PHOENIX-MESA GATEWAY AIRPORT

EAST AREA AIRPORT MASTER DRAINAGE PLAN

PhxMesa Gateway Airport

Dibble Engineering

Dibble Engineering

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Letter of Transmittal

To: Roger Clark
Phoenix-Mesa Gateway Airport
5835 S. Sossaman Road
Mesa, AZ 85212-6014

Date: 9/11/2013
Re: East Area Airport MDP - FINAL
Client Project No: 712
Dibble Project No: 100821.1006

Attention: Roger Clark

Transmitted herewith are the following items:

- ☐ Plans/Prints
- ☐ Exhibits
- ☐ Proposal
- ☐ Other
- ☐ Specifications
- ☐ Opinion of Cost
- ☐ Change Order
- ■ Report
- ☐ Shop Drawings
- ■ Electronic Media

Copies	Date	I.D. Number	Description
3	9/11/13		East Area Airport Master Drainage Plan Report_FINAL (w/PDF on CD)
1	9/11/13		Comments Response form for Pre-Final submittal

These are transmitted as checked below:

- ☐ For Review & Comment
- ■ For Your Use
- ☐ Approval Requested
- ☐ Other
- ☐ For Your Record
- ☐ Returned
- ☐ Information Only
- ☐ Reference Document
- ■ As Requested
- ☐ Return when Finished

Remarks:

Roger,
As requested, 3 copies of the FINAL Master Drainage Plan report have been provided for your use along with a CD of the report on PDF as the hydrology models and the comment/response form.

Cc: City of Mesa, Bob Draper (1 Copy)
FCDMC, Cathy Regester (1 Copy)

Sincerely,
Dibble Engineering

Justin Beeler

Justin Beeler, P.E.

REPORT REVIEW COMMENTS & RESOLUTION FORM

Project Name: PMGA East Area Airport *Master Drainage Plan Report* *Client Name Project No.: 712*	**Submittal: Pre-Final Master Plan Report** **Consultant: Dibble Engineering** **Date: June, 2013**	**Disposition Codes:** A. Will Comply B. Consultant to Evaluate C. Client to Evaluate D. No Further Action

Item No	Agency	Reviewer	Comment No	Location (Sheet/DWG No)	Review Comments	Disposition Code	Response	Responder
1	COM	BD/LW	1	TOC-i	Fix spelling for "DRAINGE" on the heading	A	Will revise text	JTB
2	COM	BD/LW	2	Page 1	Be consistent with DMP, AMDP, ADMP, etc. - FIX	A	Will revise text	JTB
3	COM	BD/LW	3	Page 16	The drainage area (SUB O) that includes the new freeway should consider this break in the watershed so existing conditions and proposed conditions can be matched up.	D	The existing conditions hydrology model was based on the project study area provided by the client. The future conditions model is based on future conditions with the future SR-24 in place and the drainage areas do not match.	JTB
4	COM	BD/LW	4	Figure 3	Call Figure 3 "Existing Conditions Watershed Map prior to Freeway Development"??	A	Will update exhibit title	JTB
5	COM	BD/LW	5	Page 22 & Figure 5	Call Figure 5 "Proposed Conditions Watershed Map" ??	A	Will update exhibit title	JTB
6	COM	BD/LW	6	Page 16, 22, 24	Study area in the existing condition needs to be consistent with the proposed conditions. Such as SR 24 being built in order to reflect apple to apples conditions.	D	See Comment #3.	
7	COM	BD/LW	7	Page 23	All alternatives include the moving of the Ellsworth Channel. Need to explain that this is necessary to allow development of the new terminal at the airport	D	This was mentioned in Section IV.C. It has been further clarified that the PLF and Ellsworth Channels are necessary for the new terminals.	JTB
8	COM	BD/LW	8	Page 35	Explain the improvements anticipated at the PLF. Improvements will be limited "by others" in the SR24 ADOT Construction Plan Set. What improvements are you alluding to other than the actual crossing of the SR24 area?	A	Discussion of the PLF improvements from the existing confluence to the new connection with Ellsworth upstream has been added to the text along with an estimated improvement cost.	JTB
9	COM	BD/LW	9	Page 35	Reference the section of the report where the $1.4M is derived for the Ellsworth Channel. This number seems very low. What about costs to improve PLF?	A	Revised estimates have been produced by both the City of Mesa and Dibble Engineering. The revised estimate included the cost of the PLF upsizing and the Ellsworth Channel Relocation. The more conservative estimate (COM) was used for this planning effort. The detailed estimate is included in the appendix of the report.	JTB
10	COM	BD/LW	10	Page 35	Given that the FCDMC has said if the Ellsworth Channel is to be relocated, the upsizing of the Powerline Floodway will need to be done as part of this project - with no FCDMC cost share since they are happy with the current alignment. Please adjust estimate to account for the Powerline improvements needed from the "new" confluence to the "old" confluence.	A	A revised estimate for the Ellsworth Channel improvements along with the PLF estimate is now included in the text.	JTB
11	COM	BD/LW	11	Page 41	"least" should be "leased" in 1st paragraph, second sentence.	A	Will revise text	JTB

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Item No	Agency	Reviewer	Comment No	Location (Sheet/DWG No)	Review Comments	Disposition Code	Response	Responder
12	COM	BD/LW	12	Page 43 - C.2	What is the basis of the 0.0020 ft/ft slope utilized? You have other alternatives that use a steeper slope. Why? Justify the use of this slope?	D	This change was made for the Recommended Plan storm drain design process. The estimated slope of the land from the southeast to the northwest is slightly higher than the average design slope used. Since this is for master planning purposes and the actual finished grades are unknown at this time, an average design slope slightly less than the existing grades was used for consistency sake instead of trying to make an estimate for each individual line.	JTB
13	COM	BD/LW	13	Page 44 - C.3	You talk about the storm drain capturing the 10-year, 2-hour peak runoff? Is this a misprint? Should be sized for the 10-year, 6-hour even though the FAA guidelines just call for the "10-year storm event".	A	Will revise text.	JTB
14	COM	BD/LW	14	Page 46 - C.5	If using the rational method, why are we referencing 10-year, 2-hour in section C.3? Rational IDF curves should be based on the 10-year, 6-hour rainfall depth.	A	Will revise text.	JTB
15	COM	BD/LW	15	Page 52	We are placing an onsite channel adjacent to the PLF? We may want to consider an alternative with first flush basins adjacent to the PLF for discharge. I know that the FCDMC has stated that 100-year, 2-hour is necessary but given the proximity of this project and the regional runoff down the Powerline Floodway along with the potential upsizing of the Powerline Floodway as part of the Ellsworth Channel relocation, it might be worth discussing this matter with the FCDMC to reconsider this retention requirement if it can be shown that hydrology and hydraulics can be justified and not serve an adverse impact on the overall system.	D	This option can be disucssed as a potential in the text for future developers, however for the master plan approach, direct discharge into the PLF after first flush will not be considered based on feedback from FCDMC.	JTB
16	COM	BD/LW	16	Appendix B	These site photos really have no value without a key map that indicates the locations of where the photos were taken, we don't know where they were shot.	A	A photo map has been prepared and will be added to the report.	JTB
17	COM	BD/LW	17	Appendix C	The initial abstraction for the existing conditions cannot be justified. This is the same value that is used for the proposed conditions - which is what value is expected after developed not before. Existing conditions evaluation indicates a desert rangeland and brush in the area prior to development. Change the LG card values to reflect a true existing conditions. Otherwise, justify the use of a 0.09 IA value. Existing land use also indicates the land use code of a developed airport with 0% vegetative cover and very low IAs? Not accurate. Expecting to see an IA closer to 0.30-0.35 for desert rangeland - according to the FCDMC hydrology values recommended. Fix or justify.	B	The areas outside the taxiways/runways are not truly open desert nor are they developed airport. The IA of .10 was intended to reflect something in between. Since the areas are open and unpaved, but were historically used as part of the air base it seems like the IA should to be lower than 0.30-0.35 ("Desert Rangeland") to reflect some level of residual compaction from its former use. Therefore, the IA for land use 621 has been changed to 0.25.	JTB/JLL

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Item No	Agency	Reviewer	Comment No	Location (Sheet/DWG No)	Review Comments	Disposition Code	Response	Responder
18	COM	BD/LW	18	Appendix E	Is 15 minute intervals appropriate for the hydrology of this size?	D	The 15 minute value on the IN record refers to the rainfall data interval and the first field on the IT record is the "NMIN" or tabulation interval in minutes. The NMIN is 5 or 2 minutes on the HEC-1 models in Appendix E.	JTB
19	COM	BD/LW	19	Appendix E	Why was the hydrology set up with PB cards and not JD cards? Generally, recommend using JD cards in this case because the area-reduction relationship is not applied from the overall to the smaller watershed areas. By using a PB card (and utilizing this information for infrastructure sizing), you are using a reduced rainfall depth applied to each watershed that applies only to the overall watershed and area reduction. Please justify.	D	Storm drains are sized using the Rational Method. The 100-year, 2-hour HEC-1 model is run to evaluate the performance of the onsite 100-year, 2-hour required storage and to size the regional storage basin. The FCDMC manual states that the single storm approach can be applied regardless of the number of subbasins used for situations that required runoff magnitudes at one point in the watershed. Since the hydrology model is used for sizing the regional storage basin, use of the PB record is applicable. The PB/PC records were also used on the 2001 Gateway Airport drainage master plan prepared by Gilbertson Assoc. It was decided to follow this methodology at the beginning of this project.	JTB
20	COM	BD/LW	20	Appendix G	Why wouldn't the relocation of the Ellsworth Channel be part of Phase 1 development? Recommended plan cost estimates should include the Powerline Floodway channel upsizing needed for the relocation of the Ellsworth Channel. This upsizing represents a significant cost associated with the overall drainage costs associated with this east area of the airport. All anticipated costs need to be on the table for the Ellsworth Channel relocation.	A	The relocation of the Ellsworth Channel and the upsizing of the PLF is now included in the Phase 1 elements.	JTB
21	FCDMC	CR	1	Report, General	There are several instances throughout the report where "detention" of the "first flush" is called out. Please be aware that the District does not accept untreated "first flush" waters to any of its facilities. The " first flush" volume must be retained onsite or adequately treated through a water treatment structure such as an oil/ grit separator prior to discharge into the District's facility. Detention of "first flush" waters in a detention basin is not considered adequately treated.	A	Discussion of first flush has been added to part D of Section I, and clearly states that the first flush must be retained, and not discharged into the Ellsworth Channel/PLF/EMF	JLL

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22	FCDMC	CR	2	Report, General	On page 8, it is stated: "Future designers should seek a variance for direct discharge for the airfield areas due to the need to eliminate bird attraction. Discussions to determine a suitable discharge variance with the FCDMC will need to be made for airfield area discharge during final design." What is the current discharge proposed under the recommended alternative? Is there an alternate plan should a mutually "suitable discharge variance with the FCDMC" not be attained?	A	The current discharge is direct discharge into the PLF with no treatment, and the proposed approach is to seek a direct discharge variance to continue this approach. If a variance is not granted, then the water collecting at the end of the runway will need to be collected and rounted westerly toward Detention Basin North or other discharge location. This discussion is included on P.8.	JLL
23	FCDMC	CR	3	Report, General	On page 20, it is stated: "The model results indicate that the peak flow difference expected for the 100-Year, 24-hour storm event is approximately 230-cfs higher than the existing condition discharge at the final downstream combine point. The volume difference at this location is about 98-acre-feet higher than existing." It appears that this is a comparison of the existing conditions to the future conditions without the recommended alternative. Please provide a comparison of existing to future with recommended alternative for the discharges and runoff volumes. Please identify the name of the concentration point(s) where this comparison is being made and include the corresponding digital HEC-1 models in the next submittal.	A	This comparison is now provided in Section V. D. of the Recommended Plan in the Final report.	JLL
24	FCDMC	CR	4	Report, General	Please be aware that the purpose of the PLF is to provide an outfall (ungated) for draining the three upstream flood retarding (dam) structures. A storm event filling these structures could require up to 30 days to drain, during which time, the PLF could be running at capacity for many days. The District can neither assure capacity within the PLF to drain the proposed on-site airport regional basin within a 36-hour drain time nor can it guarantee that capacity will be available to accept overflow spillway flows in the event of back-to-back storms from the regional basin as proposed in the report.	A	The report now calls this potential scenario to the attention of the reader, and states that if this occurs, the airport will need to have an active management plan, which may include vector control and bird detraction devices.	JLL
25	FCDMC	CR	5	Report, General	The *Phasing and Implementation* section of the report can be difficult to follow. For example, Priority No. 1 calls for a box culvert crossing in the PLF on Gateway Blvd. Gateway Blvd will also cross Ellsworth Channel near the PLF. However, no crossing of Ellsworth Channel is called for and the relocation of Ellsworth Channel is not called for until Priority No. 2. Please explain.	A	The phasing plan will be modified to include the full relocation of the Ellsworth and PLF channels as part of Phase 1.	JTB

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26	FCDMC	CR	6	Report, General	Please note that the capacity of the PLF will need to be increased between the current confluence and the relocated confluence with the Ellsworth Channel in order to accommodate the additional flows at the more upstream confluence location. At this time, neither the size of the new section of channel nor the flow regime has been determined. Currently, flow in the PLF is supercritical in the concrete lined portion. The District requires clear span (bridge) crossings of the PLF in the sections flowing supercritically. A subcritical flow regime would be required for the consideration of the proposed box culvert crossing of the PLF.	A	The phasing plan will be modified to include the full relocation of the Ellsworth and PLF channels as part of Phase 1. The crossing locations on the PLF for airport access will be over a subcritical section of the channel (downstream of the Ellsworth confluence). It was decided that the crossings themselves will be part of the roadway costs and not the overall drainage master plan costs.	JTB
27	FCDMC	CR	7	Report, General	Proposed changes impacting the PLF will require a permit from the District's Right-of-Way Permits Branch. It is recommended that you contact Shelby Brown (sjb@mail.maricopa.gov or 602-506-4583) of the Permits Branch as early in the planning and design stages as possible.	A	A section has been added in Section VI of the report summarizing the District's requirements for construction within the Ellsworth Channel, Powerline Floodway, and the EMF.	JLL
28	FCDMC	CR	8	Report, General	Per IGA with the City of Mesa, proposed changes to the Ellsworth Channel should be submitted to the District for review. Shelby Brown is also the contact person for coordination with the District for the Ellsworth Channel review.	A	See response to Comment 7.	JLL
29	FCDMC	CR	9	Report, General	We have not reviewed the specific details of this plan nor have we determined whether this development meets current standards relating to flood protection or stormwater management but rather we will rely on the expertise at the City of Mesa to provide such review.	A	A statement regarding COM's review has been added to Section III.A.2 of the report.	JLL

Phoenix-Mesa Gateway Airport

East Area Airport Master Drainage Plan

MASTER DRAINAGE PLAN REPORT

September 2013

PhxMesa Gateway Airport

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ARIZONA, U.S.A.
Expires 03/31/15

Project #100821.1006

AIRPORT MASTER DRAINAGE PLAN REPORT

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APPENDICES

EXECUTIVE SUMMARY

This Airport Master Drainage Plan Report (AMDP) is prepared for the Phoenix-Mesa Gateway Airport Authority (PMGAA). In this report, the formulation and evaluation of flood control alternatives is described which culminates with the recommendation for the preferred drainage plan for subsequent design phases. This report incorporates the results of previous reports that were submitted for the Existing Conditions Hydrology (Appendix C-E) as well as the Alternatives Analysis (Appendix F) which included preliminary hydraulic infrastructure locations and sizes, and a preliminary cost analysis.

Seven alternatives were evaluated and considered as part of the Alternatives Analysis process. These alternatives were reviewed by PMGAA, the City of Mesa, and the Flood Control District of Maricopa County (FCDMC). Some of the typical concepts initially considered as alternatives were determined not to be consistent with current FCDMC policy. Consistent with past Drainage Master Plan recommendations, the airport has historically provided detention storage to attenuate post-development discharge rates to be at or less than the existing conditions discharge rates. Discussions with FCDMC revealed that critical downstream FCDMC channel and retention basin facilities were sized based upon the assumption that all upstream development would employ the FCDMC storage requirement of 100-year, 2-hour retention. Therefore, all of the previously proposed alternatives which did not meet this storage requirement were eliminated from further consideration.

The alternative that emerged as the Recommended Plan provides for 100-year, 2-hour retention on all future tenant parcels and provides regional storage for airport\airside areas that will not have space available for on-site surface retention. A storm drain system designed to provide roadway drainage for the 10-year storm will also provide a method to "bleed off" the future tenant onsite storage basins within the required 36-hours (see **Figure 11**). Runoff from the airport facilities will be conveyed to the regional storage basin (Retention Basin NE) through a combination of a 10-year storm drain system and surface conveyance. The Retention Basin NE is sized to accommodate the 100-year, 2-hour street and airport facility site runoff, with flows in excess of the 10-year pipe system being conveyed via surface flow. Facility designers will need to ensure proper conveyance in future designs for this overland flow. The storm drain facilities, regional storage basin and onsite storage basins have been designed at a conceptual level for this master plan report and the estimated cost for the Recommended Plan is $24.2 M. The drainage planning developed in the AMDP is generally consistent with the *Northeast Area Development Plan* (NADP) with sufficient flexibility to allow future designers to adjust as the final East Area program is implemented.

I. INTRODUCTION

A. Objective

This *East Area Airport Master Drainage Plan Report* (AMDP) is prepared for the Phoenix-Mesa Gateway Airport Authority (PMGAA). This report includes the formulation and evaluation of flood control alternatives, and culminates with the recommendation for the preferred drainage plan for subsequent design phases. The Existing Conditions Hydrology Report and the Alternatives Analysis reports were previously submitted and reviewed as draft documents. Revisions to these reports have been incorporated into this *Final East Area Master Drainage Plan Report* and will not be issued separately as final documents.

The purpose of this AMDP is to identify flexible cost-effective flood control measures for the airport's eastern area considering other significant projects and ultimate build-out conditions. This AMDP has developed and identified preliminary costs, alignments and phasing opportunities for the recommended drainage plan. PMGAA is planning to move air carrier operations to the east side of the airport in the future. This AMDP is a preliminary step to evaluate and recommend the drainage infrastructure required to support this future development.

B. Study Area

The study area for the AMDP is located within the Phoenix-Mesa Gateway Airport in Sections 28, 29, 32 & 33 of Township 1S Range 7E and consists of the triangular shaped area generally bounded by Runway 12C/30C to the southwest, the Powerline Floodway (PLF) to the north and Ellsworth Road to the east. The total watershed area is approximately 1.95-square miles, which lies within the jurisdiction of the City of Mesa. The study area is shown regionally on **Figure 1 – Project Location Map** and in more detail on **Figure 2 – Project Vicinity Map**.

In addition, the currently under-construction ADOT facility, State Route 24 (SR-24), will traverse the northeast corner of the site, re-directing offsite runoff. This runoff has historically entered the Ellsworth Channel and discharged to the PLF. The airport is seeking acquisition of areas between the current Ellsworth Channel and the SR-24 and will relocate the Ellsworth Channel to the northeast to allow contiguous development.

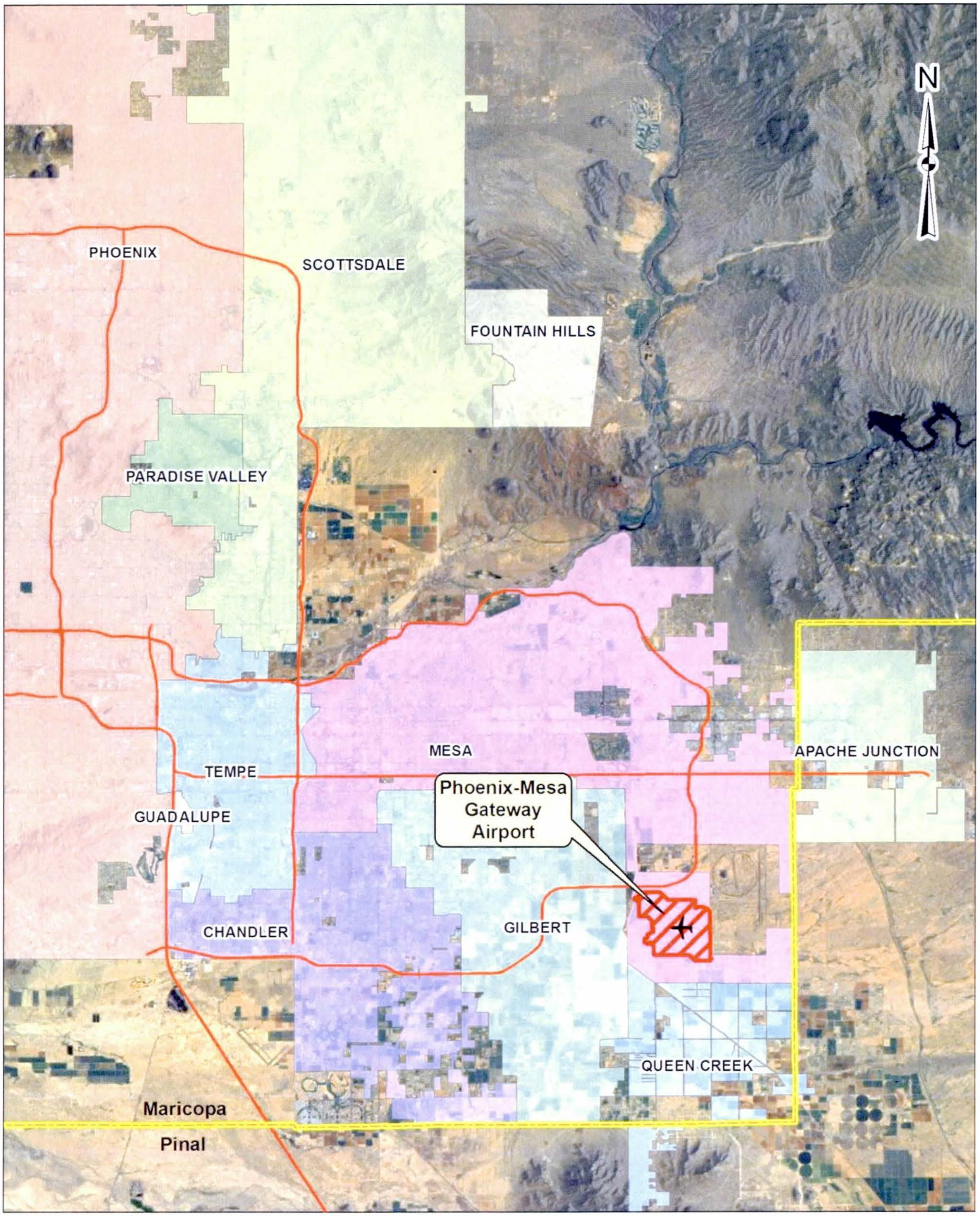


Figure 1 – Project Location Map

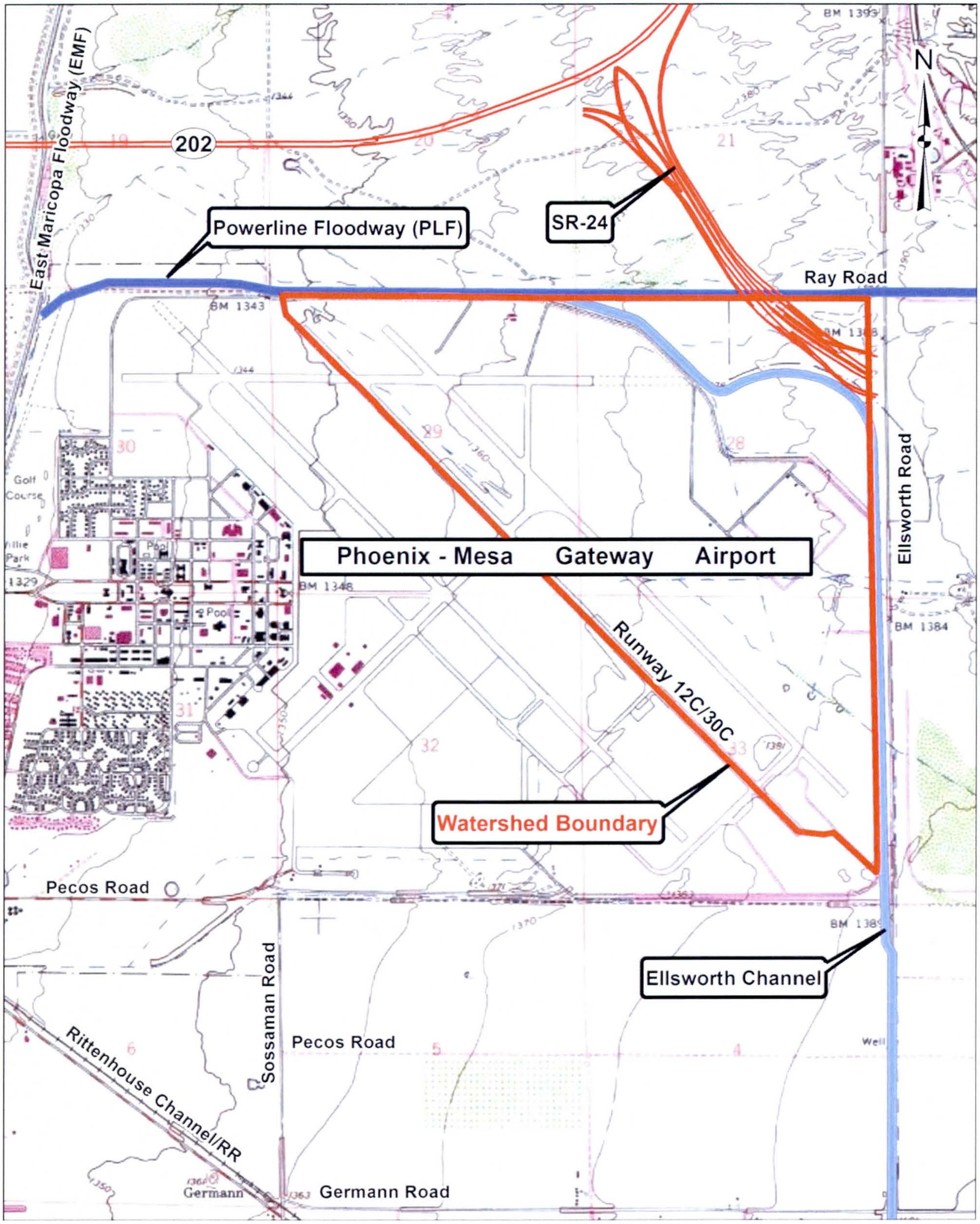


Figure 2 – Project Vicinity Map

C. Background

Based on anticipated development at the airport, past drainage planning studies focused their recommendations for drainage improvements on the area of the airport west of the Center Runway (Runway 12C/30C). The west side of the airport is currently in development utilizing the most-recent *Hydrology Study and Airport Master Drainage Plan* that was prepared by Gilbertson & Associates in 2001. That study has been used to assist in development of drainage costs and phasing for the Airport Capital Improvement Plan, and to define drainage criteria and provide a template for the overall planning and final design for drainage infrastructure in each regional basin area on the west side of the airport.

As PMGAA begins terminal and related planning for development on the east side of the airport, a similar drainage guidance document is needed for the east side. The scope of this project is to provide PMGAA an *East Area Airport Master Drainage Plan* (AMDP) that provides future design guidance for both airside (FAA criteria, "inside the fence") and landside (City of Mesa criteria, "outside the fence") drainage infrastructure east of the Center Runway. The project study area is bounded by the north proposed ultimate property boundary (the relocated Powerline Floodway), the south property boundary; the Ellsworth Road Channel on the east, and the 12C/30C Runway on the west.

Much of the airside infrastructure of the airport was developed during its early days as an Air Force Base. Past studies have shown that much of the existing drainage infrastructure does not conform to current FAA requirements for airfield drainage. This AMDP evaluates the existing infrastructure, recommends improvements to the drainage facilities to meet current FAA drainage criteria, and ensures that future airfield development includes 100-year, 2-hour retention.

The AMDP project has been completed in three phases, including:

1. Data Collection and Existing Conditions Analysis
2. Alternatives Analysis of Proposed Conditions
3. Final Master Plan, Phase Implementation & Cost Analysis

Data Collection began with developing a comprehensive existing facilities and infrastructure template that provided the basis for the Existing Conditions hydrology analysis. This model was based on the model from the Hydrology Study/Drainage Master Plan by Gilbertson & Associates, and was used to identify current flow patterns, runoff rates, and maximum discharges from the airport to offsite receiving facilities.

When the Existing Conditions model was completed, Dibble Engineering (Dibble) included components from the *Northeast Area Development Plan* (NADP). The NADP was prepared by Jacobs Engineering Group, Inc. in conjunction with this AMDP to evaluate land use, transportation, utilities and phasing requirements for development of both aviation and revenue-generating uses on the east side of the airport. The initial conceptual infrastructure alternatives from the NADP were used to identify constraints to drainage development, necessary assumptions for development, and to prepare a Developed Conditions Hydrology model. This model provided the basis for the overall planning of the impacts of the drainage infrastructure on the surrounding areas. The next step in the AMDP process was to prepare and submit an Alternatives Analysis Report identifying multiple drainage alternatives for stakeholder review. See **Section I.D** for more information regarding the Alternatives Analysis.

For this final East Area Master Drainage Plan Report, Dibble has prepared an overall Hydrology and Hydraulics drainage plan for the Recommended Alternative, an overall drainage construction phasing plan based on the NADP, and an initial cost estimate for incorporation into the PMGAA CIP process.

Given that PMGAA may refine the recommendations of the NADP, particularly with respect to overall phasing implementation, the AMDP offers a flexible template for future development that may be adjusted as required by the implementation of the final East Area Development Program.

A Conceptual Grading Plan was also prepared to help form a basis for an earthwork mass balance, identifying low areas, fill volumes, and a recommended earthwork specification so PMGAA can evaluate the long-term need for fill material on the east side of the airport. This allows beneficial placement of excess material from other projects within the airport and import locations for any potential off-airport projects seeking to donate quality fill material.

D. Agency Review, Comments, and Resolutions

Initial comments were received from PMGAA following the submittal of the Draft Alternatives Analysis report dated December, 2011. The comments involved assumptions made for the land use costs, the greenbelt basin storage and the storm drain pipe types. A memo addressing these comments was provided to PMGAA in March, 2012. The City of Mesa then provided their comments in June, 2012. The City's comments included concerns that several alternatives presented were not consistent with the City of Mesa criteria, due to the employment of "detention" for the onsite and regional storage facilities instead of "retention" basins. The City typically requires developments to retain the 100-year, 2-hour runoff volume onsite.

Since storm water runoff from the northeast portion of the Airport discharges into the Powerline Floodway (PLF), a facility owned by the Natural Resources Conservation Service (NRCS) and operated by the FCDMC, planning methodologies and deliverables had to be consistent with FCDMC requirements. The FCDMC reviewed the initial hydrology and provided comments in August, 2010 and provided comments on the Alternatives report in September, 2012. One of the comments received from FCDMC questioned a statement in the Alternatives report which noted,

> *"Typical developments of this type are generally required to retain storm water runoff per the City of Mesa design standards…. However, the PMGAA is a special case and has set a precedent where regional detention basins are utilized to limit discharge to the PLF. Limiting the discharge to pre-development rates is the most significant regulatory factor and is ultimately the goal of this drainage plan… Discussions with the FCDMC have resulted in consensus that the proposed discharge rates must be less than or equal to existing discharge rates."*

Based on the FCDMC position, several of the design approaches used for the alternatives analysis based on providing detention storage to reduce post-development discharge rates leaving the airport to predevelopment flows were no longer valid.

Based on current comments, it is clear that the FCDMC has significant concern regarding the capacity of the PLF, the East Maricopa Floodway (EMF) and related downstream facilities. These facilities have been designed assuming development areas, including the East Airport Terminal area, will incorporate 100-year, 2-hour retention. Therefore, the Recommended Plan for the airport includes 100-year, 2-hour retention with new discharges into the PLF limited to "bleed-off" rates, as defined by FCDMC staff to be approximately 10 cfs.

Additionally, the FCDMC does not accept untreated "first flush" to its facilities. It should be noted that the basin volumes discussed in this report do not include first flush volume. Nor do the discharge rates discussed in this report reflect first flush treatment. The final design should include appurtenances such as oil/grit separators or first flush retention as part of the overall system design to accommodate this requirement. Alternatively, future designers may seek a variance for direct discharge from the airfield areas due to the need to eliminate bird attraction. The FCDMC has indicated that an application for variance will be entertained, but not guaranteed. A variance from the FCDMC for direct discharge for the airfield areas to mitigate bird attraction to standing water should be pursued in the future. A secondary plan should be developed for the airfield drainage in case the FCDMC does not approve the variance request. Solutions may include draining flows away from the end of the runway to other existing discharge points north of runways 12L and 12C or to the existing Northwest Basin.

E. Watershed Characteristics

The majority of the contributing drainage area for this project is currently vacant ground with runway and taxiway pavement areas. Currently the taxiway and runway pavement areas drain into the existing airfield. The subbasin delineation is based on runway and taxiway centerlines as well as other landmark features that direct or divide surface runoff. The Ellsworth Channel and Powerline Floodway Channel are designed for the 100-year event and prevent offsite runoff from entering the airport from the east or north. Therefore, no offsite drainage areas are included in this AMDP.

The study area is situated in a semi-arid climatic zone characterized by hot summers and mild winters with average annual rainfall between six and nine inches. The watershed is subject to three primary wet seasons. The first season, during the winter months, is characterized by Pacific storms producing widespread, low intensity rainfall. The second is during the summer and is characterized by thunderstorms produced by moist air from the Gulf of Mexico. The third season, from late summer to fall, is characterized by rain produced from tropical thunderstorms arising in the Pacific. Generally, the summer thunderstorms produce the greatest rainfall amounts and intensities.

II. DATA COLLECTION

A. Previous Reports & Studies

Other drainage studies have been performed for the airport including two master plan studies: the *Master Drainage Plan – Williams Gateway Airport* prepared by Dibble and Associates in August 1996 and the *Williams Gateway Airport – Hydrology Study/Drainage Master Plan* prepared by Gilbertson Associates in October 2001. Estimated peak discharge rates at the key outfall locations from the October 2001 study were evaluated for comparison with the results of this AMDP. The flow rates at the key discharge locations into the Powerline Floodway and Ellsworth Channel are included in **Table 1**.

Table 1 – Gilbertson Study Airport Discharge Flows

October 2001 Study		
HEC-1 ID	$Q_{100y,6h}$ (cfs)	Receiving System
CP8N	335	PLF
CP3N	294	PLF
1N	255	Ellsworth Channel

B. Floodplains

The study area is located in an area designated by the Federal Emergency Management Agency (FEMA) as Flood Zone D (Flood Insurance Rate Map (FIRM) No. 04013C2685H & 04013C2695H) effective date of 9/30/2005. According to FEMA, the Zone D designation is used for areas where there are possible but undetermined flood hazards. In areas designated as Zone D, no analysis of flood hazards has been conducted. Mandatory flood insurance purchase requirements do not apply, but coverage is available. The flood insurance rates for properties in Zone D are commensurate with the uncertainty of the flood risk. The study watershed is shown superimposed on the two FIRM panels on an exhibit in **Appendix A**.

C. Rainfall

The FCDMC manual states that NOAA Atlas 14 is to be used for all drainage design purposes in Maricopa County. Several cities within the county, including the City of Mesa, have adopted the drainage policies set forth by the FCDMC. Therefore, this study uses point precipitation rainfall values obtained from NOAA Atlas 14. The project rainfall data is shown in **Table 2**.

Table 2 – NOAA Atlas 14 Project Rainfall

Duration	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
5 MIN	0.248	0.335	0.403	0.494	0.564	0.636
10 MIN	0.377	0.511	0.613	0.752	0.859	0.968
15 MIN	0.468	0.633	0.760	0.932	1.065	1.200
30 MIN	0.630	0.853	1.023	1.255	1.435	1.617
1 HOUR	0.780	1.055	1.266	1.553	1.775	2.001
2 HOUR	0.887	1.179	1.406	1.711	1.949	2.194
3 HOUR	0.934	1.226	1.457	1.779	2.035	2.302
6 HOUR	1.116	1.426	1.671	2.007	2.273	2.550
12 HOUR	1.258	1.587	1.847	2.199	2.468	2.744
24 HOUR	1.512	1.941	2.283	2.754	3.122	3.508

D. Site Visits

Dibble Engineering visited the site on March 8, 2010 to verify drainage conditions, roughness coefficients, and to document site conditions. Photos from this site visit are included in **Appendix B**.

E. Soil & Land Use data

Soil types within the watershed are determined from the SCS Soil Survey of Aguila-Carefree Area, Arizona, Parts of Maricopa and Pinal Counties, April 1986. Land use data was based on recent aerial photography and field verification. Maps have been included in **Appendix C** to illustrate the Land Use and Soils used for the hydrologic analysis.

III. HYDROLOGY

A. Drainage Criteria

The criteria for this analysis are broken into two distinct areas – Airside and Landside. As the name implies, airside refers to all airfield operations areas. Landside refers to all other areas within the airport such as areas to be developed by private tenants with airfield access. These specific criteria are described in detail as follows.

1. Airside Criteria

Airside drainage criteria are defined in the Federal Aviation Administration (FAA) AC 150/5320-5C Change 1 (*Surface Drainage Design*). The FAA has established various drainage criteria for design within airports. In regards to this AMDP, two specific criteria are considered to be relevant. First, the FAA recommends that infield areas convey the 5-year storm event without encroachment of runoff on taxiway and runway pavements (including paved shoulders). This means that the 5-year event cannot cause a ponded condition within the infield conveyance area that would extend into a paved taxiway or runway. Second, the center 50% of runways/taxiways/helipads should be free from ponding resulting from the 10-year storm event.

2. Landside Criteria

The landside criteria are set forth in the *Drainage Design Manual for Maricopa County Arizona Volume I, Hydrology Manual* (Hydrology Manual). This manual establishes the uniform criteria for hydrologic modeling with Maricopa County. The City of Mesa will provide review of the final plan as it pertains to current standards for flood protection, storm water management and roadway drainage design.

B. Methodology

1. Modeling

According to the Hydrology Manual, the required modeling program is the U.S. Army Corps of Engineers, HEC-1 Flood Hydrograph Package (Version 4.1 – June 1998). Guidance is given in the Hydrology Manual for application of the HEC-1 program within Maricopa County. Additionally, the computer program Drainage Design Management System for Windows version 4.6.5 (DDMSW) is used as a pre-processor to aid in the application of the methods described in the Hydrology Manual.

2. Rainfall

The NOAA Atlas 14 rainfall depths generated by DDMSW are point rainfalls for specified frequencies and durations. This is the depth of rainfall that is expected to occur at a point or points in a watershed for the specified frequency and duration. A reduction factor is used to convert the point rainfall to an equivalent uniform depth of rainfall over the entire watershed. As the watershed area increases, the reduction factor decreases which has the effect of reducing the point rainfall value. The reduction reflects the greater non-homogeneity of rainfall for storms of larger areas. Precipitation values are reduced based on contributing drainage area using depth-area reduction factors according to the Hydrology Manual. This is done automatically by DDMSW based on the total watershed area. In this AMDP, DDMSW uses a 0.98 reduction factor for the 1.95 square mile watershed area to reduce the 100-year, 6-hour rainfall of 2.55-inches to the 2.50-inch rainfall value that is used in the HEC-1 model.

3. Rainfall Losses

Rainfall losses are modeled using the Green and Ampt infiltration equation. The rainfall loss parameters are developed using guidance provided in the Hydrology Manual. The Green and Ampt infiltration equation parameters are based on logarithmic area-averaging of the map unit hydraulic conductivities (XKSAT) for the mapped soils in each subbasin, and the selection of capillary suction (PSIF) and soil moisture deficit (DTHETA) based on the calculated subbasin value of XKSAT. The bare ground XKSAT values for each subbasin are then adjusted for vegetation cover. The calculation of these parameters is accomplished within DDMSW.

Soil types and hydrologic parameters are established for each subbasin using the GIS update within DDMSW. DDMSW imports the specific soil areas for each subbasin and computes the weighted values for the parameters "XKSAT" and "Rock Outcrop" (%).

DDMSW is also used to import the specific land use areas for each subbasin and compute the weighted values for Initial Loss (IA), Percent Impervious (RTIMP), Vegetation Cover, Moisture Deficit (DTHETA), and Resistance Coefficient (Kb). A GIS shapefile was prepared to represent the land use based on recent aerial photography. Custom land use codes were created within DDMSW based on existing land use codes which most closely represented the existing land uses based on the aerial imagery.

Initial losses (IA) were accounted for by land use. Two distinct types were used: (620) Airports (taxiways, runways, etc.) uses an IA of 0.05 as recommended in the FCDMC manual for developed airports. The second land use (621) represents infields and open space. This was input as a custom land use with an IA of 0.25. The 0.25 value was chosen based on engineering judgment and is intended to represent open space formerly used by the Williams Air Force Base which is slowly returning to a condition similar to open desert.

4. Channel Routing

The Normal-Depth routing method is used for this hydrology study. The routing parameters are based on 1-foot contour mapping, recent aerial photography and field investigations. NSTPS are the number of steps to be used in storage routing. NSTPS values were set by DDMSW and back checked for accuracy using the equation, NSTPS = (Reach Length/average velocity)/NMIN. In each case, the NSTPS values determined by DDMSW were within a reasonable difference to the calculated value and the DDMSW determined value was used. A detailed breakdown of the soil, land use, and subbasin loss parameter data and maps are contained in **Appendix C**.

5. Stage-Storage-Discharge Relationship

There are multiple reservoir storage routes within the HEC-1 models. Typically these storage areas are within the infield areas of the airport where runoff will collect at a low point until it will drain through a culvert to the next area. The stage-storage-discharge relationship for each storage location is established using the AutoCAD Civil3D surface modeling software package. The cumulative volume at each storage area is input into the HEC-1 model at even or half-foot elevation increments throughout the range of storage within the basin.

Discharge rating curves corresponding with the stage on the Storage Elevation (SE) record were developed for the bleed-off culverts and spillways using the Federal Highway Administration (FHWA) HY-8 computer program. The HY-8 program computes a stage-discharge rating curve for the basin outlet culvert pipe over a range of discharges accounting for inlet control, outlet control, or tailwater control. The stage-discharge relationship is input into the HEC-1 model for the hydrologic routing computation. A summary of the culverts modeled for the hydrology analysis is included in the Results section of this report. The HY-8 program output data are included in **Appendix D**.

With the stage-storage-discharge relationship established, the HEC-1 model performs a hydrologic routing of the inflow hydrograph through the basin. The model computes the maximum water surface elevation of ponding, the volume of runoff stored, and the peak discharge from the basin outlet. Output from the HEC-1 analyses are included in **Appendix E**.

C. Existing Conditions

1. Subbasin Delineation

The 1.95-square mile study area is divided into 18 subbasins for the Existing Conditions model ranging in size from 17 to 207-acres. Drainage subbasins are delineated along predominant features that affect the flow direction. Subbasin delineations are made using a combination of 1-foot contour mapping, aerial photography and field investigations. The project drainage areas, shown on **Figure 3 – Existing Conditions Watershed Map, Pre SR-24(2010),** consist of taxiway and runway pavement, unpaved infields and natural desert open space.

2. Naming Convention

The subbasin naming convention reflects the HEC-1 hydrology modeling logic and uses incrementing alphabet characters along with the prefix "SUB". Therefore, the first drainage area, "SUBA" will drain downstream and combine with "SUBB" and "SUBC". A route conveying runoff from SUBA to SUBC has a prefix of "RT" and is named, "RTAC".

Combination point names have a prefix of "CP" followed by the name of the drainage area where the combine occurs. Therefore, "CPP" is the combined runoff from SUBP along with any other routes and drainage areas that outfall at that location.

Storage facilities store runoff from a single drainage area or a combination of drainage areas and routed flows. Therefore the storage routes have the prefix, "RS" followed by the drainage area identifier or the combine point identifier. "RSCPG" stores the flows that combine at "CPG".

Diversion records require two names to identify the diverted flow for each travel path. The name on the KK record has a prefix of "DI" followed by the identifier of the drainage area that is diverted. The name on the DT record has a "DD" prefix followed by the same identifier. When the diversion is retrieved, the "Divert-Retrieve" will have a "DR" prefix followed by the drainage area identifier on the KK record and DR record has the same name used on the previous DT record.

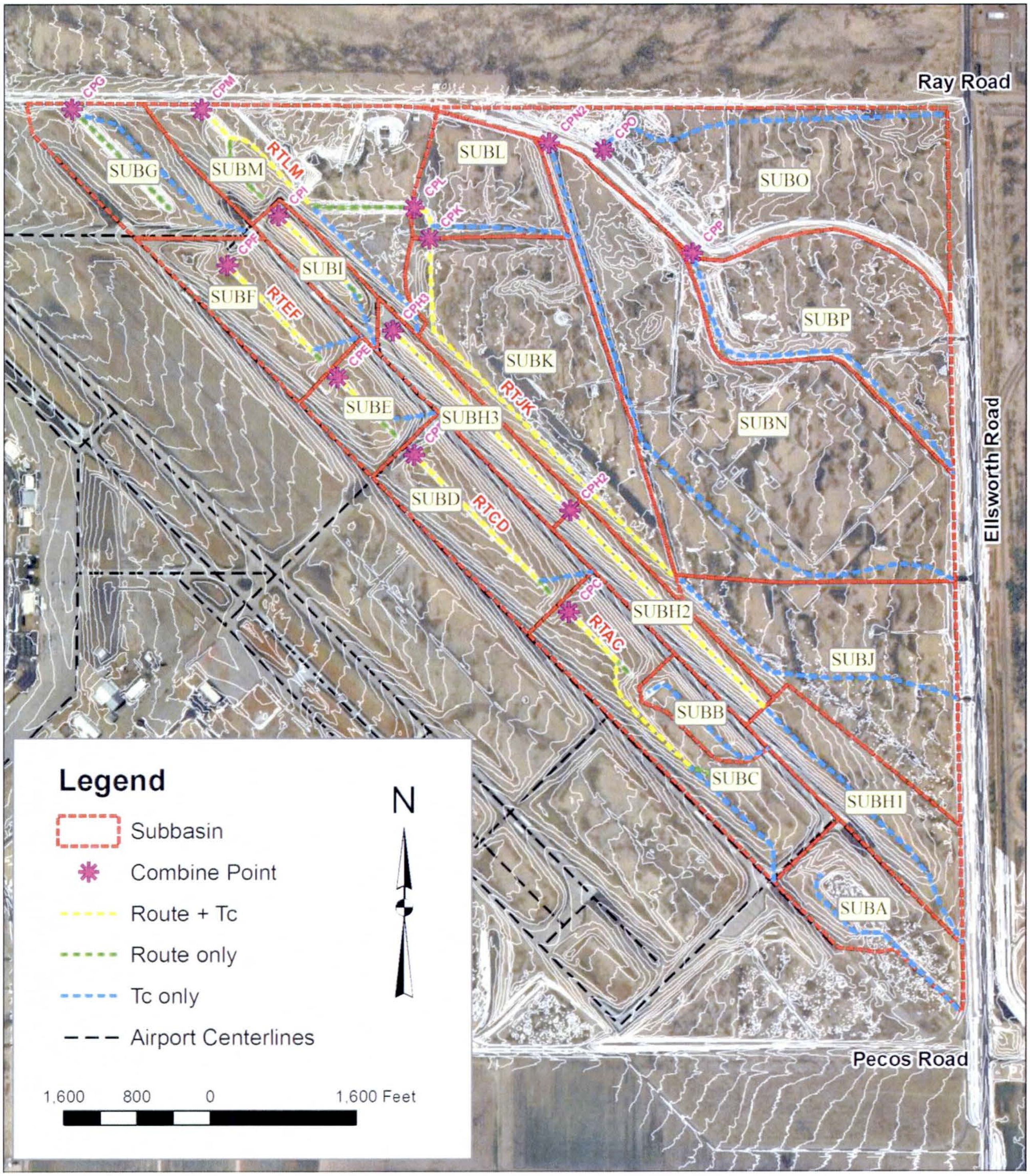


Figure 3 – Existing Conditions Watershed Map, Pre SR-24(2010)

3. Results

The 6-hour and 24-hour durations for the 5-year, 10-year, and 100-year events were each modeled for the Existing Conditions Analysis using NOAA Atlas 14. Peak discharges for the study area are shown on **Figure 4 – Flow Summary Map**. Historic discharge points into Ellsworth Channel and the PLF channel are identified on this map. A comparison of peak discharges at the historic outfall locations between the October 2001 study and this study is shown below in **Table 3**. Various changes to the airport layout since 2001 have resulted in a difference to the contributing watershed areas, and therefore to the discharge rates at each outfall into the Powerline Floodway. However, both study results have a similar unit flow rate per area of approximately 0.80 cfs/ac for the 100-year, 6-hour storm event.

Table 3 – Drainage Study Comparison Table

Gilbertson October 2001 Study				Dibble Engineering 2010 Study		
HEC-1 ID	Area (ac.)	$Q_{100y,6h}$ (cfs)		HEC-1 ID	Area (ac.)	$Q_{100y,6h}$ (cfs)
CP8N	314	335		CPG	307	277
CP3N	378	294		CPM	480	410
1N	320	255		SUBN	224	209

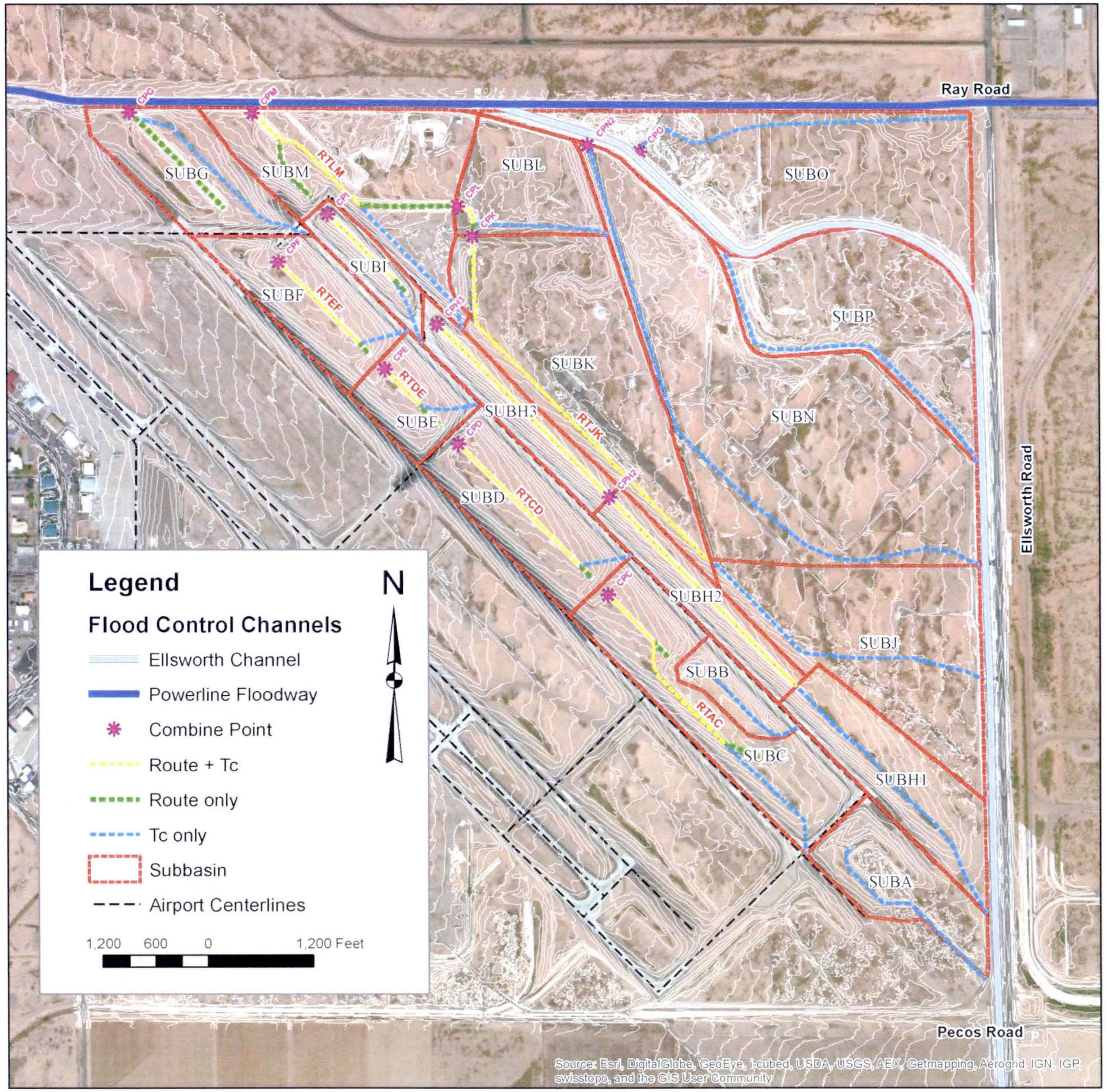
Other supporting data used for the hydrology analysis that was developed using DDMSW such as subbasin, soils, land use, routes, and storage parameters are included in **Appendix C**. A summary of the existing culverts analyzed for this hydrology analysis is included in **Table 4**.

Table 4 – Culvert Summary

Culvert ID	HEC-1 ID	Culvert Description	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Slope (ft/ft
1	RSCPG	2-36" RCP	137	1337.56	1336.00	0.0114
2	RSCPM	2-36" RCP	126	1341.89	1339.00	0.0229
3	RSCPF	5-30" RCP	857	1344.95	1340.54	0.0051
4	RSI	3-30" RCP	240	1347.33	1346.64	0.0029
5	RSCPE	5-30" RCP	241	1350.05	1349.34	0.0029
6	RSH3	3-30" RCP	464	1352.30	1350.91	0.0030
8	RSCPD	4-30" RCP	250	1353.16	1352.26	0.0036
10	RSN	1-48" RCP	134	1364.59	1357.00	0.0566
11	RSCPC	3-30" RCP	242	1360.41	1359.70	0.0029
12	RSB	3-30" RCP	242	1364.49	1363.57	0.0038
14	RSA	1-24" RCP	1382	1375.15	1372.55	0.0019

The "HEC-1 ID" referenced in **Table 4** identifies the storage route name which incorporates that culvert within the HEC-1 model. HY-8 was used to evaluate the culverts within the infield areas in order to develop the Stage-Storage-Discharge relationship used within HEC-1. The "Culvert ID" aligns with the HY-8 culvert name as shown on the exhibit identifying the culvert locations included in **Appendix D**. The results from the HY-8 models are included in **Appendix D**.

The HEC-1 models for the 6-hour 5-, 10-, and 100-year models along with the 24-hour, 100-year model are included in **Appendix E**.



HEC-1 Flow Summary

6-Hour: 10-Year & 100-Year Results

Combine Points

HEC-1 ID	Area	Time	5-Year	10-Year	100-Year
CPC	0.2	4.33	41	53	119
CPD	0.29	4.33	68	87	170
CPE	0.33	4.17	84	105	189
CPF	0.4	4.33	114	139	247
CPG	0.48	4.58	140	171	277
CPH2	0.13	4.58	31	42	102
CPH3	0.18	4.75	39	51	125
CPI	0.2	5.17	40	53	98
CPK	0.34	4.67	85	119	270
CPL	0.41	4.67	89	125	290
CPM	0.75	4.83	129	181	410
CPO	0.36	4.33	80	107	285
CPN2	0.71	4.33	79	108	286
CPM2	1.46	4.5	166	229	592
CPG2	1.94	4.67	258	335	779

Subbasins

HEC-1 ID	Area	Time	5-Year	10-Year	100-Year
SUBA	0.06	4.25	17	23	57
SUBB	0.03	4.17	10	13	30
SUBC	0.11	4.33	30	38	87
SUBD	0.09	4.17	55	69	132
SUBE	0.04	4.08	41	50	89
SUBF	0.07	4.08	56	69	129
SUBG	0.08	4.17	42	53	106
SUBH1	0.08	4.25	21	27	67
SUBH2	0.05	4.33	16	20	42
SUBH3	0.05	4.33	17	22	43
SUBI	0.03	4.17	18	22	40
SUBJ	0.16	4.33	55	71	158
SUBK	0.18	4.33	49	65	148
SUBL	0.06	4.17	36	47	100
SUBM	0.14	4.25	51	67	151
SUBN	0.35	4.5	62	84	209
SUBO	0.22	4.25	61	81	213
SUBP	0.14	4.42	20	28	79

24-Hour: 10-Year & 100-Year Results

Combine Points

HEC-1 ID	Area	Time	5-Year	10-Year	100-Year
CPC	0.2	12.33	33	45	101
CPD	0.29	12.33	55	73	146
CPE	0.33	12.17	68	89	165
CPF	0.4	12.25	95	119	203
CPG	0.48	12.33	117	148	236
CPH2	0.13	12.58	26	36	86
CPH3	0.18	12.83	32	45	106
CPI	0.2	13.17	33	47	93
CPK	0.34	12.67	73	106	230
CPL	0.41	12.67	76	111	248
CPM	0.75	12.92	117	165	367
CPO	0.36	12.33	65	98	247
CPN2	0.71	12.33	72	107	264
CPM2	1.46	12.5	179	236	578
CPG2	1.94	12.67	281	354	734

Subbasins

HEC-1 ID	Area	Time	5-Year	10-Year	100-Year
SUBA	0.06	12.25	14	20	49
SUBB	0.03	12.17	8	11	25
SUBC	0.11	12.33	23	32	74
SUBD	0.09	12.17	46	58	109
SUBE	0.04	12.08	33	42	74
SUBF	0.07	12.08	46	59	107
SUBG	0.08	12.17	35	46	89
SUBH1	0.08	12.25	17	24	58
SUBH2	0.05	12.33	14	18	35
SUBH3	0.05	12.33	14	19	36
SUBI	0.03	12.17	14	18	33
SUBJ	0.16	12.33	48	66	134
SUBK	0.18	12.33	43	60	126
SUBL	0.06	12.17	31	43	85
SUBM	0.14	12.25	43	60	128
SUBN	0.35	12.5	54	79	180
SUBO	0.22	12.25	50	77	185
SUBP	0.14	12.42	17	25	70

Figure 4 – Flow Summary Map

D. Future Conditions

Developing a "Future Conditions" model was necessary to prepare the Alternatives Analysis. The Future Conditions hydrology model kept the same subbasin delineation and parameters and updated the land use expected for the airport build-out condition. As the airport develops, the existing flow patterns, internal to the airport, will change; however this interim step allowed determination of the magnitude of change that may be anticipated to the peak runoff and volumes leaving the airport without any other added drainage improvements such as tenant parcel basins or regional storage.

A combination point (CPG2) was added at the end of the HEC-1 model that estimates the combined flow rate leaving the airport. The model results in **Table 5**, below, indicate that the peak flow difference expected for the 100-Year, 24-hour storm event is approximately 260-cfs higher than the existing condition discharge at the final downstream combine point. The volume difference at this location is about 98-acre-feet higher than existing conditions. As the Alternatives Analysis models show in the next section, the actual volume stored varies in order to keep the proposed discharge rates equal to or less than those determined for the existing conditions.

Table 5 – Existing and Future Conditions Flow Rates Leaving Airport

Model	HEC-1 ID	Area (sq-mi)	Q (cfs)	Volume (ac-ft)
Existing Condition $_{100y,24h}$	CPG2	1.94	734	161
Future Condition $_{100y,24h}$	CPG2	1.94	990	259

IV. ALTERNATIVES FORMULATION & ANALYSIS

A. Introduction

This section describes the formulation of flood control alternatives that were developed for the AMDP along with the methodology for review and evaluation.

