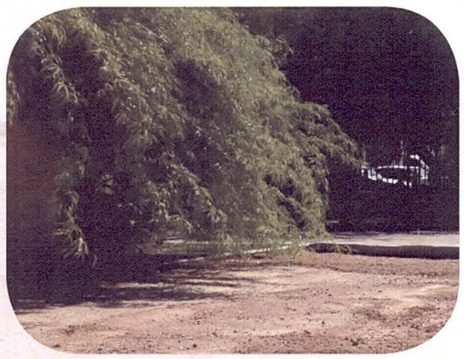


FINAL REPORT

TASK ASSIGNMENT #1 FCD2014C001

PECOS ROAD CHANNEL AND BASIN DESIGN CONCEPT REPORT

PREPARED FOR **FLOOD CONTROL DISTRICT OF MARICOPA COUNTY**

JAN 2015 » PREPARED BY Kimley»Horn

Kimley»Horn

Pecos Road Channel and Basin Design Concept Report

Contract FCD 2014C001-1
PCN 442.03.20

Prepared for:
Flood Control District of Maricopa County
2801 W. Durango
Phoenix, Arizona 85009

Prepared by:
Kimley-Horn and Associates, Inc.
1855 West Baseline Road
Suite 200
Mesa, AZ 85202

January 2015
KHA Project #091131024

Kimley»Horn

EXECUTIVE SUMMARY

The purpose of the Pecos Road Channel and Basin Design Concept Report (DCR) is to define a recommended drainage system to mitigate the flooding along the Pecos Road corridor between Meridian Road and Ellsworth Road in Mesa, Arizona. The alternatives developed as part of this project were based on Alternative 1 from the East Mesa Area Drainage Master Plan Update completed in February 2014 by Entellus.

Each alternative consisted of proposed channels along the Meridian Road alignment to convey runoff north and south to a proposed basin at the southwest corner of Pecos and Meridian Road. From the basin at Pecos and Meridian Roads, the following changes to the alternatives were formulated:

1. A channel on the north side of Pecos Road to convey flows from Pecos/Meridian Basin west to the Ellsworth Channel.
2. A storm drain to convey flows from Pecos/Meridian Basin west to 222nd Street to discharge to a channel along the north side of Pecos Road. The channel to convey flows to the Ellsworth Channel.
3. A storm drain to convey flows from Pecos/Meridian Basin west to a proposed basin at the northeast corner of Pecos Road and 222nd Street. The basin to outlet to a storm drain to the Ellsworth Channel.

A hydrologic and hydraulic analysis was conducted for each alternative to determine the size and cost of each alternative. Preliminary opinions of probable cost were developed for each alternative to assist in the alternatives evaluation.

The alternatives were presented to the land owners and businesses in the vicinity at a public meeting held September 18, 2014. The attendees expressed a strong unanimous preference for Alternative 3. The Flood Control District of Maricopa County (District) and the City of Mesa evaluated the alternatives using the following criteria:

- Construction cost
- Right-of-way acquisition cost
- Public/Stakeholder preferences
- Environmental and aesthetic impacts – industrial/commercial context
- Maintenance and life cycle costs

Based on a comparison of each alternative, Alternative 3 was selected to go forward as the DCR Drainage System. Further refinements were made to the hydrologic and hydraulic analysis of this alternative and a revised opinion of probable cost was developed. Several changes were made to Alternative 3 based on comments from the public meeting and review comments from the City of Mesa and the District. Conceptual design plans (15% level) were prepared for the DCR Drainage System (**Appendix H**). These concept plans identify the sizes, slopes, profiles, alignments, and cross sections of the proposed storm drain, channels and basins associated with the DCR Drainage System.

The final DCR Drainage System consists of a proposed channel along the McKenzie Road alignment to the north and the Meridian Road alignment to the south that convey runoff to a proposed basin at the southwest corner of Pecos and Meridian Road. A storm drain conveys flows from the Pecos/Meridian Basin west to a proposed basin at the northeast corner of Pecos Road and 222nd Street. The basin drains into a storm drain to an open channel approximately 500 feet upstream of the Ellsworth Channel. The channel conveys the runoff to the Ellsworth culverts to the ultimate outfall in the Ellsworth Channel.

Kimley»Horn

TABLE OF CONTENTS

Kimley»Horn

List of Tables

List of Appendices

Kimley»Horn

1 INTRODUCTION

The objective of the Pecos Road Channel and Basin Design Concept Report (DCR) is to define a recommended drainage system to mitigate the flooding along the Pecos Road corridor between Meridian Road and Ellsworth Road in Mesa, Arizona. Kimley-Horn and Associates, Inc. (Kimley-Horn) has been retained to perform these services as part of Flood Control District of Maricopa County (District) On-Call Contract FCD 2014C001-1. The City of Mesa is a stakeholder on this project and has provided input and feedback on the alternatives development.

The Pecos Road alignment from Meridian Road to Ellsworth Road is subject to frequent flooding and road closures. This project will advance concepts developed as part of the East Mesa Area Drainage Master Plan Update (EMADMPU) to define a recommended drainage system to mitigate the flooding along this corridor.

2 PROJECT AND DESIGN CRITERIA

The alternatives for this project were developed for the future conditions 100-year, 24-hour storm event, with the Arizona Department of Transportation (ADOT) State Route 24 (SR-24) completed. The following constraints were also used in the alternative development and evaluation:

- Minimize the size of the channel or storm drain through the selection of the most hydraulically efficient materials and cross section
- Maximize the use of the Ellsworth Road Channel
- Do not exceed the capacity of the Ellsworth Road Channel and Powerline Floodway downstream, with the consideration of hydrologic timing of peak flows

The City of Mesa is a stakeholder on this project. The goals of the City are to:

- Reduce the overall project footprint
- Utilize storm drain in the Pecos Corridor wherever feasibly possible
- Minimize the takes on existing right-of-way
- Maximize the use of the existing culverts at Ellsworth Road

The following design manuals, policies, and procedures were followed in the development of the alternatives:

- Drainage Policy and Standards Manual for Maricopa County, Arizona (2007)
- Drainage Design Manual for Maricopa County Volume I Hydrology (2013)
- Drainage Design Manual for Maricopa County Volume II Hydraulics (2013)
- Drainage Design Manual for Maricopa County Volume III Erosion Control (2013)
- Policy for the Aesthetic Treatment and Landscaping of Flood Control Projects (1992)

3 HYDROLOGY

This section includes a discussion of the hydrology completed for the Alternative Analysis. Discussion of the modifications to the Alternative Analysis hydrology that were completed for the DCR Drainage System is included in Section 6.1.

The future conditions 100-year, 24-hour HEC-1 model that was developed as part of the EMADMPU Alternative 1 was modified and used to evaluate the alternatives. Areas outside of the Pecos Road DCR study area were removed from the EMADMPU model. This generally includes areas north of the future SR-24 alignment, south of the East Ranch Road alignment (2,300 feet south of Germann Road), and west of Ellsworth Road. The model was also modified to provide storage routing for the proposed Pecos/Meridian Basin in place of a diversion. The basin depth was decreased from ten feet so that the basin would be able to be fully drained by gravity outflow.

The City of Mesa conducted an analysis of their retention storage requirements concurrent to the beginning of this study. The goal was to determine whether the 100-year, 2-hour retention requirements should be based on NOAA 14 values (2.2 inches) or the older NOAA 2 value (2.7 inches). It was determined that future retention requirements in this project area that is within the City of Mesa limits will be based on 2.7 inches of rainfall. The EMADMPU Alternative 1 HEC-1 model already accounted for this retention requirement so no additional changes were made to the model.

This modified hydrology model was used to evaluate the alternatives. Changes were limited to parameters that were significantly relevant to the performance of the alternatives. See **Appendix A** for the HEC-1 schematic and **Appendix B** for hydrology models.

4 HYDRAULICS AND SEDIMENTATION

This section includes a discussion of the hydraulics for the Alternative Analysis only. Discussion of the modifications to the hydraulics that were completed for the DCR Drainage System is included in Section 6.2.

Preliminary channel hydraulic calculations were completed using normal depth calculations in FlowMaster. Channel slopes were approximated by dropping the upstream elevation to appropriately capture flow while maintaining the existing downstream elevation. Drop structures were applied in the design where necessary to maintain Froude numbers less than 0.86 per District guidelines (Section 6.8.3 of the Policy and Standards Manual). Manning's n-values were obtained from Table 7.6 of the District's Drainage Design Manual – Hydraulics (2013). Three different channel types were used based on the zoning. Concrete channels were used in industrial areas, riprap channels were used in mixed use areas and an existing earthen channel was analyzed west of Matheson Gas (Note this channel was not used in the DCR Drainage System, a new channel was proposed east of Meridian Road, see Section 6.2). The channels were designed with a foot of freeboard.

Preliminary storm drain hydraulic calculations were performed using StormCAD. The storm drain slope was approximated by setting the upstream elevation to match the bottom elevation of the proposed Meridian and 222nd Street detention basins and using the existing downstream elevation of the Ellsworth culverts. Junction losses were not modeled for each alternative but the hydraulic grade line was kept no less than two feet below ground to allow for losses. Losses were modeled for the DCR Drainage System storm drain, as discussed in **Section 6.2**. The tailwater condition was calculated by comparing water surface elevations at the locations presented in **Table 1**. The headwater at the upstream end of the Ellsworth Channel resulted in the highest tailwater, which was used for the storm drain model.

Table 1. Tailwater Determination for DCR Drainage System Storm Drain

Location	Elevation [ft]
In Ellsworth Channel downstream of the Ellsworth culverts	1384.10
Headwater at the upstream end of the Ellsworth Channel using HY-8 and the DCR Drainage System flow	1384.51
Normal depth in the outfall channel downstream of the DCR Drainage System outlet	1381.23

Stage-storage-discharge rating tables were developed assuming a flat basin bottom with 4:1 side slopes. The average-end area method was used to determine the volume. The discharge was calculated using the Manning's equation until the depths reached 1.2 times the height of the outlet. The orifice equation was used for greater depths. The basin was designed with a foot of freeboard. Hydraulic calculations are included in **Appendix D**.

The District provided a planning-level sedimentation memo for the basin at Pecos and Meridian. A more detailed analysis should be completed at final design to quantify anticipated sedimentation amounts and future maintenance plans and needs. The analysis was based on a future conditions flow of 697 cfs obtained from the EMADMPU. The annual sediment yield is 0.087 ac-ft and the 100-year sediment yield is 1.582 ac-ft. A copy of the Sediment Yield Drainage Memo is provided in **Appendix E**. No information was provided for the 222nd Street basin and should be completed for final design.

5 ALTERNATIVE ANALYSIS

Alternative 1 of the EMADMPU was used as the starting point for the alternatives development. This baseline alternative consisted of the following drainage elements:

- Meridian Channel
- Pecos/Meridian Basin
- Pecos Channel

The proposed Meridian Channel in the EMADMPU was divided into two segments: the north segment, which extends from the proposed SR-24 alignment to the Pecos/Meridian Basin,

and the south segment, which extends from approximately 5,000 feet south of Germann Road to the Pecos/Meridian Basin. The proposed top width for the north segment was 120 feet, while the south segment varied from 50 to 110 feet, depending on the location. The total right-of-way for the Meridian Channel, which included a 14-ft maintenance road and 10-ft landscape setbacks on both sides of the channel, varied from 105 to 150 feet. Runoff is conveyed in the Meridian Channel to the Pecos/Meridian Basin.

The proposed EMADMPU Pecos/Meridian Basin was to be an offline detention basin located at the southwest corner of Pecos Road and Meridian Road. The basin was to be 10 ft deep with a capacity of 150 ac-ft. Runoff was discharged from the Pecos/Meridian Basin to the Pecos Channel.

The proposed Pecos Channel was planned to convey runoff from the Pecos/Meridian Basin west to the existing Ellsworth Channel. The proposed channel was to be located on the south side of Pecos Road from the Pecos/Meridian Basin to Crismon Road. At Crismon Road, the Pecos Channel crossed under Pecos Road to the north side of Pecos Road to the Ellsworth Channel. The proposed top width for the Pecos Channel varied from 85 to 105 feet. The total right-of-way width varied from 160 to 185 feet, which included a 14-ft maintenance road and 30-ft landscape setbacks on both sides of the channel.

With the City of Mesa's project goals in mind, the baseline alternative was modified with the consideration of channels, storm drains, additional detention basins, and alignment. A meeting was held on August 4, 2014 to discuss the options and develop alternatives. From the brainstorming meeting, the following alternatives were formulated:

1. A channel on the north side of Pecos Road to convey discharge from Pecos/Meridian Basin west to the Ellsworth Channel.
2. A storm drain to convey flows from Pecos/Meridian Basin west to 222nd Street and discharge to a channel along the north side of Pecos Road. The channel will convey flows to the Ellsworth Channel.
3. A storm drain to convey flows from Pecos/Meridian Basin west to a proposed basin at the northwest corner of Pecos Road and 222nd Street. The basin will outlet to a storm drain that will discharge to the Ellsworth Channel.

A preliminary evaluation of each alternative is presented in subsequent sections. Further guidelines were also established during the meeting. It was determined that to reduce the total right-of-way impacts, the landscape setbacks would be reduced to 30 ft on one side of the channel only. A concrete channel was also specified in the industrial areas, which allowed for steeper channel side slopes and a reduction in required right-of-way.

5.1 Alternative 1

Alternative 1 consisted of the following major drainage elements:

- Meridian Channel
- Pecos/Meridian Basin
- Pecos Channel

See the **Alternative 1** exhibit in **Appendix A** for an overview of the alternative. The proposed Meridian Channel was divided into two segments: the north segment, which extended from approximately 1,750 feet north of Pecos Road to the Pecos/Meridian Basin, and the south segment, from approximately 2,300 feet south of Germann Road to the Pecos/Meridian Basin The proposed top widths for the north and south segments were 62 feet and 56 feet, respectively. The total right-of-way for the Meridian Channel, which included a 14-ft maintenance road and a 30-ft landscape setback, was 106 and 100 feet for the north and south segments, respectively.

The proposed Pecos/Meridian Basin was to be an inline detention basin located at the southwest corner of Pecos Road and Meridian Road. The basin was 7 ft deep with a capacity of 150 ac-ft. Runoff was discharged from the Pecos/Meridian Basin through a 60-in reinforced concrete pipe (RCP) to the Pecos Channel.

The proposed Pecos Channel conveyed runoff from the Pecos/Meridian Basin west to the existing Ellsworth Channel along the north side of Pecos Road. The proposed channel was concrete-lined in the industrial areas from Pecos/Meridian Basin to 222nd Street. West of 222nd Street the channel lining was riprap due to the change in zoning to mixed use. It was pointed out during the alternative review process that if this section of channel was revised to concrete there could be additional right-of-way savings. The proposed top width for Pecos Channel varied from 21 to 32 feet in the concrete segment and was 66 feet in the riprap segment. The total right-of-way width varied from 65 to 110 feet, which included a 14-ft maintenance road and a 30-ft landscape setback.

5.2 Alternative 2

Alternative 2 consisted of the following major drainage elements:

- Meridian Channel
- Pecos/Meridian Basin
- Pecos Storm Drain
- Pecos Channel

See the **Alternative 2** exhibit in **Appendix A** for an overview of Alternative 2. The proposed Meridian Channel and Pecos/Meridian Basin elements were the same as presented for Alternative 1.

The proposed Pecos Storm Drain conveyed runoff from the Pecos/Meridian Basin west to the proposed Pecos Channel along the north side of Pecos Road. The proposed storm drain was a single barrel 60-in RCP from the Pecos/Meridian Basin to Mountain Road. From Mountain Road to 222nd Avenue the storm drain increased to 2-60-inch RCP. West of 222nd Avenue the storm drain discharged to the Pecos Channel.

The proposed Pecos Channel conveyed runoff from the Pecos Storm Drain west to the existing Ellsworth Channel along the north side of Pecos Road. The proposed channel lining was riprap. The proposed top width for Pecos Channel was 66 feet with a total right-of-way width of 110 feet, which included a 14-ft maintenance road and a 30-ft landscape setback.

5.3 Alternative 3

Alternative 3 consisted of the following major drainage elements:

- Meridian Channel
- Pecos/Meridian Basin
- Pecos Storm Drain
- 222nd Street Basin

See the **Alternative 3** exhibit in **Appendix A** for an overview of Alternative 3.The proposed Meridian Channel and Pecos/Meridian Basin elements were the same as presented for Alternatives 1 and 2.

The proposed Pecos Storm Drain is divided into two segments: the east segment and the west segment. The east segment conveyed runoff from the Pecos/Meridian Basin west to the proposed 222nd Street Basin along the north side of Pecos Road. The proposed storm drain was a single barrel 60-in RCP from the Pecos/Meridian Basin to Mountain Road. From Mountain Road to the 222nd Street the storm drain increased to 2 – 60-inch RCP. West of 222nd Street the storm drain discharged to the 222nd Street Basin. The 222nd Street Basin discharged into the west segment of the Pecos Storm Drain. The west segment consisted of 2 – 72-inch RCP from the 222nd Street Basin to the existing Ellsworth Channel.

5.4 Opinions of Probable Cost

Opinions of probable cost (OPC) were determined for each of the alternatives. Construction costs were estimated for major construction items based on recent ADOT project estimates. Right-of-way costs were determined per acre, assuming a cost per acre of $125,000. Potential utility relocations were identified based on horizontal alignments. A summary of the opinions of probable cost is presented in **Table 2**. These costs were revised for the DCR Drainage System. A more detailed analysis is included in **Appendix E**.

Table 2. Summary of Alternatives Opinions of Probable Cost

Alternative	Construction Cost [$ MM]	Right-of-Way Cost [$ MM]	Potential Utility Relocation Cost [$ MM]	Total Cost [$ MM]
1	8.7	8.1	0.093	17.8
2	9.4	7.1	0.085	17.5
3	10.7	5.3	0.160	17.2

The total cost for all three alternatives differed from Alternative 1 to 3 by $600,000 or 3%. While Alternative 1, all channels, had lower construction cost, that was offset by the additional right-of-way cost. Alternative 3 was all storm drain within the ultimate right-of-way, so the overall right-of-way acquisition cost was less than the other alternatives. The OPC above did not include contingency or the additional cost of roadway.

6 DCR DRAINAGE SYSTEM

Kimley-Horn and the District developed a set of criteria that were used to evaluate the alternatives. These evaluation criteria were:

- Construction cost
- Right-of-way acquisition cost
- Public/Stakeholder preferences
- Environmental and aesthetic impacts – industrial/commercial context
- Maintenance and life cycle costs

A comparison of each alternative in relation to the evaluation criteria is provided in **Table 3.**

Table 3. Alternatives Comparison

Criteria	Alternative 1	Alternative 2	Alternative 3
Construction cost	Lowest cost	Medium cost	Highest cost
Right-of-way acquisition cost	Highest cost	Medium cost	Lowest cost
Public/Stakeholder preference	City and public prefer storm drain	City and public prefer storm drain	City and public prefer storm drain
Environmental and aesthetic impacts	Fits in commercial context, but not as pleasing as underground pipe	Fits in commercial context, but not as pleasing as underground pipe	Most pleasing (underground)
Maintenance and life cycle costs	Highest cost	Medium cost	Lowest cost

In addition to the evaluation criteria noted above, the functionality of each alternative with a phasing plan was assessed. The extra burden required to maintain driveway culverts was considered with Alternatives 1 and 2. There was also a potential cost savings in Alternative 3 to use the earth excavated from the basins as cover for the pipes. Another important factor in making the selection of the preferred alternative was the right-of-way take. Alternative 1 had the highest take, while Alternative 3 had the lowest right-of-way take. A further savings was proposed by the District staff to revise the riprap channel west of 222nd Street to concrete to reduce the cost of right-of-way.

Based on a comparison of each alternative, Alternative 3 was selected as the DCR Drainage System. See the DCR Drainage System exhibit in **Appendix A.** In the initial evaluation of each alternative, the earthen channel west of Matheson Gas was being considered for use as the northern Meridian Channel. As part of the alternatives evaluation process, it was decided that the existing earthen channel west of Matheson Gas would not be used as the northern Meridian Channel alignment. An alternative location was selected adjacent to McKenzie Road to protect existing homes east of Meridian Road. This channel will intercept additional flow and was analyzed as a concrete channel. Landscape concepts outlined in **Section 7**

should be integrated with the design plans in final design. See Conceptual Plans in **Appendix H**.

6.1 Hydrology

Once the DCR Drainage System was selected, further refinements were made to the hydrology model to revise the storage volumes for the proposed basins at Meridian Road and 222nd Street to match the conceptual grading. The depth of the basin at Meridian Road was increased from 7 feet to 9 feet. Both basins were graded with a minimum slope of 0.15% and side slopes of 6:1. Adjustments were also made to move the subbasin boundary between E24B and E28B, E25 and E29B from Signal Butte Road to 222nd Street. Soil and land use parameters for each revised subbasin were estimated from the EMADMP shapefile data. Loss parameters and unit hydrographs for each subbasin were calculated using DDMSW. A DCR Drainage System HEC-1 Schematic showing the revised basin boundaries is provided in **Appendix A**.

Adjusting the subbasin boundary required the retention volumes for each of the modified subbasins to be revised. Because basin E25 and E24B are already partially developed with existing retention, a direct calculation of volume based on area was not done. Instead, the revised retention volumes were calculated by estimating the retention volume for the area between Signal Butte and 222nd Street. That retention volume was added to the subbasins that increased in area and subtracted from the subbasins that decreased in area. The change in retention volume was calculated by determining the retention volume per area being provided in the EMADMPU model and then multiplying by the change in area. Refined hydrology model output is included in **Appendix F**.

6.2 Hydraulics

Further refinements were also made to the hydraulic analysis. Manholes were added to the storm drain model with appropriate junction losses. Storm drain slopes were adjusted to match the revised detention basin grading. Pipes downstream of the 222nd Street basin were lowered to avoid utility conflicts where possible. Flow from the HEC-1 model was prorated based on area to calculate how much flow would be conveyed to the storm drain each quarter mile. Pipe diameters were adjusted based on the refined flow calculations, larger pipes were designed to replace some double pipes. Lowering the storm drain and revising double pipes to larger single diameter pipes resulted in approximately $2 MM in cost savings.

The outfall channel between the storm drain and Ellsworth Road is an earthen channel with riprap side slopes. Riprap was sized assuming a maximum velocity of 9 fps. There may be opportunity to reduce the riprap size with a riprap basin and final design of the storm drain. Refined hydraulic calculations are included in **Appendix F**. In most locations runoff will enter all of the proposed channels as sheet flow perpendicular to the channel. In these areas collector v-ditches or swales at the upstream side of the channel bank could be beneficial to aid in reduction of erosion or undercutting of the side slopes of the channels. This concept could be evaluated in final design.

The impacts to the Ellsworth Channel were also assessed by modifying the flow in the EllsworthChannel.prj HEC-RAS model provided from the *Final Drainage Report, Ellsworth Road – Phase I – Germann Road to Ray Road* (Ellsworth Road Drainage Report). According to the Ellsworth Road Drainage Report, this model represents the ultimate design conditions with full CIP flows included. Due to the attenuation of flow in Ellsworth Channel and the timing of peak flows, the flow decreases in Ellsworth Channel downstream of Pecos Road. The flow at Pecos Road was modeled for the entire channel. Because the flows do not increase downstream of Pecos Road, the Ellsworth Channel capacity is not exceeded. The revised HEC-RAS model is provided electronically with this report.

6.3 Implementation Plan

The DCR Drainage System may be implemented in four phases, see **Table 4** and **Appendix A** for the DCR Drainage System with Implementation Phasing exhibit. This phasing plan would allow the infrastructure to be built in stages, which may assist in project funding. It also provides an opportunity to build the highest priority drainage elements first. Because the most downstream elements are not built first, an interim outlet structure will be needed at the basin at Pecos and Meridian.

Table 4. Phases of the Implementation Plan for the DCR Drainage System

Phase	Features
Phase 1	• Detention basin at the southwest corner of Pecos and Meridian Roads • Northern Meridian Road channel segment
Phase 2	• Detention basin at 222nd Street and Pecos Road • Storm drain and channel from the 222nd Street detention basin to Ellsworth Road
Phase 3	• Storm drain from the detention basin at Meridian Road west to the 222nd Street basin
Phase 4	• Southern segment of the Meridian Road channel

An alternative implementation plan could follow a more traditional approach to build the system from the downstream portion first, see **Table 5.**

Table 5. Traditional Implementation Plan for the DCR Drainage System

Phase	Features
Phase 1	• Detention basin at 222nd Street and Pecos Road • Storm drain and channel from the 222nd Street detention basin to Ellsworth Road
Phase 2	• Detention basin at the southwest corner of Pecos and Meridian Roads • Southern segment of the Meridian Road channel • Storm drain from the detention basin at Meridian Road west to the 222nd Street basin
Phase 3	• Northern Meridian Road channel segment

The greatest disadvantage to following this traditional implementation plan is that the basin at Pecos and Meridian, which provides the most significant benefit to the area, is not built in the first phase. Instead, the first phase focuses on the downstream area which is not yet developed and where there is not as great of an immediate concern to relieve flooding.

A revised OPC was prepared for the DCR Drainage System based on the refinements and modifications discussed. The cost of each phase is provided as well as the overall project cost. A summary of the revised OPC is provided in **Table 6** and a detailed OPC is included in **Appendix F.**

Table 6. Summary of DCR Drainage System Opinion of Probable Cost

Phase	Construction Cost [$ MM]	Potential Utility Relocation Cost [$ MM]	Right-of-Way Cost [$ MM]	Total Cost [$ MM]
1	3.7	0.03	5.4	10.2
2	3.4	0.05	1.3	5.8
3	1.9	0.22	0.0	2.7
4	3.0	0.01	1.6	5.6
Total	**12.1**	**0.30**	**8.3**	**24.3**

The primary increases in cost from the Alternatives Analysis costs in **Table 2** are detailed in **Table 7**.

Table 7. Changes to OPC from Alternatives Analysis to the DCR Drainage System

Item	Reason for Change
Channel Excavation	• Meridian North Channel is now longer. • More refined grading was prepared that includes daylighting to existing ground.
Earthwork for Retention Basins	• Pecos Basin is deeper to help with peak flow attenuation. • More refined grading with sloping basin bottoms.
Riprap, D_{50}=9 inches	• Added to plan for the outfall channel near Ellsworth Road.
Reinforced concrete channel, 6 inches thick	• Meridian North Channel is now concrete and longer. Includes 90 degree bend into Pinal County.
24" RGRCP, Class IV – Area Drain Laterals	• An allowance was added to the OPC for future laterals.
Storm Drain	• Storm drain downstream of 222nd Street basin lowered and revised from double to single larger pipe where practical.
ROW Cost	• Meridian North Channel is longer and is now farther east from Pecos Road Basin, into Pinal County.
20% Contingency	• Added to OPC.

7. LANDSCAPE CONCEPTS

7.1 Introduction

As described in the Policy for the Aesthetic Treatment and Landscaping of Flood Control Projects (December 16, 1992), Landscape Aesthetics & Multiple-Use Design Guidelines for Flood Control Basins, Channels, and Flood Retarding Structures (December 23, 2004), and other various Context Sensitive Flood Hazard Mitigation design approach documents, the District Policy is to consider and incorporate aesthetic treatment in the design of new structures. The Policy provides direction for the development of aesthetic features and the allowable limits for funding these enhancements. The key is to integrally incorporate enhancements such as revegetation efforts (tall pot trees, native seed, salvage plants), earthwork and landform contouring, and bio-swales and rainwater harvesting swales to improve project aesthetics and enhance revegetation. Structural aesthetic treatments include the use of concrete form liners, organic shaped structures, integral color rip rap, and the use of a desert varnish stain or paint to provide a natural coloration to built objects. Basins can be screened by landscape screening, more effectively achieved with right of way acquisition to provide adequate buffer widths. Treatments can also apply to channels, in the way of side slope and channel meandering.

Important in the evaluation of design approaches is the context in which the project will exist. Both the current and future context are important in assessing the potential visual impact of the work. Since flood control projects are long term public works projects and exist for an indefinite amount of time, the initial investment in aesthetic improvements and revegetation can be shown to pay off over the lifetime of the project. Simple approaches such as easing the steepness of a sideslope can effect a profound visual improvement.

Other approaches that do have a positive visual impact come from the need to prevent erosion. Effective erosion control techniques are used integrally within the site, not just at the site perimeter, and are woven into the project design. These techniques include the use of seed mix and tall pot planting to reestablish vegetation on fresh earth, the use of angular rip rap on slopes or concentration points, building terraced or benched slopes, the use of wattles or erosion control fabric on exposed earth slopes to control water movement, the use of a low flow channel with higher earth mounds adjacent to it, and finally the use of a customized seed mix based on site specific study and observation. The goal is to create a native plant composition that seamlessly blends into the natural context.

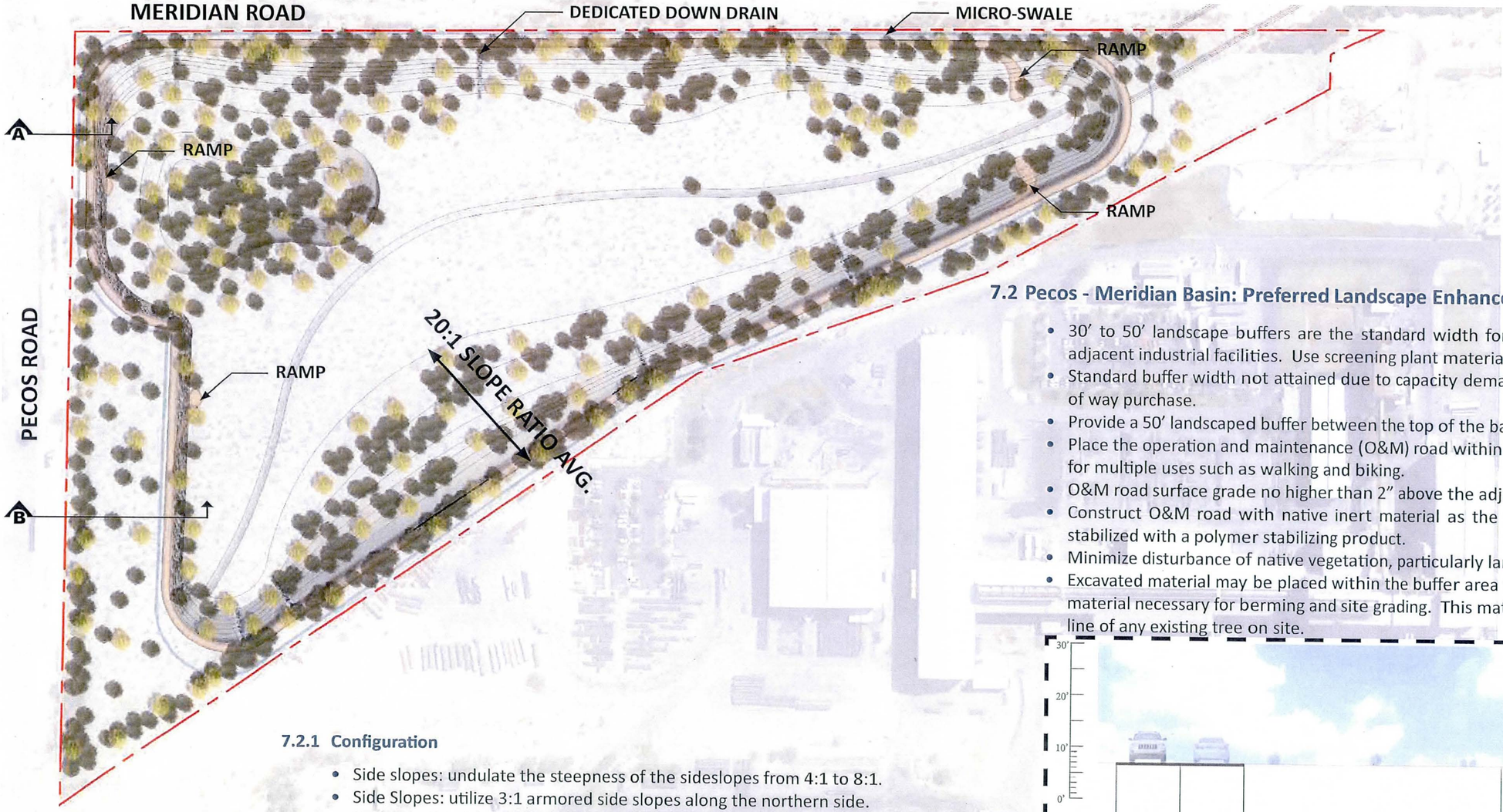
The Pecos Road project area will consist of two large detention basins and several channels conveying stormwater into and between the basins, then onward to the rest of the stormwater management system. Each basin will have an inlet point or two, and one outletting point. These points are anticipated to be constructed of concrete, necessary due to the volume and velocity of the flowing water. The size, shape, location, and composition of basins and channels present certain opportunities and constraints that may be possible for this project.

7.1.1 Opportunities

- Location: the project area is in eastern Maricopa County, an area that receives more rain than other areas in the county, which increases the potential success of revegetation approaches.
- Location: this site is adjacent to a large area of State Land, which can currently be accessed for equestrian and recreational use by permit.
- Recreation: the project area will create areas that can support passive recreation such as walking, hiking, and birdwatching.
- Vegetation: the project construction activities may be able to preserve some existing plant materials.
- Vegetation: when preservation is not possible the project construction, may be able to salvage and replant healthy plant material.
- Vegetation: the project will provide opportunities for collection and salvaging site seed, then and hand broadcasting in select areas to promote revegetation.
- Rainwater harvesting: the project can employ undulation of the ground plane, which can yield different amounts of captured rainwater and therefore non-uniform densities of vegetation.

7.1.2 Constraints

- Site Area: Available area is limited to the current available site. The City of Mesa would like to minimize the take of additional right of way.
- Budget: the budget is to be focused on executing the flood hazard mitigation demands of the project.
- Site Area: the site is projected to be sufficient in size for flood mitigation with a 15-ft perimeter buffer, not the 30 – 50 ft buffer specified in the Landscape Aesthetics & Multiple-Use Design Guidelines for Flood Contol Basins, Channels, and Flood Retarding Structures.
- Recreation: the site is not near regional trail corridors, nor other heavily used areas such as parks, bodies of water, or other open spaces.
- Future Uses: the site is bounded on one side by State Land. While that land is currently open space, the future development timeline and development type is undetermined, and this future use may be a detriment to the natural and aesthetic quality of this Pecos Road project).
- Industrial Context: the industrial context, both current and future projected land uses, do not provide incentive to the District or local partners to embellish the aesthetic enhancements of these sites.



N

7.2 Pecos - Meridian Basin: Preferred Landscape Enhancement Techniques

- 30' to 50' landscape buffers are the standard width for screening hardened facilities and adjacent industrial facilities. Use screening plant material, berms, and micro basins.
- Standard buffer width not attained due to capacity demand of basin and no additional right of way purchase.
- Provide a 50' landscaped buffer between the top of the basin and adjacent development.
- Place the operation and maintenance (O&M) road within the buffer area and design to allow for multiple uses such as walking and biking.
- O&M road surface grade no higher than 2" above the adjacent grade.
- Construct O&M road with native inert material as the finished surface. Material will be stabilized with a polymer stabilizing product.
- Minimize disturbance of native vegetation, particularly large trees, in the buffer zone.
- Excavated material may be placed within the buffer area to reduce the quantity of imported material necessary for berming and site grading. This material should be kept out of the drip line of any existing tree on site.

7.2.1 Configuration

- Side slopes: undulate the steepness of the sideslopes from 4:1 to 8:1.
- Side Slopes: utilize 3:1 armored side slopes along the northern side.
- Undulate the sides of the basin, every 300' to 500'.

A SECTION/ELEVATION
N.T.S.

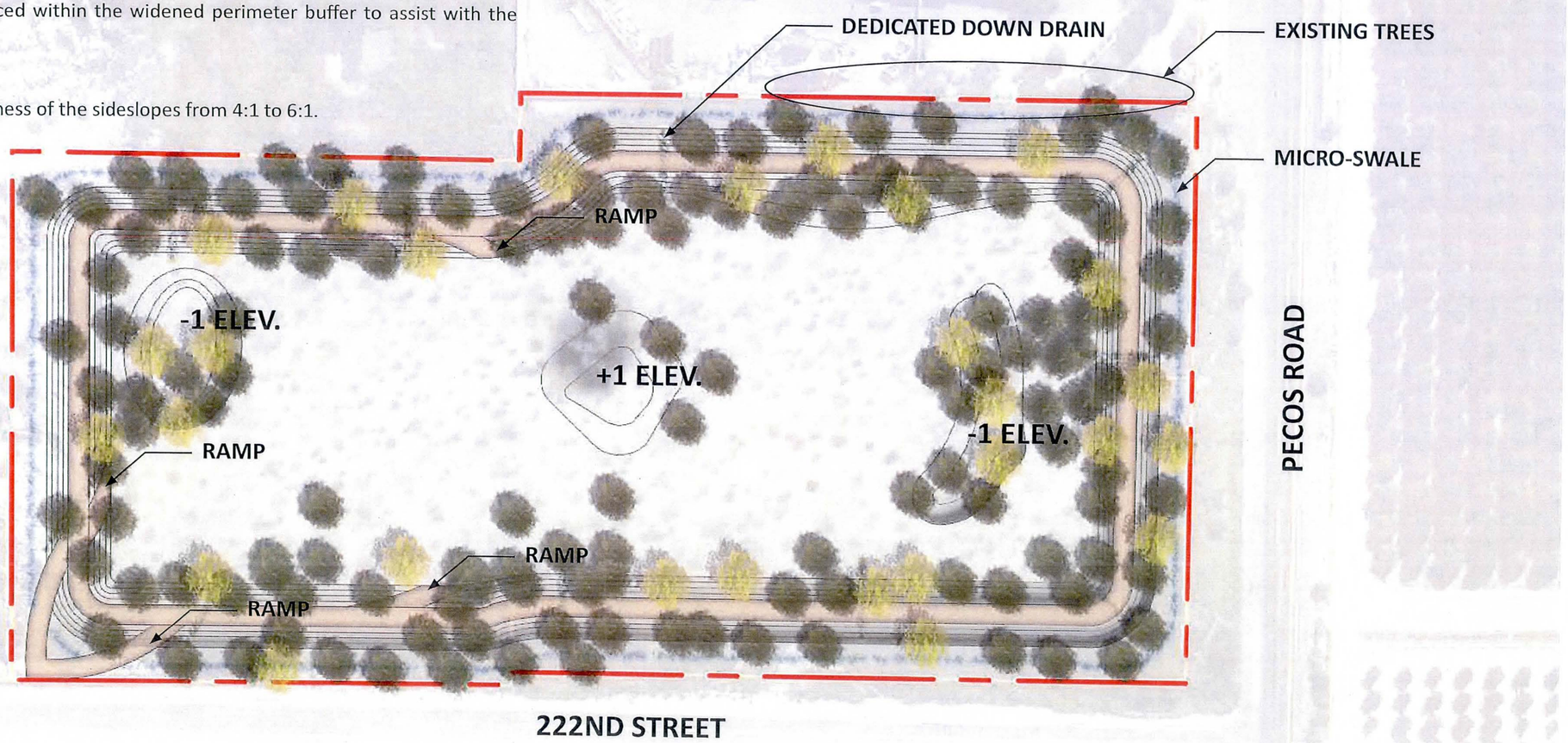
B SECTION/ELEVATION
N.T.S.

7.3 Pecos - 222nd St Basin: Preferred Landscape Enhancement Techniques

- Incorporate 30' to 50' landscape buffers for screening hardened facilities and adjacent industrial facilities. Use screening plant material, berms, and micro basins.
- Provide a terraced buffer on the west and south sides. Terraces can be the location of the O&M road to screen from direct view. This will also provide additional opportunities for multiple uses such as walking and biking.
- O&M road surface grade no higher than 2" above the adjacent grade.
- Construct O&M road with native inert material as the finished surface. Material will be stabilized with a polymer stabilizing product.
- Minimize disturbance of the east side native vegetation, particularly large trees, which help screen the basin from neighboring properties.
- Excavated material may be placed within the widened perimeter buffer to assist with the undulation of the basin form.

7.3.1 Configuration

- Side slopes: undulate the steepness of the sideslopes from 4:1 to 6:1.
- Side Slopes: utilize a terraced approach on west and southern sides.
- Undulate the sides of the basin, every 300' to 500'.
- Dedicated down drains
- Rainwater harvesting micro-swale at basin rim



7.4 Both Basins and Channels

7.4.1 Pre-Construction Activities

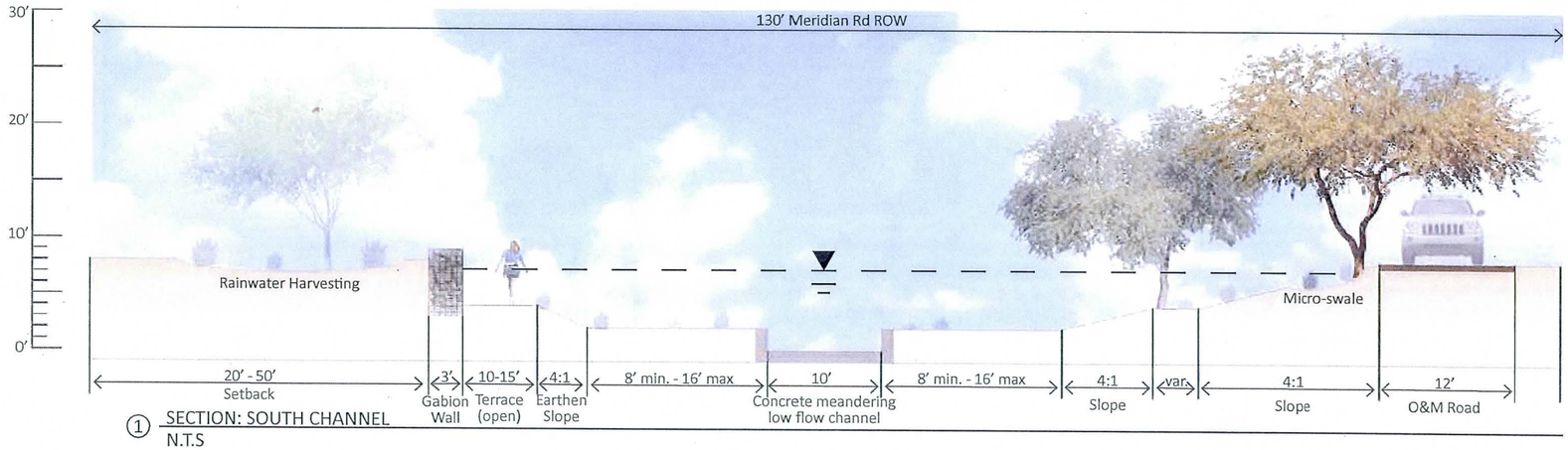
- Inventory existing trees at perimeter of site to determine which, if any, areas should be preserved from disturbance.
- Submit a Notice of Intent to Clear to Arizona State Land Department and make the site available for native plant salvage 30 to 90 days before the start of construction. Access to the site can be limited to specific dates, times and access points.
- Stockpile site boulders from surface and excavated soil for use at basin perimeters.

7.4.2 Vegetation

- Install hydroseed and tall pot trees at densities comparable to the existing perimeters. These basins are not temporary basins and therefore can be revegetated.
- Revegetation will not be supported by supplemental irrigation.
- Use Sonoran desert plant material in landscape buffer. A plant list has been developed for this project, and will utilize tall pot trees and native desert shrubs known to germinate from seed mix.
- Plant List includes plants identified as appropriate for the Natural Sonoran Desert Hydroriparian character unit.
- Select specific species native to the basin locations to respond to the context of the landscape character.
- Salvage native trees and plants including Saguaro and small cactus species. Maintain for replanting in the landscape or make available for sale by auction.
- Design the buffer landscape to transition the density, type, size, form, color, and texture of the plant material with the species found in the surrounding landscape.
- Locate vegetation along both sides of the O&M road to break the view of the line of the road alignment and provide shade.
- Trees, shrubs, and groundcovers should be arranged in an irregular pattern along the sides, bottom, and top of the basin side slopes to complement the character of the surrounding natural landscape.

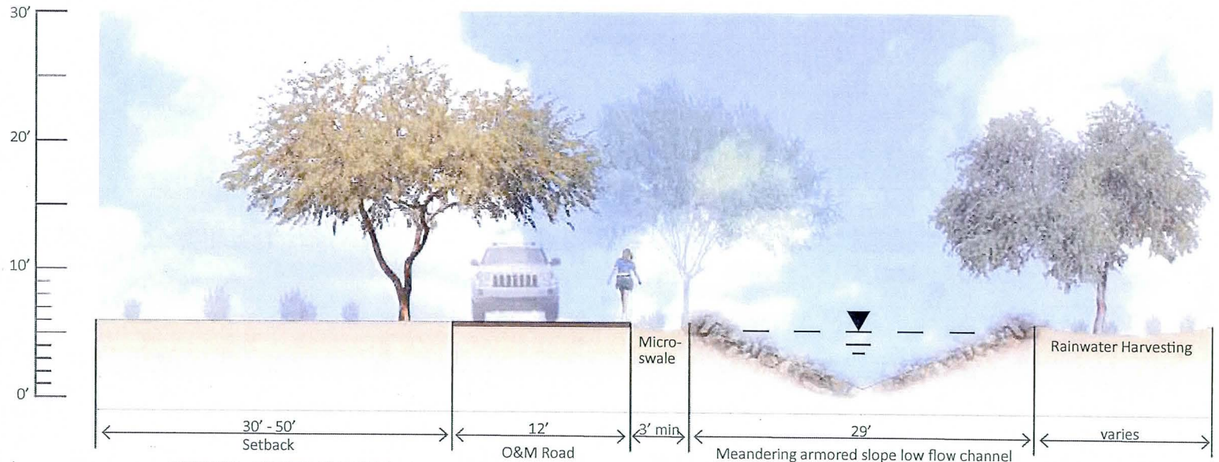
7.4.3 Inlet / Outlet Structures

- Design the structures to use the materials, shapes, colors, and textures that blend with the surrounding desert.
- Colors of materials should blend with the desert's darker color tones.
- Design structures using form liners to provide textures to blend with surrounding desert.



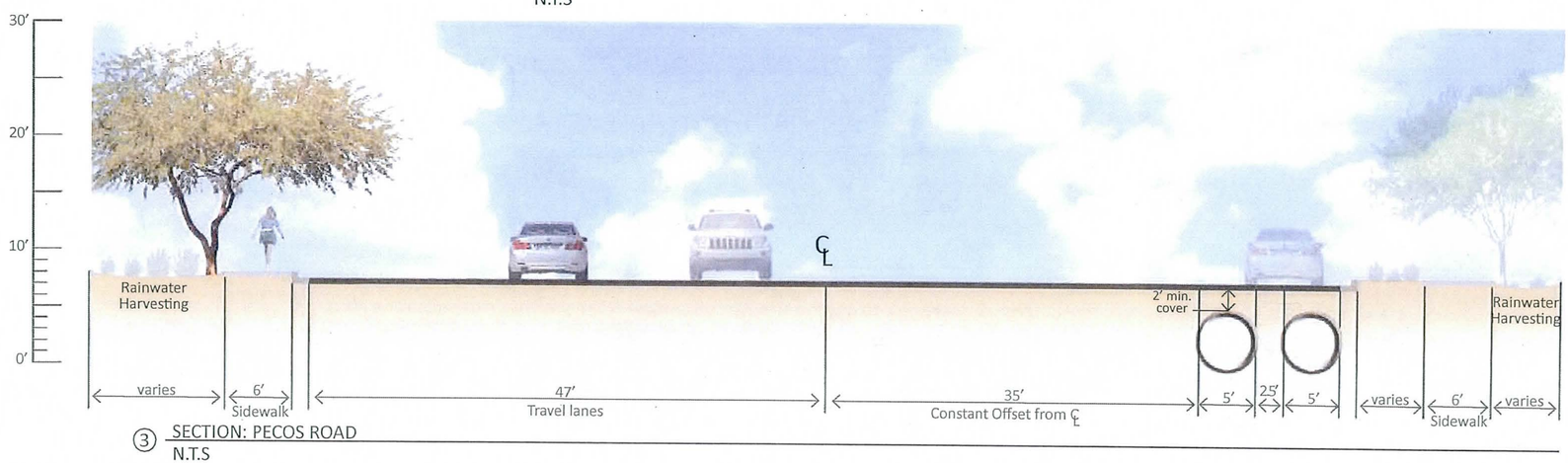
① SECTION: SOUTH CHANNEL
N.T.S

- Concrete low flow necessary due to flat site.
- Gabion wall necessary to provide area for terrace.
- 130' ROW.
- Micro-swales in the buffer areas for erosion protection, water harvesting, and vegetation reestablishment.



② SECTION: NORTH CHANNEL
N.T.S

- 44' ROW needed.
- Revegetation needed outside of ROW.
- Setback not in ROW.



③ SECTION: PECOS ROAD
N.T.S

- RCP are constantly 35' north of ROW center line.
- RCP are located under 2'-0" of cover.
- Width assumes Mesa's widest arterial, per Mesa Transportation Plan.

WALLS

FORMLINED NATURAL CONCRETE

ROCK FILLED GABION WALLS

NATURAL COLORED HEADWALL / WINGWALL

RIP RAP

NATURAL DARK COLOR

CONTEXT COLOR WITH MIXED SIZE

RIP RAP AND GROUNDPLANE COLOR

DECOMPOSED GRANITE

COLOR SELECTION

EROSION PROTECTION

STABILIZED FOR ACCESS WAYS

SAFETY RAIL

ORGANIC GEOMETRIES

BROWN COLORS

UNOBTRUSIVE

Kimley»Horn

HYDRORIPARIAN

TREE

CATCLAW ACACIA
Acacia constricta
Yellow puffballs are fragrant and are formed in clusters

IRONWOOD TREE
Olneya tesota
Bears masses of 1/2" wide lavender-pink blossoms in late spring

NETLEAF HACKBERRY
Celtis reticulata
Birds relish the tiny red berries, nubby protrusions form on bark

VELVET MESQUITE
Prosopis velutina
Excellent wildlife plant, larger thorns in its early years

SHRUBS

HACKBERRY
Celtis spp
Attractive orange berries, excellent wildlife plant

WOLFBERRY
Lycium berlandieri
Long lived shrub, produces red berries for consumption by wildlife

GRAYTHORN
Zizyphus obtusifolia
Great for wildlife, blue-black fruits attract birds

FOUR WING SALTBUSH
Atriplex canescens
Tolerates tough conditions, excellent wildlife plant

WILDFLOWER

DESERT MARIGOLD
Baileya multiradiata
Undemanding, reseeds easily, long period of color

SACRED DATURA
Datura wrightii
Boasts ornamental flowers that are sweetly fragrant

DESERT GLOBE MALLOW
Sphaeralcea ambigua subsp. Ambigua
Orange, white, pink, or lavender blooms in the spring

DESERT SENNA
Cassia covesii
Showy flowers occur mostly after spring and summer rains

XERORIPARIAN

SHRUBS

BRITTLE BUSH
Encelia farinosa
Blooms are yellow and daisylike winter - spring, seeds attract birds

CREOSOTE
Larrea tridentada
Fragrant with rain, yellow flowers early spring and with monsoons

DESERT BROOM
Baccharis sarothroides
Female plants develop dense clusters of white cottony seeds

TRIANGLE LEAF BURSAGE
Ambrosia deltoidea
Evergreen perennial, great for erosion control

TREE

WHITETHORN ACACIA
Acacia constricta
Great for naturalistic landscapes, attracts birds

IRONWOOD TREE
Olneya tesota
Fine textured gray-green foliage, flowers dusty lavender late spring

VELVET MESQUITE
Prosopis velutina
Yellow catkinlike flower clusters hang from branches in spring

BLUE PALO VERDE
Parkinsonia florida
Vivid spring color, nesting for birds

7.5 Plant List

HYDRORIPARIAN	
Trees	
Catclaw Acacia	*Acacia greggii*
Netleaf Hackberry	*Celtis reticulata*
Ironwood tree	*Olneya tesota*
Velvet Mesquite	*Prosopis velutina*
Shrubs	
Triangle leaf Bursage	*Ambrosia deltoidea*
Four wing Saltbush	*Atriplex canescens*
Desert Broom	*Baccharis sarothroides*
Hackberry	*Celtis spp*
Wolfberry	*Lycium berlandieri*
Graythorn	*Zizyphus obtusifolia*
Wildflowers/Forbs	
Desert Marigold	*Baileya multiradiata*
Sacred Datura	*Datura wrightii*
Arizona evening primrose	*Oenothera arizonica*
Arrow-weed	*Pluchea sericea*
Desert globe mallow	*Sphaeralcea ambigua subsp. Ambigua*

XERORIPARIAN	
Trees	
Whitethorn acacia	*Acacia constricta*
Ironwood tree	*Olneya tesota*
Velvet Mesquite	*Prosopis velutina*
Shrubs	
Triangle leaf Bursage	*Ambrosia deltoidea*
Desert Broom	*Baccharis sarothroides*
Brittle bush	*Encelia farinosa*
Creosote	*Larrea tridentada*
Wolfberry	*Lycium berlandieri*
Graythorn	*Zizyphus obtusifolia*
Wildflowers/Forbs	
Desert Marigold	*Baileya multiradiata*
Desert Senna	*Cassia covesii*
Sacred Datura	*Datura wrightii*
Gordon's bladderpod	*Lesquerella gordonii*
Spanish needles	*Palafoxia arida var. arida*
Desert globe mallow	*Sphaeralcea ambigua subsp. Ambigua*
Desert zinnia	*Zinnia acerosa*

- This is a partial list of plant materials to be considered in the overall design of future facilities.

8 PUBLIC INVOLVEMENT

Kimley-Horn, the District, and the City of Mesa presented the three alternatives to the land owners and businesses along the Pecos Road corridor on September 18, 2014. A summary of the project, the purpose and location were presented in addition to the general hydrology and components of each alternative. The meeting was then opened up for questions and comments from the attendees. The attendees expressed a strong unanimous preference for Alternative 3. Several questions were asked regarding the selection and timing of the improvements. Written comments were also collected at the meeting. The meeting notes, comments, and sign-in sheets are provided in **Appendix G**.

Kimley-Horn, the District, and the City of Mesa presented the DCR Drainage System 15% plans to land owners and businesses along the Pecos Road corridor on December 18, 2014. The plans were presented in roll plot format. Several questions were asked regarding the funding and timing of the improvements. In general the plan was well received by the attendees. The meeting invitation and sign-in sheets are provided in **Appendix G**.

9 SUMMARY

1. The DCR Drainage System meets the project objectives, including the goals outlined by the City of Mesa to reduce the overall project footprint, minimize the takes on existing right-of-way and maximize the use of the existing culverts at Ellsworth Road.
2. Offsite runoff is conveyed in proposed concrete channels along the Meridian and McKenzie Road alignments in subcritical conditions with one foot of freeboard.
3. The basin at the southwest corner of Pecos and Meridian Road attenuates flow from approximately 1160 cfs to 180 cfs. The basin was designed with a minimum slope of 0.15% and one foot of freeboard. The basin includes a concrete low flow channel.
4. The basin at the southeast corner of Pecos and 222nd Street attenuates flow from approximately 350 cfs to 215 cfs. The basin was designed with a minimum slope of 0.15% and one foot of freeboard.
5. Runoff is conveyed along Pecos Road in a storm drain within the ultimate roadway alignment. The hydraulic grade line is a minimum of one foot below the ground.
6. The opinion of probable cost for the DCR Drainage System is $24.3M. This cost includes construction, utility relocation, right-of-way, design, and contingency costs.
7. The DCR Drainage System assumes that the future SR-24 is in place. Once it is, this project will decrease the existing runoff at Ellsworth and Pecos Road from approximately 1500 cfs to 570 cfs. The proposed discharge from Pecos Road will not negatively impact the Ellsworth Road channel or the Powerline Floodway.

10 REFERENCES

Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County Volume I Hydrology*, August 2013.

Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County Volume II Hydraulics*, August 2013.

Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County Volume III Erosion Control*, August 2013.

Flood Control District of Maricopa County, *Drainage Policy and Standards Manual for Maricopa County*, January 2007.

Flood Control District of Maricopa County, Drainage Memo – Sediment Yield Analysis for Pecos Road Detention Basin, July 2014.

Flood Control District of Maricopa County, East Mesa Area Drainage Master Plan Update – Hydrologic Analysis, August 2011.

Flood Control District of Maricopa County, *East Mesa Area Drainage Master Plan Update – Proposed Alternative Development*, prepared by Entellus, February 2014.

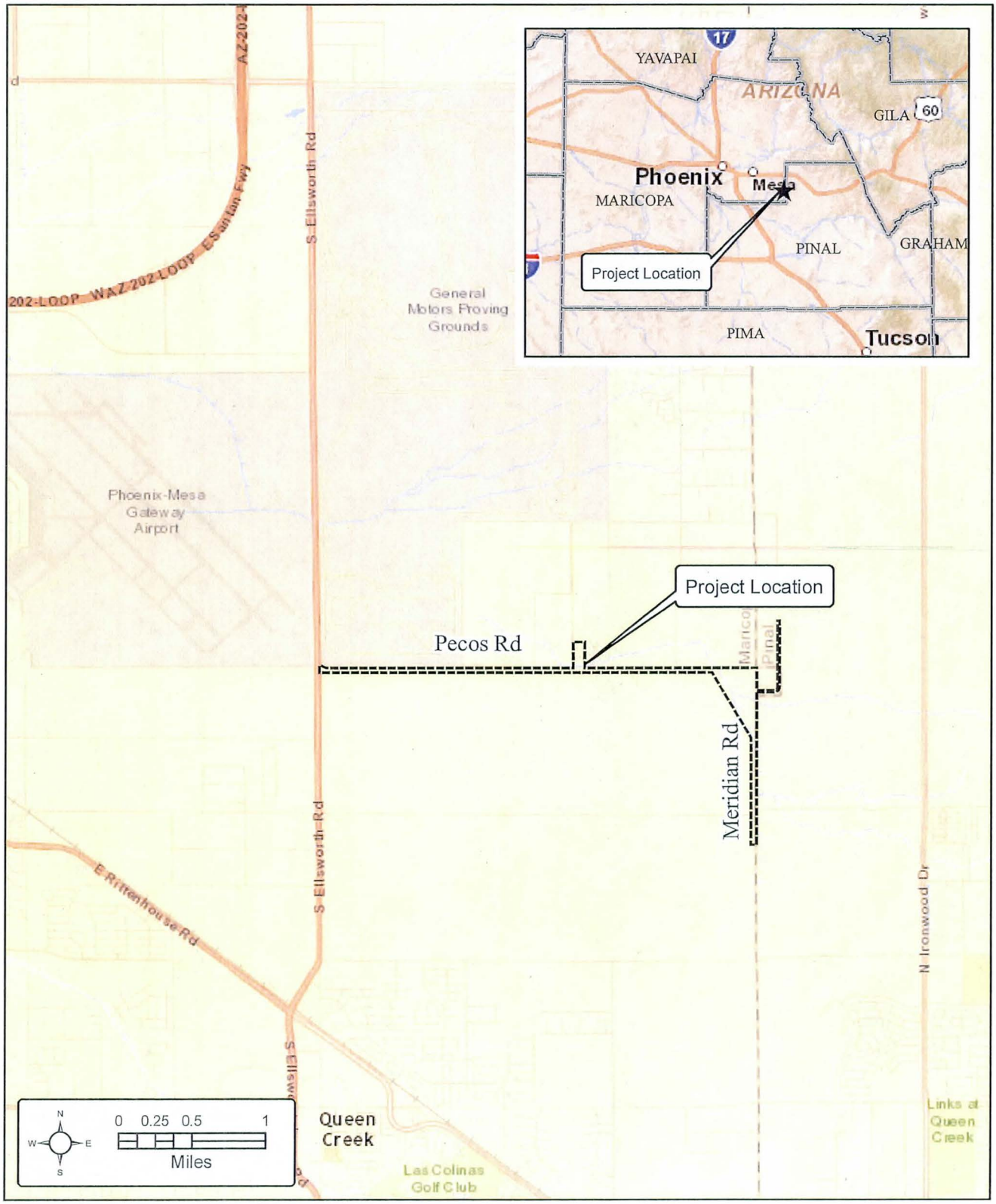
Flood Control District of Maricopa County, Policy for the Aesthetic Treatment and Landscaping of Flood Control Projects, December 1992.

Maricopa County Department of Transportation, *Final Drainage Report, Ellsworth Road - Phase 1 - Germann Road to Ray Road*, prepared by Amec, May 2005.

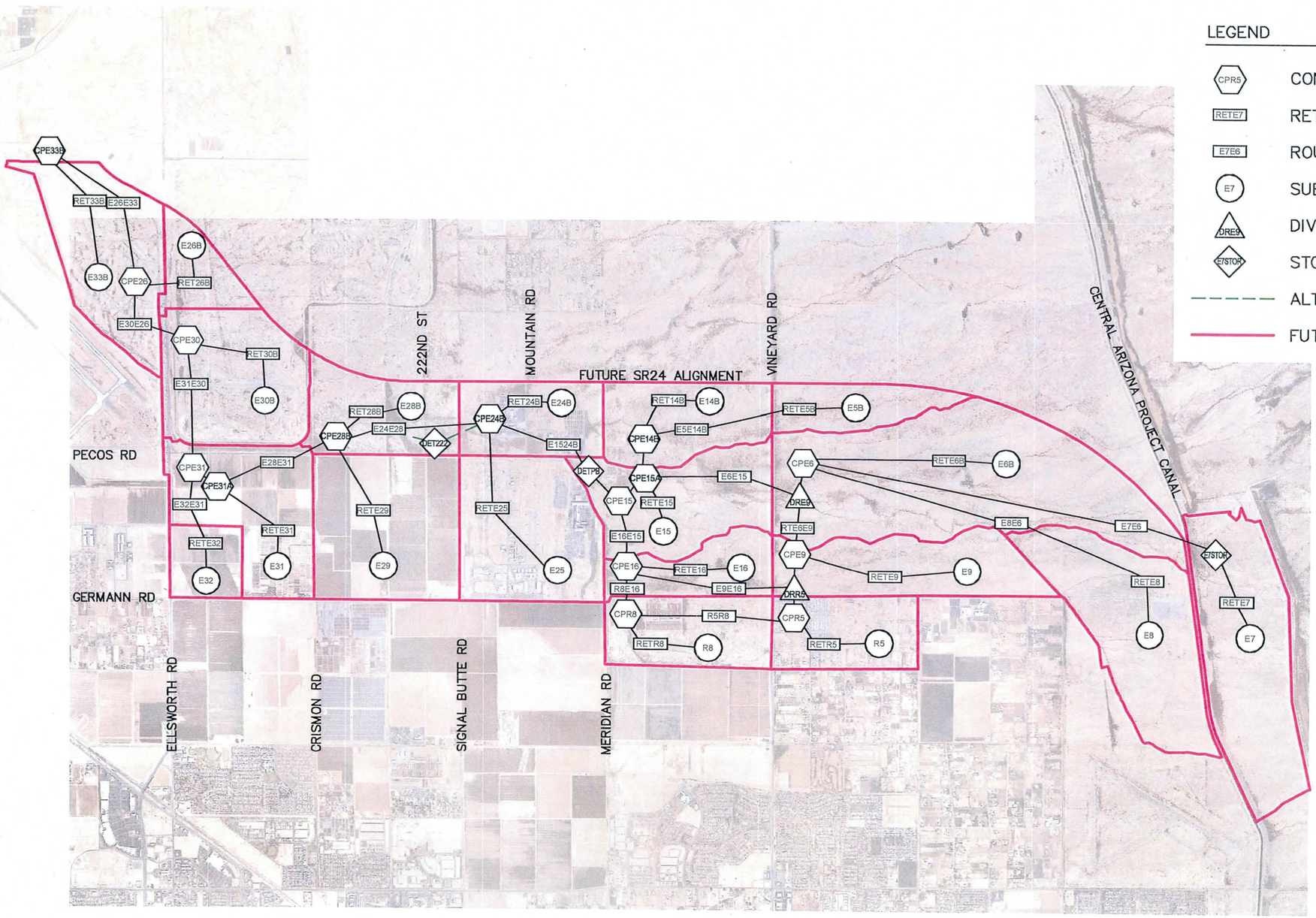
Kimley»Horn

Appendix A. Exhibits

- Location Map
- HEC-1 Schematic – Alternatives
- HEC-1 Schematic – DCR Drainage System
- Alternative 1
- Alternative 2
- Alternative 3
- DCR Drainage System
- DCR Drainage System with Implementation Phasing



Kimley»Horn	Pecos Road Channel and Basin Design Concept Report	Maricopa County, Arizona
	Location Map	



NORTH

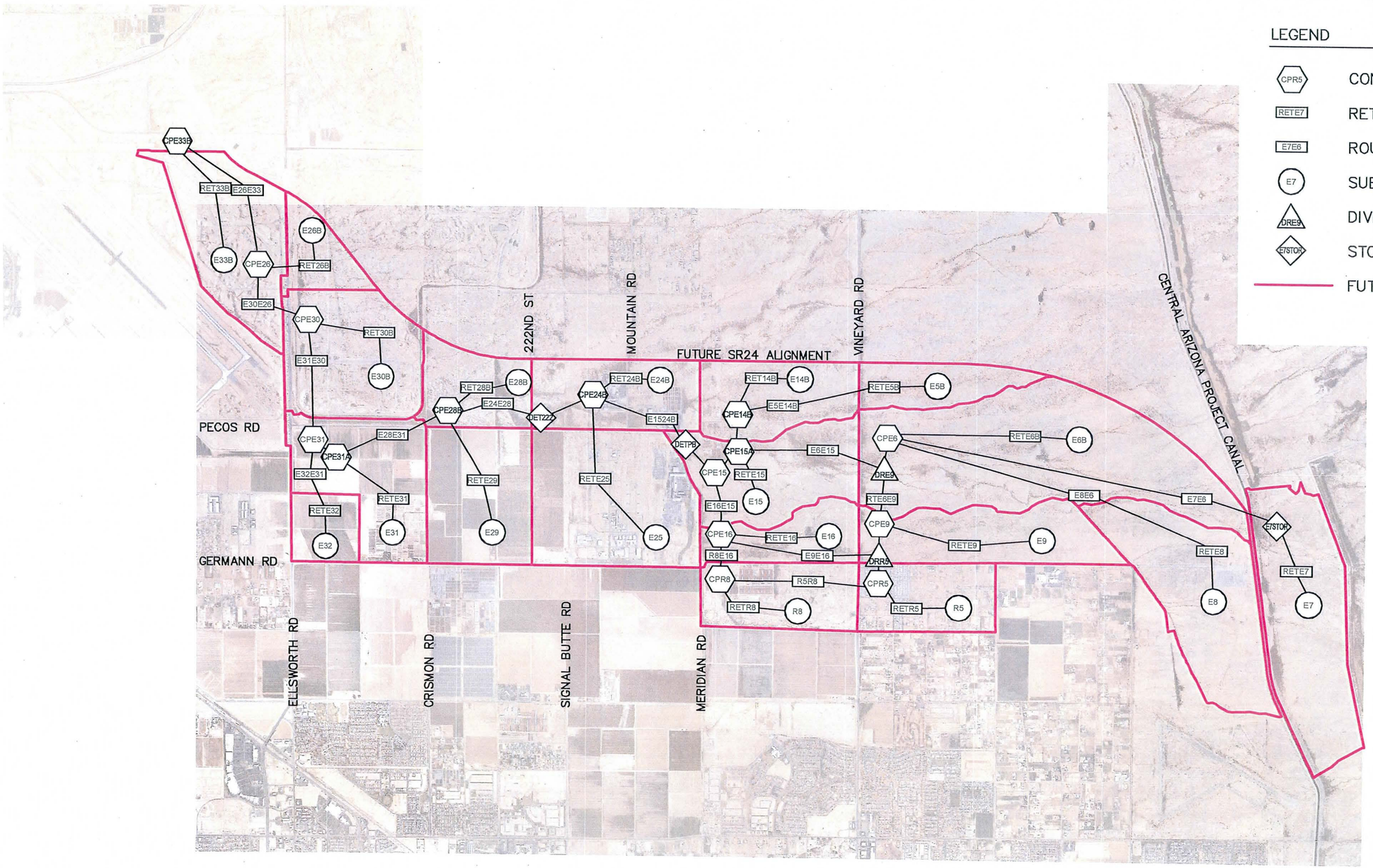
GRAPHIC SCALE IN FEET
0 1000 2000 4000

PECOS ROAD CHANNEL AND BASIN
DESIGN CONCEPT REPORT

FUTURE CONDITIONS
HEC-1 SCHEMATIC
ALTERNATIVES ANALYSIS

Kimley»Horn

K:\PHX_WaterResources\091131024\CADD\Exhibits\HEC-1 Schematic_100yr24hr.dwg Jan 06, 2015 melanie.wadsworth
XREFS: xAERIAL_091131024



NORTH

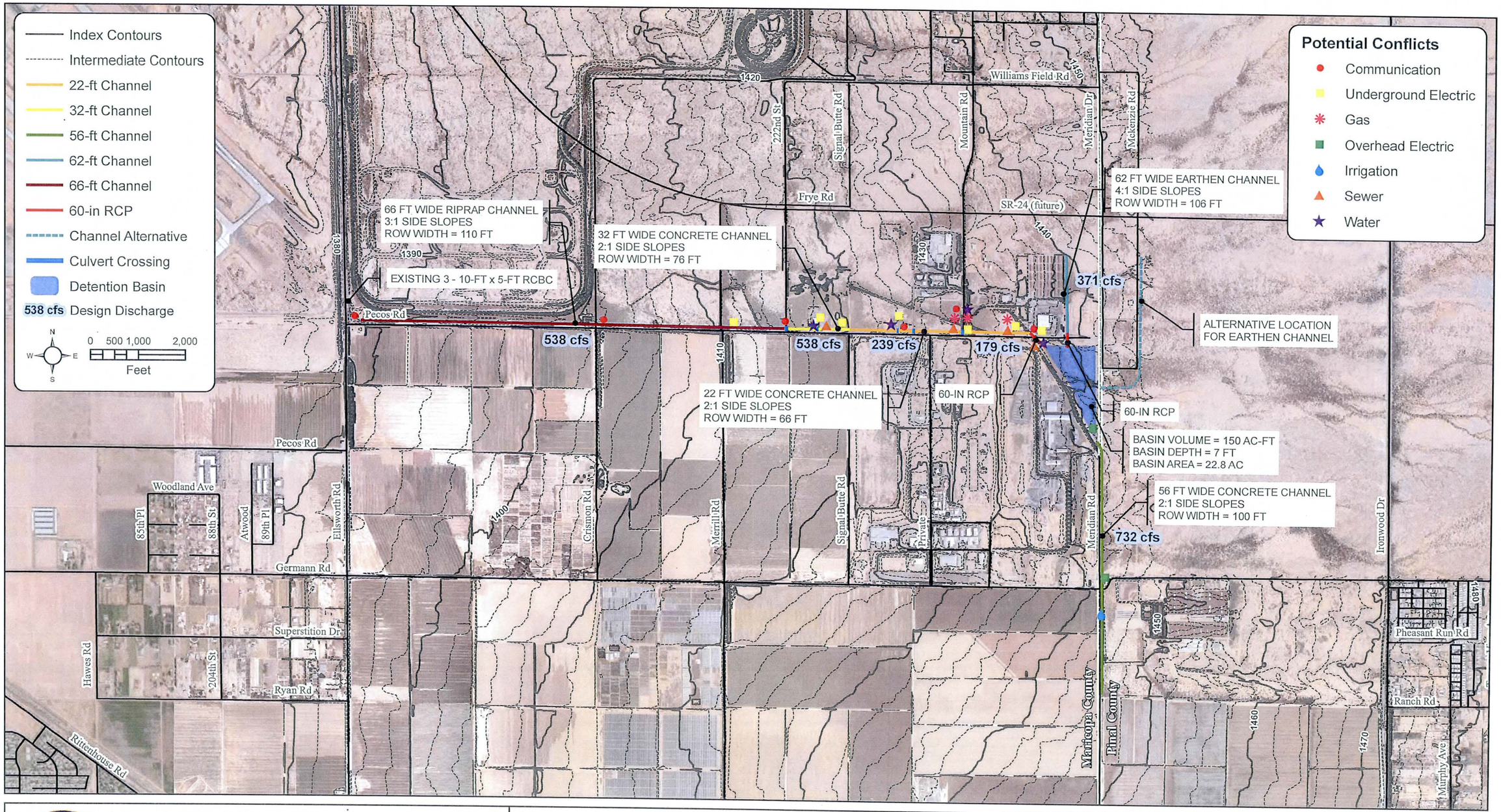
GRAPHIC SCALE IN FEET
0 1000 2000 4000

PECOS ROAD CHANNEL AND BASIN
DESIGN CONCEPT REPORT

FUTURE CONDITIONS
HEC-1 SCHEMATIC
DCR DRAINAGE SYSTEM

Kimley»Horn

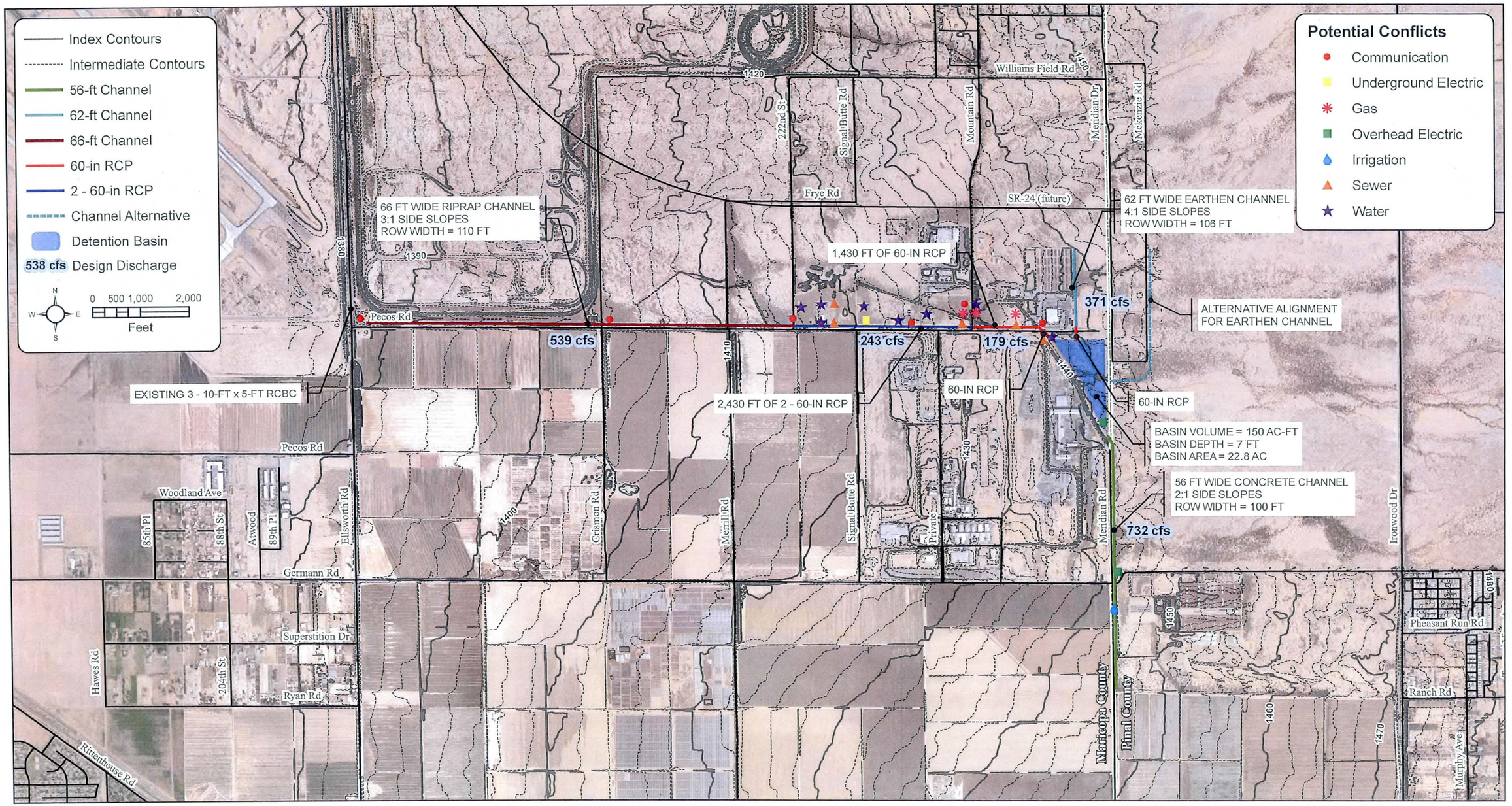
K:\PHX_WaterResources\091131024\CADD\Exhibits\HEC-1 Schematic_100yr24hr.dwg Jan 06, 2015 melanie.wadsworth
XREFS: xAERIAL_091131024



