BA05	Pa	Urban district - commercial	A	44.949134	1.03E-03	0.000%
BA05	Pa	Urban district - commercial	A	4.4079453	1.01E-04	0.000%
BA05	Pa	Urban district - commercial	A	0.1887511	4.33E-06	0.000%
BA05	Pa	Urban district - commercial	A	0.1887511	4.33E-06	0.000%
BA05	Pa	Urban district - commercial	A	0.0152132	3.49E-07	0.000%
BA06	Pa	Desert shrub - fair	A	6.8029611	1.56E-04	0.000%
BA06	Pa	Desert shrub - fair	A	1289.6006	2.96E-02	0.000%
BA06	Gh	Desert shrub - fair	C	8.934883	2.05E-04	0.000%
BA06	Gt	Desert shrub - fair	C	1.4975357	3.44E-05	0.000%
BA06	Gh	Desert shrub - fair	C	3.7873335	8.69E-05	0.000%
BA06	Gh	Desert shrub - fair	C	84.211946	1.93E-03	0.000%
BA06	Gh	Desert shrub - fair	C	2124.9376	4.88E-02	0.001%
BA06	Gt	Desert shrub - fair	C	1672.4165	3.84E-02	0.000%
BA06	Gt	Desert shrub - fair	C	0.6472387	1.49E-05	0.000%
BA06	Wm	Desert shrub - poor	A	131706.85	3.02E+00	0.039%
BA06	Cb	Desert shrub - poor	A	41617.249	9.55E-01	0.012%
BA06	Wn	Desert shrub - poor	A	102700.84	2.36E+00	0.031%
BA06	Pa	Desert shrub - poor	A	526660.33	1.21E+01	0.157%
BA06	Wk	Desert shrub - poor	A	886164.97	2.03E+01	0.265%
BA06	Pa	Desert shrub - poor	A	157.65414	3.62E-03	0.000%
BA06	Pa	Desert shrub - poor	A	3.6225096	8.32E-05	0.000%
BA06	Wk	Desert shrub - poor	A	413.15838	9.48E-03	0.000%
BA06	Wk	Desert shrub - poor	A	4.0819283	9.37E-05	0.000%
BA06	Wm	Desert shrub - poor	A	798.32874	1.83E-02	0.000%
BA06	Wn	Desert shrub - poor	A	1121.0808	2.57E-02	0.000%
BA06	Wn	Desert shrub - poor	A	97.361413	2.24E-03	0.000%
BA06	Wn	Desert shrub - poor	A	2253.4857	5.17E-02	0.001%
BA06	Pa	Desert shrub - poor	A	2751.8134	6.32E-02	0.001%
BA06	Pa	Desert shrub - poor	A	200.69382	4.61E-03	0.000%
BA06	Pa	Desert shrub - poor	A	677.88605	1.56E-02	0.000%
BA06	Pa	Desert shrub - poor	A	211.17125	4.85E-03	0.000%
BA06	Pa	Desert shrub - poor	A	168.90544	3.88E-03	0.000%
BA06	Wk	Desert shrub - poor	A	330.7399	7.59E-03	0.000%
BA06	Wk	Desert shrub - poor	A	97.451692	2.24E-03	0.000%
BA06	Wk	Desert shrub - poor	A	3174.2831	7.29E-02	0.001%
BA06	Wk	Desert shrub - poor	A	1037.0795	2.38E-02	0.000%
BA06	Wk	Desert shrub - poor	A	275.16642	6.32E-03	0.000%
BA06	Gh	Desert shrub - poor	C	3424.9522	7.86E-02	0.001%
BA06	Gt	Desert shrub - poor	C	361439.43	8.30E+00	0.108%
BA06	Gh	Desert shrub - poor	C	84.211946	1.93E-03	0.000%
BA06	Gt	Desert shrub - poor	C	1672.4165	3.84E-02	0.000%
BA06	Gt	Desert shrub - poor	C	0.6472387	1.49E-05	0.000%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA06	Cb	Open space - good	A	1999.168	4.59E-02	0.001%
BA06	Wn	Open space - good	A	534526.67	1.23E+01	0.160%
BA06	Cb	Open space - good	A	525790.87	1.21E+01	0.157%
BA06	Pa	Open space - good	A	503087.41	1.15E+01	0.150%
BA06	Wk	Open space - good	A	429097.95	9.85E+00	0.128%
BA06	Wk	Open space - good	A	1579539.4	3.63E+01	0.472%
BA06	Cb	Open space - good	A	26.967275	6.19E-04	0.000%
BA06	Wk	Open space - good	A	6.3405413	1.46E-04	0.000%
BA06	Wn	Open space - good	A	1121.0808	2.57E-02	0.000%
BA06	Pa	Open space - good	A	677.88605	1.56E-02	0.000%
BA06	Wk	Open space - good	A	330.7399	7.59E-03	0.000%
BA06	Wk	Open space - good	A	275.16642	6.32E-03	0.000%
BA06	Wk	Open space - good	A	6336.4434	1.45E-01	0.002%
BA06	Wk	Open space - good	A	602.58585	1.38E-02	0.000%
BA06	Wk	Open space - good	A	385.74916	8.86E-03	0.000%
BA06	Wk	Open space - good	A	0.5067199	1.16E-05	0.000%
BA06	Wn	Residential - 1/2 acre	A	206102.42	4.73E+00	0.062%
BA06	Wk	Residential - 1/2 acre	A	123608.26	2.84E+00	0.037%
BA06	Cb	Residential - 1/3 acre	A	155749.74	3.58E+00	0.047%
BA06	Wn	Residential - 1/3 acre	A	375917.81	8.63E+00	0.112%
BA06	Wk	Residential - 1/3 acre	A	623241.96	1.43E+01	0.186%
BA06	Wk	Residential - 1/3 acre	A	286905.27	6.59E+00	0.086%
BA06	Wn	Residential - 1/3 acre	A	97.361413	2.24E-03	0.000%
BA06	Wk	Residential - 1/3 acre	A	97.451692	2.24E-03	0.000%
BA06	Wm	Residential - 1/4 acre	A	53289.22	1.22E+00	0.016%
BA06	Wm	Residential - 1/4 acre	A	59.977705	1.38E-03	0.000%
BA06	Wn	Residential - 1/4 acre	A	501860.54	1.15E+01	0.150%
BA06	Cb	Residential - 1/4 acre	A	226199.15	5.19E+00	0.068%
BA06	Cb	Residential - 1/4 acre	A	249860.01	5.74E+00	0.075%
BA06	Pa	Residential - 1/4 acre	A	2251783.5	5.17E+01	0.672%
BA06	Pa	Residential - 1/4 acre	A	80798.805	1.85E+00	0.024%
BA06	Pa	Residential - 1/4 acre	A	8872.39	2.04E-01	0.003%
BA06	Pa	Residential - 1/4 acre	A	2.8568099	6.56E-05	0.000%
BA06	Wk	Residential - 1/4 acre	A	5373074	1.23E+02	1.604%
BA06	Wk	Residential - 1/4 acre	A	649500.09	1.49E+01	0.194%
BA06	Wk	Residential - 1/4 acre	A	282167.75	6.48E+00	0.084%
BA06	Wk	Residential - 1/4 acre	A	66.481377	1.53E-03	0.000%
BA06	Wm	Residential - 1/4 acre	A	35.418704	8.13E-04	0.000%
BA06	Wm	Residential - 1/4 acre	A	2.3163814	5.32E-05	0.000%
BA06	Cb	Residential - 1/4 acre	A	19.32867	4.44E-04	0.000%
BA06	Cb	Residential - 1/4 acre	A	30.023802	6.89E-04	0.000%
BA06	Pa	Residential - 1/4 acre	A	6.0678035	1.39E-04	0.000%
BA06	Pa	Residential - 1/4 acre	A	28.814486	6.61E-04	0.000%
BA06	Pa	Residential - 1/4 acre	A	1.4399745	3.31E-05	0.000%
BA06	Wk	Residential - 1/4 acre	A	55.150525	1.27E-03	0.000%
BA06	Wk	Residential - 1/4 acre	A	25.521384	5.86E-04	0.000%
BA06	Wk	Residential - 1/4 acre	A	190.54505	4.37E-03	0.000%
BA06	Wk	Residential - 1/4 acre	A	0.5847691	1.34E-05	0.000%
BA06	Wk	Residential - 1/4 acre	A	23.340541	5.36E-04	0.000%
BA06	Wm	Residential - 1/4 acre	A	798.32874	1.83E-02	0.000%
BA06	Wm	Residential - 1/4 acre	A	94.269379	2.16E-03	0.000%
BA06	Wm	Residential - 1/4 acre	A	94.269379	2.16E-03	0.000%
BA06	Wn	Residential - 1/4 acre	A	2253.4857	5.17E-02	0.001%
BA06	Cb	Residential - 1/4 acre	A	16.258885	3.73E-04	0.000%
BA06	Pa	Residential - 1/4 acre	A	207.12963	4.76E-03	0.000%
BA06	Pa	Residential - 1/4 acre	A	2751.8134	6.32E-02	0.001%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA06	Pa	Residential - 1/4 acre	A	200.69382	4.61E-03	0.000%
BA06	Pa	Residential - 1/4 acre	A	211.17125	4.85E-03	0.000%
BA06	Pa	Residential - 1/4 acre	A	1289.6006	2.96E-02	0.000%
BA06	Pa	Residential - 1/4 acre	A	2359.7728	5.42E-02	0.001%
BA06	Pa	Residential - 1/4 acre	A	168.90544	3.88E-03	0.000%
BA06	Pa	Residential - 1/4 acre	A	10745.303	2.47E-01	0.003%
BA06	Pa	Residential - 1/4 acre	A	28.624556	6.57E-04	0.000%
BA06	Pa	Residential - 1/4 acre	A	28.624556	6.57E-04	0.000%
BA06	Wk	Residential - 1/4 acre	A	3174.2831	7.29E-02	0.001%
BA06	Wk	Residential - 1/4 acre	A	1037.0795	2.38E-02	0.000%
BA06	Wk	Residential - 1/4 acre	A	6336.4434	1.45E-01	0.002%
BA06	Wk	Residential - 1/4 acre	A	0.369493	8.48E-06	0.000%
BA06	Wk	Residential - 1/4 acre	A	0.369493	8.48E-06	0.000%
BA06	Wk	Residential - 1/4 acre	A	1078.9201	2.48E-02	0.000%
BA06	Wk	Residential - 1/4 acre	A	1078.9201	2.48E-02	0.000%
BA06	Wk	Residential - 1/4 acre	A	385.74916	8.86E-03	0.000%
BA06	Wm	Residential - 1/4 acre	A	0.4275416	9.82E-06	0.000%
BA06	Wm	Residential - 1/4 acre	A	0.4275416	9.82E-06	0.000%
BA06	Pa	Residential - 1/4 acre	A	0.8437061	1.94E-05	0.000%
BA06	Pa	Residential - 1/4 acre	A	0.8437061	1.94E-05	0.000%
BA06	Wk	Residential - 1/4 acre	A	0.5067199	1.16E-05	0.000%
BA06	Wk	Residential - 1/4 acre	A	0.1277062	2.93E-06	0.000%
BA06	Wk	Residential - 1/4 acre	A	0.1277062	2.93E-06	0.000%
BA06	Wk	Residential - 1/4 acre	A	3.6752307	8.44E-05	0.000%
BA06	Wk	Residential - 1/4 acre	A	3.6752307	8.44E-05	0.000%
BA06	Gh	Residential - 1/4 acre	C	791296.03	1.82E+01	0.236%
BA06	Gg	Residential - 1/4 acre	C	7975.3362	1.83E-01	0.002%
BA06	Gt	Residential - 1/4 acre	C	65362.986	1.50E+00	0.020%
BA06	Gr	Residential - 1/4 acre	C	857235.36	1.97E+01	0.256%
BA06	Gh	Residential - 1/4 acre	C	2124.9376	4.88E-02	0.001%
BA06	Pa	Urban district - commercial	A	236874.32	5.44E+00	0.071%
BA06	Pa	Urban district - commercial	A	9.5363624	2.19E-04	0.000%
BA06	Cb	Urban district - commercial	A	16.258885	3.73E-04	0.000%
BA06	Pa	Urban district - commercial	A	207.12963	4.76E-03	0.000%
BA06	Pa	Urban district - commercial	A	2359.7728	5.42E-02	0.001%
BA06	Pa	Urban district - commercial	A	10745.303	2.47E-01	0.003%
BA06	Pa	Water	A	14663.35	3.37E-01	0.004%
BA06	Pa	Water	A	21809.685	5.01E-01	0.007%
BA06	Pa	Water	A	32041.509	7.36E-01	0.010%
BA06	Pa	Water	A	36490.196	8.38E-01	0.011%
BA06	Wk	Water	A	162993.53	3.74E+00	0.049%
BA06	Wk	Water	A	14025.574	3.22E-01	0.004%
BA06	Wk	Water	A	14528.741	3.34E-01	0.004%
BA06	Wk	Water	A	1078.6699	2.48E-02	0.000%
BA06	Wk	Water	A	602.58585	1.38E-02	0.000%
BA07	Gt	Desert shrub - fair	C	0.010408	2.39E-07	0.000%
BA07	Gt	Desert shrub - fair	C	0.0233573	5.36E-07	0.000%
BA07	Gt	Desert shrub - fair	C	351.40999	8.07E-03	0.000%
BA07	Gt	Desert shrub - fair	C	1.5463935	3.55E-05	0.000%
BA07	Cb	Desert shrub - poor	A	2226062.8	5.11E+01	0.665%
BA07	Wn	Desert shrub - poor	A	824980.79	1.89E+01	0.246%
BA07	Wn	Desert shrub - poor	A	539999.52	1.24E+01	0.161%
BA07	Wr	Desert shrub - poor	A	286580.34	6.58E+00	0.086%
BA07	Pa	Desert shrub - poor	A	5177689.3	1.19E+02	1.546%

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA07	Bs	Desert shrub - poor	A	2693589.1	6.18E+01	0.804%
BA07	Wk	Desert shrub - poor	A	15291021	3.51E+02	4.566%
BA07	Pa	Desert shrub - poor	A	157.65414	3.62E-03	0.000%
BA07	Bs	Desert shrub - poor	A	519.81831	1.19E-02	0.000%
BA07	Wk	Desert shrub - poor	A	823.98086	1.89E-02	0.000%
BA07	Cb	Desert shrub - poor	A	437.24359	1.00E-02	0.000%
BA07	Wn	Desert shrub - poor	A	662.13023	1.52E-02	0.000%
BA07	Wn	Desert shrub - poor	A	2498.604	5.74E-02	0.001%
BA07	Pa	Desert shrub - poor	A	1693.7184	3.89E-02	0.001%
BA07	Wk	Desert shrub - poor	A	3209.7876	7.37E-02	0.001%
BA07	Wk	Desert shrub - poor	A	49.606316	1.14E-03	0.000%
BA07	Mn	Desert shrub - poor	B	92588.859	2.13E+00	0.028%
BA07	Gh	Desert shrub - poor	C	937255.45	2.15E+01	0.280%
BA07	Gg	Desert shrub - poor	C	561964.13	1.29E+01	0.168%
BA07	Gt	Desert shrub - poor	C	438719.45	1.01E+01	0.131%
BA07	Gr	Desert shrub - poor	C	39197.844	9.00E-01	0.012%
BA07	Gt	Desert shrub - poor	C	0.3651993	8.38E-06	0.000%
BA07	Gh	Desert shrub - poor	C	827.97839	1.90E-02	0.000%
BA07	Gg	Desert shrub - poor	C	178.85177	4.11E-03	0.000%
BA07	Gt	Desert shrub - poor	C	351.40999	8.07E-03	0.000%
BA07	Gr	Desert shrub - poor	C	341.73736	7.85E-03	0.000%
BA07	Gt	Desert shrub - poor	C	1.5463935	3.55E-05	0.000%
BA07	Cb	Open space - good	A	0.3321187	7.62E-06	0.000%
BA07	Wn	Open space - good	A	175.37248	4.03E-03	0.000%
BA07	Pa	Open space - good	A	4999.5146	1.15E-01	0.001%
BA07	Wk	Open space - good	A	10382.96	2.38E-01	0.003%
BA07	Cb	Residential - 1/3 acre	A	27962.944	6.42E-01	0.008%
BA07	Wn	Residential - 1/3 acre	A	10021.052	2.30E-01	0.003%
BA07	Wk	Residential - 1/3 acre	A	65891.434	1.51E+00	0.020%
BA07	Cb	Residential - 1/3 acre	A	437.24359	1.00E-02	0.000%
BA07	Wn	Residential - 1/3 acre	A	662.13023	1.52E-02	0.000%
BA07	Wk	Residential - 1/3 acre	A	3209.7876	7.37E-02	0.001%
BA07	Wn	Residential - 1/4 acre	A	28075.736	6.45E-01	0.008%
BA07	Pa	Residential - 1/4 acre	A	21645.088	4.97E-01	0.006%
BA07	Wk	Residential - 1/4 acre	A	56.639286	1.30E-03	0.000%
BA07	Wn	Residential - 1/4 acre	A	2498.604	5.74E-02	0.001%
BA07	Pa	Residential - 1/4 acre	A	1693.7184	3.89E-02	0.001%
BA07	Wk	Residential - 1/4 acre	A	49.606316	1.14E-03	0.000%
BA07	Gh	Residential - 1/4 acre	C	20641.655	4.74E-01	0.006%
BA07	Gg	Residential - 1/4 acre	C	2712.6312	6.23E-02	0.001%
BA07	Gr	Residential - 1/4 acre	C	3789.0757	8.70E-02	0.001%
BA07	Gh	Residential - 1/4 acre	C	827.97839	1.90E-02	0.000%
BA07	Gg	Residential - 1/4 acre	C	178.85177	4.11E-03	0.000%
BA07	Gr	Residential - 1/4 acre	C	341.73736	7.85E-03	0.000%
BA08	Bs	Desert shrub - poor	A	1726950.2	3.96E+01	0.516%
BA08	Wk	Desert shrub - poor	A	719336.08	1.65E+01	0.215%
BA08	Bs	Desert shrub - poor	A	1295023.7	2.97E+01	0.387%
BA08	Bs	Desert shrub - poor	A	591072.48	1.36E+01	0.176%

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Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
BA08	Bs	Desert shrub - poor	A	16659.982	3.82E-01	0.005%
BA08	Bs	Desert shrub - poor	A	720792.89	1.65E+01	0.215%
BA08	Wk	Desert shrub - poor	A	3278152.6	7.53E+01	0.979%
BA08	Wn	Desert shrub - poor	A	517.53714	1.19E-02	0.000%
BA08	Wn	Desert shrub - poor	A	297.94362	6.84E-03	0.000%
BA08	Wn	Desert shrub - poor	A	75645.822	1.74E+00	0.023%
BA08	Wn	Desert shrub - poor	A	3813642	8.75E+01	1.139%
BA08	Bs	Desert shrub - poor	A	519.81831	1.19E-02	0.000%
BA08	Wk	Desert shrub - poor	A	823.98086	1.89E-02	0.000%
BA08	Wk	Desert shrub - poor	A	413.15838	9.48E-03	0.000%
BA08	Wk	Desert shrub - poor	A	1.283161	2.95E-05	0.000%
BA08	Md	Desert shrub - poor	B	1271429.7	2.92E+01	0.380%
BA08	Ma	Desert shrub - poor	B	1790955.2	4.11E+01	0.535%
BA08	Ma	Desert shrub - poor	B	101995.48	2.34E+00	0.030%
BA08	Md	Desert shrub - poor	B	3264525.1	7.49E+01	0.975%
BA08	Wk	Residential - 1/4 acre	A	81.234214	1.86E-03	0.000%
BA08	Wk	Residential - 1/4 acre	A	13842.69	3.18E-01	0.004%
BA08	Wk	Residential - 1/4 acre	A	1.283161	2.95E-05	0.000%
BA08	Wn	Urban district - industrial	A	4705.285	1.08E-01	0.001%
BA08	Ma	Urban district - industrial	B	1578.6601	3.62E-02	0.000%
BA08	Md	Urban district - industrial	B	14921.8	3.43E-01	0.004%
BA09	Wn	Desert shrub - poor	A	3147135.9	7.22E+01	0.940%
BA09	Bn	Desert shrub - poor	A	5714733.2	1.31E+02	1.706%
BA09	Bs	Desert shrub - poor	A	670348.16	1.54E+01	0.200%
BA09	Wk	Desert shrub - poor	A	806539.05	1.85E+01	0.241%
BA09	Wk	Desert shrub - poor	A	4957631.3	1.14E+02	1.480%
BA09	PH	Desert shrub - poor	A	82773.184	1.90E+00	0.025%
BA09	PH	Desert shrub - poor	A	207238.52	4.76E+00	0.062%

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BA09	Wn	Desert shrub - poor	A	121.43581	2.79E-03	0.000%
BA09	Bs	Desert shrub - poor	A	35.877632	8.24E-04	0.000%
BA09	Wk	Desert shrub - poor	A	48.987058	1.12E-03	0.000%
BA09	Wk	Desert shrub - poor	A	193.15347	4.43E-03	0.000%
BA09	Wn	Desert shrub - poor	A	16.111989	3.70E-04	0.000%
BA09	Wn	Desert shrub - poor	A	16.111989	3.70E-04	0.000%
BA09	Bs	Desert shrub - poor	A	20.308598	4.66E-04	0.000%
BA09	Bs	Desert shrub - poor	A	20.308598	4.66E-04	0.000%
BA09	Wk	Desert shrub - poor	A	25.999353	5.97E-04	0.000%
BA09	Wk	Desert shrub - poor	A	25.999353	5.97E-04	0.000%
BA09	Wk	Desert shrub - poor	A	57.082333	1.31E-03	0.000%
BA09	Wk	Desert shrub - poor	A	57.082333	1.31E-03	0.000%
BA09	MK	Desert shrub - poor	B	1259279.1	2.89E+01	0.376%
BA09	Ad	Desert shrub - poor	B	598690.89	1.37E+01	0.179%
BA09	Ma	Desert shrub - poor	B	962990.13	2.21E+01	0.288%
BA09	ME	Desert shrub - poor	B	128.2722	2.94E-03	0.000%
BA09	ME	Desert shrub - poor	B	2740.0098	6.29E-02	0.001%
BA09	ME	Desert shrub - poor	B	3610.0377	8.29E-02	0.001%
BA09	ME	Desert shrub - poor	B	76070897	1.75E+03	22.714%
BA09	Md	Desert shrub - poor	B	13811638	3.17E+02	4.124%
BA09	Md	Desert shrub - poor	B	153535.72	3.52E+00	0.046%
BA09	MK	Desert shrub - poor	B	2.1901502	5.03E-05	0.000%
BA09	Md	Desert shrub - poor	B	55.072439	1.26E-03	0.000%
BA09	MK	Desert shrub - poor	B	0.8976251	2.06E-05	0.000%
BA09	MK	Desert shrub - poor	B	0.8976251	2.06E-05	0.000%
BA09	Md	Desert shrub - poor	B	17.741949	4.07E-04	0.000%
BA09	Md	Desert shrub - poor	B	17.741949	4.07E-04	0.000%
BA10	Bs	Desert shrub - poor	A	173681.56	3.99E+00	0.052%
BA10	Wk	Desert shrub - poor	A	466900.06	1.07E+01	0.139%
BA10	Ma	Desert shrub - poor	B	805192.96	1.85E+01	0.240%
BA10	Md	Desert shrub - poor	B	274.65629	6.31E-03	0.000%
BA10	Md	Desert shrub - poor	B	689226.55	1.58E+01	0.206%
BA10	Md	Desert shrub - poor	B	2506002.8	5.75E+01	0.748%
BA11	Wk	Desert shrub - poor	A	713499.6	1.64E+01	0.213%
BA11	Bs	Desert shrub - poor	A	972121.24	2.23E+01	0.290%
BA11	Bs	Desert shrub - poor	A	341921.85	7.85E+00	0.102%
BA11	Ma	Desert shrub - poor	B	618714.14	1.42E+01	0.185%
BA11	Ma	Desert shrub - poor	B	944.90716	2.17E-02	0.000%
BA11	Md	Desert shrub - poor	B	260591.09	5.98E+00	0.078%
BA11	Md	Desert shrub - poor	B	1929.5721	4.43E-02	0.001%
BA11	Md	Desert shrub - poor	B	7797238.8	1.79E+02	2.328%
BA11	Md	Desert shrub - poor	B	909791.4	2.09E+01	0.272%
BA11	Ma	Desert shrub - poor	B	46.745476	1.07E-03	0.000%
BA11	Ma	Desert shrub - poor	B	717961.9	1.65E+01	0.214%
					7.69E+03	100%

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

Use this spreadsheet to import NRCS Soil Survey Map information.

Map Unit Symbol	Map Unit Name	Rating	Acres in AOI	Percent of AOI	
Ad	Adelino fine sandy loam	B	193.1	2.03%	
Bn	Bluepoint loamy fine sand, 1 to 9 percent slopes	A	151.7	1.60%	
Bs	Bluepoint-Wink complex, hummocky	A	705.4	7.43%	
Cb	Caliza-Bluepoint complex, 1 to 25 percent slopes	A	206.3	2.17%	
Gg	Gila loam, strongly alkali	C	13.2	0.14%	
Gh	Gila loam, strongly saline and alkali	C	44.1	0.46%	
Gr	Glendale loam, strongly alkali	C	20.7	0.22%	
Gt	Glendale soils, slightly saline	C	23.6	0.25%	
Ma	Madurez loamy sand, hummocky	B	172.0	1.81%	
Md	Madurez loamy fine sand	B	1675.4	17.65%	
ME	Madurez loamy fine sand	B	1747.4	18.41%	
MK	Madurez-Wink association, undulating	B	65.7	0.69%	
Mn	Mixed alluvial land	B	4.7	0.05%	Assumed B
Pa	Pajarito loamy fine sand	A	570.3	6.01%	
PH	Pajarito fine sandy loam	A	6.7	0.07%	
PITS	Gravel and caliche pits	B	7.8	0.08%	Assumed B
Wk	Wink loamy sand	A	2544.6	26.81%	
Wm	Wink loamy sand, clayey substratum	A	285.9	3.01%	
Wn	Wink loamy sand, hummocky	A	917.5	9.67%	
Wr	Wink-Caliza complex, 1 to 15 percent slopes	A	120.7	1.27%	
Ws	Wink complex, 1 to 9 percent slopes, eroded	A	15.4	0.16%	
			9492	100.00%	

Computed: **JAC** Date: **8/31/2020**
Checked: Date:

Table 404-2: Runoff Curve Numbers
Urban

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Open space - poor	68	79	86	89
Open space - fair	49	69	79	84
Open space - good	39	61	74	80
Impervious - parking lots, roofs, etc.	98	98	98	98
Impervious - streets/roads; paved; curbs, storm	98	89	98	98
Impervious - streets/roads; paved; open ditches	83	89	92	93
Impervious - streets/roads; gravel	76	85	89	91
Impervious - streets/roads; dirt	72	82	87	89
Western desert urban - natural	63	77	85	88
Western desert urban - artificial	96	96	96	96
Urban district - commercial/business	89	92	94	95
Urban district - industrial	81	88	91	93
Residential - 1/8 acre or less	77	85	90	92
Residential - 1/4 acre	61	75	83	87
Residential - 1/3 acre	57	72	81	86
Residential - 1/2 acre	54	70	80	85
Residential - 1 acre	51	68	79	84
Residential - 2 acres	46	65	77	82
Developing urban - newly graded	77	86	91	94

Table 404-4: Runoff Curve Numbers
Other Agricultural

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Pasture, grass, range - poor	68	79	86	89
Pasture, grass, range - fair	49	69	79	84
Pasture, grass, range - good	39	61	74	80
Meadow	30	58	71	78
Brush - poor	48	67	77	83
Brush - fair	35	56	70	77
Brush - good	30	48	65	73
Woods combination - poor	57	73	82	86
Woods combination - fair	43	65	76	82
Woods combination - good	32	58	72	79
Woods - poor	45	66	77	83
Woods - fair	36	60	73	79
Woods - good	30	55	70	77
Farmsteads	59	74	82	86

Computed: **JAC** Date: **8/31/2020**
Checked: Date:

Table 404-5: Runoff Curve Numbers
Arid and Semiarid Rangelands

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Herbaceous - poor		80	87	93
Herbaceous - fair		71	81	89
Herbaceous - good		62	74	85
Oak-aspen - poor		66	74	79
Oak-aspen - fair		48	57	63
Oak-aspen - good		30	41	48
Pinyon-juniper - poor		75	85	89
Pinyon-juniper - fair		58	73	80
Pinyon-juniper - good		41	61	71
Sagebrush - poor		67	80	85
Sagebrush - fair		51	63	70
Sagebrush - good		35	47	55
Desert shrub - poor	63	77	85	88
Desert shrub - fair	55	72	81	86
Desert shrub - good	49	68	79	84

Runoff Curve Numbers
Other

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Water	98	98	98	98

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

Time of Concentration					Pg, 4-99	
Basin	**Basin Tc Segments**	**Composite Tc (min)**	**Design Tc (min)**	Tc (hr)	Lag, L (min)	
BA01	1.1, 1.2, 1.3, 1.4, 1.5, 1.6	151.44	151	2.52	90.6	**Tc minimum of 10 minutes**
BA02	2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7	229.32	229	3.82	137.4	**Page 4-43 NMDOT Drainage Manual July 2018**
BA03	3.1, 3.2, 3.3, 3.3, 3.4	69.69	70	1.17	42.0	
BA04	4.1, 4.2	25.30	25	0.42	15.0	
BA05	5.1, 5.2, 5.3	31.91	32	0.53	19.2	
BA06	6.1, 6.2, 6.3, 6.4	40.89	41	0.68	24.6	
BA07	7.1, 7.2, 7.3, 7.4, 7.5	97.12	97	1.62	58.2	
BA08	8.1	78.41	78	1.30	46.8	
BA09	9.1, 9.2	199.77	200	3.33	120.0	
BA10	10.1, 10.2	28.36	28	0.47	16.8	
BA11	11.1, 11.2	36.64	37	0.62	22.2	

0.6 Tc = Lag, L (Pg. 4-99)

Tc Method	Criteria	Condition		
Upland	Ungullied, overland, < 300 ft	Rural/Urban	Tc=L/(60*V), min	Sheet
Kirpich	Gullied	Rural	Tc=0.0078*(L^0.77)*(S^-0.385), min	Shallow Concentrated
Kerby	Ungullied, overland, > 300 ft	Rural	Tc=0.0828*((L*N)^0.467)*(S^-0.235), min	Shallow Concentrated
Manning's	Gullied, defined stream	Rural/Urban	V=(1.486/n)*(R^0.667)*(S^0.5)	Channel
	Ungullied, overland, < 300 ft	Rural/Urban	Tc=[(0.007*((n*L)^0.8))/((P$_2$^0.5)*(S^0.4))]*60, min	Sheet
Figure 402-15 (Page 4-47)	Ungullied, undefined stream	Urban	Tc=L/(60*V), min	Shallow Concentrated

Notes: Per Table 402-6 (Page 4-38) and Section 404.10 (Page 4-84), both the "Upland Method" and "Kirpich Equation" are to be used to determine time of concentration for **rural conditions**. The "Manning's Kinematic Equation" provided in the "Upland Method" (Page 4-43) section will be applied to all sheet flow segments (un-gullied) and the Kirpich Equation will be used for all shallow concentrated flow segments.

All equations and information in *red font* in this spreadsheet is not being used/referenced. This information is only provided for review/comparison when evaluating Tc times.

Computed: **JAC**
Checked:

Date: **5/24/2021**
Date:

BA01	
Sheet	
Basin Segment ID	1.1
Surface Description (from Upland Graph)	Rural Upland, < 300 ft Bare Ground
High Elevation, ft	5010.0
Low Elevation, ft	5008.0
Length, ft	264.1
Slope (ft/ft)	0.0076
Manning's, n	0.028
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	13.180
Shallow	
Basin Segment ID	1.2
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	5008.0
Low Elevation, ft	4960.0
Length, ft	4024.3
Slope (ft/ft)	0.0119
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	25.600
Shallow	
Basin Segment ID	1.3
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4960.0
Low Elevation, ft	4955.0
Length, ft	3924.1
Slope (ft/ft)	0.0013
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	59.396

BA02	
Sheet	
Basin Segment ID	2.1
Surface Description (from Upland Graph)	Rural Upland, < 300 ft Bare Ground
High Elevation, ft	5008.0
Low Elevation, ft	5004.0
Length, ft	300.3
Slope (ft/ft)	0.0133
Manning's, n	0.028
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	11.657
Shallow	
Basin Segment ID	2.2
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	5004.0
Low Elevation, ft	4980.0
Length, ft	4431.1
Slope (ft/ft)	0.0054
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	37.362
Shallow	
Basin Segment ID	2.3
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4980.0
Low Elevation, ft	4964.0
Length, ft	1726.1
Slope (ft/ft)	0.0093
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	14.700

BA03	
Sheet	
Basin Segment ID	3.1
Surface Description (from Upland Graph)	Rural Upland, < 300 ft Bare Ground
High Elevation, ft	4950.5
Low Elevation, ft	4950.0
Length, ft	84.3
Slope (ft/ft)	0.0059
Manning's, n	0.028
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	5.834
Shallow	
Basin Segment ID	3.2
Surface Description (from Upland Graph)	Urban Kirpich Paved
High Elevation, ft	4950.0
Low Elevation, ft	4932.0
Length, ft	3244.2
Slope (ft/ft)	0.0131
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	20.940
Shallow	
Basin Segment ID	3.3
Surface Description (from Upland Graph)	Urban Kirpich Paved
High Elevation, ft	4932.0
Low Elevation, ft	4896.0
Length, ft	2756.0
Slope (ft/ft)	0.0131
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	18.469

Computed: **JAC**
Checked:

Date: **5/24/2021**
Date:

Shallow	
Basin Segment ID	1.4
	Rural
	Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4955.0
Low Elevation, ft	4932.0
Length, ft	1036.1
Slope (ft/ft)	0.0222
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	7.089

Shallow	
Basin Segment ID	1.5
	Rural
	Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4932.0
Low Elevation, ft	4901.0
Length, ft	3304.3
Slope (ft/ft)	0.0094
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	24.125

Shallow	
Basin Segment ID	1.6
	Rural
	Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4901.0
Low Elevation, ft	4823.0
Length, ft	4158.2
Slope (ft/ft)	0.0188
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	22.053
Total Travel Time, min	151.444

Shallow	
Basin Segment ID	2.4
	Rural
	Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4964.0
Low Elevation, ft	4954.0
Length, ft	8778.3
Slope (ft/ft)	0.0011
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	115.275

Shallow	
Basin Segment ID	2.5
	Rural
	Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4954.0
Low Elevation, ft	4906.0
Length, ft	4335.2
Slope (ft/ft)	0.0111
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	27.897

Shallow	
Basin Segment ID	2.6
	Rural
	Kirpich
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4906.0
Low Elevation, ft	4863.0
Length, ft	2396.2
Slope (ft/ft)	0.0179
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	14.674

Channel	
Basin Segment ID	2.7
	Rural
	Manning's
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4863
Low Elevation, ft	4806
Length, ft	2574
Slope (ft/ft)	0.0221
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	5.5
Tc=L/(60*V), min	
Tc, min	7.759
Total Travel Time, min	229.325

Channel	
Basin Segment ID	3.4
	Rural
	Manning's
Surface Description (from Upland Graph)	Bare Ground
High Elevation, ft	4896
Low Elevation, ft	4805
Length, ft	6466
Slope (ft/ft)	0.0141
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	4.4
Tc=L/(60*V), min	
Tc, min	24.450
Total Travel Time, min	69.693

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Checked: Date:

BA04	
Sheet	
Basin Segment ID	4.1
Surface Description (from Upland Graph)	Urban Upland, < 300 ft Paved
High Elevation, ft	4951
Low Elevation, ft	4951
Length, ft	29
Slope (ft/ft)	0.0171
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	0.776
Shallow	
Basin Segment ID	4.2
Surface Description (from Upland Graph)	Urban Kirpich Paved
High Elevation, ft	4950.5
Low Elevation, ft	4902.0
Length, ft	3891.2
Slope (ft/ft)	0.0125
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	24.526
Total Travel Time, min	25.302

BA05	
Sheet	
Basin Segment ID	5.1
Surface Description (from Upland Graph)	Rural Upland, < 300 ft Bare Ground
High Elevation, ft	4902
Low Elevation, ft	4902
Length, ft	43
Slope (ft/ft)	0.0117
Manning's, n	0.028
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	2.577
Shallow	
Basin Segment ID	5.2
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4901.5
Low Elevation, ft	4828.0
Length, ft	3129.8
Slope (ft/ft)	0.0235
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	16.252
Channel	
Basin Segment ID	5.3
Surface Description (from Upland Graph)	Rural Manning's Bare Ground
High Elevation, ft	4828
Low Elevation, ft	4819
Length, ft	1971
Slope (ft/ft)	0.0046
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	2.5
Tc=L/(60*V), min	
Tc, min	13.085
Total Travel Time, min	31.914

BA06	
Shallow	
Basin Segment ID	6.1
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4929
Low Elevation, ft	4900
Length, ft	3005
Slope (ft/ft)	0.0097
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	22.177
Shallow	
Basin Segment ID	6.2
Surface Description (from Upland Graph)	Urban Kirpich Paved
High Elevation, ft	4900
Low Elevation, ft	4865
Length, ft	1564
Slope (ft/ft)	0.0224
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	9.706
Shallow	
Basin Segment ID	6.3
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4865
Low Elevation, ft	4836
Length, ft	729
Slope (ft/ft)	0.0398
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	4.319
Channel	
Basin Segment ID	6.4
Surface Description (from Upland Graph)	Rural Manning's Bare Ground
High Elevation, ft	4836
Low Elevation, ft	4822
Length, ft	1153
Slope (ft/ft)	0.0121
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	4.1
Tc=L/(60*V), min	
Tc, min	4.692
Total Travel Time, min	40.894

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

BA07	
Sheet	
Basin Segment ID	7.1
Surface Description (from Upland Graph)	Rural Upland, < 300 ft Bare Ground
High Elevation, ft	4983
Low Elevation, ft	4982
Length, ft	98
Slope (ft/ft)	0.0102
Manning's, n	0.028
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	5.287
Shallow	
Basin Segment ID	7.2
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4982.0
Low Elevation, ft	4895.0
Length, ft	7396.7
Slope (ft/ft)	0.0118
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	41.126
Shallow	
Basin Segment ID	7.3
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4895.0
Low Elevation, ft	4815.0
Length, ft	4573.4
Slope (ft/ft)	0.0175
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	24.377
Channel	
Basin Segment ID	7.4
Surface Description (from Upland Graph)	Rural Manning's Bare Ground
High Elevation, ft	4815
Low Elevation, ft	4800
Length, ft	930
Slope (ft/ft)	0.0161
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	4.7
Tc=L/(60*V), min	
Tc, min	3.288
Shallow	
Basin Segment ID	7.5
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4800.0
Low Elevation, ft	4794.0
Length, ft	1837.1
Slope (ft/ft)	0.0033
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	23.046
Total Travel Time, min	97.124

BA08	
Shallow	
Basin Segment ID	8.1
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4968.0
Low Elevation, ft	4929.0
Length, ft	9897.9
Slope (ft/ft)	0.0039
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	78.412
Total Travel Time, min	78.412

BA09	
Shallow	
Basin Segment ID	9.1
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	5114.0
Low Elevation, ft	5113.0
Length, ft	214.2
Slope (ft/ft)	0.0047
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	3.838
Channel	
Basin Segment ID	9.2
Surface Description (from Upland Graph)	Rural Manning's Bare Ground
High Elevation, ft	5113
Low Elevation, ft	4985
Length, ft	29010
Slope (ft/ft)	0.0044
R=d, depth, ft	1.0
Manning's, n	0.040
Velocity, ft/s (Manning's)	2.5
Tc=L/(60*V), min	
Tc, min	195.936
Total Travel Time, min	199.774

BA10	
Sheet	
Basin Segment ID	10.1
Surface Description (from Upland Graph)	Rural Upland, < 300 ft Bare Ground
High Elevation, ft	4996
Low Elevation, ft	4995
Length, ft	87
Slope (ft/ft)	0.0115
Manning's, n	0.028
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	4.569
Shallow	
Basin Segment ID	10.2
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	4995.0
Low Elevation, ft	4987.0
Length, ft	2078.4
Slope (ft/ft)	0.0038
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	23.790
Total Travel Time, min	28.358

BA11	
Sheet	
Basin Segment ID	11.1
Surface Description (from Upland Graph)	Rural Upland, < 300 ft Bare Ground
High Elevation, ft	5002
Low Elevation, ft	5000
Length, ft	270
Slope (ft/ft)	0.0074
Manning's, n	0.028
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	13.518
Shallow	
Basin Segment ID	11.2
Surface Description (from Upland Graph)	Rural Kirpich Bare Ground
High Elevation, ft	5000.0
Low Elevation, ft	4967.0
Length, ft	3251.5
Slope (ft/ft)	0.0101
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	23.117
Total Travel Time, min	36.635

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

Flow ID	(1) Seg ID	(2) Flow Type	(3) Start Elevation (ft)	(4) End Elevation (ft)	(5) Length (ft)	(6) Slope (ft/ft)	(7) Slope (%)	(8) Velocity Equation	(9) Velocity (ft/s) from Tc Ref - Upland (if applicable)	Condition
BA01	1.1	Sheet	5010	5008	264	0.008	0.76	Bare Ground		Ungullied, overland
BA01	1.2	Shallow	5008	4960	4024	0.012	1.19	Bare Ground	1.1	Ungullied, overland
BA01	1.3	Shallow	4960	4955	3924	0.001	0.13	Bare Ground	0.4	Ungullied, overland
BA01	1.4	Shallow	4955	4932	1036	0.022	2.22	Bare Ground	1.5	Ungullied, overland
BA01	1.5	Shallow	4932	4901	3304	0.009	0.94	Bare Ground	1.0	Gullied
BA01	1.6	Shallow	4901	4823	4158	0.019	1.88	Bare Ground	1.4	Gullied
BA02	2.1	Sheet	5008	5004	300	0.013	1.33	Bare Ground		Ungullied, overland
BA02	2.2	Shallow	5004	4980	4431	0.005	0.54	Bare Ground	0.7	Ungullied, overland
BA02	2.3	Shallow	4980	4964	1726	0.009	0.93	Bare Ground	1.0	Ungullied, overland
BA02	2.4	Shallow	4964	4954	8778	0.001	0.11	Bare Ground	0.3	Gullied
BA02	2.5	Shallow	4954	4906	4335	0.011	1.11	Bare Ground	1.0	Gullied
BA02	2.6	Shallow	4906	4863	2396	0.018	1.79	Bare Ground	1.3	Gullied
BA02	2.7	Channel	4863	4806	2574	0.022	2.21	Bare Ground		Gullied
BA03	3.1	Sheet	4951	4950	84	0.006	0.59	Bare Ground		Ungullied, overland
BA03	3.2	Shallow	4950	4932	3244	0.006	0.55	Paved	1.5	Gullied
BA03	3.3	Shallow	4932	4896	2756	0.013	1.31	Paved	2.3	Gullied
BA03	3.4	Channel	4896	4805	6466	0.014	1.41	Bare Ground		Gullied
BA04	4.1	Sheet	4951.0	4950.5	29	0.017	1.71	Paved		Gullied
BA04	4.2	Shallow	4950.5	4902.0	3891	0.012	1.25	Paved	2.3	Gullied
BA05	5.1	Sheet	4902.0	4901.5	43	0.012	1.17	Bare Ground		Ungullied, overland
BA05	5.2	Shallow	4901.5	4828.0	3130	0.023	2.35	Bare Ground	1.5	Gullied
BA05	5.3	Channel	4828.0	4819.0	1971	0.005	0.46	Bare Ground		Gullied
BA06	6.1	Shallow	4929.0	4900.0	3005	0.010	0.97	Bare Ground	1.0	Ungullied, overland
BA06	6.2	Shallow	4900.0	4865.0	1564	0.022	2.24	Paved	3.0	Gullied
BA06	6.3	Shallow	4865.0	4836.0	729	0.040	3.98	Bare Ground	2.0	Ungullied, overland
BA06	6.4	Channel	4836.0	4822.0	1153	0.012	1.21	Bare Ground		Gullied
BA07	7.1	Sheet	4983.0	4982.0	98	0.010	1.02	Bare Ground		Ungullied, overland
BA07	7.2	Shallow	4982.0	4895.0	7397	0.012	1.18	Bare Ground	1.1	Gullied
BA07	7.3	Shallow	4895.0	4815.0	4573	0.017	1.75	Bare Ground	1.3	Gullied
BA07	7.4	Channel	4815.0	4800.0	930	0.016	1.61	Bare Ground		Gullied
BA07	7.5	Shallow	4800.0	4794.0	1837	0.003	0.33	Bare Ground	0.6	Ungullied, overland
BA08	8.1	Shallow	4968.0	4929.0	9898	0.004	0.39	Bare Ground	0.6	Gullied
BA09	9.1	Shallow	5114.0	5113.0	214	0.005	0.47	Bare Ground	0.7	Gullied
BA09	9.2	Channel	5113.0	4985.0	29010	0.004	0.44	Bare Ground		Gullied
BA10	10.1	Sheet	4996.0	4995.0	87	0.012	1.15	Bare Ground		Ungullied, overland
BA10	10.2	Shallow	4995.0	4987.0	2078	0.004	0.38	Bare Ground	0.6	Gullied
BA11	11.1	Sheet	5002.0	5000.0	270	0.007	0.74	Bare Ground		Ungullied, overland
BA11	11.2	Shallow	5000.0	4967.0	3252	0.010	1.01	Bare Ground	1.0	Gullied

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

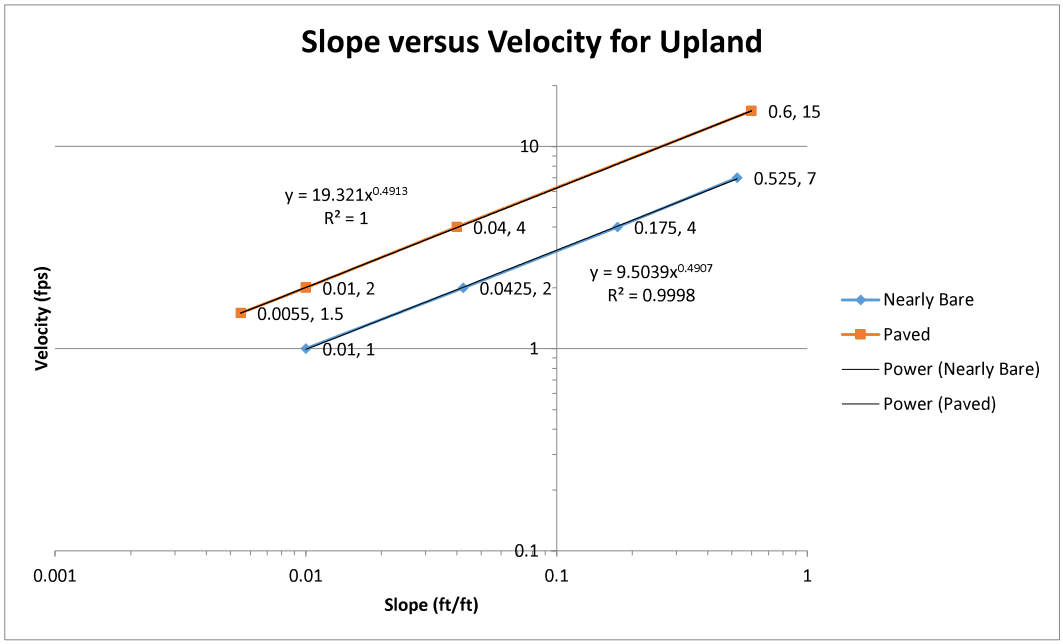
	Slope (ft/ft)	*Velocity (ft/s)*	*Chart Eq.*
Nearly bare and untilled (overland flow)	0.01	1	9.5039x^0.4907
	0.0425	2	
	0.175	4	
	0.525	7	
Pavement and small upland gullies	0.0055	1.5	19.321x^0.4913
	0.01	2	
	0.04	4	
	0.6	15	

Table 402-8 Eq. (To be used)

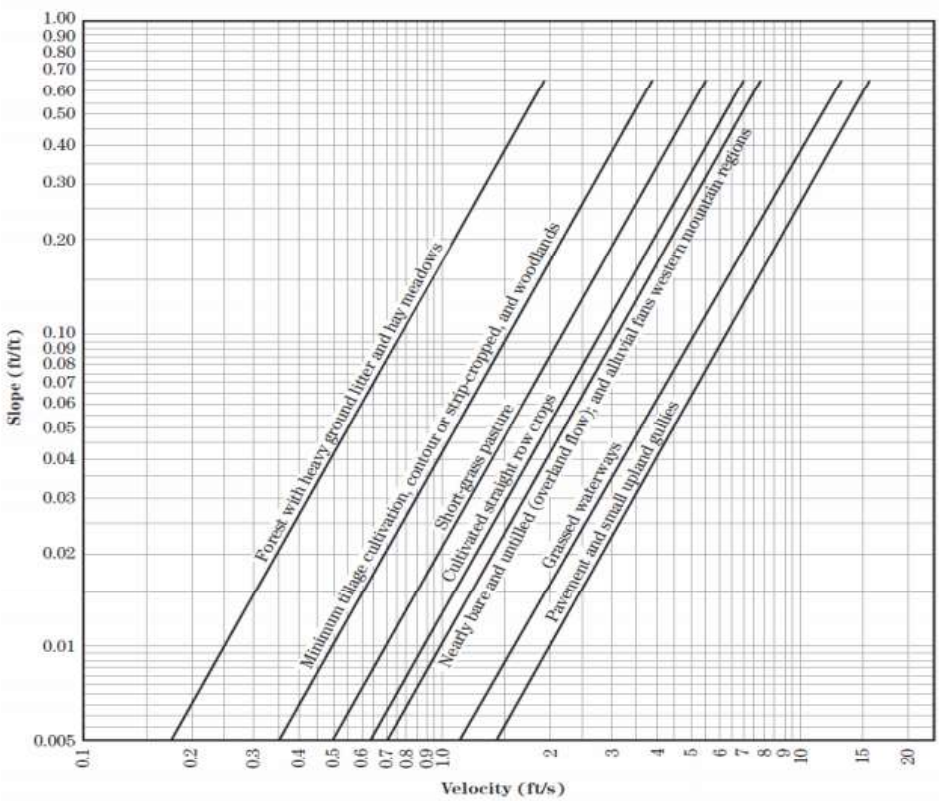
V=9.965x^0.5

V=20.328x^0.5

For simplicity, "Nearly Bare" and "Paved Area" were identified as majority conditions in analysis area.



Computed: **JAC** Date: **5/24/2021**
Checked: Date:



Source: NRCS, 2010, "Part 630 Hydrology, National Engineering Handbook, Chapter 15 Time of Concentration", Figure 15-4, p. 15-8.
http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=27002.wba

Figure 402-15 Velocity Versus Slope for Shallow Concentrated Flow

Table 402-8 Equations and Assumptions Developed from Figure 402-15

Source: NRCS, 2010, "Part 630 Hydrology, National Engineering Handbook, Chapter 15 Time of Concentration", Table 15-3, p.15-8.
http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=27002.wba

Flow type	Depth (ft)	Manning's *n*	Velocity equation (ft/s)
Pavement and small upland gullies	0.2	0.025	$V = 20.328(s)^{0.5}$
Grassed waterways	0.4	0.050	$V = 16.135(s)^{0.5}$
Nearly bare and untilled (overland flow); and alluvial fans in western mountain regions	0.2	0.051	$V = 9.965(s)^{0.5}$
Cultivated straight row crops	0.2	0.058	$V = 8.762(s)^{0.5}$
Short-grass pasture	0.2	0.073	$V = 6.962(s)^{0.5}$
Minimum tillage cultivation, contour or strip-cropped, and woodlands	0.2	0.101	$V = 5.032(s)^{0.5}$
Forest with heavy ground litter and hay meadows	0.2	0.202	$V = 2.516(s)^{0.5}$

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

Precipitation information obtained from NOAA Atlas 14 at the approximate center of the project location

Latitude: 34.6465 Longitude: -106.7218

LAT: 34D38M47.4SEC LONG: 103D43M18.48SEC

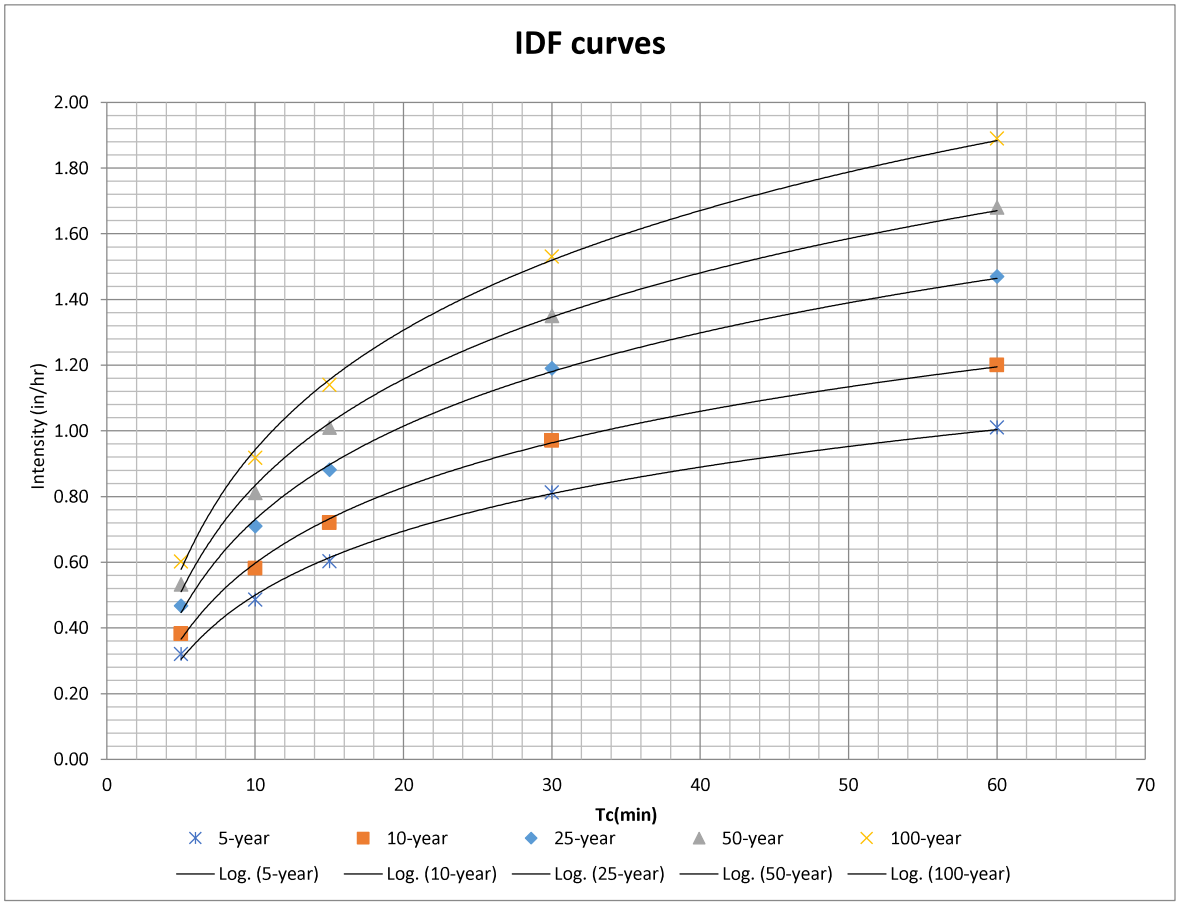
Precipitation Frequency Estimates (in/hr)

Duration		Return Interval (year)								
Time	Minutes	2	5	10	25	50	100	200	500	1000
5-min	5	0.24	0.32	0.38	0.47	0.53	0.60	0.68	0.77	0.85
10-min	10	0.36	0.49	0.58	0.71	0.81	0.92	1.03	1.18	1.30
15-min	15	0.45	0.60	0.72	0.88	1.01	1.14	1.27	1.46	1.61
30-min	30	0.61	0.81	0.97	1.19	1.35	1.53	1.72	1.97	2.16
60-min	60	0.75	1.01	1.20	1.47	1.68	1.89	2.12	2.43	2.68
2-hr	120	0.86	1.13	1.36	1.66	1.91	2.18	2.46	2.86	3.18
3-hr	180	0.91	1.18	1.41	1.72	1.97	2.24	2.53	2.93	3.26
6-hr	360	1.04	1.33	1.57	1.89	2.14	2.42	2.70	3.09	3.42
12-hr	720	1.14	1.44	1.68	2.01	2.26	2.53	2.81	3.18	3.49
24-hr	1440	1.24	1.54	1.79	2.11	2.37	2.63	2.89	3.24	3.52
2-day	2880	1.39	1.73	2.00	2.35	2.63	2.92	3.20	3.59	3.89
3-day	4320	1.50	1.85	2.13	2.50	2.79	3.09	3.38	3.78	4.09
4-day	5760	1.60	1.97	2.26	2.66	2.96	3.26	3.57	3.98	4.29
7-day	10080	1.85	2.25	2.57	2.99	3.31	3.62	3.94	4.34	4.65
10-day	14400	2.04	2.50	2.87	3.35	3.71	4.09	4.45	4.94	5.30
20-day	28800	2.52	3.06	3.47	3.99	4.38	4.75	5.11	5.56	5.89
30-day	43200	2.95	3.55	4.00	4.56	4.96	5.35	5.71	6.16	6.47
45-day	64800	3.58	4.26	4.76	5.35	5.77	6.15	6.49	6.88	7.13
60-day	86400	4.12	4.92	5.48	6.17	6.65	7.09	7.48	7.94	8.24

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

IDF Curve Equations

Recurrence Interval (year)	Equation
100	-2.038ln(x) + 9.9586
50	-1.792ln(x) + 8.7633
25	-1.565ln(x) + 7.6525
10	-1.276ln(x) + 6.2346
5	-1.067ln(x) + 5.2124



Computed: **JAC** Date: **8/5/2020**
Checked: Date:

NOTE: This data is imported from the NOAA 14 website (https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html).