B. Major Considerations in Developing Alternatives

Numerous scenarios are available in developing drainage alternatives; many more than can be realistically analyzed in detail. The goal of this exercise was to develop possible alternatives which are feasible based upon a number of factors. The major considerations that were used in developing the alternatives are summarized below.

1. Alignment

Given the development goals for the area, it is necessary to route drainage in or adjacent to the proposed roadways. This will result in providing the most developable space. A second choice for the alignment of drainage facilities would be along proposed parcel boundaries. This is generally less desirable as it limits access to the parcels.

2. Retention vs. Detention vs. Conveyance

The three primary tools for disposing of storm water are retention, detention or conveyance. Often the distinct and different terms, detention and retention, are erroneously used interchangeably. As the name implies, retention "retains" all water on site and relies on percolation, evaporation or very low bleed-off rates to drain the basin. Often, drywells are used to facilitate the draining of the basin. Detention, however, allows for some water to pass through the basin which results in a reduced peak discharge leaving the site/development. In either case, the use of retention or detention allows downstream conveyance facilities to be smaller than if neither was used. An effective master plan strikes a balance between retention/detention and conveyance considering the cost of the conveyance infrastructure against the cost of retention/detention areas.

3. Cost

The primary goal is to provide cost-effective flood control measures that minimize the amount of land area dedicated to drainage, while also minimizing infrastructure costs incurred by PMGAA or future tenants.

4. Acceptance of Risk

Acceptance of additional risk by downsizing infrastructure results in lower initial costs, but may result in increased long-term costs related to maintenance and repairs of damaged property.

5. Hydrology & Hydraulics

For the Alternatives Analysis model, the 1.88-square mile study area was divided into 28 subbasins ranging in size from 15 to 106-acres. The study area is reduced in the future conditions due to the proposed alignment for SR-24 and realignment of the Ellsworth Channel. The new airport drainage boundary is reduced in this location from a total watershed study area of 1.95 to 1.88 square miles. Drainage subbasins are delineated along predominant features that affect the flow patterns such as parcel boundaries, roads, and parks depicted on the refined airport layout plan developed by another consultant. The project drainage areas are shown on **Figure 5**.

Developments of this type are generally required to retain storm water runoff per the City of Mesa design standards. As stated in the Mesa engineering and design standards, "Development projects are required to provide retention for the storm water runoff contributed by the defined drainage area for rainfall events up to and including the 100 Year, 2-Hour storm". The formula for calculating the runoff volume to be retained:

$$V_{required} = C_w * (P100,2/12) * A_d$$

where:

C_w = coefficient representing the ratio of rainfall to runoff.

P100,2 = Precipitation depth of water generated by the 100-year 2-hour storm (inches)

A_d = the size of the drainage area (acres)

PMGAA has set a precedent where regional detention basins are utilized to limit discharge to the PLF. Limiting the discharge to pre-development rates has been the customary regulatory factor at the airport for past projects. However, due to the close proximity, runoff leaving the airport has significant impacts to the adjacent regional floodways regulated by the Flood Control District of Maricopa County (FCDMC). Discussions with the FCDMC have resulted in consensus that the future development for the proposed East Area terminal and adjacent commercial developments must meet retention requirements as defined by the City of Mesa and the FCDMC for the 100-year, 2-hour storm event. Onsite attenuation through detention in order to simply provide proposed discharge rates less than or equal to existing discharge rates will not be allowed.

The initial Alternatives Analysis design concepts were developed under the original airport design approach which involved the use of reduced volume "detention" basins which involved larger discharge rates into the PLF. The initial goal of the alternatives analysis was to meet the design criteria while minimizing area used for storm-water storage and/or conveyance.

The methodology for the hydrologic analysis was based upon conceptual land uses including Retail, Aeronautical, Office, Hotel, and Green Space. To determine the required volume for these areas, boundaries were defined by the conceptual roadway layout for each land use identified in the master plan concept. The area of each boundary was determined along with a corresponding C_w-value for the land use to determine the retention volume required for each land use described for the master plan concept.

Once the required volume was determined, a surface area footprint required to store this volume was derived. To calculate this area, an assumption was made that a single square-shaped retention basin with 2-ft depth and 4H:1V side slopes will be utilized for each tenant lot basin. Although the final basin design may vary, this gives a starting point for the minimum basin footprint for comparison and planning purposes.

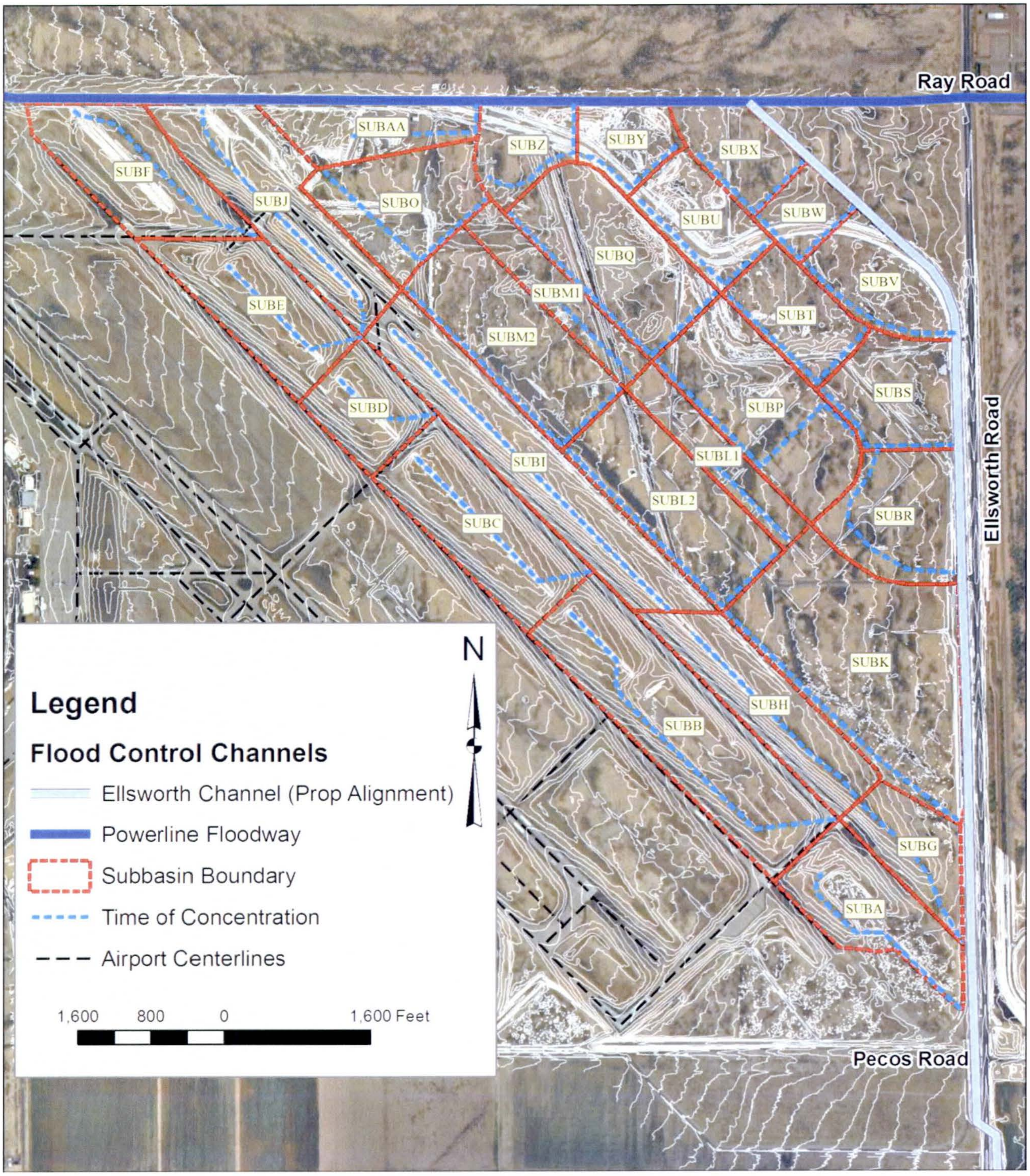


Figure 5 – Proposed Conditions Watershed Map (Build-out Conditions)

C. Potential Alternatives

Several potential alternatives were considered ranging from typical 100-yr, 2-hr on-site retention to 100-yr, 2-hr regional detention and combinations of the two. All alternatives include a Regional Basin located at the northwest corner of the Development Area and a storm drain system for the airfield apron areas. In addition, all alternatives include a relocation of the PLF and Ellsworth Channels to allow development of the new east side terminal. While the regional basin size varies from one alternative to another, the apron storm drain and Ellsworth Channel relocation remains consistent. Therefore, these common elements will be identified but in order to accentuate the cost differential between the alternatives, they are not included in the comparison costs. However, a complete cost estimate for the Recommended Alternative can be found in **Appendix G**.

One of the key elements that does change significantly with each alternative is the footprint of the on-site basins. However, at this preliminary stage, it is not feasible to determine exact shape or location of each basin. For this evaluation, an estimate of the total footprint dedicated toward on-site storage is provided. An example of the relative size of the required storm water basin is shown on **Figure 6**.

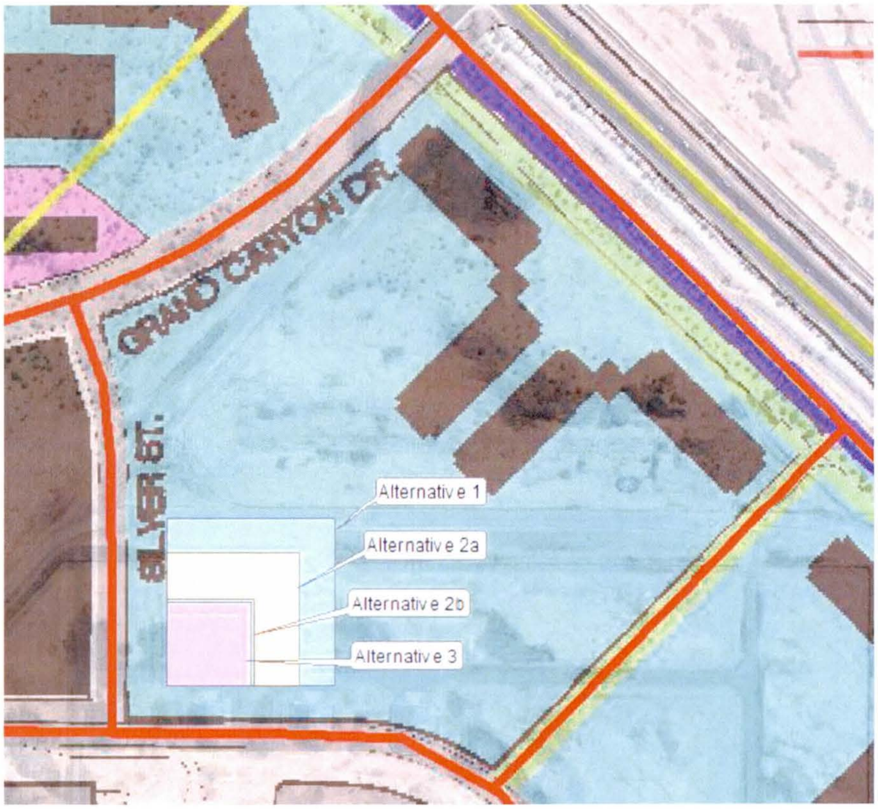


Figure 6 – Typical Basin Alternatives

Each of the following alternatives includes a brief description, a list of the strengths and weaknesses of the alternative and some engineering issues to consider.

1. Alternative 1a (100-yr, 2-hr Tenant Parcel Retention with Drywells)

Description

This alternative follows typical development standards providing for 100-yr, 2-hr on-site retention for each tenant parcel and utilizes drywells to drain the basin in 36-hrs. A roadway storm drain is not required as the roadway runoff is handled with roadside retention basins. See **Figure 7 – Alternative 1a**.

Strengths

- No storm drain required

Weaknesses

- Less land area for development
- Does not address runoff from the cargo area
- May need some additional ROW for roadside retention
- High overall cost
- As determined post Alternatives Analysis through a City of Mesa comment, this alternative does not comply with a City preference to avoid drywells

Engineering Considerations

This alternative is relatively easy to implement and is one of the generally accepted methods for storm water control. However, using drywells is less desirable from a maintenance standpoint, and can suffer from diminished percolation rates over time.

2. Alternative 1b (100-yr, 2-hr Tenant Parcel Retention with 10-yr Storm Drain)

Description

This alternative follows typical development standards providing for 100-yr, 2-hr on-site retention for each tenant parcel. The retention area is drained within 36 hours via a small bleed-off to the 10-yr roadway storm drain system. See **Figure 8 – Alternative 1b**.

Strengths

- As determined through post Alternatives Analysis comments, only this alternative complies with the FCDMC requirement for 100-year, 2-hour retention

Weaknesses

- Less land area for development
- Does not address runoff from the cargo area
- High overall cost

3. Alternative 2a (10-yr On-Site Basins & Regional Basin)

Description

This alternative utilizes smaller (10-yr) retention basins as the basis of design to control parcel runoff and a 10-yr storm drain to handle the roadway drainage. See **Figure 9 – Alternative 2a/2b**.

Strengths

- Smaller basins compared to Alternatives 1a and 1b
- Provides for street drainage
- Lower overall cost than retention options (1a/1b)

Weaknesses

- Does not address runoff in the cargo area
- As determined through post Alternatives Analysis City/FCDMC comments, this alternative does not comply with the FCDMC and City of Mesa requirement for 100-year, 2-hour retention
- Requires larger regional basin

Engineering Considerations

Uses a smaller basin than Alternatives 1a/1b but takes advantage of the storm drain in different ways.

4. Alternative 2b (10-yr Tenant Parcel Basins & Regional Basin)

Description

This alternative utilizes smaller (10-yr) tenant parcel detention basins as the basis of design. The goal of this alternative is to reduce the size of the tenant basins by allowing more discharge to pass through them. However to accomplish this, the storm drains will need to be up-sized. See **Figure 9 – Alternative 2a/2b.**

Strengths

- Smaller basins compared to Alternatives 1a and 1b
- The use of tenant parcel detention reduces the basin footprint even more
- Provides for street drainage
- Lower overall cost than retention options (1a/1b)

Weaknesses

- Does not address runoff in the cargo area
- Requires larger storm drain to convey runoff to the regional basin
- Requires larger regional basin and higher discharge to PLF
- As determined through post Alternatives Analysis City/FCDMC comments, this alternative does not comply with the FCDMC and City of Mesa requirement for 100-year, 2-hour retention

Engineering Considerations

This alternative uses a detention approach, allowing some of the storm to pass through, reserving most of the storage capacity for the peak of the storm. It would be most effective to implement this plan using as few basins as possible (i.e. semi-regional basins).

5. Alternative 3 (Conveyance to Regional Detention Basin)

Description

This alternative maximizes the Regional Detention Basin located at the northwest corner of the study area, adjacent to the PLF. This alternative consists of a 10-yr storm drain for the roadway runoff but utilizes "conveyance corridors" to convey the 100-yr runoff to the system regional basin. See **Figure 10 – Alternative 3**.

Strengths

- Uses land that is less valuable for detention
- Maximizes buildable area
- Lower overall cost than retention options (1a/1b)

Weaknesses

- Requires larger conveyance facilities to deliver the flows to the regional basin
- Surface conveyance facilities will be required
- Could require a large number of large culverts to access tenant parcels
- Limits pedestrian access (requires bridges, etc.)

- Requires larger regional basin
- Large discharge required due to limited storage capacity in regional basin
- As determined through post Alternatives Analysis City/FCDMC comments, this alternative does not comply with the FCDMC and City of Mesa requirement for 100-year, 2-hour retention

Engineering Considerations

The performance of this basin is dictated by the vertical geometry of the site. In order to drain the basin, the outfall will need to be above the flow line of the PLF. Additionally, to facilitate drainage of the basin, the outlet pipe invert should be slightly depressed and the basin bottom should be sloped (1% cross slope, .05% min. longitudinal). Careful attention to the grading will be necessary in final design to make the most efficient use of the space. In addition, because this basin also receives runoff from the airfield storm drain system, the grading will need to consider the inlet elevation as well.

6. Alternative 4 (Direct drain to Ellsworth Channel or PLF)

Description

Allows direct discharge to the adjacent Ellsworth Channel or PLF. For water quality purposes, first flush basins or other first flush treatment would be required. Tenant parcels would still need a solution based on one of the above alternatives.

Strengths

- Reduced size of conveyance facilities.

Weaknesses

- Requires land for 1st flush basins
- May be difficult to drain some parcels due to grade differences
- Does not address the cargo area
- May require special permission from the City of Mesa
- May require drywells to drain the water quality basins in 36-hrs
- Adverse impacts to Ellsworth and PLF channels and downstream basins
- As determined through post Alternatives Analysis City/FCDMC comments, this alternative does not comply with the FCDMC requirement for 100-year, 2-hour retention prior to discharge into the PLF

Engineering Considerations

The land slopes away from the Ellsworth Channel along the eastern edge of the airport, so conveying runoff to the channel will require storm drains.

7. Alternative 5 (Roadside Channels to Regional Basin)

Description

This alternative provides for a surface channel to provide conveyance to the regional basin

Strengths

- Could use landscape areas for conveyance
- Provides for street drainage
- Provides outlet for tenant lots

Weaknesses

- Less land area for development (especially in downstream areas)
- Could require a large number of large culverts to access parcels
- Limits pedestrian access
- May require special zoning (no setbacks)
- As determined through post Alternatives Analysis City/FCDMC comments, this alternative does not comply with the FCDMC and City of Mesa requirement for 100-year, 2-hour retention

Engineering Considerations

Most of the proposed channels would slope to the northwest. The ground slope is generally 0.003 ft/ft. This slope is more than adequate for channel conveyance and is actually too steep for the use of concrete without causing supercritical flow. Therefore, if concrete channels are desired, drop structures will need to be included and will add to the cost. Channel slope will also be a consideration for Earth and rock-lined channels as well and the future designers will need to pay special attention to the design criteria for open channels.

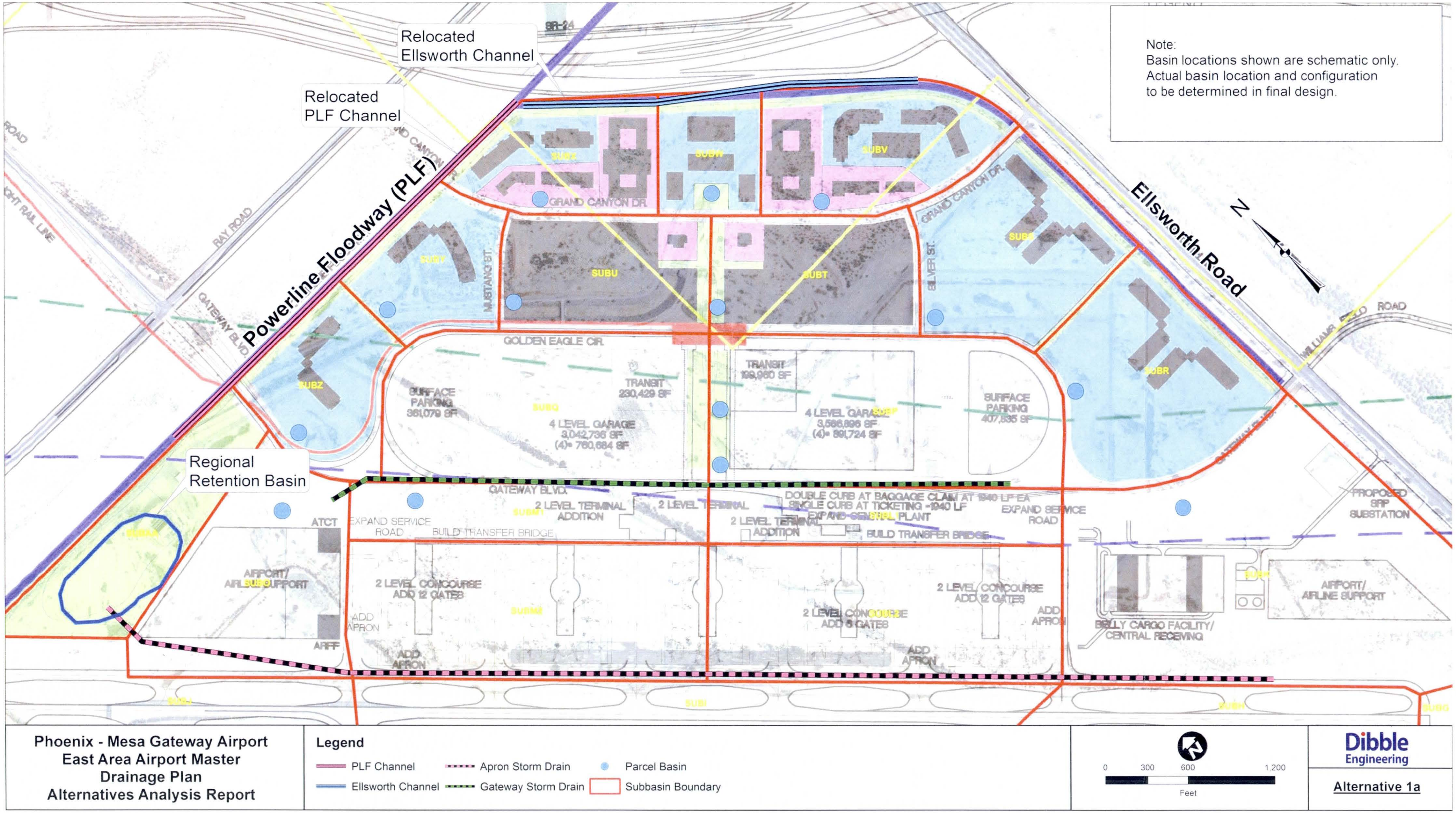


Figure 7 – Alternative 1a

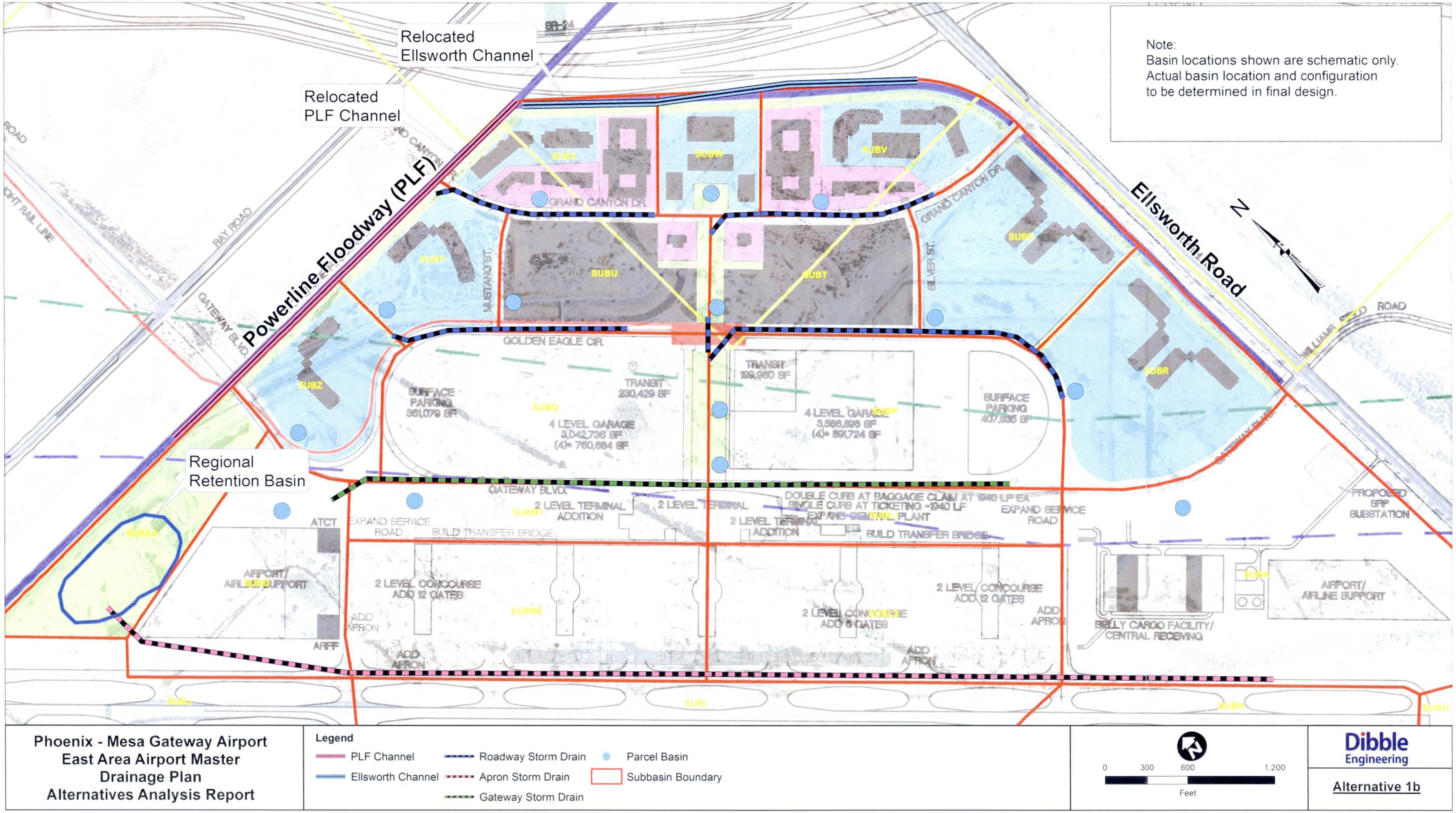


Figure 8 – Alternative 1b

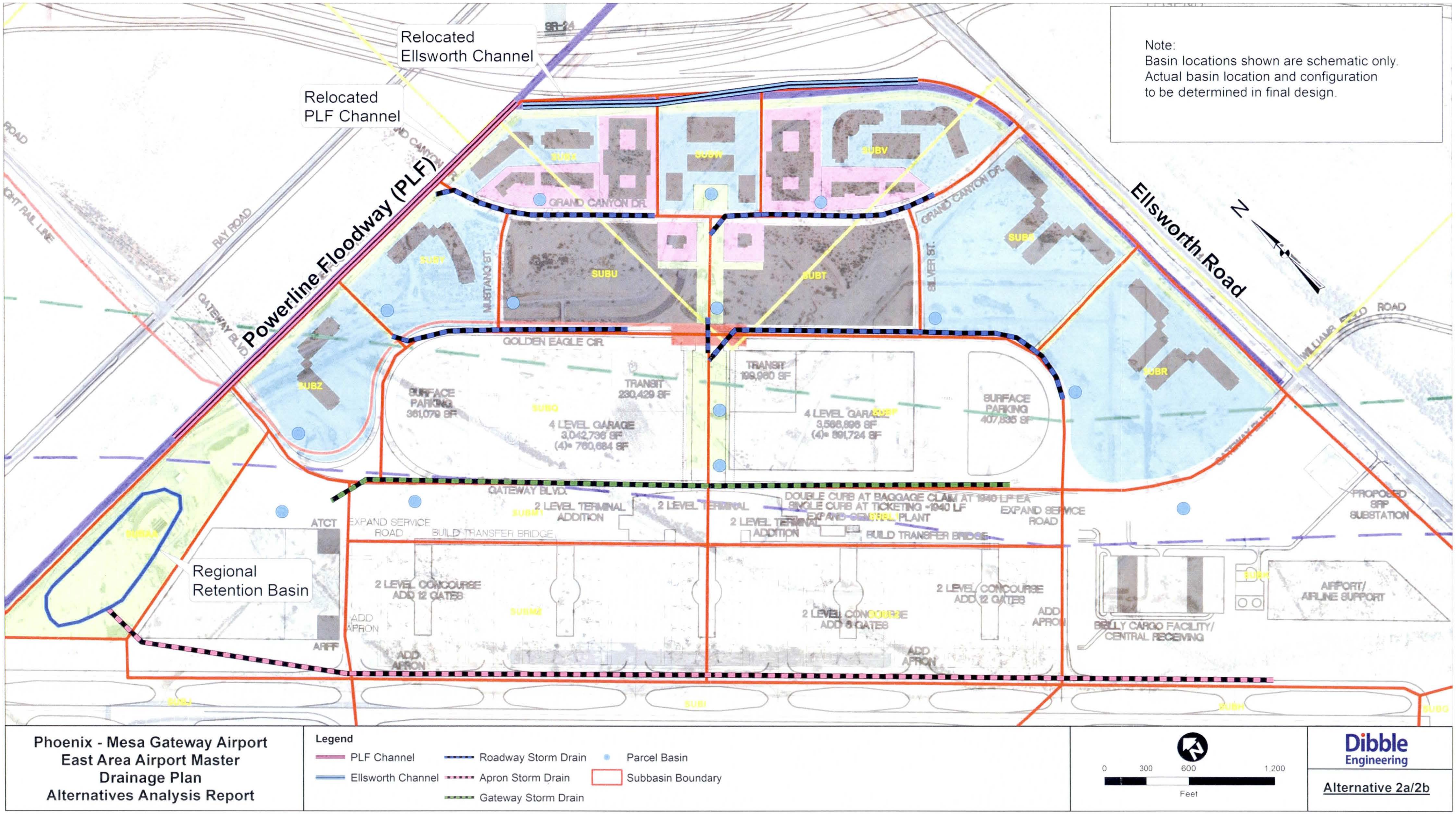


Figure 9 – Alternative 2a/2b

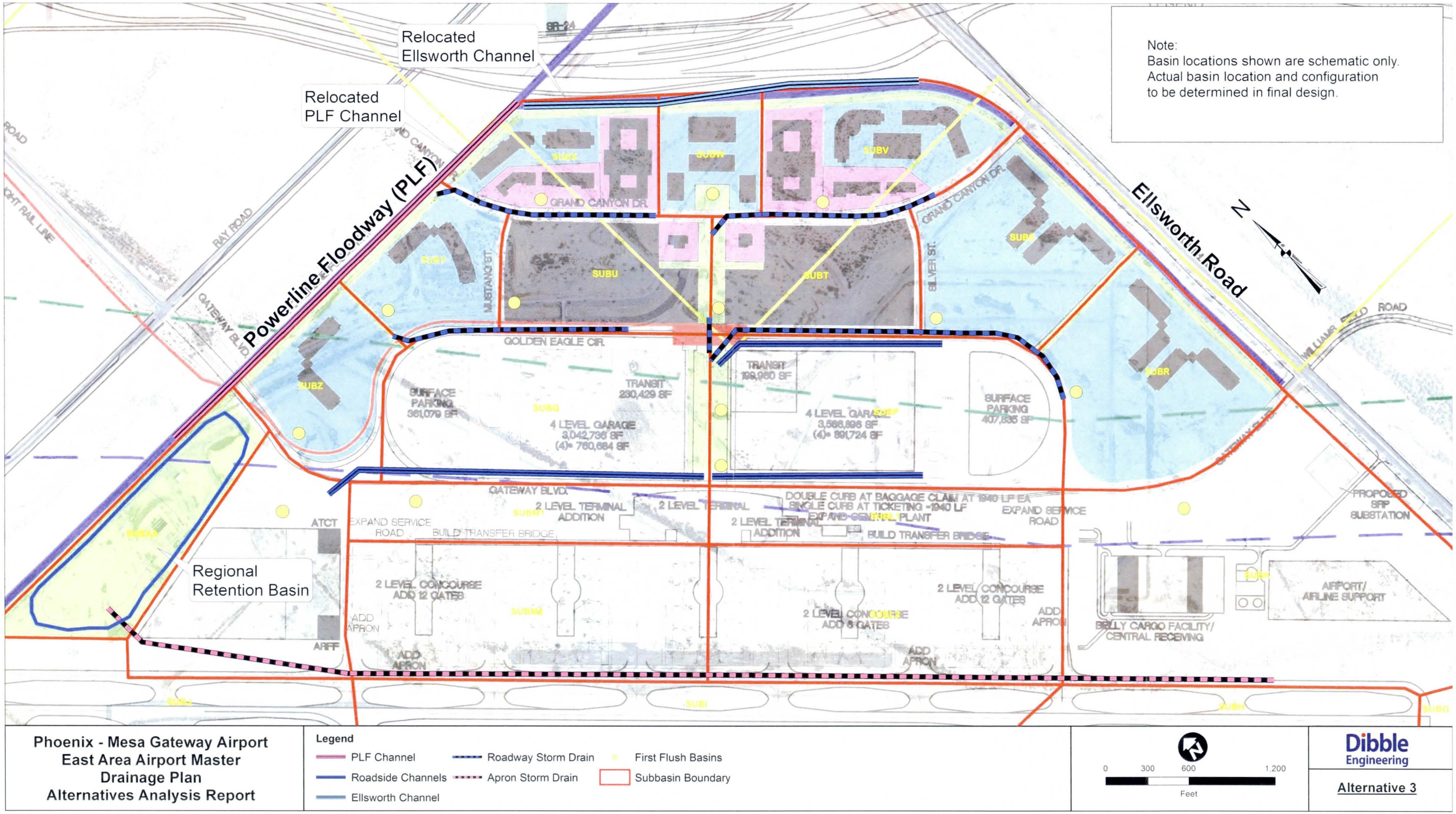


Figure 10 – Alternative 3

D. Alternatives Analysis

Alternatives 1a, 1b, 2a, 2b and 3 were initially selected for further analysis. Additionally, Alternative 4 would only apply to a portion of the AMDP watershed, requiring the remainder to mitigate drainage via one of the other alternative methods. Alternative 5 was discarded due to numerous issues associated with open channels in an urbanized environment.

1. Common Elements

There are two elements that are common to all alternatives. They are 1) the Ellsworth Channel relocation and 2) the apron storm drain system. For the purpose of a comparison analysis of the alternatives each off these elements have been identified as being required regardless of the alternative being considered and therefore will be accounted for separately.

Ellsworth & PLF Channel Relocations

This channel relocation will discharge into the PLF at a different location than under existing conditions. This will require improvements to the PLF from the existing confluence up to the new tie-in point. The Ellsworth Channel is owned and maintained by the City of Mesa and it is assumed that this section of channel will need to be rebuilt in-kind with a rock-mulch lining similar to what is existing today (N-value 0.027). Based on this change, the PLF channel will also need to be upsized from the existing connection point to the new confluence. The costs for these two channel improvements are typical for all alternatives considered.

The PLF channel upstream of the confluence with the Ellsworth Channel is concrete lined and assumed to be supercritical. However, at the confluence and downstream of that connection, the existing channel is not concrete lined and is assumed to have subcritical flow. Based on collected as-built design flows, the Ellsworth Channel is designed for a flow of approximately 3,000 cfs and the PLF for 3,300 cfs. Tractive shear and other design elements will need to be evaluated in final design.

The estimated combined conceptual cost for the PLF and Ellsworth Channel relocations as determined by the City of Mesa is $8.0 M. As discussed with PMGAA, the City of Mesa estimate, which was developed for their Bond program, is included in **Appendix G**.

Apron Storm Drain System

The apron storm drain is common to all alternatives. For the purpose of this evaluation, it is assumed that all storm drain will be constructed with concrete pipe. However as a value engineering option, alternative pipe materials should be considered. The estimated cost determined during the alternatives analysis for the apron storm drain using concrete pipe is $8.7 M.

2. Roadside Channels

In order to convey the necessary runoff, Alternative 3 will require the establishment of drainage corridors (channels). Runoff in excess of the storm drain and roadway capacity will be carried in roadside channels. Various lining materials were evaluated. Considering the design limitations, cross section requirements, construction and ROW costs of each, it was found that a rock-lined channel would be the most cost efficient. This configuration allows for a higher allowable velocity than earth and therefore provided a narrower section. Alternative 3 is the only option that will require these additional conveyances.

3. Cost Comparisons

For comparison, preliminary cost estimates were developed for each alternative to determine the relative order-of-magnitude cost associated with that alternative. The cost's for each alternative is summarized as follows. It should be noted that the actual cost of implementing any of these alternatives will also include the cost of the apron storm drain system and the Ellsworth Channel relocation as discussed previously.

Table 6 summarizes the cost of the various alternatives broken into 3 main components – tenant basins, storm drains and regional basin. For example the tenant parcel basins are most expensive in Alternative 1a and least expensive in Alternative 3.

Table 6 – Cost Summary

Alternative	Description	Tenant Basins	Storm Drain	Regional Basin	Total
1a	100-yr, 2-hr retention, drain with drywells	$6.23 M		$1.01 M	$7.24 M
1b	100-yr, 2-hr retention, drain with bleed-off to 10-yr storm drain	$4.88 M	$12.90 M	$1.01 M	$18.79 M
2a	10-yr, 6-hr retention, with 10-yr roadway storm drain	$2.55 M	$12.90 M	$1.50 M	$16.95 M
2b	10-yr, 6-hr detention, with upsized storm drain	$1.02 M	$16.0 M	$1.69 M	$18.71 M
3	Regional basin with 10-yr roadway storm drain	$0.90 M	$13.81 M	$2.00 M	$16.71 M

Detailed hydraulic calculations, sizing and cost data for each alternative are presented in **Appendix F – Alternatives Analysis**.

E. Conceptual Mass Grading Plan

This task was included in the scope as an additive allowance and was authorized to provide a conceptual mass grading plan for future development in the east half of the airport. The information developed will provide the airport an initial basis for earthwork requirements.

1. Airside

The general airside grading concept matches closely to the existing average ground slope of 0.3% for the longitudinal slope of the proposed taxiways and runway extension for the purpose of minimizing site earthwork. Taxiway C, which is adjacent to Runway 12C/30C, should be designed at 0.3% and slightly lower than the runway. Since the airport is considered a Category/Group D-V airport, the aprons must be designed with maximum cross slopes of 1.0% in any direction with positive slopes away from the terminal & concourses. With the concourses set 1,000-ft apart and an average ground slope of 0.30%, each concourse finish floor elevation should be staggered with a 3-ft differential. As such, the grading concept for the apron areas is to set a flowline northwest of center between each concourse and maintain a minimum slope of 0.25% and a maximum slope of 1.0% in any direction. All grade changes and slopes should conform to the requirements set forth in FAA AC 150/5300-13, (most recent edition).

2. Landside

The general landside grading concept is to set the northeast-southwest roadways through the site (proposed Gateway Blvd, Golden Eagle Circle & Grand Canyon Dr) at a continuous positive slope of 0.3% toward the northwest, which leads to the regional detention basin. Since the roadways will be relied upon to convey excess overland runoff, they should be designed lower than the adjacent parcels & buildings. With the site bounded by the PLF on the north and the realignment of the Ellsworth Channel on the northeast and east, the parcels adjacent to these floodways should be built up slightly from the floodway edges and have positive slope away from the channels and toward the adjacent roadways.

3. Earthwork

Based on previous projects at the airport, excavated and re-compacted material may undergo a shrink of approximately 8%. A site-specific value will need to be determined by a registered geotechnical engineer, and should be used for each construction project in the area. The site earthwork, as shown in the Master Earthwork Plan, will require approximately 1,300,000 CY of cut and fill. Total site earthwork can be balanced by adjusting elevations in the parcels adjacent to the PLF and Ellsworth Channel. The mass grading and earthwork calculations can be found in **Appendix H**.

V. RECOMMENDED PLAN

A. Introduction

A Recommended Plan is presented for drainage of the build-out conditions to be used as a guiding plan to direct the development of the east area airport improvements. The initial Alternatives Analysis design concepts were developed under the original airport design approach, and involved the use of reduced volume "detention" basins which resulted in larger discharge rates into the PLF. Through discussions with the City of Mesa and the FCDMC after their review of the Alternatives Analysis report, the initial design approach for most of the selected Alternative concepts to use detention to provide post development discharge rates at or less than the existing discharge rates are not acceptable for future development on the airport.

Since storm water runoff from the northeast portion of the airport discharges into the Powerline Floodway (PLF), a facility owned by the Natural Resources Conservation Service (NRCS) and operated by the FCDMC, planning methodologies and deliverables have been developed consistent with their requirements. The FCDMC has significant concern regarding the capacity of the PLF and the East Maricopa Floodway (EMF) and related downstream storage facilities. FCDMC makes no guarantee that the above structures will consistently have capacity for the releases from this project. Further, the time required for the PLF to drain the upstream flood retarding structures may far exceed the required drain time from the project (36 hours). When the PLF is full and the regional basin cannot drain, additional measures may be necessary to mitigate bird and insect attraction to standing water. These may include vector control and bird detraction devices. These channels and basins have been designed assuming development areas, including the East Terminal area of airport, will incorporate 100-year, 2-hour retention. Therefore, the Recommended Plan for the airport includes 100-year, 2-hour retention with new discharges into the PLF limited to "bleed-off" rates (approximately 10 cfs). Retention or other treatment for "first flush" is still required by FCDMC for flows entering the PLF and EMF.

The remaining viable alternatives were reduced to those which provide 100-year, 2-hour retention for both landside private development properties and the airport airside areas. This can be accomplished through retention provided at future tenant parcels or at a regional storage basin, or a combination of both. The property identified for a regional storage basin will allow for a limited storage volume based on the property boundary identified in the East Airport land use planning document and the maximum depth as limited by the invert elevation of the adjacent PLF channel, into which the basin will discharge.

Of the options presented in the Alternatives Analysis, only one of the original alternative concepts (Alternative 1b) provides the 100-year, 2-hour onsite storage requirements for the airport without the use of drywells as required by the City of Mesa and the FCDMC. This alternative includes a mix of 100-year, 2-hour future tenant lot storage and regional storage for the entire study area which uses various storm drain systems to provide street drainage as well as an outlet to the future tenant lot storage basins. Alternative 1b is recommended for implementation. The total estimated cost for the Recommended Alternative is $24.2 M (see **Appendix G**).

***B.* Changing Airport Layout Plan**

Through discussions with PMGAA staff, it is understood that the airport layout plan may be updated in the future. It should be noted that the hydrology, drainage concepts and associated cost estimate have been based upon the current layout plan provided in August 2011.

The Recommended Alternative for the AMDP contains concepts that are applicable to various potential layout configurations that might be presented in a revised airport layout plan. This concept is based upon providing 100-year, 2-hour retention with a local street storm drain system that allows for the future tenant lot storage basins to drain following the peak in the storm drain system. In addition, the airside and terminal areas will utilize a regional basin to meet the FCDMC storage requirement. The FAA surface runoff requirements will be met through the use of a 10-year storm drain design. This storm drain system will also convey airside surface runoff to the regional basin. Additionally, greenbelt areas within the final airport layout plan will be utilized to meet storage requirements where certain facilities such as parking garages may not include available space for surface storage basins.

C. Build-Out Conditions

The following recommendations are made for build-out conditions. General development guidelines are presented to be applied to individual leased tenant parcels as they develop throughout the study area and specific recommendations are made for area wide collection systems and shared common areas.

Development Guidelines

The following development guidelines are recommended to be implemented throughout the study area and by individual parcels as they are developed:

1. Tenant lot retention shall be provided to retain the entire 100-year, 2-hour storm runoff within the parcel boundaries.
2. Runoff from common areas such as aprons, taxiways, and roads shall be retained in a regional basin.
3. New arterial streets shall have storm drain pipes and inlets sized to carry:
    a) 10-year pavement runoff from curb to curb, and
    b) bleed-off from retention basins within 36 hours.
4. All local streets shall have 18 to 24 inch pipes where needed to drain tenant lot retention basins.
5. Individual parcel developers are required to tie into storm drains to drain retention basins. Dry wells are not allowed.

The land use plans used as a basis for this AMDP are conceptual. It is anticipated that the plans will be refined and modified as development takes place. As the refinement occurs, road alignments and parcel configurations will change. As a result, this master plan does not attempt to identify all improvements, or every storm drain, that will be required as a result of the development guidelines. The guidelines will need to be enforced during the site development process. As planners and engineers develop more detailed site development plans, provision should be made to provide required retention by including the required land area for retention in the planning. The City of Mesa limits basin depths to a maximum of three feet. The final design of the tenant lot storage basins should account for back to back storms or increased volumes that could result from storms larger than the 100-year, 2-hour event. Basins should be designed with overtop locations situated in order to prevent flooding to tenant properties.

D. Hydrology

Two models were made for the Recommended Plan. The 100-yr, 2-hr model was used to design the required storage for the project. Additionally, a 100-yr, 24-hr model was assembled to compare with the existing and future conditions models. The 100-yr, 24-hr model includes the future land use as well as the 100-yr, 2-hr storage. A comparison of the peak discharges as discussed in Section III of this report to the peak discharge as a result of the Recommended Plan is shown in **Table 7**, below. The combine points referenced in the table are a summation of all of the areas contributing from the airport and do not include the PLF discharge.

Table 7 – Combined Flow Rate Leaving Airport

Model	HEC-1 ID	Area (sq-mi)	Q (cfs)	Volume (ac-ft)
Existing Condition $_{100y,24h}$	CPG2	1.94	734	161
Future Condition $_{100y,24h}$	CPG2	1.94	990	259
Recommended Plan $_{100y,24h}$	CPEND	1.88	557	146

Note that the discharge leaving the airport under the Recommended Alternative is less than both of the Existing and Future Condition models.

E. Hydraulics

This section describes the results of the hydraulic analysis of planned storm drains. Hydraulic design criteria are presented for design of new storm drains.

1. Design Criteria

Design discharges for storm drains are developed using the Rational Method as described in Section II of the FCDMC Hydrology Manual. New culverts in the airfield areas are sized for the 5-year peak discharge per FAA criteria. In areas where tenant lot retention is planned, storm drains on arterial streets are sized for the 10-year discharge generated within the roadway as required by the City of Mesa. Runoff generated outside the roadway area will be retained within tenant lot basins. Non-arterial streets will be provided with storm drains as required to drain the retention basins. Storm drains on non-arterial streets will be small pipes with diameters of 18 to 24 inches.

2. Street Storm Drain Design

New storm drains and culverts are sized based on projected peak runoff rates under fully developed conditions. The existing conditions hydrology is updated to reflect developed runoff conditions by adjusting the runoff coefficients and modifying the flow routing. Tenant parcels that are required to provide retention are modeled to account for their required 100-year, 2-hour storage using a storage diversion. Common areas such as taxiways and aprons are modeled with high runoff coefficients to reflect the addition of impervious area resulting from their construction. Runoff is routed through the proposed system to the proposed regional basin before it ultimately will outfall to the Powerline Floodway. The peak runoff rates from rational method equations for the roadway runoff are used for preliminary sizing of storm drains.

New storm drain pipes are sized using manning's equation for full pipe flow assuming the maximum hydraulic grade line slope is equal to the average ground slope in the reach. The average slope used to design the storm drain pipes sizes is 0.002 ft/ft for the revised Recommended Plan analysis. The maximum pipe size is 48-inches based on the depth of the regional basin and minimum pipe cover. Recommended storm drains are shown on **Figure 11**. The storm drain sizing calculations are contained in **Appendix G**.

3. Terminal Storm Drain System

The area designated for the East Airport terminal and apron area will not have unpaved surface area available to provide the required 100-year, 2-hour storage. This area is anticipated to drain to the southwest towards the future east airport taxiway/runway. The FAA criteria specify that the center 50 percent of runways and taxiways remain free from ponding from 10-year frequency storms. A storm drain is proposed to capture up to the 10-

year peak runoff from the drainage areas adjacent to the airfield. The final design for this storm drain is anticipated to capture this runoff through inlets located in sump condition in order to capture the entire 10-year runoff leaving the terminal area. For storm events greater than the 10-year frequency, the excess runoff will flow overland until it is captured in the infield areas portrayed on the project airport layout plan. A rating curve was prepared to estimate the stage-storage-discharge relationship provided in the infield areas and is modeled in the HEC-1 hydrology model. These infield areas are recommended to remain interconnected as they drain to the northwest and are eventually conveyed through a culvert into the proposed Regional Basin. The 100-year, 2-hour volume that is not captured by the 10-year "Terminal" storm drain is conveyed to the regional basin for storage through overland flow. The Terminal storm drain is shown on **Figure 11**.

4. Regional Retention Basin

The airport layout plan has a large (29 ac) green space area adjacent to the north boundary of the airport along the PLF and northeast of the airport runways. This area has been set aside for non-commercial or airport uses due to the proposed placement of a future Airport Surveillance Radar (ASR) station which requires a buffer area with no development. The green space area is an ideal place for an airport regional retention basin since it will not interfere with the ASR and is located adjacent to the PLF which serves as the airport discharge facility.

A maximum volumetric capacity was estimated for the 29 acre green space parcel based on some initial constraints considered for the site. Since the basin will drain into the PLF, the basin invert could be no lower than the PLF invert. Also the portion of land defined in the layout plan to contain the future ASR station cannot be excavated and access will need to remain for the elevated pad. The bottom of the basin will also need to be sloped towards the basin outlet. The existing land surface at the top of the basin currently contains excess fill material. The average land elevation without this fill material was determined to be 1355-ft. The maximum capacity that was determined through a grading process considering a 4H:1V side slope is 53 ac-ft. The rating curve used to establish the stage-storage-discharge relationship for the regional basin assumes a 12-inch discharge pipe to meet the FCDMC requirement for limiting the retention discharge rate to approximately 10 cfs. The final design of the basin will need to be coordinated with the FCDMC to establish an acceptable discharge rate to assure a 36-hour drain time while satisfying District requirements for the PLF. The Regional Storage Basin is shown on **Figure 11**. In the event of a back to back storms or a storm larger than the 100-year, 2-hour event, basins should be designed with a spillway to provide a safe overflow location to prevent flooding to airport facilities.

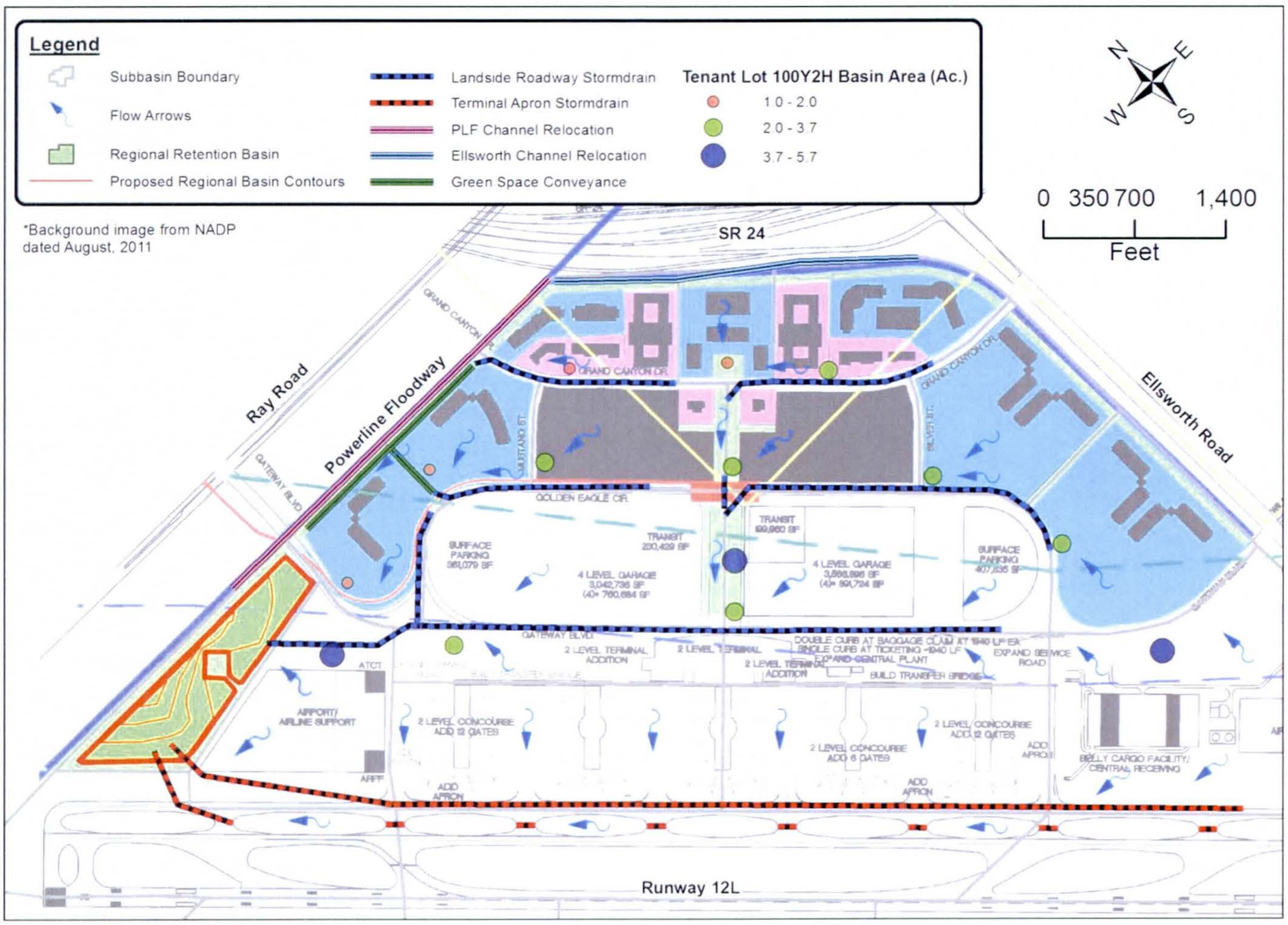


Figure 11 – Recommended Plan Drainage Facilities

5. Conceptual Cost Estimates

The drainage facility components for which cost estimates were derived for the recommended drainage plan include a combination of roadway storm drains, tenant lot storage basins, a 10-year terminal area storm drain, and a regional storage basin. Other components considered to be part of the overall drainage improvements as the airport develops were also evaluated and included. These include the relocation of the Ellsworth Channel and the future roadway crossings of the PLF.

The street storm drain system was designed based on roadway runoff from the 10-year frequency calculated using the Rational Method. The roadway right-of-way was assumed to be 130 feet. Pipes were sized using the Manning's Equation for full flow using an average design slope of 0.002 ft/ft and concrete pipe. Other components were included in the estimate to account for manholes, catch basins, and other miscellaneous construction and design costs.

The tenant lot retention basin excavation was also included in the overall master plan cost. It was assumed that this cost would be incurred by the airport and not by the future tenant. This cost is not applicable if the future tenant pays for the retention basins excavation. The cost estimate for the tenant lot basins includes excavation and drain costs as well as a cost to account for lost leasable land space required for the basins. An estimate of the top area was prepared to retain the required storage volume along with an additional foot of freeboard and a 10% safety factor was added to the top area to account for differences in basin depths or side slopes. The land value used for the basin top area was estimated by PMGAA to be $100,000 per acre. Other contingency and design costs were also included in the overall estimate.

The estimate for the regional retention basin was determined in the same way as the tenant lot storage basins. An outlet system and land acquisition cost was included as part of the overall estimate. Storage and conveyance features proposed for use in the master plan within future green space areas within the landside portion of the airport layout plan were not included in the cost estimate and were assumed to be part of the overall land development costs.

VI. PHASING AND IMPLEMENTATION

A. Introduction

For budgeting purposes, capital improvements can be prioritized and constructed in phases as funding permits. To identify phasing of capital improvements, four priority categories are used. A timeline for each priority has not been made available from PMGAA at this time. As a basis for establishing each phase or priority, the Northeast Area Development Plan (NADP) was referenced. The NADP includes four exhibits which indicate the phasing of development from initial construction to final build out. Priority 1 projects are those anticipated to be constructed as part of the initial improvements to the east side of the airport. Priority 2 projects should be budgeted now for construction of planned infrastructure expected in the next phase of development on the east side of the airport. Priority 3 and 4 projects are improvements that are not needed initially but will be needed as development occurs. Construction scheduling of Priority 3 & 4 projects will be dictated by development timing and patterns.

B. Conceptual Design Costs

Cost estimates are included in **Appendix G** for the proposed storm drains and retention basins. Projects are prioritized based on the most recently provided NADP phasing exhibits. The total estimated cost of drainage improvements is $24.2 M.

C. Priority No. 1

Priority 1 projects are those necessary for construction of the east runway, parallel taxiways, terminal, concourse and apron. Only those drainage facilities necessary to accommodate the phased airport facilities are recommended for implementation as part of Priority 1. Portions of the storm drain for the terminal area along with a portion of the regional basin for the storm drain outfall will be necessary. Some of the landside development including office space along Ellsworth Road and surface parking is also planned to be developed as part of the initial development on the east side of the airport. Relocation of the PLF and Ellsworth Channel are included in Priority 1. A crossing of the PLF is anticipated for Gateway Boulevard as part of the landside roadway network. The cost for this box culvert is estimated as part of the overall AMDP. The storm drain system within the initial street improvements in Priority 1 may be implemented or could be added later as further development occurs. For this master plan, it has been assumed that the storm drain within the roadway will not be constructed. For the interim condition, the roadway pavement area is assumed to drain through openings in the curb and runoff is retained in temporary roadside storage basins. The total estimated cost of Priority 1 improvements is $9.8 M. **Figure 12** shows the drainage facilities planned for implementation as part of Priority 1.

D. **Priority No. 2**

Priority 2 projects include the addition of new segments of storm drain within the roadway network. See **Figure 13**. Some interim channels are expected to be built to convey surface runoff through planned green space areas to minimize the use of storm drains. These channels are expected to be constructed by developers as part of the green space development and are not considered in the master plan drainage cost estimate. The regional basin will likely require additional volume to accommodate a larger contributing area draining to the basin. A second crossing of the PLF is anticipated as part of the Priority 2 projects as the landside roadway network continues and the Grand Canyon Drive roadway is constructed. The NADP plan for the second phase shows additional office development at the northeast corner of the airport adjacent to the SR24. This development will most likely require the realignment of the existing Ellsworth channel which currently cuts through the airport property. The new alignment for the Ellsworth Channel was estimated and a conceptual cost was determined. The total estimated cost of Priority 2 improvements is $3.6 M. **Figure 13** shows the drainage facilities planned for implementation as part of Priority 2.

E. **Priority No. 3**

Priority 3 projects will include drainage facilities to accommodate a large expansion of several new tenant properties for office, hotel, retail, and other commercial uses. The remaining roadway network is expected to be necessary as will the remaining portions of the landside roadway storm drain system. Some interim channels are expected to be built to convey surface runoff through planned green space areas to minimize the use of storm drains. These channels are expected to be constructed by developers as part of the green space development and are not considered in the master plan drainage cost estimate. The regional basin again requires regrading to accommodate a larger contributing area draining to the basin. The total estimated cost of Priority 3 improvements is $5.1 M. Figure 14 shows the drainage facilities planned for implementation as part of Priority 3.

F. Priority No. 4

Priority 4 projects include the drainage facilities to accommodate the remaining tenant properties, roadway network and terminal storm drain. Most interim channels will be replaced with green space storage or culverts connecting infield storage areas. The total estimated cost of Priority 4 improvements is $5.7 M. Figure 15 shows the drainage facilities planned for implementation as part of Priority 4.