Flood Control District of Maricopa County

Kimley»Horn

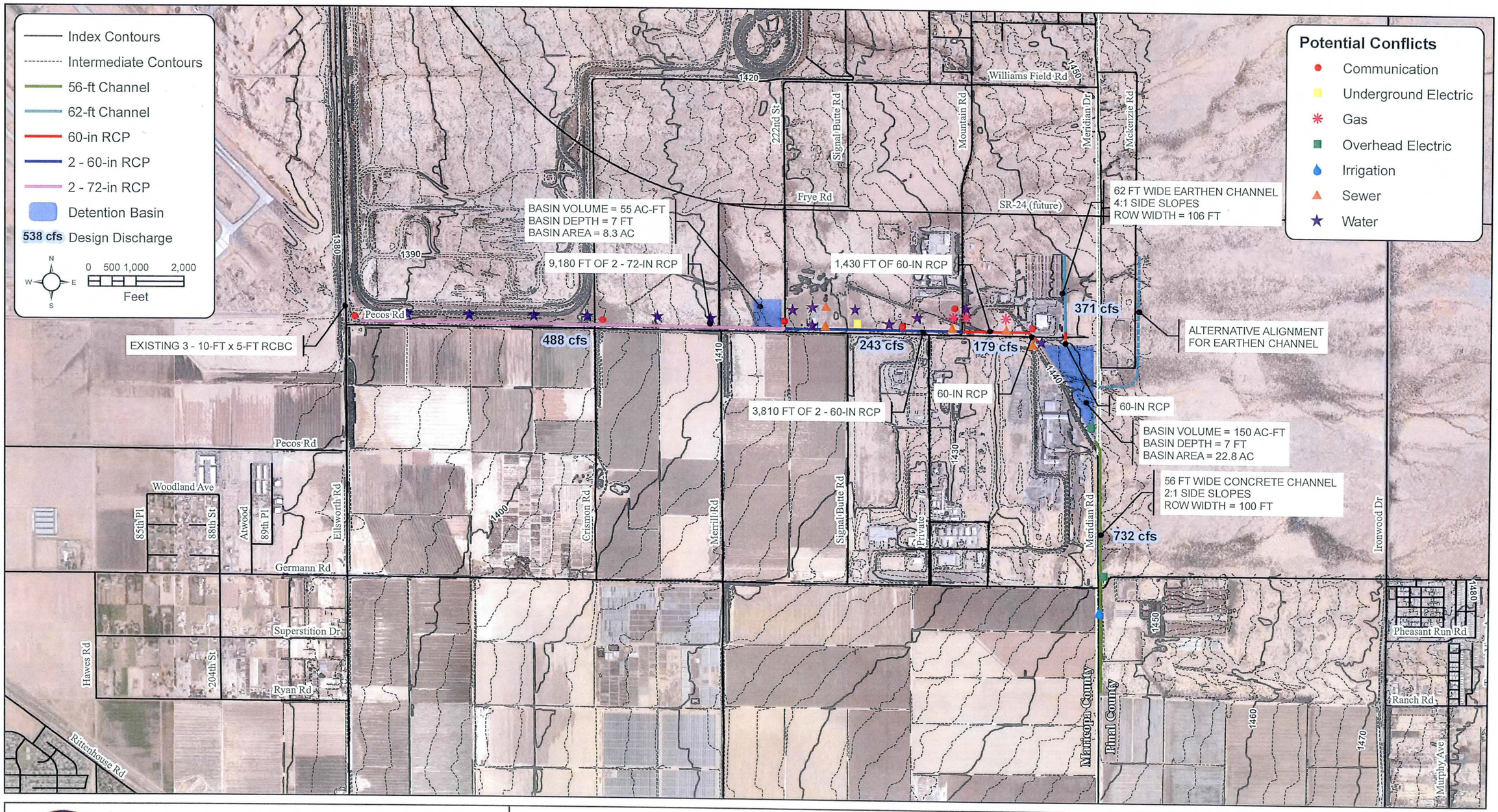
Pecos Road Channel and Basin Design Concept Report	Flood Control District of Maricopa County City of Mesa
Alternative 1	



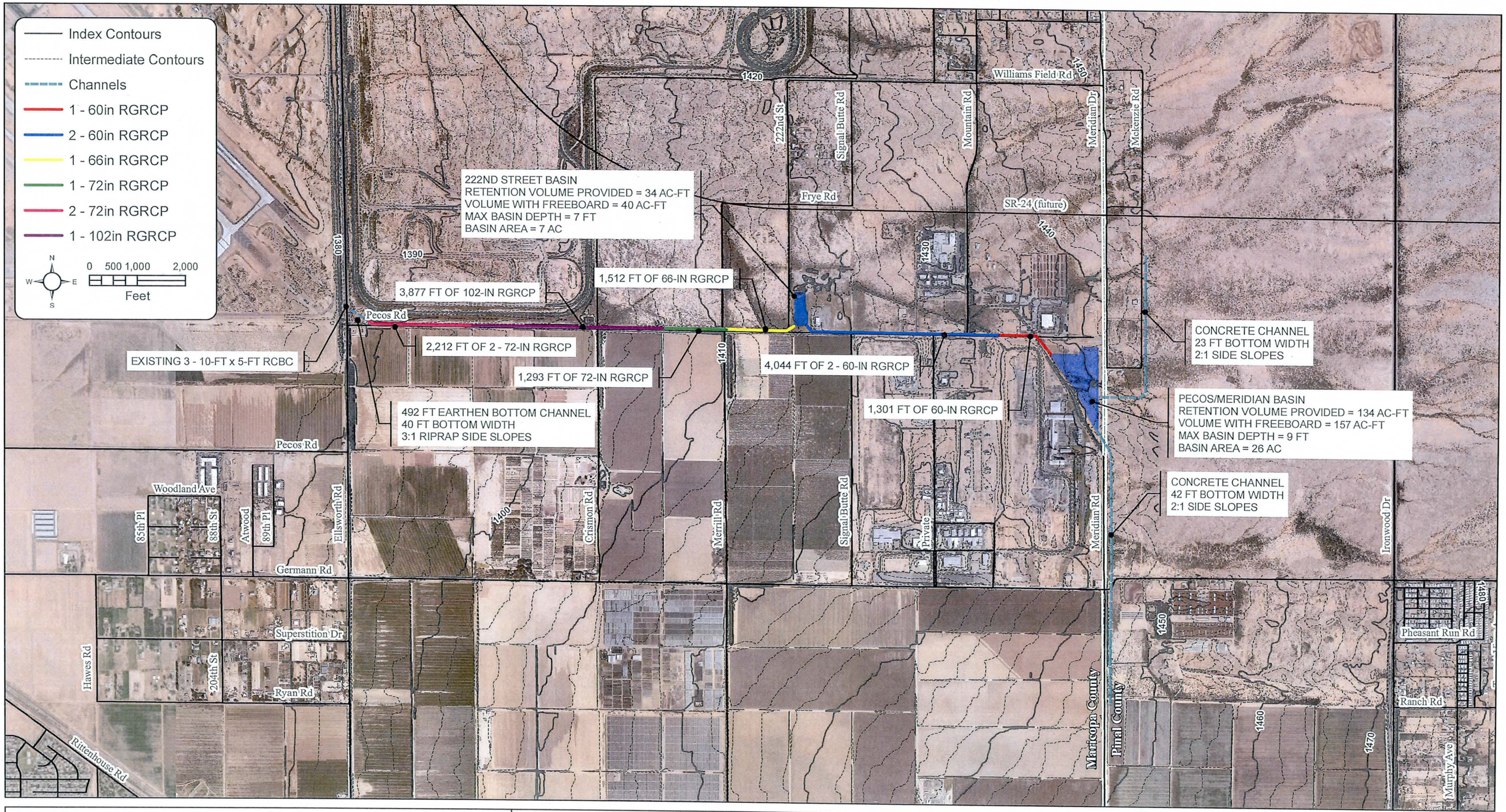
Flood Control District of Maricopa County

Kimley»Horn

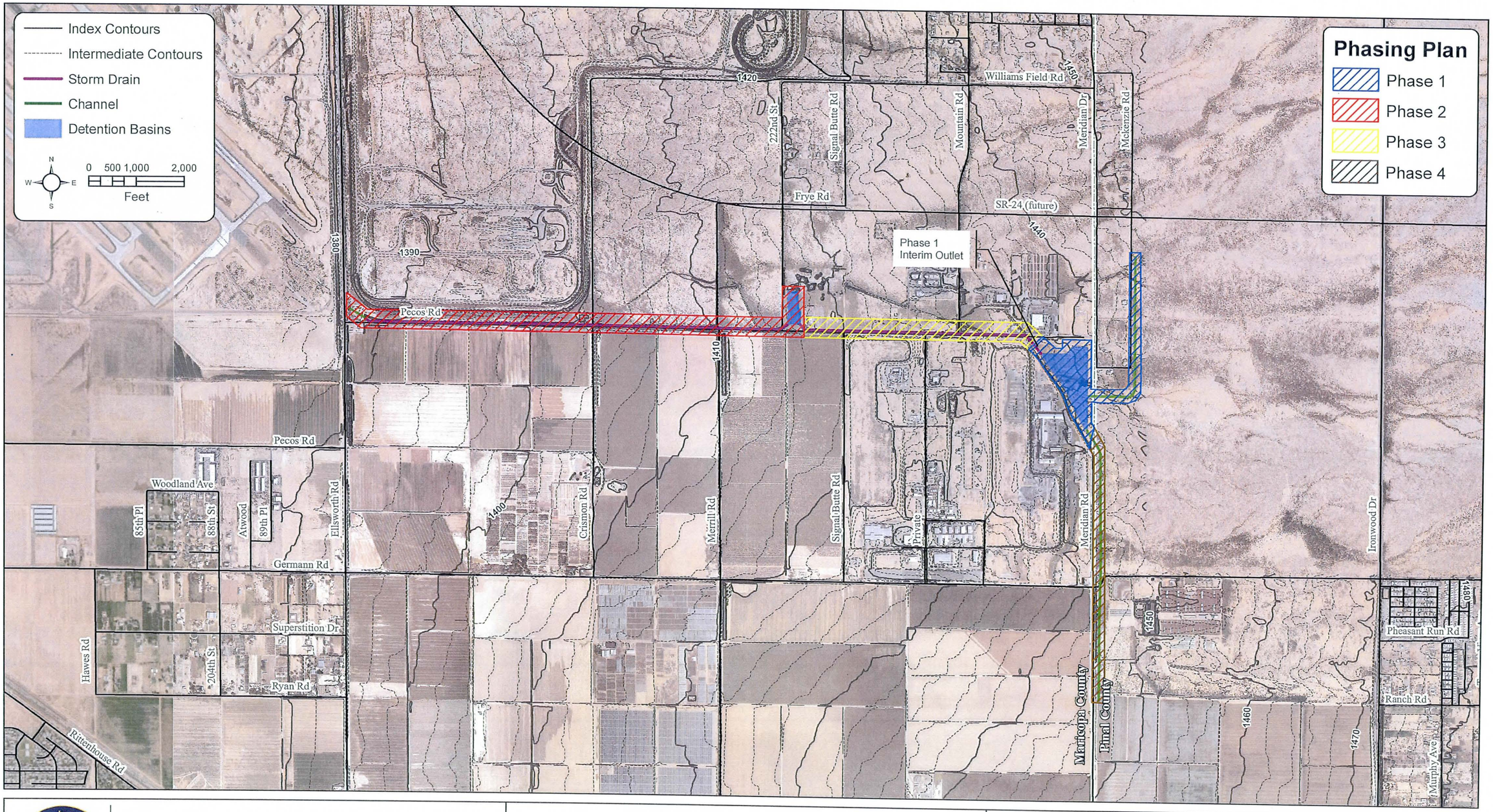
Pecos Road Channel and Basin Design Concept Report	Flood Control District of Maricopa County City of Mesa
Alternative 2	



Flood Control District of Maricopa County / Kimley»Horn	Pecos Road Channel and Basin Design Concept Report	Flood Control District of Maricopa County City of Mesa
	Alternative 3	



Kimley»Horn	Pecos Road Channel and Basin Design Concept Report	Flood Control District of Maricopa County City of Mesa
	DCR Drainage System	



Kimley»Horn	Pecos Road Channel and Basin Design Concept Report	Flood Control District of Maricopa County City of Mesa
	DCR Drainage System with Implementation Phasing	

Kimley»Horn

Appendix B. Alternatives Hydrology

- Alternative 1 HEC-1 Model Output
- Alternative 2 HEC-1 Model Output
- Alternative 3 HEC-1 Model Output

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   28AUG14  TIME  08:56:01   *
*                                       *
*****************************************
```

```
*************************************
*                                   *
*   U.S. ARMY CORPS OF ENGINEERS    *
*   HYDROLOGIC ENGINEERING CENTER   *
*         609 SECOND STREET         *
*       DAVIS, CALIFORNIA 95616     *
*           (916) 756-1104          *
*                                   *
*************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X       X     X        XX
X     X  X       X              X
XXXXXXX  XXXX    X       XXXXX  X
X     X  X       X              X
X     X  X       X     X        X
X     X  XXXXXXX  XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   1          ID      Pecos Road Channel and Basin Design Concept Report
   2          ID      Alternative Analysis
   3          ID      Future Conditions
   4          ID
   5          ID      Prepared for the Flood Control District of Maricopa County
   6          ID      District Project Number FCD 2014C001
   7          ID
   8          ID      Prepared by Kimley-Horn and Associates, Inc.
   9          ID      Kimley Horn Project Number 091131024
  10          ID      August 2014
  11          ID
  12          ID      Model based on the East Mesa Area Drainage Master Plan Update (EMADMPU)
  13          ID        for Alternative 1. The model was revised to include only those areas
  14          ID        contributing to the Ellsworth Channel.
  15          ID
  16          ID      List of Changes:
  17          ID      - Basin DIVPB at Pecos Rd and Meridian was changed from a diversion card
  18          ID        to a storage routing card with stage-storage-discharge data; the name
  19          ID        was changed from DIVPB to DETPB to reflect the change.
  20          ID      - Routing reach from CPR9 to CPR8 was eliminated
  21          ID      - Powerline section of the model was deleted (all subbasins north of the
  22          ID        future SR24 alignment).
  23          ID      - All subbasins south and east of R5 and R8 have been deleted.
  24          ID      - All comments from the East Mesa Area Drainage Master Plan Update that do
  25          ID        pertain to the Ellsworth Channel model have been deleted.
  26          ID      - Area has been adjusted on HC cards to account for reduction in area due
  27          ID        retention diversions.
  28          ID
  29          ID
  30          ID
  31          ID          ************************************************************************
  32          ID          ************************** EAST MESA ADMPU **************************
  33          ID          ************************************************************************
  34          ID
  35          ID          PROJECT:                EAST MESA AREA DRAINAGE MASTER PLAN UPDATE
  36          ID          CLIENT:                 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  37          ID          PREPARED BY:    ENTELLUS, INC.
  38          ID          PROJECT NO:             FCD 2011C017            ENTELLUS 310.057
  39          ID          MODIFIED DATE:  9/12/2012
  40          ID          MODELER:                RLJ
  41          ID
  42          ID          STORM:                  100-YEAR 24-HOUR
  43          ID
  44          ID          ALTERNATIVE:    1
  45          ID
  46          ID          DEVELOPMENT CONDITIONS: FUTURE LAND USE
  47          ID                                                  INCREASED FUTURE RETENTION (2.19->2.70 IN)
  48          ID
  49          ID          PROPOSED INFRASTRUCTURE: MOUNTAIN CHANNEL AND RETENTION BASIN
  50          ID                                                  MERIDIAN CHANNEL
  51          ID                                                  PECOS CHANNEL
  52          ID                                                  MERIDIAN AND PECOS RETENTION BASIN
  53          ID                                                  GERMANN CHANNEL
  54          ID
  55          ID          MODIFICATION 1: RETENTION VOLUMES WERE INCREASED TO
```

```
1                                     HEC-1 INPUT                                               PAGE  2

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   56         ID              100-YEAR, 2-HOUR NOAA 2 RAINFALL WITH 80% EFFECTIVE
   57         ID              VOLUME WITHIN THE CITY OF MESA AND TOWN OF QUEEN CREEK FOR THE F
   58         ID                                            SUBBASINS:
   59         ID
   60         ID                                            E28B    E29            E30B
   61         ID                                            E31             E32              E33B
   62         ID
   63         ID          MODIFICATION 4: MERIDIAN CHANNEL (SOUTH OF PECOS): CPR8
   64         ID                                            RETOUTED TO COMBINE NORTH UP MERIDIAN ROAD TO COMBINE
   65         ID                                            WITH CPE16 AND FOLLOW THE EXISTING FLOW PATH TO
   66         ID                                            PROPOSED RETENTION AT MERIDIAN AND PECOS.
   67         ID
   68         ID          MODIFICATION 5: PECOS CHANNEL (WEST OF MERIDIAN): CPE24B WAS MODIFIED TO
   69         ID                                            COMBINE WITH E25 AND WAS ROUTED ON PECOS ROAD. CPE29
   70         ID                                            WAS MODIFIED TO COMBINE WITH E29. NEW ROUTES WERE
   71         ID                                            DEFINED ON PECOS ROAD.
   72         ID
   73         ID          MODIFICATION 6: MERIDIAN AND PECOS OFFLINE RETENTION: ADDED DIVERSION
   74         ID                                            DIVPB AFTER CPE15 WITH A BYPASS FLOW OF 265 CFS
   75         ID
   76         ID
   77         ID          **********************************************************************
   78         ID          ************************** EAST MESA ADMPU **************************
   79         ID          **********************************************************************
   80         ID
   81         ID      FUTEMADMP24 20110519 - EMADMPU 24-hr Future Conditions 20110519
   82         ID      Flood Control District of Maricopa County
   83         ID      100 YEAR
   84         ID      24 Hour Storm
   85         ID      Unit Hydrograph: S-Graph
   86         ID      08/05/2011
   87         ID      ************************************************************
   88         IT      5 12Aug14       0    2000                        2000
   89         IN     15
   90         IO      5
              *DIAGRAM
              *
   91         JD   3.579  0.0001
   92         PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
   93         PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
   94         PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
   95         PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
   96         PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
   97         PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
   98         PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
   99         PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
  100         PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
  101         PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
  102         JD   3.561     1.0
  103         JD   3.490     5.0
  104         JD   3.400    10.0
  105         JD   3.286    20.0
  106         JD   3.221    30.0
  107         JD   3.175    40.0
  108         JD   3.139    50.0
1                                     HEC-1 INPUT                                               PAGE  3

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  109         JD   3.114    60.0
              *

  110         KK      E7   BASIN
  111         KM   Runoff from subbasin E7
  112         BA   1.124
  113         LG    0.24    0.26    5.10    0.32      35
  114         UI       0      64      64     102     224     281     328     369     416     477
  115         UI     561     725     814     670     575     512     449     390     339     300
  116         UI     226     159     113     106      99      64      64      46      20      20
  117         UI      20      20      20      20      20      20       0       0       0       0
  118         UI       0       0       0       0       0       0       0       0       0       0
              *

  119         KK   DIVE7  DIVERT
  120         KM   Divert the required retention volume for the subbasin out of the model
  121         DT   RETE7    85.5     0.0
  122         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
  123         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

  124         KK  E7STOR STORAGE
  125         RS       1    STOR
  126         SV           22.82   34.23   45.64   78.34  111.03  143.72  176.42  230.23  284.04
  127         SQ                    1.75    5.50   11.00   17.70   25.70   34.20   43.00   51.70
  128         SE  1566.0 1567.00 1567.50 1568.00 1568.50 1569.00 1569.50 1570.00 1570.50 1571.00
  129         ST  1574.0 10000.0     3.0     1.5
              *

  130         KK    E7E6   ROUTE
```

```
131          KM    Route outfall from E7STOR to CPE6
132          RS      23    FLOW
133          RC   0.035   0.030   0.030   16362  0.0062    5.50
134          RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
135          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
             *

136          KK     E6B   BASIN
137          KM    Runoff from subbasin E6B
138          BA   1.949
139          LG    0.14    0.25    6.00    0.24      59
140          UI       0     174     277     677     898    1079    1330    1853    2099    1602
141          UI    1321    1068     853     594     331     288     192     162      53      53
142          UI      53      53      53       0       0       0       0       0       0       0
143          UI       0       0       0       0       0       0       0       0       0       0
144          UI       0       0       0       0       0       0       0       0       0       0
             *

145          KK  DIVE6B  DIVERT
146          KM   Divert the required retention volume for the subbasin out of the model
147          DT  RETE6B   179.9     0.0
148          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
149          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *
1                                        HEC-1 INPUT                                        PAGE  4

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

150          KK      E8   BASIN
151          KM    Runoff from subbasin E8
152          BA   1.099
153          LG    0.21    0.25    4.50    0.44      39
154          UI       0      75      75     201     313     383     441     514     604     798
155          UI     955     771     649     563     475     401     337     241     145     127
156          UI     114      75      75      28      23      23      23      23      23      23
157          UI       0       0       0       0       0       0       0       0       0       0
158          UI       0       0       0       0       0       0       0       0       0       0
             *

159          KK   DIVE8  DIVERT
160          KM   Divert the required retention volume for the subbasin out of the model
161          DT   RETE8    80.9     0.0
162          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
163          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

164          KK    E8E6   ROUTE
165          KM    Route runoff from subbasin E8 that is not retained to CPE6
166          RS       9    FLOW
167          RC   0.060   0.035   0.060    9833  0.0052    5.50
168          RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
169          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
             *

170          KK    CPE6 COMBINE
171          KM    Combine routed flow from E7STOR and subbasin E8 with unretained runoff from
172          KM    subbasin E6B.
173          HC       3    3.05
             *

174          KK    DE6S  DIVERT
175          KM    Flow split diversion, DRE9 to the south, DE6S to the west
176          DT    DRE9      0.0     0.0
177          DI     0.0   236.0   682.0  1141.0  1670.0  2261.0  2886.0     0.0     0.0     0.0
178          DQ     0.0     1.0    13.0   212.0   633.0  1096.0  1568.0     0.0     0.0     0.0
             *

179          KK   E6E15   ROUTE
180          KM    Route remaining flow from flow split at DE6S west to CPE15A
181          RS       7    FLOW
182          RC   0.035   0.030   0.035    8259  0.0042    5.50
183          RX  950.00  975.00  991.00 1003.00 1007.00 1019.00 1030.00 1065.00
184          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
             *

185          KK     E5B   BASIN
186          KM   Runoff from subbasin E5B
187          BA   0.286
188          LG    0.14    0.25    3.95    0.64      62
189          UI       0      64     225     342     567     435     287     148      74      36
190          UI      15      15       0       0       0       0       0       0       0       0
191          UI       0       0       0       0       0       0       0       0       0       0
1                                        HEC-1 INPUT                                        PAGE  5

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

192          UI       0       0       0       0       0       0       0       0       0       0
193          UI       0       0       0       0       0       0       0       0       0       0
             *

194          KK  DIVE5B  DIVERT
195          KM   Divert the required retention volume for the subbasin out of the model
```

```
 196          DT  RETE5B    25.0      0.0
 197          DI     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
 198          DQ     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
              *

 199          KK  E5E14B   ROUTE
 200          KM    Route runoff from subbasin E5B that is not retained to CP14B
 201          RS       5    FLOW
 202          RC   0.035   0.030    0.035     6256  0.0054     5.50
 203          RX  950.00  985.00   991.00  1003.00 1007.00 1019.00 1025.00 1050.00
 204          RY    5.50    4.50     4.00     1.00    1.00    4.00    4.50    5.50
              *

 205          KK    E14B   BASIN
 206          KM   Runoff from subbasin E14B
 207          BA   0.528
 208          LG    0.14    0.25     5.60     0.29      60
 209          UI       0     125      435      667    1086     785     512     237     126      53
 210          UI      29      29        0        0       0       0       0       0       0       0
 211          UI       0       0        0        0       0       0       0       0       0       0
 212          UI       0       0        0        0       0       0       0       0       0       0
 213          UI       0       0        0        0       0       0       0       0       0       0
              *

 214          KK  DIV14B  DIVERT
 215          KM   Divert the required retention volume for the subbasin out of the model
 216          DT  RET14B    48.4      0.0
 217          DI     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
 218          DQ     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
              *

 219          KK   CP14B COMBINE
 220          KM    Combine routed flow from E5B with unretained runoff from subbasin E14B.
 221          HC       2
              *

 222          KK  E14E15 ROUTE
 223          KM   Route combined runoff from CP14B to CPE15A
 224          RS       2    FLOW
 225          RC    0.04    0.03     0.04     1840  0.0018
 226          RX       0       9       18       29      40      51      59      68
 227          RY       4       2        0        0       0       0       2       4
              *
1                                            HEC-1 INPUT                                              PAGE  6

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 228          KK     E15   BASIN
 229          KM   Runoff from subbasin E15
 230          BA   0.777
 231          LG    0.15    0.25     5.10     0.35      57
 232          UI       0     106      363      582     791    1239    1004     734     522     273
 233          UI     171     106       36       32      32       0       0       0       0       0
 234          UI       0       0        0        0       0       0       0       0       0       0
 235          UI       0       0        0        0       0       0       0       0       0       0
 236          UI       0       0        0        0       0       0       0       0       0       0
              *

 237          KK  DIVE15  DIVERT
 238          KM   Divert the required retention volume for the subbasin out of the model
 239          DT  RETE15    67.7      0.0
 240          DI     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
 241          DQ     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
              *

 242          KK  CPE15A COMBINE
 243          KM   Combine routed flow from split at CPE6 (DRE9, DE6S) and CP14B with unretained
 244          KM   runoff from subbasin E15.
 245          HC       3    4.29
              *

 246          KK    DRE9RETRIEVE
 247          KM   Retrieve flow from split at DRE9 that goes to the south
 248          DR    DRE9
              *

 249          KK  RTE6E9   ROUTE
 250          KM   Route split flow from CPE6 (DRE9) south to CPE9
 251          RS       5    FLOW
 252          RC   0.035   0.030    0.025     2200  0.0035     6.00
 253          RX    0.00  100.00   700.00  1050.00 1090.00 1110.00 1140.00 1240.00
 254          RY    0.00    6.00     4.00     1.00    1.00    5.00    6.00    6.00
              *

 255          KK      E9   BASIN
 256          KM   Runoff from subbasin E9
 257          BA   0.723
 258          LG    0.14    0.25     5.40     0.30      58
 259          UI       0      88      253      450     585     836    1040     754     570     416
 260          UI     225     148       92       48      27      27      27       0       0       0
 261          UI       0       0        0        0       0       0       0       0       0       0
 262          UI       0       0        0        0       0       0       0       0       0       0
```

```
 263          UI      0      0      0      0      0      0      0      0      0      0
              *

 264          KK   DIVE9  DIVERT
 265          KM   Divert the required retention volume for the subbasin out of the model
 266          DT   RETE9    65.4     0.0
 267          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 268          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *
1                                        HEC-1 INPUT                                        PAGE  7

 LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 269          KK    CPE9 COMBINE
 270          KM   Combine routed flow from split at CPE6 (DRE9) with unretained runoff from
 271          KM   subbasin E9
 272          HC       2    1.07
              *

 273          KK    DE9S  DIVERT
 274          KM    Flow split diversion, DRR5 to the south, DE9S to the west
 275          DT    DRR5      0.0     0.0
 276          DI     0.0     78.0   163.0   440.0   936.0  1475.0  2024.0     0.0     0.0     0.0
 277          DQ     0.0      1.0    43.0   245.0   670.0  1157.0  1661.0     0.0     0.0     0.0
              *

 278          KK   E9E16   ROUTE
 279          KM    Route remaining flow from flow split at DE9S west to CPE16
 280          RS       6    FLOW
 281          RC   0.035   0.030   0.035    6751  0.0040    5.50
 282          RX  950.00  985.00  991.00 1003.00 1007.00 1019.00 1025.00 1060.00
 283          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
              *

 284          KK    DRR5RETRIEVE
 285          KM   Retrieve flow from split at DRR5 that goes to the south
 286          DR    DRR5
              *

 287          KK      R5   BASIN
 288          KM   Runoff from subbasin R5
 289          BA   0.504
 290          LG    0.29    0.25    5.40    0.27      21
 291          UI       0      53     120     241     310     393     574     608     455     358
 292          UI     277     189      98      80      53      26      16      16      16      16
 293          UI       0       0       0       0       0       0       0       0       0       0
 294          UI       0       0       0       0       0       0       0       0       0       0
 295          UI       0       0       0       0       0       0       0       0       0       0
              *

 296          KK   DIVR5  DIVERT
 297          KM   Divert the required retention volume for the subbasin out of the model
 298          DT   RETR5     1.0     0.0
 299          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 300          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 301          KK    CPR5 COMBINE
 302          KM   Combine routed flow from split at CPE9 (DRR5) with unretained runoff from
 303          KM   subbasin R5
 304          HC       2    1.07
              *
1                                        HEC-1 INPUT                                        PAGE  8

 LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 305          KK    R5R8   ROUTE
 306          KM   Route combined runoff from CPR5 to CPR8
 307          RS       5    FLOW
 308          RC   0.040   0.035   0.040    6587  0.0043    5.00
 309          RX  966.00  986.00  994.00 1006.00 1012.00 1024.00 1032.00 1052.00
 310          RY    5.00    4.50    4.00    1.00    1.00    4.00    4.50    5.00
              *

 311          KK      R8   BASIN
 312          KM   Runoff from subbasin R8
 313          BA   0.554
 314          LG    0.16    0.25    4.60    0.45      64
 315          UI       0      69     208     360     471     695     788     567     421     299
 316          UI     149     105      69      23      21      21      21       0       0       0
 317          UI       0       0       0       0       0       0       0       0       0       0
 318          UI       0       0       0       0       0       0       0       0       0       0
 319          UI       0       0       0       0       0       0       0       0       0       0
              *

 320          KK   DIVR8  DIVERT
 321          KM   Divert the required retention volume for the subbasin out of the model
 322          DT   RETR8    50.5     0.0
 323          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 324          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *
```

```
         325            KK    CPR8 COMBINE
         326            KM    Combine routed runoff from CPR5 with unretained runoff from subbasin R8
         327            HC       2    1.62
                        *

         328            KK    R8E16 ROUTE
         329            KM    Route combined flows from CPR8 to CPE16 in the proposed MERIDIAN SOUTH CHANNE
         330            RS       3    FLOW
         331            RC    0.03    0.04    0.03    2660   0.001
         332            RX       0      16      33      45      58      71      87     103
         333            RY       7       3       0       0       0       0       3       7
                        *

         334            KK     E16   BASIN
         335            KM    Runoff from subbasin E16
         336            BA    0.396
         337            LG    0.15    0.25    5.10    0.35      57
         338            UI       0      58     224     342     497     684     480     338     207     100
         339            UI      64      26      18      18       0       0       0       0       0       0
         340            UI       0       0       0       0       0       0       0       0       0       0
         341            UI       0       0       0       0       0       0       0       0       0       0
         342            UI       0       0       0       0       0       0       0       0       0       0
                        *
1                                              HEC-1 INPUT                                              PAGE  9

        LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         343            KK  DIVE16  DIVERT
         344            KM    Divert the required retention volume for the subbasin out of the model
         345            DT  RETE16    35.1     0.0
         346            DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         347            DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                        *

         348            KK    CPE16 COMBINE
         349            KM    Combine routed flow from split at CPE9 (DRR5, DE9S) and routed flow from CPR8
         350            KM    with unretained runoff from subbasin E16.
         351            HC       3    2.52
                        *

         352            KK  E16E15 ROUTE
         353            KM    Route combined flows from CPE16 to CPE15 in the MERIDIAN SOUTH CHANNEL
         354            RS       4    FLOW
         355            RC    0.03    0.04    0.03    4120   0.001
         356            RX       0      16      33      44      56      68      84     100
         357            RY       7       3       0       0       0       0       3       7
                        *

         358            KK    CPE15 COMBINE
         359            KM    Combine routed flows from CPE16 in the MERIDIAN SOUTH CHANNEL with flows
         360            KM    from the north and east at the southwest corner of Pecos and Meridian. These
         361            KM    flows combine in the proposed Pecos Basin (DETPB)
         362            HC       2    6.81
                        *

         363            KK    DETPB STORAGE
         364            KM    Proposed offline retention basin at SWC Meridian and Pecos
         365            KM    Basin is 7-ft deep basin, but the top foot is not included (freeboard)
         366            KM    Side slopes are 4:1, outlet pipe is 60-in, overflow spillway at 6 ft
         367            KO       3
         368            RS       1    STOR
         369            SV       0    21.9    43.9    66.1    88.4   110.8   133.3   144.7   156.0
         370            SQ       0      15      60     119     173     176     177     189     201
         371            SE       0       1       2       3       4       5       6     6.5       7
                        *

         372            KK  E1524B ROUTE
         373            KM    Route discharge from basin DETPB in PECOS CHANNEL to Signal Butte & Pecos
         374            RS       3    FLOW
         375            RC   0.035   0.035   0.035    3800  0.0035
         376            RX       0      11      21      23      25      27      38      48
         377            RY       7       4       0       0       0       0       4       7
                        *

         378            KK     E25   BASIN
         379            KM    Runoff from subbasin E25
         380            BA    0.932
         381            LG    0.15    0.25    5.40    0.30      55
         382            UI       0      86     146     342     451     546     683     986     969     749
         383            UI     613     490     383     234     148     125      86      51      26      26
         384            UI      26      26       0       0       0       0       0       0       0       0
1                                              HEC-1 INPUT                                              PAGE 10

        LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

         385            UI       0       0       0       0       0       0       0       0       0       0
         386            UI       0       0       0       0       0       0       0       0       0       0
                        *

         387            KK  DIVE25  DIVERT
         388            KM    Divert the required retention volume for the subbasin out of the model
```

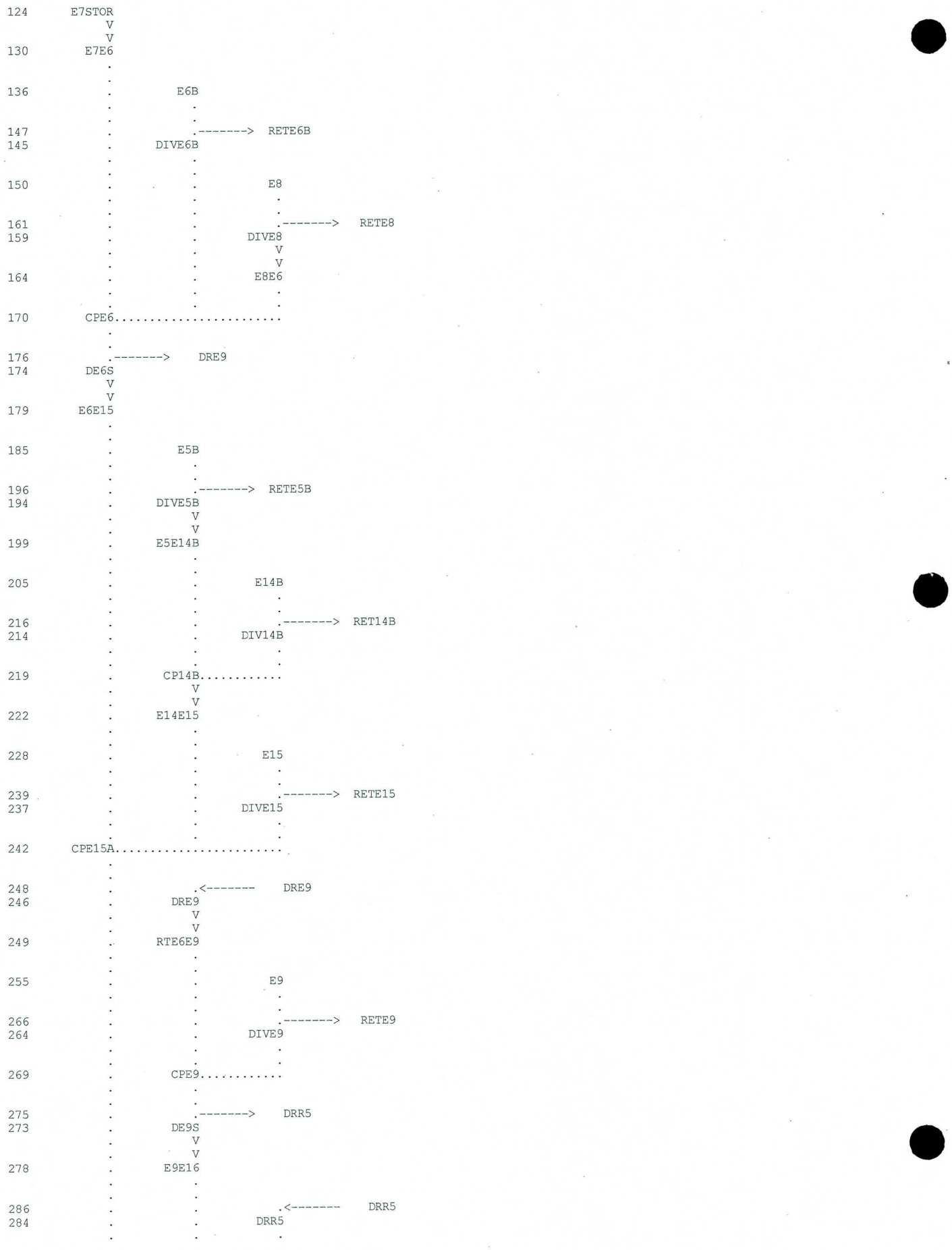
```
KM   MODIFIED MAX VOLUME FROM 110.7 TO 89.8
DT  RETE25    89.8      0.0
DI     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
DQ     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
*

KK    E24B   BASIN
KM   Runoff from subbasin E24B
BA   0.464
LG    0.15     0.15     7.30     0.14       57
UI       0       92      339      513      852      731      493      294      133       76
UI      24       24        0        0        0        0        0        0        0        0
UI       0        0        0        0        0        0        0        0        0        0
UI       0        0        0        0        0        0        0        0        0        0
UI       0        0        0        0        0        0        0        0        0        0
*

KK  DIV24B  DIVERT
KM   Divert the required retention volume for the subbasin out of the model
KM   MODIFIED MAX VOLUME FROM 38.7 TO 44.4
DT  RET24B    44.4      0.0
DI     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
DQ     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
*

KK  CPE24B COMBINE
KM   Combine routed discharge from basin DETPB with unretained runoff from
KM   subbasins E25 and E24B in PECOS CHANNEL at Signal Butte & Pecos
HC       3    8.20
*

KK  E24E28 ROUTE
KM   Route combined flows from CPE24B in PECOS CHANNEL to CPE28B at Crismon
KM   and Pecos
RS       4    FLOW
RC   0.035   0.035   0.035    5320  0.0035
RX       0      11      21      24      28      31      42      52
RY       7       4       0       0       0       0       4       7
*

KK    E28B   BASIN
KM   Runoff from subbasin E28B
BA   0.539
LG    0.20     0.15     8.40     0.09       51
UI       0       65      183      329      427      606      772      566      430      318
UI     179      110       73       41       20       20       20        0        0        0
UI       0        0        0        0        0        0        0        0        0        0
UI       0        0        0        0        0        0        0        0        0        0
UI       0        0        0        0        0        0        0        0        0        0
*
```

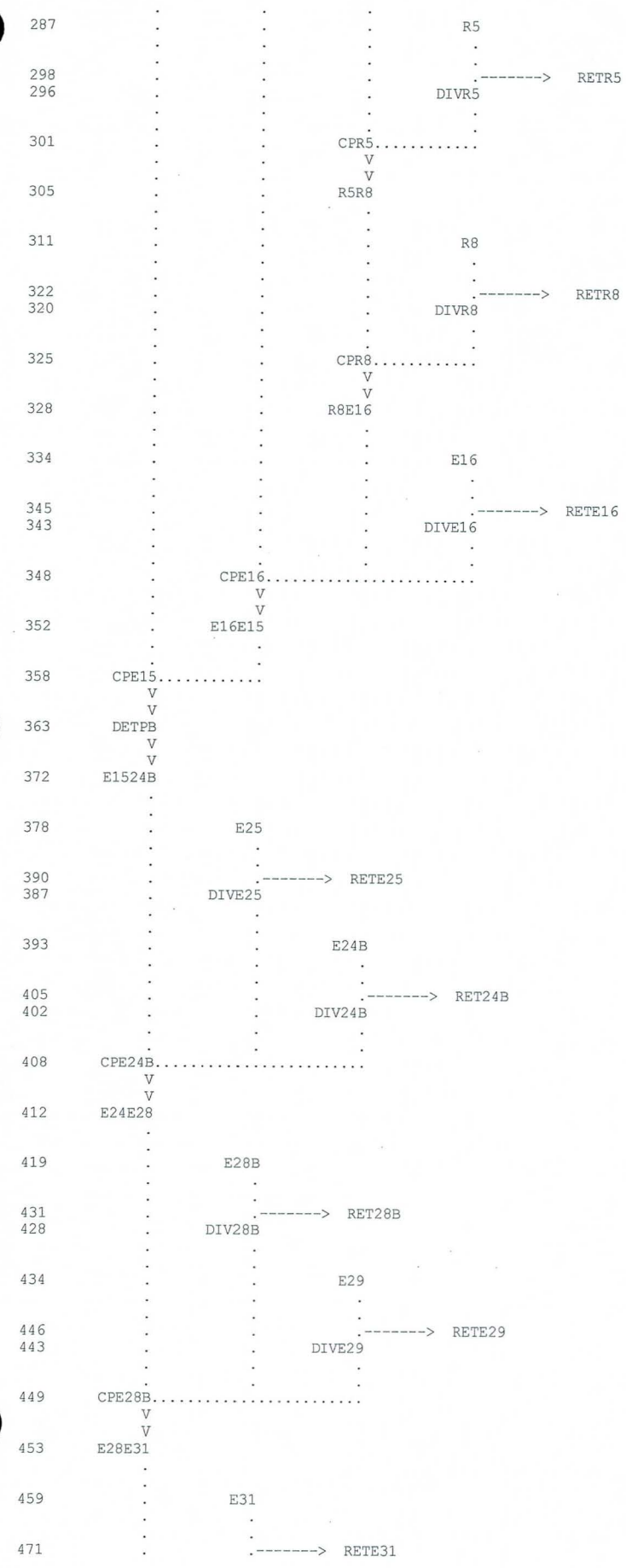


```
LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK  DIV28B  DIVERT
KM   Divert the required retention volume for the subbasin out of the model
KM   MODIFIED MAX VOLUME FROM 42.0 TO 51.3
DT  RET28B    51.3      0.0
DI     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
DQ     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
*

KK     E29   BASIN
KM   Runoff from subbasin E29
BA   1.002
LG    0.15     0.23     6.20     0.22       55
UI       0      103      218      452      586      733     1019     1240      924      737
UI     574      428      229      172      116       82       31       31       31       31
UI       0        0        0        0        0        0        0        0        0        0
UI       0        0        0        0        0        0        0        0        0        0
UI       0        0        0        0        0        0        0        0        0        0
*

KK  DIVE29  DIVERT
KM   Divert the required retention volume for the subbasin out of the model
KM   MODIFIED MAX VOLUME FROM 73.9 TO 90.2
DT  RETE29    90.2      0.0
DI     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
DQ     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
*

KK  CPE28B COMBINE
KM   Combine routed flow from CPE24B with unretained runoff from subbasins E28B
KM   and E29 in the PECOS CHANNEL at Crismon and Pecos
HC       3    9.74
*

KK  E28E31 ROUTE
KM   Route flows in the PECOS CHANNEL from CPE28B to CPE31 at Ellsworth and Pecos
RS       3    FLOW
RC   0.035   0.035   0.035    5400  0.0035
RX       0      11      21      25      29      33      44      54
```

```
 458          RY      7      4      0      0      0      0      4      7
              *

 459          KK     E31   BASIN
 460          KM   Runoff from subbasin E31
 461          BA   0.810
 462          LG    0.15    0.25    4.80    0.39      55
 463          UI       0      86     197     391     504     641     943     970     728     571
 464          UI     441     296     151     126      86      37      26      26      26       0
 465          UI       0       0       0       0       0       0       0       0       0       0
 466          UI       0       0       0       0       0       0       0       0       0       0
 467          UI       0       0       0       0       0       0       0       0       0       0
              *
1                                        HEC-1 INPUT                                        PAGE 12

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 468          KK  DIVE31  DIVERT
 469          KM   Divert the required retention volume for the subbasin out of the model
 470          KM   MODIFIED MAX VOLUME FROM 56.5 TO 68.9
 471          DT  RETE31    68.9     0.0
 472          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 473          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 474          KK  CPE31A COMBINE
 475          KM   Combine routed flows from CPE28B with unretained runoff from subbasin E31 at
 476          KM   in the PECOS CHANNEL     at Ellsworth and Pecos
 477          HC       2   10.55
              *

 478          KK     E32   BASIN
 479          KM   Runoff from subbasin E32
 480          BA   0.246
 481          LG    0.14    0.25    4.25    0.55      58
 482          UI       0      72     238     387     535     337     190      78      37      15
 483          UI      15       0       0       0       0       0       0       0       0       0
 484          UI       0       0       0       0       0       0       0       0       0       0
 485          UI       0       0       0       0       0       0       0       0       0       0
 486          UI       0       0       0       0       0       0       0       0       0       0
              *

 487          KK  DIVE32  DIVERT
 488          KM   Divert the required retention volume for the subbasin out of the model
 489          KM   MODIFIED MAX VOLUME FROM 17.2 TO 20.9
 490          DT  RETE32    20.9     0.0
 491          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 492          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 493          KK  E32E31   ROUTE
 494          KM   Route unretained runoff from subbasin E32 to CPE31
 495          RS       5    FLOW
 496          RC   0.025   0.060   0.025    3272  0.0028 1388.60
 497          RX  100.00  110.00  128.00  149.80  160.00  191.50  209.20  210.00
 498          RY  1388.3 1388.32 1388.32 1380.37 1380.17 1388.04 1388.39 1388.60
              *

 499          KK   CPE31 COMBINE
 500          KM   Combine unretained runoff from subbasin E32 with the flows from the PECOS
 501          KM   CHANNEL at CPE31 - Ellsworth and Pecos
 502          HC       2   10.80
              *

 503          KK  E31E30   ROUTE
 504          KM   Route runoff from CPE31 north in the Ellsworth Channel to CPE30
 505          RS       5    FLOW
 506          RC   0.025   0.045   0.025    4404  0.0008 1387.00
 507          RX  100.00  107.00  112.50  144.90  175.10  201.50  225.90  244.00
 508          RY  1386.1 1386.09 1386.09 1377.99 1377.99 1384.59 1385.08 1387.00
              *
1                                        HEC-1 INPUT                                        PAGE 13

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 509          KK    E30B   BASIN
 510          KM   Runoff from subbasin E30B
 511          BA   0.882
 512          LG    0.24    0.15    8.40    0.09      47
 513          UI       0      56      56     128     217     272     314     357     416     500
 514          UI     668     683     552     475     416     355     303     261     191     124
 515          UI      98      92      66      56      44      17      17      17      17      17
 516          UI      17      17       0       0       0       0       0       0       0       0
 517          UI       0       0       0       0       0       0       0       0       0       0
              *

 518          KK  DIV30B  DIVERT
 519          KM   Divert the required retention volume for the subbasin out of the model
 520          KM   MODIFIED MAX VOLUME FROM 67.1 TO 81.9
 521          DT  RET30B    81.9     0.0
 522          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
```

```
 523          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 524          KK   CPE30 COMBINE
 525          KM   Combine routed flow from CPE31 in the Ellsworth Channel with unretained
 526          KM   runoff from subbasin E30B
 527          HC       2   11.68
              *

 528          KK  E30E26   ROUTE
 529          KM   Route combined runoff from CPE30 to CPE26 in the Ellsworth Channel
 530          RS       1    FLOW
 531          RC   0.025   0.035   0.025     822  0.0005 1387.00
 532          RX  100.00  105.00  108.50  149.90  220.10  251.30  279.10  285.10
 533          RY  1387.0 1387.00 1386.66 1376.31 1376.31 1384.11 1384.66 1386.00
              *

 534          KK    E26B   BASIN
 535          KM   Runoff from subbasin E26B
 536          BA   0.259
 537          LG    0.24    0.15    8.80    0.07      48
 538          UI       0      38     145     222     320     448     315     222     139      65
 539          UI      43      18      12      12       0       0       0       0       0       0
 540          UI       0       0       0       0       0       0       0       0       0       0
 541          UI       0       0       0       0       0       0       0       0       0       0
 542          UI       0       0       0       0       0       0       0       0       0       0
              *

 543          KK  DIV26B  DIVERT
 544          KM   Divert the required retention volume for the subbasin out of the model
 545          KM   MODIFIED MAX VOLUME FROM 20.1 TO 24.5
 546          DT  RET26B    24.5     0.0
 547          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 548          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *
1                                        HEC-1 INPUT                                        PAGE 14

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 549          KK   CPE26 COMBINE
 550          KM   Combined routed flows from CPE30 with unretained runoff from subbasin E26B
 551          HC       2   11.94
              *

 552          KK  E26E33   ROUTE
 553          KM   Route combine flows from CPE26 to CPE33 in the Ellsworth Channel
 554          RS       5    FLOW
 555          RC   0.025   0.030   0.025    8929  0.0028 1379.67
 556          RX  100.00  100.50  102.50  134.90  205.10  237.50  253.50  255.00
 557          RY  1379.1 1379.12 1379.35 1371.25 1371.25 1379.35 1379.67 1379.67
              *

 558          KK    E33B   BASIN
 559          KM   Runoff from subbasin E33B
 560          BA   0.851
 561          LG    0.15    0.15    7.30    0.14      56
 562          UI       0     117     409     651     892    1385    1087     793     558     278
 563          UI     179     110      36      36      36       0       0       0       0       0
 564          UI       0       0       0       0       0       0       0       0       0       0
 565          UI       0       0       0       0       0       0       0       0       0       0
 566          UI       0       0       0       0       0       0       0       0       0       0
              *

 567          KK  DIV33B  DIVERT
 568          KM   Divert the required retention volume for the subbasin out of the model
 569          KM   MODIFIED MAX VOLUME FROM 66.8 TO 81.5
 570          DT  RET33B    81.5     0.0
 571          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 572          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 573          KK  CPE33B COMBINE
 574          KM   Combine routed flows in the Ellsworth Channel from CPE26 with unretained
 575          KM   runoff from subbasin E33B.  Note this CP also receives flow from the
 576          KM   Powerline model but that flow is not included in this model.
 577          HC       2   12.79
              *
 578          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   110          E7
                 .
                 .
   121           .-------->   RETE7
   119       DIVE7
                 V
                 V
```


124 E7STOR
130 E7E6
136 E6B
147 RETE6B
145 DIVE6B
150 E8
161 RETE8
159 DIVE8
164 E8E6
170 CPE6
176 DRE9
174 DE6S
179 E6E15
185 E5B
196 RETE5B
194 DIVE5B
199 E5E14B
205 E14B
216 RET14B
214 DIV14B
219 CP14B
222 E14E15
228 E15
239 RETE15
237 DIVE15
242 CPE15A
248 DRE9
246 DRE9
249 RTE6E9
255 E9
266 RETE9
264 DIVE9
269 CPE9
275 DRR5
273 DE9S
278 E9E16
286 DRR5
284 DRR5


287 R5
298 .-------> RETR5
296 DIVR5
301 CPR5
305 R5R8
311 R8
322 .-------> RETR8
320 DIVR8
325 CPR8
328 R8E16
334 E16
345 .-------> RETE16
343 DIVE16
348 CPE16
352 E16E15
358 CPE15
363 DETPB
372 E1524B
378 E25
390 .-------> RETE25
387 DIVE25
393 E24B
405 .-------> RET24B
402 DIV24B
408 CPE24B
412 E24E28
419 E28B
431 .-------> RET28B
428 DIV28B
434 E29
446 .-------> RETE29
443 DIVE29
449 CPE28B
453 E28E31
459 E31
471 .-------> RETE31

```
  468          .      DIVE31
               .          .
               .          .
  474      CPE31A.........
               .
               .
  478          .        E32
               .          .
               .          .
  490          .          .-------->  RETE32
  487          .      DIVE32
               .          V
               .          V
  493          .      E32E31
               .          .
               .          .
  499       CPE31.........
               V
               V
  503      E31E30
               .
               .
  509          .        E30B
               .          .
               .          .
  521          .          .-------->  RET30B
  518          .      DIV30B
               .          .
               .          .
  524       CPE30.........
               V
               V
  528      E30E26
               .
               .
  534          .        E26B
               .          .
               .          .
  546          .          .-------->  RET26B
  543          .      DIV26B
               .          .
               .          .
  549       CPE26.........
               V
               V
  552      E26E33
               .
               .
  558          .        E33B
               .          .
               .          .
  570          .          .-------->  RET33B
  567          .      DIV33B
               .          .
               .          .
  573      CPE33B.........

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*               JUN   1998             *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   28AUG14  TIME  08:56:01  *
*                                      *
****************************************

****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

Pecos Road Channel and Basin Design Concept Report
Alternative Analysis
Future Conditions

Prepared for the Flood Control District of Maricopa County
District Project Number FCD 2014C001

Prepared by Kimley-Horn and Associates, Inc.
Kimley Horn Project Number 091131024
August 2014

Model based on the East Mesa Area Drainage Master Plan Update (EMADMPU) for Alternative 1. The model was revised to include only those areas contributing to the Ellsworth Channel.

List of Changes:
- Basin DIVPB at Pecos Rd and Meridian was changed from a diversion card to a storage routing card with stage-storage-discharge data; the name was changed from DIVPB to DETPB to reflect the change.
- Routing reach from CPR9 to CPR8 was eliminated
- Powerline section of the model was deleted (all subbasins north of the

future SR24 alignment).
- All subbasins south and east of R5 and R8 have been deleted.
- All comments from the East Mesa Area Drainage Master Plan Update that do pertain to the Ellsworth Channel model have been deleted.
- Area has been adjusted on HC cards to account for reduction in area due retention diversions.

```
     **********************************************************************
     ************************** EAST MESA ADMPU ***************************
     **********************************************************************

     PROJECT:                EAST MESA AREA DRAINAGE MASTER PLAN UPDATE
     CLIENT:                 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
     PREPARED BY:    ENTELLUS, INC.
     PROJECT NO:             FCD 2011C017            ENTELLUS 310.057
     MODIFIED DATE:  9/12/2012
     MODELER:                RLJ

     STORM:                  100-YEAR 24-HOUR

     ALTERNATIVE:    1

     DEVELOPMENT CONDITIONS: FUTURE LAND USE
                                                  INCREASED FUTURE RETENTION (2.19->2.70 IN)

     PROPOSED INFRASTRUCTURE: MOUNTAIN CHANNEL AND RETENTION BASIN
                                                  MERIDIAN CHANNEL
                                                  PECOS CHANNEL
                                                  MERIDIAN AND PECOS RETENTION BASIN
                                                  GERMANN CHANNEL

     MODIFICATION 1: RETENTION VOLUMES WERE INCREASED TO
      100-YEAR, 2-HOUR NOAA 2 RAINFALL WITH 80% EFFECTIVE
      VOLUME WITHIN THE CITY OF MESA AND TOWN OF QUEEN CREEK FOR THE F
                                  SUBBASINS:

                                  E28B    E29          E30B
                                  E31          E32          E33B

     MODIFICATION 4: MERIDIAN CHANNEL (SOUTH OF PECOS): CPR8
                                  RETOUTED TO COMBINE NORTH UP MERIDIAN ROAD TO COMBINE
                                  WITH CPE16 AND FOLLOW THE EXISTING FLOW PATH TO
                                  PROPOSED RETENTION AT MERIDIAN AND PECOS.

     MODIFICATION 5: PECOS CHANNEL (WEST OF MERIDIAN): CPE24B WAS MODIFIED TO
                                  COMBINE WITH E25 AND WAS ROUTED ON PECOS ROAD. CPE29
                                  WAS MODIFIED TO COMBINE WITH E29. NEW ROUTES WERE
                                  DEFINED ON PECOS ROAD.

     MODIFICATION 6: MERIDIAN AND PECOS OFFLINE RETENTION: ADDED DIVERSION
                                  DIVPB AFTER CPE15 WITH A BYPASS FLOW OF 265 CFS


     **********************************************************************
     ************************** EAST MESA ADMPU ***************************
     **********************************************************************

FUTEMADMP24 20110519 - EMADMPU 24-hr Future Conditions 20110519
Flood Control District of Maricopa County
100 YEAR
24 Hour Storm
Unit Hydrograph: S-Graph
08/05/2011
**********************************************************************

90 IO          OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                     NMIN          5  MINUTES IN COMPUTATION INTERVAL
                    IDATE    12Aug14  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE    18   14  ENDING DATE
                   NDTIME       2235  ENDING TIME
                    ICENT         20  CENTURY MARK

                 COMPUTATION INTERVAL      .08 HOURS
                      TOTAL TIME BASE  166.58 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT
```

```
 91 JD          INDEX STORM NO. 1
                    STRM      3.58  PRECIPITATION DEPTH
                    TRDA       .00  TRANSPOSITION DRAINAGE AREA

 92 PI            PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                      .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                      .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00

102 JD          INDEX STORM NO. 2
                    STRM      3.56  PRECIPITATION DEPTH
                    TRDA      1.00  TRANSPOSITION DRAINAGE AREA

  0 PI            PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                      .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                      .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00

103 JD          INDEX STORM NO. 3
                    STRM      3.49  PRECIPITATION DEPTH
                    TRDA      5.00  TRANSPOSITION DRAINAGE AREA

  0 PI            PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                      .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                      .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

```
104 JD        INDEX STORM NO. 4
                  STRM       3.40  PRECIPITATION DEPTH
                  TRDA      10.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

```
105 JD        INDEX STORM NO. 5
                  STRM       3.29  PRECIPITATION DEPTH
                  TRDA      20.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

```
106 JD        INDEX STORM NO. 6
                  STRM       3.22  PRECIPITATION DEPTH
                  TRDA      30.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

```
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                   .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00

107 JD        INDEX STORM NO. 7
                  STRM       3.17  PRECIPITATION DEPTH
                  TRDA      40.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                   .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00

108 JD        INDEX STORM NO. 8
                  STRM       3.14  PRECIPITATION DEPTH
                  TRDA      50.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                   .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00
```

```
 109 JD          INDEX STORM NO. 9
                      STRM       3.11  PRECIPITATION DEPTH
                      TRDA      60.00  TRANSPOSITION DRAINAGE AREA

   0 PI            PRECIPITATION PATTERN
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                        .01      .01      .01      .01      .01      .01      .01      .01      .03      .03
                        .03      .09      .09      .09      .01      .01      .01      .01      .01      .01
                        .01      .01      .01      .01      .01      .01      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                        .00      .00      .00      .00      .00      .00      .00      .00

WARNING --- ROUTED OUTFLOW (    527.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    517.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    493.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    488.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    507.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    505.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    495.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    494.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    498.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    489.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    490.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    523.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    513.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    503.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    497.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    489.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    489.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    509.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    499.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    490.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    491.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


                 **************
                 *            *
 363 KK          *    DETPB   *      STORAGE
                 *            *
                 **************

 367 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
```

HYDROGRAPH ROUTING DATA

368 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP STOR TYPE OF INITIAL CONDITION
RSVRIC .00 INITIAL CONDITION
X .00 WORKING R AND D COEFFICIENT

369 SV	STORAGE	.0	21.9	43.9	66.1	88.4	110.8	133.3	144.7	156.0
370 SQ	DISCHARGE	0.	15.	60.	119.	173.	176.	177.	189.	201.
371 SE	ELEVATION	.00	1.00	2.00	3.00	4.00	5.00	6.00	6.50	7.00

***

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA .0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 199.	17.33		195.	139.	51.	22.
		(INCHES)	.266	.759	.837	.848
		(AC-FT)	97.	276.	304.	308.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
154.	17.33		150.	97.	39.	17.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
6.92	17.33		6.74	4.39	1.77	.78

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 1.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 196.	17.42		191.	137.	50.	22.
		(INCHES)	.261	.746	.823	.833
		(AC-FT)	95.	271.	299.	303.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
151.	17.42		147.	95.	38.	17.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
6.77	17.42		6.60	4.29	1.73	.77

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 5.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 182.	17.75		179.	128.	47.	20.
		(INCHES)	.244	.697	.767	.776
		(AC-FT)	89.	253.	279.	282.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
138.	17.75		134.	86.	35.	15.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
6.19	17.75		6.04	3.91	1.58	.70

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 176.	17.67		176.	117.	43.	19.
		(INCHES)	.241	.637	.699	.703
		(AC-FT)	87.	231.	254.	255.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
119.	17.75		115.	73.	30.	13.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
5.34	17.83		5.19	3.32	1.36	.59

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 20.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 174.	17.58		173.	102.	37.	16.
		(INCHES)	.237	.557	.614	.619
		(AC-FT)	86.	202.	223.	225.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
96.	17.67		93.	60.	25.	11.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
4.36	17.67		4.20	2.74	1.15	.50

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 30.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 169.	17.75		161.	93.	35.	15.
		(INCHES)	.220	.510	.566	.570
		(AC-FT)	80.	185.	206.	207.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
87.	17.75		84.	56.	24.	10.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
3.92	17.75		3.79	2.53	1.07	.47

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 40.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 156.	18.25		149.	87.	32.	14.
		(INCHES)	.204	.476	.532	.536
		(AC-FT)	74.	173.	193.	195.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
81.	18.17	79.	53.	23.	10.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
3.69	18.25	3.56	2.42	1.03	.45

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 50.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 146.	18.50		140.	82.	31.	13.
		(INCHES)	.192	.450	.505	.509
		(AC-FT)	70.	164.	183.	185.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
77.	18.50	75.	51.	22.	10.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
3.51	18.50	3.40	2.33	1.00	.44

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 60.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 140.	18.75		134.	79.	30.	13.
		(INCHES)	.183	.432	.487	.491
		(AC-FT)	67.	157.	177.	178.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
75.	18.75	72.	50.	21.	9.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
3.39	18.75	3.28	2.27	.98	.43

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT DETPB

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 179.	17.75		178.	123.	45.	20.
		(INCHES)	.243	.670	.737	.744
		(AC-FT)	88.	243.	268.	270.