Point precipitation frequency estimates (inches)
NOAA Atlas 14 Volume 1 Version 5
Data type: Precipitation depth
Time series type: Partial duration
Project area: Southwest
Location name (ESRI Maps): Belen
Station Name: -
Latitude: 34.6465°
Longitude: -106.7218°
Elevation (USGS): 4919.71 ft

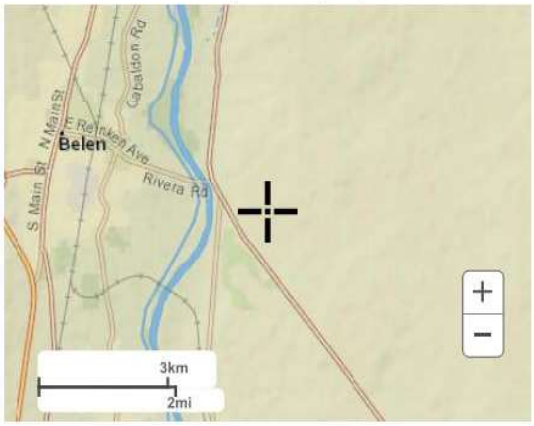
PRECIPITATION FREQUENCY ESTIMATES

by duration for ARI (years):	1	2	5	10	25	50	100	200	500	1000
5-min:	0.184	0.239	0.32	0.382	0.467	0.533	0.602	0.675	0.774	0.852
10-min:	0.28	0.363	0.486	0.581	0.71	0.811	0.917	1.03	1.18	1.3
15-min:	0.347	0.45	0.603	0.72	0.881	1.01	1.14	1.27	1.46	1.61
30-min:	0.468	0.606	0.812	0.97	1.19	1.35	1.53	1.72	1.97	2.16
60-min:	0.579	0.749	1.01	1.2	1.47	1.68	1.89	2.12	2.43	2.68
2-hr:	0.671	0.858	1.13	1.36	1.66	1.91	2.18	2.46	2.86	3.18
3-hr:	0.713	0.905	1.18	1.41	1.72	1.97	2.24	2.53	2.93	3.26
6-hr:	0.822	1.04	1.33	1.57	1.89	2.14	2.42	2.7	3.09	3.42
12-hr:	0.905	1.14	1.44	1.68	2.01	2.26	2.53	2.81	3.18	3.49
24-hr:	0.988	1.24	1.54	1.79	2.11	2.37	2.63	2.89	3.24	3.52
2-day:	1.11	1.39	1.73	2	2.35	2.63	2.92	3.2	3.59	3.89
3-day:	1.2	1.5	1.85	2.13	2.5	2.79	3.09	3.38	3.78	4.09
4-day:	1.29	1.6	1.97	2.26	2.66	2.96	3.26	3.57	3.98	4.29
7-day:	1.49	1.85	2.25	2.57	2.99	3.31	3.62	3.94	4.34	4.65
10-day:	1.64	2.04	2.5	2.87	3.35	3.71	4.09	4.45	4.94	5.3
20-day:	2.02	2.52	3.06	3.47	3.99	4.38	4.75	5.11	5.56	5.89
30-day:	2.37	2.95	3.55	4	4.56	4.96	5.35	5.71	6.16	6.47
45-day:	2.89	3.58	4.26	4.76	5.35	5.77	6.15	6.49	6.88	7.13
60-day:	3.33	4.12	4.92	5.48	6.17	6.65	7.09	7.48	7.94	8.24

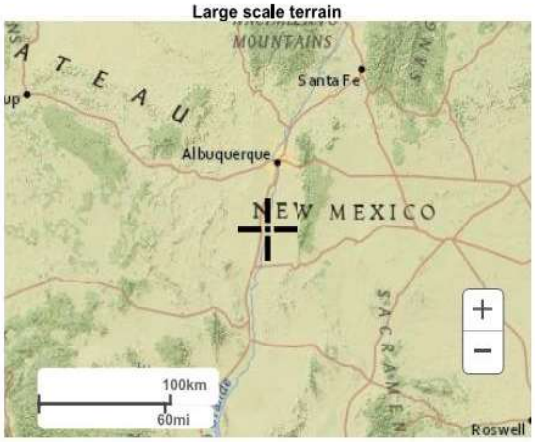
Date/time (GMT): Wed Aug 5 23:04:25 2020
pyRunTime: 0.0324950218201

8/5/2020

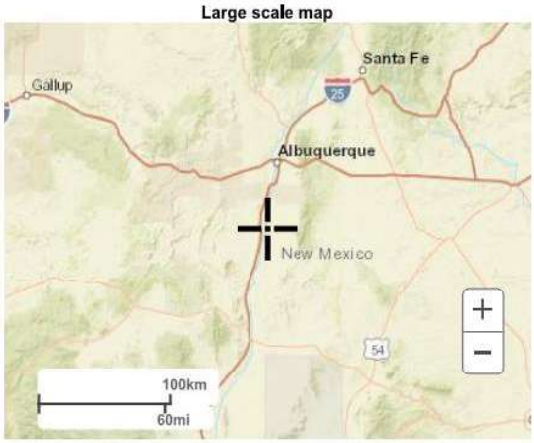
Precipitation Frequency Data Server



Large scale terrain



Large scale map



Large scale aerial

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

Using USGS Regression equations for New Mexico should be limited to:

1. Determination that the peak discharges calculated using one of the three approved hydrologic peak discharge analyses methods are within reason and supported by the exercise of judgment, and
2. For very preliminary peak discharge estimation when scoping a project
3. USGS regional regression equations may be used for design when checked against one of the hydrologic peak discharge analysis methods and approved by the NMDOT Drainage Engineer

USGS
science for a changing world

In cooperation with the New Mexico Department of Transportation

Analysis of the Magnitude and Frequency of Peak Discharge and Maximum Observed Peak Discharge in New Mexico and Surrounding Areas

Scientific Investigations Report 2008–5119

U.S. Department of the Interior
U.S. Geological Survey

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

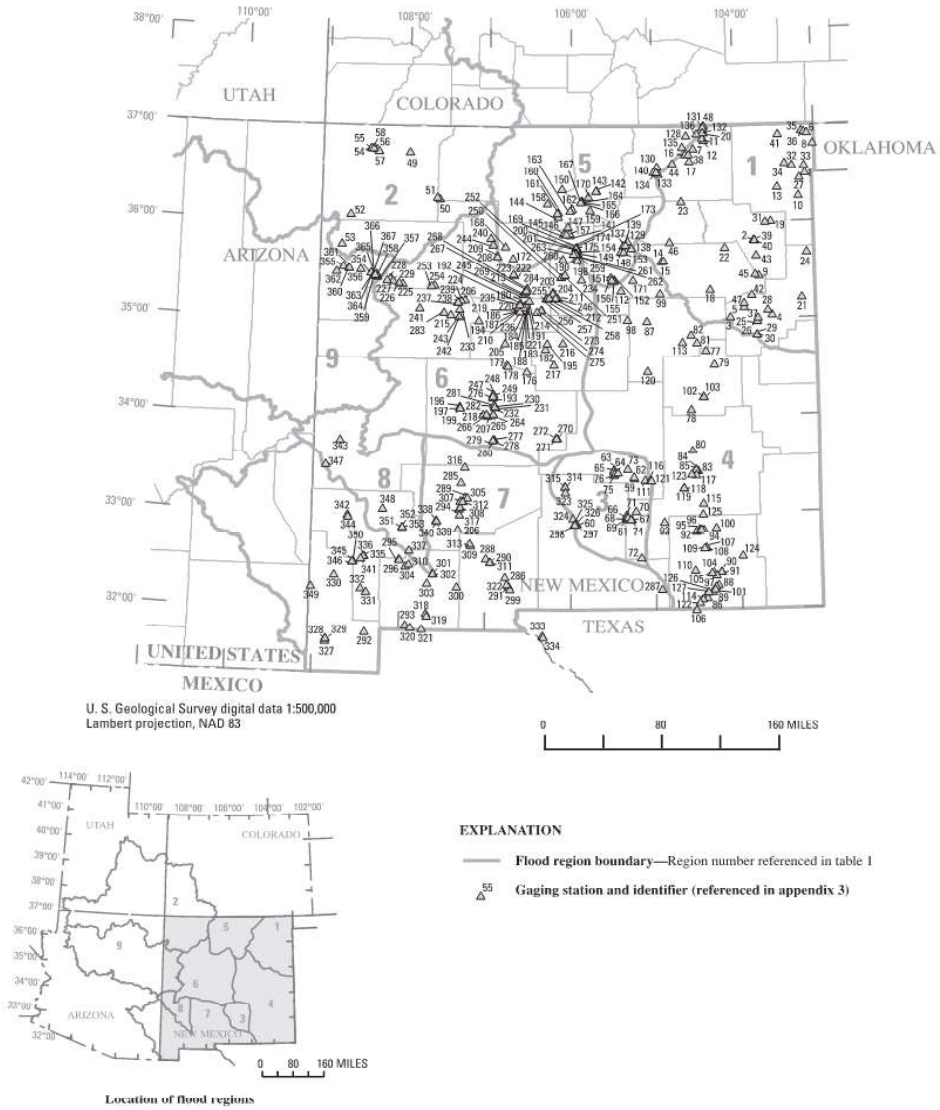
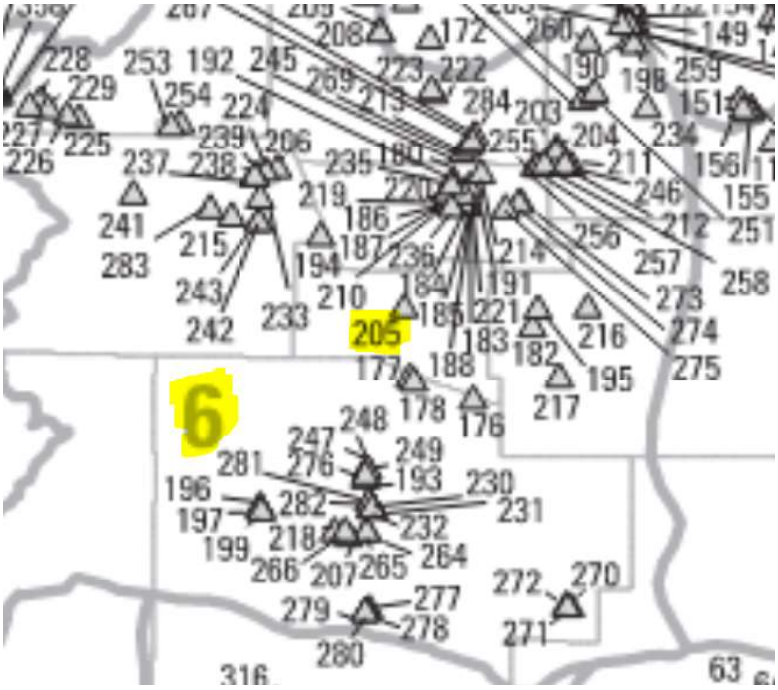


Figure 2. Flood regions and location of miscellaneous sites in New Mexico and surrounding areas.

Computed: **JAC**
Checked:

Date: **5/24/2021**
Date:

A closer look at Figure 2 indicates Map Idenifier 205 from Region 6 is most appropriate for our project area:



Appendix 3. Miscellaneous sites, maximum peak discharge, drainage area, and site elevations.—Continued

[DMS, degrees minutes seconds; NGVD 29, National Geodetic Vertical Datum of 1929]

Map identi-fier (fig. 2)	Latitude (DMS)	Longi-tude (DMS)	Miscellaneous site name	Date	Maximum peak discharge (cubic feet per second)	Drainage area (square miles)	Site elevation (feet above NGVD 29)	Region
201	354120	1055715	Arroyo Mascaras at Santa Fe, New Mexico	07/25/68	2,490	6.27	6,890	6
202	354130	1055612	Arroyo Ranchito at Santa Fe, New Mexico	08/24/57	520	0.61	7,130	6
203	351700	1061240	Arroyo Tuerto near Golden, New Mexico	09/24/55	2,000	12.9	6,480	6
204	351615	1061245	Arroyo Val Verde at Golden, New Mexico	09/24/55	987	1.40	6,580	6
205	344528	1064713	Belen Highline Canal tributary near Los Chaves, New Mexico	06/14/61	2,130	0.86	4,920	6
206	351225	1071620	Bohart Creek near Moquino, New Mexico	08/21/58	4,840	32.0	6,230	6
207	340023	1065908	Box Canyon near Socorro, New Mexico	08/01/56	6,210	24.3	5,380	6
208	353920	1065320	Cachana Arroyo near San Ysidro, New Mexico	05/14/59	1,590	5.16	6,100	6
209	353935	1065325	Cachana Arroyo tributary near San Ysidro, New Mexico	05/14/59	552	0.23	6,140	6
210	350610	1063810	Campus Wash at Albuquerque, New Mexico	08/10/63	640	7.3	5,000	6
211	351320	1060920	Canada de las Narrias (lower) near San Pedro, New Mexico	09/24/55	4,830	5.71	6,820	6
212	351335	1061055	Canada de las Narrias (upper) near San Pedro, New Mexico	09/24/55	2,200	1.53	7,010	6
213	351750	1063200	Canon del Agua at Bernalillo, New Mexico	07/19/56	5,380	3.93	5,200	6
214	351135	1062956	Canon la Cuerva near Albuquerque, New Mexico	07/27/55	1,920	2.60	6,080	6
215	350246	1072640	Encinal Arroyo near New Laguna, New Mexico	08/10/55	8,320	20.4	5,910	6
216	344530	1060539	Estancia Valley tributary No.1 near Estancia, New Mexico	07/07/52	4,660	13.2	6,180	6
217	343158	1061158	Estancia Valley tributary No.2 near Mountainair, New Mexico	07/07/52	3,560	3.35	6,410	6
218	340125	1070225	Four Mile Canyon near Socorro, New Mexico	08/08/56	1,010	16.0	6,040	6
219	350755	1063755	Hahn Arroyo above Edith Avenue at Albuquerque, New Mexico	08/10/63	4,100	8.50	5,000	6
220	350756	1063746	Hahn Arroyo at Edith Avenue at Albuquerque, New Mexico	08/11/61	935	7.60	5,000	6
221	350737	1063350	Hahn Arroyo tributary at Albuquerque, New Mexico	08/10/63	1,420	0.50	5,320	6
222	352739	1064041	Jemez River tributary at Bridge 3049 near San Ysidro, New Mexico	07/23/51	14,000	3.29	5,370	6
223	352817	1064122	Jemez River tributary at Bridge 3050 near San Ysidro, New Mexico	07/23/51	4,150	5.00	5,360	6
224	351152	1071905	Meyer Draw near Moquino, New Mexico	08/21/58	2,310	21.7	6,180	6
225	352142	1080157	Mitchell Draw tributary at Prewitt, New Mexico	08/07/59	1,020	3.00	6,790	6

Computed: **JAC** Date: **5/24/2021**
Checked: Date:

After reviewing the Appendix 3 table on Page 99, the following was detemined if Identifier 205:

Max Peak Dischage	Area	Area	Discharge (max) to Area (acre) Ratio
cfs	sq. mi.	acre	cfs/acre
2130	0.86	550.4	3.87

A closer look at the Region 6 Regression Equations on Page 9:

Analysis of Magnitude and Frequency of Peak Discharges 9

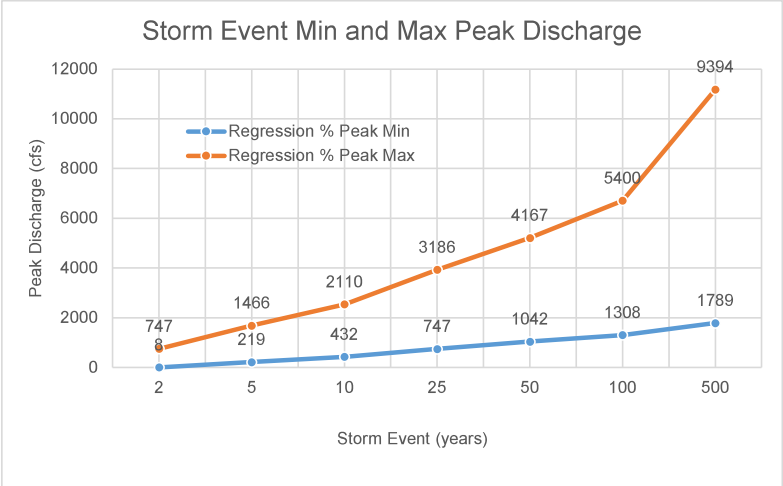
Table 2. Regional flood-frequency equations using generalized least-squares regression.

[Q, peak discharge, in cubic feet per second, for indicated recurrence interval; A, drainage area, in square miles; S, average basin slope upstream from gaging station, in percent (ft/ft*100); I24,100, maximum precipitation intensity of a storm of 24 hours duration with a recurrence interval of 100 years, in inches; Pa, mean annual precipitation (1961–90), in inches; E, average basin elevation, in feet]

Equations	Recurrence interval (years)	Average standard error of estimates			
		Regresion		Prediction	
		Log units	Percent	Log units	Percent
[redacted]					
Central mountain-valley flood region (6)					
$Q_2 = 1.328 \times 10^2 A^{0.420}$	2	0.376	98	0.394	113
$Q_5 = 3.163 \times 10^2 A^{0.394}$	5	0.298	74	0.313	83
$Q_{10} = 4.906 \times 10^2 A^{0.383}$	10	0.269	66	0.284	73
$Q_{25} = 7.800 \times 10^2 A^{0.372}$	25	0.252	62	0.267	68
$Q_{50} = 1.051 \times 10^3 A^{0.365}$	50	0.248	60	0.265	67
$Q_{100} = 1.374 \times 10^3 A^{0.359}$	100	0.251	61	0.268	68
$Q_{500} = 2.354 \times 10^3 A^{0.348}$	500	0.273	68	0.292	76

Reviewing the overall analysis study area:

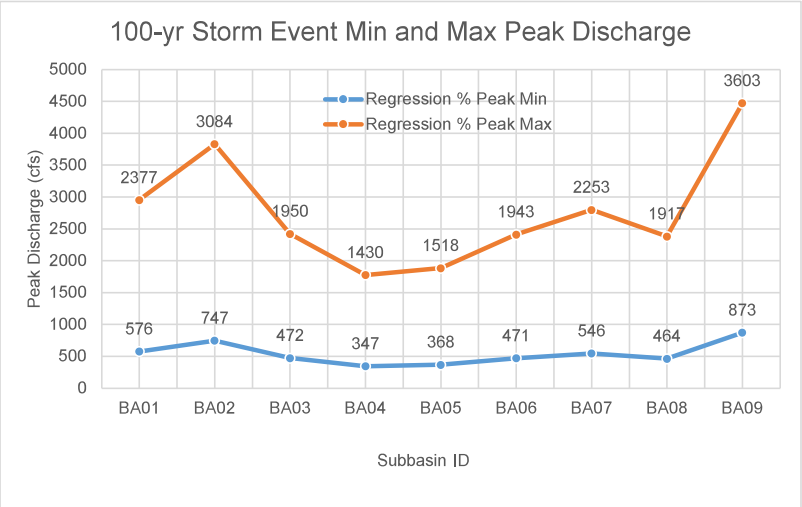
Study Area Peak Discharge Min and Max Review							
Storm Event	Area	Area	Peak Dischage	Discharge to Area (acre) Ratio	Regression %	Regression % Peak Min	Regression % Peak Max
years	acre	sq. mi.	cfs	cfs/acre		cfs	cfs
2	7688	12.01	377	20.38	98%	8	747
5	7688	12.01	842	9.13	74%	219	1466
10	7688	12.01	1271	6.05	66%	432	2110
25	7688	12.01	1967	3.91	62%	747	3186
50	7688	12.01	2604	2.95	60%	1042	4167
100	7688	12.01	3354	2.29	61%	1308	5400
500	7688	12.01	5591	1.38	68%	1789	9394



Computed: **JAC** Date: **5/24/2021**
Checked: Date:

Reviewing the basins withing analysis study area for 100-yr storm event:

Subbasin Peak Discharge Min and Max Review for 100-yr Storm Event							
Subbasin ID	Area	Area	100-yr Peak Dischage	Discharge (Q_{100}) to Area (ac) Ratio	Regression %	Regression % Peak Min	Regression % Peak Max
	acre	sq. mi.	cfs	cfs/acre		cfs	cfs
BA01	782	1.22	1476	0.53	61%	576	2377
BA02	1614	2.52	1915	0.84	61%	747	3084
BA03	450	0.70	1211	0.37	61%	472	1950
BA04	190	0.30	888	0.21	61%	347	1430
BA05	224	0.35	943	0.24	61%	368	1518
BA06	446	0.70	1207	0.37	61%	471	1943
BA07	673	1.05	1399	0.48	61%	546	2253
BA08	429	0.67	1191	0.36	61%	464	1917
BA09	2490	3.89	2238	1.11	61%	873	3603
BA10	107	0.17	722	0.15	61%	282	1162
BA11	283	0.44	1025	0.28	61%	400	1651



The values determined from the regression equations will be used to ***check*** against the approved hydrologic peak discharge analysis metholodogy used for the study area. This methodology is listed in the Summary tab of this workbook. The final values used for design will be supported by the exercise of judgement.

Project:	**Rio Communities Drainage Master Plan**	Date:	**5/24/2021**
Subject:	**Hydrology - Future Conditions - Platted Area**	Date:	
Task:		of:	
Job #:			

Rio Communities Hydrology - Future Conditions - Platted Area

Reference: NMDOT Drainage Design Manual, July 2018

Stream Name:
Mile Post:
USGS Quadrangle:
Methodology: NRCS SCS Unit Hydrograph Method within HEC-HMS
For urban conditions with basin sizes between 160 acres and 10 sq. miles

Peak Discharge per recurrence interval (cfs)						
Subbasin ID	Area (Acres)	Tc (hr)	Qp_{10}	Qp_{25}	Qp_{50}	Qp_{100}
FBA01	311	0.7	7	19	32	49
FBA02	94	0.8	2	6	10	15
FBA03	64	0.5	2	6	10	14
FBA04	39	0.4	5	10	14	19
FBA05	87	0.6	3	7	11	16
FBA06	172	0.9	4	9	16	25
FBA07	127	0.6	14	24	36	53
FBA08	134	0.8	4	9	15	23
FBA09	107	0.9	3	7	11	18
FBA10	88	0.4	2	6	11	17
FBA11	184	0.9	40	68	93	122
FBA12	209	1.5	9	18	27	36
FBA13	70	0.6	4	8	12	18
FBA14	116	0.3	3	10	19	34
	1800					

Runoff Volume, Qv (ac-ft)						
Subbasin ID	Area (Acres)	Tc (hr)	Qv_{10}	Qv_{25}	Qv_{50}	Qv_{100}
FBA01	311	0.7	0.8	2.1	3.6	5.5
FBA02	94	0.8	0.3	0.8	1.3	1.9
FBA03	64	0.5	0.2	0.5	0.8	1.3
FBA04	39	0.4	0.4	0.7	1.0	1.3
FBA05	87	0.6	0.3	0.7	1.2	1.7
FBA06	172	0.9	0.5	1.4	2.3	3.4
FBA07	127	0.6	1.4	2.5	3.5	4.7
FBA08	134	0.8	0.5	1.2	2.0	2.9
FBA09	107	0.9	0.4	1.0	1.6	2.3
FBA10	88	0.4	0.2	0.5	0.9	1.4
FBA11	184	0.9	5.2	7.8	10.1	12.6
FBA12	209	1.5	1.5	2.9	4.4	6.1
FBA13	70	0.6	0.4	0.9	1.3	1.9
FBA14	116	0.3	0.6	1.6	2.8	4.2

Comments:

The NRCS (SCS) Unit Hydrograph Method within HEC-HMS (Section 405, Page 4-92) outlined in the 2018 NMDOT Drainage Design Manual was used to determine design peak discharges and volumes for urban conditions. A weighted curve number was computed based on data pulled from USGS Web Soil Survey. NOAA 14 rainfall depths were used with the peak discharge rate occuring at 6 hours. Per Table 402-6 (Page 4-38), both the "Upland Method" and "Iterative Method within the Stream Hydraulic Method" were used to determine time of concentration. The values presented in the summary tables above are maximum values determined between this workbook and HEC-HMS results. Please review the HEC-HMS results for more information.

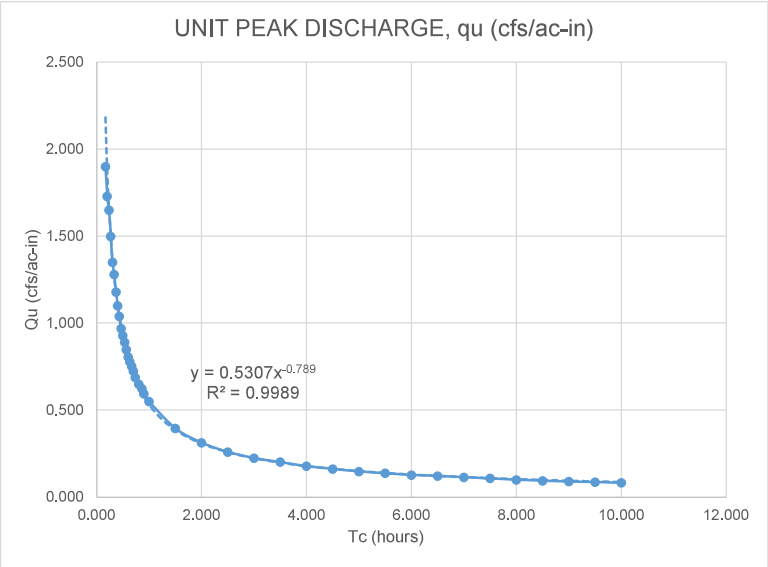
Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

General							24-hr:																
Subbasin ID	**Contributing Area**	**CN**	**Tc**	**Potential Max Soil Moisture Rentention, S**	**Initial Abstraction, Ia (Figure 402-8)**	**Unit Peak Discharge, qu**	**NOAA Rainfall Depth**				**Direct Runoff, Qd (Equation 404-1)**				**Runoff Volume, Qv (Equation 404-3)**				**Peak Discharge per recurrence interval, Qp (Equation 404-2)**				**Discharge (Q_{100}) to Area (ac) Ratio**
	(acre)		(min)			(cfs/acre-in)	(in)				(in)				(ac-ft)				(cfs)				
							P_{10}	P_{25}	P_{50}	P_{100}	Qd_{10}	Qd_{25}	Qd_{50}	Qd_{100}	Qv_{10}	Qv_{25}	Qv_{50}	Qv_{100}	Qp_{10}	Qp_{25}	Qp_{50}	Qp_{100}	
FBA01	311	60	39	6.67	1.33	0.75	1.79	2.11	2.37	2.63	0.03	0.08	0.14	0.21	0.76	2.10	3.61	5.46	6.78	18.76	32.30	48.88	0.2
FBA02	94	61	48	6.39	1.28	0.63	1.79	2.11	2.37	2.63	0.04	0.10	0.16	0.24	0.30	0.75	1.25	1.86	2.26	5.72	9.51	14.09	0.1
FBA03	64	61	29	6.39	1.28	0.94	1.79	2.11	2.37	2.63	0.04	0.10	0.16	0.24	0.20	0.51	0.85	1.25	2.28	5.75	9.57	14.18	0.2
FBA04	39	67	21	4.93	0.99	1.22	1.79	2.11	2.37	2.63	0.11	0.21	0.30	0.41	0.37	0.68	0.98	1.33	5.34	9.87	14.35	19.44	0.5
FBA05	87	61	36	6.39	1.28	0.79	1.79	2.11	2.37	2.63	0.04	0.10	0.16	0.24	0.27	0.69	1.15	1.71	2.61	6.59	10.97	16.25	0.2
FBA06	172	61	55	6.39	1.28	0.57	1.79	2.11	2.37	2.63	0.04	0.10	0.16	0.24	0.54	1.37	2.27	3.37	3.69	9.33	15.51	22.99	0.1
FBA07	127	68	34	4.71	0.94	0.83	1.79	2.11	2.37	2.63	0.13	0.23	0.33	0.45	1.37	2.45	3.51	4.70	13.63	24.44	34.98	46.88	0.4
FBA08	134	62	50	6.13	1.23	0.61	1.79	2.11	2.37	2.63	0.05	0.11	0.18	0.26	0.53	1.25	2.01	2.93	3.91	9.16	14.80	21.52	0.2
FBA09	107	62	53	6.13	1.23	0.59	1.79	2.11	2.37	2.63	0.05	0.11	0.18	0.26	0.42	0.99	1.60	2.33	2.98	6.97	11.26	16.37	0.2
FBA10	88	59	26	6.95	1.39	1.03	1.79	2.11	2.37	2.63	0.02	0.07	0.12	0.19	0.16	0.49	0.88	1.37	1.96	6.08	10.89	16.89	0.2
FBA11	184	77	53	2.99	0.60	0.59	1.79	2.11	2.37	2.63	0.34	0.51	0.66	0.82	5.20	7.78	10.10	12.59	36.55	54.62	70.91	88.41	0.5
FBA12	209	65	87	5.38	1.08	0.40	1.79	2.11	2.37	2.63	0.08	0.17	0.25	0.35	1.45	2.90	4.36	6.06	6.90	13.76	20.72	28.77	0.1
FBA13	70	64	37	5.63	1.13	0.78	1.79	2.11	2.37	2.63	0.07	0.15	0.23	0.32	0.41	0.86	1.32	1.86	3.83	8.00	12.30	17.32	0.2
FBA14	116	59	19	6.95	1.39	1.31	1.79	2.11	2.37	2.63	0.02	0.07	0.12	0.19	0.21	0.65	1.17	1.82	3.33	10.33	18.52	28.70	0.2

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

TABLE 404-1: UNIT PEAK DISCHARGE TABLE

Tc		qu
hours	**min**	**cfs/ac-in**
0.167	10	1.900
0.200	12	1.730
0.233	14	1.650
0.267	16	1.500
0.300	18	1.350
0.333	20	1.280
0.367	22	1.180
0.400	24	1.100
0.433	26	1.040
0.467	28	0.970
0.500	30	0.930
0.533	32	0.890
0.567	34	0.848
0.600	36	0.805
0.633	38	0.778
0.667	40	0.752
0.700	42	0.725
0.733	44	0.688
0.800	48	0.650
0.867	52	0.623
0.900	54	0.595
1.000	60	0.550
1.500	90	0.395
2.000	120	0.313
2.500	150	0.260
3.000	180	0.225
3.500	210	0.202
4.000	240	0.178
4.500	270	0.163
5.000	300	0.148
5.500	330	0.138
6.000	360	0.128
6.500	390	0.122
7.000	420	0.115
7.500	450	0.108
8.000	480	0.100
8.500	510	0.095
9.000	540	0.090
9.500	570	0.087
10.000	600	0.083



INPUT TABLE - TO INTERPOLATE qu FROM TABLE 404-1

Tc		qu
hours	**min**	**cfs/ac-in**
0.650	39	0.75
0.800	48	0.63
0.483	29	0.94
0.350	21	1.22
0.600	36	0.79
0.917	55	0.57
0.567	34	0.83
0.833	50	0.61
0.883	53	0.59
0.433	26	1.03
0.883	53	0.59
1.450	87	0.40
0.617	37	0.78
0.317	19	1.31
0.000		#DIV/0!

NOTE:

USE INPUT TABLE TO INTERPOLATE VALUES BETWEEN THOSE GIVEN IN TABLE 404-1. THE POLYNOMIAL TREND LINE EQUATION PROVIDES MINOR INACCURACIES FOR Tc > 14 MIN. AND MAJOR INACCURACIES FOR Tc < 14 MIN. PLEASE CHECK VALUES.

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA01

Cover Type and Hydrologic Condition	A Area	A % Area	A HSG CN	A Adjusted (% Area) HSG CN	A Adjusted (% Area) HSG CN x Area	B Area	B % Area	B HSG CN	B Adjusted (% Area) HSG CN	B Adjusted (% Area) HSG CN x Area	C Area	C % Area	C HSG CN	C Adjusted (% Area) HSG CN	C Adjusted (% Area) HSG CN x Area	D Area	D % Area	D HSG CN	D Adjusted (% Area) HSG CN	D Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair	26.88415	8.7%	49	4.241961375	1612.0			69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	283.6617	91.3%	61	55.71919094	17008.7			75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor			63					77					85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

	A	B	C	D
Subtotal Acres	310.5	0.0	0.0	0.0
HSG Adjusted CN	60.0	0.0	0.0	0.0
HSG Adjusted CN x Area	18620.7	0.0	0.0	0.0
Total Adjusted CN x Area	**18620.7**			
Total Area	**310.5**			
Area Weighted Curve Number	**60**			

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA02

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	94.45662	100.0%	61	61.0	5761.9			75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor			63					77					85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	94.5	0.0	0.0	0.0
HSG Adjusted CN	61.0	0.0	0.0	0.0
HSG Adjusted CN x Area	5761.9	0.0	0.0	0.0
Total Adjusted CN x Area	**5761.9**			
Total Area	**94.5**			
Area Weighted Curve Number	**61**			

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA03

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																							
	A						B						C						D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area		Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area		Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area		Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	
Unit:	Acre	%	-	Acre	Acre		Acre	%	-	Acre	Acre		Acre	%	-	Acre	Acre		Acre	%	-	Acre	Acre	
Urban																								
Open space - poor			68						79						86						89			
Open space - fair			49						69						79						84			
Open space - good			39						61						74						80			
Impervious - parking lots, roofs, etc.			98						98						98						98			
Impervious - streets/roads; paved; curbs, storm			98						98						98						98			
Impervious - streets/roads; paved; open ditches			83						89						92						93			
Impervious - streets/roads; gravel			76						85						89						91			
Impervious - streets/roads; dirt			72						82						87						89			
Western desert urban - natural			63						77						85						88			
Western desert urban - artificial			96						96						96						96			
Urban - commercial/business			89						92						94						95			
Urban - industrial			81						88						91						93			
Residential - 1/8 acre or less			77						85						90						92			
Residential - 1/4 acre	63.87187	100.0%	61	61.00	3896.18				75						83						87			
Residential - 1/3 acre			57						72						81						86			
Residential - 1/2 acre			54						70						80						85			
Residential - 1 acre			51						68						79						84			
Residential - 2 acres			46						65						77						82			
Developing urban - newly graded			77						86						91						94			
Other Agricultural																								
Pasture, grass, range - poor			68						79						86						89			
Pasture, grass, range - fair			49						69						79						84			
Pasture, grass, range - good			39						61						74						80			
Meadow			30						58						71						78			
Brush - poor			48						67						77						83			
Brush - fair			35						56						70						77			
Brush - good			30						48						65						73			
Woods combination - poor			57						73						82						86			
Woods combination - fair			43						65						76						82			
Woods combination - good			32						58						72						79			
Woods - poor			45						66						77						83			
Woods - fair			36						60						73						79			
Woods - good			30						55						70						77			
Farmsteads			59						74						82						86			
Arid and Semiarid Rangelands																								
Herbaceous - poor									80						87						93			
Herbaceous - fair									71						81						89			
Herbaceous - good									62						74						85			
Oak-aspen - poor									66						74						79			
Oak-aspen - fair									48						57						63			
Oak-aspen - good									30						41						48			
Pinyon-juniper - poor									75						85						89			
Pinyon-juniper - fair									58						73						80			
Pinyon-juniper - good									41						61						71			
Sagebrush - poor									67						80						85			
Sagebrush - fair									51						63						70			
Sagebrush - good									35						47						55			
Desert shrub - poor			63						77						85						88			
Desert shrub - fair			55						72						81						86			
Desert shrub - good			49						68						79						84			
Water			98						98						98						98			

Subtotal Acres	63.9	0.0	0.0	0.0
HSG Adjusted CN	61.0	0.0	0.0	0.0
HSG Adjusted CN x Area	3896.2	0.0	0.0	0.0
Total Adjusted CN x Area	**3896.2**			
Total Area	**63.9**			
Area Weighted Curve Number	**61**			

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA04

Cover Type and Hydrologic Condition	A Area	A % Area	A HSG CN	A Adjusted (% Area) HSG CN	A Adjusted (% Area) HSG CN x Area	B Area	B % Area	B HSG CN	B Adjusted (% Area) HSG CN	B Adjusted (% Area) HSG CN x Area	C Area	C % Area	C HSG CN	C Adjusted (% Area) HSG CN	C Adjusted (% Area) HSG CN x Area	D Area	D % Area	D HSG CN	D Adjusted (% Area) HSG CN	D Adjusted (% Area) HSG CN x Area
	Curve Numbers for Hydrologic Soil Group (HSG)																			
Urban																				
Open space - poor			68					79					86					89		
Open space - fair	2.270606	10.8%	49	5.3	135.6	1.162259	6.5%	69	4.5	86.7			79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	18.71917	89.2%	61	54.4	1117.6	16.70142	93.5%	75	70.1	1246.1			83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor			63					77					85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

	A	B	C	D
Subtotal Acres	21.0	17.9	0.0	0.0
HSG Adjusted CN	59.7	74.6	0.0	0.0
HSG Adjusted CN x Area	1253.1	1332.8	0.0	0.0
Total Adjusted CN x Area	**2585.9**			
Total Area	**38.9**			
Area Weighted Curve Number	**67**			

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA05

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																							
	A					B					C					D								
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																								
Open space - poor			68					79					86					89						
Open space - fair			49					69					79					84						
Open space - good			39					61					74					80						
Impervious - parking lots, roofs, etc.			98					98					98					98						
Impervious - streets/roads; paved; curbs, storm			98					98					98					98						
Impervious - streets/roads; paved; open ditches			83					89					92					93						
Impervious - streets/roads; gravel			76					85					89					91						
Impervious - streets/roads; dirt			72					82					87					89						
Western desert urban - natural			63					77					85					88						
Western desert urban - artificial			96					96					96					96						
Urban - commercial/business			89					92					94					95						
Urban - industrial			81					88					91					93						
Residential - 1/8 acre or less			77					85					90					92						
Residential - 1/4 acre	86.00293	100.0%	61	61.0	5246.2	0.807023	100.0%	75	75.0	60.5			83					87						
Residential - 1/3 acre			57					72					81					86						
Residential - 1/2 acre			54					70					80					85						
Residential - 1 acre			51					68					79					84						
Residential - 2 acres			46					65					77					82						
Developing urban - newly graded			77					86					91					94						
Other Agricultural																								
Pasture, grass, range - poor			68					79					86					89						
Pasture, grass, range - fair			49					69					79					84						
Pasture, grass, range - good			39					61					74					80						
Meadow			30					58					71					78						
Brush - poor			48					67					77					83						
Brush - fair			35					56					70					77						
Brush - good			30					48					65					73						
Woods combination - poor			57					73					82					86						
Woods combination - fair			43					65					76					82						
Woods combination - good			32					58					72					79						
Woods - poor			45					66					77					83						
Woods - fair			36					60					73					79						
Woods - good			30					55					70					77						
Farmsteads			59					74					82					86						
Arid and Semiarid Rangelands																								
Herbaceous - poor								80					87					93						
Herbaceous - fair								71					81					89						
Herbaceous - good								62					74					85						
Oak-aspen - poor								66					74					79						
Oak-aspen - fair								48					57					63						
Oak-aspen - good								30					41					48						
Pinyon-juniper - poor								75					85					89						
Pinyon-juniper - fair								58					73					80						
Pinyon-juniper - good								41					61					71						
Sagebrush - poor								67					80					85						
Sagebrush - fair								51					63					70						
Sagebrush - good								35					47					55						
Desert shrub - poor			63					77					85					88						
Desert shrub - fair			55					72					81					86						
Desert shrub - good			49					68					79					84						
Water			98					98					98					98						

Subtotal Acres	86.0	0.8	0.0	0.0
HSG Adjusted CN	61.0	75.0	0.0	0.0
HSG Adjusted CN x Area	5246.2	60.5	0.0	0.0
Total Adjusted CN x Area	**5306.7**			
Total Area	**86.8**			
Area Weighted Curve Number	**61**			

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA06

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	171.5107	100.0%	61	61.0	10462.2			75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor			63					77					85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	171.5	0.0	0.0	0.0
HSG Adjusted CN	61.0	0.0	0.0	0.0
HSG Adjusted CN x Area	10462.2	0.0	0.0	0.0
Total Adjusted CN x Area	**10462.2**			
Total Area	**171.5**			
Area Weighted Curve Number	**61**			

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA07

Cover Type and Hydrologic Condition	A Area	A % Area	A HSG CN	A Adjusted (% Area) HSG CN	A Adjusted (% Area) HSG CN x Area	B Area	B % Area	B HSG CN	B Adjusted (% Area) HSG CN	B Adjusted (% Area) HSG CN x Area	C Area	C % Area	C HSG CN	C Adjusted (% Area) HSG CN	C Adjusted (% Area) HSG CN x Area	D Area	D % Area	D HSG CN	D Adjusted (% Area) HSG CN	D Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair	2.851161	5.0%	49	2.4	172.2	3.598906	5.2%	69	3.6	268.8			79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	54.42798	95.0%	61	58.0	3287.6	65.6335	94.8%	75	71.1	4902.0			83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor			63					77					85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

	A	B	C	D
Subtotal Acres	57.3	69.2	0.0	0.0
HSG Adjusted CN	60.4	74.7	0.0	0.0
HSG Adjusted CN x Area	3459.8	5170.8	0.0	0.0
Total Adjusted CN x Area	**8630.7**			
Total Area	**126.5**			
Area Weighted Curve Number	**68**			

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA08

Cover Type and Hydrologic Condition	A Area	A % Area	A HSG CN	A Adjusted (% Area) HSG CN	A Adjusted (% Area) HSG CN x Area	B Area	B % Area	B HSG CN	B Adjusted (% Area) HSG CN	B Adjusted (% Area) HSG CN x Area	C Area	C % Area	C HSG CN	C Adjusted (% Area) HSG CN	C Adjusted (% Area) HSG CN x Area	D Area	D % Area	D HSG CN	D Adjusted (% Area) HSG CN	D Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair	11.39122	10.5%	49	5.2	680.5	9.709918	37.3%	69	25.7	706.5			79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	96.72515	89.5%	61	54.6	5777.9	16.3323	62.7%	75	47.0	1188.4			83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor			63					77					85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

	A	B	C	D
Subtotal Acres	108.1	26.0	0.0	0.0
HSG Adjusted CN	59.7	72.8	0.0	0.0
HSG Adjusted CN x Area	6458.4	1894.9	0.0	0.0
Total Adjusted CN x Area	**8353.3**			
Total Area	**134.2**			
Area Weighted Curve Number	**62**			

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA09

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair	2.677169	2.7%	49	1.3	162.4	0.697746	9.9%	69	6.9	51.9			79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	97.19451	97.3%	61	59.4	5897.6	6.321416	90.1%	75	67.5	470.3			83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor			63					77					85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	99.9	7.0	0.0	0.0
HSG Adjusted CN	60.7	74.4	0.0	0.0
HSG Adjusted CN x Area	6060.0	522.3	0.0	0.0
Total Adjusted CN x Area	**6582.3**			
Total Area	**106.9**			
Area Weighted Curve Number	**62**			

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA10

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair	13.35045	15.2%	49	7.5	790.0			69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	74.23343	84.8%	61	51.7	4392.5			75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor			63					77					85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	87.6	0.0	0.0	0.0
HSG Adjusted CN	59.2	0.0	0.0	0.0
HSG Adjusted CN x Area	5182.4	0.0	0.0	0.0
Total Adjusted CN x Area	**5182.4**			
Total Area	**87.6**			
Area Weighted Curve Number	**59**			

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA11

Cover Type and Hydrologic Condition	A Area	A % Area	A HSG CN	A Adjusted (% Area) HSG CN	A Adjusted (% Area) HSG CN x Area	B Area	B % Area	B HSG CN	B Adjusted (% Area) HSG CN	B Adjusted (% Area) HSG CN x Area	C Area	C % Area	C HSG CN	C Adjusted (% Area) HSG CN	C Adjusted (% Area) HSG CN x Area	D Area	D % Area	D HSG CN	D Adjusted (% Area) HSG CN	D Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair	2.618289	5.1%	49	2.5	169.1	0.94388	0.7%	69	0.5	76.7			79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial	10.68036	21.0%	81	17.0	689.7	64.16731	48.4%	88	42.6	5213.5			91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	37.64935	73.9%	61	45.1	2431.2	67.4694	50.9%	75	38.2	5481.8			83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor			63					77					85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

	A	B	C	D
Subtotal Acres	50.9	132.6	0.0	0.0
HSG Adjusted CN	64.6	81.2	0.0	0.0
HSG Adjusted CN x Area	3290.0	10772.1	0.0	0.0
Total Adjusted CN x Area	**14062.1**			
Total Area	**183.5**			
Area Weighted Curve Number	**77**			

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA12

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial	16.22751	9.0%	81	7.3	1019.0	14.83959	52.2%	88	46.0	1213.7			91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	164.4005	91.0%	61	55.5	10323.8	13.57792	47.8%	75	35.8	1110.5			83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor			63					77					85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	180.6	28.4	0.0	0.0
HSG Adjusted CN	62.8	81.8	0.0	0.0
HSG Adjusted CN x Area	11342.9	2324.2	0.0	0.0
Total Adjusted CN x Area	**13667.1**			
Total Area	**209.0**			
Area Weighted Curve Number	**65**			

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA13

Cover Type and Hydrologic Condition	A					B					C					D				
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair	2.929759	5.8%	49	2.8	176.7	0.915281	4.7%	69	3.2	68.4			79					84		
Open space - good			39					61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	47.65946	94.2%	61	57.5	2874.1	18.66705	95.3%	75	71.5	1394.8			83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor			63					77					85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

	A	B	C	D
Subtotal Acres	50.6	19.6	0.0	0.0
HSG Adjusted CN	60.3	74.7	0.0	0.0
HSG Adjusted CN x Area	3050.8	1463.2	0.0	0.0
Total Adjusted CN x Area	**4514.0**			
Total Area	**70.2**			
Area Weighted Curve Number	**64**			

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA14

Cover Type and Hydrologic Condition	Curve Numbers for Hydrologic Soil Group (HSG)																				
	A					B					C					D					
	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area	Area	% Area	HSG CN	Adjusted (% Area) HSG CN	Adjusted (% Area) HSG CN x Area
Unit:	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre	Acre	%	-	Acre	Acre
Urban																				
Open space - poor			68					79					86					89		
Open space - fair			49					69					79					84		
Open space - good	12.44736	10.7%	39	4.2	730.0			61					74					80		
Impervious - parking lots, roofs, etc.			98					98					98					98		
Impervious - streets/roads; paved; curbs, storm			98					98					98					98		
Impervious - streets/roads; paved; open ditches			83					89					92					93		
Impervious - streets/roads; gravel			76					85					89					91		
Impervious - streets/roads; dirt			72					82					87					89		
Western desert urban - natural			63					77					85					88		
Western desert urban - artificial			96					96					96					96		
Urban - commercial/business			89					92					94					95		
Urban - industrial			81					88					91					93		
Residential - 1/8 acre or less			77					85					90					92		
Residential - 1/4 acre	103.7761	89.3%	61	54.5	6085.8			75					83					87		
Residential - 1/3 acre			57					72					81					86		
Residential - 1/2 acre			54					70					80					85		
Residential - 1 acre			51					68					79					84		
Residential - 2 acres			46					65					77					82		
Developing urban - newly graded			77					86					91					94		
Other Agricultural																				
Pasture, grass, range - poor			68					79					86					89		
Pasture, grass, range - fair			49					69					79					84		
Pasture, grass, range - good			39					61					74					80		
Meadow			30					58					71					78		
Brush - poor			48					67					77					83		
Brush - fair			35					56					70					77		
Brush - good			30					48					65					73		
Woods combination - poor			57					73					82					86		
Woods combination - fair			43					65					76					82		
Woods combination - good			32					58					72					79		
Woods - poor			45					66					77					83		
Woods - fair			36					60					73					79		
Woods - good			30					55					70					77		
Farmsteads			59					74					82					86		
Arid and Semiarid Rangelands																				
Herbaceous - poor								80					87					93		
Herbaceous - fair								71					81					89		
Herbaceous - good								62					74					85		
Oak-aspen - poor								66					74					79		
Oak-aspen - fair								48					57					63		
Oak-aspen - good								30					41					48		
Pinyon-juniper - poor								75					85					89		
Pinyon-juniper - fair								58					73					80		
Pinyon-juniper - good								41					61					71		
Sagebrush - poor								67					80					85		
Sagebrush - fair								51					63					70		
Sagebrush - good								35					47					55		
Desert shrub - poor			63					77					85					88		
Desert shrub - fair			55					72					81					86		
Desert shrub - good			49					68					79					84		
Water			98					98					98					98		

Subtotal Acres	116.2	0.0	0.0	0.0
HSG Adjusted CN	58.6	0.0	0.0	0.0
HSG Adjusted CN x Area	6815.8	0.0	0.0	0.0
Total Adjusted CN x Area	**6815.8**			
Total Area	**116.2**			
Area Weighted Curve Number	**59**			

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

Use this spreadsheet to import GIS data. This info will then be used to populate "Composite CN" spreadsheet.
Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
FBA01	Bs	Open space - fair	A	268573.33	6.17E+00	0.34%
FBA01	Wk	Open space - fair	A	902500.23	2.07E+01	1.15%
FBA01	Wn	Residential - 1/4 acre	A	3463132.6	7.95E+01	4.42%
FBA01	Bs	Residential - 1/4 acre	A	3201797.8	7.35E+01	4.08%
FBA01	Bs	Residential - 1/4 acre	A	351053.55	8.06E+00	0.45%
FBA01	Wk	Residential - 1/4 acre	A	3608096.7	8.28E+01	4.60%
FBA01	Wk	Residential - 1/4 acre	A	1732112.5	3.98E+01	2.21%
FBA01	Bs	Residential - 1/4 acre	A	43.2073	9.92E-04	0.00%
FBA01	Wk	Residential - 1/4 acre	A	21.259932	4.88E-04	0.00%
FBA01	Wk	Residential - 1/4 acre	A	22.323535	5.12E-04	0.00%
FBA01	Wk	Residential - 1/4 acre	A	22.085065	5.07E-04	0.00%
FBA02	Wn	Residential - 1/4 acre	A	91004.801	2.09E+00	0.12%
FBA02	Wn	Residential - 1/4 acre	A	1450268.6	3.33E+01	1.85%
FBA02	Bs	Residential - 1/4 acre	A	1351042.6	3.10E+01	1.72%
FBA02	Wk	Residential - 1/4 acre	A	1222214.5	2.81E+01	1.56%
FBA03	Wn	Residential - 1/4 acre	A	938.32329	2.15E-02	0.00%
FBA03	Wk	Residential - 1/4 acre	A	2781320.5	6.39E+01	3.55%
FBA04	Bs	Open space - fair	A	23285.721	5.35E-01	0.03%
FBA04	Wk	Open space - fair	A	75621.888	1.74E+00	0.10%
FBA04	Md	Open space - fair	B	50627.998	1.16E+00	0.06%
FBA04	Bs	Residential - 1/4 acre	A	135666.65	3.11E+00	0.17%
FBA04	Wk	Residential - 1/4 acre	A	677712.49	1.56E+01	0.86%
FBA04	Wk	Residential - 1/4 acre	A	2005.6015	4.60E-02	0.00%
FBA04	Wk	Residential - 1/4 acre	A	22.323535	5.12E-04	0.00%
FBA04	Md	Residential - 1/4 acre	B	727513.98	1.67E+01	0.93%
FBA05	Bs	Residential - 1/4 acre	A	883334.17	2.03E+01	1.13%
FBA05	Bs	Residential - 1/4 acre	A	991133.61	2.28E+01	1.26%
FBA05	Wk	Residential - 1/4 acre	A	54065.408	1.24E+00	0.07%
FBA05	Wk	Residential - 1/4 acre	A	1817668.1	4.17E+01	2.32%
FBA05	Bs	Residential - 1/4 acre	A	43.2073	9.92E-04	0.00%
FBA05	Wk	Residential - 1/4 acre	A	21.259932	4.88E-04	0.00%
FBA05	Wk	Residential - 1/4 acre	A	22.085065	5.07E-04	0.00%
FBA05	Md	Residential - 1/4 acre	B	35153.902	8.07E-01	0.04%
FBA06	Wn	Residential - 1/4 acre	A	903121.2	2.07E+01	1.15%
FBA06	Bs	Residential - 1/4 acre	A	753067.43	1.73E+01	0.96%
FBA06	Wn	Residential - 1/4 acre	A	1605552.4	3.69E+01	2.05%
FBA06	Bs	Residential - 1/4 acre	A	599034.44	1.38E+01	0.76%
FBA06	Wk	Residential - 1/4 acre	A	318804.24	7.32E+00	0.41%
FBA06	Wk	Residential - 1/4 acre	A	3291427.2	7.56E+01	4.20%
FBA07	Bs	Open space - fair	A	42888.809	9.85E-01	0.05%
FBA07	Wk	Open space - fair	A	81307.743	1.87E+00	0.10%
FBA07	Md	Open space - fair	B	156768.36	3.60E+00	0.20%

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

Use this spreadsheet to import GIS data. This info will then be used to populate "Composite CN" spreadsheet.
Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
FBA07	Bs	Residential - 1/4 acre	A	169311.57	3.89E+00	0.22%
FBA07	Bs	Residential - 1/4 acre	A	47207.14	1.08E+00	0.06%
FBA07	Wk	Residential - 1/4 acre	A	2154364.1	4.95E+01	2.75%
FBA07	Md	Residential - 1/4 acre	B	2858995.4	6.56E+01	3.65%
FBA08	Bs	Open space - fair	A	31115.579	7.14E-01	0.04%
FBA08	Bs	Open space - fair	A	357736.17	8.21E+00	0.46%
FBA08	Bs	Open space - fair	A	14606.22	3.35E-01	0.02%
FBA08	Wn	Open space - fair	A	32074.432	7.36E-01	0.04%
FBA08	Wk	Open space - fair	A	56400.743	1.29E+00	0.07%
FBA08	Wk	Open space - fair	A	4268.5523	9.80E-02	0.01%
FBA08	Md	Open space - fair	B	136515.13	3.13E+00	0.17%
FBA08	Md	Open space - fair	B	286448.91	6.58E+00	0.37%
FBA08	Bs	Residential - 1/4 acre	A	847139.08	1.94E+01	1.08%
FBA08	Bs	Residential - 1/4 acre	A	15764.726	3.62E-01	0.02%
FBA08	Wn	Residential - 1/4 acre	A	639354.56	1.47E+01	0.82%
FBA08	Wk	Residential - 1/4 acre	A	2711089.3	6.22E+01	3.46%
FBA08	Md	Residential - 1/4 acre	B	711434.91	1.63E+01	0.91%
FBA09	Wn	Open space - fair	A	27400.868	6.29E-01	0.03%
FBA09	Wk	Open space - fair	A	76046.2	1.75E+00	0.10%
FBA09	Wk	Open space - fair	A	6767.1698	1.55E-01	0.01%
FBA09	Wn	Open space - fair	A	6403.2314	1.47E-01	0.01%
FBA09	Md	Open space - fair	B	30393.795	6.98E-01	0.04%
FBA09	Bs	Residential - 1/4 acre	A	514448	1.18E+01	0.66%
FBA09	Wn	Residential - 1/4 acre	A	1639470.5	3.76E+01	2.09%
FBA09	Wk	Residential - 1/4 acre	A	1120393.2	2.57E+01	1.43%
FBA09	Wk	Residential - 1/4 acre	A	957464.84	2.20E+01	1.22%
FBA09	Wn	Residential - 1/4 acre	A	2016.4113	4.63E-02	0.00%
FBA09	Md	Residential - 1/4 acre	B	275360.87	6.32E+00	0.35%
FBA10	Wm	Open space - fair	A	75116.796	1.72E+00	0.10%
FBA10	Wm	Open space - fair	A	79684.643	1.83E+00	0.10%
FBA10	Pa	Open space - fair	A	21309.953	4.89E-01	0.03%
FBA10	Wk	Open space - fair	A	69241.222	1.59E+00	0.09%
FBA10	Wk	Open space - fair	A	237315.63	5.45E+00	0.30%
FBA10	Wk	Open space - fair	A	98877.221	2.27E+00	0.13%
FBA10	Wm	Residential - 1/4 acre	A	1240100.2	2.85E+01	1.58%
FBA10	Pa	Residential - 1/4 acre	A	165285.26	3.79E+00	0.21%
FBA10	Wk	Residential - 1/4 acre	A	1828222.9	4.20E+01	2.33%
FBA11	Bs	Open space - fair	A	32546.475	7.47E-01	0.04%
FBA11	Wn	Open space - fair	A	31178.855	7.16E-01	0.04%
FBA11	Wk	Open space - fair	A	50327.34	1.16E+00	0.06%
FBA11	Md	Open space - fair	B	41115.414	9.44E-01	0.05%

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

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Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
FBA11	Bs	Residential - 1/4 acre	A	108413.54	2.49E+00	0.14%
FBA11	Wn	Residential - 1/4 acre	A	792677.53	1.82E+01	1.01%
FBA11	Bs	Residential - 1/4 acre	A	384251.51	8.82E+00	0.49%
FBA11	Wk	Residential - 1/4 acre	A	350748.7	8.05E+00	0.45%
FBA11	Wn	Residential - 1/4 acre	A	3910.8995	8.98E-02	0.00%
FBA11	Wn	Residential - 1/4 acre	A	3.5498792	8.15E-05	0.00%
FBA11	Md	Residential - 1/4 acre	B	2938967	6.75E+01	3.75%
FBA11	Bs	Urban district - industrial	A	98810.928	2.27E+00	0.13%
FBA11	Wn	Urban district - industrial	A	192678.91	4.42E+00	0.25%
FBA11	Bs	Urban district - industrial	A	105753.58	2.43E+00	0.13%
FBA11	Wk	Urban district - industrial	A	13098.077	3.01E-01	0.02%
FBA11	Wn	Urban district - industrial	A	54894.965	1.26E+00	0.07%
FBA11	Md	Urban district - industrial	B	2795127.8	6.42E+01	3.56%
FBA12	Wn	Residential - 1/4 acre	A	114397.94	2.63E+00	0.15%
FBA12	Bs	Residential - 1/4 acre	A	3311052.3	7.60E+01	4.22%
FBA12	Wk	Residential - 1/4 acre	A	119897.38	2.75E+00	0.15%
FBA12	Wn	Residential - 1/4 acre	A	3615928	8.30E+01	4.61%
FBA12	Wn	Residential - 1/4 acre	A	4.2360776	9.72E-05	0.00%
FBA12	Wn	Residential - 1/4 acre	A	6.8157563	1.56E-04	0.00%
FBA12	Ma	Residential - 1/4 acre	B	303570.32	6.97E+00	0.39%
FBA12	Md	Residential - 1/4 acre	B	287880.76	6.61E+00	0.37%
FBA12	Md	Residential - 1/4 acre	B	3.0832772	7.08E-05	0.00%
FBA12	Wn	Urban district - industrial	A	706870.4	1.62E+01	0.90%
FBA12	Ma	Urban district - industrial	B	646298.48	1.48E+01	0.82%
FBA12	Md	Urban district - industrial	B	113.89212	2.61E-03	0.00%
FBA13	Wn	Open space - fair	A	35603.859	8.17E-01	0.05%
FBA13	Wk	Open space - fair	A	73299.055	1.68E+00	0.09%
FBA13	Wk	Open space - fair	A	5048.3637	1.16E-01	0.01%
FBA13	Wn	Open space - fair	A	13669.017	3.14E-01	0.02%
FBA13	Md	Open space - fair	B	39869.647	9.15E-01	0.05%
FBA13	Wn	Residential - 1/4 acre	A	375803.16	8.63E+00	0.48%
FBA13	Wk	Residential - 1/4 acre	A	514825.99	1.18E+01	0.66%
FBA13	Wk	Residential - 1/4 acre	A	26614.952	6.11E-01	0.03%
FBA13	Wn	Residential - 1/4 acre	A	1158787.5	2.66E+01	1.48%
FBA13	Wn	Residential - 1/4 acre	A	3.5498792	8.15E-05	0.00%
FBA13	Wn	Residential - 1/4 acre	A	4.2360777	9.72E-05	0.00%
FBA13	Wn	Residential - 1/4 acre	A	6.8157563	1.56E-04	0.00%
FBA13	Md	Residential - 1/4 acre	B	813133.67	1.87E+01	1.04%
FBA13	Md	Residential - 1/4 acre	B	3.0832772	7.08E-05	0.00%
FBA14	Wm	Open space - good	A	82529.089	1.89E+00	0.11%
FBA14	Wm	Open space - good	A	126024.77	2.89E+00	0.16%
FBA14	Pa	Open space - good	A	22791.591	5.23E-01	0.03%
FBA14	Wk	Open space - good	A	76019.158	1.75E+00	0.10%

Computed:	**JAC**	Date:	**5/12/2021**
Checked:	**AC**	Date:	**5/24/2021**

Use this spreadsheet to import GIS data. This info will then be used to populate "Composite CN" spreadsheet.
Custom Sort - Basin > then Map Unit Name > then Rating

Basin	Map Unit Symbol	Map Unit Name	Rating	SF in AOI	Acres in AOI	Percent of AOI
FBA14	Wk	Open space - good	A	234842.32	5.39E+00	0.30%
FBA14	Wm	Residential - 1/4 acre	A	1055546.2	2.42E+01	1.35%
FBA14	Pa	Residential - 1/4 acre	A	336880.71	7.73E+00	0.43%
FBA14	Bs	Residential - 1/4 acre	A	33888.551	7.78E-01	0.04%
FBA14	Wk	Residential - 1/4 acre	A	1987618.1	4.56E+01	2.53%
FBA14	Wn	Residential - 1/4 acre	A	1106552.2	2.54E+01	1.41%
					1.80E+03	100.0%

Computed: **JAC** Date: **9/11/2020**
Checked: **AC** Date: **5/24/2021**

Use this spreadsheet to import NRCS Soil Survey Map information.
This is the overall area of interest (AOI) for the entire DMP study area. The soil was clipped to the future AOI.