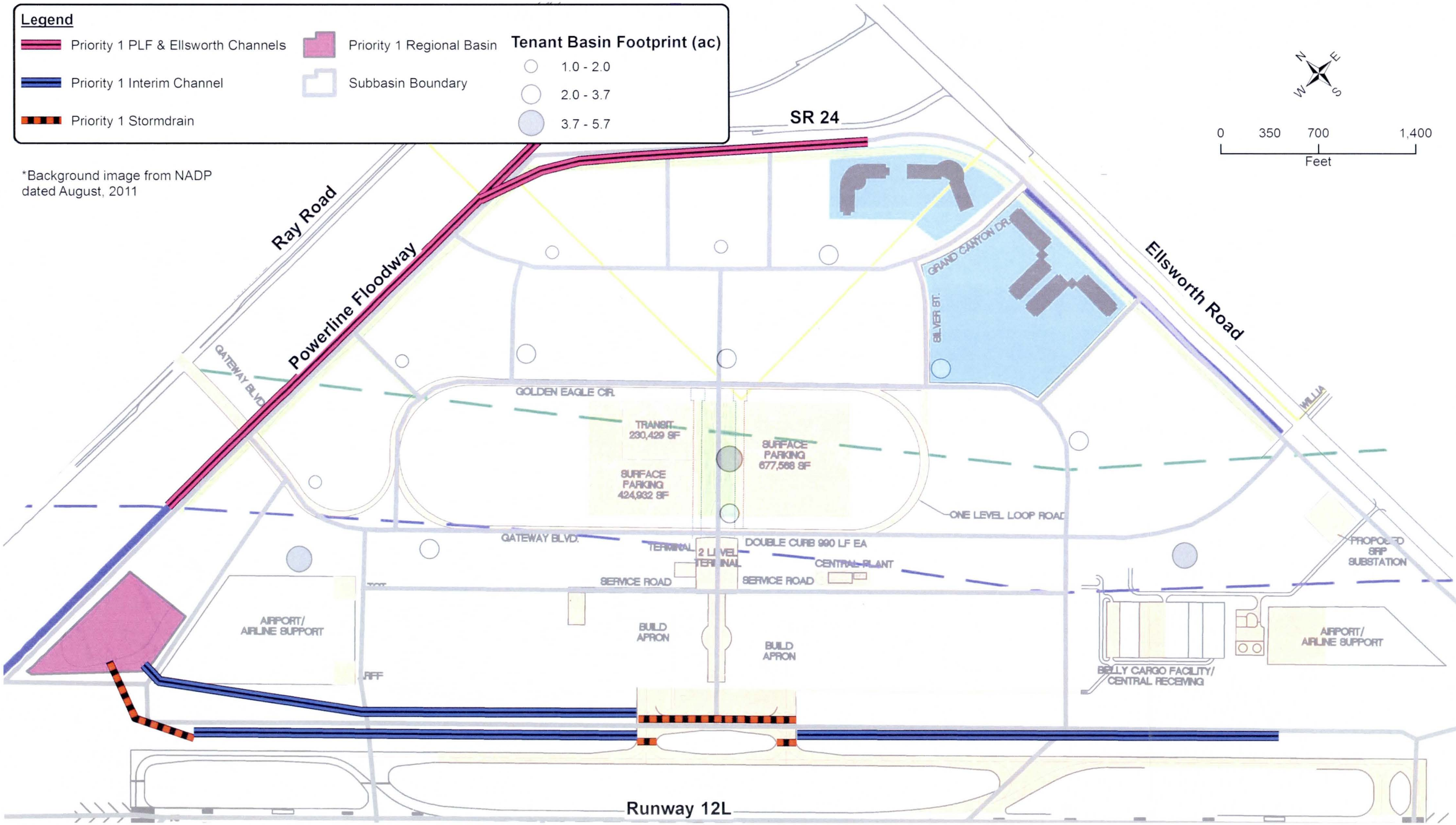


Figure 12 – Priority No. 1 Map

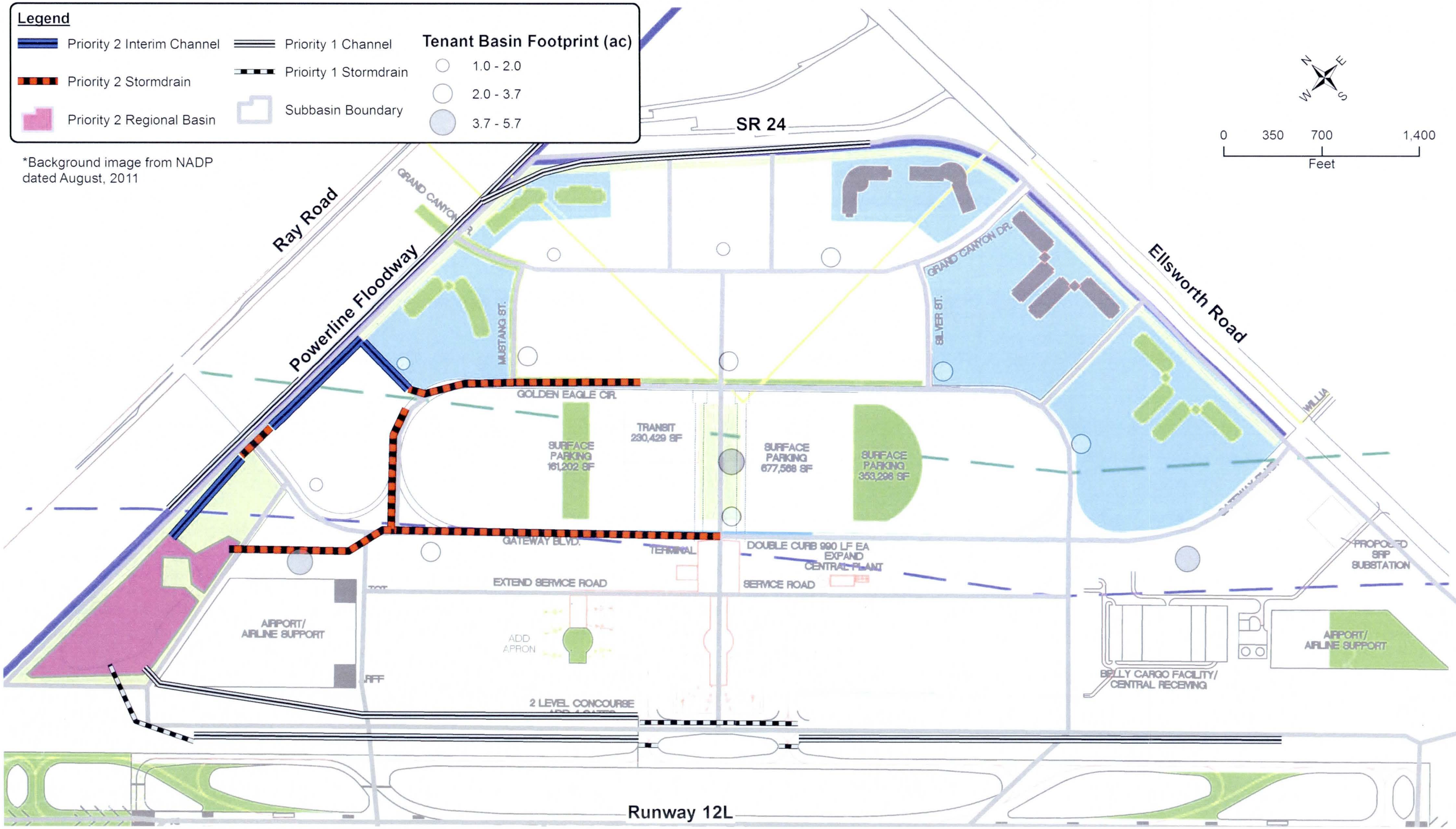


Figure 13 – Priority No. 2 Map

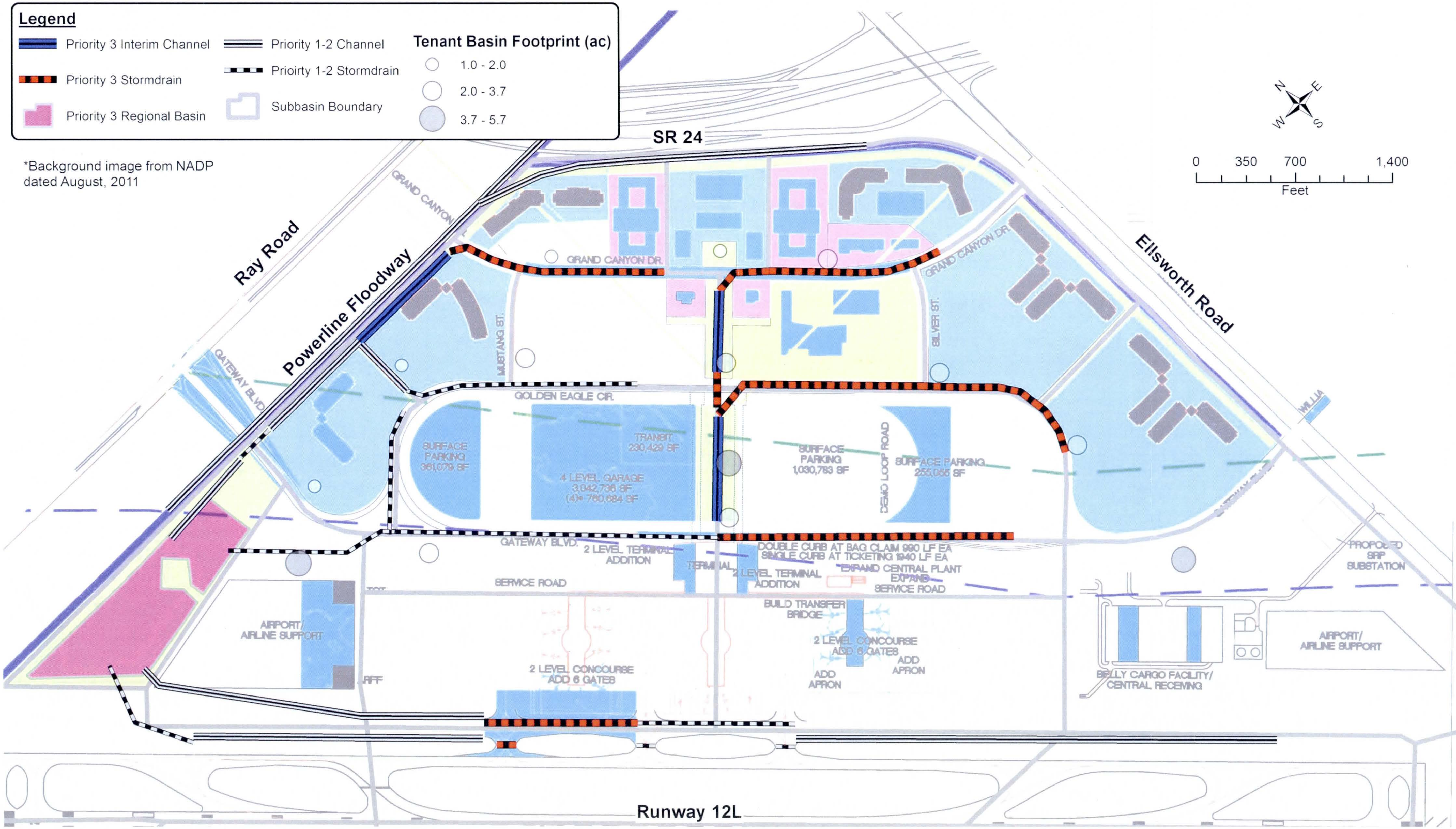


Figure 14 – Priority No. 3 Map

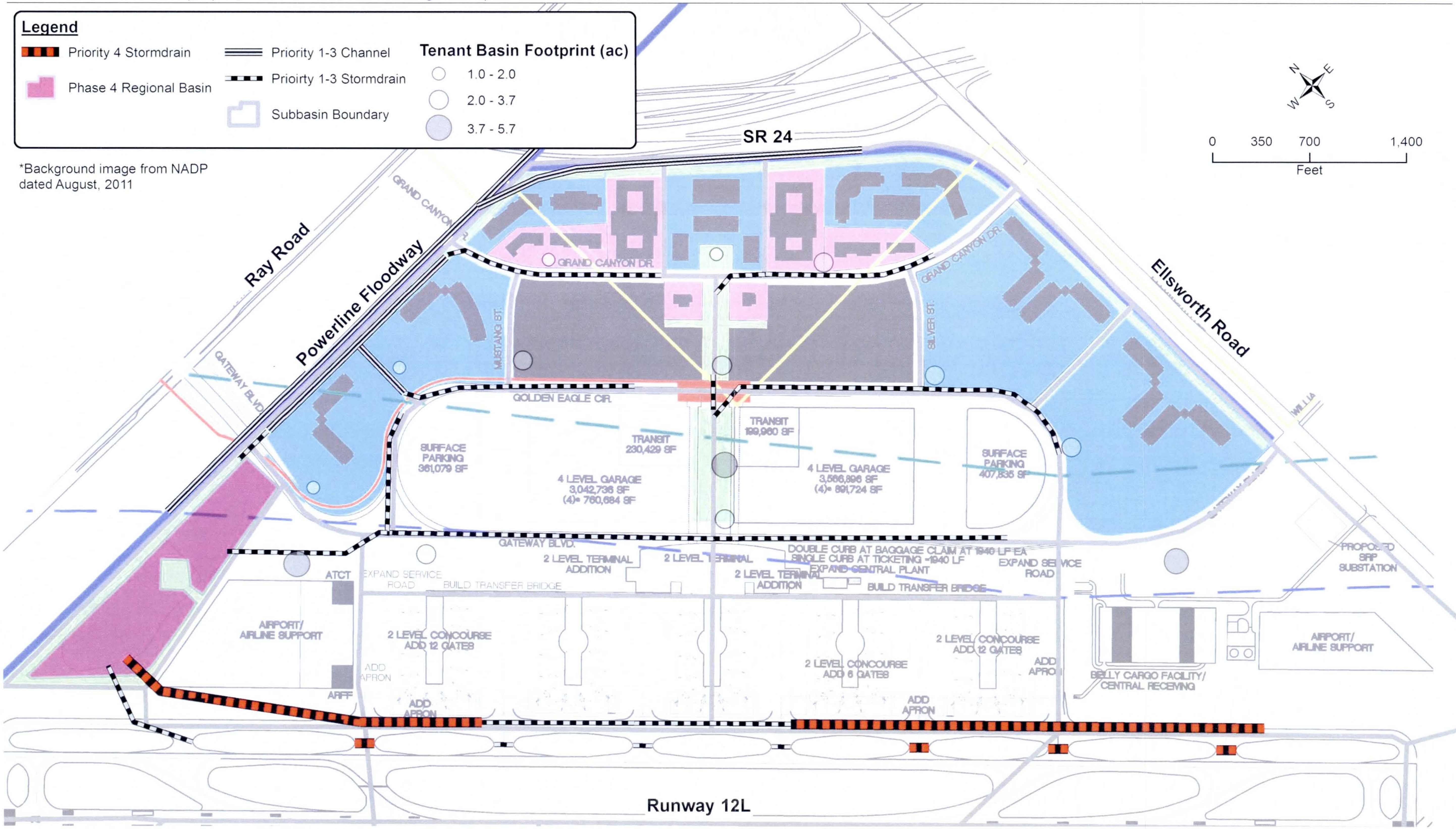


Figure 15 – Priority No. 4 Map

G. Recommendations

Preparation of this AMDP has included ongoing collaboration with PMGAA staff, the City of Mesa and the FCDMC. Through this collaboration, the plan has been refined with an eye toward integration with the Northeast Area Development Plan and Airport priorities for successful implementation as development occurs on the east side of the center runway. The following recommendations are made with this in mind:

- Future tenants should be made aware of the requirement for tenant lot storage of runoff, in accordance with City of Mesa standards.
- Property set aside as green space for future regional storage basins in the 2011 NADP plan should remain as such to allow for regional storage for airport developments.
- Future access streets should incorporate an underground storm drain system to collect pavement runoff and provide for a discharge point for future tenant parcels.
- Proposed storm drain systems should be incorporated into the Airport Capital Improvement Program Prioritization Procedure to obtain FAA cost-share project funding for implementation.
- Future designs outside tenant parcels must accommodate the need to convey 100-year flows in excess of the recommended storm drain systems via overland flow to Retention Basin NE.

Since the final design involves changes to the Powerline Floodway and the Ellsworth Channel, the following recommendations are made with respect to FCDMC requirements for construction within its right-of way:

- Per IGA with the City of Mesa, proposed changes to the Ellsworth Channel shall be submitted to the FCDMC for review.
- 15% plans (or later design level that details work to be done within the FCDMC right-of-way) should be reviewed by the FCDMC early in the process to identify all necessary permit requirements. Relocation of the Ellsworth Channel will require acquisition of a right-of-way permit through the FCDMC as well as posting of a performance bond naming the FCDMC as an additional insured. The ROW permit typically includes the Land Use Fee or TCE if it is determined that the acquired parcels have an underlying fee interest by the FCDMC. The airport will be responsible for verification of all property owners affected by the proposed project.
- The initial submittal will also be reviewed by the FCDMC Floodplain Branch to determine if a Floodplain Use Permit is required. The Floodplain Use Permit

application is available on the FCDMC website. Currently, Lynn Thomas is the appropriate contact person.

- Other permitting may be required for implementation of the final design of the Ellsworth Channel and Powerline Floodway, including U.S. Army Corps of Engineer Section 404 permits, Dust Control permitting and/or other environmental permits. Other permits may also be required through the airport.
- The design will also require review and approval by the Natural Resources Conservation Service (NRCS) because it sponsors the Powerline Floodway. It is recommended that this review be done following the first review by the FCDMC.
- FCDMC review fees will include a $250 ROW application fee, a $650 review fee for the first submittal, and subsequent reviews will be charged $325 each. The combined fees can be assessed and paid at one time prior to delivery of the ROW permit.
- Approximately four weeks should be anticipated for the first FCDMC review and three weeks for subsequent reviews.
- Inspection fees will be required at $80 per trip to the site. The total inspection fee can be assessed and prepaid prior to construction.
- The Contractor may need to provide the District a Work Plan and an Emergency Action Plan to mitigate flows within the District's facilities.

VII. REFERENCES

1. Department of Transportation, Federal Aviation Administration. Airport Drainage Advisory Circular. Advisory Circular #150/5320-5C (Change 1): Surface Drainage Design. 2008.

2. Dibble Engineering, Final Taxilane Lima Drainage Evaluation, June 2008.

3. Dibble Engineering, Master Drainage Plan, Williams Gateway Airport, August 19, 1996.

4. FEMA, Flood Insurance Rate Map, Maricopa County, Arizona. Map Number 04013C2685H & 04013C2695H, September 30, 2005.

5. Flood Control District of Maricopa County, Drainage Design Manual for Maricopa County, Arizona-Volume I (Hydrology). November 18, 2009.

6. Flood Control District of Maricopa County, Drainage Design Manual for Maricopa County, Arizona-Volume II (Hydraulics), January 1995.

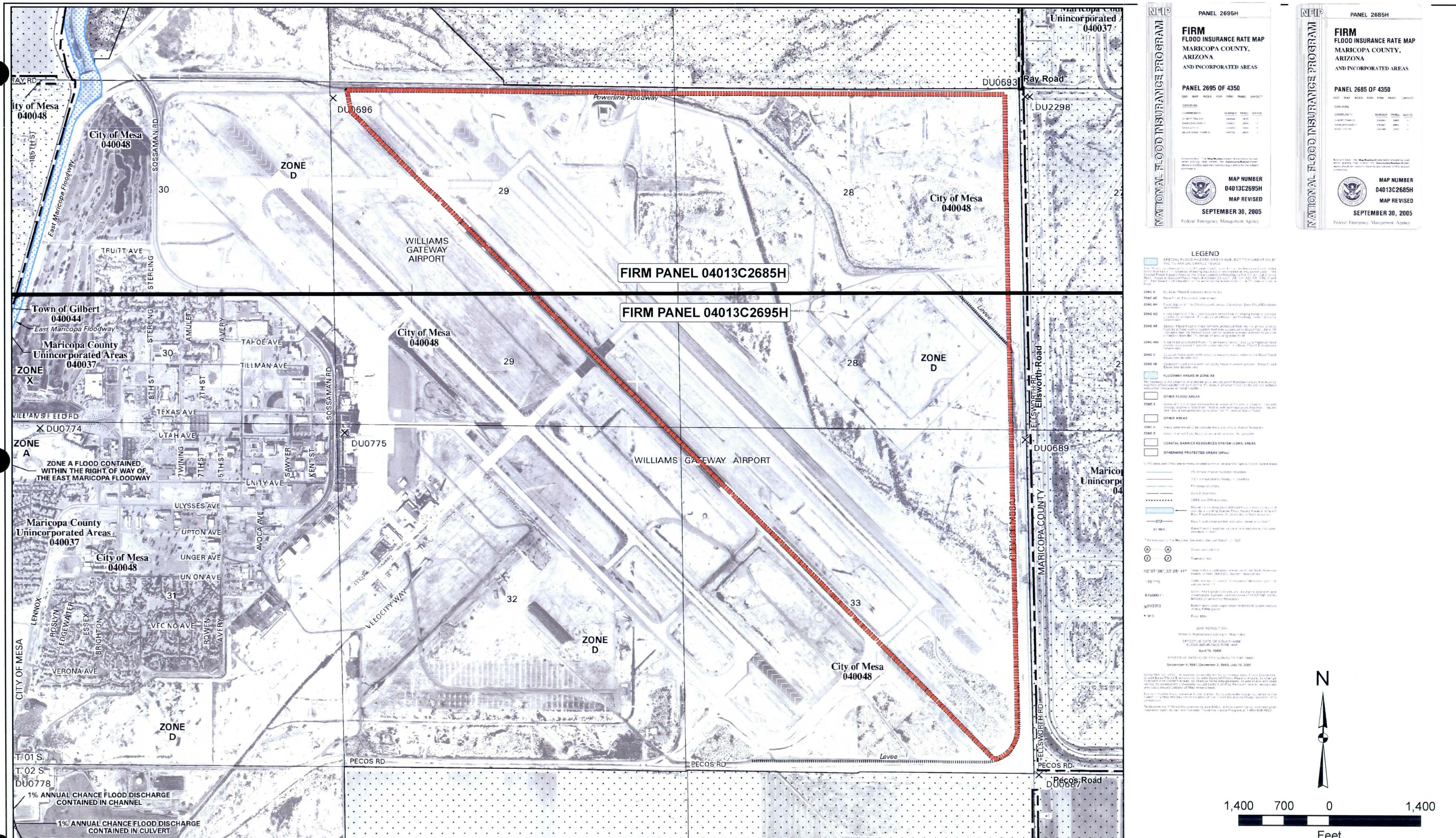
7. Flood Control District of Maricopa County, Drainage Design Management System for Windows (DDMSW), Version 4.6.5.

8. Gilbertson Associates, Inc., Hydrology Study/Drainage Master Plan, October 10, 2001.

9. Jacobs Engineering Group, Inc., *Technical Report, Northeast Area Development Plan, Phoenix-Mesa Gateway Airport*, May, 2011.

10. U.S. Dept. of Agriculture-Soil Conservation Service. Soil Survey of Aquila-Carefree Area, Parts of Maricopa and Pinal Counties, Arizona. April 1986.

Flood Insurance Rate Map

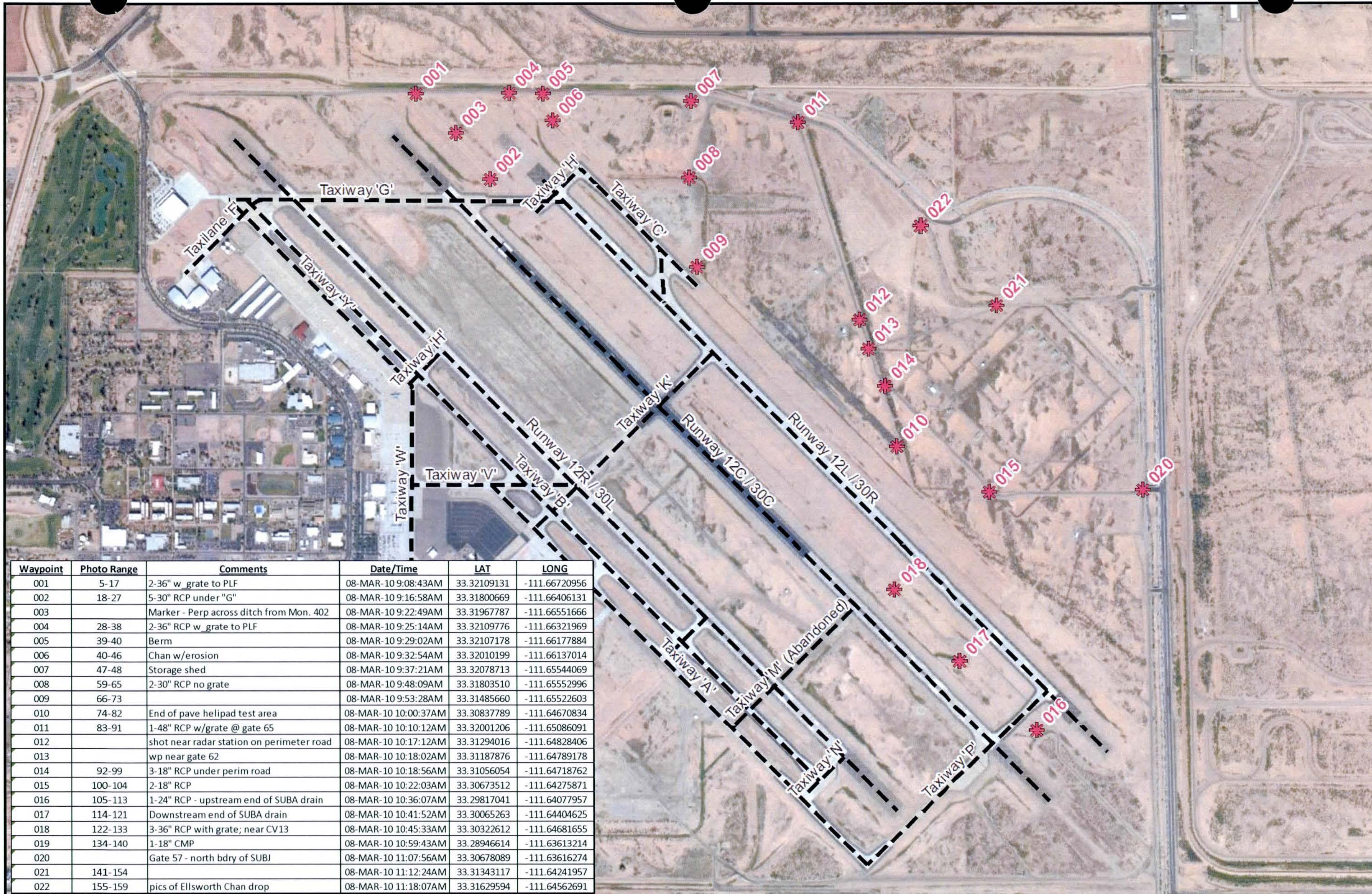


East Area Airport Master Drainage Plan
Phoenix-Mesa Gateway Airport
Existing Conditions Hydrology

Dibble Engineering

APPENDIX A
FIRM PANELS

SITE PHOTOGRAPHS



Waypoint	Photo Range	Comments	Date/Time	LAT	LONG
001	5-17	2-36" w_grate to PLF	08-MAR-10 9:08:43AM	33.32109131	-111.66720956
002	18-27	5-30" RCP under "G"	08-MAR-10 9:16:58AM	33.31800669	-111.66406131
003		Marker - Perp across ditch from Mon. 402	08-MAR-10 9:22:49AM	33.31967787	-111.66551666
004	28-38	2-36" RCP w_grate to PLF	08-MAR-10 9:25:14AM	33.32109776	-111.66321969
005	39-40	Berm	08-MAR-10 9:29:02AM	33.32107178	-111.66177884
006	40-46	Chan w/erosion	08-MAR-10 9:32:54AM	33.32010199	-111.66137014
007	47-48	Storage shed	08-MAR-10 9:37:21AM	33.32078713	-111.65544069
008	59-65	2-30" RCP no grate	08-MAR-10 9:48:09AM	33.31803510	-111.65552996
009	66-73		08-MAR-10 9:53:28AM	33.31485660	-111.65522603
010	74-82	End of pave helipad test area	08-MAR-10 10:00:37AM	33.30837789	-111.64670834
011	83-91	1-48" RCP w/grate @ gate 65	08-MAR-10 10:10:12AM	33.32001206	-111.65086091
012		shot near radar station on perimeter road	08-MAR-10 10:17:12AM	33.31294016	-111.64828406
013		wp near gate 62	08-MAR-10 10:18:02AM	33.31187876	-111.64789178
014	92-99	3-18" RCP under perim road	08-MAR-10 10:18:56AM	33.31056054	-111.64718762
015	100-104	2-18" RCP	08-MAR-10 10:22:03AM	33.30673512	-111.64275871
016	105-113	1-24" RCP - upstream end of SUBA drain	08-MAR-10 10:36:07AM	33.29817041	-111.64077957
017	114-121	Downstream end of SUBA drain	08-MAR-10 10:41:52AM	33.30065263	-111.64404625
018	122-133	3-36" RCP with grate; near CV13	08-MAR-10 10:45:33AM	33.30322612	-111.64681655
019	134-140	1-18" CMP	08-MAR-10 10:59:43AM	33.28946614	-111.63613214
020		Gate 57 - north bdry of SUBJ	08-MAR-10 11:07:56AM	33.30678089	-111.63616274
021	141-154		08-MAR-10 11:12:24AM	33.31343117	-111.64241957
022	155-159	pics of Ellsworth Chan drop	08-MAR-10 11:18:07AM	33.31629594	-111.64562691

Legend

Photo Waypoint Number*

Airport Centerlines

**A range of photos were taken at various locations identified by a GPS Waypoint. See table for photo numbers taken at each location. Additional waypoints and photos are listed in this table which are not included in this report.*

N W E S

1,800 900 0 1,800

Feet

Exhibit B.1
Photo Location Map

Gateway_Drng 005

Gateway_Drng 006

Gateway_Drng 007

Gateway_Drng 009

Gateway_Drng 012

Gateway_Drng 014

Gateway_Drng 016

Gateway_Drng 020

Gateway_Drng 021

Gateway_Drng 024

Gateway_Drng 026

Gateway_Drng 028


Gateway_Drng 035


Gateway_Drng 036


Gateway_Drng 042


Gateway_Drng 043

Gateway_Drng 047

Gateway_Drng 060

Gateway_Drng 062

Gateway_Drng 066

Gateway_Drng 074

Gateway_Drng 082

Gateway_Drng 085

Gateway_Drng 092

Gateway_Drng 100

Gateway_Drng 106

Gateway_Drng 114

Gateway_Drng 115

Gateway_Drng 122

Gateway_Drng 123

Gateway_Drng 129

Gateway_Drng 133

Gateway_Drng 136

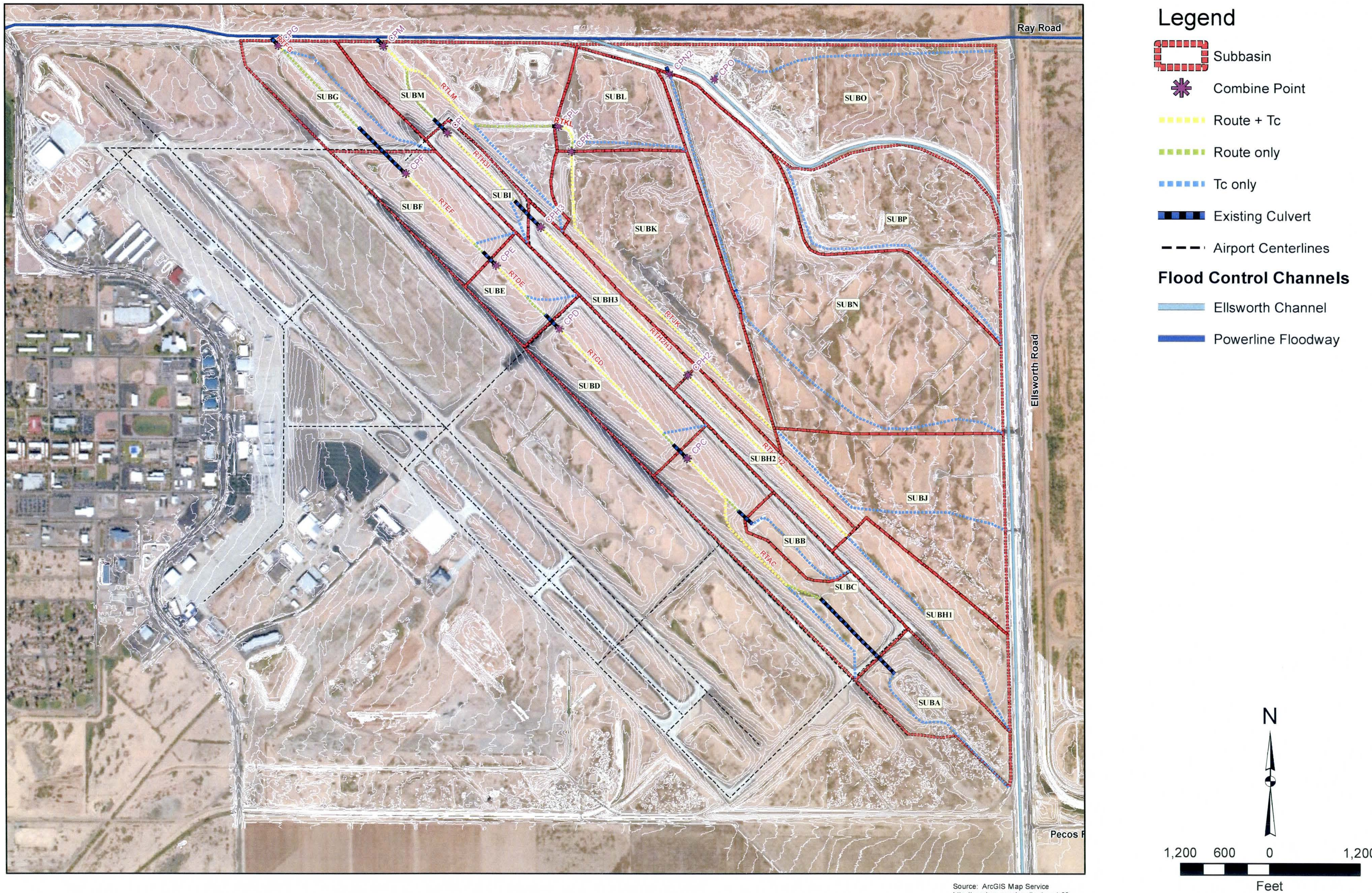
Gateway_Drng 143

Gateway_Drng 154

DDMSW SUMMARY

TABLES AND MAPS

- 6-hour Flow Summary
- 24-hour Flow Summary
- 6-hour Subbasin Parameters
- 24-hour Subbasin Parameters
- NOAA Atlas 14 Rainfall (Typical)
- Land Use (Typical)
- Land Use Map
- Soils (Typical)
- Soils Map
- Routing (Typical)
- Storage (Typical)

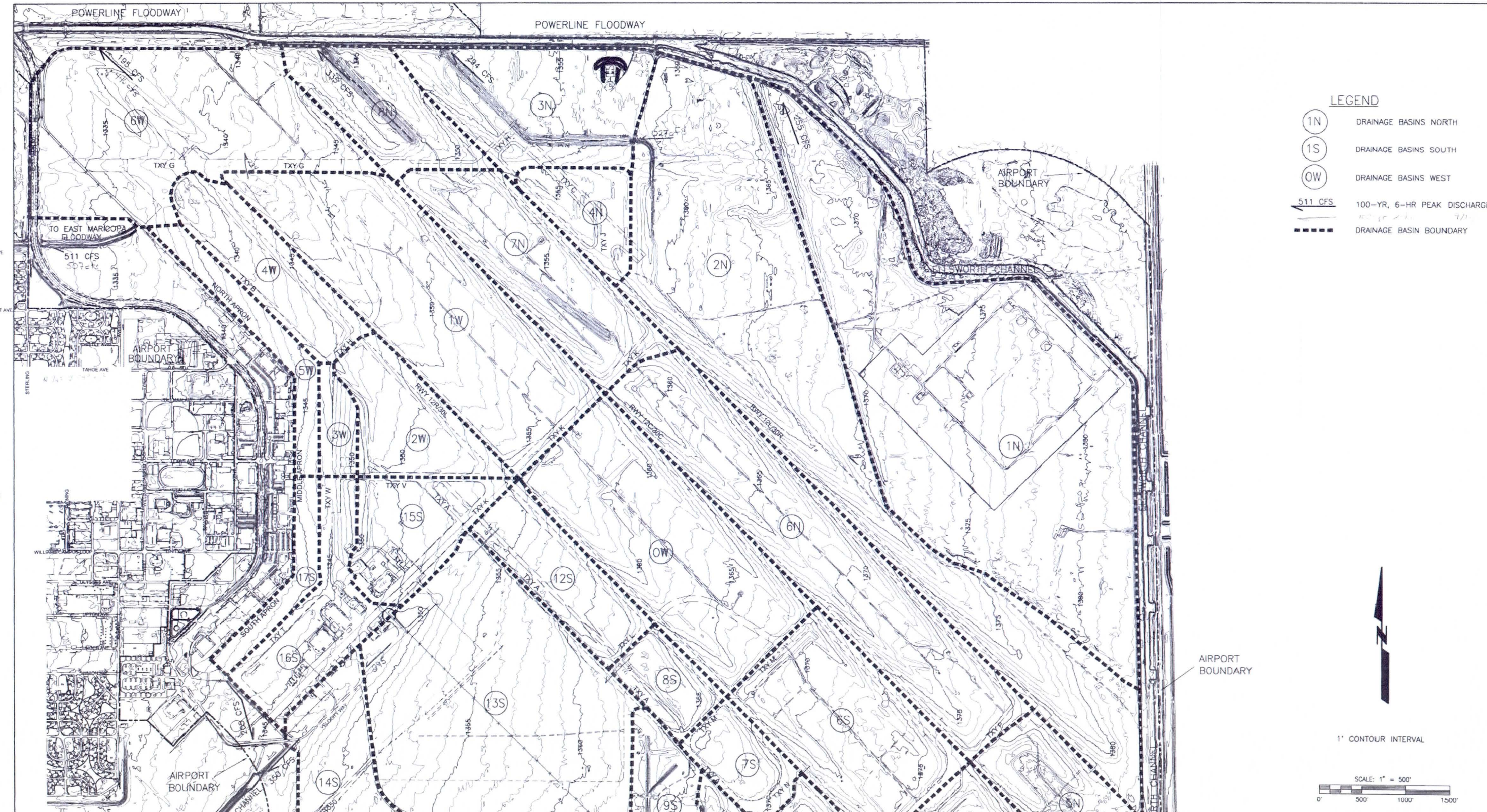


Source: ArcGIS Map Service
http://services.arcgisonline/com/v92
I3_Imagery_Prime_World_2D

East Area Airport Master Drainage Plan
Phoenix-Mesa Gateway Airport
Existing Conditions Hydrology

Dibble Engineering

Existing Conditions Drainage Area Map



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WILLIAMS GATEWAY AIRPORT

EXHIBIT 1-A
EXISTING CONDITIONS (HEC-1)
DRAINAGE BASINS (4-6-01)

Designed by Derek Rogers	Drawn by RMB	
Date SEPTEMBER 30, 2001	Job No. 53111	Sheet 1 of 1

ID	Type	Area (sq mi)	Discharge cfs 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin 01								
SUBA	Hydrograph	0.060		17	23			57
RSA	Routed	0.060		10	11			13
RTAC	Routed	0.060		10	11			13
SUBB	Hydrograph	0.030		10	13			30
RSB	Routed	0.030		70	70			70
RTBC	Routed	0.030		15	15			29
SUBC	Hydrograph	0.110		30	38			87
CPC	Combined	0.200		41	53			119
RSCPC	Routed	0.200		40	52			97
RTCD	Routed	0.200		40	51			96
SUBD	Hydrograph	0.090		55	69			132
CPD	Combined	0.290		68	87			170
RSCPD	Routed	0.290		68	87			144
RTDE	Routed	0.290		68	86			144
SUBE	Hydrograph	0.040		41	50			89
CPE	Combined	0.330		84	105			189
RSCPE	Routed	0.330		82	101			195
RTEF	Routed	0.330		81	101			179
SUBF	Hydrograph	0.070		56	69			129
CPF	Combined	0.400		114	139			247
RSCPF	Routed	0.400		112	136			269
RTFG	Routed	0.400		111	135			228
SUBG	Hydrograph	0.080		42	53			106
CPG	Combined	0.480		140	171			277
RSCPG	Routed	0.480		116	133			263
SUBH1	Hydrograph	0.080		21	27			67
RTH1H2	Routed	0.080		19	26			66
SUBH2	Hydrograph	0.050		16	20			42
CPH2	Combined	0.130		31	42			102
RTH2H3	Routed	0.130		30	39			98
SUBH3	Hydrograph	0.050		17	22			43
CPH3	Combined	0.180		39	51			125
RSH3	Routed	0.180		38	50			94
RTH3I	Routed	0.180		38	50			94
SUBI	Hydrograph	0.030		18	22			40
CPI	Combined	0.200		40	53			98
RSI	Routed	0.200		40	52			93
RTIM	Routed	0.200		39	52			93
SUBJ	Hydrograph	0.160		55	71			158
RTJK	Routed	0.160		50	68			151
SUBK	Hydrograph	0.180		49	65			148
CPK	Combined	0.340		85	119			270
RTKL	Routed	0.340		85	117			269
SUBL	Hydrograph	0.060		36	47			100
CPL	Combined	0.410		89	125			290
RTLM	Routed	0.410		86	121			280
SUBM	Hydrograph	0.140		51	67			151
CPM	Combined	0.750		129	181			410
RSCPM	Routed	0.750		124	177			407
SUBN	Hydrograph	0.350		62	84			209
RSN	Routed	0.350		24	30			67
SUBO	Hydrograph	0.220		61	81			213
SUBP	Hydrograph	0.140		20	28			79
CPO	Combined	0.360		80	107			285
CPN2	Combined	0.710		79	108			286
CPM2	Combined	1.460		166	229			592
CPG2	Combined	1.940		258	335			779

ID	Type	Area (sq mi)	Discharge cfs 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin 01								
SUBA	Hydrograph	0.060		14	20			49
RSA	Routed	0.060		9	11			12
RTAC	Routed	0.060		9	11			12
SUBB	Hydrograph	0.030		8	11			25
RSB	Routed	0.030		70	70			70
RTBC	Routed	0.030		15	15			24
SUBC	Hydrograph	0.110		23	32			74
CPC	Combined	0.200		33	45			101
RSCPC	Routed	0.200		33	43			89
RTCD	Routed	0.200		32	43			88
SUBD	Hydrograph	0.090		46	58			109
CPD	Combined	0.290		55	73			146
RSCPD	Routed	0.290		55	73			133
RTDE	Routed	0.290		55	72			133
SUBE	Hydrograph	0.040		33	42			74
CPE	Combined	0.330		68	89			165
RSCPE	Routed	0.330		67	86			153
RTEF	Routed	0.330		67	86			151
SUBF	Hydrograph	0.070		46	59			107
CPF	Combined	0.400		95	119			203
RSCPF	Routed	0.400		94	118			174
RTFG	Routed	0.400		93	117			174
SUBG	Hydrograph	0.080		35	46			89
CPG	Combined	0.480		117	148			236
RSCPG	Routed	0.480		104	121			205
SUBH1	Hydrograph	0.080		17	24			58
RTH1H2	Routed	0.080		16	22			55
SUBH2	Hydrograph	0.050		14	18			35
CPH2	Combined	0.130		26	36			86
RTH2H3	Routed	0.130		24	35			83
SUBH3	Hydrograph	0.050		14	19			36
CPH3	Combined	0.180		32	45			106
RSH3	Routed	0.180		31	44			88
RTH3I	Routed	0.180		31	44			87
SUBI	Hydrograph	0.030		14	18			33
CPI	Combined	0.200		33	47			93
RSI	Routed	0.200		33	46			90
RTIM	Routed	0.200		33	46			89
SUBJ	Hydrograph	0.160		48	66			134
RTJK	Routed	0.160		44	61			128
SUBK	Hydrograph	0.180		43	60			126
CPK	Combined	0.340		73	106			230
RTKL	Routed	0.340		73	105			230
SUBL	Hydrograph	0.060		31	43			85
CPL	Combined	0.410		76	111			248
RTLM	Routed	0.410		74	107			244
SUBM	Hydrograph	0.140		43	60			128
CPM	Combined	0.750		117	165			367
RSCPM	Routed	0.750		114	163			365
SUBN	Hydrograph	0.350		54	79			180
RSN	Routed	0.350		22	28			52
SUBO	Hydrograph	0.220		50	77			185
SUBP	Hydrograph	0.140		17	25			70
CPO	Combined	0.360		65	98			247
CPN2	Combined	0.710		72	107			264
CPM2	Combined	1.460		179	236			578
CPG2	Combined	1.940		281	354			734

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
SUBA	0.063	0.44	22.7	22.7	URBAN	0.055	0.23	0.35	4.70	0.261	16	**Tc (Hrs)**	0.722	0.722	0.717	0.642	0.595	0.554
												Vel (f/s)	0.89	0.89	0.90	1.01	1.08	1.16
												R (Hrs)	0.647	0.647	0.641	0.567	0.522	0.481
SUBB	0.026	0.32	40.6	40.6	URBAN	0.056	0.20	0.36	5.10	0.221	27	**Tc (Hrs)**	0.490	0.490	0.487	0.440	0.410	0.383
												Vel (f/s)	0.96	0.96	0.96	1.07	1.14	1.23
												R (Hrs)	0.539	0.539	0.535	0.479	0.442	0.410
SUBC	0.110	0.78	23.0	23.0	URBAN	0.049	0.20	0.39	5.80	0.158	26	**Tc (Hrs)**	0.842	0.842	0.836	0.756	0.701	0.656
												Vel (f/s)	1.36	1.36	1.37	1.51	1.63	1.74
												R (Hrs)	0.882	0.882	0.875	0.782	0.720	0.669
SUBD	0.087	0.48	35.2	35.2	URBAN	0.049	0.20	0.25	9.70	0.040	28	**Tc (Hrs)**	0.518	0.518	0.515	0.470	0.443	0.421
												Vel (f/s)	1.36	1.36	1.37	1.50	1.59	1.67
												R (Hrs)	0.399	0.399	0.396	0.358	0.335	0.317
SUBE	0.042	0.24	63.0	63.0	URBAN	0.052	0.20	0.25	9.70	0.040	29	**Tc (Hrs)**	0.315	0.315	0.313	0.286*	0.270*	0.256 *
												Vel (f/s)	1.12	1.12	1.12	1.23	1.30	1.38
												R (Hrs)	0.200	0.200	0.198	0.179	0.168	0.159
SUBF	0.072	0.36	42.0	42.0	URBAN	0.050	0.20	0.25	9.70	0.040	27	**Tc (Hrs)**	0.430	0.430	0.427	0.390	0.367	0.349
												Vel (f/s)	1.23	1.23	1.24	1.35	1.44	1.51
												R (Hrs)	0.287	0.287	0.285	0.257	0.241	0.227
SUBG	0.075	0.48	39.6	39.6	URBAN	0.052	0.21	0.27	8.80	0.052	21	**Tc (Hrs)**	0.530	0.530	0.527	0.478	0.448	0.424
												Vel (f/s)	1.33	1.33	1.34	1.47	1.57	1.66
												R (Hrs)	0.445	0.445	0.442	0.396	0.369	0.347
SUBH1	0.082	0.65	24.8	24.8	URBAN	0.054	0.23	0.37	6.60	0.115	14	**Tc (Hrs)**	0.807	0.807	0.801	0.714	0.659	0.616
												Vel (f/s)	1.18	1.18	1.19	1.34	1.45	1.55
												R (Hrs)	0.860	0.860	0.853	0.750	0.687	0.637
SUBH2	0.048	0.58	17.4	17.4	URBAN	0.053	0.21	0.25	9.70	0.043	25	**Tc (Hrs)**	0.746	0.746	0.741	0.675	0.635	0.602
												Vel (f/s)	1.14	1.14	1.15	1.26	1.34	1.41
												R (Hrs)	0.975	0.975	0.968	0.873	0.816	0.769

* Non default value or value out of range

Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
SUBH3	0.046	0.53	15.2	15.2	URBAN	0.051	0.19	0.25	9.70	0.040	32	**Tc (Hrs)**	0.716	0.716	0.712	0.652	0.615	0.584
												Vel (f/s)	1.09	1.09	1.09	1.19	1.26	1.33
												R (Hrs)	0.889	0.889	0.883	0.800	0.750	0.709
SUBI	0.027	0.35	36.7	36.7	URBAN	0.048	0.15	0.25	9.70	0.041	50	**Tc (Hrs)**	0.419	0.419	0.416	0.384	0.363	0.346
												Vel (f/s)	1.23	1.23	1.23	1.34	1.41	1.48
												R (Hrs)	0.476	0.476	0.473	0.432	0.407	0.385
SUBJ	0.161	0.78	19.3	19.3	URBAN	0.052	0.25	0.25	9.70	0.044	5	**Tc (Hrs)**	0.866	0.866	0.860	0.773	0.722	0.681
												Vel (f/s)	1.32	1.32	1.33	1.48	1.58	1.68
												R (Hrs)	0.733	0.733	0.726	0.646	0.598	0.561
SUBK	0.183	0.97	18.6	18.6	URBAN	0.052	0.25	0.27	8.80	0.045	5	**Tc (Hrs)**	0.978*	0.978*	0.970*	0.872	0.815	0.769
												Vel (f/s)	1.45	1.45	1.47	1.63	1.75	1.85
												R (Hrs)	0.927	0.927	0.919	0.817	0.757	0.710
SUBL	0.064	0.35	45.7	45.7	URBAN	0.058	0.25	0.29	8.40	0.057	5	**Tc (Hrs)**	0.483	0.483	0.479	0.428	0.398	0.374
												Vel (f/s)	1.06	1.06	1.07	1.20	1.29	1.37
												R (Hrs)	0.341	0.341	0.338	0.298	0.275	0.257
SUBM	0.137	0.67	25.6	25.6	URBAN	0.051	0.23	0.30	8.00	0.066	12	**Tc (Hrs)**	0.743	0.743	0.737	0.660	0.616	0.579
												Vel (f/s)	1.32	1.32	1.33	1.49	1.60	1.70
												R (Hrs)	0.600	0.600	0.595	0.526	0.487	0.455
SUBN	0.350	1.51	14.6	14.6	URBAN	0.048	0.25	0.30	8.00	0.065	5	**Tc (Hrs)**	1.315*	1.315*	1.304*	1.161*	1.079*	1.012 *
												Vel (f/s)	1.68	1.68	1.70	1.91	2.05	2.19
												R (Hrs)	1.268	1.268	1.257	1.104	1.018	0.949
SUBO	0.218	0.76	24.9	24.9	URBAN	0.051	0.25	0.36	6.80	0.113	5	**Tc (Hrs)**	0.878	0.878	0.870	0.769	0.706	0.656
												Vel (f/s)	1.27	1.27	1.28	1.45	1.58	1.70
												R (Hrs)	0.612	0.612	0.607	0.529	0.481	0.444
SUBP	0.145	0.80	12.6	12.6	URBAN	0.053	0.25	0.36	5.10	0.216	5	**Tc (Hrs)**	1.197*	1.197*	1.187*	1.051*	0.967*	0.892
												Vel (f/s)	0.98	0.98	0.99	1.12	1.21	1.32
												R (Hrs)	1.136	1.136	1.126	0.983	0.897	0.820

Column groups: Sub Basin Parameters (Area through Kb); Rainfall Losses (IA through RTIMP); Return Period Parameters (2 Yr through 100 Yr).

Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					
Major Basin ID: 01																		
SUBA	0.063	0.44	22.7	22.7	URBAN	0.055	0.23	0.35	4.70	0.261	16	**Tc (Hrs)**	0.801	0.736	0.682	0.618	0.579	0.546
												Vel (f/s)	0.81	0.88	0.95	1.04	1.11	1.18
												R (Hrs)	0.725	0.660	0.607	0.544	0.506	0.474
SUBB	0.026	0.32	40.6	40.6	URBAN	0.056	0.20	0.36	5.10	0.221	27	**Tc (Hrs)**	0.542	0.504	0.470	0.428	0.404	0.382
												Vel (f/s)	0.87	0.93	1.00	1.10	1.16	1.23
												R (Hrs)	0.604	0.557	0.515	0.464	0.435	0.409
SUBC	0.110	0.78	23.0	23.0	URBAN	0.049	0.20	0.39	5.80	0.158	26	**Tc (Hrs)**	0.929*	0.867	0.804	0.734	0.692	0.654
												Vel (f/s)	1.23	1.32	1.42	1.56	1.65	1.75
												R (Hrs)	0.984	0.911	0.838	0.757	0.709	0.667
SUBD	0.087	0.48	35.2	35.2	URBAN	0.049	0.20	0.25	9.70	0.040	28	**Tc (Hrs)**	0.576	0.537	0.503	0.467	0.445	0.426
												Vel (f/s)	1.22	1.31	1.40	1.51	1.58	1.65
												R (Hrs)	0.449	0.415	0.386	0.355	0.337	0.321
SUBE	0.042	0.24	63.0	63.0	URBAN	0.052	0.20	0.25	9.70	0.040	29	**Tc (Hrs)**	0.350	0.327	0.306	0.284*	0.271*	0.259 *
												Vel (f/s)	1.01	1.08	1.15	1.24	1.30	1.36
												R (Hrs)	0.225	0.208	0.193	0.178	0.169	0.161
SUBF	0.072	0.36	42.0	42.0	URBAN	0.050	0.20	0.25	9.70	0.040	27	**Tc (Hrs)**	0.478	0.446	0.417	0.387	0.369	0.353
												Vel (f/s)	1.10	1.18	1.27	1.36	1.43	1.50
												R (Hrs)	0.323	0.299	0.277	0.255	0.242	0.230
SUBG	0.075	0.48	39.6	39.6	URBAN	0.052	0.21	0.27	8.80	0.052	21	**Tc (Hrs)**	0.591	0.547	0.509	0.470	0.447	0.427
												Vel (f/s)	1.19	1.29	1.38	1.50	1.57	1.65
												R (Hrs)	0.502	0.461	0.426	0.390	0.368	0.350
SUBH1	0.082	0.65	24.8	24.8	URBAN	0.054	0.23	0.37	6.60	0.115	14	**Tc (Hrs)**	0.888	0.824	0.757	0.688	0.646	0.611
												Vel (f/s)	1.07	1.16	1.26	1.39	1.48	1.56
												R (Hrs)	0.956	0.880	0.800	0.720	0.672	0.631
SUBH2	0.048	0.58	17.4	17.4	URBAN	0.053	0.21	0.25	9.70	0.043	25	**Tc (Hrs)**	0.830	0.772	0.720	0.668	0.636	0.608
												Vel (f/s)	1.02	1.10	1.18	1.27	1.34	1.40
												R (Hrs)	1.098	1.013	0.939	0.863	0.818	0.778

* Non default value or value out of range

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)	Return Period Parameters	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
SUBH3	0.046	0.53	15.2	15.2	URBAN	0.051	0.19	0.25	9.70	0.040	32	**Tc (Hrs)**	0.797	0.745	0.697	0.648	0.618	0.592
												Vel (f/s)	0.98	1.04	1.12	1.20	1.26	1.31
												R (Hrs)	1.001	0.928	0.863	0.796	0.755	0.719
SUBI	0.027	0.35	36.7	36.7	URBAN	0.048	0.15	0.25	9.70	0.041	50	**Tc (Hrs)**	0.466	0.438	0.413	0.385	0.368	0.352
												Vel (f/s)	1.10	1.17	1.24	1.33	1.39	1.46
												R (Hrs)	0.537	0.501	0.468	0.434	0.413	0.393
SUBJ	0.161	0.78	19.3	19.3	URBAN	0.052	0.25	0.25	9.70	0.044	5	**Tc (Hrs)**	0.962*	0.884	0.818	0.753	0.715	0.682
												Vel (f/s)	1.19	1.29	1.40	1.52	1.60	1.68
												R (Hrs)	0.823	0.749	0.687	0.627	0.592	0.562
SUBK	0.183	0.97	18.6	18.6	URBAN	0.052	0.25	0.27	8.80	0.045	5	**Tc (Hrs)**	1.086*	0.998*	0.923*	0.850	0.807	0.770
												Vel (f/s)	1.31	1.43	1.54	1.67	1.76	1.85
												R (Hrs)	1.042	0.948	0.870	0.794	0.749	0.711
SUBL	0.064	0.35	45.7	45.7	URBAN	0.058	0.25	0.29	8.40	0.057	5	**Tc (Hrs)**	0.537	0.492	0.453	0.415	0.392	0.373
												Vel (f/s)	0.96	1.04	1.13	1.24	1.31	1.38
												R (Hrs)	0.384	0.348	0.318	0.288	0.271	0.257
SUBM	0.137	0.67	25.6	25.6	URBAN	0.051	0.23	0.30	8.00	0.066	12	**Tc (Hrs)**	0.826	0.761	0.702	0.643	0.608	0.579
												Vel (f/s)	1.19	1.29	1.40	1.53	1.62	1.70
												R (Hrs)	0.675	0.616	0.563	0.511	0.480	0.455
SUBN	0.350	1.51	14.6	14.6	URBAN	0.048	0.25	0.30	8.00	0.065	5	**Tc (Hrs)**	1.459*	1.338*	1.228*	1.121*	1.059*	1.007 *
												Vel (f/s)	1.52	1.66	1.80	1.98	2.09	2.20
												R (Hrs)	1.424	1.293	1.176	1.063	0.997	0.943
SUBO	0.218	0.76	24.9	24.9	URBAN	0.051	0.25	0.36	6.80	0.113	5	**Tc (Hrs)**	0.961*	0.887	0.810	0.732	0.685	0.646
												Vel (f/s)	1.16	1.26	1.38	1.52	1.63	1.73
												R (Hrs)	0.678	0.620	0.560	0.501	0.465	0.436
SUBP	0.145	0.80	12.6	12.6	URBAN	0.053	0.25	0.36	5.10	0.216	5	**Tc (Hrs)**	1.320*	1.204*	1.110*	0.995*	0.929*	0.872
												Vel (f/s)	0.89	0.97	1.06	1.18	1.26	1.35
												R (Hrs)	1.266	1.144	1.045	0.926	0.858	0.800

ID	Method	Duration	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
DEFAULT	NOAA14	5 MIN	0.247	0.335	0.402	0.493	0.564	0.636
	NOAA14	10 MIN	0.377	0.510	0.612	0.751	0.858	0.967
	NOAA14	15 MIN	0.467	0.632	0.759	0.931	1.064	1.199
	NOAA14	30 MIN	0.629	0.851	1.022	1.254	1.433	1.615
	NOAA14	1 HOUR	0.778	1.054	1.265	1.551	1.773	1.999
	NOAA14	2 HOUR	0.886	1.178	1.405	1.710	1.948	2.193
	NOAA14	3 HOUR	0.933	1.224	1.455	1.777	2.033	2.299
	NOAA14	6 HOUR	1.115	1.423	1.669	2.004	2.270	2.547
	NOAA14	12 HOUR	1.256	1.584	1.844	2.195	2.464	2.739
	NOAA14	24 HOUR	1.510	1.939	2.281	2.752	3.119	3.506

Phoenix-Mesa Gateway Airport Authority
Drainage Design Management System
LAND USE
Project Reference: 10-0821.1006_EX_6HR

Major Basin ID: 01

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
SUBA	620	0.0077	12.2	0.05	95	0.0	DRY	0.030	Airports (Taxiways, runways, and paved areas)
	621	0.0554	87.8	0.25	5	0.0	DRY	0.058	Airports (Infield & open spaces)
		0.0631	**100.0**						
SUBB	620	0.0064	24.7	0.05	95	0.0	DRY	0.032	Airports (Taxiways, runways, and paved areas)
	621	0.0195	75.3	0.25	5	0.0	DRY	0.063	Airports (Infield & open spaces)
		0.0259	**100.0**						
SUBC	620	0.0256	23.3	0.05	95	0.0	DRY	0.028	Airports (Taxiways, runways, and paved areas)
	621	0.0843	76.7	0.25	5	0.0	DRY	0.055	Airports (Infield & open spaces)
		0.1099	**100.0**						
SUBD	620	0.0222	25.4	0.05	95	0.0	DRY	0.029	Airports (Taxiways, runways, and paved areas)
	621	0.0651	74.6	0.25	5	0.0	DRY	0.056	Airports (Infield & open spaces)
		0.0873	**100.0**						
SUBE	620	0.0112	26.8	0.05	95	0.0	DRY	0.031	Airports (Taxiways, runways, and paved areas)
	621	0.0306	73.2	0.25	5	0.0	DRY	0.060	Airports (Infield & open spaces)
		0.0418	**100.0**						
SUBF	620	0.0179	24.8	0.05	95	0.0	DRY	0.030	Airports (Taxiways, runways, and paved areas)
	621	0.0542	75.2	0.25	5	0.0	DRY	0.057	Airports (Infield & open spaces)
		0.0721	**100.0**						
SUBG	620	0.0136	18.2	0.05	95	0.0	DRY	0.029	Airports (Taxiways, runways, and paved areas)
	621	0.0611	81.8	0.25	5	0.0	DRY	0.057	Airports (Infield & open spaces)

* Non default value

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description

Major Basin ID: 01

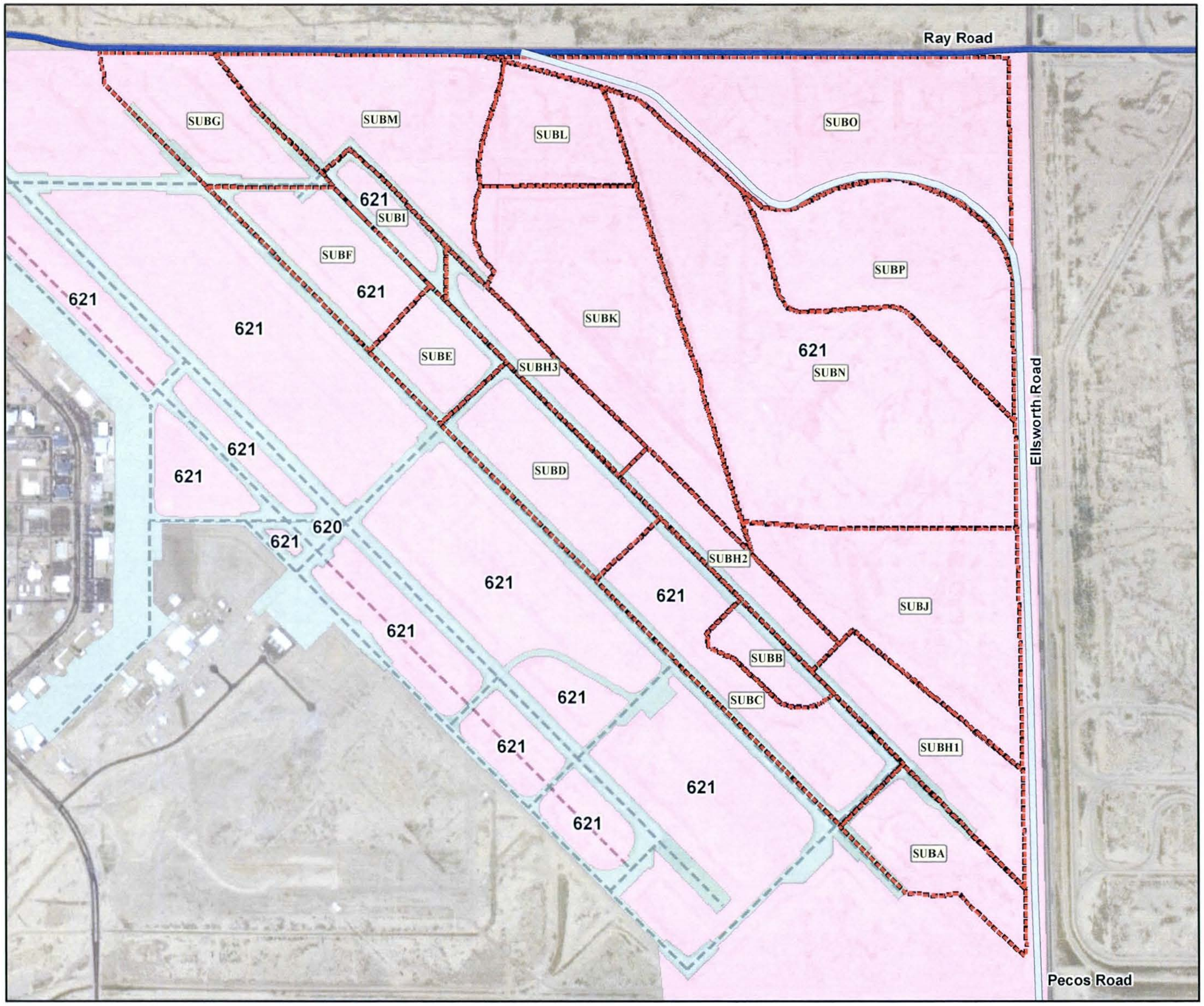
Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
		0.0747	**100.0**						
SUBH1	620	0.0083	10.1	0.05	95	0.0	DRY	0.029	Airports (Taxiways, runways, and paved areas)
	621	0.0738	89.9	0.25	5	0.0	DRY	0.056	Airports (Infield & open spaces)
		0.0821	**100.0**						
SUBH2	620	0.0106	22.1	0.05	95	0.0	DRY	0.031	Airports (Taxiways, runways, and paved areas)
	621	0.0374	77.9	0.25	5	0.0	DRY	0.060	Airports (Infield & open spaces)
		0.0480	**100.0**						
SUBH3	620	0.0137	30.1	0.05	95	0.0	DRY	0.031	Airports (Taxiways, runways, and paved areas)
	621	0.0318	69.9	0.25	5	0.0	DRY	0.060	Airports (Infield & open spaces)
		0.0455	**100.0**						
SUBI	620	0.0136	49.8	0.05	95	0.0	DRY	0.032	Airports (Taxiways, runways, and paved areas)
	621	0.0137	50.2	0.25	5	0.0	DRY	0.063	Airports (Infield & open spaces)
		0.0273	**100.0**						
SUBJ	621	0.1608	100.0	0.25	5	0.0	DRY	0.052	Airports (Infield & open spaces)
		0.1608	**100.0**						
SUBK	621	0.1827	100.0	0.25	5	0.0	DRY	0.052	Airports (Infield & open spaces)
		0.1827	**100.0**						
SUBL	621	0.0641	100.0	0.25	5	0.0	DRY	0.058	Airports (Infield & open spaces)
		0.0641	**100.0**						
SUBM	620	0.0106	7.7	0.05	95	0.0	DRY	0.028	Airports (Taxiways, runways, and paved areas)
	621	0.1267	92.3	0.25	5	0.0	DRY	0.053	Airports (Infield & open spaces)

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description

Major Basin ID: 01

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
		0.1373	**100.0**						
SUBN	621	0.3500	100.0	0.25	5	0.0	DRY	0.048	Airports (Infield & open spaces)
		0.3500	**100.0**						
SUBO	621	0.2181	100.0	0.25	5	0.0	DRY	0.051	Airports (Infield & open spaces)
		0.2181	**100.0**						
SUBP	621	0.1448	100.0	0.25	5	0.0	DRY	0.053	Airports (Infield & open spaces)
		0.1448	**100.0**						

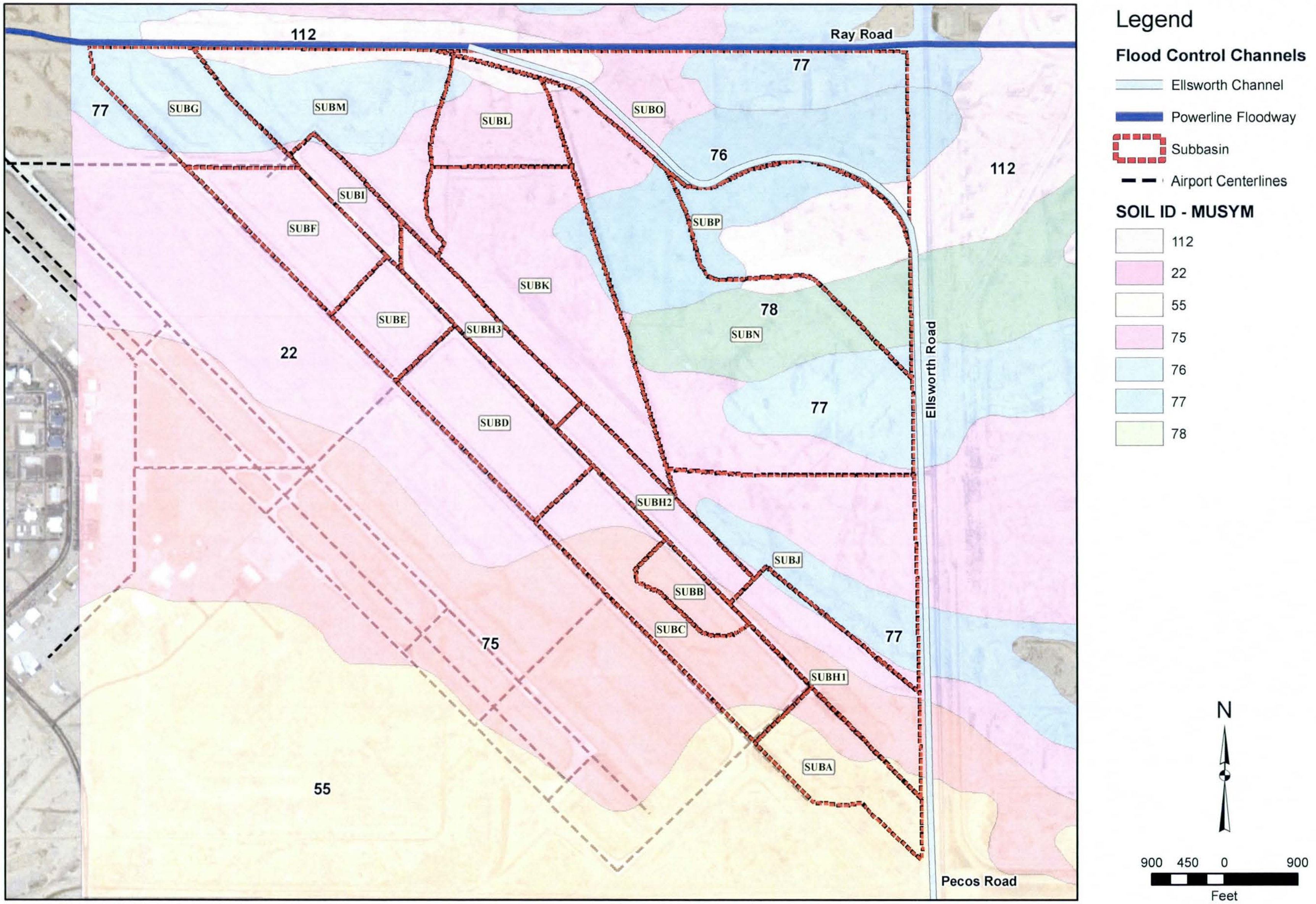
Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments
Major Basin ID: 01									
SUBA	645	55	64555	0.049	78.30	0.270	-	100	
	645	75	64575	0.014	21.70	0.230	-	100	
SUBB	645	22	64522	0.001	2.30	0.040	-	100	
	645	75	64575	0.025	97.70	0.230	-	100	
SUBC	645	22	64522	0.024	22.20	0.040	-	100	
	645	55	64555	0.007	6.40	0.270	-	100	
	645	75	64575	0.079	71.40	0.230	-	100	
SUBD	645	22	64522	0.087	100.00	0.040	-	100	
SUBE	645	22	64522	0.042	100.00	0.040	-	100	
SUBF	645	22	64522	0.072	100.00	0.040	-	100	
SUBG	645	22	64522	0.010	13.50	0.040	-	100	
	645	77	64577	0.062	83.30	0.050	-	100	
	645	112	645112	0.002	3.20	0.390	-	100	
SUBH1	645	22	64522	0.030	36.50	0.040	-	100	
	645	55	64555	0.003	3.20	0.270	-	100	
	645	75	64575	0.046	56.30	0.230	-	100	
	645	77	64577	0.003	4.00	0.050	-	100	
SUBH2	645	22	64522	0.046	96.70	0.040	-	100	
	645	75	64575	0.002	3.30	0.230	-	100	
SUBH3	645	22	64522	0.046	100.00	0.040	-	100	
SUBI	645	22	64522	0.027	97.80	0.040	-	100	
	645	77	64577	0.001	2.20	0.050	-	100	
SUBJ	645	22	64522	0.101	62.80	0.040	-	100	
	645	77	64577	0.060	37.20	0.050	-	100	
SUBK	645	22	64522	0.172	93.90	0.040	-	100	
	645	76	64576	0.011	6.00	0.230	-	100	
	645	78	64578	0.000	0.10	0.050	-	100	
SUBL	645	22	64522	0.052	80.40	0.040	-	100	
	645	77	64577	0.003	5.00	0.050	-	100	
	645	112	645112	0.009	14.60	0.390	-	100	
SUBM	645	22	64522	0.034	24.40	0.040	-	100	
	645	77	64577	0.082	59.50	0.050	-	100	
	645	112	645112	0.022	16.10	0.390	-	100	
SUBN	645	22	64522	0.108	30.70	0.040	-	100	
	645	76	64576	0.067	19.10	0.230	-	100	
	645	77	64577	0.081	23.20	0.050	-	100	
	645	78	64578	0.088	25.10	0.050	-	100	
	645	112	645112	0.007	1.90	0.390	-	100	
SUBO	645	22	64522	0.045	20.40	0.040	-	100	
	645	76	64576	0.091	41.80	0.230	-	100	
	645	77	64577	0.060	27.30	0.050	-	100	
	645	112	645112	0.023	10.50	0.390	-	100	
SUBP	645	76	64576	0.049	33.60	0.230	-	100	
	645	77	64577	0.003	1.90	0.050	-	100	
	645	78	64578	0.027	18.40	0.050	-	100	
	645	112	645112	0.067	46.10	0.390	-	100	



East Area Airport Master Drainage Plan
Phoenix-Mesa Gateway Airport
Existing Conditions Hydrology

Dibble Engineering

Land Use Map



East Area Airport Master Drainage Plan
Phoenix-Mesa Gateway Airport
Existing Conditions Hydrology

Dibble Engineering

Soils Map

Route ID	LOB N	Chan N	ROB N	Length (ft)	Slope (ft/ft)	Max Elev (ft)		1.	2.	3.	4.	5.	6.	7.	8.
NORMAL DEPTH															
Major Basin 01															
RTAC	0.025	0.030	0.025	2,728.00	0.0059	1,372.92	X:	-	77.20	102.40	174.70	200.40	242.40	260.70	434.30
							Y:	1,373.77	1,373.01	1,372.00	1,370.28	1,370.29	1,371.00	1,372.00	1,372.92
RTBC	0.025	0.030	0.025	983.00	0.0041	1,368.00	X:	-	183.30	385.40	413.00	439.40	456.20	496.70	674.30
							Y:	1,369.00	1,366.05	1,365.00	1,363.00	1,363.00	1,365.00	1,366.00	1,368.00
RTCD	0.025	0.030	0.025	2,153.00	0.0028	1,364.53	X:	-	170.00	431.90	450.10	465.30	490.90	660.00	790.00
							Y:	1,364.53	1,361.00	1,359.03	1,357.00	1,357.00	1,360.01	1,362.16	1,365.11
RTDE	0.025	0.030	0.025	917.00	0.0033	1,359.00	X:	-	228.50	428.50	448.60	475.10	516.40	663.60	786.60
							Y:	1,359.00	1,354.10	1,353.99	1,352.07	1,352.00	1,355.02	1,356.01	1,359.24
RTEF	0.025	0.030	0.025	1,474.00	0.0020	1,355.00	X:	-	207.90	430.20	453.10	465.10	495.80	690.60	787.10
							Y:	1,355.00	1,350.84	1,350.00	1,348.00	1,348.01	1,350.89	1,352.99	1,355.31
RTFG	0.025	0.030	0.025	1,524.00	0.0013	1,346.95	X:	-	65.30	112.50	125.20	140.50	145.90	181.60	212.30
							Y:	1,346.95	1,346.05	1,342.35	1,341.00	1,341.00	1,341.96	1,344.69	1,347.00
RTH1H2	0.025	0.030	0.025	3,034.00	0.0033	1,369.97	X:	-	51.80	87.60	104.30	142.40	153.20	157.20	268.10
							Y:	1,370.15	1,369.00	1,367.00	1,365.00	1,365.29	1,367.00	1,368.00	1,369.97
RTH2H3	0.025	0.030	0.025	2,777.00	0.0029	1,362.64	X:	-	28.60	59.80	85.30	114.90	125.50	142.80	217.50
							Y:	1,362.64	1,361.85	1,361.00	1,358.00	1,358.00	1,359.00	1,361.53	1,362.87
RTH3I	0.025	0.030	0.025	1,270.00	0.0024	1,356.00	X:	-	76.00	134.60	150.20	203.70	218.20	250.50	328.70
							Y:	1,356.65	1,354.44	1,353.00	1,351.00	1,351.00	1,353.00	1,354.40	1,356.00
RTIM	0.025	0.030	0.025	1,224.00	0.0033	1,350.85	X:	-	60.40	133.50	145.70	185.70	204.40	214.00	264.50
							Y:	1,351.00	1,349.32	1,348.00	1,346.00	1,346.00	1,348.66	1,350.00	1,350.85
RTJK	0.025	0.030	0.025	4,767.00	0.0029	1,360.96	X:	-	58.90	85.30	127.40	140.70	146.20	152.30	156.60
							Y:	1,360.96	1,360.25	1,359.86	1,359.02	1,359.00	1,360.14	1,361.63	1,362.00

Route ID	LOB N	Chan N	ROB N	Length (ft)	Slope (ft/ft)	Max Elev (ft)		1.	2.	3.	4.	5.	6.	7.	8.
RTKL	0.025	0.030	0.025	450.00	0.0044	1,358.75	X:	-	10.30	21.50	33.70	49.10	62.30	71.10	92.80
							Y:	1,359.00	1,358.15	1,356.46	1,354.00	1,354.00	1,356.75	1,358.02	1,358.75
RTLM	0.025	0.030	0.025	2,667.00	0.0030	1,356.26	X:	-	8.80	37.10	61.70	87.20	114.30	136.50	172.70
							Y:	1,356.26	1,356.03	1,353.00	1,351.00	1,351.00	1,353.70	1,356.00	1,356.61

Storage Basin ID: RSA

Elevation Top of Dam:	1,379.00
Length of Dam:	30.00
Discharge Coefficient:	3.00
Weir Coefficient:	1.50

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		0.05	0.27	0.80	2.14	4.55	7.97	7.97		
Discharge (cfs)	3	6	10	12	13	13	14	15		
Elevation (ft)	1,376.0	1,376.5	1,377.0	1,377.5	1,378.0	1,378.5	1,379.0	1,379.5	-	-

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Peak Volume (ac-ft)	0.00	0.26	0.52	0.00	0.00	3.58
Peak Stage (ft)	0.00	1,376.97	1,377.24	0.00	0.00	1,378.30
Peak Discharge (cfs)	0.00	10.00	11.00	0.00	0.00	13.00

Storage Basin ID: RSB

Elevation Top of Dam:	1,370.50
Length of Dam:	30.00
Discharge Coefficient:	3.00
Weir Coefficient:	1.50

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)			0.01	0.04	0.08	0.14	0.23	0.37	0.57	0.87
Discharge (cfs)		70	90	100	110	118	127	135	143	150
Elevation (ft)	1,364.5	1,367.0	1,367.5	1,368.0	1,368.5	1,369.0	1,369.5	1,370.0	1,370.5	1,371.0

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Peak Volume (ac-ft)	0.00	0.00	0.00	0.00	0.00	0.00
Peak Stage (ft)	0.00	1,366.99	1,366.99	0.00	0.00	1,366.99
Peak Discharge (cfs)	0.00	70.00	70.00	0.00	0.00	70.00

Storage Basin ID: RSCPC

Elevation Top of Dam:	1,364.50
Length of Dam:	30.00
Discharge Coefficient:	3.00
Weir Coefficient:	1.50

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)			0.05	0.16	0.36	0.69	1.22	2.03	2.03	
Discharge (cfs)	5	16	32	51	71	87	97	107	116	
Elevation (ft)	1,361.0	1,361.5	1,362.0	1,362.5	1,363.0	1,363.5	1,364.0	1,364.5	1,365.0	-

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Peak Volume (ac-ft)	0.00	0.09	0.17	0.00	0.00	1.21
Peak Stage (ft)	0.00	1,362.20	1,362.51	0.00	0.00	1,363.99
Peak Discharge (cfs)	0.00	40.00	52.00	0.00	0.00	97.00

Storage Basin ID: RSCPD

Elevation Top of Dam:	1,359.50
Length of Dam:	30.00
Discharge Coefficient:	3.00
Weir Coefficient:	1.50

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		0.33	0.69	1.26	2.18	3.54	5.52	8.31	12.21	12.21
Discharge (cfs)		110	128	140	152	163	174	185	195	204
Elevation (ft)	1,353.5	1,356.0	1,356.5	1,357.0	1,357.5	1,358.0	1,358.5	1,359.0	1,359.5	1,360.0

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Peak Volume (ac-ft)	0.00	0.20	0.26	0.00	0.00	1.57
Peak Stage (ft)	0.00	1,355.04	1,355.47	0.00	0.00	1,357.17
Peak Discharge (cfs)	0.00	68.00	87.00	0.00	0.00	144.00

Storage Basin ID: RSCPE

Elevation Top of Dam:	1,353.00
Length of Dam:	30.00
Discharge Coefficient:	3.00
Weir Coefficient:	1.50

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		0.01	0.09	0.28	0.61	1.17	1.50			
Discharge (cfs)	5	21	45	77	110	140	200			
Elevation (ft)	1,350.5	1,351.0	1,351.5	1,352.0	1,352.5	1,353.0	1,354.5	-	-	-

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Peak Volume (ac-ft)	0.00	0.33	0.52	0.00	0.00	1.47
Peak Stage (ft)	0.00	1,352.08	1,352.37	0.00	0.00	1,354.37
Peak Discharge (cfs)	0.00	82.00	101.00	0.00	0.00	195.00

Storage Basin ID: RSCPF

Elevation Top of Dam:	1,349.00
Length of Dam:	30.00
Discharge Coefficient:	3.00
Weir Coefficient:	1.50

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		0.01	0.05	0.15	0.32	0.60	1.13	2.11	2.11	2.11
Discharge (cfs)	-	27	54	88	126	158	172	176	182	270
Elevation (ft)	1,345.0	1,346.0	1,346.5	1,347.0	1,347.5	1,348.0	1,348.5	1,349.0	1,349.5	1,351.0

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Peak Volume (ac-ft)	0.00	0.26	0.41	0.00	0.00	2.11
Peak Stage (ft)	0.00	1,347.32	1,347.66	0.00	0.00	1,350.98
Peak Discharge (cfs)	0.00	112.00	136.00	0.00	0.00	269.00

Storage Basin ID: RSCPG

Elevation Top of Dam:	1,343.00
Length of Dam:	30.00
Discharge Coefficient:	3.00
Weir Coefficient:	1.50

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		0.02	0.09	0.25	0.54	1.07	1.83	2.84	4.10	5.61
Discharge (cfs)		37	55	75	93	109	123	135	146	300
Elevation (ft)	1,339.0	1,339.5	1,340.0	1,340.5	1,341.0	1,341.5	1,342.0	1,342.5	1,343.0	1,344.0

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Peak Volume (ac-ft)	0.00	1.45	2.66	0.00	0.00	5.25
Peak Stage (ft)	0.00	1,341.75	1,342.41	0.00	0.00	1,343.76
Peak Discharge (cfs)	0.00	116.00	133.00	0.00	0.00	263.00

Storage Basin ID: RSCPM

Elevation Top of Dam:	1,347.50
Length of Dam:	30.00
Discharge Coefficient:	3.00
Weir Coefficient:	1.50

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)				0.02	0.10	0.40	1.19	2.94		
Discharge (cfs)		5	14	43	82	115	139	410		
Elevation (ft)	1,342.0	1,342.5	1,343.0	1,344.0	1,345.0	1,346.0	1,347.0	1,348.5	-	-

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Peak Volume (ac-ft)	0.00	0.70	1.43	0.00	0.00	2.92
Peak Stage (ft)	0.00	1,346.38	1,347.21	0.00	0.00	1,348.48
Peak Discharge (cfs)	0.00	124.00	177.00	0.00	0.00	407.00

Storage Basin ID: RSH3

Elevation Top of Dam:	1,357.50
Length of Dam:	30.00
Discharge Coefficient:	3.00
Weir Coefficient:	1.50

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		0.06	0.20	0.47	0.88	1.43	2.14	3.05	4.23	5.72
Discharge (cfs)	1	36	56	75	85	92	99	105	111	117
Elevation (ft)	1,352.5	1,354.0	1,354.5	1,355.0	1,355.5	1,356.0	1,356.5	1,357.0	1,357.5	1,358.0

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Peak Volume (ac-ft)	0.00	0.07	0.16	0.00	0.00	1.63
Peak Stage (ft)	0.00	1,354.05	1,354.35	0.00	0.00	1,356.14
Peak Discharge (cfs)	0.00	38.00	50.00	0.00	0.00	94.00

Storage Basin ID: RSI

Elevation Top of Dam:	1,353.50
Length of Dam:	30.00
Discharge Coefficient:	3.00
Weir Coefficient:	1.50

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		0.47	0.78	1.32	2.13	3.09	4.23	5.60	7.30	7.30
Discharge (cfs)		74	89	99	108	117	126	134	142	149
Elevation (ft)	1,347.5	1,350.0	1,350.5	1,351.0	1,351.5	1,352.0	1,352.5	1,353.0	1,353.5	1,354.0

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Peak Volume (ac-ft)	0.00	0.25	0.33	0.00	0.00	1.01
Peak Stage (ft)	0.00	1,348.85	1,349.25	0.00	0.00	1,350.71
Peak Discharge (cfs)	0.00	40.00	52.00	0.00	0.00	93.00

Storage Basin ID: RSN

Elevation Top of Dam:	1,367.50
Length of Dam:	30.00
Discharge Coefficient:	3.00
Weir Coefficient:	1.50

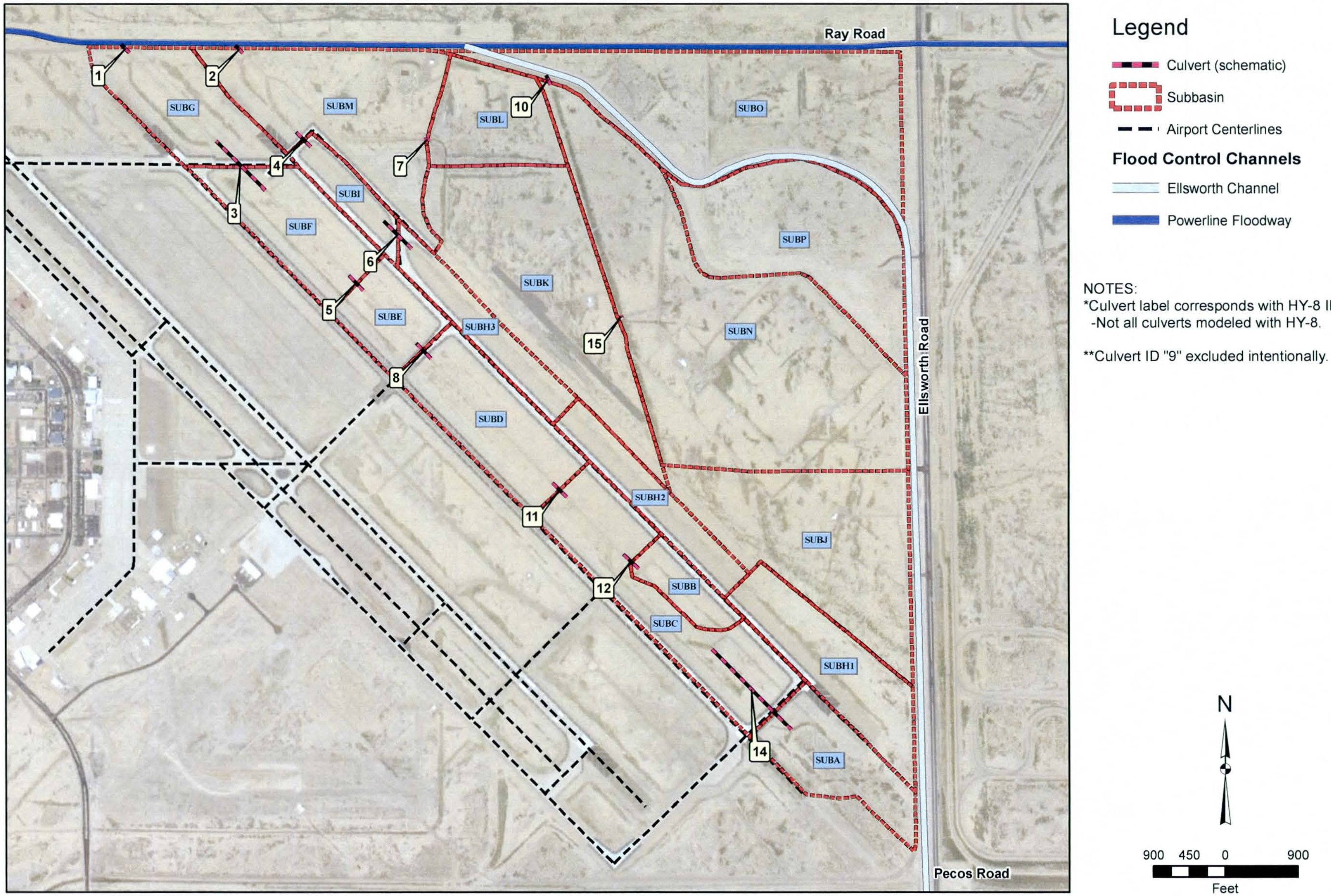
	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		0.30	0.81	2.25	5.00	8.95	14.25	21.10		
Discharge (cfs)		2	6	14	24	36	49	70		
Elevation (ft)	1,364.5	1,365.0	1,365.5	1,366.0	1,366.5	1,367.0	1,367.5	1,368.5	-	-

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Peak Volume (ac-ft)	0.00	4.89	6.92	0.00	0.00	20.11
Peak Stage (ft)	0.00	1,366.48	1,366.74	0.00	0.00	1,368.36
Peak Discharge (cfs)	0.00	24.00	30.00	0.00	0.00	67.00

HY-8 OUTPUT

- **Culvert Map**
- **HY-8 Output**



East Area Airport Master Drainage Plan
Phoenix-Mesa Gateway Airport
Existing Conditions Hydrology

Dibble Engineering

Culvert Map

HY-8 Culvert Analysis Report

Table 19 - Summary of Culvert Flows at Crossing: Culvert 1

Headwater Elevation (ft)	Total Discharge (cfs)	2-36" RCP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1339.00	0.00	0.00	0.00	1
1339.10	17.50	17.50	0.00	1
1339.44	35.00	35.00	0.00	1
1339.93	52.50	52.50	0.00	1
1340.37	70.00	70.00	0.00	1
1340.83	87.50	87.50	0.00	1
1341.20	100.00	100.00	0.00	1
1341.98	122.50	122.50	0.00	1
1342.71	140.00	140.00	0.00	1
1343.51	157.50	156.84	0.51	17
1343.64	175.00	159.31	15.56	7
1343.50	156.55	156.55	0.00	Overtopping

Table 20 - Culvert Summary Table: 2-36" RCP

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1339.00	0.000	1.440	0-NF	0.000	0.000	0.000	3.000	0.000	0.000
17.50	17.50	1339.10	1.268	1.538	1-S1f	0.671	0.930	3.000	3.000	1.238	0.000
35.00	35.00	1339.44	1.877	1.877	1-S1f	0.965	1.331	1.331	3.000	5.775	0.000
52.50	52.50	1339.93	2.371	2.371	1-S1f	1.205	1.648	1.648	3.000	6.602	0.000
70.00	70.00	1340.37	2.813	2.813	1-S1f	1.414	1.916	1.916	3.000	7.353	0.000
87.50	87.50	1340.83	3.274	3.274	5-S1f	1.616	2.150	2.150	3.000	8.061	0.000
100.00	100.00	1341.20	3.642	3.025	4-FFf	1.757	2.293	1.757	3.000	11.628	0.000
122.50	122.50	1341.98	4.423	3.818	4-FFf	2.019	2.506	2.019	3.000	12.117	0.000
140.00	140.00	1342.71	5.151	4.546	4-FFf	2.247	2.646	2.247	3.000	12.354	0.000
157.50	156.84	1343.51	5.955	5.338	4-FFf	2.528	2.781	2.528	3.000	12.382	0.000
175.00	159.31	1343.64	6.081	5.462	4-FFf	2.582	2.801	2.582	3.000	12.351	0.000

****

Inlet Elevation (invert): 1337.56 ft, Outlet Elevation (invert): 1336.00 ft

Culvert Length: 137.01 ft, Culvert Slope: 0.0114

****

Site Data - 2-36" RCP

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1337.56 ft

Outlet Station: 137.00 ft

Outlet Elevation: 1336.00 ft

Number of Barrels: 2

Culvert Data Summary - 2-36" RCP

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Grooved End Projecting

Inlet Depression: None

Table 28 - Summary of Culvert Flows at Crossing: Culvert 2

Headwater Elevation (ft)	Total Discharge (cfs)	2-36" RCP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1342.00	0.00	0.00	0.00	1
1343.04	15.00	15.00	0.00	1
1343.59	30.00	30.00	0.00	1
1344.04	45.00	45.00	0.00	1
1344.43	60.00	60.00	0.00	1
1344.81	75.00	75.00	0.00	1
1345.22	90.00	90.00	0.00	1
1345.67	105.00	105.00	0.00	1
1346.20	120.00	120.00	0.00	1
1346.80	135.00	135.00	0.00	1
1347.49	150.00	150.00	0.00	1
1348.00	160.22	160.22	0.00	Overtopping

Table 29 - Culvert Summary Table: 2-36" RCP

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1342.00	0.000	0.110	0-NF	0.000	0.000	0.000	3.000	0.000	0.000
15.00	15.00	1343.04	1.153	1.153	1-S1f	0.514	0.856	0.856	3.000	4.491	0.000
30.00	30.00	1343.59	1.696	1.696	1-S1f	0.736	1.232	1.232	3.000	5.493	0.000
45.00	45.00	1344.04	2.153	2.153	1-S1f	0.920	1.524	1.524	3.000	6.239	0.000
60.00	60.00	1344.43	2.544	2.544	1-S1f	1.065	1.772	1.772	3.000	6.904	0.000
75.00	75.00	1344.81	2.923	2.923	5-S1f	1.209	1.986	1.986	3.000	7.561	0.000
90.00	90.00	1345.22	3.327	3.327	5-S1f	1.335	2.178	2.178	3.000	8.200	0.000
105.00	105.00	1345.67	3.784	3.784	5-S1f	1.461	2.350	2.350	3.000	8.848	0.000
120.00	120.00	1346.20	4.310	4.310	5-S1f	1.582	2.486	2.486	3.000	9.609	0.000
135.00	135.00	1346.80	4.915	4.915	5-S1f	1.702	2.606	2.606	3.000	10.384	0.000
150.00	150.00	1347.49	5.599	3.557	4-FFf	1.822	2.726	1.822	3.000	16.689	0.000

****

Inlet Elevation (invert): 1341.89 ft,   Outlet Elevation (invert): 1339.00 ft

Culvert Length: 126.03 ft,   Culvert Slope: 0.0229

****

Site Data - 2-36" RCP

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1341.89 ft

Outlet Station: 126.00 ft

Outlet Elevation: 1339.00 ft

Number of Barrels: 2

Culvert Data Summary - 2-36" RCP

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Grooved End Projecting

Inlet Depression: None

Table 16 - Summary of Culvert Flows at Crossing: Culvert 3

Headwater Elevation (ft)	Total Discharge (cfs)	5-30" RCP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1344.95	0.00	0.00	0.00	1
1345.78	17.50	17.50	0.00	1
1346.15	35.00	35.00	0.00	1
1346.47	52.50	52.50	0.00	1
1346.75	70.00	70.00	0.00	1
1346.99	87.50	87.50	0.00	1
1347.16	100.00	100.00	0.00	1
1347.46	122.50	122.50	0.00	1
1347.77	140.00	140.00	0.00	1
1347.99	157.50	157.50	0.00	1
1348.93	175.00	175.00	0.00	1
1350.00	187.90	187.90	0.00	Overtopping

Table 17 - Culvert Summary Table: 5-30" RCP

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1344.95	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
17.50	17.50	1345.78	0.828	0.0*	1-S2n	0.551	0.602	0.552	0.981	4.311	1.607
35.00	35.00	1346.15	1.199	0.0*	1-S2n	0.791	0.869	0.798	1.272	5.211	1.911
52.50	52.50	1346.47	1.522	0.0*	1-S2n	0.985	1.078	0.987	1.480	5.824	2.115
70.00	70.00	1346.75	1.797	0.0*	1-S2n	1.155	1.259	1.158	1.649	6.292	2.272
87.50	87.50	1346.99	2.041	0.0*	1-S2n	1.320	1.411	1.320	1.793	6.660	2.403
100.00	100.00	1347.16	2.207	0.0*	1-S2n	1.434	1.516	1.435	1.885	6.861	2.484
122.50	122.50	1347.46	2.507	0.0*	5-S2n	1.644	1.682	1.651	2.034	7.135	2.614
140.00	140.00	1347.77	2.756	2.820	2-M2c	1.820	1.799	1.804	2.139	7.382	2.702
157.50	157.50	1347.99	3.027	3.042	2-M2c	2.025	1.905	1.912	2.235	7.819	2.783
175.00	175.00	1348.93	3.327	3.977	7-M2c	2.500	2.007	2.010	2.325	8.276	2.857

****

Inlet Elevation (invert): 1344.95 ft,   Outlet Elevation (invert): 1340.54 ft

Culvert Length: 857.01 ft,   Culvert Slope: 0.0051

****

Site Data - 5-30" RCP

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1344.95 ft

Outlet Station: 857.00 ft

Outlet Elevation: 1340.54 ft

Number of Barrels: 5

Culvert Data Summary - 5-30" RCP

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Grooved End Projecting

Inlet Depression: None

Table 25 - Summary of Culvert Flows at Crossing: Culvert 4

Headwater Elevation (ft)	Total Discharge (cfs)	3-30" RCP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1347.33	0.00	0.00	0.00	1
1348.47	17.50	17.50	0.00	1
1349.00	35.00	35.00	0.00	1
1349.45	52.50	52.50	0.00	1
1349.89	70.00	70.00	0.00	1
1350.44	87.50	87.50	0.00	1
1351.07	100.00	100.00	0.00	1
1352.30	122.50	122.50	0.00	1
1353.36	140.00	140.00	0.00	1
1354.09	157.50	150.74	6.62	10
1354.21	175.00	152.38	22.50	6
1354.00	149.41	149.41	0.00	Overtopping

Table 26 - Culvert Summary Table: 3-30" RCP

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1347.33	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
17.50	17.50	1348.47	1.095	1.141	2-M2c	0.836	0.793	0.798	0.901	4.320	2.174
35.00	35.00	1349.00	1.621	1.670	2-M2c	1.233	1.139	1.145	1.169	5.323	2.586
52.50	52.50	1349.45	2.044	2.123	2-M2c	1.592	1.411	1.416	1.361	6.104	2.862
70.00	70.00	1349.89	2.431	2.561	2-M2c	2.000	1.639	1.644	1.516	6.817	3.075
87.50	87.50	1350.44	2.846	3.111	2-M2c	2.500	1.835	1.841	1.648	7.526	3.251
100.00	100.00	1351.07	3.183	3.737	7-M2c	2.500	1.960	1.964	1.733	8.056	3.362
122.50	122.50	1352.30	3.905	4.970	7-M2c	2.500	2.130	2.145	1.870	9.110	3.537
140.00	140.00	1353.36	4.581	6.026	7-M2c	2.500	2.253	2.256	1.966	10.010	3.657
157.50	150.74	1354.09	5.044	6.763	7-M2c	2.500	2.329	2.307	2.054	10.614	3.766
175.00	152.38	1354.21	5.118	6.878	7-M2c	2.500	2.340	2.314	2.137	10.709	3.867

****

Inlet Elevation (invert): 1347.33 ft,   Outlet Elevation (invert): 1346.64 ft

Culvert Length: 240.00 ft,   Culvert Slope: 0.0029

****

Site Data - 3-30" RCP

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1347.33 ft

Outlet Station: 240.00 ft

Outlet Elevation: 1346.64 ft

Number of Barrels: 3

Culvert Data Summary - 3-30" RCP

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Grooved End Projecting

Inlet Depression: None

Table 13 - Summary of Culvert Flows at Crossing: Culvert 5

Headwater Elevation (ft)	Total Discharge (cfs)	5-30" RCP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1350.05	0.00	0.00	0.00	1
1350.92	17.50	17.50	0.00	1
1351.31	35.00	35.00	0.00	1
1351.62	52.50	52.50	0.00	1
1351.90	70.00	70.00	0.00	1
1352.17	87.50	87.50	0.00	1
1352.35	100.00	100.00	0.00	1
1352.69	122.50	122.50	0.00	1
1353.00	140.00	140.00	0.00	1
1353.50	157.50	157.50	0.00	1
1353.64	175.00	162.46	12.41	7
1353.50	157.58	157.58	0.00	Overtopping

Table 14 - Culvert Summary Table: 5-30" RCP

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1350.05	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
17.50	17.50	1350.92	0.830	0.868	2-M2c	0.632	0.602	0.614	0.831	3.741	1.779
35.00	35.00	1351.31	1.202	1.258	2-M2c	0.916	0.869	0.877	1.077	4.555	2.116
52.50	52.50	1351.62	1.525	1.575	2-M2c	1.150	1.078	1.083	1.254	5.149	2.341
70.00	70.00	1351.90	1.800	1.852	2-M2c	1.365	1.259	1.259	1.397	5.652	2.516
87.50	87.50	1352.17	2.044	2.115	2-M2c	1.579	1.411	1.416	1.519	6.104	2.660
100.00	100.00	1352.35	2.210	2.299	2-M2c	1.735	1.516	1.518	1.597	6.413	2.750
122.50	122.50	1352.69	2.510	2.639	2-M2c	2.103	1.682	1.686	1.723	6.957	2.894
140.00	140.00	1353.00	2.758	2.950	2-M2c	2.500	1.799	1.804	1.812	7.382	2.992
157.50	157.50	1353.50	3.030	3.447	7-M2c	2.500	1.905	1.912	1.894	7.819	3.081
175.00	162.46	1353.64	3.111	3.595	7-M2c	2.500	1.935	1.941	1.970	7.946	3.163

****

Inlet Elevation (invert): 1350.05 ft,   Outlet Elevation (invert): 1349.34 ft

Culvert Length: 241.00 ft,   Culvert Slope: 0.0029

****

Site Data - 5-30" RCP

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1350.05 ft

Outlet Station: 241.00 ft

Outlet Elevation: 1349.34 ft

Number of Barrels: 5

Culvert Data Summary - 5-30" RCP

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Grooved End Projecting

Inlet Depression: None

Table 22 - Summary of Culvert Flows at Crossing: Culvert 6

Headwater Elevation (ft)	Total Discharge (cfs)	3-30" RCP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1352.30	0.00	0.00	0.00	1
1353.44	17.50	17.50	0.00	1
1353.97	35.00	35.00	0.00	1
1354.41	52.50	52.50	0.00	1
1354.86	70.00	70.00	0.00	1
1355.67	87.50	87.50	0.00	1
1356.59	100.00	100.00	0.00	1
1358.06	122.50	118.09	4.18	18
1358.17	140.00	119.35	20.47	6
1358.26	157.50	120.31	37.08	5
1358.33	175.00	121.12	53.73	4
1358.00	117.37	117.37	0.00	Overtopping

Table 23 - Culvert Summary Table: 3-30" RCP

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1352.30	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
17.50	17.50	1353.44	1.095	1.140	2-M2c	0.827	0.793	0.798	0.939	4.320	1.861
35.00	35.00	1353.97	1.621	1.670	2-M2c	1.217	1.139	1.145	1.218	5.323	2.213
52.50	52.50	1354.41	2.044	2.114	2-M2c	1.570	1.411	1.416	1.418	6.104	2.449
70.00	70.00	1354.86	2.431	2.558	2-M2c	1.964	1.639	1.644	1.580	6.817	2.632
87.50	87.50	1355.67	2.846	3.367	7-M2c	2.500	1.835	1.841	1.718	7.526	2.782
100.00	100.00	1356.59	3.183	4.289	7-M2c	2.500	1.960	1.964	1.806	8.056	2.877
122.50	118.09	1358.06	3.751	5.760	7-M2c	2.500	2.099	2.114	1.949	8.890	3.027
140.00	119.35	1358.17	3.794	5.874	7-M2c	2.500	2.108	2.123	2.049	8.952	3.129
157.50	120.31	1358.26	3.828	5.958	7-M2c	2.500	2.115	2.130	2.141	9.000	3.223
175.00	121.12	1358.33	3.856	6.029	7-M2c	2.500	2.121	2.136	2.228	9.040	3.309

****

Inlet Elevation (invert): 1352.30 ft,   Outlet Elevation (invert): 1350.91 ft

Culvert Length: 464.00 ft,   Culvert Slope: 0.0030

****

Site Data - 3-30" RCP

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1352.30 ft

Outlet Station: 464.00 ft

Outlet Elevation: 1350.91 ft

Number of Barrels: 3

Culvert Data Summary - 3-30" RCP

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Grooved End Projecting

Inlet Depression: None

Table 10 - Summary of Culvert Flows at Crossing: Culvert 8

Headwater Elevation (ft)	Total Discharge (cfs)	4-30" RCP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1353.16	0.00	0.00	0.00	1
1354.02	15.00	15.00	0.00	1
1354.41	30.00	30.00	0.00	1
1354.80	45.00	45.00	0.00	1
1355.08	60.00	60.00	0.00	1
1355.35	75.00	75.00	0.00	1
1355.61	90.00	90.00	0.00	1
1355.89	105.00	105.00	0.00	1
1356.21	120.00	120.00	0.00	1
1356.79	135.00	135.00	0.00	1
1357.42	150.00	150.00	0.00	1
1360.00	203.95	203.95	0.00	Overtopping

Table 11 - Culvert Summary Table: 4-30" RCP

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1353.16	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
15.00	15.00	1354.02	0.860	0.0*	1-S2n	0.622	0.624	0.623	0.895	3.884	1.699
30.00	30.00	1354.41	1.247	0.0*	1-S2n	0.900	0.902	0.901	1.160	4.693	2.020
45.00	45.00	1354.80	1.586	1.637	3-M1t	1.129	1.117	1.271	1.351	4.487	2.236
60.00	60.00	1355.08	1.871	1.924	3-M1t	1.339	1.302	1.425	1.505	5.190	2.402
75.00	75.00	1355.35	2.127	2.190	3-M1t	1.545	1.465	1.556	1.636	5.837	2.540
90.00	90.00	1355.61	2.375	2.453	3-M2t	1.759	1.608	1.672	1.752	6.448	2.659
105.00	105.00	1355.89	2.631	2.726	3-M2t	2.015	1.746	1.776	1.856	7.037	2.763
120.00	120.00	1356.21	2.909	3.046	3-M2t	2.500	1.860	1.872	1.952	7.611	2.857
135.00	135.00	1356.79	3.218	3.632	7-M2c	2.500	1.973	1.976	2.040	8.110	2.942
150.00	150.00	1357.42	3.564	4.258	7-M2c	2.500	2.060	2.072	2.122	8.621	3.021

****

Inlet Elevation (invert): 1353.16 ft,   Outlet Elevation (invert): 1352.26 ft

Culvert Length: 250.00 ft,   Culvert Slope: 0.0036

****

Site Data - 4-30" RCP

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1353.16 ft

Outlet Station: 250.00 ft

Outlet Elevation: 1352.26 ft

Number of Barrels: 4

Culvert Data Summary - 4-30" RCP

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Grooved End Projecting

Inlet Depression: None

Table 31 - Summary of Culvert Flows at Crossing: Culvert 10

Headwater Elevation (ft)	Total Discharge (cfs)	1-48" RCP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1364.59	0.00	0.00	0.00	1
1365.22	3.00	3.00	0.00	1
1365.50	6.00	6.00	0.00	1
1365.72	9.00	9.00	0.00	1
1365.90	12.00	12.00	0.00	1
1366.06	15.00	15.00	0.00	1
1366.22	18.00	18.00	0.00	1
1366.35	21.00	21.00	0.00	1
1366.48	24.00	24.00	0.00	1
1366.61	27.00	27.00	0.00	1
1366.75	30.00	30.00	0.00	1
1368.00	64.19	64.19	0.00	Overtopping

Table 32 - Culvert Summary Table: 1-48" RCP

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1364.59	0.000	0.0*	0-NF	0.000	0.000	0.000	4.000	0.000	0.000
3.00	3.00	1365.22	0.632	0.632	1-S1f	0.155	0.475	0.475	4.000	3.459	0.000
6.00	6.00	1365.50	0.906	0.906	1-S1f	0.310	0.687	0.687	4.000	4.083	0.000
9.00	9.00	1365.72	1.126	1.126	1-S1f	0.420	0.862	0.862	4.000	4.495	0.000
12.00	12.00	1365.90	1.306	1.306	1-S1f	0.469	0.993	0.993	4.000	4.887	0.000
15.00	15.00	1366.06	1.472	1.472	1-S1f	0.517	1.124	1.124	4.000	5.157	0.000
18.00	18.00	1366.22	1.628	1.628	1-S1f	0.566	1.241	1.241	4.000	5.435	0.000
21.00	21.00	1366.35	1.761	1.761	1-S1f	0.614	1.337	1.337	4.000	5.685	0.000
24.00	24.00	1366.48	1.891	1.891	1-S1f	0.663	1.434	1.434	4.000	5.908	0.000
27.00	27.00	1366.61	2.020	2.020	1-S1f	0.711	1.531	1.531	4.000	6.095	0.000
30.00	30.00	1366.75	2.158	2.158	1-S1f	0.760	1.622	1.622	4.000	6.280	0.000

****

Inlet Elevation (invert): 1364.59 ft, Outlet Elevation (invert): 1357.00 ft

Culvert Length: 134.21 ft, Culvert Slope: 0.0566

****

Site Data - 1-48" RCP

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1364.59 ft

Outlet Station: 134.00 ft

Outlet Elevation: 1357.00 ft

Number of Barrels: 1

Culvert Data Summary - 1-48" RCP

Barrel Shape: Circular

Barrel Diameter: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Grooved End Projecting

Inlet Depression: None

Table 7 - Summary of Culvert Flows at Crossing: Culvert 11

Headwater Elevation (ft)	Total Discharge (cfs)	3-30" RCP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1360.41	0.00	0.00	0.00	1
1361.26	10.00	10.00	0.00	1
1361.64	20.00	20.00	0.00	1
1361.94	30.00	30.00	0.00	1
1362.21	40.00	40.00	0.00	1
1362.46	50.00	50.00	0.00	1
1362.71	60.00	60.00	0.00	1
1362.97	70.00	70.00	0.00	1
1363.25	80.00	80.00	0.00	1
1363.63	90.00	90.00	0.00	1
1364.14	100.00	100.00	0.00	1
1365.00	115.99	115.99	0.00	Overtopping

Table 8 - Culvert Summary Table: 3-30" RCP

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1360.41	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
10.00	10.00	1361.26	0.809	0.846	2-M2c	0.617	0.588	0.599	0.844	3.692	1.822
20.00	20.00	1361.64	1.171	1.225	2-M2c	0.893	0.848	0.855	1.095	4.490	2.167
30.00	30.00	1361.94	1.482	1.533	2-M2c	1.119	1.052	1.056	1.275	5.072	2.398
40.00	40.00	1362.21	1.750	1.801	2-M2c	1.327	1.226	1.228	1.420	5.559	2.577
50.00	50.00	1362.46	1.988	2.051	2-M2c	1.529	1.375	1.380	1.544	5.999	2.725
60.00	60.00	1362.71	2.210	2.300	2-M2c	1.738	1.516	1.518	1.653	6.413	2.852
70.00	70.00	1362.97	2.431	2.556	2-M2c	1.982	1.639	1.644	1.752	6.817	2.964
80.00	80.00	1363.25	2.662	2.836	2-M2c	2.500	1.759	1.760	1.842	7.220	3.064
90.00	90.00	1363.63	2.910	3.224	7-M2c	2.500	1.860	1.867	1.925	7.630	3.156
100.00	100.00	1364.14	3.183	3.728	7-M2c	2.500	1.960	1.964	2.002	8.056	3.240

****

Inlet Elevation (invert): 1360.41 ft,   Outlet Elevation (invert): 1359.70 ft

Culvert Length: 242.00 ft,   Culvert Slope: 0.0029

****

Site Data - 3-30" RCP

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1360.41 ft

Outlet Station: 242.00 ft

Outlet Elevation: 1359.70 ft

Number of Barrels: 3

Culvert Data Summary - 3-30" RCP

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Grooved End Projecting

Inlet Depression: None

Table 4 - Summary of Culvert Flows at Crossing: Culvert 12

Headwater Elevation (ft)	Total Discharge (cfs)	3-30" RCP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1364.49	0.00	0.00	0.00	1
1365.30	10.00	10.00	0.00	1
1365.66	20.00	20.00	0.00	1
1365.97	30.00	30.00	0.00	1
1366.29	40.00	40.00	0.00	1
1366.54	50.00	50.00	0.00	1
1366.77	60.00	60.00	0.00	1
1366.99	70.00	70.00	0.00	1
1367.23	80.00	80.00	0.00	1
1367.51	90.00	90.00	0.00	1
1367.99	100.00	100.00	0.00	1
1371.00	150.06	150.06	0.00	Overtopping

Table 5 - Culvert Summary Table: 3-30" RCP

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1364.49	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
10.00	10.00	1365.30	0.809	0.0*	1-S2n	0.578	0.588	0.587	3.257	3.763	2.363
20.00	20.00	1365.66	1.170	0.0*	1-S2n	0.833	0.848	0.838	4.224	4.606	2.810
30.00	30.00	1365.97	1.480	0.0*	1-S2n	1.042	1.052	1.042	4.917	5.172	3.110
40.00	40.00	1366.29	1.749	1.803	2-M2c	1.228	1.226	1.228	5.477	5.559	3.342
50.00	50.00	1366.54	1.987	2.046	2-M2c	1.406	1.375	1.380	5.955	5.999	3.534
60.00	60.00	1366.77	2.209	2.280	2-M2c	1.586	1.516	1.518	6.377	6.413	3.698
70.00	70.00	1366.99	2.430	2.504	2-M2c	1.773	1.639	1.644	6.756	6.817	3.844
80.00	80.00	1367.23	2.661	2.745	2-M2c	1.989	1.759	1.760	7.103	7.220	3.974
90.00	90.00	1367.51	2.909	3.020	2-M2c	2.500	1.860	1.867	7.424	7.630	4.093
100.00	100.00	1367.99	3.182	3.495	7-M2c	2.500	1.960	1.964	7.723	8.056	4.202

****

Inlet Elevation (invert): 1364.49 ft, Outlet Elevation (invert): 1363.57 ft

Culvert Length: 242.00 ft, Culvert Slope: 0.0038

****

Site Data - 3-30" RCP

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1364.49 ft

Outlet Station: 242.00 ft

Outlet Elevation: 1363.57 ft

Number of Barrels: 3

Culvert Data Summary - 3-30" RCP

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Grooved End Projecting

Inlet Depression: None

Table 1 - Summary of Culvert Flows at Crossing: Culvert 14

Headwater Elevation (ft)	Total Discharge (cfs)	1-24" RCP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1375.15	0.00	0.00	0.00	1
1376.03	3.00	3.00	0.00	1
1376.45	6.00	6.00	0.00	1
1376.83	9.00	9.00	0.00	1
1377.59	12.00	12.00	0.00	1
1379.52	15.00	14.66	0.32	17
1379.59	18.00	14.75	3.20	6
1379.64	21.00	14.81	6.10	4
1379.68	24.00	14.87	9.10	4
1379.71	27.00	14.91	11.99	3
1379.76	30.00	14.96	14.98	3
1379.50	14.63	14.63	0.00	Overtopping

Table 2 - Culvert Summary Table: 1-24" RCP

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1375.15	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
3.00	3.00	1376.03	0.826	0.883	3-M1t	0.722	0.604	1.201	0.181	1.522	0.922
6.00	6.00	1376.45	1.220	1.302	3-M1t	1.074	0.862	1.255	0.235	2.890	1.096
9.00	9.00	1376.83	1.539	1.681	3-M2t	1.411	1.067	1.294	0.274	4.186	1.213
12.00	12.00	1377.59	1.820	2.440	7-M2t	2.000	1.241	1.325	0.305	5.431	1.304
15.00	14.66	1379.52	2.070	4.369	7-M2c	2.000	1.378	1.379	0.332	6.342	1.378
18.00	14.75	1379.59	2.079	4.441	7-M2c	2.000	1.383	1.384	0.355	6.360	1.443
21.00	14.81	1379.64	2.086	4.487	7-M2t	2.000	1.386	1.396	0.376	6.324	1.499
24.00	14.87	1379.68	2.091	4.525	7-M2t	2.000	1.389	1.416	0.396	6.253	1.550
27.00	14.91	1379.71	2.096	4.557	7-M2t	2.000	1.391	1.434	0.414	6.189	1.597
30.00	14.96	1379.76	2.100	4.607	7-M2t	2.000	1.393	1.450	0.430	6.131	1.639