CUMULATIVE AREA = 6.81 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+					6-HOUR	24-HOUR	72-HOUR			
	HYDROGRAPH AT									
+		E7	820.	12.92	182.	56.	19.	1.12		
	DIVERSION TO									

+	RETE7	820.	12.92	159.	43.	14.	1.12
	HYDROGRAPH AT						
+	DIVE7	234.	13.67	43.	13.	4.	1.12
	ROUTED TO						
+	E7STOR	1.	25.67	1.	1.	0.	1.12
	ROUTED TO						
+	E7E6	1.	30.00	1.	1.	0.	1.12
	HYDROGRAPH AT						
+	E6B	2187.	12.58	400.	132.	44.	1.95
	DIVERSION TO						
+	RETE6B	2187.	12.58	326.	91.	30.	1.95
	HYDROGRAPH AT						
+	DIVE6B	897.	13.00	131.	41.	14.	1.95
	HYDROGRAPH AT						
+	E8	901.	12.75	180.	57.	19.	1.10
	DIVERSION TO						
+	RETE8	901.	12.75	149.	41.	14.	1.10
	HYDROGRAPH AT						
+	DIVE8	378.	13.25	52.	16.	5.	1.10
	ROUTED TO						
+	E8E6	191.	14.00	50.	16.	5.	1.10
	3 COMBINED AT						
+	CPE6	897.	13.00	176.	57.	19.	3.05
	DIVERSION TO						
+	DRE9	104.	13.00	3.	1.	0.	3.05
	HYDROGRAPH AT						
+	DE6S	788.	13.00	169.	55.	18.	3.05
	ROUTED TO						
+	E6E15	497.	13.58	165.	55.	18.	3.05
	HYDROGRAPH AT						
+	E5B	447.	12.25	57.	19.	6.	.29
	DIVERSION TO						
+	RETE5B	447.	12.25	45.	13.	4.	.29
	HYDROGRAPH AT						
+	DIVE5B	204.	12.50	21.	7.	2.	.29
	ROUTED TO						
+	E5E14B	89.	12.92	20.	7.	2.	.29
	HYDROGRAPH AT						
+	E14B	884.	12.25	109.	36.	12.	.53
	DIVERSION TO						
+	RET14B	884.	12.25	88.	24.	8.	.53
	HYDROGRAPH AT						
+	DIV14B	372.	12.50	37.	12.	4.	.53
	2 COMBINED AT						
+	CP14B	371.	12.50	57.	18.	6.	.81
	ROUTED TO						
+	E14E15	210.	12.67	56.	18.	6.	.81
	HYDROGRAPH AT						
+	E15	1096.	12.33	154.	51.	17.	.78
	DIVERSION TO						
+	RETE15	1096.	12.33	122.	34.	11.	.78
	HYDROGRAPH AT						
+	DIVE15	431.	12.67	54.	17.	6.	.78
	3 COMBINED AT						
+	CPE15A	638.	13.58	256.	87.	29.	4.29
	HYDROGRAPH AT						
	DRE9	104.	13.00	3.	1.	0.	3.05
	ROUTED TO						
+	RTE6E9	26.	13.42	3.	1.	0.	3.05
	HYDROGRAPH AT						
+	E9	968.	12.42	147.	48.	16.	.72
	DIVERSION TO						

+		RETE9	968.	12.42	118.	33.	11.	.72
+	HYDROGRAPH AT	DIVE9	372.	12.75	49.	15.	5.	.72
+	2 COMBINED AT	CPE9	372.	12.75	52.	16.	5.	1.07
+	DIVERSION TO	DRR5	195.	12.75	9.	2.	1.	1.07
+	HYDROGRAPH AT	DE9S	176.	12.75	43.	14.	5.	1.07
+	ROUTED TO	E9E16	121.	13.25	41.	14.	5.	1.07
+	HYDROGRAPH AT	DRR5	195.	12.75	9.	2.	1.	1.07
+	HYDROGRAPH AT	R5	546.	12.50	72.	21.	7.	.50
+	DIVERSION TO	RETR5	4.	4.67	2.	1.	0.	.50
+	HYDROGRAPH AT	DIVR5	546.	12.50	72.	21.	7.	.50
+	2 COMBINED AT	CPR5	545.	12.50	81.	23.	8.	1.07
+	ROUTED TO	R5R8	472.	12.92	81.	23.	8.	1.07
+	HYDROGRAPH AT	R8	741.	12.42	115.	39.	13.	.55
+	DIVERSION TO	RETR8	741.	12.42	91.	25.	8.	.55
+	HYDROGRAPH AT	DIVR8	366.	12.67	42.	13.	4.	.55
+	2 COMBINED AT	CPR8	732.	12.67	119.	36.	12.	1.62
+	ROUTED TO	R8E16	649.	13.00	119.	36.	12.	1.62
+	HYDROGRAPH AT	E16	582.	12.33	79.	26.	9.	.40
+	DIVERSION TO	RETE16	582.	12.33	64.	18.	6.	.40
+	HYDROGRAPH AT	DIVE16	213.	12.58	26.	8.	3.	.40
+	3 COMBINED AT	CPE16	721.	13.00	180.	56.	19.	2.52
+	ROUTED TO	E16E15	679.	13.33	177.	56.	19.	2.52
+	2 COMBINED AT	CPE15	1161.	13.50	405.	136.	45.	6.81
+	ROUTED TO	DETPB	179.	17.75	178.	123.	45.	6.81
+	ROUTED TO	E1524B	179.	17.92	178.	123.	45.	6.81
+	HYDROGRAPH AT	E25	1038.	12.50	184.	60.	20.	.93
+	DIVERSION TO	RETE25	1038.	12.50	164.	45.	15.	.93
+	HYDROGRAPH AT	DIVE25	240.	13.17	46.	15.	5.	.93
+	HYDROGRAPH AT	E24B	788.	12.25	100.	32.	11.	.46
+	DIVERSION TO	RET24B	788.	12.25	81.	22.	7.	.46
+	HYDROGRAPH AT	DIV24B	274.	12.58	32.	10.	3.	.46
	3 COMBINED AT							

+	CPE24B	239.	14.58	217.	140.	51.	8.20
	ROUTED TO						
+	E24E28	237.	14.83	216.	139.	51.	8.20
	HYDROGRAPH AT						
+	E28B	773.	12.42	116.	37.	12.	.54
	DIVERSION TO						
+	RET28B	773.	12.42	95.	26.	9.	.54
	HYDROGRAPH AT						
+	DIV28B	316.	12.75	35.	11.	4.	.54
	HYDROGRAPH AT						
+	E29	1237.	12.50	203.	66.	22.	1.00
	DIVERSION TO						
+	RETE29	1237.	12.50	164.	45.	15.	1.00
	HYDROGRAPH AT						
+	DIVE29	573.	12.83	66.	21.	7.	1.00
	3 COMBINED AT						
+	CPE28B	538.	12.92	274.	163.	58.	9.74
	ROUTED TO						
+	E28E31	399.	13.25	270.	162.	58.	9.74
	HYDROGRAPH AT						
+	E31	964.	12.42	157.	52.	17.	.81
	DIVERSION TO						
+	RETE31	964.	12.42	125.	35.	12.	.81
	HYDROGRAPH AT						
+	DIVE31	402.	12.83	54.	17.	6.	.81
	2 COMBINED AT						
+	CPE31A	493.	13.25	302.	174.	62.	10.55
	HYDROGRAPH AT						
+	E32	404.	12.25	48.	16.	5.	.25
	DIVERSION TO						
+	RETE32	404.	12.25	38.	11.	4.	.25
	HYDROGRAPH AT						
+	DIVE32	136.	12.50	17.	5.	2.	.25
	ROUTED TO						
+	E32E31	68.	12.92	16.	5.	2.	.25
	2 COMBINED AT						
+	CPE31	523.	13.25	314.	177.	63.	10.80
	ROUTED TO						
+	E31E30	425.	13.75	307.	176.	63.	10.80
	HYDROGRAPH AT						
+	E30B	844.	12.83	186.	58.	19.	.88
	DIVERSION TO						
+	RET30B	844.	12.83	151.	41.	14.	.88
	HYDROGRAPH AT						
+	DIV30B	401.	13.33	55.	17.	6.	.88
	2 COMBINED AT						
+	CPE30	569.	13.75	343.	187.	67.	11.68
	ROUTED TO						
+	E30E26	549.	13.83	341.	187.	67.	11.68
	HYDROGRAPH AT						
+	E26B	415.	12.33	56.	18.	6.	.26
	DIVERSION TO						
+	RET26B	415.	12.33	45.	12.	4.	.26
	HYDROGRAPH AT						
+	DIV26B	146.	12.67	17.	5.	2.	.26
	2 COMBINED AT						
	CPE26	557.	13.83	347.	189.	68.	11.94
	ROUTED TO						
+	E26E33	458.	14.50	337.	188.	68.	11.94
	HYDROGRAPH AT						
+	E33B	1304.	12.33	183.	59.	20.	.85
	DIVERSION TO						

```
+                    RET33B      1304.   12.33         149.         41.         14.         .85

     HYDROGRAPH AT
+                    DIV33B       526.   12.67          57.         18.          6.         .85

     2 COMBINED AT
+                    CPE33B       478.   14.50         356.        198.         72.       12.79
1                 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION   E7STOR
                  (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED  DURING BREACH FORMATION)


 PLAN  1 .............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                          ELEVATION         1566.00           1574.00        1574.00
                          STORAGE              0.               607.           607.
                          OUTFLOW              0.               104.           104.

          RATIO     MAXIMUM      MAXIMUM     MAXIMUM     MAXIMUM     DURATION     TIME OF      TIME OF
            OF    RESERVOIR        DEPTH     STORAGE     OUTFLOW     OVER TOP   MAX OUTFLOW     FAILURE
           PMF     W.S.ELEV     OVER DAM       AC-FT         CFS        HOURS         HOURS       HOURS

          1.00      1567.20          .00         27.          1.          .00         25.75          .00


 PLAN  2 .............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                          ELEVATION         1566.00           1574.00        1574.00
                          STORAGE              0.               607.           607.
                          OUTFLOW              0.               104.           104.

          RATIO     MAXIMUM      MAXIMUM     MAXIMUM     MAXIMUM     DURATION     TIME OF      TIME OF
            OF    RESERVOIR        DEPTH     STORAGE     OUTFLOW     OVER TOP   MAX OUTFLOW     FAILURE
           PMF     W.S.ELEV     OVER DAM       AC-FT         CFS        HOURS         HOURS       HOURS

          1.00      1567.17          .00         27.          1.          .00         25.75          .00


 PLAN  3 .............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                          ELEVATION         1566.00           1574.00        1574.00
                          STORAGE              0.               607.           607.
                          OUTFLOW              0.               104.           104.

          RATIO     MAXIMUM      MAXIMUM     MAXIMUM     MAXIMUM     DURATION     TIME OF      TIME OF
            OF    RESERVOIR        DEPTH     STORAGE     OUTFLOW     OVER TOP   MAX OUTFLOW     FAILURE
           PMF     W.S.ELEV     OVER DAM       AC-FT         CFS        HOURS         HOURS       HOURS

          1.00      1567.06          .00         24.          0.          .00         26.00          .00


 PLAN  4 .............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                          ELEVATION         1566.00           1574.00        1574.00
                          STORAGE              0.               607.           607.
                          OUTFLOW              0.               104.           104.

          RATIO     MAXIMUM      MAXIMUM     MAXIMUM     MAXIMUM     DURATION     TIME OF      TIME OF
            OF    RESERVOIR        DEPTH     STORAGE     OUTFLOW     OVER TOP   MAX OUTFLOW     FAILURE
           PMF     W.S.ELEV     OVER DAM       AC-FT         CFS        HOURS         HOURS       HOURS

          1.00      1566.91          .00         21.          0.          .00          .00          .00


 PLAN  5 .............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                          ELEVATION         1566.00           1574.00        1574.00
                          STORAGE              0.               607.           607.
                          OUTFLOW              0.               104.           104.

          RATIO     MAXIMUM      MAXIMUM     MAXIMUM     MAXIMUM     DURATION     TIME OF      TIME OF
            OF    RESERVOIR        DEPTH     STORAGE     OUTFLOW     OVER TOP   MAX OUTFLOW     FAILURE
           PMF     W.S.ELEV     OVER DAM       AC-FT         CFS        HOURS         HOURS       HOURS

          1.00      1566.72          .00         16.          0.          .00          .00          .00


 PLAN  6 .............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                          ELEVATION         1566.00           1574.00        1574.00
                          STORAGE              0.               607.           607.
                          OUTFLOW              0.               104.           104.

          RATIO     MAXIMUM      MAXIMUM     MAXIMUM     MAXIMUM     DURATION     TIME OF      TIME OF
            OF    RESERVOIR        DEPTH     STORAGE     OUTFLOW     OVER TOP   MAX OUTFLOW     FAILURE
           PMF     W.S.ELEV     OVER DAM       AC-FT         CFS        HOURS         HOURS       HOURS

          1.00      1566.61          .00         14.          0.          .00          .00          .00


 PLAN  7 .............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                          ELEVATION         1566.00           1574.00        1574.00
                          STORAGE              0.               607.           607.
                          OUTFLOW              0.               104.           104.
```

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.53	.00	12.	0.	.00	.00	.00

PLAN 8 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.47	.00	11.	0.	.00	.00	.00

PLAN 9 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.43	.00	10.	0.	.00	.00	.00

*** NORMAL END OF HEC-1 ***

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   28AUG14  TIME  09:00:07   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   1          ID      Pecos Road Channel and Basin Design Concept Report
   2          ID      Alternative Analysis
   3          ID      Future Conditions
   4          ID
   5          ID      Alternative 3: Storm drain from the Pecos Basin to the Ellsworth Channel
   6          ID
   7          ID      Prepared for the Flood Control District of Maricopa County
   8          ID      District Project Number FCD 2014C001
   9          ID
  10          ID      Prepared by Kimley-Horn and Associates, Inc.
  11          ID      Kimley Horn Project Number 091131024
  12          ID      August 2014
  13          ID
  14          ID      Model based on the East Mesa Area Drainage Master Plan Update (EMADMPU)
  15          ID        for Alternative 1. The model was revised to include only those areas
  16          ID        contributing to the Ellsworth Channel.
  17          ID
  18          ID      List of Changes:
  19          ID      - Basin DIVPB at Pecos Rd and Meridian was changed from a diversion card
  20          ID        to a storage routing card with stage-storage-discharge data; the name
  21          ID        was changed from DIVPB to DETPB to reflect the change.
  22          ID      - Routing reach from CPR9 to CPR8 was eliminated
  23          ID      - Powerline section of the model was deleted (all subbasins north of the
  24          ID        future SR24 alignment).
  25          ID      - All subbasins south and east of R5 and R8 have been deleted.
  26          ID      - All comments from the East Mesa Area Drainage Master Plan Update that do
  27          ID        pertain to the Ellsworth Channel model have been deleted.
  28          ID      - Area has been adjusted on HC cards to account for reduction in area due
  29          ID        retention diversions.
  30          ID
  31          ID
  32          ID
  33          ID          ************************************************************************
  34          ID          ************************** EAST MESA ADMPU ******************************
  35          ID          ************************************************************************
  36          ID
  37          ID          PROJECT:                EAST MESA AREA DRAINAGE MASTER PLAN UPDATE
  38          ID          CLIENT:                 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  39          ID          PREPARED BY:    ENTELLUS, INC.
  40          ID          PROJECT NO:             FCD 2011C017            ENTELLUS 310.057
  41          ID          MODIFIED DATE:  9/12/2012
  42          ID          MODELER:                RLJ
  43          ID
  44          ID          STORM:                  100-YEAR 24-HOUR
  45          ID
  46          ID          ALTERNATIVE:    1
  47          ID
  48          ID          DEVELOPMENT CONDITIONS: FUTURE LAND USE
  49          ID                                                  INCREASED FUTURE RETENTION (2.19->2.70 IN)
  50          ID
  51          ID          PROPOSED INFRASTRUCTURE: MOUNTAIN CHANNEL AND RETENTION BASIN
  52          ID                                                  MERIDIAN CHANNEL
  53          ID                                                  PECOS CHANNEL
  54          ID                                                  MERIDIAN AND PECOS RETENTION BASIN
  55          ID                                                  GERMANN CHANNEL
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   56     ID
   57     ID          MODIFICATION 1: RETENTION VOLUMES WERE INCREASED TO
   58     ID              100-YEAR, 2-HOUR NOAA 2 RAINFALL WITH 80% EFFECTIVE
   59     ID              VOLUME WITHIN THE CITY OF MESA AND TOWN OF QUEEN CREEK FOR THE F
   60     ID                                  SUBBASINS:
   61     ID
   62     ID                                  E28B    E29             E30B
   63     ID                                  E31             E32             E33B
   64     ID
   65     ID          MODIFICATION 4: MERIDIAN CHANNEL (SOUTH OF PECOS): CPR8
   66     ID                                  RETOUTED TO COMBINE NORTH UP MERIDIAN ROAD TO COMBINE
   67     ID                                  WITH CPE16 AND FOLLOW THE EXISTING FLOW PATH TO
   68     ID                                  PROPOSED RETENTION AT MERIDIAN AND PECOS.
   69     ID
   70     ID          MODIFICATION 5: PECOS CHANNEL (WEST OF MERIDIAN): CPE24B WAS MODIFIED TO
   71     ID                                  COMBINE WITH E25 AND WAS ROUTED ON PECOS ROAD. CPE29
   72     ID                                  WAS MODIFIED TO COMBINE WITH E29. NEW ROUTES WERE
   73     ID                                  DEFINED ON PECOS ROAD.
   74     ID
   75     ID          MODIFICATION 6: MERIDIAN AND PECOS OFFLINE RETENTION: ADDED DIVERSION
   76     ID                                  DIVPB AFTER CPE15 WITH A BYPASS FLOW OF 265 CFS
   77     ID
   78     ID
   79     ID          **************************************************************************
   80     ID          ************************** EAST MESA ADMPU **************************
   81     ID          **************************************************************************
   82     ID
   83     ID        FUTEMADMP24 20110519 - EMADMPU 24-hr Future Conditions 20110519
   84     ID        Flood Control District of Maricopa County
   85     ID        100 YEAR
   86     ID        24 Hour Storm
   87     ID        Unit Hydrograph: S-Graph
   88     ID        08/05/2011
   89     ID        ****************************************************************
   90     IT       5 12Aug14       0    2000                    2000
   91     IN      15
   92     IO       5
          *DIAGRAM
          *
   93     JD   3.579  0.0001
   94     PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
   95     PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
   96     PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
   97     PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
   98     PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
   99     PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
  100     PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
  101     PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
  102     PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
  103     PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
  104     JD   3.561     1.0
  105     JD   3.490     5.0
  106     JD   3.400    10.0
  107     JD   3.286    20.0
  108     JD   3.221    30.0
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
  109     JD   3.175    40.0
  110     JD   3.139    50.0
  111     JD   3.114    60.0
          *

  112     KK      E7   BASIN
  113     KM   Runoff from subbasin E7
  114     BA   1.124
  115     LG    0.24    0.26    5.10    0.32      35
  116     UI       0      64      64     102     224     281     328     369     416     477
  117     UI     561     725     814     670     575     512     449     390     339     300
  118     UI     226     159     113     106      99      64      64      46      20      20
  119     UI      20      20      20      20      20      20       0       0       0       0
  120     UI       0       0       0       0       0       0       0       0       0       0
          *

  121     KK   DIVE7  DIVERT
  122     KM   Divert the required retention volume for the subbasin out of the model
  123     DT   RETE7    85.5     0.0
  124     DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
  125     DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          *

  126     KK  E7STOR STORAGE
  127     RS       1    STOR
  128     SV           22.82   34.23   45.64   78.34  111.03  143.72  176.42  230.23  284.04
  129     SQ            1.75    5.50   11.00   17.70   25.70   34.20   43.00   51.70
  130     SE  1566.0 1567.00 1567.50 1568.00 1568.50 1569.00 1569.50 1570.00 1570.50 1571.00
  131     ST  1574.0 10000.0     3.0     1.5
          *
```

```
 132         KK    E7E6   ROUTE
 133         KM    Route outfall from E7STOR to CPE6
 134         RS     23     FLOW
 135         RC   0.035   0.030   0.030   16362  0.0062    5.50
 136         RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
 137         RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
             *

 138         KK     E6B   BASIN
 139         KM    Runoff from subbasin E6B
 140         BA   1.949
 141         LG    0.14    0.25    6.00    0.24      59
 142         UI       0     174     277     677     898    1079    1330    1853    2099    1602
 143         UI    1321    1068     853     594     331     288     192     162      53      53
 144         UI      53      53      53       0       0       0       0       0       0       0
 145         UI       0       0       0       0       0       0       0       0       0       0
 146         UI       0       0       0       0       0       0       0       0       0       0
             *
1                                   HEC-1 INPUT                                             PAGE  4

 LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 147         KK  DIVE6B  DIVERT
 148         KM   Divert the required retention volume for the subbasin out of the model
 149         DT  RETE6B   179.9     0.0
 150         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 151         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

 152         KK      E8   BASIN
 153         KM    Runoff from subbasin E8
 154         BA   1.099
 155         LG    0.21    0.25    4.50    0.44      39
 156         UI       0      75      75     201     313     383     441     514     604     798
 157         UI     955     771     649     563     475     401     337     241     145     127
 158         UI     114      75      75      28      23      23      23      23      23      23
 159         UI       0       0       0       0       0       0       0       0       0       0
 160         UI       0       0       0       0       0       0       0       0       0       0
             *

 161         KK   DIVE8  DIVERT
 162         KM   Divert the required retention volume for the subbasin out of the model
 163         DT   RETE8    80.9     0.0
 164         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 165         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

 166         KK    E8E6   ROUTE
 167         KM    Route runoff from subbasin E8 that is not retained to CPE6
 168         RS       9    FLOW
 169         RC   0.060   0.035   0.060    9833  0.0052    5.50
 170         RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
 171         RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
             *

 172         KK    CPE6 COMBINE
 173         KM    Combine routed flow from E7STOR and subbasin E8 with unretained runoff from
 174         KM    subbasin E6B.
 175         HC       3    3.05
             *

 176         KK    DE6S  DIVERT
 177         KM    Flow split diversion, DRE9 to the south, DE6S to the west
 178         DT    DRE9     0.0     0.0
 179         DI     0.0   236.0   682.0  1141.0  1670.0  2261.0  2886.0     0.0     0.0     0.0
 180         DQ     0.0     1.0    13.0   212.0   633.0  1096.0  1568.0     0.0     0.0     0.0
             *

 181         KK   E6E15   ROUTE
 182         KM    Route remaining flow from flow split at DE6S west to CPE15A
 183         RS       7    FLOW
 184         RC   0.035   0.030   0.035    8259  0.0042    5.50
 185         RX  950.00  975.00  991.00 1003.00 1007.00 1019.00 1030.00 1065.00
 186         RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
             *
1                                   HEC-1 INPUT                                             PAGE  5

 LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 187         KK     E5B   BASIN
 188         KM    Runoff from subbasin E5B
 189         BA   0.286
 190         LG    0.14    0.25    3.95    0.64      62
 191         UI       0      64     225     342     567     435     287     148      74      36
 192         UI      15      15       0       0       0       0       0       0       0       0
 193         UI       0       0       0       0       0       0       0       0       0       0
 194         UI       0       0       0       0       0       0       0       0       0       0
 195         UI       0       0       0       0       0       0       0       0       0       0
             *
```

```
196          KK  DIVE5B  DIVERT
197          KM   Divert the required retention volume for the subbasin out of the model
198          DT  RETE5B    25.0     0.0
199          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
200          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

201          KK  E5E14B   ROUTE
202          KM    Route runoff from subbasin E5B that is not retained to CP14B
203          RS        5    FLOW
204          RC   0.035   0.030   0.035    6256  0.0054    5.50
205          RX  950.00  985.00  991.00 1003.00 1007.00 1019.00 1025.00 1050.00
206          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
             *

207          KK    E14B   BASIN
208          KM   Runoff from subbasin E14B
209          BA   0.528
210          LG    0.14    0.25    5.60    0.29      60
211          UI       0     125     435     667    1086     785     512     237     126      53
212          UI      29      29       0       0       0       0       0       0       0       0
213          UI       0       0       0       0       0       0       0       0       0       0
214          UI       0       0       0       0       0       0       0       0       0       0
215          UI       0       0       0       0       0       0       0       0       0       0
             *

216          KK  DIV14B  DIVERT
217          KM   Divert the required retention volume for the subbasin out of the model
218          DT  RET14B    48.4     0.0
219          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
220          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

221          KK   CP14B COMBINE
222          KM    Combine routed flow from E5B with unretained runoff from subbasin E14B.
223          HC        2
             *
1                                        HEC-1 INPUT                                        PAGE  6

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

224          KK  E14E15 ROUTE
225          KM   Route combined runoff from CP14B to CPE15A
226          RS        2    FLOW
227          RC    0.04    0.03    0.04    1840  0.0018
228          RX       0       9      18      29      40      51      59      68
229          RY       4       2       0       0       0       0       2       4
             *

230          KK     E15   BASIN
231          KM   Runoff from subbasin E15
232          BA   0.777
233          LG    0.15    0.25    5.10    0.35      57
234          UI       0     106     363     582     791    1239    1004     734     522     273
235          UI     171     106      36      32      32       0       0       0       0       0
236          UI       0       0       0       0       0       0       0       0       0       0
237          UI       0       0       0       0       0       0       0       0       0       0
238          UI       0       0       0       0       0       0       0       0       0       0
             *

239          KK  DIVE15  DIVERT
240          KM   Divert the required retention volume for the subbasin out of the model
241          DT  RETE15    67.7     0.0
242          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
243          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

244          KK  CPE15A COMBINE
245          KM   Combine routed flow from split at CPE6 (DRE9, DE6S) and CP14B with unretained
246          KM   runoff from subbasin E15.
247          HC        3    4.29
             *

248          KK    DRE9RETRIEVE
249          KM   Retrieve flow from split at DRE9 that goes to the south
250          DR    DRE9
             *

251          KK  RTE6E9   ROUTE
252          KM   Route split flow from CPE6 (DRE9) south to CPE9
253          RS        5    FLOW
254          RC   0.035   0.030   0.025    2200  0.0035    6.00
255          RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
256          RY    0.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
             *

257          KK      E9   BASIN
258          KM   Runoff from subbasin E9
259          BA   0.723
260          LG    0.14    0.25    5.40    0.30      58
261          UI       0      88     253     450     585     836    1040     754     570     416
262          UI     225     148      92      48      27      27      27       0       0       0
```

```
263          UI       0       0       0       0       0       0       0       0       0       0
264          UI       0       0       0       0       0       0       0       0       0       0
265          UI       0       0       0       0       0       0       0       0       0       0
             *
1                                        HEC-1 INPUT                                        PAGE  7

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

266          KK   DIVE9  DIVERT
267          KM   Divert the required retention volume for the subbasin out of the model
268          DT   RETE9    65.4     0.0
269          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
270          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *
271          KK    CPE9 COMBINE
272          KM   Combine routed flow from split at CPE6 (DRE9) with unretained runoff from
273          KM   subbasin E9
274          HC       2    1.07
             *
275          KK    DE9S  DIVERT
276          KM    Flow split diversion, DRR5 to the south, DE9S to the west
277          DT    DRR5     0.0     0.0
278          DI     0.0    78.0   163.0   440.0   936.0  1475.0  2024.0     0.0     0.0     0.0
279          DQ     0.0     1.0    43.0   245.0   670.0  1157.0  1661.0     0.0     0.0     0.0
             *
280          KK   E9E16   ROUTE
281          KM    Route remaining flow from flow split at DE9S west to CPE16
282          RS       6    FLOW
283          RC   0.035   0.030   0.035    6751  0.0040    5.50
284          RX  950.00  985.00  991.00 1003.00 1007.00 1019.00 1025.00 1060.00
285          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
             *
286          KK    DRR5RETRIEVE
287          KM   Retrieve flow from split at DRR5 that goes to the south
288          DR    DRR5
             *
289          KK      R5   BASIN
290          KM   Runoff from subbasin R5
291          BA   0.504
292          LG    0.29    0.25    5.40    0.27      21
293          UI       0      53     120     241     310     393     574     608     455     358
294          UI     277     189      98      80      53      26      16      16      16      16
295          UI       0       0       0       0       0       0       0       0       0       0
296          UI       0       0       0       0       0       0       0       0       0       0
297          UI       0       0       0       0       0       0       0       0       0       0
             *
298          KK   DIVR5  DIVERT
299          KM   Divert the required retention volume for the subbasin out of the model
300          DT   RETR5     1.0     0.0
301          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
302          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *
1                                        HEC-1 INPUT                                        PAGE  8

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

303          KK    CPR5 COMBINE
304          KM   Combine routed flow from split at CPE9 (DRR5) with unretained runoff from
305          KM   subbasin R5
306          HC       2    1.07
             *
307          KK    R5R8   ROUTE
308          KM   Route combined runoff from CPR5 to CPR8
309          RS       5    FLOW
310          RC   0.040   0.035   0.040    6587  0.0043    5.00
311          RX  966.00  986.00  994.00 1006.00 1012.00 1024.00 1032.00 1052.00
312          RY    5.00    4.50    4.00    1.00    1.00    4.00    4.50    5.00
             *
313          KK      R8   BASIN
314          KM   Runoff from subbasin R8
315          BA   0.554
316          LG    0.16    0.25    4.60    0.45      64
317          UI       0      69     208     360     471     695     788     567     421     299
318          UI     149     105      69      23      21      21      21       0       0       0
319          UI       0       0       0       0       0       0       0       0       0       0
320          UI       0       0       0       0       0       0       0       0       0       0
321          UI       0       0       0       0       0       0       0       0       0       0
             *
322          KK   DIVR8  DIVERT
323          KM   Divert the required retention volume for the subbasin out of the model
324          DT   RETR8    50.5     0.0
325          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
```

```
326          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

327          KK    CPR8 COMBINE
328          KM   Combine routed runoff from CPR5 with unretained runoff from subbasin R8
329          HC       2    1.62
             *

330          KK   R8E16 ROUTE
331          KM   Route combined flows from CPR8 to CPE16 in the proposed MERIDIAN SOUTH CHANNE
332          RS       3    FLOW
333          RC    0.03    0.04    0.03    2660   0.001
334          RX       0      16      33      45      58      71      87     103
335          RY       7       3       0       0       0       0       3       7
             *

336          KK     E16   BASIN
337          KM   Runoff from subbasin E16
338          BA   0.396
339          LG    0.15    0.25    5.10    0.35      57
340          UI       0      58     224     342     497     684     480     338     207     100
341          UI      64      26      18      18       0       0       0       0       0       0
342          UI       0       0       0       0       0       0       0       0       0       0
343          UI       0       0       0       0       0       0       0       0       0       0
344          UI       0       0       0       0       0       0       0       0       0       0
             *
1                                        HEC-1 INPUT                                        PAGE  9

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

345          KK  DIVE16  DIVERT
346          KM   Divert the required retention volume for the subbasin out of the model
347          DT  RETE16    35.1     0.0
348          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
349          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

350          KK   CPE16 COMBINE
351          KM   Combine routed flow from split at CPE9 (DRR5, DE9S) and routed flow from CPR8
352          KM   with unretained runoff from subbasin E16.
353          HC       3    2.52
             *

354          KK  E16E15 ROUTE
355          KM   Route combined flows from CPE16 to CPE15 in the MERIDIAN SOUTH CHANNEL
356          RS       4    FLOW
357          RC    0.03    0.04    0.03    4120   0.001
358          RX       0      16      33      44      56      68      84     100
359          RY       7       3       0       0       0       0       3       7
             *

360          KK   CPE15 COMBINE
361          KM   Combine routed flows from CPE16 in the MERIDIAN SOUTH CHANNEL with flows
362          KM   from the north and east at the southwest corner of Pecos and Meridian. These
363          KM   flows combine in the proposed Pecos Basin (DETPB)
364          HC       2    6.81
             *

365          KK   DETPB STORAGE
366          KM   Proposed inline retention basin at SWC Meridian and Pecos
367          KM   Basin is 7-ft deep basin, but the top foot is not included (freeboard)
368          KM   Side slopes are 4:1, outlet pipe is 60-in RCP
369          KO       3
370          RS       1    STOR
371          SV       0    21.9    43.9    66.1    88.4   110.8   133.3   144.7   156.0
372          SQ       0      15      60     119     173     176     177     189     201
373          SE       0       1       2       3       4       5       6     6.5       7
             *

374          KK  E1524B ROUTE
375          KM   Route discharge from basin DETPB in PECOS STORM DRAIN to Signal Butte & Pecos
376          RD    3800  0.0035   0.013            CIRC       7
             * RS     3    FLOW
             * RC 0.035   0.035   0.035    3800  0.0035
             * RX     0      11      21      23      25      27      38      48
             * RY     7       4       0       0       0       0       4       7
             *

377          KK     E25   BASIN
378          KM   Runoff from subbasin E25
379          BA   0.932
380          LG    0.15    0.25    5.40    0.30      55
381          UI       0      86     146     342     451     546     683     986     969     749
382          UI     613     490     383     234     148     125      86      51      26      26
1                                        HEC-1 INPUT                                        PAGE 10

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

383          UI      26      26       0       0       0       0       0       0       0       0
384          UI       0       0       0       0       0       0       0       0       0       0
385          UI       0       0       0       0       0       0       0       0       0       0
             *
```

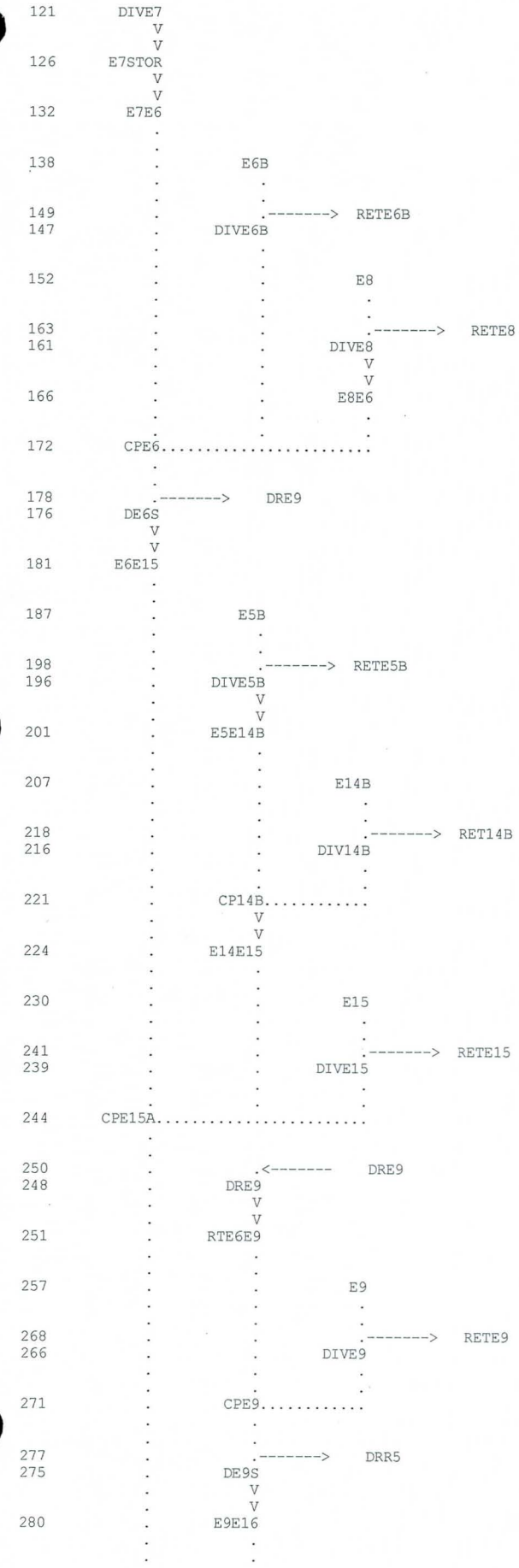
```
386          KK  DIVE25  DIVERT
387          KM   Divert the required retention volume for the subbasin out of the model
388          KM   MODIFIED MAX VOLUME FROM 110.7 TO 89.8
389          DT  RETE25    89.8     0.0
390          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
391          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

392          KK    E24B   BASIN
393          KM   Runoff from subbasin E24B
394          BA   0.464
395          LG    0.15    0.15    7.30    0.14      57
396          UI       0      92     339     513     852     731     493     294     133      76
397          UI      24      24       0       0       0       0       0       0       0       0
398          UI       0       0       0       0       0       0       0       0       0       0
399          UI       0       0       0       0       0       0       0       0       0       0
400          UI       0       0       0       0       0       0       0       0       0       0
             *

401          KK  DIV24B  DIVERT
402          KM   Divert the required retention volume for the subbasin out of the model
403          KM   MODIFIED MAX VOLUME FROM 38.7 TO 44.4
404          DT  RET24B    44.4     0.0
405          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
406          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

407          KK  CPE24B COMBINE
408          KM   Combine routed discharge from basin DETPB with unretained runoff from
409          KM   subbasins E25 and E24B in PECOS CHANNEL at Signal Butte & Pecos
410          HC       3    8.20
             *

411          KK  E24E28 ROUTE
412          KM   Route combined flows from CPE24B in PECOS CHANNEL to CPE28B at Crismon
413          KM   and Pecos
414          RS       4    FLOW
415          RC   0.035   0.035   0.035    5320  0.0035
416          RX       0      11      21      24      28      31      42      52
417          RY       7       4       0       0       0       0       4       7
             *

418          KK    E28B   BASIN
419          KM   Runoff from subbasin E28B
420          BA   0.539
421          LG    0.20    0.15    8.40    0.09      51
422          UI       0      65     183     329     427     606     772     566     430     318
423          UI     179     110      73      41      20      20      20       0       0       0
424          UI       0       0       0       0       0       0       0       0       0       0
425          UI       0       0       0       0       0       0       0       0       0       0
```

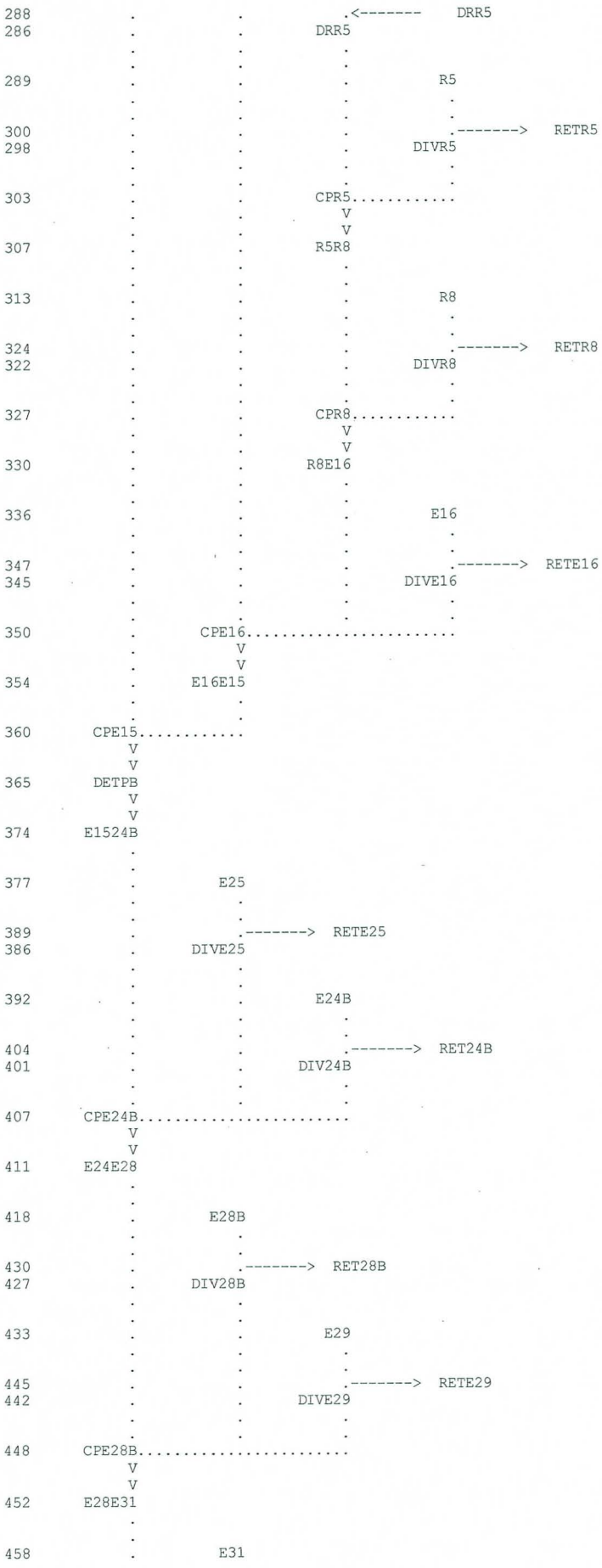
1 HEC-1 INPUT PAGE 11

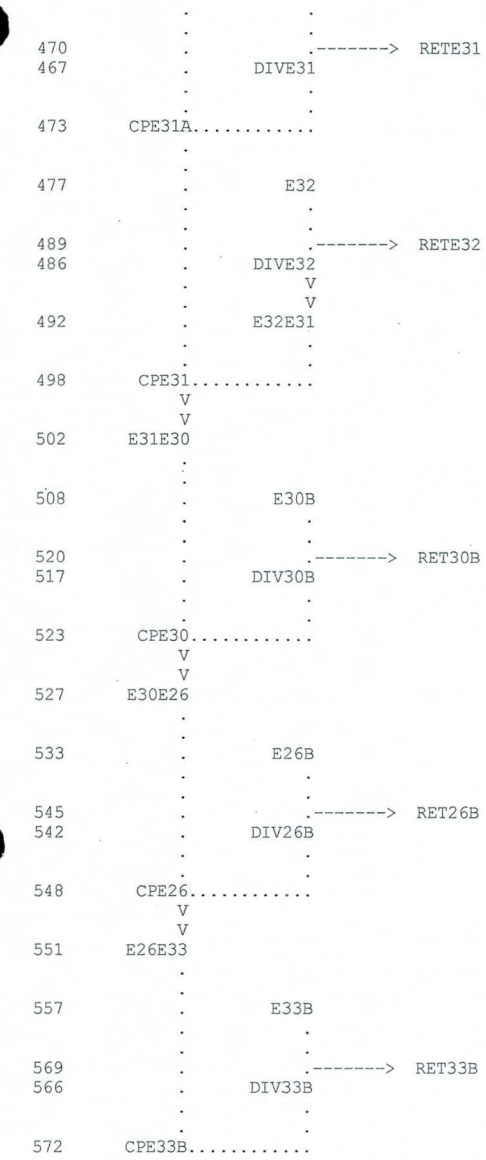
```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

426          UI       0       0       0       0       0       0       0       0       0       0
             *

427          KK  DIV28B  DIVERT
428          KM   Divert the required retention volume for the subbasin out of the model
429          KM   MODIFIED MAX VOLUME FROM 42.0 TO 51.3
430          DT  RET28B    51.3     0.0
431          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
432          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

433          KK     E29   BASIN
434          KM   Runoff from subbasin E29
435          BA   1.002
436          LG    0.15    0.23    6.20    0.22      55
437          UI       0     103     218     452     586     733    1019    1240     924     737
438          UI     574     428     229     172     116      82      31      31      31      31
439          UI       0       0       0       0       0       0       0       0       0       0
440          UI       0       0       0       0       0       0       0       0       0       0
441          UI       0       0       0       0       0       0       0       0       0       0
             *

442          KK  DIVE29  DIVERT
443          KM   Divert the required retention volume for the subbasin out of the model
444          KM   MODIFIED MAX VOLUME FROM 73.9 TO 90.2
445          DT  RETE29    90.2     0.0
446          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
447          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

448          KK  CPE28B COMBINE
449          KM   Combine routed flow from CPE24B with unretained runoff from subbasins E28B
450          KM   and E29 in the PECOS STORM DRAIN at Crismon and Pecos
451          HC       3    9.74
             *

452          KK  E28E31 ROUTE
453          KM   Route flows in the PECOS CHANNEL from CPE28B to CPE31 at Ellsworth and Pecos
```

```
 454          RS       3    FLOW
 455          RC   0.035   0.035   0.035    5400  0.0035
 456          RX       0      11      21      25      29      33      44      54
 457          RY       7       4       0       0       0       0       4       7
              *

 458          KK     E31   BASIN
 459          KM   Runoff from subbasin E31
 460          BA   0.810
 461          LG    0.15    0.25    4.80    0.39      55
 462          UI       0      86     197     391     504     641     943     970     728     571
 463          UI     441     296     151     126      86      37      26      26      26       0
 464          UI       0       0       0       0       0       0       0       0       0       0
 465          UI       0       0       0       0       0       0       0       0       0       0
 466          UI       0       0       0       0       0       0       0       0       0       0
              *
1                                        HEC-1 INPUT                                        PAGE 12

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 467          KK  DIVE31  DIVERT
 468          KM   Divert the required retention volume for the subbasin out of the model
 469          KM   MODIFIED MAX VOLUME FROM 56.5 TO 68.9
 470          DT  RETE31     68.9     0.0
 471          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 472          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 473          KK  CPE31A COMBINE
 474          KM   Combine routed flows from CPE28B with unretained runoff from subbasin E31 at
 475          KM   in the PECOS CHANNEL     at Ellsworth and Pecos
 476          HC       2   10.55
              *

 477          KK     E32   BASIN
 478          KM   Runoff from subbasin E32
 479          BA   0.246
 480          LG    0.14    0.25    4.25    0.55      58
 481          UI       0      72     238     387     535     337     190      78      37      15
 482          UI      15       0       0       0       0       0       0       0       0       0
 483          UI       0       0       0       0       0       0       0       0       0       0
 484          UI       0       0       0       0       0       0       0       0       0       0
 485          UI       0       0       0       0       0       0       0       0       0       0
              *

 486          KK  DIVE32  DIVERT
 487          KM   Divert the required retention volume for the subbasin out of the model
 488          KM   MODIFIED MAX VOLUME FROM 17.2 TO 20.9
 489          DT  RETE32     20.9     0.0
 490          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 491          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 492          KK  E32E31   ROUTE
 493          KM   Route unretained runoff from subbasin E32 to CPE31
 494          RS       5    FLOW
 495          RC   0.025   0.060   0.025    3272  0.0028 1388.60
 496          RX  100.00  110.00  128.00  149.80  160.00  191.50  209.20  210.00
 497          RY  1388.3 1388.32 1388.32 1380.37 1380.17 1388.04 1388.39 1388.60
              *

 498          KK   CPE31 COMBINE
 499          KM   Combine unretained runoff from subbasin E32 with the flows from the PECOS
 500          KM   CHANNEL at CPE31 - Ellsworth and Pecos
 501          HC       2   10.80
              *

 502          KK  E31E30   ROUTE
 503          KM   Route runoff from CPE31 north in the Ellsworth Channel to CPE30
 504          RS       5    FLOW
 505          RC   0.025   0.045   0.025    4404  0.0008 1387.00
 506          RX  100.00  107.00  112.50  144.90  175.10  201.50  225.90  244.00
 507          RY  1386.1 1386.09 1386.09 1377.99 1377.99 1384.59 1385.08 1387.00
              *
1                                        HEC-1 INPUT                                        PAGE 13

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 508          KK    E30B   BASIN
 509          KM   Runoff from subbasin E30B
 510          BA   0.882
 511          LG    0.24    0.15    8.40    0.09      47
 512          UI       0      56      56     128     217     272     314     357     416     500
 513          UI     668     683     552     475     416     355     303     261     191     124
 514          UI      98      92      66      56      44      17      17      17      17      17
 515          UI      17      17       0       0       0       0       0       0       0       0
 516          UI       0       0       0       0       0       0       0       0       0       0
              *

 517          KK  DIV30B  DIVERT
 518          KM   Divert the required retention volume for the subbasin out of the model
```

```
519          KM   MODIFIED MAX VOLUME FROM 67.1 TO 81.9
520          DT  RET30B    81.9     0.0
521          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
522          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

523          KK   CPE30 COMBINE
524          KM   Combine routed flow from CPE31 in the Ellsworth Channel with unretained
525          KM   runoff from subbasin E30B
526          HC       2   11.68
             *

527          KK  E30E26   ROUTE
528          KM   Route combined runoff from CPE30 to CPE26 in the Ellsworth Channel
529          RS       1    FLOW
530          RC   0.025   0.035   0.025     822  0.0005 1387.00
531          RX  100.00  105.00  108.50  149.90  220.10  251.30  279.10  285.10
532          RY  1387.0 1387.00 1386.66 1376.31 1376.31 1384.11 1384.66 1386.00
             *

533          KK    E26B   BASIN
534          KM   Runoff from subbasin E26B
535          BA   0.259
536          LG    0.24    0.15    8.80    0.07      48
537          UI       0      38     145     222     320     448     315     222     139      65
538          UI      43      18      12      12       0       0       0       0       0       0
539          UI       0       0       0       0       0       0       0       0       0       0
540          UI       0       0       0       0       0       0       0       0       0       0
541          UI       0       0       0       0       0       0       0       0       0       0
             *

542          KK  DIV26B  DIVERT
543          KM   Divert the required retention volume for the subbasin out of the model
544          KM   MODIFIED MAX VOLUME FROM 20.1 TO 24.5
545          DT  RET26B    24.5     0.0
546          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
547          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *
1                                        HEC-1 INPUT                                    PAGE 14

        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

548          KK   CPE26 COMBINE
549          KM   Combined routed flows from CPE30 with unretained runoff from subbasin E26B
550          HC       2   11.94
             *

551          KK  E26E33   ROUTE
552          KM   Route combine flows from CPE26 to CPE33 in the Ellsworth Channel
553          RS       5    FLOW
554          RC   0.025   0.030   0.025    8929  0.0028 1379.67
555          RX  100.00  100.50  102.50  134.90  205.10  237.50  253.50  255.00
556          RY  1379.1 1379.12 1379.35 1371.25 1371.25 1379.35 1379.67 1379.67
             *

557          KK    E33B   BASIN
558          KM   Runoff from subbasin E33B
559          BA   0.851
560          LG    0.15    0.15    7.30    0.14      56
561          UI       0     117     409     651     892    1385    1087     793     558     278
562          UI     179     110      36      36      36       0       0       0       0       0
563          UI       0       0       0       0       0       0       0       0       0       0
564          UI       0       0       0       0       0       0       0       0       0       0
565          UI       0       0       0       0       0       0       0       0       0       0
             *

566          KK  DIV33B  DIVERT
567          KM   Divert the required retention volume for the subbasin out of the model
568          KM   MODIFIED MAX VOLUME FROM 66.8 TO 81.5
569          DT  RET33B    81.5     0.0
570          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
571          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

572          KK  CPE33B COMBINE
573          KM   Combine routed flows in the Ellsworth Channel from CPE26 with unretained
574          KM   runoff from subbasin E33B.  Note this CP also receives flow from the
575          KM   Powerline model but that flow is not included in this model.
576          HC       2   12.79
             *
577          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   112          E7
                 .
                 .
   123           .-------->   RETE7
```


121 DIVE7
126 E7STOR
132 E7E6
138 E6B
149 RETE6B
147 DIVE6B
152 E8
163 RETE8
161 DIVE8
166 E8E6
172 CPE6
178 DRE9
176 DE6S
181 E6E15
187 E5B
198 RETE5B
196 DIVE5B
201 E5E14B
207 E14B
218 RET14B
216 DIV14B
221 CP14B
224 E14E15
230 E15
241 RETE15
239 DIVE15
244 CPE15A
250 DRE9
248 DRE9
251 RTE6E9
257 E9
268 RETE9
266 DIVE9
271 CPE9
277 DRR5
275 DE9S
280 E9E16


288 .<------- DRR5
286 DRR5
289 R5
300 .-------> RETR5
298 DIVR5
303 CPR5.....
307 R5R8
313 R8
324 .-------> RETR8
322 DIVR8
327 CPR8.....
330 R8E16
336 E16
347 .-------> RETE16
345 DIVE16
350 CPE16.....
354 E16E15
360 CPE15.....
365 DETPB
374 E1524B
377 E25
389 .-------> RETE25
386 DIVE25
392 E24B
404 .-------> RET24B
401 DIV24B
407 CPE24B.....
411 E24E28
418 E28B
430 .-------> RET28B
427 DIV28B
433 E29
445 .-------> RETE29
442 DIVE29
448 CPE28B.....
452 E28E31
458 E31



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   28AUG14  TIME  09:00:07   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*            (916) 756-1104             *
*                                       *
*****************************************
```

Pecos Road Channel and Basin Design Concept Report
Alternative Analysis
Future Conditions

Alternative 3: Storm drain from the Pecos Basin to the Ellsworth Channel

Prepared for the Flood Control District of Maricopa County
District Project Number FCD 2014C001

Prepared by Kimley-Horn and Associates, Inc.
Kimley Horn Project Number 091131024
August 2014

Model based on the East Mesa Area Drainage Master Plan Update (EMADMPU)
for Alternative 1. The model was revised to include only those areas
contributing to the Ellsworth Channel.

List of Changes:

- Basin DIVPB at Pecos Rd and Meridian was changed from a diversion card to a storage routing card with stage-storage-discharge data; the name was changed from DIVPB to DETPB to reflect the change.
- Routing reach from CPR9 to CPR8 was eliminated
- Powerline section of the model was deleted (all subbasins north of the future SR24 alignment).
- All subbasins south and east of R5 and R8 have been deleted.
- All comments from the East Mesa Area Drainage Master Plan Update that do pertain to the Ellsworth Channel model have been deleted.
- Area has been adjusted on HC cards to account for reduction in area due retention diversions.

```
**************************************************************************
************************** EAST MESA ADMPU ***************************
**************************************************************************

PROJECT:                EAST MESA AREA DRAINAGE MASTER PLAN UPDATE
CLIENT:                 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
PREPARED BY:     ENTELLUS, INC.
PROJECT NO:             FCD 2011C017            ENTELLUS 310.057
MODIFIED DATE:  9/12/2012
MODELER:                RLJ

STORM:                  100-YEAR 24-HOUR

ALTERNATIVE:    1

DEVELOPMENT CONDITIONS: FUTURE LAND USE
                                                  INCREASED FUTURE RETENTION (2.19->2.70 IN)

PROPOSED INFRASTRUCTURE: MOUNTAIN CHANNEL AND RETENTION BASIN
                                                  MERIDIAN CHANNEL
                                                  PECOS CHANNEL
                                                  MERIDIAN AND PECOS RETENTION BASIN
                                                  GERMANN CHANNEL

MODIFICATION 1: RETENTION VOLUMES WERE INCREASED TO
 100-YEAR, 2-HOUR NOAA 2 RAINFALL WITH 80% EFFECTIVE
 VOLUME WITHIN THE CITY OF MESA AND TOWN OF QUEEN CREEK FOR THE F
                                  SUBBASINS:

                                  E28B    E29             E30B
                                  E31             E32             E33B

MODIFICATION 4: MERIDIAN CHANNEL (SOUTH OF PECOS): CPR8
                                  RETOUTED TO COMBINE NORTH UP MERIDIAN ROAD TO COMBINE
                                  WITH CPE16 AND FOLLOW THE EXISTING FLOW PATH TO
                                  PROPOSED RETENTION AT MERIDIAN AND PECOS.

MODIFICATION 5: PECOS CHANNEL (WEST OF MERIDIAN): CPE24B WAS MODIFIED TO
                                  COMBINE WITH E25 AND WAS ROUTED ON PECOS ROAD. CPE29
                                  WAS MODIFIED TO COMBINE WITH E29. NEW ROUTES WERE
                                  DEFINED ON PECOS ROAD.

MODIFICATION 6: MERIDIAN AND PECOS OFFLINE RETENTION: ADDED DIVERSION
                                  DIVPB AFTER CPE15 WITH A BYPASS FLOW OF 265 CFS


**************************************************************************
************************** EAST MESA ADMPU ***************************
**************************************************************************

FUTEMADMP24 20110519 - EMADMPU 24-hr Future Conditions 20110519
Flood Control District of Maricopa County
100 YEAR
24 Hour Storm
Unit Hydrograph: S-Graph
08/05/2011
*****************************************************************

92 IO          OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                     NMIN          5  MINUTES IN COMPUTATION INTERVAL
                    IDATE     12Aug14  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE     18   14  ENDING DATE
                   NDTIME       2235  ENDING TIME
                   ICENT          20  CENTURY MARK

                 COMPUTATION INTERVAL      .08 HOURS
                     TOTAL TIME BASE  166.58 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
```

```
                   FLOW                  CUBIC FEET PER SECOND
                   STORAGE VOLUME        ACRE-FEET
                   SURFACE AREA          ACRES
                   TEMPERATURE           DEGREES FAHRENHEIT

  93 JD              INDEX STORM NO. 1
                          STRM        3.58  PRECIPITATION DEPTH
                          TRDA         .00  TRANSPOSITION DRAINAGE AREA

  94 PI                PRECIPITATION PATTERN
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                          .01      .01      .01      .01      .01      .01      .01      .01      .03      .03
                          .03      .09      .09      .09      .01      .01      .01      .01      .01      .01
                          .01      .01      .01      .01      .01      .01      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00

 104 JD              INDEX STORM NO. 2
                          STRM        3.56  PRECIPITATION DEPTH
                          TRDA        1.00  TRANSPOSITION DRAINAGE AREA

   0 PI                PRECIPITATION PATTERN
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                          .01      .01      .01      .01      .01      .01      .01      .01      .03      .03
                          .03      .09      .09      .09      .01      .01      .01      .01      .01      .01
                          .01      .01      .01      .01      .01      .01      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00

 105 JD              INDEX STORM NO. 3
                          STRM        3.49  PRECIPITATION DEPTH
                          TRDA        5.00  TRANSPOSITION DRAINAGE AREA

   0 PI                PRECIPITATION PATTERN
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                          .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
```

```
                  .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                  .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                  .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00

106 JD        INDEX STORM NO. 4
                 STRM      3.40  PRECIPITATION DEPTH
                 TRDA     10.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                  .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                  .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                  .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00

107 JD        INDEX STORM NO. 5
                 STRM      3.29  PRECIPITATION DEPTH
                 TRDA     20.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                  .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                  .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                  .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00

108 JD        INDEX STORM NO. 6
                 STRM      3.22  PRECIPITATION DEPTH
                 TRDA     30.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

109 JD INDEX STORM NO. 7
STRM 3.17 PRECIPITATION DEPTH
TRDA 40.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

110 JD INDEX STORM NO. 8
STRM 3.14 PRECIPITATION DEPTH
TRDA 50.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

```
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00

 111 JD         INDEX STORM NO. 9
                  STRM      3.11  PRECIPITATION DEPTH
                  TRDA     60.00  TRANSPOSITION DRAINAGE AREA

   0 PI           PRECIPITATION PATTERN
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
               .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
               .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
               .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
               .00       .00       .00       .00       .00       .00       .00       .00

WARNING --- ROUTED OUTFLOW (     527.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     517.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     493.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     488.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     507.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     505.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     495.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     494.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     498.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     489.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     490.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     523.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     513.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     503.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     497.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     489.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     489.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     509.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     499.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     490.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     491.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 365 KK     *    DETPB   *       STORAGE
            *            *
            **************
```

```
 369 KO         OUTPUT CONTROL VARIABLES
                     IPRNT          3  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

 370 RS         STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       STOR  TYPE OF INITIAL CONDITION
                    RSVRIC        .00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

 371 SV          STORAGE        .0      21.9      43.9      66.1      88.4     110.8     133.3     144.7     156.0

 372 SQ         DISCHARGE       0.       15.       60.      119.      173.      176.      177.      189.      201.

 373 SE         ELEVATION      .00      1.00      2.00      3.00      4.00      5.00      6.00      6.50      7.00
                                                           ***

       ***             ***             ***             ***             ***

                     HYDROGRAPH AT STATION      DETPB
                   TRANSPOSITION AREA        .0 SQ MI

 PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                    6-HR         24-HR         72-HR     166.58-HR
+  (CFS)        (HR)
                          (CFS)
+     199.     17.33                195.          139.           51.           22.
                       (INCHES)     .266          .759          .837          .848
                        (AC-FT)      97.          276.          304.          308.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                    6-HR         24-HR         72-HR     166.58-HR
+ (AC-FT)       (HR)
      154.     17.33                150.           97.           39.           17.

  PEAK STAGE    TIME                           MAXIMUM AVERAGE STAGE
                                    6-HR         24-HR         72-HR     166.58-HR
+   (FEET)      (HR)
      6.92     17.33                6.74          4.39          1.77           .78

                       CUMULATIVE AREA =     6.81 SQ MI


       ***             ***             ***             ***             ***

                     HYDROGRAPH AT STATION      DETPB
                   TRANSPOSITION AREA       1.0 SQ MI

 PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                    6-HR         24-HR         72-HR     166.58-HR
+  (CFS)        (HR)
                          (CFS)
+     196.     17.42                191.          137.           50.           22.
                       (INCHES)     .261          .746          .823          .833
                        (AC-FT)      95.          271.          299.          303.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                    6-HR         24-HR         72-HR     166.58-HR
+ (AC-FT)       (HR)
      151.     17.42                147.           95.           38.           17.

  PEAK STAGE    TIME                           MAXIMUM AVERAGE STAGE
                                    6-HR         24-HR         72-HR     166.58-HR
+   (FEET)      (HR)
      6.77     17.42                6.60          4.29          1.73           .77

                       CUMULATIVE AREA =     6.81 SQ MI


       ***             ***             ***             ***             ***

                     HYDROGRAPH AT STATION      DETPB
                   TRANSPOSITION AREA       5.0 SQ MI

 PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                    6-HR         24-HR         72-HR     166.58-HR
+  (CFS)        (HR)
                          (CFS)
+     182.     17.75                179.          128.           47.           20.
                       (INCHES)     .244          .697          .767          .776
                        (AC-FT)      89.          253.          279.          282.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                    6-HR         24-HR         72-HR     166.58-HR
+ (AC-FT)       (HR)
      138.     17.75                134.           86.           35.           15.

  PEAK STAGE    TIME                           MAXIMUM AVERAGE STAGE
```

		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
6.19	17.75	6.04	3.91	1.58	.70

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 176.	17.67	176.	117.	43.	19.
		(INCHES) .241	.637	.699	.703
		(AC-FT) 87.	231.	254.	255.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
119.	17.75	115.	73.	30.	13.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
5.34	17.83	5.19	3.32	1.36	.59

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 20.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 174.	17.58	173.	102.	37.	16.
		(INCHES) .237	.557	.614	.619
		(AC-FT) 86.	202.	223.	225.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
96.	17.67	93.	60.	25.	11.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
4.36	17.67	4.20	2.74	1.15	.50

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 30.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 169.	17.75	161.	93.	35.	15.
		(INCHES) .220	.510	.566	.570
		(AC-FT) 80.	185.	206.	207.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
87.	17.75	84.	56.	24.	10.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
3.92	17.75	3.79	2.53	1.07	.47

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 40.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				

+				6-HR	24-HR	72-HR	166.58-HR
			(CFS)				
+	156.	18.25		149.	87.	32.	14.
			(INCHES)	.204	.476	.532	.536
			(AC-FT)	74.	173.	193.	195.

+	PEAK STORAGE (AC-FT)	TIME (HR)		6-HR	MAXIMUM AVERAGE STORAGE 24-HR	72-HR	166.58-HR
	81.	18.17		79.	53.	23.	10.

+	PEAK STAGE (FEET)	TIME (HR)		6-HR	MAXIMUM AVERAGE STAGE 24-HR	72-HR	166.58-HR
	3.69	18.25		3.56	2.42	1.03	.45

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 50.0 SQ MI

+	PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	166.58-HR
			(CFS)				
+	146.	18.50		140.	82.	31.	13.
			(INCHES)	.192	.450	.505	.509
			(AC-FT)	70.	164.	183.	185.

+	PEAK STORAGE (AC-FT)	TIME (HR)		6-HR	MAXIMUM AVERAGE STORAGE 24-HR	72-HR	166.58-HR
	77.	18.50		75.	51.	22.	10.

+	PEAK STAGE (FEET)	TIME (HR)		6-HR	MAXIMUM AVERAGE STAGE 24-HR	72-HR	166.58-HR
	3.51	18.50		3.40	2.33	1.00	.44

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 60.0 SQ MI

+	PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	166.58-HR
			(CFS)				
+	140.	18.75		134.	79.	30.	13.
			(INCHES)	.183	.432	.487	.491
			(AC-FT)	67.	157.	177.	178.

+	PEAK STORAGE (AC-FT)	TIME (HR)		6-HR	MAXIMUM AVERAGE STORAGE 24-HR	72-HR	166.58-HR
	75.	18.75		72.	50.	21.	9.

+	PEAK STAGE (FEET)	TIME (HR)		6-HR	MAXIMUM AVERAGE STAGE 24-HR	72-HR	166.58-HR
	3.39	18.75		3.28	2.27	.98	.43

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT DETPB

+	PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	166.58-HR
			(CFS)				
+	179.	17.75		178.	123.	45.	20.
			(INCHES)	.243	.670	.737	.744
			(AC-FT)	88.	243.	268.	270.

CUMULATIVE AREA = 6.81 SQ MI

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

+	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE

+	HYDROGRAPH AT	E7	820.	12.92	182.	56.	19.	1.12
+	DIVERSION TO	RETE7	820.	12.92	159.	43.	14.	1.12
+	HYDROGRAPH AT	DIVE7	234.	13.67	43.	13.	4.	1.12
+	ROUTED TO	E7STOR	1.	25.67	1.	1.	0.	1.12
+	ROUTED TO	E7E6	1.	30.00	1.	1.	0.	1.12
+	HYDROGRAPH AT	E6B	2187.	12.58	400.	132.	44.	1.95
+	DIVERSION TO	RETE6B	2187.	12.58	326.	91.	30.	1.95
+	HYDROGRAPH AT	DIVE6B	897.	13.00	131.	41.	14.	1.95
+	HYDROGRAPH AT	E8	901.	12.75	180.	57.	19.	1.10
+	DIVERSION TO	RETE8	901.	12.75	149.	41.	14.	1.10
+	HYDROGRAPH AT	DIVE8	378.	13.25	52.	16.	5.	1.10
+	ROUTED TO	E8E6	191.	14.00	50.	16.	5.	1.10
+	3 COMBINED AT	CPE6	897.	13.00	176.	57.	19.	3.05
+	DIVERSION TO	DRE9	104.	13.00	3.	1.	0.	3.05
+	HYDROGRAPH AT	DE6S	788.	13.00	169.	55.	18.	3.05
+	ROUTED TO	E6E15	497.	13.58	165.	55.	18.	3.05
+	HYDROGRAPH AT	E5B	447.	12.25	57.	19.	6.	.29
+	DIVERSION TO	RETE5B	447.	12.25	45.	13.	4.	.29
+	HYDROGRAPH AT	DIVE5B	204.	12.50	21.	7.	2.	.29
+	ROUTED TO	E5E14B	89.	12.92	20.	7.	2.	.29
+	HYDROGRAPH AT	E14B	884.	12.25	109.	36.	12.	.53
+	DIVERSION TO	RET14B	884.	12.25	88.	24.	8.	.53
+	HYDROGRAPH AT	DIV14B	372.	12.50	37.	12.	4.	.53
+	2 COMBINED AT	CP14B	371.	12.50	57.	18.	6.	.81
+	ROUTED TO	E14E15	210.	12.67	56.	18.	6.	.81
+	HYDROGRAPH AT	E15	1096.	12.33	154.	51.	17.	.78
+	DIVERSION TO	RETE15	1096.	12.33	122.	34.	11.	.78
+	HYDROGRAPH AT	DIVE15	431.	12.67	54.	17.	6.	.78
+	3 COMBINED AT	CPE15A	638.	13.58	256.	87.	29.	4.29
+	HYDROGRAPH AT	DRE9	104.	13.00	3.	1.	0.	3.05
+	ROUTED TO	RTE6E9	26.	13.42	3.	1.	0.	3.05

+	HYDROGRAPH AT	E9	968.	12.42	147.	48.	16.	.72
+	DIVERSION TO	RETE9	968.	12.42	118.	33.	11.	.72
+	HYDROGRAPH AT	DIVE9	372.	12.75	49.	15.	5.	.72
+	2 COMBINED AT	CPE9	372.	12.75	52.	16.	5.	1.07
+	DIVERSION TO	DRR5	195.	12.75	9.	2.	1.	1.07
+	HYDROGRAPH AT	DE9S	176.	12.75	43.	14.	5.	1.07
+	ROUTED TO	E9E16	121.	13.25	41.	14.	5.	1.07
+	HYDROGRAPH AT	DRR5	195.	12.75	9.	2.	1.	1.07
+	HYDROGRAPH AT	R5	546.	12.50	72.	21.	7.	.50
+	DIVERSION TO	RETR5	4.	4.67	2.	1.	0.	.50
+	HYDROGRAPH AT	DIVR5	546.	12.50	72.	21.	7.	.50
+	2 COMBINED AT	CPR5	545.	12.50	81.	23.	8.	1.07
+	ROUTED TO	R5R8	472.	12.92	81.	23.	8.	1.07
+	HYDROGRAPH AT	R8	741.	12.42	115.	39.	13.	.55
+	DIVERSION TO	RETR8	741.	12.42	91.	25.	8.	.55
+	HYDROGRAPH AT	DIVR8	366.	12.67	42.	13.	4.	.55
+	2 COMBINED AT	CPR8	732.	12.67	119.	36.	12.	1.62
+	ROUTED TO	R8E16	649.	13.00	119.	36.	12.	1.62
+	HYDROGRAPH AT	E16	582.	12.33	79.	26.	9.	.40
+	DIVERSION TO	RETE16	582.	12.33	64.	18.	6.	.40
+	HYDROGRAPH AT	DIVE16	213.	12.58	26.	8.	3.	.40
+	3 COMBINED AT	CPE16	721.	13.00	180.	56.	19.	2.52
+	ROUTED TO	E16E15	679.	13.33	177.	56.	19.	2.52
+	2 COMBINED AT	CPE15	1161.	13.50	405.	136.	45.	6.81
+	ROUTED TO	DETPB	179.	17.75	178.	123.	45.	6.81
+	ROUTED TO	E1524B	179.	17.83	178.	123.	45.	6.81
+	HYDROGRAPH AT	E25	1038.	12.50	184.	60.	20.	.93
+	DIVERSION TO	RETE25	1038.	12.50	164.	45.	15.	.93
+	HYDROGRAPH AT	DIVE25	240.	13.17	46.	15.	5.	.93
+	HYDROGRAPH AT	E24B	788.	12.25	100.	32.	11.	.46
+	DIVERSION TO	RET24B	788.	12.25	81.	22.	7.	.46

+	HYDROGRAPH AT	DIV24B	274.	12.58	32.	10.	3.	.46
+	3 COMBINED AT	CPE24B	243.	14.42	219.	140.	51.	8.20
+	ROUTED TO	E24E28	242.	14.67	218.	140.	51.	8.20
+	HYDROGRAPH AT	E28B	773.	12.42	116.	37.	12.	.54
+	DIVERSION TO	RET28B	773.	12.42	95.	26.	9.	.54
+	HYDROGRAPH AT	DIV28B	316.	12.75	35.	11.	4.	.54
+	HYDROGRAPH AT	E29	1237.	12.50	203.	66.	22.	1.00
+	DIVERSION TO	RETE29	1237.	12.50	164.	45.	15.	1.00
+	HYDROGRAPH AT	DIVE29	573.	12.83	66.	21.	7.	1.00
+	3 COMBINED AT	CPE28B	539.	12.92	279.	163.	58.	9.74
+	ROUTED TO	E28E31	400.	13.25	274.	162.	58.	9.74
+	HYDROGRAPH AT	E31	964.	12.42	157.	52.	17.	.81
+	DIVERSION TO	RETE31	964.	12.42	125.	35.	12.	.81
+	HYDROGRAPH AT	DIVE31	402.	12.83	54.	17.	6.	.81
+	2 COMBINED AT	CPE31A	495.	13.25	306.	174.	62.	10.55
+	HYDROGRAPH AT	E32	404.	12.25	48.	16.	5.	.25
+	DIVERSION TO	RETE32	404.	12.25	38.	11.	4.	.25
+	HYDROGRAPH AT	DIVE32	136.	12.50	17.	5.	2.	.25
+	ROUTED TO	E32E31	68.	12.92	16.	5.	2.	.25
+	2 COMBINED AT	CPE31	524.	13.25	318.	178.	64.	10.80
+	ROUTED TO	E31E30	427.	13.75	312.	177.	63.	10.80
+	HYDROGRAPH AT	E30B	844.	12.83	186.	58.	19.	.88
+	DIVERSION TO	RET30B	844.	12.83	151.	41.	14.	.88
+	HYDROGRAPH AT	DIV30B	401.	13.33	55.	17.	6.	.88
+	2 COMBINED AT	CPE30	571.	13.75	348.	187.	67.	11.68
+	ROUTED TO	E30E26	551.	13.83	345.	187.	67.	11.68
+	HYDROGRAPH AT	E26B	415.	12.33	56.	18.	6.	.26
+	DIVERSION TO	RET26B	415.	12.33	45.	12.	4.	.26
+	HYDROGRAPH AT	DIV26B	146.	12.67	17.	5.	2.	.26
+	2 COMBINED AT	CPE26	559.	13.83	351.	189.	68.	11.94
+	ROUTED TO	E26E33	463.	14.50	342.	189.	68.	11.94

HYDROGRAPH AT
+ E33B 1304. 12.33 183. 59. 20. .85

DIVERSION TO
+ RET33B 1304. 12.33 149. 41. 14. .85

HYDROGRAPH AT
+ DIV33B 526. 12.67 57. 18. 6. .85

2 COMBINED AT
+ CPE33B 483. 14.58 361. 199. 72. 12.79

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
FOR STORM = 1 STORM AREA (SQ MI) = .00									
E1524B	MANE	5.00	199.12	1045.00	.85	5.00	199.12	1045.00	.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3078E+03 EXCESS= .0000E+00 OUTFLOW= .3078E+03 BASIN STORAGE= .7116E-02 PERCENT ERROR= .0

FOR STORM = 2 STORM AREA (SQ MI) = 1.00									
E1524B	MANE	5.00	195.58	1050.00	.83	5.00	195.58	1050.00	.83

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3025E+03 EXCESS= .0000E+00 OUTFLOW= .3025E+03 BASIN STORAGE= .7037E-02 PERCENT ERROR= .0

FOR STORM = 3 STORM AREA (SQ MI) = 5.00									
E1524B	MANE	5.00	181.59	1070.00	.78	5.00	181.59	1070.00	.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2818E+03 EXCESS= .0000E+00 OUTFLOW= .2818E+03 BASIN STORAGE= .6933E-02 PERCENT ERROR= .0

FOR STORM = 4 STORM AREA (SQ MI) = 10.00									
E1524B	MANE	5.00	176.34	1070.00	.70	5.00	176.34	1070.00	.70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2555E+03 EXCESS= .0000E+00 OUTFLOW= .2555E+03 BASIN STORAGE= .6368E-03 PERCENT ERROR= .0

FOR STORM = 5 STORM AREA (SQ MI) = 20.00									
E1524B	MANE	5.00	174.08	1065.00	.62	5.00	174.08	1065.00	.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2247E+03 EXCESS= .0000E+00 OUTFLOW= .2247E+03 BASIN STORAGE= .6066E-03 PERCENT ERROR= .0

FOR STORM = 6 STORM AREA (SQ MI) = 30.00									
E1524B	MANE	5.00	168.82	1070.00	.57	5.00	168.82	1070.00	.57

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2071E+03 EXCESS= .0000E+00 OUTFLOW= .2071E+03 BASIN STORAGE= .6004E-03 PERCENT ERROR= .0

FOR STORM = 7 STORM AREA (SQ MI) = 40.00									
E1524B	MANE	5.00	156.05	1100.00	.54	5.00	156.05	1100.00	.54

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1947E+03 EXCESS= .0000E+00 OUTFLOW= .1947E+03 BASIN STORAGE= .5998E-03 PERCENT ERROR= .0

FOR STORM = 8 STORM AREA (SQ MI) = 50.00									
E1524B	MANE	5.00	146.46	1115.00	.51	5.00	146.46	1115.00	.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1850E+03 EXCESS= .0000E+00 OUTFLOW= .1850E+03 BASIN STORAGE= .6009E-03 PERCENT ERROR= .0

FOR STORM = 9 STORM AREA (SQ MI) = 60.00									
E1524B	MANE	5.00	140.00	1130.00	.49	5.00	140.00	1130.00	.49

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1783E+03 EXCESS= .0000E+00 OUTFLOW= .1783E+03 BASIN STORAGE= .6007E-03 PERCENT ERROR= .0

1

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION E7STOR
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1567.20	.00	27.	1.	.00	25.75	.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1567.17	.00	27.	1.	.00	25.75	.00

PLAN 3 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1567.06	.00	24.	0.	.00	26.00	.00

PLAN 4 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.91	.00	21.	0.	.00	.00	.00

PLAN 5 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.72	.00	16.	0.	.00	.00	.00

PLAN 6 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.61	.00	14.	0.	.00	.00	.00

PLAN 7 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.53	.00	12.	0.	.00	.00	.00

PLAN 8 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.47	.00	11.	0.	.00	.00	.00

PLAN 9 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.43	.00	10.	0.	.00	.00	.00

*** NORMAL END OF HEC-1 ***

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   28AUG14  TIME  09:02:10   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   1          ID      Pecos Road Channel and Basin Design Concept Report
   2          ID      Alternative Analysis
   3          ID      Future Conditions
   4          ID
   5          ID      Alternative 3: Storm drain from the Pecos Basin to the Ellsworth Channel
   6          ID
   7          ID      Prepared for the Flood Control District of Maricopa County
   8          ID      District Project Number FCD 2014C001
   9          ID
  10          ID      Prepared by Kimley-Horn and Associates, Inc.
  11          ID      Kimley Horn Project Number 091131024
  12          ID      August 2014
  13          ID
  14          ID      Model based on the East Mesa Area Drainage Master Plan Update (EMADMPU)
  15          ID        for Alternative 1. The model was revised to include only those areas
  16          ID        contributing to the Ellsworth Channel.
  17          ID
  18          ID      List of Changes:
  19          ID      - Basin DIVPB at Pecos Rd and Meridian was changed from a diversion card
  20          ID        to a storage routing card with stage-storage-discharge data; the name
  21          ID        was changed from DIVPB to DETPB to reflect the change.
  22          ID      - Routing reach from CPR9 to CPR8 was eliminated
  23          ID      - Powerline section of the model was deleted (all subbasins north of the
  24          ID        future SR24 alignment).
  25          ID      - All subbasins south and east of R5 and R8 have been deleted.
  26          ID      - All comments from the East Mesa Area Drainage Master Plan Update that do
  27          ID        pertain to the Ellsworth Channel model have been deleted.
  28          ID      - Area has been adjusted on HC cards to account for reduction in area due
  29          ID        retention diversions.
  30          ID
  31          ID
  32          ID
  33          ID          ************************************************************************
  34          ID          ************************** EAST MESA ADMPU **************************
  35          ID          ************************************************************************
  36          ID
  37          ID          PROJECT:                EAST MESA AREA DRAINAGE MASTER PLAN UPDATE
  38          ID          CLIENT:                 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  39          ID          PREPARED BY:    ENTELLUS, INC.
  40          ID          PROJECT NO:             FCD 2011C017            ENTELLUS 310.057
  41          ID          MODIFIED DATE:  9/12/2012
  42          ID          MODELER:                RLJ
  43          ID
  44          ID          STORM:                  100-YEAR 24-HOUR
  45          ID
  46          ID          ALTERNATIVE:    1
  47          ID
  48          ID          DEVELOPMENT CONDITIONS: FUTURE LAND USE
  49          ID                                                  INCREASED FUTURE RETENTION (2.19->2.70 IN)
  50          ID
  51          ID          PROPOSED INFRASTRUCTURE: MOUNTAIN CHANNEL AND RETENTION BASIN
  52          ID                                                  MERIDIAN CHANNEL
  53          ID                                                  PECOS CHANNEL
  54          ID                                                  MERIDIAN AND PECOS RETENTION BASIN
  55          ID                                                  GERMANN CHANNEL
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  56      ID
  57      ID          MODIFICATION 1: RETENTION VOLUMES WERE INCREASED TO
  58      ID              100-YEAR, 2-HOUR NOAA 2 RAINFALL WITH 80% EFFECTIVE
  59      ID              VOLUME WITHIN THE CITY OF MESA AND TOWN OF QUEEN CREEK FOR THE F
  60      ID                                  SUBBASINS:
  61      ID
  62      ID                                  E28B    E29             E30B
  63      ID                                  E31             E32             E33B
  64      ID
  65      ID          MODIFICATION 4: MERIDIAN CHANNEL (SOUTH OF PECOS): CPR8
  66      ID                                  RETOUTED TO COMBINE NORTH UP MERIDIAN ROAD TO COMBINE
  67      ID                                  WITH CPE16 AND FOLLOW THE EXISTING FLOW PATH TO
  68      ID                                  PROPOSED RETENTION AT MERIDIAN AND PECOS.
  69      ID
  70      ID          MODIFICATION 5: PECOS CHANNEL (WEST OF MERIDIAN): CPE24B WAS MODIFIED TO
  71      ID                                  COMBINE WITH E25 AND WAS ROUTED ON PECOS ROAD. CPE29
  72      ID                                  WAS MODIFIED TO COMBINE WITH E29. NEW ROUTES WERE
  73      ID                                  DEFINED ON PECOS ROAD.
  74      ID
  75      ID          MODIFICATION 6: MERIDIAN AND PECOS OFFLINE RETENTION: ADDED DIVERSION
  76      ID                                  DIVPB AFTER CPE15 WITH A BYPASS FLOW OF 265 CFS
  77      ID
  78      ID
  79      ID          ************************************************************************
  80      ID          ************************** EAST MESA ADMPU **************************
  81      ID          ************************************************************************
  82      ID
  83      ID       FUTEMADMP24 20110519 - EMADMPU 24-hr Future Conditions 20110519
  84      ID       Flood Control District of Maricopa County
  85      ID       100 YEAR
  86      ID       24 Hour Storm
  87      ID       Unit Hydrograph: S-Graph
  88      ID       08/05/2011
  89      ID       ****************************************************************
  90      IT      5 12Aug14       0    2000                    2000
  91      IN     15
  92      IO      5
          *DIAGRAM
          *
  93      JD   3.579  0.0001
  94      PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
  95      PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
  96      PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
  97      PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
  98      PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
  99      PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
 100      PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
 101      PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
 102      PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
 103      PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
 104      JD   3.561     1.0
 105      JD   3.490     5.0
 106      JD   3.400    10.0
 107      JD   3.286    20.0
 108      JD   3.221    30.0
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 109      JD   3.175    40.0
 110      JD   3.139    50.0
 111      JD   3.114    60.0
          *

 112      KK      E7   BASIN
 113      KM   Runoff from subbasin E7
 114      BA   1.124
 115      LG    0.24    0.26    5.10    0.32      35
 116      UI       0      64      64     102     224     281     328     369     416     477
 117      UI     561     725     814     670     575     512     449     390     339     300
 118      UI     226     159     113     106      99      64      64      46      20      20
 119      UI      20      20      20      20      20      20       0       0       0       0
 120      UI       0       0       0       0       0       0       0       0       0       0
          *

 121      KK   DIVE7  DIVERT
 122      KM   Divert the required retention volume for the subbasin out of the model
 123      DT   RETE7    85.5     0.0
 124      DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 125      DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          *

 126      KK  E7STOR STORAGE
 127      RS       1    STOR
 128      SV           22.82   34.23   45.64   78.34  111.03  143.72  176.42  230.23  284.04
 129      SQ                    1.75    5.50   11.00   17.70   25.70   34.20   43.00   51.70
 130      SE  1566.0 1567.00 1567.50 1568.00 1568.50 1569.00 1569.50 1570.00 1570.50 1571.00
 131      ST  1574.0 10000.0     3.0     1.5
          *
```

```
 132          KK    E7E6   ROUTE
 133          KM    Route outfall from E7STOR to CPE6
 134          RS      23    FLOW
 135          RC   0.035   0.030   0.030   16362  0.0062    5.50
 136          RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
 137          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
              *

 138          KK     E6B   BASIN
 139          KM    Runoff from subbasin E6B
 140          BA   1.949
 141          LG    0.14    0.25    6.00    0.24      59
 142          UI       0     174     277     677     898    1079    1330    1853    2099    1602
 143          UI    1321    1068     853     594     331     288     192     162      53      53
 144          UI      53      53      53       0       0       0       0       0       0       0
 145          UI       0       0       0       0       0       0       0       0       0       0
 146          UI       0       0       0       0       0       0       0       0       0       0
              *
1                                        HEC-1 INPUT                                        PAGE  4

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 147          KK  DIVE6B  DIVERT
 148          KM   Divert the required retention volume for the subbasin out of the model
 149          DT  RETE6B   179.9     0.0
 150          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 151          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 152          KK      E8   BASIN
 153          KM    Runoff from subbasin E8
 154          BA   1.099
 155          LG    0.21    0.25    4.50    0.44      39
 156          UI       0      75      75     201     313     383     441     514     604     798
 157          UI     955     771     649     563     475     401     337     241     145     127
 158          UI     114      75      75      28      23      23      23      23      23      23
 159          UI       0       0       0       0       0       0       0       0       0       0
 160          UI       0       0       0       0       0       0       0       0       0       0
              *

 161          KK   DIVE8  DIVERT
 162          KM   Divert the required retention volume for the subbasin out of the model
 163          DT   RETE8    80.9     0.0
 164          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 165          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 166          KK    E8E6   ROUTE
 167          KM    Route runoff from subbasin E8 that is not retained to CPE6
 168          RS       9    FLOW
 169          RC   0.060   0.035   0.060    9833  0.0052    5.50
 170          RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
 171          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
              *

 172          KK    CPE6 COMBINE
 173          KM    Combine routed flow from E7STOR and subbasin E8 with unretained runoff from
 174          KM    subbasin E6B.
 175          HC       3    3.05
              *

 176          KK    DE6S  DIVERT
 177          KM    Flow split diversion, DRE9 to the south, DE6S to the west
 178          DT    DRE9     0.0     0.0
 179          DI     0.0   236.0   682.0  1141.0  1670.0  2261.0  2886.0     0.0     0.0     0.0
 180          DQ     0.0     1.0    13.0   212.0   633.0  1096.0  1568.0     0.0     0.0     0.0
              *

 181          KK   E6E15   ROUTE
 182          KM    Route remaining flow from flow split at DE6S west to CPE15A
 183          RS       7    FLOW
 184          RC   0.035   0.030   0.035    8259  0.0042    5.50
 185          RX  950.00  975.00  991.00 1003.00 1007.00 1019.00 1030.00 1065.00
 186          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
              *
1                                        HEC-1 INPUT                                        PAGE  5

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 187          KK     E5B   BASIN
 188          KM   Runoff from subbasin E5B
 189          BA   0.286
 190          LG    0.14    0.25    3.95    0.64      62
 191          UI       0      64     225     342     567     435     287     148      74      36
 192          UI      15      15       0       0       0       0       0       0       0       0
 193          UI       0       0       0       0       0       0       0       0       0       0
 194          UI       0       0       0       0       0       0       0       0       0       0
 195          UI       0       0       0       0       0       0       0       0       0       0
              *
```

```
196          KK  DIVE5B  DIVERT
197          KM   Divert the required retention volume for the subbasin out of the model
198          DT  RETE5B    25.0     0.0
199          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
200          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

201          KK  E5E14B   ROUTE
202          KM    Route runoff from subbasin E5B that is not retained to CP14B
203          RS       5    FLOW
204          RC   0.035   0.030   0.035    6256  0.0054    5.50
205          RX  950.00  985.00  991.00 1003.00 1007.00 1019.00 1025.00 1050.00
206          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
             *

207          KK    E14B   BASIN
208          KM   Runoff from subbasin E14B
209          BA   0.528
210          LG    0.14    0.25    5.60    0.29      60
211          UI       0     125     435     667    1086     785     512     237     126      53
212          UI      29      29       0       0       0       0       0       0       0       0
213          UI       0       0       0       0       0       0       0       0       0       0
214          UI       0       0       0       0       0       0       0       0       0       0
215          UI       0       0       0       0       0       0       0       0       0       0
             *

216          KK  DIV14B  DIVERT
217          KM   Divert the required retention volume for the subbasin out of the model
218          DT  RET14B    48.4     0.0
219          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
220          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

221          KK   CP14B COMBINE
222          KM    Combine routed flow from E5B with unretained runoff from subbasin E14B.
223          HC       2
             *
1                                        HEC-1 INPUT                                    PAGE  6

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

224          KK  E14E15 ROUTE
225          KM   Route combined runoff from CP14B to CPE15A
226          RS       2    FLOW
227          RC    0.04    0.03    0.04    1840  0.0018
228          RX       0       9      18      29      40      51      59      68
229          RY       4       2       0       0       0       0       2       4
             *

230          KK     E15   BASIN
231          KM   Runoff from subbasin E15
232          BA   0.777
233          LG    0.15    0.25    5.10    0.35      57
234          UI       0     106     363     582     791    1239    1004     734     522     273
235          UI     171     106      36      32      32       0       0       0       0       0
236          UI       0       0       0       0       0       0       0       0       0       0
237          UI       0       0       0       0       0       0       0       0       0       0
238          UI       0       0       0       0       0       0       0       0       0       0
             *

239          KK  DIVE15  DIVERT
240          KM   Divert the required retention volume for the subbasin out of the model
241          DT  RETE15    67.7     0.0
242          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
243          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

244          KK  CPE15A COMBINE
245          KM   Combine routed flow from split at CPE6 (DRE9, DE6S) and CP14B with unretained
246          KM   runoff from subbasin E15.
247          HC       3    4.29
             *

248          KK    DRE9RETRIEVE
249          KM   Retrieve flow from split at DRE9 that goes to the south
250          DR    DRE9
             *

251          KK  RTE6E9   ROUTE
252          KM   Route split flow from CPE6 (DRE9) south to CPE9
253          RS       5    FLOW
254          RC   0.035   0.030   0.025    2200  0.0035    6.00
255          RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
256          RY    0.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
             *

257          KK      E9   BASIN
258          KM   Runoff from subbasin E9
259          BA   0.723
260          LG    0.14    0.25    5.40    0.30      58
261          UI       0      88     253     450     585     836    1040     754     570     416
262          UI     225     148      92      48      27      27      27       0       0       0
```