Map Unit Symbol	Map Unit Name	Rating	Acres in AOI	Percent of AOI
Ad	Adelino fine sandy loam	B	209.1	2.32%
Bn	Bluepoint loamy fine sand, 1 to 9 percent slopes	A	176.6	1.96%
Bs	Bluepoint-Wink complex, hummocky	A	705.4	7.84%
Bu	Brazito loamy fine sand	A	13.8	0.15%
Bw	Brazito sandy clay loam, thick surface	B	35.5	0.39%
Cb	Caliza-Bluepoint complex, 1 to 25 percent slopes	A	275.1	3.06%
Gd	slopes mlra 42-1Gila loam, 0 to 1 percent	B	53.6	0.60%
Ge	Gila loam, slightly saline	C	12.0	0.13%
Gf	Gila loam, moderately alkali	C	13.5	0.15%
Gg	Gila loam, strongly alkali	C	35.4	0.39%
Gh	Gila loam, strongly saline and alkali	C	97.5	1.08%
Gr	Glendale loam, strongly alkali	C	20.7	0.23%
Gt	Glendale soils, slightly saline	C	26.5	0.29%
Ma	Madurez loamy sand, hummocky	B	172.0	1.91%
Md	Madurez loamy fine sand	B	1677.5	18.65%
ME	Madurez loamy fine sand	B	415.6	4.62%
MK	Madurez-Wink association, undulating	B	65.7	0.73%
Mn	Mixed alluvial land		20.1	0.22%
Pa	Pajarito loamy fine sand	A	696.8	7.75%
PITS	Gravel and caliche pits		16.9	0.19%
Vf	Vinton loamy fine sand, moderately alkali	C	9.2	0.10%
Vg	Vinton loam	B	4.3	0.05%
Vk	Vinton loam moderately saline and alkali	C	12.7	0.14%
Wk	Wink loamy sand	A	2668.0	29.66%
Wm	Wink loamy sand, clayey substratum	A	344.5	3.83%
Wn	Wink loamy sand, hummocky	A	917.5	10.20%
Wr	Wink-Caliza complex, 1 to 15 percent slopes	A	188.0	2.09%
Ws	Wink complex, 1 to 9 percent slopes, eroded	A	111.5	1.24%
			8995	100.00%

Computed: **JAC** Date: **8/31/2020**
Checked: **AC** Date: **5/24/2021**

Table 404-2: Runoff Curve Numbers
Urban

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Open space - poor	68	79	86	89
Open space - fair	49	69	79	84
Open space - good	39	61	74	80
Impervious - parking lots, roofs, etc.	98	98	98	98
Impervious - streets/roads; paved; curbs, storm	98	89	98	98
Impervious - streets/roads; paved; open ditches	83	89	92	93
Impervious - streets/roads; gravel	76	85	89	91
Impervious - streets/roads; dirt	72	82	87	89
Western desert urban - natural	63	77	85	88
Western desert urban - artificial	96	96	96	96
Urban district - commercial/business	89	92	94	95
Urban district - industrial	81	88	91	93
Residential - 1/8 acre or less	77	85	90	92
Residential - 1/4 acre	61	75	83	87
Residential - 1/3 acre	57	72	81	86
Residential - 1/2 acre	54	70	80	85
Residential - 1 acre	51	68	79	84
Residential - 2 acres	46	65	77	82
Developing urban - newly graded	77	86	91	94

Table 404-4: Runoff Curve Numbers
Other Agricultural

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Pasture, grass, range - poor	68	79	86	89
Pasture, grass, range - fair	49	69	79	84
Pasture, grass, range - good	39	61	74	80
Meadow	30	58	71	78
Brush - poor	48	67	77	83
Brush - fair	35	56	70	77
Brush - good	30	48	65	73
Woods combination - poor	57	73	82	86
Woods combination - fair	43	65	76	82
Woods combination - good	32	58	72	79
Woods - poor	45	66	77	83
Woods - fair	36	60	73	79
Woods - good	30	55	70	77
Farmsteads	59	74	82	86

Computed: **JAC** Date: **8/31/2020**
Checked: **AC** Date: **5/24/2021**

Table 404-5: Runoff Curve Numbers
Arid and Semiarid Rangelands

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Herbaceous - poor		80	87	93
Herbaceous - fair		71	81	89
Herbaceous - good		62	74	85
Oak-aspen - poor		66	74	79
Oak-aspen - fair		48	57	63
Oak-aspen - good		30	41	48
Pinyon-juniper - poor		75	85	89
Pinyon-juniper - fair		58	73	80
Pinyon-juniper - good		41	61	71
Sagebrush - poor		67	80	85
Sagebrush - fair		51	63	70
Sagebrush - good		35	47	55
Desert shrub - poor	63	77	85	88
Desert shrub - fair	55	72	81	86
Desert shrub - good	49	68	79	84

Runoff Curve Numbers
Other

	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition	**A**	**B**	**C**	**D**
Water	98	98	98	98

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

Time of Concentration					Pg, 4-99	
Basin	**Basin Tc Segments**	**Composite Tc (min)**	**Design Tc (min)**	Tc (hr)	Lag, L (min)	
FBA01	1.1, 1.2	39.26	39	0.65	23.4	**Tc minimum of 10 minutes**
FBA02	2.1, 2.2, 2.3	48.03	48	0.80	28.8	**Page 4-43 NMDOT Drainage Manual July 2018**
FBA03	3.1, 3.2	29.45	29	0.48	17.4	
FBA04	4.1, 4.2	21.12	21	0.35	12.6	
FBA05	5.1, 5.2	36.21	36	0.60	21.6	
FBA06	6.1, 6.2, 6.3	54.75	55	0.92	33.0	
FBA07	7.1, 7.2	33.54	34	0.57	20.4	
FBA08	8.1, 8.2	49.65	50	0.83	30.0	
FBA09	9.1, 9.2	52.62	53	0.88	31.8	
FBA10	10.1, 10.2	26.34	26	0.43	15.6	
FBA11	11.1, 11.2	53.47	53	0.88	31.8	
FBA12	12.1, 12.2	87.15	87	1.45	52.2	
FBA13	13.1, 13.2	37.39	37	0.62	22.2	
FBA14	14.1, 14.2	18.65	19	0.32	11.4	

0.6 Tc = Lag, L (Pg. 4-99)

Tc Method	Criteria	Condition		
Upland	Ungullied, overland, < 300 ft	**Rural/Urban**	Tc=L/(60*V), min	Sheet
Kirpich	Gullied	**Rural**	Tc=0.0078*(L^0.77)*(S^-0.385), min	Shallow Concentrated
Kerby	Ungullied, overland, > 300 ft	**Rural**	Tc=0.0828*((L*N)^0.467)*(S^-0.235), min	Shallow Concentrated
Manning's	Gullied, defined stream	Rural/Urban	V=(1.486/n)*(R^0.667)*(S^0.5)	Channel
	Ungullied, overland, < 300 ft	**Rural/Urban**	Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	Sheet
Figure 402-15 (Page 4-47)	Ungullied, undefined stream	**Urban**	Tc=L/(60*V), min	Shallow Concentrated

Notes: Per Table 402-6 (Page 4-38), both the "Upland Method" and "Iterative Method within the Stream Hydraulic Method" are to be used to determine time of concentration for **urban conditions**. The "Manning's Kinematic Equation" provided in the "Upland Method" (Page 4-43) section will be applied to all sheet flow segments (no defined stream channel) as used in Example Problem 6-5 on Page Appendix 6.32. The "Figure 402-15 Velocity Versus Slope for Concentrated Flow" (Page 4-47) will be used for all shallow concentrated flow segments. See Tc Ref tab. The Iterative Method within the Stream Hydraulic Method will not be used since there aren't any identified channel segments.

After review against the Kirpich Equation, it was determined Tc times using Figure 402-15 were slightly larger than using the Kirpich Equation. The smaller Tc times provided by the Kirpich Equation will provide larger, conservative peak discharge and volume values. The Kirpich Equation will be used for Tc times for shallow concentrated flows.

All equations and information in *red font* in this spreadsheet is not being used/referenced. This information is only provided for review/comparison when evaluating Tc times.

Computed: **JAC** Date: **5/12/2021**
Checked: **AC** Date: **5/24/2021**

FBA01	
Sheet	
Basin Segment ID	1.1
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4999.0
Low Elevation, ft	4997.3
Length, ft	292.0
Slope (ft/ft)	0.0059
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	7.462
Shallow	
Basin Segment ID	*1.2*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4997.3*
Low Elevation, ft	*4975.0*
Length, ft	*3758.4*
Slope (ft/ft)	*0.0059*
Velocity (ft/s)	*1.5648*
*Tc=L/(60*V), min*	
Tc, min	*40.031*
Shallow	
Basin Segment ID	1.2
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4997.3
Low Elevation, ft	4975.0
Length, ft	3758.4
Slope (ft/ft)	0.0059
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	31.794
Total Travel Time, min	39.256

FBA02	
Sheet	
Basin Segment ID	2.1
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4966.0
Low Elevation, ft	4965.4
Length, ft	170.6
Slope (ft/ft)	0.0034
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	6.047
Shallow	
Basin Segment ID	*2.2*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4965.4*
Low Elevation, ft	*4959.2*
Length, ft	*1803.1*
Slope (ft/ft)	*0.0034*
Velocity (ft/s)	*1.1894*
*Tc=L/(60*V), min*	
Tc, min	*25.267*
Shallow	
Basin Segment ID	*2.3*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4959.2*
Low Elevation, ft	*4954.0*
Length, ft	*1531.7*
Slope (ft/ft)	*0.0034*
Velocity (ft/s)	*1.1894*
*Tc=L/(60*V), min*	
Tc, min	*21.463*
Shallow	
Basin Segment ID	2.2
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4965.4
Low Elevation, ft	4959.2
Length, ft	1803.1
Slope (ft/ft)	0.0034
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	22.308
Shallow	
Basin Segment ID	2.3
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4959.2
Low Elevation, ft	4954.0
Length, ft	1531.7
Slope (ft/ft)	0.0034
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	19.675
Total Travel Time, min	48.030

FBA03	
Sheet	
Basin Segment ID	3.1
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4961.0
Low Elevation, ft	4960.0
Length, ft	252.6
Slope (ft/ft)	0.0040
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	7.809
Shallow	
Basin Segment ID	*3.2*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4960.0*
Low Elevation, ft	*4950.0*
Length, ft	*2062.6*
Slope (ft/ft)	*0.0048*
Velocity (ft/s)	*1.4154*
*Tc=L/(60*V), min*	
Tc, min	*24.288*
Shallow	
Basin Segment ID	3.2
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4960.0
Low Elevation, ft	4950.0
Length, ft	2062.6
Slope (ft/ft)	0.0048
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	21.640
Total Travel Time, min	29.449

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FBA04	
Sheet	
Basin Segment ID	4.1
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4985.0
Low Elevation, ft	4980.0
Length, ft	281.5
Slope (ft/ft)	0.0178
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	4.670
Shallow	
Basin Segment ID	*4.2*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4980.0*
Low Elevation, ft	*4970.0*
Length, ft	*1627.0*
Slope (ft/ft)	*0.0061*
Velocity (ft/s)	*1.5937*
*Tc=L/(60*V), min*	
Tc, min	*17.015*
Shallow	
Basin Segment ID	4.2
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4980.0
Low Elevation, ft	4970.0
Length, ft	1627.0
Slope (ft/ft)	0.0061
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	16.453
Total Travel Time, min	21.124

FBA05	
Sheet	
Basin Segment ID	5.1
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4969.0
Low Elevation, ft	4967.9
Length, ft	292.1
Slope (ft/ft)	0.0039
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	8.810
Shallow	
Basin Segment ID	*5.2*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4967.9*
Low Elevation, ft	*4958.0*
Length, ft	*2518.1*
Slope (ft/ft)	*0.0039*
Velocity (ft/s)	*1.2718*
*Tc=L/(60*V), min*	
Tc, min	*32.999*
Shallow	
Basin Segment ID	5.2
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4967.9
Low Elevation, ft	4958.0
Length, ft	2518.1
Slope (ft/ft)	0.0039
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	27.400
Total Travel Time, min	36.211

FBA06	
Sheet	
Basin Segment ID	6.1
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4988.0
Low Elevation, ft	4987.0
Length, ft	296.5
Slope (ft/ft)	0.0034
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	9.462
Shallow	
Basin Segment ID	*6.2*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4987.0*
Low Elevation, ft	*4949.0*
Length, ft	*3442.5*
Slope (ft/ft)	*0.0110*
Velocity (ft/s)	*2.1357*
*Tc=L/(60*V), min*	
Tc, min	*26.865*
Shallow	
Basin Segment ID	*6.3*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4949.0*
Low Elevation, ft	*4947.0*
Length, ft	*1218.8*
Slope (ft/ft)	*0.0016*
Velocity (ft/s)	*0.8235*
*Tc=L/(60*V), min*	
Tc, min	*24.668*
Shallow	
Basin Segment ID	6.2
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4987.0
Low Elevation, ft	4949.0
Length, ft	3442.5
Slope (ft/ft)	0.0110
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	23.387
Shallow	
Basin Segment ID	6.3
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4949.0
Low Elevation, ft	4947.0
Length, ft	1218.8
Slope (ft/ft)	0.0016
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	21.900
Total Travel Time, min	54.749

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FBA07	
Sheet	
Basin Segment ID	7.1
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4987.0
Low Elevation, ft	4985.3
Length, ft	285.9
Slope (ft/ft)	0.0061
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	7.244
Shallow	
Basin Segment ID	*7.2*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4985.3*
Low Elevation, ft	*4967.0*
Length, ft	*2983.9*
Slope (ft/ft)	*0.0061*
Velocity (ft/s)	*1.5898*
*Tc=L/(60*V), min*	
Tc, min	*31.282*
Shallow	
Basin Segment ID	7.2
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4985.3
Low Elevation, ft	4967.0
Length, ft	2983.9
Slope (ft/ft)	0.0061
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	26.295
Total Travel Time, min	33.539

FBA08	
Sheet	
Basin Segment ID	8.1
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4969.0
Low Elevation, ft	4966.0
Length, ft	245.5
Slope (ft/ft)	0.0122
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	4.862
Shallow	
Basin Segment ID	*8.2*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4966.0*
Low Elevation, ft	*4962.0*
Length, ft	*2852.7*
Slope (ft/ft)	*0.0014*
Velocity (ft/s)	*0.7612*
*Tc=L/(60*V), min*	
Tc, min	*62.459*
Shallow	
Basin Segment ID	8.2
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4966.0
Low Elevation, ft	4962.0
Length, ft	2852.7
Slope (ft/ft)	0.0014
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	44.783
Total Travel Time, min	49.646

FBA09	
Sheet	
Basin Segment ID	9.1
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4955.0
Low Elevation, ft	4953.0
Length, ft	298.3
Slope (ft/ft)	0.0067
Manning's, n	0.011
Tc=L/(60*V), min	
Tc, min	7.224
Shallow	
Basin Segment ID	*9.2*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4953.0*
Low Elevation, ft	*4942.0*
Length, ft	*4044.2*
Slope (ft/ft)	*0.0027*
Velocity (ft/s)	*1.0602*
*Tc=L/(60*V), min*	
Tc, min	*63.579*
Shallow	
Basin Segment ID	9.2
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4953.0
Low Elevation, ft	4942.0
Length, ft	4044.2
Slope (ft/ft)	0.0027
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	45.400
Total Travel Time, min	52.624

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FBA10	
Sheet	
Basin Segment ID	10.1
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4946.0
Low Elevation, ft	4942.0
Length, ft	278.9
Slope (ft/ft)	0.0143
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	5.051
Shallow	
Basin Segment ID	*10.2*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4942.0*
Low Elevation, ft	*4907.0*
Length, ft	*3087.7*
Slope (ft/ft)	*0.0113*
Velocity (ft/s)	*2.1643*
*Tc=L/(60*V), min*	
Tc, min	*23.778*
Shallow	
Basin Segment ID	10.2
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4942.0
Low Elevation, ft	4907.0
Length, ft	3087.7
Slope (ft/ft)	0.0113
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	21.289
Total Travel Time, min	26.340

FBA11	
Sheet	
Basin Segment ID	11.1
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4973.0
Low Elevation, ft	4971.8
Length, ft	282.1
Slope (ft/ft)	0.0043
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	8.249
Shallow	
Basin Segment ID	*11.2*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4971.8*
Low Elevation, ft	*4950.0*
Length, ft	*5061.3*
Slope (ft/ft)	*0.0043*
Velocity (ft/s)	*1.3337*
*Tc=L/(60*V), min*	
Tc, min	*63.249*
Shallow	
Basin Segment ID	11.2
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4971.8
Low Elevation, ft	4950.0
Length, ft	5061.3
Slope (ft/ft)	0.0043
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	45.218
Total Travel Time, min	53.467

FBA12	
Sheet	
Basin Segment ID	12.1
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4953.0
Low Elevation, ft	4952.6
Length, ft	292.8
Slope (ft/ft)	0.0013
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	13.803
Shallow	
Basin Segment ID	*12.2*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4952.6*
Low Elevation, ft	*4946.0*
Length, ft	*5173.7*
Slope (ft/ft)	*0.0013*
Velocity (ft/s)	*0.7274*
*Tc=L/(60*V), min*	
Tc, min	*118.540*
Shallow	
Basin Segment ID	12.2
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4952.6
Low Elevation, ft	4946.0
Length, ft	5173.7
Slope (ft/ft)	0.0013
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	73.346
Total Travel Time, min	87.150

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FBA13	
Sheet	
Basin Segment ID	13.1
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4950.0
Low Elevation, ft	4948.0
Length, ft	285.4
Slope (ft/ft)	0.0070
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	6.851
Shallow	
Basin Segment ID	*13.2*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4948.0*
Low Elevation, ft	*4942.0*
Length, ft	*2344.3*
Slope (ft/ft)	*0.0026*
Velocity (ft/s)	*1.0284*
*Tc=L/(60*V), min*	
Tc, min	*37.991*
Shallow	
Basin Segment ID	13.2
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4948.0
Low Elevation, ft	4942.0
Length, ft	2344.3
Slope (ft/ft)	0.0026
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	30.539
Total Travel Time, min	37.390

FBA14	
Sheet	
Basin Segment ID	14.1
	Mannings, < 300 ft
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4935.0
Low Elevation, ft	4934.0
Length, ft	161.4
Slope (ft/ft)	0.0062
Manning's, n	0.011
Tc=[(0.007*((n*L)^0.8))/((P2^0.5)*(S^0.4))]*60, min	
Tc, min	4.561
Shallow	
Basin Segment ID	*14.2*
	Figure 402-15
Surface Description (from Upland Graph)	*Paved*
High Elevation, ft	*4934.0*
Low Elevation, ft	*4907.0*
Length, ft	*1981.4*
Slope (ft/ft)	*0.0136*
Velocity (ft/s)	*2.3730*
*Tc=L/(60*V), min*	
Tc, min	*13.916*
Shallow	
Basin Segment ID	14.2
	Kirpich
Surface Description (from Upland Graph)	Paved
High Elevation, ft	4934.0
Low Elevation, ft	4907.0
Length, ft	1981.4
Slope (ft/ft)	0.0136
Tc=0.0078*(L^0.77)*(S^-0.385), min	
Tc, min	14.093
Total Travel Time, min	18.654

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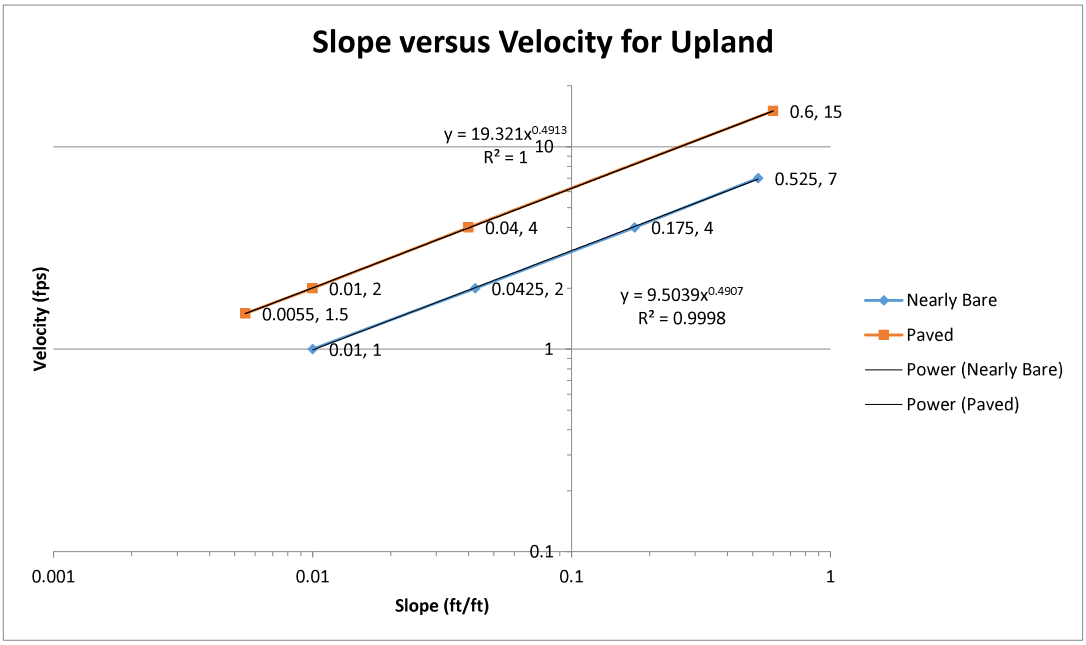
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Flow ID	**Seg ID**	**Flow Type**	**Start Elevation (ft)**	**End Elevation (ft)**	**Length (ft)**	**Slope (ft/ft)**	**Slope (%)**	**Velocity Equation**	**Velocity (ft/s) from Tc Ref - Upland (if applicable)**	**Condition**
FBA01	1.1	Sheet	4999.0	4997.3	292	0.006	0.59	Paved		Ungullied, overland
FBA01	1.2	Shallow	4997.3	4975.0	3758	0.006	0.59	Paved	1.6	Gullied
FBA02	2.1	Sheet	4966.0	4965.4	171	0.003	0.34	Paved		Ungullied, overland
FBA02	2.2	Shallow	4965.4	4959.2	1803	0.003	0.34	Paved	1.2	Gullied
FBA02	2.3	Shallow	4959.2	4954.0	1532	0.003	0.34	Paved	1.2	Gullied
FBA03	3.1	Sheet	4961.0	4960.0	253	0.004	0.40	Paved		Ungullied, overland
FBA03	3.2	Shallow	4960.0	4950.0	2063	0.005	0.48	Paved	1.4	Gullied
FBA04	4.1	Sheet	4985.0	4980.0	281	0.018	1.78	Paved		Ungullied, overland
FBA04	4.2	Shallow	4980.0	4970.0	1627	0.006	0.61	Paved	1.6	Gullied
FBA05	5.1	Sheet	4969.0	4967.9	292	0.004	0.39	Paved		Ungullied, overland
FBA05	5.2	Shallow	4967.9	4958.0	2518	0.004	0.39	Paved	1.3	Gullied
FBA06	6.1	Sheet	4988.0	4987.0	296	0.003	0.34	Paved		Ungullied, overland
FBA06	6.2	Shallow	4987.0	4949.0	3443	0.011	1.10	Paved	2.1	Gullied
FBA06	6.3	Shallow	4949.0	4947.0	1219	0.002	0.16	Paved	0.8	Gullied
FBA07	7.1	Sheet	4987.0	4985.3	286	0.006	0.61	Paved		Ungullied, overland
FBA07	7.2	Shallow	4985.3	4967.0	2984	0.006	0.61	Paved	1.6	Gullied
FBA08	8.1	Sheet	4969.0	4966.0	245	0.012	1.22	Paved		Ungullied, overland
FBA08	8.2	Shallow	4966.0	4962.0	2853	0.001	0.14	Paved	0.8	Gullied
FBA09	9.1	Sheet	4955.0	4953.0	298	0.007	0.67	Paved		Ungullied, overland
FBA09	9.2	Shallow	4953.0	4942.0	4044	0.003	0.27	Paved	1.1	Gullied
FBA10	10.1	Sheet	4946.0	4942.0	279	0.014	1.43	Paved		Ungullied, overland
FBA10	10.2	Shallow	4942.0	4907.0	3088	0.011	1.13	Paved	2.2	Gullied
FBA11	11.1	Sheet	4973.0	4971.8	282	0.004	0.43	Paved		Ungullied, overland
FBA11	11.2	Shallow	4971.8	4950.0	5061	0.004	0.43	Paved	1.3	Gullied
FBA12	12.1	Sheet	4953.0	4952.6	293	0.001	0.13	Paved		Ungullied, overland
FBA12	12.2	Shallow	4952.6	4946.0	5174	0.001	0.13	Paved	0.7	Gullied
FBA13	13.1	Sheet	4950.0	4948.0	285	0.007	0.70	Paved		Ungullied, overland
FBA13	13.2	Shallow	4948.0	4942.0	2344	0.003	0.26	Paved	1.0	Gullied
FBA14	14.1	Sheet	4935.0	4934.0	161	0.006	0.62	Paved		Ungullied, overland
FBA14	14.2	Shallow	4934.0	4907.0	1981	0.014	1.36	Paved	2.4	Gullied

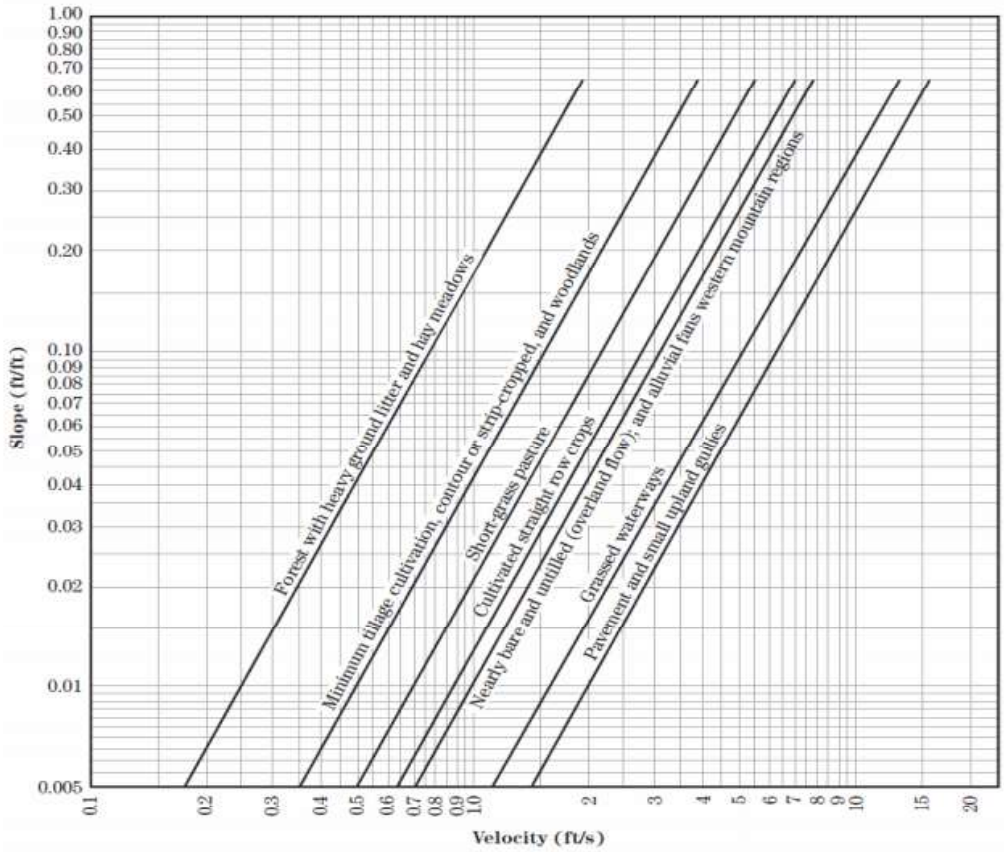
Computed: **JAC** Date: **9/16/2020**
Checked: **AC** Date: **5/24/2021**

	Slope (ft/ft)	Velocity (ft/s)	Chart Eq.	Table 402-8 Eq. (To be used)
Nearly Bare	0.01	1	**9.5039x^0.4907**	**V=9.965x^0.5**
	0.0425	2		
	0.175	4		
	0.525	7		
Paved Area (Shallow Concentrated Flow)	0.0055	1.5	**19.321x^0.4913**	**V=20.328x^0.5**
	0.01	2		
	0.04	4		
	0.6	15		

For simplicity, "Nearly Bare" and "Paved Area" were identified as majority conditions in analysis area.



Computed: **JAC** Date: **9/16/2020**
Checked: **AC** Date: **5/24/2021**



Source: NRCS, 2010, "Part 630 Hydrology, National Engineering Handbook, Chapter 15 Time of Concentration", Figure 15-4, p. 15-8.
http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=27002.wba

Figure 402-15 Velocity Versus Slope for Shallow Concentrated Flow

Table 402-8 Equations and Assumptions Developed from Figure 402-15

Source: NRCS, 2010, "Part 630 Hydrology, National Engineering Handbook, Chapter 15 Time of Concentration", Table 15-3, p.15-8.
http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=27002.wba

Flow type	Depth (ft)	Manning's *n*	Velocity equation (ft/s)
Pavement and small upland gullies	0.2	0.025	$V = 20.328(s)^{0.5}$
Grassed waterways	0.4	0.050	$V = 16.135(s)^{0.5}$
Nearly bare and untilled (overland flow); and alluvial fans in western mountain regions	0.2	0.051	$V = 9.965(s)^{0.5}$
Cultivated straight row crops	0.2	0.058	$V = 8.762(s)^{0.5}$
Short-grass pasture	0.2	0.073	$V = 6.962(s)^{0.5}$
Minimum tillage cultivation, contour or strip-cropped, and woodlands	0.2	0.101	$V = 5.032(s)^{0.5}$
Forest with heavy ground litter and hay meadows	0.2	0.202	$V = 2.516(s)^{0.5}$

Computed:	JAC	Date:	9/15/2020
Checked:	AC	Date:	5/24/2021

Precipitation information obtained from NOAA Atlas 14 at the approximate center of the project location

Latitude: 34.6465 Longitude: -106.7218

LAT: 34D38M47.4SEC LONG: 103D43M18.48SEC

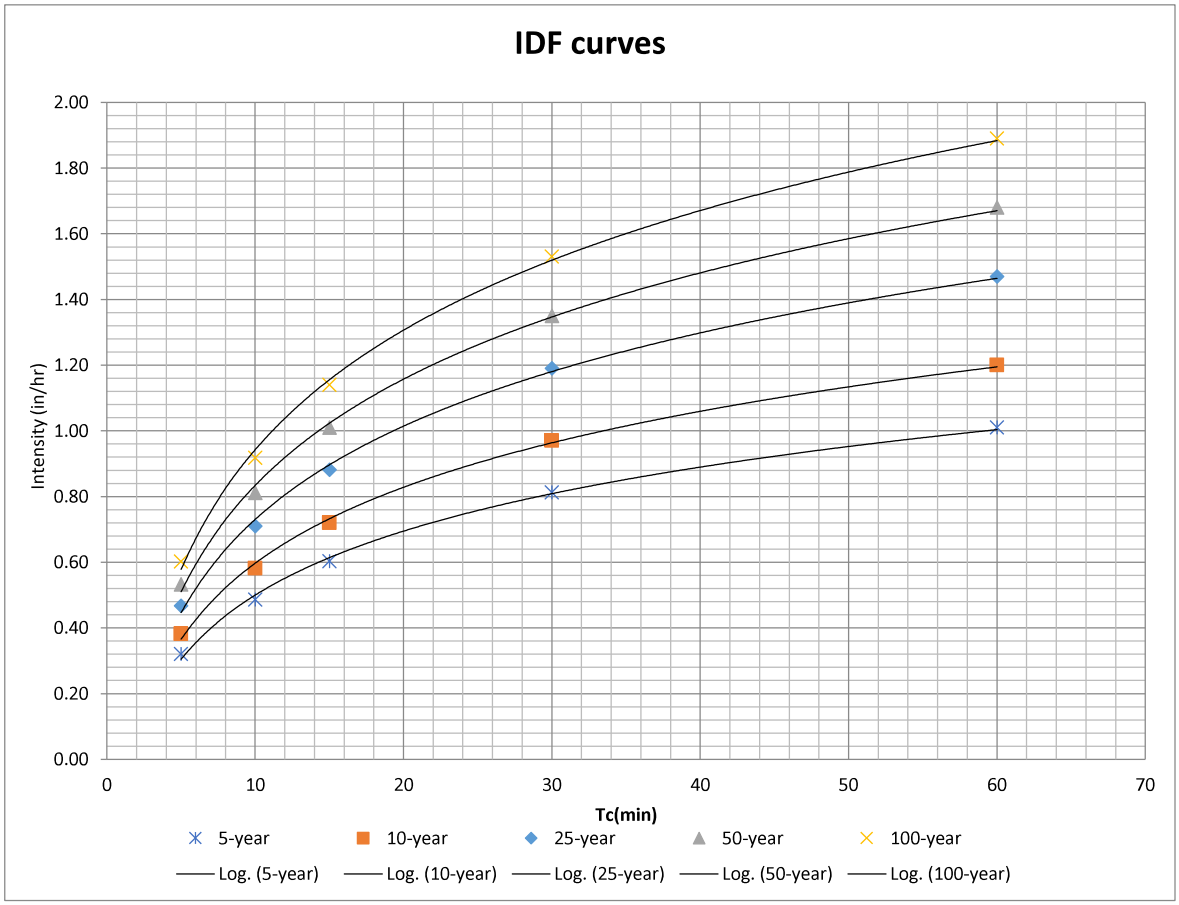
Precipitation Frequency Estimates (in/hr)

Duration		Return Interval (year)								
Time	Minutes	2	5	10	25	50	100	200	500	1000
5-min	5	0.24	0.32	0.38	0.47	0.53	0.60	0.68	0.77	0.85
10-min	10	0.36	0.49	0.58	0.71	0.81	0.92	1.03	1.18	1.30
15-min	15	0.45	0.60	0.72	0.88	1.01	1.14	1.27	1.46	1.61
30-min	30	0.61	0.81	0.97	1.19	1.35	1.53	1.72	1.97	2.16
60-min	60	0.75	1.01	1.20	1.47	1.68	1.89	2.12	2.43	2.68
2-hr	120	0.86	1.13	1.36	1.66	1.91	2.18	2.46	2.86	3.18
3-hr	180	0.91	1.18	1.41	1.72	1.97	2.24	2.53	2.93	3.26
6-hr	360	1.04	1.33	1.57	1.89	2.14	2.42	2.70	3.09	3.42
12-hr	720	1.14	1.44	1.68	2.01	2.26	2.53	2.81	3.18	3.49
24-hr	1440	1.24	1.54	1.79	2.11	2.37	2.63	2.89	3.24	3.52
2-day	2880	1.39	1.73	2.00	2.35	2.63	2.92	3.20	3.59	3.89
3-day	4320	1.50	1.85	2.13	2.50	2.79	3.09	3.38	3.78	4.09
4-day	5760	1.60	1.97	2.26	2.66	2.96	3.26	3.57	3.98	4.29
7-day	10080	1.85	2.25	2.57	2.99	3.31	3.62	3.94	4.34	4.65
10-day	14400	2.04	2.50	2.87	3.35	3.71	4.09	4.45	4.94	5.30
20-day	28800	2.52	3.06	3.47	3.99	4.38	4.75	5.11	5.56	5.89
30-day	43200	2.95	3.55	4.00	4.56	4.96	5.35	5.71	6.16	6.47
45-day	64800	3.58	4.26	4.76	5.35	5.77	6.15	6.49	6.88	7.13
60-day	86400	4.12	4.92	5.48	6.17	6.65	7.09	7.48	7.94	8.24

Computed:	JAC	Date:	9/15/2020
Checked:	AC	Date:	5/12/2021

IDF Curve Equations

Recurrence Interval (year)	Equation
100	-2.038ln(x) + 9.9586
50	-1.792ln(x) + 8.7633
25	-1.565ln(x) + 7.6525
10	-1.276ln(x) + 6.2346
5	-1.067ln(x) + 5.2124



Computed:	JAC	Date:	8/5/2020
Checked:	AC	Date:	5/24/2021

NOTE: This data is imported from the NOAA 14 website (https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html).

Point precipitation frequency estimates (inches)
NOAA Atlas 14 Volume 1 Version 5
Data type: Precipitation depth
Time series type: Partial duration
Project area: Southwest
Location name (ESRI Maps): Belen
Station Name: -
Latitude: 34.6465°
Longitude: -106.7218°
Elevation (USGS): 4919.71 ft

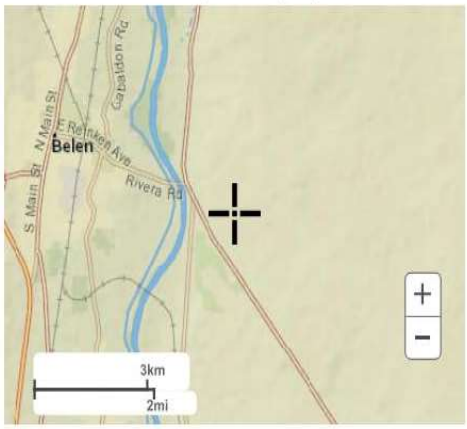
PRECIPITATION FREQUENCY ESTIMATES

by duration for ARI (years):	1	2	5	10	25	50	100	200	500	1000
5-min:	0.184	0.239	0.32	0.382	0.467	0.533	0.602	0.675	0.774	0.852
10-min:	0.28	0.363	0.486	0.581	0.71	0.811	0.917	1.03	1.18	1.3
15-min:	0.347	0.45	0.603	0.72	0.881	1.01	1.14	1.27	1.46	1.61
30-min:	0.468	0.606	0.812	0.97	1.19	1.35	1.53	1.72	1.97	2.16
60-min:	0.579	0.749	1.01	1.2	1.47	1.68	1.89	2.12	2.43	2.68
2-hr:	0.671	0.858	1.13	1.36	1.66	1.91	2.18	2.46	2.86	3.18
3-hr:	0.713	0.905	1.18	1.41	1.72	1.97	2.24	2.53	2.93	3.26
6-hr:	0.822	1.04	1.33	1.57	1.89	2.14	2.42	2.7	3.09	3.42
12-hr:	0.905	1.14	1.44	1.68	2.01	2.26	2.53	2.81	3.18	3.49
24-hr:	0.988	1.24	1.54	1.79	2.11	2.37	2.63	2.89	3.24	3.52
2-day:	1.11	1.39	1.73	2	2.35	2.63	2.92	3.2	3.59	3.89
3-day:	1.2	1.5	1.85	2.13	2.5	2.79	3.09	3.38	3.78	4.09
4-day:	1.29	1.6	1.97	2.26	2.66	2.96	3.26	3.57	3.98	4.29
7-day:	1.49	1.85	2.25	2.57	2.99	3.31	3.62	3.94	4.34	4.65
10-day:	1.64	2.04	2.5	2.87	3.35	3.71	4.09	4.45	4.94	5.3
20-day:	2.02	2.52	3.06	3.47	3.99	4.38	4.75	5.11	5.56	5.89
30-day:	2.37	2.95	3.55	4	4.56	4.96	5.35	5.71	6.16	6.47
45-day:	2.89	3.58	4.26	4.76	5.35	5.77	6.15	6.49	6.88	7.13
60-day:	3.33	4.12	4.92	5.48	6.17	6.65	7.09	7.48	7.94	8.24

Date/time (GMT): Wed Aug 5 23:04:25 2020
pyRunTime: 0.0324950218201

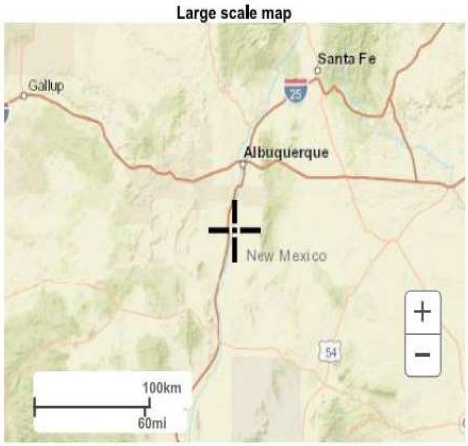
8/5/2020

Precipitation Frequency Data Server



Large scale terrain

Large scale map



Large scale aerial

Computed: **JAC** Date: **5/19/2021**
Checked: **AC** Date: **5/24/2021**

Using USGS Regression equations for New Mexico should be limited to:

1. Determination that the peak discharges calculated using one of the three approved hydrologic peak discharge analyses methods are within reason and supported by the exercise of judgment, and
2. For very preliminary peak discharge estimation when scoping a project
3. USGS regional regression equations may be used for design when checked against one of the hydrologic peak discharge analysis methods and approved by the NMDOT Drainage Engineer

USGS
science for a changing world

In cooperation with the New Mexico Department of Transportation

Analysis of the Magnitude and Frequency of Peak Discharge and Maximum Observed Peak Discharge in New Mexico and Surrounding Areas

Scientific Investigations Report 2008–5119

U.S. Department of the Interior
U.S. Geological Survey

Computed: **JAC** Date: **5/19/2021**
Checked: **AC** Date: **5/24/2021**

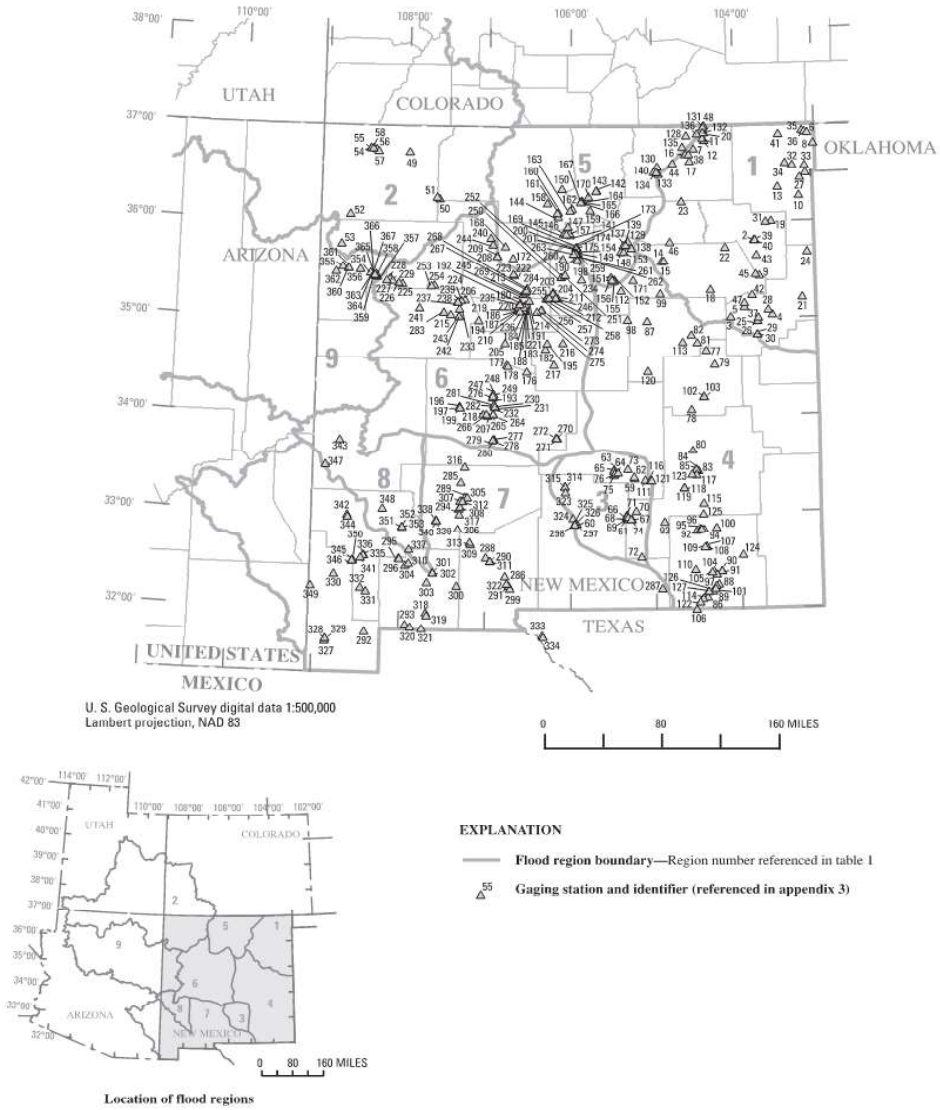
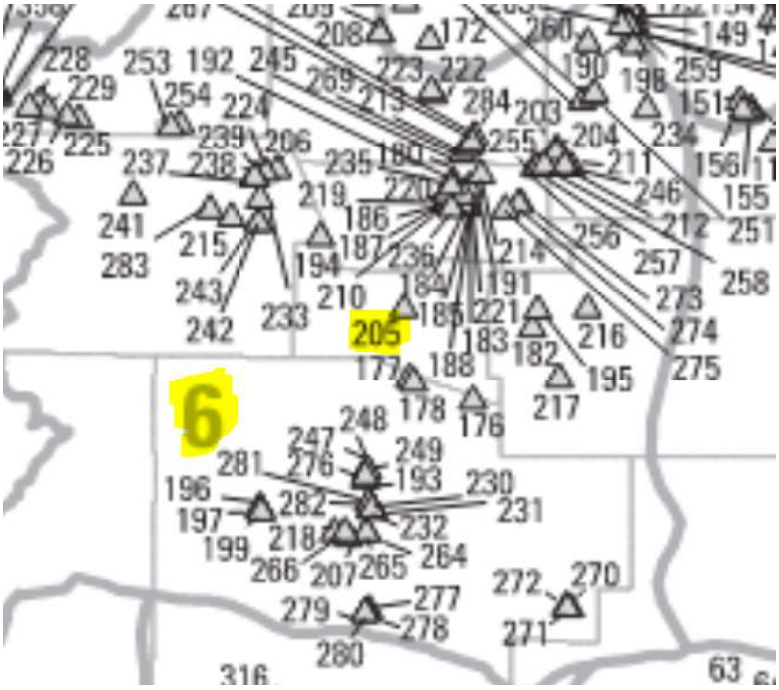


Figure 2. Flood regions and location of miscellaneous sites in New Mexico and surrounding areas.

Computed: **JAC** Date: **5/19/2021**
Checked: **AC** Date: **5/24/2021**

A closer look at Figure 2 indicates Map Idenifier 205 from Region 6 is most appropriate for our project area:



Appendix 3. Miscellaneous sites, maximum peak discharge, drainage area, and site elevations.—Continued

[DMS, degrees minutes seconds; NGVD 29, National Geodetic Vertical Datum of 1929]

Map identi-fier (fig. 2)	Latitude (DMS)	Longi-tude (DMS)	Miscellaneous site name	Date	Maximum peak discharge (cubic feet per second)	Drainage area (square miles)	Site elevation (feet above NGVD 29)	Region
201	354120	1055715	Arroyo Mascaras at Santa Fe, New Mexico	07/25/68	2,490	6.27	6,890	6
202	354130	1055612	Arroyo Ranchito at Santa Fe, New Mexico	08/24/57	520	0.61	7,130	6
203	351700	1061240	Arroyo Tuerto near Golden, New Mexico	09/24/55	2,000	12.9	6,480	6
204	351615	1061245	Arroyo Val Verde at Golden, New Mexico	09/24/55	987	1.40	6,580	6
205	344528	1064713	Belen Highline Canal tributary near Los Chaves, New Mexico	06/14/61	2,130	0.86	4,920	6
206	351225	1071620	Bohart Creek near Moquino, New Mexico	08/21/58	4,840	32.0	6,230	6
207	340023	1065908	Box Canyon near Socorro, New Mexico	08/01/56	6,210	24.3	5,380	6
208	353920	1065320	Cachana Arroyo near San Ysidro, New Mexico	05/14/59	1,590	5.16	6,100	6
209	353935	1065325	Cachana Arroyo tributary near San Ysidro, New Mexico	05/14/59	552	0.23	6,140	6
210	350610	1063810	Campus Wash at Albuquerque, New Mexico	08/10/63	640	7.3	5,000	6
211	351320	1060920	Canada de las Narrias (lower) near San Pedro, New Mexico	09/24/55	4,830	5.71	6,820	6
212	351335	1061055	Canada de las Narrias (upper) near San Pedro, New Mexico	09/24/55	2,200	1.53	7,010	6
213	351750	1063200	Canon del Agua at Bernalillo, New Mexico	07/19/56	5,380	3.93	5,200	6
214	351135	1062956	Canon la Cuerva near Albuquerque, New Mexico	07/27/55	1,920	2.60	6,080	6
215	350246	1072640	Encinal Arroyo near New Laguna, New Mexico	08/10/55	8,320	20.4	5,910	6
216	344530	1060539	Estancia Valley tributary No.1 near Estancia, New Mexico	07/07/52	4,660	13.2	6,180	6
217	343158	1061158	Estancia Valley tributary No.2 near Mountainair, New Mexico	07/07/52	3,560	3.35	6,410	6
218	340125	1070225	Four Mile Canyon near Socorro, New Mexico	08/08/56	1,010	16.0	6,040	6
219	350755	1063755	Hahn Arroyo above Edith Avenue at Albuquerque, New Mexico	08/10/63	4,100	8.50	5,000	6
220	350756	1063746	Hahn Arroyo at Edith Avenue at Albuquerque, New Mexico	08/11/61	935	7.60	5,000	6
221	350737	1063350	Hahn Arroyo tributary at Albuquerque, New Mexico	08/10/63	1,420	0.50	5,320	6
222	352739	1064041	Jemez River tributary at Bridge 3049 near San Ysidro, New Mexico	07/23/51	14,000	3.29	5,370	6
223	352817	1064122	Jemez River tributary at Bridge 3050 near San Ysidro, New Mexico	07/23/51	4,150	5.00	5,360	6
224	351152	1071905	Meyer Draw near Moquino, New Mexico	08/21/58	2,310	21.7	6,180	6
225	352142	1080157	Mitchell Draw tributary at Prewitt, New Mexico	08/07/59	1,020	3.00	6,790	6

Appendix 3 99

Computed: **JAC** Date: **5/19/2021**
Checked: **AC** Date: **5/24/2021**

After reviewing the Appendix 3 table on Page 99, the following was detemined if Identifier 205:

Max Peak Dischage	Area	Area	Discharge (max) to Area (acre) Ratio
cfs	sq. mi.	acre	cfs/acre
2130	0.86	550.4	3.87

A closer look at the Region 6 Regression Equations on Page 9:

Analysis of Magnitude and Frequency of Peak Discharges 9

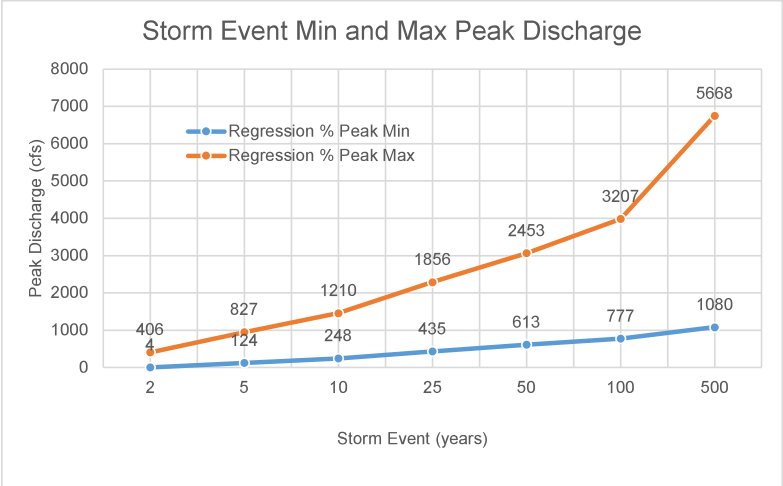
Table 2. Regional flood-frequency equations using generalized least-squares regression.

[Q, peak discharge, in cubic feet per second, for indicated recurrence interval; A, drainage area, in square miles; S, average basin slope upstream from gaging station, in percent (ft/ft*100); I24,100, maximum precipitation intensity of a storm of 24 hours duration with a recurrence interval of 100 years, in inches; Pa, mean annual precipitation (1961–90), in inches; E, average basin elevation, in feet]

Equations	Recurrence interval (years)	Average standard error of estimates			
		Regresion		Prediction	
		Log units	Percent	Log units	Percent
Central mountain-valley flood region (6)					
$Q_2 = 1.328 \times 10^2 A^{0.420}$	2	0.376	98	0.394	113
$Q_5 = 3.163 \times 10^2 A^{0.394}$	5	0.298	74	0.313	83
$Q_{10} = 4.906 \times 10^2 A^{0.383}$	10	0.269	66	0.284	73
$Q_{25} = 7.800 \times 10^2 A^{0.372}$	25	0.252	62	0.267	68
$Q_{50} = 1.051 \times 10^3 A^{0.365}$	50	0.248	60	0.265	67
$Q_{100} = 1.374 \times 10^3 A^{0.359}$	100	0.251	61	0.268	68
$Q_{500} = 2.354 \times 10^3 A^{0.348}$	500	0.273	68	0.292	76

Reviewing the overall analysis study area:

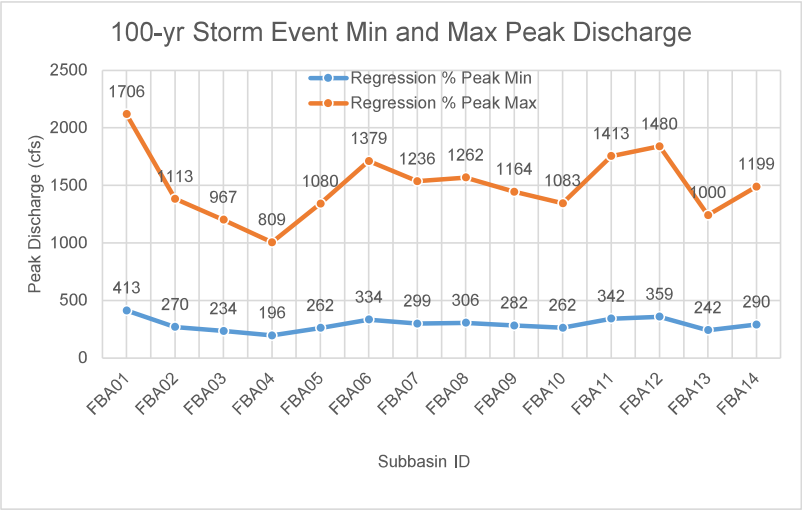
Study Area Peak Discharge Min and Max Review							
Storm Event	Area	Area	Peak Dischage	Discharge to Area (acre) Ratio	Regression %	Regression % Peak Min	Regression % Peak Max
years	acre	sq. mi.	cfs	cfs/acre		cfs	cfs
2	1800	2.81	205	8.78	98%	4	406
5	1800	2.81	475	3.79	74%	124	827
10	1800	2.81	729	2.47	66%	248	1210
25	1800	2.81	1146	1.57	62%	435	1856
50	1800	2.81	1533	1.17	60%	613	2453
100	1800	2.81	1992	0.90	61%	777	3207
500	1800	2.81	3374	0.53	68%	1080	5668



Computed: **JAC** Date: **5/19/2021**
Checked: **AC** Date: **5/24/2021**

Reviewing the basins withing analysis study area for 100-yr storm event:

Subbasin Peak Discharge Min and Max Review for 100-yr Storm Event							
Subbasin ID	Area	Area	100-yr Peak Dischage	Discharge (Q_{100}) to Area (ac) Ratio	Regression %	Regression % Peak Min	Regression % Peak Max
	acre	sq. mi.	cfs	cfs/acre		cfs	cfs
FBA01	311	0.49	1060	0.29	61%	413	1706
FBA02	94	0.15	691	0.14	61%	270	1113
FBA03	64	0.10	601	0.11	61%	234	967
FBA04	39	0.06	503	0.08	61%	196	809
FBA05	87	0.14	671	0.13	61%	262	1080
FBA06	172	0.27	856	0.20	61%	334	1379
FBA07	127	0.20	768	0.16	61%	299	1236
FBA08	134	0.21	784	0.17	61%	306	1262
FBA09	107	0.17	723	0.15	61%	282	1164
FBA10	88	0.14	673	0.13	61%	262	1083
FBA11	184	0.29	877	0.21	61%	342	1413
FBA12	209	0.33	919	0.23	61%	359	1480
FBA13	70	0.11	621	0.11	61%	242	1000
FBA14	116	0.18	745	0.16	61%	290	1199

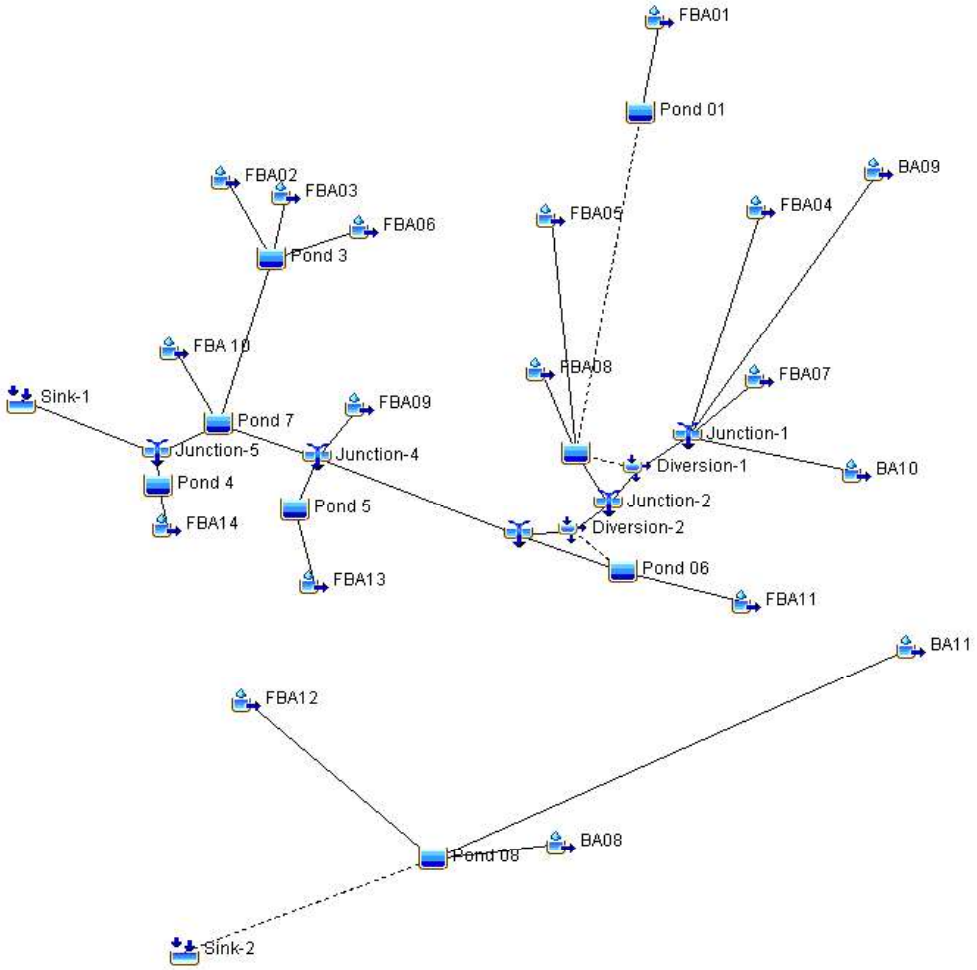


The values determined from the regression equations will be used to ***check*** against the approved hydrologic peak discharge analysis metholodogy used for the study area. This methodology is listed in the Summary tab of this workbook. The final values used for design will be supported by the exercise of judgement.