****

Inlet Elevation (invert): 1375.15 ft, Outlet Elevation (invert): 1372.55 ft

Culvert Length: 1382.00 ft, Culvert Slope: 0.0019

****

Site Data - 1-24" RCP

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1375.15 ft

Outlet Station: 1382.00 ft

Outlet Elevation: 1372.55 ft

Number of Barrels: 1

Culvert Data Summary - 1-24" RCP

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Grooved End Projecting

Inlet Depression: None

EXISTING CONDITIONS HEC-1 OUTPUT

- **Schematic Diagram of Stream Network (Typical)**
- **5-Year, 6-hour Model & Runoff Summary**
- **10-Year, 6-hour Model & Runoff Summary**
- **100-Year, 6-hour Model & Runoff Summary**
- **100-Year, 24-hour Model & Runoff Summary**
- **"Future Conditions" 100-Year, 24-hour Model & Runoff Summary**

```
SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

            (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

   22        SUBA
                V
                V
   28         RSA
                V
                V
   35        RTAC
                .
                .
   40           .          SUBB
                .             V
                .             V
   46           .           RSB
                .             V
                .             V
   53           .          RTBC
                .             .
                .             .
   58           .             .          SUBC
                .             .             .
                .             .             .
   64         CPC.......................
                V
                V
   66       RSCPC
                V
                V
   73        RTCD
                .
                .
   78           .          SUBD
                .             .
                .             .
   84         CPD...........
                V
                V
   86       RSCPD
                V
                V
   93        RTDE
                .
                .
   98           .          SUBE
                .             .
                .             .
  104         CPE...........
                V
                V
  106       RSCPE
                V
                V
  113        RTEF
                .
                .
  118           .          SUBF
                .             .
                .             .
  124         CPF...........
                V
                V
  126       RSCPF
                V
                V
  133        RTFG
                .
                .
  138           .          SUBG
                .             .
                .             .
  144         CPG...........
                V
                V
  146       RSCPG
                .
                .
  153           .         SUBH1
                .             V
                .             V
  159           .        RTH1H2
                .             .
                .             .
                .             .         SUBH2
                .             .             .
                .             .             .
  170           .          CPH2...........
                .             V
                .             V
  172           .        RTH2H3
                .             .
                .             .
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177            .           .       SUBH3
               .           .           .
               .           .           .
183            .        CPH3............
               .           V
               .           V
185            .        RSH3
               .           V
               .           V
192            .       RTH3I
               .           .
               .           .
197            .           .        SUBI
               .           .           .
               .           .           .
203            .         CPI............
               .           V
               .           V
205            .         RSI
               .           V
               .           V
212            .        RTIM
               .           .
               .           .
217            .           .        SUBJ
               .           .           V
               .           .           V
223            .           .        RTJK
               .           .           .
               .           .           .
228            .           .           .           SUBK
               .           .           .           .
               .           .           .           .
234            .           .         CPK............
               .           .           V
               .           .           V
236            .           .        RTKL
               .           .           .
               .           .           .
241            .           .           .           SUBL
               .           .           .           .
               .           .           .           .
247            .           .         CPL............
               .           .           V
               .           .           V
249            .           .        RTLM
               .           .           .
               .           .           .
254            .           .           .           SUBM
               .           .           .           .
               .           .           .           .
260            .         CPM........................
               .           V
               .           V
262            .       RSCPM
               .           .
               .           .
269            .           .        SUBN
               .           .           V
               .           .           V
275            .           .         RSN
               .           .           .
               .           .           .
282            .           .           .           SUBO
               .           .           .           .
               .           .           .           .
288            .           .           .           .           SUBP
               .           .           .           .           .
               .           .           .           .           .
294            .           .           .         CPO............
               .           .           .           .
               .           .           .           .
296            .           .        CPN2............
               .           .           .
               .           .           .
298            .        CPM2............
               .           .
               .           .
300         CPG2............
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1**************************************                                      **************************************
 *                                    *                                      *                                    *
 *  FLOOD HYDROGRAPH PACKAGE  (HEC-1) *                                      *  U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN  1998              *                                      *  HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1             *                                      *       609 SECOND STREET            *
 *                                    *                                      *    DAVIS, CALIFORNIA 95616         *
 * RUN DATE  30AUG13  TIME  10:02:50  *                                      *       (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        Phoenix-Mesa Gateway Airport Authority
            2          ID        10-0821.1006_EX_6HR - East Area Airport Master Drainage Plan
            3          ID        5 YEAR
            4          ID        6 Hour  Storm
            5          ID        Unit Hydrograph: Clark
            6          ID        08/30/2013
            7          IT       5       0       0    1000
            8          IN      15
            9          IO       5
                       *DIAGRAM
                       *
           10          JD   1.423  0.0001
           11          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
           12          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
           13          PC   0.962   0.972   0.983   0.991   1.000
           14          JD   1.414  0.5000
           15          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
           16          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
           17          PC   0.962   0.972   0.983   0.991   1.000
           18          JD   1.387     2.8
           19          PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.068   0.077
           20          PC   0.088   0.101   0.121   0.164   0.253   0.451   0.694   0.836   0.900   0.938
           21          PC   0.950   0.963   0.975   0.988   1.000
                       *

           22          KK    SUBA   BASIN
           23          BA   0.063
           24          LG    0.23    0.35    4.70    0.26      16
           25          UC   0.722   0.647
           26          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
           27          UA     100
                       *

           28          KK     RSA STORAGE
           29          KO
           30          RS       1    STOR
           31          SV            0.05    0.27    0.80    2.14    4.55    7.97    7.97
           32          SQ    2.80    6.37   10.20   11.88   12.57   13.29   13.99   14.63
           33          SE  1376.0 1376.50 1377.00 1377.50 1378.00 1378.50 1379.00 1379.50
           34          ST  1379.0   30.00    3.00    1.50
                       *

           35          KK    RTAC   ROUTE
           36          RS      14    FLOW
           37          RC   0.025   0.030   0.025    2728  0.0059 1372.92
           38          RX    0.00   77.20  102.40  174.70  200.40  242.40  260.70  434.30
           39          RY  1373.8 1373.01 1372.00 1370.28 1370.29 1371.00 1372.00 1372.92
                       *

           40          KK    SUBB   BASIN
           41          BA   0.026
           42          LG    0.20    0.36    5.10    0.22      27
           43          UC   0.490   0.539
           44          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
           45          UA     100
                       *
1                                       HEC-1 INPUT                                            PAGE  2
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 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   46          KK     RSB STORAGE
   47          KO
   48          RS       1    STOR
   49          SV                    0.01    0.04    0.08    0.14    0.23    0.37    0.57    0.87
   50          SQ           70.28   89.53  100.29  109.59  118.30  126.85  135.06  143.06  150.06
   51          SE  1364.5 1367.00 1367.50 1368.00 1368.50 1369.00 1369.50 1370.00 1370.50 1371.00
   52          ST  1370.5   30.00    3.00    1.50
                *

   53          KK    RTBC   ROUTE
   54          RS       4    FLOW
   55          RC   0.025   0.030   0.025     983  0.0041 1368.00
   56          RX    0.00  183.30  385.40  413.00  439.40  456.20  496.70  674.30
   57          RY  1369.0 1366.05 1365.00 1363.00 1363.00 1365.00 1366.00 1368.00
                *

   58          KK    SUBC   BASIN
   59          BA   0.110
   60          LG    0.20    0.39    5.80    0.16      26
   61          UC   0.842   0.882
   62          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
   63          UA     100
                *

   64          KK     CPC COMBINE
   65          HC       3
                *

   66          KK   RSCPC STORAGE
   67          KO
   68          RS       1    STOR
   69          SV                    0.05    0.16    0.36    0.69    1.22    2.03    2.03
   70          SQ    5.05   16.07   32.06   51.49   71.33   87.21   97.27  106.96  115.99
   71          SE  1361.0 1361.50 1362.00 1362.50 1363.00 1363.50 1364.00 1364.50 1365.00
   72          ST  1364.5   30.00    3.00    1.50
                *

   73          KK    RTCD   ROUTE
   74          RS       5    FLOW
   75          RC   0.025   0.030   0.025    2153  0.0028 1364.53
   76          RX    0.00  170.00  431.90  450.10  465.30  490.90  660.00  790.00
   77          RY  1364.5 1361.00 1359.03 1357.00 1357.00 1360.01 1362.16 1365.11
                *

   78          KK    SUBD   BASIN
   79          BA   0.087
   80          LG    0.20    0.25    9.70    0.04      28
   81          UC   0.518   0.399
   82          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
   83          UA     100
                *
1                                          HEC-1 INPUT                                            PAGE  3

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

   84          KK     CPD COMBINE
   85          HC       2
                *

   86          KK   RSCPD STORAGE
   87          KO
   88          RS       1    STOR
   89          SV            0.33    0.69    1.26    2.18    3.54    5.52    8.31   12.21   12.21
   90          SQ          110.49  127.59  140.03  151.93  163.28  174.31  184.90  195.20  203.95
   91          SE  1353.5 1356.00 1356.50 1357.00 1357.50 1358.00 1358.50 1359.00 1359.50 1360.00
   92          ST  1359.5   30.00    3.00    1.50
                *

   93          KK    RTDE   ROUTE
   94          RS       2    FLOW
   95          RC   0.025   0.030   0.025     917  0.0033 1359.00
   96          RX    0.00  228.50  428.50  448.60  475.10  516.40  663.60  786.60
   97          RY  1359.0 1354.10 1353.99 1352.07 1352.00 1355.02 1356.01 1359.24
                *

   98          KK    SUBE   BASIN
   99          BA   0.042
  100          LG    0.20    0.25    9.70    0.04      29
  101          UC   0.315   0.200
  102          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
  103          UA     100
                *

  104          KK     CPE COMBINE
  105          HC       2
                *

  106          KK   RSCPE STORAGE
  107          KO
  108          RS       1    STOR
  109          SV            0.01    0.09    0.28    0.61    1.17    1.50
  110          SQ    5.05   20.72   45.32   76.51  109.89  140.01  200.00
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       111           SE  1350.5 1351.00 1351.50 1352.00 1352.50 1353.00 1354.50
       112           ST  1353.0   30.00    3.00    1.50
                     *

       113           KK    RTEF   ROUTE
       114           RS       6    FLOW
       115           RC   0.025   0.030   0.025    1474  0.0020 1355.00
       116           RX    0.00  207.90  430.20  453.10  465.10  495.80  690.60  787.10
       117           RY  1355.0 1350.84 1350.00 1348.00 1348.01 1350.89 1352.99 1355.31
                     *

       118           KK    SUBF   BASIN
       119           BA   0.072
       120           LG    0.20    0.25    9.70    0.04      27
       121           UC   0.430   0.287
       122           UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
       123           UA     100
                     *
1                                               HEC-1 INPUT                                                PAGE  4

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


       124           KK     CPF COMBINE
       125           HC       2
                     *

       126           KK   RSCPF STORAGE
       127           KO
       128           RS       1    STOR
       129           SV            0.01    0.05    0.15    0.32    0.60    1.13    2.11    2.11    2.11
       130           SQ    0.32   27.15   54.17   88.14  125.55  158.05  172.28  175.83  181.88  270.00
       131           SE  1345.0 1346.00 1346.50 1347.00 1347.50 1348.00 1348.50 1349.00 1349.50 1351.00
       132           ST  1349.0   30.00    3.00    1.50
                     *

       133           KK    RTFG   ROUTE
       134           RS       5    FLOW
       135           RC   0.025   0.030   0.025    1524  0.0013 1346.95
       136           RX    0.00   65.30  112.50  125.20  140.50  145.90  181.60  212.30
       137           RY  1347.0 1346.05 1342.35 1341.00 1341.00 1341.96 1344.69 1347.00
                     *

       138           KK    SUBG   BASIN
       139           BA   0.075
       140           LG    0.21    0.27    8.80    0.05      21
       141           UC   0.530   0.445
       142           UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
       143           UA     100
                     *

       144           KK     CPG COMBINE
       145           HC       2
                     *

       146           KK   RSCPG STORAGE
       147           KO
       148           RS       1    STOR
       149           SV            0.02    0.09    0.25    0.54    1.07    1.83    2.84    4.10    5.61
       150           SQ           37.05   55.20   74.99   93.30  109.16  122.94  135.18  146.29  300.00
       151           SE  1339.0 1339.50 1340.00 1340.50 1341.00 1341.50 1342.00 1342.50 1343.00 1344.00
       152           ST  1343.0   30.00    3.00    1.50
                     *

       153           KK   SUBH1   BASIN
       154           BA   0.082
       155           LG    0.23    0.37    6.60    0.12      14
       156           UC   0.807   0.860
       157           UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
       158           UA     100
                     *
1                                               HEC-1 INPUT                                                PAGE  5

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


       159           KK  RTH1H2   ROUTE
       160           RS       9    FLOW
       161           RC   0.025   0.030   0.025    3034  0.0033 1369.97
       162           RX    0.00   51.80   87.60  104.30  142.40  153.20  157.20  268.10
       163           RY  1370.2 1369.00 1367.00 1365.00 1365.29 1367.00 1368.00 1369.97
                     *

       164           KK   SUBH2   BASIN
       165           BA   0.048
       166           LG    0.21    0.25    9.70    0.04      25
       167           UC   0.746   0.975
       168           UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
       169           UA     100
                     *

       170           KK    CPH2 COMBINE
       171           HC       2
                     *

       172           KK  RTH2H3   ROUTE
```

```
 173          RS      7    FLOW
 174          RC  0.025   0.030   0.025    2777  0.0029 1362.64
 175          RX   0.00   28.60   59.80   85.30  114.90  125.50  142.80  217.50
 176          RY 1362.6 1361.85 1361.00 1358.00 1358.00 1359.00 1361.53 1362.87
              *

 177          KK  SUBH3   BASIN
 178          BA  0.046
 179          LG   0.19    0.25    9.70    0.04      32
 180          UC  0.716   0.889
 181          UA      0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 182          UA    100
              *

 183          KK   CPH3 COMBINE
 184          HC      2
              *

 185          KK   RSH3 STORAGE
 186          KO
 187          RS      1    STOR
 188          SV           0.06    0.20    0.47    0.88    1.43    2.14    3.05    4.23    5.72
 189          SQ   0.98   36.15   55.83   74.70   85.18   92.15   98.84  105.30  111.45  117.37
 190          SE 1352.5 1354.00 1354.50 1355.00 1355.50 1356.00 1356.50 1357.00 1357.50 1358.00
 191          ST 1357.5   30.00    3.00    1.50
              *

 192          KK  RTH3I   ROUTE
 193          RS      3    FLOW
 194          RC  0.025   0.030   0.025    1270  0.0024 1356.00
 195          RX   0.00   76.00  134.60  150.20  203.70  218.20  250.50  328.70
 196          RY 1356.7 1354.44 1353.00 1351.00 1351.00 1353.00 1354.40 1356.00
              *
1                                     HEC-1 INPUT                                                 PAGE  6

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


 197          KK   SUBI   BASIN
 198          BA  0.027
 199          LG   0.15    0.25    9.70    0.04      50
 200          UC  0.419   0.476
 201          UA      0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 202          UA    100
              *

 203          KK    CPI COMBINE
 204          HC      2
              *

 205          KK    RSI STORAGE
 206          KO
 207          RS      1    STOR
 208          SV           0.47    0.78    1.32    2.13    3.09    4.23    5.60    7.30    7.30
 209          SQ          74.21   88.73   98.68  108.35  117.31  125.92  134.24  142.29  149.41
 210          SE 1347.5 1350.00 1350.50 1351.00 1351.50 1352.00 1352.50 1353.00 1353.50 1354.00
 211          ST 1353.5   30.00    3.00    1.50
              *

 212          KK   RTIM   ROUTE
 213          RS      3    FLOW
 214          RC  0.025   0.030   0.025    1224  0.0033 1350.85
 215          RX   0.00   60.40  133.50  145.70  185.70  204.40  214.00  264.50
 216          RY 1351.0 1349.32 1348.00 1346.00 1346.00 1348.66 1350.00 1350.85
              *

 217          KK   SUBJ   BASIN
 218          BA  0.161
 219          LG   0.25    0.25    9.70    0.04       5
 220          UC  0.866   0.733
 221          UA      0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 222          UA    100
              *

 223          KK   RTJK   ROUTE
 224          RS     13    FLOW
 225          RC  0.025   0.030   0.025    4767  0.0029 1360.96
 226          RX   0.00   58.90   85.30  127.40  140.70  146.20  152.30  156.60
 227          RY 1361.0 1360.25 1359.86 1359.02 1359.00 1360.14 1361.63 1362.00
              *

 228          KK   SUBK   BASIN
 229          BA  0.183
 230          LG   0.25    0.27    8.80    0.05       5
 231          UC  0.978   0.927
 232          UA      0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 233          UA    100
              *
1                                     HEC-1 INPUT                                                 PAGE  7

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


 234          KK    CPK COMBINE
 235          HC      2
              *
```

```
 236          KK    RTKL   ROUTE
 237          RS       1    FLOW
 238          RC   0.025   0.030   0.025     450  0.0044 1358.75
 239          RX    0.00   10.30   21.50   33.70   49.10   62.30   71.10   92.80
 240          RY  1359.0 1358.15 1356.46 1354.00 1354.00 1356.75 1358.02 1358.75
              *

 241          KK    SUBL   BASIN
 242          BA   0.064
 243          LG    0.25    0.29    8.40    0.06       5
 244          UC   0.483   0.341
 245          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 246          UA     100
              *

 247          KK     CPL COMBINE
 248          HC       2
              *

 249          KK    RTLM   ROUTE
 250          RS       6    FLOW
 251          RC   0.025   0.030   0.025    2667  0.0030 1356.26
 252          RX    0.00    8.80   37.10   61.70   87.20  114.30  136.50  172.70
 253          RY  1356.3 1356.03 1353.00 1351.00 1351.00 1353.70 1356.00 1356.61
              *

 254          KK    SUBM   BASIN
 255          BA   0.137
 256          LG    0.23    0.30    8.00    0.07      12
 257          UC   0.743   0.600
 258          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 259          UA     100
              *

 260          KK     CPM COMBINE
 261          HC       3
              *

 262          KK   RSCPM STORAGE
 263          KO
 264          RS       1    STOR
 265          SV                            0.02    0.10    0.40    1.19    2.94
 266          SQ            4.54   14.00   43.47   82.13  114.53  139.46  410.00
 267          SE  1342.0 1342.50 1343.00 1344.00 1345.00 1346.00 1347.00 1348.50
 268          ST  1347.5   30.00    3.00    1.50
              *
1                                    HEC-1 INPUT                                          PAGE  8

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

 269          KK    SUBN   BASIN
 270          BA   0.350
 271          LG    0.25    0.30    8.00    0.07       5
 272          UC   1.315   1.268
 273          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 274          UA     100
              *

 275          KK     RSN STORAGE
 276          KO
 277          RS       1    STOR
 278          SV            0.30    0.81    2.25    5.00    8.95   14.25   21.10
 279          SQ            1.58    6.06   13.86   24.44   35.90   49.22   70.00
 280          SE  1364.5 1365.00 1365.50 1366.00 1366.50 1367.00 1367.50 1368.50
 281          ST  1367.5   30.00    3.00    1.50
              *

 282          KK    SUBO   BASIN
 283          BA   0.218
 284          LG    0.25    0.36    6.80    0.11       5
 285          UC   0.878   0.612
 286          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 287          UA     100
              *

 288          KK    SUBP   BASIN
 289          BA   0.145
 290          LG    0.25    0.36    5.10    0.22       5
 291          UC   1.197   1.136
 292          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 293          UA     100
              *

 294          KK     CPO COMBINE
 295          HC       2
              *

 296          KK    CPN2 COMBINE
 297          HC       2
              *

 298          KK    CPM2 COMBINE
 299          HC       2
              *
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```
300          KK    CPG2 COMBINE
301          HC       2
             *
302          ZZ
```

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	SUBA	17.	4.33	3.	1.	0.	0.06		
+	ROUTED TO	RSA	10.	4.83	4.	1.	0.	0.06		
+	ROUTED TO	RTAC	10.	5.33	4.	1.	0.	0.06		
+	HYDROGRAPH AT	SUBB	10.	4.25	2.	0.	0.	0.03		
+	ROUTED TO	RSB	70.	0.00	2.	1.	0.	0.03		
+	ROUTED TO	RTBC	15.	0.25	2.	1.	0.	0.03		
+	HYDROGRAPH AT	SUBC	30.	4.42	8.	2.	1.	0.11		
+	3 COMBINED AT	CPC	41.	4.50	13.	4.	1.	0.20		
+	ROUTED TO	RSCPC	40.	4.75	14.	5.	2.	0.20		
+	ROUTED TO	RTCD	40.	4.92	14.	5.	2.	0.20		
+	HYDROGRAPH AT	SUBD	55.	4.25	8.	2.	1.	0.09		
+	2 COMBINED AT	CPD	68.	4.42	22.	7.	2.	0.29		
+	ROUTED TO	RSCPD	68.	4.50	22.	7.	2.	0.29		
+	ROUTED TO	RTDE	68.	4.58	22.	7.	2.	0.29		
+	HYDROGRAPH AT	SUBE	41.	4.08	4.	1.	0.	0.04		
+	2 COMBINED AT	CPE	84.	4.33	26.	8.	3.	0.33		
+	ROUTED TO	RSCPE	82.	4.42	26.	9.	3.	0.33		
+	ROUTED TO	RTEF	81.	4.58	26.	9.	3.	0.33		
+	HYDROGRAPH AT	SUBF	56.	4.17	7.	2.	1.	0.07		
+	2 COMBINED AT	CPF	114.	4.33	33.	10.	4.	0.40		
+	ROUTED TO	RSCPF	112.	4.42	33.	10.	4.	0.40		
+	ROUTED TO	RTFG	111.	4.58	33.	10.	4.	0.40		
+	HYDROGRAPH AT	SUBG	42.	4.25	6.	2.	1.	0.08		
+	2 COMBINED AT	CPG	140.	4.50	39.	12.	4.	0.48		
+	ROUTED TO	RSCPG	116.	4.83	39.	12.	4.	0.48		
+	HYDROGRAPH AT	SUBH1	21.	4.42	5.	1.	0.	0.08		
+	ROUTED TO	RTH1H2	19.	5.00	5.	1.	0.	0.08		

HYDROGRAPH AT	SUBH2	16.	4.42	4.	1.	0.	0.05
2 COMBINED AT	CPH2	31.	4.92	9.	2.	1.	0.13
ROUTED TO	RTH2H3	30.	5.25	9.	2.	1.	0.13
HYDROGRAPH AT	SUBH3	17.	4.42	4.	1.	0.	0.05
2 COMBINED AT	CPH3	39.	5.17	13.	3.	1.	0.18
ROUTED TO	RSH3	38.	5.25	13.	4.	1.	0.18
ROUTED TO	RTH3I	38.	5.42	13.	4.	1.	0.18
HYDROGRAPH AT	SUBI	18.	4.17	3.	1.	0.	0.03
2 COMBINED AT	CPI	40.	5.42	16.	5.	2.	0.20
ROUTED TO	RSI	40.	5.50	16.	5.	2.	0.20
ROUTED TO	RTIM	39.	5.58	16.	5.	2.	0.20
HYDROGRAPH AT	SUBJ	55.	4.42	12.	3.	1.	0.16
ROUTED TO	RTJK	50.	5.08	12.	3.	1.	0.16
HYDROGRAPH AT	SUBK	49.	4.50	12.	3.	1.	0.18
2 COMBINED AT	CPK	85.	5.00	24.	6.	2.	0.34
ROUTED TO	RTKL	85.	5.08	24.	6.	2.	0.34
HYDROGRAPH AT	SUBL	36.	4.17	4.	1.	0.	0.06
2 COMBINED AT	CPL	89.	5.00	28.	7.	2.	0.41
ROUTED TO	RTLM	86.	5.33	28.	7.	2.	0.41
HYDROGRAPH AT	SUBM	51.	4.33	9.	2.	1.	0.14
3 COMBINED AT	CPM	129.	5.25	51.	13.	4.	0.75
ROUTED TO	RSCPM	124.	5.42	51.	13.	4.	0.75
HYDROGRAPH AT	SUBN	62.	4.67	21.	5.	2.	0.35
ROUTED TO	RSN	24.	6.25	18.	5.	2.	0.35
HYDROGRAPH AT	SUBO	61.	4.42	11.	3.	1.	0.22
HYDROGRAPH AT	SUBP	20.	4.58	6.	2.	1.	0.14
2 COMBINED AT	CPO	80.	4.42	18.	4.	1.	0.36
2 COMBINED AT	CPN2	79.	4.50	32.	9.	3.	0.71
2 COMBINED AT	CPM2	166.	4.75	73.	20.	7.	1.46
2 COMBINED AT	CPG2	258.	4.75	102.	30.	10.	1.94

```
1****************************************                              ****************************************
 *                                      *                              *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                              *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN   1998              *                              *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.1                *                              *         609 SECOND STREET            *
 *                                      *                              *       DAVIS, CALIFORNIA 95616        *
 * RUN DATE   30AUG13  TIME  10:02:53   *                              *          (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        Phoenix-Mesa Gateway Airport Authority
            2            ID        10-0821.1006_EX_6HR - East Area Airport Master Drainage Plan
            3            ID        10 YEAR
            4            ID        6 Hour  Storm
            5            ID        Unit Hydrograph: Clark
            6            ID        08/30/2013
            7            IT      5       0       0    1000
            8            IN     15
            9            IO      5
                         *DIAGRAM
                         *
           10            JD   1.669  0.0001
           11            PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
           12            PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
           13            PC   0.962   0.972   0.983   0.991   1.000
           14            JD   1.659  0.5000
           15            PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
           16            PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
           17            PC   0.962   0.972   0.983   0.991   1.000
           18            JD   1.627     2.8
           19            PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.068   0.077
           20            PC   0.088   0.101   0.121   0.164   0.253   0.451   0.694   0.836   0.900   0.938
           21            PC   0.950   0.963   0.975   0.988   1.000
                         *

           22            KK    SUBA   BASIN
           23            BA   0.063
           24            LG    0.23    0.35    4.70    0.26      16
           25            UC   0.717   0.641
           26            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
           27            UA     100
                         *

           28            KK     RSA STORAGE
           29            KO
           30            RS       1    STOR
           31            SV            0.05    0.27    0.80    2.14    4.55    7.97    7.97
           32            SQ    2.80    6.37   10.20   11.88   12.57   13.29   13.99   14.63
           33            SE  1376.0 1376.50 1377.00 1377.50 1378.00 1378.50 1379.00 1379.50
           34            ST  1379.0   30.00    3.00    1.50
                         *

           35            KK    RTAC   ROUTE
           36            RS      14    FLOW
           37            RC   0.025   0.030   0.025    2728  0.0059 1372.92
           38            RX    0.00   77.20  102.40  174.70  200.40  242.40  260.70  434.30
           39            RY  1373.8 1373.01 1372.00 1370.28 1370.29 1371.00 1372.00 1372.92
                         *

           40            KK    SUBB   BASIN
           41            BA   0.026
           42            LG    0.20    0.36    5.10    0.22      27
           43            UC   0.487   0.535
           44            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
           45            UA     100
                         *
1                                             HEC-1 INPUT                                              PAGE  2
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  46           KK     RSB STORAGE
  47           KO
  48           RS       1    STOR
  49           SV                  0.01    0.04    0.08    0.14    0.23    0.37    0.57    0.87
  50           SQ          70.28   89.53  100.29  109.59  118.30  126.85  135.06  143.06  150.06
  51           SE  1364.5 1367.00 1367.50 1368.00 1368.50 1369.00 1369.50 1370.00 1370.50 1371.00
  52           ST  1370.5   30.00    3.00    1.50
               *

  53           KK    RTBC   ROUTE
  54           RS       4    FLOW
  55           RC   0.025   0.030   0.025     983  0.0041 1368.00
  56           RX    0.00  183.30  385.40  413.00  439.40  456.20  496.70  674.30
  57           RY  1369.0 1366.05 1365.00 1363.00 1363.00 1365.00 1366.00 1368.00
               *

  58           KK    SUBC   BASIN
  59           BA   0.110
  60           LG    0.20    0.39    5.80    0.16      26
  61           UC   0.836   0.875
  62           UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
  63           UA     100
               *

  64           KK     CPC COMBINE
  65           HC       3
               *

  66           KK   RSCPC STORAGE
  67           KO
  68           RS       1    STOR
  69           SV                  0.05    0.16    0.36    0.69    1.22    2.03    2.03
  70           SQ    5.05   16.07   32.06   51.49   71.33   87.21   97.27  106.96  115.99
  71           SE  1361.0 1361.50 1362.00 1362.50 1363.00 1363.50 1364.00 1364.50 1365.00
  72           ST  1364.5   30.00    3.00    1.50
               *

  73           KK    RTCD   ROUTE
  74           RS       5    FLOW
  75           RC   0.025   0.030   0.025    2153  0.0028 1364.53
  76           RX    0.00  170.00  431.90  450.10  465.30  490.90  660.00  790.00
  77           RY  1364.5 1361.00 1359.03 1357.00 1357.00 1360.01 1362.16 1365.11
               *

  78           KK    SUBD   BASIN
  79           BA   0.087
  80           LG    0.20    0.25    9.70    0.04      28
  81           UC   0.515   0.396
  82           UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
  83           UA     100
               *
1                                               HEC-1 INPUT                                          PAGE  3

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


  84           KK     CPD COMBINE
  85           HC       2
               *

  86           KK   RSCPD STORAGE
  87           KO
  88           RS       1    STOR
  89           SV            0.33    0.69    1.26    2.18    3.54    5.52    8.31   12.21   12.21
  90           SQ          110.49  127.59  140.03  151.93  163.28  174.31  184.90  195.20  203.95
  91           SE  1353.5 1356.00 1356.50 1357.00 1357.50 1358.00 1358.50 1359.00 1359.50 1360.00
  92           ST  1359.5   30.00    3.00    1.50
               *

  93           KK    RTDE   ROUTE
  94           RS       2    FLOW
  95           RC   0.025   0.030   0.025     917  0.0033 1359.00
  96           RX    0.00  228.50  428.50  448.60  475.10  516.40  663.60  786.60
  97           RY  1359.0 1354.10 1353.99 1352.07 1352.00 1355.02 1356.01 1359.24
               *

  98           KK    SUBE   BASIN
  99           BA   0.042
 100           LG    0.20    0.25    9.70    0.04      29
 101           UC   0.313   0.198
 102           UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 103           UA     100
               *

 104           KK     CPE COMBINE
 105           HC       2
               *

 106           KK   RSCPE STORAGE
 107           KO
 108           RS       1    STOR
 109           SV            0.01    0.09    0.28    0.61    1.17    1.50
 110           SQ    5.05   20.72   45.32   76.51  109.89  140.01  200.00
```

```
 111             SE  1350.5 1351.00 1351.50 1352.00 1352.50 1353.00 1354.50
 112             ST  1353.0   30.00    3.00    1.50
                  *

 113             KK    RTEF   ROUTE
 114             RS       6    FLOW
 115             RC   0.025   0.030   0.025    1474  0.0020 1355.00
 116             RX    0.00  207.90  430.20  453.10  465.10  495.80  690.60  787.10
 117             RY  1355.0 1350.84 1350.00 1348.00 1348.01 1350.89 1352.99 1355.31
                  *

 118             KK    SUBF   BASIN
 119             BA   0.072
 120             LG    0.20    0.25    9.70    0.04      27
 121             UC   0.427   0.285
 122             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 123             UA     100
                  *
1                                            HEC-1 INPUT                                             PAGE  4

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


 124             KK     CPF COMBINE
 125             HC       2
                  *

 126             KK   RSCPF STORAGE
 127             KO
 128             RS       1    STOR
 129             SV            0.01    0.05    0.15    0.32    0.60    1.13    2.11    2.11    2.11
 130             SQ    0.32   27.15   54.17   88.14  125.55  158.05  172.28  175.83  181.88  270.00
 131             SE  1345.0 1346.00 1346.50 1347.00 1347.50 1348.00 1348.50 1349.00 1349.50 1351.00
 132             ST  1349.0   30.00    3.00    1.50
                  *

 133             KK    RTFG   ROUTE
 134             RS       5    FLOW
 135             RC   0.025   0.030   0.025    1524  0.0013 1346.95
 136             RX    0.00   65.30  112.50  125.20  140.50  145.90  181.60  212.30
 137             RY  1347.0 1346.05 1342.35 1341.00 1341.00 1341.96 1344.69 1347.00
                  *

 138             KK    SUBG   BASIN
 139             BA   0.075
 140             LG    0.21    0.27    8.80    0.05      21
 141             UC   0.527   0.442
 142             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 143             UA     100
                  *

 144             KK     CPG COMBINE
 145             HC       2
                  *

 146             KK   RSCPG STORAGE
 147             KO
 148             RS       1    STOR
 149             SV            0.02    0.09    0.25    0.54    1.07    1.83    2.84    4.10    5.61
 150             SQ           37.05   55.20   74.99   93.30  109.16  122.94  135.18  146.29  300.00
 151             SE  1339.0 1339.50 1340.00 1340.50 1341.00 1341.50 1342.00 1342.50 1343.00 1344.00
 152             ST  1343.0   30.00    3.00    1.50
                  *

 153             KK   SUBH1   BASIN
 154             BA   0.082
 155             LG    0.23    0.37    6.60    0.12      14
 156             UC   0.801   0.853
 157             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 158             UA     100
                  *
1                                            HEC-1 INPUT                                             PAGE  5

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


 159             KK  RTH1H2   ROUTE
 160             RS       9    FLOW
 161             RC   0.025   0.030   0.025    3034  0.0033 1369.97
 162             RX    0.00   51.80   87.60  104.30  142.40  153.20  157.20  268.10
 163             RY  1370.2 1369.00 1367.00 1365.00 1365.29 1367.00 1368.00 1369.97
                  *

 164             KK   SUBH2   BASIN
 165             BA   0.048
 166             LG    0.21    0.25    9.70    0.04      25
 167             UC   0.741   0.968
 168             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 169             UA     100
                  *

 170             KK    CPH2 COMBINE
 171             HC       2
                  *

 172             KK  RTH2H3   ROUTE
```

```
 173          RS       7    FLOW
 174          RC   0.025   0.030   0.025    2777  0.0029 1362.64
 175          RX    0.00   28.60   59.80   85.30  114.90  125.50  142.80  217.50
 176          RY  1362.6 1361.85 1361.00 1358.00 1358.00 1359.00 1361.53 1362.87
              *

 177          KK   SUBH3   BASIN
 178          BA   0.046
 179          LG    0.19    0.25    9.70    0.04      32
 180          UC   0.712   0.883
 181          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 182          UA     100
              *

 183          KK    CPH3 COMBINE
 184          HC       2
              *

 185          KK    RSH3 STORAGE
 186          KO
 187          RS       1    STOR
 188          SV            0.06    0.20    0.47    0.88    1.43    2.14    3.05    4.23    5.72
 189          SQ    0.98   36.15   55.83   74.70   85.18   92.15   98.84  105.30  111.45  117.37
 190          SE  1352.5 1354.00 1354.50 1355.00 1355.50 1356.00 1356.50 1357.00 1357.50 1358.00
 191          ST  1357.5   30.00    3.00    1.50
              *

 192          KK   RTH3I   ROUTE
 193          RS       3    FLOW
 194          RC   0.025   0.030   0.025    1270  0.0024 1356.00
 195          RX    0.00   76.00  134.60  150.20  203.70  218.20  250.50  328.70
 196          RY  1356.7 1354.44 1353.00 1351.00 1351.00 1353.00 1354.40 1356.00
              *
1                                        HEC-1 INPUT                                          PAGE  6

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


 197          KK    SUBI   BASIN
 198          BA   0.027
 199          LG    0.15    0.25    9.70    0.04      50
 200          UC   0.416   0.473
 201          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 202          UA     100
              *

 203          KK     CPI COMBINE
 204          HC       2
              *

 205          KK     RSI STORAGE
 206          KO
 207          RS       1    STOR
 208          SV            0.47    0.78    1.32    2.13    3.09    4.23    5.60    7.30    7.30
 209          SQ           74.21   88.73   98.68  108.35  117.31  125.92  134.24  142.29  149.41
 210          SE  1347.5 1350.00 1350.50 1351.00 1351.50 1352.00 1352.50 1353.00 1353.50 1354.00
 211          ST  1353.5   30.00    3.00    1.50
              *

 212          KK    RTIM   ROUTE
 213          RS       3    FLOW
 214          RC   0.025   0.030   0.025    1224  0.0033 1350.85
 215          RX    0.00   60.40  133.50  145.70  185.70  204.40  214.00  264.50
 216          RY  1351.0 1349.32 1348.00 1346.00 1346.00 1348.66 1350.00 1350.85
              *

 217          KK    SUBJ   BASIN
 218          BA   0.161
 219          LG    0.25    0.25    9.70    0.04       5
 220          UC   0.860   0.726
 221          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 222          UA     100
              *

 223          KK    RTJK   ROUTE
 224          RS      13    FLOW
 225          RC   0.025   0.030   0.025    4767  0.0029 1360.96
 226          RX    0.00   58.90   85.30  127.40  140.70  146.20  152.30  156.60
 227          RY  1361.0 1360.25 1359.86 1359.02 1359.00 1360.14 1361.63 1362.00
              *

 228          KK    SUBK   BASIN
 229          BA   0.183
 230          LG    0.25    0.27    8.80    0.05       5
 231          UC   0.970   0.919
 232          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 233          UA     100
              *
1                                        HEC-1 INPUT                                          PAGE  7

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


 234          KK     CPK COMBINE
 235          HC       2
              *
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```
236         KK    RTKL   ROUTE
237         RS       1    FLOW
238         RC   0.025   0.030   0.025     450  0.0044 1358.75
239         RX    0.00   10.30   21.50   33.70   49.10   62.30   71.10   92.80
240         RY  1359.0 1358.15 1356.46 1354.00 1354.00 1356.75 1358.02 1358.75
            *

241         KK    SUBL   BASIN
242         BA   0.064
243         LG    0.25    0.29    8.40    0.06       5
244         UC   0.479   0.338
245         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
246         UA     100
            *

247         KK     CPL COMBINE
248         HC       2
            *

249         KK    RTLM   ROUTE
250         RS       6    FLOW
251         RC   0.025   0.030   0.025    2667  0.0030 1356.26
252         RX    0.00    8.80   37.10   61.70   87.20  114.30  136.50  172.70
253         RY  1356.3 1356.03 1353.00 1351.00 1351.00 1353.70 1356.00 1356.61
            *

254         KK    SUBM   BASIN
255         BA   0.137
256         LG    0.23    0.30    8.00    0.07      12
257         UC   0.737   0.595
258         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
259         UA     100
            *

260         KK     CPM COMBINE
261         HC       3
            *

262         KK   RSCPM STORAGE
263         KO
264         RS       1    STOR
265         SV                            0.02    0.10    0.40    1.19    2.94
266         SQ            4.54   14.00   43.47   82.13  114.53  139.46  410.00
267         SE  1342.0 1342.50 1343.00 1344.00 1345.00 1346.00 1347.00 1348.50
268         ST  1347.5   30.00    3.00    1.50
            *
1                                         HEC-1 INPUT                                        PAGE  8

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

269         KK    SUBN   BASIN
270         BA   0.350
271         LG    0.25    0.30    8.00    0.07       5
272         UC   1.304   1.257
273         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
274         UA     100
            *

275         KK     RSN STORAGE
276         KO
277         RS       1    STOR
278         SV            0.30    0.81    2.25    5.00    8.95   14.25   21.10
279         SQ            1.58    6.06   13.86   24.44   35.90   49.22   70.00
280         SE  1364.5 1365.00 1365.50 1366.00 1366.50 1367.00 1367.50 1368.50
281         ST  1367.5   30.00    3.00    1.50
            *

282         KK    SUBO   BASIN
283         BA   0.218
284         LG    0.25    0.36    6.80    0.11       5
285         UC   0.870   0.607
286         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
287         UA     100
            *

288         KK    SUBP   BASIN
289         BA   0.145
290         LG    0.25    0.36    5.10    0.22       5
291         UC   1.187   1.126
292         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
293         UA     100
            *

294         KK     CPO COMBINE
295         HC       2
            *

296         KK    CPN2 COMBINE
297         HC       2
            *

298         KK    CPM2 COMBINE
299         HC       2
            *
```

```
 300        KK    CPG2 COMBINE
 301        HC       2
             *
 302        ZZ
```

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	SUBA	23.	4.33	5.	1.	0.	0.06		
+	ROUTED TO	RSA	11.	5.00	5.	1.	0.	0.06		
+	ROUTED TO	RTAC	11.	5.50	5.	1.	0.	0.06		
+	HYDROGRAPH AT	SUBB	13.	4.25	2.	1.	0.	0.03		
+	ROUTED TO	RSB	70.	0.00	3.	1.	0.	0.03		
+	ROUTED TO	RTBC	15.	0.25	3.	1.	0.	0.03		
+	HYDROGRAPH AT	SUBC	38.	4.42	10.	2.	1.	0.11		
+	3 COMBINED AT	CPC	53.	4.42	17.	5.	2.	0.20		
+	ROUTED TO	RSCPC	52.	4.50	17.	6.	2.	0.20		
+	ROUTED TO	RTCD	51.	4.83	17.	6.	2.	0.20		
+	HYDROGRAPH AT	SUBD	69.	4.25	10.	3.	1.	0.09		
+	2 COMBINED AT	CPD	87.	4.50	27.	8.	3.	0.29		
+	ROUTED TO	RSCPD	87.	4.58	27.	8.	3.	0.29		
+	ROUTED TO	RTDE	86.	4.67	27.	8.	3.	0.29		
+	HYDROGRAPH AT	SUBE	50.	4.08	5.	1.	0.	0.04		
+	2 COMBINED AT	CPE	105.	4.25	32.	10.	3.	0.33		
+	ROUTED TO	RSCPE	101.	4.42	32.	10.	4.	0.33		
+	ROUTED TO	RTEF	101.	4.58	32.	10.	4.	0.33		
+	HYDROGRAPH AT	SUBF	69.	4.17	8.	2.	1.	0.07		
+	2 COMBINED AT	CPF	139.	4.33	40.	12.	4.	0.40		
+	ROUTED TO	RSCPF	136.	4.50	40.	12.	4.	0.40		
+	ROUTED TO	RTFG	135.	4.58	40.	12.	4.	0.40		
+	HYDROGRAPH AT	SUBG	53.	4.25	8.	2.	1.	0.08		
+	2 COMBINED AT	CPG	171.	4.50	48.	14.	5.	0.48		
+	ROUTED TO	RSCPG	133.	4.92	48.	14.	5.	0.48		
+	HYDROGRAPH AT	SUBH1	27.	4.42	6.	2.	1.	0.08		
+	ROUTED TO	RTH1H2	26.	4.83	6.	2.	1.	0.08		

+	HYDROGRAPH AT	SUBH2	20.	4.42	5.	1.	0.	0.05
+	2 COMBINED AT	CPH2	42.	4.83	12.	3.	1.	0.13
+	ROUTED TO	RTH2H3	39.	5.17	12.	3.	1.	0.13
+	HYDROGRAPH AT	SUBH3	22.	4.42	5.	1.	0.	0.05
+	2 COMBINED AT	CPH3	51.	5.08	17.	4.	1.	0.18
+	ROUTED TO	RSH3	50.	5.17	17.	5.	2.	0.18
+	ROUTED TO	RTH3I	50.	5.33	17.	5.	2.	0.18
+	HYDROGRAPH AT	SUBI	22.	4.17	4.	1.	0.	0.03
+	2 COMBINED AT	CPI	53.	5.33	20.	6.	2.	0.20
+	ROUTED TO	RSI	52.	5.42	20.	6.	2.	0.20
+	ROUTED TO	RTIM	52.	5.50	20.	6.	2.	0.20
+	HYDROGRAPH AT	SUBJ	71.	4.42	15.	4.	1.	0.16
+	ROUTED TO	RTJK	68.	5.00	15.	4.	1.	0.16
+	HYDROGRAPH AT	SUBK	65.	4.50	16.	4.	1.	0.18
+	2 COMBINED AT	CPK	119.	4.92	31.	8.	3.	0.34
+	ROUTED TO	RTKL	117.	5.00	31.	8.	3.	0.34
+	HYDROGRAPH AT	SUBL	47.	4.17	5.	1.	0.	0.06
+	2 COMBINED AT	CPL	125.	4.92	37.	9.	3.	0.41
+	ROUTED TO	RTLM	121.	5.17	37.	9.	3.	0.41
+	HYDROGRAPH AT	SUBM	67.	4.33	12.	3.	1.	0.14
+	3 COMBINED AT	CPM	181.	5.17	67.	17.	6.	0.75
+	ROUTED TO	RSCPM	177.	5.25	67.	17.	6.	0.75
+	HYDROGRAPH AT	SUBN	84.	4.67	28.	7.	2.	0.35
+	ROUTED TO	RSN	30.	6.33	24.	7.	2.	0.35
+	HYDROGRAPH AT	SUBO	81.	4.42	15.	4.	1.	0.22
+	HYDROGRAPH AT	SUBP	28.	4.58	9.	2.	1.	0.14
+	2 COMBINED AT	CPO	107.	4.42	23.	6.	2.	0.36
+	2 COMBINED AT	CPN2	108.	4.50	43.	12.	4.	0.71
+	2 COMBINED AT	CPM2	229.	4.75	101.	27.	9.	1.46
+	2 COMBINED AT	CPG2	335.	4.75	139.	39.	13.	1.94

```
1***************************************                          ***************************************
 *                                     *                          *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1) *                          *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN   1998              *                          *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1               *                          *        609 SECOND STREET            *
 *                                     *                          *     DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   30AUG13  TIME  10:02:55 *                          *        (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        Phoenix-Mesa Gateway Airport Authority
     2       ID        10-0821.1006_EX_6HR - East Area Airport Master Drainage Plan
     3       ID        100 YEAR
     4       ID        6 Hour  Storm
     5       ID        Unit Hydrograph: Clark
     6       ID        08/30/2013
     7       IT       5       0       0    1000
     8       IN      15
     9       IO       5
             *DIAGRAM
             *
    10       JD   2.547  0.0001
    11       PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
    12       PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
    13       PC   0.962   0.972   0.983   0.991   1.000
    14       JD   2.532  0.5000
    15       PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
    16       PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
    17       PC   0.962   0.972   0.983   0.991   1.000
    18       JD   2.483     2.8
    19       PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.068   0.077
    20       PC   0.088   0.101   0.121   0.164   0.253   0.451   0.694   0.836   0.900   0.938
    21       PC   0.950   0.963   0.975   0.988   1.000
             *

    22       KK    SUBA   BASIN
    23       BA   0.063
    24       LG    0.23    0.35    4.70    0.26      16
    25       UC   0.554   0.481
    26       UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
    27       UA     100
             *

    28       KK     RSA STORAGE
    29       KO
    30       RS       1    STOR
    31       SV            0.05    0.27    0.80    2.14    4.55    7.97    7.97
    32       SQ    2.80    6.37   10.20   11.88   12.57   13.29   13.99   14.63
    33       SE  1376.0 1376.50 1377.00 1377.50 1378.00 1378.50 1379.00 1379.50
    34       ST  1379.0   30.00    3.00    1.50
             *

    35       KK    RTAC   ROUTE
    36       RS      14    FLOW
    37       RC   0.025   0.030   0.025    2728  0.0059 1372.92
    38       RX    0.00   77.20  102.40  174.70  200.40  242.40  260.70  434.30
    39       RY  1373.8 1373.01 1372.00 1370.28 1370.29 1371.00 1372.00 1372.92
             *

    40       KK    SUBB   BASIN
    41       BA   0.026
    42       LG    0.20    0.36    5.10    0.22      27
    43       UC   0.383   0.410
    44       UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
    45       UA     100
             *
1                                     HEC-1 INPUT                                               PAGE  2
```

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

   46          KK     RSB STORAGE
   47          KO
   48          RS       1    STOR
   49          SV                 0.01    0.04    0.08    0.14    0.23    0.37    0.57    0.87
   50          SQ          70.28  89.53  100.29  109.59  118.30  126.85  135.06  143.06  150.06
   51          SE  1364.5 1367.00 1367.50 1368.00 1368.50 1369.00 1369.50 1370.00 1370.50 1371.00
   52          ST  1370.5   30.00    3.00    1.50
               *

   53          KK    RTBC   ROUTE
   54          RS       4    FLOW
   55          RC   0.025   0.030   0.025     983  0.0041 1368.00
   56          RX    0.00  183.30  385.40  413.00  439.40  456.20  496.70  674.30
   57          RY  1369.0 1366.05 1365.00 1363.00 1363.00 1365.00 1366.00 1368.00
               *

   58          KK    SUBC   BASIN
   59          BA   0.110
   60          LG    0.20    0.39    5.80    0.16      26
   61          UC   0.656   0.669
   62          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
   63          UA     100
               *

   64          KK     CPC COMBINE
   65          HC       3
               *

   66          KK   RSCPC STORAGE
   67          KO
   68          RS       1    STOR
   69          SV                 0.05    0.16    0.36    0.69    1.22    2.03    2.03
   70          SQ    5.05   16.07   32.06   51.49   71.33   87.21   97.27  106.96  115.99
   71          SE  1361.0 1361.50 1362.00 1362.50 1363.00 1363.50 1364.00 1364.50 1365.00
   72          ST  1364.5   30.00    3.00    1.50
               *

   73          KK    RTCD   ROUTE
   74          RS       5    FLOW
   75          RC   0.025   0.030   0.025    2153  0.0028 1364.53
   76          RX    0.00  170.00  431.90  450.10  465.30  490.90  660.00  790.00
   77          RY  1364.5 1361.00 1359.03 1357.00 1357.00 1360.01 1362.16 1365.11
               *

   78          KK    SUBD   BASIN
   79          BA   0.087
   80          LG    0.20    0.25    9.70    0.04      28
   81          UC   0.421   0.317
   82          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
   83          UA     100
               *
1                                        HEC-1 INPUT                                            PAGE  3

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

   84          KK     CPD COMBINE
   85          HC       2
               *

   86          KK   RSCPD STORAGE
   87          KO
   88          RS       1    STOR
   89          SV            0.33    0.69    1.26    2.18    3.54    5.52    8.31   12.21   12.21
   90          SQ          110.49  127.59  140.03  151.93  163.28  174.31  184.90  195.20  203.95
   91          SE  1353.5 1356.00 1356.50 1357.00 1357.50 1358.00 1358.50 1359.00 1359.50 1360.00
   92          ST  1359.5   30.00    3.00    1.50
               *

   93          KK    RTDE   ROUTE
   94          RS       2    FLOW
   95          RC   0.025   0.030   0.025     917  0.0033 1359.00
   96          RX    0.00  228.50  428.50  448.60  475.10  516.40  663.60  786.60
   97          RY  1359.0 1354.10 1353.99 1352.07 1352.00 1355.02 1356.01 1359.24
               *

   98          KK    SUBE   BASIN
   99          BA   0.042
  100          LG    0.20    0.25    9.70    0.04      29
  101          UC   0.256   0.159
  102          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
  103          UA     100
               *

  104          KK     CPE COMBINE
  105          HC       2
               *

  106          KK   RSCPE STORAGE
  107          KO
  108          RS       1    STOR
  109          SV            0.01    0.09    0.28    0.61    1.17    1.50
  110          SQ    5.05   20.72   45.32   76.51  109.89  140.01  200.00
```

```
      SE  1350.5 1351.00 1351.50 1352.00 1352.50 1353.00 1354.50
      ST  1353.0   30.00    3.00    1.50
       *

      KK    RTEF   ROUTE
      RS       6    FLOW
      RC   0.025   0.030   0.025    1474  0.0020 1355.00
      RX    0.00  207.90  430.20  453.10  465.10  495.80  690.60  787.10
      RY  1355.0 1350.84 1350.00 1348.00 1348.01 1350.89 1352.99 1355.31
       *

      KK    SUBF   BASIN
      BA   0.072
      LG    0.20    0.25    9.70    0.04      27
      UC   0.349   0.227
      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
      UA     100
       *
1                                   HEC-1 INPUT                                                 PAGE  4

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

      KK     CPF COMBINE
      HC       2
       *

      KK   RSCPF STORAGE
      KO
      RS       1    STOR
      SV            0.01    0.05    0.15    0.32    0.60    1.13    2.11    2.11    2.11
      SQ    0.32   27.15   54.17   88.14  125.55  158.05  172.28  175.83  181.88  270.00
      SE  1345.0 1346.00 1346.50 1347.00 1347.50 1348.00 1348.50 1349.00 1349.50 1351.00
      ST  1349.0   30.00    3.00    1.50
       *

      KK    RTFG   ROUTE
      RS       5    FLOW
      RC   0.025   0.030   0.025    1524  0.0013 1346.95
      RX    0.00   65.30  112.50  125.20  140.50  145.90  181.60  212.30
      RY  1347.0 1346.05 1342.35 1341.00 1341.00 1341.96 1344.69 1347.00
       *

      KK    SUBG   BASIN
      BA   0.075
      LG    0.21    0.27    8.80    0.05      21
      UC   0.424   0.347
      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
      UA     100
       *

      KK     CPG COMBINE
      HC       2
       *

      KK   RSCPG STORAGE
      KO
      RS       1    STOR
      SV            0.02    0.09    0.25    0.54    1.07    1.83    2.84    4.10    5.61
      SQ           37.05   55.20   74.99   93.30  109.16  122.94  135.18  146.29  300.00
      SE  1339.0 1339.50 1340.00 1340.50 1341.00 1341.50 1342.00 1342.50 1343.00 1344.00
      ST  1343.0   30.00    3.00    1.50
       *

      KK   SUBH1   BASIN
      BA   0.082
      LG    0.23    0.37    6.60    0.12      14
      UC   0.616   0.637
      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
      UA     100
       *
1                                   HEC-1 INPUT                                                 PAGE  5

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

      KK  RTH1H2   ROUTE
      RS       9    FLOW
      RC   0.025   0.030   0.025    3034  0.0033 1369.97
      RX    0.00   51.80   87.60  104.30  142.40  153.20  157.20  268.10
      RY  1370.2 1369.00 1367.00 1365.00 1365.29 1367.00 1368.00 1369.97
       *

      KK   SUBH2   BASIN
      BA   0.048
      LG    0.21    0.25    9.70    0.04      25
      UC   0.602   0.769
      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
      UA     100
       *

      KK    CPH2 COMBINE
      HC       2
       *

      KK  RTH2H3   ROUTE
```

```
        173          RS       7    FLOW
        174          RC   0.025   0.030   0.025    2777  0.0029 1362.64
        175          RX    0.00   28.60   59.80   85.30  114.90  125.50  142.80  217.50
        176          RY  1362.6 1361.85 1361.00 1358.00 1358.00 1359.00 1361.53 1362.87
                     *

        177          KK   SUBH3   BASIN
        178          BA   0.046
        179          LG    0.19    0.25    9.70    0.04      32
        180          UC   0.584   0.709
        181          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
        182          UA     100
                     *

        183          KK    CPH3 COMBINE
        184          HC       2
                     *

        185          KK    RSH3 STORAGE
        186          KO
        187          RS       1    STOR
        188          SV            0.06    0.20    0.47    0.88    1.43    2.14    3.05    4.23    5.72
        189          SQ    0.98   36.15   55.83   74.70   85.18   92.15   98.84  105.30  111.45  117.37
        190          SE  1352.5 1354.00 1354.50 1355.00 1355.50 1356.00 1356.50 1357.00 1357.50 1358.00
        191          ST  1357.5   30.00    3.00    1.50
                     *

        192          KK   RTH3I   ROUTE
        193          RS       3    FLOW
        194          RC   0.025   0.030   0.025    1270  0.0024 1356.00
        195          RX    0.00   76.00  134.60  150.20  203.70  218.20  250.50  328.70
        196          RY  1356.7 1354.44 1353.00 1351.00 1351.00 1353.00 1354.40 1356.00
                     *
1                                        HEC-1 INPUT                                                  PAGE  6

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


        197          KK    SUBI   BASIN
        198          BA   0.027
        199          LG    0.15    0.25    9.70    0.04      50
        200          UC   0.346   0.385
        201          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
        202          UA     100
                     *

        203          KK     CPI COMBINE
        204          HC       2
                     *

        205          KK     RSI STORAGE
        206          KO
        207          RS       1    STOR
        208          SV            0.47    0.78    1.32    2.13    3.09    4.23    5.60    7.30    7.30
        209          SQ           74.21   88.73   98.68  108.35  117.31  125.92  134.24  142.29  149.41
        210          SE  1347.5 1350.00 1350.50 1351.00 1351.50 1352.00 1352.50 1353.00 1353.50 1354.00
        211          ST  1353.5   30.00    3.00    1.50
                     *

        212          KK    RTIM   ROUTE
        213          RS       3    FLOW
        214          RC   0.025   0.030   0.025    1224  0.0033 1350.85
        215          RX    0.00   60.40  133.50  145.70  185.70  204.40  214.00  264.50
        216          RY  1351.0 1349.32 1348.00 1346.00 1346.00 1348.66 1350.00 1350.85
                     *

        217          KK    SUBJ   BASIN
        218          BA   0.161
        219          LG    0.25    0.25    9.70    0.04       5
        220          UC   0.681   0.561
        221          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
        222          UA     100
                     *

        223          KK    RTJK   ROUTE
        224          RS      13    FLOW
        225          RC   0.025   0.030   0.025    4767  0.0029 1360.96
        226          RX    0.00   58.90   85.30  127.40  140.70  146.20  152.30  156.60
        227          RY  1361.0 1360.25 1359.86 1359.02 1359.00 1360.14 1361.63 1362.00
                     *

        228          KK    SUBK   BASIN
        229          BA   0.183
        230          LG    0.25    0.27    8.80    0.05       5
        231          UC   0.769   0.710
        232          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
        233          UA     100
                     *
1                                        HEC-1 INPUT                                                  PAGE  7

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


        234          KK     CPK COMBINE
        235          HC       2
                     *
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 236          KK    RTKL   ROUTE
 237          RS       1    FLOW
 238          RC   0.025   0.030   0.025     450  0.0044 1358.75
 239          RX    0.00   10.30   21.50   33.70   49.10   62.30   71.10   92.80
 240          RY  1359.0 1358.15 1356.46 1354.00 1354.00 1356.75 1358.02 1358.75
              *

 241          KK    SUBL   BASIN
 242          BA   0.064
 243          LG    0.25    0.29    8.40    0.06       5
 244          UC   0.374   0.257
 245          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 246          UA     100
              *

 247          KK     CPL COMBINE
 248          HC       2
              *

 249          KK    RTLM   ROUTE
 250          RS       6    FLOW
 251          RC   0.025   0.030   0.025    2667  0.0030 1356.26
 252          RX    0.00    8.80   37.10   61.70   87.20  114.30  136.50  172.70
 253          RY  1356.3 1356.03 1353.00 1351.00 1351.00 1353.70 1356.00 1356.61
              *

 254          KK    SUBM   BASIN
 255          BA   0.137
 256          LG    0.23    0.30    8.00    0.07      12
 257          UC   0.579   0.455
 258          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 259          UA     100
              *

 260          KK     CPM COMBINE
 261          HC       3
              *

 262          KK   RSCPM STORAGE
 263          KO
 264          RS       1    STOR
 265          SV                            0.02    0.10    0.40    1.19    2.94
 266          SQ            4.54   14.00   43.47   82.13  114.53  139.46  410.00
 267          SE  1342.0 1342.50 1343.00 1344.00 1345.00 1346.00 1347.00 1348.50
 268          ST  1347.5   30.00    3.00    1.50
              *
1                                    HEC-1 INPUT                                         PAGE  8

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


 269          KK    SUBN   BASIN
 270          BA   0.350
 271          LG    0.25    0.30    8.00    0.07       5
 272          UC   1.012   0.949
 273          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 274          UA     100
              *

 275          KK     RSN STORAGE
 276          KO
 277          RS       1    STOR
 278          SV            0.30    0.81    2.25    5.00    8.95   14.25   21.10
 279          SQ            1.58    6.06   13.86   24.44   35.90   49.22   70.00
 280          SE  1364.5 1365.00 1365.50 1366.00 1366.50 1367.00 1367.50 1368.50
 281          ST  1367.5   30.00    3.00    1.50
              *

 282          KK    SUBO   BASIN
 283          BA   0.218
 284          LG    0.25    0.36    6.80    0.11       5
 285          UC   0.656   0.444
 286          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 287          UA     100
              *