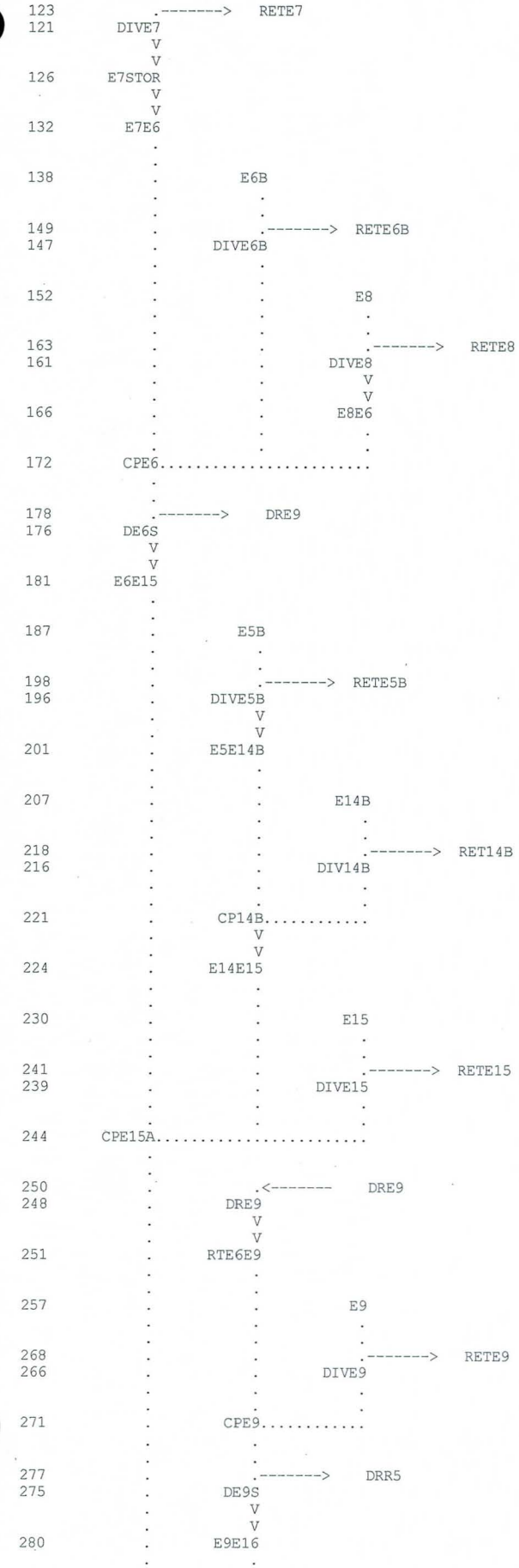
```
 263          UI       0       0       0       0       0       0       0       0       0       0
 264          UI       0       0       0       0       0       0       0       0       0       0
 265          UI       0       0       0       0       0       0       0       0       0       0
              *
1                                        HEC-1 INPUT                                        PAGE  7

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 266          KK   DIVE9  DIVERT
 267          KM   Divert the required retention volume for the subbasin out of the model
 268          DT   RETE9    65.4     0.0
 269          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 270          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 271          KK    CPE9 COMBINE
 272          KM   Combine routed flow from split at CPE6 (DRE9) with unretained runoff from
 273          KM   subbasin E9
 274          HC       2    1.07
              *

 275          KK    DE9S  DIVERT
 276          KM    Flow split diversion, DRR5 to the south, DE9S to the west
 277          DT    DRR5      0.0     0.0
 278          DI     0.0     78.0   163.0   440.0   936.0  1475.0  2024.0     0.0     0.0     0.0
 279          DQ     0.0      1.0    43.0   245.0   670.0  1157.0  1661.0     0.0     0.0     0.0
              *

 280          KK   E9E16   ROUTE
 281          KM    Route remaining flow from flow split at DE9S west to CPE16
 282          RS       6    FLOW
 283          RC   0.035   0.030   0.035    6751  0.0040    5.50
 284          RX  950.00  985.00  991.00 1003.00 1007.00 1019.00 1025.00 1060.00
 285          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
              *

 286          KK    DRR5RETRIEVE
 287          KM   Retrieve flow from split at DRR5 that goes to the south
 288          DR    DRR5
              *

 289          KK      R5   BASIN
 290          KM   Runoff from subbasin R5
 291          BA   0.504
 292          LG    0.29    0.25    5.40    0.27      21
 293          UI       0      53     120     241     310     393     574     608     455     358
 294          UI     277     189      98      80      53      26      16      16      16      16
 295          UI       0       0       0       0       0       0       0       0       0       0
 296          UI       0       0       0       0       0       0       0       0       0       0
 297          UI       0       0       0       0       0       0       0       0       0       0
              *

 298          KK   DIVR5  DIVERT
 299          KM   Divert the required retention volume for the subbasin out of the model
 300          DT   RETR5     1.0     0.0
 301          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 302          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *
1                                        HEC-1 INPUT                                        PAGE  8

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 303          KK    CPR5 COMBINE
 304          KM   Combine routed flow from split at CPE9 (DRR5) with unretained runoff from
 305          KM   subbasin R5
 306          HC       2    1.07
              *

 307          KK    R5R8   ROUTE
 308          KM   Route combined runoff from CPR5 to CPR8
 309          RS       5    FLOW
 310          RC   0.040   0.035   0.040    6587  0.0043    5.00
 311          RX  966.00  986.00  994.00 1006.00 1012.00 1024.00 1032.00 1052.00
 312          RY    5.00    4.50    4.00    1.00    1.00    4.00    4.50    5.00
              *

 313          KK      R8   BASIN
 314          KM   Runoff from subbasin R8
 315          BA   0.554
 316          LG    0.16    0.25    4.60    0.45      64
 317          UI       0      69     208     360     471     695     788     567     421     299
 318          UI     149     105      69      23      21      21      21       0       0       0
 319          UI       0       0       0       0       0       0       0       0       0       0
 320          UI       0       0       0       0       0       0       0       0       0       0
 321          UI       0       0       0       0       0       0       0       0       0       0
              *

 322          KK   DIVR8  DIVERT
 323          KM   Divert the required retention volume for the subbasin out of the model
 324          DT   RETR8    50.5     0.0
 325          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
```

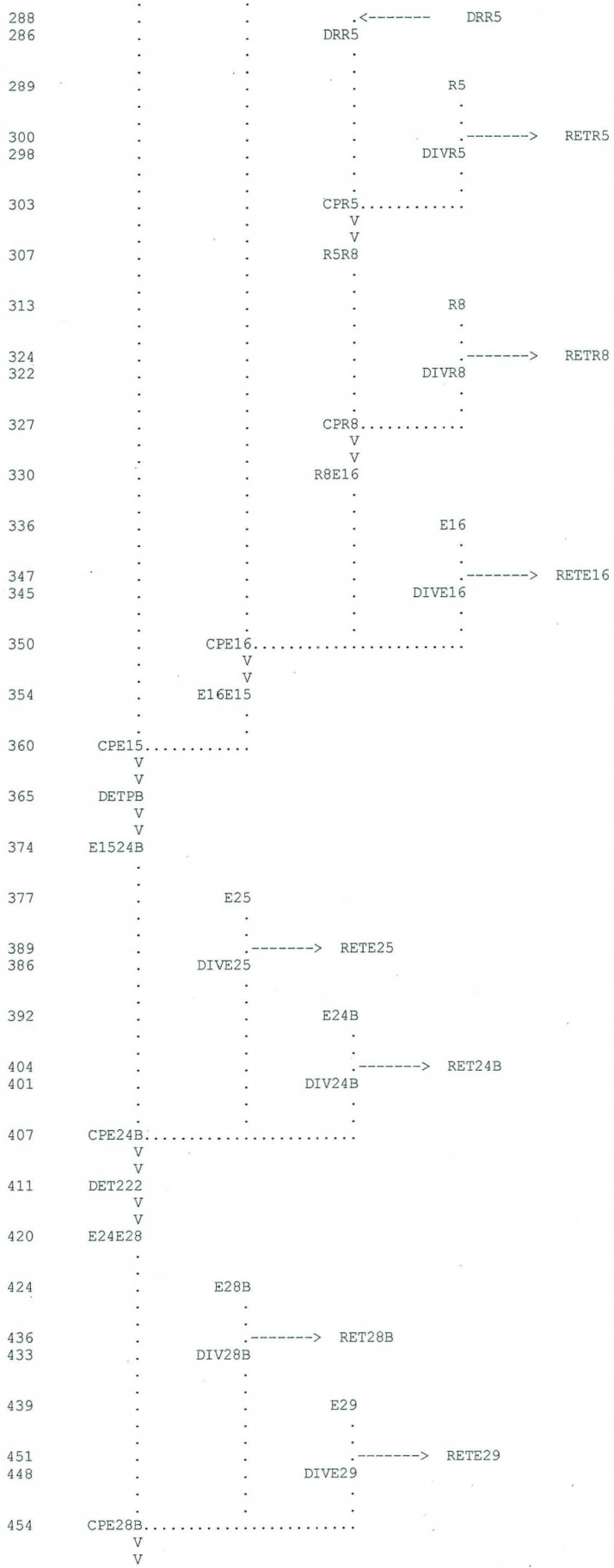
```
 326          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 327          KK    CPR8 COMBINE
 328          KM    Combine routed runoff from CPR5 with unretained runoff from subbasin R8
 329          HC       2    1.62
              *

 330          KK    R8E16 ROUTE
 331          KM    Route combined flows from CPR8 to CPE16 in the proposed MERIDIAN SOUTH CHANNE
 332          RS       3    FLOW
 333          RC    0.03    0.04    0.03    2660   0.001
 334          RX       0      16      33      45      58      71      87     103
 335          RY       7       3       0       0       0       0       3       7
              *

 336          KK     E16   BASIN
 337          KM    Runoff from subbasin E16
 338          BA    0.396
 339          LG    0.15    0.25    5.10    0.35      57
 340          UI       0      58     224     342     497     684     480     338     207     100
 341          UI      64      26      18      18       0       0       0       0       0       0
 342          UI       0       0       0       0       0       0       0       0       0       0
 343          UI       0       0       0       0       0       0       0       0       0       0
 344          UI       0       0       0       0       0       0       0       0       0       0
              *
1                                        HEC-1 INPUT                                          PAGE  9

 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 345          KK  DIVE16  DIVERT
 346          KM    Divert the required retention volume for the subbasin out of the model
 347          DT  RETE16    35.1     0.0
 348          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 349          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 350          KK    CPE16 COMBINE
 351          KM    Combine routed flow from split at CPE9 (DRR5, DE9S) and routed flow from CPR8
 352          KM    with unretained runoff from subbasin E16.
 353          HC       3    2.52
              *

 354          KK  E16E15 ROUTE
 355          KM    Route combined flows from CPE16 to CPE15 in the MERIDIAN SOUTH CHANNEL
 356          RS       4    FLOW
 357          RC    0.03    0.04    0.03    4120   0.001
 358          RX       0      16      33      44      56      68      84     100
 359          RY       7       3       0       0       0       0       3       7
              *

 360          KK    CPE15 COMBINE
 361          KM    Combine routed flows from CPE16 in the MERIDIAN SOUTH CHANNEL with flows
 362          KM    from the north and east at the southwest corner of Pecos and Meridian. These
 363          KM    flows combine in the proposed Pecos Basin (DETPB)
 364          HC       2    6.81
              *

 365          KK    DETPB STORAGE
 366          KM    Proposed inline retention basin at SWC Meridian and Pecos
 367          KM    Basin is 7-ft deep basin, but the top foot is not included (freeboard)
 368          KM    Side slopes are 4:1, outlet pipe is 60-in RCP
 369          KO       3
 370          RS       1    STOR
 371          SV       0    21.9    43.9    66.1    88.4   110.8   133.3   144.7   156.0
 372          SQ       0      15      60     119     173     176     177     189     201
 373          SE       0       1       2       3       4       5       6     6.5       7
              *

 374          KK  E1524B ROUTE
 375          KM    Route discharge from basin DETPB in PECOS STORM DRAIN to Signal Butte & Pecos
 376          RD    3800  0.0035   0.013            CIRC       7
              *

 377          KK     E25   BASIN
 378          KM    Runoff from subbasin E25
 379          BA    0.932
 380          LG    0.15    0.25    5.40    0.30      55
 381          UI       0      86     146     342     451     546     683     986     969     749
 382          UI     613     490     383     234     148     125      86      51      26      26
 383          UI      26      26       0       0       0       0       0       0       0       0
 384          UI       0       0       0       0       0       0       0       0       0       0
 385          UI       0       0       0       0       0       0       0       0       0       0
              *
1                                        HEC-1 INPUT                                          PAGE 10

 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 386          KK  DIVE25  DIVERT
 387          KM    Divert the required retention volume for the subbasin out of the model
 388          KM    MODIFIED MAX VOLUME FROM 110.7 TO 89.8
```

```
389          DT  RETE25    89.8     0.0
390          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
391          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

392          KK    E24B   BASIN
393          KM   Runoff from subbasin E24B
394          BA   0.464
395          LG    0.15    0.15    7.30    0.14      57
396          UI       0      92     339     513     852     731     493     294     133      76
397          UI      24      24       0       0       0       0       0       0       0       0
398          UI       0       0       0       0       0       0       0       0       0       0
399          UI       0       0       0       0       0       0       0       0       0       0
400          UI       0       0       0       0       0       0       0       0       0       0
             *

401          KK  DIV24B  DIVERT
402          KM   Divert the required retention volume for the subbasin out of the model
403          KM   MODIFIED MAX VOLUME FROM 38.7 TO 44.4
404          DT  RET24B    44.4     0.0
405          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
406          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

407          KK  CPE24B COMBINE
408          KM   Combine routed discharge from basin DETPB with unretained runoff from
409          KM   subbasins E25 and E24B in PECOS CHANNEL at Signal Butte & Pecos
410          HC       3    8.20
             *

411          KK  DET222  STORAGE
412          KM   Proposed inline retention basin at SWC Meridian and Pecos
413          KM   Basin is 6-ft deep basin, but the top foot is not included (freeboard)
414          KM   Side slopes are 4:1, outlet pipe is two 72-in RCP
415          KO       3
416          RS       1    STOR
417          SV       0     7.5    15.2    23.0    30.9    38.9    47.0    51.1    55.2
418          SQ       0      24      85     141     136     167     191     202     212
419          SE       0       1       2       3       4       5       6     6.5       7
             *

420          KK  E24E28 ROUTE
421          KM   Route combined flows from CPE24B in PECOS STORM DRAIN to CPE28B at Crismon
422          KM   and Pecos
423          RD    5320  0.0035   0.013            CIRC       9
             *
1                                        HEC-1 INPUT                                    PAGE 11

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

424          KK    E28B   BASIN
425          KM   Runoff from subbasin E28B
426          BA   0.539
427          LG    0.20    0.15    8.40    0.09      51
428          UI       0      65     183     329     427     606     772     566     430     318
429          UI     179     110      73      41      20      20      20       0       0       0
430          UI       0       0       0       0       0       0       0       0       0       0
431          UI       0       0       0       0       0       0       0       0       0       0
432          UI       0       0       0       0       0       0       0       0       0       0
             *

433          KK  DIV28B  DIVERT
434          KM   Divert the required retention volume for the subbasin out of the model
435          KM   MODIFIED MAX VOLUME FROM 42.0 TO 51.3
436          DT  RET28B    51.3     0.0
437          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
438          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

439          KK     E29   BASIN
440          KM   Runoff from subbasin E29
441          BA   1.002
442          LG    0.15    0.23    6.20    0.22      55
443          UI       0     103     218     452     586     733    1019    1240     924     737
444          UI     574     428     229     172     116      82      31      31      31      31
445          UI       0       0       0       0       0       0       0       0       0       0
446          UI       0       0       0       0       0       0       0       0       0       0
447          UI       0       0       0       0       0       0       0       0       0       0
             *

448          KK  DIVE29  DIVERT
449          KM   Divert the required retention volume for the subbasin out of the model
450          KM   MODIFIED MAX VOLUME FROM 73.9 TO 90.2
451          DT  RETE29    90.2     0.0
452          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
453          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

454          KK  CPE28B COMBINE
455          KM   Combine routed flow from CPE24B with unretained runoff from subbasins E28B
456          KM   and E29 in the PECOS STORM DRAIN at Crismon and Pecos
457          HC       3    9.74
```

```
                *
          458   KK  E28E31 ROUTE
          459   KM   Route flows in the PECOS STORM DRAIN from CPE28B to CPE31 at Ellsworth and Pe
          460   RD    5400  0.0035   0.013          CIRC       9
                *
1                                        HEC-1 INPUT                                        PAGE 12

        LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          461   KK     E31   BASIN
          462   KM   Runoff from subbasin E31
          463   BA   0.810
          464   LG    0.15    0.25    4.80    0.39      55
          465   UI       0      86     197     391     504     641     943     970     728     571
          466   UI     441     296     151     126      86      37      26      26      26       0
          467   UI       0       0       0       0       0       0       0       0       0       0
          468   UI       0       0       0       0       0       0       0       0       0       0
          469   UI       0       0       0       0       0       0       0       0       0       0
                *
          470   KK  DIVE31  DIVERT
          471   KM   Divert the required retention volume for the subbasin out of the model
          472   KM   MODIFIED MAX VOLUME FROM 56.5 TO 68.9
          473   DT  RETE31    68.9     0.0
          474   DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          475   DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                *
          476   KK  CPE31A COMBINE
          477   KM   Combine routed flows from CPE28B with unretained runoff from subbasin E31 at
          478   KM   in the PECOS CHANNEL     at Ellsworth and Pecos
          479   HC       2   10.55
                *
          480   KK     E32   BASIN
          481   KM   Runoff from subbasin E32
          482   BA   0.246
          483   LG    0.14    0.25    4.25    0.55      58
          484   UI       0      72     238     387     535     337     190      78      37      15
          485   UI      15       0       0       0       0       0       0       0       0       0
          486   UI       0       0       0       0       0       0       0       0       0       0
          487   UI       0       0       0       0       0       0       0       0       0       0
          488   UI       0       0       0       0       0       0       0       0       0       0
                *
          489   KK  DIVE32  DIVERT
          490   KM   Divert the required retention volume for the subbasin out of the model
          491   KM   MODIFIED MAX VOLUME FROM 17.2 TO 20.9
          492   DT  RETE32    20.9     0.0
          493   DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          494   DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                *
          495   KK  E32E31   ROUTE
          496   KM   Route unretained runoff from subbasin E32 to CPE31
          497   RS       5    FLOW
          498   RC   0.025   0.060   0.025    3272  0.0028 1388.60
          499   RX  100.00  110.00  128.00  149.80  160.00  191.50  209.20  210.00
          500   RY  1388.3 1388.32 1388.32 1380.37 1380.17 1388.04 1388.39 1388.60
                *
1                                        HEC-1 INPUT                                        PAGE 13

        LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          501   KK   CPE31 COMBINE
          502   KM   Combine unretained runoff from subbasin E32 with the flows from the PECOS
          503   KM   CHANNEL at CPE31 - Ellsworth and Pecos
          504   HC       2   10.80
                *
          505   KK  E31E30   ROUTE
          506   KM   Route runoff from CPE31 north in the Ellsworth Channel to CPE30
          507   RS       5    FLOW
          508   RC   0.025   0.045   0.025    4404  0.0008 1387.00
          509   RX  100.00  107.00  112.50  144.90  175.10  201.50  225.90  244.00
          510   RY  1386.1 1386.09 1386.09 1377.99 1377.99 1384.59 1385.08 1387.00
                *
          511   KK    E30B   BASIN
          512   KM   Runoff from subbasin E30B
          513   BA   0.882
          514   LG    0.24    0.15    8.40    0.09      47
          515   UI       0      56      56     128     217     272     314     357     416     500
          516   UI     668     683     552     475     416     355     303     261     191     124
          517   UI      98      92      66      56      44      17      17      17      17      17
          518   UI      17      17       0       0       0       0       0       0       0       0
          519   UI       0       0       0       0       0       0       0       0       0       0
                *
          520   KK  DIV30B  DIVERT
```

```
          521          KM   Divert the required retention volume for the subbasin out of the model
          522          KM   MODIFIED MAX VOLUME FROM 67.1 TO 81.9
          523          DT  RET30B    81.9     0.0
          524          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          525          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

          526          KK   CPE30 COMBINE
          527          KM   Combine routed flow from CPE31 in the Ellsworth Channel with unretained
          528          KM   runoff from subbasin E30B
          529          HC       2   11.68
                       *

          530          KK  E30E26   ROUTE
          531          KM   Route combined runoff from CPE30 to CPE26 in the Ellsworth Channel
          532          RS       1    FLOW
          533          RC   0.025   0.035   0.025     822  0.0005 1387.00
          534          RX  100.00  105.00  108.50  149.90  220.10  251.30  279.10  285.10
          535          RY  1387.0 1387.00 1386.66 1376.31 1376.31 1384.11 1384.66 1386.00
                       *

          536          KK    E26B   BASIN
          537          KM   Runoff from subbasin E26B
          538          BA   0.259
          539          LG    0.24    0.15    8.80    0.07      48
          540          UI       0      38     145     222     320     448     315     222     139      65
          541          UI      43      18      12      12       0       0       0       0       0       0
          542          UI       0       0       0       0       0       0       0       0       0       0
1                                                  HEC-1 INPUT                                          PAGE 14

        LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          543          UI       0       0       0       0       0       0       0       0       0       0
          544          UI       0       0       0       0       0       0       0       0       0       0
                       *

          545          KK  DIV26B  DIVERT
          546          KM   Divert the required retention volume for the subbasin out of the model
          547          KM   MODIFIED MAX VOLUME FROM 20.1 TO 24.5
          548          DT  RET26B    24.5     0.0
          549          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          550          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

          551          KK   CPE26 COMBINE
          552          KM   Combined routed flows from CPE30 with unretained runoff from subbasin E26B
          553          HC       2   11.94
                       *

          554          KK  E26E33   ROUTE
          555          KM   Route combine flows from CPE26 to CPE33 in the Ellsworth Channel
          556          RS       5    FLOW
          557          RC   0.025   0.030   0.025    8929  0.0028 1379.67
          558          RX  100.00  100.50  102.50  134.90  205.10  237.50  253.50  255.00
          559          RY  1379.1 1379.12 1379.35 1371.25 1371.25 1379.35 1379.67 1379.67
                       *

          560          KK    E33B   BASIN
          561          KM   Runoff from subbasin E33B
          562          BA   0.851
          563          LG    0.15    0.15    7.30    0.14      56
          564          UI       0     117     409     651     892    1385    1087     793     558     278
          565          UI     179     110      36      36      36       0       0       0       0       0
          566          UI       0       0       0       0       0       0       0       0       0       0
          567          UI       0       0       0       0       0       0       0       0       0       0
          568          UI       0       0       0       0       0       0       0       0       0       0
                       *

          569          KK  DIV33B  DIVERT
          570          KM   Divert the required retention volume for the subbasin out of the model
          571          KM   MODIFIED MAX VOLUME FROM 66.8 TO 81.5
          572          DT  RET33B    81.5     0.0
          573          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          574          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

          575          KK  CPE33B COMBINE
          576          KM   Combine routed flows in the Ellsworth Channel from CPE26 with unretained
          577          KM   runoff from subbasin E33B.  Note this CP also receives flow from the
          578          KM   Powerline model but that flow is not included in this model.
          579          HC       2   12.79
                       *
          580          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE       (V) ROUTING          (---->) DIVERSION OR PUMP FLOW

    NO.      (.) CONNECTOR        (<----) RETURN OF DIVERTED OR PUMPED FLOW

    112          E7
                  .
                  .
```


123
121 DIVE7
126 E7STOR
132 E7E6
138 E6B
149
147 DIVE6B
152 E8
163
161 DIVE8
166 E8E6
172 CPE6
178
176 DE6S
181 E6E15
187 E5B
198
196 DIVE5B
201 E5E14B
207 E14B
218
216 DIV14B
221 CP14B
224 E14E15
230 E15
241
239 DIVE15
244 CPE15A
250
248 DRE9
251 RTE6E9
257 E9
268
266 DIVE9
271 CPE9
277
275 DE9S
280 E9E16
RETE7
RETE6B
RETE8
RETE5B
RET14B
RETE15
RETE9
DRE9
DRR5


288
286 DRR5
289 R5
300 RETR5
298 DIVR5
303 CPR5
307 R5R8
313 R8
324 RETR8
322 DIVR8
327 CPR8
330 R8E16
336 E16
347 RETE16
345 DIVE16
350 CPE16
354 E16E15
360 CPE15
365 DETPB
374 E1524B
377 E25
389 RETE25
386 DIVE25
392 E24B
404 RET24B
401 DIV24B
407 CPE24B
411 DET222
420 E24E28
424 E28B
436 RET28B
433 DIV28B
439 E29
451 RETE29
448 DIVE29
454 CPE28B

```
458      E28E31
              .
              .
461           .         E31
              .           .
              .           .
473           .           .-------->  RETE31
470           .      DIVE31
              .           .
              .           .
476      CPE31A............
              .
              .
480           .         E32
              .           .
              .           .
492           .           .-------->  RETE32
489           .      DIVE32
              .           V
              .           V
495           .      E32E31
              .           .
              .           .
501       CPE31............
              V
              V
505      E31E30
              .
              .
511           .        E30B
              .           .
              .           .
523           .           .-------->  RET30B
520           .      DIV30B
              .           .
              .           .
526       CPE30............
              V
              V
530      E30E26
              .
              .
536           .        E26B
              .           .
              .           .
548           .           .-------->  RET26B
545           .      DIV26B
              .           .
              .           .
551       CPE26............
              V
              V
554      E26E33
              .
              .
560           .        E33B
              .           .
              .           .
572           .           .-------->  RET33B
569           .      DIV33B
              .           .
              .           .
575      CPE33B............

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   28AUG14  TIME  09:02:10  *
*                                      *
****************************************

****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

Pecos Road Channel and Basin Design Concept Report
Alternative Analysis
Future Conditions

Alternative 3: Storm drain from the Pecos Basin to the Ellsworth Channel

Prepared for the Flood Control District of Maricopa County
District Project Number FCD 2014C001

Prepared by Kimley-Horn and Associates, Inc.
Kimley Horn Project Number 091131024
August 2014

Model based on the East Mesa Area Drainage Master Plan Update (EMADMPU)

for Alternative 1. The model was revised to include only those areas contributing to the Ellsworth Channel.

List of Changes:
- Basin DIVPB at Pecos Rd and Meridian was changed from a diversion card to a storage routing card with stage-storage-discharge data; the name was changed from DIVPB to DETPB to reflect the change.
- Routing reach from CPR9 to CPR8 was eliminated
- Powerline section of the model was deleted (all subbasins north of the future SR24 alignment).
- All subbasins south and east of R5 and R8 have been deleted.
- All comments from the East Mesa Area Drainage Master Plan Update that do pertain to the Ellsworth Channel model have been deleted.
- Area has been adjusted on HC cards to account for reduction in area due retention diversions.

```
**************************************************************************
************************** EAST MESA ADMPU **************************
**************************************************************************

PROJECT:                EAST MESA AREA DRAINAGE MASTER PLAN UPDATE
CLIENT:                 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
PREPARED BY:    ENTELLUS, INC.
PROJECT NO:             FCD 2011C017            ENTELLUS 310.057
MODIFIED DATE:  9/12/2012
MODELER:                RLJ

STORM:                  100-YEAR 24-HOUR

ALTERNATIVE:    1

DEVELOPMENT CONDITIONS: FUTURE LAND USE
                                                INCREASED FUTURE RETENTION (2.19->2.70 IN)

PROPOSED INFRASTRUCTURE: MOUNTAIN CHANNEL AND RETENTION BASIN
                                                MERIDIAN CHANNEL
                                                PECOS CHANNEL
                                                MERIDIAN AND PECOS RETENTION BASIN
                                                GERMANN CHANNEL

MODIFICATION 1: RETENTION VOLUMES WERE INCREASED TO
 100-YEAR, 2-HOUR NOAA 2 RAINFALL WITH 80% EFFECTIVE
 VOLUME WITHIN THE CITY OF MESA AND TOWN OF QUEEN CREEK FOR THE F
                                SUBBASINS:

                                E28B    E29             E30B
                                E31             E32             E33B

MODIFICATION 4: MERIDIAN CHANNEL (SOUTH OF PECOS): CPR8
                                RETOUTED TO COMBINE NORTH UP MERIDIAN ROAD TO COMBINE
                                WITH CPE16 AND FOLLOW THE EXISTING FLOW PATH TO
                                PROPOSED RETENTION AT MERIDIAN AND PECOS.

MODIFICATION 5: PECOS CHANNEL (WEST OF MERIDIAN): CPE24B WAS MODIFIED TO
                                COMBINE WITH E25 AND WAS ROUTED ON PECOS ROAD. CPE29
                                WAS MODIFIED TO COMBINE WITH E29. NEW ROUTES WERE
                                DEFINED ON PECOS ROAD.

MODIFICATION 6: MERIDIAN AND PECOS OFFLINE RETENTION: ADDED DIVERSION
                                DIVPB AFTER CPE15 WITH A BYPASS FLOW OF 265 CFS


**************************************************************************
************************** EAST MESA ADMPU **************************
**************************************************************************

FUTEMADMP24 20110519 - EMADMPU 24-hr Future Conditions 20110519
Flood Control District of Maricopa County
100 YEAR
24 Hour Storm
Unit Hydrograph: S-Graph
08/05/2011
*****************************************************************

92 IO          OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                     NMIN          5  MINUTES IN COMPUTATION INTERVAL
                    IDATE     12Aug14  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE     18   14  ENDING DATE
                   NDTIME       2235  ENDING TIME
                    ICENT         20  CENTURY MARK

             COMPUTATION INTERVAL     .08 HOURS
                 TOTAL TIME BASE  166.58 HOURS
```

```
          ENGLISH UNITS
              DRAINAGE AREA         SQUARE MILES
              PRECIPITATION DEPTH   INCHES
              LENGTH, ELEVATION     FEET
              FLOW                  CUBIC FEET PER SECOND
              STORAGE VOLUME        ACRE-FEET
              SURFACE AREA          ACRES
              TEMPERATURE           DEGREES FAHRENHEIT

 93 JD          INDEX STORM NO. 1
                      STRM      3.58  PRECIPITATION DEPTH
                      TRDA       .00  TRANSPOSITION DRAINAGE AREA

 94 PI            PRECIPITATION PATTERN
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .01     .00     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .03     .03
                 .03     .09     .09     .09     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00

104 JD          INDEX STORM NO. 2
                      STRM      3.56  PRECIPITATION DEPTH
                      TRDA      1.00  TRANSPOSITION DRAINAGE AREA

  0 PI            PRECIPITATION PATTERN
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .01     .00     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .03     .03
                 .03     .09     .09     .09     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00

105 JD          INDEX STORM NO. 3
                      STRM      3.49  PRECIPITATION DEPTH
                      TRDA      5.00  TRANSPOSITION DRAINAGE AREA

  0 PI            PRECIPITATION PATTERN
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
```

```
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                  .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                  .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                  .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00

 106 JD        INDEX STORM NO. 4
                 STRM        3.40  PRECIPITATION DEPTH
                 TRDA       10.00  TRANSPOSITION DRAINAGE AREA

   0 PI          PRECIPITATION PATTERN
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                  .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                  .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                  .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00

 107 JD        INDEX STORM NO. 5
                 STRM        3.29  PRECIPITATION DEPTH
                 TRDA       20.00  TRANSPOSITION DRAINAGE AREA

   0 PI          PRECIPITATION PATTERN
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                  .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                  .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                  .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00

 108 JD        INDEX STORM NO. 6
                 STRM        3.22  PRECIPITATION DEPTH
```

```
                 TRDA       30.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                  .01      .01      .01      .01      .01      .01      .01      .01      .03      .03
                  .03      .09      .09      .09      .01      .01      .01      .01      .01      .01
                  .01      .01      .01      .01      .01      .01      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00

109 JD          INDEX STORM NO. 7
                 STRM        3.17  PRECIPITATION DEPTH
                 TRDA       40.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                  .01      .01      .01      .01      .01      .01      .01      .01      .03      .03
                  .03      .09      .09      .09      .01      .01      .01      .01      .01      .01
                  .01      .01      .01      .01      .01      .01      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00

110 JD          INDEX STORM NO. 8
                 STRM        3.14  PRECIPITATION DEPTH
                 TRDA       50.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                  .01      .01      .01      .01      .01      .01      .01      .01      .03      .03
                  .03      .09      .09      .09      .01      .01      .01      .01      .01      .01
                  .01      .01      .01      .01      .01      .01      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
```

```
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00

  111 JD          INDEX STORM NO. 9
                         STRM        3.11  PRECIPITATION DEPTH
                         TRDA       60.00  TRANSPOSITION DRAINAGE AREA

    0 PI             PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                    .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00

WARNING --- ROUTED OUTFLOW (      527.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      517.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      493.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      488.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      507.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      505.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      495.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      494.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      498.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      489.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      490.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      523.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      513.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      503.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      497.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      489.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      489.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      509.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      499.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      490.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      491.) IS GREATER THAN MAXIMUM OUTFLOW (      487.) IN STORAGE-OUTFLOW TABLE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            *************
```

```
                 *            *
 365 KK          *    DETPB   *      STORAGE
                 *            *
                 **************

 369 KO           OUTPUT CONTROL VARIABLES
                        IPRNT          3  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE

                HYDROGRAPH ROUTING DATA

 370 RS           STORAGE ROUTING
                        NSTPS          1  NUMBER OF SUBREACHES
                         ITYP       STOR  TYPE OF INITIAL CONDITION
                       RSVRIC        .00  INITIAL CONDITION
                            X        .00 WORKING R AND D COEFFICIENT

 371 SV             STORAGE         .0      21.9      43.9      66.1      88.4     110.8     133.3     144.7     156.0

 372 SQ           DISCHARGE         0.       15.       60.      119.      173.      176.      177.      189.      201.

 373 SE           ELEVATION        .00      1.00      2.00      3.00      4.00      5.00      6.00      6.50      7.00
                                                                ***

       ***             ***             ***             ***             ***

                   HYDROGRAPH AT STATION    DETPB
                 TRANSPOSITION AREA       .0 SQ MI

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR         24-HR         72-HR      166.58-HR
+   (CFS)        (HR)
                           (CFS)
+     199.      17.33                195.          139.           51.            22.
                         (INCHES)   .266          .759          .837           .848
                          (AC-FT)     97.          276.          304.           308.

 PEAK STORAGE    TIME                        MAXIMUM AVERAGE STORAGE
                                    6-HR         24-HR         72-HR      166.58-HR
+  (AC-FT)       (HR)
      154.      17.33                150.           97.           39.            17.

  PEAK STAGE     TIME                          MAXIMUM AVERAGE STAGE
                                    6-HR         24-HR         72-HR      166.58-HR
+   (FEET)       (HR)
      6.92      17.33                6.74          4.39          1.77            .78

                       CUMULATIVE AREA =     6.81 SQ MI

       ***             ***             ***             ***             ***

                   HYDROGRAPH AT STATION    DETPB
                 TRANSPOSITION AREA      1.0 SQ MI

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR         24-HR         72-HR      166.58-HR
+   (CFS)        (HR)
                           (CFS)
+     196.      17.42                191.          137.           50.            22.
                         (INCHES)   .261          .746          .823           .833
                          (AC-FT)     95.          271.          299.           303.

 PEAK STORAGE    TIME                        MAXIMUM AVERAGE STORAGE
                                    6-HR         24-HR         72-HR      166.58-HR
+  (AC-FT)       (HR)
      151.      17.42                147.           95.           38.            17.

  PEAK STAGE     TIME                          MAXIMUM AVERAGE STAGE
                                    6-HR         24-HR         72-HR      166.58-HR
+   (FEET)       (HR)
      6.77      17.42                6.60          4.29          1.73            .77

                       CUMULATIVE AREA =     6.81 SQ MI

       ***             ***             ***             ***             ***

                   HYDROGRAPH AT STATION    DETPB
                 TRANSPOSITION AREA      5.0 SQ MI

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR         24-HR         72-HR      166.58-HR
+   (CFS)        (HR)
                           (CFS)
+     182.      17.75                179.          128.           47.            20.
                         (INCHES)   .244          .697          .767           .776
                          (AC-FT)     89.          253.          279.           282.

 PEAK STORAGE    TIME                        MAXIMUM AVERAGE STORAGE
                                    6-HR         24-HR         72-HR      166.58-HR
```

+ (AC-FT)	(HR)					
138.	17.75		134.	86.	35.	15.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
6.19	17.75		6.04	3.91	1.58	.70

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 176.	17.67		176.	117.	43.	19.
		(INCHES)	.241	.637	.699	.703
		(AC-FT)	87.	231.	254.	255.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
119.	17.75		115.	73.	30.	13.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
5.34	17.83		5.19	3.32	1.36	.59

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 20.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 174.	17.58		173.	102.	37.	16.
		(INCHES)	.237	.557	.614	.619
		(AC-FT)	86.	202.	223.	225.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
96.	17.67		93.	60.	25.	11.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
4.36	17.67		4.20	2.74	1.15	.50

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 30.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 169.	17.75		161.	93.	35.	15.
		(INCHES)	.220	.510	.566	.570
		(AC-FT)	80.	185.	206.	207.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
87.	17.75		84.	56.	24.	10.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
3.92	17.75		3.79	2.53	1.07	.47

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 40.0 SQ MI

```
  PEAK FLOW     TIME                               MAXIMUM AVERAGE FLOW
                                         6-HR          24-HR          72-HR      166.58-HR
+   (CFS)       (HR)
                              (CFS)
+     156.      18.25                    149.           87.            32.           14.
                            (INCHES)     .204          .476           .532          .536
                             (AC-FT)      74.          173.           193.          195.

 PEAK STORAGE   TIME                             MAXIMUM AVERAGE STORAGE
                                         6-HR          24-HR          72-HR      166.58-HR
+  (AC-FT)      (HR)
       81.      18.17                     79.           53.            23.           10.

  PEAK STAGE    TIME                               MAXIMUM AVERAGE STAGE
                                         6-HR          24-HR          72-HR      166.58-HR
+   (FEET)      (HR)
      3.69      18.25                    3.56          2.42           1.03           .45

                         CUMULATIVE AREA =     6.81 SQ MI

        ***               ***            ***            ***            ***

                          HYDROGRAPH AT STATION     DETPB
                        TRANSPOSITION AREA      50.0 SQ MI

  PEAK FLOW     TIME                               MAXIMUM AVERAGE FLOW
                                         6-HR          24-HR          72-HR      166.58-HR
+   (CFS)       (HR)
                              (CFS)
+     146.      18.50                    140.           82.            31.           13.
                            (INCHES)     .192          .450           .505          .509
                             (AC-FT)      70.          164.           183.          185.

 PEAK STORAGE   TIME                             MAXIMUM AVERAGE STORAGE
                                         6-HR          24-HR          72-HR      166.58-HR
+  (AC-FT)      (HR)
       77.      18.50                     75.           51.            22.           10.

  PEAK STAGE    TIME                               MAXIMUM AVERAGE STAGE
                                         6-HR          24-HR          72-HR      166.58-HR
+   (FEET)      (HR)
      3.51      18.50                    3.40          2.33           1.00           .44

                         CUMULATIVE AREA =     6.81 SQ MI

        ***               ***            ***            ***            ***

                          HYDROGRAPH AT STATION     DETPB
                        TRANSPOSITION AREA      60.0 SQ MI

  PEAK FLOW     TIME                               MAXIMUM AVERAGE FLOW
                                         6-HR          24-HR          72-HR      166.58-HR
+   (CFS)       (HR)
                              (CFS)
+     140.      18.75                    134.           79.            30.           13.
                            (INCHES)     .183          .432           .487          .491
                             (AC-FT)      67.          157.           177.          178.

 PEAK STORAGE   TIME                             MAXIMUM AVERAGE STORAGE
                                         6-HR          24-HR          72-HR      166.58-HR
+  (AC-FT)      (HR)
       75.      18.75                     72.           50.            21.            9.

  PEAK STAGE    TIME                               MAXIMUM AVERAGE STAGE
                                         6-HR          24-HR          72-HR      166.58-HR
+   (FEET)      (HR)
      3.39      18.75                    3.28          2.27            .98           .43

                         CUMULATIVE AREA =     6.81 SQ MI

        ***               ***            ***            ***            ***


                         INTERPOLATED HYDROGRAPH AT      DETPB

  PEAK FLOW     TIME                               MAXIMUM AVERAGE FLOW
                                         6-HR          24-HR          72-HR      166.58-HR
+   (CFS)       (HR)
                              (CFS)
+     179.      17.75                    178.          123.            45.           20.
                            (INCHES)     .243          .670           .737          .744
                             (AC-FT)      88.          243.           268.          270.

                         CUMULATIVE AREA =     6.81 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
```

```
              **************
              *            *
  411 KK      *   DET222   *       STORAGE
              *            *
              **************

  415 KO           OUTPUT CONTROL VARIABLES
                        IPRNT          3  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE

                 HYDROGRAPH ROUTING DATA

  416 RS           STORAGE ROUTING
                        NSTPS          1  NUMBER OF SUBREACHES
                         ITYP       STOR  TYPE OF INITIAL CONDITION
                       RSVRIC        .00  INITIAL CONDITION
                            X        .00 WORKING R AND D COEFFICIENT

  417 SV             STORAGE          .0       7.5      15.2      23.0      30.9      38.9      47.0      51.1      55.2

  418 SQ           DISCHARGE          0.       24.       85.      141.      136.      167.      191.      202.      212.

  419 SE           ELEVATION         .00      1.00      2.00      3.00      4.00      5.00      6.00      6.50      7.00
                                                                 ***

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    DET222
                      TRANSPOSITION AREA        .0 SQ MI

   PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
                                               6-HR          24-HR         72-HR    166.58-HR
 +   (CFS)        (HR)
                               (CFS)
 +      206.      21.33                        204.          159.           59.          26.
                             (INCHES)          .232          .722          .809         .819
                              (AC-FT)          101.          316.          354.         358.

  PEAK STORAGE    TIME                               MAXIMUM AVERAGE STORAGE
                                               6-HR          24-HR         72-HR    166.58-HR
 +  (AC-FT)       (HR)
        53.       21.33                         52.           37.           14.           6.

   PEAK STAGE     TIME                               MAXIMUM AVERAGE STAGE
                                               6-HR          24-HR         72-HR    166.58-HR
 +   (FEET)       (HR)
       6.71       21.33                        6.61          4.80          1.86          .82

                            CUMULATIVE AREA =     8.20 SQ MI

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    DET222
                      TRANSPOSITION AREA       1.0 SQ MI

   PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
                                               6-HR          24-HR         72-HR    166.58-HR
 +   (CFS)        (HR)
                               (CFS)
 +      203.      21.33                        202.          157.           58.          26.
                             (INCHES)          .229          .710          .795         .804
                              (AC-FT)          100.          310.          348.         352.

  PEAK STORAGE    TIME                               MAXIMUM AVERAGE STORAGE
                                               6-HR          24-HR         72-HR    166.58-HR
 +  (AC-FT)       (HR)
        52.       21.33                         51.           37.           14.           6.

   PEAK STAGE     TIME                               MAXIMUM AVERAGE STAGE
                                               6-HR          24-HR         72-HR    166.58-HR
 +   (FEET)       (HR)
       6.57       21.33                        6.49          4.70          1.82          .80

                            CUMULATIVE AREA =     8.20 SQ MI

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    DET222
                      TRANSPOSITION AREA       5.0 SQ MI

   PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
                                               6-HR          24-HR         72-HR    166.58-HR
 +   (CFS)        (HR)
                               (CFS)
 +      195.      24.17                        193.          146.           54.          24.
                             (INCHES)          .219          .662          .740         .748
                              (AC-FT)           96.          289.          323.         327.
```

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
48.	24.17	48.	34.	13.	6.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
6.17	24.17	6.09	4.32	1.67	.73

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DET222
TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 191.	24.17	188.	133.	49.	21.
		(INCHES) .214	.602	.671	.676
		(AC-FT) 93.	263.	294.	296.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
47.	24.17	46.	30.	12.	5.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
6.01	24.17	5.89	3.89	1.51	.66

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DET222
TRANSPOSITION AREA 20.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 181.	21.75	176.	115.	43.	19.
		(INCHES) .200	.523	.586	.591
		(AC-FT) 87.	229.	256.	258.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
43.	21.75	42.	26.	10.	4.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
5.57	21.75	5.39	3.31	1.30	.57

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DET222
TRANSPOSITION AREA 30.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 168.	21.42	163.	105.	40.	17.
		(INCHES) .185	.477	.538	.542
		(AC-FT) 81.	209.	235.	237.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
39.	21.42	38.	23.	9.	4.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
5.02	21.42	4.88	2.96	1.17	.51

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DET222
TRANSPOSITION AREA 40.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 155.	22.00		151.	98.	37.	16.
		(INCHES)	.171	.444	.504	.508
		(AC-FT)	75.	194.	220.	222.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
36.	22.00	35.	21.	8.	4.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
4.61	22.00	4.47	2.71	1.09	.47

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DET222
TRANSPOSITION AREA 50.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 144.	22.75		141.	92.	35.	15.
		(INCHES)	.160	.418	.477	.481
		(AC-FT)	70.	183.	209.	210.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
33.	22.75	32.	19.	8.	3.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
4.25	22.75	4.11	2.50	1.01	.44

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DET222
TRANSPOSITION AREA 60.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 141.	26.58		138.	88.	34.	15.
		(INCHES)	.156	.401	.458	.462
		(AC-FT)	68.	175.	200.	202.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
30.	23.33	29.	18.	7.	3.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
3.88	23.33	3.74	2.31	.95	.41

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT DET222

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 192.	24.17		190.	137.	51.	22.
		(INCHES)	.215	.619	.691	.697
		(AC-FT)	94.	271.	302.	305.

CUMULATIVE AREA = 8.20 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	E7	820.	12.92	182.	56.	19.	1.12		
+	DIVERSION TO	RETE7	820.	12.92	159.	43.	14.	1.12		
+	HYDROGRAPH AT	DIVE7	234.	13.67	43.	13.	4.	1.12		
+	ROUTED TO	E7STOR	1.	25.67	1.	1.	0.	1.12		
+	ROUTED TO	E7E6	1.	30.00	1.	1.	0.	1.12		
+	HYDROGRAPH AT	E6B	2187.	12.58	400.	132.	44.	1.95		
+	DIVERSION TO	RETE6B	2187.	12.58	326.	91.	30.	1.95		
+	HYDROGRAPH AT	DIVE6B	897.	13.00	131.	41.	14.	1.95		
+	HYDROGRAPH AT	E8	901.	12.75	180.	57.	19.	1.10		
+	DIVERSION TO	RETE8	901.	12.75	149.	41.	14.	1.10		
+	HYDROGRAPH AT	DIVE8	378.	13.25	52.	16.	5.	1.10		
+	ROUTED TO	E8E6	191.	14.00	50.	16.	5.	1.10		
+	3 COMBINED AT	CPE6	897.	13.00	176.	57.	19.	3.05		
+	DIVERSION TO	DRE9	104.	13.00	3.	1.	0.	3.05		
+	HYDROGRAPH AT	DE6S	788.	13.00	169.	55.	18.	3.05		
+	ROUTED TO	E6E15	497.	13.58	165.	55.	18.	3.05		
+	HYDROGRAPH AT	E5B	447.	12.25	57.	19.	6.	.29		
+	DIVERSION TO	RETE5B	447.	12.25	45.	13.	4.	.29		
+	HYDROGRAPH AT	DIVE5B	204.	12.50	21.	7.	2.	.29		
+	ROUTED TO	E5E14B	89.	12.92	20.	7.	2.	.29		
+	HYDROGRAPH AT	E14B	884.	12.25	109.	36.	12.	.53		
+	DIVERSION TO	RET14B	884.	12.25	88.	24.	8.	.53		
+	HYDROGRAPH AT	DIV14B	372.	12.50	37.	12.	4.	.53		
+	2 COMBINED AT	CP14B	371.	12.50	57.	18.	6.	.81		
+	ROUTED TO	E14E15	210.	12.67	56.	18.	6.	.81		
	HYDROGRAPH AT	E15	1096.	12.33	154.	51.	17.	.78		
+	DIVERSION TO	RETE15	1096.	12.33	122.	34.	11.	.78		
+	HYDROGRAPH AT	DIVE15	431.	12.67	54.	17.	6.	.78		
	3 COMBINED AT									

+	CPE15A	638.	13.58	256.	87.	29.	4.29
+ HYDROGRAPH AT	DRE9	104.	13.00	3.	1.	0.	3.05
+ ROUTED TO	RTE6E9	26.	13.42	3.	1.	0.	3.05
+ HYDROGRAPH AT	E9	968.	12.42	147.	48.	16.	.72
+ DIVERSION TO	RETE9	968.	12.42	118.	33.	11.	.72
+ HYDROGRAPH AT	DIVE9	372.	12.75	49.	15.	5.	.72
+ 2 COMBINED AT	CPE9	372.	12.75	52.	16.	5.	1.07
+ DIVERSION TO	DRR5	195.	12.75	9.	2.	1.	1.07
+ HYDROGRAPH AT	DE9S	176.	12.75	43.	14.	5.	1.07
+ ROUTED TO	E9E16	121.	13.25	41.	14.	5.	1.07
+ HYDROGRAPH AT	DRR5	195.	12.75	9.	2.	1.	1.07
+ HYDROGRAPH AT	R5	546.	12.50	72.	21.	7.	.50
+ DIVERSION TO	RETR5	4.	4.67	2.	1.	0.	.50
+ HYDROGRAPH AT	DIVR5	546.	12.50	72.	21.	7.	.50
+ 2 COMBINED AT	CPR5	545.	12.50	81.	23.	8.	1.07
+ ROUTED TO	R5R8	472.	12.92	81.	23.	8.	1.07
+ HYDROGRAPH AT	R8	741.	12.42	115.	39.	13.	.55
+ DIVERSION TO	RETR8	741.	12.42	91.	25.	8.	.55
+ HYDROGRAPH AT	DIVR8	366.	12.67	42.	13.	4.	.55
+ 2 COMBINED AT	CPR8	732.	12.67	119.	36.	12.	1.62
+ ROUTED TO	R8E16	649.	13.00	119.	36.	12.	1.62
+ HYDROGRAPH AT	E16	582.	12.33	79.	26.	9.	.40
+ DIVERSION TO	RETE16	582.	12.33	64.	18.	6.	.40
+ HYDROGRAPH AT	DIVE16	213.	12.58	26.	8.	3.	.40
+ 3 COMBINED AT	CPE16	721.	13.00	180.	56.	19.	2.52
+ ROUTED TO	E16E15	679.	13.33	177.	56.	19.	2.52
+ 2 COMBINED AT	CPE15	1161.	13.50	405.	136.	45.	6.81
+ ROUTED TO	DETPB	179.	17.75	178.	123.	45.	6.81
+ ROUTED TO	E1524B	179.	17.83	178.	123.	45.	6.81
+ HYDROGRAPH AT	E25	1038.	12.50	184.	60.	20.	.93
+ DIVERSION TO	RETE25	1038.	12.50	164.	45.	15.	.93
HYDROGRAPH AT							

+	DIVE25	240.	13.17	46.	15.	5.	.93
	HYDROGRAPH AT						
+	E24B	788.	12.25	100.	32.	11.	.46
	DIVERSION TO						
+	RET24B	788.	12.25	81.	22.	7.	.46
	HYDROGRAPH AT						
+	DIV24B	274.	12.58	32.	10.	3.	.46
	3 COMBINED AT						
+	CPE24B	243.	14.42	219.	140.	51.	8.20
	ROUTED TO						
+	DET222	192.	24.17	190.	137.	51.	8.20
	ROUTED TO						
+	E24E28	192.	24.25	190.	137.	51.	8.20
	HYDROGRAPH AT						
+	E28B	773.	12.42	116.	37.	12.	.54
	DIVERSION TO						
+	RET28B	773.	12.42	95.	26.	9.	.54
	HYDROGRAPH AT						
+	DIV28B	316.	12.75	35.	11.	4.	.54
	HYDROGRAPH AT						
+	E29	1237.	12.50	203.	66.	22.	1.00
	DIVERSION TO						
+	RETE29	1237.	12.50	164.	45.	15.	1.00
	HYDROGRAPH AT						
+	DIVE29	573.	12.83	66.	21.	7.	1.00
	3 COMBINED AT						
+	CPE28B	488.	12.92	210.	159.	58.	9.74
	ROUTED TO						
+	E28E31	495.	13.08	210.	159.	58.	9.74
	HYDROGRAPH AT						
+	E31	964.	12.42	157.	52.	17.	.81
	DIVERSION TO						
+	RETE31	964.	12.42	125.	35.	12.	.81
	HYDROGRAPH AT						
+	DIVE31	402.	12.83	54.	17.	6.	.81
	2 COMBINED AT						
+	CPE31A	642.	13.08	238.	171.	62.	10.55
	HYDROGRAPH AT						
+	E32	404.	12.25	48.	16.	5.	.25
	DIVERSION TO						
+	RETE32	404.	12.25	38.	11.	4.	.25
	HYDROGRAPH AT						
+	DIVE32	136.	12.50	17.	5.	2.	.25
	ROUTED TO						
+	E32E31	68.	12.92	16.	5.	2.	.25
	2 COMBINED AT						
+	CPE31	669.	13.08	250.	174.	63.	10.80
	ROUTED TO						
+	E31E30	418.	13.67	241.	173.	63.	10.80
	HYDROGRAPH AT						
+	E30B	844.	12.83	186.	58.	19.	.88
	DIVERSION TO						
+	RET30B	844.	12.83	151.	41.	14.	.88
	HYDROGRAPH AT						
+	DIV30B	401.	13.33	55.	17.	6.	.88
	2 COMBINED AT						
+	CPE30	593.	13.67	278.	184.	67.	11.68
	ROUTED TO						
+	E30E26	560.	13.75	276.	184.	67.	11.68
	HYDROGRAPH AT						
+	E26B	415.	12.33	56.	18.	6.	.26
	DIVERSION TO						

+		RET26B	415.	12.33	45.	12.	4.	.26
	HYDROGRAPH AT							
+		DIV26B	146.	12.67	17.	5.	2.	.26
	2 COMBINED AT							
+		CPE26	570.	13.75	282.	186.	68.	11.94
	ROUTED TO							
+		E26E33	437.	14.42	273.	185.	68.	11.94
	HYDROGRAPH AT							
+		E33B	1304.	12.33	183.	59.	20.	.85
	DIVERSION TO							
+		RET33B	1304.	12.33	149.	41.	14.	.85
	HYDROGRAPH AT							
+		DIV33B	526.	12.67	57.	18.	6.	.85
	2 COMBINED AT							
+		CPE33B	461.	14.42	293.	195.	72.	12.79

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	INTERPOLATED TO COMPUTATION INTERVAL PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR STORM = 1	STORM AREA (SQ MI) =		.00						
E1524B	MANE	5.00	199.12	1045.00	.85	5.00	199.12	1045.00	.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3078E+03 EXCESS= .0000E+00 OUTFLOW= .3078E+03 BASIN STORAGE= .7116E-02 PERCENT ERROR= .0

FOR STORM = 2	STORM AREA (SQ MI) =		1.00						
E1524B	MANE	5.00	195.58	1050.00	.83	5.00	195.58	1050.00	.83

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3025E+03 EXCESS= .0000E+00 OUTFLOW= .3025E+03 BASIN STORAGE= .7037E-02 PERCENT ERROR= .0

FOR STORM = 3	STORM AREA (SQ MI) =		5.00						
E1524B	MANE	5.00	181.59	1070.00	.78	5.00	181.59	1070.00	.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2818E+03 EXCESS= .0000E+00 OUTFLOW= .2818E+03 BASIN STORAGE= .6933E-02 PERCENT ERROR= .0

FOR STORM = 4	STORM AREA (SQ MI) =		10.00						
E1524B	MANE	5.00	176.34	1070.00	.70	5.00	176.34	1070.00	.70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2555E+03 EXCESS= .0000E+00 OUTFLOW= .2555E+03 BASIN STORAGE= .6368E-03 PERCENT ERROR= .0

FOR STORM = 5	STORM AREA (SQ MI) =		20.00						
E1524B	MANE	5.00	174.08	1065.00	.62	5.00	174.08	1065.00	.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2247E+03 EXCESS= .0000E+00 OUTFLOW= .2247E+03 BASIN STORAGE= .6066E-03 PERCENT ERROR= .0

FOR STORM = 6	STORM AREA (SQ MI) =		30.00						
E1524B	MANE	5.00	168.82	1070.00	.57	5.00	168.82	1070.00	.57

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2071E+03 EXCESS= .0000E+00 OUTFLOW= .2071E+03 BASIN STORAGE= .6004E-03 PERCENT ERROR= .0

FOR STORM = 7	STORM AREA (SQ MI) =		40.00						
E1524B	MANE	5.00	156.05	1100.00	.54	5.00	156.05	1100.00	.54

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1947E+03 EXCESS= .0000E+00 OUTFLOW= .1947E+03 BASIN STORAGE= .5998E-03 PERCENT ERROR= .0

FOR STORM = 8	STORM AREA (SQ MI) =		50.00						
E1524B	MANE	5.00	146.46	1115.00	.51	5.00	146.46	1115.00	.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1850E+03 EXCESS= .0000E+00 OUTFLOW= .1850E+03 BASIN STORAGE= .6009E-03 PERCENT ERROR= .0

FOR STORM = 9	STORM AREA (SQ MI) =		60.00						
E1524B	MANE	5.00	140.00	1130.00	.49	5.00	140.00	1130.00	.49

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1783E+03 EXCESS= .0000E+00 OUTFLOW= .1783E+03 BASIN STORAGE= .6007E-03 PERCENT ERROR= .0

```
          FOR STORM = 1  STORM AREA (SQ MI) =        .00
            E24E28  MANE         5.00    206.13   1290.00       .82      5.00    206.13   1290.00         .82

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3582E+03 EXCESS= .0000E+00 OUTFLOW= .3582E+03 BASIN STORAGE= .9821E-02 PERCENT ERROR=    .0

          FOR STORM = 2  STORM AREA (SQ MI) =       1.00
            E24E28  MANE         5.00    203.36   1290.00       .80      5.00    203.36   1290.00         .80

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3518E+03 EXCESS= .0000E+00 OUTFLOW= .3518E+03 BASIN STORAGE= .9685E-02 PERCENT ERROR=    .0

          FOR STORM = 3  STORM AREA (SQ MI) =       5.00
            E24E28  MANE         5.00    194.80   1455.00       .75      5.00    194.80   1455.00         .75

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3270E+03 EXCESS= .0000E+00 OUTFLOW= .3270E+03 BASIN STORAGE= .9503E-02 PERCENT ERROR=    .0

          FOR STORM = 4  STORM AREA (SQ MI) =      10.00
            E24E28  MANE         5.00    191.20   1460.00       .68      5.00    191.20   1460.00         .68

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2956E+03 EXCESS= .0000E+00 OUTFLOW= .2956E+03 BASIN STORAGE= .1059E-02 PERCENT ERROR=    .0

          FOR STORM = 5  STORM AREA (SQ MI) =      20.00
            E24E28  MANE         5.00    180.58   1315.00       .59      5.00    180.58   1315.00         .59

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2584E+03 EXCESS= .0000E+00 OUTFLOW= .2584E+03 BASIN STORAGE= .1009E-02 PERCENT ERROR=    .0

          FOR STORM = 6  STORM AREA (SQ MI) =      30.00
            E24E28  MANE         5.00    167.59   1290.00       .54      5.00    167.59   1290.00         .54

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2371E+03 EXCESS= .0000E+00 OUTFLOW= .2371E+03 BASIN STORAGE= .9942E-03 PERCENT ERROR=    .0

          FOR STORM = 7  STORM AREA (SQ MI) =      40.00
            E24E28  MANE         5.00    154.82   1330.00       .51      5.00    154.82   1330.00         .51

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2221E+03 EXCESS= .0000E+00 OUTFLOW= .2221E+03 BASIN STORAGE= .9873E-03 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =      50.00
            E24E28  MANE         5.00    143.84   1375.00       .48      5.00    143.84   1375.00         .48

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2104E+03 EXCESS= .0000E+00 OUTFLOW= .2104E+03 BASIN STORAGE= .9817E-03 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =      60.00
            E24E28  MANE         5.00    140.97   1100.00       .46      5.00    140.97   1100.00         .46

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2023E+03 EXCESS= .0000E+00 OUTFLOW= .2022E+03 BASIN STORAGE= .9777E-03 PERCENT ERROR=    .0

          FOR STORM = 1  STORM AREA (SQ MI) =        .00
            E28E31  MANE         5.00    728.97    775.00       .81      5.00    728.97    775.00         .81

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .4219E+03 EXCESS= .0000E+00 OUTFLOW= .4217E+03 BASIN STORAGE= .9981E-02 PERCENT ERROR=    .0

          FOR STORM = 2  STORM AREA (SQ MI) =       1.00
            E28E31  MANE         5.00    698.45    780.00       .80      5.00    698.45    780.00         .80

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .4144E+03 EXCESS= .0000E+00 OUTFLOW= .4142E+03 BASIN STORAGE= .9840E-02 PERCENT ERROR=    .0

          FOR STORM = 3  STORM AREA (SQ MI) =       5.00
            E28E31  MANE         5.00    609.14    780.00       .74      5.00    609.14    780.00         .74

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3850E+03 EXCESS= .0000E+00 OUTFLOW= .3849E+03 BASIN STORAGE= .9653E-02 PERCENT ERROR=    .0

          FOR STORM = 4  STORM AREA (SQ MI) =      10.00
            E28E31  MANE         5.00    494.24    785.00       .67      5.00    494.24    785.00         .67