Job No.	10236786

Computation

Project: Rio Communities DMP	Computed: DAP	Date: 5/27/21
Subject: Hydrology	Checked: AC	Date: 5/28/21
Task: HEC-HMS Results	Sheet:	



Job No. 10236786

Computation

Project: Rio Communities DMP		Computed: DAP	Date: 5/27/21
Subject: Hydrology		Checked: AC	Date: 5/28/21
Task: HEC-HMS Results (10-Yr)		Sheet:	

Hydrologic Element	Peak Discharge (cfs)	Time of Peak	Volume (ac-ft)
BA08	21	15Sep2020, 19:10	4.6
BA09	195	15Sep2020, 20:25	68.1
BA10	26	15Sep2020, 18:25	2.5
BA11	60.5	15Sep2020, 18:35	6.6
Diversion-1	149.4	15Sep2020, 20:20	31.4
Diversion-2	102.9	15Sep2020, 20:25	16.1
FBA 10	0.3	15Sep2020, 19:05	0.2
FBA01	2	15Sep2020, 19:05	0.8
FBA02	0.9	15Sep2020, 19:10	0.3
FBA03	0.7	15Sep2020, 18:50	0.2
FBA04	2.8	15Sep2020, 18:30	0.4
FBA05	0.9	15Sep2020, 19:00	0.3
FBA06	1.5	15Sep2020, 19:15	0.5
FBA07	9.7	15Sep2020, 18:40	1.4
FBA08	1.8	15Sep2020, 19:05	0.5
FBA09	1.4	15Sep2020, 19:05	0.4
FBA11	40.4	15Sep2020, 18:45	5.2
FBA12	9.3	15Sep2020, 18:55	1.5
FBA13	2	15Sep2020, 18:45	0.4
FBA14	0.5	15Sep2020, 19:05	0.2
Junction-1	199.4	15Sep2020, 20:20	72.3
Junction-2	152.9	15Sep2020, 20:25	51.4
Junction-3	108.1	15Sep2020, 20:25	36.6
Junction-4	108.8	15Sep2020, 20:25	37
Junction-5	12.9	16Sep2020, 12:00	11.7
Pond 01	0	15Sep2020, 12:00	0
Pond 02	18.2	16Sep2020, 03:35	20
Pond 06	17.3	16Sep2020, 09:30	20.5
Pond 08	0	15Sep2020, 12:00	0
Pond 3	0	15Sep2020, 12:00	0
Pond 4	0.1	16Sep2020, 12:00	0.1
Pond 5	0	16Sep2020, 12:00	0
Pond 7	12.8	16Sep2020, 12:00	11.6
Sink-1	12.9	16Sep2020, 12:00	11.7
Sink-2	4.9	15Sep2020, 22:55	5.8

Job No. 10236786

Computation

Project: Rio Communities DMP		Computed: DAP	Date: 5/27/21
Subject: Hydrology		Checked: AC	Date: 5/28/21
Task: HEC-HMS Results (25-Yr)		Sheet:	

Hydrologic Element	Peak Discharge (cfs)	Time of Peak	Volume (ac-ft)
BA08	47.5	15Sep2020, 19:05	8.3
BA09	337.4	15Sep2020, 20:20	106
BA10	47.6	15Sep2020, 18:25	3.8
BA11	107.9	15Sep2020, 18:30	10.2
Diversion-1	293.7	15Sep2020, 20:20	68.5
Diversion-2	248	15Sep2020, 20:20	48.5
FBA 10	3.1	15Sep2020, 18:40	0.5
FBA01	12.3	15Sep2020, 18:45	2.1
FBA02	4.3	15Sep2020, 18:50	0.7
FBA03	3.6	15Sep2020, 18:40	0.5
FBA04	7.2	15Sep2020, 18:25	0.7
FBA05	4.5	15Sep2020, 18:45	0.7
FBA06	7.2	15Sep2020, 19:00	1.3
FBA07	22.8	15Sep2020, 18:35	2.4
FBA08	7.3	15Sep2020, 18:50	1.2
FBA09	5.6	15Sep2020, 18:55	1
FBA11	68.3	15Sep2020, 18:45	7.7
FBA12	18.2	15Sep2020, 18:50	2.4
FBA13	6.5	15Sep2020, 18:40	0.8
FBA14	4.6	15Sep2020, 18:35	0.7
Junction-1	343.7	15Sep2020, 20:20	112.9
Junction-2	298	15Sep2020, 20:20	91.7
Junction-3	257.4	15Sep2020, 20:20	75.3
Junction-4	258.9	15Sep2020, 20:20	76.4
Junction-5	37.7	15Sep2020, 23:05	39.5
Pond 01	0	15Sep2020, 12:00	0
Pond 02	21.3	16Sep2020, 03:45	23.2
Pond 06	21.4	16Sep2020, 06:30	26.8
Pond 08	0	15Sep2020, 12:00	0
Pond 3	0	15Sep2020, 12:00	0
Pond 4	0.5	15Sep2020, 21:20	0.5
Pond 5	0.1	16Sep2020, 12:00	0.1
Pond 7	37.2	15Sep2020, 23:05	39
Sink-1	37.7	15Sep2020, 23:05	39.5
Sink-2	12.7	15Sep2020, 21:35	12.3

Job No. 10236786

Computation

Project: Rio Communities DMP		Computed: DAP	Date: 5/27/21
Subject: Hydrology		Checked: AC	Date: 5/28/21
Task: HEC-HMS Results (50-Yr)		Sheet:	

Hydrologic Element	Peak Discharge (cfs)	Time of Peak	Volume (ac-ft)
BA08	74.5	15Sep2020, 19:05	11.8
BA09	467.6	15Sep2020, 20:20	140.3
BA10	67.2	15Sep2020, 18:25	5.1
BA11	152.5	15Sep2020, 18:30	13.5
Diversion-1	424.9	15Sep2020, 20:20	102
Diversion-2	380.1	15Sep2020, 20:20	80.9
FBA 10	7.3	15Sep2020, 18:35	0.9
FBA01	26.6	15Sep2020, 18:45	3.6
FBA02	8.7	15Sep2020, 18:50	1.2
FBA03	7.4	15Sep2020, 18:35	0.8
FBA04	12	15Sep2020, 18:20	1
FBA05	9.2	15Sep2020, 18:40	1.1
FBA06	14.6	15Sep2020, 18:55	2.3
FBA07	36	15Sep2020, 18:30	3.5
FBA08	14	15Sep2020, 18:50	2
FBA09	10.8	15Sep2020, 18:50	1.6
FBA11	93.4	15Sep2020, 18:40	10
FBA12	26.5	15Sep2020, 18:50	3.3
FBA13	11.4	15Sep2020, 18:35	1.3
FBA14	10.5	15Sep2020, 18:30	1.2
Junction-1	474.9	15Sep2020, 20:20	149.9
Junction-2	430.1	15Sep2020, 20:20	128.1
Junction-3	392	15Sep2020, 20:20	110.8
Junction-4	394.2	15Sep2020, 20:20	112.6
Junction-5	68.3	15Sep2020, 23:00	67.8
Pond 01	0	15Sep2020, 12:00	0
Pond 02	23.5	16Sep2020, 04:20	26.1
Pond 06	23.7	16Sep2020, 08:00	29.9
Pond 08	0	15Sep2020, 12:00	0
Pond 3	0	15Sep2020, 12:00	0
Pond 4	1.5	15Sep2020, 19:30	1
Pond 5	0.2	16Sep2020, 04:00	0.3
Pond 7	67.3	15Sep2020, 23:05	66.8
Sink-1	68.3	15Sep2020, 23:00	67.8
Sink-2	21.9	15Sep2020, 21:00	18.8

Job No. 10236786

Computation

Project: Rio Communities DMP		Computed: DAP	Date: 5/27/21
Subject: Hydrology		Checked: AC	Date: 5/28/21
Task: HEC-HMS Results (100-Yr)		Sheet:	

Hydrologic Element	Peak Discharge (cfs)	Time of Peak	Volume (ac-ft)
BA08	107.9	15Sep2020, 19:05	15.9
BA09	623.6	15Sep2020, 20:15	178.1
BA10	89.8	15Sep2020, 18:25	6.4
BA11	204.3	15Sep2020, 18:30	17.1
Diversion-1	582.6	15Sep2020, 20:15	142.3
Diversion-2	538.9	15Sep2020, 20:15	120.9
FBA 10	13.3	15Sep2020, 18:30	1.4
FBA01	47.2	15Sep2020, 18:40	5.5
FBA02	14.8	15Sep2020, 18:45	1.8
FBA03	12.6	15Sep2020, 18:30	1.3
FBA04	18.5	15Sep2020, 18:20	1.3
FBA05	15.6	15Sep2020, 18:35	1.7
FBA06	24.8	15Sep2020, 18:50	3.3
FBA07	53.1	15Sep2020, 18:30	4.7
FBA08	23.2	15Sep2020, 18:45	2.9
FBA09	17.9	15Sep2020, 18:50	2.3
FBA11	122.3	15Sep2020, 18:40	12.5
FBA12	36.4	15Sep2020, 18:50	4.3
FBA13	18.2	15Sep2020, 18:35	1.8
FBA14	19.6	15Sep2020, 18:25	1.8
Junction-1	632.6	15Sep2020, 20:15	190.6
Junction-2	588.9	15Sep2020, 20:15	170.7
Junction-3	553.3	15Sep2020, 20:20	153.4
Junction-4	556.4	15Sep2020, 20:15	156.3
Junction-5	84.8	15Sep2020, 23:00	98.1
Pond 01	0	15Sep2020, 12:00	0
Pond 02	25.4	16Sep2020, 04:05	28.4
Pond 06	25.4	16Sep2020, 07:25	32.5
Pond 08	0	15Sep2020, 12:00	0
Pond 3	0	15Sep2020, 12:00	0
Pond 4	4	15Sep2020, 19:15	1.6
Pond 5	0.4	15Sep2020, 23:00	0.6
Pond 7	83.5	15Sep2020, 23:15	96.5
Sink-1	84.8	15Sep2020, 23:00	98.1
Sink-2	35.4	15Sep2020, 20:35	26.6

Job No. 10236786

Computation

Project: Rio Communities Drainage Master Plan	Computed: JAC	Date: 5/26/21
Subject: Detention Ponds - 100-yr Analysis	Checked: DP	Date: 5/28/21
Task: Drainage Basin Excavation Calculations	Sheet: 1 of 9	

VOLUME EXCAVATED

DETENTION BASIN	*VOLUME PROVIDED*			
	(ft^3)	*(Ac-ft)*	*(yd^3)*	
Pond 01	484,648	11.13	17,950	
Pond 02	2,074,872	47.63	76,847	
Pond 03	396,727	9.11	14,694	
Pond 04	190,800	4.38	7,067	
Pond 05	848,924	19.49	31,442	
Pond 06	2,575,990	59.14	95,407	
Pond 07	6,272,218	143.99	232,304	
Pond 08	1,832,292	42.06	67,863	
Subtotal:	14,676,471	336.93	543,573	

Job No. 10236786

Computation

Project: Rio Communities Drainage Master Plan	Computed: JAC	Date: 5/26/21
Subject: Detention Ponds - 100-yr Analysis	Checked: DP	Date: 5/28/21
Task: Drainage Basin Excavation Calculations	Sheet: 2 of 9	

VOLUME EXCAVATED

Conic Section Formula:

$$V_{1-2} = ((E_1 - E_2) / 3) * (A_1 + A_2 + (A_1 * A_2)^{1/2})$$

V_{1-2}	Storage Volume in cubic feet.
A_1	Top surface area in square feet.
A_2	Bottom surface area in square feet.
E_1	Top elevation in feet.
E_2	Bottom elevation in feet.

DETENTION BASIN	*ELEVATION*	*SURFACE AREA*	*VOLUME PROVIDED*	
	(ft)	*(ft^2)*	*(ft^3)*	*(Ac-ft)*
Pond 01	4,969	137,274	133,131	3.06
	4,968	129,031	125,001	2.87
FBA01	4,967	121,014	117,097	2.69
	4,966	113,223	109,419	2.51
	4,965	105,658		
		Subtotal:	484,648	11.13

Job No. 10236786

Computation

Project: Rio Communities Drainage Master Plan	Computed: JAC	Date: 5/26/21
Subject: Detention Ponds - 100-yr Analysis	Checked: DP	Date: 5/28/21
Task: Drainage Basin Excavation Calculations	Sheet: 3 of 9	

VOLUME EXCAVATED

Conic Section Formula:

$$V_{1\text{-}2} = ((E_1 - E_2) / 3) * (A_1 + A_2 + (A_1 * A_2)^{1/2})$$

$V_{1\text{-}2}$	Storage Volume in cubic feet.
A_1	Top surface area in square feet.
A_2	Bottom surface area in square feet.
E_1	Top elevation in feet.
E_2	Bottom elevation in feet.

DETENTION BASIN	*ELEVATION*	*SURFACE AREA*	*VOLUME PROVIDED*	
	(ft)	*(ft^2)*	*(ft^3)*	*(Ac-ft)*
Pond 02	4,958	458,612	449,726	10.32
	4,957	440,898	432,124	9.92
FBA05	4,956	423,409	414,748	9.52
FBA08	4,955	406,147	397,599	9.13
	4,954	389,111	380,675	8.74
	4,953	372,301		
		Subtotal:	2,074,872	47.63

Job No. 10236786

Computation

Project: Rio Communities Drainage Master Plan	Computed: JAC	Date: 5/26/21
Subject: Detention Ponds - 100-yr Analysis	Checked: DP	Date: 5/28/21
Task: Drainage Basin Excavation Calculations	Sheet: 4 of 9	

VOLUME EXCAVATED

Conic Section Formula:

$$V_{1\text{-}2} = ((E_1 - E_2) / 3) * (A_1 + A_2 + (A_1 * A_2)^{1/2})$$

$V_{1\text{-}2}$	Storage Volume in cubic feet.
A_1	Top surface area in square feet.
A_2	Bottom surface area in square feet.
E_1	Top elevation in feet.
E_2	Bottom elevation in feet.

DETENTION BASIN	*ELEVATION*	*SURFACE AREA*	*VOLUME PROVIDED*	
	(ft)	*(ft^2)*	*(ft^3)*	*(Ac-ft)*
Pond 03	4,948	114,339	110,434	2.54
	4,947	106,574	102,781	2.36
FBA02	4,946	99,035	95,356	2.19
FBA03	4,945	91,723	88,156	2.02
FBA06	4,944	84,636		
		Subtotal:	396,727	9.11

Job No. 10236786

Computation

Project: Rio Communities Drainage Master Plan	Computed: JAC	Date: 5/26/21
Subject: Detention Ponds - 100-yr Analysis	Checked: DP	Date: 5/28/21
Task: Drainage Basin Excavation Calculations	Sheet: 5 of 9	

VOLUME EXCAVATED

Conic Section Formula:

$$V_{1\text{-}2} = ((E_1 - E_2) / 3) * (A_1 + A_2 + (A_1 * A_2)^{1/2})$$

$V_{1\text{-}2}$	Storage Volume in cubic feet.
A_1	Top surface area in square feet.
A_2	Bottom surface area in square feet.
E_1	Top elevation in feet.
E_2	Bottom elevation in feet.

DETENTION BASIN	*ELEVATION*	*SURFACE AREA*	*VOLUME PROVIDED*	
	(ft)	*(ft^2)*	*(ft^3)*	*(Ac-ft)*
Pond 04	4,909	59,211	56,215	1.29
	4,908	53,271	50,388	1.16
FBA14	4,907	47,558	44,786	1.03
	4,906	42,071	39,411	0.90
	4,905	36,810		
		Subtotal:	190,800	4.38

Job No. 10236786

Computation

Project: Rio Communities Drainage Master Plan	Computed: JAC	Date: 5/26/21
Subject: Detention Ponds - 100-yr Analysis	Checked: DP	Date: 5/28/21
Task: Drainage Basin Excavation Calculations	Sheet: 6 of 9	

VOLUME EXCAVATED

Conic Section Formula:

$$V_{1\text{-}2} = ((E_1 - E_2) / 3) * (A_1 + A_2 + (A_1 * A_2)^{1/2})$$

$V_{1\text{-}2}$	Storage Volume in cubic feet.
A_1	Top surface area in square feet.
A_2	Bottom surface area in square feet.
E_1	Top elevation in feet.
E_2	Bottom elevation in feet.

DETENTION BASIN	*ELEVATION*	*SURFACE AREA*	*VOLUME PROVIDED*	
	(ft)	*(ft^2)*	*(ft^3)*	*(Ac-ft)*
Pond 05	4,948	233,949	228,404	5.24
	4,947	222,903	217,471	4.99
FBA11	4,946	212,084	206,765	4.75
FBA12	4,945	201,491	196,285	4.51
FBA13	4,944	191,124		
		Subtotal:	848,924	19.49

Job No. 10236786

Computation

Project: Rio Communities Drainage Master Plan	Computed: JAC	Date: 5/26/21
Subject: Detention Ponds - 100-yr Analysis	Checked: DP	Date: 5/28/21
Task: Drainage Basin Excavation Calculations	Sheet: 7 of 9	

VOLUME EXCAVATED

Conic Section Formula:

$$V_{1\text{-}2} = ((E_1 - E_2) / 3) * (A_1 + A_2 + (A_1 * A_2)^{1/2})$$

$V_{1\text{-}2}$	Storage Volume in cubic feet.
A_1	Top surface area in square feet.
A_2	Bottom surface area in square feet.
E_1	Top elevation in feet.
E_2	Bottom elevation in feet.

DETENTION BASIN	*ELEVATION*	*SURFACE AREA*	*VOLUME PROVIDED*	
	(ft)	*(ft^2)*	*(ft^3)*	*(Ac-ft)*
Pond 06	4,958	475,158	467,330	10.73
	4,957	459,545	451,829	10.37
	4,956	444,157	436,555	10.02
	4,955	428,996	421,506	9.68
	4,954	414,060	406,683	9.34
	4,953	399,351	392,088	9.00
	4,952	384,869		
		Subtotal:	2,575,990	59.14

Job No. 10236786

Computation

Project: Rio Communities Drainage Master Plan	Computed: JAC	Date: 5/26/21
Subject: Detention Ponds - 100-yr Analysis	Checked: DP	Date: 5/28/21
Task: Drainage Basin Excavation Calculations	Sheet: 8 of 9	

VOLUME EXCAVATED

Conic Section Formula:

$$V_{1\text{-}2} = ((E_1 - E_2) / 3) * (A_1 + A_2 + (A_1 * A_2)^{1/2})$$

$V_{1\text{-}2}$	Storage Volume in cubic feet.
A_1	Top surface area in square feet.
A_2	Bottom surface area in square feet.
E_1	Top elevation in feet.
E_2	Bottom elevation in feet.

DETENTION BASIN	*ELEVATION*	*SURFACE AREA*	*VOLUME PROVIDED*	
	(ft)	*(ft^2)*	*(ft^3)*	*(Ac-ft)*
Pond 07	4,922	874,108	862,578	19.80
	4,921	851,100	839,683	19.28
FBA10	4,920	828,317	817,013	18.76
	4,919	805,761	794,570	18.24
	4,918	783,432	772,354	17.73
	4,917	761,328	750,362	17.23
	4,916	739,450	728,598	16.73
	4,915	717,799	707,059	16.23
	4,914	696,374		
		Subtotal:	6,272,218	143.99

Job No. 10236786

Computation

Project: Rio Communities Drainage Master Plan	Computed: JAC	Date: 5/26/21
Subject: Detention Ponds - 100-yr Analysis	Checked: DP	Date: 5/28/21
Task: Drainage Basin Excavation Calculations	Sheet: 9 of 9	

VOLUME EXCAVATED

Conic Section Formula:

$$V_{1-2} = ((E_1 - E_2) / 3) * (A_1 + A_2 + (A_1 * A_2)^{1/2})$$

V_{1-2}	Storage Volume in cubic feet.
A_1	Top surface area in square feet.
A_2	Bottom surface area in square feet.
E_1	Top elevation in feet.
E_2	Bottom elevation in feet.

DETENTION BASIN	*ELEVATION*	*SURFACE AREA*	*VOLUME PROVIDED*	
	(ft)	*(ft^2)*	*(ft^3)*	*(Ac-ft)*
Pond 08	4,947	491,415	482,962	11.09
	4,946	474,559	466,219	10.70
FBA12, BA08, BA11	4,945	457,928	449,701	10.32
	4,944	441,524	433,409	9.95
	4,943	425,345		
		Subtotal:	1,832,292	42.06

Appendix C. Hydraulic Evaluation

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 48 cfs

Maximum Flow: 48 cfs

Table 1 - Summary of Culvert Flows at Crossing: NM Hwy 309 / Hillandale Ave

Headwater Elevation (ft)	Total Discharge (cfs)	CV-01 and CV-02 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4869.25	0.00	0.00	0.00	1
4870.02	4.80	4.80	0.00	1
4870.35	9.60	9.60	0.00	1
4870.61	14.40	14.40	0.00	1
4870.84	19.20	19.20	0.00	1
4871.05	24.00	24.00	0.00	1
4871.24	28.80	28.80	0.00	1
4871.42	33.60	33.60	0.00	1
4871.60	38.40	38.40	0.00	1
4871.77	43.20	43.20	0.00	1
4871.94	48.00	48.00	0.00	1
4873.48	87.64	87.64	0.00	Overtopping

Table 2 - Culvert Summary Table: CV-01 and CV-02

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4869.25	0.000	0.000	0-NF	0.000	0.000	0.380	0.000	0.000	0.000
4.80	4.80	4870.02	0.704	0.768	3-M1t	0.583	0.479	0.616	0.236	2.299	2.340
9.60	9.60	4870.35	1.007	1.098	3-M2t	0.826	0.682	0.734	0.354	3.584	2.997
14.40	14.40	4870.61	1.247	1.361	2-M2c	1.021	0.839	0.839	0.447	4.454	3.445
19.20	19.20	4870.84	1.454	1.589	2-M2c	1.192	0.976	0.976	0.528	4.811	3.795
24.00	24.00	4871.05	1.644	1.797	2-M2c	1.351	1.095	1.095	0.600	5.142	4.085
28.80	28.80	4871.24	1.824	1.991	2-M2c	1.503	1.204	1.204	0.665	5.433	4.334
33.60	33.60	4871.42	1.998	2.174	2-M2c	1.652	1.309	1.309	0.725	5.671	4.553
38.40	38.40	4871.60	2.166	2.349	2-M2c	1.800	1.405	1.405	0.782	5.908	4.750
43.20	43.20	4871.77	2.332	2.519	2-M2c	1.953	1.494	1.494	0.835	6.142	4.929
48.00	48.00	4871.94	2.496	2.686	2-M2c	2.116	1.577	1.577	0.885	6.376	5.092

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Straight Culvert

Inlet Elevation (invert): 4869.25 ft, Outlet Elevation (invert): 4868.87 ft

Culvert Length: 66.00 ft, Culvert Slope: 0.0058

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Site Data - CV-01 and CV-02

Site Data Option:

Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4869.25 ft

Outlet Station: 66.00 ft

Outlet Elevation: 4868.87 ft

Number of Barrels: 2

Culvert Data Summary - CV-01 and CV-02

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: NM Hwy 309 / Hillandale Ave)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4869.25	0.00	0.00	0.00	0.00
4.80	4869.49	0.24	2.34	0.22	0.88
9.60	4869.60	0.35	3.00	0.33	0.94
14.40	4869.70	0.45	3.45	0.42	0.97
19.20	4869.78	0.53	3.80	0.49	0.99
24.00	4869.85	0.60	4.08	0.56	1.01
28.80	4869.91	0.66	4.33	0.62	1.03
33.60	4869.98	0.73	4.55	0.68	1.04
38.40	4870.03	0.78	4.75	0.73	1.05
43.20	4870.08	0.83	4.93	0.78	1.06
48.00	4870.13	0.88	5.09	0.83	1.07

Tailwater Channel Data - NM Hwy 309 / Hillandale Ave

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4869.25 ft

Roadway Data for Crossing: NM Hwy 309 / Hillandale Ave

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4873.48 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 48 cfs

Maximum Flow: 48 cfs

Table 4 - Summary of Culvert Flows at Crossing: NM Hwy 309

Headwater Elevation (ft)	Total Discharge (cfs)	CV-03 and CV-04 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4855.58	0.00	0.00	0.00	1
4856.31	4.80	4.80	0.00	1
4856.64	9.60	9.60	0.00	1
4856.89	14.40	14.40	0.00	1
4857.13	19.20	19.20	0.00	1
4857.36	24.00	24.00	0.00	1
4857.57	28.80	28.80	0.00	1
4857.79	33.60	33.60	0.00	1
4858.01	38.40	38.40	0.00	1
4858.24	43.20	43.20	0.00	1
4858.64	48.00	48.00	0.00	1
4858.74	51.85	51.85	0.00	Overtopping

Table 5 - Culvert Summary Table: CV-03 and CV-04

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4855.58	0.000	0.000	0-NF	0.000	0.000	1.340	0.000	0.000	0.000
4.80	4.80	4856.31	0.733	0.252	1-S2n	0.471	0.502	0.471	0.236	3.609	2.340
9.60	9.60	4856.64	1.056	0.418	1-JS1t	0.668	0.718	1.694	0.354	1.317	2.997
14.40	14.40	4856.89	1.314	0.592	1-JS1t	0.824	0.886	1.787	0.447	1.865	3.445
19.20	19.20	4857.13	1.551	0.786	1-S2n	0.962	1.031	0.962	0.528	5.328	3.795
24.00	24.00	4857.36	1.775	1.002	1-S2n	1.088	1.162	1.088	0.600	5.654	4.085
28.80	28.80	4857.57	1.993	1.245	1-S2n	1.209	1.278	1.209	0.665	5.925	4.334
33.60	33.60	4857.79	2.209	1.514	1-JS1t	1.326	1.381	2.065	0.725	3.785	4.553
38.40	38.40	4858.01	2.431	1.812	1-S2n	1.442	1.482	1.442	0.782	6.344	4.750
43.20	43.20	4858.24	2.661	2.139	5-S2n	1.560	1.577	1.560	0.835	6.505	4.929
48.00	48.00	4858.64	2.906	3.060	7-M1t	1.683	1.664	2.225	0.885	5.201	5.092

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Straight Culvert

Inlet Elevation (invert): 4855.58 ft, Outlet Elevation (invert): 4854.24 ft

Culvert Length: 78.01 ft, Culvert Slope: 0.0172

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Site Data - CV-03 and CV-04

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4855.58 ft

Outlet Station: 78.00 ft

Outlet Elevation: 4854.24 ft

Number of Barrels: 2

Culvert Data Summary - CV-03 and CV-04

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 6 - Downstream Channel Rating Curve (Crossing: NM Hwy 309)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4855.58	0.00	0.00	0.00	0.00
4.80	4855.82	0.24	2.34	0.22	0.88
9.60	4855.93	0.35	3.00	0.33	0.94
14.40	4856.03	0.45	3.45	0.42	0.97
19.20	4856.11	0.53	3.80	0.49	0.99
24.00	4856.18	0.60	4.08	0.56	1.01
28.80	4856.24	0.66	4.33	0.62	1.03
33.60	4856.31	0.73	4.55	0.68	1.04
38.40	4856.36	0.78	4.75	0.73	1.05
43.20	4856.41	0.83	4.93	0.78	1.06
48.00	4856.46	0.88	5.09	0.83	1.07

Tailwater Channel Data - NM Hwy 309

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4855.58 ft

Roadway Data for Crossing: NM Hwy 309

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4858.74 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 45 cfs

Maximum Flow: 45 cfs

Table 7 - Summary of Culvert Flows at Crossing: Kaghan Loop Dr

Headwater Elevation (ft)	Total Discharge (cfs)	CV-05, CV-06 and CV-07 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4902.78	0.00	0.00	0.00	1
4903.32	4.50	4.50	0.00	1
4903.55	9.00	9.00	0.00	1
4903.74	13.50	13.50	0.00	1
4903.89	18.00	18.00	0.00	1
4904.03	22.50	22.50	0.00	1
4904.16	27.00	27.00	0.00	1
4904.28	31.50	31.50	0.00	1
4904.39	36.00	36.00	0.00	1
4904.50	40.50	40.50	0.00	1
4904.61	45.00	45.00	0.00	1
4906.41	122.95	122.95	0.00	Overtopping

Table 8 - Culvert Summary Table: CV-05, CV-06 and CV-07

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4902.78	0.000	0.000	0-NF	0.000	0.000	1.060	0.000	0.000	0.000
4.50	4.50	4903.32	0.541	0.079	1-S2n	0.367	0.375	0.367	0.077	2.914	1.169
9.00	9.00	4903.55	0.773	0.126	1-S2n	0.514	0.537	0.514	0.116	3.577	1.540
13.50	13.50	4903.74	0.957	0.170	1-S2n	0.629	0.659	0.629	0.148	4.031	1.807
18.00	18.00	4903.89	1.110	0.214	1-JS1t	0.726	0.766	1.236	0.176	2.111	2.025
22.50	22.50	4904.03	1.250	0.261	1-JS1t	0.814	0.857	1.261	0.201	2.570	2.212
27.00	27.00	4904.16	1.377	0.311	1-JS1t	0.894	0.944	1.284	0.224	3.010	2.376
31.50	31.50	4904.28	1.496	0.364	1-JS1t	0.969	1.023	1.306	0.246	3.436	2.525
36.00	36.00	4904.39	1.613	0.420	1-JS1t	1.040	1.095	1.326	0.266	3.848	2.660
40.50	40.50	4904.50	1.723	0.481	1-S2n	1.108	1.166	1.108	0.286	5.501	2.785
45.00	45.00	4904.61	1.827	0.305	1-S2n	1.173	1.231	1.173	0.305	5.658	2.903

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Straight Culvert

Inlet Elevation (invert): 4902.78 ft, Outlet Elevation (invert): 4901.72 ft

Culvert Length: 71.01 ft, Culvert Slope: 0.0149

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Site Data - CV-05, CV-06 and CV-07

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4902.78 ft

Outlet Station: 71.00 ft

Outlet Elevation: 4901.72 ft

Number of Barrels: 3

Culvert Data Summary - CV-05, CV-06 and CV-07

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: None

Table 9 - Downstream Channel Rating Curve (Crossing: Kaghan Loop Dr)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4902.78	0.00	0.00	0.00	0.00
4.50	4902.86	0.08	1.17	0.07	0.75
9.00	4902.90	0.12	1.54	0.11	0.80
13.50	4902.93	0.15	1.81	0.14	0.83
18.00	4902.96	0.18	2.02	0.16	0.86
22.50	4902.98	0.20	2.21	0.19	0.87
27.00	4903.00	0.22	2.38	0.21	0.89
31.50	4903.03	0.25	2.52	0.23	0.90
36.00	4903.05	0.27	2.66	0.25	0.92
40.50	4903.07	0.29	2.79	0.27	0.93
45.00	4903.08	0.30	2.90	0.29	0.94

Tailwater Channel Data - Kaghan Loop Dr

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 50.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4902.78 ft

Roadway Data for Crossing: Kaghan Loop Dr

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4906.41 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 45 cfs

Maximum Flow: 45 cfs

Table 10 - Summary of Culvert Flows at Crossing: Horner St

Headwater Elevation (ft)	Total Discharge (cfs)	CV-08 and CV-09 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4895.53	0.00	0.00	0.00	1
4896.37	4.50	4.50	0.00	1
4896.75	9.00	9.00	0.00	1
4897.06	13.50	13.50	0.00	1
4897.34	18.00	18.00	0.00	1
4897.62	22.50	22.50	0.00	1
4897.94	27.00	27.00	0.00	1
4898.25	31.50	29.80	1.59	18
4898.29	36.00	30.11	5.80	5
4898.33	40.50	30.34	10.07	4
4898.35	45.00	30.51	14.28	3
4898.22	29.57	29.57	0.00	Overtopping

Table 11 - Culvert Summary Table: CV-08 and CV-09

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4895.53	0.000	0.000	0-NF	0.000	0.000	0.790	0.000	0.000	0.000
4.50	4.50	4896.37	0.765	0.843	3-M1t	0.574	0.516	0.867	0.077	1.724	1.169
9.00	9.00	4896.75	1.113	1.224	3-M1t	0.830	0.743	0.906	0.116	3.253	1.540
13.50	13.50	4897.06	1.413	1.532	3-M2t	1.050	0.921	0.938	0.148	4.665	1.807
18.00	18.00	4897.34	1.697	1.810	2-M2c	1.266	1.069	1.069	0.176	5.269	2.025
22.50	22.50	4897.62	1.986	2.087	7-M2c	1.509	1.199	1.199	0.201	5.720	2.212
27.00	27.00	4897.94	2.298	2.406	7-M2c	2.000	1.320	1.320	0.224	6.139	2.376
31.50	29.80	4898.25	2.509	2.721	7-M2c	2.000	1.387	1.387	0.246	6.408	2.525
36.00	30.11	4898.29	2.534	2.763	7-M2c	2.000	1.394	1.394	0.266	6.438	2.660
40.50	30.34	4898.33	2.552	2.795	7-M2c	2.000	1.400	1.400	0.286	6.460	2.785
45.00	30.51	4898.35	2.566	2.823	7-M2c	2.000	1.404	1.404	0.305	6.477	2.903

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Straight Culvert

Inlet Elevation (invert): 4895.53 ft, Outlet Elevation (invert): 4894.74 ft

Culvert Length: 84.00 ft, Culvert Slope: 0.0094

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Site Data - CV-08 and CV-09

Site Data Option:

Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4895.53 ft

Outlet Station: 84.00 ft

Outlet Elevation: 4894.74 ft

Number of Barrels: 2

Culvert Data Summary - CV-08 and CV-09

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 12 - Downstream Channel Rating Curve (Crossing: Horner St)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4895.53	0.00	0.00	0.00	0.00
4.50	4895.61	0.08	1.17	0.07	0.75
9.00	4895.65	0.12	1.54	0.11	0.80
13.50	4895.68	0.15	1.81	0.14	0.83
18.00	4895.71	0.18	2.02	0.16	0.86
22.50	4895.73	0.20	2.21	0.19	0.87
27.00	4895.75	0.22	2.38	0.21	0.89
31.50	4895.78	0.25	2.52	0.23	0.90
36.00	4895.80	0.27	2.66	0.25	0.92
40.50	4895.82	0.29	2.79	0.27	0.93
45.00	4895.83	0.30	2.90	0.29	0.94

Tailwater Channel Data - Horner St

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 50.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4895.53 ft

Roadway Data for Crossing: Horner St

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4898.22 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 105 cfs

Maximum Flow: 105 cfs

Table 13 - Summary of Culvert Flows at Crossing: Dirt Road

Headwater Elevation (ft)	Total Discharge (cfs)	CV-10 and CV-11 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4861.55	0.00	0.00	0.00	1
4862.75	10.50	10.50	0.00	1
4863.42	21.00	21.00	0.00	1
4864.18	31.50	31.50	0.00	1
4865.27	42.00	42.00	0.00	1
4867.11	52.50	52.50	0.00	1
4869.33	63.00	63.00	0.00	1
4870.62	73.50	68.40	4.94	15
4870.69	84.00	68.69	15.11	5
4870.74	94.50	68.91	25.37	4
4870.79	105.00	69.11	35.80	4
4870.55	68.13	68.13	0.00	Overtopping

Table 14 - Culvert Summary Table: CV-10 and CV-11

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4861.55	0.000	0.000	0-NF	0.000	0.000	1.770	0.000	0.000	0.000
10.50	10.50	4862.75	1.196	0.459	1-JS1f	0.665	0.804	2.000	0.266	1.671	2.628
21.00	21.00	4863.42	1.869	1.181	1-JS1f	0.977	1.158	2.000	0.406	3.342	3.444
31.50	31.50	4864.18	2.627	2.265	5-JS1f	1.263	1.426	2.000	0.521	5.013	4.027
42.00	42.00	4865.27	3.641	3.723	4-FFf	2.000	1.640	2.000	0.623	6.685	4.495
52.50	52.50	4867.11	5.006	5.559	4-FFf	2.000	1.792	2.000	0.715	8.356	4.892
63.00	63.00	4869.33	6.750	7.777	4-FFf	2.000	1.881	2.000	0.801	10.027	5.241
73.50	68.40	4870.62	7.778	9.105	4-FFf	2.000	1.901	2.000	0.882	10.886	5.553
84.00	68.69	4870.69	7.835	9.252	4-FFf	2.000	1.885	2.000	0.960	10.932	5.836
94.50	68.91	4870.74	7.880	9.380	4-FFf	2.000	1.876	2.000	1.033	10.968	6.096
105.00	69.11	4870.79	7.920	9.499	4-FFf	2.000	1.869	2.000	1.105	11.000	6.338

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Straight Culvert

Inlet Elevation (invert): 4861.55 ft, Outlet Elevation (invert): 4859.78 ft

Culvert Length: 61.03 ft, Culvert Slope: 0.0290

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Site Data - CV-10 and CV-11

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4861.55 ft

Outlet Station: 61.00 ft

Outlet Elevation: 4859.78 ft

Number of Barrels: 2

Culvert Data Summary - CV-10 and CV-11

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 15 - Downstream Channel Rating Curve (Crossing: Dirt Road)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4861.55	0.00	0.00	0.00	0.00
10.50	4861.82	0.27	2.63	0.25	0.90
21.00	4861.96	0.41	3.44	0.38	0.95
31.50	4862.07	0.52	4.03	0.49	0.98
42.00	4862.17	0.62	4.50	0.58	1.00
52.50	4862.27	0.72	4.89	0.67	1.02
63.00	4862.35	0.80	5.24	0.75	1.03
73.50	4862.43	0.88	5.55	0.83	1.04
84.00	4862.51	0.96	5.84	0.90	1.05
94.50	4862.58	1.03	6.10	0.97	1.06
105.00	4862.65	1.10	6.34	1.03	1.06

Tailwater Channel Data - Dirt Road

Tailwater Channel Option: Rectangular Channel

Bottom Width: 15.00 ft

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4861.55 ft

Roadway Data for Crossing: Dirt Road

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4870.55 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 105 cfs

Maximum Flow: 105 cfs

Table 16 - Summary of Culvert Flows at Crossing: NM Hwy 47 / Goodman Ave

Headwater Elevation (ft)	Total Discharge (cfs)	CV-12 and CV-13 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4849.23	0.00	0.00	0.00	1
4850.59	10.50	10.50	0.00	1
4851.23	21.00	21.00	0.00	1
4851.87	31.50	31.50	0.00	1
4853.09	42.00	42.00	0.00	1
4854.62	52.50	52.50	0.00	1
4856.45	63.00	63.00	0.00	1
4858.08	73.50	73.50	0.00	1
4858.34	84.00	74.48	10.17	10
4858.40	94.50	73.80	20.67	5
4858.45	105.00	75.12	30.04	4
4858.23	73.79	73.79	0.00	Overtopping

Table 17 - Culvert Summary Table: CV-12 and CV-13

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4849.23	0.000	0.000	0-NF	0.000	0.000	0.540	0.000	0.000	0.000
10.50	10.50	4850.59	1.213	1.363	3-M2t	0.835	0.804	0.806	0.266	4.427	2.628
21.00	21.00	4851.23	1.885	2.004	7-M2c	1.275	1.158	1.158	0.406	5.569	3.444
31.50	31.50	4851.87	2.643	2.626	7-M2c	2.000	1.426	1.426	0.521	6.572	4.027
42.00	42.00	4853.09	3.658	3.856	7-M2c	2.000	1.640	1.640	0.623	7.616	4.495
52.50	52.50	4854.62	5.023	5.392	7-M2c	2.000	1.792	1.792	0.715	8.844	4.892
63.00	63.00	4856.45	6.769	7.222	7-M2c	2.000	1.881	1.881	0.801	10.277	5.241
73.50	73.50	4858.08	8.852	0.000	7-M2c	2.000	1.844	1.844	0.882	12.137	5.553
84.00	74.48	4858.34	9.063	0.000	7-M2c	2.000	1.669	1.669	0.960	13.292	5.836
94.50	73.80	4858.40	8.917	9.399	7-M2c	2.000	1.928	1.928	1.033	11.882	6.096
105.00	75.12	4858.45	9.203	0.000	3-M2t	2.000	1.583	1.645	1.105	13.590	6.338

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Straight Culvert

Inlet Elevation (invert): 4849.23 ft, Outlet Elevation (invert): 4848.69 ft

Culvert Length: 43.00 ft, Culvert Slope: 0.0126

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Site Data - CV-12 and CV-13

Site Data Option:

Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4849.23 ft

Outlet Station: 43.00 ft

Outlet Elevation: 4848.69 ft

Number of Barrels: 2

Culvert Data Summary - CV-12 and CV-13

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 18 - Downstream Channel Rating Curve (Crossing: NM Hwy 47 / Goodman Ave)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4849.23	0.00	0.00	0.00	0.00
10.50	4849.50	0.27	2.63	0.25	0.90
21.00	4849.64	0.41	3.44	0.38	0.95
31.50	4849.75	0.52	4.03	0.49	0.98
42.00	4849.85	0.62	4.50	0.58	1.00
52.50	4849.95	0.72	4.89	0.67	1.02
63.00	4850.03	0.80	5.24	0.75	1.03
73.50	4850.11	0.88	5.55	0.83	1.04
84.00	4850.19	0.96	5.84	0.90	1.05
94.50	4850.26	1.03	6.10	0.97	1.06
105.00	4850.33	1.10	6.34	1.03	1.06

Tailwater Channel Data - NM Hwy 47 / Goodman Ave

Tailwater Channel Option: Rectangular Channel

Bottom Width: 15.00 ft

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4849.23 ft

Roadway Data for Crossing: NM Hwy 47 / Goodman Ave

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4858.23 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 105 cfs

Maximum Flow: 105 cfs

Table 19 - Summary of Culvert Flows at Crossing: NM Hwy 47 / Damon St

Headwater Elevation (ft)	Total Discharge (cfs)	CV-14 and CV-15 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4831.19	0.00	0.00	0.00	1
4832.52	10.50	10.50	0.00	1
4833.18	21.00	21.00	0.00	1
4833.88	31.50	31.50	0.00	1
4835.15	42.00	42.00	0.00	1
4836.67	52.50	52.50	0.00	1
4838.48	63.00	63.00	0.00	1
4840.05	73.50	73.50	0.00	1
4840.29	84.00	74.59	9.95	10
4840.36	94.50	73.61	20.74	6
4840.41	105.00	74.87	30.75	5
4840.19	73.72	73.72	0.00	Overtopping

Table 20 - Culvert Summary Table: CV-14 and CV-15

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4831.19	0.000	0.000	0-NF	0.000	0.000	0.410	0.000	0.000	0.000
10.50	10.50	4832.52	1.215	1.334	2-M2c	0.896	0.804	0.804	0.266	4.441	2.628
21.00	21.00	4833.18	1.888	1.990	2-M2c	1.400	1.158	1.158	0.406	5.569	3.444
31.50	31.50	4833.88	2.646	2.687	7-M2c	2.000	1.426	1.426	0.521	6.572	4.027
42.00	42.00	4835.15	3.661	3.962	7-M2c	2.000	1.640	1.640	0.623	7.616	4.495
52.50	52.50	4836.67	5.025	5.477	7-M2c	2.000	1.792	1.792	0.715	8.844	4.892
63.00	63.00	4838.48	6.772	7.286	7-M2c	2.000	1.881	1.881	0.801	10.277	5.241
73.50	73.50	4840.05	8.857	0.000	7-M2c	2.000	1.844	1.844	0.882	12.137	5.553
84.00	74.59	4840.29	9.092	0.000	7-M2c	2.000	1.753	1.753	0.960	12.776	5.836
94.50	73.61	4840.36	8.881	9.408	7-M2c	2.000	1.882	1.882	1.033	12.005	6.096
105.00	74.87	4840.41	9.151	0.000	7-M2c	2.000	1.830	1.830	1.105	12.425	6.338

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Straight Culvert

Inlet Elevation (invert): 4831.19 ft, Outlet Elevation (invert): 4830.78 ft

Culvert Length: 42.00 ft, Culvert Slope: 0.0098

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Site Data - CV-14 and CV-15

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4831.19 ft

Outlet Station: 42.00 ft

Outlet Elevation: 4830.78 ft

Number of Barrels: 2

Culvert Data Summary - CV-14 and CV-15

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 21 - Downstream Channel Rating Curve (Crossing: NM Hwy 47 / Damon St)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4831.19	0.00	0.00	0.00	0.00
10.50	4831.46	0.27	2.63	0.25	0.90
21.00	4831.60	0.41	3.44	0.38	0.95
31.50	4831.71	0.52	4.03	0.49	0.98
42.00	4831.81	0.62	4.50	0.58	1.00
52.50	4831.91	0.72	4.89	0.67	1.02
63.00	4831.99	0.80	5.24	0.75	1.03
73.50	4832.07	0.88	5.55	0.83	1.04
84.00	4832.15	0.96	5.84	0.90	1.05
94.50	4832.22	1.03	6.10	0.97	1.06
105.00	4832.29	1.10	6.34	1.03	1.06

Tailwater Channel Data - NM Hwy 47 / Damon St

Tailwater Channel Option: Rectangular Channel

Bottom Width: 15.00 ft

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4831.19 ft

Roadway Data for Crossing: NM Hwy 47 / Damon St

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4840.19 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 77 cfs

Maximum Flow: 77 cfs

Table 22 - Summary of Culvert Flows at Crossing: NM Hwy 304 / Rio Communities Way

Headwater Elevation (ft)	Total Discharge (cfs)	CV-37 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4820.53	0.00	0.00	0.00	1
4822.19	7.70	7.70	0.00	1
4823.06	15.40	13.91	1.42	17
4823.13	23.10	14.24	8.76	6
4823.17	30.80	14.45	16.16	4
4823.22	38.50	14.62	23.79	4
4823.25	46.20	14.68	31.27	3
4823.29	53.90	14.86	38.90	3
4823.32	61.60	15.01	46.51	3
4823.35	69.30	15.16	54.11	3
4823.38	77.00	15.28	61.71	3
4823.03	13.75	13.75	0.00	Overtopping

(1)

Table 23 - Culvert Summary Table: CV-37

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4820.53	0.000	0.000	0-NF	0.000	0.000	0.410	0.000	0.000	0.000
7.70	7.70	4822.19	1.536	1.663	2-M2c	1.262	0.987	0.987	0.534	4.985	3.546
15.40	13.91	4823.06	2.360	2.529	7-M2c	2.000	1.340	1.340	0.778	6.218	4.347
23.10	14.24	4823.13	2.411	2.595	3-M2t	2.000	1.356	1.373	0.963	6.197	4.873
30.80	14.45	4823.17	2.442	2.687	7-M2t	2.000	1.366	1.526	1.116	5.617	5.274
38.50	14.62	4823.22	2.469	2.763	7-M2t	2.000	1.374	1.660	1.250	5.247	5.602
46.20	14.68	4823.25	2.478	2.857	7-M2t	2.000	1.377	1.779	1.369	4.974	5.883
53.90	14.86	4823.29	2.505	2.995	7-M2t	2.000	1.385	1.887	1.477	4.837	6.129
61.60	15.01	4823.32	2.530	3.131	7-M2t	2.000	1.392	1.987	1.577	4.783	6.348
69.30	15.16	4823.35	2.553	3.254	4-FFf	2.000	1.399	2.000	1.670	4.825	6.548
77.00	15.28	4823.38	2.572	3.366	4-FFf	2.000	1.404	2.000	1.756	4.862	6.731

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Straight Culvert

Inlet Elevation (invert): 4820.53 ft, Outlet Elevation (invert): 4820.12 ft

Culvert Length: 59.00 ft, Culvert Slope: 0.0069

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Site Data - CV-37

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4820.53 ft

Outlet Station: 59.00 ft

Outlet Elevation: 4820.12 ft

Number of Barrels: 1

Culvert Data Summary - CV-37

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 24 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / Rio Communities Way (1))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4820.53	0.00	0.00	0.00	0.00
7.70	4821.06	0.53	3.55	0.50	0.96
15.40	4821.31	0.78	4.35	0.73	1.01
23.10	4821.49	0.96	4.87	0.90	1.03
30.80	4821.65	1.12	5.27	1.04	1.05
38.50	4821.78	1.25	5.60	1.17	1.07
46.20	4821.90	1.37	5.88	1.28	1.08
53.90	4822.01	1.48	6.13	1.38	1.09
61.60	4822.11	1.58	6.35	1.48	1.10
69.30	4822.20	1.67	6.55	1.56	1.10
77.00	4822.29	1.76	6.73	1.64	1.11

Tailwater Channel Data - NM Hwy 304 / Rio Communities Way (1)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4820.53 ft

Roadway Data for Crossing: NM Hwy 304 / Rio Communities Way (1)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4823.03 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 77 cfs

Maximum Flow: 77 cfs

Table 25 - Summary of Culvert Flows at Crossing: NM Hwy 304 / Rio Communities Way

Headwater Elevation (ft)	Total Discharge (cfs)	CV-38 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4821.19	0.00	0.00	0.00	1
4822.31	7.70	7.70	0.00	1
4822.80	15.40	15.40	0.00	1
4823.23	23.10	23.10	0.00	1
4823.60	30.80	30.80	0.00	1
4823.94	38.50	38.50	0.00	1
4824.25	46.20	46.20	0.00	1
4824.55	53.90	53.90	0.00	1
4824.87	61.60	61.60	0.00	1
4825.20	69.30	68.84	0.26	24
4825.27	77.00	70.35	6.52	6
4825.19	68.66	68.66	0.00	Overtopping

(2)

Table 26 - Culvert Summary Table: CV-38

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4821.19	0.000	0.000	0-NF	0.000	0.000	1.440	0.000	0.000	0.000
7.70	7.70	4822.31	1.116	0.330	1-JS1t	0.511	0.833	1.754	0.314	1.544	2.838
15.40	15.40	4822.80	1.610	0.535	1-S2n	0.720	1.192	0.785	0.473	9.202	3.637
23.10	23.10	4823.23	2.038	0.738	1-S2n	0.881	1.473	0.976	0.600	10.159	4.185
30.80	30.80	4823.60	2.414	0.955	1-S2n	1.021	1.716	1.153	0.709	10.760	4.613
38.50	38.50	4823.94	2.745	1.190	1-S2n	1.147	1.926	1.312	0.806	11.286	4.967
46.20	46.20	4824.25	3.056	1.448	1-S2n	1.264	2.118	1.460	0.895	11.749	5.271
53.90	53.90	4824.55	3.364	1.730	1-S2n	1.374	2.292	1.600	0.977	12.154	5.539
61.60	61.60	4824.87	3.684	2.038	5-S2n	1.479	2.457	1.736	1.054	12.518	5.779
69.30	68.84	4825.20	4.009	2.385	5-S2n	1.575	2.597	1.857	1.127	12.859	5.997
77.00	70.35	4825.27	4.079	2.478	5-S2n	1.595	2.625	1.881	1.196	12.928	6.197

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Straight Culvert

Inlet Elevation (invert): 4821.19 ft, Outlet Elevation (invert): 4819.75 ft

Culvert Length: 69.02 ft, Culvert Slope: 0.0209

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Site Data - CV-38

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4821.19 ft

Outlet Station: 69.00 ft

Outlet Elevation: 4819.75 ft

Number of Barrels: 1

Culvert Data Summary - CV-38

Barrel Shape: Circular

Barrel Diameter: 3.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 27 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / Rio Communities Way (2))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4821.19	0.00	0.00	0.00	0.00
7.70	4821.50	0.31	2.84	0.29	0.92
15.40	4821.66	0.47	3.64	0.44	0.98
23.10	4821.79	0.60	4.19	0.56	1.01
30.80	4821.90	0.71	4.61	0.66	1.04
38.50	4822.00	0.81	4.97	0.75	1.05
46.20	4822.09	0.90	5.27	0.84	1.07
53.90	4822.17	0.98	5.54	0.91	1.08
61.60	4822.24	1.05	5.78	0.99	1.09
69.30	4822.32	1.13	6.00	1.05	1.10
77.00	4822.39	1.20	6.20	1.12	1.11

Tailwater Channel Data - NM Hwy 304 / Rio Communities Way (2)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4821.19 ft

Roadway Data for Crossing: NM Hwy 304 / Rio Communities Way (2)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4825.19 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 77 cfs

Maximum Flow: 77 cfs

Table 28 - Summary of Culvert Flows at Crossing: NM Hwy 304 / Rio Communities Way

Headwater Elevation (ft)	Total Discharge (cfs)	CV-39 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4825.80	0.00	0.00	0.00	1
4827.80	7.70	7.55	0.09	10
4827.89	15.40	7.75	7.58	7
4827.94	23.10	7.82	15.22	5
4827.98	30.80	7.92	22.79	4
4828.02	38.50	8.01	30.24	3
4828.05	46.20	8.10	37.94	3
4828.09	53.90	8.18	45.64	3
4828.12	61.60	8.24	53.32	3
4828.15	69.30	8.31	60.98	3
4828.17	77.00	8.37	68.46	2
4827.80	7.53	7.53	0.00	Overtopping

(3)

Table 29 - Culvert Summary Table: CV-39

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4825.80	0.000	0.000	0-NF	0.000	0.000	0.570	0.000	0.000	0.000
7.70	7.55	4827.80	1.951	2.004	7-M2c	1.500	1.061	1.061	0.311	5.649	2.772
15.40	7.75	4827.89	2.002	2.087	7-M2c	1.500	1.075	1.075	0.465	5.718	3.525
23.10	7.82	4827.94	2.020	2.128	7-M2t	1.500	1.079	1.157	0.587	5.346	4.034
30.80	7.92	4827.98	2.047	2.207	7-M2t	1.500	1.087	1.261	0.691	4.996	4.428
38.50	8.01	4828.02	2.071	2.306	7-M2t	1.500	1.093	1.353	0.783	4.777	4.753
46.20	8.10	4828.05	2.094	2.428	7-M2t	1.500	1.099	1.436	0.866	4.652	5.032
53.90	8.18	4828.09	2.114	2.540	4-FFf	1.500	1.104	1.500	0.943	4.627	5.277
61.60	8.24	4828.12	2.133	2.638	4-FFf	1.500	1.108	1.500	1.015	4.665	5.495
69.30	8.31	4828.15	2.150	2.730	4-FFf	1.500	1.112	1.500	1.082	4.701	5.694
77.00	8.37	4828.17	2.166	2.818	4-FFf	1.500	1.116	1.500	1.146	4.734	5.875

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Straight Culvert

Inlet Elevation (invert): 4825.80 ft, Outlet Elevation (invert): 4825.23 ft

Culvert Length: 47.00 ft, Culvert Slope: 0.0121

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Site Data - CV-39

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4825.80 ft

Outlet Station: 47.00 ft

Outlet Elevation: 4825.23 ft

Number of Barrels: 1

Culvert Data Summary - CV-39

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 30 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / Rio Communities Way (3))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4825.80	0.00	0.00	0.00	0.00
7.70	4826.11	0.31	2.77	0.29	0.92
15.40	4826.27	0.47	3.52	0.44	0.98
23.10	4826.39	0.59	4.03	0.55	1.01
30.80	4826.49	0.69	4.43	0.65	1.03
38.50	4826.58	0.78	4.75	0.73	1.05
46.20	4826.67	0.87	5.03	0.81	1.06
53.90	4826.74	0.94	5.28	0.88	1.08
61.60	4826.81	1.01	5.50	0.95	1.09
69.30	4826.88	1.08	5.69	1.01	1.09
77.00	4826.95	1.15	5.88	1.07	1.10

Tailwater Channel Data - NM Hwy 304 / Rio Communities Way (3)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4825.80 ft

Roadway Data for Crossing: NM Hwy 304 / Rio Communities Way (3)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4827.80 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 77 cfs

Maximum Flow: 77 cfs

Table 31 - Summary of Culvert Flows at Crossing: NM Hwy 304 / Horizon Vista Blvd

Headwater Elevation (ft)	Total Discharge (cfs)	CV-40 and CV-41 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4825.27	0.00	0.00	0.00	1
4826.08	7.70	7.70	0.00	1
4826.42	15.40	15.40	0.00	1
4826.69	23.10	23.10	0.00	1
4826.93	30.80	30.80	0.00	1
4827.14	38.50	38.50	0.00	1
4827.33	46.20	46.20	0.00	1
4827.53	53.90	53.90	0.00	1
4827.71	61.60	61.60	0.00	1
4827.89	69.30	69.30	0.00	1
4828.07	77.00	77.00	0.00	1
4829.77	150.64	150.64	0.00	Overtopping