 288          KK    SUBP   BASIN
 289          BA   0.145
 290          LG    0.25    0.36    5.10    0.22       5
 291          UC   0.892   0.820
 292          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 293          UA     100
              *

 294          KK     CPO COMBINE
 295          HC       2
              *

 296          KK    CPN2 COMBINE
 297          HC       2
              *

 298          KK    CPM2 COMBINE
 299          HC       2
              *
```

```
300          KK     CPG2 COMBINE
301          HC        2
             *
302          ZZ
```

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	SUBA	57.	4.25	9.	2.	1.	0.06		
+	ROUTED TO	RSA	13.	5.08	9.	2.	1.	0.06		
+	ROUTED TO	RTAC	13.	5.58	9.	2.	1.	0.06		
+	HYDROGRAPH AT	SUBB	30.	4.17	4.	1.	0.	0.03		
+	ROUTED TO	RSB	70.	0.00	5.	1.	0.	0.03		
+	ROUTED TO	RTBC	29.	4.33	5.	1.	0.	0.03		
+	HYDROGRAPH AT	SUBC	87.	4.33	18.	5.	2.	0.11		
+	3 COMBINED AT	CPC	119.	4.33	30.	8.	3.	0.20		
+	ROUTED TO	RSCPC	97.	4.67	31.	9.	3.	0.20		
+	ROUTED TO	RTCD	96.	4.83	31.	9.	3.	0.20		
+	HYDROGRAPH AT	SUBD	132.	4.17	17.	4.	1.	0.09		
+	2 COMBINED AT	CPD	170.	4.33	47.	13.	4.	0.29		
+	ROUTED TO	RSCPD	144.	4.58	47.	13.	4.	0.29		
+	ROUTED TO	RTDE	144.	4.67	47.	13.	4.	0.29		
+	HYDROGRAPH AT	SUBE	89.	4.08	8.	2.	1.	0.04		
+	2 COMBINED AT	CPE	189.	4.17	55.	16.	5.	0.33		
+	ROUTED TO	RSCPE	195.	4.25	56.	16.	6.	0.33		
+	ROUTED TO	RTEF	179.	4.42	56.	16.	6.	0.33		
+	HYDROGRAPH AT	SUBF	129.	4.08	14.	4.	1.	0.07		
+	2 COMBINED AT	CPF	247.	4.33	69.	20.	7.	0.40		
+	ROUTED TO	RSCPF	269.	4.42	69.	20.	7.	0.40		
+	ROUTED TO	RTFG	228.	4.58	69.	20.	7.	0.40		
+	HYDROGRAPH AT	SUBG	106.	4.17	14.	4.	1.	0.08		
+	2 COMBINED AT	CPG	277.	4.58	83.	24.	8.	0.48		
+	ROUTED TO	RSCPG	263.	4.67	83.	24.	8.	0.48		
+	HYDROGRAPH AT	SUBH1	67.	4.25	13.	3.	1.	0.08		
+	ROUTED TO	RTH1H2	66.	4.58	13.	3.	1.	0.08		
	HYDROGRAPH AT									

+		SUBH2	42.	4.33	9.	2.	1.	0.05
+	2 COMBINED AT	CPH2	102.	4.58	22.	6.	2.	0.13
+	ROUTED TO	RTH2H3	98.	4.83	22.	6.	2.	0.13
+	HYDROGRAPH AT	SUBH3	43.	4.33	9.	2.	1.	0.05
+	2 COMBINED AT	CPH3	125.	4.75	31.	8.	3.	0.18
+	ROUTED TO	RSH3	94.	5.17	31.	8.	3.	0.18
+	ROUTED TO	RTH3I	94.	5.25	31.	8.	3.	0.18
+	HYDROGRAPH AT	SUBI	40.	4.17	6.	2.	1.	0.03
+	2 COMBINED AT	CPI	98.	5.17	37.	10.	3.	0.20
+	ROUTED TO	RSI	93.	5.50	37.	10.	3.	0.20
+	ROUTED TO	RTIM	93.	5.58	37.	10.	3.	0.20
+	HYDROGRAPH AT	SUBJ	158.	4.33	28.	7.	2.	0.16
+	ROUTED TO	RTJK	151.	4.75	28.	7.	2.	0.16
+	HYDROGRAPH AT	SUBK	148.	4.33	31.	8.	3.	0.18
+	2 COMBINED AT	CPK	270.	4.67	59.	15.	5.	0.34
+	ROUTED TO	RTKL	269.	4.67	59.	15.	5.	0.34
+	HYDROGRAPH AT	SUBL	100.	4.17	10.	3.	1.	0.06
+	2 COMBINED AT	CPL	290.	4.67	69.	17.	6.	0.41
+	ROUTED TO	RTLM	280.	4.83	69.	17.	6.	0.41
+	HYDROGRAPH AT	SUBM	151.	4.25	23.	6.	2.	0.14
+	3 COMBINED AT	CPM	410.	4.83	126.	32.	11.	0.75
+	ROUTED TO	RSCPM	407.	4.92	126.	32.	11.	0.75
+	HYDROGRAPH AT	SUBN	209.	4.50	55.	14.	5.	0.35
+	ROUTED TO	RSN	67.	5.83	44.	14.	5.	0.35
+	HYDROGRAPH AT	SUBO	213.	4.25	32.	8.	3.	0.22
+	HYDROGRAPH AT	SUBP	79.	4.42	18.	5.	2.	0.14
+	2 COMBINED AT	CPO	285.	4.33	50.	12.	4.	0.36
+	2 COMBINED AT	CPN2	286.	4.33	88.	26.	9.	0.71
+	2 COMBINED AT	CPM2	592.	4.50	204.	56.	19.	1.46
+	2 COMBINED AT	CPG2	779.	4.67	278.	77.	26.	1.94

```
1***************************************                    ***************************************
 *                                     *                    *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1) *                    *   U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN  1998              *                    *   HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1              *                    *        609 SECOND STREET            *
 *                                     *                    *     DAVIS, CALIFORNIA 95616         *
 *   RUN DATE  30AUG13  TIME  10:04:57 *                    *         (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        Phoenix-Mesa Gateway Airport Authority
       2         ID        10-0821.1006_EX_24HR - East Area Airport Master Drainage Plan
       3         ID        100 YEAR
       4         ID        24 Hour Storm
       5         ID        Unit Hydrograph: Clark
       6         ID        08/30/2013
       7         IT       5       0       0    1000
       8         IN      15
       9         IO       5
                 *DIAGRAM
                 *
      10         JD   3.506  0.0001
      11         PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
      12         PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
      13         PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
      14         PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
      15         PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
      16         PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
      17         PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
      18         PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
      19         PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
      20         PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
      21         JD   3.331    10.0
                 *

      22         KK    SUBA   BASIN
      23         BA   0.063
      24         LG    0.23    0.35    4.70    0.26      16
      25         UC   0.546   0.474
      26         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
      27         UA     100
                 *

      28         KK     RSA STORAGE
      29         KO
      30         RS       1    STOR
      31         SV            0.05    0.27    0.80    2.14    4.55    7.97    7.97
      32         SQ    2.80    6.37   10.20   11.88   12.57   13.29   13.99   14.63
      33         SE  1376.0 1376.50 1377.00 1377.50 1378.00 1378.50 1379.00 1379.50
      34         ST  1379.0   30.00    3.00    1.50
                 *

      35         KK    RTAC   ROUTE
      36         RS      14    FLOW
      37         RC   0.025   0.030   0.025    2728  0.0059 1372.92
      38         RX    0.00   77.20  102.40  174.70  200.40  242.40  260.70  434.30
      39         RY  1373.8 1373.01 1372.00 1370.28 1370.29 1371.00 1372.00 1372.92
                 *

      40         KK    SUBB   BASIN
      41         BA   0.026
      42         LG    0.20    0.36    5.10    0.22      27
      43         UC   0.382   0.409
      44         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
      45         UA     100
                 *
1                                         HEC-1 INPUT                                              PAGE  2
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 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   46          KK     RSB STORAGE
   47          KO
   48          RS       1    STOR
   49          SV                  0.01    0.04    0.08    0.14    0.23    0.37    0.57    0.87
   50          SQ           70.28   89.53  100.29  109.59  118.30  126.85  135.06  143.06  150.06
   51          SE  1364.5 1367.00 1367.50 1368.00 1368.50 1369.00 1369.50 1370.00 1370.50 1371.00
   52          ST  1370.5   30.00    3.00    1.50
               *

   53          KK    RTBC   ROUTE
   54          RS       4    FLOW
   55          RC   0.025   0.030   0.025     983  0.0041 1368.00
   56          RX    0.00  183.30  385.40  413.00  439.40  456.20  496.70  674.30
   57          RY  1369.0 1366.05 1365.00 1363.00 1363.00 1365.00 1366.00 1368.00
               *

   58          KK    SUBC   BASIN
   59          BA   0.110
   60          LG    0.20    0.39    5.80    0.16      26
   61          UC   0.654   0.667
   62          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
   63          UA     100
               *

   64          KK     CPC COMBINE
   65          HC       3
               *

   66          KK   RSCPC STORAGE
   67          KO
   68          RS       1    STOR
   69          SV                  0.05    0.16    0.36    0.69    1.22    2.03    2.03
   70          SQ    5.05   16.07   32.06   51.49   71.33   87.21   97.27  106.96  115.99
   71          SE  1361.0 1361.50 1362.00 1362.50 1363.00 1363.50 1364.00 1364.50 1365.00
   72          ST  1364.5   30.00    3.00    1.50
               *

   73          KK    RTCD   ROUTE
   74          RS       5    FLOW
   75          RC   0.025   0.030   0.025    2153  0.0028 1364.53
   76          RX    0.00  170.00  431.90  450.10  465.30  490.90  660.00  790.00
   77          RY  1364.5 1361.00 1359.03 1357.00 1357.00 1360.01 1362.16 1365.11
               *

   78          KK    SUBD   BASIN
   79          BA   0.087
   80          LG    0.20    0.25    9.70    0.04      28
   81          UC   0.426   0.321
   82          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
   83          UA     100
               *
1                                    HEC-1 INPUT                                                PAGE  3

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

   84          KK     CPD COMBINE
   85          HC       2
               *

   86          KK   RSCPD STORAGE
   87          KO
   88          RS       1    STOR
   89          SV            0.33    0.69    1.26    2.18    3.54    5.52    8.31   12.21   12.21
   90          SQ          110.49  127.59  140.03  151.93  163.28  174.31  184.90  195.20  203.95
   91          SE  1353.5 1356.00 1356.50 1357.00 1357.50 1358.00 1358.50 1359.00 1359.50 1360.00
   92          ST  1359.5   30.00    3.00    1.50
               *

   93          KK    RTDE   ROUTE
   94          RS       2    FLOW
   95          RC   0.025   0.030   0.025     917  0.0033 1359.00
   96          RX    0.00  228.50  428.50  448.60  475.10  516.40  663.60  786.60
   97          RY  1359.0 1354.10 1353.99 1352.07 1352.00 1355.02 1356.01 1359.24
               *

   98          KK    SUBE   BASIN
   99          BA   0.042
  100          LG    0.20    0.25    9.70    0.04      29
  101          UC   0.259   0.161
  102          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
  103          UA     100
               *

  104          KK     CPE COMBINE
  105          HC       2
               *

  106          KK   RSCPE STORAGE
  107          KO
  108          RS       1    STOR
  109          SV            0.01    0.09    0.28    0.61    1.17    1.50
  110          SQ    5.05   20.72   45.32   76.51  109.89  140.01  200.00
```

```
 111          SE  1350.5 1351.00 1351.50 1352.00 1352.50 1353.00 1354.50
 112          ST  1353.0   30.00    3.00    1.50
              *

 113          KK    RTEF   ROUTE
 114          RS       6    FLOW
 115          RC   0.025   0.030   0.025    1474  0.0020 1355.00
 116          RX    0.00  207.90  430.20  453.10  465.10  495.80  690.60  787.10
 117          RY  1355.0 1350.84 1350.00 1348.00 1348.01 1350.89 1352.99 1355.31
              *

 118          KK    SUBF   BASIN
 119          BA   0.072
 120          LG    0.20    0.25    9.70    0.04      27
 121          UC   0.353   0.230
 122          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 123          UA     100
              *
1                                         HEC-1 INPUT                                         PAGE  4

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


 124          KK     CPF COMBINE
 125          HC       2
              *

 126          KK   RSCPF STORAGE
 127          KO
 128          RS       1    STOR
 129          SV            0.01    0.05    0.15    0.32    0.60    1.13    2.11    2.11    2.11
 130          SQ    0.32   27.15   54.17   88.14  125.55  158.05  172.28  175.83  181.88  270.00
 131          SE  1345.0 1346.00 1346.50 1347.00 1347.50 1348.00 1348.50 1349.00 1349.50 1351.00
 132          ST  1349.0   30.00    3.00    1.50
              *

 133          KK    RTFG   ROUTE
 134          RS       5    FLOW
 135          RC   0.025   0.030   0.025    1524  0.0013 1346.95
 136          RX    0.00   65.30  112.50  125.20  140.50  145.90  181.60  212.30
 137          RY  1347.0 1346.05 1342.35 1341.00 1341.00 1341.96 1344.69 1347.00
              *

 138          KK    SUBG   BASIN
 139          BA   0.075
 140          LG    0.21    0.27    8.80    0.05      21
 141          UC   0.427   0.350
 142          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 143          UA     100
              *

 144          KK     CPG COMBINE
 145          HC       2
              *

 146          KK   RSCPG STORAGE
 147          KO
 148          RS       1    STOR
 149          SV            0.02    0.09    0.25    0.54    1.07    1.83    2.84    4.10    5.61
 150          SQ           37.05   55.20   74.99   93.30  109.16  122.94  135.18  146.29  300.00
 151          SE  1339.0 1339.50 1340.00 1340.50 1341.00 1341.50 1342.00 1342.50 1343.00 1344.00
 152          ST  1343.0   30.00    3.00    1.50
              *

 153          KK   SUBH1   BASIN
 154          BA   0.082
 155          LG    0.23    0.37    6.60    0.12      14
 156          UC   0.611   0.631
 157          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 158          UA     100
              *
1                                         HEC-1 INPUT                                         PAGE  5

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


 159          KK  RTH1H2   ROUTE
 160          RS       9    FLOW
 161          RC   0.025   0.030   0.025    3034  0.0033 1369.97
 162          RX    0.00   51.80   87.60  104.30  142.40  153.20  157.20  268.10
 163          RY  1370.2 1369.00 1367.00 1365.00 1365.29 1367.00 1368.00 1369.97
              *

 164          KK   SUBH2   BASIN
 165          BA   0.048
 166          LG    0.21    0.25    9.70    0.04      25
 167          UC   0.608   0.778
 168          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 169          UA     100
              *

 170          KK    CPH2 COMBINE
 171          HC       2
              *

 172          KK  RTH2H3   ROUTE
```

```
      173           RS       7    FLOW
      174           RC   0.025   0.030   0.025    2777  0.0029 1362.64
      175           RX    0.00   28.60   59.80   85.30  114.90  125.50  142.80  217.50
      176           RY  1362.6 1361.85 1361.00 1358.00 1358.00 1359.00 1361.53 1362.87
                    *

      177           KK   SUBH3   BASIN
      178           BA   0.046
      179           LG    0.19    0.25    9.70    0.04      32
      180           UC   0.592   0.719
      181           UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
      182           UA     100
                    *

      183           KK    CPH3 COMBINE
      184           HC       2
                    *

      185           KK    RSH3 STORAGE
      186           KO
      187           RS       1    STOR
      188           SV            0.06    0.20    0.47    0.88    1.43    2.14    3.05    4.23    5.72
      189           SQ    0.98   36.15   55.83   74.70   85.18   92.15   98.84  105.30  111.45  117.37
      190           SE  1352.5 1354.00 1354.50 1355.00 1355.50 1356.00 1356.50 1357.00 1357.50 1358.00
      191           ST  1357.5   30.00    3.00    1.50
                    *

      192           KK   RTH3I   ROUTE
      193           RS       3    FLOW
      194           RC   0.025   0.030   0.025    1270  0.0024 1356.00
      195           RX    0.00   76.00  134.60  150.20  203.70  218.20  250.50  328.70
      196           RY  1356.7 1354.44 1353.00 1351.00 1351.00 1353.00 1354.40 1356.00
                    *
1                                         HEC-1 INPUT                                        PAGE  6

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


      197           KK    SUBI   BASIN
      198           BA   0.027
      199           LG    0.15    0.25    9.70    0.04      50
      200           UC   0.352   0.393
      201           UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
      202           UA     100
                    *

      203           KK     CPI COMBINE
      204           HC       2
                    *

      205           KK     RSI STORAGE
      206           KO
      207           RS       1    STOR
      208           SV            0.47    0.78    1.32    2.13    3.09    4.23    5.60    7.30    7.30
      209           SQ           74.21   88.73   98.68  108.35  117.31  125.92  134.24  142.29  149.41
      210           SE  1347.5 1350.00 1350.50 1351.00 1351.50 1352.00 1352.50 1353.00 1353.50 1354.00
      211           ST  1353.5   30.00    3.00    1.50
                    *

      212           KK    RTIM   ROUTE
      213           RS       3    FLOW
      214           RC   0.025   0.030   0.025    1224  0.0033 1350.85
      215           RX    0.00   60.40  133.50  145.70  185.70  204.40  214.00  264.50
      216           RY  1351.0 1349.32 1348.00 1346.00 1346.00 1348.66 1350.00 1350.85
                    *

      217           KK    SUBJ   BASIN
      218           BA   0.161
      219           LG    0.25    0.25    9.70    0.04       5
      220           UC   0.682   0.562
      221           UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
      222           UA     100
                    *

      223           KK    RTJK   ROUTE
      224           RS      13    FLOW
      225           RC   0.025   0.030   0.025    4767  0.0029 1360.96
      226           RX    0.00   58.90   85.30  127.40  140.70  146.20  152.30  156.60
      227           RY  1361.0 1360.25 1359.86 1359.02 1359.00 1360.14 1361.63 1362.00
                    *

      228           KK    SUBK   BASIN
      229           BA   0.183
      230           LG    0.25    0.27    8.80    0.05       5
      231           UC   0.770   0.711
      232           UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
      233           UA     100
                    *
1                                         HEC-1 INPUT                                        PAGE  7

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


      234           KK     CPK COMBINE
      235           HC       2
                    *
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 236           KK    RTKL    ROUTE
 237           RS       1     FLOW
 238           RC   0.025    0.030    0.025      450   0.0044  1358.75
 239           RX    0.00    10.30    21.50    33.70    49.10    62.30    71.10    92.80
 240           RY  1359.0  1358.15  1356.46  1354.00  1354.00  1356.75  1358.02  1358.75
               *

 241           KK    SUBL    BASIN
 242           BA   0.064
 243           LG    0.25     0.29     8.40     0.06        5
 244           UC   0.373    0.257
 245           UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 246           UA     100
               *

 247           KK     CPL  COMBINE
 248           HC       2
               *

 249           KK    RTLM    ROUTE
 250           RS       6     FLOW
 251           RC   0.025    0.030    0.025     2667   0.0030  1356.26
 252           RX    0.00     8.80    37.10    61.70    87.20   114.30   136.50   172.70
 253           RY  1356.3  1356.03  1353.00  1351.00  1351.00  1353.70  1356.00  1356.61
               *

 254           KK    SUBM    BASIN
 255           BA   0.137
 256           LG    0.23     0.30     8.00     0.07       12
 257           UC   0.579    0.455
 258           UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 259           UA     100
               *

 260           KK     CPM  COMBINE
 261           HC       3
               *

 262           KK   RSCPM  STORAGE
 263           KO
 264           RS       1     STOR
 265           SV                               0.02     0.10     0.40     1.19     2.94
 266           SQ             4.54    14.00    43.47    82.13   114.53   139.46   410.00
 267           SE  1342.0  1342.50  1343.00  1344.00  1345.00  1346.00  1347.00  1348.50
 268           ST  1347.5    30.00     3.00     1.50
               *
1                                            HEC-1 INPUT                                             PAGE  8

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

 269           KK    SUBN    BASIN
 270           BA   0.350
 271           LG    0.25     0.30     8.00     0.07        5
 272           UC   1.007    0.943
 273           UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 274           UA     100
               *

 275           KK     RSN  STORAGE
 276           KO
 277           RS       1     STOR
 278           SV             0.30     0.81     2.25     5.00     8.95    14.25    21.10
 279           SQ             1.58     6.06    13.86    24.44    35.90    49.22    70.00
 280           SE  1364.5  1365.00  1365.50  1366.00  1366.50  1367.00  1367.50  1368.50
 281           ST  1367.5    30.00     3.00     1.50
               *

 282           KK    SUBO    BASIN
 283           BA   0.218
 284           LG    0.25     0.36     6.80     0.11        5
 285           UC   0.646    0.436
 286           UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 287           UA     100
               *

 288           KK    SUBP    BASIN
 289           BA   0.145
 290           LG    0.25     0.36     5.10     0.22        5
 291           UC   0.872    0.800
 292           UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 293           UA     100
               *

 294           KK     CPO  COMBINE
 295           HC       2
               *

 296           KK    CPN2  COMBINE
 297           HC       2
               *

 298           KK    CPM2  COMBINE
 299           HC       2
               *
```

```
300          KK    CPG2 COMBINE
301          HC       2
             *
302          ZZ
```

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	SUBA	49.	12.25	8.	2.	1.	0.06		
+	ROUTED TO	RSA	12.	13.08	8.	3.	1.	0.06		
+	ROUTED TO	RTAC	12.	13.50	8.	3.	1.	0.06		
+	HYDROGRAPH AT	SUBB	25.	12.17	4.	1.	0.	0.03		
+	ROUTED TO	RSB	70.	0.00	4.	1.	0.	0.03		
+	ROUTED TO	RTBC	24.	12.25	4.	1.	0.	0.03		
+	HYDROGRAPH AT	SUBC	74.	12.33	16.	5.	2.	0.11		
+	3 COMBINED AT	CPC	101.	12.33	28.	9.	3.	0.20		
+	ROUTED TO	RSCPC	89.	12.58	28.	10.	4.	0.20		
+	ROUTED TO	RTCD	88.	12.75	28.	10.	4.	0.20		
+	HYDROGRAPH AT	SUBD	109.	12.17	17.	5.	2.	0.09		
+	2 COMBINED AT	CPD	146.	12.33	44.	15.	5.	0.29		
+	ROUTED TO	RSCPD	133.	12.67	44.	15.	5.	0.29		
+	ROUTED TO	RTDE	133.	12.67	44.	15.	5.	0.29		
+	HYDROGRAPH AT	SUBE	74.	12.08	8.	2.	1.	0.04		
+	2 COMBINED AT	CPE	165.	12.17	52.	17.	6.	0.33		
+	ROUTED TO	RSCPE	153.	12.33	52.	18.	7.	0.33		
+	ROUTED TO	RTEF	151.	12.58	52.	18.	7.	0.33		
+	HYDROGRAPH AT	SUBF	107.	12.08	14.	4.	1.	0.07		
+	2 COMBINED AT	CPF	203.	12.25	66.	21.	8.	0.40		
+	ROUTED TO	RSCPF	174.	12.67	66.	21.	8.	0.40		
+	ROUTED TO	RTFG	174.	12.83	66.	21.	8.	0.40		
+	HYDROGRAPH AT	SUBG	89.	12.17	13.	4.	1.	0.08		
+	2 COMBINED AT	CPG	236.	12.33	78.	25.	9.	0.48		
+	ROUTED TO	RSCPG	205.	12.75	78.	25.	9.	0.48		
+	HYDROGRAPH AT	SUBH1	58.	12.25	11.	3.	1.	0.08		
+	ROUTED TO	RTH1H2	55.	12.58	11.	3.	1.	0.08		

+	HYDROGRAPH AT	SUBH2	35.	12.33	9.	3.	1.	0.05
+	2 COMBINED AT	CPH2	86.	12.58	20.	6.	2.	0.13
+	ROUTED TO	RTH2H3	83.	12.83	20.	6.	2.	0.13
+	HYDROGRAPH AT	SUBH3	36.	12.33	9.	3.	1.	0.05
+	2 COMBINED AT	CPH3	106.	12.83	29.	8.	3.	0.18
+	ROUTED TO	RSH3	88.	13.08	29.	8.	3.	0.18
+	ROUTED TO	RTH3I	87.	13.25	29.	8.	3.	0.18
+	HYDROGRAPH AT	SUBI	33.	12.17	6.	2.	1.	0.03
+	2 COMBINED AT	CPI	93.	13.17	34.	10.	4.	0.20
+	ROUTED TO	RSI	90.	13.42	34.	10.	3.	0.20
+	ROUTED TO	RTIM	89.	13.50	34.	10.	3.	0.20
+	HYDROGRAPH AT	SUBJ	134.	12.33	27.	7.	2.	0.16
+	ROUTED TO	RTJK	128.	12.75	27.	7.	2.	0.16
+	HYDROGRAPH AT	SUBK	126.	12.33	29.	7.	2.	0.18
+	2 COMBINED AT	CPK	230.	12.67	55.	14.	5.	0.34
+	ROUTED TO	RTKL	230.	12.75	55.	14.	5.	0.34
+	HYDROGRAPH AT	SUBL	85.	12.17	10.	3.	1.	0.06
+	2 COMBINED AT	CPL	248.	12.67	65.	17.	6.	0.41
+	ROUTED TO	RTLM	244.	12.92	65.	17.	6.	0.41
+	HYDROGRAPH AT	SUBM	128.	12.25	21.	6.	2.	0.14
+	3 COMBINED AT	CPM	367.	12.92	119.	32.	11.	0.75
+	ROUTED TO	RSCPM	365.	12.92	119.	32.	11.	0.75
+	HYDROGRAPH AT	SUBN	180.	12.50	50.	13.	4.	0.35
+	ROUTED TO	RSN	52.	14.00	40.	13.	4.	0.35
+	HYDROGRAPH AT	SUBO	185.	12.25	28.	7.	2.	0.22
+	HYDROGRAPH AT	SUBP	70.	12.42	16.	4.	1.	0.14
+	2 COMBINED AT	CPO	247.	12.33	43.	11.	4.	0.36
+	2 COMBINED AT	CPN2	264.	12.33	80.	24.	8.	0.71
+	2 COMBINED AT	CPM2	578.	12.50	199.	56.	19.	1.46
+	2 COMBINED AT	CPG2	734.	12.67	275.	81.	28.	1.94

```
1***************************************                                               ***************************************
 *                                     *                                               *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                               *   U.S. ARMY CORPS OF ENGINEERS       *
 *             JUN   1998               *                                               *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.1                *                                               *        609 SECOND STREET             *
 *                                     *                                               *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   04SEP13  TIME  11:12:16  *                                               *         (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        Phoenix-Mesa Gateway Airport Authority
             2          ID        10-0821.1006_PR_24HR - East Area Airport Master Drainage Plan
             3          ID        100 YEAR
             4          ID        24 Hour Storm
             5          ID        Unit Hydrograph: Clark
             6          ID        Storm: Multiple
             7          ID        09/04/2013
             8          IT       5       0       0    2000
             9          IN      15
            10          IO       5
                        *DIAGRAM
                        *
            11          JD   3.506  0.0001
            12          PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
            13          PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
            14          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
            15          PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
            16          PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
            17          PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
            18          PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
            19          PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
            20          PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
            21          PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
            22          JD   3.331    10.0
                        *

            23          KK    SUBA   BASIN
            24          BA   0.063
            25          LG    0.23    0.35    4.70    0.26      16
            26          UC   0.546   0.474
            27          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
            28          UA     100
                        *

            29          KK     RSA STORAGE
            30          KO
            31          RS       1    STOR
            32          SV            0.05    0.27    0.80    2.14    4.55    7.97    7.97
            33          SQ    2.80    6.37   10.20   11.88   12.57   13.29   13.99   14.63
            34          SE  1376.0 1376.50 1377.00 1377.50 1378.00 1378.50 1379.00 1379.50
            35          ST  1379.0   30.00    3.00    1.50
                        *

            36          KK    RTAC   ROUTE
            37          RS      14    FLOW
            38          RC   0.025   0.030   0.025    2728  0.0059 1372.92
            39          RX    0.00   77.20  102.40  174.70  200.40  242.40  260.70  434.30
            40          RY  1373.8 1373.01 1372.00 1370.28 1370.29 1371.00 1372.00 1372.92
                        *
1                                            HEC-1 INPUT                                                    PAGE  2

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


            41          KK    SUBB   BASIN
            42          BA   0.026
            43          LG    0.20    0.36    5.10    0.22      27
            44          UC   0.382   0.409
```

```
 45        UA       0      5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 46        UA     100
           *

 47        KK     RSB STORAGE
 48        KO
 49        RS       1     STOR
 50        SV                     0.01    0.04    0.08    0.14    0.23    0.37    0.57    0.87
 51        SQ            70.28   89.53  100.29  109.59  118.30  126.85  135.06  143.06  150.06
 52        SE  1364.5  1367.00 1367.50 1368.00 1368.50 1369.00 1369.50 1370.00 1370.50 1371.00
 53        ST  1370.5    30.00    3.00    1.50
           *

 54        KK    RTBC    ROUTE
 55        RS       4     FLOW
 56        RC   0.025    0.030   0.025     983  0.0041 1368.00
 57        RX    0.00   183.30  385.40  413.00  439.40  456.20  496.70  674.30
 58        RY  1369.0  1366.05 1365.00 1363.00 1363.00 1365.00 1366.00 1368.00
           *

 59        KK    SUBC    BASIN
 60        BA   0.110
 61        LG    0.20     0.39    5.80    0.16      26
 62        UC   0.654    0.667
 63        UA       0      5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 64        UA     100
           *

 65        KK     CPC COMBINE
 66        HC       3
           *

 67        KK   RSCPC STORAGE
 68        KO
 69        RS       1     STOR
 70        SV                     0.05    0.16    0.36    0.69    1.22    2.03    2.03
 71        SQ    5.05    16.07   32.06   51.49   71.33   87.21   97.27  106.96  115.99
 72        SE  1361.0  1361.50 1362.00 1362.50 1363.00 1363.50 1364.00 1364.50 1365.00
 73        ST  1364.5    30.00    3.00    1.50
           *

 74        KK    RTCD    ROUTE
 75        RS       5     FLOW
 76        RC   0.025    0.030   0.025    2153  0.0028 1364.53
 77        RX    0.00   170.00  431.90  450.10  465.30  490.90  660.00  790.00
 78        RY  1364.5  1361.00 1359.03 1357.00 1357.00 1360.01 1362.16 1365.11
           *
1                                  HEC-1 INPUT                                           PAGE  3

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


 79        KK    SUBD    BASIN
 80        BA   0.087
 81        LG    0.20     0.25    9.70    0.04      28
 82        UC   0.426    0.321
 83        UA       0      5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 84        UA     100
           *

 85        KK     CPD COMBINE
 86        HC       2
           *

 87        KK   RSCPD STORAGE
 88        KO
 89        RS       1     STOR
 90        SV             0.33    0.69    1.26    2.18    3.54    5.52    8.31   12.21   12.21
 91        SQ           110.49  127.59  140.03  151.93  163.28  174.31  184.90  195.20  203.95
 92        SE  1353.5  1356.00 1356.50 1357.00 1357.50 1358.00 1358.50 1359.00 1359.50 1360.00
 93        ST  1359.5    30.00    3.00    1.50
           *

 94        KK    RTDE    ROUTE
 95        RS       2     FLOW
 96        RC   0.025    0.030   0.025     917  0.0033 1359.00
 97        RX    0.00   228.50  428.50  448.60  475.10  516.40  663.60  786.60
 98        RY  1359.0  1354.10 1353.99 1352.07 1352.00 1355.02 1356.01 1359.24
           *

 99        KK    SUBE    BASIN
100        BA   0.042
101        LG    0.20     0.25    9.70    0.04      29
102        UC   0.259    0.161
103        UA       0      5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
104        UA     100
           *

105        KK     CPE COMBINE
106        HC       2
           *

107        KK   RSCPE STORAGE
108        KO
109        RS       1     STOR
110        SV             0.01    0.09    0.28    0.61    1.17    1.50
```

```
 111          SQ    5.05   20.72   45.32   76.51  109.89  140.01  157.58
 112          SE  1350.5 1351.00 1351.50 1352.00 1352.50 1353.00 1354.50
 113          ST  1353.0   30.00    3.00    1.50
              *
1                                     HEC-1 INPUT                                       PAGE  4

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


 114          KK    RTEF   ROUTE
 115          RS       6    FLOW
 116          RC   0.025   0.030   0.025    1474  0.0020 1355.00
 117          RX    0.00  207.90  430.20  453.10  465.10  495.80  690.60  787.10
 118          RY  1355.0 1350.84 1350.00 1348.00 1348.01 1350.89 1352.99 1355.31
              *

 119          KK    SUBF   BASIN
 120          BA   0.072
 121          LG    0.20    0.25    9.70    0.04      27
 122          UC   0.353   0.230
 123          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 124          UA     100
              *

 125          KK     CPF COMBINE
 126          HC       2
              *

 127          KK   RSCPF STORAGE
 128          KO
 129          RS       1    STOR
 130          SV            0.01    0.05    0.15    0.32    0.60    1.13    2.11    2.11    2.11
 131          SQ    0.32   27.15   54.17   88.14  125.55  158.05  172.28  175.83  181.88  187.90
 132          SE  1345.0 1346.00 1346.50 1347.00 1347.50 1348.00 1348.50 1349.00 1349.50 1351.00
 133          ST  1349.0   30.00    3.00    1.50
              *

 134          KK    RTFG   ROUTE
 135          RS       5    FLOW
 136          RC   0.025   0.030   0.025    1524  0.0013 1346.95
 137          RX    0.00   65.30  112.50  125.20  140.50  145.90  181.60  212.30
 138          RY  1347.0 1346.05 1342.35 1341.00 1341.00 1341.96 1344.69 1347.00
              *

 139          KK    SUBG   BASIN
 140          BA   0.075
 141          LG    0.21    0.27    8.80    0.05      21
 142          UC   0.427   0.350
 143          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 144          UA     100
              *

 145          KK     CPG COMBINE
 146          HC       2
              *

 147          KK   RSCPG STORAGE
 148          KO
 149          RS       1    STOR
 150          SV            0.02    0.09    0.25    0.54    1.07    1.83    2.84    4.10    5.61
 151          SQ           37.05   55.20   74.99   93.30  109.16  122.94  135.18  146.29  200.00
 152          SE  1339.0 1339.50 1340.00 1340.50 1341.00 1341.50 1342.00 1342.50 1343.00 1344.00
 153          ST  1343.0   30.00    3.00    1.50
              *
1                                     HEC-1 INPUT                                       PAGE  5

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


 154          KK   SUBH1   BASIN
 155          BA   0.082
 156          LG    0.20    0.37    6.60    0.12      30
 157          UC   0.572   0.586
 158          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 159          UA     100
              *

 160          KK  RTH1H2   ROUTE
 161          RS       9    FLOW
 162          RC   0.025   0.030   0.025    3034  0.0033 1369.97
 163          RX    0.00   51.80   87.60  104.30  142.40  153.20  157.20  268.10
 164          RY  1370.2 1369.00 1367.00 1365.00 1365.29 1367.00 1368.00 1369.97
              *

 165          KK   SUBH2   BASIN
 166          BA   0.048
 167          LG    0.17    0.25    9.70    0.04      42
 168          UC   0.574   0.729
 169          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 170          UA     100
              *

 171          KK    CPH2 COMBINE
 172          HC       2
              *
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```
 173          KK  RTH2H3   ROUTE
 174          RS       7    FLOW
 175          RC   0.025   0.030   0.025    2777  0.0029 1362.64
 176          RX    0.00   28.60   59.80   85.30  114.90  125.50  142.80  217.50
 177          RY  1362.6 1361.85 1361.00 1358.00 1358.00 1359.00 1361.53 1362.87
              *

 178          KK   SUBH3   BASIN
 179          BA   0.046
 180          LG    0.19    0.25    9.70    0.04      30
 181          UC   0.598   0.728
 182          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 183          UA     100
              *

 184          KK    CPH3 COMBINE
 185          HC       2
              *

 186          KK    RSH3 STORAGE
 187          KO
 188          RS       1    STOR
 189          SV            0.06    0.20    0.47    0.88    1.43    2.14    3.05    4.23    5.72
 190          SQ    0.98   36.15   55.83   74.70   85.18   92.15   98.84  105.30  111.45  117.37
 191          SE  1352.5 1354.00 1354.50 1355.00 1355.50 1356.00 1356.50 1357.00 1357.50 1358.00
 192          ST  1357.5   30.00    3.00    1.50
              *
1                                        HEC-1 INPUT                                        PAGE  6

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

 193          KK   RTH3I   ROUTE
 194          RS       3    FLOW
 195          RC   0.025   0.030   0.025    1270  0.0024 1356.00
 196          RX    0.00   76.00  134.60  150.20  203.70  218.20  250.50  328.70
 197          RY  1356.7 1354.44 1353.00 1351.00 1351.00 1353.00 1354.40 1356.00
              *

 198          KK    SUBI   BASIN
 199          BA   0.027
 200          LG    0.15    0.25    9.70    0.04      50
 201          UC   0.349   0.389
 202          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 203          UA     100
              *

 204          KK     CPI COMBINE
 205          HC       2
              *

 206          KK     RSI STORAGE
 207          KO
 208          RS       1    STOR
 209          SV            0.47    0.78    1.32    2.13    3.09    4.23    5.60    7.30    7.30
 210          SQ           74.21   88.73   98.68  108.35  117.31  125.92  134.24  142.29  149.41
 211          SE  1347.5 1350.00 1350.50 1351.00 1351.50 1352.00 1352.50 1353.00 1353.50 1354.00
 212          ST  1353.5   30.00    3.00    1.50
              *

 213          KK    RTIM   ROUTE
 214          RS       3    FLOW
 215          RC   0.025   0.030   0.025    1224  0.0033 1350.85
 216          RX    0.00   60.40  133.50  145.70  185.70  204.40  214.00  264.50
 217          RY  1351.0 1349.32 1348.00 1346.00 1346.00 1348.66 1350.00 1350.85
              *

 218          KK    SUBJ   BASIN
 219          BA   0.161
 220          LG    0.10    0.25    9.70    0.04      71
 221          UC   0.534   0.428
 222          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 223          UA     100
              *

 224          KK    RTJK   ROUTE
 225          RS      13    FLOW
 226          RC   0.025   0.030   0.025    4767  0.0029 1360.96
 227          RX    0.00   58.90   85.30  127.40  140.70  146.20  152.30  156.60
 228          RY  1361.0 1360.25 1359.86 1359.02 1359.00 1360.14 1361.63 1362.00
              *
1                                        HEC-1 INPUT                                        PAGE  7

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

 229          KK    SUBK   BASIN
 230          BA   0.183
 231          LG    0.07    0.27    8.80    0.05      86
 232          UC   0.551   0.491
 233          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 234          UA     100
              *

 235          KK     CPK COMBINE
 236          HC       2
```

```
                 *

   237           KK   RTKL   ROUTE
   238           RS      1    FLOW
   239           RC  0.025   0.030   0.025     450  0.0044 1358.75
   240           RX   0.00   10.30   21.50   33.70   49.10   62.30   71.10   92.80
   241           RY 1359.0 1358.15 1356.46 1354.00 1354.00 1356.75 1358.02 1358.75
                 *

   242           KK   SUBL   BASIN
   243           BA  0.064
   244           LG   0.07    0.25    8.40    0.06      85
   245           UC  0.264   0.175
   246           UA      0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
   247           UA    100
                 *

   248           KK    CPL COMBINE
   249           HC      2
                 *

   250           KK   RTLM   ROUTE
   251           RS      6    FLOW
   252           RC  0.025   0.030   0.025    2667  0.0030 1356.26
   253           RX   0.00    8.80   37.10   61.70   87.20  114.30  136.50  172.70
   254           RY 1356.3 1356.03 1353.00 1351.00 1351.00 1353.70 1356.00 1356.61
                 *

   255           KK   SUBM   BASIN
   256           BA  0.137
   257           LG   0.17    0.26    8.00    0.07      37
   258           UC  0.527   0.410
   259           UA      0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
   260           UA    100
                 *

   261           KK    CPM COMBINE
   262           HC      3
                 *
1                                            HEC-1 INPUT                                                PAGE  8

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


   263           KK  RSCPM STORAGE
   264           KO
   265           RS      1    STOR
   266           SV                           0.02    0.10    0.40    1.19    2.94
   267           SQ            4.54   14.00   43.47   82.13  114.53  139.46  470.00
   268           SE 1342.0 1342.50 1343.00 1344.00 1345.00 1346.00 1347.00 1348.50
   269           ST 1347.5   30.00    3.00    1.50
                 *

   270           KK   SUBN   BASIN
   271           BA  0.350
   272           LG   0.06    0.26    8.00    0.07      89
   273           UC  0.701   0.631
   274           UA      0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
   275           UA    100
                 *

   276           KK    RSN STORAGE
   277           KO
   278           RS      1    STOR
   279           SV            0.30    0.81    2.25    5.00    8.95   14.25   21.10
   280           SQ            1.58    6.06   13.86   24.44   35.90   49.22  200.00
   281           SE 1364.5 1365.00 1365.50 1366.00 1366.50 1367.00 1367.50 1368.50
   282           ST 1367.5   30.00    3.00    1.50
                 *

   283           KK   SUBO   BASIN
   284           BA  0.218
   285           LG   0.10    0.19    6.80    0.19      70
   286           UC  0.463   0.301
   287           UA      0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
   288           UA    100
                 *

   289           KK   SUBP   BASIN
   290           BA  0.145
   291           LG   0.09    0.27    5.10    0.34      76
   292           UC  0.591   0.519
   293           UA      0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
   294           UA    100
                 *

   295           KK    CPO COMBINE
   296           HC      2
                 *

   297           KK   CPN2 COMBINE
   298           HC      2
                 *
1                                            HEC-1 INPUT                                                PAGE  9

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

```
299          KK     CPM2 COMBINE
300          HC        2
             *

301          KK     CPG2 COMBINE
302          KO        1
303          HC        2
             *

304          ZZ
```

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	SUBA	49.	12.25	8.	2.	1.	0.06		
+	ROUTED TO	RSA	12.	13.08	8.	3.	1.	0.06		
+	ROUTED TO	RTAC	12.	13.50	8.	3.	1.	0.06		
+	HYDROGRAPH AT	SUBB	25.	12.17	4.	1.	0.	0.03		
+	ROUTED TO	RSB	70.	0.00	4.	1.	0.	0.03		
+	ROUTED TO	RTBC	24.	12.25	4.	1.	0.	0.03		
+	HYDROGRAPH AT	SUBC	74.	12.33	16.	5.	2.	0.11		
+	3 COMBINED AT	CPC	101.	12.33	28.	9.	3.	0.20		
+	ROUTED TO	RSCPC	89.	12.58	28.	10.	4.	0.20		
+	ROUTED TO	RTCD	88.	12.75	28.	10.	4.	0.20		
+	HYDROGRAPH AT	SUBD	109.	12.17	17.	5.	2.	0.09		
+	2 COMBINED AT	CPD	146.	12.33	44.	15.	5.	0.29		
+	ROUTED TO	RSCPD	133.	12.67	44.	15.	5.	0.29		
+	ROUTED TO	RTDE	133.	12.67	44.	15.	5.	0.29		
+	HYDROGRAPH AT	SUBE	74.	12.08	8.	2.	1.	0.04		
+	2 COMBINED AT	CPE	165.	12.17	52.	17.	6.	0.33		
+	ROUTED TO	RSCPE	152.	12.33	52.	18.	7.	0.33		
+	ROUTED TO	RTEF	151.	12.58	52.	18.	7.	0.33		
+	HYDROGRAPH AT	SUBF	107.	12.08	14.	4.	1.	0.07		
+	2 COMBINED AT	CPF	203.	12.25	66.	21.	8.	0.40		
+	ROUTED TO	RSCPF	174.	12.67	66.	21.	8.	0.40		
+	ROUTED TO	RTFG	174.	12.83	66.	21.	8.	0.40		
+	HYDROGRAPH AT	SUBG	89.	12.17	13.	4.	1.	0.08		
+	2 COMBINED AT	CPG	236.	12.33	78.	25.	9.	0.48		
+	ROUTED TO	RSCPG	199.	12.83	78.	25.	9.	0.48		

+	HYDROGRAPH AT	SUBH1	65.	12.25	13.	4.	1.	0.08
+	ROUTED TO	RTH1H2	63.	12.58	13.	4.	1.	0.08
+	HYDROGRAPH AT	SUBH2	38.	12.25	10.	3.	1.	0.05
+	2 COMBINED AT	CPH2	95.	12.58	23.	7.	2.	0.13
+	ROUTED TO	RTH2H3	92.	12.83	23.	7.	2.	0.13
+	HYDROGRAPH AT	SUBH3	35.	12.33	9.	3.	1.	0.05
+	2 COMBINED AT	CPH3	117.	12.75	32.	9.	3.	0.18
+	ROUTED TO	RSH3	91.	13.08	32.	9.	3.	0.18
+	ROUTED TO	RTH3I	91.	13.25	32.	9.	3.	0.18
+	HYDROGRAPH AT	SUBI	33.	12.17	6.	2.	1.	0.03
+	2 COMBINED AT	CPI	97.	13.17	37.	11.	4.	0.20
+	ROUTED TO	RSI	92.	13.50	37.	11.	4.	0.20
+	ROUTED TO	RTIM	92.	13.58	37.	11.	4.	0.20
+	HYDROGRAPH AT	SUBJ	177.	12.25	37.	12.	4.	0.16
+	ROUTED TO	RTJK	166.	12.67	37.	12.	4.	0.16
+	HYDROGRAPH AT	SUBK	190.	12.25	45.	15.	5.	0.18
+	2 COMBINED AT	CPK	299.	12.58	81.	27.	9.	0.34
+	ROUTED TO	RTKL	298.	12.58	81.	27.	9.	0.34
+	HYDROGRAPH AT	SUBL	113.	12.08	16.	5.	2.	0.06
+	2 COMBINED AT	CPL	322.	12.58	97.	33.	11.	0.41
+	ROUTED TO	RTLM	318.	12.75	97.	33.	11.	0.41
+	HYDROGRAPH AT	SUBM	145.	12.25	26.	8.	3.	0.14
+	3 COMBINED AT	CPM	470.	12.42	158.	51.	17.	0.75
+	ROUTED TO	RSCPM	469.	12.42	158.	51.	17.	0.75
+	HYDROGRAPH AT	SUBN	304.	12.33	85.	29.	10.	0.35
+	ROUTED TO	RSN	186.	12.92	72.	29.	10.	0.35
+	HYDROGRAPH AT	SUBO	277.	12.17	47.	16.	5.	0.22
+	HYDROGRAPH AT	SUBP	135.	12.25	32.	11.	4.	0.14
+	2 COMBINED AT	CPO	402.	12.17	78.	26.	9.	0.36
+	2 COMBINED AT	CPN2	436.	12.17	146.	55.	19.	0.71
+	2 COMBINED AT	CPM2	851.	12.33	302.	106.	36.	1.46
+	2 COMBINED AT	CPG2	990.	12.75	380.	131.	45.	1.94

ALTERNATIVES ANALYSIS

- **Cost Estimates**
- **Hydrology**
  - *Drainage Area Map*
  - *DDMSW Output*

Option 1A - Storm Drain Cost

Description	Element ID	Design Flow (cfs)	Design Storm	Length of Pipe (ft.)	Pipe Slope (ft/ft)	Material/ Barrel Type	Pipe n-value	Number of Barrels	Design Culvert Diameter (IN.) Max Dia. = 48"	Velocity (Full Flow) ft/s	Manning's Q_{full} (cfs)	Total Pipe Unit Cost ($/ft)	Total Trench Drain Cost *(32' drain/swale @ $2K/LF)	Total Pipe Cost	Total Lateral Cost	Catchbasins	Manholes	Miscellaneous Removals	Construction Sub Total	Mobilization	Total Construction Cost ($)	Overall Contingency Cost ($)	Construction Admin ($)	Testing/Insurance ($)	PM/CM ($)	Engineering Cost ($)	Total Cost including Contingency and Engineering
Onsite Roadway Only																											
SUBR	DTSDR	6.1	10-YR	392	0.0030	RCP	0.013	1	18	3.26	5.75	$ 72	$0	$28,224	$8,467	$10,455	$6,535	$2,352	$56,032	$2,802	$58,834	$17,650	$4,707	$588	$2,353	$5,883	$90,016
SUBS	DTSDS	14.0	10-YR	856	0.0030	RCP	0.013	1	18	3.26	5.75	$ 72	$0	$61,632	$18,490	$22,830	$14,270	$5,136	$122,357	$6,118	$128,474	$38,542	$10,278	$1,285	$5,139	$12,847	$196,566
SUBT	DTSDT	28.0	10-YR	1584	0.0030	RCP	0.013	1	30	4.58	22.47	$ 120	$0	$190,080	$34,214	$42,245	$26,405	$9,504	$302,449	$15,122	$317,571	$95,271	$25,406	$3,176	$12,703	$31,757	$485,884
SUBV	DTSDV	19.1	10-YR	1255	0.0030	RCP	0.013	1	24	3.94	12.39	$ 96	$0	$120,480	$27,108	$33,471	$20,921	$7,530	$209,510	$10,475	$219,985	$65,996	$17,599	$2,200	$8,799	$21,999	$336,577
SUBW	DTSDW	26.0	10-YR	416	0.0030	RCP	0.013	1	30	4.58	22.47	$ 120	$0	$49,920	$8,986	$11,095	$6,935	$2,496	$79,431	$3,972	$83,403	$25,021	$6,672	$834	$3,336	$8,340	$127,606
SUBX	DTSDX	14.7	10-YR	1578	0.0030	RCP	0.013	1	24	3.94	12.39	$ 96	$0	$151,488	$34,085	$42,085	$26,305	$9,468	$263,431	$13,172	$276,603	$82,981	$22,128	$2,766	$11,064	$27,660	$423,202
SUBU	DTSDU	13.9	10-YR	905	0.0030	RCP	0.013	1	24	3.94	12.39	$ 96	$0	$86,880	$19,548	$24,136	$15,086	$5,430	$151,081	$7,554	$158,635	$47,590	$12,691	$1,586	$6,345	$15,863	$242,711
SUBY	DTSDY	20.3	10-YR	767	0.0030	RCP	0.013	1	30	4.58	22.47	$ 120	$0	$92,040	$16,567	$20,456	$12,786	$4,602	$146,451	$7,323	$153,774	$46,132	$12,302	$1,538	$6,151	$15,377	$235,273
																											$2,137,837
Airport Apron Storm Drain																											
Sub K to CPL	CPL2B	181.0	10-YR	2496	0.0028	RCP	0.013	3	48	6.26	236.03	$ 192	$192,000	$1,437,696	$53,914	$66,568	$124,825	$14,976	$1,889,979	$94,499	$1,984,478	$595,343	$158,758	$19,845	$79,379	$198,448	$3,036,251
CPL to CPM	CPM2B	242.0	10-YR	2566	0.0028	RCP	0.013	3	48	6.26	236.03	$ 192	$192,000	$1,478,016	$55,426	$68,435	$128,326	$15,396	$1,937,598	$96,880	$2,034,478	$610,344	$162,758	$20,345	$81,379	$203,448	$3,112,752
CPM to CPO	CPSDKO	291.0	10-YR	1805	0.0028	RCP	0.013	4	48	6.26	314.71	$ 192	$0	$1,386,240	$38,988	$48,139	$120,357	$10,830	$1,604,555	$80,228	$1,684,782	$505,435	$134,783	$16,848	$67,391	$168,478	$2,577,717
																											$8,726,720
Gateway Blvd Storm Drain																											
Sub P	RTSDP	41.0	10-YR	2131	0.0028	RCP	0.013	1	48	6.26	78.68	$ 192	$0	$409,152	$46,030	$56,834	$35,524	$12,786	$560,325	$28,016	$588,341	$176,502	$47,067	$5,883	$23,534	$58,834	$900,162
Sub P to Sub Q	CPSDQ	62.0	10-YR	2696	0.0028	RCP	0.013	1	48	6.26	78.68	$ 192	$0	$517,632	$58,234	$71,902	$44,942	$16,176	$708,886	$35,444	$744,331	$223,299	$59,546	$7,443	$29,773	$74,433	$1,138,826
																											$2,038,988
																										TOTAL	**$12,903,545**

Option 1A - Tenant Lot Basin Cost

Description	Original Required Volume (ac-ft) Per 100Y-2H subbasin volume	Total Excavation Volume with freeboard (ac-ft)	Total Excavation Volume with freeboard (CY)	Required Top Area (ac.)	Excavation Cost ($/CY)	Proposed Land Use	Land Cost per ACRE ($)	Land Cost ($)	# of Drywells	Drywell Cost ($)	Total Construction Cost ($)	Overall Contingency Cost ($)	Construction Admin ($)	Testing/Insurance ($)	PM/CM ($)	Engineering Cost ($)	Total Cost including contingency and Engineering
					$5		0.5		0.2			30%	8%	1%	4%	10%	
SUBR	9.0	12.2	19,667	4.31	$98,334	OFFICE	$100,000	$431,155	15	$157,500	$686,989	$206,097	$54,959	$6,870	$27,480	$68,699	$1,051,093
SUBS	7.6	10.4	16,763	3.69	$83,813	OFFICE	$100,000	$368,622	13	$136,500	$588,936	$176,681	$47,115	$5,889	$23,557	$58,894	$901,071
SUBT	6.1	8.3	13,407	2.96	$67,034	HOTEL	$100,000	$296,361	10	$105,000	$468,396	$140,519	$37,472	$4,684	$18,736	$46,840	$716,646
SUBU	6.0	8.2	13,181	2.91	$65,905	HOTEL	$100,000	$291,498	10	$105,000	$462,403	$138,721	$36,992	$4,624	$18,496	$46,240	$707,476
SUBV	6.8	9.3	14,972	3.30	$74,859	OFFICE	$100,000	$330,060	11	$115,500	$520,419	$156,126	$41,634	$5,204	$20,817	$52,042	$796,241
SUBW	3.1	4.2	6,824	1.55	$34,122	OFFICE	$100,000	$154,621	5	$52,500	$241,243	$72,373	$19,299	$2,412	$9,650	$24,124	$369,102
SUBX	5.1	6.9	11,164	2.48	$55,822	OFFICE	$100,000	$248,072	9	$94,500	$398,394	$119,518	$31,871	$3,984	$15,936	$39,839	$609,542
SUBY	4.2	5.7	9,261	2.07	$46,303	OFFICE	$100,000	$207,078	7	$73,500	$326,881	$98,064	$26,150	$3,269	$13,075	$32,688	$500,128
SUBZ	4.9	6.7	10,761	2.39	$53,805	OFFICE	$100,000	$239,387	8	$84,000	$377,192	$113,158	$30,175	$3,772	$15,088	$37,719	$577,103

TOTAL **$6,228,404**

Option 1B - Tenant Lot Basin Cost

Description	Original Required Volume (ac-ft) Per 100Y-2H subbasin volume	Total Excavation Volume with freeboard (ac-ft)	Total Excavation Volume with freeboard (CY)	Required Top Area (ac.)	Excavation Cost ($/CY)	Proposed Land Use	Land Cost per ACRE ($)	Land Cost ($)	Drain Pipe Size (in)	Drain Pipe Cost/LF	Drain Cost ($)	Total Construction Cost ($)	Overall Contingency Cost ($)	Construction Admin ($)	Testing/Insurance ($)	PM/CM ($)	Engineering Cost ($)	Total Cost including contingency and Engineering
					$5						100		30%	8%	1%	4%	10%	
SUBR	9.0	12.2	19,667	4.31	$98,334	OFFICE	$100,000	$431,155	12	$48	$4,800	$534,289	$160,287	$42,743	$5,343	$21,372	$53,429	$817,462
SUBS	7.6	10.4	16,763	3.69	$83,813	OFFICE	$100,000	$368,622	12	$48	$4,800	$457,236	$137,171	$36,579	$4,572	$18,289	$45,724	$699,570
SUBT	6.1	8.3	13,407	2.96	$67,034	HOTEL	$100,000	$296,361	12	$48	$4,800	$368,196	$110,459	$29,456	$3,682	$14,728	$36,820	$563,340
SUBU	6.0	8.2	13,181	2.91	$65,905	HOTEL	$100,000	$291,498	12	$48	$4,800	$362,203	$108,661	$28,976	$3,622	$14,488	$36,220	$554,170
SUBV	6.8	9.3	14,972	3.30	$74,859	OFFICE	$100,000	$330,060	12	$48	$4,800	$409,719	$122,916	$32,778	$4,097	$16,389	$40,972	$626,870
SUBW	3.1	4.2	6,824	1.55	$34,122	OFFICE	$100,000	$154,621	12	$48	$4,800	$193,543	$58,063	$15,483	$1,935	$7,742	$19,354	$296,121
SUBX	5.1	6.9	11,164	2.48	$55,822	OFFICE	$100,000	$248,072	12	$48	$4,800	$308,694	$92,608	$24,695	$3,087	$12,348	$30,869	$472,301
SUBY	4.2	5.7	9,261	2.07	$46,303	OFFICE	$100,000	$207,078	12	$48	$4,800	$258,181	$77,454	$20,654	$2,582	$10,327	$25,818	$395,017
SUBZ	4.9	6.7	10,761	2.39	$53,805	OFFICE	$100,000	$239,387	12	$48	$4,800	$297,992	$89,398	$23,839	$2,980	$11,920	$29,799	$455,927

TOTAL **$4,880,780**

Option 1A/1B - Regional Basin Cost

HEC-1 Element ID	FLOW ENTERING BASIN (cfs)	Actual Ponding Elev	Basin Bottom Elevation	Total Depth	Ponding Depth	Freeboard	Ponded Storage Volume (ac-ft)	Basin Volume @ Top (ac-ft)	Total Basin Excavation Volume (CY)	Outflow Pipe (# of barrels)	Outflow Pipe Diameter (in.)	Pipe Length (ft)	Pipe Discharge @ Peak Stage
							@1353.97						
RSAA	652.0	1354.0	1347.0	8.0	7.0	1.0	25.8	34.9	56,361	2.0	48.0	95.0	285.0

HEC-1 Element ID	Excavation Unit Cost ($/cy)	Detention Basin Excavation Cost	Outlet Pipe Unit Cost ($/ft.)	Total Outlet system Cost	# Of Manholes	Manhole Unit Cost	Manhole Total Cost	No. of Headwalls	Unit Cost (Ea.)	Headwall Cost	Length of Fencing (ft)	Unit Cost ($/lf)	Fence Cost
	$5				400	$4,500			$10,000		5%		
RSAA	5.0	$281,807	$192	$36,480	1	$4,500	$4,500	2.0	$10,000	$20,000	2,171	4.0	$8,684

HEC-1 Element ID	Basin Top Area (ac)	Zoning	Land Cost per Sq. Ft. ($)	Total Land Acquisition Cost	Total Construction Cost	Overall Contingency Cost ($)	Construction Admin ($)	Testing/Insurance ($)	PM/CM ($)	Engineering Cost ($)	Total Cost including contingency and Engineering
						30%	8%	1%	4%	10%	
RSAA	6.13	Park	$50,000	$306,697	**$658,169**	$197,451	$52,653	$6,582	$26,327	$65,817	**$1,006,998**