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3478E+03 EXCESS= .0000E+00 OUTFLOW= .3477E+03 BASIN STORAGE= .1089E-02 PERCENT ERROR=    .0
```

FOR STORM = 5 STORM AREA (SQ MI) = 20.00

E28E31	MANE	5.00	321.21	795.00	.58	5.00	321.21	795.00	.58

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3033E+03 EXCESS= .0000E+00 OUTFLOW= .3032E+03 BASIN STORAGE= .1037E-02 PERCENT ERROR= .0

FOR STORM = 6 STORM AREA (SQ MI) = 30.00

E28E31	MANE	5.00	283.08	800.00	.53	5.00	283.08	800.00	.53

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2779E+03 EXCESS= .0000E+00 OUTFLOW= .2779E+03 BASIN STORAGE= .1025E-02 PERCENT ERROR= .0

FOR STORM = 7 STORM AREA (SQ MI) = 40.00

E28E31	MANE	5.00	223.68	805.00	.50	5.00	223.68	805.00	.50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2599E+03 EXCESS= .0000E+00 OUTFLOW= .2599E+03 BASIN STORAGE= .1017E-02 PERCENT ERROR= .0

FOR STORM = 8 STORM AREA (SQ MI) = 50.00

E28E31	MANE	5.00	174.53	1075.00	.47	5.00	174.53	1075.00	.47

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2459E+03 EXCESS= .0000E+00 OUTFLOW= .2459E+03 BASIN STORAGE= .1012E-02 PERCENT ERROR= .0

FOR STORM = 9 STORM AREA (SQ MI) = 60.00

E28E31	MANE	5.00	171.76	1100.00	.45	5.00	171.76	1100.00	.45

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2361E+03 EXCESS= .0000E+00 OUTFLOW= .2361E+03 BASIN STORAGE= .1008E-02 PERCENT ERROR= .0

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION E7STOR
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1567.20	.00	27.	1.	.00	25.75	.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1567.17	.00	27.	1.	.00	25.75	.00

PLAN 3 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1567.06	.00	24.	0.	.00	26.00	.00

PLAN 4 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.91	.00	21.	0.	.00	.00	.00

PLAN 5 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00

STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.72	.00	16.	0.	.00	.00	.00

PLAN 6 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.61	.00	14.	0.	.00	.00	.00

PLAN 7 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.53	.00	12.	0.	.00	.00	.00

PLAN 8 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.47	.00	11.	0.	.00	.00	.00

PLAN 9 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.43	.00	10.	0.	.00	.00	.00

*** NORMAL END OF HEC-1 ***

Kimley»Horn

Appendix C. Alternatives Hydraulic Calculations

- Normal depth calculations
- Storm drain calculations
- Stage-storage-discharge table

Worksheet for Meridian Channel - North Segment

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00174	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	30.00	ft
Discharge	371.00	ft^3/s

Results

Normal Depth	2.92	ft
Flow Area	121.90	ft^2
Wetted Perimeter	54.11	ft
Hydraulic Radius	2.25	ft
Top Width	53.39	ft
Critical Depth	1.56	ft
Critical Slope	0.01642	ft/ft
Velocity	3.04	ft/s
Velocity Head	0.14	ft
Specific Energy	3.07	ft
Froude Number	0.36	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.92	ft
Critical Depth	1.56	ft
Channel Slope	0.00174	ft/ft

Worksheet for Meridian Channel - North Segment

GVF Output Data

Critical Slope	0.01642	ft/ft

Messages

Notes

This slope is set assuming the channel drops 5' from existing ground. A 5' drop was chosen so there would be cover over a crossing to take these flows to the basin south of Pecos Road.

There is approximately 120' available for offsite flows west of Matheson Tri-Gas (MTG). This 62' top width (including 1' of freeboard) allows room for a 14' access road and an additional 44', which can be used as a landscape buffer if desired.

Cross Section for Meridian Channel - North Segment

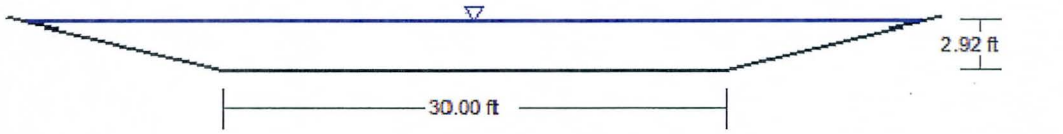
Project Description

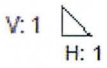
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00174	ft/ft
Normal Depth	2.92	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	30.00	ft
Discharge	371.00	ft³/s

Cross Section Image





Worksheet for Meridian Channel - South Segment

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00154	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	42.00	ft
Discharge	732.00	ft^3/s

Results

Normal Depth	2.42	ft
Flow Area	113.23	ft^2
Wetted Perimeter	52.81	ft
Hydraulic Radius	2.14	ft
Top Width	51.67	ft
Critical Depth	2.04	ft
Critical Slope	0.00273	ft/ft
Velocity	6.46	ft/s
Velocity Head	0.65	ft
Specific Energy	3.07	ft
Froude Number	0.77	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.42	ft
Critical Depth	2.04	ft
Channel Slope	0.00154	ft/ft

Worksheet for Meridian Channel - South Segment

GVF Output Data

Critical Slope	0.00273	ft/ft

Messages

Notes

With 1' of freeboard, the top width of the channel will be 56'. An additional 44', which includes a 30' landscape buffer and 14' access road, will bring the total ROW required to 100'.

Cross Section for Meridian Channel - South Segment

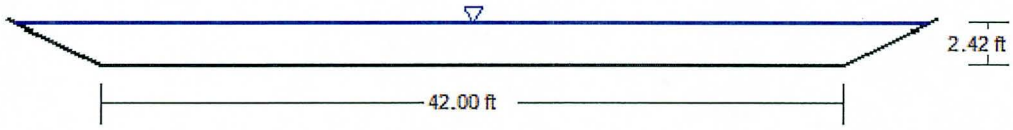
Project Description

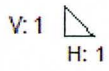
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00154	ft/ft
Normal Depth	2.42	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	42.00	ft
Discharge	732.00	ft³/s

Cross Section Image





Worksheet for Pecos Channel - Pecos Basin to Mountain Rd

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00210	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	6.00	ft
Discharge	180.00	ft³/s

Results

Normal Depth	2.57	ft
Flow Area	28.58	ft²
Wetted Perimeter	17.48	ft
Hydraulic Radius	1.63	ft
Top Width	16.27	ft
Critical Depth	2.33	ft
Critical Slope	0.00306	ft/ft
Velocity	6.30	ft/s
Velocity Head	0.62	ft
Specific Energy	3.18	ft
Froude Number	0.84	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.57	ft
Critical Depth	2.33	ft
Channel Slope	0.00210	ft/ft

Worksheet for Pecos Channel - Pecos Basin to Mountain Rd

GVF Output Data

Critical Slope	0.00306	ft/ft

Messages

Notes

With 1' of freeboard, the top width of the channel will be 21'. An additional 44', which includes a 30' landscape buffer and 14' access road, will bring the total ROW required to 65'.

Cross Section for Pecos Channel - Pecos Basin to Mountain Rd

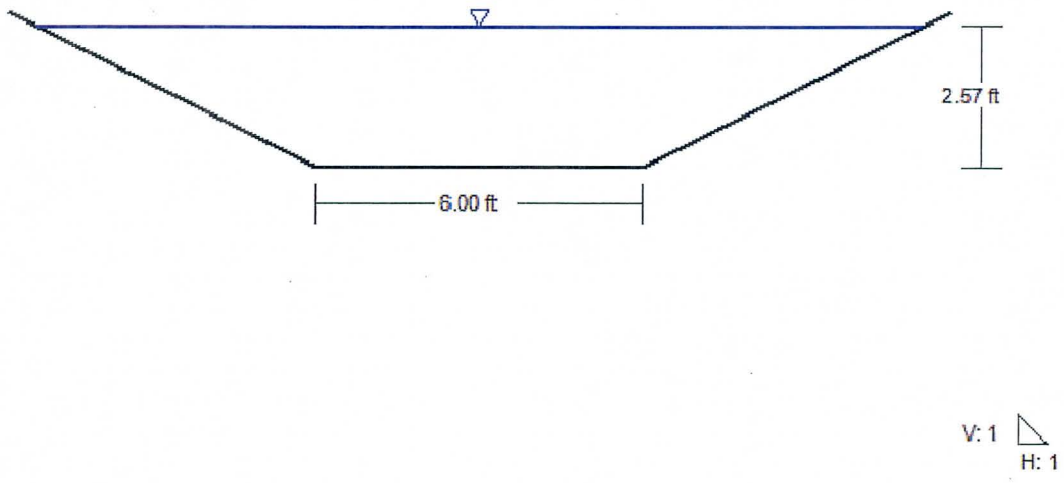
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00210	ft/ft
Normal Depth	2.57	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	6.00	ft
Discharge	180.00	ft³/s

Cross Section Image



Worksheet for Pecos Channel - Mountain Rd to Signal Butte Rd

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00206	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	6.00	ft
Discharge	239.00	ft^3/s

Results

Normal Depth	2.97	ft
Flow Area	35.43	ft^2
Wetted Perimeter	19.27	ft
Hydraulic Radius	1.84	ft
Top Width	17.87	ft
Critical Depth	2.72	ft
Critical Slope	0.00295	ft/ft
Velocity	6.75	ft/s
Velocity Head	0.71	ft
Specific Energy	3.68	ft
Froude Number	0.84	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.97	ft
Critical Depth	2.72	ft
Channel Slope	0.00206	ft/ft

Worksheet for Pecos Channel - Mountain Rd to Signal Butte Rd

GVF Output Data

Critical Slope	0.00295	ft/ft

Messages

Notes

With 1' of freeboard, the top width of the channel will be 22'. An additional 44', which includes a 30' landscape buffer and 14' access road, will bring the total ROW required to 66'.

Cross Section for Pecos Channel - Mountain Rd to Signal Butte Rd

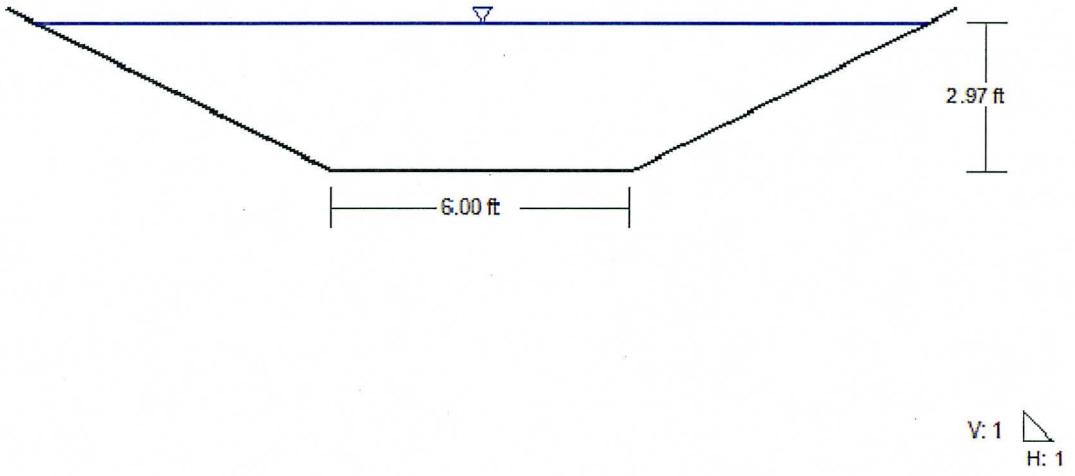
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00206	ft/ft
Normal Depth	2.97	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	6.00	ft
Discharge	239.00	ft³/s

Cross Section Image



Worksheet for Pecos Channel - Signal Butte Rd to 222nd St

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00152	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	12.00	ft
Discharge	538.00	ft^3/s

Results

Normal Depth	3.79	ft
Flow Area	74.33	ft^2
Wetted Perimeter	28.97	ft
Hydraulic Radius	2.57	ft
Top Width	27.18	ft
Critical Depth	3.28	ft
Critical Slope	0.00264	ft/ft
Velocity	7.24	ft/s
Velocity Head	0.81	ft
Specific Energy	4.61	ft
Froude Number	0.77	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.79	ft
Critical Depth	3.28	ft
Channel Slope	0.00152	ft/ft

Worksheet for Pecos Channel - Signal Butte Rd to 222nd St

GVF Output Data

Critical Slope	0.00264	ft/ft

Messages

Notes

With 1' of freeboard, the top width of the channel will be 32'. An additional 44', which includes a 30' landscape buffer and 14' access road, will bring the total ROW required to 76'.

Cross Section for Pecos Channel - Signal Butte Rd to 222nd St

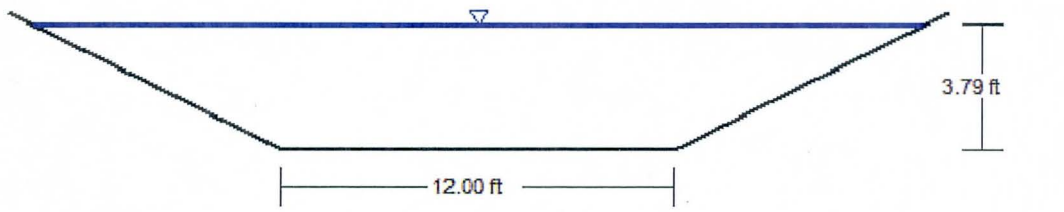
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00152	ft/ft
Normal Depth	3.79	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	12.00	ft
Discharge	538.00	ft³/s

Cross Section Image



V: 1
H: 1

Worksheet for Pecos Channel - 222nd St to Crismon Rd

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.050	
Channel Slope	0.00303	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	40.00	ft
Discharge	539.00	ft^3/s

Results

Normal Depth	3.36	ft
Flow Area	168.07	ft^2
Wetted Perimeter	61.23	ft
Hydraulic Radius	2.74	ft
Top Width	60.14	ft
Critical Depth	1.70	ft
Critical Slope	0.03208	ft/ft
Velocity	3.21	ft/s
Velocity Head	0.16	ft
Specific Energy	3.52	ft
Froude Number	0.34	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.36	ft
Critical Depth	1.70	ft
Channel Slope	0.00303	ft/ft

Worksheet for Pecos Channel - 222nd St to Crismon Rd

GVF Output Data

Critical Slope	0.03208	ft/ft

Messages

Notes

With 1' of freeboard, the top width of the channel will be 66'. An additional 44', which includes a 30' landscape buffer and 14' access road, will bring the total ROW required to 110'.

Cross Section for Pecos Channel - 222nd St to Crismon Rd

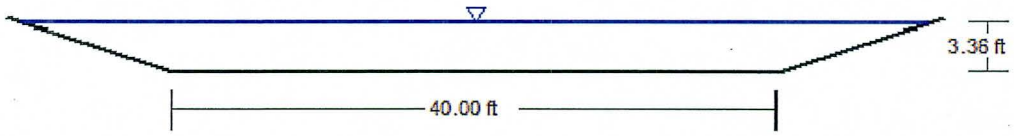
Project Description

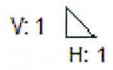
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.050	
Channel Slope	0.00303	ft/ft
Normal Depth	3.36	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	40.00	ft
Discharge	539.00	ft³/s

Cross Section Image





Worksheet for Pecos Channel - Crismon Rd to Ellsworth Rd

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.050	
Channel Slope	0.00341	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	40.00	ft
Discharge	539.00	ft^3/s

Results

Normal Depth	3.25	ft
Flow Area	161.48	ft^2
Wetted Perimeter	60.53	ft
Hydraulic Radius	2.67	ft
Top Width	59.48	ft
Critical Depth	1.70	ft
Critical Slope	0.03208	ft/ft
Velocity	3.34	ft/s
Velocity Head	0.17	ft
Specific Energy	3.42	ft
Froude Number	0.36	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.25	ft
Critical Depth	1.70	ft
Channel Slope	0.00341	ft/ft

Worksheet for Pecos Channel - Crismon Rd to Ellsworth Rd

GVF Output Data

Critical Slope	0.03208	ft/ft

Messages

Notes

With 1' of freeboard, the top width of the channel will be 66'. An additional 44', which includes a 30' landscape buffer and 14' access road, will bring the total ROW required to 110'.

Cross Section for Pecos Channel - Crismon Rd to Ellsworth Rd

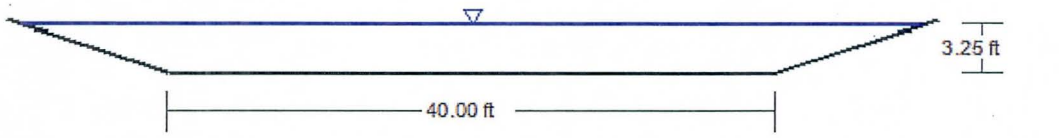
Project Description

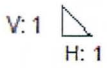
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.050	
Channel Slope	0.00341	ft/ft
Normal Depth	3.25	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	40.00	ft
Discharge	539.00	ft³/s

Cross Section Image

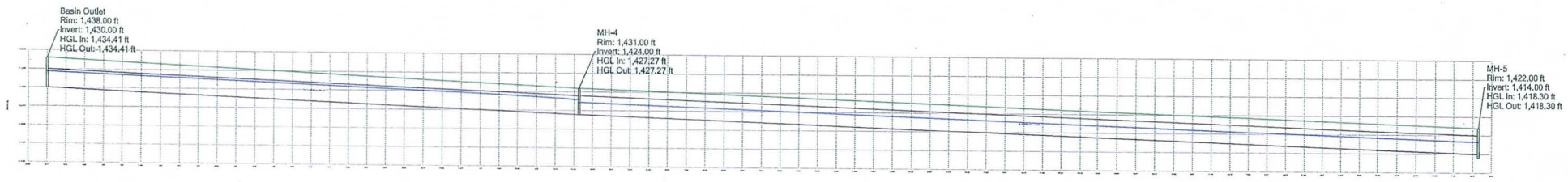




FlexTable: Conduit Table

Label	Start Node	Stop Node	Length (Unified) (ft)	Manning's n	Slope (ft/ft)	Diameter (in)	Total Flow (cfs)	Velocity (ft/s)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Invert (U/S) (ft)	Invert (D/S) (ft)
CO-1	Basin Outlet	MH-4	1,414.3	0.013	0.004	60.0	179.00	9.77	1,438.00	1,431.00	1,434.41	1,427.83	1,430.00	1,424.00
CO-2	MH-4	MH-5	2,401.4	0.013	0.004	60.0	243.00	8.94	1,431.00	1,422.00	1,427.27	1,418.30	1,424.00	1,415.00
CO-3	MH-5	222nd St Outfall	1,342.0	0.013	0.004	72.0	488.00	11.27	1,422.00	1,416.00	1,418.30	1,412.28	1,414.00	1,408.00
CO-5	Mountain Rd Inlet	MH-4	36.9	0.013	0.014	60.0	64.00	12.24	1,431.00	1,431.00	1,427.02	1,427.27	1,424.50	1,424.00
CO-6	Signal Butte Rd Inlet	MH-5	29.2	0.013	0.017	60.0	245.00	15.94	1,422.00	1,422.00	1,418.66	1,418.30	1,415.50	1,415.00

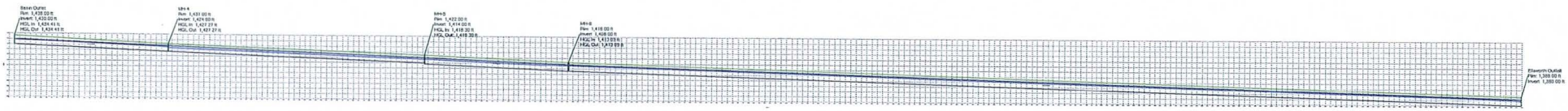
Profile Report
Engineering Profile - Profile - 1 (Pecos Road Network_Alt2.stsw)



FlexTable: Conduit Table

Label	Start Node	Stop Node	Length (Unified) (ft)	Manning's n	Slope (ft/ft)	Diameter (in)	Total Flow (cfs)	Velocity (ft/s)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Invert (U/S) (ft)	Invert (D/S) (ft)
CO-1	Basin Outlet	MH-4	1,414.3	0.013	0.004	60.0	179.00	9.77	1,438.00	1,431.00	1,434.41	1,427.83	1,430.00	1,424.00
CO-2	MH-4	MH-5	2,401.4	0.013	0.004	60.0	243.00	8.94	1,431.00	1,422.00	1,427.27	1,418.30	1,424.00	1,415.00
CO-3	MH-5	MH-6	1,342.0	0.013	0.004	72.0	488.00	11.27	1,422.00	1,416.00	1,418.30	1,413.09	1,414.00	1,408.00
CO-4	MH-6	Ellsworth Outfall	8,934.7	0.013	0.003	72.0	488.00	9.54	1,416.00	1,388.00	1,413.09	1,384.28	1,408.00	1,380.00
CO-5	Mountain Rd Inlet	MH-4	36.9	0.013	0.014	60.0	64.00	12.24	1,431.00	1,431.00	1,427.02	1,427.27	1,424.50	1,424.00
CO-6	Signal Butte Rd Inlet	MH-5	29.2	0.013	0.017	60.0	245.00	15.94	1,422.00	1,422.00	1,418.66	1,418.30	1,415.50	1,415.00

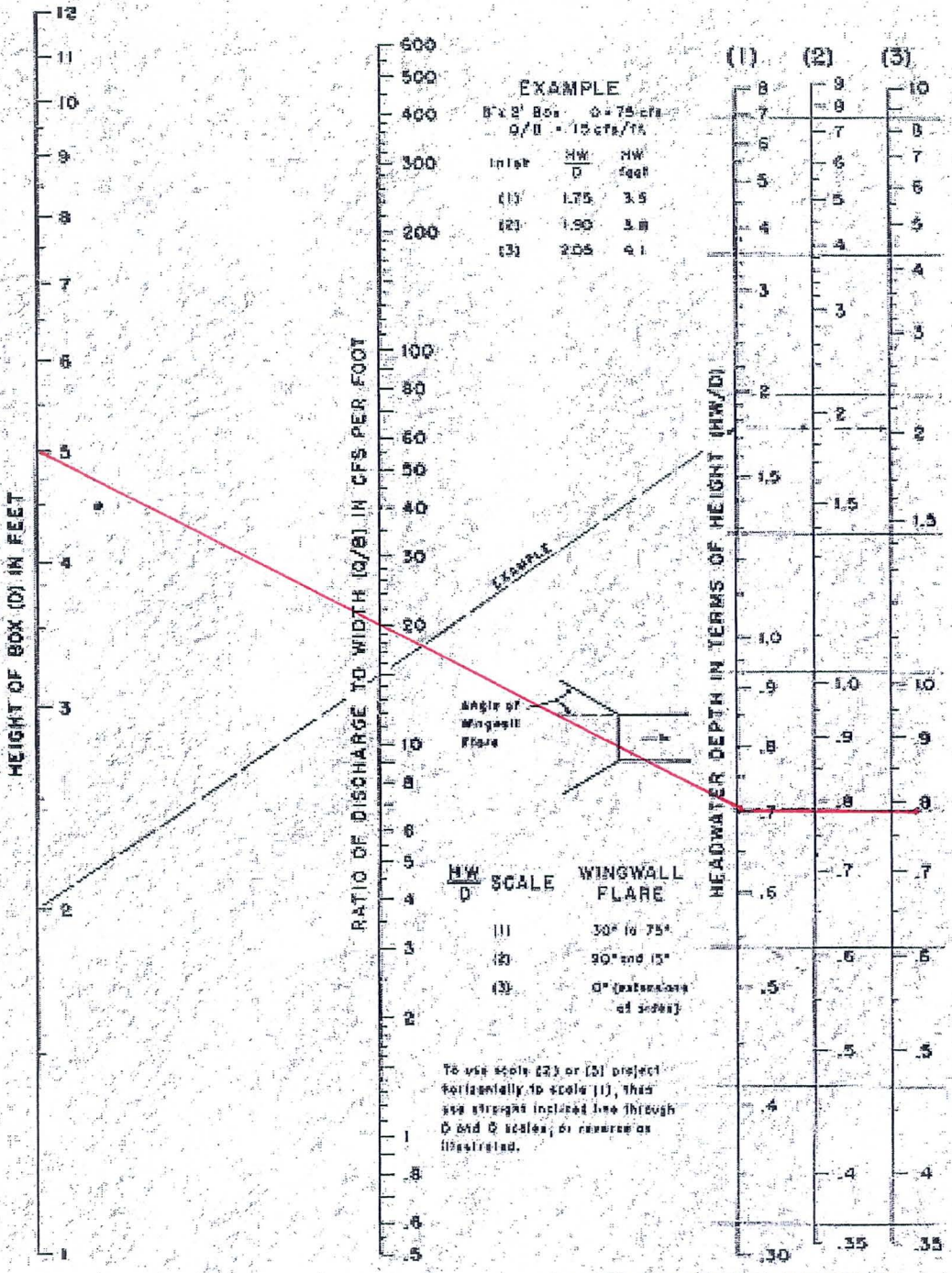
Profile Report
Engineering Profile - Profile - 1 (Pecos Road Network.stsw)



Go Back to Part II

Go to Chart 2

CHART 1



HEADWATER DEPTH FOR BOX CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

Kimley»Horn

Project ***Pecos Road DCR***
Subject **Proposed Detention Basin Calculations**
Designed by **MAW** Date 7/30/2014 Project No. 091131024
Checked by Date District Project No: 2014C001

Objective: to estimate the stage-storage-discharge relationship

Detention Basin - SWC Pecos/Meridian ***Drains in 51.47 hours***

Outlet Diameter 5.00 ft
Outlet Elevation 0 ft
Outlet X-Sect Area 19.635 ft^2
No. of Outlet Barrels 1
Outlet Pipe Slope 0.0046 ft/ft

Elevation [ft]	Surface Storage Area [ft^2]	Surface Storage Area [acre]	Average Area [acre]	Δ Elev [ft]	Δ Vol [ac-ft]	Σ Vol [ac-ft]	Δ Time to Drain [hr]	Q_{pipe} [cfs]	Q_{weir} [cfs]	Total Q_{out} [cfs]
0	950,683	21.82				0		0.00	0	0.00
			21.89	1.0	21.89		34.25			
1	956,443	21.96				21.89		15.47	0	15.47
			22.02	1.0	22.02		7.11			
2	962,219	22.09				43.91		59.53	0	59.53
			22.16	1.0	22.16		3.01			
3	968,011	22.22				66.07		118.67	0	118.67
			22.29	1.0	22.29		1.85			
4	973,819	22.36				88.36		172.66	0	172.66
			22.42	1.0	22.42		1.55			
5	979,643	22.49				110.78		176.64	0	176.64
			22.56	1.0	22.56		1.55			
6	985,483	22.62				133.34		176.64	0	176.64
Freeboard										
			22.66	0.5	11.33		0.75			
6.5	988,408	22.69				144.67		189.08	0.00	189.1
			22.69	1.0	22.69		1.41			
7	991,338	22.76				156.03		200.55	0.00	200.6

Notes:

Q_{pipe} goes from Mannings Eqn to Orifice Eqn when water surface exceeds 1.2*(Outlet Diameter) per Linsley et al. Water Resources Engineering 4th Edition, pg 652.

Kimley»Horn

Project ***Pecos Road DCR***
Subject **Proposed Detention Basin Calculations**
Designed by **MAW** Date 7/30/2014 Project No. 091131024
Checked by Date District Project No: 2014C001

Objective: to estimate the stage-storage-discharge relationship

Detention Basin - NWC Pecos/222nd Street ***Drains in 12.66 hours***

Outlet Diameter 3.50 ft
Outlet Elevation 0 ft
Outlet X-Sect Area 9.621 ft^2
No. of Outlet Barrels 2
Outlet Pipe Slope 0.0046 ft/ft

Elevation [ft]	Surface Storage Area [ft^2]	Surface Storage Area [acre]	Average Area [acre]	Δ Elev [ft]	Δ Vol [ac-ft]	Σ Vol [ac-ft]	Δ Time to Drain [hr]	Q_{pipe} [cfs]	Q_{weir} [cfs]	Total Q_{out} [cfs]
0	327,184	7.51				0		0.00	0	0.00
			7.56	1.0	7.56		7.53			
1	331,776	7.62				7.56		24.31	0	24.31
			7.67	1.0	7.67		1.70			
2	336,400	7.72				15.23		84.98	0	84.98
			7.78	1.0	7.78		0.83			
3	341,056	7.83				23.01		141.48	0	141.48
			7.88	1.0	7.88		0.69			
4	345,744	7.94				30.89		136.47	0	136.47
			7.99	1.0	7.99		0.64			
5	350,464	8.05				38.88		167.03	0	167.03
			8.10	1.0	8.10		0.55			
6	355,216	8.15				46.98		191.00	0	191.00
Freeboard										
			8.18	0.5	4.09		0.25			
6.5	357,604	8.21				51.08		201.93	0.00	201.9
			8.21	1.0	8.21		0.48			
7	360,000	8.26				55.19		212.29	0.00	212.3

Notes:

Q_{pipe} goes from Mannings Eqn to Orifice Eqn when water surface exceeds 1.2*(Outlet Diameter) per Linsley et al. Water Resources Engineering 4th Edition, pg 652.

Kimley»Horn

Appendix D. Sediment Yield Analysis

Drainage Memo – Sediment Yield Analysis for Pecos Road Detention Basin, prepared by the Flood Control District of Maricopa County

Drainage Memo

Sediment Yield Analysis

For

Pecos Road Detention Basin

Prepared by

Raj Shrestha, PE, CFM
Engineering Application Development & River Mechanics Branch
Engineering Division
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009-6399
Phone: 602-506-1501
Fax: 602 506 4601
July 2014

Table of Contents

List of Figures

List of Tables

Appendices

1 Background and Scope

Pecos Road Detention Basin (Pecos Basin) is located at the southwest corner of Pecos Road and Meridian Road intersection (Figure 1). It is one of the alternative measures to reduce the flooding along Pecos Road. The Pecos Basin and its watershed fall within the study area of East Mesa Area Drainage Master Plan Update (EMADMPU) completed by Flood Control District of Maricopa County (FCDMC, 2011). The purpose of this study is to perform a planning-level analysis to determine the sediment accumulation on the facility. It is anticipated that a more detailed sediment yield analysis will be performed in future during the design phase of the project. See figure below for the location of the Pecos Basin.

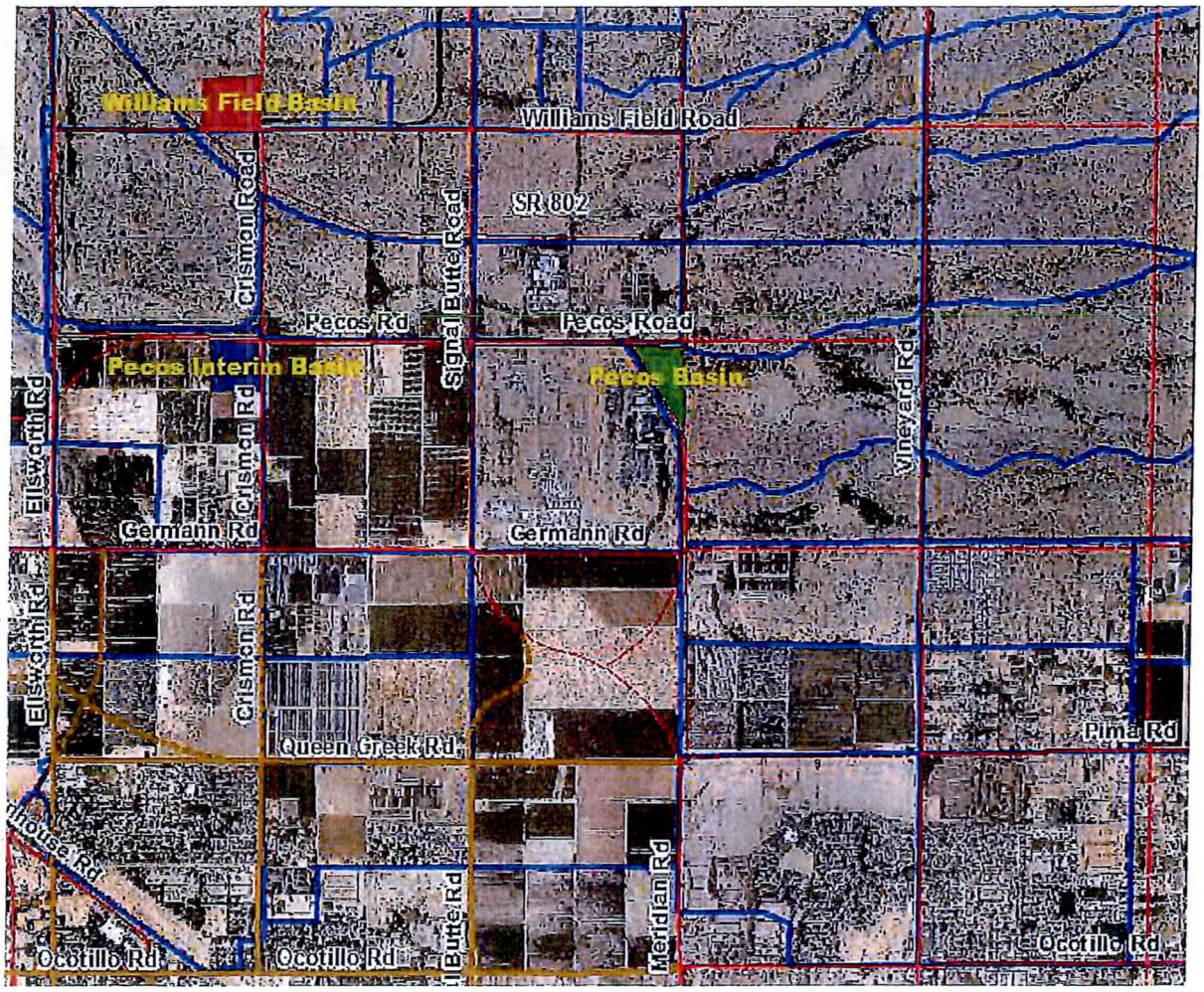


Figure 1: Pecos Basin Location Map

2 Methodology

The sediment yield analysis performed in this memo follows the procedure outlined in River Mechanics Manual for DDMSW, January 2013. DDMSW (Version 4.6.4) software developed by Flood Control District is used to create the sediment yield model. The sediment yield consists of two parts and is defined as the sum of the wash load and the total bed material load delivered to a point of interest. The wash load is calculated with the Modified Universal Soil Loss Equation (MUSLE) method, and the total bed material load is calculated with the Zeller-Fullerton equation (Zeller and Fullerton, 1983), which is based on the assumption that the reach is at an equilibrium condition.

The sediment yield calculation is performed for future condition as requested by Flood Control District Project Manager Mike Duncan. The email conversation regarding the peak discharge and the HEC-1 model for the future condition is attached in "Appendix A: Design Discharge and HEC-1 Output". Peak discharge of 697cfs corresponding to concentration point CPE24B is used as a design peak discharge for the sediment yield model.

3 Parameter Estimation

The majority of the parameters required to calculate the sediment yield were derived from the previous studies completed for the EMADMPU (FCDMC, 2011). However, since the watershed for the basin is located in the Pinal County, DDMSW software does not include some of the soil parameters that fall outside of the Maricopa County Soil Survey Study area. The soil parameters that fall outside of the Maricopa County Study area is obtained from the USDA-NRCS soil data.

3.1 Wash Load

The MUSLE relationship given by SLA (1985) is used to compute the watershed soil loss in tons. MUSLE equation has following form,

$$Y_s = \alpha(Vq_p)^{\beta} KLSCP$$

Where,

Y_s = watershed soil loss from the storm of a particular return period in tons,

$\alpha = 95$

V = runoff volume for the storm, ac-ft

q_p = peak flow rate for a storm event of a particular return period

$\beta = 0.56$

K = soil erodibility factor

LS = topographic factor

C = cover and management factor

P = erosion control practice factor (usually 1.0 for wild land areas)

The topographic factor is defined as,

$$LS = \left(\frac{\lambda}{72.6}\right)^{n} (0.065 + 0.0454S + 0.0065S^2)$$

Where,

λ = slope length, ft

S = percent slope

3.1.1 Runoff Volume

Runoff volume for the project is obtained from the Future Condition HEC-1 model prepared by Flood Control District on August 2011 for EMADMPU. The 100-year return period runoff volume used for the calculation is 229 ac-ft. See "Appendix A: Design Discharge and HEC-1 Output" for HEC-1 output results.

3.1.2 Peak Flow Rate

Peak flow rate for the project is obtained from the Future Condition HEC-1 model prepared by Flood Control District on August 2011 for EMADMPU. The 100-year return period peak discharge used in the calculation is 697 cfs. See "Appendix A: Design Discharge and HEC-1 Output" for HEC-1 output results.

3.1.3 Soil Erodibility Factor

The soils within the watershed boundary fall into the following three different soil survey area.

i. Aguila – Carefree Area, Arizona, Parts of Maricopa and Pinal Counties
ii. Eastern Maricopa and Northern Pinal Counties Area, Arizona
iii. Eastern Pinal and Southern Gila Counties

The soil erodibility factor for the soils located in Aguila-Carefree Area, and Eastern Maricopa and Northern Pinal Counties Area are already in the DDMSW software. Whereas, the DDMSW software does

not include the soil parameter for the area located outside of the Maricopa County. The soil erodibility factor for the soils located in Eastern Pinal and Southern Gila Counties were obtained from the United States Department of Agriculture – Natural Resources Conservation Service's Web Soil Survey (WSS). The data obtained from the WSS is entered into the DDMSW software for sediment yield calculation. The website address for the WSS is http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. The WSS is an interactive web application developed by USDA-NRCS for soil properties database.

3.1.4 Topographic Factor

The topographic factor consists of two components; slope length and percent slope. Slope length is defined as the distance from the point of origin of overland flow to the point where either the slope gradient decreases enough such that deposition begins, or the runoff water enters a well-defined channel that may be part of a drainage network or a constructed channel. Percent slope is the slope for the slope length and is approximated by the average watershed slope excluding the large slope near the mountainous areas. Both slope length and percent slope is estimated from the countywide 10 ft contour obtained from the Flood Control District's GIS database. For this project, percent slope of 1.10% was used and entered in the DDMSW model, and the slope length was assumed to be 400 feet which is an upper limit for MUSLE method (FCDMC, 2013). The MUSLE equation is best used for slope length of less than 400feet and gradients of 3 to 8 percent.

3.1.5 Cover and Management Factor

The cover and management factor consists of three distinct types of affects as follows

i. Effects of canopy (C_i)
ii. Effects of mulch or close-growing vegetation in direct contact with the soil surface (C_{ii})
iii. Tillage and residual effects of the land use (C_{iii})

The default land use factor obtained from the DDMSW software is further evaluated using the topographic and aerial image of the drainage area and found to be acceptable for this study. Following are the cover and management factor used in the model.

Table 1: Cover and management factor

Land Use Code	Description	Area, sq. mi.	Area Percent	C_i	C_{ii}	C_{iii}	Percent Impervious
140	Medium Lot Residential	1.492	24%	0.73	0.87	0.33	30
230	Community Commercial	0.45	7.2%	0.59	0.81	0.26	80
300	General Industrial	3.71	59.6%	0.67	0.84	0.3	55
610	Transportation	0.422	6.8%	0.59	0.81	0.26	80
900	Vacant	0.153	2.5%	0.86	0.93	0.39	0

3.1.6 Drainage Area

Drainage area corresponding to the concentration point CPE24B is obtained from the watershed area shape file prepared with the EMADMPU. The total contributing sediment drainage area is 6.23 sq.mi.

3.1.7 Specific Weight

Specific weight of soils located in Aguila-Carefree Area, and Eastern Maricopa and Northern Pinal Counties Area were obtained from the DDMSW software, whereas, the specific weight of soils located in Eastern Pinal and Southern Gila Counties were obtained from the United States Department of Agriculture – Natural Resources Conservation Service's Web Soil Survey. See "Appendix B: Soil and Land Use" for the specific weight values used in this project.

3.2 Bed Load

The Zeller-Fullerton equation, which assumes that the reach is at the equilibrium condition, is used to calculate the total bed material load. It has the form

$$q_s = 0.0064\left(\frac{n^{1.77}V_a^{4.32}G^{0.45}}{Y_h^{0.3}D_{50}^{0.61}}\right)$$

Where,

Q_s = bed-material discharge in cfs per unit width

n = manning's roughness coefficient

V_a = average velocity, ft/s

Y_h = hydraulic depth, ft

D_{50} = median diameter, mm

G = gradation coefficient and is as follows

$$G = \frac{1}{2}\left(\frac{D_{84.1}}{D_{50}} + \frac{D_{50}}{D_{15.9}}\right)$$

3.2.1 Sediment Sample

The sediment gradation data used in this study was obtained from the sieve analysis performed for EMADMPU (FCDMC, 2011). Sediment diameters utilized to determine the sediment yield was taken from soil sample B2 which is located at Meridian Road and Pecos Road. Following are the particle size used in this project.

Table 2: Particle size table

Sediment	Size, mm
D_{10}	0.001
D_{16}	0.003
D_{50}	0.052
D_{84}	0.400

3.2.2 Cross Section Geometry and Hydraulics

Cross section geometry and hydraulics were obtained from the future condition HEC-1 model prepared by Flood Control District. The output of the HEC-1 model can be found in "Appendix A: Design Discharge and HEC-1 Output". The cross section x and y ordinates, slope and manning's n were taken from routing data E6E15. The cross section input parameters can be found in DDMSW output in "Appendix C: DDMSW Output".

4 Results and Conclusion

The summary of the annual sediment yield for wash load and bed load for Pecos Basin are presented below in Table 3 on next page. The detailed output from DDMSW can be found in "Appendix C: DDMSW Output". Queen Creek Sports Complex Basin (Entellus, 2013) sediment yield is also included in the second row for comparison. The typical design sediment volume for detention basin is total annual sediment multiplied by number of sediment removal cycle (years) plus 100-year return event sediment yield. For example, if the sediment removal cycle is 3 years, the design sediment volume is 3 x 0.087 + 1.582 = 1.843 ac-ft.

Table 3: Sediment Yield Summary

	Watershed Area, mi^2	Annual Sediment Yield Bed Load ac.-ft.	Annual Sediment Yield Wash Load, ac.-ft.	Annual Sediment Yield, ac.-ft.	100-Yr Sediment Yield Bed Load, ac.-ft.	100-Yr Sediment Yield Wash Load, ac.-ft.	100-Yr Sediment Yield, ac.-ft.
Pecos Basin	6.2	0.059	0.028	0.087	1.070	0.512	1.582
Queen Creek Sports Complex Basin (Entellus)	6.7	0.110	0.088	0.198	0.949	0.957	1.906

5 References

i. *Entellus Inc. (December, 2013), Technical Memorandum – Sediment Yield Analysis for Queen Creek Sports Complex Basin.*

ii. *Flood Control District of Maricopa County (August, 2011), East Mesa Area Drainage Master Plan Update.*

iii. *Flood Control District of Maricopa County (January, 2013), River Mechanics Manual for DDMSW.*

iv. *United States Department of Agriculture – Natural Resources Conservation Service's (USDA-NRCS), Web Soil Survey http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm*

Appendix A
Design Discharge and HEC-1 Output

Raj Shrestha - FCDX

From:	Michael Duncan - FCDX
Sent:	Wednesday, February 26, 2014 4:04 PM
To:	Raj Shrestha - FCDX
Cc:	Bing Zhao - FCDX; Jennifer Pokorski - FCDX
Subject:	RE: Pecos Road DCR - project number
Attachments:	24Fut100.dat; 24Fut100.out

Raj, here is the future model (input and output files) from Cathy Regester's study. I prefer this to the Entellus models, for our purposes. Please do the sediment analysis for concentration point CPE24B, which has 6.23 sq. mi. contributing and a peak of 697 cfs.

This model is on the share drive at:

W:\Hydrology-Hydraulics\cwr\East Mesa ADMPU Plan\HEC-1 with 600 in Powerline\Future Conditions

---

From: Raj Shrestha - FCDX
Sent: Wednesday, February 26, 2014 10:47 AM
To: Michael Duncan - FCDX
Cc: Bing Zhao - FCDX
Subject: RE: Pecos Road DCR - project number

Mike,
I have been trying to find the final future condition Hec-1 model that should be used for the Pecos Basin sediment analysis. Please see attached email from Jennifer. Per her email the East Mesa ADMP did not require the development of FINAL future condition Model for SR 24 and Ellsworth Systems. The FINAL future condition model is built only for Rittenhouse system. However there is a draft (pre-final) future condition Model that Entellus will be submitting for SR 24 and Ellsworth, and a final future condition model for Pecos system. She has also mentioned that for SR24 and Ellsworth systems, Entellus only prepared preliminary alternatives and the recommended alternative will be prepared with the Pecos Road Channel Project. Cathy also mentioned that the SR24 highway will be built about 20 years down the road and the existing peak discharge is higher than the future condition peak discharge. Do you still think that the sediment analysis should be done for the future condition? If yes, would you like me to use the draft future condition Model prepared by Entellus or would you like me to use the model that will be prepared with recommended alternative.

Thanks,
Raj

From: Michael Duncan - FCDX
Sent: Tuesday, February 11, 2014 12:12 PM
To: Raj Shrestha - FCDX
Cc: Bing Zhao - FCDX
Subject: RE: Pecos Road DCR - project number

Assume future conditions for your analysis, since the related channel and basins will have future conditions as their design criteria.

From: Raj Shrestha - FCDX
Sent: Tuesday, February 11, 2014 11:57 AM
To: Michael Duncan - FCDX
Cc: Bing Zhao - FCDX
Subject: RE: Pecos Road DCR - project number

Mike,
Are you looking for both existing and future condition sediment yield analysis or just for the future condition. Please let us know.
Thanks,
Raj

From: Michael Duncan - FCDX
Sent: Tuesday, February 11, 2014 11:30 AM
To: Raj Shrestha - FCDX
Cc: Bing Zhao - FCDX
Subject: Pecos Road DCR - project number

The PCN number is

A442.03.20 – Pecos Road Channel & Basins DCR

Which is a planning budget item, which comes from the Operations (non-CIP) Budget,

and the timesheet code for this is:

/////FCOPER/

900.00.00 - Flood Control (non-CIP) Operations

```
1****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*           JUN    1998                 *
*         VERSION 4.1                   *
*                                       *
* RUN DATE   05AUG11  TIME  12:24:43    *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*        609 SECOND STREET              *
*      DAVIS, CALIFORNIA 95616          *
*         (916) 756-1104                *
*                                       *
*****************************************
```

```
                FUTEMADMP24 20110519 - EMADMPU 24-hr Future Conditions 20110519
                Flood Control District of Maricopa County
                100 YEAR
                24 Hour Storm
                Unit Hydrograph: S-Graph
                08/05/2011

  9 IO      OUTPUT CONTROL VARIABLES
                 IPRNT          5  PRINT CONTROL
                 IPLOT          0  PLOT CONTROL
                 QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT      HYDROGRAPH TIME DATA
                  NMIN          5  MINUTES IN COMPUTATION INTERVAL
                 IDATE      1   0  STARTING DATE
                 ITIME       0000  STARTING TIME
                    NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE      7   0  ENDING DATE
                NDTIME       2235  ENDING TIME
                 ICENT         19  CENTURY MARK

             COMPUTATION INTERVAL    0.08 HOURS
                  TOTAL TIME BASE  166.58 HOURS

       ENGLISH UNITS
           DRAINAGE AREA          SQUARE MILES
           PRECIPITATION DEPTH    INCHES
           LENGTH, ELEVATION      FEET
           FLOW                   CUBIC FEET PER SECOND
           STORAGE VOLUME         ACRE-FEET
           SURFACE AREA           ACRES
           TEMPERATURE            DEGREES FAHRENHEIT

 10 JD      INDEX STORM NO. 1
                 STRM        3.58  PRECIPITATION DEPTH
                 TRDA        0.00  TRANSPOSITION DRAINAGE AREA

 11 PI       PRECIPITATION PATTERN
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03
0.03	0.09	0.09	0.09	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

```
 21 JD      INDEX STORM NO. 2
                 STRM        3.56  PRECIPITATION DEPTH
                 TRDA        1.00  TRANSPOSITION DRAINAGE AREA

  0 PI       PRECIPITATION PATTERN
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03
0.03	0.09	0.09	0.09	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Kimley»Horn

Appendix E. Alternatives Opinions of Probable Cost

Preliminary Alternative OPCs

Kimley»Horn

Project: *Pecos Road DCR*
Subject: **Opinion of Probable Cost for Design Alternatives**
Designed by: **DWT** Date: 9/26/2014 KHA Project No: 091131024
Checked by: **MAW** Date: 9/26/2014 District Project No: 2014C001-1

Alternative 1: Channel from Meridian to Ellsworth

MAG Item Number	Description	Qty	Unit	Unit Price	Cost
215.01100	Channel Excavation	186,242	CY	$ 6	$ 1,117,500
215.01510	Earthwork for Retention Basins	242,000	CY	$ 6	$ 1,452,000
220.10300	Riprap, D50=12"	51,408	CY	$ 80	$ 4,112,700
523.10160	Headwall, MAG Det. 501, Straight Type, 60" Pipe	6	EACH	$ 3,500	$ 21,000
523.10260	Headwall, MAG Det. 501, Straight Type, 2-60" Pipe	8	EACH	$ 4,000	$ 32,000
525.03217	Reinforced Concrete Channel, 6" Thick	5,806	CY	$ 300	$ 1,741,800
618.20460	60" RGRCP, Class IV	1,270	LF	$ 175	$ 222,300
	Concrete Drop Structure	4	EACH	$ 3,500	$ 14,000
				Construction Subtotal	**$ 8,713,300**
Potential Utility Relocation					
	Electric Line Relocation	7	EACH	$ 3,000	$ 21,000
	Gas Line Relocation	3	EACH	$ 4,000	$ 12,000
	Water Line Relocation - 4"/6"	2	EACH	$ 5,000	$ 10,000
	Water Line Relocation - 8"	0	EACH	$ 10,000	$ -
	Water Line Relocation - 12"	2	EACH	$ 15,000	$ 30,000
	Water Line Relocatoin - 16"	1	EACH	$ 20,000	$ 20,000
				Potential Utility Relocation Subtotal	**$ 93,000**
	Right of Way Cost	65	AC	$ 125,000	$ 8,125,000
	Design Cost (10% of Construction Cost)				$ 871,330
				Total	**$ 17,803,000**

Notes: Construction costs were determined from ADOT Estimated Engineering Construction Cost E2C2.
Utility relocation estimates based on typical relocation costs.

Kimley»Horn

Project: *Pecos Road DCR*
Subject: **Opinion of Probable Cost for Design Alternatives**
Designed by: **DWT** Date: 9/26/2014 KHA Project No: 091131024
Checked by: **MAW** Date: 9/26/2014 District Project No: 2014C001-1

Alternative 2: Storm Drain from Meridian 222nd and Channel from 222nd to Ellsworth

MAG Item Number	Description	Qty	Unit	Unit Price	Cost
215.01100	Channel Excavation	173,429	CY	$ 6	$ 1,040,600
215.01510	Earthwork for Retention Basins	242,000	CY	$ 6	$ 1,452,000
220.10300	Riprap, D50=12"	51,408	CY	$ 80	$ 4,112,700
505.10130	Catch Basin, MAG Det. 533, Type D	6	EACH	$ 4,500	$ 27,000
523.10160	Headwall, MAG Det. 501, Straight Type, 60" Pipe	3	EACH	$ 3,500	$ 10,500
523.10260	Headwall, MAG Det. 501, Straight Type, 2-60" Pipe	1	EACH	$ 4,000	$ 4,000
525.03217	Reinforced Concrete Channel, 6" Thick	3,409	CY	$ 300	$ 1,022,700
618.20460	60" RGRCP, Class IV	9,360	LF	$ 175	$ 1,638,000
625.01260	Storm Drain Manhole, MAG Det. 521 & 522, 60" Pipe	12	EACH	$ 3,500	$ 42,000
	Transition Structure	1	EACH	$ 10,000	$ 10,000
				Construction Subtotal	**$ 9,359,500**
Potential Utility Relocation					
	Electric Line Relocation	1	EACH	$ 3,000	$ 3,000
	Gas Line Relocation	3	EACH	$ 4,000	$ 12,000
	Water Line Relocation - 4"/6"	1	EACH	$ 5,000	$ 5,000
	Water Line Relocation - 8"	3	EACH	$ 10,000	$ 30,000
	Water Line Relocation - 12"	1	EACH	$ 15,000	$ 15,000
	Water Line Relocatoin - 16"	1	EACH	$ 20,000	$ 20,000
				Potential Utility Relocation Subtotal	**$ 85,000**
	Right of Way Cost	57	AC	$ 125,000	$ 7,125,000
	Design Cost (10% of Construction Cost)				$ 935,950
				Total	**$ 17,505,000**

Notes: Construction costs were determined from ADOT Estimated Engineering Construction Cost E2C2.

Manholes estimated from 800 ft spacing, as specified in the 2012 City of Mesa Engineering and Design Standards Manual.

Utility relocation estimates based on typical relocation costs.

Kimley»Horn

Project: *Pecos Road DCR*
Subject: **Opinion of Probable Cost for Design Alternatives**
Designed by: **DWT** Date: 9/26/2014 KHA Project No: 091131024
Checked by: **MAW** Date: 9/26/2014 District Project No: 2014C001-1

Alternative 3: Storm drain from Meridian to Ellsworth

MAG Item Number	Description	Qty	Unit	Unit Price	Cost
215.01100	Channel Excavation	39,630	CY	$ 6	$ 237,800
215.01510	Earthwork for Retention Basins	331,000	CY	$ 6	$ 1,986,000
505.10130	Catch Basin, MAG Det. 533, Type D	31	EACH	$ 4,500	$ 139,500
523.10160	Headwall, MAG Det. 501, Straight Type, 60" Pipe	3	EACH	$ 3,500	$ 10,500
523.10260	Headwall, MAG Det. 501, Straight Type, 2-60" Pipe	1	EACH	$ 4,000	$ 4,000
523.10272	Headwall, MAG Det. 501, Straight Type, 2-72" Pipe	2	EACH	$ 4,200	$ 8,400
525.03217	Reinforced Concrete Channel, 6" Thick	3,409	CY	$ 300	$ 1,022,700
618.20460	60" RGRCP, Class IV	9,360	LF	$ 175	$ 1,638,000
618.20472	72" RGRCP, Class IV	18,480	LF	$ 300	$ 5,544,000
625.01260	Storm Drain Manhole, MAG Det. 521 & 522, 60" Pipe	36	EACH	$ 3,500	$ 126,000
	Transition Structure	1	EACH	$ 10,000	$ 10,000
				Construction Subtotal	**$ 10,726,900**
Potential Utility Relocation					
	Electric Line Relocation	1	EACH	$ 3,000	$ 3,000
	Gas Line Relocation	3	EACH	$ 4,000	$ 12,000
	Water Line Relocation - 4"/6"	1	EACH	$ 5,000	$ 5,000
	Water Line Relocation - 8"	6	EACH	$ 10,000	$ 60,000
	Water Line Relocation - 12"	4	EACH	$ 15,000	$ 60,000
	Water Line Relocatoin - 16"	1	EACH	$ 20,000	$ 20,000
				Potential Utility Relocation Subtotal	**$ 160,000**
	Right of Way Cost	42	AC	$ 125,000	$ 5,250,000
	Design Cost (10% of Construction Cost)				$ 1,072,690
				Total	**$ 17,210,000**

Notes: Construction costs were determined from ADOT Estimated Engineering Construction Cost E2C2.

Manholes estimated from 800 ft spacing, as specified in the 2012 City of Mesa Engineering and Design Standards Manual.

Utility relocation estimates based on typical relocation costs.

Kimley»Horn

Appendix F. DCR Drainage System

- Revised HEC-1 Model Output
- Revised stage-storage-discharge tables
- Revised normal depth calculations
- Revised storm drain calculations
- Revised OPC

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN  1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   06JAN15  TIME  07:45:05   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   1          ID      Pecos Road Channel and Basin Design Concept Report
   2          ID      DCR System Model
   3          ID      Future Conditions
   4          ID
   5          ID      DCR System Model: Storm drain from the Pecos Basin to the Ellsworth Channe
   6          ID
   7          ID      Prepared for the Flood Control District of Maricopa County
   8          ID      District Project Number FCD 2014C001-1
   9          ID
  10          ID      Prepared by Kimley-Horn and Associates, Inc.
  11          ID      Kimley Horn Project Number 091131024
  12          ID      January 2015
  13          ID
  14          ID      Model based on Alternative 1 of the East Mesa Area Drainage Master Plan
  15          ID      Update (EMADMPU). The model was revised to include only those areas
  16          ID      contributing to the Ellsworth Channel.
  17          ID
  18          ID      List of Changes:
  19          ID      - Basin DIVPB at Pecos Rd and Meridian was changed from a diversion card
  20          ID        to a storage routing card with stage-storage-discharge data; the name
  21          ID        was changed from DIVPB to DETPB to reflect the change.
  22          ID      - Routing reach from CPR9 to CPR8 was eliminated
  23          ID      - Powerline section of the model was deleted (all subbasins north of the
  24          ID        future SR24 alignment).
  25          ID      - All subbasins south and east of R5 and R8 have been deleted.
  26          ID      - All comments from the East Mesa Area Drainage Master Plan Update that do
  27          ID        pertain to the Ellsworth Channel model have been deleted.
  28          ID      - Area has been adjusted on HC cards to account for reduction in area due
  29          ID        retention diversions.
  30          ID      - An additional proposed detention basin was modeled at 222nd Street with
  31          ID        KK record of DET222.
  32          ID      - The subbasin boundary between Subbasins E28B and E24B and Subbasins E29
  33          ID        and E25 have been shifted from Signal Butte Road to 222nd Street to
  34          ID        more accurately model flows upstream of detention basin DET222.
  35          ID      - For routing reaches with double pipes a single equivalent diameter pipe
  36          ID        was modeled.
  37          ID
  38          ID
  39          ID
  40          ID          ************************************************************************
  41          ID          ************************** EAST MESA ADMPU **************************
  42          ID          ************************************************************************
  43          ID
  44          ID          PROJECT:                EAST MESA AREA DRAINAGE MASTER PLAN UPDATE
  45          ID          CLIENT:                 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  46          ID          PREPARED BY:    ENTELLUS, INC.
  47          ID          PROJECT NO:             FCD 2011C017            ENTELLUS 310.057
  48          ID          MODIFIED DATE:  9/12/2012
  49          ID          MODELER:                RLJ
  50          ID
  51          ID          STORM:                  100-YEAR 24-HOUR
  52          ID
  53          ID          DEVELOPMENT CONDITIONS: FUTURE LAND USE
  54          ID                                                  INCREASED FUTURE RETENTION (2.19->2.70 IN)
  55          ID
```

```
1                                   HEC-1 INPUT                                         PAGE  2

 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  56           ID              PROPOSED INFRASTRUCTURE: MOUNTAIN CHANNEL AND RETENTION BASIN
  57           ID                                                              MERIDIAN CHANNEL
  58           ID                                                              PECOS CHANNEL
  59           ID                                                              MERIDIAN AND PECOS RETENTION BASIN
  60           ID                                                              GERMANN CHANNEL
  61           ID
  62           ID              MODIFICATION 1: RETENTION VOLUMES WERE INCREASED TO
  63           ID                  100-YEAR, 2-HOUR NOAA 2 RAINFALL WITH 80% EFFECTIVE
  64           ID                  VOLUME WITHIN THE CITY OF MESA AND TOWN OF QUEEN CREEK FOR THE F
  65           ID                                              SUBBASINS:
  66           ID
  67           ID                                              E28B    E29              E30B
  68           ID                                              E31              E32              E33B
  69           ID
  70           ID              MODIFICATION 4: MERIDIAN CHANNEL (SOUTH OF PECOS): CPR8
  71           ID                                              RETOUTED TO COMBINE NORTH UP MERIDIAN ROAD TO COMBINE
  72           ID                                              WITH CPE16 AND FOLLOW THE EXISTING FLOW PATH TO
  73           ID                                              PROPOSED RETENTION AT MERIDIAN AND PECOS.
  74           ID
  75           ID              MODIFICATION 5: PECOS CHANNEL (WEST OF MERIDIAN): CPE24B WAS MODIFIED TO
  76           ID                                              COMBINE WITH E25 AND WAS ROUTED ON PECOS ROAD. CPE29
  77           ID                                              WAS MODIFIED TO COMBINE WITH E29. NEW ROUTES WERE
  78           ID                                              DEFINED ON PECOS ROAD.
  79           ID
  80           ID              MODIFICATION 6: MERIDIAN AND PECOS OFFLINE RETENTION: ADDED DIVERSION
  81           ID                                              DIVPB AFTER CPE15 WITH A BYPASS FLOW OF 265 CFS
  82           ID
  83           ID
  84           ID              ***********************************************************************
  85           ID              ************************** EAST MESA ADMPU **************************
  86           ID              ***********************************************************************
  87           ID
  88           ID          FUTEMADMP24 20110519 - EMADMPU 24-hr Future Conditions 20110519
  89           ID          Flood Control District of Maricopa County
  90           ID          100 YEAR
  91           ID          24 Hour Storm
  92           ID          Unit Hydrograph: S-Graph
  93           ID          08/05/2011
  94           ID          *************************************************************
  95           IT       5 12Aug14       0    2000                        2000
  96           IN      15
  97           IO       5
               *DIAGRAM
               *
  98           JD    3.579  0.0001
  99           PC    0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
 100           PC    0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
 101           PC    0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
 102           PC    0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
 103           PC    0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
 104           PC    0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
 105           PC    0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
 106           PC    0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
 107           PC    0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
 108           PC    0.983   0.986   0.989   0.992   0.995   0.998   1.000
1                                   HEC-1 INPUT                                         PAGE  3

 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 109           JD    3.561     1.0
 110           JD    3.490     5.0
 111           JD    3.400    10.0
 112           JD    3.286    20.0
 113           JD    3.221    30.0
 114           JD    3.175    40.0
 115           JD    3.139    50.0
 116           JD    3.114    60.0
               *

 117           KK       E7   BASIN
 118           KM    Runoff from subbasin E7
 119           BA    1.124
 120           LG     0.24    0.26    5.10    0.32      35
 121           UI        0      64      64     102     224     281     328     369     416     477
 122           UI      561     725     814     670     575     512     449     390     339     300
 123           UI      226     159     113     106      99      64      64      46      20      20
 124           UI       20      20      20      20      20      20       0       0       0       0
 125           UI        0       0       0       0       0       0       0       0       0       0
               *

 126           KK    DIVE7   DIVERT
 127           KM    Divert the required retention volume for the subbasin out of the model
 128           DT    RETE7    85.5     0.0
 129           DI      0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 130           DQ      0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
               *

 131           KK   E7STOR STORAGE
 132           RS        1    STOR
```

```
 133          SV          22.82   34.23   45.64   78.34  111.03  143.72  176.42  230.23  284.04
 134          SQ           1.75    5.50   11.00   17.70   25.70   34.20   43.00   51.70
 135          SE  1566.0 1567.00 1567.50 1568.00 1568.50 1569.00 1569.50 1570.00 1570.50 1571.00
 136          ST  1574.0 10000.0     3.0     1.5
              *

 137          KK    E7E6   ROUTE
 138          KM   Route outfall from E7STOR to CPE6
 139          RS      23    FLOW
 140          RC   0.035   0.030   0.030   16362  0.0062    5.50
 141          RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
 142          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
              *

 143          KK     E6B   BASIN
 144          KM   Runoff from subbasin E6B
 145          BA   1.949
 146          LG    0.14    0.25    6.00    0.24      59
 147          UI       0     174     277     677     898    1079    1330    1853    2099    1602
 148          UI    1321    1068     853     594     331     288     192     162      53      53
 149          UI      53      53      53       0       0       0       0       0       0       0
 150          UI       0       0       0       0       0       0       0       0       0       0
 151          UI       0       0       0       0       0       0       0       0       0       0
              *
1                                          HEC-1 INPUT                                          PAGE  4

    LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 152          KK  DIVE6B  DIVERT
 153          KM   Divert the required retention volume for the subbasin out of the model
 154          DT  RETE6B   179.9     0.0
 155          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 156          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 157          KK      E8   BASIN
 158          KM   Runoff from subbasin E8
 159          BA   1.099
 160          LG    0.21    0.25    4.50    0.44      39
 161          UI       0      75      75     201     313     383     441     514     604     798
 162          UI     955     771     649     563     475     401     337     241     145     127
 163          UI     114      75      75      28      23      23      23      23      23      23
 164          UI       0       0       0       0       0       0       0       0       0       0
 165          UI       0       0       0       0       0       0       0       0       0       0
              *

 166          KK   DIVE8  DIVERT
 167          KM   Divert the required retention volume for the subbasin out of the model
 168          DT   RETE8    80.9     0.0
 169          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 170          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 171          KK    E8E6   ROUTE
 172          KM   Route runoff from subbasin E8 that is not retained to CPE6
 173          RS       9    FLOW
 174          RC   0.060   0.035   0.060    9833  0.0052    5.50
 175          RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
 176          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
              *

 177          KK    CPE6 COMBINE
 178          KM   Combine routed flow from E7STOR and subbasin E8 with unretained runoff from
 179          KM   subbasin E6B.
 180          HC       3    3.05
              *

 181          KK    DE6S  DIVERT
 182          KM   Flow split diversion, DRE9 to the south, DE6S to the west
 183          DT    DRE9     0.0     0.0
 184          DI     0.0   236.0   682.0  1141.0  1670.0  2261.0  2886.0     0.0     0.0     0.0
 185          DQ     0.0     1.0    13.0   212.0   633.0  1096.0  1568.0     0.0     0.0     0.0
              *

 186          KK   E6E15   ROUTE
 187          KM   Route remaining flow from flow split at DE6S west to CPE15A
 188          RS       7    FLOW
 189          RC   0.035   0.030   0.035    8259  0.0042    5.50
 190          RX  950.00  975.00  991.00 1003.00 1007.00 1019.00 1030.00 1065.00
 191          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
              *
1                                          HEC-1 INPUT                                          PAGE  5

    LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 192          KK     E5B   BASIN
 193          KM   Runoff from subbasin E5B
 194          BA   0.286
 195          LG    0.14    0.25    3.95    0.64      62
 196          UI       0      64     225     342     567     435     287     148      74      36
 197          UI      15      15       0       0       0       0       0       0       0       0
```

```
198          UI       0       0       0       0       0       0       0       0       0       0
199          UI       0       0       0       0       0       0       0       0       0       0
200          UI       0       0       0       0       0       0       0       0       0       0
             *

201          KK  DIVE5B  DIVERT
202          KM   Divert the required retention volume for the subbasin out of the model
203          DT  RETE5B    25.0     0.0
204          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
205          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

206          KK  E5E14B   ROUTE
207          KM    Route runoff from subbasin E5B that is not retained to CP14B
208          RS        5    FLOW
209          RC   0.035   0.030   0.035    6256  0.0054    5.50
210          RX  950.00  985.00  991.00 1003.00 1007.00 1019.00 1025.00 1050.00
211          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
             *

212          KK    E14B   BASIN
213          KM   Runoff from subbasin E14B
214          BA   0.528
215          LG    0.14    0.25    5.60    0.29      60
216          UI       0     125     435     667    1086     785     512     237     126      53
217          UI      29      29       0       0       0       0       0       0       0       0
218          UI       0       0       0       0       0       0       0       0       0       0
219          UI       0       0       0       0       0       0       0       0       0       0
220          UI       0       0       0       0       0       0       0       0       0       0
             *

221          KK  DIV14B  DIVERT
222          KM   Divert the required retention volume for the subbasin out of the model
223          DT  RET14B    48.4     0.0
224          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
225          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

226          KK   CP14B COMBINE
227          KM    Combine routed flow from E5B with unretained runoff from subbasin E14B.
228          HC        2
             *
1                                        HEC-1 INPUT                                    PAGE  6

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

229          KK  E14E15 ROUTE
230          KM   Route combined runoff from CP14B to CPE15A
231          RS        2    FLOW
232          RC     0.04    0.03    0.04    1840  0.0018
233          RX        0       9      18      29      40      51      59      68
234          RY        4       2       0       0       0       0       2       4
             *

235          KK     E15   BASIN
236          KM   Runoff from subbasin E15
237          BA   0.777
238          LG    0.15    0.25    5.10    0.35      57
239          UI       0     106     363     582     791    1239    1004     734     522     273
240          UI     171     106      36      32      32       0       0       0       0       0
241          UI       0       0       0       0       0       0       0       0       0       0
242          UI       0       0       0       0       0       0       0       0       0       0
243          UI       0       0       0       0       0       0       0       0       0       0
             *

244          KK  DIVE15  DIVERT
245          KM   Divert the required retention volume for the subbasin out of the model
246          DT  RETE15    67.7     0.0
247          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
248          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

249          KK  CPE15A COMBINE
250          KM   Combine routed flow from split at CPE6 (DRE9, DE6S) and CP14B with unretained
251          KM   runoff from subbasin E15.
252          HC        3    4.29
             *

253          KK    DRE9RETRIEVE
254          KM   Retrieve flow from split at DRE9 that goes to the south
255          DR    DRE9
             *

256          KK  RTE6E9   ROUTE
257          KM   Route split flow from CPE6 (DRE9) south to CPE9
258          RS        5    FLOW
259          RC   0.035   0.030   0.025    2200  0.0035    6.00
260          RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
261          RY    0.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
             *

262          KK      E9   BASIN
```

```
 263          KM   Runoff from subbasin E9
 264          BA   0.723
 265          LG    0.14    0.25    5.40    0.30      58
 266          UI       0      88     253     450     585     836    1040     754     570     416
 267          UI     225     148      92      48      27      27      27       0       0       0
 268          UI       0       0       0       0       0       0       0       0       0       0
 269          UI       0       0       0       0       0       0       0       0       0       0
 270          UI       0       0       0       0       0       0       0       0       0       0
              *
1                                        HEC-1 INPUT                                        PAGE  7

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 271          KK   DIVE9  DIVERT
 272          KM   Divert the required retention volume for the subbasin out of the model
 273          DT   RETE9    65.4     0.0
 274          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 275          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 276          KK    CPE9 COMBINE
 277          KM   Combine routed flow from split at CPE6 (DRE9) with unretained runoff from
 278          KM   subbasin E9
 279          HC       2    1.07
              *

 280          KK    DE9S  DIVERT
 281          KM    Flow split diversion, DRR5 to the south, DE9S to the west
 282          DT    DRR5     0.0     0.0
 283          DI     0.0    78.0   163.0   440.0   936.0  1475.0  2024.0     0.0     0.0     0.0
 284          DQ     0.0     1.0    43.0   245.0   670.0  1157.0  1661.0     0.0     0.0     0.0
              *

 285          KK   E9E16   ROUTE
 286          KM    Route remaining flow from flow split at DE9S west to CPE16
 287          RS       6    FLOW
 288          RC   0.035   0.030   0.035    6751  0.0040    5.50
 289          RX  950.00  985.00  991.00 1003.00 1007.00 1019.00 1025.00 1060.00
 290          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
              *

 291          KK    DRR5RETRIEVE
 292          KM   Retrieve flow from split at DRR5 that goes to the south
 293          DR    DRR5
              *

 294          KK      R5   BASIN
 295          KM   Runoff from subbasin R5
 296          BA   0.504
 297          LG    0.29    0.25    5.40    0.27      21
 298          UI       0      53     120     241     310     393     574     608     455     358
 299          UI     277     189      98      80      53      26      16      16      16      16
 300          UI       0       0       0       0       0       0       0       0       0       0
 301          UI       0       0       0       0       0       0       0       0       0       0
 302          UI       0       0       0       0       0       0       0       0       0       0
              *

 303          KK   DIVR5  DIVERT
 304          KM   Divert the required retention volume for the subbasin out of the model
 305          DT   RETR5     1.0     0.0
 306          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 307          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *
1                                        HEC-1 INPUT                                        PAGE  8

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 308          KK    CPR5 COMBINE
 309          KM   Combine routed flow from split at CPE9 (DRR5) with unretained runoff from
 310          KM   subbasin R5
 311          HC       2    1.07
              *

 312          KK    R5R8   ROUTE
 313          KM   Route combined runoff from CPR5 to CPR8
 314          RS       5    FLOW
 315          RC   0.040   0.035   0.040    6587  0.0043    5.00
 316          RX  966.00  986.00  994.00 1006.00 1012.00 1024.00 1032.00 1052.00
 317          RY    5.00    4.50    4.00    1.00    1.00    4.00    4.50    5.00
              *

 318          KK      R8   BASIN
 319          KM   Runoff from subbasin R8
 320          BA   0.554
 321          LG    0.16    0.25    4.60    0.45      64
 322          UI       0      69     208     360     471     695     788     567     421     299
 323          UI     149     105      69      23      21      21      21       0       0       0
 324          UI       0       0       0       0       0       0       0       0       0       0
 325          UI       0       0       0       0       0       0       0       0       0       0
 326          UI       0       0       0       0       0       0       0       0       0       0
              *
```

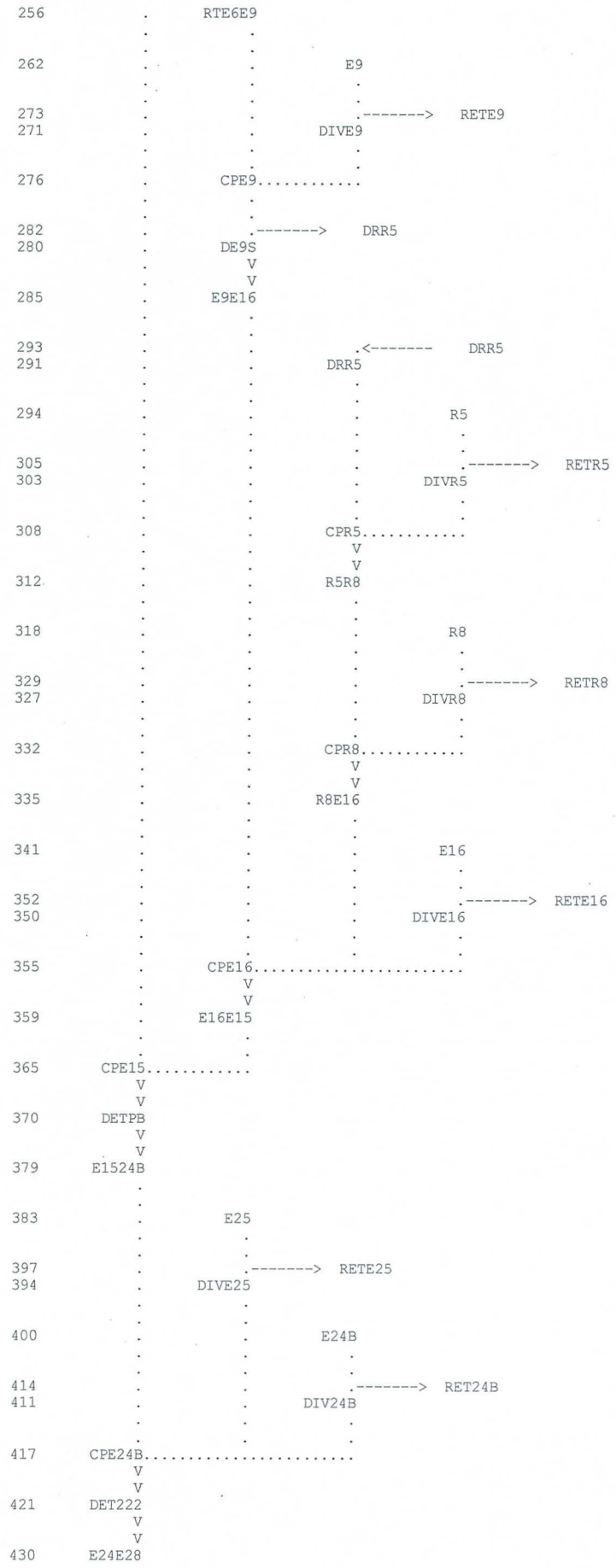
```
 327          KK   DIVR8  DIVERT
 328          KM   Divert the required retention volume for the subbasin out of the model
 329          DT   RETR8    50.5      0.0
 330          DI     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
 331          DQ     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
              *

 332          KK    CPR8 COMBINE
 333          KM   Combine routed runoff from CPR5 with unretained runoff from subbasin R8
 334          HC       2    1.62
              *

 335          KK   R8E16 ROUTE
 336          KM   Route combined flows from CPR8 to CPE16 in the proposed MERIDIAN SOUTH CHANNE
 337          RS       3     FLOW
 338          RC    0.03     0.04     0.03     2660    0.001
 339          RX       0       16       33       45       58       71       87      103
 340          RY       7        3        0        0        0        0        3        7
              *

 341          KK     E16   BASIN
 342          KM   Runoff from subbasin E16
 343          BA   0.396
 344          LG    0.15     0.25     5.10     0.35       57
 345          UI       0       58      224      342      497      684      480      338      207      100
 346          UI      64       26       18       18        0        0        0        0        0        0
 347          UI       0        0        0        0        0        0        0        0        0        0
 348          UI       0        0        0        0        0        0        0        0        0        0
 349          UI       0        0        0        0        0        0        0        0        0        0
              *
1                                          HEC-1 INPUT                                             PAGE  9

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 350          KK  DIVE16  DIVERT
 351          KM   Divert the required retention volume for the subbasin out of the model
 352          DT  RETE16    35.1      0.0
 353          DI     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
 354          DQ     0.0 10000.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
              *

 355          KK   CPE16 COMBINE
 356          KM   Combine routed flow from split at CPE9 (DRR5, DE9S) and routed flow from CPR8
 357          KM   with unretained runoff from subbasin E16.
 358          HC       3    2.52
              *

 359          KK  E16E15 ROUTE
 360          KM   Route combined flows from CPE16 to CPE15 in the MERIDIAN SOUTH CHANNEL
 361          RS       4     FLOW
 362          RC    0.03     0.04     0.03     4120    0.001
 363          RX       0       16       33       44       56       68       84      100
 364          RY       7        3        0        0        0        0        3        7
              *

 365          KK   CPE15 COMBINE
 366          KM   Combine routed flows from CPE16 in the MERIDIAN SOUTH CHANNEL with flows
 367          KM   from the north and east at the southwest corner of Pecos and Meridian. These
 368          KM   flows combine in the proposed Pecos Basin (DETPB)
 369          HC       2    6.81
              *

 370          KK   DETPB STORAGE
 371          KM   Proposed inline retention basin at SWC Meridian and Pecos
 372          KM   Basin is 9 ft deep with 1 foot provided for freeboard
 373          KM   Approximately 134 ac-ft provided (not including freeboard)
 374          KO       3
 375          RS       1     STOR
 376          SV       0      0.7      8.3     25.2     45.8     66.9     88.6    110.9    133.8    157.2
 377          SQ       0       12       45       58       90      120      148      167      184      199
 378          SE    1428     1429     1430     1431     1432     1433     1434     1435     1436     1437
              *

 379          KK  E1524B ROUTE
 380          KM   Route discharge from basin DETPB in PECOS STORM DRAIN to 222nd St & Pecos
 381          KM   Pipe size selected based on equivalent size for two pipes
 382          RD    5160  0.0035    0.013             CIRC        7
              *

 383          KK     E25   BASIN
 384          KM   Runoff from subbasin E25
 385          KM   Modified as part of the Pecos Road DCR to move the western subbasin boundary
 386          KM   from Signal Butte to 222nd Street
 387          BA   1.180
 388          LG    0.15     0.25     5.85     0.25       55
 389          UI       0      137      368      676      870     1180     1677     1273      980      738
 390          UI     494      245      190      130       42       42       42       42        0        0
 391          UI       0        0        0        0        0        0        0        0        0        0
1                                          HEC-1 INPUT                                             PAGE 10

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

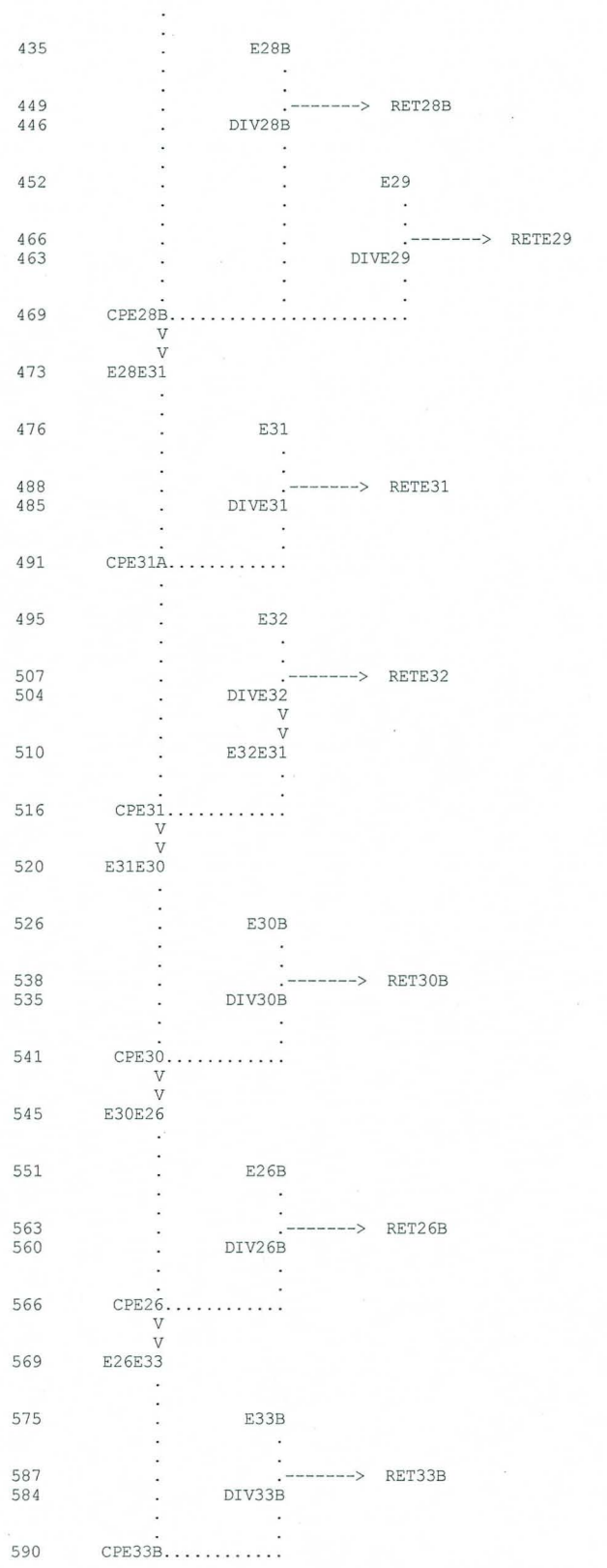
```
392          UI       0       0       0       0       0       0       0       0       0       0
393          UI       0       0       0       0       0       0       0       0       0       0
             *

394          KK  DIVE25  DIVERT
395          KM   Divert the required retention volume for the subbasin out of the model
396          KM   Modified as part of the Pecos Road DCR from 89.8 to 112.1
397          DT  RETE25   112.1     0.0
398          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
399          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

400          KK    E24B   BASIN
401          KM   Runoff from subbasin E24B
402          KM   Modified as part of the Pecos Road DCR to move the western subbasin boundary
403          KM   from Signal Butte to 222nd Street
404          BA   0.582
405          LG    0.15    0.15    7.58    0.13      57
406          UI       0      84     313     483     686     996     717     512     333     154
407          UI     103      50      26      26       0       0       0       0       0       0
408          UI       0       0       0       0       0       0       0       0       0       0
409          UI       0       0       0       0       0       0       0       0       0       0
410          UI       0       0       0       0       0       0       0       0       0       0
             *