Table 32 - Culvert Summary Table: CV-40 and CV-41

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4825.27	0.000	0.000	0-NF	0.000	0.000	2.480	0.000	0.000	0.000
7.70	7.70	4826.08	0.810	0.316	1-S2n	0.447	0.562	0.447	0.311	4.857	2.772
15.40	15.40	4826.42	1.152	0.484	1-JS1t	0.628	0.804	2.945	0.465	0.756	3.525
23.10	23.10	4826.69	1.424	0.629	1-JS1t	0.765	0.988	3.067	0.587	1.089	4.034
30.80	30.80	4826.93	1.658	0.766	1-JS1t	0.883	1.147	3.171	0.691	1.407	4.428
38.50	38.50	4827.14	1.868	0.901	1-JS1t	0.988	1.286	3.263	0.783	1.714	4.753
46.20	46.20	4827.33	2.065	1.037	1-JS1t	1.084	1.415	3.346	0.866	2.012	5.032
53.90	53.90	4827.53	2.256	1.176	1-JS1t	1.174	1.532	3.423	0.943	2.303	5.277
61.60	61.60	4827.71	2.442	1.318	1-JS1t	1.258	1.641	3.495	1.015	2.592	5.495
69.30	69.30	4827.89	2.621	1.466	1-JS1t	1.339	1.749	3.562	1.082	2.878	5.694
77.00	77.00	4828.07	2.797	1.620	1-JS1t	1.416	1.850	3.626	1.146	3.158	5.875

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Straight Culvert

Inlet Elevation (invert): 4825.27 ft, Outlet Elevation (invert): 4822.79 ft

Culvert Length: 81.04 ft, Culvert Slope: 0.0306

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Site Data - CV-40 and CV-41

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4825.27 ft

Outlet Station: 81.00 ft

Outlet Elevation: 4822.79 ft

Number of Barrels: 2

Culvert Data Summary - CV-40 and CV-41

Barrel Shape: Circular

Barrel Diameter: 4.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 33 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / Horizon Vista Blvd)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4825.27	0.00	0.00	0.00	0.00
7.70	4825.58	0.31	2.77	0.29	0.92
15.40	4825.74	0.47	3.52	0.44	0.98
23.10	4825.86	0.59	4.03	0.55	1.01
30.80	4825.96	0.69	4.43	0.65	1.03
38.50	4826.05	0.78	4.75	0.73	1.05
46.20	4826.14	0.87	5.03	0.81	1.06
53.90	4826.21	0.94	5.28	0.88	1.08
61.60	4826.28	1.01	5.50	0.95	1.09
69.30	4826.35	1.08	5.69	1.01	1.09
77.00	4826.42	1.15	5.88	1.07	1.10

Tailwater Channel Data - NM Hwy 304 / Horizon Vista Blvd

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4825.27 ft

Roadway Data for Crossing: NM Hwy 304 / Horizon Vista Blvd

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4829.77 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 206 cfs

Maximum Flow: 206 cfs

Table 34 - Summary of Culvert Flows at Crossing: NM Hwy 304 / Good Dr

Headwater Elevation (ft)	Total Discharge (cfs)	CV-44 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4820.38	0.00	0.00	0.00	1
4823.04	20.60	20.60	0.00	1
4824.88	41.20	41.20	0.00	1
4825.21	61.80	42.94	18.65	9
4825.31	82.40	43.54	38.68	5
4825.39	103.00	44.00	58.76	4
4825.46	123.60	44.39	79.11	4
4825.53	144.20	44.75	99.11	3
4825.59	164.80	44.97	119.59	3
4825.65	185.40	45.32	139.98	3
4825.70	206.00	45.65	160.31	3
4825.05	42.18	42.18	0.00	Overtopping

Table 35 - Culvert Summary Table: CV-44

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4820.38	0.000	0.000	0-NF	0.000	0.000	1.050	0.000	0.000	0.000
20.60	20.60	4823.04	2.409	2.663	3-M1t	1.512	1.500	1.611	0.561	5.781	4.024
41.20	41.20	4824.88	4.488	4.501	7-M2c	2.700	2.138	2.138	0.838	8.472	5.078
61.80	42.94	4825.21	4.720	4.828	7-M2c	2.700	2.179	2.179	1.056	8.670	5.785
82.40	43.54	4825.31	4.804	4.937	7-M2t	2.700	2.193	2.292	1.242	8.403	6.328
103.00	44.00	4825.39	4.870	5.081	7-M2t	2.700	2.204	2.456	1.406	8.046	6.775
123.60	44.39	4825.46	4.925	5.257	7-M2t	2.700	2.213	2.605	1.555	7.841	7.156
144.20	44.75	4825.53	4.976	5.447	4-FFf	2.700	2.221	2.700	1.691	7.816	7.490
164.80	44.97	4825.59	5.008	5.611	4-FFf	2.700	2.225	2.700	1.818	7.854	7.788
185.40	45.32	4825.65	5.059	5.790	4-FFf	2.700	2.233	2.700	1.937	7.916	8.059
206.00	45.65	4825.70	5.108	5.958	4-FFf	2.700	2.240	2.700	2.050	7.973	8.306

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Straight Culvert

Inlet Elevation (invert): 4820.38 ft, Outlet Elevation (invert): 4819.33 ft

Culvert Length: 73.01 ft, Culvert Slope: 0.0144

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Site Data - CV-44

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4820.38 ft

Outlet Station: 73.00 ft

Outlet Elevation: 4819.33 ft

Number of Barrels: 1

Culvert Data Summary - CV-44

Barrel Shape: Circular

Barrel Diameter: 2.70 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 36 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / Good Dr)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4820.38	0.00	0.00	0.00	0.00
20.60	4820.94	0.56	4.02	0.53	1.00
41.20	4821.22	0.84	5.08	0.78	1.06
61.80	4821.44	1.06	5.78	0.99	1.09
82.40	4821.62	1.24	6.33	1.16	1.11
103.00	4821.79	1.41	6.77	1.32	1.13
123.60	4821.93	1.55	7.16	1.46	1.14
144.20	4822.07	1.69	7.49	1.58	1.16
164.80	4822.20	1.82	7.79	1.70	1.17
185.40	4822.32	1.94	8.06	1.81	1.18
206.00	4822.43	2.05	8.31	1.92	1.18

Tailwater Channel Data - NM Hwy 304 / Good Dr

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4820.38 ft

Roadway Data for Crossing: NM Hwy 304 / Good Dr

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4825.05 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 77 cfs

Maximum Flow: 77 cfs

Table 37 - Summary of Culvert Flows at Crossing: NM Hwy 304 / NM Hwy 47 (8)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-48 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4815.09	0.00	0.00	0.00	1
4816.63	7.70	7.70	0.00	1
4817.33	15.40	15.40	0.00	1
4817.96	23.10	23.10	0.00	1
4818.66	30.80	30.80	0.00	1
4819.69	38.50	38.50	0.00	1
4820.15	46.20	41.52	4.52	15
4820.21	53.90	41.90	11.89	5
4820.25	61.60	42.18	19.29	4
4820.29	69.30	42.43	26.81	4
4820.33	77.00	42.65	34.17	3
4820.09	41.04	41.04	0.00	Overtopping

Table 38 - Culvert Summary Table: CV-48

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4815.09	0.000	0.000	0-NF	0.000	0.000	0.260	0.000	0.000	0.000
7.70	7.70	4816.63	1.298	1.537	2-M2c	1.444	0.869	0.869	0.314	4.533	2.838
15.40	15.40	4817.33	1.903	2.242	2-M2c	2.346	1.249	1.249	0.473	5.532	3.637
23.10	23.10	4817.96	2.440	2.867	2-M2c	3.000	1.546	1.546	0.600	6.289	4.185
30.80	30.80	4818.66	2.976	3.570	7-M2c	3.000	1.793	1.793	0.709	6.987	4.613
38.50	38.50	4819.69	3.562	4.602	7-M2c	3.000	2.014	2.014	0.806	7.630	4.967
46.20	41.52	4820.15	3.815	5.062	7-M2c	3.000	2.096	2.096	0.895	7.871	5.271
53.90	41.90	4820.21	3.848	5.117	7-M2c	3.000	2.106	2.106	0.977	7.903	5.539
61.60	42.18	4820.25	3.872	5.161	7-M2c	3.000	2.113	2.113	1.054	7.927	5.779
69.30	42.43	4820.29	3.894	5.201	7-M2c	3.000	2.119	2.119	1.127	7.948	5.997
77.00	42.65	4820.33	3.914	5.236	7-M2c	3.000	2.125	2.125	1.196	7.967	6.197

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Straight Culvert

Inlet Elevation (invert): 4815.09 ft, Outlet Elevation (invert): 4814.83 ft

Culvert Length: 138.00 ft, Culvert Slope: 0.0019

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Site Data - CV-48

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4815.09 ft

Outlet Station: 138.00 ft

Outlet Elevation: 4814.83 ft

Number of Barrels: 1

Culvert Data Summary - CV-48

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 39 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / NM Hwy 47 (8))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4815.09	0.00	0.00	0.00	0.00
7.70	4815.40	0.31	2.84	0.29	0.92
15.40	4815.56	0.47	3.64	0.44	0.98
23.10	4815.69	0.60	4.19	0.56	1.01
30.80	4815.80	0.71	4.61	0.66	1.04
38.50	4815.90	0.81	4.97	0.75	1.05
46.20	4815.99	0.90	5.27	0.84	1.07
53.90	4816.07	0.98	5.54	0.91	1.08
61.60	4816.14	1.05	5.78	0.99	1.09
69.30	4816.22	1.13	6.00	1.05	1.10
77.00	4816.29	1.20	6.20	1.12	1.11

Tailwater Channel Data - NM Hwy 304 / NM Hwy 47 (8)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4815.09 ft

Roadway Data for Crossing: NM Hwy 304 / NM Hwy 47 (8)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4820.09 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 77 cfs

Maximum Flow: 77 cfs

Table 40 - Summary of Culvert Flows at Crossing: NM Hwy 304 / Rio Communities Way

Headwater Elevation (ft)	Total Discharge (cfs)	CV-49 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4815.70	0.00	0.00	0.00	1
4817.17	7.70	7.70	0.00	1
4817.84	15.40	15.40	0.00	1
4818.42	23.10	23.10	0.00	1
4818.98	30.80	30.80	0.00	1
4819.67	38.50	38.50	0.00	1
4820.58	46.20	46.20	0.00	1
4820.78	53.90	47.68	6.08	9
4820.83	61.60	48.10	13.42	5
4820.87	69.30	48.43	20.76	4
4820.91	77.00	48.73	28.22	4
4820.70	46.97	46.97	0.00	Overtopping

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Table 41 - Culvert Summary Table: CV-49

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4815.70	0.000	0.000	0-NF	0.000	0.000	0.200	0.000	0.000	0.000
7.70	7.70	4817.17	1.297	1.471	2-M2c	1.317	0.869	0.869	0.314	4.533	2.838
15.40	15.40	4817.84	1.902	2.142	2-M2c	2.042	1.249	1.249	0.473	5.532	3.637
23.10	23.10	4818.42	2.439	2.718	2-M2c	3.000	1.546	1.546	0.600	6.289	4.185
30.80	30.80	4818.98	2.975	3.283	7-M2c	3.000	1.793	1.793	0.709	6.987	4.613
38.50	38.50	4819.67	3.561	3.969	7-M2c	3.000	2.014	2.014	0.806	7.630	4.967
46.20	46.20	4820.58	4.238	4.883	7-M2c	3.000	2.211	2.211	0.895	8.271	5.271
53.90	47.68	4820.78	4.381	5.075	7-M2c	3.000	2.246	2.246	0.977	8.400	5.539
61.60	48.10	4820.83	4.423	5.127	7-M2c	3.000	2.256	2.256	1.054	8.437	5.779
69.30	48.43	4820.87	4.455	5.169	7-M2c	3.000	2.263	2.263	1.127	8.466	5.997
77.00	48.73	4820.91	4.486	5.208	7-M2c	3.000	2.270	2.270	1.196	8.492	6.197

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Straight Culvert

Inlet Elevation (invert): 4815.70 ft, Outlet Elevation (invert): 4815.50 ft

Culvert Length: 77.00 ft, Culvert Slope: 0.0026

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Site Data - CV-49

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4815.70 ft

Outlet Station: 77.00 ft

Outlet Elevation: 4815.50 ft

Number of Barrels: 1

Culvert Data Summary - CV-49

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 42 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / Rio Communities Way (4))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4815.70	0.00	0.00	0.00	0.00
7.70	4816.01	0.31	2.84	0.29	0.92
15.40	4816.17	0.47	3.64	0.44	0.98
23.10	4816.30	0.60	4.19	0.56	1.01
30.80	4816.41	0.71	4.61	0.66	1.04
38.50	4816.51	0.81	4.97	0.75	1.05
46.20	4816.60	0.90	5.27	0.84	1.07
53.90	4816.68	0.98	5.54	0.91	1.08
61.60	4816.75	1.05	5.78	0.99	1.09
69.30	4816.83	1.13	6.00	1.05	1.10
77.00	4816.90	1.20	6.20	1.12	1.11

Tailwater Channel Data - NM Hwy 304 / Rio Communities Way (4)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4815.70 ft

Roadway Data for Crossing: NM Hwy 304 / Rio Communities Way (4)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4820.70 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 77 cfs

Maximum Flow: 77 cfs

Table 43 - Summary of Culvert Flows at Crossing: NM Hwy 304 / Rio Communities Way

Headwater Elevation (ft)	Total Discharge (cfs)	CV-50 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4817.38	0.00	0.00	0.00	1
4818.66	7.70	7.70	0.00	1
4819.26	15.40	15.40	0.00	1
4819.80	23.10	23.10	0.00	1
4820.34	30.80	30.80	0.00	1
4821.08	38.50	38.50	0.00	1
4821.60	46.20	46.20	0.00	1
4822.38	53.90	53.76	0.00	42
4822.46	61.60	54.49	6.92	6
4822.51	69.30	54.93	14.30	5
4822.55	77.00	55.29	21.61	4
4822.38	53.76	53.76	0.00	Overtopping

(5)

Table 44 - Culvert Summary Table: CV-50

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4817.38	0.000	0.000	0-NF	0.000	0.000	0.640	0.000	0.000	0.000
7.70	7.70	4818.66	1.280	0.368	1-S2n	0.810	0.869	0.810	0.314	4.829	2.838
15.40	15.40	4819.26	1.882	0.821	1-S2n	1.168	1.249	1.168	0.473	5.843	3.637
23.10	23.10	4819.80	2.419	1.384	1-S2n	1.469	1.546	1.469	0.600	6.493	4.185
30.80	30.80	4820.34	2.955	2.002	1-S2n	1.755	1.793	1.755	0.709	6.949	4.613
38.50	38.50	4821.08	3.541	3.700	7-M2c	2.053	2.014	2.014	0.806	7.630	4.967
46.20	46.20	4821.60	4.218	4.099	7-M2c	3.000	2.211	2.211	0.895	8.271	5.271
53.90	53.76	4822.38	5.000	4.618	7-M2c	3.000	2.379	2.379	0.977	8.943	5.539
61.60	54.49	4822.46	5.082	4.679	7-M2c	3.000	2.394	2.394	1.054	9.010	5.779
69.30	54.93	4822.51	5.133	4.718	7-M2c	3.000	2.403	2.403	1.127	9.051	5.997
77.00	55.29	4822.55	5.174	4.750	7-M2c	3.000	2.410	2.410	1.196	9.084	6.197

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Straight Culvert

Inlet Elevation (invert): 4817.38 ft, Outlet Elevation (invert): 4816.74 ft

Culvert Length: 40.01 ft, Culvert Slope: 0.0160

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Site Data - CV-50

Site Data Option:

Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4817.38 ft

Outlet Station: 40.00 ft

Outlet Elevation: 4816.74 ft

Number of Barrels: 1

Culvert Data Summary - CV-50

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 45 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / Rio Communities Way (5))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4817.38	0.00	0.00	0.00	0.00
7.70	4817.69	0.31	2.84	0.29	0.92
15.40	4817.85	0.47	3.64	0.44	0.98
23.10	4817.98	0.60	4.19	0.56	1.01
30.80	4818.09	0.71	4.61	0.66	1.04
38.50	4818.19	0.81	4.97	0.75	1.05
46.20	4818.28	0.90	5.27	0.84	1.07
53.90	4818.36	0.98	5.54	0.91	1.08
61.60	4818.43	1.05	5.78	0.99	1.09
69.30	4818.51	1.13	6.00	1.05	1.10
77.00	4818.58	1.20	6.20	1.12	1.11

Tailwater Channel Data - NM Hwy 304 / Rio Communities Way (5)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4817.38 ft

Roadway Data for Crossing: NM Hwy 304 / Rio Communities Way (5)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4822.38 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 77 cfs

Maximum Flow: 77 cfs

Table 46 - Summary of Culvert Flows at Crossing: NM Hwy 304 / Rio Communities Way

Headwater Elevation (ft)	Total Discharge (cfs)	CV-51 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4818.55	0.00	0.00	0.00	1
4819.98	7.70	7.70	0.00	1
4820.64	15.40	15.40	0.00	1
4821.19	23.10	23.10	0.00	1
4821.71	30.80	30.80	0.00	1
4822.25	38.50	38.50	0.00	1
4822.91	46.20	46.20	0.00	1
4823.58	53.90	52.56	1.16	26
4823.64	61.60	53.18	8.32	6
4823.69	69.30	53.57	15.50	4
4823.73	77.00	53.83	23.08	4
4823.55	52.32	52.32	0.00	Overtopping

(6)

Table 47 - Culvert Summary Table: CV-51

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4818.55	0.000	0.000	0-NF	0.000	0.000	0.140	0.000	0.000	0.000
7.70	7.70	4819.98	1.296	1.432	2-M2c	1.220	0.869	0.869	0.314	4.533	2.838
15.40	15.40	4820.64	1.901	2.086	2-M2c	1.850	1.249	1.249	0.473	5.532	3.637
23.10	23.10	4821.19	2.438	2.638	2-M2c	3.000	1.546	1.546	0.600	6.289	4.185
30.80	30.80	4821.71	2.974	3.159	7-M2c	3.000	1.793	1.793	0.709	6.987	4.613
38.50	38.50	4822.25	3.560	3.695	7-M2c	3.000	2.014	2.014	0.806	7.630	4.967
46.20	46.20	4822.91	4.237	4.355	7-M2c	3.000	2.211	2.211	0.895	8.271	5.271
53.90	52.56	4823.58	4.887	5.025	7-M2c	3.000	2.354	2.354	0.977	8.834	5.539
61.60	53.18	4823.64	4.955	5.093	7-M2c	3.000	2.367	2.367	1.054	8.890	5.779
69.30	53.57	4823.69	4.998	5.136	7-M2c	3.000	2.375	2.375	1.127	8.926	5.997
77.00	53.83	4823.73	5.027	5.183	7-M2c	3.000	2.380	2.380	1.196	8.950	6.197

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Straight Culvert

Inlet Elevation (invert): 4818.55 ft, Outlet Elevation (invert): 4818.41 ft

Culvert Length: 41.00 ft, Culvert Slope: 0.0034

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Site Data - CV-51

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4818.55 ft

Outlet Station: 41.00 ft

Outlet Elevation: 4818.41 ft

Number of Barrels: 1

Culvert Data Summary - CV-51

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 48 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / Rio Communities Way (6))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4818.55	0.00	0.00	0.00	0.00
7.70	4818.86	0.31	2.84	0.29	0.92
15.40	4819.02	0.47	3.64	0.44	0.98
23.10	4819.15	0.60	4.19	0.56	1.01
30.80	4819.26	0.71	4.61	0.66	1.04
38.50	4819.36	0.81	4.97	0.75	1.05
46.20	4819.45	0.90	5.27	0.84	1.07
53.90	4819.53	0.98	5.54	0.91	1.08
61.60	4819.60	1.05	5.78	0.99	1.09
69.30	4819.68	1.13	6.00	1.05	1.10
77.00	4819.75	1.20	6.20	1.12	1.11

Tailwater Channel Data - NM Hwy 304 / Rio Communities Way (6)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4818.55 ft

Roadway Data for Crossing: NM Hwy 304 / Rio Communities Way (6)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4823.55 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 77 cfs

Maximum Flow: 77 cfs

Table 49 - Summary of Culvert Flows at Crossing: NM Hwy 304 / Rio Communities Way

Headwater Elevation (ft)	Total Discharge (cfs)	CV-52 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4821.14	0.00	0.00	0.00	1
4822.32	7.70	7.70	0.00	1
4822.87	15.40	15.40	0.00	1
4823.34	23.10	23.10	0.00	1
4823.73	30.80	30.80	0.00	1
4824.12	38.50	38.50	0.00	1
4824.55	46.20	46.20	0.00	1
4825.03	53.90	53.90	0.00	1
4825.58	61.60	61.60	0.00	1
4826.16	69.30	68.56	0.58	32
4826.23	77.00	69.36	7.51	6
4826.14	68.37	68.37	0.00	Overtopping

(7)

Table 50 - Culvert Summary Table: CV-52

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4821.14	0.000	0.000	0-NF	0.000	0.000	0.640	0.000	0.000	0.000
7.70	7.70	4822.32	1.176	0.341	1-S2n	0.568	0.869	0.620	0.314	7.031	2.838
15.40	15.40	4822.87	1.733	0.715	1-S2n	0.805	1.249	0.911	0.473	8.188	3.637
23.10	23.10	4823.34	2.196	1.145	1-S2n	0.994	1.546	1.149	0.600	8.951	4.185
30.80	30.80	4823.73	2.594	1.577	1-S2n	1.160	1.793	1.362	0.709	9.544	4.613
38.50	38.50	4824.12	2.984	2.037	1-S2n	1.313	2.014	1.554	0.806	10.084	4.967
46.20	46.20	4824.55	3.406	2.526	5-S2n	1.458	2.211	1.734	0.895	10.577	5.271
53.90	53.90	4825.03	3.887	3.350	5-S2n	1.600	2.382	1.903	0.977	11.064	5.539
61.60	61.60	4825.58	4.442	3.821	5-S2n	1.741	2.528	2.063	1.054	11.551	5.779
69.30	68.56	4826.16	5.016	4.281	5-S2n	1.870	2.637	2.201	1.127	11.997	5.997
77.00	69.36	4826.23	5.087	4.336	5-S2n	1.885	2.649	2.217	1.196	12.057	6.197

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Straight Culvert

Inlet Elevation (invert): 4821.14 ft, Outlet Elevation (invert): 4820.50 ft

Culvert Length: 39.01 ft, Culvert Slope: 0.0164

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Site Data - CV-52

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4821.14 ft

Outlet Station: 39.00 ft

Outlet Elevation: 4820.50 ft

Number of Barrels: 1

Culvert Data Summary - CV-52

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 51 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / Rio Communities Way (7))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4821.14	0.00	0.00	0.00	0.00
7.70	4821.45	0.31	2.84	0.29	0.92
15.40	4821.61	0.47	3.64	0.44	0.98
23.10	4821.74	0.60	4.19	0.56	1.01
30.80	4821.85	0.71	4.61	0.66	1.04
38.50	4821.95	0.81	4.97	0.75	1.05
46.20	4822.04	0.90	5.27	0.84	1.07
53.90	4822.12	0.98	5.54	0.91	1.08
61.60	4822.19	1.05	5.78	0.99	1.09
69.30	4822.27	1.13	6.00	1.05	1.10
77.00	4822.34	1.20	6.20	1.12	1.11

Tailwater Channel Data - NM Hwy 304 / Rio Communities Way (7)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4821.14 ft

Roadway Data for Crossing: NM Hwy 304 / Rio Communities Way (7)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4826.14 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 206 cfs

Maximum Flow: 206 cfs

Table 52 - Summary of Culvert Flows at Crossing: NM Hwy 304 / Horizon Vista Blvd

Headwater Elevation (ft)	Total Discharge (cfs)	CV-53 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4824.22	0.00	0.00	0.00	1
4827.78	20.60	20.60	0.00	1
4828.38	41.20	22.63	18.45	10
4828.48	61.80	22.92	38.69	5
4828.56	82.40	23.17	59.00	4
4828.63	103.00	23.38	79.53	4
4828.70	123.60	23.57	99.69	3
4828.76	144.20	23.76	120.24	3
4828.82	164.80	23.93	140.78	3
4828.88	185.40	24.09	161.27	3
4828.93	206.00	24.25	181.74	3
4828.22	22.15	22.15	0.00	Overtopping

Table 53 - Culvert Summary Table: CV-53

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4824.22	0.000	0.000	0-NF	0.000	0.000	1.370	0.000	0.000	0.000
20.60	20.60	4827.78	3.559	3.482	7-M2t	2.000	1.626	1.931	0.561	6.628	4.024
41.20	22.63	4828.38	4.030	4.403	4-FFf	2.000	1.694	2.000	0.838	7.202	5.078
61.80	22.92	4828.48	4.104	4.715	4-FFf	2.000	1.703	2.000	1.056	7.297	5.785
82.40	23.17	4828.56	4.165	4.979	4-FFf	2.000	1.710	2.000	1.242	7.374	6.328
103.00	23.38	4828.63	4.219	5.212	4-FFf	2.000	1.717	2.000	1.406	7.442	6.775
123.60	23.57	4828.70	4.270	5.424	4-FFf	2.000	1.722	2.000	1.555	7.504	7.156
144.20	23.76	4828.76	4.318	5.621	4-FFf	2.000	1.728	2.000	1.691	7.562	7.490
164.80	23.93	4828.82	4.363	5.805	4-FFf	2.000	1.733	2.000	1.818	7.617	7.788
185.40	24.09	4828.88	4.405	5.978	4-FFf	2.000	1.737	2.000	1.937	7.668	8.059
206.00	24.25	4828.93	4.447	6.143	4-FFf	2.000	1.741	2.000	2.050	7.718	8.306

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Straight Culvert

Inlet Elevation (invert): 4824.22 ft, Outlet Elevation (invert): 4822.85 ft

Culvert Length: 60.02 ft, Culvert Slope: 0.0228

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Site Data - CV-53

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4824.22 ft

Outlet Station: 60.00 ft

Outlet Elevation: 4822.85 ft

Number of Barrels: 1

Culvert Data Summary - CV-53

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 54 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / Horizon Vista Blvd)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4824.22	0.00	0.00	0.00	0.00
20.60	4824.78	0.56	4.02	0.53	1.00
41.20	4825.06	0.84	5.08	0.78	1.06
61.80	4825.28	1.06	5.78	0.99	1.09
82.40	4825.46	1.24	6.33	1.16	1.11
103.00	4825.63	1.41	6.77	1.32	1.13
123.60	4825.77	1.55	7.16	1.46	1.14
144.20	4825.91	1.69	7.49	1.58	1.16
164.80	4826.04	1.82	7.79	1.70	1.17
185.40	4826.16	1.94	8.06	1.81	1.18
206.00	4826.27	2.05	8.31	1.92	1.18

Tailwater Channel Data - NM Hwy 304 / Horizon Vista Blvd

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4824.22 ft

Roadway Data for Crossing: NM Hwy 304 / Horizon Vista Blvd

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4828.22 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 126 cfs

Maximum Flow: 126 cfs

Table 55 - Summary of Culvert Flows at Crossing: NM Hwy 47 / NM Hwy 309 (1)

Headwater Elevation (ft)	Total Discharge (cfs)	SD-01 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4812.03	0.00	0.00	0.00	1
4813.00	12.60	12.60	0.00	1
4813.71	25.20	25.20	0.00	1
4814.32	37.80	37.80	0.00	1
4814.86	50.40	50.40	0.00	1
4815.37	63.00	63.00	0.00	1
4815.87	75.60	75.60	0.00	1
4816.56	88.20	86.59	1.47	29
4816.66	100.80	86.59	14.01	6
4816.73	113.40	86.59	26.71	5
4816.78	126.00	86.59	37.27	8
4816.53	86.59	86.59	0.00	Overtopping

Table 56 - Culvert Summary Table: SD-01

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4812.03	0.000	0.000	0-NF	0.000	0.000	1.330	0.000	0.000	0.000
12.60	12.60	4813.00	0.971	0.452	1-JS1t	0.753	1.124	1.957	0.370	2.504	3.171
25.20	25.20	4813.71	1.678	0.885	1-S2n	1.080	1.616	1.436	0.557	7.293	4.070
37.80	37.80	4814.32	2.287	1.443	1-S2n	1.351	1.995	1.751	0.706	8.555	4.689
50.40	50.40	4814.86	2.832	2.634	1-S2n	1.602	2.307	2.040	0.835	9.562	5.171
63.00	63.00	4815.37	3.340	0.950	5-S2n	1.850	2.552	2.309	0.950	10.519	5.571
75.60	75.60	4815.87	3.839	1.055	5-S2n	2.115	2.726	2.577	1.055	11.449	5.916
88.20	86.59	4816.56	4.283	1.153	5-S2n	2.397	2.826	2.830	1.153	12.374	6.219
100.80	86.59	4816.66	4.283	1.244	5-S2n	2.397	2.826	2.830	1.244	12.374	6.491
113.40	86.59	4816.73	4.283	1.329	5-S2n	2.397	2.826	2.830	1.329	12.374	6.738
126.00	86.59	4816.78	4.283	1.411	5-S2n	2.397	2.826	2.830	1.411	12.374	6.965

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Straight Culvert

Inlet Elevation (invert): 4812.03 ft, Outlet Elevation (invert): 4810.70 ft

Culvert Length: 75.01 ft, Culvert Slope: 0.0143

Inlet Throat Elevation: 4811.77 ft, Inlet Crest Elevation: 0.00 ft

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Site Data - SD-01

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4812.03 ft

Outlet Station: 93.00 ft

Outlet Elevation: 4810.70 ft

Number of Barrels: 1

Culvert Data Summary - SD-01

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Side-Tapered, Rectangular

Inlet Configuration: Square Edge Top (26-90º) Wingwall

Inlet Depression: None

Table 57 - Downstream Channel Rating Curve (Crossing: NM Hwy 47 / NM Hwy 309 (1))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4812.03	0.00	0.00	0.00	0.00
12.60	4812.40	0.37	3.17	0.35	0.95
25.20	4812.59	0.56	4.07	0.52	1.01
37.80	4812.74	0.71	4.69	0.66	1.04
50.40	4812.87	0.84	5.17	0.78	1.07
63.00	4812.98	0.95	5.57	0.89	1.08
75.60	4813.09	1.06	5.92	0.99	1.10
88.20	4813.18	1.15	6.22	1.08	1.11
100.80	4813.27	1.24	6.49	1.16	1.12
113.40	4813.36	1.33	6.74	1.24	1.13
126.00	4813.44	1.41	6.97	1.32	1.14

Tailwater Channel Data - NM Hwy 47 / NM Hwy 309 (1)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4812.03 ft

Roadway Data for Crossing: NM Hwy 47 / NM Hwy 309 (1)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4816.53 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 222 cfs

Maximum Flow: 222 cfs

Table 58 - Summary of Culvert Flows at Crossing: NM Hwy 47 / NM Hwy 309 (2)

Headwater Elevation (ft)	Total Discharge (cfs)	SD-02 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4810.70	0.00	0.00	0.00	1
4812.89	22.20	22.20	0.00	1
4814.25	44.40	44.40	0.00	1
4816.16	66.60	66.60	0.00	1
4816.84	88.80	72.72	15.87	9
4816.95	111.00	73.64	37.10	5
4817.04	133.20	74.37	58.53	4
4817.11	155.40	75.02	80.26	4
4817.18	177.60	75.60	101.95	4
4817.25	199.80	76.14	123.43	3
4817.31	222.00	76.65	145.23	3
4816.70	71.48	71.48	0.00	Overtopping

Table 59 - Culvert Summary Table: SD-02

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4810.70	0.000	0.000	0-NF	0.000	0.000	3.000	0.000	0.000	0.000
22.20	22.20	4812.89	2.193	0.956	1-JS1f	0.821	1.515	3.000	0.637	3.141	4.359
44.40	44.40	4814.25	3.546	2.276	5-JS1f	1.183	2.168	3.000	0.994	6.281	5.584
66.60	66.60	4816.16	5.462	4.184	5-JS1f	1.491	2.609	3.000	1.298	9.422	6.413
88.80	72.72	4816.84	6.142	5.016	5-JS1f	1.572	2.692	3.000	1.574	10.288	7.051
111.00	73.64	4816.95	6.249	5.361	5-JS1f	1.584	2.703	3.000	1.833	10.417	7.570
133.20	74.37	4817.04	6.336	5.678	5-JS1f	1.594	2.712	3.000	2.079	10.521	8.010
155.40	75.02	4817.11	6.413	5.977	5-JS1f	1.602	2.719	3.000	2.315	10.613	8.390
177.60	75.60	4817.18	6.484	6.264	5-JS1f	1.610	2.726	3.000	2.544	10.695	8.725
199.80	76.14	4817.25	6.550	6.540	5-JS1f	1.617	2.732	3.000	2.768	10.772	9.024
222.00	76.65	4817.31	6.612	2.986	5-JS1f	1.624	2.738	3.000	2.986	10.844	9.293

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Straight Culvert

Inlet Elevation (invert): 4810.70 ft, Outlet Elevation (invert): 4807.63 ft

Culvert Length: 97.05 ft, Culvert Slope: 0.0316

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Site Data - SD-02

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4810.70 ft

Outlet Station: 97.00 ft

Outlet Elevation: 4807.63 ft

Number of Barrels: 1

Culvert Data Summary - SD-02

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 60 - Downstream Channel Rating Curve (Crossing: NM Hwy 47 / NM Hwy 309 (2))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4810.70	0.00	0.00	0.00	0.00
22.20	4811.34	0.64	4.36	0.60	0.96
44.40	4811.69	0.99	5.58	0.93	0.99
66.60	4812.00	1.30	6.41	1.22	0.99
88.80	4812.27	1.57	7.05	1.47	0.99
111.00	4812.53	1.83	7.57	1.72	0.99
133.20	4812.78	2.08	8.01	1.95	0.98
155.40	4813.02	2.32	8.39	2.17	0.97
177.60	4813.24	2.54	8.72	2.38	0.96
199.80	4813.47	2.77	9.02	2.59	0.96
222.00	4813.69	2.99	9.29	2.79	0.95

Tailwater Channel Data - NM Hwy 47 / NM Hwy 309 (2)

Tailwater Channel Option: Rectangular Channel

Bottom Width: 8.00 ft

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4810.70 ft

Roadway Data for Crossing: NM Hwy 47 / NM Hwy 309 (2)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4816.70 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 105 cfs

Maximum Flow: 105 cfs

Table 61 - Summary of Culvert Flows at Crossing: NM Hwy 47

Headwater Elevation (ft)	Total Discharge (cfs)	SD-03 and SD-04 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4820.09	0.00	0.00	0.00	1
4820.99	10.50	10.50	0.00	1
4821.38	21.00	21.00	0.00	1
4821.68	31.50	31.50	0.00	1
4821.94	42.00	42.00	0.00	1
4822.17	52.50	52.50	0.00	1
4822.38	63.00	63.00	0.00	1
4822.58	73.50	73.50	0.00	1
4822.77	84.00	84.00	0.00	1
4822.96	94.50	94.50	0.00	1
4823.14	105.00	105.00	0.00	1
4827.09	326.13	326.13	0.00	Overtopping

Table 62 - Culvert Summary Table: SD-03 and SD-04

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4820.09	0.000	0.000	0-NF	0.000	0.000	1.610	0.000	0.000	0.000
10.50	10.50	4820.99	0.901	0.381	1-S2n	0.596	0.622	0.596	0.378	3.812	3.175
21.00	21.00	4821.38	1.287	0.583	1-S2n	0.835	0.884	0.835	0.568	4.677	4.051
31.50	31.50	4821.68	1.588	0.752	1-JS1t	1.023	1.089	2.328	0.718	1.700	4.647
42.00	42.00	4821.94	1.848	0.908	1-S2n	1.180	1.261	1.180	0.848	5.727	5.110
52.50	52.50	4822.17	2.080	1.057	1-JS1t	1.321	1.416	2.573	0.963	2.495	5.492
63.00	63.00	4822.38	2.292	1.204	1-JS1t	1.450	1.557	2.678	1.068	2.849	5.820
73.50	73.50	4822.58	2.491	1.350	1-S2n	1.572	1.684	1.617	1.165	6.450	6.108
84.00	84.00	4822.77	2.684	1.497	1-S2n	1.686	1.806	1.732	1.255	6.714	6.366
94.50	94.50	4822.96	2.870	1.646	1-JS1t	1.796	1.918	2.951	1.341	3.799	6.600
105.00	105.00	4823.14	3.051	1.421	1-JS1t	1.901	2.029	3.031	1.421	4.089	6.814

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Straight Culvert

Inlet Elevation (invert): 4820.09 ft, Outlet Elevation (invert): 4818.48 ft

Culvert Length: 121.01 ft, Culvert Slope: 0.0133

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Site Data - SD-03 and SD-04

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4820.09 ft

Outlet Station: 121.00 ft

Outlet Elevation: 4818.48 ft

Number of Barrels: 2

Culvert Data Summary - SD-03 and SD-04

Barrel Shape: Circular

Barrel Diameter: 5.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 63 - Downstream Channel Rating Curve (Crossing: NM Hwy 47)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4820.09	0.00	0.00	0.00	0.00
10.50	4820.47	0.38	3.18	0.35	0.95
21.00	4820.66	0.57	4.05	0.53	1.00
31.50	4820.81	0.72	4.65	0.67	1.04
42.00	4820.94	0.85	5.11	0.79	1.06
52.50	4821.05	0.96	5.49	0.90	1.08
63.00	4821.16	1.07	5.82	1.00	1.09
73.50	4821.25	1.16	6.11	1.09	1.10
84.00	4821.35	1.26	6.37	1.18	1.11
94.50	4821.43	1.34	6.60	1.25	1.12
105.00	4821.51	1.42	6.81	1.33	1.13

Tailwater Channel Data - NM Hwy 47

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4820.09 ft

Roadway Data for Crossing: NM Hwy 47

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4827.09 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 105 cfs

Maximum Flow: 105 cfs

Table 64 - Summary of Culvert Flows at Crossing: NM Hwy 47 / Avenida Del Fuego

Headwater Elevation (ft)	Total Discharge (cfs)	CV-16 and CV-17 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4825.37	0.00	0.00	0.00	1
4826.70	10.50	10.50	0.00	1
4827.39	21.00	21.00	0.00	1
4828.20	31.50	31.50	0.00	1
4829.46	42.00	42.00	0.00	1
4830.97	52.50	52.50	0.00	1
4832.78	63.00	63.00	0.00	1
4833.45	73.50	66.63	6.71	15
4833.52	84.00	66.98	16.83	5
4833.57	94.50	67.26	27.00	4
4833.62	105.00	67.51	37.37	4
4833.37	66.22	66.22	0.00	Overtopping

Table 65 - Culvert Summary Table: CV-16 and CV-17

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4825.37	0.000	0.000	0-NF	0.000	0.000	0.290	0.000	0.000	0.000
10.50	10.50	4826.70	1.218	1.329	2-M2c	0.991	0.804	0.804	0.266	4.441	2.628
21.00	21.00	4827.39	1.891	2.015	7-M2c	2.000	1.158	1.158	0.406	5.569	3.444
31.50	31.50	4828.20	2.649	2.832	7-M2c	2.000	1.426	1.426	0.521	6.572	4.027
42.00	42.00	4829.46	3.664	4.087	7-M2c	2.000	1.640	1.640	0.623	7.616	4.495
52.50	52.50	4830.97	5.028	5.598	7-M2c	2.000	1.792	1.792	0.715	8.844	4.892
63.00	63.00	4832.78	6.776	7.406	7-M2c	2.000	1.881	1.881	0.801	10.277	5.241
73.50	66.63	4833.45	7.460	8.081	7-M2c	2.000	1.909	1.909	0.882	10.781	5.553
84.00	66.98	4833.52	7.529	8.148	7-M2c	2.000	1.911	1.911	0.960	10.832	5.836
94.50	67.26	4833.57	7.582	8.201	7-M2c	2.000	1.903	1.903	1.033	10.899	6.096
105.00	67.51	4833.62	7.631	8.251	7-M2c	2.000	1.904	1.904	1.105	10.936	6.338

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Straight Culvert

Inlet Elevation (invert): 4825.37 ft, Outlet Elevation (invert): 4825.08 ft

Culvert Length: 42.00 ft, Culvert Slope: 0.0069

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Site Data - CV-16 and CV-17

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4825.37 ft

Outlet Station: 42.00 ft

Outlet Elevation: 4825.08 ft

Number of Barrels: 2

Culvert Data Summary - CV-16 and CV-17

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 66 - Downstream Channel Rating Curve (Crossing: NM Hwy 47 / Avenida Del Fuego)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4825.37	0.00	0.00	0.00	0.00
10.50	4825.64	0.27	2.63	0.25	0.90
21.00	4825.78	0.41	3.44	0.38	0.95
31.50	4825.89	0.52	4.03	0.49	0.98
42.00	4825.99	0.62	4.50	0.58	1.00
52.50	4826.09	0.72	4.89	0.67	1.02
63.00	4826.17	0.80	5.24	0.75	1.03
73.50	4826.25	0.88	5.55	0.83	1.04
84.00	4826.33	0.96	5.84	0.90	1.05
94.50	4826.40	1.03	6.10	0.97	1.06
105.00	4826.47	1.10	6.34	1.03	1.06

Tailwater Channel Data - NM Hwy 47 / Avenida Del Fuego

Tailwater Channel Option: Rectangular Channel

Bottom Width: 15.00 ft

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4825.37 ft

Roadway Data for Crossing: NM Hwy 47 / Avenida Del Fuego

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4833.37 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 67 - Summary of Culvert Flows at Crossing: NM Hwy 47 / Dollar General

Headwater Elevation (ft)	Total Discharge (cfs)	CV-18 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4823.81	0.00	0.00	0.00	1
4825.24	6.00	6.00	0.00	1
4826.04	12.00	12.00	0.00	1
4826.37	18.00	13.75	4.09	13
4826.42	24.00	13.90	10.02	5
4826.45	30.00	14.03	15.88	4
4826.48	36.00	14.14	21.63	3
4826.52	42.00	14.23	27.61	3
4826.54	48.00	14.32	33.60	3
4826.57	54.00	14.40	39.56	3
4826.60	60.00	14.48	45.50	3
4826.31	13.54	13.54	0.00	Overtopping

Table 68 - Culvert Summary Table: CV-18

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4823.81	0.000	0.000	0-NF	0.000	0.000	0.790	0.000	0.000	0.000
6.00	6.00	4825.24	1.317	1.430	3-M2t	1.022	0.865	0.928	0.138	4.206	1.714
12.00	12.00	4826.04	2.088	2.228	7-M2c	2.000	1.239	1.239	0.209	5.870	2.245
18.00	13.75	4826.37	2.336	2.565	7-M2c	2.000	1.332	1.332	0.266	6.188	2.627
24.00	13.90	4826.42	2.358	2.605	7-M2c	2.000	1.339	1.339	0.315	6.215	2.933
30.00	14.03	4826.45	2.378	2.642	7-M2c	2.000	1.346	1.346	0.360	6.241	3.193
36.00	14.14	4826.48	2.394	2.675	7-M2c	2.000	1.351	1.351	0.401	6.262	3.422
42.00	14.23	4826.52	2.408	2.705	7-M2c	2.000	1.355	1.355	0.440	6.280	3.626
48.00	14.32	4826.54	2.422	2.734	7-M2c	2.000	1.360	1.360	0.476	6.297	3.814
54.00	14.40	4826.57	2.434	2.760	7-M2c	2.000	1.364	1.364	0.511	6.313	3.985
60.00	14.48	4826.60	2.446	2.785	7-M2c	2.000	1.367	1.367	0.544	6.328	4.145

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Straight Culvert

Inlet Elevation (invert): 4823.81 ft, Outlet Elevation (invert): 4823.02 ft

Culvert Length: 97.00 ft, Culvert Slope: 0.0081

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Site Data - CV-18

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4823.81 ft

Outlet Station: 97.00 ft

Outlet Elevation: 4823.02 ft

Number of Barrels: 1

Culvert Data Summary - CV-18

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 69 - Downstream Channel Rating Curve (Crossing: NM Hwy 47 / Dollar General)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4823.81	0.00	0.00	0.00	0.00
6.00	4823.95	0.14	1.71	0.13	0.82
12.00	4824.02	0.21	2.25	0.20	0.88
18.00	4824.08	0.27	2.63	0.25	0.91
24.00	4824.13	0.32	2.93	0.30	0.94
30.00	4824.17	0.36	3.19	0.34	0.96
36.00	4824.21	0.40	3.42	0.38	0.97
42.00	4824.25	0.44	3.63	0.41	0.99
48.00	4824.29	0.48	3.81	0.45	1.00
54.00	4824.32	0.51	3.99	0.48	1.01
60.00	4824.35	0.54	4.14	0.51	1.02

Tailwater Channel Data - NM Hwy 47 / Dollar General

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 25.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4823.81 ft

Roadway Data for Crossing: NM Hwy 47 / Dollar General

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4826.31 ft

Roadway Surface: Paved

Roadway Top Width: 50.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 70 - Summary of Culvert Flows at Crossing: Avenida Del Fuego / Diamante Pl

Headwater Elevation (ft)	Total Discharge (cfs)	CV-19 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4877.75	0.00	0.00	0.00	1
4878.94	6.00	6.00	0.00	1
4879.54	12.00	12.00	0.00	1
4880.14	18.00	18.00	0.00	1
4880.31	24.00	19.44	4.40	9
4880.36	30.00	19.80	10.12	5
4880.39	36.00	20.09	15.82	4
4880.42	42.00	20.34	21.44	3
4880.45	48.00	20.57	27.28	3
4880.48	54.00	20.79	33.13	3
4880.51	60.00	20.98	38.98	3
4880.25	18.93	18.93	0.00	Overtopping

Table 71 - Culvert Summary Table: CV-19

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4877.75	0.000	0.000	0-NF	0.000	0.000	0.670	0.000	0.000	0.000
6.00	6.00	4878.94	1.189	0.433	1-S2n	0.486	0.865	0.572	0.352	7.804	4.598
12.00	12.00	4879.54	1.790	0.891	1-S2n	0.696	1.239	0.861	0.520	8.964	5.710
18.00	18.00	4880.14	2.391	1.818	5-S2n	0.870	1.526	1.103	0.650	9.815	6.443
24.00	19.44	4880.31	2.561	1.967	5-S2n	0.908	1.583	1.155	0.759	10.019	7.004
30.00	19.80	4880.36	2.606	2.005	5-S2n	0.918	1.597	1.168	0.854	10.069	7.464
36.00	20.09	4880.39	2.642	1.842	5-S2n	0.926	1.608	1.179	0.939	10.113	7.854
42.00	20.34	4880.42	2.674	1.943	5-S2n	0.932	1.617	1.187	1.018	10.147	8.196
48.00	20.57	4880.45	2.704	2.036	5-S2n	0.939	1.625	1.196	1.090	10.179	8.503
54.00	20.79	4880.48	2.732	2.123	5-S2n	0.944	1.633	1.203	1.157	10.209	8.779
60.00	20.98	4880.51	2.758	2.205	5-S2n	0.949	1.640	1.210	1.221	10.236	9.035

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Straight Culvert

Inlet Elevation (invert): 4877.75 ft, Outlet Elevation (invert): 4877.08 ft

Culvert Length: 21.01 ft, Culvert Slope: 0.0319

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Site Data - CV-19

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4877.75 ft

Outlet Station: 21.00 ft

Outlet Elevation: 4877.08 ft

Number of Barrels: 1

Culvert Data Summary - CV-19

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 72 - Downstream Channel Rating Curve (Crossing: Avenida Del Fuego / Diamante Pl)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4877.75	0.00	0.00	0.00	0.00
6.00	4878.10	0.35	4.60	0.88	1.49
12.00	4878.27	0.52	5.71	1.30	1.56
18.00	4878.40	0.65	6.44	1.62	1.61
24.00	4878.51	0.76	7.00	1.89	1.64
30.00	4878.60	0.85	7.46	2.13	1.66
36.00	4878.69	0.94	7.85	2.34	1.68
42.00	4878.77	1.02	8.20	2.54	1.70
48.00	4878.84	1.09	8.50	2.72	1.71
54.00	4878.91	1.16	8.78	2.89	1.72
60.00	4878.97	1.22	9.03	3.05	1.73

Tailwater Channel Data - Avenida Del Fuego / Diamante Pl

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0280

Channel Invert Elevation: 4877.75 ft

Roadway Data for Crossing: Avenida Del Fuego / Diamante Pl

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4880.25 ft

Roadway Surface: Paved

Roadway Top Width: 20.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 73 - Summary of Culvert Flows at Crossing: Avenida Del Fuego / Chico Pl (1)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-20 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4874.10	0.00	0.00	0.00	1
4875.39	6.00	6.00	0.00	1
4876.16	12.00	12.00	0.00	1
4876.64	18.00	15.27	2.63	19
4876.69	24.00	15.57	8.31	5
4876.73	30.00	15.81	14.07	4
4876.77	36.00	16.01	19.93	4
4876.80	42.00	16.19	25.65	3
4876.82	48.00	16.36	31.54	3
4876.85	54.00	16.52	37.43	3
4876.88	60.00	16.66	43.31	3
4876.60	14.99	14.99	0.00	Overtopping

Table 74 - Culvert Summary Table: CV-20

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4874.10	0.000	0.000	0-NF	0.000	0.000	1.020	0.000	0.000	0.000
6.00	6.00	4875.39	1.291	0.531	1-JS1t	0.685	0.865	1.372	0.352	2.536	4.598
12.00	12.00	4876.16	2.062	1.237	5-S2n	1.009	1.239	1.040	0.520	7.036	5.710
18.00	15.27	4876.64	2.543	1.810	5-S2n	1.172	1.404	1.211	0.650	7.443	6.443
24.00	15.57	4876.69	2.593	1.966	5-S2n	1.188	1.418	1.226	0.759	7.476	7.004
30.00	15.81	4876.73	2.632	2.098	5-S2n	1.200	1.429	1.238	0.854	7.506	7.464
36.00	16.01	4876.77	2.666	2.216	5-JS1t	1.210	1.438	1.959	0.939	5.090	7.854
42.00	16.19	4876.80	2.696	2.322	5-JS1f	1.219	1.446	2.000	1.018	5.155	8.196
48.00	16.36	4876.82	2.724	2.422	5-JS1f	1.227	1.453	2.000	1.090	5.208	8.503
54.00	16.52	4876.85	2.751	2.515	5-JS1f	1.235	1.463	2.000	1.157	5.258	8.779
60.00	16.66	4876.88	2.776	2.736	5-S1f	1.243	1.470	2.000	1.221	5.304	9.035

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Straight Culvert

Inlet Elevation (invert): 4874.10 ft, Outlet Elevation (invert): 4873.08 ft

Culvert Length: 30.02 ft, Culvert Slope: 0.0340

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Site Data - CV-20

Site Data Option:

Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4874.10 ft

Outlet Station: 30.00 ft

Outlet Elevation: 4873.08 ft

Number of Barrels: 1

Culvert Data Summary - CV-20

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 75 - Downstream Channel Rating Curve (Crossing: Avenida Del Fuego / Chico Pl

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4874.10	0.00	0.00	0.00	0.00
6.00	4874.45	0.35	4.60	0.88	1.49
12.00	4874.62	0.52	5.71	1.30	1.56
18.00	4874.75	0.65	6.44	1.62	1.61
24.00	4874.86	0.76	7.00	1.89	1.64
30.00	4874.95	0.85	7.46	2.13	1.66
36.00	4875.04	0.94	7.85	2.34	1.68
42.00	4875.12	1.02	8.20	2.54	1.70
48.00	4875.19	1.09	8.50	2.72	1.71
54.00	4875.26	1.16	8.78	2.89	1.72
60.00	4875.32	1.22	9.03	3.05	1.73

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Tailwater Channel Data - Avenida Del Fuego / Chico Pl (1)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0280

Channel Invert Elevation: 4874.10 ft

Roadway Data for Crossing: Avenida Del Fuego / Chico Pl (1)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4876.60 ft

Roadway Surface: Paved

Roadway Top Width: 20.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 76 - Summary of Culvert Flows at Crossing: Avenida Del Fuego / Chico Pl (2)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-21 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4870.40	0.00	0.00	0.00	1
4871.99	6.00	6.00	0.00	1
4872.46	12.00	7.99	3.95	17
4872.50	18.00	8.17	9.75	5
4872.54	24.00	8.31	15.60	4
4872.57	30.00	8.43	21.53	4
4872.60	36.00	8.53	27.33	3
4872.63	42.00	8.63	33.29	3
4872.66	48.00	8.73	39.23	3
4872.68	54.00	8.81	45.17	3
4872.71	60.00	8.89	50.92	2
4872.40	7.78	7.78	0.00	Overtopping

Table 77 - Culvert Summary Table: CV-21

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4870.40	0.000	0.000	0-NF	0.000	0.000	0.390	0.000	0.000	0.000
6.00	6.00	4871.99	1.587	1.069	5-S2n	0.879	0.942	0.904	0.352	5.226	4.598
12.00	7.99	4872.46	2.057	1.619	5-S2n	1.082	1.092	1.082	0.520	5.691	5.710
18.00	8.17	4872.50	2.103	1.672	5-S2n	1.103	1.103	1.103	0.650	5.708	6.443
24.00	8.31	4872.54	2.141	2.144	7-M1t	1.119	1.112	1.149	0.759	5.721	7.004
30.00	8.43	4872.57	2.174	2.130	7-M1t	1.134	1.120	1.244	0.854	5.380	7.464
36.00	8.53	4872.60	2.204	2.130	7-M1t	1.147	1.127	1.329	0.939	5.153	7.854
42.00	8.63	4872.63	2.231	2.131	7-M1t	1.160	1.133	1.408	1.018	5.012	8.196
48.00	8.73	4872.66	2.259	2.163	7-M1t	1.173	1.139	1.480	1.090	4.951	8.503
54.00	8.81	4872.68	2.283	2.272	4-FFf	1.185	1.145	1.500	1.157	4.986	8.779
60.00	8.89	4872.71	2.306	2.356	4-FFf	1.197	1.149	1.500	1.221	5.031	9.035

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Straight Culvert

Inlet Elevation (invert): 4870.40 ft, Outlet Elevation (invert): 4870.01 ft

Culvert Length: 16.00 ft, Culvert Slope: 0.0244

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Site Data - CV-21

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4870.40 ft

Outlet Station: 16.00 ft

Outlet Elevation: 4870.01 ft

Number of Barrels: 1

Culvert Data Summary - CV-21

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 78 - Downstream Channel Rating Curve (Crossing: Avenida Del Fuego / Chico Pl

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4870.40	0.00	0.00	0.00	0.00
6.00	4870.75	0.35	4.60	0.88	1.49
12.00	4870.92	0.52	5.71	1.30	1.56
18.00	4871.05	0.65	6.44	1.62	1.61
24.00	4871.16	0.76	7.00	1.89	1.64
30.00	4871.25	0.85	7.46	2.13	1.66
36.00	4871.34	0.94	7.85	2.34	1.68
42.00	4871.42	1.02	8.20	2.54	1.70
48.00	4871.49	1.09	8.50	2.72	1.71
54.00	4871.56	1.16	8.78	2.89	1.72
60.00	4871.62	1.22	9.03	3.05	1.73

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Tailwater Channel Data - Avenida Del Fuego / Chico Pl (2)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0280

Channel Invert Elevation: 4870.40 ft

Roadway Data for Crossing: Avenida Del Fuego / Chico Pl (2)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4872.40 ft

Roadway Surface: Paved

Roadway Top Width: 20.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 79 - Summary of Culvert Flows at Crossing: Avenida Del Fuego / Estrella Pl (1)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-22 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4866.47	0.00	0.00	0.00	1
4868.05	6.00	6.00	0.00	1
4868.53	12.00	8.03	3.91	17
4868.57	18.00	8.20	9.71	5
4868.61	24.00	8.34	15.56	4
4868.64	30.00	8.46	21.50	4
4868.67	36.00	8.57	27.30	3
4868.70	42.00	8.66	33.25	3
4868.73	48.00	8.76	39.20	3
4868.75	54.00	8.84	45.14	3
4868.78	60.00	8.92	50.89	2
4868.47	7.81	7.81	0.00	Overtopping

Table 80 - Culvert Summary Table: CV-22

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4866.47	0.000	0.000	0-NF	0.000	0.000	1.100	0.000	0.000	0.000
6.00	6.00	4868.05	1.577	1.024	5-JS1t	0.773	0.942	1.452	0.352	3.386	4.598
12.00	8.03	4868.53	2.056	1.722	5-JS1f	0.932	1.094	1.500	0.520	4.543	5.710
18.00	8.20	4868.57	2.103	1.905	5-JS1f	0.946	1.105	1.500	0.650	4.641	6.443
24.00	8.34	4868.61	2.141	2.081	5-S1f	0.957	1.114	1.500	0.759	4.719	7.004
30.00	8.46	4868.64	2.174	2.189	4-FFf	0.966	1.122	1.500	0.854	4.788	7.464
36.00	8.57	4868.67	2.204	2.309	4-FFf	0.975	1.129	1.500	0.939	4.848	7.854
42.00	8.66	4868.70	2.231	2.418	4-FFf	0.983	1.135	1.500	1.018	4.903	8.196
48.00	8.76	4868.73	2.258	2.520	4-FFf	0.991	1.141	1.500	1.090	4.955	8.503
54.00	8.84	4868.75	2.283	2.616	4-FFf	0.998	1.146	1.500	1.157	5.004	8.779
60.00	8.92	4868.78	2.306	2.706	4-FFf	1.005	1.151	1.500	1.221	5.049	9.035

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Straight Culvert

Inlet Elevation (invert): 4866.47 ft, Outlet Elevation (invert): 4865.37 ft

Culvert Length: 30.02 ft, Culvert Slope: 0.0367

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Site Data - CV-22

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4866.47 ft

Outlet Station: 30.00 ft

Outlet Elevation: 4865.37 ft

Number of Barrels: 1

Culvert Data Summary - CV-22

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 81 - Downstream Channel Rating Curve (Crossing: Avenida Del Fuego / Estrella Pl

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4866.47	0.00	0.00	0.00	0.00
6.00	4866.82	0.35	4.60	0.88	1.49
12.00	4866.99	0.52	5.71	1.30	1.56
18.00	4867.12	0.65	6.44	1.62	1.61
24.00	4867.23	0.76	7.00	1.89	1.64
30.00	4867.32	0.85	7.46	2.13	1.66
36.00	4867.41	0.94	7.85	2.34	1.68
42.00	4867.49	1.02	8.20	2.54	1.70
48.00	4867.56	1.09	8.50	2.72	1.71
54.00	4867.63	1.16	8.78	2.89	1.72
60.00	4867.69	1.22	9.03	3.05	1.73

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Tailwater Channel Data - Avenida Del Fuego / Estrella Pl (1)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0280