Option 2A - Storm Drain Cost

Description	Element ID	Design Flow (cfs)	Design Storm	Length of Pipe (ft.)	Pipe Slope (ft/ft)	Material/ Barrel Type	Pipe n-value	Number of Barrels	Design Culvert Diameter (IN.) Max Dia. = 48"	Total Pipe Area (sq. ft.)	Velocity (Full Flow) ft/s	Manning's Q_{full} (cfs)	Total Pipe Unit Cost ($/ft)	Total Trench Drain Cost *(32' drain/swale @ $2K/LF)	Total Pipe Cost	Total Lateral Cost	Catchbasins	Manholes	Miscellaneous Removals	Construction Sub Total	Mobilization	Total Construction Cost ($)	Overall Contingency Cost ($)	Construction Admin ($)	Testing/Insurance ($)	PM/CM ($)	Engineering Cost ($)	Total Cost including Contingency and Engineering
Onsite Roadway Only																												
SUBR	DTSDR	6.1	10-YR	392	0.0030	RCP	0.013	1	18	1.77	3.26	5.75	$ 72	$0	$28,224	$8,467	$10,455	$6,535	$2,352	$56,032	$2,802	$58,834	$17,650	$4,707	$588	$2,353	$5,883	$90,016
SUBS	DTSDS	14.0	10-YR	856	0.0030	RCP	0.013	1	18	1.77	3.26	5.75	$ 72	$0	$61,632	$18,490	$22,830	$14,270	$5,136	$122,357	$6,118	$128,474	$38,542	$10,278	$1,285	$5,139	$12,847	$196,566
SUBT	DTSDT	28.0	10-YR	1584	0.0030	RCP	0.013	1	30	4.91	4.58	22.47	$ 120	$0	$190,080	$34,214	$42,245	$26,405	$9,504	$302,449	$15,122	$317,571	$95,271	$25,406	$3,176	$12,703	$31,757	$485,884
SUBV	DTSDV	19.1	10-YR	1255	0.0030	RCP	0.013	1	24	3.14	3.94	12.39	$ 96	$0	$120,480	$27,108	$33,471	$20,921	$7,530	$209,510	$10,475	$219,985	$65,996	$17,599	$2,200	$8,799	$21,999	$336,577
SUBW	DTSDW	26.0	10-YR	416	0.0030	RCP	0.013	1	30	4.91	4.58	22.47	$ 120	$0	$49,920	$8,986	$11,095	$6,935	$2,496	$79,431	$3,972	$83,403	$25,021	$6,672	$834	$3,336	$8,340	$127,606
SUBX	DTSDX	14.7	10-YR	1578	0.0030	RCP	0.013	1	24	3.14	3.94	12.39	$ 96	$0	$151,488	$34,085	$42,085	$26,305	$9,468	$263,431	$13,172	$276,603	$82,981	$22,128	$2,766	$11,064	$27,660	$423,202
SUBU	DTSDU	13.9	10-YR	905	0.0030	RCP	0.013	1	24	3.14	3.94	12.39	$ 96	$0	$86,880	$19,548	$24,136	$15,086	$5,430	$151,081	$7,554	$158,635	$47,590	$12,691	$1,586	$6,345	$15,863	$242,711
SUBY	DTSDY	20.3	10-YR	767	0.0030	RCP	0.013	1	30	4.91	4.58	22.47	$ 120	$0	$92,040	$16,567	$20,456	$12,786	$4,602	$146,451	$7,323	$153,774	$46,132	$12,302	$1,538	$6,151	$15,377	$235,273
																												$2,137,837
Airport Apron Storm Drain																												
Sub K to CPL	CPL2B	181.0	10-YR	2496	0.0028	RCP	0.013	3	48	37.70	6.26	236.03	$ 192	$192,000	$1,437,696	$53,914	$66,568	$124,825	$14,976	$1,889,979	$94,499	$1,984,478	$595,343	$158,758	$19,845	$79,379	$198,448	$3,036,251
CPL to CPM	CPM2B	242.0	10-YR	2566	0.0028	RCP	0.013	3	48	37.70	6.26	236.03	$ 192	$192,000	$1,478,016	$55,426	$68,435	$128,326	$15,396	$1,937,598	$96,880	$2,034,478	$610,344	$162,758	$20,345	$81,379	$203,448	$3,112,752
CPM to CPN	CPSDKO	291.0	10-YR	1805	0.0028	RCP	0.013	4	48	50.27	6.26	314.71	$ 192	$0	$1,386,240	$38,988	$48,139	$120,357	$10,830	$1,604,555	$80,228	$1,684,782	$505,435	$134,783	$16,848	$67,391	$168,478	$2,577,717
																												$8,726,720
Gateway Blvd Storm Drain																												
Sub P	RTSDP	41.0	10-YR	2131	0.0028	RCP	0.013	1	48	12.57	6.26	78.68	$ 192	$0	$409,152	$46,030	$56,834	$35,524	$12,786	$560,325	$28,016	$588,341	$176,502	$47,067	$5,883	$23,534	$58,834	$900,162
Sub P to Sub Q	CPSDQ	62.0	10-YR	2696	0.0028	RCP	0.013	1	48	12.57	6.26	78.68	$ 192	$0	$517,632	$58,234	$71,902	$44,942	$16,176	$708,886	$35,444	$744,331	$223,299	$59,546	$7,443	$29,773	$74,433	$1,138,826
																												$2,038,988
																											TOTAL	**$12,903,545**

Option 2A - Tenant Lot Basin Cost

Description	Original Required Volume (ac-ft) Per 100Y-2H subbasin volume	Total Excavation Volume with freeboard (ac-ft)	Total Excavation Volume with freeboard (CY)	Required Top Area (ac.)	Excavation Cost ($/CY)	Proposed Land Use	Land Cost per ACRE ($)	Land Cost ($)	Drain Pipe Size (in)	Drain Pipe Cost/LF	Drain Cost ($)	Total Construction Cost ($)	Overall Contingency Cost ($)	Construction Admin ($)	Testing/Insurance ($)	PM/CM ($)	Engineering Cost ($)	Total Cost including contingency and Engineering
					$5						100		30%	8%	1%	4%	10%	
SUBR	5.54	7.54	12,162	2.09	$60,809	OFFICE	$100,000	$209,465	12	$48	$4,800	$275,073	$82,522	$22,006	$2,751	$11,003	$27,507	$420,862
SUBS	4.72	6.42	10,358	1.80	$51,788	OFFICE	$100,000	$179,866	12	$48	$4,800	$236,455	$70,936	$18,916	$2,365	$9,458	$23,645	$361,776
SUBT	3.78	5.13	8,283	1.46	$41,416	HOTEL	$100,000	$145,663	12	$48	$4,800	$191,879	$57,564	$15,350	$1,919	$7,675	$19,188	$293,574
SUBU	3.71	5.05	8,148	1.43	$40,739	HOTEL	$100,000	$143,420	12	$48	$4,800	$188,960	$56,688	$15,117	$1,890	$7,558	$18,896	$289,108
SUBV	4.22	5.74	9,253	1.62	$46,264	OFFICE	$100,000	$161,676	12	$48	$4,800	$212,740	$63,822	$17,019	$2,127	$8,510	$21,274	$325,492
SUBW	1.92	2.62	4,220	0.78	$21,100	OFFICE	$100,000	$77,735	12	$48	$4,800	$103,635	$31,090	$8,291	$1,036	$4,145	$10,363	$158,561
SUBX	3.15	4.28	6,902	1.23	$34,508	OFFICE	$100,000	$122,748	12	$48	$4,800	$162,056	$48,617	$12,964	$1,621	$6,482	$16,206	$247,946
SUBY	2.61	3.55	5,728	1.03	$28,642	OFFICE	$100,000	$103,162	12	$48	$4,800	$136,604	$40,981	$10,928	$1,366	$5,464	$13,660	$209,004
SUBZ	3.03	4.13	6,655	1.186	$33,277	OFFICE	$100,000	$118,637	12	$48	$4,800	$156,714	$47,014	$12,537	$1,567	$6,269	$15,671	$239,772

TOTAL **$2,546,095**

Option 2A - Regional Basin Cost

HEC-1 Element ID	Basin Outfall Pipe flow	Spillway Elev	Actual Max Ponding Elev	Basin Bottom Elevation	Ponding Depth	Actual Ponding Depth	Freeboard to Spillway	Basin Volume @ Spillway (cu.ft.)	Ponded Storage Volume (ac-ft)	Basin Volume @ Spillway (ac-ft)	Total Basin Excavation Volume (cy)	Outflow Pipe (# of barrels)	Outflow Pipe Diameter (in.)	Pipe Length (ft)	Pipe Discharge @ Peak Stage	Excavation Unit Cost ($/cy)	Detention Basin Excavation Cost
									@1354.01							$5	
RSAA	286.0	1355.0	1354.0	1347.0	8.0	7.0	1.0	2,282,648	39.1	52.4	84,543	2.0	48.0	95.0	286.0	5.0	$422,713

HEC-1 Element ID	Outlet Pipe Unit Cost ($/ft.)	Total Outlet system Cost	Manhole Total Cost	Headwall Cost	Length of Fencing (ft)	Unit Cost ($/lf)	Fence Cost	Basin Top Area (ac)	Land Use Cost per Acre ($)	Total Land Acquisition Cost	Total Construction Cost	Overall Contingency Cost ($)	Construction Admin ($)	Testing/Insurance ($)	PM/CM ($)	Engineering Cost ($)	Total Cost including contingency and Engineering
					5%							30%	8%	1%	4%	10%	
RSAA	$192	$36,480	$4,500	$20,000	2,741	4.0	$10,964	9.78	$50,000	$488,845	**$983,501**	$295,050	$78,680	$9,835	$39,340	$98,350	**$1,504,757**

Option 2B - Storm Drain Cost

Description	Element ID	Design Flow (cfs) (10 Year, 6 Hour)	Design Storm	Length of Pipe (ft.)	Pipe Slope (ft/ft)	Material/ Barrel Type	Pipe n-value	Number of Barrels	Design Culvert Diameter (IN.) Max Dia. = 48"	Total Pipe Area (sq. ft.)	Velocity (Full Flow) ft/s	Manning's Q_{full} (cfs)	Total Pipe Unit Cost ($/ft)	Total Trench Drain Cost *(32' drain/swale @ $2K/LF)	Total Pipe Cost	Total Lateral Cost	Catchbasins	Manholes	Miscellaneous Removals	Construction Sub Total	Mobilization	Total Construction Cost ($)	Overall Contingency Cost ($)	Construction Admin ($)	Testing/Insurance ($)	PM/CM ($)	Engineering Cost ($)	Total Cost including Contingency and Engineering
Onsite Roadway Only																												
SUBR	RSR	33.0	10-YR	392	0.0030	RCP	0.013	1	36	7.07	5.17	36.53	$ 144	$0	$56,448	$8,467	$10,455	$6,535	$2,352	$84,256	$4,213	$88,469	$26,541	$7,078	$885	$3,539	$8,847	$135,358
SUBS	CPS	67.0	10-YR	856	0.0030	RCP	0.013	1	48	12.57	6.26	78.68	$ 192	$0	$164,352	$18,490	$22,830	$14,270	$5,136	$225,077	$11,254	$236,330	$70,899	$18,906	$2,363	$9,453	$23,633	$361,586
SUBT	CPT1	91.0	10-YR	1584	0.0030	RCP	0.013	3	36	21.21	5.17	109.60	$ 144	$0	$684,288	$34,214	$42,245	$79,216	$9,504	$849,468	$42,473	$891,941	$267,582	$71,355	$8,919	$35,678	$89,194	$1,364,670
SUBV	RSV	23.0	10-YR	1255	0.0030	RCP	0.013	1	36	7.07	5.17	36.53	$ 144	$0	$180,720	$27,108	$33,471	$20,921	$7,530	$269,750	$13,487	$283,237	$84,971	$22,659	$2,832	$11,329	$28,324	$433,353
SUBW	CPW	33.0	10-YR	416	0.0030	RCP	0.013	1	36	7.07	5.17	36.53	$ 144	$0	$59,904	$8,986	$11,095	$6,935	$2,496	$89,415	$4,471	$93,886	$28,166	$7,511	$939	$3,755	$9,389	$143,645
SUBX	RSX	25.0	10-YR	1578	0.0030	RCP	0.013	1	36	7.07	5.17	36.53	$ 144	$0	$227,232	$34,085	$42,085	$26,305	$9,468	$339,175	$16,959	$356,134	$106,840	$28,491	$3,561	$14,245	$35,613	$544,885
SUBU	RSU	25.0	10-YR	905	0.0030	RCP	0.013	1	36	7.07	5.17	36.53	$ 144	$0	$130,320	$19,548	$24,136	$15,086	$5,430	$194,521	$9,726	$204,247	$61,274	$16,340	$2,042	$8,170	$20,425	$312,498
SUBY	CPY	49.0	10-YR	767	0.0030	RCP	0.013	1	48	12.57	6.26	78.68	$ 192	$0	$147,264	$16,567	$20,456	$12,786	$4,602	$201,675	$10,084	$211,759	$63,528	$16,941	$2,118	$8,470	$21,176	$323,991
																												$3,619,985
Airport Apron Storm Drain																												
Sub K to CPL	CPL2B	181.0	10-YR	2496	0.0028	RCP	0.013	3	48	37.70	6.26	236.03	$ 192	$192,000	$1,437,696	$53,914	$66,568	$124,825	$14,976	$1,889,979	$94,499	$1,984,478	$595,343	$158,758	$19,845	$79,379	$198,448	$3,036,251
CPL to CPM	CPM2B	242.0	10-YR	2566	0.0028	RCP	0.013	3	48	37.70	6.26	236.03	$ 192	$192,000	$1,478,016	$55,426	$68,435	$128,326	$15,396	$1,937,598	$96,880	$2,034,478	$610,344	$162,758	$20,345	$81,379	$203,448	$3,112,752
CPM to CPN	CPSDKO	279.0	10-YR	1805	0.0028	RCP	0.013	4	48	50.27	6.26	314.71	$ 192	$0	$1,386,240	$38,988	$48,139	$120,357	$10,830	$1,604,555	$80,228	$1,684,782	$505,435	$134,783	$16,848	$67,391	$168,478	$2,577,717
																												$8,726,720
Gateway Blvd Storm Drain																												
Sub P	CPL1	119.0	10-YR	2131	0.0028	RCP	0.013	2	48	25.13	6.26	157.35	$ 192	$0	$818,304	$46,030	$56,834	$71,048	$12,786	$1,005,001	$50,250	$1,055,251	$316,575	$84,420	$10,553	$42,210	$105,525	$1,614,534
Sub P to Sub Q	CPQ	146.0	10-YR	2696	0.0028	RCP	0.013	2	48	25.13	6.26	157.35	$ 192	$0	$1,035,264	$58,234	$71,902	$89,885	$16,176	$1,271,461	$63,573	$1,335,034	$400,510	$106,803	$13,350	$53,401	$133,503	$2,042,601
																												$3,657,135

1-6'x4' CBC - 132 cfs

TOTAL CULVERT CONCRETE (CY)	*1,882*	$350	$658,573
TOTAL CULVERT STEEL (Lb)	*282,823*	$1	$282,823
			$941,397

TOTAL **$16,003,840**

Option 2B - Tenant Lot Basin Cost

Description	Original Required Volume (ac-ft) Per 100Y-2H subbasin volume	Total Excavation Volume with freeboard (ac-ft)	Total Excavation Volume with freeboard (CY)	Required Top Area (ac.)	Excavation Cost ($/CY)	Proposed Land Use	Land Cost per ACRE ($)	Land Cost ($)	Drain Pipe Size (in)	Drain Pipe Cost/LF	Drain Cost ($)	Total Construction Cost ($)	Overall Contingency Cost ($)	Construction Admin ($)	Testing/Insurance ($)	PM/CM ($)	Engineering Cost ($)	Total Cost including contingency and Engineering
					$5		2				100		30%	8%	1%	4%	10%	
SUBR	5.54	3.39	5,473	0.99	$27,364	OFFICE	$100,000	$98,870	36	$144	$14,400	$140,634	$42,190	$11,251	$1,406	$5,625	$14,063	$215,170
SUBS	4.72	2.57	4,143	0.76	$20,715	OFFICE	$100,000	$76,429	36	$144	$14,400	$111,544	$33,463	$8,924	$1,115	$4,462	$11,154	$170,663
SUBT	3.78	1.28	2,071	0.41	$10,354	HOTEL	$100,000	$40,707	30	$120	$12,000	$63,061	$18,918	$5,045	$631	$2,522	$6,306	$96,483
SUBU	3.71	1.52	2,444	0.47	$12,222	HOTEL	$100,000	$47,247	30	$120	$12,000	$71,469	$21,441	$5,718	$715	$2,859	$7,147	$109,348
SUBV	4.22	2.01	3,238	0.61	$16,192	OFFICE	$100,000	$60,974	30	$120	$12,000	$89,166	$26,750	$7,133	$892	$3,567	$8,917	$136,425
SUBW	1.92	0.65	1,055	0.22	$5,275	OFFICE	$100,000	$22,455	18	$72	$7,200	$34,930	$10,479	$2,794	$349	$1,397	$3,493	$53,443
SUBX	3.15	1.07	1,725	0.35	$8,627	OFFICE	$100,000	$34,564	30	$120	$12,000	$55,191	$16,557	$4,415	$552	$2,208	$5,519	$84,442
SUBY	2.61	0.78	1,260	0.26	$6,301	OFFICE	$100,000	$26,198	30	$120	$12,000	$44,499	$13,350	$3,560	$445	$1,780	$4,450	$68,083
SUBZ	3.03	1.03	1,664	0.335	$8,319	OFFICE	$100,000	$33,470	30	$120	$12,000	$53,789	$16,137	$4,303	$538	$2,152	$5,379	$82,297

TOTAL **$1,016,355**

Option 2B - Regional Basin Cost

HEC-1 Element ID	Basin Outfall Pipe flow	Basin Bottom Elevation	Total Depth	Ponding Depth	Freeboard to Spillway	Basin Volume @ Spillway (cu.ft.)	Ponded Storage Volume (ac-ft)	Basin Volume @ Top (ac-ft)	Total Basin Excavation Volume (cy)	Outflow Pipe (# of barrels)	Outflow Pipe Diameter (in.)	Pipe Length (ft)	Pipe Discharge @ Peak Stage	Excavation Unit Cost ($/cy)	Detention Basin Excavation Cost	Outlet Pipe Unit Cost ($/ft.)	Total Outlet system Cost	Manhole Total Cost	Headwall Cost	Length of Fencing (ft)	Unit Cost ($/lf)	Fence Cost	Basin Top Area (ac)	Land Use Cost per Acre ($)	Total Land Acquisition Cost	Total Construction Cost	Overall Contingency Cost ($)	Construction Admin ($)	Testing/Insurance ($)	PM/CM ($)	Engineering Cost ($)	Total Cost including contingency and Engineering
														$5						5%							30%	8%	1%	4%	10%	
RSAA	343.0	1347.0	8.0	7.0	1.0	2,516,783	42.7	57.8	93,251	3.0	48.0	95.0	389.0	5.0	$466,253	$192	$54,720	$4,500	$20,000	2,894	4.0	$11,576	10.90	$50,000	$545,000	**$1,102,049**	$330,615	$88,164	$11,020	$44,082	$110,205	**$1,686,135**

Option 3 - Storm Drain Cost

Description	Element ID	Design Flow (cfs)	Design Storm	Length of Pipe (ft.)	Pipe Slope (ft/ft)	Material/ Barrel Type	Pipe n-value	Number of Barrels	Design Culvert Diameter (IN.) Max Dia. = 48"	Total Pipe Area (sq. ft.)	Velocity (Full Flow) ft/s	Manning's Q_{full} (cfs)	Total Pipe Unit Cost ($/ft)	Total Trench Drain Cost *(32' drain/swale @ $2K/LF)	Total Pipe Cost	Total Lateral Cost	Catchbasins	Manholes	Miscellaneous Removals	Construction Sub Total	Mobilization	Total Construction Cost ($)	Overall Contingency Cost ($)	Construction Admin ($)	Testing/Insurance ($)	PM/CM ($)	Engineering Cost ($)	Total Cost including Contingency and Engineering
Onsite Roadway Only																												
	DTSDR	6.1	10-YR	392	0.0030	RCP	0.013	1	18	1.77	3.26	5.75	$ 72	$0	$28,224	$8,467	$10,455	$6,535	$2,352	$56,032	$2,802	$58,834	$17,650	$4,707	$588	$2,353	$5,883	**$90,016**
	DTSDS	14.0	10-YR	856	0.0030	RCP	0.013	1	18	1.77	3.26	5.75	$ 72	$0	$61,632	$18,490	$22,830	$14,270	$5,136	$122,357	$6,118	$128,474	$38,542	$10,278	$1,285	$5,139	$12,847	**$196,566**
	DTSDT	28.0	10-YR	1584	0.0030	RCP	0.013	1	30	4.91	4.58	22.47	$ 120	$0	$190,080	$34,214	$42,245	$26,405	$9,504	$302,449	$15,122	$317,571	$95,271	$25,406	$3,176	$12,703	$31,757	**$485,884**
	DTSDV	19.1	10-YR	1255	0.0030	RCP	0.013	1	24	3.14	3.94	12.39	$ 96	$0	$120,480	$27,108	$33,471	$20,921	$7,530	$209,510	$10,475	$219,985	$65,996	$17,599	$2,200	$8,799	$21,999	**$336,577**
	DTSDW	26.0	10-YR	416	0.0030	RCP	0.013	1	30	4.91	4.58	22.47	$ 120	$0	$49,920	$8,986	$11,095	$6,935	$2,496	$79,431	$3,972	$83,403	$25,021	$6,672	$834	$3,336	$8,340	**$127,606**
	DTSDX	14.7	10-YR	1578	0.0030	RCP	0.013	1	24	3.14	3.94	12.39	$ 96	$0	$151,488	$34,085	$42,085	$26,305	$9,468	$263,431	$13,172	$276,603	$82,981	$22,128	$2,766	$11,064	$27,660	**$423,202**
	DTSDU	13.9	10-YR	905	0.0030	RCP	0.013	1	24	3.14	3.94	12.39	$ 96	$0	$86,880	$19,548	$24,136	$15,086	$5,430	$151,081	$7,554	$158,635	$47,590	$12,691	$1,586	$6,345	$15,863	**$242,711**
	DTSDY	20.3	10-YR	767	0.0030	RCP	0.013	1	30	4.91	4.58	22.47	$ 120	$0	$92,040	$16,567	$20,456	$12,786	$4,602	$146,451	$7,323	$153,774	$46,132	$12,302	$1,538	$6,151	$15,377	**$235,273**
																												$2,137,837
Airport Apron Storm Drain																												
Sub K to CPL	CPL2B	181.0	10-YR	2496	0.0028	RCP	0.013	3	48	37.70	6.26	236.03	$ 192	$192,000	$1,437,696	$53,914	$66,568	$124,825	$14,976	$1,889,979	$94,499	$1,984,478	$595,343	$158,758	$19,845	$79,379	$198,448	**$3,036,251**
CPL to CPM	CPM2B	242.0	10-YR	2566	0.0028	RCP	0.013	3	48	37.70	6.26	236.03	$ 192	$192,000	$1,478,016	$55,426	$68,435	$128,326	$15,396	$1,937,598	$96,880	$2,034,478	$610,344	$162,758	$20,345	$81,379	$203,448	**$3,112,752**
CPM to CPN	CPSDKO	291.0	10-YR	1805	0.0028	RCP	0.013	4	48	50.27	6.26	314.71	$ 192	$0	$1,386,240	$38,988	$48,139	$120,357	$10,830	$1,604,555	$80,228	$1,684,782	$505,435	$134,783	$16,848	$67,391	$168,478	**$2,577,717**
																												$8,726,720
Gateway Blvd Storm Drain																												
Sub P	RTSDP	41.0	10-YR	2131	0.0028	RCP	0.013	1	48	12.57	6.26	78.68	$ 192	$0	$409,152	$46,030	$56,834	$35,524	$12,786	$560,325	$28,016	$588,341	$176,502	$47,067	$5,883	$23,534	$58,834	**$900,162**
Sub P to Sub Q	CPSDQ	116.0	10-YR	2696	0.0028	RCP	0.013	2	48	25.13	6.26	157.35	$ 192	$0	$1,035,264	$58,234	$71,902	$89,885	$16,176	$1,271,461	$63,573	$1,335,034	$400,510	$106,803	$13,350	$53,401	$133,503	**$2,042,601**
																												$2,942,764

TOTAL **$13,807,321**

Option 3 - Tenant Lot Basin Cost

Description	Original Required Volume (ac-ft) Per 100Y-2H subbasin volume	Total Excavation Volume with freeboard (ac-ft)	Total Excavation Volume with freeboard (CY)	Required Top Area (ac.)	Excavation Cost ($/CY)	Proposed Land Use	Land Cost per ACRE ($)	Land Cost ($)	Drain Pipe Size (in)	Drain Pipe Cost/LF	Drain Cost ($)	Total Construction Cost ($)	Overall Contingency Cost ($)	Construction Admin ($)	Testing/Insurance ($)	PM/CM ($)	Engineering Cost ($)	Total Cost including contingency and Engineering
					$5						100		30%	8%	1%	4%	10%	
SUBR	1.75	2.38	3,835	0.71	$19,176	OFFICE	$100,000	$71,196	12	$48	$4,800	$95,172	$28,551	$7,614	$952	$3,807	$9,517	$145,613
SUBS	1.49	2.02	3,266	0.61	$16,331	OFFICE	$100,000	$61,479	12	$48	$4,800	$82,610	$24,783	$6,609	$826	$3,304	$8,261	$126,394
SUBT	1.19	1.62	2,612	0.50	$13,060	HOTEL	$100,000	$50,165	12	$48	$4,800	$68,025	$20,408	$5,442	$680	$2,721	$6,803	$104,079
SUBU	1.17	1.59	2,569	0.49	$12,847	HOTEL	$100,000	$49,435	12	$48	$4,800	$67,083	$20,125	$5,367	$671	$2,683	$6,708	$102,636
SUBV	1.33	1.81	2,918	0.55	$14,589	OFFICE	$100,000	$55,476	12	$48	$4,800	$74,865	$22,460	$5,989	$749	$2,995	$7,487	$114,544
SUBW	0.61	0.82	1,331	0.27	$6,654	OFFICE	$100,000	$27,491	12	$48	$4,800	$38,945	$11,683	$3,116	$389	$1,558	$3,894	$59,586
SUBX	0.99	1.35	2,176	0.43	$10,882	OFFICE	$100,000	$42,556	12	$48	$4,800	$58,238	$17,472	$4,659	$582	$2,330	$5,824	$89,105
SUBY	0.82	1.12	1,806	0.36	$9,032	OFFICE	$100,000	$36,032	12	$48	$4,800	$49,864	$14,959	$3,989	$499	$1,995	$4,986	$76,292
SUBZ	0.96	1.30	2,099	0.412	$10,494	OFFICE	$100,000	$41,195	12	$48	$4,800	$56,489	$16,947	$4,519	$565	$2,260	$5,649	$86,428

TOTAL **$904,675**

Option 3 - Regional Basin Cost

HEC-1 Element ID	Basin Outfall Pipe flow	Basin Bottom Elevation	Ponding Depth	Total Depth	Freeboard	Basin Volume @ Spillway (cu.ft.)	Ponded Storage Volume (ac-ft)	Basin Volume @ Spillway (ac-ft)	Basin Volume @ Top (ac-ft)	Total Basin Excavation Volume (cy)	Outflow Pipe (# of barrels)	Outflow Pipe Diameter (in.)	Pipe Length (ft)	Pipe Discharge @ Peak Stage	Excavation Unit Cost ($/cy)	Detention Basin Excavation Cost	Outlet Pipe Unit Cost ($/ft.)	Total Outlet system Cost	Manhole Total Cost	Headwall Cost	Length of Fencing (ft)	Unit Cost ($/lf)	Fence Cost	Basin Top Area (ac)	Land Use Cost per Acre ($)	Total Land Acquisition Cost	Total Construction Cost	Overall Contingency Cost ($)	Construction Admin ($)	Testing/Insurance ($)	PM/CM ($)	Engineering Cost ($)	Total Cost including contingency and Engineering
							@1356.78								$5						5%							30%	8%	1%	4%	10%	
RSAA	362.0	1347.0	8.0	9.8	1.8	2,986,766	50.9	68.6	68.6	110,621	5.0	36.0	95.0	362.0	5.0	$553,105	$144	$68,400	$4,500	$20,000	3,163	4.0	$12,652	13.02	$50,000	$650,956	**$1,309,612**	$392,884	$104,769	$13,096	$52,384	$130,961	**$2,003,707**

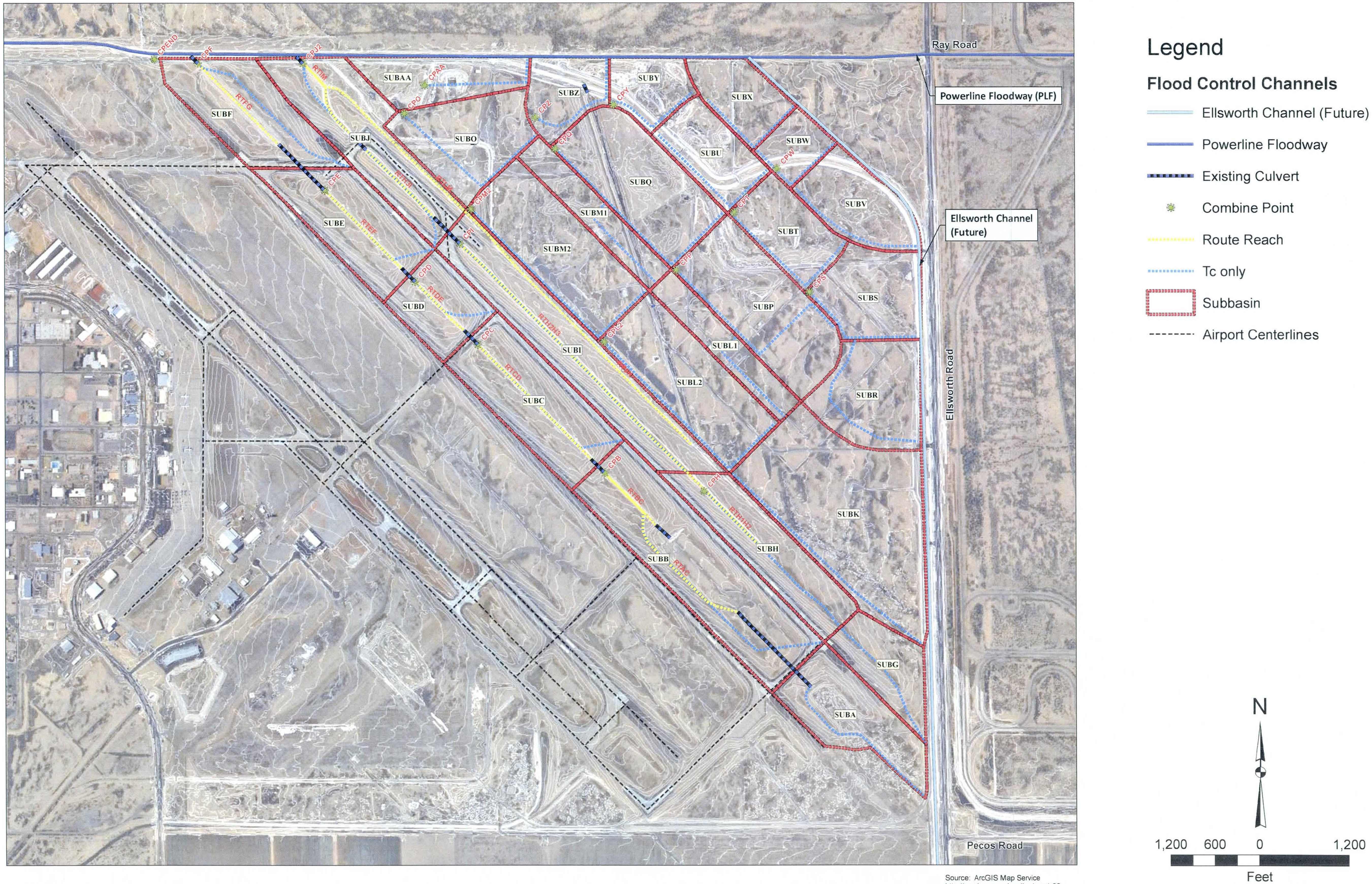
Ellsworth Channel Relocations

Ellsworth Reach	Cross Sectional Area (Sq. Ft.)	Length of Channel (ft.)	Top Width of Channel (ft.)	Excavation Volume (Cu. Yds.)	Excavation Unit Cost ($/cy)	Channel Excavation Cost	Length of Fencing (ft) (One side only)	Unit Cost ($/lf)	Fence Cost	Channel Top Area (Ac.) (with 10% buffer)	Channel Top Area (Sq. Ft.)	Mulch Volume (CY) (5" Thick, D50=1-1/4")	Mulch Unit Cost ($30/cy)	Mulch Cost ($)	Total Drops Structures (EA.)	Drop Structure Unit Cost ($/Ea.)	Drop Structure Cost ($)	Landscaping Unit Cost ($/SF)	Landscaping Cost ($)	Land Unit Cost ($/ac)	Total Construction Cost	Overall Contingency Cost ($)	Construction Admin ($)	Testing/Insurance ($)	PM/CM ($)	Engineering Cost ($)	Total Cost including contingency and Engineering
					$5		1	$4					$30			$10,000.00		$0.50		$0		30%	8%	1%	4%	10%	
1	1,265	2,235	155	104,714	$5	$523,569	2,235	4.0	$8,940	8.75	381,068	5,881	$30	$176,420	3	$10,000	$30,000	$0.50	$190,534	$100,000	**$929,463**	$278,839	$74,357.07	$9,294.63	$37,178.53	$92,946.33	**$1,422,079**

Alternatives Analysis

Hydrology

Exhibit & Results



Source: ArcGIS Map Service http://services.arcgisonline/com/v92 I3_Imagery_Prime_World_2D

Project Location

Maricopa
Pinal

East Area Airport Master Drainage Plan
Phoenix-Mesa Gateway Airport
Alternatives Analysis Hydrology

Dibble Engineering

Drainage Area Map

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
SUBA	0.063	0.44	22.7	22.7	Urban	0.055	0.09	0.35	4.70	0.26	16	**Tc (Hrs)**	0.784 *	0.727 *	0.675*	0.612*	0.575*	0.544*
												Vel (f/s)	0.82	0.89	0.96	1.05	1.12	1.19
												R (Hrs)	0.708	0.651	0.600	0.538	0.502	0.472
SUBL1	0.037	0.28	18.0	18.0	Urban	0.031	0.05	0.29	8.40	0.06	95	**Tc (Hrs)**	0.397	0.377	0.358	0.337	0.323	0.310
												Vel (f/s)	1.03	1.09	1.15	1.22	1.27	1.32
												R (Hrs)	0.314	0.297	0.280	0.261	0.249	0.238
SUBAA	0.045	0.32	6.3	6.3	Urban	0.059	0.20	0.21	6.40	0.14	7	**Tc (Hrs)**	0.992 *	0.910 *	0.840*	0.765*	0.721*	0.683*
												Vel (f/s)	0.47	0.52	0.56	0.61	0.65	0.69
												R (Hrs)	0.863	0.785	0.718	0.647	0.605	0.571
SUBL2	0.087	0.62	16.1	16.1	Urban	0.029	0.05	0.25	9.70	0.04	95	**Tc (Hrs)**	0.590 *	0.561 *	0.532*	0.500*	0.480*	0.461*
												Vel (f/s)	1.54	1.62	1.71	1.82	1.89	1.97
												R (Hrs)	0.565	0.534	0.504	0.471	0.449	0.430
SUBB	0.136	0.78	23.0	23.0	Urban	0.047	0.09	0.39	5.70	0.17	26	**Tc (Hrs)**	0.906 *	0.847 *	0.784*	0.719*	0.678*	0.642*
												Vel (f/s)	1.26	1.35	1.46	1.59	1.69	1.78
												R (Hrs)	0.847	0.786	0.722	0.656	0.615	0.578
SUBM1	0.038	0.28	14.2	14.2	Urban	0.031	0.05	0.33	7.30	0.09	95	**Tc (Hrs)**	0.428 *	0.407	0.386	0.363	0.348	0.334
												Vel (f/s)	0.96	1.01	1.06	1.13	1.18	1.23
												R (Hrs)	0.336	0.317	0.300	0.280	0.267	0.255
SUBC	0.087	0.48	35.2	35.2	Urban	0.049	0.09	0.25	9.70	0.04	28	**Tc (Hrs)**	0.570 *	0.534 *	0.501*	0.467*	0.445*	0.426*
												Vel (f/s)	1.24	1.32	1.41	1.51	1.58	1.65
												R (Hrs)	0.443	0.412	0.384	0.355	0.337	0.321
SUBM2	0.088	0.63	17.4	17.4	Urban	0.029	0.05	0.25	9.70	0.04	95	**Tc (Hrs)**	0.580 *	0.552 *	0.524*	0.492*	0.472*	0.454*
												Vel (f/s)	1.59	1.67	1.76	1.88	1.96	2.04
												R (Hrs)	0.558	0.528	0.498	0.465	0.444	0.425
SUBD	0.042	0.24	63.0	63.0	Urban	0.052	0.09	0.25	9.70	0.04	29	**Tc (Hrs)**	0.347	0.325	0.305	0.284	0.271	0.260
												Vel (f/s)	1.01	1.08	1.15	1.24	1.30	1.35
												R (Hrs)	0.222	0.207	0.193	0.178	0.169	0.161

* Non default value or value out of range

Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Sub Basin Parameters							Rainfall Losses						Return Period Parameters					
Major Basin ID: 01																		
SUBE	0.072	0.36	42.0	42.0	Urban	0.050	0.09	0.25	9.70	0.04	27	**Tc (Hrs)**	0.473*	0.443*	0.416	0.387	0.369	0.353
												Vel (f/s)	1.12	1.19	1.27	1.36	1.43	1.50
												R (Hrs)	0.319	0.296	0.276	0.255	0.242	0.231
SUBF	0.075	0.48	39.6	39.6	Urban	0.052	0.09	0.27	8.80	0.05	21	**Tc (Hrs)**	0.580*	0.541*	0.505*	0.469*	0.447*	0.427*
												Vel (f/s)	1.21	1.30	1.39	1.50	1.57	1.65
												R (Hrs)	0.492	0.455	0.422	0.388	0.368	0.350
SUBG	0.042	0.37	43.7	43.7	Urban	0.057	0.09	0.38	5.60	0.18	15	**Tc (Hrs)**	0.587*	0.546*	0.503*	0.458*	0.431*	0.407
												Vel (f/s)	0.92	0.99	1.08	1.18	1.26	1.33
												R (Hrs)	0.563	0.520	0.475	0.428	0.400	0.375
SUBH	0.069	0.49	20.5	20.5	Urban	0.044	0.08	0.29	8.40	0.06	47	**Tc (Hrs)**	0.644*	0.604*	0.567*	0.528*	0.504*	0.482*
												Vel (f/s)	1.12	1.19	1.27	1.36	1.43	1.49
												R (Hrs)	0.589	0.549	0.512	0.472	0.448	0.427
SUBI	0.112	0.82	13.5	13.5	Urban	0.045	0.08	0.25	9.70	0.04	38	**Tc (Hrs)**	0.949*	0.891*	0.838*	0.782*	0.747*	0.715*
												Vel (f/s)	1.27	1.35	1.44	1.54	1.61	1.68
												R (Hrs)	1.037	0.968	0.904	0.837	0.795	0.758
SUBJ	0.089	0.59	30.4	30.4	Urban	0.046	0.08	0.29	8.40	0.06	39	**Tc (Hrs)**	0.647*	0.606*	0.568*	0.527*	0.503*	0.481*
												Vel (f/s)	1.34	1.43	1.52	1.64	1.72	1.80
												R (Hrs)	0.594	0.552	0.514	0.474	0.449	0.427
SUBK	0.166	0.65	15.4	15.4	Urban	0.033	0.06	0.25	9.70	0.04	74	**Tc (Hrs)**	0.667*	0.631*	0.597*	0.560*	0.536*	0.515*
												Vel (f/s)	1.43	1.51	1.60	1.70	1.78	1.85
												R (Hrs)	0.465	0.438	0.412	0.384	0.365	0.349
SUBO	0.066	0.46	17.5	17.5	Urban	0.035	0.06	0.25	9.70	0.04	77	**Tc (Hrs)**	0.554*	0.525*	0.497*	0.467*	0.447*	0.429*
												Vel (f/s)	1.22	1.29	1.36	1.44	1.51	1.57
												R (Hrs)	0.486	0.458	0.431	0.402	0.383	0.366
SUBP	0.094	0.58	15.6	15.6	Urban	0.030	0.05	0.32	7.30	0.09	91	**Tc (Hrs)**	0.591*	0.562*	0.533*	0.500*	0.479*	0.460*
												Vel (f/s)	1.44	1.51	1.60	1.70	1.78	1.85
												R (Hrs)	0.514	0.485	0.458	0.427	0.407	0.389

* Non default value or value out of range

Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					

Major Basin ID: 01

Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
SUBQ	0.087	0.61	16.3	16.3	Urban	0.030	0.05	0.32	7.30	0.09	90	**Tc (Hrs)**	0.599*	0.569*	0.539*	0.506*	0.485*	0.465*
												Vel (f/s)	1.49	1.57	1.66	1.77	1.84	1.92
												R (Hrs)	0.568	0.536	0.505	0.471	0.449	0.429
SUBR	0.066	0.43	16.4	16.4	Urban	0.032	0.10	0.16	8.80	0.08	75	**Tc (Hrs)**	0.526*	0.498*	0.471*	0.441*	0.422*	0.405
												Vel (f/s)	1.20	1.27	1.34	1.43	1.49	1.56
												R (Hrs)	0.435	0.409	0.384	0.358	0.340	0.325
SUBS	0.056	0.33	18.3	18.3	Urban	0.033	0.10	0.16	8.00	0.12	73	**Tc (Hrs)**	0.457*	0.433*	0.409	0.382	0.365	0.350
												Vel (f/s)	1.06	1.12	1.18	1.27	1.33	1.38
												R (Hrs)	0.331	0.311	0.292	0.271	0.258	0.246
SUBT	0.045	0.41	14.8	14.8	Urban	0.033	0.09	0.27	4.40	0.51	77	**Tc (Hrs)**	0.559*	0.528*	0.499*	0.468*	0.446*	0.427*
												Vel (f/s)	1.08	1.14	1.21	1.28	1.35	1.41
												R (Hrs)	0.557	0.523	0.491	0.457	0.434	0.413
SUBU	0.044	0.39	17.9	17.9	Urban	0.033	0.09	0.25	6.20	0.22	78	**Tc (Hrs)**	0.504*	0.478*	0.451*	0.422*	0.403	0.386
												Vel (f/s)	1.13	1.20	1.27	1.36	1.42	1.48
												R (Hrs)	0.483	0.455	0.427	0.397	0.377	0.359
SUBV	0.050	0.36	13.9	13.9	Urban	0.036	0.10	0.26	4.35	0.54	68	**Tc (Hrs)**	0.576*	0.542*	0.511*	0.477*	0.455*	0.434*
												Vel (f/s)	0.92	0.97	1.03	1.11	1.16	1.22
												R (Hrs)	0.488	0.457	0.428	0.397	0.376	0.357
SUBW	0.023	0.28	14.3	14.3	Urban	0.040	0.10	0.26	5.10	0.38	64	**Tc (Hrs)**	0.532*	0.501*	0.473*	0.440*	0.419*	0.400
												Vel (f/s)	0.77	0.82	0.87	0.93	0.98	1.03
												R (Hrs)	0.569	0.533	0.499	0.462	0.437	0.415
SUBX	0.037	0.32	19.0	19.0	Urban	0.037	0.10	0.16	8.00	0.11	67	**Tc (Hrs)**	0.475*	0.449*	0.424*	0.396	0.378	0.362
												Vel (f/s)	0.99	1.05	1.11	1.19	1.24	1.30
												R (Hrs)	0.427	0.401	0.375	0.348	0.331	0.316
SUBY	0.031	0.26	15.3	15.3	Urban	0.035	0.10	0.16	8.80	0.08	73	**Tc (Hrs)**	0.439*	0.415	0.393	0.368	0.352	0.337
												Vel (f/s)	0.87	0.92	0.97	1.04	1.08	1.13
												R (Hrs)	0.366	0.344	0.323	0.300	0.286	0.273

Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					
Major Basin ID: 01																		
SUBZ	0.036	0.31	16.3	16.3	Urban	0.034	0.09	0.28	5.80	0.25	76	**Tc (Hrs)**	0.474*	0.449*	0.424*	0.396	0.378	0.362
												Vel (f/s)	0.96	1.01	1.07	1.15	1.20	1.26
												R (Hrs)	0.421	0.396	0.372	0.345	0.328	0.312

* Non default value or value out of range

ID	Type	Area	Discharge cfs					
		(sq mi)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Major Basin 01								
SUBA	Hydrograph	0.060	9	15	22	33	42	52
RSA	Routed	0.060	7	10	11	12	12	13
RTAB	Routed	0.060	7	10	11	12	12	13
SUBB	Hydrograph	0.140	21	34	47	68	85	105
CPB	Combined	0.200	23	36	49	70	87	107
RSCPB	Routed	0.200	23	35	48	67	80	92
RTBC	Routed	0.200	22	35	47	66	80	91
SUBC	Hydrograph	0.090	34	49	62	82	98	114
CPC	Combined	0.290	41	62	83	112	134	156
RSCPC	Routed	0.290	41	62	83	111	126	138
RTCD	Routed	0.290	41	61	82	111	126	138
SUBD	Hydrograph	0.040	25	36	45	57	67	78
CPD	Combined	0.330	52	74	96	128	150	169
RSCPD	Routed	0.330	51	73	93	122	138	182
RTDE	Routed	0.330	50	72	93	122	137	159
SUBE	Hydrograph	0.070	34	50	63	81	96	112
CPE	Combined	0.400	72	102	126	162	186	214
RSCPE	Routed	0.400	71	101	125	157	169	175
RTEF	Routed	0.400	70	100	124	156	169	175
SUBF	Hydrograph	0.080	25	38	49	65	79	93
CPF	Combined	0.480	88	126	157	197	221	241
RSCPF	Routed	0.480	83	110	126	146	173	190
SUBG	Hydrograph	0.040	8	13	19	28	35	43
RTGH	Routed	0.040	6	11	16	23	30	38
SUBH	Hydrograph	0.070	22	32	42	55	65	77
CPH	Combined	0.110	23	33	42	59	78	96
RTHI	Routed	0.110	21	31	41	58	74	92
SUBI	Hydrograph	0.110	24	35	45	60	72	85
CPI	Combined	0.220	44	65	84	112	137	168
RSCPI	Routed	0.220	43	61	77	92	101	109
RTIJ	Routed	0.220	42	61	77	92	101	109
SUBJ	Hydrograph	0.090	27	40	52	69	83	98
CPJ	Combined	0.310	56	83	103	125	143	161
RSCPJ	Routed	0.310	56	79	94	107	116	123
SUBK	Hydrograph	0.170	71	97	121	154	181	210
DTK	Diversion	0.170	71	97	121	121	121	121
DIK	Hydrograph	0.170				33	60	89
SUBL2	Hydrograph	0.090	37	49	60	76	89	103
DTL2	Diversion	0.090	37	49	60	60	60	60
DIL2	Hydrograph	0.090				16	29	43
CPL2	Combined	0.250				49	90	132
SUBM2	Hydrograph	0.090	37	50	61	78	91	105
DTM2	Diversion	0.090	37	50	61	61	61	61
DIM2	Hydrograph	0.090				17	30	44
CPM2	Combined	0.340			1	66	120	176
SUBO	Hydrograph	0.070	29	39	49	62	73	85
DTO	Diversion	0.070	29	39	49	49	49	49
DIO	Hydrograph	0.070				13	24	36
CPO	Combined	0.410			1	79	143	211
CPJ2	Combined	0.720	56	79	94	156	230	304
SUBR	Hydrograph	0.070	30	41	51	66	77	89
DTR	Diversion	0.070	30	41	51	66	77	89
DIR	Hydrograph	0.070					1	3
DTSDR	Diversion	0.070					1	3

ID	Type	Area	Discharge cfs					
		(sq mi)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
DISDR	Hydrograph	0.070						
SUBS	Hydrograph	0.060	29	40	50	64	75	86
DTS	Diversion	0.060	29	40	50	64	75	86
DIS	Hydrograph	0.060						2
DTSDS	Diversion	0.060						2
DISDS	Hydrograph	0.060						
CPS	Combined	0.120						
SUBV	Hydrograph	0.050	16	24	30	40	48	57
DTV	Diversion	0.050	16	24	30	40	48	57
DIV	Hydrograph	0.050						1
DTSDV	Diversion	0.050						1
DISDV	Hydrograph	0.050						
SUBW	Hydrograph	0.020	7	10	13	17	21	25
DTW	Diversion	0.020	7	10	13	17	21	25
DIW	Hydrograph	0.020						
DTSDW	Diversion	0.020						
DISDW	Hydrograph	0.020						
CPW	Combined	0.070						
SUBT	Hydrograph	0.050	16	22	28	36	43	50
DTT	Diversion	0.050	16	22	28	36	43	50
DIT	Hydrograph	0.050						2
DTSDT	Diversion	0.050						2
DISDT	Hydrograph	0.050						
CPT	Combined	0.240						
SUBL1	Hydrograph	0.040	22	30	36	45	53	61
SUBP	Hydrograph	0.090	40	55	67	85	100	116
DTSDP	Diversion	0.090	40	41	41	41	41	41
DISDP	Hydrograph	0.090		14	27	45	59	75
CPP	Combined	0.370	22	42	60	87	109	132
SUBM1	Hydrograph	0.040	22	29	35	44	52	60
SUBQ	Hydrograph	0.090	35	48	59	75	88	102
DTSDQ	Diversion	0.090	22	22	22	22	22	22
DISDQ	Hydrograph	0.090	14	26	37	53	66	80
CPQ	Combined	0.500	56	96	131	183	224	269
SUBU	Hydrograph	0.040	18	25	31	40	48	56
DTU	Diversion	0.040	18	25	31	40	48	56
DIU	Hydrograph	0.040					1	2
DTSDU	Diversion	0.040					1	2
DISDU	Hydrograph	0.040						
SUBY	Hydrograph	0.030	16	22	27	34	40	47
DTY	Diversion	0.030	16	22	27	34	40	47
DIY	Hydrograph	0.030					1	1
DTSDY	Diversion	0.030					1	1
DISDY	Hydrograph	0.030						
CPY	Combined	0.080						
SUBX	Hydrograph	0.040	16	23	29	37	44	51
DTX	Diversion	0.040	16	23	29	37	44	51
DIX	Hydrograph	0.040						1
DTSDX	Diversion	0.040						1
DISDX	Hydrograph	0.040						
SUBZ	Hydrograph	0.040	16	22	27	35	42	49
DTZ	Diversion	0.040	16	22	27	35	42	49
DIZ	Hydrograph	0.040						1
CPZ	Combined	0.150						1
RTSDR	Hydrograph						1	3
RTSDS	Hydrograph							2

ID	Type	Area	Discharge cfs					
		(sq mi)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
CPSDS	Combined						1	5
RTSDT	Hydrograph							2
CPSDT	Combined						1	6
RTSDV	Hydrograph							1
RTSDW	Hydrograph							
CPSDW	Combined							1
CPDR1	Combined						1	6
RTSDP	Hydrograph		40	41	41	41	41	41
RTSDQ	Hydrograph		22	22	22	22	22	22
CPSDQ	Combined		62	62	62	62	62	62
RTSDU	Hydrograph						1	2
RTSDY	Hydrograph						1	1
CPSDY	Combined						1	3
CPDR2	Combined		62	62	62	62	62	62
RTSDX	Hydrograph							1
CPDR3	Combined		62	62	62	62	62	62
RTK	Hydrograph		71	97	121	121	121	121
RTL2	Hydrograph		37	49	60	60	60	60
CPL2B	Combined		108	146	181	181	181	181
RTM2	Hydrograph		37	50	61	61	61	61
CPM2B	Combined		145	197	242	242	242	242
RTO	Hydrograph		29	39	49	49	49	49
CPSDK	Combined		174	236	290	291	291	291
SUBAA	Hydrograph	0.050	6	11	16	23	29	35
CPAA	Combined	0.690	295	401	495	554	601	652
RSAA	Routed	0.690	186	216	238	260	273	285
CPEND	Combined	1.880	322	404	457	511	571	659

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Basin           SUBA
Route           RSA
Route           RTAB
Basin           .        SUBB
Combine         CPB...........
Route           RSCPB
Route           RTBC
Basin           .        SUBC
Combine         CPC...........
Route           RSCPC
Route           RTCD
Basin           .        SUBD
Combine         CPD...........
Route           RSCPD
Route           RTDE
Basin           .        SUBE
Combine         CPE...........
Route           RSCPE
Route           RTEF
Basin           .        SUBF
Combine         CPF...........
Route           RSCPF
Basin           .        SUBG
Route           .        RTGH
Basin           .        .        SUBH
Combine         .        CPH...........
Route           .        RTHI
Basin           .        .        SUBI
Combine         .        CPI...........
Route           .        RSCPI
Route           .        RTIJ
Basin           .        .        SUBJ
Combine         .        CPJ...........
Route           .        RSCPJ
Basin           .        .        SUBK
Divert          .        .        .------->  DTK
Hydrograph      .        .        DIK
Basin           .        .        .        SUBL2
Divert          .        .        .        .------->  DTL2
Hydrograph      .        .        .        DIL2
Combine         .        .        CPL2...........
Basin           .        .        .        SUBM2
Divert          .        .        .        .------->  DTM2
Hydrograph      .        .        .        DIM2
Combine         .        .        CPM2...........
Basin           .        .        .        SUBO
Divert          .        .        .        .------->  DTO
Hydrograph      .        .        .        DIO
Combine         .        .        CPO...........
Combine         .        CPJ2...........
Basin           .        .        SUBR
Divert          .        .        .------->  DTR
Hydrograph      .        .        DIR
Divert          .        .        .------->  DTSDR
Hydrograph      .        .        DISDR
Basin           .        .        .        SUBS
Divert          .        .        .        .------->  DTS
Hydrograph      .        .        .        DIS
Divert          .        .        .        .------->  DTSDS
Hydrograph      .        .        .        DISDS
Combine         .        .        CPS...........
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Route	. . . .-------> DTV
Route	. . . .-------> DTSDV
Route	. . . . SUBW
Divert	. . . . .-------> DTW
Hydrograph	. . . . DIW
Divert	. . . . .-------> DTSDW
Hydrograph	. . . . DISDW
Combine	. . . CPW...........
Basin	. . . . SUBT
Divert	. . . . .-------> DTT
Hydrograph	. . . . DIT
Divert	. . . . .-------> DTSDT
Hydrograph	. . . . DISDT
Combine	. . CPT.......................
Basin	. . . SUBL1
Basin	. . . . SUBP
Divert	. . . . .-------> DTSDP
Hydrograph	. . . . DISDP
Combine	. . CPP.......................
Basin	. . . SUBM1
Basin	. . . . SUBQ
Divert	. . . . .-------> DTSDQ
Hydrograph	. . . . DISDQ
Combine	. . CPQ.......................
Basin	. . . SUBU
Divert	. . . .-------> DTU
Hydrograph	. . . DIU
Divert	. . . .-------> DTSDU
Hydrograph	. . . DISDU
Basin	. . . . SUBY
Divert	. . . . .-------> DTY
Hydrograph	. . . . DIY
Divert	. . . . .-------> DTSDY
Hydrograph	. . . . DISDY
Combine	. . . CPY...........
Basin	. . . . SUBX
Divert	. . . . .-------> DTX
Hydrograph	. . . . DIX
Divert	. . . . .-------> DTSDX
Hydrograph	. . . . DISDX
Basin	. . . . . SUBZ
Divert	. . . . . .-------> DTZ
Hydrograph	. . . . . DIZ
Combine	. . . CPZ.......................
Retrieve	. . . . .<------- DTSDR
Hydrograph	. . . . RTSDR
Retrieve	. . . . . .<------- DTSDS
Hydrograph	. . . . . RTSDS
Combine	. . . . CPSDS...........
Retrieve	. . . . . .<------- DTSDT
Hydrograph	. . . . . RTSDT
Combine	. . . . CPSDT...........
Retrieve	. . . . . .<------- DTSDV
Hydrograph	. . . . . RTSDV
Retrieve	. . . .<------- DTSDW
Hydrograph	. . . . . . RTSDW
Combine	. . . . . CPSDW...........
Combine	. . . . CPDR1...........
Retrieve	. . . . . .<------- DTSDP
Hydrograph	. . . . . RTSDP
Retrieve	. . . .<------- DTSDQ
Hydrograph	. . . . . . RTSDQ

Combine . . . . CPSDQ........................
Retrieve . . . . . .<------- DTSDU
Hydrograph . . . . . RTSDU
Retrieve . . . .<------- DTSDY
Hydrograph . . . . . . RTSDY
Combine . . . . . CPSDY............
Combine . . . . CPDR2............
Retrieve . . . . . .<------- DTSDX
Hydrograph . . . . . RTSDX
Combine . . . . CPDR3............
Retrieve . . . . . .<------- DTK
Hydrograph . . . . . RTK
Retrieve . . . .<------- DTL2
Hydrograph RTL2
Combine . . . . . CPL2B............
Retrieve . . . .<------- DTM2
Hydrograph RTM2
Combine . . . . . CPM2B............
Retrieve . . . .<------- DTO
Hydrograph . . . . . . RTO
Combine . . . . . CPSDKO............
Basin . . . . . . SUBAA
Combine . . CPAA..
Route . . RSAA
Combine CPEND........................