411          KK  DIV24B  DIVERT
412          KM   Divert the required retention volume for the subbasin out of the model
413          KM   Modified as part of the Pecos Road DCR from 44.4 to 55.8
414          DT  RET24B    55.8     0.0
415          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
416          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

417          KK  CPE24B COMBINE
418          KM   Combine routed discharge from basin DETPB with unretained runoff from
419          KM   subbasins E25 and E24B in PECOS CHANNEL at Signal Butte & Pecos
420          HC       3    8.20
             *

421          KK  DET222  STORAGE
422          KM   Proposed inline retention basin at NEC 222nd St and Pecos
423          KM   Basin is 7.9 ft deep with 1 foot provided for freeboard
424          KM   Approximately 34 ac-ft provided (not including freeboard)
425          KO       3
426          RS       1    STOR
427          SV       0     2.0     6.4    11.3    16.4    22.0    27.8    33.9    39.7
428          SQ       0      16      53      54      97     150     200     236     260
429          SE    1408    1409    1410    1411    1412    1413    1414    1415  1415.9
             *

1                                        HEC-1 INPUT                                    PAGE 11

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

430          KK  E24E28 ROUTE
431          KM   Route combined flows from CPE24B in PECOS STORM DRAIN to CPE28B at Crismon
432          KM   and Pecos
433          KM   Pipe size selected based on equivalent size for two pipes
434          RD    3970  0.0035   0.013           CIRC       9
             *

435          KK    E28B   BASIN
436          KM   Runoff from subbasin E28B
437          KM   Modified as part of the Pecos Road DCR to move the eastern subbasin boundary
438          KM   from Signal Butte to 222nd Street
439          BA   0.418
440          LG    0.22    0.15    8.36    0.10      48
441          UI       0      52     154     268     350     512     598     430     321     232
442          UI     115      82      52      20      16      16      16       0       0       0
443          UI       0       0       0       0       0       0       0       0       0       0
444          UI       0       0       0       0       0       0       0       0       0       0
445          UI       0       0       0       0       0       0       0       0       0       0
             *

446          KK  DIV28B  DIVERT
447          KM   Divert the required retention volume for the subbasin out of the model
448          KM   Modified as part of the Pecos Road DCR from 51.3 to 39.9
449          DT  RET28B    39.9     0.0
450          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
451          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

452          KK     E29   BASIN
453          KM   Runoff from subbasin E29
454          KM   Modified as part of the Pecos Road DCR to move the eastern subbasin boundary
455          KM   from Signal Butte to 222nd Street
456          BA   0.754
457          LG    0.15    0.25    5.85    0.26      55
458          UI       0      84     212     400     516     675    1012     846     651     498
459          UI     368     191     141      88      53      26      26      26       0       0
460          UI       0       0       0       0       0       0       0       0       0       0
461          UI       0       0       0       0       0       0       0       0       0       0
```

```
 462          UI      0       0       0       0       0       0       0       0       0       0
              *

 463          KK  DIVE29  DIVERT
 464          KM   Divert the required retention volume for the subbasin out of the model
 465          KM   Modified as part of the Pecos Road DCR from 90.2 to 67.9
 466          DT  RETE29    67.9     0.0
 467          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 468          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *
1                                        HEC-1 INPUT                                        PAGE 12

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 469          KK  CPE28B COMBINE
 470          KM   Combine routed flow from CPE24B with unretained runoff from subbasins E28B
 471          KM   and E29 in the PECOS STORM DRAIN at Crismon and Pecos
 472          HC       3    9.74
              *

 473          KK  E28E31 ROUTE
 474          KM   Route flows in the PECOS STORM DRAIN from CPE28B to CPE31 at Ellsworth and Pe
 475          RD    5400  0.0035   0.013            CIRC       9
              *

 476          KK     E31   BASIN
 477          KM   Runoff from subbasin E31
 478          BA   0.810
 479          LG    0.15    0.25    4.80    0.39      55
 480          UI       0      86     197     391     504     641     943     970     728     571
 481          UI     441     296     151     126      86      37      26      26      26       0
 482          UI       0       0       0       0       0       0       0       0       0       0
 483          UI       0       0       0       0       0       0       0       0       0       0
 484          UI       0       0       0       0       0       0       0       0       0       0
              *

 485          KK  DIVE31  DIVERT
 486          KM   Divert the required retention volume for the subbasin out of the model
 487          KM   MODIFIED MAX VOLUME FROM 56.5 TO 68.9
 488          DT  RETE31    68.9     0.0
 489          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 490          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 491          KK  CPE31A COMBINE
 492          KM   Combine routed flows from CPE28B with unretained runoff from subbasin E31 at
 493          KM   in the PECOS CHANNEL     at Ellsworth and Pecos
 494          HC       2   10.55
              *

 495          KK     E32   BASIN
 496          KM   Runoff from subbasin E32
 497          BA   0.246
 498          LG    0.14    0.25    4.25    0.55      58
 499          UI       0      72     238     387     535     337     190      78      37      15
 500          UI      15       0       0       0       0       0       0       0       0       0
 501          UI       0       0       0       0       0       0       0       0       0       0
 502          UI       0       0       0       0       0       0       0       0       0       0
 503          UI       0       0       0       0       0       0       0       0       0       0
              *

 504          KK  DIVE32  DIVERT
 505          KM   Divert the required retention volume for the subbasin out of the model
 506          KM   MODIFIED MAX VOLUME FROM 17.2 TO 20.9
 507          DT  RETE32    20.9     0.0
 508          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 509          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *
1                                        HEC-1 INPUT                                        PAGE 13

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 510          KK  E32E31   ROUTE
 511          KM   Route unretained runoff from subbasin E32 to CPE31
 512          RS       5    FLOW
 513          RC   0.025   0.060   0.025    3272  0.0028 1388.60
 514          RX  100.00  110.00  128.00  149.80  160.00  191.50  209.20  210.00
 515          RY  1388.3 1388.32 1388.32 1380.37 1380.17 1388.04 1388.39 1388.60
              *

 516          KK   CPE31 COMBINE
 517          KM   Combine unretained runoff from subbasin E32 with the flows from the PECOS
 518          KM   CHANNEL at CPE31 - Ellsworth and Pecos
 519          HC       2   10.80
              *

 520          KK  E31E30   ROUTE
 521          KM   Route runoff from CPE31 north in the Ellsworth Channel to CPE30
 522          RS       5    FLOW
 523          RC   0.025   0.045   0.025    4404  0.0008 1387.00
 524          RX  100.00  107.00  112.50  144.90  175.10  201.50  225.90  244.00
```

```
 525          RY  1386.1 1386.09 1386.09 1377.99 1377.99 1384.59 1385.08 1387.00
              *

 526          KK    E30B   BASIN
 527          KM   Runoff from subbasin E30B
 528          BA   0.882
 529          LG    0.24    0.15    8.40    0.09      47
 530          UI       0      56      56     128     217     272     314     357     416     500
 531          UI     668     683     552     475     416     355     303     261     191     124
 532          UI      98      92      66      56      44      17      17      17      17      17
 533          UI      17      17       0       0       0       0       0       0       0       0
 534          UI       0       0       0       0       0       0       0       0       0       0
              *

 535          KK  DIV30B  DIVERT
 536          KM   Divert the required retention volume for the subbasin out of the model
 537          KM   MODIFIED MAX VOLUME FROM 67.1 TO 81.9
 538          DT  RET30B    81.9     0.0
 539          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 540          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 541          KK   CPE30 COMBINE
 542          KM   Combine routed flow from CPE31 in the Ellsworth Channel with unretained
 543          KM   runoff from subbasin E30B
 544          HC       2   11.68
              *

 545          KK  E30E26   ROUTE
 546          KM   Route combined runoff from CPE30 to CPE26 in the Ellsworth Channel
 547          RS       1    FLOW
 548          RC   0.025   0.035   0.025     822  0.0005 1387.00
 549          RX  100.00  105.00  108.50  149.90  220.10  251.30  279.10  285.10
 550          RY  1387.0 1387.00 1386.66 1376.31 1376.31 1384.11 1384.66 1386.00
              *
1                                        HEC-1 INPUT                                    PAGE 14

    LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 551          KK    E26B   BASIN
 552          KM   Runoff from subbasin E26B
 553          BA   0.259
 554          LG    0.24    0.15    8.80    0.07      48
 555          UI       0      38     145     222     320     448     315     222     139      65
 556          UI      43      18      12      12       0       0       0       0       0       0
 557          UI       0       0       0       0       0       0       0       0       0       0
 558          UI       0       0       0       0       0       0       0       0       0       0
 559          UI       0       0       0       0       0       0       0       0       0       0
              *

 560          KK  DIV26B  DIVERT
 561          KM   Divert the required retention volume for the subbasin out of the model
 562          KM   MODIFIED MAX VOLUME FROM 20.1 TO 24.5
 563          DT  RET26B    24.5     0.0
 564          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 565          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 566          KK   CPE26 COMBINE
 567          KM   Combined routed flows from CPE30 with unretained runoff from subbasin E26B
 568          HC       2   11.94
              *

 569          KK  E26E33   ROUTE
 570          KM   Route combine flows from CPE26 to CPE33 in the Ellsworth Channel
 571          RS       5    FLOW
 572          RC   0.025   0.030   0.025    8929  0.0028 1379.67
 573          RX  100.00  100.50  102.50  134.90  205.10  237.50  253.50  255.00
 574          RY  1379.1 1379.12 1379.35 1371.25 1371.25 1379.35 1379.67 1379.67
              *

 575          KK    E33B   BASIN
 576          KM   Runoff from subbasin E33B
 577          BA   0.851
 578          LG    0.15    0.15    7.30    0.14      56
 579          UI       0     117     409     651     892    1385    1087     793     558     278
 580          UI     179     110      36      36      36       0       0       0       0       0
 581          UI       0       0       0       0       0       0       0       0       0       0
 582          UI       0       0       0       0       0       0       0       0       0       0
 583          UI       0       0       0       0       0       0       0       0       0       0
              *

 584          KK  DIV33B  DIVERT
 585          KM   Divert the required retention volume for the subbasin out of the model
 586          KM   MODIFIED MAX VOLUME FROM 66.8 TO 81.5
 587          DT  RET33B    81.5     0.0
 588          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 589          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *
1                                        HEC-1 INPUT                                    PAGE 15

    LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
          590          KK  CPE33B COMBINE
          591          KM   Combine routed flows in the Ellsworth Channel from CPE26 with unretained
          592          KM   runoff from subbasin E33B.  Note this CP also receives flow from the
          593          KM   Powerline model but that flow is not included in this model.
          594          HC       2   12.79
                       *
          595          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   117          E7
                 .
                 .
   128           .-------->   RETE7
   126       DIVE7
                 V
                 V
   131       E7STOR
                 V
                 V
   137        E7E6
                 .
                 .
   143           .          E6B
                 .            .
                 .            .
   154           .            .-------->  RETE6B
   152           .       DIVE6B
                 .            .
                 .            .
   157           .            .          E8
                 .            .           .
                 .            .           .
   168           .            .           .-------->   RETE8
   166           .            .       DIVE8
                 .            .           V
                 .            .           V
   171           .            .        E8E6
                 .            .           .
                 .            .           .
   177        CPE6.........................
                 .
                 .
   183           .-------->    DRE9
   181        DE6S
                 V
                 V
   186       E6E15
                 .
                 .
   192           .          E5B
                 .            .
                 .            .
   203           .            .-------->  RETE5B
   201           .       DIVE5B
                 .            V
                 .            V
   206           .       E5E14B
                 .            .
                 .            .
   212           .            .        E14B
                 .            .           .
                 .            .           .
   223           .            .           .-------->  RET14B
   221           .            .       DIV14B
                 .            .           .
                 .            .           .
   226           .        CP14B............
                 .            V
                 .            V
   229           .       E14E15
                 .            .
                 .            .
   235           .            .         E15
                 .            .           .
                 .            .           .
   246           .            .           .-------->  RETE15
   244           .            .       DIV15
                 .            .           .
                 .            .           .
   249       CPE15A.........................
                 .
                 .
   255           .            .<--------    DRE9
   253           .         DRE9
                 .            V
                 .            V
```


256 RTE6E9
262 E9
273 RETE9
271 DIVE9
276 CPE9
282 DRR5
280 DE9S
285 E9E16
293 DRR5
291 DRR5
294 R5
305 RETR5
303 DIVR5
308 CPR5
312 R5R8
318 R8
329 RETR8
327 DIVR8
332 CPR8
335 R8E16
341 E16
352 RETE16
350 DIVE16
355 CPE16
359 E16E15
365 CPE15
370 DETPB
379 E1524B
383 E25
397 RETE25
394 DIVE25
400 E24B
414 RET24B
411 DIV24B
417 CPE24B
421 DET222
430 E24E28



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   06JAN15  TIME  07:45:05   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

Pecos Road Channel and Basin Design Concept Report
DCR System Model
Future Conditions

DCR System Model: Storm drain from the Pecos Basin to the Ellsworth Channe

Prepared for the Flood Control District of Maricopa County
District Project Number FCD 2014C001-1

Prepared by Kimley-Horn and Associates, Inc.
Kimley Horn Project Number 091131024
January 2015

Model based on Alternative 1 of the East Mesa Area Drainage Master Plan Update (EMADMPU). The model was revised to include only those areas contributing to the Ellsworth Channel.

List of Changes:
- Basin DIVPB at Pecos Rd and Meridian was changed from a diversion card to a storage routing card with stage-storage-discharge data; the name was changed from DIVPB to DETPB to reflect the change.
- Routing reach from CPR9 to CPR8 was eliminated
- Powerline section of the model was deleted (all subbasins north of the future SR24 alignment).
- All subbasins south and east of R5 and R8 have been deleted.
- All comments from the East Mesa Area Drainage Master Plan Update that do pertain to the Ellsworth Channel model have been deleted.
- Area has been adjusted on HC cards to account for reduction in area due retention diversions.
- An additional proposed detention basin was modeled at 222nd Street with KK record of DET222.
- The subbasin boundary between Subbasins E28B and E24B and Subbasins E29 and E25 have been shifted from Signal Butte Road to 222nd Street to more accurately model flows upstream of detention basin DET222.
- For routing reaches with double pipes a single equivalent diameter pipe was modeled.

```
**************************************************************************
************************** EAST MESA ADMPU **************************
**************************************************************************

PROJECT:                EAST MESA AREA DRAINAGE MASTER PLAN UPDATE
CLIENT:                 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
PREPARED BY:    ENTELLUS, INC.
PROJECT NO:             FCD 2011C017            ENTELLUS 310.057
MODIFIED DATE:  9/12/2012
MODELER:                RLJ

STORM:                  100-YEAR 24-HOUR

DEVELOPMENT CONDITIONS: FUTURE LAND USE
                                                INCREASED FUTURE RETENTION (2.19->2.70 IN)

PROPOSED INFRASTRUCTURE: MOUNTAIN CHANNEL AND RETENTION BASIN
                                                MERIDIAN CHANNEL
                                                PECOS CHANNEL
                                                MERIDIAN AND PECOS RETENTION BASIN
                                                GERMANN CHANNEL

MODIFICATION 1: RETENTION VOLUMES WERE INCREASED TO
 100-YEAR, 2-HOUR NOAA 2 RAINFALL WITH 80% EFFECTIVE
 VOLUME WITHIN THE CITY OF MESA AND TOWN OF QUEEN CREEK FOR THE F
                                SUBBASINS:

                                E28B    E29             E30B
                                E31             E32             E33B

MODIFICATION 4: MERIDIAN CHANNEL (SOUTH OF PECOS): CPR8
                                RETOUTED TO COMBINE NORTH UP MERIDIAN ROAD TO COMBINE
                                WITH CPE16 AND FOLLOW THE EXISTING FLOW PATH TO
                                PROPOSED RETENTION AT MERIDIAN AND PECOS.

MODIFICATION 5: PECOS CHANNEL (WEST OF MERIDIAN): CPE24B WAS MODIFIED TO
                                COMBINE WITH E25 AND WAS ROUTED ON PECOS ROAD. CPE29
                                WAS MODIFIED TO COMBINE WITH E29. NEW ROUTES WERE
                                DEFINED ON PECOS ROAD.

MODIFICATION 6: MERIDIAN AND PECOS OFFLINE RETENTION: ADDED DIVERSION
                                DIVPB AFTER CPE15 WITH A BYPASS FLOW OF 265 CFS


**************************************************************************
************************** EAST MESA ADMPU **************************
**************************************************************************
```

```
                              Flood Control District of Maricopa County
                              100 YEAR
                              24 Hour Storm
                              Unit Hydrograph: S-Graph
                              08/05/2011
                              ***************************************************************

  97 IO         OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT         HYDROGRAPH TIME DATA
                       NMIN          5  MINUTES IN COMPUTATION INTERVAL
                      IDATE    12Aug14  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     18  14  ENDING DATE
                     NDTIME       2235  ENDING TIME
                      ICENT         20  CENTURY MARK

                COMPUTATION INTERVAL      .08 HOURS
                     TOTAL TIME BASE   166.58 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT

  98 JD         INDEX STORM NO. 1
                       STRM       3.58  PRECIPITATION DEPTH
                       TRDA        .00  TRANSPOSITION DRAINAGE AREA

  99 PI           PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                    .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00

 109 JD         INDEX STORM NO. 2
                       STRM       3.56  PRECIPITATION DEPTH
                       TRDA       1.00  TRANSPOSITION DRAINAGE AREA

   0 PI           PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                    .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00

110 JD        INDEX STORM NO. 3
                   STRM      3.49  PRECIPITATION DEPTH
                   TRDA      5.00  TRANSPOSITION DRAINAGE AREA

  0 PI           PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                   .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00

111 JD        INDEX STORM NO. 4
                   STRM      3.40  PRECIPITATION DEPTH
                   TRDA     10.00  TRANSPOSITION DRAINAGE AREA

  0 PI           PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                   .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00

112 JD        INDEX STORM NO. 5
                   STRM      3.29  PRECIPITATION DEPTH
                   TRDA     20.00  TRANSPOSITION DRAINAGE AREA

  0 PI           PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                  .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                  .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                  .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00

 113 JD         INDEX STORM NO. 6
                    STRM        3.22  PRECIPITATION DEPTH
                    TRDA       30.00  TRANSPOSITION DRAINAGE AREA

   0 PI           PRECIPITATION PATTERN
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                  .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                  .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                  .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00

 114 JD         INDEX STORM NO. 7
                    STRM        3.17  PRECIPITATION DEPTH
                    TRDA       40.00  TRANSPOSITION DRAINAGE AREA

   0 PI           PRECIPITATION PATTERN
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                  .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                  .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                  .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                  .00       .00       .00       .00       .00       .00       .00       .00

 115 JD         INDEX STORM NO. 8
```

```
                         STRM        3.14  PRECIPITATION DEPTH
                         TRDA       50.00  TRANSPOSITION DRAINAGE AREA

     0 PI            PRECIPITATION PATTERN
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                         .01      .01      .01      .01      .01      .01      .01      .01      .03      .03
                         .03      .09      .09      .09      .01      .01      .01      .01      .01      .01
                         .01      .01      .01      .01      .01      .01      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00

   116 JD          INDEX STORM NO. 9
                         STRM        3.11  PRECIPITATION DEPTH
                         TRDA       60.00  TRANSPOSITION DRAINAGE AREA

     0 PI            PRECIPITATION PATTERN
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .01      .00      .01
                         .01      .01      .01      .01      .01      .01      .01      .01      .03      .03
                         .03      .09      .09      .09      .01      .01      .01      .01      .01      .01
                         .01      .01      .01      .01      .01      .01      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00

WARNING --- ROUTED OUTFLOW (     527.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     517.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     493.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     488.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     507.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     505.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     495.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     494.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     498.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     489.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     490.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     523.) IS GREATER THAN MAXIMUM OUTFLOW (     487.) IN STORAGE-OUTFLOW TABLE
```

```
WARNING --- ROUTED OUTFLOW (    513.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    503.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    497.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    489.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    489.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    509.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    499.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    490.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    491.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


             **************
             *            *
 370 KK      *   DETPB    *      STORAGE
             *            *
             **************

 374 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

               HYDROGRAPH ROUTING DATA

 375 RS          STORAGE ROUTING
                       NSTPS          1  NUMBER OF SUBREACHES
                        ITYP       STOR  TYPE OF INITIAL CONDITION
                      RSVRIC        .00  INITIAL CONDITION
                           X        .00 WORKING R AND D COEFFICIENT

 376 SV           STORAGE         .0        .7       8.3      25.2      45.8      66.9      88.6     110.9     133.8     157.2


 377 SQ          DISCHARGE        0.       12.       45.       58.       90.      120.      148.      167.      184.      199.


 378 SE          ELEVATION   1428.00   1429.00   1430.00   1431.00   1432.00   1433.00   1434.00   1435.00   1436.00   1437.00

                                                                              ***

       ***              ***              ***              ***              ***

                              HYDROGRAPH AT STATION     DETPB
                            TRANSPOSITION AREA       .0 SQ MI

  PEAK FLOW      TIME                              MAXIMUM AVERAGE FLOW
                                          6-HR         24-HR         72-HR      166.58-HR
+     (CFS)      (HR)
                                 (CFS)
+      196.     17.42                      193.          143.           51.           22.
                               (INCHES)    .264          .781          .843          .848
                                (AC-FT)     96.          284.          306.          308.

 PEAK STORAGE    TIME                            MAXIMUM AVERAGE STORAGE
                                          6-HR         24-HR         72-HR      166.58-HR
+   (AC-FT)      (HR)
       153.     17.42                      149.           96.           33.           14.

  PEAK STAGE     TIME                              MAXIMUM AVERAGE STAGE
                                          6-HR         24-HR         72-HR      166.58-HR
+    (FEET)      (HR)
    1436.80     17.42                  1436.63       1434.25       1430.29       1428.99

                                CUMULATIVE AREA =     6.81 SQ MI

       ***              ***              ***              ***              ***

                              HYDROGRAPH AT STATION     DETPB
                            TRANSPOSITION AREA      1.0 SQ MI

  PEAK FLOW      TIME                              MAXIMUM AVERAGE FLOW
                                          6-HR         24-HR         72-HR      166.58-HR
+     (CFS)      (HR)
                                 (CFS)
+      194.     17.50                      191.          141.           51.           22.
                               (INCHES)    .261          .769          .829          .834
                                (AC-FT)     95.          279.          301.          303.

 PEAK STORAGE    TIME                            MAXIMUM AVERAGE STORAGE
```

			6-HR	24-HR	72-HR	166.58-HR
+	(AC-FT)	(HR)				
	149.	17.50	145.	93.	32.	14.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+	(FEET)	(HR)				
	1436.65	17.50	1436.48	1434.15	1430.25	1428.97

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 5.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	185.	17.67	182.	133.	47.	20.
		(INCHES)	.249	.725	.773	.777
		(AC-FT)	90.	263.	281.	282.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+	(AC-FT)	(HR)				
	135.	17.67	132.	84.	29.	12.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+	(FEET)	(HR)				
	1436.07	17.67	1435.91	1433.74	1430.07	1428.89

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	173.	17.92	170.	122.	43.	19.
		(INCHES)	.233	.668	.703	.703
		(AC-FT)	85.	243.	255.	255.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+	(AC-FT)	(HR)				
	119.	17.92	116.	73.	25.	11.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+	(FEET)	(HR)				
	1435.35	17.92	1435.20	1433.24	1429.87	1428.81

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 20.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	157.	18.33	154.	109.	38.	16.
		(INCHES)	.211	.596	.619	.619
		(AC-FT)	77.	216.	225.	225.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+	(AC-FT)	(HR)				
	99.	18.33	96.	61.	20.	9.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+	(FEET)	(HR)				
	1434.47	18.42	1434.34	1432.65	1429.64	1428.71

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB

TRANSPOSITION AREA 30.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 148.	18.67		145.	101.	35.	15.
		(INCHES)	.197	.553	.570	.570
		(AC-FT)	72.	201.	207.	207.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
89.	18.67	86.	54.	18.	8.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
1434.00	18.58	1433.88	1432.33	1429.52	1428.66

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 40.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 139.	18.92		136.	96.	33.	14.
		(INCHES)	.186	.522	.536	.536
		(AC-FT)	67.	189.	195.	195.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
82.	18.92	79.	50.	17.	7.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
1433.68	18.92	1433.57	1432.13	1429.44	1428.62

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 50.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 132.	19.17		129.	91.	31.	13.
		(INCHES)	.177	.497	.509	.509
		(AC-FT)	64.	181.	185.	185.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
76.	19.17	74.	46.	16.	7.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
1433.44	19.17	1433.34	1431.96	1429.38	1428.60

CUMULATIVE AREA = 6.81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DETPB
TRANSPOSITION AREA 60.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 128.	19.42		125.	88.	30.	13.
		(INCHES)	.171	.480	.491	.491
		(AC-FT)	62.	174.	178.	178.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
73.	19.33	71.	44.	15.	6.

```
 PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                      6-HR       24-HR       72-HR     166.58-HR
+  (FEET)      (HR)
  1433.27     19.33                1433.18     1431.85     1429.34      1428.58

                          CUMULATIVE AREA =     6.81 SQ MI

      ***              ***             ***             ***              ***


                          INTERPOLATED HYDROGRAPH AT      DETPB

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     166.58-HR
+   (CFS)      (HR)
                          (CFS)
+     180.    17.75                    177.        128.         45.          20.
                        (INCHES)       .242        .700        .742         .744
                         (AC-FT)        88.        254.        269.         270.

                          CUMULATIVE AREA =     6.81 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             **************
             *            *
 421 KK      *   DET222   *       STORAGE
             *            *
             **************

 425 KO          OUTPUT CONTROL VARIABLES
                       IPRNT            3  PRINT CONTROL
                       IPLOT            0  PLOT CONTROL
                       QSCAL           0.  HYDROGRAPH PLOT SCALE

               HYDROGRAPH ROUTING DATA

 426 RS          STORAGE ROUTING
                       NSTPS            1  NUMBER OF SUBREACHES
                        ITYP         STOR  TYPE OF INITIAL CONDITION
                      RSVRIC          .00  INITIAL CONDITION
                           X          .00 WORKING R AND D COEFFICIENT

 427 SV          STORAGE         .0       2.0       6.4      11.3      16.4      22.0      27.8      33.9      39.7

 428 SQ          DISCHARGE        0.       16.       53.       54.       97.      150.      200.      236.      260.

 429 SE          ELEVATION   1408.00   1409.00   1410.00   1411.00   1412.00   1413.00   1414.00   1415.00   1415.90
                                                                ***

      ***              ***             ***             ***              ***

                           HYDROGRAPH AT STATION    DET222
                         TRANSPOSITION AREA        .0 SQ MI

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     166.58-HR
+   (CFS)      (HR)
                          (CFS)
+     239.    18.17                    235.        171.         63.          27.
                        (INCHES)       .266        .774        .855         .859
                         (AC-FT)       116.        339.        374.         376.

 PEAK STORAGE  TIME                          MAXIMUM AVERAGE STORAGE
                                      6-HR       24-HR       72-HR     166.58-HR
+  (AC-FT)     (HR)
       35.    18.17                     34.         25.          9.           4.

 PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                      6-HR       24-HR       72-HR     166.58-HR
+  (FEET)      (HR)
  1415.10     18.17                1414.97     1413.51     1410.13      1408.92

                          CUMULATIVE AREA =     8.20 SQ MI

      ***              ***             ***             ***              ***

                           HYDROGRAPH AT STATION    DET222
                         TRANSPOSITION AREA       1.0 SQ MI

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     166.58-HR
+   (CFS)      (HR)
                          (CFS)
+     237.    18.08                    232.        168.         62.          27.
                        (INCHES)       .263        .762        .840         .844
```

		(AC-FT)	115.	333.	367.	369.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
34.	18.08		33.	25.	9.	4.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
1415.02	18.08		1414.89	1413.45	1410.10	1408.91

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DET222
TRANSPOSITION AREA 5.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 226.	18.17		221.	158.	57.	25.
		(INCHES)	.251	.715	.781	.784
		(AC-FT)	110.	313.	342.	343.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
32.	18.17		31.	23.	9.	4.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
1414.72	18.17		1414.59	1413.20	1409.97	1408.85

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DET222
TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 212.	18.25		207.	144.	52.	23.
		(INCHES)	.235	.654	.708	.708
		(AC-FT)	103.	286.	310.	310.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
30.	18.25		29.	22.	8.	3.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
1414.33	18.25		1414.20	1412.90	1409.83	1408.79

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DET222
TRANSPOSITION AREA 20.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 193.	18.33		188.	127.	45.	20.
		(INCHES)	.213	.578	.619	.619
		(AC-FT)	93.	253.	271.	271.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
27.	18.33		26.	20.	7.	3.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
1413.86	18.33		1413.76	1412.53	1409.65	1408.71

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DET222
TRANSPOSITION AREA 30.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 180.	18.92		176.	118.	42.	18.
		(INCHES)	.199	.535	.568	.568
		(AC-FT)	87.	234.	248.	248.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
26.	18.83	25.	18.	6.	3.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
1413.61	18.92	1413.52	1412.31	1409.55	1408.67

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DET222
TRANSPOSITION AREA 40.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 170.	19.92		166.	111.	39.	17.
		(INCHES)	.188	.504	.532	.532
		(AC-FT)	82.	221.	233.	233.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
24.	19.83	24.	17.	6.	3.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
1413.41	19.92	1413.31	1412.16	1409.48	1408.64

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DET222
TRANSPOSITION AREA 50.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 163.	20.08		158.	106.	37.	16.
		(INCHES)	.179	.480	.504	.504
		(AC-FT)	78.	210.	220.	220.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
23.	20.00	23.	17.	6.	3.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
1413.25	20.08	1413.16	1412.02	1409.43	1408.62

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION DET222
TRANSPOSITION AREA 60.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
(CFS)	(HR)					
		(CFS)				
+ 157.	20.08		153.	102.	36.	15.
		(INCHES)	.173	.463	.484	.484
		(AC-FT)	76.	203.	212.	212.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR

+ (AC-FT)	(HR)				
23.	20.08	22.	16.	6.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
1413.14	20.08	1413.06	1411.93	1409.39	1408.60

CUMULATIVE AREA = 8.20 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT DET222

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 216.	18.25		211.	148.	54.	23.
		(INCHES)	.240	.671	.729	.730
		(AC-FT)	105.	294.	319.	319.

CUMULATIVE AREA = 8.20 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

+	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
					6-HOUR	24-HOUR	72-HOUR			
+	HYDROGRAPH AT	E7	820.	12.92	182.	56.	19.	1.12		
+	DIVERSION TO	RETE7	820.	12.92	159.	43.	14.	1.12		
+	HYDROGRAPH AT	DIVE7	234.	13.67	43.	13.	4.	1.12		
+	ROUTED TO	E7STOR	1.	25.67	1.	1.	0.	1.12		
+	ROUTED TO	E7E6	1.	30.00	1.	1.	0.	1.12		
+	HYDROGRAPH AT	E6B	2187.	12.58	400.	132.	44.	1.95		
+	DIVERSION TO	RETE6B	2187.	12.58	326.	91.	30.	1.95		
+	HYDROGRAPH AT	DIVE6B	897.	13.00	131.	41.	14.	1.95		
+	HYDROGRAPH AT	E8	901.	12.75	180.	57.	19.	1.10		
+	DIVERSION TO	RETE8	901.	12.75	149.	41.	14.	1.10		
+	HYDROGRAPH AT	DIVE8	378.	13.25	52.	16.	5.	1.10		
+	ROUTED TO	E8E6	191.	14.00	50.	16.	5.	1.10		
+	3 COMBINED AT	CPE6	897.	13.00	176.	57.	19.	3.05		
+	DIVERSION TO	DRE9	104.	13.00	3.	1.	0.	3.05		
+	HYDROGRAPH AT	DE6S	788.	13.00	169.	55.	18.	3.05		
+	ROUTED TO	E6E15	497.	13.58	165.	55.	18.	3.05		
+	HYDROGRAPH AT	E5B	447.	12.25	57.	19.	6.	.29		
+	DIVERSION TO	RETE5B	447.	12.25	45.	13.	4.	.29		
+	HYDROGRAPH AT	DIVE5B	204.	12.50	21.	7.	2.	.29		
	ROUTED TO									

+		E5E14B	89.	12.92	20.	7.	2.	.29
	HYDROGRAPH AT							
+		E14B	884.	12.25	109.	36.	12.	.53
	DIVERSION TO							
+		RET14B	884.	12.25	88.	24.	8.	.53
	HYDROGRAPH AT							
+		DIV14B	372.	12.50	37.	12.	4.	.53
	2 COMBINED AT							
+		CP14B	371.	12.50	57.	18.	6.	.81
	ROUTED TO							
+		E14E15	210.	12.67	56.	18.	6.	.81
	HYDROGRAPH AT							
+		E15	1096.	12.33	154.	51.	17.	.78
	DIVERSION TO							
+		RETE15	1096.	12.33	122.	34.	11.	.78
	HYDROGRAPH AT							
+		DIVE15	431.	12.67	54.	17.	6.	.78
	3 COMBINED AT							
+		CPE15A	638.	13.58	256.	87.	29.	4.29
	HYDROGRAPH AT							
+		DRE9	104.	13.00	3.	1.	0.	3.05
	ROUTED TO							
+		RTE6E9	26.	13.42	3.	1.	0.	3.05
	HYDROGRAPH AT							
+		E9	968.	12.42	147.	48.	16.	.72
	DIVERSION TO							
+		RETE9	968.	12.42	118.	33.	11.	.72
	HYDROGRAPH AT							
+		DIVE9	372.	12.75	49.	15.	5.	.72
	2 COMBINED AT							
+		CPE9	372.	12.75	52.	16.	5.	1.07
	DIVERSION TO							
+		DRR5	195.	12.75	9.	2.	1.	1.07
	HYDROGRAPH AT							
+		DE9S	176.	12.75	43.	14.	5.	1.07
	ROUTED TO							
+		E9E16	121.	13.25	41.	14.	5.	1.07
	HYDROGRAPH AT							
+		DRR5	195.	12.75	9.	2.	1.	1.07
	HYDROGRAPH AT							
+		R5	546.	12.50	72.	21.	7.	.50
	DIVERSION TO							
+		RETR5	4.	4.67	2.	1.	0.	.50
	HYDROGRAPH AT							
+		DIVR5	546.	12.50	72.	21.	7.	.50
	2 COMBINED AT							
+		CPR5	545.	12.50	81.	23.	8.	1.07
	ROUTED TO							
+		R5R8	472.	12.92	81.	23.	8.	1.07
	HYDROGRAPH AT							
+		R8	741.	12.42	115.	39.	13.	.55
	DIVERSION TO							
+		RETR8	741.	12.42	91.	25.	8.	.55
	HYDROGRAPH AT							
+		DIVR8	366.	12.67	42.	13.	4.	.55
	2 COMBINED AT							
		CPR8	732.	12.67	119.	36.	12.	1.62
	ROUTED TO							
+		R8E16	649.	13.00	119.	36.	12.	1.62
	HYDROGRAPH AT							
+		E16	582.	12.33	79.	26.	9.	.40
	DIVERSION TO							

+		RETE16	582.	12.33	64.	18.	6.	.40
+	HYDROGRAPH AT	DIVE16	213.	12.58	26.	8.	3.	.40
+	3 COMBINED AT	CPE16	721.	13.00	180.	56.	19.	2.52
+	ROUTED TO	E16E15	679.	13.33	177.	56.	19.	2.52
+	2 COMBINED AT	CPE15	1161.	13.50	405.	136.	45.	6.81
+	ROUTED TO	DETPB	180.	17.75	177.	128.	45.	6.81
+	ROUTED TO	E1524B	180.	17.92	177.	128.	45.	6.81
+	HYDROGRAPH AT	E25	1554.	12.42	236.	77.	26.	1.18
+	DIVERSION TO	RETE25	1554.	12.42	205.	57.	19.	1.18
+	HYDROGRAPH AT	DIVE25	349.	12.92	64.	21.	7.	1.18
+	HYDROGRAPH AT	E24B	916.	12.33	126.	41.	14.	.58
+	DIVERSION TO	RET24B	916.	12.33	102.	28.	9.	.58
+	HYDROGRAPH AT	DIV24B	330.	12.67	41.	13.	4.	.58
+	3 COMBINED AT	CPE24B	352.	13.08	229.	153.	54.	8.20
+	ROUTED TO	DET222	216.	18.25	211.	148.	54.	8.20
+	ROUTED TO	E24E28	216.	18.33	211.	148.	54.	8.20
+	HYDROGRAPH AT	E28B	601.	12.42	88.	28.	9.	.42
+	DIVERSION TO	RET28B	601.	12.42	74.	20.	7.	.42
+	HYDROGRAPH AT	DIV28B	169.	12.83	24.	7.	2.	.42
+	HYDROGRAPH AT	E29	967.	12.42	150.	49.	16.	.75
+	DIVERSION TO	RETE29	967.	12.42	124.	34.	11.	.75
+	HYDROGRAPH AT	DIVE29	344.	12.83	47.	15.	5.	.75
+	3 COMBINED AT	CPE28B	359.	12.92	232.	163.	58.	9.74
+	ROUTED TO	E28E31	383.	13.08	232.	163.	58.	9.74
+	HYDROGRAPH AT	E31	964.	12.42	157.	52.	17.	.81
+	DIVERSION TO	RETE31	964.	12.42	125.	35.	12.	.81
+	HYDROGRAPH AT	DIVE31	402.	12.83	54.	17.	6.	.81
+	2 COMBINED AT	CPE31A	534.	13.08	258.	174.	62.	10.55
+	HYDROGRAPH AT	E32	404.	12.25	48.	16.	5.	.25
+	DIVERSION TO	RETE32	404.	12.25	38.	11.	4.	.25
+	HYDROGRAPH AT	DIVE32	136.	12.50	17.	5.	2.	.25
	ROUTED TO							

+	E32E31	68.	12.92	16.	5.	2.	.25
	2 COMBINED AT						
+	CPE31	561.	13.08	270.	178.	64.	10.80
	ROUTED TO						
+	E31E30	343.	13.67	263.	177.	64.	10.80
	HYDROGRAPH AT						
+	E30B	844.	12.83	186.	58.	19.	.88
	DIVERSION TO						
+	RET30B	844.	12.83	151.	41.	14.	.88
	HYDROGRAPH AT						
+	DIV30B	401.	13.33	55.	17.	6.	.88
	2 COMBINED AT						
+	CPE30	517.	13.67	299.	187.	67.	11.68
	ROUTED TO						
+	E30E26	483.	13.75	297.	187.	67.	11.68
	HYDROGRAPH AT						
+	E26B	415.	12.33	56.	18.	6.	.26
	DIVERSION TO						
+	RET26B	415.	12.33	45.	12.	4.	.26
	HYDROGRAPH AT						
+	DIV26B	146.	12.67	17.	5.	2.	.26
	2 COMBINED AT						
+	CPE26	492.	13.75	303.	189.	68.	11.94
	ROUTED TO						
+	E26E33	392.	14.50	294.	188.	68.	11.94
	HYDROGRAPH AT						
+	E33B	1304.	12.33	183.	59.	20.	.85
	DIVERSION TO						
+	RET33B	1304.	12.33	149.	41.	14.	.85
	HYDROGRAPH AT						
+	DIV33B	526.	12.67	57.	18.	6.	.85
	2 COMBINED AT						
+	CPE33B	416.	14.50	313.	197.	72.	12.79

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR STORM = 1 STORM AREA (SQ MI) = .00									
	E1524B MANE	5.00	196.00	1050.00	.85	5.00	196.00	1050.00	.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3081E+03 EXCESS= .0000E+00 OUTFLOW= .3081E+03 BASIN STORAGE= .9008E-02 PERCENT ERROR= .0

FOR STORM = 2 STORM AREA (SQ MI) = 1.00									
	E1524B MANE	5.00	193.74	1055.00	.83	5.00	193.74	1055.00	.83

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3028E+03 EXCESS= .0000E+00 OUTFLOW= .3028E+03 BASIN STORAGE= .9008E-02 PERCENT ERROR= .0

FOR STORM = 3 STORM AREA (SQ MI) = 5.00									
	E1524B MANE	5.00	185.02	1065.00	.78	5.00	185.02	1065.00	.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2821E+03 EXCESS= .0000E+00 OUTFLOW= .2821E+03 BASIN STORAGE= .9008E-02 PERCENT ERROR= .0

FOR STORM = 4 STORM AREA (SQ MI) = 10.00									
	E1524B MANE	5.00	172.87	1085.00	.70	5.00	172.87	1085.00	.70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2555E+03 EXCESS= .0000E+00 OUTFLOW= .2555E+03 BASIN STORAGE= .8899E-03 PERCENT ERROR= .0

FOR STORM = 5 STORM AREA (SQ MI) = 20.00									
	E1524B MANE	5.00	156.89	1110.00	.62	5.00	156.89	1110.00	.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2247E+03 EXCESS= .0000E+00 OUTFLOW= .2247E+03 BASIN STORAGE= .9015E-03 PERCENT ERROR= .0

```
          FOR STORM = 6  STORM AREA (SQ MI) =      30.00
            E1524B  MANE         5.00    147.88   1125.00       .57      5.00    147.88   1125.00         .57

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2071E+03 EXCESS= .0000E+00 OUTFLOW= .2071E+03 BASIN STORAGE= .8193E-03 PERCENT ERROR=    .0

          FOR STORM = 7  STORM AREA (SQ MI) =      40.00
            E1524B  MANE         5.00    139.06   1140.00       .54      5.00    139.06   1140.00         .54

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1947E+03 EXCESS= .0000E+00 OUTFLOW= .1947E+03 BASIN STORAGE= .8743E-03 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =      50.00
            E1524B  MANE         5.00    132.25   1155.00       .51      5.00    132.25   1155.00         .51

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1850E+03 EXCESS= .0000E+00 OUTFLOW= .1850E+03 BASIN STORAGE= .8140E-03 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =      60.00
            E1524B  MANE         5.00    127.59   1170.00       .49      5.00    127.59   1170.00         .49

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1783E+03 EXCESS= .0000E+00 OUTFLOW= .1783E+03 BASIN STORAGE= .8542E-03 PERCENT ERROR=    .0

          FOR STORM = 1  STORM AREA (SQ MI) =        .00
            E24E28  MANE         5.00    238.80   1095.00       .86      5.00    238.80   1095.00         .86

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3755E+03 EXCESS= .0000E+00 OUTFLOW= .3755E+03 BASIN STORAGE= .6702E-02 PERCENT ERROR=    .0

          FOR STORM = 2  STORM AREA (SQ MI) =       1.00
            E24E28  MANE         5.00    236.57   1090.00       .84      5.00    236.57   1090.00         .84

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3689E+03 EXCESS= .0000E+00 OUTFLOW= .3689E+03 BASIN STORAGE= .6702E-02 PERCENT ERROR=    .0

          FOR STORM = 3  STORM AREA (SQ MI) =       5.00
            E24E28  MANE         5.00    225.97   1095.00       .78      5.00    225.97   1095.00         .78

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3430E+03 EXCESS= .0000E+00 OUTFLOW= .3430E+03 BASIN STORAGE= .6702E-02 PERCENT ERROR=    .0

          FOR STORM = 4  STORM AREA (SQ MI) =      10.00
            E24E28  MANE         5.00    211.70   1100.00       .71      5.00    211.70   1100.00         .71

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3098E+03 EXCESS= .0000E+00 OUTFLOW= .3098E+03 BASIN STORAGE= .6336E-03 PERCENT ERROR=    .0

          FOR STORM = 5  STORM AREA (SQ MI) =      20.00
            E24E28  MANE         5.00    193.14   1105.00       .62      5.00    193.14   1105.00         .62

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2706E+03 EXCESS= .0000E+00 OUTFLOW= .2706E+03 BASIN STORAGE= .6071E-03 PERCENT ERROR=    .0

          FOR STORM = 6  STORM AREA (SQ MI) =      30.00
            E24E28  MANE         5.00    180.45   1140.00       .57      5.00    180.45   1140.00         .57

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2483E+03 EXCESS= .0000E+00 OUTFLOW= .2483E+03 BASIN STORAGE= .6105E-03 PERCENT ERROR=    .0

          FOR STORM = 7  STORM AREA (SQ MI) =      40.00
            E24E28  MANE         5.00    170.27   1200.00       .53      5.00    170.27   1200.00         .53

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2326E+03 EXCESS= .0000E+00 OUTFLOW= .2326E+03 BASIN STORAGE= .6282E-03 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =      50.00
            E24E28  MANE         5.00    162.56   1210.00       .50      5.00    162.56   1210.00         .50

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2203E+03 EXCESS= .0000E+00 OUTFLOW= .2203E+03 BASIN STORAGE= .6085E-03 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =      60.00
            E24E28  MANE         5.00    157.21   1210.00       .48      5.00    157.21   1210.00         .48

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2118E+03 EXCESS= .0000E+00 OUTFLOW= .2118E+03 BASIN STORAGE= .6230E-03 PERCENT ERROR=    .0