Channel Invert Elevation: 4866.47 ft

Roadway Data for Crossing: Avenida Del Fuego / Estrella Pl (1)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4868.47 ft

Roadway Surface: Paved

Roadway Top Width: 20.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 82 - Summary of Culvert Flows at Crossing: Avenida Del Fuego / Estrella Pl (2)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-23 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4859.78	0.00	0.00	0.00	1
4860.99	6.00	6.00	0.00	1
4861.67	12.00	12.00	0.00	1
4862.30	18.00	17.30	0.56	36
4862.36	24.00	17.74	6.16	6
4862.40	30.00	18.03	11.80	4
4862.43	36.00	18.28	17.65	4
4862.46	42.00	18.50	23.31	3
4862.49	48.00	18.70	29.17	3
4862.52	54.00	18.89	35.04	3
4862.55	60.00	19.06	40.90	3
4862.28	17.18	17.18	0.00	Overtopping

Table 83 - Culvert Summary Table: CV-23

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4859.78	0.000	0.000	0-NF	0.000	0.000	1.540	0.000	0.000	0.000
6.00	6.00	4860.99	1.212	0.463	1-JS1t	0.475	0.865	1.892	0.352	1.920	4.598
12.00	12.00	4861.67	1.885	0.964	1-S2n	0.679	1.239	0.774	0.520	10.316	5.710
18.00	17.30	4862.30	2.515	1.573	5-S2n	0.828	1.497	0.963	0.650	11.171	6.443
24.00	17.74	4862.36	2.576	1.730	5-S2n	0.840	1.516	0.978	0.759	11.240	7.004
30.00	18.03	4862.40	2.617	1.857	5-JS1f	0.848	1.528	2.000	0.854	5.740	7.464
36.00	18.28	4862.43	2.652	1.971	5-JS1f	0.854	1.538	2.000	0.939	5.820	7.854
42.00	18.50	4862.46	2.684	2.074	5-JS1f	0.860	1.547	2.000	1.018	5.890	8.196
48.00	18.70	4862.49	2.713	2.170	5-JS1f	0.866	1.555	2.000	1.090	5.954	8.503
54.00	18.89	4862.52	2.740	2.259	5-JS1f	0.871	1.562	2.000	1.157	6.013	8.779
60.00	19.06	4862.55	2.766	2.342	5-JS1f	0.875	1.569	2.000	1.221	6.068	9.035

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Straight Culvert

Inlet Elevation (invert): 4859.78 ft, Outlet Elevation (invert): 4858.24 ft

Culvert Length: 44.03 ft, Culvert Slope: 0.0350

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Site Data - CV-23

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4859.78 ft

Outlet Station: 44.00 ft

Outlet Elevation: 4858.24 ft

Number of Barrels: 1

Culvert Data Summary - CV-23

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 84 - Downstream Channel Rating Curve (Crossing: Avenida Del Fuego / Estrella Pl

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4859.78	0.00	0.00	0.00	0.00
6.00	4860.13	0.35	4.60	0.88	1.49
12.00	4860.30	0.52	5.71	1.30	1.56
18.00	4860.43	0.65	6.44	1.62	1.61
24.00	4860.54	0.76	7.00	1.89	1.64
30.00	4860.63	0.85	7.46	2.13	1.66
36.00	4860.72	0.94	7.85	2.34	1.68
42.00	4860.80	1.02	8.20	2.54	1.70
48.00	4860.87	1.09	8.50	2.72	1.71
54.00	4860.94	1.16	8.78	2.89	1.72
60.00	4861.00	1.22	9.03	3.05	1.73

(2))

Tailwater Channel Data - Avenida Del Fuego / Estrella Pl (2)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0280

Channel Invert Elevation: 4859.78 ft

Roadway Data for Crossing: Avenida Del Fuego / Estrella Pl (2)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4862.28 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 85 - Summary of Culvert Flows at Crossing: Avenida Del Fuego / Estrella Pl (3)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-24 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4855.97	0.00	0.00	0.00	1
4857.16	6.00	6.00	0.00	1
4857.76	12.00	12.00	0.00	1
4858.36	18.00	18.00	0.00	1
4858.53	24.00	19.46	4.36	9
4858.58	30.00	19.83	10.10	5
4858.61	36.00	20.12	15.80	4
4858.64	42.00	20.37	21.41	3
4858.67	48.00	20.60	27.25	3
4858.70	54.00	20.81	33.11	3
4858.73	60.00	21.01	38.95	3
4858.47	18.96	18.96	0.00	Overtopping

Table 86 - Culvert Summary Table: CV-24

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4855.97	0.000	0.000	0-NF	0.000	0.000	0.810	0.000	0.000	0.000
6.00	6.00	4857.16	1.186	0.434	1-S2n	0.474	0.865	0.554	0.352	8.189	4.598
12.00	12.00	4857.76	1.787	0.847	1-S2n	0.678	1.239	0.835	0.520	9.333	5.710
18.00	18.00	4858.36	2.388	1.688	5-S2n	0.846	1.526	1.069	0.650	10.204	6.443
24.00	19.46	4858.53	2.561	1.842	5-S2n	0.884	1.584	1.121	0.759	10.399	7.004
30.00	19.83	4858.58	2.606	1.746	5-S2n	0.893	1.598	1.134	0.854	10.451	7.464
36.00	20.12	4858.61	2.642	1.858	5-S2n	0.900	1.609	1.144	0.939	10.490	7.854
42.00	20.37	4858.64	2.674	1.959	5-S2n	0.907	1.618	1.153	1.018	10.523	8.196
48.00	20.60	4858.67	2.704	2.052	5-S2n	0.913	1.626	1.161	1.090	10.554	8.503
54.00	20.81	4858.70	2.731	2.140	5-S2n	0.918	1.634	1.168	1.157	10.583	8.779
60.00	21.01	4858.73	2.758	2.221	5-S2n	0.923	1.640	1.175	1.221	10.609	9.035

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Straight Culvert

Inlet Elevation (invert): 4855.97 ft, Outlet Elevation (invert): 4855.16 ft

Culvert Length: 23.01 ft, Culvert Slope: 0.0352

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Site Data - CV-24

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4855.97 ft

Outlet Station: 23.00 ft

Outlet Elevation: 4855.16 ft

Number of Barrels: 1

Culvert Data Summary - CV-24

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 87 - Downstream Channel Rating Curve (Crossing: Avenida Del Fuego / Estrella Pl

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4855.97	0.00	0.00	0.00	0.00
6.00	4856.32	0.35	4.60	0.88	1.49
12.00	4856.49	0.52	5.71	1.30	1.56
18.00	4856.62	0.65	6.44	1.62	1.61
24.00	4856.73	0.76	7.00	1.89	1.64
30.00	4856.82	0.85	7.46	2.13	1.66
36.00	4856.91	0.94	7.85	2.34	1.68
42.00	4856.99	1.02	8.20	2.54	1.70
48.00	4857.06	1.09	8.50	2.72	1.71
54.00	4857.13	1.16	8.78	2.89	1.72
60.00	4857.19	1.22	9.03	3.05	1.73

(3))

Tailwater Channel Data - Avenida Del Fuego / Estrella Pl (3)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0280

Channel Invert Elevation: 4855.97 ft

Roadway Data for Crossing: Avenida Del Fuego / Estrella Pl (3)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4858.47 ft

Roadway Surface: Paved

Roadway Top Width: 20.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 88 - Summary of Culvert Flows at Crossing: Avenida Del Fuego / Estrella Pl (4)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-25 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4854.22	0.00	0.00	0.00	1
4855.41	6.00	6.00	0.00	1
4856.01	12.00	12.00	0.00	1
4856.62	18.00	18.00	0.00	1
4856.78	24.00	19.41	4.44	9
4856.83	30.00	19.77	10.16	5
4856.86	36.00	20.06	15.85	4
4856.89	42.00	20.31	21.47	3
4856.92	48.00	20.54	27.31	3
4856.95	54.00	20.76	33.16	3
4856.98	60.00	20.95	39.01	3
4856.72	18.90	18.90	0.00	Overtopping

Table 89 - Culvert Summary Table: CV-25

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4854.22	0.000	0.000	0-NF	0.000	0.000	0.890	0.000	0.000	0.000
6.00	6.00	4855.41	1.194	0.439	1-S2n	0.504	0.865	0.563	0.352	8.012	4.598
12.00	12.00	4856.01	1.794	0.868	1-S2n	0.723	1.239	0.843	0.520	9.216	5.710
18.00	18.00	4856.62	2.395	1.433	5-S2n	0.904	1.526	1.078	0.650	10.098	6.443
24.00	19.41	4856.78	2.561	1.670	5-S2n	0.944	1.582	1.129	0.759	10.282	7.004
30.00	19.77	4856.83	2.606	1.799	5-S2n	0.954	1.596	1.143	0.854	10.329	7.464
36.00	20.06	4856.86	2.642	1.913	5-S2n	0.963	1.607	1.153	0.939	10.366	7.854
42.00	20.31	4856.89	2.674	2.015	5-S2n	0.970	1.616	1.162	1.018	10.397	8.196
48.00	20.54	4856.92	2.704	2.110	5-S2n	0.976	1.624	1.170	1.090	10.427	8.503
54.00	20.76	4856.95	2.732	2.199	5-S2n	0.982	1.632	1.177	1.157	10.454	8.779
60.00	20.95	4856.98	2.758	2.282	5-S2n	0.988	1.639	1.184	1.221	10.485	9.035

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Straight Culvert

Inlet Elevation (invert): 4854.22 ft, Outlet Elevation (invert): 4853.33 ft

Culvert Length: 32.01 ft, Culvert Slope: 0.0278

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Site Data - CV-25

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4854.22 ft

Outlet Station: 32.00 ft

Outlet Elevation: 4853.33 ft

Number of Barrels: 1

Culvert Data Summary - CV-25

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 90 - Downstream Channel Rating Curve (Crossing: Avenida Del Fuego / Estrella Pl

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4854.22	0.00	0.00	0.00	0.00
6.00	4854.57	0.35	4.60	0.88	1.49
12.00	4854.74	0.52	5.71	1.30	1.56
18.00	4854.87	0.65	6.44	1.62	1.61
24.00	4854.98	0.76	7.00	1.89	1.64
30.00	4855.07	0.85	7.46	2.13	1.66
36.00	4855.16	0.94	7.85	2.34	1.68
42.00	4855.24	1.02	8.20	2.54	1.70
48.00	4855.31	1.09	8.50	2.72	1.71
54.00	4855.38	1.16	8.78	2.89	1.72
60.00	4855.44	1.22	9.03	3.05	1.73

(4))

Tailwater Channel Data - Avenida Del Fuego / Estrella Pl (4)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0280

Channel Invert Elevation: 4854.22 ft

Roadway Data for Crossing: Avenida Del Fuego / Estrella Pl (4)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4856.72 ft

Roadway Surface: Paved

Roadway Top Width: 24.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 91 - Summary of Culvert Flows at Crossing: Avenida Del Fuego / La Luna Pl (1)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-26 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4843.88	0.00	0.00	0.00	1
4845.17	6.00	6.00	0.00	1
4845.94	12.00	12.00	0.00	1
4846.43	18.00	15.07	2.77	18
4846.48	24.00	15.31	8.58	5
4846.51	30.00	15.48	14.41	4
4846.55	36.00	15.61	20.33	4
4846.58	42.00	15.73	26.12	3
4846.61	48.00	15.84	32.07	3
4846.63	54.00	15.93	38.02	3
4846.66	60.00	16.05	43.93	3
4846.38	14.82	14.82	0.00	Overtopping

Table 92 - Culvert Summary Table: CV-26

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4843.88	0.000	0.000	0-NF	0.000	0.000	2.000	0.000	0.000	0.000
6.00	6.00	4845.17	1.285	0.653	1-JS1f	0.658	0.865	2.000	0.352	1.910	4.598
12.00	12.00	4845.94	2.057	1.731	5-JS1f	0.965	1.239	2.000	0.520	3.820	5.710
18.00	15.07	4846.43	2.507	2.584	1-S1f	1.108	1.395	2.000	0.650	4.798	6.443
24.00	15.31	4846.48	2.544	2.730	4-FFf	1.119	1.406	2.000	0.759	4.873	7.004
30.00	15.48	4846.51	2.571	2.869	4-FFf	1.126	1.414	2.000	0.854	4.926	7.464
36.00	15.61	4846.55	2.594	2.991	4-FFf	1.133	1.420	2.000	0.939	4.970	7.854
42.00	15.73	4846.58	2.613	3.099	4-FFf	1.138	1.425	2.000	1.018	5.007	8.196
48.00	15.84	4846.61	2.630	3.200	4-FFf	1.143	1.430	2.000	1.090	5.041	8.503
54.00	15.93	4846.63	2.646	3.293	4-FFf	1.148	1.434	2.000	1.157	5.071	8.779
60.00	16.05	4846.66	2.666	3.388	4-FFf	1.153	1.440	2.000	1.221	5.109	9.035

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Straight Culvert

Inlet Elevation (invert): 4843.88 ft, Outlet Elevation (invert): 4840.64 ft

Culvert Length: 82.06 ft, Culvert Slope: 0.0395

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Site Data - CV-26

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4843.88 ft

Outlet Station: 82.00 ft

Outlet Elevation: 4840.64 ft

Number of Barrels: 1

Culvert Data Summary - CV-26

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 93 - Downstream Channel Rating Curve (Crossing: Avenida Del Fuego / La Luna Pl

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4843.88	0.00	0.00	0.00	0.00
6.00	4844.23	0.35	4.60	0.88	1.49
12.00	4844.40	0.52	5.71	1.30	1.56
18.00	4844.53	0.65	6.44	1.62	1.61
24.00	4844.64	0.76	7.00	1.89	1.64
30.00	4844.73	0.85	7.46	2.13	1.66
36.00	4844.82	0.94	7.85	2.34	1.68
42.00	4844.90	1.02	8.20	2.54	1.70
48.00	4844.97	1.09	8.50	2.72	1.71
54.00	4845.04	1.16	8.78	2.89	1.72
60.00	4845.10	1.22	9.03	3.05	1.73

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Tailwater Channel Data - Avenida Del Fuego / La Luna Pl (1)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0280

Channel Invert Elevation: 4843.88 ft

Roadway Data for Crossing: Avenida Del Fuego / La Luna Pl (1)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4846.38 ft

Roadway Surface: Paved

Roadway Top Width: 70.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 94 - Summary of Culvert Flows at Crossing: Avenida Del Fuego / Chico Pl (3)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-27 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4873.41	0.00	0.00	0.00	1
4874.59	6.00	6.00	0.00	1
4875.19	12.00	12.00	0.00	1
4875.80	18.00	18.00	0.00	1
4875.98	24.00	19.53	4.31	9
4876.03	30.00	19.92	10.00	5
4876.06	36.00	20.23	15.67	4
4876.10	42.00	20.51	21.45	4
4876.13	48.00	20.75	27.12	3
4876.16	54.00	20.97	32.94	3
4876.19	60.00	21.19	38.77	3
4875.91	18.98	18.98	0.00	Overtopping

Table 95 - Culvert Summary Table: CV-27

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4873.41	0.000	0.000	0-NF	0.000	0.000	1.530	0.000	0.000	0.000
6.00	6.00	4874.59	1.184	0.479	1-JS1t	0.468	0.865	1.917	0.387	1.914	4.372
12.00	12.00	4875.19	1.784	0.913	1-S2n	0.668	1.239	0.769	0.544	10.414	5.277
18.00	18.00	4875.80	2.386	1.491	5-S2n	0.832	1.526	0.979	0.660	11.396	5.874
24.00	19.53	4875.98	2.566	1.733	5-S2n	0.871	1.587	1.030	0.755	11.583	6.332
30.00	19.92	4876.03	2.615	1.854	5-JS1f	0.881	1.601	2.000	0.836	6.341	6.710
36.00	20.23	4876.06	2.654	1.958	5-JS1f	0.889	1.613	2.000	0.909	6.440	7.033
42.00	20.51	4876.10	2.690	2.052	5-JS1f	0.895	1.623	2.000	0.974	6.527	7.317
48.00	20.75	4876.13	2.721	2.138	5-JS1f	0.901	1.631	2.000	1.034	6.604	7.571
54.00	20.97	4876.16	2.751	2.217	5-JS1f	0.907	1.639	2.000	1.089	6.676	7.803
60.00	21.19	4876.19	2.779	2.292	5-JS1f	0.912	1.647	2.000	1.141	6.744	8.016

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Straight Culvert

Inlet Elevation (invert): 4873.41 ft, Outlet Elevation (invert): 4871.88 ft

Culvert Length: 41.03 ft, Culvert Slope: 0.0373

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Site Data - CV-27

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4873.41 ft

Outlet Station: 41.00 ft

Outlet Elevation: 4871.88 ft

Number of Barrels: 1

Culvert Data Summary - CV-27

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 96 - Downstream Channel Rating Curve (Crossing: Avenida Del Fuego / Chico Pl

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4873.41	0.00	0.00	0.00	0.00
6.00	4873.80	0.39	4.37	0.97	1.48
12.00	4873.95	0.54	5.28	1.36	1.55
18.00	4874.07	0.66	5.87	1.65	1.60
24.00	4874.17	0.76	6.33	1.88	1.63
30.00	4874.25	0.84	6.71	2.09	1.65
36.00	4874.32	0.91	7.03	2.27	1.67
42.00	4874.38	0.97	7.32	2.43	1.68
48.00	4874.44	1.03	7.57	2.58	1.70
54.00	4874.50	1.09	7.80	2.72	1.71
60.00	4874.55	1.14	8.02	2.85	1.72

(3))

Tailwater Channel Data - Avenida Del Fuego / Chico Pl (3)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 ft

Side Slope (H:V): 4.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0280

Channel Invert Elevation: 4873.41 ft

Roadway Data for Crossing: Avenida Del Fuego / Chico Pl (3)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4875.91 ft

Roadway Surface: Gravel

Roadway Top Width: 40.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 97 - Summary of Culvert Flows at Crossing: Avenida Del Fuego / Chico Pl (4)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-28 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4871.58	0.00	0.00	0.00	1
4873.29	6.00	6.00	0.00	1
4873.64	12.00	8.00	3.92	14
4873.69	18.00	8.19	9.72	5
4873.73	24.00	8.34	15.56	4
4873.77	30.00	8.47	21.49	4
4873.80	36.00	8.58	27.28	3
4873.83	42.00	8.69	33.22	3
4873.86	48.00	8.79	39.17	3
4873.89	54.00	8.88	45.10	3
4873.91	60.00	8.97	50.84	2
4873.58	7.76	7.76	0.00	Overtopping

Table 98 - Culvert Summary Table: CV-28

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4871.58	0.000	0.000	0-NF	0.000	0.000	0.380	0.000	0.000	0.000
6.00	6.00	4873.29	1.591	1.708	7-M2c	0.956	0.942	0.942	0.405	5.138	4.603
12.00	8.00	4873.64	2.061	2.014	7-M2c	1.500	1.092	1.092	0.577	5.804	5.577
18.00	8.19	4873.69	2.113	2.048	7-M2c	1.500	1.104	1.104	0.704	5.871	6.220
24.00	8.34	4873.73	2.154	2.076	3-M2t	1.500	1.114	1.188	0.808	5.555	6.712
30.00	8.47	4873.77	2.190	2.101	3-M2t	1.500	1.123	1.278	0.898	5.279	7.116
36.00	8.58	4873.80	2.222	2.133	3-M2t	1.500	1.130	1.358	0.978	5.102	7.462
42.00	8.69	4873.83	2.252	2.190	3-M2t	1.500	1.137	1.430	1.050	5.002	7.765
48.00	8.79	4873.86	2.281	2.321	7-M2t	1.500	1.143	1.496	1.116	4.975	8.038
54.00	8.88	4873.89	2.308	2.408	4-FFf	1.500	1.149	1.500	1.178	5.027	8.287
60.00	8.97	4873.91	2.333	2.489	4-FFf	1.500	1.154	1.500	1.235	5.074	8.512

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Straight Culvert

Inlet Elevation (invert): 4871.58 ft, Outlet Elevation (invert): 4871.20 ft

Culvert Length: 20.00 ft, Culvert Slope: 0.0190

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Site Data - CV-28

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4871.58 ft

Outlet Station: 20.00 ft

Outlet Elevation: 4871.20 ft

Number of Barrels: 1

Culvert Data Summary - CV-28

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 99 - Downstream Channel Rating Curve (Crossing: Avenida Del Fuego / Chico Pl

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4871.58	0.00	0.00	0.00	0.00
6.00	4871.99	0.41	4.60	1.01	1.50
12.00	4872.16	0.58	5.58	1.44	1.57
18.00	4872.28	0.70	6.22	1.76	1.61
24.00	4872.39	0.81	6.71	2.02	1.64
30.00	4872.48	0.90	7.12	2.24	1.66
36.00	4872.56	0.98	7.46	2.44	1.68
42.00	4872.63	1.05	7.77	2.62	1.70
48.00	4872.70	1.12	8.04	2.79	1.71
54.00	4872.76	1.18	8.29	2.94	1.72
60.00	4872.82	1.24	8.51	3.08	1.73

(4))

Tailwater Channel Data - Avenida Del Fuego / Chico Pl (4)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0280

Channel Invert Elevation: 4871.58 ft

Roadway Data for Crossing: Avenida Del Fuego / Chico Pl (4)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4873.58 ft

Roadway Surface: Gravel

Roadway Top Width: 20.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 100 - Summary of Culvert Flows at Crossing: Avenida Del Fuego / Chico Pl (5)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-29 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4867.94	0.00	0.00	0.00	1
4869.13	6.00	6.00	0.00	1
4869.73	12.00	12.00	0.00	1
4870.33	18.00	18.00	0.00	1
4870.50	24.00	19.42	4.43	9
4870.55	30.00	19.78	10.15	5
4870.58	36.00	20.07	15.84	4
4870.61	42.00	20.32	21.46	3
4870.64	48.00	20.55	27.30	3
4870.67	54.00	20.76	33.15	3
4870.70	60.00	20.96	39.00	3
4870.44	18.91	18.91	0.00	Overtopping

Table 101 - Culvert Summary Table: CV-29

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4867.94	0.000	0.000	0-NF	0.000	0.000	0.580	0.000	0.000	0.000
6.00	6.00	4869.13	1.192	0.420	1-S2n	0.498	0.865	0.587	0.340	7.539	4.386
12.00	12.00	4869.73	1.793	0.979	1-S2n	0.714	1.239	0.883	0.496	8.676	5.396
18.00	18.00	4870.33	2.394	1.902	5-S2n	0.893	1.526	1.127	0.613	9.557	6.063
24.00	19.42	4870.50	2.561	2.048	5-S2n	0.933	1.583	1.180	0.711	9.757	6.570
30.00	19.78	4870.55	2.606	2.087	5-S2n	0.943	1.596	1.194	0.797	9.807	6.988
36.00	20.07	4870.58	2.642	2.117	5-S2n	0.951	1.607	1.204	0.873	9.846	7.344
42.00	20.32	4870.61	2.674	2.144	5-S2n	0.958	1.616	1.213	0.942	9.880	7.656
48.00	20.55	4870.64	2.704	2.169	5-S2n	0.964	1.624	1.221	1.005	9.912	7.935
54.00	20.76	4870.67	2.732	2.022	5-S2n	0.970	1.632	1.229	1.065	9.941	8.189
60.00	20.96	4870.70	2.758	2.095	5-S2n	0.976	1.639	1.236	1.120	9.974	8.420

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Straight Culvert

Inlet Elevation (invert): 4867.94 ft, Outlet Elevation (invert): 4867.36 ft

Culvert Length: 20.01 ft, Culvert Slope: 0.0290

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Site Data - CV-29

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4867.94 ft

Outlet Station: 20.00 ft

Outlet Elevation: 4867.36 ft

Number of Barrels: 1

Culvert Data Summary - CV-29

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 102 - Downstream Channel Rating Curve (Crossing: Avenida Del Fuego / Chico Pl

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4867.94	0.00	0.00	0.00	0.00
6.00	4868.28	0.34	4.39	0.85	1.48
12.00	4868.44	0.50	5.40	1.24	1.56
18.00	4868.55	0.61	6.06	1.53	1.60
24.00	4868.65	0.71	6.57	1.78	1.63
30.00	4868.74	0.80	6.99	1.99	1.66
36.00	4868.81	0.87	7.34	2.18	1.68
42.00	4868.88	0.94	7.66	2.35	1.69
48.00	4868.95	1.01	7.93	2.51	1.71
54.00	4869.00	1.06	8.19	2.66	1.72
60.00	4869.06	1.12	8.42	2.80	1.73

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Tailwater Channel Data - Avenida Del Fuego / Chico Pl (5)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0280

Channel Invert Elevation: 4867.94 ft

Roadway Data for Crossing: Avenida Del Fuego / Chico Pl (5)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4870.44 ft

Roadway Surface: Paved

Roadway Top Width: 20.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 103 - Summary of Culvert Flows at Crossing: Avenida Del Fuego / Estrella Pl (5)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-30 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4861.71	0.00	0.00	0.00	1
4862.92	6.00	6.00	0.00	1
4863.52	12.00	12.00	0.00	1
4864.12	18.00	18.00	0.00	1
4864.27	24.00	19.30	4.59	9
4864.32	30.00	19.66	10.27	5
4864.35	36.00	19.95	15.96	4
4864.38	42.00	20.20	21.58	3
4864.41	48.00	20.44	27.42	3
4864.44	54.00	20.65	33.27	3
4864.47	60.00	20.85	39.11	3
4864.21	18.78	18.78	0.00	Overtopping

Table 104 - Culvert Summary Table: CV-30

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4861.71	0.000	0.000	0-NF	0.000	0.000	0.430	0.000	0.000	0.000
6.00	6.00	4862.92	1.208	0.522	1-S2n	0.607	0.865	0.659	0.352	6.434	4.598
12.00	12.00	4863.52	1.808	1.157	1-S2n	0.883	1.239	0.981	0.520	7.578	5.710
18.00	18.00	4864.12	2.410	2.117	5-S2n	1.124	1.526	1.253	0.650	8.430	6.443
24.00	19.30	4864.27	2.563	2.260	5-S2n	1.176	1.578	1.309	0.759	8.601	7.004
30.00	19.66	4864.32	2.607	2.301	5-S2n	1.191	1.592	1.324	0.854	8.646	7.464
36.00	19.95	4864.35	2.643	2.334	5-S2n	1.203	1.603	1.336	0.939	8.688	7.854
42.00	20.20	4864.38	2.674	2.363	5-S2n	1.213	1.612	1.347	1.018	8.720	8.196
48.00	20.44	4864.41	2.704	2.390	5-S2n	1.222	1.620	1.357	1.090	8.749	8.503
54.00	20.65	4864.44	2.732	2.415	5-S2n	1.231	1.628	1.366	1.157	8.775	8.779
60.00	20.85	4864.47	2.758	2.271	5-S2n	1.239	1.635	1.374	1.221	8.800	9.035

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Straight Culvert

Inlet Elevation (invert): 4861.71 ft, Outlet Elevation (invert): 4861.28 ft

Culvert Length: 32.00 ft, Culvert Slope: 0.0134

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Site Data - CV-30

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4861.71 ft

Outlet Station: 32.00 ft

Outlet Elevation: 4861.28 ft

Number of Barrels: 1

Culvert Data Summary - CV-30

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 105 - Downstream Channel Rating Curve (Crossing: Avenida Del Fuego / Estrella Pl

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4861.71	0.00	0.00	0.00	0.00
6.00	4862.06	0.35	4.60	0.88	1.49
12.00	4862.23	0.52	5.71	1.30	1.56
18.00	4862.36	0.65	6.44	1.62	1.61
24.00	4862.47	0.76	7.00	1.89	1.64
30.00	4862.56	0.85	7.46	2.13	1.66
36.00	4862.65	0.94	7.85	2.34	1.68
42.00	4862.73	1.02	8.20	2.54	1.70
48.00	4862.80	1.09	8.50	2.72	1.71
54.00	4862.87	1.16	8.78	2.89	1.72
60.00	4862.93	1.22	9.03	3.05	1.73

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Tailwater Channel Data - Avenida Del Fuego / Estrella Pl (5)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0280

Channel Invert Elevation: 4861.71 ft

Roadway Data for Crossing: Avenida Del Fuego / Estrella Pl (5)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4864.21 ft

Roadway Surface: Paved

Roadway Top Width: 20.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 106 - Summary of Culvert Flows at Crossing: Avenida Del Fuego / Estrella Pl (6)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-31 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4859.43	0.00	0.00	0.00	1
4860.63	6.00	6.00	0.00	1
4861.23	12.00	12.00	0.00	1
4861.83	18.00	18.00	0.00	1
4861.99	24.00	19.38	4.49	9
4862.04	30.00	19.74	10.19	5
4862.07	36.00	20.03	15.89	4
4862.10	42.00	20.28	21.50	3
4862.13	48.00	20.51	27.34	3
4862.16	54.00	20.73	33.19	3
4862.19	60.00	20.92	39.04	3
4861.93	18.87	18.87	0.00	Overtopping

Table 107 - Culvert Summary Table: CV-31

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4859.43	0.000	0.000	0-NF	0.000	0.000	0.570	0.000	0.000	0.000
6.00	6.00	4860.63	1.198	0.435	1-S2n	0.524	0.865	0.600	0.352	7.324	4.598
12.00	12.00	4861.23	1.798	0.998	1-S2n	0.754	1.239	0.899	0.520	8.471	5.710
18.00	18.00	4861.83	2.399	1.934	5-S2n	0.946	1.526	1.148	0.650	9.347	6.443
24.00	19.38	4861.99	2.562	2.079	5-S2n	0.988	1.581	1.201	0.759	9.539	7.004
30.00	19.74	4862.04	2.606	2.118	5-S2n	0.999	1.595	1.214	0.854	9.588	7.464
36.00	20.03	4862.07	2.642	2.150	5-S2n	1.008	1.605	1.225	0.939	9.626	7.854
42.00	20.28	4862.10	2.674	2.177	5-S2n	1.015	1.615	1.234	1.018	9.665	8.196
48.00	20.51	4862.13	2.704	2.051	5-S2n	1.022	1.623	1.243	1.090	9.697	8.503
54.00	20.73	4862.16	2.732	2.139	5-S2n	1.029	1.631	1.251	1.157	9.726	8.779
60.00	20.92	4862.19	2.758	2.221	5-S2n	1.035	1.638	1.258	1.221	9.753	9.035

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Straight Culvert

Inlet Elevation (invert): 4859.43 ft, Outlet Elevation (invert): 4858.86 ft

Culvert Length: 24.01 ft, Culvert Slope: 0.0238

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Site Data - CV-31

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4859.43 ft

Outlet Station: 24.00 ft

Outlet Elevation: 4858.86 ft

Number of Barrels: 1

Culvert Data Summary - CV-31

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 108 - Downstream Channel Rating Curve (Crossing: Avenida Del Fuego / Estrella Pl

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4859.43	0.00	0.00	0.00	0.00
6.00	4859.78	0.35	4.60	0.88	1.49
12.00	4859.95	0.52	5.71	1.30	1.56
18.00	4860.08	0.65	6.44	1.62	1.61
24.00	4860.19	0.76	7.00	1.89	1.64
30.00	4860.28	0.85	7.46	2.13	1.66
36.00	4860.37	0.94	7.85	2.34	1.68
42.00	4860.45	1.02	8.20	2.54	1.70
48.00	4860.52	1.09	8.50	2.72	1.71
54.00	4860.59	1.16	8.78	2.89	1.72
60.00	4860.65	1.22	9.03	3.05	1.73

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Tailwater Channel Data - Avenida Del Fuego / Estrella Pl (6)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0280

Channel Invert Elevation: 4859.43 ft

Roadway Data for Crossing: Avenida Del Fuego / Estrella Pl (6)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4861.93 ft

Roadway Surface: Paved

Roadway Top Width: 20.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 109 - Summary of Culvert Flows at Crossing: Avenida Del Fuego / La Luna (2)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-32 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4837.07	0.00	0.00	0.00	1
4838.65	6.00	6.00	0.00	1
4839.13	12.00	8.04	3.87	16
4839.18	18.00	8.23	9.68	5
4839.22	24.00	8.38	15.52	4
4839.26	30.00	8.51	21.45	4
4839.29	36.00	8.62	27.25	3
4839.32	42.00	8.72	33.19	3
4839.35	48.00	8.82	39.13	3
4839.38	54.00	8.92	45.07	3
4839.40	60.00	9.00	50.80	2
4839.07	7.80	7.80	0.00	Overtopping

Table 110 - Culvert Summary Table: CV-32

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4837.07	0.000	0.000	0-NF	0.000	0.000	0.950	0.000	0.000	0.000
6.00	6.00	4838.65	1.580	1.013	5-S2n	0.800	0.942	0.800	0.352	6.058	4.598
12.00	8.04	4839.13	2.061	1.706	5-JS1t	0.970	1.094	1.470	0.520	4.508	5.710
18.00	8.23	4839.18	2.113	1.892	5-JS1f	0.986	1.107	1.500	0.650	4.655	6.443
24.00	8.38	4839.22	2.153	2.082	5-S1f	1.000	1.117	1.500	0.759	4.740	7.004
30.00	8.51	4839.26	2.190	2.182	4-FFf	1.011	1.125	4838.570	0.854	4.813	7.464
36.00	8.62	4839.29	2.221	2.302	4-FFf	1.021	1.132	1.500	0.939	4.876	7.854
42.00	8.72	4839.32	2.252	2.414	4-FFf	1.031	1.139	1.500	1.018	4.937	8.196
48.00	8.82	4839.35	2.280	2.518	4-FFf	1.040	1.145	1.500	1.090	4.993	8.503
54.00	8.92	4839.38	2.307	2.616	4-FFf	1.049	1.151	1.500	1.157	5.045	8.779
60.00	9.00	4839.40	2.332	2.707	4-FFf	1.057	1.156	1.500	1.221	5.093	9.035

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Straight Culvert

Inlet Elevation (invert): 4837.07 ft, Outlet Elevation (invert): 4836.12 ft

Culvert Length: 29.02 ft, Culvert Slope: 0.0328

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Site Data - CV-32

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4837.07 ft

Outlet Station: 29.00 ft

Outlet Elevation: 4836.12 ft

Number of Barrels: 1

Culvert Data Summary - CV-32

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 111 - Downstream Channel Rating Curve (Crossing: Avenida Del Fuego / La Luna

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4837.07	0.00	0.00	0.00	0.00
6.00	4837.42	0.35	4.60	0.88	1.49
12.00	4837.59	0.52	5.71	1.30	1.56
18.00	4837.72	0.65	6.44	1.62	1.61
24.00	4837.83	0.76	7.00	1.89	1.64
30.00	4837.92	0.85	7.46	2.13	1.66
36.00	4838.01	0.94	7.85	2.34	1.68
42.00	4838.09	1.02	8.20	2.54	1.70
48.00	4838.16	1.09	8.50	2.72	1.71
54.00	4838.23	1.16	8.78	2.89	1.72
60.00	4838.29	1.22	9.03	3.05	1.73

(2))

Tailwater Channel Data - Avenida Del Fuego / La Luna (2)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0280

Channel Invert Elevation: 4837.07 ft

Roadway Data for Crossing: Avenida Del Fuego / La Luna (2)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4839.07 ft

Roadway Surface: Gravel

Roadway Top Width: 20.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 112 - Summary of Culvert Flows at Crossing: NM Hwy 304 / NM Hwy 47 (1)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-33 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4824.41	0.00	0.00	0.00	1
4825.62	6.00	6.00	0.00	1
4826.22	12.00	12.00	0.00	1
4826.83	18.00	18.00	0.00	1
4826.98	24.00	19.31	4.61	9
4827.03	30.00	19.69	10.23	5
4827.07	36.00	20.01	15.90	4
4827.10	42.00	20.28	21.51	3
4827.13	48.00	20.53	27.32	3
4827.16	54.00	20.76	33.16	3
4827.19	60.00	20.97	38.99	3
4826.91	18.73	18.73	0.00	Overtopping

Table 113 - Culvert Summary Table: CV-33

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4824.41	0.000	0.000	0-NF	0.000	0.000	0.280	0.000	0.000	0.000
6.00	6.00	4825.62	1.214	0.676	1-S2n	0.711	0.865	0.742	0.269	5.460	2.537
12.00	12.00	4826.22	1.814	1.322	1-S2n	1.053	1.239	1.103	0.403	6.544	3.237
18.00	18.00	4826.83	2.416	2.299	5-S2n	1.385	1.526	1.433	0.509	7.260	3.714
24.00	19.31	4826.98	2.569	2.447	5-S2n	1.467	1.578	1.513	0.600	7.375	4.085
30.00	19.69	4827.03	2.617	2.493	5-S2n	1.493	1.593	1.538	0.680	7.404	4.391
36.00	20.01	4827.07	2.656	2.530	5-S2n	1.515	1.605	1.560	0.754	7.419	4.654
42.00	20.28	4827.10	2.690	2.562	5-S2n	1.534	1.614	1.534	0.822	7.632	4.885
48.00	20.53	4827.13	2.722	2.592	5-S2n	1.553	1.623	1.597	0.885	7.447	5.092
54.00	20.76	4827.16	2.752	2.620	5-S2n	1.571	1.632	1.571	0.944	7.640	5.280
60.00	20.97	4827.19	2.780	2.646	5-S2n	1.588	1.639	1.588	1.000	7.639	5.451

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Straight Culvert

Inlet Elevation (invert): 4824.41 ft, Outlet Elevation (invert): 4824.13 ft

Culvert Length: 38.00 ft, Culvert Slope: 0.0074

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Site Data - CV-33

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4824.41 ft

Outlet Station: 38.00 ft

Outlet Elevation: 4824.13 ft

Number of Barrels: 1

Culvert Data Summary - CV-33

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 114 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / NM Hwy 47 (1))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4824.41	0.00	0.00	0.00	0.00
6.00	4824.68	0.27	2.54	0.25	0.90
12.00	4824.81	0.40	3.24	0.38	0.96
18.00	4824.92	0.51	3.71	0.48	0.99
24.00	4825.01	0.60	4.08	0.56	1.01
30.00	4825.09	0.68	4.39	0.64	1.03
36.00	4825.16	0.75	4.65	0.71	1.04
42.00	4825.23	0.82	4.89	0.77	1.06
48.00	4825.29	0.88	5.09	0.83	1.07
54.00	4825.35	0.94	5.28	0.88	1.08
60.00	4825.41	1.00	5.45	0.94	1.08

Tailwater Channel Data - NM Hwy 304 / NM Hwy 47 (1)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4824.41 ft

Roadway Data for Crossing: NM Hwy 304 / NM Hwy 47 (1)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4826.91 ft

Roadway Surface: Gravel

Roadway Top Width: 32.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 115 - Summary of Culvert Flows at Crossing: NM Hwy 304 / NM Hwy 47 (3)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-35 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4820.45	0.00	0.00	0.00	1
4822.13	6.00	6.00	0.00	1
4822.28	12.00	6.49	5.46	9
4822.32	18.00	6.64	11.30	5
4822.36	24.00	6.77	17.15	4
4822.40	30.00	6.87	22.93	3
4822.43	36.00	6.97	28.89	3
4822.46	42.00	7.06	34.86	3
4822.49	48.00	7.15	40.82	3
4822.52	54.00	7.23	46.76	3
4822.54	60.00	7.30	52.55	2
4822.20	6.23	6.23	0.00	Overtopping

Table 116 - Culvert Summary Table: CV-35

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4820.45	0.000	0.000	0-NF	0.000	0.000	0.150	0.000	0.000	0.000
6.00	6.00	4822.13	1.684	1.608	7-M2c	1.250	0.987	0.987	0.269	5.775	2.537
12.00	6.49	4822.28	1.827	1.713	7-M2c	1.250	1.023	1.023	0.403	6.037	3.237
18.00	6.64	4822.32	1.874	1.749	7-M2c	1.250	1.034	1.034	0.509	6.121	3.714
24.00	6.77	4822.36	1.914	1.778	7-M2c	1.250	1.042	1.042	0.600	6.190	4.085
30.00	6.87	4822.40	1.948	1.804	7-M2c	1.250	1.049	1.049	0.680	6.250	4.391
36.00	6.97	4822.43	1.980	1.829	7-M2c	1.250	1.056	1.056	0.754	6.306	4.654
42.00	7.06	4822.46	2.010	1.853	7-M2c	1.250	1.061	1.061	0.822	6.358	4.885
48.00	7.15	4822.49	2.039	1.877	7-M2c	1.250	1.067	1.067	0.885	6.407	5.092
54.00	7.23	4822.52	2.065	1.901	7-M2t	1.250	1.072	1.094	0.944	6.343	5.280
60.00	7.30	4822.54	2.090	1.938	7-M2t	1.250	1.076	1.150	1.000	6.177	5.451

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Straight Culvert

Inlet Elevation (invert): 4820.45 ft, Outlet Elevation (invert): 4820.30 ft

Culvert Length: 28.00 ft, Culvert Slope: 0.0054

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Site Data - CV-35

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4820.45 ft

Outlet Station: 28.00 ft

Outlet Elevation: 4820.30 ft

Number of Barrels: 1

Culvert Data Summary - CV-35

Barrel Shape: Circular

Barrel Diameter: 1.25 ft

Barrel Material: PVC

Embedment: 0.00 in

Barrel Manning's n: 0.0110

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: None

Table 117 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / NM Hwy 47 (3))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4820.45	0.00	0.00	0.00	0.00
6.00	4820.72	0.27	2.54	0.25	0.90
12.00	4820.85	0.40	3.24	0.38	0.96
18.00	4820.96	0.51	3.71	0.48	0.99
24.00	4821.05	0.60	4.08	0.56	1.01
30.00	4821.13	0.68	4.39	0.64	1.03
36.00	4821.20	0.75	4.65	0.71	1.04
42.00	4821.27	0.82	4.89	0.77	1.06
48.00	4821.33	0.88	5.09	0.83	1.07
54.00	4821.39	0.94	5.28	0.88	1.08
60.00	4821.45	1.00	5.45	0.94	1.08

Tailwater Channel Data - NM Hwy 304 / NM Hwy 47 (3)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4820.45 ft

Roadway Data for Crossing: NM Hwy 304 / NM Hwy 47 (3)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4822.20 ft

Roadway Surface: Gravel

Roadway Top Width: 28.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 77 cfs

Maximum Flow: 77 cfs

Table 118 - Summary of Culvert Flows at Crossing: NM Hwy 304 / NM Hwy 47 (4)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-36 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4818.81	0.00	0.00	0.00	1
4820.00	7.70	7.70	0.00	1
4820.53	15.40	15.40	0.00	1
4820.99	23.10	23.10	0.00	1
4821.42	30.80	30.80	0.00	1
4821.84	38.50	38.50	0.00	1
4822.27	46.20	46.20	0.00	1
4822.73	53.90	53.90	0.00	1
4822.88	61.60	56.28	5.11	8
4822.93	69.30	57.08	12.12	5
4822.97	77.00	57.73	19.16	4
4822.81	55.22	55.22	0.00	Overtopping

Table 119 - Culvert Summary Table: CV-36

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4818.81	0.000	0.000	0-NF	0.000	0.000	2.240	0.000	0.000	0.000
7.70	7.70	4820.00	1.190	0.247	1-JS1t	0.609	0.833	2.457	0.217	1.037	2.296
15.40	15.40	4820.53	1.718	0.448	1-JS1t	0.860	1.192	2.569	0.329	1.981	2.992
23.10	23.10	4820.99	2.179	0.687	1-JS1t	1.059	1.473	2.658	0.418	2.871	3.486
30.80	30.80	4821.42	2.607	0.974	1-S2n	1.233	1.716	1.274	0.496	9.401	3.880
38.50	38.50	4821.84	3.026	1.312	1-S2n	1.391	1.926	1.449	0.567	9.886	4.211
46.20	46.20	4822.27	3.457	1.705	1-S2n	1.540	2.118	1.611	0.631	10.330	4.500
53.90	53.90	4822.73	3.917	2.153	5-S2n	1.683	2.292	1.753	0.692	10.816	4.757
61.60	56.28	4822.88	4.067	2.341	5-S2n	1.726	2.347	1.726	0.748	11.515	4.991
69.30	57.08	4822.93	4.119	2.441	5-S2n	1.741	2.364	1.741	0.802	11.556	5.205
77.00	57.73	4822.97	4.161	2.530	5-S2n	1.753	2.377	1.827	0.853	10.997	5.401

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Straight Culvert

Inlet Elevation (invert): 4818.81 ft, Outlet Elevation (invert): 4816.57 ft

Culvert Length: 55.05 ft, Culvert Slope: 0.0407

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Site Data - CV-36

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4818.81 ft

Outlet Station: 55.00 ft

Outlet Elevation: 4816.57 ft

Number of Barrels: 1

Culvert Data Summary - CV-36

Barrel Shape: Circular

Barrel Diameter: 3.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 120 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / NM Hwy 47 (4))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4818.81	0.00	0.00	0.00	0.00
7.70	4819.03	0.22	2.30	0.20	0.88
15.40	4819.14	0.33	2.99	0.31	0.94
23.10	4819.23	0.42	3.49	0.39	0.97
30.80	4819.31	0.50	3.88	0.46	1.00
38.50	4819.38	0.57	4.21	0.53	1.02
46.20	4819.44	0.63	4.50	0.59	1.04
53.90	4819.50	0.69	4.76	0.65	1.05
61.60	4819.56	0.75	4.99	0.70	1.06
69.30	4819.61	0.80	5.20	0.75	1.07
77.00	4819.66	0.85	5.40	0.80	1.08

Tailwater Channel Data - NM Hwy 304 / NM Hwy 47 (4)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 15.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4818.81 ft

Roadway Data for Crossing: NM Hwy 304 / NM Hwy 47 (4)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4822.81 ft

Roadway Surface: Paved

Roadway Top Width: 40.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 121 - Summary of Culvert Flows at Crossing: NM Hwy 304 / NM Hwy 47 (2)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-34 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4823.80	0.00	0.00	0.00	1
4825.45	6.00	6.00	0.00	1
4825.86	12.00	7.41	4.51	15
4825.91	18.00	7.48	10.45	5
4825.95	24.00	7.53	16.38	4
4825.98	30.00	7.58	22.20	3
4826.01	36.00	7.62	28.23	3
4826.04	42.00	7.67	34.26	3
4826.06	48.00	7.71	40.25	3
4826.09	54.00	7.75	46.23	3
4826.11	60.00	7.79	52.05	2
4825.80	7.34	7.34	0.00	Overtopping

Table 122 - Culvert Summary Table: CV-34

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4823.80	0.000	0.000	0-NF	0.000	0.000	1.000	0.000	0.000	0.000
6.00	6.00	4825.45	1.595	1.653	7-M1t	1.115	0.942	1.269	0.269	3.764	2.537
12.00	7.41	4825.86	1.918	2.187	7-M2t	1.500	1.051	1.403	0.403	4.314	3.237
18.00	7.48	4825.91	1.934	2.377	4-FFf	1.500	1.056	1.500	0.509	4.232	3.714
24.00	7.53	4825.95	1.946	2.493	4-FFf	1.500	1.059	1.500	0.600	4.260	4.085
30.00	7.58	4825.98	1.958	2.599	4-FFf	1.500	1.063	1.500	0.680	4.288	4.391
36.00	7.62	4826.01	1.969	2.694	4-FFf	1.500	1.066	1.500	0.754	4.313	4.654
42.00	7.67	4826.04	1.982	2.787	4-FFf	1.500	1.069	1.500	0.822	4.341	4.885
48.00	7.71	4826.06	1.992	2.871	4-FFf	1.500	1.072	1.500	0.885	4.363	5.092
54.00	7.75	4826.09	2.002	2.951	4-FFf	1.500	1.075	1.500	0.944	4.387	5.280
60.00	7.79	4826.11	2.012	3.028	4-FFf	1.500	1.078	1.500	1.000	4.409	5.451

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Straight Culvert

Inlet Elevation (invert): 4823.80 ft, Outlet Elevation (invert): 4822.80 ft

Culvert Length: 78.01 ft, Culvert Slope: 0.0128

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Site Data - CV-34

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4823.80 ft

Outlet Station: 78.00 ft

Outlet Elevation: 4822.80 ft

Number of Barrels: 1

Culvert Data Summary - CV-34

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 123 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / NM Hwy 47 (2))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4823.80	0.00	0.00	0.00	0.00
6.00	4824.07	0.27	2.54	0.25	0.90
12.00	4824.20	0.40	3.24	0.38	0.96
18.00	4824.31	0.51	3.71	0.48	0.99
24.00	4824.40	0.60	4.08	0.56	1.01
30.00	4824.48	0.68	4.39	0.64	1.03
36.00	4824.55	0.75	4.65	0.71	1.04
42.00	4824.62	0.82	4.89	0.77	1.06
48.00	4824.68	0.88	5.09	0.83	1.07
54.00	4824.74	0.94	5.28	0.88	1.08
60.00	4824.80	1.00	5.45	0.94	1.08

Tailwater Channel Data - NM Hwy 304 / NM Hwy 47 (2)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4823.80 ft

Roadway Data for Crossing: NM Hwy 304 / NM Hwy 47 (2)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4825.80 ft

Roadway Surface: Paved

Roadway Top Width: 62.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 206 cfs

Maximum Flow: 206 cfs

Table 124 - Summary of Culvert Flows at Crossing: NM Hwy 304 / Chisum Trail (1)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-42 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4829.10	0.00	0.00	0.00	1
4831.37	20.60	10.50	9.94	14
4831.49	41.20	11.17	29.91	6
4831.57	61.80	11.55	50.16	5
4831.65	82.40	11.88	70.39	4
4831.72	103.00	12.16	90.79	4
4831.78	123.60	12.42	110.94	3
4831.84	144.20	12.66	131.40	3
4831.90	164.80	12.89	151.86	3
4831.96	185.40	13.10	172.29	3
4832.01	206.00	13.29	192.46	2
4831.27	9.87	9.87	0.00	Overtopping

Table 125 - Culvert Summary Table: CV-42

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4829.10	0.000	0.000	0-NF	0.000	0.000	1.100	0.000	0.000	0.000
20.60	10.50	4831.37	2.242	2.249	7-M1t	1.237	1.213	1.650	0.550	4.667	3.885
41.20	11.17	4831.49	2.386	2.549	4-FFf	1.308	1.250	1.700	0.813	4.920	4.856
61.80	11.55	4831.57	2.474	2.875	4-FFf	1.355	1.271	1.700	1.017	5.091	5.501
82.40	11.88	4831.65	2.549	3.152	4-FFf	1.700	1.291	1.700	1.188	5.233	5.995
103.00	12.16	4831.72	2.618	3.398	4-FFf	1.700	1.306	1.700	1.339	5.358	6.400
123.60	12.42	4831.78	2.682	3.622	4-FFf	1.700	1.320	1.700	1.475	5.472	6.746
144.20	12.66	4831.84	2.743	3.830	4-FFf	1.700	1.332	1.700	1.599	5.578	7.050
164.80	12.89	4831.90	2.800	4.024	4-FFf	1.700	1.343	1.700	1.713	5.677	7.321
185.40	13.10	4831.96	2.856	4.208	4-FFf	1.700	1.353	1.700	1.820	5.770	7.566
206.00	13.29	4832.01	2.908	4.381	4-FFf	1.700	1.362	1.700	1.921	5.856	7.791

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Straight Culvert

Inlet Elevation (invert): 4829.10 ft, Outlet Elevation (invert): 4828.00 ft

Culvert Length: 52.01 ft, Culvert Slope: 0.0212

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Site Data - CV-42

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4829.10 ft

Outlet Station: 52.00 ft

Outlet Elevation: 4828.00 ft

Number of Barrels: 1

Culvert Data Summary - CV-42

Barrel Shape: Circular

Barrel Diameter: 1.70 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 126 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / Chisum Trail (1))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4829.10	0.00	0.00	0.00	0.00
20.60	4829.65	0.55	3.88	0.51	1.00
41.20	4829.91	0.81	4.86	0.76	1.05
61.80	4830.12	1.02	5.50	0.95	1.09
82.40	4830.29	1.19	6.00	1.11	1.11
103.00	4830.44	1.34	6.40	1.25	1.13
123.60	4830.57	1.47	6.75	1.38	1.14
144.20	4830.70	1.60	7.05	1.50	1.15
164.80	4830.81	1.71	7.32	1.60	1.16
185.40	4830.92	1.82	7.57	1.70	1.17
206.00	4831.02	1.92	7.79	1.80	1.18

Tailwater Channel Data - NM Hwy 304 / Chisum Trail (1)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4829.10 ft

Roadway Data for Crossing: NM Hwy 304 / Chisum Trail (1)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4831.27 ft

Roadway Surface: Paved

Roadway Top Width: 34.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 206 cfs

Maximum Flow: 206 cfs

Table 127 - Summary of Culvert Flows at Crossing: NM Hwy 304 / Chisum Trail (2)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-43 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4824.00	0.00	0.00	0.00	1
4826.62	20.60	20.60	0.00	1
4827.28	41.20	30.21	10.77	10
4827.39	61.80	31.58	29.90	5
4827.47	82.40	32.43	49.88	5
4827.55	103.00	33.15	69.71	4
4827.62	123.60	33.80	89.75	4
4827.68	144.20	34.39	109.57	3
4827.74	164.80	34.94	129.73	3
4827.80	185.40	35.45	149.89	3
4827.85	206.00	35.94	170.04	3
4827.17	28.60	28.60	0.00	Overtopping

Table 128 - Culvert Summary Table: CV-43

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4824.00	0.000	0.000	0-NF	0.000	0.000	1.000	0.000	0.000	0.000
20.60	20.60	4826.62	2.411	2.621	3-M2t	1.569	1.500	1.561	0.561	6.005	4.024
41.20	30.21	4827.28	3.251	3.280	3-M2t	2.102	1.832	1.838	0.838	7.275	5.078
61.80	31.58	4827.39	3.386	3.382	3-M2t	2.700	1.877	2.056	1.056	6.749	5.785
82.40	32.43	4827.47	3.473	3.454	3-M2t	2.700	1.902	2.242	1.242	6.382	6.328
103.00	33.15	4827.55	3.547	3.533	3-M2t	2.700	1.924	2.406	1.406	6.153	6.775
123.60	33.80	4827.62	3.615	3.658	3-M2t	2.700	1.942	2.555	1.555	6.029	7.156
144.20	34.39	4827.68	3.678	3.987	7-M2t	2.700	1.959	2.691	1.691	6.007	7.490
164.80	34.94	4827.74	3.738	4.189	4-FFf	2.700	1.975	2.700	1.818	6.102	7.788
185.40	35.45	4827.80	3.795	4.379	4-FFf	2.700	1.989	2.700	1.937	6.192	8.059
206.00	35.94	4827.85	3.850	4.559	4-FFf	2.700	2.002	2.700	2.050	6.277	8.306

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Straight Culvert

Inlet Elevation (invert): 4824.00 ft, Outlet Elevation (invert): 4823.00 ft

Culvert Length: 78.01 ft, Culvert Slope: 0.0128

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Site Data - CV-43

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4824.00 ft

Outlet Station: 78.00 ft

Outlet Elevation: 4823.00 ft

Number of Barrels: 1

Culvert Data Summary - CV-43

Barrel Shape: Circular

Barrel Diameter: 2.70 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 129 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / Chisum Trail (2))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4824.00	0.00	0.00	0.00	0.00
20.60	4824.56	0.56	4.02	0.53	1.00
41.20	4824.84	0.84	5.08	0.78	1.06
61.80	4825.06	1.06	5.78	0.99	1.09
82.40	4825.24	1.24	6.33	1.16	1.11
103.00	4825.41	1.41	6.77	1.32	1.13
123.60	4825.55	1.55	7.16	1.46	1.14
144.20	4825.69	1.69	7.49	1.58	1.16
164.80	4825.82	1.82	7.79	1.70	1.17
185.40	4825.94	1.94	8.06	1.81	1.18
206.00	4826.05	2.05	8.31	1.92	1.18

Tailwater Channel Data - NM Hwy 304 / Chisum Trail (2)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4824.00 ft

Roadway Data for Crossing: NM Hwy 304 / Chisum Trail (2)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4827.17 ft

Roadway Surface: Paved

Roadway Top Width: 40.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 130 - Summary of Culvert Flows at Crossing: NM Hwy 304 / NM Hwy 47 (5)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-45 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4820.20	0.00	0.00	0.00	1
4821.90	6.00	6.00	0.00	1
4822.26	12.00	7.98	3.96	15
4822.30	18.00	8.15	9.77	5
4822.34	24.00	8.29	15.62	4
4822.37	30.00	8.41	21.55	4
4822.40	36.00	8.52	27.35	3
4822.43	42.00	8.62	33.30	3
4822.46	48.00	8.71	39.25	3
4822.48	54.00	8.80	45.19	3
4822.51	60.00	8.88	50.93	2
4822.20	7.75	7.75	0.00	Overtopping

Table 131 - Culvert Summary Table: CV-45

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4820.20	0.000	0.000	0-NF	0.000	0.000	0.400	0.000	0.000	0.000
6.00	6.00	4821.90	1.591	1.696	7-M2c	0.971	0.942	0.942	0.262	5.138	2.396
12.00	7.98	4822.26	2.056	2.008	7-M2c	1.500	1.090	1.090	0.387	5.797	3.004
18.00	8.15	4822.30	2.103	2.040	7-M2c	1.500	1.102	1.102	0.484	5.858	3.411
24.00	8.29	4822.34	2.141	2.067	7-M2c	1.500	1.111	1.111	0.566	5.906	3.721
30.00	8.41	4822.37	2.174	2.090	7-M2c	1.500	1.119	1.119	0.638	5.949	3.977
36.00	8.52	4822.40	2.204	2.112	7-M2c	1.500	1.126	1.126	0.703	5.986	4.195
42.00	8.62	4822.43	2.232	2.132	3-M2t	1.500	1.132	1.162	0.762	5.869	4.387
48.00	8.71	4822.46	2.259	2.153	3-M2t	1.500	1.138	1.216	0.816	5.675	4.558
54.00	8.80	4822.48	2.284	2.176	3-M2t	1.500	1.144	1.268	0.868	5.523	4.713
60.00	8.88	4822.51	2.307	2.202	3-M2t	1.500	1.149	1.316	0.916	5.404	4.856

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Straight Culvert

Inlet Elevation (invert): 4820.20 ft, Outlet Elevation (invert): 4819.80 ft

Culvert Length: 22.00 ft, Culvert Slope: 0.0182

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Site Data - CV-45

Site Data Option:

Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4820.20 ft

Outlet Station: 22.00 ft

Outlet Elevation: 4819.80 ft

Number of Barrels: 1

Culvert Data Summary - CV-45

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 132 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / NM Hwy 47 (5))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4820.20	0.00	0.00	0.00	0.00
6.00	4820.46	0.26	2.40	0.24	0.89
12.00	4820.59	0.39	3.00	0.36	0.94
18.00	4820.68	0.48	3.41	0.45	0.97
24.00	4820.77	0.57	3.72	0.53	0.99
30.00	4820.84	0.64	3.98	0.60	1.01
36.00	4820.90	0.70	4.20	0.66	1.02
42.00	4820.96	0.76	4.39	0.71	1.03
48.00	4821.02	0.82	4.56	0.76	1.04
54.00	4821.07	0.87	4.71	0.81	1.05
60.00	4821.12	0.92	4.86	0.86	1.06