          FOR STORM = 1  STORM AREA (SQ MI) =        .00
```

E28E31	MANE	5.00	567.60	775.00	.81	5.00	567.60	775.00	.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4206E+03 EXCESS= .0000E+00 OUTFLOW= .4205E+03 BASIN STORAGE= .9117E-02 PERCENT ERROR= .0

FOR STORM = 2 STORM AREA (SQ MI) = 1.00

E28E31	MANE	5.00	515.79	775.00	.80	5.00	515.79	775.00	.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4131E+03 EXCESS= .0000E+00 OUTFLOW= .4130E+03 BASIN STORAGE= .9117E-02 PERCENT ERROR= .0

FOR STORM = 3 STORM AREA (SQ MI) = 5.00

E28E31	MANE	5.00	505.95	780.00	.74	5.00	505.95	780.00	.74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3837E+03 EXCESS= .0000E+00 OUTFLOW= .3836E+03 BASIN STORAGE= .9117E-02 PERCENT ERROR= .0

FOR STORM = 4 STORM AREA (SQ MI) = 10.00

E28E31	MANE	5.00	384.75	785.00	.67	5.00	384.75	785.00	.67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3461E+03 EXCESS= .0000E+00 OUTFLOW= .3461E+03 BASIN STORAGE= .8492E-03 PERCENT ERROR= .0

FOR STORM = 5 STORM AREA (SQ MI) = 20.00

E28E31	MANE	5.00	222.87	795.00	.58	5.00	222.87	795.00	.58

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3015E+03 EXCESS= .0000E+00 OUTFLOW= .3015E+03 BASIN STORAGE= .8639E-03 PERCENT ERROR= .0

FOR STORM = 6 STORM AREA (SQ MI) = 30.00

E28E31	MANE	5.00	203.37	1095.00	.53	5.00	203.37	1095.00	.53

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2761E+03 EXCESS= .0000E+00 OUTFLOW= .2761E+03 BASIN STORAGE= .8687E-03 PERCENT ERROR= .0

FOR STORM = 7 STORM AREA (SQ MI) = 40.00

E28E31	MANE	5.00	191.23	1095.00	.50	5.00	191.23	1095.00	.50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2582E+03 EXCESS= .0000E+00 OUTFLOW= .2582E+03 BASIN STORAGE= .8456E-03 PERCENT ERROR= .0

FOR STORM = 8 STORM AREA (SQ MI) = 50.00

E28E31	MANE	5.00	182.24	1200.00	.47	5.00	182.24	1200.00	.47

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2442E+03 EXCESS= .0000E+00 OUTFLOW= .2442E+03 BASIN STORAGE= .8659E-03 PERCENT ERROR= .0

FOR STORM = 9 STORM AREA (SQ MI) = 60.00

E28E31	MANE	5.00	176.60	1200.00	.45	5.00	176.60	1200.00	.45

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2345E+03 EXCESS= .0000E+00 OUTFLOW= .2345E+03 BASIN STORAGE= .8386E-03 PERCENT ERROR= .0

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION E7STOR
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1567.20	.00	27.	1.	.00	25.75	.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1567.17	.00	27.	1.	.00	25.75	.00

PLAN 3 ..... INITIAL VALUE SPILLWAY CREST TOP OF DAM

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1567.06	.00	24.	0.	.00	26.00	.00

PLAN 4 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.91	.00	21.	0.	.00	.00	.00

PLAN 5 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.72	.00	16.	0.	.00	.00	.00

PLAN 6 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.61	.00	14.	0.	.00	.00	.00

PLAN 7 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.53	.00	12.	0.	.00	.00	.00

PLAN 8 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.47	.00	11.	0.	.00	.00	.00

PLAN 9 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1566.00	1574.00	1574.00
STORAGE	0.	607.	607.
OUTFLOW	0.	104.	104.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1566.43	.00	10.	0.	.00	.00	.00

*** NORMAL END OF HEC-1 ***

Flood Control District of Maricopa County
Drainage Design Management System
RAINFALL DATA
Project Reference: PECOS RD - FUT UPDAT

 1/5/2015

ID	Method	Duration	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
DEFAULT	NOAA14	5 MIN	0.251	0.340	0.408	0.500	0.572	0.645
	NOAA14	10 MIN	0.383	0.518	0.621	0.762	0.871	0.981
	NOAA14	15 MIN	0.474	0.642	0.770	0.944	1.079	1.216
	NOAA14	30 MIN	0.639	0.865	1.037	1.272	1.453	1.638
	NOAA14	1 HOUR	0.791	1.070	1.283	1.574	1.799	2.027
	NOAA14	2 HOUR	0.897	1.193	1.422	1.731	1.971	2.219
	NOAA14	3 HOUR	0.944	1.239	1.472	1.797	2.055	2.324
	NOAA14	6 HOUR	1.126	1.438	1.686	2.025	2.293	2.572
	NOAA14	12 HOUR	1.278	1.611	1.874	2.231	2.505	2.785
	NOAA14	24 HOUR	1.547	1.982	2.330	2.809	3.184	3.579

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments
Major Basin ID: 01									
E24B	645	1	6451	0.047	8.10	0.410	-	100	
	645	22	64522	0.350	60.20	0.040	-	100	
	645	75	64575	0.024	4.10	0.230	-	100	
	645	77	64577	0.058	9.90	0.050	-	100	
	645	112	645112	0.098	16.90	0.390	-	100	
	655	Mv	6554463	0.003	0.50	0.250	-	100	
	655	AnA	655204720	0.001	0.20	0.400	-	100	
E25	645	22	64522	0.001	0.00	0.040	-	100	
	645	75	64575	0.000	0.00	0.230	-	100	
	655	Co	6552449	0.226	19.10	0.040	-	100	
	655	Gf	6553231	0.005	0.40	0.250	-	100	
	655	Gm	6553245	0.369	31.30	0.250	-	100	
	655	Gn	6553247	0.119	10.10	0.040	-	100	
	655	Mv	6554463	0.250	21.20	0.250	-	100	
	655	AnA	655204720	0.210	17.80	0.400	-	100	
E28B	645	22	64522	0.236	56.50	0.040	-	100	
	645	75	64575	0.047	11.30	0.230	-	100	
	645	77	64577	0.075	18.00	0.050	-	100	
	645	78	64578	0.019	4.60	0.050	-	100	
	645	112	645112	0.039	9.40	0.390	-	100	
	655	Co	6552449	0.001	0.20	0.040	-	100	
E29	645	22	64522	0.001	0.10	0.040	-	100	
	645	75	64575	0.001	0.10	0.230	-	100	
	655	Co	6552449	0.167	22.20	0.040	-	100	
	655	Gf	6553231	0.226	30.00	0.250	-	100	
	655	Gm	6553245	0.302	40.10	0.250	-	100	
	655	Gn	6553247	0.018	2.30	0.040	-	100	
	655	Mv	6554463	0.027	3.60	0.250	-	100	
	655	Vf	6556231	0.011	1.50	1.200	-	100	

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: PECOS RD - FUT UPDAT

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kn	Description
Major Basin ID: 01									
E24B	300	0.5365	92.2	0.15	55	60.0	NORMAL	0.030	General Industrial (Industrial where no detail available)
	610	0.0451	7.8	0.10	80	75.0	NORMAL	0.020	Transportation (Includes railroads, railyards, transit cente
		0.5816	**100.0**						
E25	300	1.1795	100.0	0.15	55	60.0	NORMAL	0.030	General Industrial (Industrial where no detail available)
		1.1795	**100.0**						
E28B	190	0.2939	70.3	0.25	45	50.0	NORMAL	0.050	Very High Density Residential - Multi Family (> 15 du per ac
	300	0.1156	27.7	0.15	55	60.0	NORMAL	0.030	General Industrial (Industrial where no detail available)
	610	0.0083	2.0	0.10	80	75.0	NORMAL	0.020	Transportation (Includes railroads, railyards, transit cente
		0.4178	**100.0**						
E29	300	0.7537	100.0	0.15	55	60.0	NORMAL	0.030	General Industrial (Industrial where no detail available)
		0.7537	**100.0**						

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: PECOS RD - FUT UPDAT

Area ID	Sub Basin Parameters								Rainfall Losses				
	Area (sq mi)	Length (mi)	Slope (ft/mi)	S-Graph	Lca (mi)	Lag (min)	Velocity (f/s)	Kn	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)
Major Basin ID: 01													
E24B	0.582	1.40	20.6	Valley	0.70	23.30	5.28	0.029	0.15	0.15	7.58	0.126	57
E25	1.180	1.66	15.8	Valley	0.83	28.90	5.06	0.030	0.15	0.25	5.85	0.250	55
E28B	0.418	1.04	25.1	Valley	0.52	27.10	3.36	0.044	0.22	0.15	8.36	0.095	48
E29	0.754	1.63	12.0	Valley	0.82	30.10	4.77	0.030	0.15	0.25	5.85	0.256	55

* Non default value

Project ***Pecos Road Channel and Basin DCR***
Subject **Revised Retention Volume Calculations**
Designed by **MAW** Date 10/29/2014 Project No. 091131024
Checked by Date District Project No: 2014C001

Objective: Calculate the updated retention volumes for the subbasins that were updated based on the location of the 222nd Street detention basin.

The updated retention volumes are estimated by calculating the retention volume for the portion of the area that is changing and then adding or subtracting that volume from the current retention volumes.

Change in Retention Volume

Subbasin ID	Current Area [sq mi]	Current Retention [ac-ft]	Retention per Area [ac-ft/sq mi]	Change in Area [sq mi]	Change in Retention [ac-ft]
E28B	0.539	51.3	95.2	0.120	11.4
E29	1.002	90.2	90.0	0.248	22.3

Updated Retention Volume Calculation

Subbasin ID	Current Retention [ac-ft]	Change in Retention [ac-ft]	Revised Retention [ac-ft]
E24B	44.4	11.4	55.8
E25	89.8	22.3	112.1
E28B	51.3	-11.4	39.9
E29	90.2	-22.3	67.9

Notes:
The current area and retention values were taken from the HEC-1 model from the East Mesa Area Drainage Master Plan Update (2014)

Kimley»Horn

Project ***Pecos Road DCR***
Subject **Proposed Detention Basin Calculations**
Designed by **MAW** Date 1/5/2015 Project No. 091131024
Checked by **LSM** Date 1/5/2015 District Project No: 2014C001

Objective: to estimate the stage-storage-discharge relationship

Detention Basin - SWC Pecos/Meridian ***Drains in 21.2 hours***

Outlet Diameter	4.50 ft	Outlet X-Sect Area	15.904 ft^2
Outlet Elevation	1428 ft	No. of Outlet Barrels	1
		Outlet Pipe Slope	0.0032 ft/ft

Elevation [ft]	Surface Storage Area [ft^2]	Surface Storage Area [acre]	Average Area [acre]	Δ Elev [ft]	Δ Vol [ac-ft]	Σ Vol [ac-ft]	Δ Time to Drain [hr]	Q_{pipe} [cfs]
1428	-	-				0		0
			0.75	1.0	0.7		1.5	
1429	65,295	1.50				0.7		12
			7.58	1.0	7.6		3.2	
1430	595,321	13.67				8.3		45
			16.90	1.0	16.9		4.0	
1431	877,394	20.14				25.2		58
			20.52	1.0	20.5		3.4	
1432	910,727	20.91				45.8		90
			21.15	1.0	21.1		2.4	
1433	931,720	21.39				66.9		120
			21.70	1.0	21.7		2.0	
1434	958,877	22.01				88.6		148
			22.29	1.0	22.3		1.7	
1435	983,198	22.57				110.9		167
			22.85	1.0	22.9		1.6	
1436	1,007,682	23.13				133.8		184
Freeboard								
			23.42	1.0	23.4		1.5	
1437	1,032,328	23.70				157.2		199

Notes:

Q_{pipe} calculated using Mannings Equation, FHWA nomograph, and Orifice Equation

Outlet diameter is for a 54" orifice plate on a 60" outlet pipe

Kimley»Horn

Project ***Pecos Road DCR***
Subject **Proposed Detention Basin Calculations**
Designed by **MAW** Date 1/5/2015 Project No. 091131024
Checked by **LSM** Date 1/5/2015 District Project No: 2014C001

Objective: to estimate the stage-storage-discharge relationship

Detention Basin - NEC Pecos/222nd Street ***Drains in*** ***7.7 hours***

Outlet Diameter	5.50 ft	Outlet X-Sect Area	23.758 ft^2
Outlet Elevation	1408 ft	No. of Outlet Barrels	1
		Outlet Pipe Slope	0.0045 ft/ft

Elevation [ft]	Surface Storage Area [ft^2]	Surface Storage Area [acre]	Average Area [acre]	Δ Elev [ft]	Δ Vol [ac-ft]	Σ Vol [ac-ft]	Δ Time to Drain [hr]	Q_{pipe} [cfs]
1408	-	-				0		0
			1.99	1.0	2.0		3.0	
1409	173,539	3.98				2.0		16
			4.36	1.0	4.4		1.3	
1410	206,699	4.75				6.4		64
			4.89	1.0	4.9		1.0	
1411	219,731	5.04				11.3		54
			5.20	1.0	5.2		0.8	
1412	233,023	5.35				16.4		97
			5.51	1.0	5.5		0.5	
1413	246,574	5.66				22.0		150
			5.82	1.0	5.8		0.4	
1414	260,385	5.98				27.8		200
			6.14	1.0	6.1		0.3	
1415	274,454	6.30				33.9		236
Freeboard								
			6.45	0.9	5.8		0.3	
1415.9	287,339	6.60				39.7		260

Notes:

Q_{pipe} calculated using Mannings Equation, FHWA nomograph, and Orifice Equation

Worksheet for Meridian Channel - North Segment (upstream)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.0016	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	13.00	ft
Discharge	371.00	ft^3/s

Results

Normal Depth	2.97	ft
Flow Area	56.34	ft^2
Wetted Perimeter	26.30	ft
Hydraulic Radius	2.14	ft
Top Width	24.89	ft
Critical Depth	2.56	ft
Critical Slope	0.00279	ft/ft
Velocity	6.59	ft/s
Velocity Head	0.67	ft
Specific Energy	3.65	ft
Froude Number	0.77	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.97	ft
Critical Depth	2.56	ft
Channel Slope	0.0016	ft/ft

Worksheet for Meridian Channel - North Segment (upstream)

GVF Output Data

Critical Slope	0.00279	ft/ft

Cross Section for Meridian Channel - North Segment (upstream)

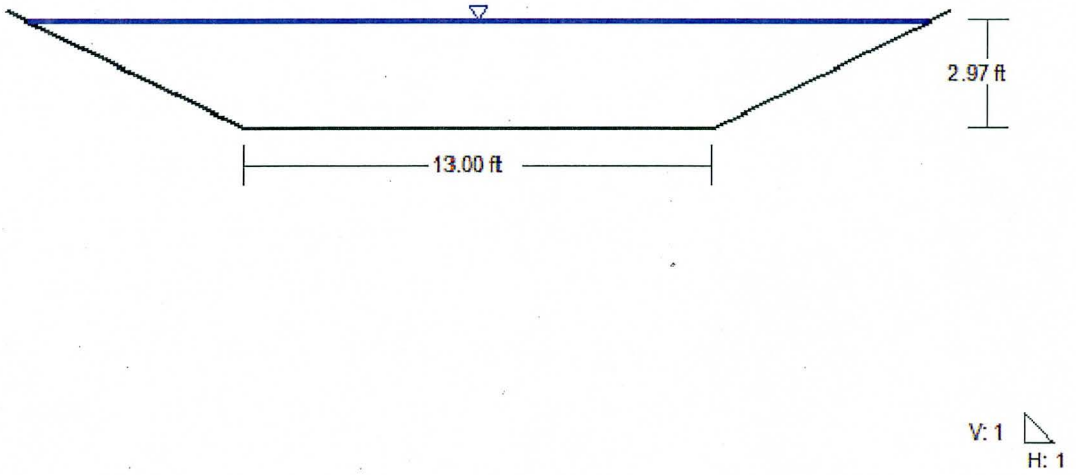
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.0016	ft/ft
Normal Depth	2.97	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	13.00	ft
Discharge	371.00	ft³/s

Cross Section Image



Worksheet for Meridian Channel - North Segment (downstream)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.0018	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	23.00	ft
Discharge	638.00	ft^3/s

Results

Normal Depth	2.96	ft
Flow Area	85.59	ft^2
Wetted Perimeter	36.24	ft
Hydraulic Radius	2.36	ft
Top Width	34.84	ft
Critical Depth	2.66	ft
Critical Slope	0.00263	ft/ft
Velocity	7.45	ft/s
Velocity Head	0.86	ft
Specific Energy	3.82	ft
Froude Number	0.84	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.96	ft
Critical Depth	2.66	ft
Channel Slope	0.0018	ft/ft

Worksheet for Meridian Channel - North Segment (downstream)

GVF Output Data

Critical Slope	0.00263	ft/ft

Cross Section for Meridian Channel - North Segment (downstream)

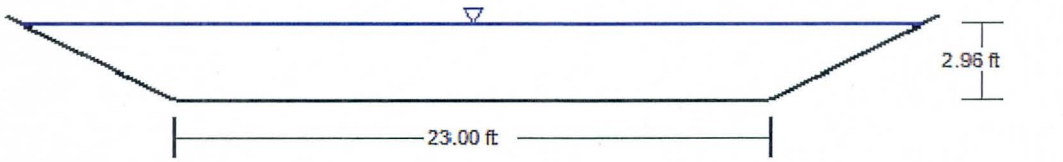
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.0018	ft/ft
Normal Depth	2.96	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	23.00	ft
Discharge	638.00	ft³/s

Cross Section Image



V: 1
H: 1

Worksheet for Meridian Channel - South Segment (max slope)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.0020	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	42.00	ft
Discharge	732.00	ft^3/s

Results

Normal Depth	2.26	ft
Flow Area	104.91	ft^2
Wetted Perimeter	52.09	ft
Hydraulic Radius	2.01	ft
Top Width	51.02	ft
Critical Depth	2.04	ft
Critical Slope	0.00273	ft/ft
Velocity	6.98	ft/s
Velocity Head	0.76	ft
Specific Energy	3.01	ft
Froude Number	0.86	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.26	ft
Critical Depth	2.04	ft
Channel Slope	0.0020	ft/ft

Worksheet for Meridian Channel - South Segment (max slope)

GVF Output Data

Critical Slope	0.00273	ft/ft

Cross Section for Meridian Channel - South Segment (max slope)

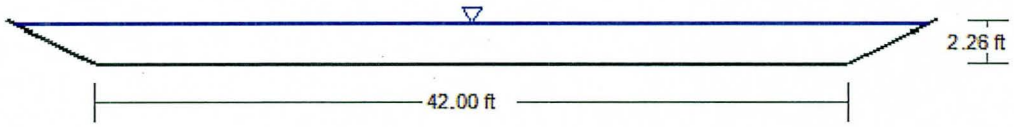
Project Description

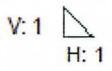
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.0020	ft/ft
Normal Depth	2.26	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	42.00	ft
Discharge	732.00	ft³/s

Cross Section Image





Worksheet for Meridian Channel - South Segment (min slope)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.0015	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	42.00	ft
Discharge	732.00	ft^3/s

Results

Normal Depth	2.44	ft
Flow Area	114.21	ft^2
Wetted Perimeter	52.90	ft
Hydraulic Radius	2.16	ft
Top Width	51.75	ft
Critical Depth	2.04	ft
Critical Slope	0.00273	ft/ft
Velocity	6.41	ft/s
Velocity Head	0.64	ft
Specific Energy	3.07	ft
Froude Number	0.76	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.44	ft
Critical Depth	2.04	ft
Channel Slope	0.0015	ft/ft

Worksheet for Meridian Channel - South Segment (min slope)

GVF Output Data

Critical Slope	0.00273	ft/ft

Cross Section for Meridian Channel - South Segment (min slope)

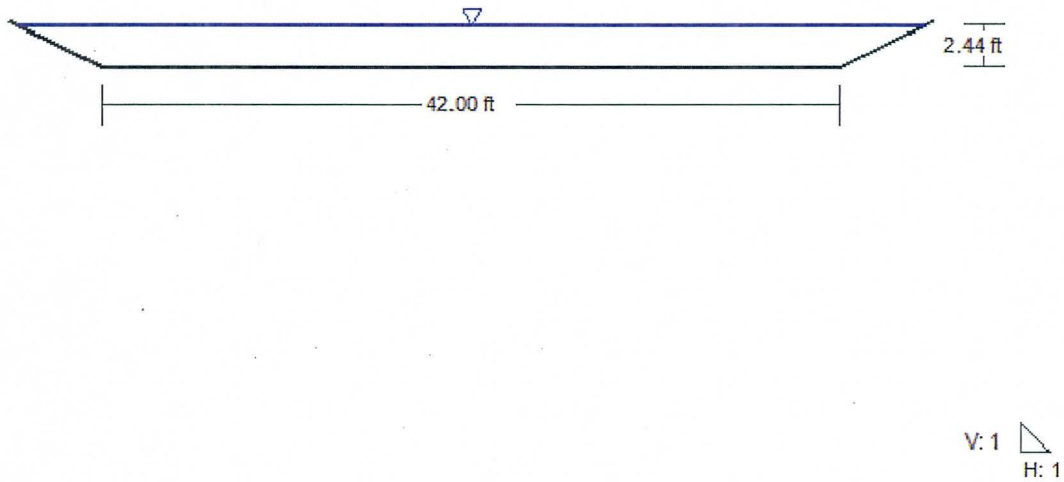
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.0015	ft/ft
Normal Depth	2.44	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	42.00	ft
Discharge	732.00	ft³/s

Cross Section Image



As-Builts for Ellsworth Road Phase I, Volume 2 (COM - A111438) used for geometric data input in HY-8

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	68927	115	130	

REMOVAL /RELOCATE

[1] Sta 477+64.36, 23.00' Rt, Realign 16" Water Line Per COP Std Det P1370

[3] Relocate Existing 10" Sanitary Sewer Force Main.

[5] Relocate Existing Telephone.

[6] Remove Temporary Fencing, 747 Lf

CONSTRUCTION

(1) Sta 477+64.36,
(C6) Construct 3-10'x 5'x 247' CBC Skew 45° Rt, Construct Inlet Headwall, Apron & Handrails per Structure Drawing Series SO1 to S12 & Details

(2) Construct Outlet Headwall, Apron & Handrails per Structure Drawing Series SO1 to S12 & Details, & Bank Armor, per Detail, Sheet CHD1

(3) Construct Trashrack, per Detail, Sheet CHD5

(4) Construct 2400 s.f. of Concrete Maintenance Road with Concrete walls per ADOT Std Det C-19.10

(5) Construct Dumped Riprap Scour Protection, D_{50}=1.00', Thickness=2.00' Per Dimensions And Section E-E This Sheet

(6) 6' Temporary Chain Link fence, MAG Det. 160, 747 LF Sta 73+02.74, 435' Rt to Sta 76+69.25, 345' Rt - Sta 76+69.23, 345' Rt to Sta 76+80.35, 55' Rt

Structural Quantities

Item	Unit	(C6)
Structural Excavation	cu.yd.	1,834
Structural Backfill	cu.yd.	536
Structural Concrete	cu.yd.	849
Reinforcing Steel	lbs.	122,270
Galv. Pipe Handrail	ft.	131

Dumped Riprap D_{50} =1.00' 2.0' Thick

SECTION E-E

High Survivability Filter Fabric

115 of 130

SCALE: Hor=1"=40'
Vert=1"=4'

TWO WORKING DAYS BEFORE YOU DIG, CALL. 602-263-1100 BLUE STAKE

NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ELLSWORTH ROAD
GERMANN RD TO RAY RD
PROJECT NO. 68927

	BY	DATE
DESIGNED	J.CHRISTOPH, R.DAVIES	04/15/05
DRAWN	S.CARLOCK	04/15/05
CHECKED	R.DAVIES	04/15/05

AMEC Infrastructure, Inc.
2001 WEST CAMELBACK ROAD, SUITE 300
PHOENIX, ARIZONA 85015
PHONE (602) 343-2400
FAX (602) 343-2499

CULVERT C6 DETAIL
CHANNEL CULVERT SHEETS

SHEET CHC5 OF CHC6

TRACS NO.

RECORD DRAWING

A-111438

Temporary Fence Ang Pt Sta 76+69.25, 435' Rt

END BERM ELLSWORTH STA 76+50.00 428' RT TOP OF BERM EL=1391'

End Temporary Fence Sta 76+80.35, 55' Rt

BEGIN BERM ELLSWORTH STA 76+60.00 126' RT TOP OF BERM EL=1390'

BERM ℄

New R/W

Existing R/W

ELLSWORTH ROAD

Drainage Easement

Sta 76+50.4± 417.30' Rt±

Sta 74+64.55± 345.53' Rt±

Begin Temporary Fence Sta 73+02.74, 435' Rt

CONSTRUCTED CONCRETE MAINT. RD ADOT Std DET. C-19.10

PECOS ROAD

Existing R/W

New R/W

INV. EL=1380.31'

34' @ 2:1

64'

G.M. MAINT. ROAD

Channel Control Line

Existing Tel
Relocate By Others

Existing R/W

New R/W

A-A

B-B

C-C

D-D

R/W

G.M. ACCESS ROAD

GRADE TO MATCH EXIST.

MATCH BERM EL=1390 ELLSWORTH STA 96+69.00 125' RT

GUTTER ±

2.00%

Ellsworth Rd Cst ℄

Existing Fence

125'

122'

IE 1388'

GM Access Rd

EXISTING GRADE

PROPOSED GRADE

IE 1387

IE 1385.55'

IE 1383.37'

S=0.00324 /ft

Existing Tel

18" SD IE 1379.59'

IE 1379.51' AB

Existing 16" W

Existing 2" G Abandon / 10" G

Existing 10" SSFM

IE 1380.31' AB

D.E.

Channel Control Line Sta 477+64.36
(Ellsworth Rd STA 76+85.90)
See Sheets CH06, CH07, PL15 & SD5
New 3-10' x 5' x 247' CBC
New Headwall Lt & Rt
New Inlet Trashrack Rt
Skew=45° Rt

1390
1386
1382
1378

-200 -160 -120 -80 -40 0 40 80 120 160 200 240 280 320 360 400 440 480

s:\Plans\68927chanele1pp02_Edgn
10:22:10 AM
04/19/2005

HEC-RAS Plan: Final River: River Reach: Ellsworth Profile: Original

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Ellsworth	17100	Original	600.00	1384.17	1390.46	1387.48	1390.58	0.000638	2.78	216.12	61.90	0.26
Ellsworth	17000	Original	600.00	1384.11	1390.40	1387.42	1390.51	0.000639	2.78	215.98	72.77	0.26
Ellsworth	16900	Original	600.00	1384.05	1390.33	1387.36	1390.45	0.000641	2.78	215.72	84.61	0.26
Ellsworth	16800	Original	600.00	1383.99	1390.27	1387.29	1390.39	0.000644	2.79	215.42	98.78	0.26
Ellsworth	16700	Original	600.00	1383.93	1390.20	1387.24	1390.32	0.000646	2.79	215.13	132.13	0.26
Ellsworth	16600	Original	600.00	1383.87	1390.14	1387.17	1390.26	0.000649	2.79	214.80	123.12	0.26
Ellsworth	16500	Original	600.00	1383.81	1390.07	1387.12	1390.19	0.000651	2.80	214.53	185.41	0.26
Ellsworth	16400	Original	600.00	1383.75	1390.01	1387.03	1390.13	0.000653	2.80	214.22	166.40	0.26
Ellsworth	16300	Original	600.00	1383.69	1389.94	1387.00	1390.06	0.000657	2.81	213.83	157.76	0.26
Ellsworth	16200	Original	600.00	1383.63	1389.87	1386.93	1390.00	0.000659	2.81	213.49	150.44	0.26
Ellsworth	16100	Original	600.00	1383.57	1389.81	1386.87	1389.93	0.000663	2.82	213.11	148.88	0.26
Ellsworth	16000	Original	600.00	1383.51	1389.74	1386.82	1389.86	0.000667	2.82	212.59	148.70	0.26
Ellsworth	15966.5	Original	600.00	1383.49	1389.71		1389.84	0.000990	2.83	212.27	59.17	0.26
Ellsworth	15947.5	Original	600.00	1383.48	1389.72	1386.03	1389.81	0.000497	2.44	246.18	64.09	0.19
Ellsworth	15937.5	Original	600.00	1383.47	1389.70	1385.74	1389.81	0.000068	2.66	225.22	65.44	0.19
Ellsworth	15920.67	Original	600.00	1383.46	1389.46	1386.31	1389.79	0.000352	4.58	130.97	21.83	0.33
Ellsworth	15895		Culvert									
Ellsworth	15870.67	Original	600.00	1383.42	1388.57		1389.01	0.000546	5.34	112.46	21.83	0.41
Ellsworth	15855.5	Original	600.00	1383.42	1388.76	1385.70	1388.92	0.000854	3.19	188.06	61.04	0.25
Ellsworth	15845.5	Original	600.00	1383.41	1388.77	1385.98	1388.91	0.000536	2.96	202.72	59.18	0.25
Ellsworth	15826.6	Original	600.00	1383.40	1388.66		1388.88	0.001445	3.77	158.99	51.45	0.38
Ellsworth	15809	Original	600.00	1383.43	1388.63		1388.85	0.001508	3.83	156.47	51.05	0.39
Ellsworth	15800	Original	600.00	1383.39	1388.61		1388.84	0.001491	3.82	157.14	51.16	0.38
Ellsworth	15700	Original	600.00	1383.33	1388.44		1388.68	0.001652	3.97	151.23	50.23	0.40
Ellsworth	15600	Original	600.00	1383.27	1388.23		1388.50	0.001878	4.16	144.12	49.08	0.43
Ellsworth	15550	Original	600.00	1383.24	1388.08		1388.38	0.003447	4.34	138.30	48.12	0.45
Ellsworth	15460	Original	600.00	1383.18	1387.66		1388.18	0.000744	5.77	103.92	27.67	0.53
Ellsworth	15450	Original	600.00	1381.86	1387.71	1384.91	1388.12	0.000376	5.16	116.31	109.54	0.39
Ellsworth	15350		Culvert									
Ellsworth	15192	Original	600.00	1380.41	1386.03	1383.69	1386.26	0.001558	3.89	154.36	54.31	0.33
Ellsworth	15100	Original	600.00	1380.33	1385.90	1383.64	1386.08	0.001825	3.43	175.18	53.91	0.33
Ellsworth	15000	Original	600.00	1380.25	1385.74	1383.55	1385.93	0.001188	3.51	171.12	53.30	0.34
Ellsworth	14900	Original	600.00	1380.17	1385.61	1383.48	1385.81	0.001236	3.56	168.62	52.93	0.35
Ellsworth	14800	Original	600.00	1380.09	1385.48	1383.40	1385.68	0.001293	3.62	165.81	52.51	0.36
Ellsworth	14700	Original	600.00	1380.01	1385.34	1383.32	1385.55	0.001362	3.69	162.60	52.02	0.37
Ellsworth	14600	Original	600.00	1379.93	1385.19	1383.23	1385.41	0.001448	3.78	158.90	51.43	0.38
Ellsworth	14579	Original	600.00	1379.90	1385.16	1383.21	1385.38	0.001450	3.78	158.81	51.41	0.38
Ellsworth	14569	Original	600.00	1379.90	1385.14		1385.36	0.001472	3.80	157.91	51.27	0.38
Ellsworth	14501	Original	600.00	1379.85	1385.03		1385.26	0.001556	3.88	154.64	50.76	0.39
Ellsworth	14491	Original	600.00	1379.84	1385.01	1383.15	1385.24	0.001566	3.89	154.29	50.70	0.39
Ellsworth	14451	Original	600.00	1379.81	1384.94	1383.12	1385.18	0.001622	3.94	152.26	50.38	0.40
Ellsworth	14400	Original	600.00	1379.77	1384.84	1383.06	1385.09	0.001700	4.01	149.62	49.97	0.41
Ellsworth	14300	Original	600.00	1379.69	1384.64	1382.99	1384.91	0.001900	4.18	143.50	48.99	0.43
Ellsworth	14200	Original	600.00	1379.61	1384.40	1382.91	1384.70	0.002202	4.42	135.79	47.71	0.46
Ellsworth	14100	Original	600.00	1379.53	1384.10	1382.85	1384.46	0.002722	4.78	125.41	45.94	0.51
Ellsworth	14000	Original	600.00	1379.45	1384.09	1381.74	1384.22	0.001116	2.84	211.15	64.94	0.28
Ellsworth	13900	Original	600.00	1379.37	1384.01	1381.66	1384.13	0.000713	2.85	210.61	64.88	0.28
Ellsworth	13800	Original	600.00	1379.29	1383.94	1381.57	1384.06	0.000707	2.84	211.20	64.95	0.28
Ellsworth	13700	Original	600.00	1379.21	1383.87	1381.49	1383.99	0.000702	2.83	211.80	78.22	0.28
Ellsworth	13600	Original	600.00	1379.13	1383.80	1381.41	1383.92	0.000695	2.82	212.55	78.27	0.28
Ellsworth	13500	Original	600.00	1379.05	1383.73	1381.34	1					0.27
Ellsworth	13400	Original	600.00	1378.97	1383.66	1381.26	1					0.27
Ellsworth	13300	Original	600.00	1378.89	1383.59	1381.17	1					0.27
Ellsworth	13200	Original	600.00	1378.81	1383.53	1381.08	1					0.27
Ellsworth	13100	Original					1					0.27
Ellsworth	13000	Original					1					0.27
Ellsworth	12900	Original					1					0.27
Ellsworth	12800	Original					1					0.26
Ellsworth	12700	Original					1					0.26
Ellsworth	12600	Original					1					0.26
Ellsworth	12500	Original					1					0.26
Ellsworth	12400	Original					1					0.26
Ellsworth	12300	Original					1					0.25
Ellsworth	12200	Original	600.00	1378.01	1382.91	1380.30	1					0.25
Ellsworth	12100	Original	600.00	1377.93	1382.85	1380.21	1382.96	0.000563	2.61	229.54	67.16	0.25
Ellsworth	12000	Original	600.00	1377.85	1382.80	1380.13	1382.90	0.000552	2.59	231.23	67.37	0.25

Culvert Location and Size	No.	Approx Sta
Pecos North 3-10' x 5' C.B.C	C-6	Roadway: 76+20 Channel: 477+00 RAS: 14100

Clip from Table 7 of the Final Drainage Report (W.O.#68927, May 2005 by AMEC) for Ellsworth Road Phase I - Germann Road to Ray Road drainage study and HEC-RAS model. The Proposed Conditions HEC-RAS model at RS 14100 was used to determine starting tailwater conditions for the HY-8 model.

HY-8 Culvert Analysis Report

Crossing Discharge Data

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

Minimum Flow: 100 cfs

Design Flow: 542 cfs

Maximum Flow: 600 cfs

Table 1 - Summary of Culvert Flows at Crossing: Culvert C6

Headwater Elevation (ft)	Total Discharge (cfs)	C6 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1384.11	100.00	100.00	0.00	1
1384.13	150.00	150.00	0.00	1
1384.16	200.00	200.00	0.00	1
1384.19	250.00	250.00	0.00	1
1384.23	300.00	300.00	0.00	1
1384.27	350.00	350.00	0.00	1
1384.33	400.00	400.00	0.00	1
1384.38	450.00	450.00	0.00	1
1384.45	500.00	500.00	0.00	1
1384.51	542.00	542.00	0.00	1
1384.61	600.00	600.00	0.00	1
1387.50	1485.31	1485.31	0.00	Overtopping

Rating Curve Plot for Crossing: Culvert C6

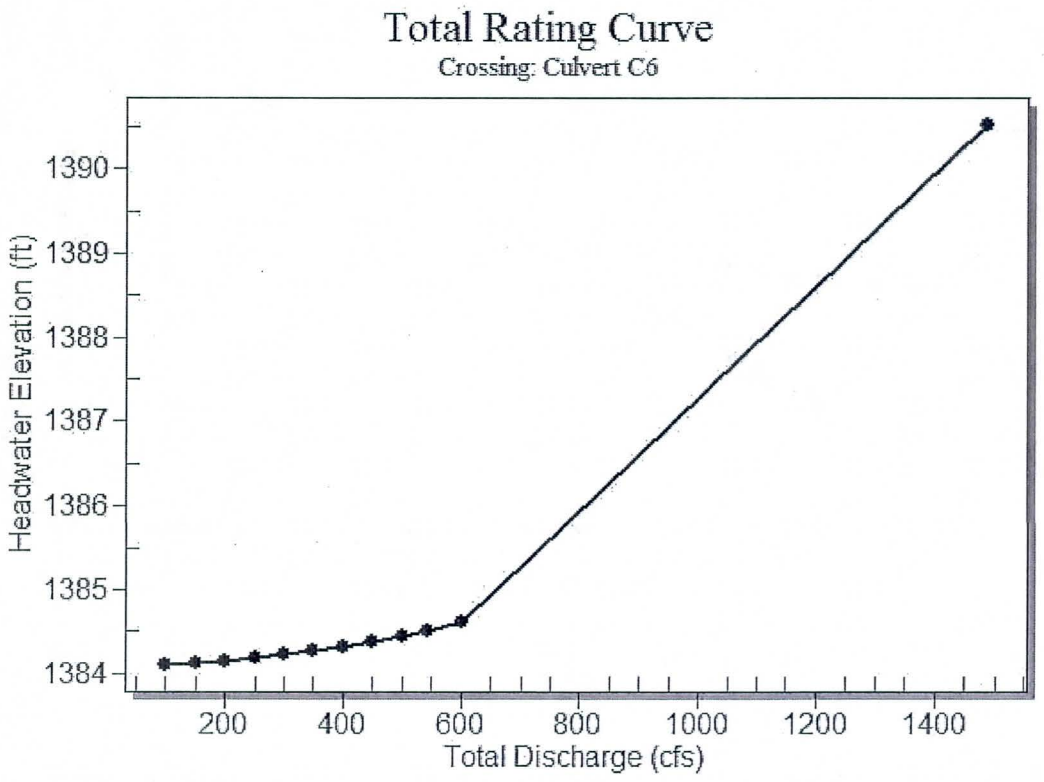


Table 2 - Culvert Summary Table: C6

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)
100.00	100.00	1384.11	1.066	3.804	1-S1t	0.649	0.701	4.590	4.590	0.726	0.000
150.00	150.00	1384.13	1.396	3.822	1-S1t	0.860	0.919	4.590	4.590	1.089	0.000
200.00	200.00	1384.16	1.691	3.846	1-S1t	1.033	1.113	4.590	4.590	1.452	0.000
250.00	250.00	1384.19	1.963	3.878	1-S1t	1.194	1.292	4.590	4.590	1.816	0.000
300.00	300.00	1384.23	2.216	3.917	1-S1t	1.356	1.459	4.590	4.590	2.179	0.000
350.00	350.00	1384.27	2.456	3.962	1-S1t	1.495	1.617	4.590	4.590	2.542	0.000
400.00	400.00	1384.33	2.693	4.015	1-S1t	1.634	1.767	4.590	4.590	2.905	0.000
450.00	450.00	1384.38	2.922	4.075	1-S1t	1.772	1.912	4.590	4.590	3.268	0.000
500.00	500.00	1384.45	3.145	4.142	1-S1t	1.902	2.051	4.590	4.590	3.631	0.000
542.00	542.00	1384.51	3.328	4.204	1-S1t	2.007	2.164	4.590	4.590	3.936	0.000
600.00	600.00	1384.61	3.574	4.297	1-S1t	2.152	2.316	4.590	4.590	4.357	0.000

****

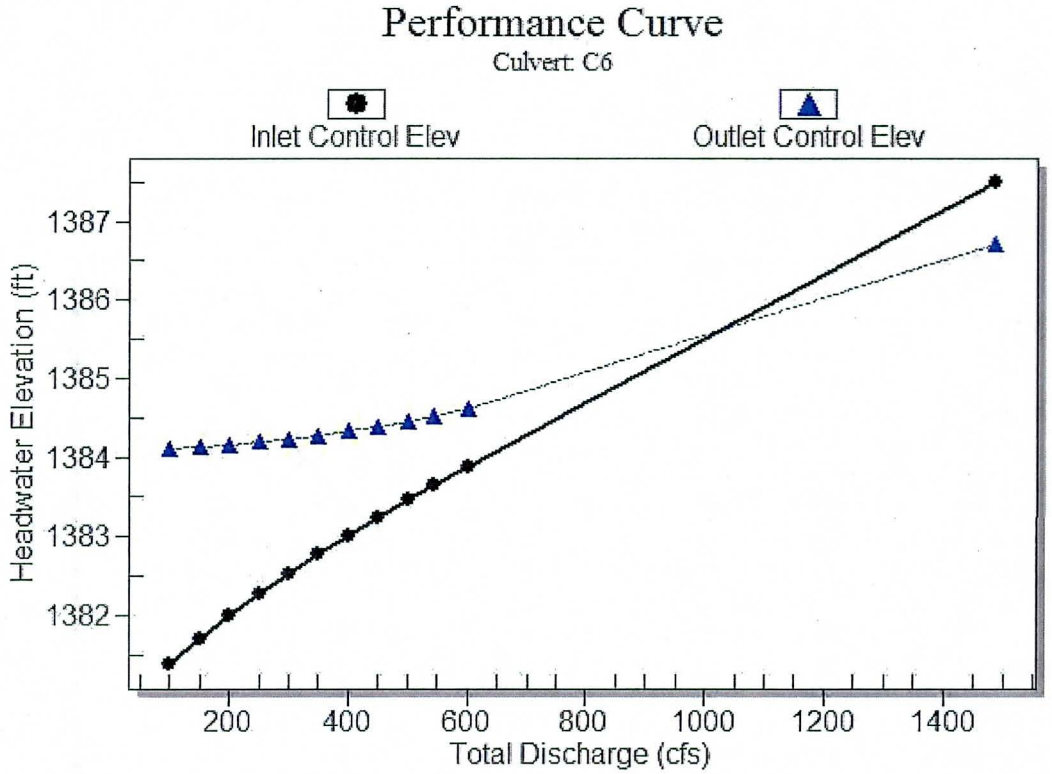
Straight Culvert

Inlet Elevation (invert): 1380.31 ft, Outlet Elevation (invert): 1379.51 ft

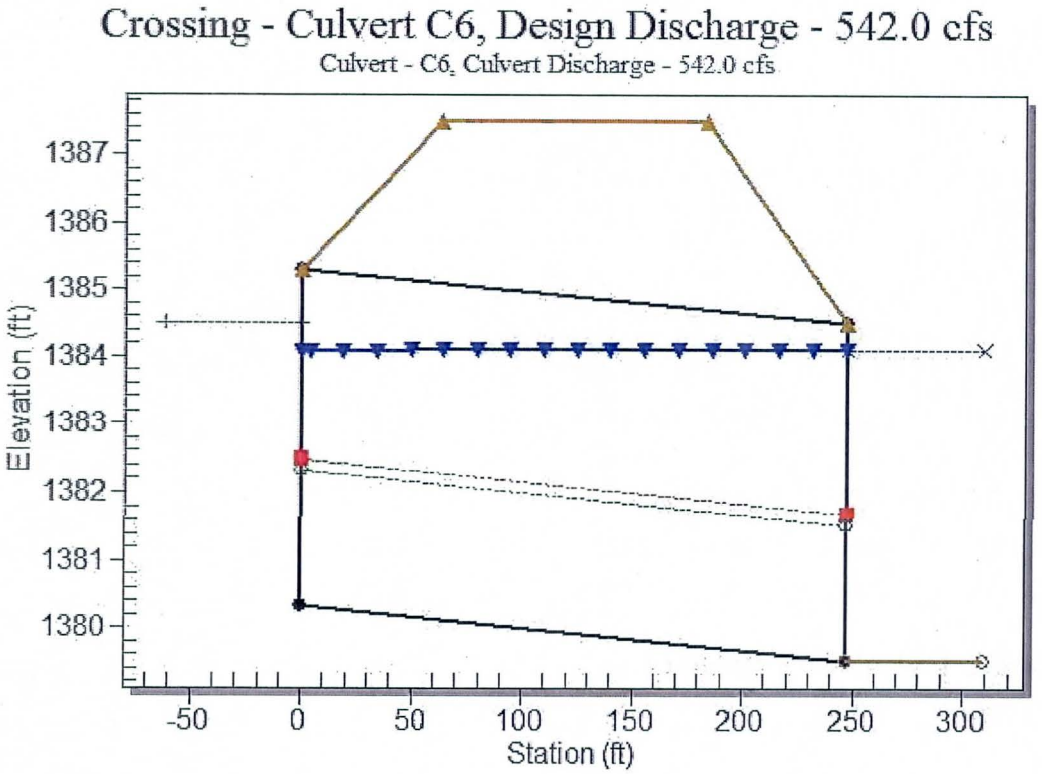
Culvert Length: 247.00 ft, Culvert Slope: 0.0032

****

Culvert Performance Curve Plot: C6



Water Surface Profile Plot for Culvert: C6



Site Data - C6

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1380.31 ft

Outlet Station: 247.00 ft

Outlet Elevation: 1379.51 ft

Number of Barrels: 3

Culvert Data Summary - C6

Barrel Shape: Concrete Box

Barrel Span: 10.00 ft

Barrel Rise: 5.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: 1:1 Bevel (45° flare) Wingwall

Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: Culvert C6)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
100.00	1384.10	4.59
150.00	1384.10	4.59
200.00	1384.10	4.59
250.00	1384.10	4.59
300.00	1384.10	4.59
350.00	1384.10	4.59
400.00	1384.10	4.59
450.00	1384.10	4.59
500.00	1384.10	4.59
542.00	1384.10	4.59
600.00	1384.10	4.59

Tailwater Channel Data - Culvert C6

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 1384.10 ft

Roadway Data for Crossing: Culvert C6

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 40.00 ft

Crest Elevation: 1387.50 ft

Roadway Surface: Paved

Roadway Top Width: 120.00 ft

Pecos Channel - Pecos Outfall at Ellsworth (earthen w/ riprap)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.0019	ft/ft
Discharge	542.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	1386.23
0+15	1381.23
0+55	1381.23
0+70	1386.23

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 1386.23)	(0+15, 1381.23)	0.050
(0+15, 1381.23)	(0+55, 1381.23)	0.022
(0+55, 1381.23)	(0+70, 1386.23)	0.050

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	3.08	ft
Elevation Range	1381.23 to 1386.23 ft	
Flow Area	151.66	ft²
Wetted Perimeter	59.48	ft
Hydraulic Radius	2.55	ft
Top Width	58.48	ft
Normal Depth	3.08	ft

Pecos Channel - Pecos Outfall at Ellsworth (earthen w/ riprap)

Results

Critical Depth		1.71	ft
Critical Slope		0.01467	ft/ft
Velocity		3.57	ft/s
Velocity Head		0.20	ft
Specific Energy		3.28	ft
Froude Number		0.39	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth		0.00	ft
Length		0.00	ft
Number Of Steps		0	

GVF Output Data

Upstream Depth		0.00	ft
Profile Description			
Profile Headloss		0.00	ft
Downstream Velocity		Infinity	ft/s
Upstream Velocity		Infinity	ft/s
Normal Depth		3.08	ft
Critical Depth		1.71	ft
Channel Slope		0.0019	ft/ft
Critical Slope		0.01467	ft/ft

Normal depth in proposed storm drain outfall channel is less than headwater at Ellsworth culvert, so it was not used as the starting tailwater for the storm drain design.

Pecos Channel - Pecos Outfall at Ellsworth (earthen w/ riprap)

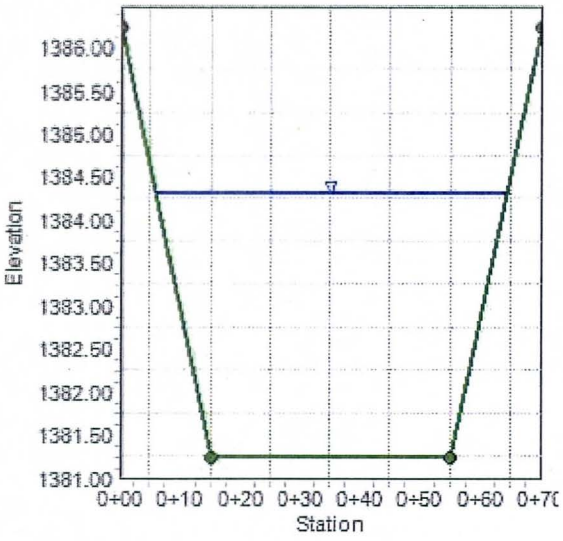
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

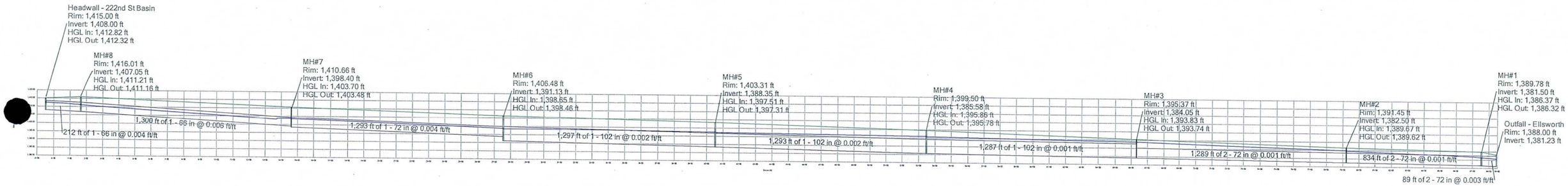
Channel Slope	0.0019	ft/ft
Normal Depth	3.08	ft
Discharge	542.00	ft³/s

Cross Section Image



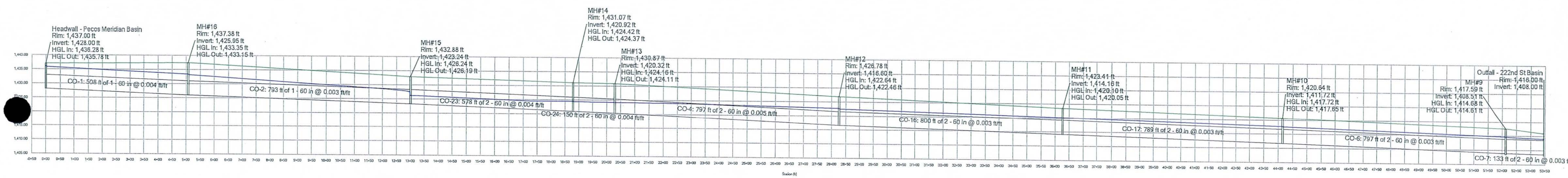
Profile Report

Engineering Profile - 222nd to Outfall Channel (DCR Drainage System.stsw)



Profile Report

Engineering Profile - Meridian to 222nd (DCR Drainage System.stsw)



FlexTable: Conduit Table

Label	Start Node	Stop Node	Diameter (in)	Length (Unified) (ft)	Total Flow (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Invert (U/S) (ft)	Invert (D/S) (ft)	Manning's n	Slope (ft/ft)	Velocity (ft/s)	Froude Number (Normal)
CO-1	Headwall - Pecos Meridian Basin	MH#16	60	508	180.00	1,435.78	1,433.35	1,428.00	1,425.95	0.013	0.004	9.17	0.723
CO-2	MH#16	MH#15	60	793	214.00	1,433.15	1,427.40	1,425.95	1,423.24	0.013	0.003	10.90	0.859
CO-23	MH#15	MH#14	60	578	214.00	1,426.19	1,424.42	1,423.24	1,420.92	0.013	0.004	8.94	0.430
CO-4	MH#13	MH#12	60	797	249.00	1,424.11	1,422.64	1,420.32	1,416.60	0.013	0.005	9.80	0.500
CO-16	MH#12	MH#11	60	800	283.00	1,422.46	1,420.10	1,416.60	1,414.16	0.013	0.003	7.21	0.568
CO-6	MH#10	MH#9	60	797	318.00	1,417.65	1,414.68	1,411.72	1,408.93	0.013	0.003	8.10	0.638
CO-7	MH#9	Outfall - 222nd St Basin	60	133	352.00	1,414.61	1,414.00	1,408.93	1,408.60	0.013	0.003	8.96	0.707
CO-8	Headwall - 222nd St Basin	MH#8	66	212	216.00	1,412.32	1,411.21	1,408.00	1,407.05	0.013	0.004	10.77	0.901
CO-25	MH#8	MH#7	66	1,300	216.00	1,411.16	1,403.70	1,407.05	1,398.90	0.013	0.006	12.47	1.194
CO-26	MH#7	MH#6	72	1,293	264.00	1,403.48	1,398.65	1,398.40	1,393.63	0.013	0.004	10.35	0.752
CO-11	MH#6	MH#5	102	1,297	311.00	1,398.46	1,397.51	1,391.13	1,388.35	0.013	0.002	9.23	0.813
CO-12	MH#5	MH#4	102	1,293	359.00	1,397.31	1,395.86	1,388.35	1,385.58	0.013	0.002	6.33	0.784
CO-13	MH#4	MH#3	102	1,287	417.00	1,395.78	1,393.83	1,385.58	1,384.05	0.013	0.001	7.35	0.444
CO-14	MH#3	MH#2	72	1,289	476.00	1,393.74	1,389.67	1,384.05	1,382.50	0.013	0.001	8.42	0.606
CO-15	MH#2	MH#1	72	834	505.00	1,389.62	1,386.37	1,382.50	1,381.50	0.013	0.001	8.93	0.643
CO-17	MH#11	MH#10	60	789	283.00	1,420.05	1,417.72	1,414.16	1,411.72	0.013	0.003	7.21	0.568
CO-20	MH#1	Outfall - Ellsworth	72	89	505.00	1,386.32	1,385.58	1,381.50	1,381.23	0.013	0.003	8.93	0.643
CO-24	MH#14	MH#13	60	150	249.00	1,424.37	1,424.16	1,420.92	1,420.32	0.013	0.004	9.22	0.500

FlexTable: Manhole Table

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Is Flooded?	Absolute Headloss (ft)
Headwall - 222nd St Basin	1,415.00	1,408.00	1,412.82	1,412.32	False	0.50
Headwall - Pecos Meridian Basin	1,437.00	1,428.00	1,436.28	1,435.78	False	0.50
MH#1	1,389.78	1,381.50	1,386.37	1,386.32	False	0.05
MH#2	1,391.45	1,382.50	1,389.67	1,389.62	False	0.05
MH#3	1,395.37	1,384.05	1,393.83	1,393.74	False	0.09
MH#4	1,399.50	1,385.58	1,395.86	1,395.78	False	0.08
MH#5	1,403.31	1,388.35	1,397.51	1,397.31	False	0.20
MH#6	1,406.48	1,391.13	1,398.65	1,398.46	False	0.19
MH#7	1,410.66	1,398.40	1,403.70	1,403.48	False	0.22
MH#8	1,416.01	1,407.05	1,411.21	1,411.16	False	0.05
MH#9	1,417.59	1,408.51	1,414.68	1,414.61	False	0.07
MH#10	1,420.64	1,411.72	1,417.72	1,417.65	False	0.07
MH#11	1,423.41	1,414.16	1,420.10	1,420.05	False	0.05
MH#12	1,426.78	1,416.60	1,422.64	1,422.46	False	0.18
MH#13	1,430.87	1,420.32	1,424.16	1,424.11	False	0.05
MH#14	1,431.07	1,420.92	1,424.42	1,424.37	False	0.05
MH#15	1,432.88	1,423.24	1,426.24	1,426.19	False	0.05
MH#16	1,437.38	1,425.95	1,433.35	1,433.15	False	0.20

Kimley»Horn

Project ***Pecos Road Basin and Channel DCR***
Subject ***Storm drain flows***

Designed by **MAW**	Date	11/3/2014	KH Project No.	091131024
Checked by **LSM**	Date	12/30/2014	District Ref. No.	FCD2014C001-1

Objective: To prorate the flows for storm drain sizing using contributing drainage area

Calculate Prorated Flow

Location of HEC-1 Flow Change	HEC-1 ID	Storm Drain Flow[a] [cfs]	Overland Flow[b] [cfs]	Number of Quarter Mile Segments	Incremental Overland Flow[c] [cfs]
Discharge from Pecos/Meridian Basin	DETPB	180	--	--	--
222nd Street	CPE24B	352	172	5	34
Discharge from Pecos/222nd Sreet Basin	DET222	216	--	--	--
Crismon Road	CPE28B	359	143	3	48
Ellsworth Road	CPE31A	534	175	3	58

Notes:
[a] Flow from HEC-1 ID that indicates the total flow in the storm drain at the HEC-1 flow change location.
[b] Calculated by subtracting the current storm drain flow from the upstream storm drain flow.
[c] Calculated by prorating the overland flow for each quarter mile segment of the HEC-1 flow change location.

Calculate Flow for Each Quarter Mile

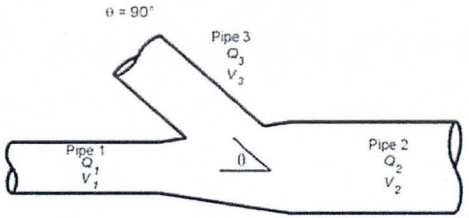
Location of Storm Drain Flow Change	Upstream Storm Drain Flow [cfs]	Incremental Overland Flow [cfs]	Total Storm Drain flow [cfs]
Discharge from Pecos/Meridian Basin	180	--	180
1/4 mile west of Meridian Road	180	34	214
Mountain Road	214	34	249
1/4 mile west of Mountain Road	249	34	283
Signal Butte Road	283	34	318
222nd Street	318	34	352
Discharge from Pecos/222nd Street Basin	216	--	216
1/4 mile west of 222nd Street	216	48	264
1/4 east of Crismon Road	264	48	311
Crismon Road	311	48	359
1/4 mile west of Crismon Road	359	58	417
1/2 mile west of Crismon Road	417	58	476
1/4 east of Ellsworth Road	476	29	505
Ellsworth Road	505	29	534

Kinley»Horn

Project ***Pecos Road Basin and Channel DCR***
Subject ***Junction Structure Losses***
Designed by **NAS** Date 1/5/2015 Job No. 091131024
Checked by **LSM** Date 1/6/2015 Client Ref. No. FCD2014C001-1

Objective: To determine the losses for junction structures throughout the Pecos Road pipe network per the Flood Control District guidelines

$$\frac{2(Q_2V_2 - Q_1V_1 - Q_3V_3Cos\theta)}{(A_1 + A_2)g} + V_1^2/2g - V_2^2/2g = h_j \qquad (4.10b)$$



Junction ID	Pipe 1				Pipe 2				Pipe 3		h_j**
	Size	# Barrels	Flow	Velocity	Size	# Barrels	Flow	Velocity	Flow	Velocity*	
[-]	[in]	[-]	[cfs]	[ft/s]	[in]	[-]	[cfs]	[ft/s]	[cfs]	[ft/s]	[ft]
MH#1	72	2	513	9.07	72	2	513	9.07	-	9.07	0.05
MH#2	72	2	483	8.54	72	2	513	9.07	30.00	8.54	0.05
MH#3	72	2	425	7.52	72	2	483	8.54	58.00	7.52	0.09
MH#4	72	2	366	8.32	72	2	425	7.52	59.00	8.32	0.09
MH#5	60	2	315	9.03	72	2	366	8.32	51.00	9.03	0.11
MH#6	60	2	264	7.87	60	2	315	9.03	51.00	7.87	0.08
MH#7	60	2	264	6.72	60	2	264	7.87	-	6.72	0.05
MH#8	54	2	213	8.85	60	2	264	6.72	51.00	8.85	0.14
MH#9	54	2	213	6.70	54	2	213	8.85	-	6.70	0.05
MH#10	48	2	213	8.48	54	2	213	6.70	-	8.48	0.05
MH#11	60	2	320	8.15	60	2	355	8.48	35.00	8.15	0.07
MH#12	60	2	285	7.26	60	2	320	8.15	35.00	7.26	0.07
MH#13	60	2	285	7.26	60	2	285	7.26	-	7.26	0.05
MH#14	60	2	249	9.80	60	2	285	7.26	36.00	9.80	0.18
MH#15	60	2	214	8.93	60	2	249	9.80	35.00	8.93	(0.01)
MH#16	60	2	214	8.94	60	2	214	8.93	-	8.94	0.05
MH#17	60	1	214	10.90	60	2	214	8.94	-	10.90	0.05
MH#18	60	1	179	9.12	60	1	214	10.90	35.00	9.12	0.20

* Pipe 3 velocity was assumed to be the same as Pipe 1
** Equation for h_j assumed θ = 45 degrees, g = 32.2 ft/s/s

Kimley»Horn

Project: *Pecos Road DCR*
Subject: **Opinion of Probable Cost for Recommended Alternative**
Designed by: **NAS** Date: 1/5/2014 KHA Project No: 091131024
Checked by: **ZRS** Date: 1/8/2014 District Project No: 2014C001-1

Recommended Alternative

MAG Item Number	Description	Qty	Unit	Unit Price	Cost
Phase 1 Construction Items					
215.01100	Channel Excavation - Meridian North Channel	43,231	CY	$ 6	$ 259,400
215.01510	Earthwork for Retention Basins - Pecos/Meridian	370,874	CY	$ 6	$ 2,225,300
525.03217	Reinforced Concrete Channel, 6" Thick	4,041	CY	$ 300	$ 1,212,300
	Energy Dissipation Structure	1	EACH	$ 20,000	$ 20,000
				Construction Subtotal	**$ 3,717,000**
Phase 1 Potential Utility Relocation					
	Gas Line Relocation	1	EACH	$ 30,000	$ 30,000
				Potential Utility Relocation Subtotal	**$ 30,000**
	Right of Way Cost	43	AC	$ 125,000	$ 5,375,000
	Design Cost (10% of Construction Cost)				$ 371,700
	Construction Admin and Contingency (20% of Construction Cost)				$ 743,400
				Phase 1 Total	**$ 10,237,000**
Phase 2					
215.01100	Channel Excavation - Outfall Channel at Ellsworth	3,086	CY	$ 6	$ 18,600
215.01510	Earthwork for Retention Basins - Pecos/222nd	77,352	CY	$ 6	$ 464,200
220.10300	Riprap, D50=12"	1,826	CY	$ 85	$ 155,300
505.10150	Catch Basin, MAG Det. 535, Type F	15	EACH	$ 4,500	$ 67,500
523.10166	Headwall, MAG Det. 501, Straight Type, 66" Pipe	1	EACH	$ 3,800	$ 3,800
523.10272	Headwall, MAG Det. 501, Straight Type, 2-72" Pipe	1	EACH	$ 4,200	$ 4,200
618.20424	24" RGRCP, Class IV - Area Drain Laterals	600	LF	$ 120	$ 72,000
618.20466	66" RGRCP, Class IV	1,512	LF	$ 190	$ 287,300
618.20472	72" RGRCP, Class IV	5,717	LF	$ 200	$ 1,143,400
618.20502	102" RGRCP, Class IV	3,877	LF	$ 300	$ 1,163,100
625.01260	Storm Drain Manhole, MAG Det. 521 & 522	7	EACH	$ 5,000	$ 35,000
	Junction Structure	2	EACH	$ 15,000	$ 30,000
				Construction Subtotal	**$ 3,444,400**
Phase 2 Potential Utility Relocation					
	Water Line Relocation - 8"	1	EACH	$ 20,000	$ 20,000
	Water Line Relocation - 12"	1	EACH	$ 25,000	$ 25,000
				Potential Utility Relocation Subtotal	**$ 45,000**
	Right of Way Cost	10	AC	$ 125,000	$ 1,250,000
	Design Cost (10% of Construction Cost)				$ 344,440
	Construction Admin and Contingency (20% of Construction Cost)				$ 688,880
				Phase 2 Total	**$ 5,773,000**

Kimley»Horn

Project: ***Pecos Road DCR***
Subject: **Opinion of Probable Cost for Recommended Alternative**
Designed by: **NAS** Date: 1/5/2014 KHA Project No: 091131024
Checked by: **ZRS** Date: 1/8/2014 District Project No: 2014C001-1

Phase 3					
505.10150	Catch Basin, MAG Det. 535, Type F	15	EACH	$ 4,500	$ 67,500
523.10160	Headwall, MAG Det. 501, Straight Type, 60" Pipe	1	EACH	$ 3,500	$ 3,500
523.10260	Headwall, MAG Det. 501, Straight Type, 2-60" Pipe	1	EACH	$ 4,000	$ 4,000
618.20424	24" RGRCP, Class IV - Area Drain Laterals	600	LF	$ 120	$ 72,000
618.20460	60" RGRCP, Class IV	9,389	LF	$ 180	$ 1,690,100
625.01260	Storm Drain Manhole, MAG Det. 521 & 522	5	EACH	$ 5,000	$ 25,000
	Junction Structure	5	EACH	$ 15,000	$ 75,000
				Construction Subtotal	**$ 1,937,100**
Phase 3 Potential Utility Relocation					
	Gas Line Relocation	2	EACH	$ 30,000	$ 60,000
	Water Line Relocation - 4"/6"	2	EACH	$ 15,000	$ 30,000
	Water Line Relocation - 12"	4	EACH	$ 25,000	$ 100,000
	Water Line Relocation - 16"	1	EACH	$ 30,000	$ 30,000
				Potential Utility Relocation Subtotal	**$ 220,000**
	Right of Way Cost	0	AC	$ 125,000	$ -
	Design Cost (10% of Construction Cost)				$ 193,710
	Construction Admin and Contingency (20% of Construction Cost)				$ 387,420
				Phase 3 Total	**$ 2,738,000**
Phase 4					
215.01100	Channel Excavation - Meridian South Channel	85,816	CY	$ 6	$ 514,900
525.03217	Reinforced Concrete Channel, 6" Thick	8,312	CY	$ 300	$ 2,493,600
	Energy Dissipation Structure	1	EACH	$ 20,000	$ 20,000
				Construction Subtotal	**$ 3,028,500**
Phase 4 Potential Utility Relocation					
	Electric Line Relocation	1	EACH	$ 5,000	$ 5,000
				Potential Utility Relocation Subtotal	**$ 5,000**
	Right of Way Cost	13	AC	$ 125,000	$ 1,625,000
	Design Cost (10% of Construction Cost)				$ 302,850
	Construction Admin and Contingency (20% of Construction Cost)				$ 605,700
				Phase 4 Total	**$ 5,567,000**
				Construction Subtotal	**$ 12,127,000**
				Potential Utility Relocation Subtotal	**$ 300,000**
				Right of Way Subtotal	**$ 8,250,000**
				Design Cost Subtotal	**$ 1,213,000**
				Construction Admin and Contingency Subtotal	**$ 2,425,000**
				Project Total	**$ 24,315,000**

Notes: Construction costs were determined from ADOT Estimated Engineering Construction Cost E2C2.
Utility relocation estimates based on typical relocation costs.
Riprap quantities were determined from standard cross sections in AutoCAD
Lateral pipe quantities and catch basin quantities were determined based on future developments along Pecos Road with an allowance of 40 ft of pipe per catch basin

Kimley»Horn

Appendix G. Public Meetings

- Public Meeting 1
  Notes, Sign-in Sheets, Comments
- Public Meeting 2
  Invitation, Sign-in Sheets

Kimley»Horn

NOTES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
PECOS ROAD CHANNEL AND BASIN DESIGN CONCEPT REPORT

September 18, 2014

Stakeholder Meeting #1
12:00 – 1:30 PM

CMC Steel
11444 E. Germann Rd., Mesa

The meeting notes for the aforementioned project are attached for your information and use. If you believe that these notes do not accurately reflect your understanding of the conversations that took place or if major discussions are missing, please contact Laurie Marin at (602) 906-1369 within one week of these meeting notes being issued. Thanks to all who participated in the meeting.

Attendees:
See attached Sign-in Sheets

Handouts:
The following item(s) were provided to attendees or displayed as exhibits. These items are included as attachments to the meeting notes.

- Exhibits of Alternatives 1, 2, and 3
- Meeting Action Item Sheets

Presenters:
Mike Duncan, Flood Control District of Maricopa County
Laurie Marin, Kimley-Horn
Melanie Wadsworth, Kimley-Horn
Lance Webb, City of Mesa (for Q & A)
Stephen Ganstrom, City of Mesa (for Q & A)

Notes:
Mike began the meeting with a summary of the project, the purpose and location. Laurie discussed the general hydrology of the project area, and Melanie presented the components of each alternative. The meeting was then opened up for questions and input from the attendees.

Kimley»Horn

Q1 Is it possible to get copies of the maps?
A1 The District will distribute the maps.

Q2 What if we don't want a channel on our property?
A2 Mike handed out comment forms at this point and asked attendees to write down any comments they had and we would take them into consideration.

Q3 Pecos Road is a didn't used to be there before, why is flow there now?
A3 There was a discussion from residents about past conditions in the area. The statement was made that now there is a problem down Williams Field Road and down 222nd that didn't used to be there.

Q4 How long has study been underway?
A4 The study has been underway since June and should be finished in December.

Q5 Who decides on alternatives?
A5 The Flood Control District and the City of Mesa, with input from the consultant team and the local property owners and operators.

Q6 Who is paying for this project?
A6 FCDMC

Q7 Isn't there a rule or law that the upstream properties have to take care of their water so it doesn't affect downstream properties?
A7 No there is no such rule.

Q8 How big was the storm event last Monday
A8 Lance: it was a 5-10 year event on Monday

The preference is #3 from meeting attendees

Stephen explained future development – the storm drain is an advantage for retention bleed off

Q9 What is going to be developed in the Mesa proving grounds?
A9 Mesa said haven't seen a lot, subdivisions with retail

Fuji representative indicated they are not in favor of Alternative 1, they bought the NW corner of Pecos and Mountain.

The chemical company representative indicated they are opposed to anything on the north side

Kimley»Horn

Q10 Are you leaning towards the storm drain option?
A10 Lance: Mesa pushed for the storm drain from an economic development standpoint, they wanted to know if it could be done, and what would it mean for corridor.

Q11 How will the water get into the storm drain?
A11 Many (30, 40) inlets have been estimated at this point to get the water into the storm drain.

Q12 Who is taking the lead on the project?
A12 FCDMC with Mesa

Lance and Stephen explained that Mesa has this project #1 or #2 on their priority list. There is a new focus on this area due to future development. Stormwater projects have historically been unpopular in Mesa so the City rolls stormwater projects into roadway projects.

Q13 When are projects submitted for review for funding?
A13 Answer not recorded.

Q14 Is there a timeframe if everything went perfectly?
A14 Maybe 4 years, if the City does a bond maybe 2-3 years, because if the City does a bond the funding percentage would change between the District and the City.

Lance and Stephen stated that the Economic Development group has been interested in this project. It is on their radar and they know they need to get drainage under control to help push development of the area forward.

Q15 How do "they" decide which projects get selected. What is it based on?
A15 Looking at City/District funding
Prioritization list from Mesa
There are currently several projects in NE Mesa, the McDowell and Ellsworth basin, this project

Comment from attendee: Every company is wanting to grow and create jobs

Q16 How is SR-24 is a factor in the design?
A16 If we put it in before SR-24 get 40-year protection, once SR-24 is complete it will be 100-year protection. It doesn't make sense to build it bigger now because it will go to waste when SR-24 is in.

Kimley»Horn

Q17 Has Pinal County funded their piece?
A17 No answer given.

Q18 Is there any interim stuff to make it any better now?
A18 The improvements will likely be built in phases – it makes best sense to do the upstream basin but then a dedicated path for outflows is needed.

Q19 I have heard talks about building up Pecos and putting viaducts in?
A19 No answer given.

Discussion about the storm on Monday

Pecos was a river

It's been worse

The tire recycling place was 6 inches from having water in the facility

Q20 Are all developments in the area a zero discharge requirement? Like TRW Fuji?, etc.
A20 Answer not recorded.

The meeting was adjourned and attendees gave a strong unanimous indication that Alternative 3 was preferred by them. Comments were collected and are included as an attachment to these notes.

Meeting Attendees

Date: 09/18/2014 Time: 12:00 pm Number Present: 25

Meeting Title: PECOS ROAD CHANNEL AND BASIN D.C.R. - PRESENTATION OF ALTERNATIVES

Meeting Attendees :

Name	Organization	Contact Phone/Email:
1. MIKE DUNCAN	F.C.D.MC.	602-506-4732
2. Travis Watkins	MATHESON GAS	480-492-1912
3. Jerry Wright	Matheson Gas	602-317-4510
4. Mike Taylor	CMC	480-396-7261
5. DAWN HELMS	CMC	480 987 3006
6. Charles Mineer	CMC	480-399-3653
7. Don Mock	Mesa Wash Ranch	480-988-2521
8. Alan Nelson	CMC	480-280-5826
9. Abel Hernandez	CMC	214-876-9985
10. Georgenna Lagler	Fuji	480-703-0532 (cell)
11. Rudy Komoda	TRW	480 722 6215
12. Monte Lee	CMC	480-286-6045
13. John Alston	Signa Butte Gateway	480-833-4418
14. PAT JOHN	CMC	480-396-7120
15. Rod Eidas	Wilson Engr	480-212-3238
16.		

NE Cor. Galveston/Mountain St. 2½ acre

Meeting Attendees

Date: 09/18/2014 Time: 12:00 pm Number Present:

Meeting Title: PECOS ROAD CHANNEL AND BASIN D.C.R. - PRESENTATION OF ALTERNATIVES

Meeting Attendees :

Name	Organization	Contact Phone/Email:
1. MIKE MAGRUDER	TIZW	480 722 4174 MICHAEL.MAGRUDER@TRW.COM
2. KEN SMITH	SIGNAL BUTTE GOLF CLUB	KEN@SMITHALSTON LAW.COM 480 833 4488
3. Steve TUCKER	TUCKER Prop.	480-620 8683
4. Patricia Tretick	Naegel: GUEST RANCH	602-369-9222
5. Blythe Tretick	Estate LLC	btretick@gmail.com
6. Stephen GRANSTROM	COM	stephenG2@MESAAZ.GOV
7. Lance Webb	COM	lance.webb@mesaaz.gov
8. Melanie Wadsworth	Kimley-Horn	melanie.wadsworth@kimley-horn.com
9. Laurie Marin	"	laurie.marin@kimley-horn.com
10.		
11.		
12.		
13.		
14.		
15.		
16.		

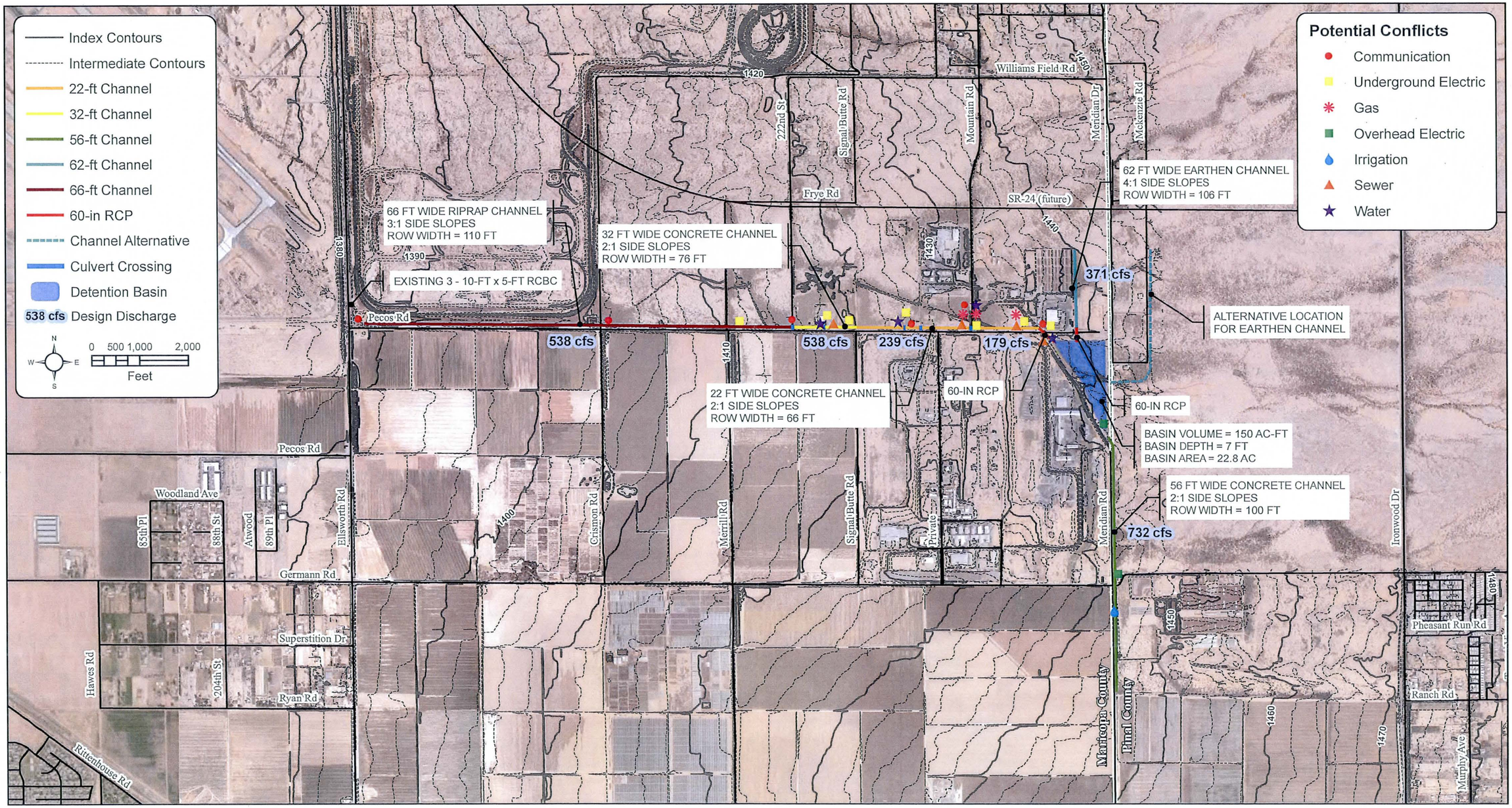
Meeting Attendees

3 OF 3

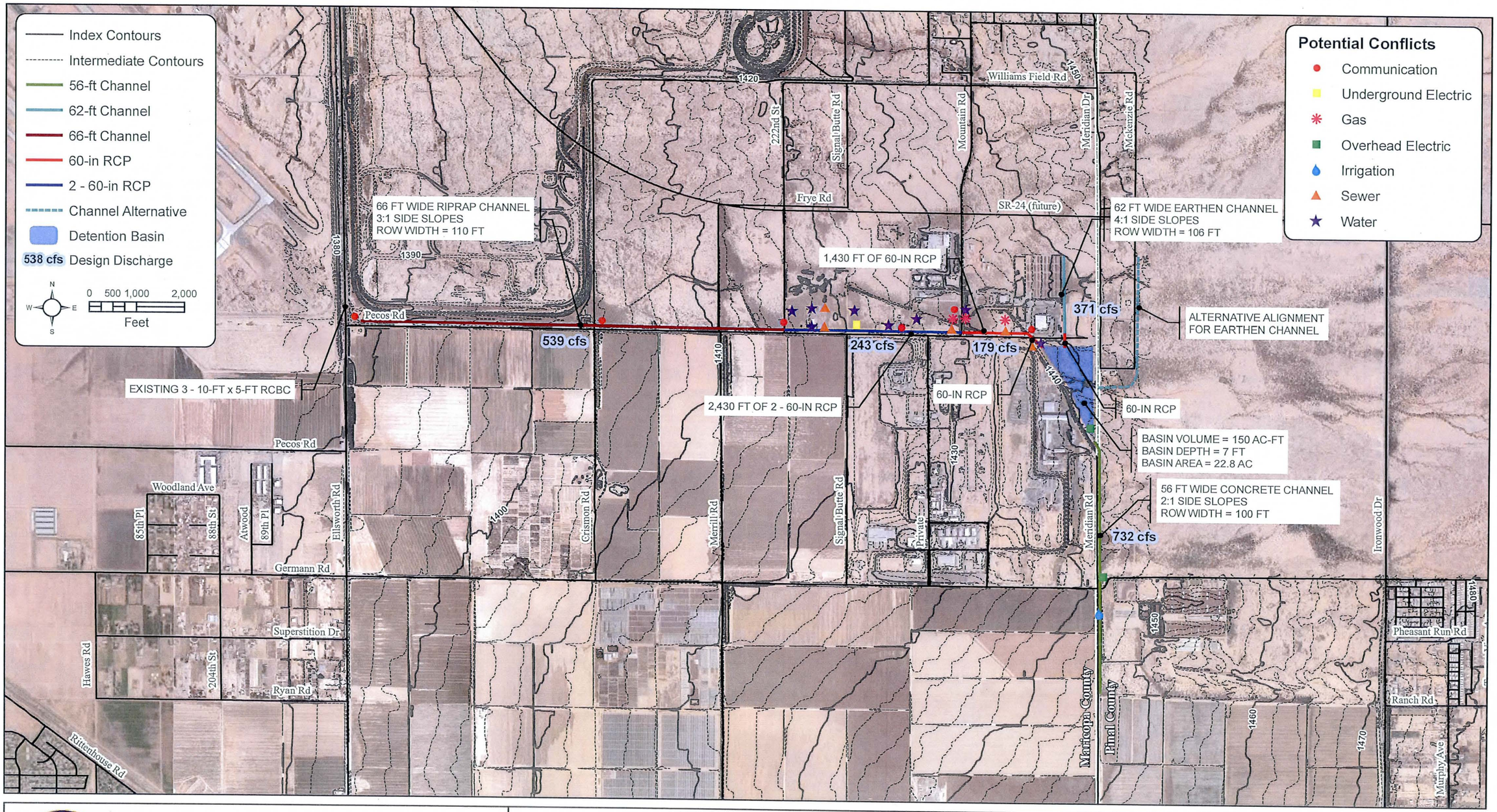
Date: 09/18/2014 Time: 12:00 pm Number Present: _____

Meeting Title: PECOS ROAD CHANNEL AND BASIN D.C.R. - PRESENTATION OF ALTERNATIVES

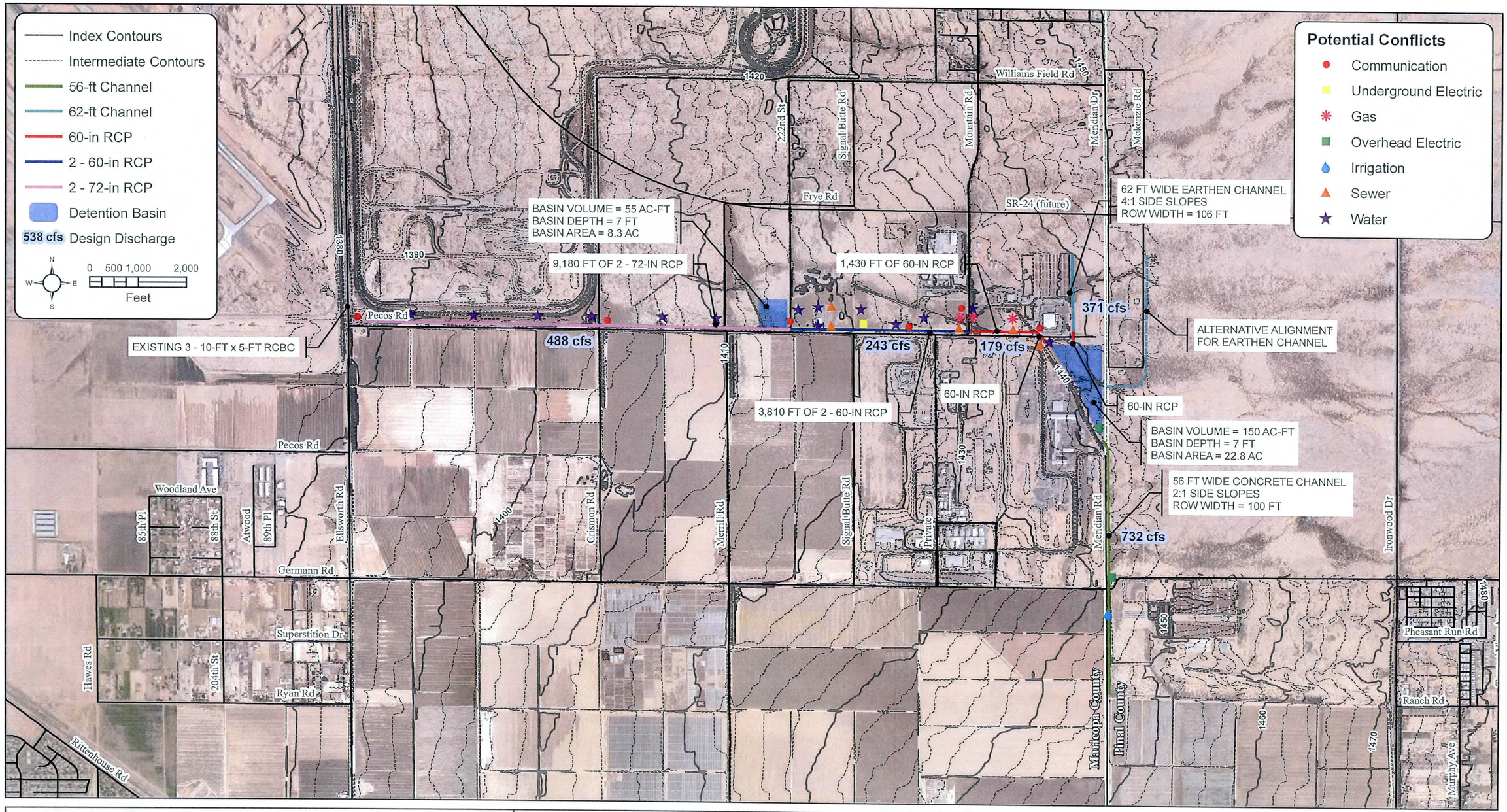
Meeting Attendees :		
Name	**Organization**	**Contact Phone/Email:**
1. REECE BAWDEN	AMERICAN PACIFIC	480-650-1441
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		



Flood Control District of Maricopa County / Kimley»Horn	Pecos Road Channel and Basin Design Concept Report	Flood Control District of Maricopa County City of Mesa
	Alternative 1	



Flood Control District of Maricopa County / Kimley»Horn	Pecos Road Channel and Basin Design Concept Report	Flood Control District of Maricopa County City of Mesa
	Alternative 2	



Flood Control District of Maricopa County / Kimley»Horn	Pecos Road Channel and Basin Design Concept Report	Flood Control District of Maricopa County City of Mesa
	Alternative 3	

Meeting Action Items

Action Items		
Question/Follow-up	**Who**	**By When**
I AM FOR ALTERNATIVE 3!!!	KEN SMITH 480 833 4488 KENESMITHALTONLAW.COM	
"	John Alston 480-833-4988	
Want to see full explanation of All options w/ photos on your site	T Watkins 480-492-1912	
Alternative #3! Please post all info on your website	Georganna Lagen 480-703-0532 (c) FFEM	
Alternative #3!!	DAWN HELMS CRILL OF AMERICA 480 987-3006	
ALT. #3	Rod Endres Wilson const. 480-212-3238	
Alt #3 But move retention area off 222nd St to West	Steve Tucker 480 620 8683	

Reviewed BY: (District PM) [signature] Date: 9-22-14

Reviewed BY: (Organization) [signature] CITY OF MESA Date: 9/22/14

Meeting Action Items

Action Items		
Question/Follow-up	**Who**	**By When**
We are not in favor of option 1 or 2. Negative impact to our usuable property for development. Takes to much out of property if a concrete canel put in.	Gene Tokraks 480-982-9100 ext 102	MGC Pure Chemicals America Pecos & Mountain
Strongly against retention area on NW corner of 222 & Pecos Takes too much of our property	Tucker Prop. 480 620 8683 8683	
Ditto above objection to retention adjacent to 222.	Naegeli Trust property	602 369-9222 on east side of 222

Reviewed BY: (District PM) Michael Duncan Date: 9-22-14

Reviewed BY: (Organization) Jamie Webb City of MESA Date: 9/22/14

Meeting Action Items

Action Items		
Question/Follow-up	**Who**	**By When**
WE ARE IN FAVOR OF OPTION 3	AMERICAN PACIFIC HOLDINGS	

Reviewed BY: (District PM) Michael Duncan Date: 9-22-14

Reviewed BY: (Organization) Jamie Neff CITY OF MESA Date: 09/22/14

Flood Control District
of Maricopa County

www.fcd.maricopa.gov

2801 West Durango Street
Phoenix, Arizona 85009
Phone: 602-506-1501
Fax: 602-506-4601

PROJECT/STUDY: ***Pecos Road Corridor - Design Concept Report***

MEETING ANNOUNCEMENT: ***Presentation of Preliminary (15%) Plans***

The Flood Control District of Maricopa County and the City of Mesa, along with Kimley-Horn and Associates, Inc., have developed preliminary plans for drainage improvements to address flooding issues along the three-mile segment of Pecos Road, from Ellsworth Road to the Meridian Road alignment.

The majority of the drainage improvements comprise underground storm drains along Pecos Road. East of the Meridian Road alignment, the improvements include two channels to collect stormwater runoff that approaches from the east. Also, two detention basins are included in the system to attenuate the storm flows.

We invite you to attend an upcoming meeting where the concepts of the preliminary, or 15%-level, plans will be presented:

Thursday, December 18, 2014
Noon – 12:40 pm
Fujifilm Electronic Materials
6550 South Mountain Road, Mesa, AZ,

This is approx. ¼ mile north of Pecos Rd., on the west side;

at a modular building at the south end of the parking lot.

If you are unable to attend and would like to obtain related information, or have any questions, please contact:

Mike Duncan, Project Manager
Flood Control District of Maricopa County
602-506-4732
mwd@mail.maricopa.gov

The City of Mesa contact is Lance Webb, Senior Civil Engineer, 480-644-2399, lance.webb@mesaaz.gov

Meeting Attendees

Date: 12/18/2014 Time: 12:00 pm Number Present:

Meeting Title: PECOS ROAD CHANNEL AND BASIN D.C.R. - PRESENTATION OF 15% PLANS

Meeting Attendees :

Name	Organization	Contact Phone/Email:
1. MIKE MAGRUDER	TRW	MICHAEL.A.MAGRUDER@TRW.COM
2. DAVID JARVIS	APH, LLC	602-370-5525
3. Rick Decker	Investor	602-738-2371
4. REECE BAWDEN	APH LLC	480-650-1441
5. RUDY KOMENDA	TRW	RUDY.KOMENDA@TRW.COM 480 722 6215
6. LAURIE MARIN	Kimley-Horn	laurie.marin@kimley-horn.com 480 270 2677
7. FreddieSanchez	Matheson Tri-Gas	fSanchez@mathesongas.com 928 701 2447
8. NICK STAFFORD	KIMLEY-HORN	NICK.STAFFORD@KIMLEY-HORN.COM
9. DANA McBRIDE	MESA PD	DANA.MCBRIDE@MESAAZ.GOV (480) 644-5520
10. Anne Micci	Fujifilm	(480) 987-7033
11.		
12.		
13.		
14.		
15.		
16.		

Meeting Attendees

Date: 12/18/2014 Time: 12:00 pm _____ Number Present: _____

Meeting Title: PECOS ROAD CHANNEL AND BASIN D.C.R. - PRESENTATION OF 15% PLANS _____

Meeting Attendees :		
Name	**Organization**	**Contact Phone/Email:**
1. Charles Minter	CMC	480-399-3653
2. NEAL STODDARD	ALA	480-299-9658
3. JAMES Corkishey	Mesa Wash Ranch	602-677-2410
4. Blythe Trefick	Bruce Naegeli	602-369-9222
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Meeting Attendees

Date: __ 12/18/2014 ___ Time: __ 12:00 pm __________ Number Present: ____________________

Meeting Title: ___ PECOS ROAD CHANNEL AND BASIN D.C.R. - PRESENTATION OF 15% PLANS _____

Meeting Attendees :

Name	Organization	Contact Phone/Email:
1. Dawn Helms	CRM	480 987 3006 DHELMS@CRMarketplace.com
2. Alan Jackson	CMC	alan.jackson@cmc.com 480-280-5876
3. Gene Tokraks	MPCA	480-987-9100 ext 102 gtokraks@mgcpure.com
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Kimley»Horn

Appendix H. Conceptual Plans

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

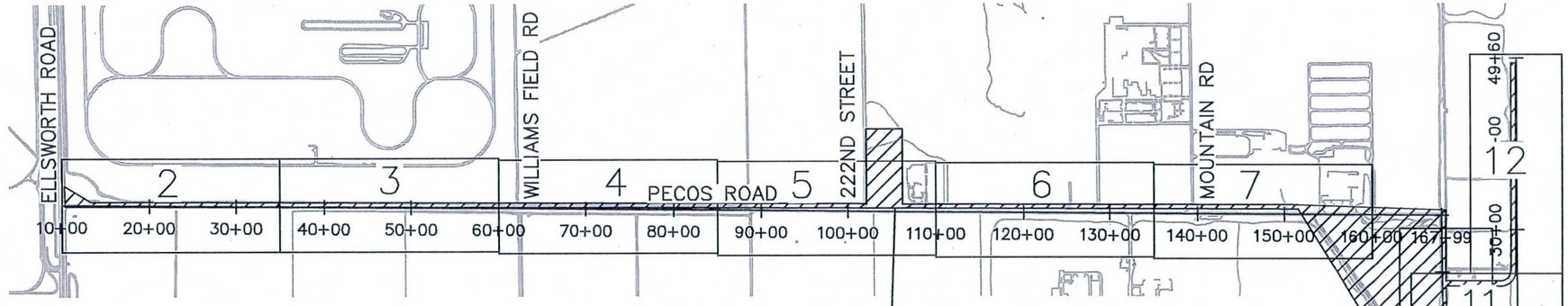
IN COOPERATION WITH KIMLEY-HORN

CONCEPTUAL PLANS FOR THE CONSTRUCTION OF

PECOS ROAD CHANNEL AND BASIN DRAINAGE IMPROVEMENTS

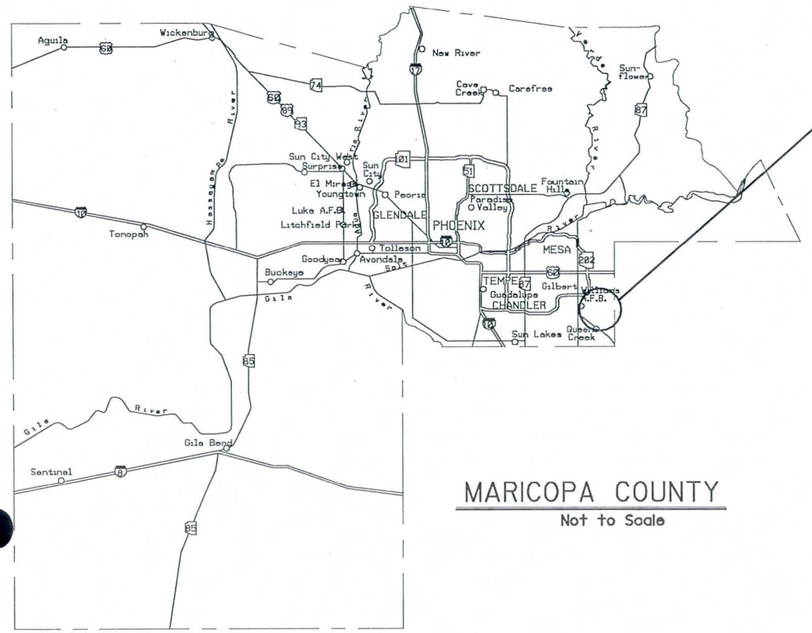
PCN 442.03.20

FCD CONTRACT NO. 2014C001-1



VICINITY MAP

Not to Scale

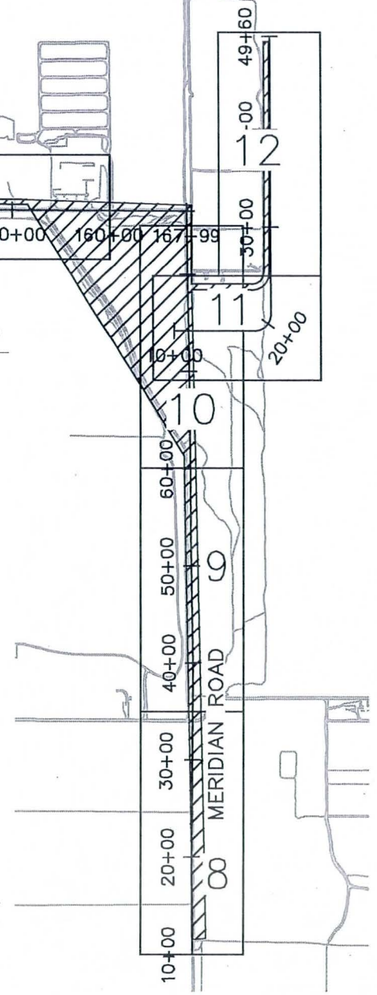


PROJECT LOCATION

MARICOPA COUNTY

Not to Scale

INDEX OF SHEETS



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ISSUE RECOMMENDED BY:

PROJECT MANAGER DATE

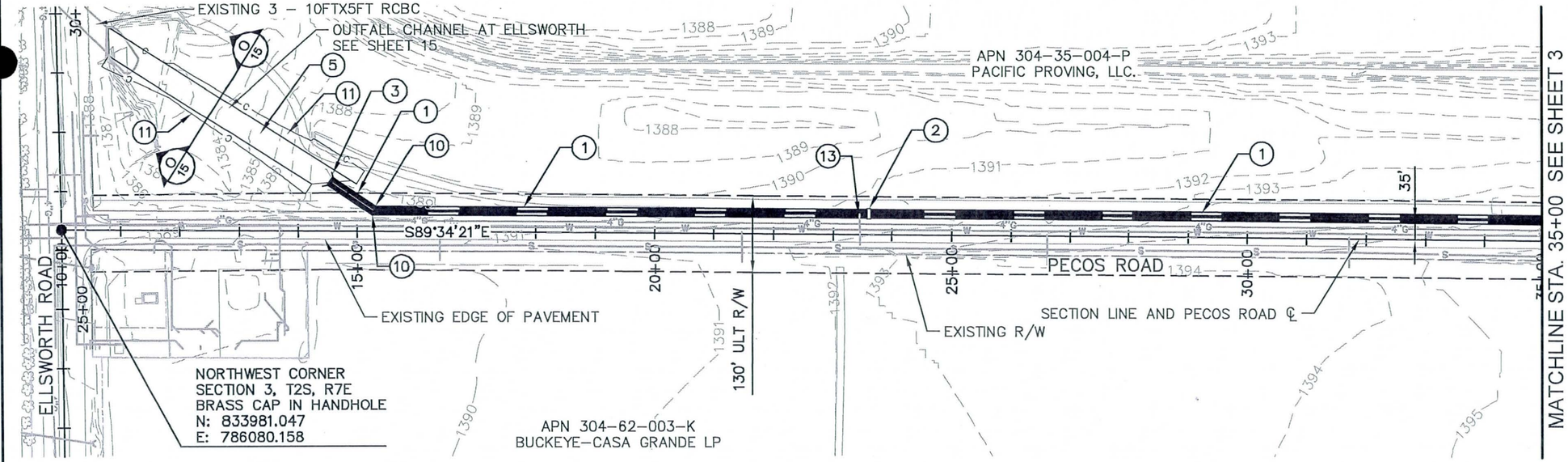
ISSUED FOR PUBLIC BIDDING BY:

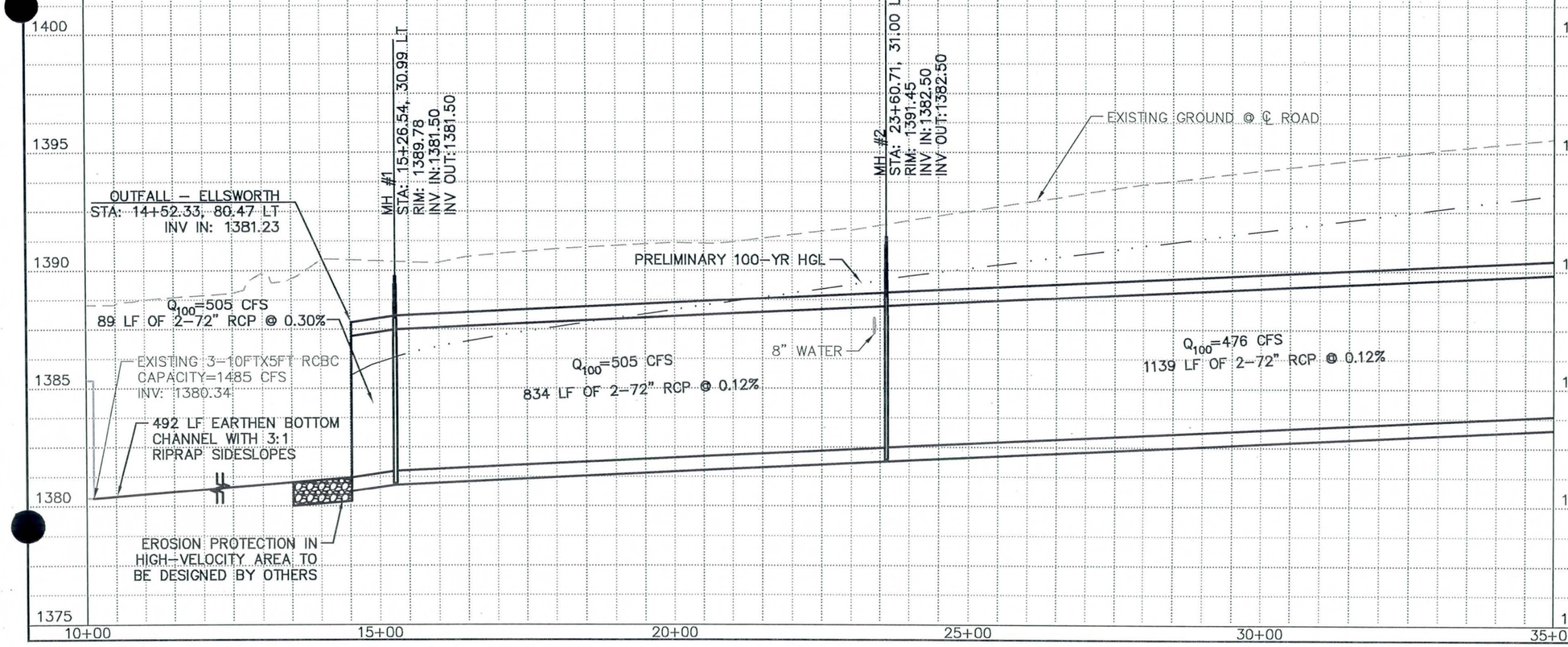
CHIEF ENGINEER & GENERAL MANAGER DATE

BOARD OF DIRECTORS OF THE FLOOD CONTROL DISTRICT

DENNY BARNEY - CHAIRMAN

DISTRICT 1	DENNY BARNEY
DISTRICT 2	STEVE CHUCRI
DISTRICT 3	ANDY KUNASEK
DISTRICT 4	CLINT HICKMAN
DISTRICT 5	MARIE LOPEZ ROGERS





☐ REMOVE ☐

○ CONSTRUCT ○

NO	DESCRIPTION	QTY	UNIT
(1)	2 – 72" RGRCP	2062	LF
(2)	JUNCTION STRUCTURE	1	EA
(3)	HEADWALL, MAG 501–3	1	EA
(5)	CHANNEL EXCAVATION	3086	CYD
(10)	MANHOLE, MAG 521&522	2	EA
(11)	RIPRAP, D_{50}=12"	1826	CYD
(13)	WATER LINE RELOCATION	1	EA

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

N

GRAPHIC SCALE
5 2.5 1.25 0
100 0 50 100 200
1 INCH = 200FEET

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

PECOS ROAD CHANNEL AND BASIN DCR
442.03.20
FCD 2014C001–1

PRELIMINARY
NOT FOR
CONSTRUCTION

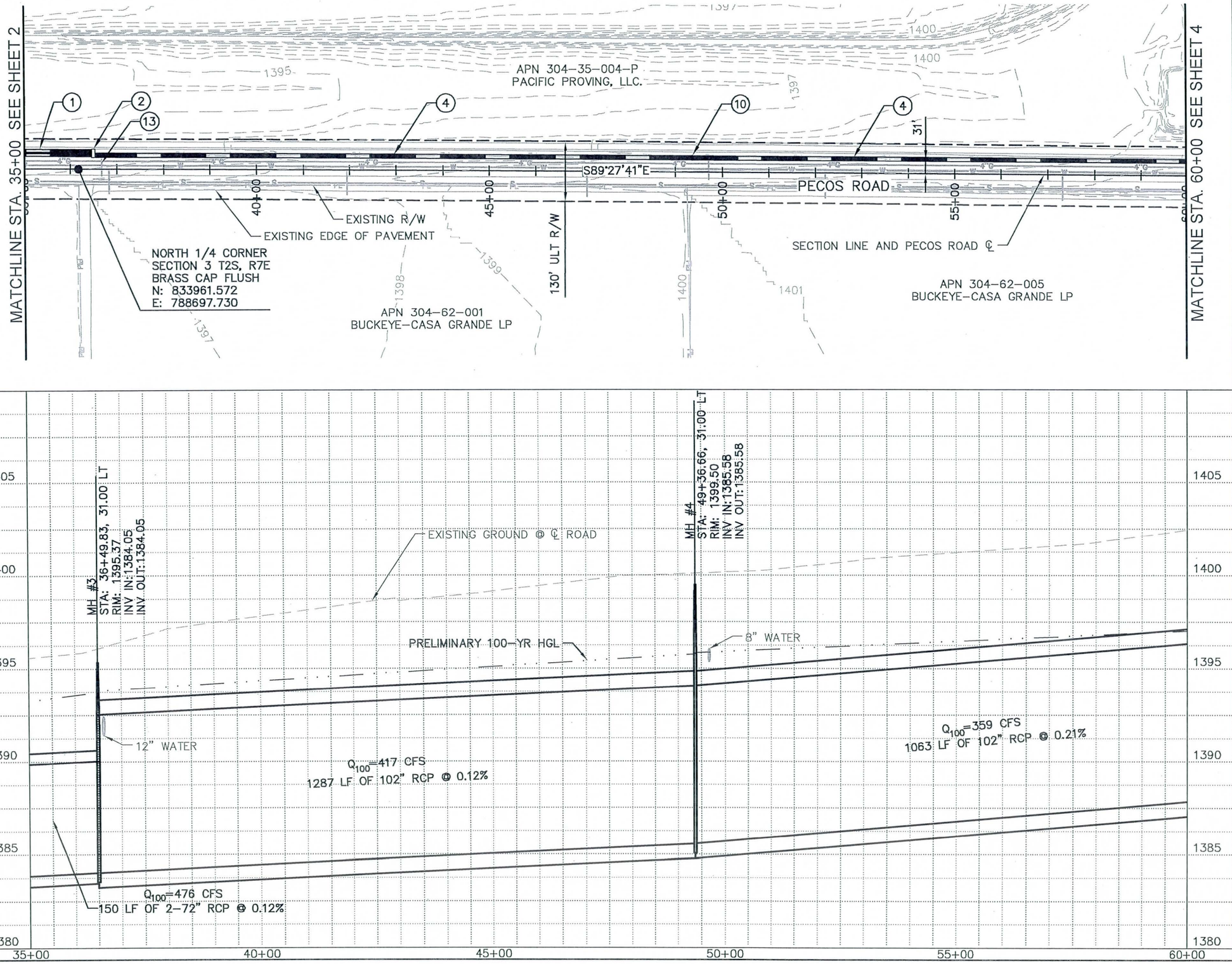
	BY	DATE
DES:	MAW	1/15
DR:	NAS	1/15
CK:	LSM	1/15

Kimley»Horn

DRAWING NO. DR01

PLAN AND PROFILE
STA. 10+00 TO STA. 35+00

SHEET OF 2 15



☐ REMOVE ☐

○ CONSTRUCT ○

NO	DESCRIPTION	QTY	UNIT
(1)	2 – 72" RGRCP	150	LF
(2)	JUNCTION STRUCTURE	1	EA
(4)	102" RGRCP	2350	LF
(10)	MANHOLE, MAG 521&522	1	EA
(13)	WATER LINE RELOCATION	1	EA

ALL TYPE WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

GRAPHIC SCALE
5 2.5 1.25 0
100 0 50 100 200
1 INCH = 200 FEET

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

PECOS ROAD CHANNEL AND BASIN DCR
442.03.20
FCD 2014C001-1

PRELIMINARY
NOT FOR
CONSTRUCTION

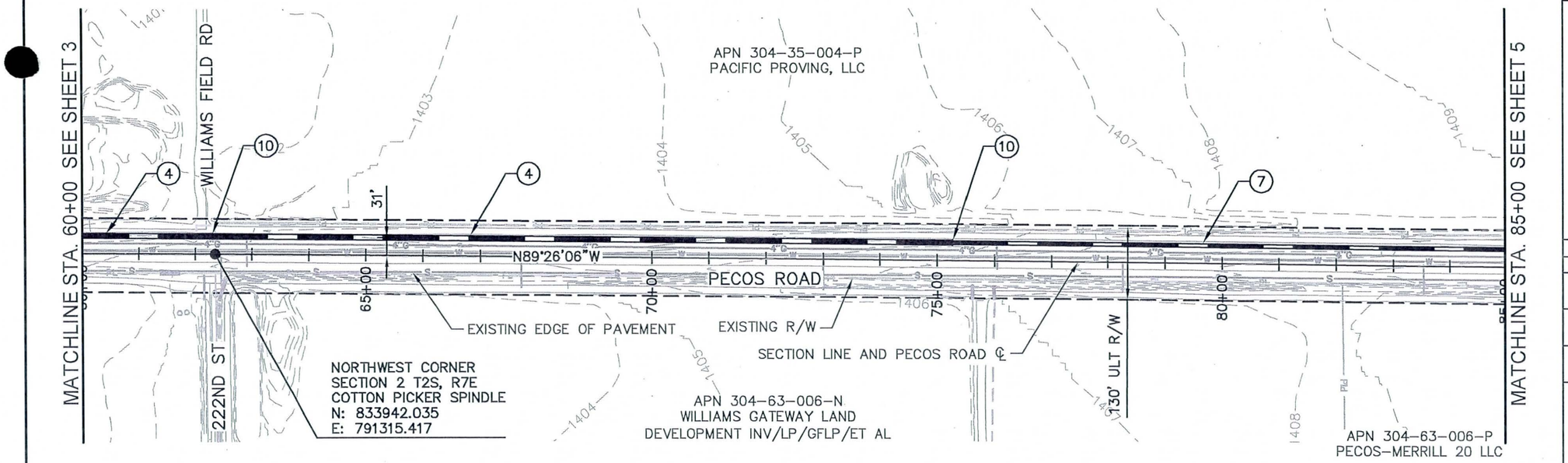
	BY	DATE
DES:	MAW	1/15
DR:	NAS	1/15
CK:	LSM	1/15

Kimley»Horn

DRAWING NO.
DR02

PLAN AND PROFILE
STA. 35+00 TO STA. 60+00

SHEET OF
3 15



☐ REMOVE ☐

○ CONSTRUCT ○

NO	DESCRIPTION	QTY	UNIT
(4)	102" RGRCP	1527	LF
(7)	72" RGRCP	973	LF
(10)	MANHOLE, MAG 521&522	2	EA

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

N

GRAPHIC SCALE
100 0 50 100 200
1 INCH = 200 FEET

5
2.5
1.25
0

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

PECOS ROAD CHANNEL AND BASIN DCR
442.03.20
FCD 2014C001-1

PRELIMINARY
NOT FOR
CONSTRUCTION

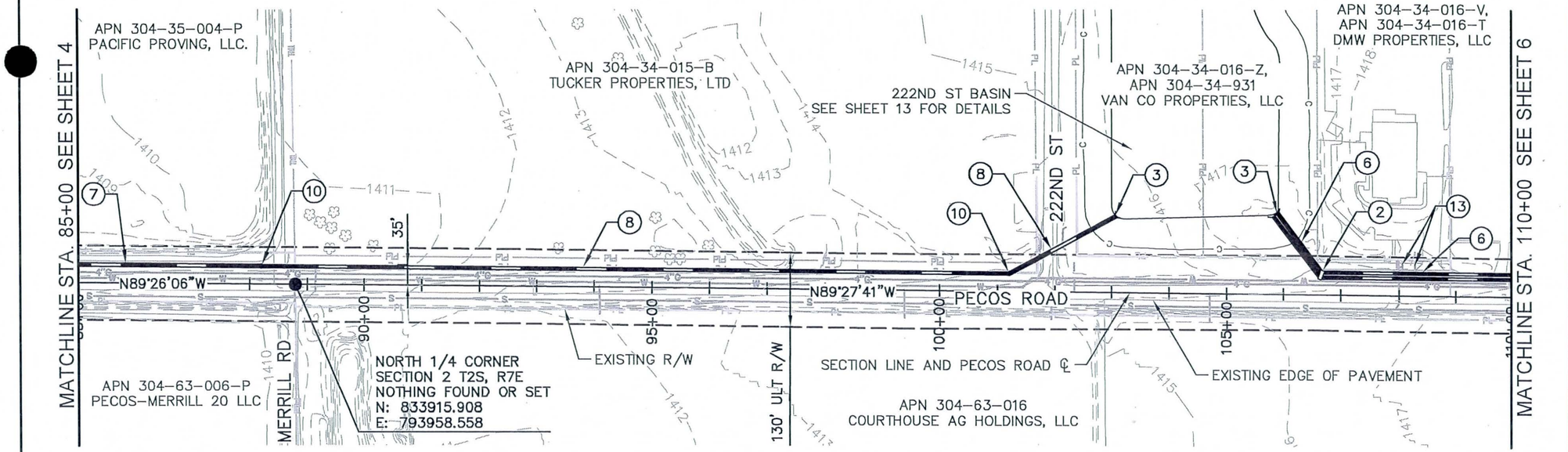
	BY	DATE
DES:	MAW	1/15
DR:	NAS	1/15
CK:	LSM	1/15

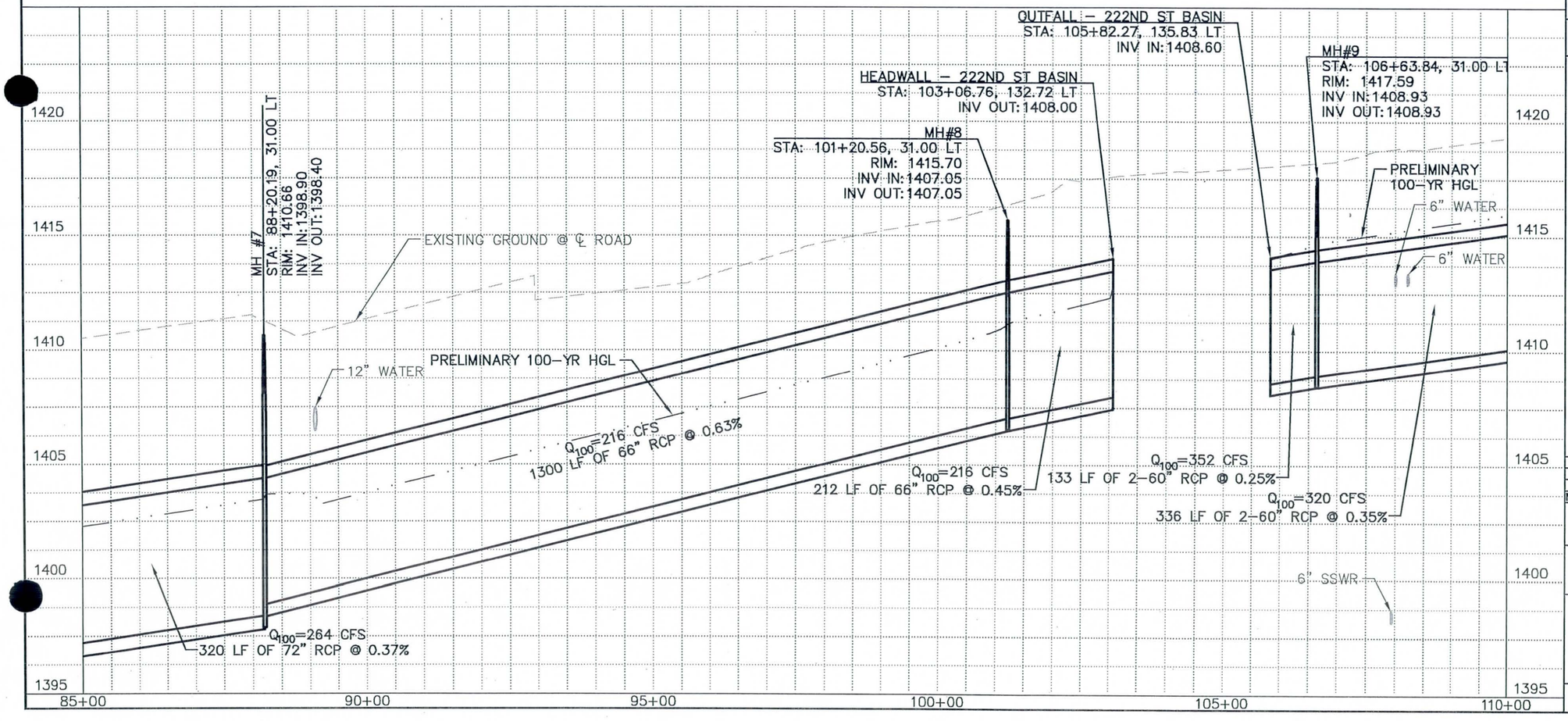
Kimley»Horn

DRAWING NO. DR03

PLAN AND PROFILE
STA. 60+00 TO STA. 85+00

SHEET OF 4 15





☐ REMOVE ☐

○ CONSTRUCT ○

NO	STATION TO STATION	QTY	UNIT
(2)	JUNCTION STRUCTURE	1	EA
(3)	HEADWALL, MAG 501-3	2	EA
(6)	2 - 60" RGRCP	469	LF
(7)	72" RGRCP	320	LF
(8)	66" RGRCP	1512	LF
(10)	MANHOLE, MAG 521&522	2	EA
(13)	WATER LINE RELOCATION	2	EA

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(ARIZONA BLUE STAKE, CORP.)

N

GRAPHIC SCALE
100 0 50 100 200
1 INCH = 200 FEET

5
2.5
1.25
0

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

PECOS ROAD CHANNEL AND BASIN DCR
442.03.20
FCD 2014C001-1

PRELIMINARY
NOT FOR
CONSTRUCTION

	BY	DATE
DES:	MAW	1/15
DR:	NAS	1/15
CK:	LSM	1/15

Kimley»Horn

DRAWING NO. DR04

PLAN AND PROFILE
STA. 85+00 TO STA. 110+00

SHEET OF 5 15

MATCHLINE STA. 110+00 SEE SHEET 5

MATCHLINE STA. 135+00 SEE SHEET 7

APN 304-34-016-T
SIGNAL BUTTE GATEWAY, LLC

APN 304-34-020-D
SIGNAL BUTTE 10, LLC

APN 304-34-043
MARTIN L DAWSON/
SUSAN BARBARA

APN 304-34-044
CITY OF MESA

APN 304-34-037-D
MGC PURE CHEMICALS
AMERICA, INC

APN 304-34-037-A
MGC PURE CHEMICALS
AMERICA, INC

APN 304-63-016
COURTHOUSE AG HOLDINGS, LLC

APN 304-63-005
TRW VEHICLE SAFETY SYSTEMS, INC

130' ULT R/W

35'

N89°36'09"W

PECOS ROAD

SIGNAL BUTTE RD

EXISTING EDGE OF PAVEMENT

EXISTING R/W

SECTION LINE AND PECOS ROAD ℄

NORTHWEST CORNER
SECTION 1 T2S, R7E
ALUMINUM CAP FLUSH
N: 833891.057
E: 796601.304

MH #10
STA: 114+60.59, 31.00 LT
RIM: 1420.64
INV IN: 1411.72
INV OUT: 1411.72

MH #11
STA: 122+49.90, 31.00 LT
RIM: 1423.41
INV IN: 1414.16
INV OUT: 1414.16

MH#12
STA: 130+49.90, 31.00 LT
RIM: 1426.78
INV IN: 1416.60
INV OUT: 1416.60

EXISTING GROUND @ ℄ ROAD

PRELIMINARY 100-YR HGL

12" WATER
Q_{100}=318 CFS
461 LF OF 2-60" RCP @ 0.35%

12" WATER
Q_{100}=283 CFS
789 LF OF 2-60" RCP @ 0.31%

12" WATER
Q_{100}=283 CFS
800 LF OF 2-60" RCP @ 0.30%

12" WATER
Q_{100}=249 CFS
450 LF OF 2-60" RCP @ 0.47%

1430 1425 1420 1415 1410 1405

110+00 115+00 120+00 125+00 130+00 135+00

☐ REMOVE ☐

○ CONSTRUCT ○

NO	STATION TO STATION	QTY	UNIT
(2)	JUNCTION STRUCTURE	2	EA
(6)	2 – 60" RGRCP	2500	LF
(10)	MANHOLE, MAG 521&522	2	EA
(13)	WATER LINE RELOCATION	3	EA

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(ARIZONA BLUE STAKE, INC.)

N

GRAPHIC SCALE
5 2.5 1.25 0
100 0 50 100 200
1 INCH = 200FEET

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

PECOS ROAD CHANNEL AND BASIN DCR
442.03.20
FCD 2014C001-1

PRELIMINARY
NOT FOR
CONSTRUCTION

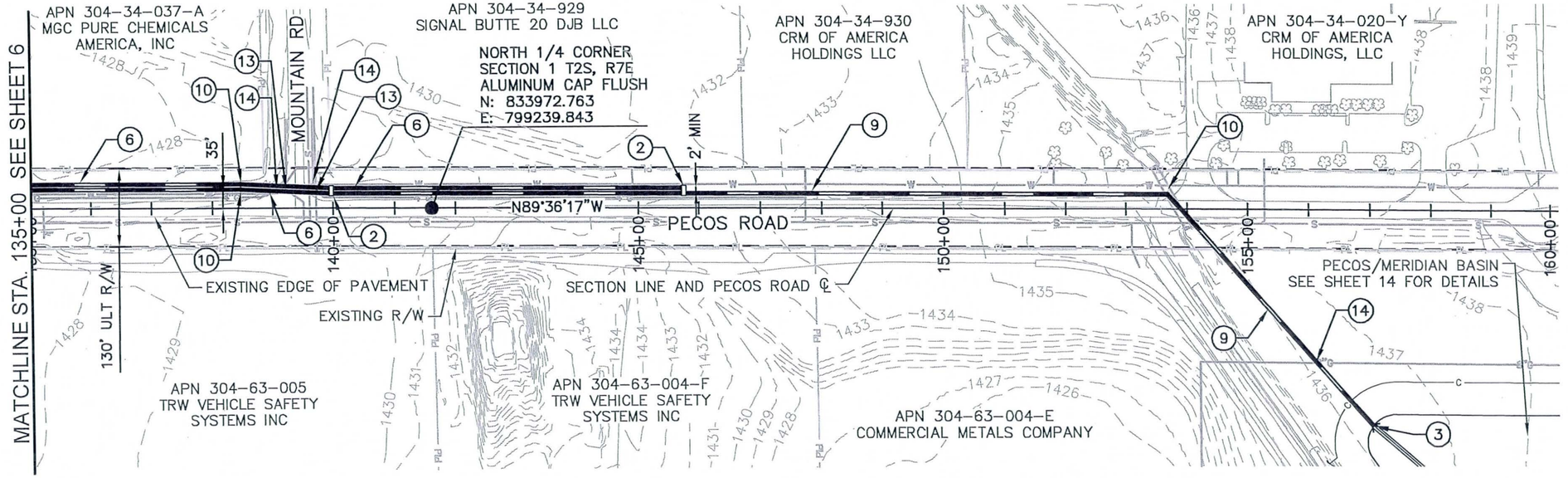
	BY	DATE
DES:	MAW	1/15
DR:	NAS	1/15
CK:	LSM	1/15

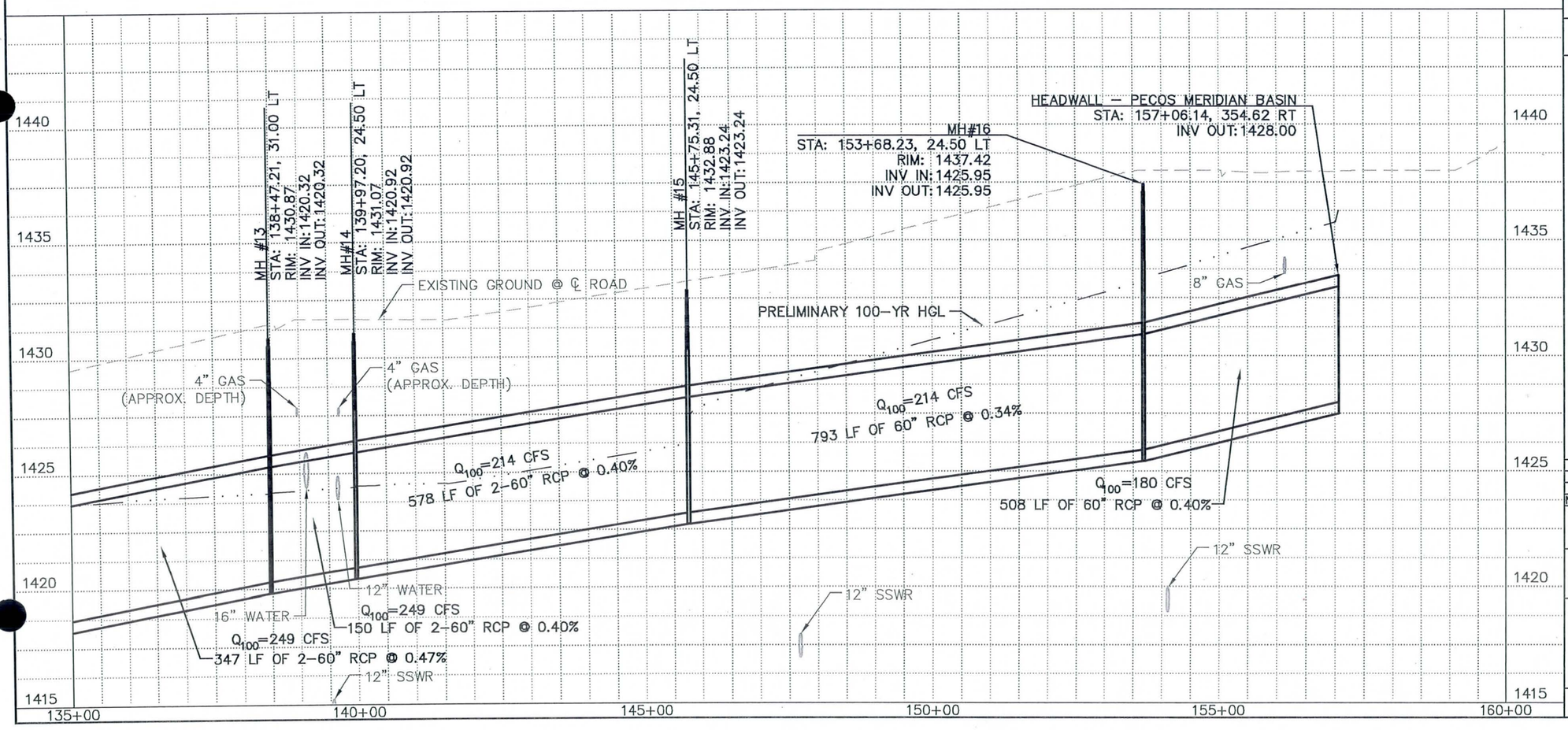
Kimley»Horn

DRAWING NO. DR05

PLAN AND PROFILE
STA. 110+00 TO STA. 135+00

SHEET 6 OF 15





☐ REMOVE ☐

○ CONSTRUCT ○

NO	DESCRIPTION	QTY	UNIT
(2)	JUNCTION STRUCTURE	2	EA
(3)	HEADWALL, MAG 501-3	1	EA
(6)	2 – 60" RGRCP	1075	LF
(9)	60" RGRCP	1301	LF
(10)	MANHOLE, MAG 521&522	3	EA
(13)	WATER LINE RELOCATION	2	EA
(14)	GAS LINE RELOCATION	3	EA

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

N

GRAPHIC SCALE
100 0 50 100 200
1 INCH = 200 FEET

5
2.5
1.25
0

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

PECOS ROAD CHANNEL AND BASIN DCR
442.03.20
FCD 2014C001-1

	BY	DATE
DES:	MAW	1/15
DR:	NAS	1/15
CK:	LSM	1/15

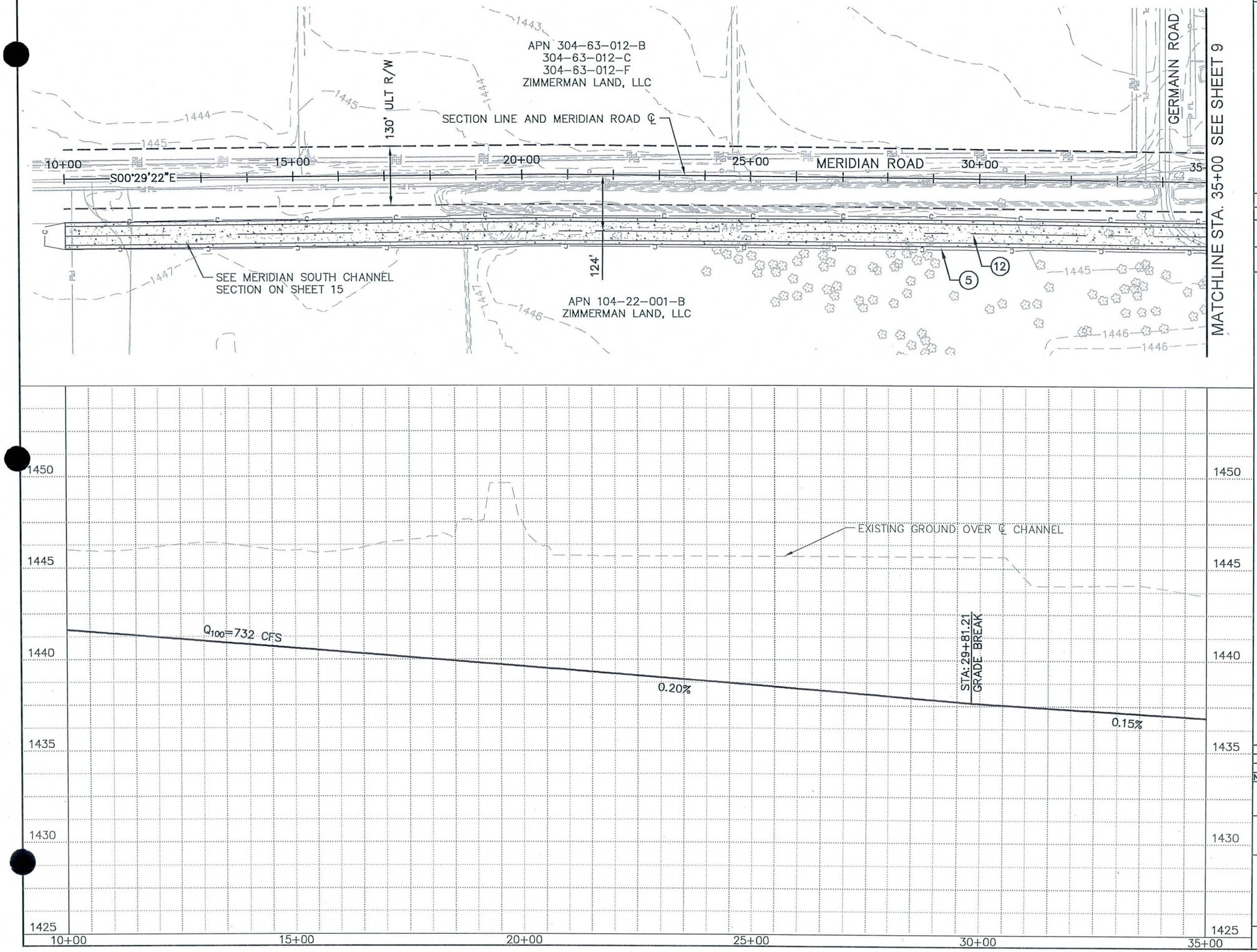
PRELIMINARY NOT FOR CONSTRUCTION

Kimley»Horn

DRAWING NO. DR06

PLAN AND PROFILE
STA. 135+00 TO STA. 160+00

SHEET OF 7 15



☐ REMOVE ☐

○ CONSTRUCT ○

NO	DESCRIPTION	QTY	UNIT
(5)	CHANNEL EXCAVATION	33833	CYD
(12)	REINFORCED CONCRETE	3617	CYD

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

5
2.5
1.25
0

GRAPHIC SCALE
100 0 50 100 200
1 INCH = 200 FEET

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

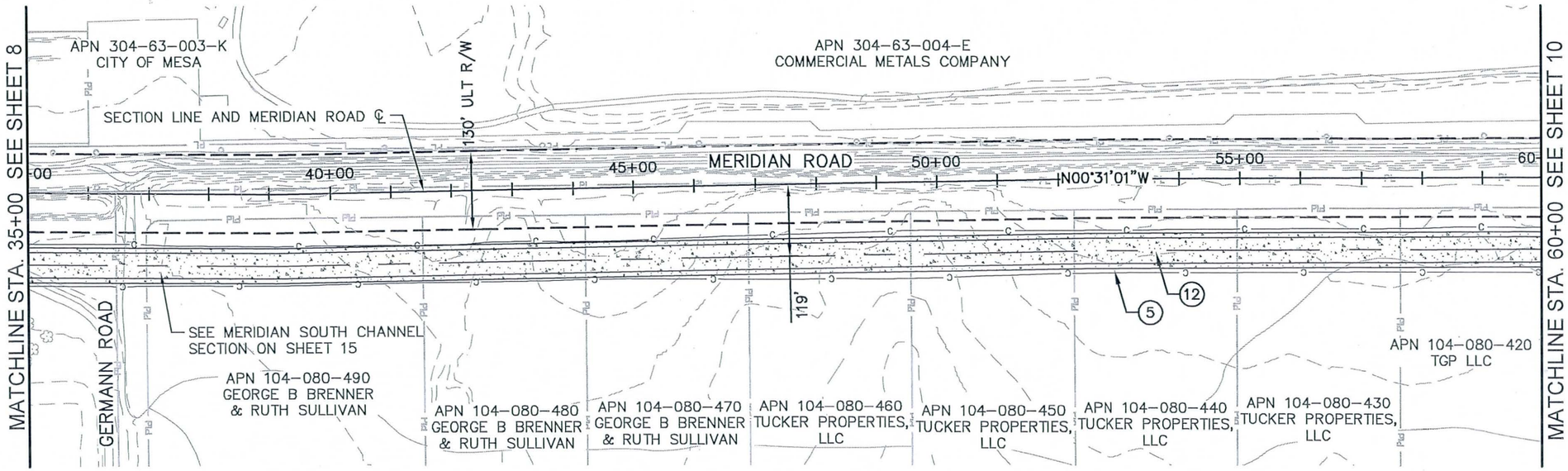
PECOS ROAD CHANNEL AND BASIN DCR
442.03.20
FCD 2014C001-1

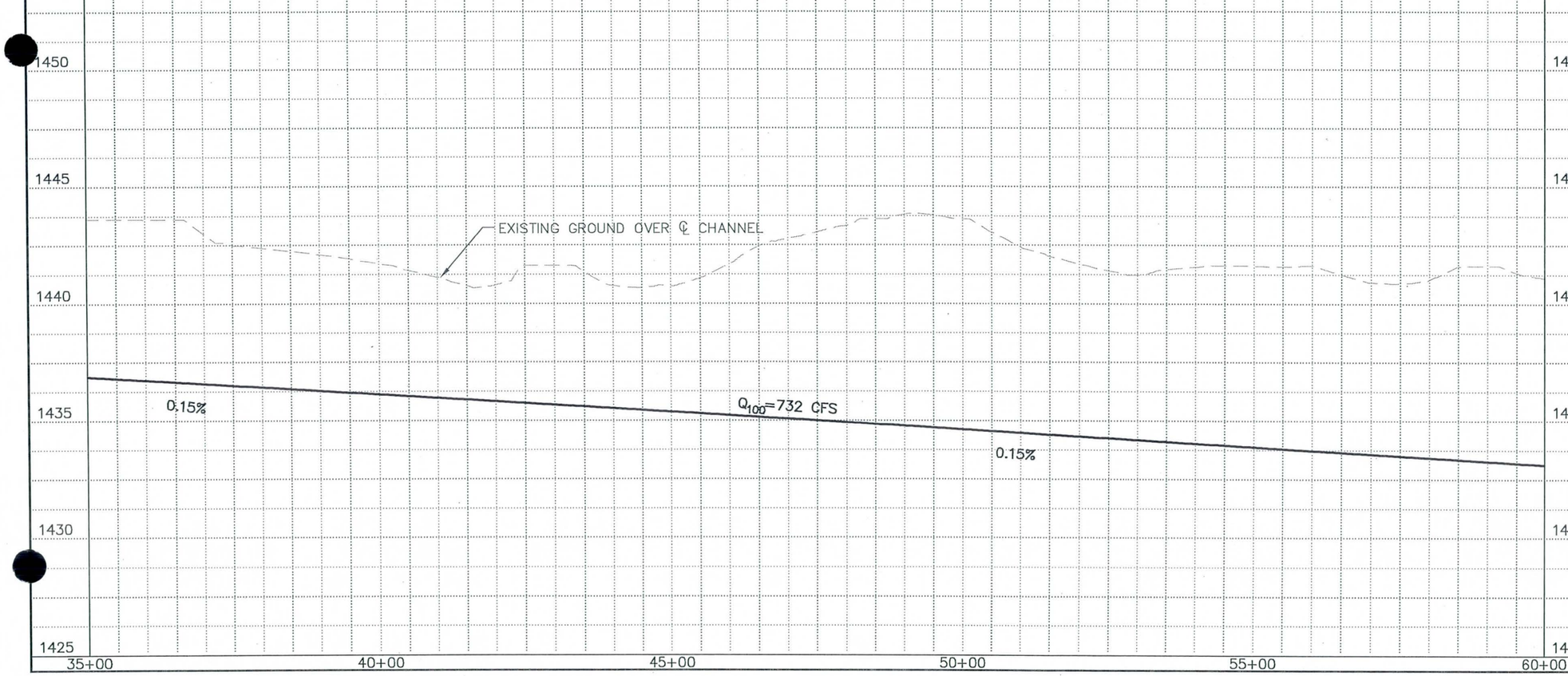
PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DES:	MAW	1/15
DR:	NAS	1/15
CK:	LSM	1/15

Kimley»Horn

DRAWING NO.	PLAN AND PROFILE STA. 10+00 TO STA. 35+00	SHEET OF
DR07		8 15





☐ REMOVE ☐

○ CONSTRUCT ○

NO	DESCRIPTION	QTY	UNIT
(5)	CHANNEL EXCAVATION	36318	CYD
(12)	REINFORCED CONCRETE	3617	CYD

602-263-1100
1-800-STAKE-IT

5
2.5
1.25
0

GRAPHIC SCALE
100 0 50 100 200
1 INCH = 200 FEET

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

PECOS ROAD CHANNEL AND BASIN DCR
442.03.20
FCD 2014C001-1

PRELIMINARY
NOT FOR
CONSTRUCTION

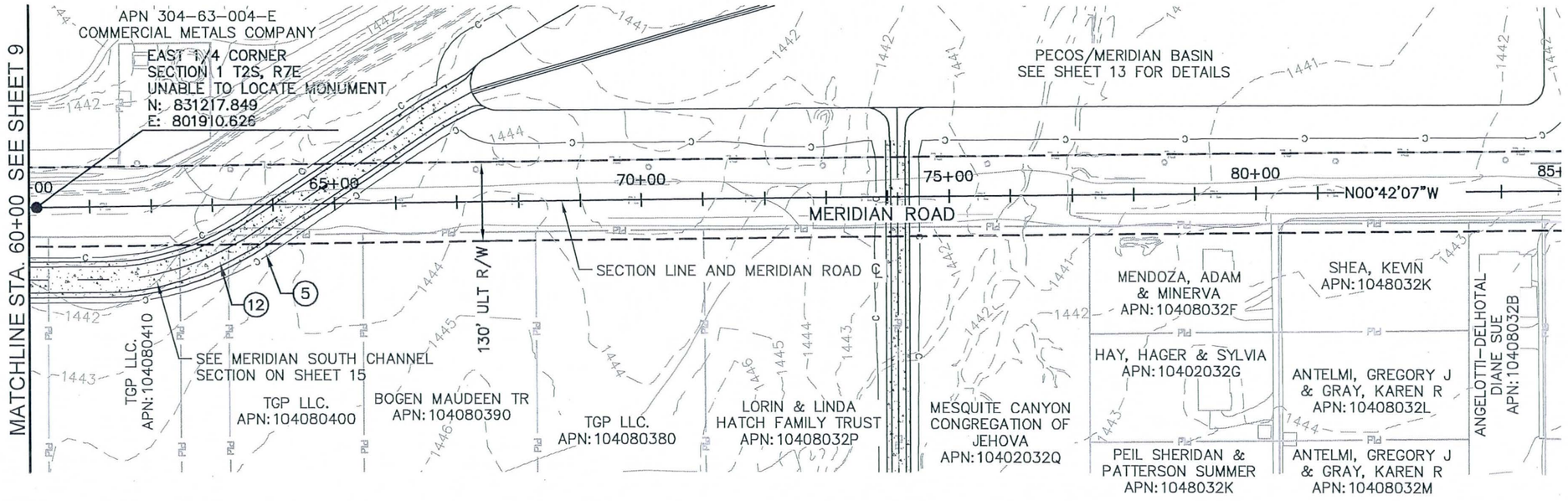
	BY	DATE
DES:	MAW	1/15
DR:	NAS	1/15
CK:	LSM	1/15

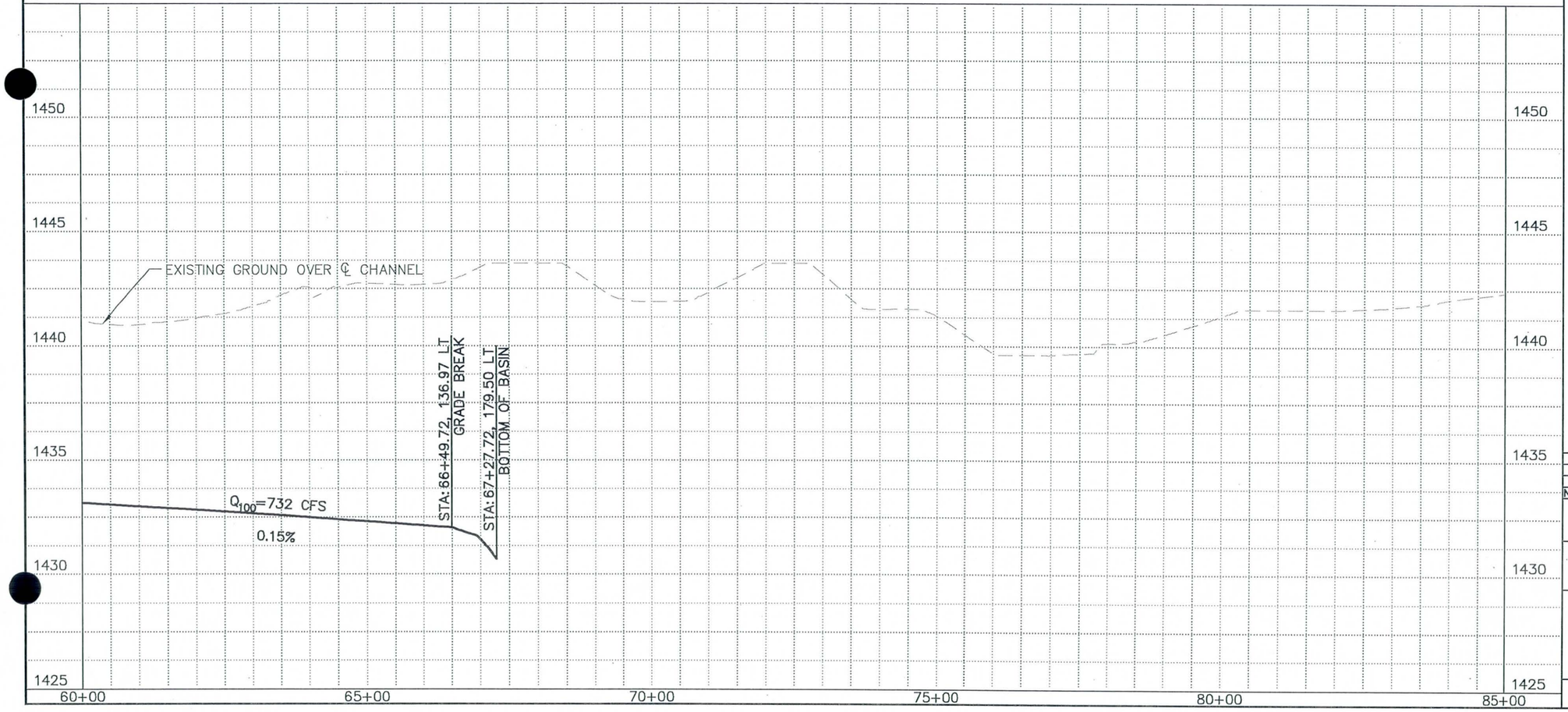
Kimley»Horn

DRAWING NO. DR08

PLAN AND PROFILE
STA. 35+00 TO STA. 60+00

SHEET OF 9 15





☐ REMOVE ☐

○ CONSTRUCT ○

NO	DESCRIPTION	QTY	UNIT
5	CHANNEL EXCAVATION	15665	CYD
12	REINFORCED CONCRETE	1078	CYD

BLUE STAKE, INC.
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

5
2.5
1.25
0

GRAPHIC SCALE
100 0 50 100 200
1 INCH = 200 FEET

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

PECOS ROAD CHANNEL AND BASIN DCR
442.03.20
FCD 2014C001-1

PRELIMINARY
NOT FOR
CONSTRUCTION

	BY	DATE
DES:	MAW	1/15
DR:	NAS	1/15
CK:	LSM	1/15

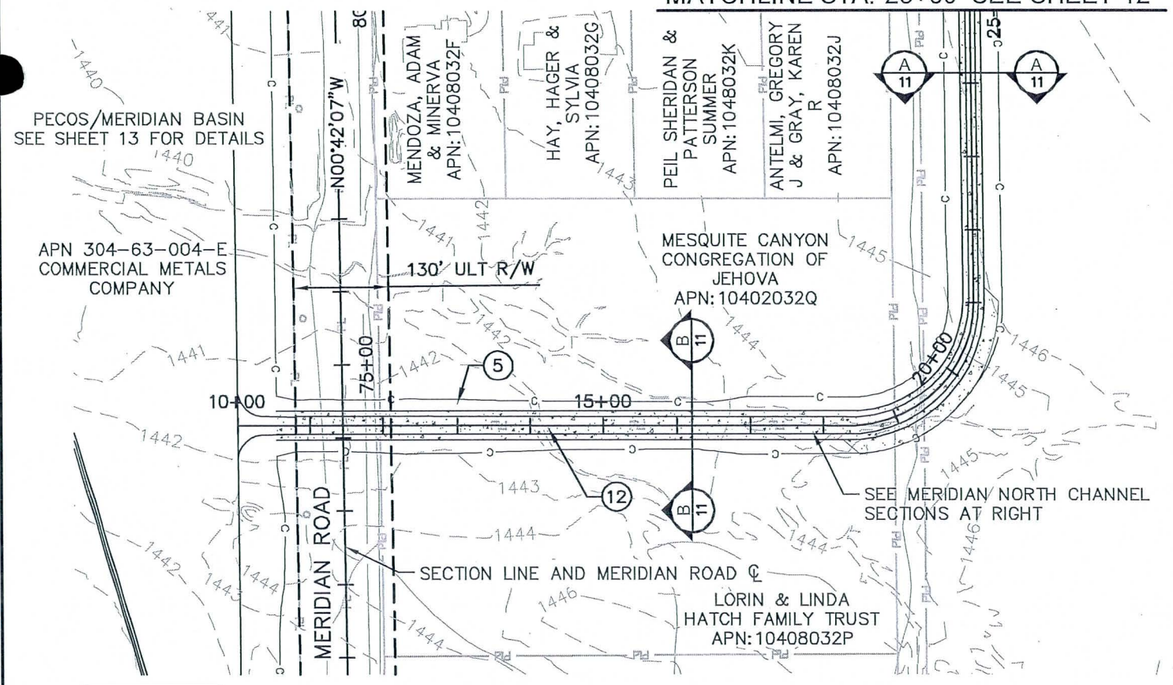
Kimley»Horn

DRAWING NO. DR09

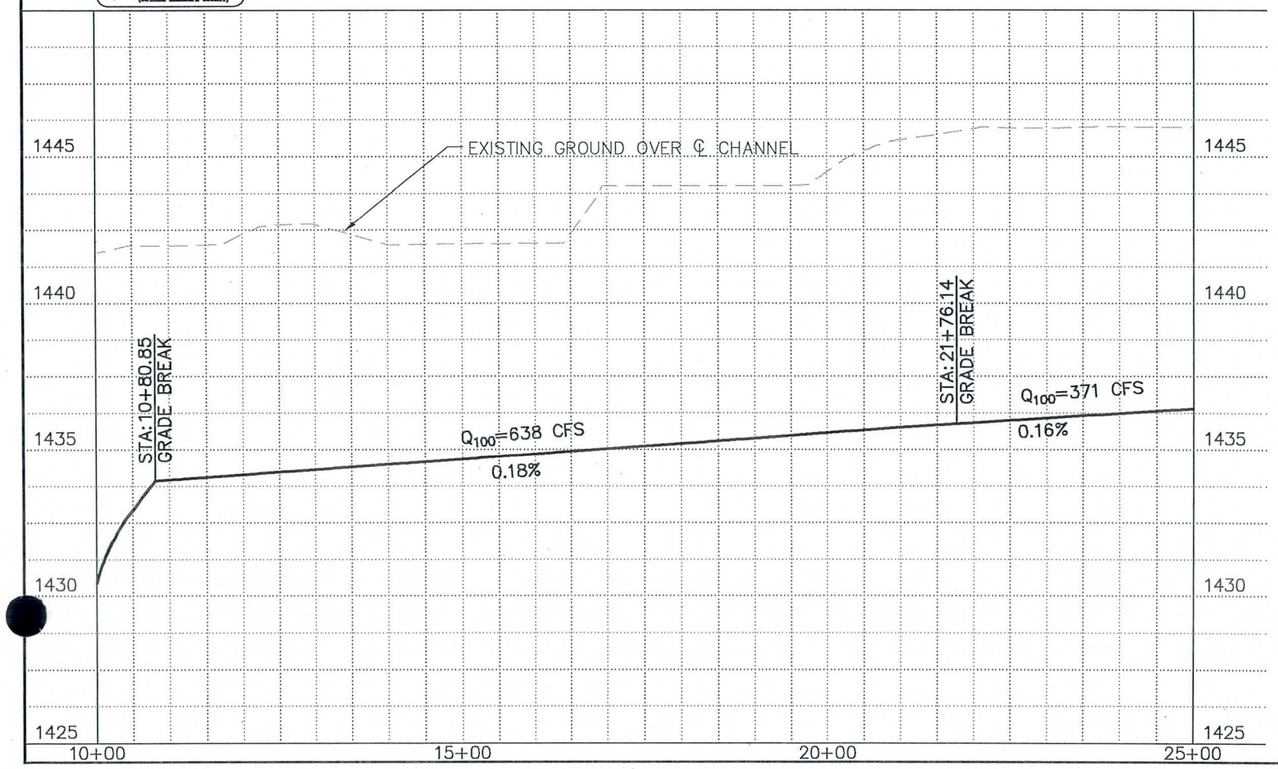
PLAN AND PROFILE
STA. 60+00 TO STA. 67+28

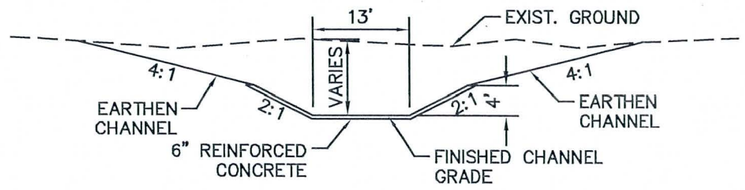
SHEET OF 10 15

MATCHLINE STA. 25+00 SEE SHEET 12

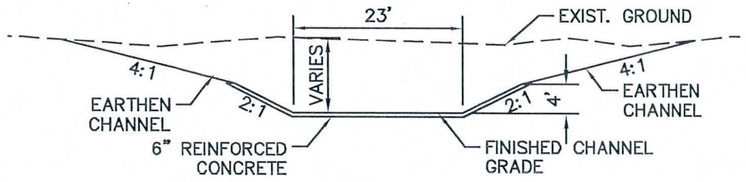


602-263-1100
1-800-STAKE-IT

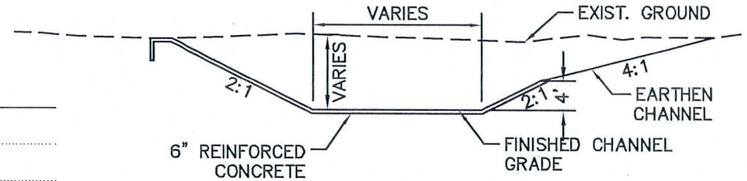




MERIDIAN NORTH CHANNEL – SECTION A–A
STA: 21+02 TO 42+00
SCALE: 1"=20'



MERIDIAN NORTH CHANNEL – SECTION B–B
STA: 10+00 TO 18+45
SCALE: 1"=20'

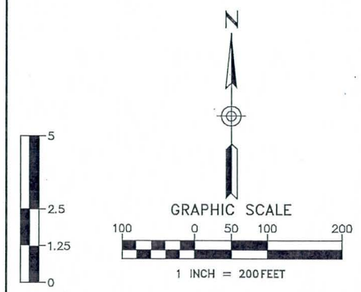


MERIDIAN NORTH CHANNEL – TRANSITION SECTION
STA: 18+45 TO 21+02
STA: 42+00 TO 49+60
SCALE: 1"=20'

☐ REMOVE ☐

○ CONSTRUCT ○

NO	DESCRIPTION	QTY	UNIT
(5)	CHANNEL EXCAVATION	19146	CYD
(12)	REINFORCED CONCRETE	1583	CYD



NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

PECOS ROAD CHANNEL AND BASIN DCR
442.03.20
FCD 2014C001–1

PRELIMINARY NOT FOR CONSTRUCTION

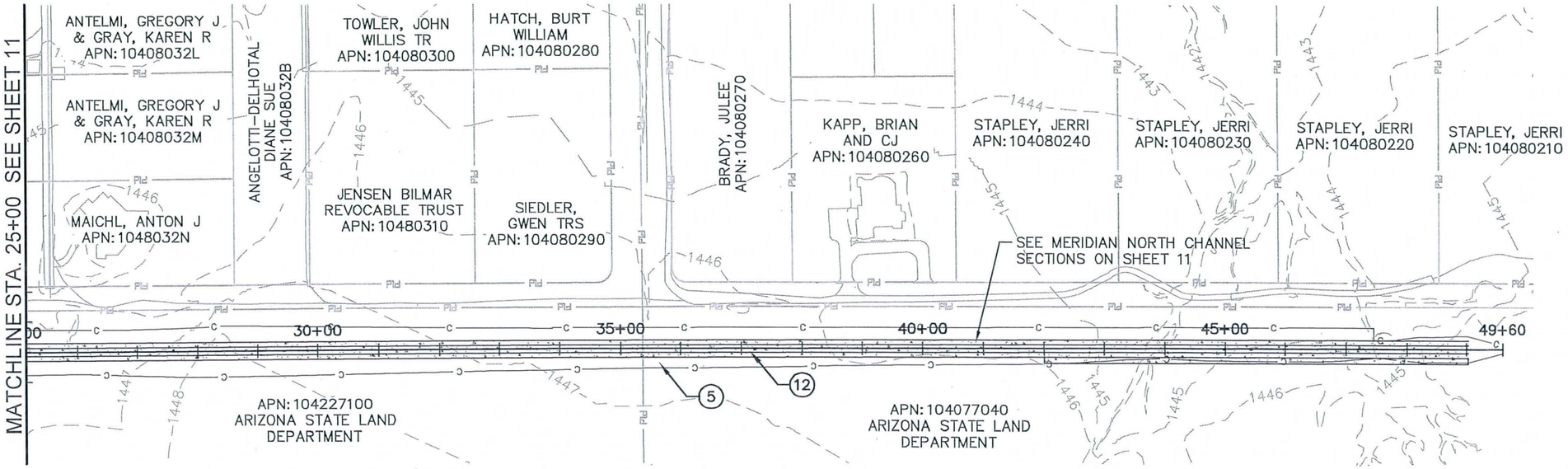
	BY	DATE
DES:	MAW	1/15
DR:	NAS	1/15
CK:	LSM	1/15

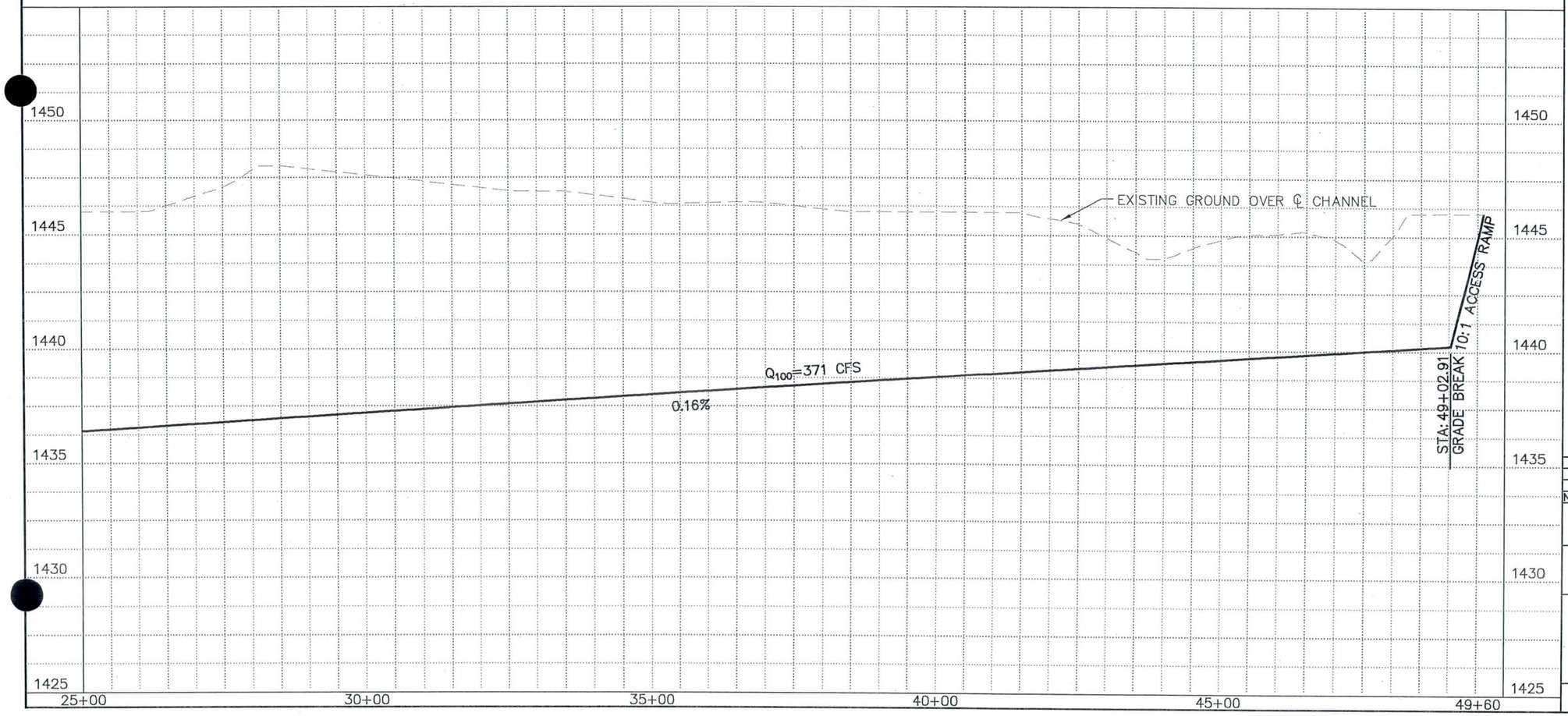
Kimley»Horn

DRAWING NO. DR10

PLAN AND PROFILE
STA. 10+00 TO STA. 25+00

SHEET OF 11 15





☐ REMOVE ☐

○ CONSTRUCT ○

NO	DESCRIPTION	QTY	UNIT
(5)	CHANNEL EXCAVATION	24085	CYD
(12)	REINFORCED CONCRETE	2205	CYD

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

5
2.5
1.25
0

GRAPHIC SCALE
100 0 50 100 200
1 INCH = 200 FEET

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

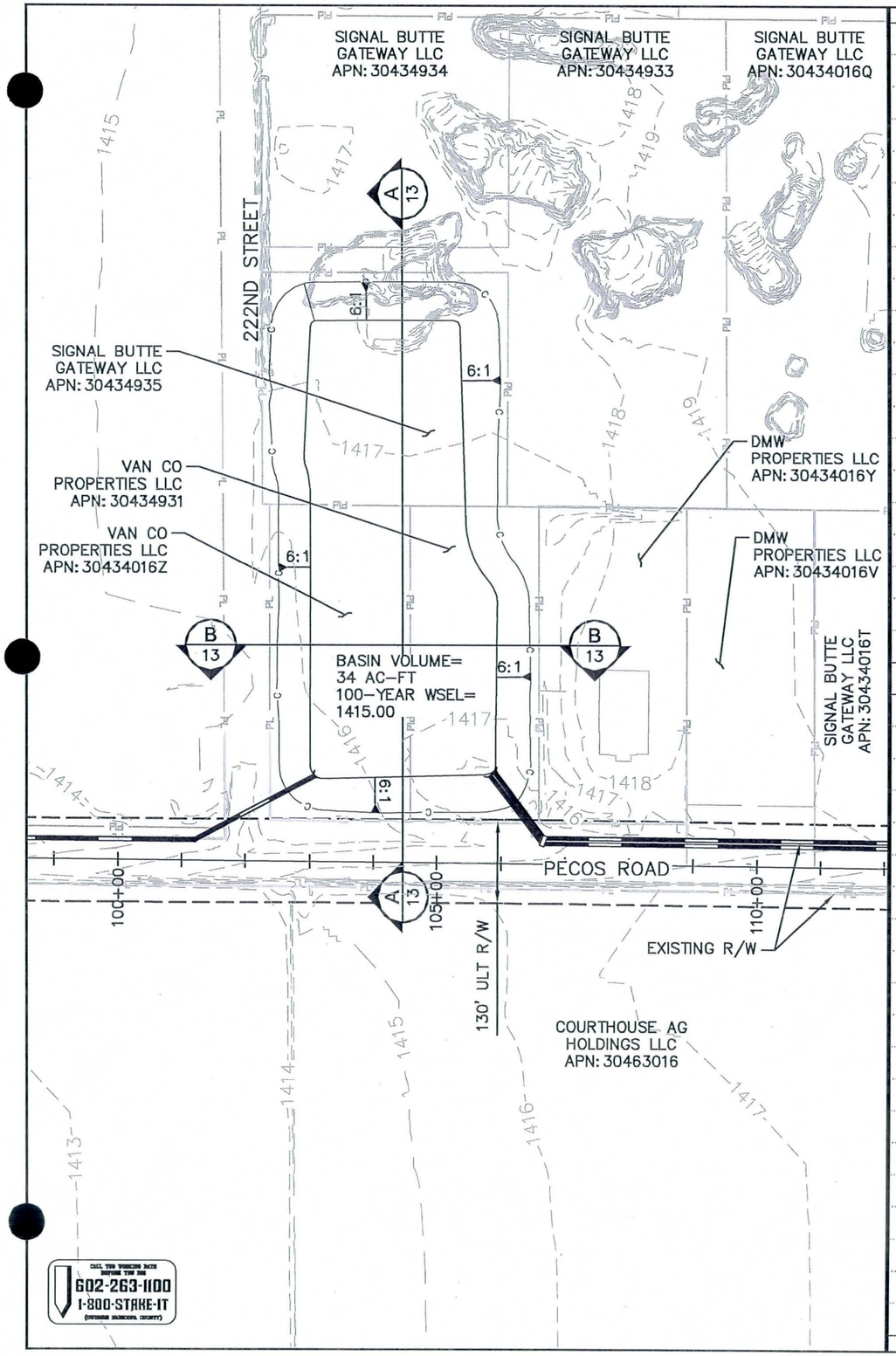
PECOS ROAD CHANNEL AND BASIN DCR
442.03.20
FCD 2014C001-1

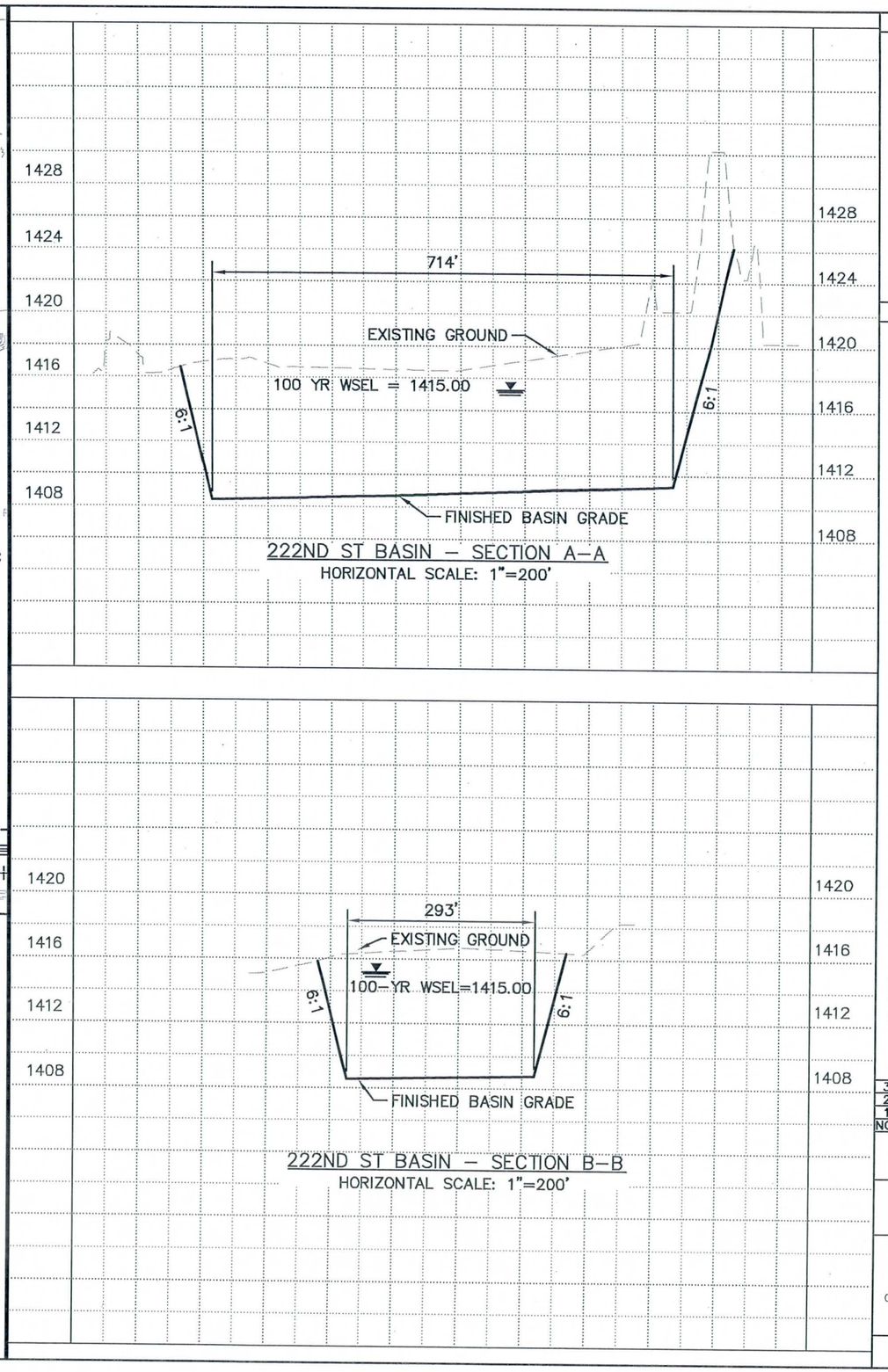
PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DES:	MAW	1/15
DR:	NAS	1/15
CK:	LSM	1/15

Kimley»Horn

DRAWING NO.	PLAN AND PROFILE STA. 25+00 TO STA. 49+60	SHEET OF
DR11		12 15



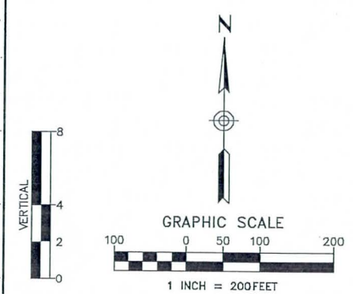


222ND ST BASIN – SECTION A–A
HORIZONTAL SCALE: 1"=200'

222ND ST BASIN – SECTION B–B
HORIZONTAL SCALE: 1"=200'

☐ REMOVE ☐

○ CONSTRUCT ○



NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

PECOS ROAD CHANNEL AND BASIN DCR
442.03.20
FCD 2014C001-1

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DES:	MAW	1/15
DR:	NAS	1/15
CK:	LSM	1/15

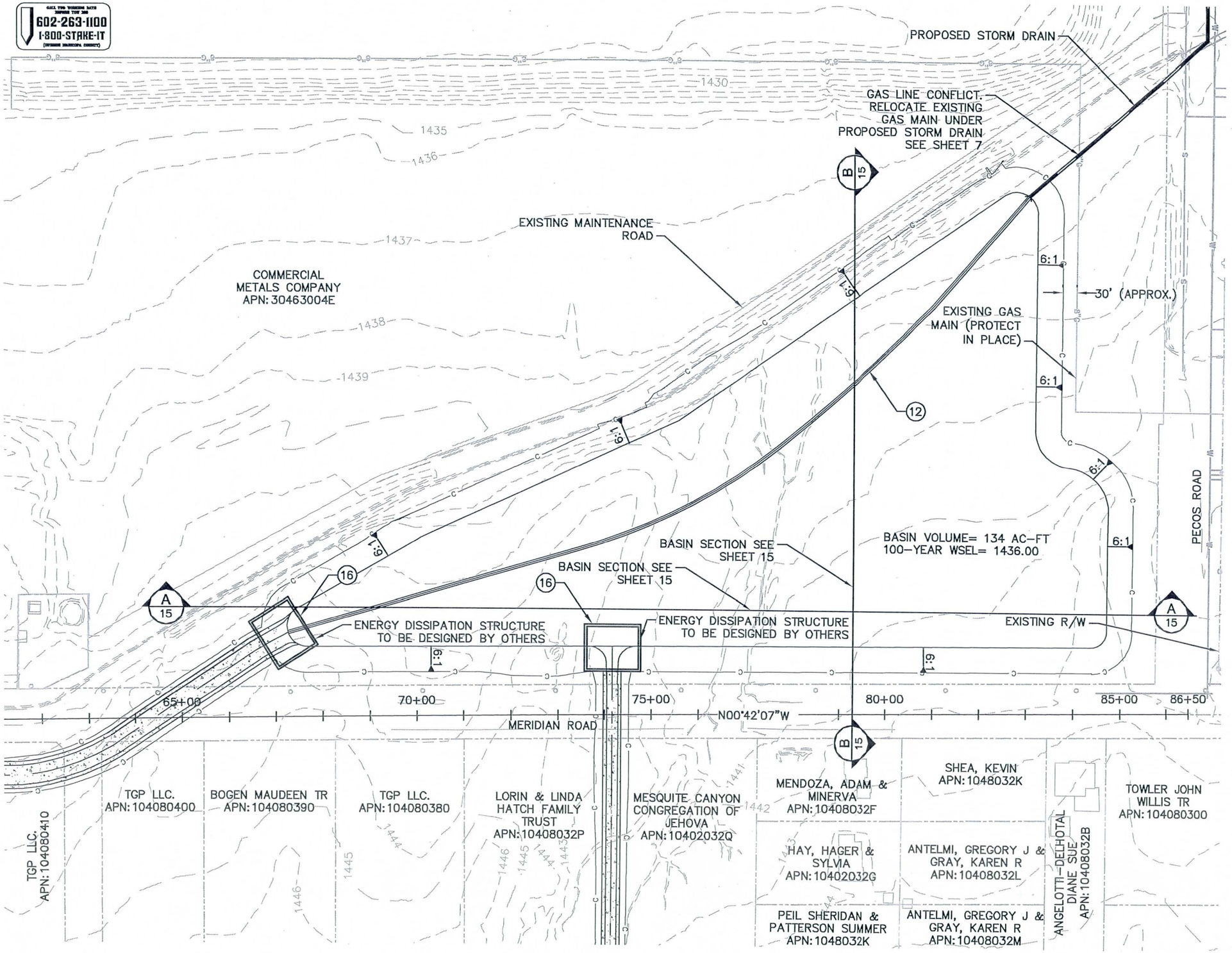
Kimley»Horn

DRAWING NO. DR12

BASIN DETAILS
PECOS/222ND STREET BASIN

SHEET OF 13 15

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)



☐ REMOVE ☐

○ CONSTRUCT ○

NO	STATION TO STATION	QTY	UNIT
(12)	REINFORCED CONCRETE	253	CYD
(16)	ENERGY DISSIPATION STRUCTURE	2	EA

GRAPHIC SCALE
100 0 50 100 200
1 INCH = 200 FEET

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

PECOS ROAD CHANNEL AND BASIN DCR
442.03.20
FCD 2014C001-1

PRELIMINARY NOT FOR CONSTRUCTION

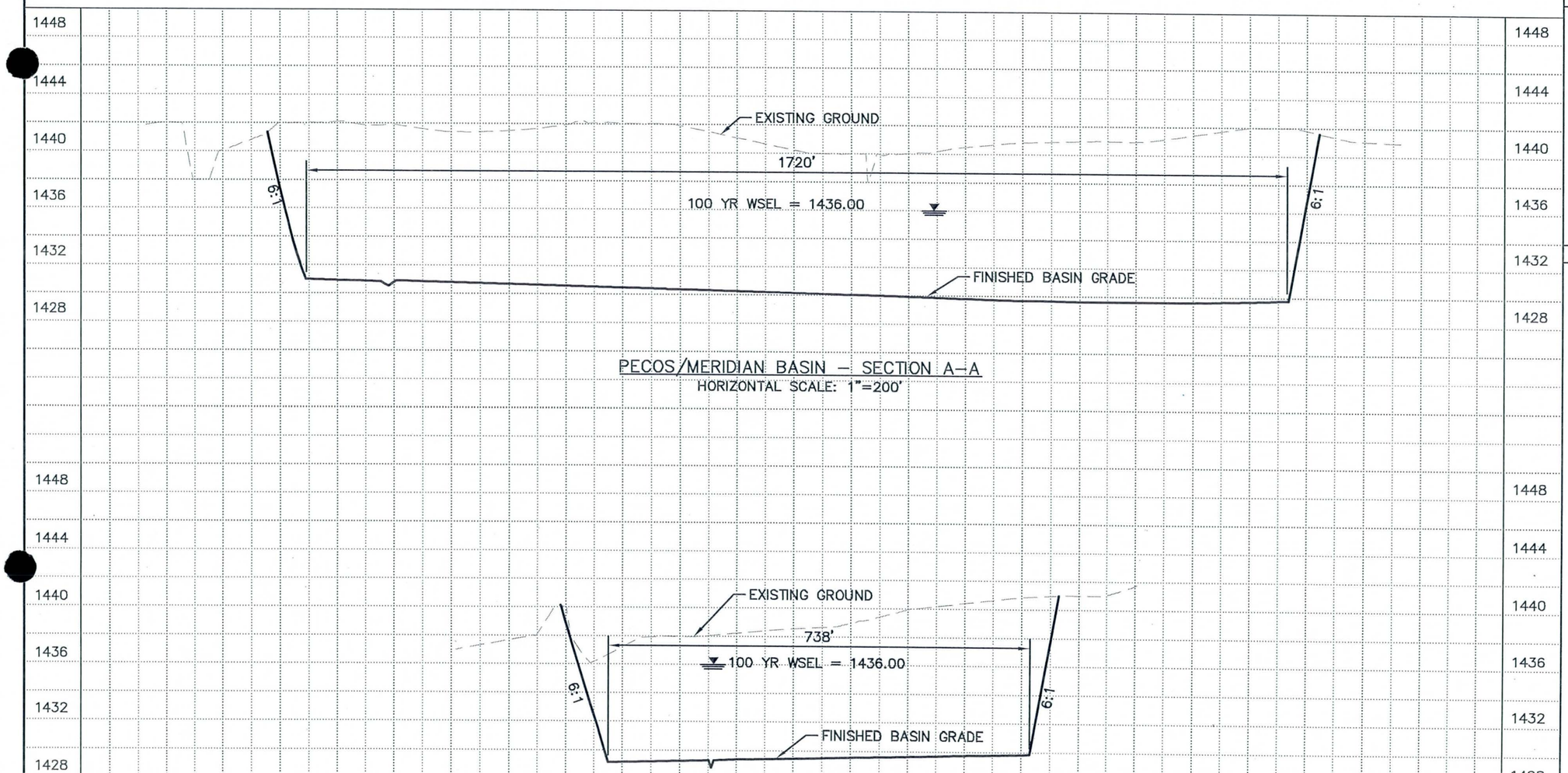
	BY	DATE
DES:	MAW	1/15
DR:	NAS	1/15
CK:	LSM	1/15

Kimley»Horn

DRAWING NO. DR13

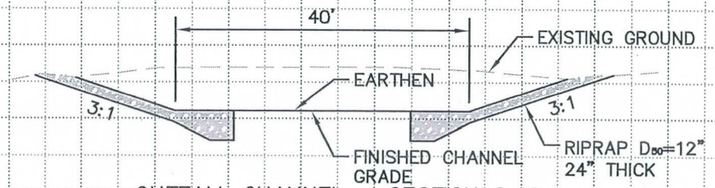
BASIN DETAIL PECOS/MERIDIAN BASIN

SHEET OF 14 15

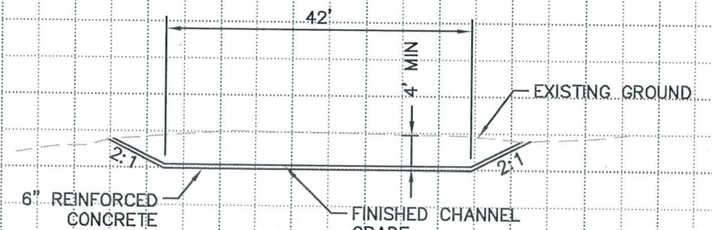


PECOS/MERIDIAN BASIN – SECTION A–A
HORIZONTAL SCALE: 1"=200'

PECOS/MERIDIAN BASIN – SECTION B–B
HORIZONTAL SCALE: 1"=200'



OUTFALL CHANNEL – SECTION O–O
SCALE: 1"=20'



MERIDIAN SOUTH CHANNEL
SCALE: 1"=20'

☐ REMOVE ☐

○ CONSTRUCT ○

VERTICAL 8 4 2 0

GRAPHIC SCALE
100 0 50 100 200
1 INCH = 200 FEET

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

PECOS ROAD CHANNEL AND BASIN DCR
442.03.20
FCD 2014C001–1

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DES:	MAW	1/15
DR:	NAS	1/15
CK:	LSM	1/15

Kimley»Horn

DRAWING NO. DR14

TYPICAL SECTIONS
PECOS/222ND STREET BASIN

SHEET OF 15 15