Tailwater Channel Data - NM Hwy 304 / NM Hwy 47 (5)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 6.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4820.20 ft

Roadway Data for Crossing: NM Hwy 304 / NM Hwy 47 (5)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4822.20 ft

Roadway Surface: Paved

Roadway Top Width: 40.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 60 cfs

Maximum Flow: 60 cfs

Table 133 - Summary of Culvert Flows at Crossing: NM Hwy 304 / NM Hwy 47 (6)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-46 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4817.80	0.00	0.00	0.00	1
4819.39	6.00	6.00	0.00	1
4819.86	12.00	7.98	3.94	16
4819.90	18.00	8.03	9.89	5
4819.94	24.00	8.11	15.80	4
4819.98	30.00	8.18	21.78	4
4820.01	36.00	8.24	27.63	3
4820.03	42.00	8.30	33.62	3
4820.06	48.00	8.35	39.61	3
4820.09	54.00	8.40	45.58	3
4820.11	60.00	8.45	51.37	2
4819.80	7.76	7.76	0.00	Overtopping

Table 134 - Culvert Summary Table: CV-46

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4817.80	0.000	0.000	0-NF	0.000	0.000	1.200	0.000	0.000	0.000
6.00	6.00	4819.39	1.590	1.265	5-S2n	0.939	0.942	0.939	0.262	4.998	2.396
12.00	7.98	4819.86	2.056	2.162	4-FFf	1.185	1.091	1.500	0.387	4.516	3.004
18.00	8.03	4819.90	2.069	2.281	4-FFf	1.192	1.094	1.500	0.484	4.543	3.411
24.00	8.11	4819.94	2.090	2.398	4-FFf	1.500	1.099	1.500	0.566	4.588	3.721
30.00	8.18	4819.98	2.108	2.501	4-FFf	1.500	1.104	1.500	0.638	4.627	3.977
36.00	8.24	4820.01	2.125	2.594	4-FFf	1.500	1.108	1.500	0.703	4.661	4.195
42.00	8.30	4820.03	2.141	2.681	4-FFf	1.500	1.112	1.500	0.762	4.695	4.387
48.00	8.35	4820.06	2.156	2.761	4-FFf	1.500	1.115	1.500	0.816	4.726	4.558
54.00	8.40	4820.09	2.170	2.836	4-FFf	1.500	1.119	1.500	0.868	4.755	4.713
60.00	8.45	4820.11	2.184	2.906	4-FFf	1.500	1.122	1.500	0.916	4.782	4.856

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Straight Culvert

Inlet Elevation (invert): 4817.80 ft, Outlet Elevation (invert): 4816.60 ft

Culvert Length: 60.01 ft, Culvert Slope: 0.0200

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Site Data - CV-46

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4817.80 ft

Outlet Station: 60.00 ft

Outlet Elevation: 4816.60 ft

Number of Barrels: 1

Culvert Data Summary - CV-46

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 135 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / NM Hwy 47 (6))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4817.80	0.00	0.00	0.00	0.00
6.00	4818.06	0.26	2.40	0.24	0.89
12.00	4818.19	0.39	3.00	0.36	0.94
18.00	4818.28	0.48	3.41	0.45	0.97
24.00	4818.37	0.57	3.72	0.53	0.99
30.00	4818.44	0.64	3.98	0.60	1.01
36.00	4818.50	0.70	4.20	0.66	1.02
42.00	4818.56	0.76	4.39	0.71	1.03
48.00	4818.62	0.82	4.56	0.76	1.04
54.00	4818.67	0.87	4.71	0.81	1.05
60.00	4818.72	0.92	4.86	0.86	1.06

Tailwater Channel Data - NM Hwy 304 / NM Hwy 47 (6)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 6.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4817.80 ft

Roadway Data for Crossing: NM Hwy 304 / NM Hwy 47 (6)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4819.80 ft

Roadway Surface: Paved

Roadway Top Width: 45.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 137 cfs

Maximum Flow: 137 cfs

Table 136 - Summary of Culvert Flows at Crossing: NM Hwy 304 / NM Hwy 47 (7)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-47 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4814.40	0.00	0.00	0.00	1
4816.19	13.70	13.70	0.00	1
4817.05	27.40	27.40	0.00	1
4817.86	41.10	41.10	0.00	1
4818.02	54.80	43.69	10.99	8
4818.10	68.50	44.87	23.48	5
4818.17	82.20	45.82	36.17	4
4818.23	95.90	46.63	49.17	4
4818.28	109.60	47.14	62.42	4
4818.33	123.30	47.99	75.17	3
4818.38	137.00	48.61	88.30	3
4817.90	41.77	41.77	0.00	Overtopping

Table 137 - Culvert Summary Table: CV-47

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4814.40	0.000	0.000	0-NF	0.000	0.000	0.100	0.000	0.000	0.000
13.70	13.70	4816.19	1.638	1.792	2-M2c	1.772	1.175	1.175	0.442	5.335	3.490
27.40	27.40	4817.05	2.446	2.653	2-M2c	3.000	1.689	1.689	0.663	6.682	4.434
41.10	41.10	4817.86	3.145	3.458	7-M2c	3.000	2.086	2.086	0.837	7.836	5.074
54.80	43.69	4818.02	3.287	3.622	7-M2c	3.000	2.151	2.151	0.987	8.056	5.568
68.50	44.87	4818.10	3.353	3.701	7-M2c	3.000	2.180	2.180	1.120	8.157	5.975
82.20	45.82	4818.17	3.407	3.767	7-M2c	3.000	2.202	2.202	1.240	8.239	6.323
95.90	46.63	4818.23	3.455	3.826	7-M2c	3.000	2.222	2.222	1.352	8.309	6.629
109.60	47.14	4818.28	3.485	3.880	7-M2c	3.000	2.233	2.233	1.455	8.353	6.903
123.30	47.99	4818.33	3.535	3.929	7-M2c	3.000	2.253	2.253	1.553	8.427	7.151
137.00	48.61	4818.38	3.572	3.976	7-M2c	3.000	2.267	2.267	1.645	8.481	7.378

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Straight Culvert

Inlet Elevation (invert): 4814.40 ft, Outlet Elevation (invert): 4814.30 ft

Culvert Length: 130.00 ft, Culvert Slope: 0.0008

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Site Data - CV-47

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4814.40 ft

Outlet Station: 130.00 ft

Outlet Elevation: 4814.30 ft

Number of Barrels: 1

Culvert Data Summary - CV-47

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 138 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / NM Hwy 47 (7))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4814.40	0.00	0.00	0.00	0.00
13.70	4814.84	0.44	3.49	0.41	0.97
27.40	4815.06	0.66	4.43	0.62	1.03
41.10	4815.24	0.84	5.07	0.78	1.06
54.80	4815.39	0.99	5.57	0.92	1.08
68.50	4815.52	1.12	5.97	1.05	1.10
82.20	4815.64	1.24	6.32	1.16	1.11
95.90	4815.75	1.35	6.63	1.27	1.12
109.60	4815.86	1.46	6.90	1.36	1.13
123.30	4815.95	1.55	7.15	1.45	1.14
137.00	4816.04	1.64	7.38	1.54	1.15

Tailwater Channel Data - NM Hwy 304 / NM Hwy 47 (7)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4814.40 ft

Roadway Data for Crossing: NM Hwy 304 / NM Hwy 47 (7)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4817.90 ft

Roadway Surface: Gravel

Roadway Top Width: 120.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 206 cfs

Maximum Flow: 206 cfs

Table 139 - Summary of Culvert Flows at Crossing: NM Hwy 304 / Chisum Trail (3)

Headwater Elevation (ft)	Total Discharge (cfs)	CV-54 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4828.20	0.00	0.00	0.00	1
4830.32	20.60	8.18	12.25	10
4830.43	41.20	8.62	32.28	5
4830.51	61.80	8.91	52.56	4
4830.59	82.40	9.17	73.11	4
4830.66	103.00	9.39	93.56	4
4830.72	123.60	9.59	113.79	3
4830.78	144.20	9.77	134.31	3
4830.84	164.80	9.95	154.81	3
4830.89	185.40	10.11	175.27	3
4830.95	206.00	10.26	195.55	2
4830.20	7.77	7.77	0.00	Overtopping

Table 140 - Culvert Summary Table: CV-54

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4828.20	0.000	0.000	0-NF	0.000	0.000	0.900	0.000	0.000	0.000
20.60	8.18	4830.32	2.106	2.090	7-M1t	1.105	1.104	1.450	0.550	4.677	3.885
41.20	8.62	4830.43	2.227	2.358	4-FFf	1.159	1.132	1.500	0.813	4.876	4.856
61.80	8.91	4830.51	2.313	2.670	4-FFf	1.500	1.151	1.500	1.017	5.043	5.501
82.40	9.17	4830.59	2.389	2.937	4-FFf	1.500	1.166	1.500	1.188	5.187	5.995
103.00	9.39	4830.66	2.457	3.173	4-FFf	1.500	1.183	1.500	1.339	5.312	6.400
123.60	9.59	4830.72	2.521	3.388	4-FFf	1.500	1.194	1.500	1.475	5.426	6.746
144.20	9.77	4830.78	2.581	3.587	4-FFf	1.500	1.205	1.500	1.599	5.531	7.050
164.80	9.95	4830.84	2.638	3.772	4-FFf	1.500	1.215	1.500	1.713	5.629	7.321
185.40	10.11	4830.89	2.693	3.948	4-FFf	1.500	1.224	1.500	1.820	5.721	7.566
206.00	10.26	4830.95	2.746	4.113	4-FFf	1.500	1.232	1.500	1.921	5.808	7.791

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Straight Culvert

Inlet Elevation (invert): 4828.20 ft, Outlet Elevation (invert): 4827.30 ft

Culvert Length: 37.01 ft, Culvert Slope: 0.0243

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Site Data - CV-54

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4828.20 ft

Outlet Station: 37.00 ft

Outlet Elevation: 4827.30 ft

Number of Barrels: 1

Culvert Data Summary - CV-54

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 141 - Downstream Channel Rating Curve (Crossing: NM Hwy 304 / Chisum Trail (3))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4828.20	0.00	0.00	0.00	0.00
20.60	4828.75	0.55	3.88	0.51	1.00
41.20	4829.01	0.81	4.86	0.76	1.05
61.80	4829.22	1.02	5.50	0.95	1.09
82.40	4829.39	1.19	6.00	1.11	1.11
103.00	4829.54	1.34	6.40	1.25	1.13
123.60	4829.67	1.47	6.75	1.38	1.14
144.20	4829.80	1.60	7.05	1.50	1.15
164.80	4829.91	1.71	7.32	1.60	1.16
185.40	4830.02	1.82	7.57	1.70	1.17
206.00	4830.12	1.92	7.79	1.80	1.18

Tailwater Channel Data - NM Hwy 304 / Chisum Trail (3)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4828.20 ft

Roadway Data for Crossing: NM Hwy 304 / Chisum Trail (3)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4830.20 ft

Roadway Surface: Paved

Roadway Top Width: 25.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 77 cfs

Maximum Flow: 77 cfs

Table 142 - Summary of Culvert Flows at Crossing: Maddox St

Headwater Elevation (ft)	Total Discharge (cfs)	CV-55 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4861.10	0.00	0.00	0.00	1
4863.88	7.70	7.70	0.00	1
4864.68	15.40	9.25	6.09	14
4864.73	23.10	9.35	13.66	5
4864.77	30.80	9.44	21.25	4
4864.81	38.50	9.50	28.94	4
4864.85	46.20	9.57	36.48	3
4864.88	53.90	9.63	44.17	3
4864.91	61.60	9.68	51.87	3
4864.94	69.30	9.73	59.56	3
4864.97	77.00	9.79	67.02	2
4864.60	9.11	9.11	0.00	Overtopping

Table 143 - Culvert Summary Table: CV-55

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	4861.10	0.000	0.000	0-NF	0.000	0.000	0.100	0.000	0.000	0.000
7.70	7.70	4863.88	1.997	2.781	7-M2c	1.500	1.071	1.071	0.636	5.701	3.700
15.40	9.25	4864.68	2.432	3.575	7-M2c	1.500	1.174	1.174	0.905	6.231	4.468
23.10	9.35	4864.73	2.462	3.622	7-M2t	1.500	1.180	1.204	1.104	6.150	4.974
30.80	9.44	4864.77	2.490	3.725	7-M2t	1.500	1.186	1.367	1.267	5.585	5.362
38.50	9.50	4864.81	2.509	3.867	4-FFf	1.500	1.189	1.500	1.407	5.375	5.681
46.20	9.57	4864.85	2.533	4.031	4-FFf	1.500	1.193	1.500	1.532	5.417	5.954
53.90	9.63	4864.88	2.552	4.174	4-FFf	1.500	1.197	1.500	1.645	5.450	6.193
61.60	9.68	4864.91	2.567	4.302	4-FFf	1.500	1.200	1.500	1.749	5.477	6.408
69.30	9.73	4864.94	2.583	4.424	4-FFf	1.500	1.202	1.500	1.845	5.504	6.603
77.00	9.79	4864.97	2.603	4.546	4-FFf	1.500	1.206	1.500	1.934	5.539	6.782

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Straight Culvert

Inlet Elevation (invert): 4861.10 ft, Outlet Elevation (invert): 4861.00 ft

Culvert Length: 58.00 ft, Culvert Slope: 0.0017

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Site Data - CV-55

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4861.10 ft

Outlet Station: 58.00 ft

Outlet Elevation: 4861.00 ft

Number of Barrels: 1

Culvert Data Summary - CV-55

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 144 - Downstream Channel Rating Curve (Crossing: Maddox St)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	4861.10	0.00	0.00	0.00	0.00
7.70	4861.74	0.64	3.70	0.60	0.96
15.40	4862.00	0.90	4.47	0.85	1.01
23.10	4862.20	1.10	4.97	1.03	1.03
30.80	4862.37	1.27	5.36	1.19	1.05
38.50	4862.51	1.41	5.68	1.32	1.06
46.20	4862.63	1.53	5.95	1.43	1.07
53.90	4862.75	1.65	6.19	1.54	1.08
61.60	4862.85	1.75	6.41	1.64	1.09
69.30	4862.94	1.84	6.60	1.73	1.10
77.00	4863.03	1.93	6.78	1.81	1.11

Tailwater Channel Data - Maddox St

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0280

Channel Invert Elevation: 4861.10 ft

Roadway Data for Crossing: Maddox St

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 4864.60 ft

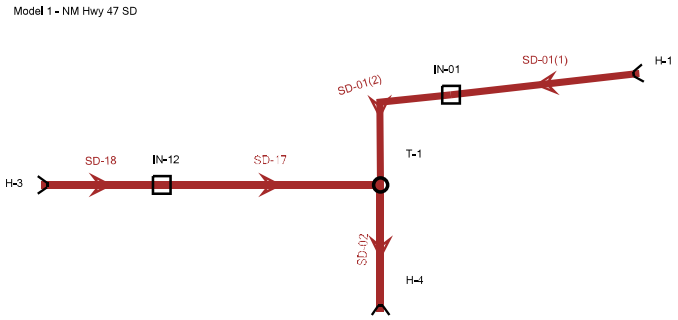
Roadway Surface: Paved

Roadway Top Width: 30.00 ft

Hydraulic Assessment - Model 1

Hydraulic Model Properties	
Title	
Engineer	
Company	
Date	11/20/2020
Notes	

Entire Model - Time: 0.00 hours



Hydraulic Assessment - Model 1

Network Elements Table - Time: 0.00 hours

Label	Station (Calculated) (ft)	Inlet	Inlet Location	Inlet C	Inlet Drainage Area (acres)	Total Inlet Intensity (in/h)
SD-02						
SD-17						
H-1	(N/A)					
IN-12	(N/A)	<None>	On Grade	(N/A)	(N/A)	8.000
SD-18						
H-3	(N/A)					
IN-01	(N/A)	<None>	On Grade	(N/A)	(N/A)	8.000
SD-01(2)						
SD-01(1)						
H-4	(N/A)					
T-1	(N/A)					

Flow (Total In) (cfs)	Flow (Captured) (cfs)	Flow (Total Bypassed) (cfs)	Bypass Target	Spread / Top Width (ft)	System CA (acres)	System Flow Time (min)
					0.000	2.584
					0.000	0.662
					0.000	0.000
	0.00	0.00	(N/A)	0.0	0.000	0.662
					0.000	0.000
					0.000	0.000
	0.00	0.00	(N/A)	0.0	0.000	0.119
					0.000	0.119
					0.000	0.000
					0.000	2.660
					0.000	2.584

System Rational Flow (cfs)	Flow (cfs)	Start Node	Stop Node	Number of Barrels	Rise (Unified) (ft)	Span (ft)
0.00	133.00	T-1	H-4	1	4.00	8.0
0.00	6.00	IN-12	T-1	1	1.50	2.3
0.00						
0.00						
0.00	5.00	H-3	IN-12	1	1.50	2.3
0.00						
0.00						
0.00	127.00	IN-01	T-1	1	4.00	8.0
0.00	126.00	H-1	IN-01	1	4.00	8.0
0.00						
0.00						

Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Friction Slope (ft/ft)	Headloss (ft)	Velocity (ft/s)	Depth (Normal) (ft)	Invert (Start) (ft)
66.0	0.019	0.009	1.94	14.47	1.15	4,808.86
252.0	0.008	0.004	0.91	2.19	0.87	4,811.00
			0.04			

Hydraulic Assessment - Model 1

Network Elements Table - Time: 0.00 hours

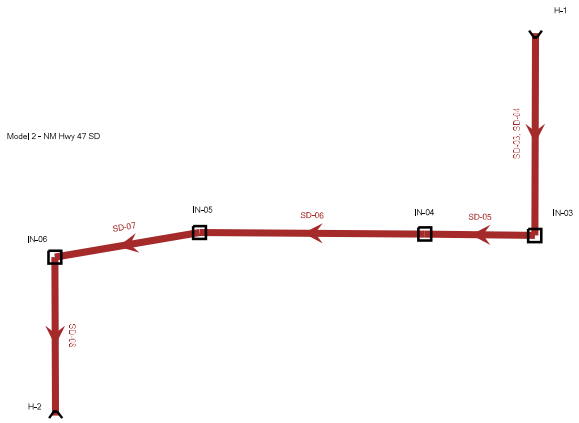
Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Friction Slope (ft/ft)	Headloss (ft)	Velocity (ft/s)	Depth (Normal) (ft)	Invert (Start) (ft)
146.0	0.010	0.005	0.57	3.68	0.74	4,812.50
			0.60			
51.0	0.036	0.029	0.96	17.67	0.90	4,810.70
93.0	0.014	0.012	0.72	13.01	1.21	4,812.03
			0.82			

Hydraulic Grade Line (In) (ft)	Elevation Ground (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Stop) (ft)
4,810.91	4,815.60	4,807.63	4,808.97	4,814.08
4,812.63	4,814.00	4,808.86	4,811.73	4,815.60
4,814.01			4,814.01	
4,812.67			4,812.63	
4,813.24	4,814.00	4,811.00	4,812.67	4,814.00
4,813.24			4,813.24	
4,813.28			4,812.69	
4,812.69	4,815.20	4,808.86	4,811.73	4,815.60
4,814.01	4,817.50	4,810.70	4,813.28	4,815.20
4,808.97			4,808.97	
4,811.73			4,810.91	

Hydraulic Assessment - Model 2, Storm Drain 1

Hydraulic Model Properties	
Title	
Engineer	
Company	
Date	11/20/2020
Notes	

Entire Model - Time: 0.00 hours



Hydraulic Assessment - Model 2, Storm Drain 1

Network Elements Table - Time: 0.00 hours

Label	Station (Calculated) (ft)	Inlet	Inlet Location	Inlet C	Inlet Drainage Area (acres)	Total Inlet Intensity (in/h)
SD-03, SD-04						
SD-05						
SD-06						
SD-07						
SD-08						
IN-03	(N/A)	<None>	On Grade	(N/A)	(N/A)	8.000
IN-04	(N/A)	<None>	On Grade	(N/A)	(N/A)	8.000
IN-05	(N/A)	<None>	On Grade	(N/A)	(N/A)	8.000
IN-06	(N/A)	<None>	On Grade	(N/A)	(N/A)	8.000
H-1	(N/A)					
H-2	(N/A)					

Flow (Total In) (cfs)	Flow (Captured) (cfs)	Flow (Total Bypassed) (cfs)	Bypass Target	Spread / Top Width (ft)	System CA (acres)	System Flow Time (min)
					0.000	0.000
					0.000	0.273
					0.000	0.419
					0.000	1.127
					0.000	1.382
	0.00	0.00	(N/A)	0.0	0.000	0.273
	0.00	0.00	(N/A)	0.0	0.000	0.419
	0.00	0.00	(N/A)	0.0	0.000	1.127
	0.00	0.00	(N/A)	0.0	0.000	1.382
					0.000	0.000
					0.000	1.530

System Rational Flow (cfs)	Flow (cfs)	Start Node	Stop Node	Number of Barrels	Rise (Unified) (ft)	Span (ft)
0.00	105.00	H-1	IN-03	2	5.00	0.0
0.00	108.00	IN-03	IN-04	1	4.00	0.0
0.00	111.00	IN-04	IN-05	1	4.00	0.0
0.00	114.00	IN-05	IN-06	1	4.00	0.0
0.00	117.00	IN-06	H-2	1	4.00	0.0
0.00						
0.00						
0.00						
0.00						
0.00						
0.00						

Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Friction Slope (ft/ft)	Headloss (ft)	Velocity (ft/s)	Depth (Normal) (ft)	Invert (Start) (ft)
121.0	0.013	0.003	0.01	7.39	1.95	4,820.09
115.0	0.011	0.010	0.75	13.14	2.49	4,818.48
533.0	0.010	0.009	4.62	12.55	2.65	4,817.19
213.0	0.013	0.011	1.83	13.88	2.49	4,811.93

Hydraulic Assessment - Model 2, Storm Drain 1

Network Elements Table - Time: 0.00 hours

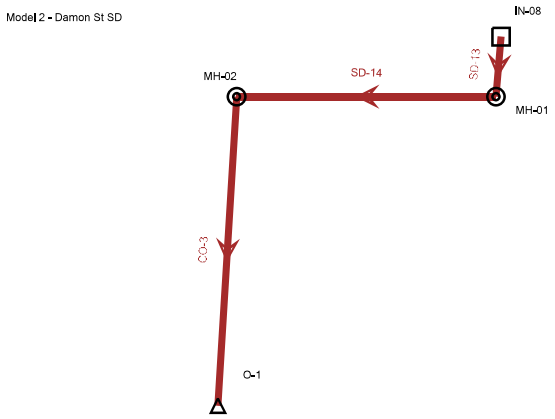
Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Friction Slope (ft/ft)	Headloss (ft)	Velocity (ft/s)	Depth (Normal) (ft)	Invert (Start) (ft)
172.0	0.030	0.018	6.35	19.47	1.93	4,809.26
			0.80			
			0.50			
			0.60			
			0.80			

Hydraulic Grade Line (In) (ft)	Elevation Ground (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Stop) (ft)
4,822.44	4,827.04	4,818.48	4,822.42	4,826.10
4,821.62	4,826.10	4,817.19	4,820.87	4,824.70
4,820.37	4,824.70	4,811.93	4,815.75	4,822.80
4,815.15	4,822.80	4,809.26	4,813.32	4,825.50
4,812.52	4,825.50	4,804.12	4,806.17	4,809.44
4,822.42			4,821.62	
4,820.87			4,820.37	
4,815.75			4,815.15	
4,813.32			4,812.52	
4,822.44			4,822.44	
4,806.17			4,806.17	

Hydraulic Assessment - Model 2, Storm Drain 2

Hydraulic Model Properties	
Title	
Engineer	
Company	
Date	11/20/2020
Notes	

Entire Model - Time: 0.00 hours



Hydraulic Assessment - Model 2, Storm Drain 2

Network Elements Table - Time: 0.00 hours

Label	Station (Calculated) (ft)	Inlet	Inlet Location	Inlet C	Inlet Drainage Area (acres)	Total Inlet Intensity (in/h)
IN-08	5+84	<None>	In Sag	(N/A)	(N/A)	8.000
MH-01	5+73					
SD-13						
MH-02	3+75					
SD-14						
CO-3						
O-1						

Flow (Total In) (cfs)	Flow (Captured) (cfs)	Flow (Total Bypassed) (cfs)	Bypass Target	Spread / Top Width (ft)	System CA (acres)	System Flow Time (min)
	0.00	0.00	(N/A)	0.0	0.000	0.000
					0.000	0.029
					0.000	0.000
					0.000	0.389
					0.000	0.029
					0.000	0.389
					0.000	0.945

System Rational Flow (cfs)	Flow (cfs)	Start Node	Stop Node	Number of Barrels	Rise (Unified) (ft)	Span (ft)
0.00						
0.00						
0.00	20.00	IN-08	MH-01	1	2.00	0.0
0.00						
0.00	20.00	MH-01	MH-02	1	2.00	0.0
0.00	20.00	MH-02	O-1	1	2.00	0.0
0.00						

Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Friction Slope (ft/ft)	Headloss (ft)	Velocity (ft/s)	Depth (Normal) (ft)	Invert (Start) (ft)
			0.38			
			0.68			
11.0	0.014	0.008	0.09	6.37	1.30	4,864.88
			0.68			
198.0	0.013	0.011	1.96	9.16	1.31	4,864.73
375.0	0.023	0.021	8.95	11.25	1.10	4,862.09

Hydraulic Grade Line (In) (ft)	Elevation Ground (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Stop) (ft)
4,867.46			4,867.09	
4,867.02			4,866.34	
4,867.09	4,867.70	4,864.73	4,867.00	4,867.00
4,864.38			4,863.70	
4,866.34	4,867.00	4,862.09	4,864.38	4,866.17

Hydraulic Assessment - Model 2, Storm Drain 2

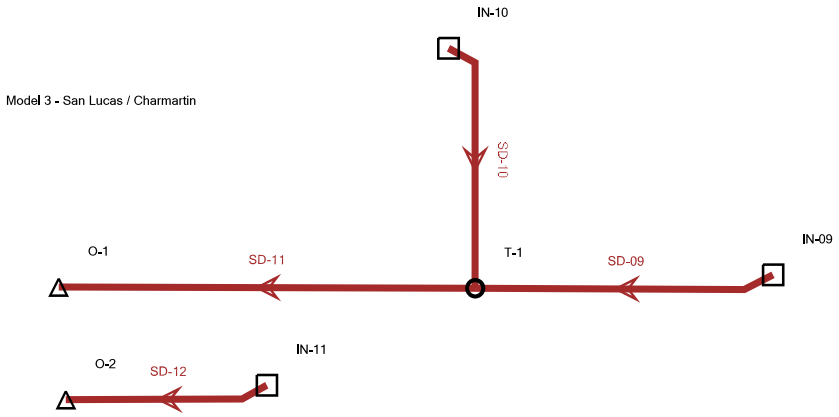
Network Elements Table - Time: 0.00 hours

Hydraulic Grade Line (In) (ft)	Elevation Ground (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Stop) (ft)
4,863.70	4,866.17	4,853.64	4,854.74	4,859.00

Hydraulic Assessment - Model 3

Hydraulic Model Properties	
Title	
Engineer	
Company	
Date	11/20/2020
Notes	

Enitre Model - Time: 0.00 hours



Hydraulic Assessment - Model 3

Network Elements Table - Time: 0.00 hours

Label	Station (Calculated) (ft)	Inlet	Inlet Location	Inlet C	Inlet Drainage Area (acres)	Total Inlet Intensity (in/h)
IN-09	9+71	<None>	On Grade	(N/A)	(N/A)	8.000
IN-10	8+02	<None>	On Grade	(N/A)	(N/A)	8.000
IN-11	1+18	<None>	On Grade	(N/A)	(N/A)	8.000
SD-12						
SD-09						
SD-11						
SD-10						
O-1						
O-2						
T-1	6+49					

Flow (Total In) (cfs)	Flow (Captured) (cfs)	Flow (Total Bypassed) (cfs)	Bypass Target	Spread / Top Width (ft)	System CA (acres)	System Flow Time (min)
	0.00	0.00	(N/A)	0.0	0.000	0.000
	0.00	0.00	(N/A)	0.0	0.000	0.000
	0.00	0.00	(N/A)	0.0	0.000	0.000
					0.000	0.000
					0.000	0.000
					0.000	1.589
					0.000	0.000
					0.000	4.297
					0.000	0.437
					0.000	1.589

System Rational Flow (cfs)	Flow (cfs)	Start Node	Stop Node	Number of Barrels	Rise (Unified) (ft)	Span (ft)
0.00						
0.00						
0.00						
0.00	5.00	IN-11	O-2	1	3.00	0.0
0.00	5.00	IN-09	T-1	1	2.00	0.0
0.00	10.00	T-1	O-1	1	3.00	0.0
0.00	5.00	IN-10	T-1	1	2.00	0.0
0.00						
0.00						
0.00						

Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Friction Slope (ft/ft)	Headloss (ft)	Velocity (ft/s)	Depth (Normal) (ft)	Invert (Start) (ft)
			0.60			
			0.60			
			0.60			
118.0	0.019	0.019	2.29	4.50	0.64	4,881.67
322.0	0.008	0.005	1.51	3.38	0.95	4,890.58
649.0	0.008	0.008	5.22	4.00	1.15	4,888.07
153.0	0.008	0.002	0.01	5.27	0.68	4,889.25

Hydraulic Assessment - Model 3

Network Elements Table - Time: 0.00 hours

Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Friction Slope (ft/ft)	Headloss (ft)	Velocity (ft/s)	Depth (Normal) (ft)	Invert (Start) (ft)
			0.80			

Hydraulic Grade Line (In) (ft)	Elevation Ground (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Stop) (ft)
4,892.13			4,891.54	
4,890.64			4,890.04	
4,882.97			4,882.37	
4,882.37	4,886.00	4,879.44	4,880.08	4,886.44
4,891.54	4,894.00	4,888.07	4,890.02	4,893.00
4,889.22	4,893.00	4,883.00	4,884.00	4,888.00
4,890.04	4,893.00	4,888.07	4,890.02	4,893.00
4,890.02			4,889.22	

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow
Minimum Flow: 628 cfs
Design Flow: 628 cfs
Maximum Flow: 628 cfs

Table 1 - Summary of Culvert Flows at Crossing: C1

Headwater Elevatio	Total Discharge (c	Culvert 1 Discharg (cfs)	Roadway Discharg (cfs)	Iterations
5.77	628.00	628.00	0.00	1
5.77	628.00	628.00	0.00	1
5.77	628.00	628.00	0.00	1
5.77	628.00	628.00	0.00	1
5.77	628.00	628.00	0.00	1
5.77	628.00	628.00	0.00	1
5.77	628.00	628.00	0.00	1
5.77	628.00	628.00	0.00	1
5.77	628.00	628.00	0.00	1
5.77	628.00	628.00	0.00	1
5.77	628.00	628.00	0.00	1
7.00	815.78	815.78	0.00	Overtopping

Rating Curve Plot for Crossing: C1

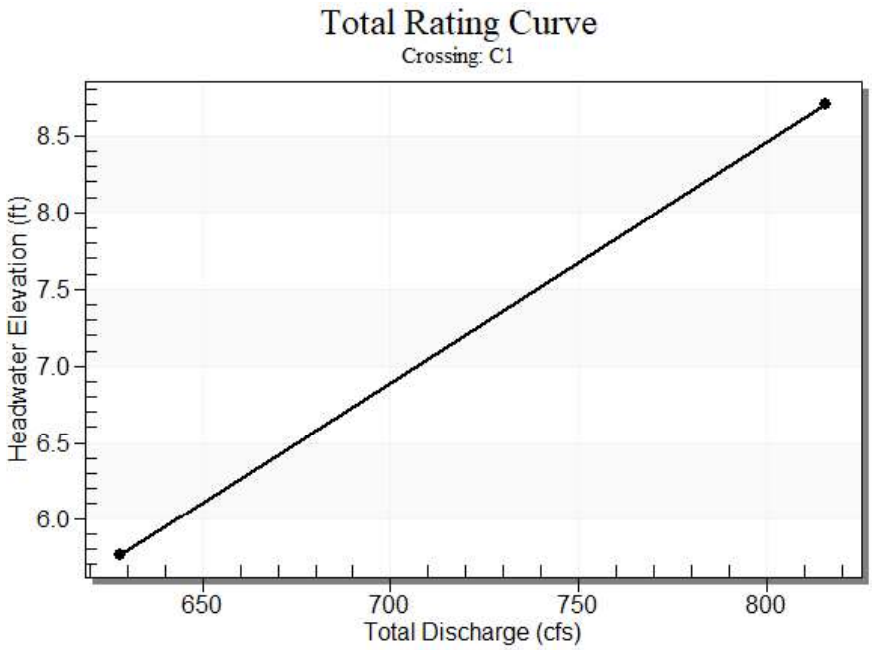


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (f	Outlet Control Depth (f	Flow Type	Normal Depth (f	Critical Depth (f	Outlet Depth (f	Tailwater Depth (f	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
628.00	628.00	5.77	4.766	3.082	5-S2	1.589	2.770	2.021	2.638	12.948	5.870
628.00	628.00	5.77	4.766	3.082	5-S2	1.589	2.770	2.021	2.638	12.948	5.870
628.00	628.00	5.77	4.766	3.082	5-S2	1.589	2.770	2.021	2.638	12.948	5.870
628.00	628.00	5.77	4.766	3.082	5-S2	1.589	2.770	2.021	2.638	12.948	5.870
628.00	628.00	5.77	4.766	3.082	5-S2	1.589	2.770	2.021	2.638	12.948	5.870
628.00	628.00	5.77	4.766	3.082	5-S2	1.589	2.770	2.021	2.638	12.948	5.870
628.00	628.00	5.77	4.766	3.082	5-S2	1.589	2.770	2.021	2.638	12.948	5.870
628.00	628.00	5.77	4.766	3.082	5-S2	1.589	2.770	2.021	2.638	12.948	5.870
628.00	628.00	5.77	4.766	3.082	5-S2	1.589	2.770	2.021	2.638	12.948	5.870
628.00	628.00	5.77	4.766	3.082	5-S2	1.589	2.770	2.021	2.638	12.948	5.870
628.00	628.00	5.77	4.766	3.082	5-S2	1.589	2.770	2.021	2.638	12.948	5.870

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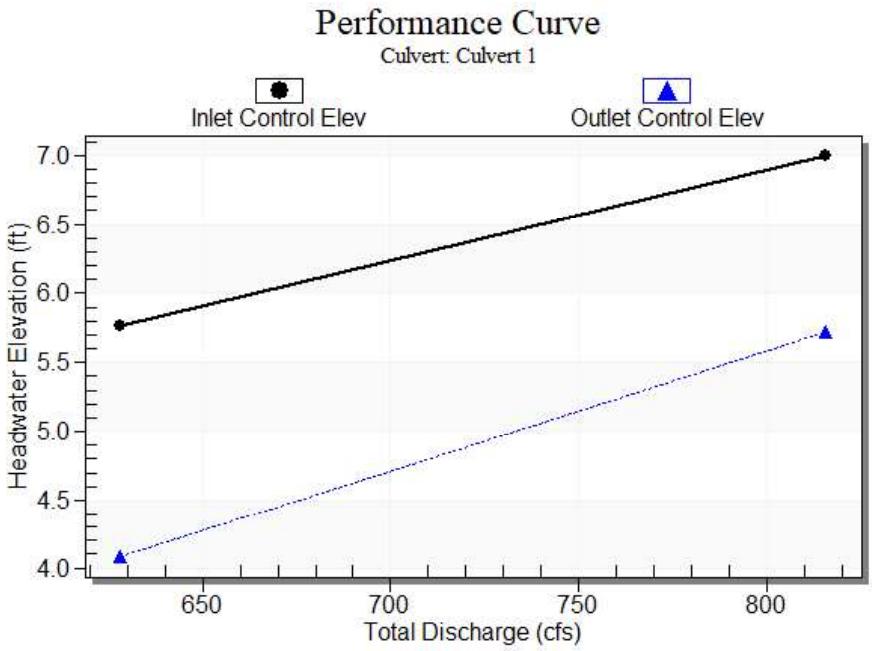
Straight Culvert

Inlet Elevation (invert): 1.00 ft, Outlet Elevation (invert): 0.21 ft

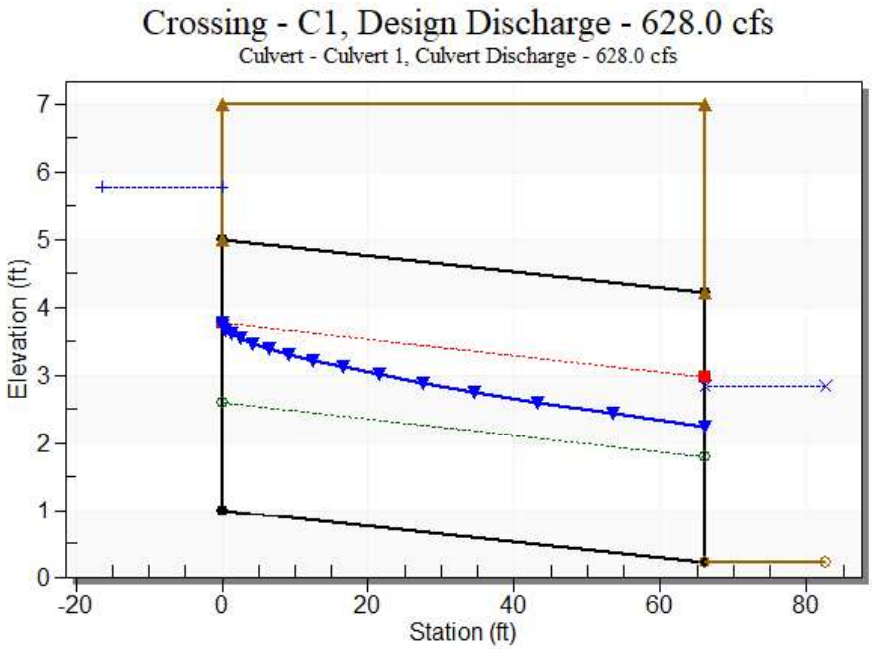
Culvert Length: 66.00 ft, Culvert Slope: 0.0120

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 1.00 ft
Outlet Station: 66.00 ft
Outlet Elevation: 0.21 ft
Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box
Barrel Span: 12.00 ft
Barrel Rise: 4.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: C1)

Flow (cfs)	Water Surfac Elev (ft)	Depth (ft)	Velocity (ft/s	Shear (psf)	Froude Number
628.00	2.85	2.64	5.87	1.98	0.71
628.00	2.85	2.64	5.87	1.98	0.71
628.00	2.85	2.64	5.87	1.98	0.71
628.00	2.85	2.64	5.87	1.98	0.71
628.00	2.85	2.64	5.87	1.98	0.71
628.00	2.85	2.64	5.87	1.98	0.71
628.00	2.85	2.64	5.87	1.98	0.71
628.00	2.85	2.64	5.87	1.98	0.71
628.00	2.85	2.64	5.87	1.98	0.71
628.00	2.85	2.64	5.87	1.98	0.71
628.00	2.85	2.64	5.87	1.98	0.71

Tailwater Channel Data - C1

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 30.00 ft
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0120
Channel Manning's n: 0.0450
Channel Invert Elevation: 0.21 ft

Roadway Data for Crossing: C1

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 7.00 ft
Roadway Surface: Paved
Roadway Top Width: 66.00 ft

Appendix D. Data Collection

Existing Pipes

Pipe_ID	Long_Feat	Near_Inter	Pipe_Type	Dia_Inch	Dia_ft	In_Inv_ft	In_Cond	Out_Inv_ft	Out_Cond	Inspt_Date	Inspt_By	Action	Material	Length_ft	Owner
CV-01	NM Hwy 309 Arroyo	NM Hwy 309 / Hillandale Ave	Culvert	36"	3	4869.25	Sediment - Full	4868.87	Good	8/20/2020	HDR Engineering	To Clean	CMP	66	
CV-02	NM Hwy 309 Arroyo	NM Hwy 309 / Hillandale Ave	Culvert	36"	3	4869.98	Debris	4868.83	Debris	8/20/2020	HDR Engineering	To Clean	CMP	65	
CV-03	NM Hwy 309 Arroyo	NM Hwy 309	Culvert	30"	2.5	4855.58	Debris	4854.24	Good	8/20/2020	HDR Engineering	To Clean	CMP	75	
CV-04	NM Hwy 309 Arroyo	NM Hwy 309	Culvert	30"	2.5	4855.74	Debris	4853.93	Good	8/20/2020	HDR Engineering	To Clean	CMP	78	
CV-05	NM Hwy 47 Arroyo	Kaghan Loop Dr	Culvert	36"	3	4902.78	Good	4901.72	Good	8/20/2020	HDR Engineering	No Action	CMP	72	
CV-06	NM Hwy 47 Arroyo	Kaghan Loop Dr	Culvert	36"	3	4902.87	Good	4901.56	Good	8/20/2020	HDR Engineering	No Action	CMP	71	
CV-07	NM Hwy 47 Arroyo	Kaghan Loop Dr	Culvert	36"	3	4902.91	Good	4901.61	Good	8/20/2020	HDR Engineering	No Action	CMP	71	
CV-08	NM Hwy 47 Arroyo	Horner St	Culvert	18" X 30"	2	4895.53	Debris	4894.74	Good	8/20/2020	HDR Engineering	To Clean	CMP	84	
CV-09	NM Hwy 47 Arroyo	Horner St	Culvert	18" X 30"	2	4895.72	Debris	4894.75	Good	8/20/2020	HDR Engineering	To Clean	CMP	84	
CV-10	NM Hwy 47 Arroyo	Dirt Road	Culvert	24"	2	4861.55	Good	4859.78	Good	8/20/2020	HDR Engineering	To Clean	CMP	61	
CV-11	NM Hwy 47 Arroyo	Dirt Road	Culvert	24"	2	4861.63	Good	4860.43	Good	8/20/2020	HDR Engineering	To Clean	CMP	62	
CV-12	NM Hwy 47 Arroyo	NM Hwy 47 / Goodman Ave	Culvert	18" X 30"	2	4849.41	Debris	4848.84	Erosion	8/20/2020	HDR Engineering	To Repair	CMP	42	
CV-13	NM Hwy 47 Arroyo	NM Hwy 47 / Goodman Ave	Culvert	18" X 30"	2	4849.23	Good	4848.69	Erosion	8/20/2020	HDR Engineering	To Repair	CMP	43	
CV-14	NM Hwy 47 Arroyo	NM Hwy 47 / Damon St	Culvert	18" X 30"	2	4831.44	Debris	4830.86	Erosion	8/20/2020	HDR Engineering	To Repair	CMP	46	
CV-15	NM Hwy 47 Arroyo	NM Hwy 47 / Damon St	Culvert	18" X 30"	2	4831.19	Sediment - Partial	4830.78	Erosion	8/20/2020	HDR Engineering	To Repair	CMP	42	
CV-16	NM Hwy 47 Arroyo	NM Hwy 47 / Avenida Del Fuego	Culvert	18" X 30"	2	4825.37	Debris	4825.08	Erosion	8/20/2020	HDR Engineering	To Repair	CMP	42	
CV-17	NM Hwy 47 Arroyo	NM Hwy 47 / Avenida Del Fuego	Culvert	18" X 30"	2	4825.43	Debris	4825.09	Erosion	8/20/2020	HDR Engineering	To Repair	CMP	41	
CV-18	NM Hwy 47 Arroyo	NM Hwy 47 / Dollar General	Culvert	16" X 30"	2	4823.81	Sediment - Partial	4823.02	Debris	8/20/2020	HDR Engineering	To Clean	CMP	97	
CV-19	Avenida Del Fuego (North)	Avenida Del Fuego / Diamante Pl	Culvert	24"	2	4877.75	Erosion	4877.08	Good	8/20/2020	HDR Engineering	To Repair	RCP	21	
CV-20	Avenida Del Fuego (North)	Avenida Del Fuego / Chico Pl	Culvert	24"	2	4874.1	Good	4873.08	Good	8/20/2020	HDR Engineering	No Action	RCP	30	
CV-21	Avenida Del Fuego (North)	Avenida Del Fuego / Chico Pl	Culvert	18"	1.5	4870.4	Sediment - Full	4870.01	Sediment - Full	8/20/2020	HDR Engineering	To Clean	CMP	16	
CV-22	Avenida Del Fuego (North)	Avenida Del Fuego / Estrella Pl	Culvert	18"	1.5	4866.47	Good	4865.37	Good	8/20/2020	HDR Engineering	No Action	CMP	30	
CV-23	Avenida Del Fuego (North)	Avenida Del Fuego / Estrella Pl	Culvert	24"	2	4859.78	Damaged	4858.24	Good	8/20/2020	HDR Engineering	To Repair	RCP	44	
CV-24	Avenida Del Fuego (North)	Avenida Del Fuego / Estrella Pl	Culvert	24"	2	4855.97	Good	4855.16	Good	8/20/2020	HDR Engineering	No Action	RCP	23	
CV-25	Avenida Del Fuego (North)	Avenida Del Fuego / Estrella Pl	Culvert	24"	2	4854.22	Good	4853.33	Good	8/20/2020	HDR Engineering	No Action	RCP	32	
CV-26	Avenida Del Fuego (North)	Avenida Del Fuego / La Luna Pl	Culvert	24"	2	4843.88	Good	4840.64	Sediment - Full	8/20/2020	HDR Engineering	To Clean	CMP	82	
CV-27	Avenida Del Fuego (South)	Avenida Del Fuego / Chico Pl	Culvert	24"	2	4873.41	Sediment - Full	4871.88	Sediment - Full	8/20/2020	HDR Engineering	To Clean	RCP	41	
CV-28	Avenida Del Fuego (South)	Avenida Del Fuego / Chico Pl	Culvert	18"	1.5	4871.58	Sediment - Full	4871.2	Sediment - Full	8/20/2020	HDR Engineering	To Clean	CMP	20	
CV-29	Avenida Del Fuego (South)	Avenida Del Fuego / Chico Pl	Culvert	24"	2	4867.94	Sediment - Full	4867.36	Sediment - Full	8/20/2020	HDR Engineering	To Clean	RCP	20	
CV-30	Avenida Del Fuego (South)	Avenida Del Fuego / Estrella Pl	Culvert	24"	2	4861.71	Good	4861.28	Good	8/20/2020	HDR Engineering	No Action	RCP	32	
CV-31	Avenida Del Fuego (South)	Avenida Del Fuego / Estrella Pl	Culvert	24"	2	4859.43	Good	4858.86	Good	8/20/2020	HDR Engineering	No Action	RCP	24	
CV-32	Avenida Del Fuego (South)	Avenida Del Fuego / La Luna Pl	Culvert	18"	1.5	4837.07	Sediment - Full	4836.12	Sediment - Full	8/20/2020	HDR Engineering	To Clean	CMP	29	
CV-33	NM Hwy 304 (East)	NM Hwy 304 / NM Hwy 47	Culvert	24"	2	4824.41	Sediment - Full	4824.13	Sediment - Full	8/26/2020	HDR Engineering	To Clean	RCP	38	
CV-34	NM Hwy 304 (East)	NM Hwy 304 / NM Hwy 47	Culvert	18"	1.5	Unknown	Sediment - Full	Unknown	Sediment - Full	8/26/2020	HDR Engineering	To Clean	CMP	78	
CV-35	NM Hwy 304 (East)	NM Hwy 304 / NM Hwy 47	Culvert	15"	1.25	4820.45	Sediment - Partial	4820.3	Damaged	8/26/2020	HDR Engineering	To Repair	PVC	28	
CV-36	NM Hwy 304	NM Hwy 304 / NM Hwy 47	Culvert	42"	3.5	4818.81	Sediment - Partial	4816.57	Good	8/26/2020	HDR Engineering	To Clean	CMP	55	
CV-37	NM Hwy 304 (East)	NM Hwy 304 / Rio Communities Way	Culvert	24"	2	4820.53	Good	4820.12	Good	8/26/2020	HDR Engineering	No Action	CMP	59	
CV-38	NM Hwy 304	NM Hwy 304 / Rio Communities Way	Culvert	42"	3.5	4821.19	Good	4819.75	Good	8/26/2020	HDR Engineering	No Action	RCP	69	
CV-39	NM Hwy 304 (East)	NM Hwy 304 / Rio Communities Way	Culvert	16" X 20"	1.5	4825.8	Damaged	4825.23	Damaged	8/26/2020	HDR Engineering	To Repair	CMP	47	
CV-40	NM Hwy 304	NM Hwy 304 / Horizon Vista Blvd	Culvert	48"	4	4825.27	Good	4822.79	Debris	8/26/2020	HDR Engineering	To Clean	CMP	81	
CV-41	NM Hwy 304	NM Hwy 304 / Horizon Vista Blvd	Culvert	48	4	4825.35	Good	4823.23	Debris	8/26/2020	HDR Engineering	To Clean	CMP	81	
CV-42	NM Hwy 304 (East)	NM Hwy 304 / Chisum Trail	Culvert	16" X 24"	1.7	Unknown	Good	Unknown	Good	8/26/2020	HDR Engineering	No Action	CMP	52	
CV-43	NM Hwy 304	NM Hwy 304 / Chisum Trail	Culvert	32"	2.7	Unknown	Good	Unknown	Damaged	8/26/2020	HDR Engineering	To Repair	CMP	78	
CV-44	NM Hwy 304	NM Hwy 304 / Good Dr	Culvert	32"	2.7	4820.38	Good	4819.33	Good	8/26/2020	HDR Engineering	No Action	CMP	73	
CV-45	NM Hwy 304 (West)	NM Hwy 304 / NM Hwy 47	Culvert	18"	1.5	Unknown	Sediment - Full	Unknown	Sediment - Full	8/26/2020	HDR Engineering	To Clean	CMP	22	
CV-46	NM Hwy 304 (West)	NM Hwy 304 / NM Hwy 47	Culvert	18"	1.5	Unknown	Sediment - Full	Unknown	Good	8/26/2020	HDR Engineering	To Clean	CMP	60	
CV-47	NM Hwy 304 (West)	NM Hwy 304 / NM Hwy 47	Culvert	36"	3	4814.4	Good	Unknown	Unknown	8/26/2020	HDR Engineering		RCP	130	
CV-48	NM Hwy 304 (West)	NM Hwy 304 / NM Hwy 47	Culvert	36"	3	4815.09	Debris	4814.83	Debris	8/26/2020	HDR Engineering	To Clean	CMP	138	
CV-49	NM Hwy 304 (West)	NM Hwy 304 / Rio Communities Way	Culvert	36"	3	4815.7	Good	4815.5	Debris	8/26/2020	HDR Engineering	To Clean	CMP	77	
CV-50	NM Hwy 304 (West)	NM Hwy 304 / Rio Communities Way	Culvert	36"	3	4817.38	Good	4816.74	Good	8/26/2020	HDR Engineering	No Action	CMP	40	
CV-51	NM Hwy 304 (West)	NM Hwy 304 / Rio Communities Way	Culvert	36"	3	4818.55	Debris	4818.41	Debris	8/26/2020	HDR Engineering	To Clean	CMP	41	
CV-52	NM Hwy 304 (West)	NM Hwy 304 / Rio Communities Way	Culvert	36"	3	4821.14	Good	4820.5	Good	8/26/2020	HDR Engineering	No Action	RCP	39	
CV-53	NM Hwy 304 (West)	NM Hwy 304 / Horizon Vista Blvd	Culvert	24"	2	4824.22	Debris	4822.85	Debris	8/26/2020	HDR Engineering	To Clean	CMP	60	

Existing Pipes

Pipe_ID	Long_Feat	Near_Inter	Pipe_Type	Dia_Inch	Dia_ft	In_Inv_ft	In_Cond	Out_Inv_ft	Out_Cond	Inspt_Date	Inspt_By	Action	Material	Length_ft	Owner
CV-54	NM Hwy 304 (West)	NM Hwy 304 / Chisum Trail	Culvert	18"	1.5	Unknown	Damaged	Unknown	Damaged	8/26/2020	HDR Engineering	To Replace	CMP	37	
CV-55	Golf Course Ditch	Maddox St	Culvert	18"	1.5	Unknown	Debris	Unknown	Debris	8/26/2020	HDR Engineering	To Clean	CMP	58	
SD-01	NM Hwy 309 Arroyo	NM Hwy 47 / NM Hwy 309	Storm Drain	96" X 48"	4	4812.03	Good	4810.7	Good	8/20/2020	HDR Engineering	No Action	CBC	93	
SD-02	NM Hwy 309 Arroyo	NM Hwy 47 / NM Hwy 309	Storm Drain	96" X 48"	4	4810.7	Good	4807.63	Sediment - Partial	8/20/2020	HDR Engineering	To Clean	CBC	97	
SD-03	NM Hwy 47 Arroyo	NM Hwy 47	Storm Drain	60"	5	4820.07	Sediment - Partial	4823.18	Sediment - Partial	8/20/2020	HDR Engineering	To Clean	CMP	121	
SD-04	NM Hwy 47 Arroyo	NM Hwy 47	Storm Drain	60"	5	4820.09	Good	4818.48	Good	8/20/2020	HDR Engineering	No Action	CMP	121	
SD-05	NM Hwy 47 Arroyo	NM Hwy 47 / NM Hwy 309	Storm Drain	48"	4	4818.12	Good	4817.32	Good	8/20/2020	HDR Engineering	No Action	RCP	115	
SD-06	NM Hwy 47 Arroyo	NM Hwy 47 / NM Hwy 309	Storm Drain	48"	4	4817.19	Good	4812	Good	8/20/2020	HDR Engineering	No Action	RCP	533	
SD-07	NM Hwy 47 Arroyo	NM Hwy 47 / NM Hwy 309	Storm Drain	48"	4	4811.93	Good	4809.26	Good	8/20/2020	HDR Engineering	No Action	RCP	213	
SD-08	NM Hwy 47 Arroyo	NM Hwy 47 / NM Hwy 309	Storm Drain	48"	4	4809.21	Good	4804.12	Good	8/20/2020	HDR Engineering	No Action	RCP	172	
SD-09	San Lucas Ave	San Lucas Ave / Lee Trevino Blvd	Storm Drain	24"	2	Unknown	Good	Unknown	Good	8/26/2020	HDR Engineering	No Action	CMP	322	
SD-10	Lee Trevino Blvd	San Lucas Ave / Lee Trevino Blvd	Storm Drain	24"	2	Unknown	Good	Unknown	Good	8/26/2020	HDR Engineering	No Action	CMP	153	
SD-11	San Lucas Ave	San Lucas Ave / Lee Trevino Blvd	Storm Drain	36"	3	Unknown	Good	Unknown	Good	8/26/2020	HDR Engineering	No Action	CMP	649	
SD-12	Chamartin Ave	San Lucas Ave / Chamartin Ave	Storm Drain	36"	3	Unknown	Good	Unknown	Damaged	8/26/2020	HDR Engineering	To Replace	CMP	118	
SD-13	Damon St	Damon St / Fulton Ave	Storm Drain	24"	2	Unknown	Good	Unknown	Unknown	8/26/2020	HDR Engineering	No Action	RCP	11	
SD-14	Damon St	Damon St / Fulton Ave	Storm Drain	24"	2	Unknown	Unknown	Unknown	Unknown	8/26/2020	HDR Engineering	No Action	RCP	198	
SD-15	Goodman Ave	Goodman Ave / Damon St	Storm Drain	24"	2	Unknown	Unknown	4853.67	Erosion	8/20/2020	HDR Engineering	To Repair	RCP	375	
SD-16	NM Hwy 47	NM Hwy 47 / NM Hwy 309	Storm Drain	12"	1	Unknown	Good	Unknown	Unknown	8/26/2020	HDR Engineering	No Action	RCP	16	
SD-17	NM Hwy 47	NM Hwy 47 / NM Hwy 309	Storm Drain	24"	2	Unknown	Debris	Unknown	Debris	10/24/2020	HDR Engineering	To Clean	CMP	279	
SD-18	NM Hwy 47	NM Hwy 47 / NM Hwy 309	Storm Drain	24"	2	Unknown	Debris	Unknown	Unknown	10/24/2020	HDR Engineering	To Clean	CMP	146	

Existing Inlets

Inlet_ID	Long_Feat	Near_Inter	Inlet_Type	Size_Inch	Material	Depth_Inch	Inlet_Inv_ft	In_Cond	Out_Inv_ft	Out_Cond	Owner	Inspt_Date	Inspt_By	Action
IN-01	NM Hwy 309 Arroyo	NM Hwy 47 / NM Hwy 309	MDI	60" X 60"	Concrete	50	4810.7	Good	4810.7	Good	Unknown	8/20/2020	HDR Engineering	No Action
IN-02	NM Hwy 47	NM Hwy 47 / NM Hwy 309	CDI	16" X 60"	Concrete	42	Unknown	Good	Unknown	Unknown	Unknown	8/20/2020	HDR Engineering	No Action
IN-03	NM Hwy 47 Arroyo	NM Hwy 47 / NM Hwy 309	MDI	66" X 204"	Concrete	90	4818.48	Sediment - Partial	4818.12	Good	Unknown	8/20/2020	HDR Engineering	To Clean
IN-04	NM Hwy 47 Arroyo	NM Hwy 47 / NM Hwy 309	MDI	60" X 66"	Concrete	Unknown	4817.32	Unknown	4817.19	Unknown	Unknown	8/20/2020	HDR Engineering	<Null>
IN-05	NM Hwy 47 Arroyo	NM Hwy 47 / NM Hwy 309	MDI	60" X 66"	Concrete	Unknown	4812	Unknown	4811.93	Unknown	Unknown	8/20/2020	HDR Engineering	<Null>
IN-06	NM Hwy 47 Arroyo	NM Hwy 47 / NM Hwy 309	MDI	60" X 66"	Concrete	136	4809.26	Good	4809.21	Good	Unknown	8/20/2020	HDR Engineering	No Action
IN-07	NM Hwy 47	NM Hwy 47 / Rio Communities Way	CDI	14" X 120"	Concrete	Unknown	4850.48	Unknown	Unknown	Unknown	Unknown	8/20/2020	HDR Engineering	<Null>
IN-08	Damon St	Damon St / Fulton Ave	MDI	36" X 420"	Concrete	32	<Null>	Good	4864.88	Good	Unknown	8/20/2020	HDR Engineering	No Action
IN-09	San Lucas Ave	San Lucas Ave / Lee Trevino Blvd	MDI	72" X 72"	Concrete	41	<Null>	Good	<Null>	Good	Unknown	8/20/2020	HDR Engineering	No Action
IN-10	Lee Trevino Blvd	San Lucas Ave / Lee Trevino Blvd	MDI	66" X 72"	Concrete	45	<Null>	Good	<Null>	Good	Unknown	8/20/2020	HDR Engineering	No Action
IN-11	Charmartin Ave	San Lucas Ave / Charmartin Ave	MDI	72" X 72"	Concrete	52	<Null>	Good	<Null>	Good	Unknown	8/20/2020	HDR Engineering	No Action
IN-12	NM Hwy 47	NM Hwy 47 / NM Hwy 309	MDI	60" X 60"	Concrete	36	Unknown	Debris	Unknown	Debris	Unknown	10/24/2020	HDR Engineering	To Clean

Existing Manholes

MH_ID	Long_Feat	Near_Inter	MH_Type	Dia_Inch	Material	Depth_ft	Inlet_Inv_ft	In_Cond	Out_Inv_ft	Out_Cond	Owner	Inspt_Date	Inspt_By	Action
MH-01	Damon St	Damon St / Fulton St	MH	48"	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	8/26/2020	HDR Engineering	No Action
MH-02	Damon St	Damon St / Goodman Ave	MH	48"	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	8/26/2020	HDR Engineering	No Action

Existing Ponds

Pond_ID	Long_Feat	Near_Inter	Pond_Type	Area_ac	Material	Avg_D_ft	Stor_acft	Pond_Cond	Owner	Inspt_Date	Inspt_By	Action
PD-01	San Lucas Ave	San Lucas Ave / Chamartin Ave	Retention Pond	2	Natural	5	10	Good	Unknown	8/20/2020	HDR Engineering	No Action
PD-02	Nancy Lopez Blvd	Nancy Lopez Blvd / San Lucas Ave	Retention Pond	2	Natural	5	10	Good	Unknown	8/20/2020	HDR Engineering	No Action

Existing Rundowns

RD_ID	Long_Feat	Near_Inter	RD_Type	Width_In	Material	Depth_ft	RD_Cond	Owner	Inspt_Date	Inspt_By	Action
RD-01	NM Hwy 47 Arroyo	La Paz Ave / Loma Dr	Curb Rundown	96	Concrete	Unknown	Good	Unknown	8/20/2020	HDR Engineering	No Action
RD-02	NM Hwy 47 Arroyo	Damon St / Riggs St	Curb Rundown	69	Concrete	9.5	Safety	Unknown	8/20/2020	HDR Engineering	To Repair
RD-03	NM Hwy 47 Arroyo	NM Hwy 47 / Avenida Del Fuego	Curb Rundown	Unknown	CMP	Unknown	Debris	Unknown	8/20/2020	HDR Engineering	To Clean
RD-04	Nancy Lopez Blvd	Nancy Lopez Blvd / Lee Trevino Dr	Curb Rundown	84	Concrete	Unknown	Good	Unknown	8/20/2020	HDR Engineering	No Action
RD-05	Nancy Lopez Blvd	Nancy Lopez Blvd / San Lucas Ave	Curb Rundown	108	Concrete	Unknown	Good	Unknown	8/20/2020	HDR Engineering	No Action
RD-06	San Lucas Ave	San Lucas Ave / Chamartin Ave	Curb Rundown	Unknown	Concrete	Unknown	Damaged	Unknown	8/20/2020	HDR Engineering	To Replace
RD-07	Carmel Rd	Carmel Rd / Fairway Ct	Wall Rundown	104	Concrete	Unknown	Good	Unknown	8/20/2020	HDR Engineering	No Action
RD-08	NM Hwy 304	NM Hwy 304 / Rio Verde Appartments	Curb Rundown	Unknown	Concrete	Unknown	Good	Private	8/20/2020	HDR Engineering	No Action
RD-09	Lee Trevino Blvd	Lee Trevino Blvd / Brown Dr	Curb Rundown	16	Concrete	Unknown	Unknown	Unknown	<Null>	<Null>	To Investigate

GENERAL NOTES

1. WORKMANSHIP AND MATERIAL ~~SHALL~~ CONFORM TO THE NEW MEXICO STATE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION 2007 EDITION SPECIFICATIONS AND APPLICABLE SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS.

2. CONCRETE SHALL BE CLASS AA. ALL CONCRETE MIX DESIGNS ~~SHALL BE~~ MUST BE ADJUSTED TO MEET THE LEVEL OF LOW-RISK ZONE AS SPECIFIED IN SECTION 509-PORTLAND CEMENT CONCRETE MIX DESIGNS. CONCRETE PLACED DURING COLD WEATHER SHALL CONFORM TO SECTION 511.3.3.1 OF THE 2007 STANDARD SPECIFICATIONS.

3. REINFORCING BARS. ALL REINFORCING BARS ~~SHALL BE~~ GRADE 60. DIMENSIONS SHOWN REFER TO CENTERLINES OF BARS UNLESS NOTED OTHERWISE. ALL REINFORCING ~~SHALL BE~~ STORED ABOVE GROUND ON PLATFORM SKIDS OR OTHER SUPPORTS. REINFORCING ~~SHALL BE~~ MUST BE KEPT FREE FROM DIRT, GREASE, AND OTHER FOREIGN MATTER. REINFORCING ~~SHALL BE~~ MUST BE KEPT FREE OF CORROSION AS FAR AS PRACTICAL.

4. EXISTING UTILITIES. THE CONTRACTOR ~~SHALL~~ MUST VERIFY IN THE FIELD THE LOCATIONS OF ALL EXISTING UTILITIES, CABLES, PIPES, OR CONDUITS WHICH MUST ~~BE~~ BE REMOVED, RELOCATED OR PROTECTED FROM DAMAGE BEFORE PROCEEDING WITH THE NEW WORK. THE LOCATING OF EXISTING UTILITIES WILL ~~BE~~ BE INCIDENTAL.

5. PERMANENT ANTI-GRAFFITI PROTECTIVE COATING ~~SHALL BE~~ MUST BE APPLIED TO THE FOLLOWING SURFACES:

   a. EXPOSED SURFACES OF WINGWALLS
   b. HEADWALLS

6. ~~THE CONTRACTOR SHALL~~ MUST VERIFY IN THE FIELD ALL DIMENSIONS, ELEVATIONS, AND DETAILS WHICH ~~WILL BE~~ MUST BE INVOLVED IN THE NEW CONSTRUCTION BEFORE PROCEEDING WITH THE WORK.

7. CONSTRUCT A SINGLE BARREL 8 FT SPAN BY 4 FT HEIGHT CONCRETE BOX CULVERT, USE THE STANDARD DRAWINGS INDICATED ON THIS SHEET AS MODIFIED BY THE DETAILS CONTAINED HEREIN.

DESIGN DATA

DESIGN IS IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS 5TH EDITION AND CURRENT INTERIMS.

DESIGN STRESSES:

REINFORCED CONCRETE.
F'C=4,000 PSI AT 28 DAYS
N=8 FY=60,000 PSI GRADE 60

HDR

STANDARD DRAWINGS REQUIRED

CONCRETE BOX CULVERT INDEX OF SHEETS EXPLANATION OF USE OF DRAWINGS	511-59-1/2 SHT. 1 OF 2
CONCRETE BOX CULVERT EXAMPLE OF USE OF DRAWINGS	511-59-2/2 SHT. 2 OF 2
CONCRETE BOX CULVERT SINGLE OPENING – DESIGN FILL 'A' 0-10 FT STRUCTURAL SECTIONS AND REBAR	511-60-1/2 SHT. 1 OF 2
CONCRETE BOX CULVERT SINGLE OPENING – DESIGN FILL 'A' 0-10 FT DIMENSIONS AND REBAR SCHEDULE	511-60-2/2 SHT. 2 OF 2
CBC HEAD/CUTOFF WALLS – ALL DESIGN FILLS – 0° 15° 30° 45° SKEWS STRUCTURAL SECTIONS AND REBAR	511-66-1/6 SHT. 1 OF 6
CONCRETE BOX CULVERT HEADWALL ALL DESIGN FILLS – 0° 15° 30° 45° SKEWS SKEWS DIMS AND REBAR SCHEDULE	511-66-2/6 SHT. 2 OF 6
CONCRETE BOX CULVERT EXT. ALL DESIGN FILLS – 0° 15° 30° 45° SKEWS CBC EXTENSIONS/MULTI-BARREL CBC	511-66-3/6 SHT. 3 OF 6
CONCRETE BOX CULVERT EXTENSION ALL DESIGN FILLS – ALL SKEWS METHOD OF EXTENDING CB 20 & 30	511-66-4/6 SHT. 4 OF 6
CONCRETE BOX CULVERT EXTENSION ALL DESIGN FILLS – ALL SKEWS MISCELLANEOUS DETAILS & BACKFILL	511-66-5/6 SHT. 5 OF 6
GUARDRAIL POST ANCHOR ATTACHMENT TO CONCRETE BOX CULVERT TOP SLAB	511-66-6/6 SHT. 6 OF 6
CONCRETE BOX CULVERT WINGWALL & OUTLET APRON ALL SKEWS PLAN, PERSPECTIVE & DIMENSIONS	511-67-1/2 SHT. 1 OF 2
CONCRETE BOX CULVERT WINGWALL & OUTLET APRON ALL SKEWS STRUCTURAL SECTIONS AND REBAR	511-67-2/2 SHT. 2 OF 2

INCIDENTAL ITEMS

1. WALL PENETRATION FOR STORM DRAIN
2. DROP INLET PENETRATION
3. DROP INLET GRATING AND ANGLES
4. WATERPROOFING (511-66-5/6, TOP SLAB MEMBRANE AND HEADWALL DRAIN DETAIL)
5. LOCATING EXISTING UTILITIES

NOTES:

ITEMS LISTED ABOVE ARE ONLY A GENERAL DESCRIPTION OF THE REQUIRED WORK AND MATERIALS, AND MAY NOT BE COMPLETE. PARAGRAPH 104.1 OF THE STANDARD SPECIFICATIONS APPLIES. THIS LIST DOES NOT INCLUDE ANY INCIDENTAL WORK OR MATERIAL REQUIRED BY SPECIAL PROVISIONS, SPRAYS (STANDARD DETAILS), SUPPLEMENTAL SPECIFICATIONS OR THE STANDARD SPECIFICATIONS.

SPECIAL PROVISIONS:

1. SPECIAL PROVISIONS FOR SECTION 532-A – PERMANENT ANTI-GRAFFITI PROTECTIVE COATING, DATED JAN. 23, 1997.

ESTIMATED QUANTITIES

ITEM NO.	ITEM DESCRIPTION	UNIT	TOTAL QUANTITY
210000	EXCAVATION AND BACKFILL FOR MAJOR STRUCTURES	CY	325
611030	STRUCTURAL CONCRETE, CL AA	CY	176
511200	STRUCTURAL CONCRETE, CLASS AA*	SY	12
532100	PERMANENT ANTI-GRAFFITI PROTECTIVE COATING	SF	300
640060	REINFORCING BARS GRADE 60	LB	40000

DRAWING INDEX

S-1	GENERAL NOTES AND QUANTITIES
S-2	STRUCTURE LOCATION PLAN
S-3	SECTIONS AND DETAILS

KELLY R. SILLIMAN
NEW MEXICO
18915
11/9/10
PROFESSIONAL ENGINEER

APPROVED: R. M. Tyler DATE: 11/22/10
REGION ENGINEER

6			
5			
4			
3			
2			
1			
NO.	DESCRIPTION	DATE	BY

REVISIONS (ON LEGEND SHEET)

NEW MEXICO DEPARTMENT
OF TRANSPORTATION
NM 47
MP 18.3 TO MP 19.6

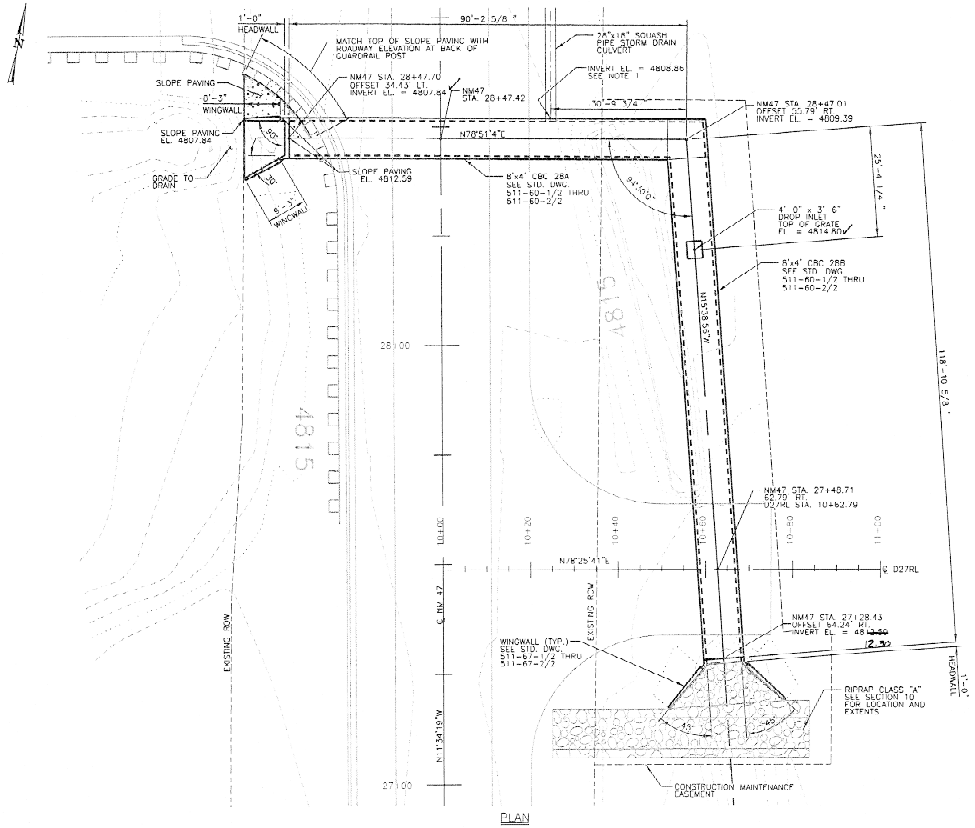
CBC 28A AND 28B
GENERAL NOTES AND QUANTITIES

NEW MEXICO PROJECT NO. STP0010

SHEET NO. S-1

40

HDR



KELLY R. SILLIMAN
NEW MEXICO
18815
11/22/10
PROFESSIONAL ENGINEER

NOTE:

1. SEE STANDARD DRAWING 511-66-5/6 FOR OUTER WALL PENETRATION DETAIL

NO.	DESCRIPTION	DATE	BY
6			
5			
4			
3			
2			
1			
0			

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT
OF TRANSPORTATION
NM 47
MP 18.3 TO MP 19.6

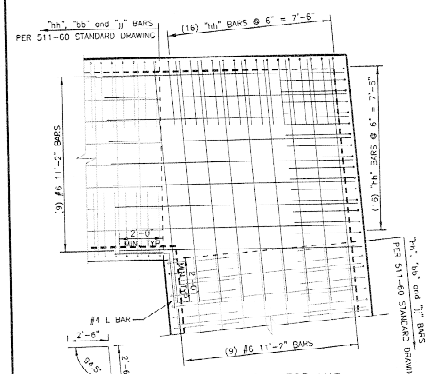
CBC 28A AND 28B
STRUCTURE LOCATION PLAN

APPROVED BY DIVISION ENGINEER DATE: 11/22/10

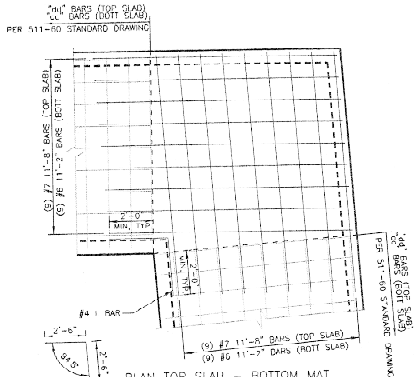
NEW MEXICO PROJECT NO. 3100219

SHEET NO. 5 - 2

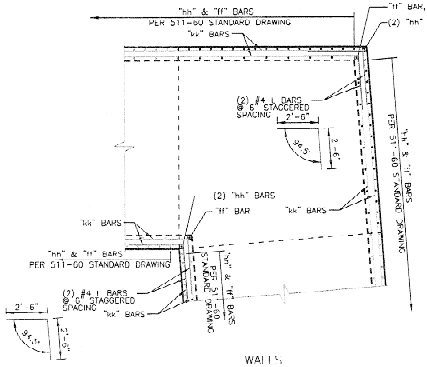
HDR



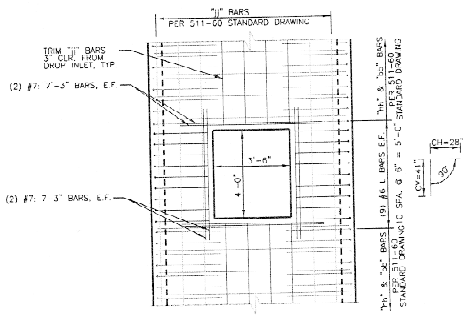
PLAN TOP SLAB – TOP MAT
PLAN BOTTOM SLAB – BOTTOM MAT
WALL BARS NOT SHOWN FOR CLARITY.



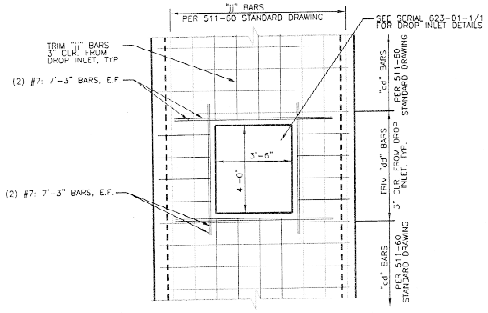
PLAN TOP SLAB – BOTTOM MAT
PLAN BOTTOM SLAB – TOP MAT
WALL BARS NOT SHOWN FOR CLARITY.



WALLS



PLAN TOP SLAB DROP INLET – TOP MAT
WALL BARS NOT SHOWN FOR CLARITY.



PLAN TOP SLAB DROP INLET – BOTTOM MAT
WALL BARS NOT SHOWN FOR CLARITY.

APPROVED: [signature] DATE: 11/20/10

KELLY R. SILLIMAN
NEW MEXICO
18915
11/19/10
PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

REVISIONS (FOR CHANGE NOTICES)

NEW MEXICO DEPARTMENT
OF TRANSPORTATION
NM 47
MP 18.5 TO MP 19.6

CBC 28A AND 28B
SECTIONS AND DETAILS

NEW MEXICO PROJECT NO. S100152

SHEET NO. 5 - 2

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Appendix E. Photolog

Title:	NM-47 CBC Wingwall Outlet	File:	01IMG_20200820_084849.jpg	Date:	8/20/2020 7:48
Desc:				Slide:	1

This photo shows the existing wingwall outlet for the 8' x 4' concrete box culvert (CBC) that crosses NM-47 just north of NM-309. This discharge from this outlet travels west towards the Rio Grande River. There is nearly 2 feet of sediment measured inside this outlet. Photo direction is east.

Title:	NM-47 CBC MDI		
Date:	8/20/2020 7:46		
File:	02IMG_20200820_084615.jpg		
Desc:		Slide #:	2

This photos shows the existing median drop inlet (MDI) connected to the 8' x 4' concrete box culvert (CBC) that crosses NM-47 just north of NM-309. This MDI is upstream from the approx.. 90 degree bend of the culvert before crossing NM-47. Photo direction is south.

Title:	NM Hwy 309 Arroyo Embankment - Off-road Traffic	File:	03IMG_20200820_092102.jpg	Date:	8/20/2020 8:21
Desc:				Slide:	3

This photo shows the embankment of the NM Hwy 309 Arroyo near the NM-309 and NM-47 intersection. There is evidence of off-road vehicle tracking. Photo direction is south.

Title:	NM-309 Crossing Outfall Structure		
Date:	8/20/2020 8:32		
File:	04IMG_20200820_093155_1.jpg		
Desc:		Slide #:	4

This photo shows the existing outfall structure for the NM-309 culvert crossing near Hillandale Ave. Photo direction is east.

Title:	NM Hwy 309 Arroyo		
Date:	8/20/2020 8:37		
File:	05IMG_20200820_093712.jpg		
Desc:		Slide #:	5

This photo shows the upstream channel for the NM Hwy 309 Arroyo. Photo direction is east.

Title:	Hillandale Ave Culvert Outlets		
Date:	8/20/2020 8:51		
File:	06IMG_20200820_095147.jpg		
Desc:		Slide #:	6

This photo shows the existing culvert outlets at the Hillandale Ave crossing near the NM-309 intersection. These culverts appear to be slightly damaged and impacted by debris. Photo direction is south.

Title:	Hillandale Ave Culvert Inlets	File:	07IMG_20200820_095342.jpg	Date:	8/20/2020 8:53
Desc:				Slide:	7

This photo shows the existing culvert inlets at the Hillandale Ave crossing near the NM-309 intersection. These culverts appear to be impacted by debris. Photo direction is north.

Title:	NM Hwy 47 Arroyo Outfall Into River		
Date:	8/20/2020 9:27		
File:	08IMG_20200820_102735.jpg		
Desc:		Slide #:	8

This photo shows the location where the NM Hwy 47 Arroyo outfalls into the Rio Grande River under the NM-309 bridge crossing. Photo direction is north.

Title:	NM Hwy 47 Arroyo Outfall SD Pipe		
Date:	8/20/2020 9:28		
File:	09IMG_20200820_102753.jpg		
Desc:		Slide #:	9

This photo shows the outfall concrete storm drain (SD) pipe for the NM Hwy 47 Arroyo. Photo direction is east.

Title:	NM Hwy 47 Arroyo SD MDI		
Date:	8/20/2020 9:30		
File:	10IMG_20200820_102955.jpg		
Desc:		Slide #:	10

This photo shows an existing median drop inlet (MDI) connection to the NM Hwy 47 Arroyo storm drain (SD) system. Photo direction is south.

Title:	NM Hwy 47 Arroyo SD Crossing		
Date:	8/20/2020 9:42		
File:	11IMG_20200820_104242.jpg		
Desc:		Slide #:	11

This photo shows the location where the NM Hwy 47 Arroyo enters the storm drain pipes that cross NM-47 near the Rio Communities Fire Department. Photo direction is south.

Title:	NM Hwy 47 Arroyo SD Crossing Inlets	File:	12IMG_20200826_113931.jpg	Date:	8/26/2020 10:39
Desc:				Slide:	12

This photo shows the inlets for the existing storm drain pipes that cross NM-47 near the Rio Communities Fire Department. Photo direction is west.

Title:	NM Hwy 47 Arroyo Channel Section 1		
Date:	8/20/2020 9:57		
File:	13IMG_20200820_105708.jpg		
Desc:		Slide #:	13

This photo shows a section of the NM Hwy 47 Arroyo channel just upstream of the NM-47 SD crossing. Photo direction is south.

Title:	NM Hwy 47 Arroyo - Goodman Ave Crossing Outlets	File:	14IMG_20200820_144422.jpg	Date:	8/20/2020 13:44
Desc:				Slide:	14

This photo shows the existing culvert outlet concrete structure for the NM Hwy 47 Arroyo at the Goodman Ave crossing. There is evidence of erosion at this outlet structure, and other similar structures located within the NM Hwy 47 Arroyo. A utility is exposed at this crossing. Photo direction is south.

Title:	NM Hwy 47 Arroyo - Damon St Crossing Inlets	File:	15IMG_20200820_145434.jpg	Date:	8/20/2020 13:54
Desc:				Slide:	15

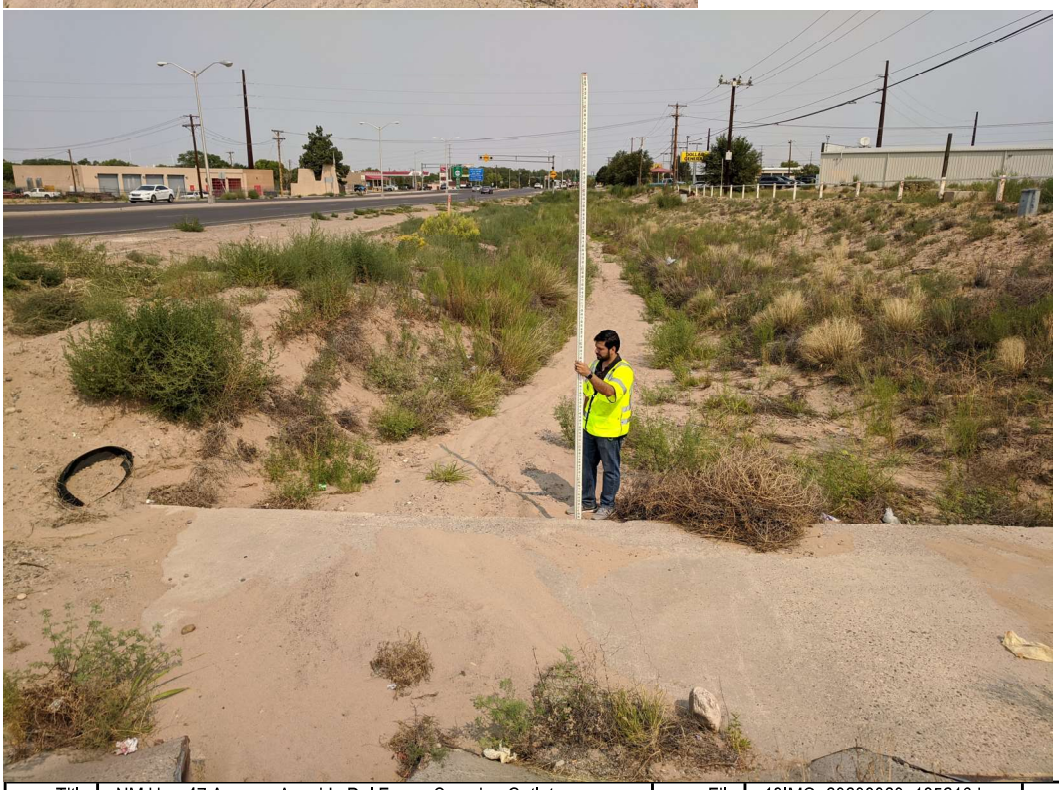
This photo shows the existing culvert inlet concrete structure for the NM Hwy 47 Arroyo and Damon Street crossing. There is evidence of heavy debris and sediment located at this inlet structure. Photo direction is north

Title:	NM Hwy 47 Arroyo Check Dam	File:	16IMG_20200820_110904.jpg	Date:	8/20/2020 10:09
Desc:				Slide:	16

This photo shows an existing concrete check dam located in the NM Hwy 47 Arroyo. Photo direction is south.

Title:	NM Hwy 47 Arroyo Section 2		
Date:	8/20/2020 13:51		
File:	17IMG_20200820_145143.jpg		
Desc:		Slide #:	17

This photo shows a section of the NM Hwy 47 Arroyo channel just upstream of the Goodman Ave crossing. Photo direction is north.



Title:	NM Hwy 47 Arroyo - Avenida Del Fuego Crossing Outlets	File:	18IMG_20200820_105216.jpg	Date:	8/20/2020 9:52
Desc:				Slide:	18

This photo shows the downstream channel of the NM Hwy 47 Arroyo from the Avenida Del Fuego crossing. Photo direction is north.

Title:	NM Hwy 47 Arroyo - Dirt Rd Crossing		
Date:	8/20/2020 14:11		
File:	19IMG_20200820_151131.jpg		
Desc:		Slide #:	19

This photo shows existing damaged culverts at a dirt road crossing. Photo direction is south.

Title:	NM Hwy 47 Arroyo - 90 Degree Bend		
Date:	8/20/2020 14:38		
File:	20IMG_20200820_153834.jpg		
Desc:		Slide #:	20

This photo shows the downstream 90 degree bend in the NM Hwy 47 Arroyo channel across Maddox St. Photo direction is south.

Title:	NM Hwy 47 Arroyo Concrete Spillway		
Date:	8/20/2020 15:07		
File:	21IMG_20200820_160737.jpg		
Desc:		Slide #:	21

This photo shows an existing concrete spillway entering the NM Hwy 47 Arroyo near the Riggs Street and Damon Street intersection. Photo direction is west.

Title:	NM Hwy 47 Arroyo Concrete Rundown		
Date:	8/20/2020 15:51		
File:	22IMG_20200820_165124.jpg		
Desc:		Slide #:	22

This photo shows an existing concrete rundown entering the NM Hwy 47 Arroyo near the Loma Drive and La Paz Avenue intersection. Photo direction is south.

Title:	San Lucas Ave SD MDI		
Date:	8/26/2020 11:03		
File:	23IMG_20200826_120338.jpg		
Desc:		Slide #:	23

This photo shows an existing median drop inlet (MDI) connection to the existing storm drain (SD) system located along San Lucas Avenue. Photo direction is west.

Title:	San Lucas Ave SD Outfall		
Date:	5/19/2020 8:50		
File:	24IMG_20200424_102659.jpg		
Desc:		Slide #:	24

This photo shows the existing pipe outfall for the San Lucas Avenue storm drain (SD). This outfall discharges into an existing retention pond. Photo direction is south.

Title:	San Lucas Ave Concrete Rundown Failure		
Date:	5/19/2020 8:50		
File:	25IMG_20200424_101757.jpg		
Desc:		Slide #:	25

This photo shows the failure of the existing concrete rundown structure at the intersection of San Lucas Avenue and Charmartin Avenue. Photo direction is south.

Title:	Damon St SD MDI		
Date:	8/26/2020 10:47		
File:	26IMG_20200826_114659.jpg		
Desc:		Slide #:	26

This photo shows an existing median drop inlet (MDI) located at the intersection of Damon Street and Fulton Avenue. This inlet connects to an existing storm drain (SD) system that outfalls into the NM Hwy 47 Arroyo near the Goodman Avenue crossing. Photo direction is east.

Title:	Damon St SD Manhole		
Date:	8/26/2020 10:54		
File:	27IMG_20200826_115356.jpg		
Desc:		Slide #:	27

This photo shows an existing storm drain (SD) manhole connected to existing storm drain that discharges the Damon Street MDI to the NM Hwy 47 Arroyo. This manhole is located at the intersection of Damon Street and Goodman Avenue. Photo direction is north.

Title:	Nancy Lopez Blvd Concrete Rundown		
Date:	8/26/2020 11:58		
File:	28IMG_20200826_125826.jpg		
Desc:		Slide #:	28

This photo shows an existing concrete rundown located near the intersection of Nancy Lopez Boulevard and Lee Trevino Drive. Photo direction is south.

Title:	Nancy Lopez Blvd Retention Pond		
Date:	8/26/2020 12:16		
File:	29IMG_20200826_131647.jpg		
Desc:		Slide #:	29

This photo shows the existing retention pond located along Nancy Lopez Boulevard. Photo direction is east.

Title:	Avenida Del Fuego / Diamante Pl Intersectior		
Date:	8/20/2020 11:26		
File:	30IMG_20200820_122618.jpg		
Desc:		Slide #:	30

This photo shows the intersection of Avenida Del Fuego and Diamante Place. There is evidence of roadway degradation most likely due to lack of drainage infrastructure. Photo direction is east.

Title:	Avenida Del Fuego Residential Culvert		
Date:	8/20/2020 11:23		
File:	31IMG_20200820_122301.jpg		
Desc:		Slide #:	31

This photo shows an existing concrete culvert located at a residential property entrance crossing. Photo direction is west.

Title:	Estrella Pl Culvert - Damaged Inlet		
Date:	8/20/2020 11:10		
File:	32IMG_20200820_121030.jpg		
Desc:		Slide #:	32

This photo shows the damaged inlet of the existing concrete culvert at the intersection of Avenida Del Fuego and Estrella Place. The roadway surface degradation in the photo suggests drainage flow bypass the inlet of this culvert. Photo direction is west.

Title:	La Luna Pl Culvert - Buried Outlet		
Date:	8/20/2020 11:05		
File:	33IMG_20200820_120519.jpg		
Desc:		Slide #:	33

This photos shows the buried outlet of the existing culvert at the intersection of Avenida Del Fuego and La Luna Place. Photo direction is east.

Title:	Avenida Del Fuego Roadside Drainage		
Date:	8/20/2020 11:02		
File:	34IMG_20200820_120217.jpg		
Desc:		Slide #:	34

This photo shows the existing drainage flow path along the south side of the Avenida Del Fuego roadway. This flow path requires an established roadside ditch to help prevent further damage to the roadway surface. Photo direction is west.

Title:	NM-47 CDI		
Date:	8/26/2020 10:24		
File:	35IMG_20200826_112451.jpg		
Desc:		Slide #:	35

This photo shows an existing curb drop inlet (CDI) located at the SE corner of the NM-47 and NM-309 intersection. Photo direction is north.

Title:	Commercial Drainage Swale		
Date:	8/26/2020 10:34		
File:	36IMG_20200826_113449.jpg		
Desc:		Slide #:	36

This photo shows an existing drainage swale connecting the parking lot of the Dollar General and NM Hwy 309 Arroyo. Photo direction is east.

Title:	Sidewalk Culvert		
Date:	8/26/2020 10:35		
File:	37IMG_20200826_113505.jpg		
Desc:		Slide #:	37

This photo shows a typical existing sidewalk culvert that discharges into the NM Hwy 47 Arroyo. This sidewalk culvert is located at the Dollar General entrance and shows signs of structural fatigue that should be addressed to prevent safety issues. Photo direction is south.

Title:	NM-47 Modified Concrete Rundown		
Date:	8/20/2020 9:44		
File:	38IMG_20200820_104357.jpg		
Desc:		Slide #:	38

This photo shows an existing concrete rundown from NM-47 that discharges into the NM Hwy 47 Arroyo. This rundown uses both concrete and corrugated metal to convey flow into the arroyo. Photo direction is west.

Title:	NM-304 Culvert Crossing Outlet		
Date:	8/26/2020 12:19		
File:	39IMG_20200826_131924.jpg		
Desc:		Slide #:	39

This photo shows the outlet for the existing culvert that crosses NM-304 near the intersection of Good Drive. Photo direction is east.

Title:	NM-304 Culvert Crossing Outlets		
Date:	8/26/2020 13:06		
File:	40IMG_20200826_140627.jpg		
Desc:		Slide #:	40

This photos shows a culvert outlet configuration for the NM-304 crossing near the Yucca Self Storage entrance. Photo direction is south.

Title:	Calle Del Valle Pl Concrete Rundown		
Date:	8/26/2020 12:42		
File:	41IMG_20200826_134219.jpg		
Desc:		Slide #:	41

This photo shows an existing concrete rundown that conveys flow from Calle Del Valle Place down to the NM-304 roadside ditches. This concrete appears to have a shotcrete finish. Photo direction is east.

Title:	Modified Culvert Extension		
Date:	8/26/2020 13:15		
File:	42IMG_20200826_141514.jpg		
Desc:		Slide #:	42

This photo shows the inside of an existing concrete culvert crossing NM-304 north of the Rio Communities Way intersection. This concrete culvert appears to have corrugated metal pipe (CMP) extensions on both ends. Photo direction is east.

Title:	NM-304 Culvert Crossing Inlet Protection
Date:	8/26/2020 13:17
File:	43IMG_20200826_141736.jpg
Desc:	Slide #: 43

This photo shows the inlet of the concrete/corrugated metal pipe (CMP) culvert crossing NM-304 north of the Rio Communities Way intersection. This concrete/CMP culvert has large sized rock located near the inlet to help protect the surrounding area from high velocities and consequential erosion. Photo direction is west.

Title:	NM-304 Roadside Ditch Outfall
Date:	8/26/2020 13:39
File:	44IMG_20200826_143915.jpg
Desc:	Slide #: 44

This photo shows the location for the outfall culvert for the NM-304 roadside ditches. This location requires debris and vegetation maintenance. The outlet of the outfall culvert appears to be located on private property, This discharge from the outlet then conveys west until it reaches the Rio Grande River. Photo direction is west.

Appendix F. Meeting Minutes

City of Rio Communities
2020 Drainage Master Plan

Meeting Minutes

Subject:	NMDOT Coordination Meeting
Date:	Thursday, November 12, 2020
Location:	Webex Conference Call
Attendees:	Antonio Nunez, HDR Dan Pfeifer, HDR Danton Bean, HDR Jordan Chavez, HDR Tim Trujillo, NMDOT Jill Mosher, NMDOT

The following meeting notes were developed based on the best recollection of HDR staff present as to the topics discussed during the meeting. Please provide prompt response of any revisions or additions to these meeting notes.

Objective:

The overall purpose of this meeting is to review project history and provide project updates/status.

Discussion:

1. Introductions
    a. Antonio Nunez – Project Manager
    b. Dan Pfeifer – Project Drainage Engineer/Lead
    c. Jordan Chavez – Project Drainage Engineer
    d. Danton Bean – Transportation Group Manager
    e. Tim Trujillo – NMDOT District 3 Drainage Engineer
    f. Jill Mosher – NMDOT District 3 Assistant District Engineer

2. Project Background
    a. City of Rio Communities Drainage Master Plan – first drainage master plan for City
    b. Preliminary DMP – to be delivered 11/24/20
    c. Final DMP – to be delivered 2/26/21

3. Data Collection (8/3/20 – 8/28/20)
    a. NMDOT – reached out to Records Custodian SB-5 at 505-469-0724 on 10/1. Emailed Cynthia Gustafson at cynthia.gustafson@state.nm.us with mile markers for the state highways we are requesting information. Cynthia has been on hold until we can gather more information from NMDOT District 3. According to Jill, records department has experienced employee turnover recently.
    b. Main issue is identifying owner of existing drainage infrastructure along NM highways - Hwy 47, Hwy 304, and Hwy 309.
    c. Agreement was with County for traffic signal in past
    d. NMDOT District 3 will look into agreements with Valencia County. District 3 isn't immediately aware.

e. NMDOT highways pass water from one side to another – NMDOT limited to R/W for these highways.
f. If within R/W then it's most likely owned by NMDOT pending agreements research.
g. Records to provide R/W maps
h. Has HDR reached out to patrol foreman? Jill tried getting maintenance to respond/attend this meeting, but land patrol is limited. There are two people working at any given time. Barry Lytle – interim contact in Maintenance since Tom recently retired. Barry's phone number is 659-9155.
i. Has HDR reached out to MRGCD? According to Jill, Francesca and Matt Martinez are good contacts from MRGCD.
j. Are there any ongoing NMDOT improvements in this area? Jill not aware of any in this area. Only Interstate FDR, Jarales BNSF Bridge, Delgado Rd, Aragon Rd; HDR to talk to Barry about pavement improvements in the area.
k. HDR to talk to Lina about upcoming County projects.

4. Coordination
    a. NMDOT Meetings
        i. Meeting 1 – 11/12/20
        ii. Meeting 2 – Possibly, depending on data collection. Most likely just an email update.
    b. Antonio coordinating with NMDOT for meetings. City staff doesn't want to be included in these meetings.
    c. Who should we be coordinating with at NMDOT for this project? Jill and Tim.

5. Hydrology (8/17/20 – 9/25/20)
    a. Hydrology method – NRCS based on four basin sizes determined.

6. Hydraulics (9/21/20 – 10/30/20)
    a. To be modeled in HEC-RAS 2D

7. Other Action Items
    a. NMDOT drainage/maintenance staff to provide past project information: agreements.
    b. HDR to reach out to NMDOT Records for R/W information.
    c. HDR to keep reaching out to Valencia County.

Telephone Record

Date:	Thursday, December 10, 2020		
Project:	City of Rio Communities DMP	Project No:	10236786
Call to:	Jessica Blanton - Valencia County Clerk's Office	Phone No:	(505) 866-8741
Call from:	Jordan Chavez - HDR	Phone No:	(505) 480-4114
Subject:	Rio Communities Data Collection – Valencia County Clerk Appointment		

Discussion, Agreement, and/or Action:

Jessica hadn't talked to Antonio. She only talked to Lina Benavidez from Public Works. This was my misunderstanding.

There is one record for the City of Rio Communities that couldn't be emailed since it didn't fit in scanner. Also, this document is very old.

County Clerk's Office only open by appointment. I would only be allowed to come in and look at the document. There will be no additional research while in the office at this time. This appointment will be about 10 minutes. I'm allowed to take photos of the document.

My appointment (first available) is scheduled for Tuesday, December 29th at 11 am. Jessica won't be in the office on this day, but the other staff ("girls") will be able to assist me.

Jessica.blanton@co.valencia.nm.us

Appendix G. Opinion of Probable Construction Cost

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST ESTIMATE
CITY OF RIO COMMUNITIES: DMP (FINAL)

PROJECT NUMBER: 2020-0101

PREPARED BY: Dan Pfeifer
DATE PREPARED: 6/14/2021

CATEGORY: PROJECT 1 - CULVERT REPLACEMENT AND REPAIR

NMDOT ITEM NO.	SHORT DESCRIPTION	UNIT	ESTIMATE QUANTITY	ESTIMATE UNIT PRICE	ESTIMATE AMOUNT
107000	ENVIRONMENTAL COMMITMENTS	LS	LS	$1,000.00	$1,000.00
201000	CLEARING AND GRUBBING	LS	LS	$1,200.00	$1,200.00
207000	SUBGRADE PREPARATION	S.Y.	135	$2.20	$297.00
210002	MAJOR STRUCTURE EXCAVATION	C.Y.	290	$28.90	$8,381.00
210003	MAJOR STRUCTURE BACKFILL	C.Y.	145	$51.10	$7,409.50
303010	BASE COURSE	C.Y.	45	$71.70	$3,226.50
423282	HMA SP-III COMPLETE	S.Y.	135	$69.50	$9,382.50
511000	STRUCTURAL CONCRETE, CLASS A	C.Y.	35	$700.00	$24,500.00
570461	36" STORM DRAIN CULVERT PIPE	L.F.	240	$115.00	$27,600.00
570467	42" STORM DRAIN CULVERT PIPE	L.F.	130	$164.00	$21,320.00
601000	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	LS	$10,000.00	$10,000.00
601110	REMOVAL OF SURFACING	S.Y.	135	$7.00	$945.00
602000	RIPRAP CLASS A	C.Y.	20	$300.00	$6,000.00
603050	CLEAN WATER ACT COMPLIANCE WORK PLAN	ALOW	ALOW	$1,000.00	$1,000.00
603281	SWPPP PLAN PREPARATION AND MAINTENANCE	LS	LS	$1,000.00	$1,000.00
618000	TRAFFIC CONTROL MANAGEMENT	LS	LS	$3,000.00	$3,000.00
618011	PUBLIC AWARENESS	LS	LS	$5,000.00	$5,000.00
621000	MOBILIZATION	LS	LS	$12,000.00	$12,000.00
623105	MEDIAN DROP INLET 5'X5' (URBAN) H=3'1" TO 6'0"	EACH	1	$9,650.00	$9,650.00
663049	PRECONSTRUCTION UTILITY SURVEY	LS	LS	$1,000.00	$1,000.00
801000	CONSTRUCTION STAKING BY THE CONTRACTOR	LS	LS	$1,800.00	$1,800.00
802000	POST CONSTRUCTION PLANS	LS	LS	$10,000.00	$10,000.00
			SUBTOTAL:		$165,711.50
			CONTINGENCY (20.0%):		$33,142.30
			SUBTOTAL WITH CONTINGENCY:		$198,853.80
			NMGR TAX @ 7.6875%:		$15,286.89
			SUBTOTAL:		***$214,140.69***

CATEGORY: PROJECT 2 - CULVERT REPAIR AND CHANNEL RESTORATION

NMDOT ITEM NO.	SHORT DESCRIPTION	UNIT	ESTIMATE QUANTITY	ESTIMATE UNIT PRICE	ESTIMATE AMOUNT
107000	ENVIRONMENTAL COMMITMENTS	LS	LS	$1,000.00	$1,000.00
201000	CLEARING AND GRUBBING	LS	LS	$1,200.00	$1,200.00
203000	UNCLASSIFIED EXCAVATION	C.Y.	355	$9.00	$3,195.00
511000	STRUCTURAL CONCRETE, CLASS A	C.Y.	40	$700.00	$28,000.00
570437	24" STORM DRAIN CULVERT PIPE	L.F.	124	$98.10	$12,164.40
602000	RIPRAP CLASS A	C.Y.	75	$300.00	$22,500.00
603050	CLEAN WATER ACT COMPLIANCE WORK PLAN	ALOW	ALOW	$1,000.00	$1,000.00
603220	CHECK DAM TYPE I	L.F.	105	$11.50	$1,207.50
603281	SWPPP PLAN PREPARATION AND MAINTENANCE	LS	LS	$1,000.00	$1,000.00
613000	CLEANING CULVERTS AND DRAINAGE STRUCTURES	EACH	6	$7,000.00	$42,000.00
618000	TRAFFIC CONTROL MANAGEMENT	LS	LS	$2,800.00	$2,800.00
618011	PUBLIC AWARENESS	LS	LS	$5,000.00	$5,000.00
621000	MOBILIZATION	LS	LS	$11,100.00	$11,100.00
663049	PRECONSTRUCTION UTILITY SURVEY	LS	LS	$1,000.00	$1,000.00
801000	CONSTRUCTION STAKING BY THE CONTRACTOR	LS	LS	$1,700.00	$1,700.00
802000	POST CONSTRUCTION PLANS	LS	LS	$10,000.00	$10,000.00
			SUBTOTAL:		$144,866.90
			CONTINGENCY (20.0%):		$28,973.38
			SUBTOTAL WITH CONTINGENCY:		$173,840.28
			NMGR TAX @ 7.6875%:		$13,363.97
			SUBTOTAL:		***$187,204.25***

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST ESTIMATE
CITY OF RIO COMMUNITIES: DMP (FINAL)

PROJECT NUMBER: 2020-0101

PREPARED BY: Dan Pfeifer
DATE PREPARED: 6/14/2021

CATEGORY: PROJECT 3 - ROADWAY IMPROVEMENTS

NMDOT ITEM NO.	SHORT DESCRIPTION	UNIT	ESTIMATE QUANTITY	ESTIMATE UNIT PRICE	ESTIMATE AMOUNT
107000	ENVIRONMENTAL COMMITMENTS	LS	LS	$1,000.00	$1,000.00
201000	CLEARING AND GRUBBING	LS	LS	$1,200.00	$1,200.00
601000	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	LS	$10,000.00	$10,000.00
603281	SWPPP PLAN PREPARATION AND MAINTENANCE	LS	LS	$1,000.00	$1,000.00
609500	STANDARD CURB & GUTTER	L.F.	2,280	$32.00	$72,960.00
609636	CONCRETE VALLEY GUTTER 6" X 36"	L.F.	295	$40.20	$11,859.00
618000	TRAFFIC CONTROL MANAGEMENT	LS	LS	$2,800.00	$2,800.00
618011	PUBLIC AWARENESS	LS	LS	$5,000.00	$5,000.00
621000	MOBILIZATION	LS	LS	$11,100.00	$11,100.00
663049	PRECONSTRUCTION UTILITY SURVEY	LS	LS	$1,000.00	$1,000.00
701108	STEEL I-BEAM POST TY S4X7.7	L.F.	720	$35.00	$25,200.00
801000	CONSTRUCTION STAKING BY THE CONTRACTOR	LS	LS	$1,700.00	$1,700.00
802000	POST CONSTRUCTION PLANS	LS	LS	$10,000.00	$10,000.00
			SUBTOTAL:		$154,819.00
			CONTINGENCY (20.0%):		$30,963.80
			SUBTOTAL WITH CONTINGENCY:		$185,782.80
			NMGR TAX @ 7.6875%:		$14,282.05
			SUBTOTAL:		***$200,064.85***

CATEGORY: PROJECT 4 - STORM DRAIN IMPROVEMENTS

NMDOT ITEM NO.	SHORT DESCRIPTION	UNIT	ESTIMATE QUANTITY	ESTIMATE UNIT PRICE	ESTIMATE AMOUNT
107000	ENVIRONMENTAL COMMITMENTS	LS	LS	$1,000.00	$1,000.00
203000	UNCLASSIFIED EXCAVATION	C.Y.	40	$9.00	$360.00
203100	BORROW	C.Y.	20	$11.00	$220.00
207000	SUBGRADE PREPARATION	S.Y.	30	$2.20	$66.00
210003	MAJOR STRUCTURE BACKFILL	C.Y.	40	$51.10	$2,044.00
303010	BASE COURSE	C.Y.	5	$71.70	$358.50
423282	HMA SP-III COMPLETE	S.Y.	30	$69.50	$2,085.00
511000	STRUCTURAL CONCRETE, CLASS A	C.Y.	20	$700.00	$14,000.00
570437	24" STORM DRAIN CULVERT PIPE	L.F.	50	$98.10	$4,905.00
601000	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	LS	$10,000.00	$10,000.00
601110	REMOVAL OF SURFACING	S.Y.	30	$7.00	$210.00
602000	RIPRAP CLASS A	C.Y.	15	$300.00	$4,500.00
603050	CLEAN WATER ACT COMPLIANCE WORK PLAN	ALOW	ALOW	$1,000.00	$1,000.00
603281	SWPPP PLAN PREPARATION AND MAINTENANCE	LS	LS	$1,000.00	$1,000.00
609500	STANDARD CURB & GUTTER	L.F.	60	$32.00	$1,920.00
609636	CONCRETE VALLEY GUTTER 6" X 36"	L.F.	146	$40.20	$5,869.20
618000	TRAFFIC CONTROL MANAGEMENT	LS	LS	$1,700.00	$1,700.00
618011	PUBLIC AWARENESS	LS	LS	$5,000.00	$5,000.00
621000	MOBILIZATION	LS	LS	$6,700.00	$6,700.00
623001	MEDIAN DROP INLET TYPE I (URBAN) H=3'1" TO 6'0"	EACH	2	$9,250.00	$18,500.00
662000	MANHOLE TYPE C-4' DIAMETER 0' TO 6' DEPTH	EACH	2	$5,050.00	$10,100.00
663049	PRECONSTRUCTION UTILITY SURVEY	LS	LS	$1,000.00	$1,000.00
801000	CONSTRUCTION STAKING BY THE CONTRACTOR	LS	LS	$1,000.00	$1,000.00
802000	POST CONSTRUCTION PLANS	LS	LS	$10,000.00	$10,000.00
			SUBTOTAL:		$103,537.70
			CONTINGENCY (20.0%):		$20,707.54
			SUBTOTAL WITH CONTINGENCY:		$124,245.24
			NMGR TAX @ 7.6875%:		$9,551.35
			SUBTOTAL:		***$133,796.59***

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST ESTIMATE
CITY OF RIO COMMUNITIES: DMP (FINAL)

PROJECT NUMBER: 2020-0101

PREPARED BY: Dan Pfeifer
DATE PREPARED: 6/14/2021

CATEGORY: PROJECT 5A - NAVAJO LOOP CHANNEL

NMDOT ITEM NO.	SHORT DESCRIPTION	UNIT	ESTIMATE QUANTITY	ESTIMATE UNIT PRICE	ESTIMATE AMOUNT
107000	ENVIRONMENTAL COMMITMENTS	LS	LS	$1,000.00	$1,000.00
201000	CLEARING AND GRUBBING	LS	LS	$79,300.00	$79,300.00
203000	UNCLASSIFIED EXCAVATION	C.Y.	567,196	$9.00	$5,104,764.00
515000	REINF.CONCRETE FOR MINOR STRUCTURES	C.Y.	800	$917.00	$733,600.00
540060	REINFORCING BARS GRADE 60	LB	320,950	$1.40	$449,330.00
570437	24" STORM DRAIN CULVERT PIPE	L.F.	4,760	$98.10	$466,956.00
570060	60" CULVERT PIPE	L.F.	132	$225.00	$29,700.00
601000	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	LS	$10,000.00	$10,000.00
602000	RIPRAP CLASS A	C.Y.	80	$300.00	$24,000.00
602030	RIPRAP CLASS D	C.Y.	7,980	$140.00	$1,117,200.00
603050	CLEAN WATER ACT COMPLIANCE WORK PLAN	ALOW	ALOW	$1,000.00	$1,000.00
603281	SWPPP PLAN PREPARATION AND MAINTENANCE	LS	LS	$1,000.00	$1,000.00
618000	TRAFFIC CONTROL MANAGEMENT	LS	LS	$198,200.00	$198,200.00
618011	PUBLIC AWARENESS	LS	LS	$5,000.00	$5,000.00
621000	MOBILIZATION	LS	LS	$792,700.00	$792,700.00
663049	PRECONSTRUCTION UTILITY SURVEY	LS	LS	$1,000.00	$1,000.00
801000	CONSTRUCTION STAKING BY THE CONTRACTOR	LS	LS	$118,900.00	$118,900.00
802000	POST CONSTRUCTION PLANS	LS	LS	$10,000.00	$10,000.00
			SUBTOTAL:		$9,143,650.00
			CONTINGENCY (20.0%):		$1,828,730.00
			SUBTOTAL WITH CONTINGENCY:		$10,972,380.00
			NMGR TAX @ 7.6875%:		$843,501.71
			SUBTOTAL:		***$11,815,881.71***

CATEGORY: PROJECT 5B - POND 08 AND ROADSIDE DITCH

NMDOT ITEM NO.	SHORT DESCRIPTION	UNIT	ESTIMATE QUANTITY	ESTIMATE UNIT PRICE	ESTIMATE AMOUNT
107000	ENVIRONMENTAL COMMITMENTS	LS	LS	$1,000.00	$1,000.00
201000	CLEARING AND GRUBBING	LS	LS	$9,100.00	$9,100.00
203000	UNCLASSIFIED EXCAVATION	C.Y.	95,270	$9.00	$857,430.00
570437	24" STORM DRAIN CULVERT PIPE	L.F.	500	$98.10	$49,050.00
601000	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	LS	$10,000.00	$10,000.00
603050	CLEAN WATER ACT COMPLIANCE WORK PLAN	ALOW	ALOW	$1,000.00	$1,000.00
603281	SWPPP PLAN PREPARATION AND MAINTENANCE	LS	LS	$1,000.00	$1,000.00
618000	TRAFFIC CONTROL MANAGEMENT	LS	LS	$22,700.00	$22,700.00
618011	PUBLIC AWARENESS	LS	LS	$5,000.00	$5,000.00
621000	MOBILIZATION	LS	LS	$90,800.00	$90,800.00
663049	PRECONSTRUCTION UTILITY SURVEY	LS	LS	$1,000.00	$1,000.00
801000	CONSTRUCTION STAKING BY THE CONTRACTOR	LS	LS	$13,700.00	$13,700.00
802000	POST CONSTRUCTION PLANS	LS	LS	$10,000.00	$10,000.00
			SUBTOTAL:		$1,071,780.00
			CONTINGENCY (20.0%):		$214,356.00
			SUBTOTAL WITH CONTINGENCY:		$1,286,136.00
			NMGR TAX @ 7.6875%:		$98,871.71
			SUBTOTAL:		***$1,385,007.71***

CATEGORY: PROJECT 6 - OPERATIONS & MAINTENANCE (O&M)

NMDOT ITEM NO.	SHORT DESCRIPTION	UNIT	ESTIMATE QUANTITY	ESTIMATE UNIT PRICE	ESTIMATE AMOUNT
201000	CLEARING AND GRUBBING	LS	LS	$1,300.00	$1,300.00
209000	BLADING AND RESHAPING	MILE	0	$30,650.00	$12,260.00
613000	CLEANING CULVERTS AND DRAINAGE STRUCTURES	EACH	16	$7,000.00	$112,000.00
			SUBTOTAL:		$125,560.00
			CONTINGENCY (20.0%):		$25,112.00
			SUBTOTAL WITH CONTINGENCY:		$150,672.00
			NMGR TAX @ 7.6875%:		$11,582.91
			SUBTOTAL:		***$162,254.91***

CATEGORY: PROJECT 7 - RIGGS STREET IMPROVEMENTS

NMDOT ITEM NO.	SHORT DESCRIPTION	UNIT	ESTIMATE QUANTITY	ESTIMATE UNIT PRICE	ESTIMATE AMOUNT
201000	CLEARING AND GRUBBING	LS	LS	$200.00	$200.00
203000	UNCLASSIFIED EXCAVATION	C.Y.	460	$9.00	$4,140.00
609636	CONCRETE VALLEY GUTTER 6" X 36"	L.F.	150	$40.20	$6,030.00
663049	PRECONSTRUCTION UTILITY SURVEY	LS	LS	$1,000.00	$1,000.00
801000	CONSTRUCTION STAKING BY THE CONTRACTOR	LS	LS	$200.00	$200.00
802000	POST CONSTRUCTION PLANS	LS	LS	$10,000.00	$10,000.00
			SUBTOTAL:		$21,570.00
			CONTINGENCY (20.0%):		$4,314.00
			SUBTOTAL WITH CONTINGENCY:		$25,884.00
			NMGR TAX @ 7.6875%:		$1,989.83
			SUBTOTAL:		***$27,873.83***

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST ESTIMATE
CITY OF RIO COMMUNITIES: DMP (FINAL)

PROJECT NUMBER: 2020-0101

PREPARED BY: Dan Pfeifer
DATE PREPARED: 6/14/2021

CATEGORY: *PROJECT 8 - COUNTRY CLUB LANE DRAINAGE IMPROVEMENTS

NMDOT ITEM NO.	SHORT DESCRIPTION	UNIT	ESTIMATE QUANTITY	ESTIMATE UNIT PRICE	ESTIMATE AMOUNT
	DITCH RESTORATION	LS	1	$1,000.00	$1,000.00
602000	RIPRAP CLASS A	C.Y.	30	$300.00	$9,000.00
		SUBTOTAL:			$10,000.00
		CONTINGENCY (20.0%):			$2,000.00
		SUBTOTAL WITH CONTINGENCY:			$12,000.00
		NMGR TAX @ 7.6875%:			$922.50
		SUBTOTAL:			***$12,922.50***

COST ESTIMATE SUMMARY

SHORT DESCRIPTION	SUBTOTAL AMOUNT	CONTINGENCY 20%	GR TAX 7.6875%	TOTAL AMOUNT
PROJECT 1 - CULVERT REPLACEMENT AND REPAIR	$165,711.50	$33,142.30	$15,286.89	$214,140.69
PROJECT 2 - CULVERT REPAIR AND CHANNEL RESTORATION	$144,866.90	$28,973.38	$13,363.97	$187,204.25
PROJECT 3 - ROADWAY IMPROVEMENTS	$154,819.00	$30,963.80	$14,282.05	$200,064.85
PROJECT 4 - STORM DRAIN IMPROVEMENTS	$103,537.70	$20,707.54	$9,551.35	$133,796.59
PROJECT 5A - NAVAJO LOOP CHANNEL	$9,143,650.00	$1,828,730.00	$843,501.71	$11,815,881.71
PROJECT 5B - POND 08 AND ROADSIDE DITCH	$1,071,780.00	$214,356.00	$98,871.71	$1,385,007.71
PROJECT 6 - OPERATIONS & MAINTENANCE (O&M)	$125,560.00	$25,112.00	$11,582.91	$162,254.91
PROJECT 7 - RIGGS STREET IMPROVEMENTS	$21,570.00	$4,314.00	$1,989.83	$27,873.83
*PROJECT 8 - COUNTRY CLUB LANE DRAINAGE IMPROVEMENTS	$10,000.00	$2,000.00	$922.50	$12,922.50
TOTAL =	$10,941,495.10	$2,188,299.02	$1,009,352.92	**$14,139,147.04**

**DRAINAGE IMPROVEMENTS INCLUDED IN ROADWAY IMPROVEMENTS PROJECT (2021)*

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We practice increased use of sustainable materials and reduction of material use.

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