ID	Type	Area	Discharge cfs					
		(sq mi)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year

Major Basin 01

ID	Type	Area (sq mi)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
SUBA	Hydrograph	0.060	9	15	22	33	42	52
RSA	Routed	0.060	7	10	11	12	12	13
RTAB	Routed	0.060	7	10	11	12	12	13
SUBB	Hydrograph	0.140	21	34	47	68	85	105
CPB	Combined	0.200	23	36	49	70	87	107
RSCPB	Routed	0.200	23	35	48	67	80	92
RTBC	Routed	0.200	22	35	47	66	80	91
SUBC	Hydrograph	0.090	34	49	62	82	98	114
CPC	Combined	0.290	41	62	83	112	134	156
RSCPC	Routed	0.290	41	62	83	111	126	138
RTCD	Routed	0.290	41	61	82	111	126	138
SUBD	Hydrograph	0.040	25	36	45	57	67	78
CPD	Combined	0.330	52	74	96	128	150	169
RSCPD	Routed	0.330	51	73	93	122	138	182
RTDE	Routed	0.330	50	72	93	122	137	159
SUBE	Hydrograph	0.070	34	50	63	81	96	112
CPE	Combined	0.400	72	102	126	162	186	214
RSCPE	Routed	0.400	71	101	125	157	169	175
RTEF	Routed	0.400	70	100	124	156	169	175
SUBF	Hydrograph	0.080	25	38	49	65	79	93
CPF	Combined	0.480	88	126	157	197	221	241
RSCPF	Routed	0.480	83	110	126	146	173	190
SUBG	Hydrograph	0.040	8	13	19	28	35	43
RTGH	Routed	0.040	6	11	16	23	30	38
SUBH	Hydrograph	0.070	22	32	42	55	65	77
CPH	Combined	0.110	23	33	42	59	78	96
RTHI	Routed	0.110	21	31	41	58	74	92
SUBI	Hydrograph	0.110	24	35	45	60	72	85
CPI	Combined	0.220	44	65	84	112	137	168
RSCPI	Routed	0.220	43	61	77	92	101	109
RTIJ	Routed	0.220	42	61	77	92	101	109
SUBJ	Hydrograph	0.090	27	40	52	69	83	98
CPJ	Combined	0.310	56	83	103	125	143	161
RSCPJ	Routed	0.310	56	79	94	107	116	123
SUBK	Hydrograph	0.170	71	97	121	154	181	210
DTK	Diversion	0.170	71	97	121	121	121	121
DIK	Hydrograph	0.170				33	60	89
SUBL2	Hydrograph	0.090	37	49	60	76	89	103
DTL2	Diversion	0.090	37	49	60	60	60	60
DIL2	Hydrograph	0.090				16	29	43
CPL2	Combined	0.250				49	90	132
SUBM2	Hydrograph	0.090	37	50	61	78	91	105
DTM2	Diversion	0.090	37	50	61	61	61	61
DIM2	Hydrograph	0.090				17	30	44
CPM2	Combined	0.340			1	66	120	176
SUBO	Hydrograph	0.070	29	39	49	62	73	85
DTO	Diversion	0.070	29	39	49	49	49	49
DIO	Hydrograph	0.070				13	24	36
CPO	Combined	0.410			1	79	143	211
CPJ2	Combined	0.720	56	79	94	156	230	304
SUBR	Hydrograph	0.070	30	41	51	66	77	89
DTR	Diversion	0.070	30	41	51	66	77	89
DIR	Hydrograph	0.070		1	3	23	46	70
DTSDR	Diversion	0.070		1	3	6	6	6

ID	Type	Area	Discharge cfs					
		(sq mi)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
DISDR	Hydrograph	0.070				17	40	64
SUBS	Hydrograph	0.060	29	40	50	64	75	86
DTS	Diversion	0.060	29	40	50	64	75	86
DIS	Hydrograph	0.060			2	18	39	63
DTSDS	Diversion	0.060			2	8	8	8
DISDS	Hydrograph	0.060				10	31	55
CPS	Combined	0.120				24	64	113
SUBV	Hydrograph	0.050	16	24	30	40	48	57
DTV	Diversion	0.050	16	24	30	40	48	57
DIV	Hydrograph	0.050			1	5	16	30
DTSDV	Diversion	0.050			1	5	16	19
DISDV	Hydrograph	0.050						11
SUBW	Hydrograph	0.020	7	10	13	17	21	25
DTW	Diversion	0.020	7	10	13	17	21	25
DIW	Hydrograph	0.020				2	7	13
DTSDW	Diversion	0.020				2	7	7
DISDW	Hydrograph	0.020						6
CPW	Combined	0.070						15
SUBT	Hydrograph	0.050	16	22	28	36	43	50
DTT	Diversion	0.050	16	22	28	36	43	50
DIT	Hydrograph	0.050			1	10	20	33
DTSDT	Diversion	0.050			1	10	14	14
DISDT	Hydrograph	0.050					6	19
CPT	Combined	0.240				24	64	113
SUBL1	Hydrograph	0.040	22	30	36	45	53	61
SUBP	Hydrograph	0.090	40	55	67	85	100	116
DTSDP	Diversion	0.090	40	41	41	41	41	41
DISDP	Hydrograph	0.090		14	27	45	59	75
CPP	Combined	0.370	22	42	60	87	116	212
SUBM1	Hydrograph	0.040	22	29	35	44	52	60
SUBQ	Hydrograph	0.090	35	48	59	75	88	102
DTSDQ	Diversion	0.090	22	22	22	22	22	22
DISDQ	Hydrograph	0.090	14	26	37	53	66	80
CPQ	Combined	0.500	56	96	131	183	224	322
SUBU	Hydrograph	0.040	18	25	31	40	48	56
DTU	Diversion	0.040	18	25	31	40	48	56
DIU	Hydrograph	0.040			2	12	26	39
DTSDU	Diversion	0.040			2	12	14	14
DISDU	Hydrograph	0.040					12	25
SUBY	Hydrograph	0.030	16	22	27	34	40	47
DTY	Diversion	0.030	16	22	27	34	40	47
DIY	Hydrograph	0.030			1	10	22	34
DTSDY	Diversion	0.030			1	7	7	7
DISDY	Hydrograph	0.030				4	16	28
CPY	Combined	0.080				4	21	46
SUBX	Hydrograph	0.040	16	23	29	37	44	51
DTX	Diversion	0.040	16	23	29	37	44	51
DIX	Hydrograph	0.040			1	9	21	33
DTSDX	Diversion	0.040			1	9	15	15
DISDX	Hydrograph	0.040					6	18
SUBZ	Hydrograph	0.040	16	22	27	35	42	49
DTZ	Diversion	0.040	16	22	27	35	42	49
DIZ	Hydrograph	0.040			1	10	21	36
CPZ	Combined	0.150			1	11	47	95
RTSDR	Hydrograph			1	3	6	6	6
RTSDS	Hydrograph				2	8	8	8

ID	Type	Area	Discharge cfs					
		(sq mi)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
CPSDS	Combined			1	4	14	14	14
RTSDT	Hydrograph				1	10	14	14
CPSDT	Combined			1	4	23	28	28
RTSDV	Hydrograph				1	5	16	19
RTSDW	Hydrograph					2	7	7
CPSDW	Combined				1	6	21	26
CPDR1	Combined			1	4	23	49	54
RTSDP	Hydrograph		40	41	41	41	41	41
RTSDQ	Hydrograph		22	22	22	22	22	22
CPSDQ	Combined		62	62	62	76	106	116
RTSDU	Hydrograph				2	12	14	14
RTSDY	Hydrograph				1	7	7	7
CPSDY	Combined				3	19	20	20
CPDR2	Combined		62	62	62	87	126	137
RTSDX	Hydrograph				1	9	15	15
CPDR3	Combined		62	62	62	93	136	151
RTK	Hydrograph		71	97	121	121	121	121
RTL2	Hydrograph		37	49	60	60	60	60
CPL2B	Combined		108	146	181	181	181	181
RTM2	Hydrograph		37	50	61	61	61	61
CPM2B	Combined		145	197	242	242	242	242
RTO	Hydrograph		29	39	49	49	49	49
CPSDK	Combined		174	236	290	291	291	291
SUBAA	Hydrograph	0.050	6	11	16	23	29	35
CPAA	Combined	0.690	295	401	495	554	612	828
RSAA	Routed	0.690	171	198	219	241	264	286
CPEND	Combined	1.880	307	386	438	493	552	636

Basin	SUBA
Route	RSA
Route	RTAB
Basin	. SUBB
Combine	CPB............
Route	RSCPB
Route	RTBC
Basin	. SUBC
Combine	CPC............
Route	RSCPC
Route	RTCD
Basin	. SUBD
Combine	CPD............
Route	RSCPD
Route	RTDE
Basin	. SUBE
Combine	CPE............
Route	RSCPE
Route	RTEF
Basin	. SUBF
Combine	CPF............
Route	RSCPF
Basin	. SUBG
Route	. RTGH
Basin	. . SUBH
Combine	. CPH............
Route	. RTHI
Basin	. . SUBI
Combine	. CPI............
Route	. RSCPI
Route	. RTIJ
Basin	. . SUBJ
Combine	. CPJ............
Route	. RSCPJ
Basin	. . SUBK
Divert	. . .-------> DTK
Hydrograph	. . DIK
Basin	. . . SUBL2
Divert	. . . .-------> DTL2
Hydrograph	. . . DIL2
Combine	. . CPL2............
Basin	. . . SUBM2
Divert	. . . .-------> DTM2
Hydrograph	. . . DIM2
Combine	. . CPM2............
Basin	. . . SUBO
Divert	. . . .-------> DTO
Hydrograph	. . . DIO
Combine	. . CPO............
Combine	. CPJ2............
Basin	. . SUBR
Divert	. . .-------> DTR
Hydrograph	. . DIR
Divert	. . .-------> DTSDR
Hydrograph	. . DISDR
Basin	. . . SUBS
Divert	. . . .-------> DTS
Hydrograph	. . . DIS
Divert	. . . .-------> DTSDS
Hydrograph	. . . DISDS
Combine	. . CPS............

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Route        .  .  .  .------->  DTV
Route        .  .  .  .------->  DTSDV
Route        .  .  .  .  SUBW
Divert       .  .  .  .  .------->  DTW
Hydrograph   .  .  .  .  DIW
Divert       .  .  .  .  .------->  DTSDW
Hydrograph   .  .  .  .  DISDW
Combine      .  .  .  CPW...........
Basin        .  .  .  .  SUBT
Divert       .  .  .  .  .------->  DTT
Hydrograph   .  .  .  .  DIT
Divert       .  .  .  .  .------->  DTSDT
Hydrograph   .  .  .  .  DISDT
Combine      .  .  CPT.......................
Basin        .  .  .  SUBL1
Basin        .  .  .  .  SUBP
Divert       .  .  .  .  .------->  DTSDP
Hydrograph   .  .  .  .  DISDP
Combine      .  .  CPP.......................
Basin        .  .  .  SUBM1
Basin        .  .  .  .  SUBQ
Divert       .  .  .  .  .------->  DTSDQ
Hydrograph   .  .  .  .  DISDQ
Combine      .  .  CPQ.......................
Basin        .  .  .  SUBU
Divert       .  .  .  .------->  DTU
Hydrograph   .  .  .  DIU
Divert       .  .  .  .------->  DTSDU
Hydrograph   .  .  .  DISDU
Basin        .  .  .  .  SUBY
Divert       .  .  .  .  .------->  DTY
Hydrograph   .  .  .  .  DIY
Divert       .  .  .  .  .------->  DTSDY
Hydrograph   .  .  .  .  DISDY
Combine      .  .  .  CPY...........
Basin        .  .  .  .  SUBX
Divert       .  .  .  .  .------->  DTX
Hydrograph   .  .  .  .  DIX
Divert       .  .  .  .  .------->  DTSDX
Hydrograph   .  .  .  .  DISDX
Basin        .  .  .  .  .  SUBZ
Divert       .  .  .  .  .  .------->  DTZ
Hydrograph   .  .  .  .  .  DIZ
Combine      .  .  .  CPZ.......................
Retrieve     .  .  .  .  .<-------  DTSDR
Hydrograph   .  .  .  .  RTSDR
Retrieve     .  .  .  .  .  .<-------  DTSDS
Hydrograph   .  .  .  .  .  RTSDS
Combine      .  .  .  .  CPSDS...........
Retrieve     .  .  .  .  .  .<-------  DTSDT
Hydrograph   .  .  .  .  .  RTSDT
Combine      .  .  .  .  CPSDT...........
Retrieve     .  .  .  .  .  .<-------  DTSDV
Hydrograph   .  .  .  .  .  RTSDV
Retrieve     .  .  .  .  .  .  .<-------  DTSDW
Hydrograph   .  .  .  .  .  .  RTSDW
Combine      .  .  .  .  .  CPSDW...........
Combine      .  .  .  .  CPDR1...........
Retrieve     .  .  .  .  .  .<-------  DTSDP
Hydrograph   .  .  .  .  .  RTSDP
Retrieve     .  .  .  .  .  .  .<-------  DTSDQ
Hydrograph   .  .  .  .  .  .  RTSDQ
```

Combine	. . . . CPSDQ........................
Retrieve	. . . . . .<------- DTSDU
Hydrograph	. . . . . RTSDU
Retrieve	. . . .<------- DTSDY
Hydrograph	. . . . . . RTSDY
Combine	. . . . . CPSDY............
Combine	. . . . CPDR2............
Retrieve	. . . . . .<------- DTSDX
Hydrograph	. . . . . RTSDX
Combine	. . . . CPDR3............
Retrieve	. . . . . .<------- DTK
Hydrograph	. . . . . RTK
Retrieve	. . . .<------- DTL2
Hydrograph	. . . . . . RTL2
Combine	. . . . . CPL2B............
Retrieve	. . . .<------- DTM2
Hydrograph	. . . . . . RTM2
Combine	. . . . . CPM2B............
Retrieve	. . . .<------- DTO
Hydrograph	. . . . . . RTO
Combine	. . . . . CPSDKO............
Basin	. . . . SUBAA
Combine	. . CPAA..
Route	. . RSAA
Combine	CPEND........................

ID	Type	Area (sq mi)	Discharge cfs 2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Major Basin 01								
SUBA	Hydrograph	0.060	9	15	22	33	42	52
RSA	Routed	0.060	7	10	11	12	12	13
RTAB	Routed	0.060	7	10	11	12	12	13
SUBB	Hydrograph	0.140	21	34	47	68	85	105
CPB	Combined	0.200	23	36	49	70	87	107
RSCPB	Routed	0.200	23	35	48	67	80	92
RTBC	Routed	0.200	22	35	47	66	80	91
SUBC	Hydrograph	0.090	34	49	62	82	98	114
CPC	Combined	0.290	41	62	83	112	134	156
RSCPC	Routed	0.290	41	62	83	111	126	138
RTCD	Routed	0.290	41	61	82	111	126	138
SUBD	Hydrograph	0.040	25	36	45	57	67	78
CPD	Combined	0.330	52	74	96	128	150	169
RSCPD	Routed	0.330	51	73	93	122	138	182
RTDE	Routed	0.330	50	72	93	122	137	159
SUBE	Hydrograph	0.070	34	50	63	81	96	112
CPE	Combined	0.400	72	102	126	162	186	214
RSCPE	Routed	0.400	71	101	125	157	169	175
RTEF	Routed	0.400	70	100	124	156	169	175
SUBF	Hydrograph	0.080	25	38	49	65	79	93
CPF	Combined	0.480	88	126	157	197	221	241
RSCPF	Routed	0.480	83	110	126	146	173	190
SUBG	Hydrograph	0.040	8	13	19	28	35	43
RTGH	Routed	0.040	6	11	16	23	30	38
SUBH	Hydrograph	0.070	22	32	42	55	65	77
CPH	Combined	0.110	23	33	42	59	78	96
RTHI	Routed	0.110	21	31	41	58	74	92
SUBI	Hydrograph	0.110	24	35	45	60	72	85
CPI	Combined	0.220	44	65	84	112	137	168
RSCPI	Routed	0.220	43	61	77	92	101	109
RTIJ	Routed	0.220	42	61	77	92	101	109
SUBJ	Hydrograph	0.090	27	40	52	69	83	98
CPJ	Combined	0.310	56	83	103	125	143	161
RSCPJ	Routed	0.310	56	79	94	107	116	123
SUBK	Hydrograph	0.170	71	97	121	154	181	210
DTK	Diversion	0.170	71	97	121	121	121	121
DIK	Hydrograph	0.170				33	60	89
SUBL2	Hydrograph	0.090	37	49	60	76	89	103
DTL2	Diversion	0.090	37	49	60	60	60	60
DIL2	Hydrograph	0.090				16	29	43
CPL2	Combined	0.250				49	90	132
SUBM2	Hydrograph	0.090	37	50	61	78	91	105
DTM2	Diversion	0.090	37	50	61	61	61	61
DIM2	Hydrograph	0.090				17	30	44
CPM2	Combined	0.340			1	66	120	176
SUBO	Hydrograph	0.070	29	39	49	62	73	85
DTO	Diversion	0.070	29	37	37	37	37	37
DIO	Hydrograph	0.070		2	12	25	36	48
CPO	Combined	0.410		2	12	91	155	223
CPJ2	Combined	0.720	56	79	94	168	242	316
SUBR	Hydrograph	0.070	30	41	51	66	77	89
RSR	Routed	0.070	18	24	29	36	41	46
SUBS	Hydrograph	0.060	29	40	50	64	75	86
RSS	Routed	0.060	18	24	29	36	42	47

ID	Type	Area	Discharge cfs					
		(sq mi)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
CPS	Combined	0.120	36	48	58	71	82	93
SUBT	Hydrograph	0.050	16	22	28	36	43	50
RST	Routed	0.050	13	17	21	26	30	35
CPT1	Combined	0.170	49	65	79	98	112	127
SUBV	Hydrograph	0.050	16	24	30	40	48	57
RSV	Routed	0.050	12	16	20	25	29	33
SUBW	Hydrograph	0.020	7	10	13	17	21	25
RSW	Routed	0.020	6	8	10	12	14	15
CPW	Combined	0.070	18	24	29	37	42	48
CPT2	Combined	0.240	66	89	108	134	154	175
SUBL1	Hydrograph	0.040	22	30	36	45	53	61
SUBP	Hydrograph	0.090	40	55	67	85	100	116
CPP	Combined	0.370	117	156	190	236	274	313
SUBM1	Hydrograph	0.040	22	29	35	44	52	60
SUBQ	Hydrograph	0.090	35	48	59	75	88	102
CPQ	Combined	0.500	170	228	278	348	406	467
SUBU	Hydrograph	0.040	18	25	31	40	48	56
RSU	Routed	0.040	14	18	22	27	31	35
SUBY	Hydrograph	0.030	16	22	27	34	40	47
RSY	Routed	0.030	13	18	22	27	31	35
CPY	Combined	0.080	26	35	42	53	61	69
SUBX	Hydrograph	0.040	16	23	29	37	44	51
RSX	Routed	0.040	13	18	22	27	31	35
SUBZ	Hydrograph	0.040	16	22	27	35	42	49
RSZ	Routed	0.040	13	17	21	26	30	34
CPZ	Combined	0.150	52	70	85	106	122	139
RTK	Hydrograph		71	97	121	121	121	121
RTL2	Hydrograph		37	49	60	60	60	60
CPL2B	Combined		108	146	181	181	181	181
RTM2	Hydrograph		37	50	61	61	61	61
CPM2B	Combined		145	197	242	242	242	242
RTO	Hydrograph		29	37	37	37	37	37
CPSDK	Combined		174	234	279	279	279	279
SUBAA	Hydrograph	0.050	6	11	16	23	29	35
CPAA	Combined	0.690	398	537	650	750	826	908
RSAA	Routed	0.690	252	291	320	351	370	389
CPEND	Combined	1.880	388	479	539	603	657	739

Basin	SUBA
Route	RSA
Route	RTAB
Basin	. SUBB
Combine	CPB...........
Route	RSCPB
Route	RTBC
Basin	. SUBC
Combine	CPC...........
Route	RSCPC
Route	RTCD
Basin	. SUBD
Combine	CPD...........
Route	RSCPD
Route	RTDE
Basin	. SUBE
Combine	CPE...........
Route	RSCPE
Route	RTEF
Basin	. SUBF
Combine	CPF...........
Route	RSCPF
Basin	. SUBG
Route	. RTGH
Basin	. . SUBH
Combine	. CPH...........
Route	. RTHI
Basin	. . SUBI
Combine	. CPI...........
Route	. RSCPI
Route	. RTIJ
Basin	. . SUBJ
Combine	. CPJ...........
Route	. RSCPJ
Basin	. . SUBK
Divert	. . .-------> DTK
Hydrograph	. . DIK
Basin	. . . SUBL2
Divert	. . . .-------> DTL2
Hydrograph	. . . DIL2
Combine	. . CPL2...........
Basin	. . . SUBM2
Divert	. . . .-------> DTM2
Hydrograph	. . . DIM2
Combine	. . CPM2...........
Basin	. . . SUBO
Divert	. . . .-------> DTO
Hydrograph	. . . DIO
Combine	. . CPO...........
Combine	. CPJ2...........
Basin	. . SUBR
Route	. . RSR
Basin	. . . SUBS
Route	. . . RSS
Combine	. . CPS...........
Basin	. . . SUBT
Route	. . . RST
Combine	. . CPT1...........
Route	. . . V
Route	. . . . SUBW
Route	. . . . RSW

Combine	. . . CPW...........
Combine	. . CPT2...........
Basin	. . . SUBL1
Basin	. . . . SUBP
Combine	. . CPP.......................
Basin	. . . SUBM1
Basin	. . . . SUBQ
Combine	. . CPQ.......................
Basin	. . . SUBU
Route	. . . RSU
Basin	. . . . SUBY
Route	. . . . RSY
Combine	. . . CPY...........
Basin	. . . . SUBX
Route	. . . . RSX
Basin	. . . . . SUBZ
Route	. . . . . RSZ
Combine	. . . CPZ.......................
Retrieve	. . . . .<------- DTK
Hydrograph	. . . . RTK
Retrieve	. . . . . .<------- DTL2
Hydrograph	. . . . . RTL2
Combine	. . . . CPL2B...........
Retrieve	. . . . . .<------- DTM2
Hydrograph	. . . . . RTM2
Combine	. . . . CPM2B...........
Retrieve	. . . . . .<------- DTO
Hydrograph	. . . . . RTO
Combine	. . . . CPSDKO...........
Basin	. . . . . SUBAA
Combine	. . CPAA...................................
Route	. . RSAA
Combine	CPEND.......................

ID	Type	Area (sq mi)	Discharge cfs 2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Major Basin 01								
SUBA	Hydrograph	0.060	9	15	22	33	42	52
RSA	Routed	0.060	7	10	11	12	12	13
RTAB	Routed	0.060	7	10	11	12	12	13
SUBB	Hydrograph	0.140	21	34	47	68	85	105
CPB	Combined	0.200	23	36	49	70	87	107
RSCPB	Routed	0.200	23	35	48	67	80	92
RTBC	Routed	0.200	22	35	47	66	80	91
SUBC	Hydrograph	0.090	34	49	62	82	98	114
CPC	Combined	0.290	41	62	83	112	134	156
RSCPC	Routed	0.290	41	62	83	111	126	138
RTCD	Routed	0.290	41	61	82	111	126	138
SUBD	Hydrograph	0.040	25	36	45	57	67	78
CPD	Combined	0.330	52	74	96	128	150	169
RSCPD	Routed	0.330	51	73	93	122	138	182
RTDE	Routed	0.330	50	72	93	122	137	159
SUBE	Hydrograph	0.070	34	50	63	81	96	112
CPE	Combined	0.400	72	102	126	162	186	214
RSCPE	Routed	0.400	71	101	125	157	169	175
RTEF	Routed	0.400	70	100	124	156	169	175
SUBF	Hydrograph	0.080	25	38	49	65	79	93
CPF	Combined	0.480	88	126	157	197	221	241
RSCPF	Routed	0.480	83	110	126	146	173	190
SUBG	Hydrograph	0.040	8	13	19	28	35	43
RTGH	Routed	0.040	6	11	16	23	30	38
SUBH	Hydrograph	0.070	22	32	42	55	65	77
CPH	Combined	0.110	23	33	42	59	78	96
RTHI	Routed	0.110	21	31	41	58	74	92
SUBI	Hydrograph	0.110	24	35	45	60	72	85
CPI	Combined	0.220	44	65	84	112	137	168
RSCPI	Routed	0.220	43	61	77	92	101	109
RTIJ	Routed	0.220	42	61	77	92	101	109
SUBJ	Hydrograph	0.090	27	40	52	69	83	98
CPJ	Combined	0.310	56	83	103	125	143	161
RSCPJ	Routed	0.310	56	79	94	107	116	123
SUBK	Hydrograph	0.170	71	97	121	154	181	210
DTK	Diversion	0.170	71	97	121	121	121	121
DIK	Hydrograph	0.170				33	60	89
SUBL2	Hydrograph	0.090	37	49	60	76	89	103
DTL2	Diversion	0.090	37	49	60	60	60	60
DIL2	Hydrograph	0.090				16	29	43
CPL2	Combined	0.250				49	90	132
SUBM2	Hydrograph	0.090	37	50	61	78	91	105
DTM2	Diversion	0.090	37	50	61	61	61	61
DIM2	Hydrograph	0.090				17	30	44
CPM2	Combined	0.340			1	66	120	176
SUBO	Hydrograph	0.070	29	39	49	62	73	85
DTO	Diversion	0.070	29	39	49	49	49	49
DIO	Hydrograph	0.070				13	24	36
CPO	Combined	0.410			1	79	143	211
CPJ2	Combined	0.720	56	79	94	156	230	304
SUBR	Hydrograph	0.070	30	41	51	66	77	89
DTR	Diversion	0.070	30	27	17	7	6	5
DIR	Hydrograph	0.070	30	41	51	66	77	89
DTSDR	Diversion	0.070	6	6	6	6	6	6

ID	Type	Area	Discharge cfs					
		(sq mi)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
DISDR	Hydrograph	0.070	24	35	45	59	71	83
SUBS	Hydrograph	0.060	29	40	50	64	75	86
DTS	Diversion	0.060	29	25	17	7	5	5
DIS	Hydrograph	0.060	28	40	50	64	75	86
DTSDS	Diversion	0.060	8	8	8	8	8	8
DISDS	Hydrograph	0.060	20	32	42	56	67	78
CPS	Combined	0.120	44	67	87	114	137	161
SUBV	Hydrograph	0.050	16	24	30	40	48	57
DTV	Diversion	0.050	16	22	18	9	5	4
DIV	Hydrograph	0.050	15	24	30	40	48	57
DTSDV	Diversion	0.050	15	19	19	19	19	19
DISDV	Hydrograph	0.050		5	11	21	29	38
SUBW	Hydrograph	0.020	7	10	13	17	21	25
DTW	Diversion	0.020	7	10	10	6	3	2
DIW	Hydrograph	0.020	6	10	13	17	21	25
DTSDW	Diversion	0.020	6	7	7	7	7	7
DISDW	Hydrograph	0.020		3	6	10	14	18
CPW	Combined	0.070		8	18	31	43	56
SUBT	Hydrograph	0.050	16	22	28	36	43	50
DTT	Diversion	0.050	16	17	13	5	4	3
DIT	Hydrograph	0.050	15	22	28	36	43	50
DTSDT	Diversion	0.050	14	14	14	14	14	14
DISDT	Hydrograph	0.050		8	13	22	28	36
CPT	Combined	0.240	44	80	117	167	207	252
SUBL1	Hydrograph	0.040	22	30	36	45	53	61
SUBP	Hydrograph	0.090	40	55	67	85	100	116
DTSDP	Diversion	0.090	40	41	41	41	41	41
DISDP	Hydrograph	0.090		14	27	45	59	75
CPP	Combined	0.370	64	121	177	254	316	384
SUBM1	Hydrograph	0.040	22	29	35	44	52	60
SUBQ	Hydrograph	0.090	35	48	59	75	88	102
DTSDQ	Diversion	0.090	22	22	22	22	22	22
DISDQ	Hydrograph	0.090	14	26	37	53	66	80
CPQ	Combined	0.500	98	174	248	349	431	521
SUBU	Hydrograph	0.040	18	25	31	40	48	56
DTU	Diversion	0.040	18	19	12	5	4	3
DIU	Hydrograph	0.040	17	25	31	40	48	56
DTSDU	Diversion	0.040	14	14	14	14	14	14
DISDU	Hydrograph	0.040	3	11	17	26	34	42
SUBY	Hydrograph	0.030	16	22	27	34	40	47
DTY	Diversion	0.030	16	14	8	3	3	2
DIY	Hydrograph	0.030	16	22	27	34	40	47
DTSDY	Diversion	0.030	7	7	7	7	7	7
DISDY	Hydrograph	0.030	9	15	20	28	34	40
CPY	Combined	0.080	11	26	37	54	67	82
SUBX	Hydrograph	0.040	16	23	29	37	44	51
DTX	Diversion	0.040	16	20	15	10	4	4
DIX	Hydrograph	0.040	15	23	29	37	44	51
DTSDX	Diversion	0.040	15	15	15	15	15	15
DISDX	Hydrograph	0.040		8	14	22	29	36
SUBZ	Hydrograph	0.040	16	22	27	35	42	49
DTZ	Diversion	0.040	16	17	12	5	4	3
DIZ	Hydrograph	0.040	15	22	27	35	42	49
CPZ	Combined	0.150	25	56	79	111	138	166
RTSDR	Hydrograph		6	6	6	6	6	6
RTSDS	Hydrograph		8	8	8	8	8	8

ID	Type	Area	Discharge cfs					
		(sq mi)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
CPSDS	Combined		14	14	14	14	14	14
RTSDT	Hydrograph		14	14	14	14	14	14
CPSDT	Combined		28	28	28	28	28	28
RTSDV	Hydrograph		15	19	19	19	19	19
RTSDW	Hydrograph		6	7	7	7	7	7
CPSDW	Combined		19	26	26	26	26	26
CPDR1	Combined		46	54	54	54	54	54
RTSDP	Hydrograph		40	41	41	41	41	41
RTSDQ	Hydrograph		22	22	22	22	22	22
CPSDQ	Combined		101	116	116	116	116	116
RTSDU	Hydrograph		14	14	14	14	14	14
RTSDY	Hydrograph		7	7	7	7	7	7
CPSDY	Combined		20	20	20	20	20	20
CPDR2	Combined		121	137	137	137	137	137
RTSDX	Hydrograph		15	15	15	15	15	15
CPDR3	Combined		134	151	151	151	151	151
RTK	Hydrograph		71	97	121	121	121	121
RTL2	Hydrograph		37	49	60	60	60	60
CPL2B	Combined		108	146	181	181	181	181
RTM2	Hydrograph		37	50	61	61	61	61
CPM2B	Combined		145	197	242	242	242	242
RTO	Hydrograph		29	39	49	49	49	49
CPSDK	Combined		174	236	290	291	291	291
SUBAA	Hydrograph	0.050	6	11	16	23	29	35
CPAA	Combined	0.690	401	623	777	921	1,033	1,157
RSAA	Routed	0.690	216	260	289	319	340	362
CPEND	Combined	1.880	351	448	508	571	627	716

Phoenix-Mesa Gateway Airport Authority

Drainage Design Management System

HEC-1 SCHEMATIC

Project Reference: 100821.1006PRO3_24HR

Major Basin: 01

Basin	SUBA
Route	RSA
Route	RTAB
Basin	. SUBB
Combine	CPB............
Route	RSCPB
Route	RTBC
Basin	. SUBC
Combine	CPC............
Route	RSCPC
Route	RTCD
Basin	. SUBD
Combine	CPD............
Route	RSCPD
Route	RTDE
Basin	. SUBE
Combine	CPE............
Route	RSCPE
Route	RTEF
Basin	. SUBF
Combine	CPF............
Route	RSCPF
Basin	. SUBG
Route	. RTGH
Basin	. . SUBH
Combine	. CPH............
Route	. RTHI
Basin	. . SUBI
Combine	. CPI............
Route	. RSCPI
Route	. RTIJ
Basin	. . SUBJ
Combine	. CPJ............
Route	. RSCPJ
Basin	. . SUBK
Divert	. . .-------> DTK
Hydrograph	. . DIK
Basin	. . . SUBL2
Divert	. . . .-------> DTL2
Hydrograph	. . . DIL2
Combine	. . CPL2............
Basin	. . . SUBM2
Divert	. . . .-------> DTM2
Hydrograph	. . . DIM2
Combine	. . CPM2............
Basin	. . . SUBO
Divert	. . . .-------> DTO
Hydrograph	. . . DIO
Combine	. . CPO............
Combine	. CPJ2............
Basin	. . SUBR
Divert	. . .-------> DTR
Hydrograph	. . DIR
Divert	. . .-------> DTSDR
Hydrograph	. . DISDR
Basin	. . . SUBS
Divert	. . . .-------> DTS
Hydrograph	. . . DIS
Divert	. . . .-------> DTSDS
Hydrograph	. . . DISDS
Combine	. . CPS............

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Route        .   .   .  .-------> DTV
Route        .   .   .  .-------> DTSDV
Route        .   .   .   .   SUBW
Divert       .   .   .   .   .-------> DTW
Hydrograph   .   .   .   .   DIW
Divert       .   .   .   .   .-------> DTSDW
Hydrograph   .   .   .   .   DISDW
Combine      .   .   .   CPW...........
Basin        .   .   .   .   SUBT
Divert       .   .   .   .   .-------> DTT
Hydrograph   .   .   .   .   DIT
Divert       .   .   .   .   .-------> DTSDT
Hydrograph   .   .   .   .   DISDT
Combine      .   .   CPT......................
Basin        .   .   .   SUBL1
Basin        .   .   .   .   SUBP
Divert       .   .   .   .   .-------> DTSDP
Hydrograph   .   .   .   .   DISDP
Combine      .   .   CPP......................
Basin        .   .   .   SUBM1
Basin        .   .   .   .   SUBQ
Divert       .   .   .   .   .-------> DTSDQ
Hydrograph   .   .   .   .   DISDQ
Combine      .   .   CPQ......................
Basin        .   .   .   SUBU
Divert       .   .   .   .-------> DTU
Hydrograph   .   .   .   DIU
Divert       .   .   .   .-------> DTSDU
Hydrograph   .   .   .   DISDU
Basin        .   .   .   .   SUBY
Divert       .   .   .   .   .-------> DTY
Hydrograph   .   .   .   .   DIY
Divert       .   .   .   .   .-------> DTSDY
Hydrograph   .   .   .   .   DISDY
Combine      .   .   .   CPY...........
Basin        .   .   .   .   SUBX
Divert       .   .   .   .   .-------> DTX
Hydrograph   .   .   .   .   DIX
Divert       .   .   .   .   .-------> DTSDX
Hydrograph   .   .   .   .   DISDX
Basin        .   .   .   .   .   SUBZ
Divert       .   .   .   .   .   .-------> DTZ
Hydrograph   .   .   .   .   .   DIZ
Combine      .   .   .   CPZ......................
Retrieve     .   .   .   .   .<------- DTSDR
Hydrograph   .   .   .   .   RTSDR
Retrieve     .   .   .   .   .   .<------- DTSDS
Hydrograph   .   .   .   .   .   RTSDS
Combine      .   .   .   .   CPSDS...........
Retrieve     .   .   .   .   .   .<------- DTSDT
Hydrograph   .   .   .   .   .   RTSDT
Combine      .   .   .   .   CPSDT...........
Retrieve     .   .   .   .   .   .<------- DTSDV
Hydrograph   .   .   .   .   .   RTSDV
Retrieve     .   .   .   .   .   .   .<------- DTSDW
Hydrograph   .   .   .   .   .   .   RTSDW
Combine      .   .   .   .   .   CPSDW...........
Combine      .   .   .   .   CPDR1...........
Retrieve     .   .   .   .   .   .<------- DTSDP
Hydrograph   .   .   .   .   .   RTSDP
Retrieve     .   .   .   .   .   .   .<------- DTSDQ
Hydrograph   .   .   .   .   .   .   RTSDQ
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Combine      .    .    .    .   CPSDQ.......................
Retrieve     .    .    .    .    .   .<-------  DTSDU
Hydrograph   .    .    .    .    .  RTSDU
Retrieve     .    .    .    .    .    .    .<-------  DTSDY
Hydrograph   .    .    .    .    .    .  RTSDY
Combine      .    .    .    .    .  CPSDY...........
Combine      .    .    .    .   CPDR2...........
Retrieve     .    .    .    .    .   .<-------  DTSDX
Hydrograph   .    .    .    .    .  RTSDX
Combine      .    .    .    .   CPDR3...........
Retrieve     .    .    .    .    .   .<-------  DTK
Hydrograph   .    .    .    .    .  RTK
Retrieve     .    .    .    .    .    .    .<-------  DTL2
Hydrograph   .    .    .    .    .    .  RTL2
Combine      .    .    .    .    .  CPL2B...........
Retrieve     .    .    .    .    .    .    .<-------  DTM2
Hydrograph   .    .    .    .    .    .  RTM2
Combine      .    .    .    .    .  CPM2B...........
Retrieve     .    .    .    .    .    .    .<-------  DTO
Hydrograph   .    .    .    .    .    .  RTO
Combine      .    .    .    .    .  CPSDKO...........
Basin        .    .    .    .    .    .  SUBAA
Combine      .    .  CPAA...............................................
Route        .    .  RSAA
Combine    CPEND.......................
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RECOMMENDED PLAN

- **Hydrology**
  - *DDMSW Output*
  - *HEC-1 Output*
  - *Rational Method Calculations*
- **Hydraulics**
- **Cost Estimates**
- **Phasing and Implementation**

RECOMMENDED PLAN
HYDROLOGY

DDMSW OUTPUT

ID	Method	Duration	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
DEFAULT	NOAA14	5 MIN	0.247	0.335	0.402	0.493	0.564	0.636
	NOAA14	10 MIN	0.377	0.510	0.612	0.751	0.858	0.967
	NOAA14	15 MIN	0.467	0.632	0.759	0.931	1.064	1.199
	NOAA14	30 MIN	0.629	0.851	1.022	1.254	1.433	1.615
	NOAA14	1 HOUR	0.778	1.054	1.265	1.551	1.773	1.998
	NOAA14	2 HOUR	0.886	1.178	1.405	1.710	1.948	2.193
	NOAA14	3 HOUR	0.933	1.224	1.455	1.777	2.033	2.299
	NOAA14	6 HOUR	1.115	1.423	1.669	2.005	2.270	2.547
	NOAA14	12 HOUR	1.256	1.584	1.844	2.195	2.464	2.740
	NOAA14	24 HOUR	1.510	1.939	2.281	2.752	3.120	3.506

Major Basin ID	Type	Area		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin 01									
SUBA	Hydrograph	0.0600	Flow (cfs)		13	19			51
			Volume (Inches)		0.363	0.520			1.145
			Volume (Ac-Ft)		1.22	1.75			3.85
			Ac-Ft/Sq Mi		20.33	29.17			64.17
			Time to Peak (Hrs)		1.50	1.47			1.43
RSA	Routed	0.0600	Flow (cfs)		9	11			13
			Volume (Inches)		4.784	4.918			5.428
			Volume (Ac-Ft)		16.07	16.52			18.24
			Ac-Ft/Sq Mi		267.83	275.33			304.00
			Time to Peak (Hrs)		1.90	2.03			2.30
RTAB	Routed	0.0600	Flow (cfs)		9	11			13
			Volume (Inches)		4.701	4.835			5.345
			Volume (Ac-Ft)		15.80	16.25			17.96
			Ac-Ft/Sq Mi		263.33	270.83			299.33
			Time to Peak (Hrs)		2.67	2.80			3.03
SUBB	Hydrograph	0.1400	Flow (cfs)		33	46			107
			Volume (Inches)		0.497	0.672			1.345
			Volume (Ac-Ft)		3.60	4.88			9.76
			Ac-Ft/Sq Mi		25.71	34.86			69.71
			Time to Peak (Hrs)		1.57	1.57			1.50
CPB	Combined	0.2000	Flow (cfs)		36	48			109
			Volume (Inches)		1.828	1.990			2.611
			Volume (Ac-Ft)		19.40	21.12			27.71
			Ac-Ft/Sq Mi		97.00	105.60			138.55
			Time to Peak (Hrs)		1.57	1.57			1.50
RSCPB	Routed	0.2000	Flow (cfs)		35	47			92
			Volume (Inches)		1.830	1.992			2.613
			Volume (Ac-Ft)		19.42	21.14			27.74
			Ac-Ft/Sq Mi		97.10	105.70			138.70
			Time to Peak (Hrs)		1.63	1.63			1.77
RTBC	Routed	0.2000	Flow (cfs)		34	46			92
			Volume (Inches)		1.820	1.982			2.604
			Volume (Ac-Ft)		19.32	21.04			27.63
			Ac-Ft/Sq Mi		96.60	105.20			138.15
			Time to Peak (Hrs)		1.93	1.87			1.93
SUBC	Hydrograph	0.0900	Flow (cfs)		50	64			126
			Volume (Inches)		0.721	0.929			1.663
			Volume (Ac-Ft)		3.35	4.31			7.72
			Ac-Ft/Sq Mi		37.22	47.89			85.78
			Time to Peak (Hrs)		1.37	1.37			1.33
CPC	Combined	0.2900	Flow (cfs)		64	84			166
			Volume (Inches)		1.486	1.662			2.317
			Volume (Ac-Ft)		22.66	25.35			35.35
			Ac-Ft/Sq Mi		78.14	87.41			121.90
			Time to Peak (Hrs)		1.63	1.70			1.53
RSCPC	Routed	0.2900	Flow (cfs)		64	84			142
			Volume (Inches)		1.485	1.661			2.317
			Volume (Ac-Ft)		22.65	25.34			35.34

Major Basin ID	Type	Area		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
			Ac-Ft/Sq Mi		78.10	87.38			121.86
			Time to Peak (Hrs)		1.67	1.70			1.83
RTCD	Routed	0.2900	Flow (cfs)		63	84			142
			Volume (Inches)		1.482	1.659			2.314
			Volume (Ac-Ft)		22.61	25.30			35.30
			Ac-Ft/Sq Mi		77.97	87.24			121.72
			Time to Peak (Hrs)		1.73	1.77			1.90
SUBD	Hydrograph	0.0400	Flow (cfs)		38	49			91
			Volume (Inches)		0.727	0.935			1.672
			Volume (Ac-Ft)		1.63	2.10			3.74
			Ac-Ft/Sq Mi		40.75	52.50			93.50
			Time to Peak (Hrs)		1.23	1.23			1.20
CPD	Combined	0.3300	Flow (cfs)		74	97			178
			Volume (Inches)		1.386	1.566			2.232
			Volume (Ac-Ft)		24.24	27.39			39.04
			Ac-Ft/Sq Mi		73.45	83.00			118.30
			Time to Peak (Hrs)		1.43	1.47			1.33
RSCPD	Routed	0.3300	Flow (cfs)		73	95			177
			Volume (Inches)		1.387	1.568			2.233
			Volume (Ac-Ft)		24.27	27.42			39.07
			Ac-Ft/Sq Mi		73.55	83.09			118.39
			Time to Peak (Hrs)		1.63	1.67			1.40
RTDE	Routed	0.3300	Flow (cfs)		73	95			168
			Volume (Inches)		1.383	1.563			2.229
			Volume (Ac-Ft)		24.19	27.34			38.99
			Ac-Ft/Sq Mi		73.30	82.85			118.15
			Time to Peak (Hrs)		1.77	1.80			1.60
SUBE	Hydrograph	0.0700	Flow (cfs)		51	66			126
			Volume (Inches)		0.715	0.923			1.656
			Volume (Ac-Ft)		2.75	3.54			6.36
			Ac-Ft/Sq Mi		39.29	50.57			90.86
			Time to Peak (Hrs)		1.30	1.30			1.27
CPE	Combined	0.4000	Flow (cfs)		102	130			243
			Volume (Inches)		1.262	1.448			2.126
			Volume (Ac-Ft)		26.93	30.88			45.35
			Ac-Ft/Sq Mi		67.33	77.20			113.38
			Time to Peak (Hrs)		1.57	1.53			1.53
RSCPE	Routed	0.4000	Flow (cfs)		100	128			258
			Volume (Inches)		1.264	1.449			2.127
			Volume (Ac-Ft)		26.97	30.92			45.39
			Ac-Ft/Sq Mi		67.43	77.30			113.48
			Time to Peak (Hrs)		1.60	1.63			1.63
RTEF	Routed	0.4000	Flow (cfs)		99	127			209
			Volume (Inches)		1.258	1.443			2.121
			Volume (Ac-Ft)		26.84	30.79			45.26
			Ac-Ft/Sq Mi		67.10	76.98			113.15
			Time to Peak (Hrs)		1.77	1.77			1.77

Major Basin ID	Type	Area		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
SUBF	Hydrograph	0.0800	Flow (cfs)		37	49			99
			Volume (Inches)		0.641	0.845			1.569
			Volume (Ac-Ft)		2.56	3.38			6.28
			Ac-Ft/Sq Mi		32.00	42.25			78.50
			Time to Peak (Hrs)		1.40	1.40			1.33
CPF	Combined	0.4800	Flow (cfs)		124	160			260
			Volume (Inches)		1.161	1.349			2.034
			Volume (Ac-Ft)		29.40	34.17			51.54
			Ac-Ft/Sq Mi		61.25	71.19			107.38
			Time to Peak (Hrs)		1.67	1.67			1.77
RSCPF	Routed	0.4800	Flow (cfs)		108	127			234
			Volume (Inches)		1.161	1.349			2.034
			Volume (Ac-Ft)		29.40	34.17			51.53
			Ac-Ft/Sq Mi		61.25	71.19			107.35
			Time to Peak (Hrs)		1.93	2.07			1.90
SUBG	Hydrograph	0.0400	Flow (cfs)		12	17			43
			Volume (Inches)		0.380	0.545			1.196
			Volume (Ac-Ft)		0.85	1.22			2.68
			Ac-Ft/Sq Mi		21.25	30.50			67.00
			Time to Peak (Hrs)		1.40	1.40			1.37
RTGH	Routed	0.0400	Flow (cfs)		10	14			39
			Volume (Inches)		0.380	0.545			1.196
			Volume (Ac-Ft)		0.85	1.22			2.68
			Ac-Ft/Sq Mi		21.25	30.50			67.00
			Time to Peak (Hrs)		1.93	1.93			1.67
SUBH	Hydrograph	0.0700	Flow (cfs)		36	46			87
			Volume (Inches)		0.811	1.022			1.763
			Volume (Ac-Ft)		2.99	3.76			6.49
			Ac-Ft/Sq Mi		42.71	53.71			92.71
			Time to Peak (Hrs)		1.43	1.43			1.37
CPH	Combined	0.1100	Flow (cfs)		38	49			109
			Volume (Inches)		0.648	0.842			1.549
			Volume (Ac-Ft)		3.84	4.98			9.17
			Ac-Ft/Sq Mi		34.91	45.27			83.36
			Time to Peak (Hrs)		1.50	1.53			1.60
RTHI	Routed	0.1100	Flow (cfs)		36	47			101
			Volume (Inches)		0.648	0.842			1.549
			Volume (Ac-Ft)		3.84	4.98			9.17
			Ac-Ft/Sq Mi		34.91	45.27			83.36
			Time to Peak (Hrs)		2.10	2.00			1.90
SUBI	Hydrograph	0.1100	Flow (cfs)		38	48			94
			Volume (Inches)		0.792	1.003			1.744
			Volume (Ac-Ft)		4.73	5.99			10.42
			Ac-Ft/Sq Mi		43.00	54.45			94.73
			Time to Peak (Hrs)		1.63	1.63			1.57
CPI	Combined	0.2200	Flow (cfs)		66	88			181
			Volume (Inches)		0.721	0.923			1.647
			Volume (Ac-Ft)		8.57	10.98			19.59
			Ac-Ft/Sq Mi		38.95	49.91			89.05

Major Basin ID	Type	Area		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
			Time to Peak (Hrs)		1.97	1.93			1.83
RSCPI	Routed	0.2200	Flow (cfs)		63	78			111
			Volume (Inches)		1.138	1.339			2.065
			Volume (Ac-Ft)		13.53	15.93			24.57
			Ac-Ft/Sq Mi		61.50	72.41			111.68
			Time to Peak (Hrs)		2.13	2.17			2.33
RTIJ	Routed	0.2200	Flow (cfs)		61	78			111
			Volume (Inches)		1.133	1.334			2.061
			Volume (Ac-Ft)		13.48	15.87			24.51
			Ac-Ft/Sq Mi		61.27	72.14			111.41
			Time to Peak (Hrs)		2.50	2.43			2.60
SUBJ	Hydrograph	0.0900	Flow (cfs)		44	56			109
			Volume (Inches)		0.753	0.961			1.696
			Volume (Ac-Ft)		3.57	4.56			8.05
			Ac-Ft/Sq Mi		39.67	50.67			89.44
			Time to Peak (Hrs)		1.43	1.43			1.40
CPJ	Combined	0.3100	Flow (cfs)		71	92			142
			Volume (Inches)		1.024	1.228			1.957
			Volume (Ac-Ft)		17.05	20.43			32.56
			Ac-Ft/Sq Mi		55.00	65.90			105.03
			Time to Peak (Hrs)		2.40	2.27			1.80
RSCPJ	Routed	0.3100	Flow (cfs)		71	91			132
			Volume (Inches)		1.025	1.228			1.957
			Volume (Ac-Ft)		17.05	20.44			32.57
			Ac-Ft/Sq Mi		55.00	65.94			105.06
			Time to Peak (Hrs)		2.40	2.40			2.20
SUBK	Hydrograph	0.1700	Flow (cfs)		119	144			252
			Volume (Inches)		1.027	1.247			2.014
			Volume (Ac-Ft)		9.09	11.04			17.83
			Ac-Ft/Sq Mi		53.47	64.94			104.88
			Time to Peak (Hrs)		1.40	1.40			1.37
DTK	Diversion	0.1700	Flow (cfs)		119	144			252
			Volume (Inches)		0.169	0.388			1.155
			Volume (Ac-Ft)		1.49	3.44			10.23
			Ac-Ft/Sq Mi		8.76	20.24			60.18
			Time to Peak (Hrs)		2.07	1.80			1.47
DIK	Hydrograph	0.1700	Flow (cfs)		42	89			239
			Volume (Inches)		0.169	0.388			1.155
			Volume (Ac-Ft)		1.49	3.44			10.23
			Ac-Ft/Sq Mi		8.76	20.24			60.18
			Time to Peak (Hrs)		2.07	1.80			1.47
DTSDK	Diversion	0.1700	Flow (cfs)		42	87			87
			Volume (Inches)			0.001			0.400
			Volume (Ac-Ft)			0.01			3.54
			Ac-Ft/Sq Mi			0.06			20.82
			Time to Peak (Hrs)			1.80			1.47
DISDK	Hydrograph	0.1700	Flow (cfs)			2			152
			Volume (Inches)			0.001			0.400

Major Basin ID	Type	Area		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
			Volume (Ac-Ft)			0.01			3.54
			Ac-Ft/Sq Mi			0.06			20.82
			Time to Peak (Hrs)			1.80			1.47
RSK	Routed	0.1700	Flow (cfs)						6
			Volume (Inches)			0.001			0.400
			Volume (Ac-Ft)			0.01			3.54
			Ac-Ft/Sq Mi			0.06			20.82
			Time to Peak (Hrs)			1.83			1.97
SUBL2	Hydrograph	0.0900	Flow (cfs)		62	75			127
			Volume (Inches)		1.146	1.371			2.152
			Volume (Ac-Ft)		5.32	6.36			9.98
			Ac-Ft/Sq Mi		59.11	70.67			110.89
			Time to Peak (Hrs)		1.40	1.40			1.37
DTSDL2	Diversion	0.0900	Flow (cfs)		62	71			71
			Volume (Inches)			0.010			0.416
			Volume (Ac-Ft)			0.04			1.93
			Ac-Ft/Sq Mi			0.44			21.44
			Time to Peak (Hrs)			1.40			1.37
DISDL2	Hydrograph	0.0900	Flow (cfs)			4			56
			Volume (Inches)			0.010			0.416
			Volume (Ac-Ft)			0.04			1.93
			Ac-Ft/Sq Mi			0.44			21.44
			Time to Peak (Hrs)			1.40			1.37
CPL2	Combined	0.2500	Flow (cfs)			4			56
			Volume (Inches)			0.004			0.405
			Volume (Ac-Ft)			0.05			5.47
			Ac-Ft/Sq Mi			0.20			21.88
			Time to Peak (Hrs)			1.40			1.37
RSCPL2	Routed	0.2500	Flow (cfs)						4
			Volume (Inches)			0.004			0.405
			Volume (Ac-Ft)			0.05			5.47
			Ac-Ft/Sq Mi			0.20			21.88
			Time to Peak (Hrs)			1.53			5.13
SUBM2	Hydrograph	0.0900	Flow (cfs)		64	76			129
			Volume (Inches)		1.146	1.371			2.152
			Volume (Ac-Ft)		5.38	6.43			10.10
			Ac-Ft/Sq Mi		59.78	71.44			112.22
			Time to Peak (Hrs)		1.40	1.40			1.37
DTSDM	Diversion	0.0900	Flow (cfs)		64	72			72
			Volume (Inches)			0.011			0.420
			Volume (Ac-Ft)			0.05			1.97
			Ac-Ft/Sq Mi			0.56			21.89
			Time to Peak (Hrs)			1.40			1.37
DISDM2	Hydrograph	0.0900	Flow (cfs)			4			57
			Volume (Inches)			0.011			0.420
			Volume (Ac-Ft)			0.05			1.97
			Ac-Ft/Sq Mi			0.56			21.89
			Time to Peak (Hrs)			1.40			1.37

Major Basin ID	Type	Area		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
CPM2	Combined	0.3400	Flow (cfs)			4			59
			Volume (Inches)			0.006			0.409
			Volume (Ac-Ft)			0.10			7.44
			Ac-Ft/Sq Mi			0.29			21.88
			Time to Peak (Hrs)			1.40			1.37
RSCPM	Routed	0.3400	Flow (cfs)						5
			Volume (Inches)			0.006			0.409
			Volume (Ac-Ft)			0.10			7.44
			Ac-Ft/Sq Mi			0.29			21.88
			Time to Peak (Hrs)			1.53			1.80
SUBO	Hydrograph	0.0700	Flow (cfs)		48	59			102
			Volume (Inches)		1.046	1.266			2.035
			Volume (Ac-Ft)		3.68	4.46			7.16
			Ac-Ft/Sq Mi		52.57	63.71			102.29
			Time to Peak (Hrs)		1.37	1.37			1.33
DTO	Diversion	0.0700	Flow (cfs)		48	59			102
			Volume (Inches)						0.273
			Volume (Ac-Ft)						0.96
			Ac-Ft/Sq Mi						13.71
			Time to Peak (Hrs)						2.03
DIO	Hydrograph	0.0700	Flow (cfs)						29
			Volume (Inches)						0.273
			Volume (Ac-Ft)						0.96
			Ac-Ft/Sq Mi						13.71
			Time to Peak (Hrs)						2.03
CPO	Combined	0.4100	Flow (cfs)						34
			Volume (Inches)			0.005			0.387
			Volume (Ac-Ft)			0.10			8.40
			Ac-Ft/Sq Mi			0.24			20.49
			Time to Peak (Hrs)			1.53			2.03
RSCPO	Routed	0.4100	Flow (cfs)						4
			Volume (Inches)			0.005			0.387
			Volume (Ac-Ft)			0.10			8.40
			Ac-Ft/Sq Mi			0.24			20.49
			Time to Peak (Hrs)			5.83			3.70
DTCPO	Diversion	0.4100	Flow (cfs)						4
			Volume (Inches)						
			Volume (Ac-Ft)						
			Ac-Ft/Sq Mi						
			Time to Peak (Hrs)						
DICPO	Hydrograph	0.4100	Flow (cfs)						
			Volume (Inches)						
			Volume (Ac-Ft)						
			Ac-Ft/Sq Mi						
			Time to Peak (Hrs)						
SUBR	Hydrograph	0.0700	Flow (cfs)		51	62			108
			Volume (Inches)		1.021	1.240			2.006
			Volume (Ac-Ft)		3.60	4.37			7.06
			Ac-Ft/Sq Mi		51.43	62.43			100.86

Major Basin ID	Type	Area		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
			Time to Peak (Hrs)		1.33	1.33			1.30
DTR	Diversion	0.0700	Flow (cfs)		51	62			108
			Volume (Inches)						0.386
			Volume (Ac-Ft)						1.36
			Ac-Ft/Sq Mi						19.43
			Time to Peak (Hrs)						1.83
DIR	Hydrograph	0.0700	Flow (cfs)						42
			Volume (Inches)						0.386
			Volume (Ac-Ft)						1.36
			Ac-Ft/Sq Mi						19.43
			Time to Peak (Hrs)						1.83
RTRS	Routed	0.0700	Flow (cfs)						20
			Volume (Inches)						0.386
			Volume (Ac-Ft)						1.36
			Ac-Ft/Sq Mi						19.43
			Time to Peak (Hrs)						2.30
SUBS	Hydrograph	0.0600	Flow (cfs)		50	60			105
			Volume (Inches)		0.994	1.213			1.974
			Volume (Ac-Ft)		2.97	3.62			5.90
			Ac-Ft/Sq Mi		49.50	60.33			98.33
			Time to Peak (Hrs)		1.30	1.30			1.27
DTS	Diversion	0.0600	Flow (cfs)		50	60			105
			Volume (Inches)						0.400
			Volume (Ac-Ft)						1.20
			Ac-Ft/Sq Mi						20.00
			Time to Peak (Hrs)						1.67
DIS	Hydrograph	0.0600	Flow (cfs)						46
			Volume (Inches)						0.400
			Volume (Ac-Ft)						1.20
			Ac-Ft/Sq Mi						20.00
			Time to Peak (Hrs)						1.67
CPS	Combined	0.1200	Flow (cfs)						46
			Volume (Inches)						0.393
			Volume (Ac-Ft)						2.56
			Ac-Ft/Sq Mi						21.33
			Time to Peak (Hrs)						1.67
RTST	Routed	0.1200	Flow (cfs)						24
			Volume (Inches)						0.393
			Volume (Ac-Ft)						2.56
			Ac-Ft/Sq Mi						21.33
			Time to Peak (Hrs)						2.47
SUBV	Hydrograph	0.0500	Flow (cfs)		29	36			68
			Volume (Inches)		0.849	1.044			1.744
			Volume (Ac-Ft)		2.26	2.78			4.65
			Ac-Ft/Sq Mi		45.20	55.60			93.00
			Time to Peak (Hrs)		1.37	1.37			1.33
DTV	Diversion	0.0500	Flow (cfs)		29	36			68
			Volume (Inches)						0.169

Major Basin ID	Type	Area		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
			Volume (Ac-Ft)						0.45
			Ac-Ft/Sq Mi						9.00
			Time to Peak (Hrs)						2.13
DIV	Hydrograph	0.0500	Flow (cfs)						15
			Volume (Inches)						0.169
			Volume (Ac-Ft)						0.45
			Ac-Ft/Sq Mi						9.00
			Time to Peak (Hrs)						2.13
SUBW	Hydrograph	0.0200	Flow (cfs)		12	16			29
			Volume (Inches)		0.829	1.025			1.728
			Volume (Ac-Ft)		1.02	1.26			2.12
			Ac-Ft/Sq Mi		51.00	63.00			106.00
			Time to Peak (Hrs)		1.37	1.37			1.33
DTW	Diversion	0.0200	Flow (cfs)		12	16			29
			Volume (Inches)						0.261
			Volume (Ac-Ft)						0.32
			Ac-Ft/Sq Mi						16.00
			Time to Peak (Hrs)						2.07
DIW	Hydrograph	0.0200	Flow (cfs)						9
			Volume (Inches)						0.261
			Volume (Ac-Ft)						0.32
			Ac-Ft/Sq Mi						16.00
			Time to Peak (Hrs)						2.07
CPW	Combined	0.0700	Flow (cfs)						22
			Volume (Inches)						0.198
			Volume (Ac-Ft)						0.77
			Ac-Ft/Sq Mi						11.00
			Time to Peak (Hrs)						2.13
DTGB1	Diversion	0.0700	Flow (cfs)						22
			Volume (Inches)						
			Volume (Ac-Ft)						
			Ac-Ft/Sq Mi						
			Time to Peak (Hrs)						
DIGB1	Hydrograph	0.0700	Flow (cfs)						
			Volume (Inches)						
			Volume (Ac-Ft)						
			Ac-Ft/Sq Mi						
			Time to Peak (Hrs)						
SUBT	Hydrograph	0.0500	Flow (cfs)		27	33			60
			Volume (Inches)		0.942	1.147			1.873
			Volume (Ac-Ft)		2.26	2.75			4.49
			Ac-Ft/Sq Mi		45.20	55.00			89.80
			Time to Peak (Hrs)		1.37	1.37			1.33
DTT	Diversion	0.0500	Flow (cfs)		27	33			60
			Volume (Inches)						0.123
			Volume (Ac-Ft)						0.29
			Ac-Ft/Sq Mi						5.80
			Time to Peak (Hrs)						2.40

Major Basin ID	Type	Area		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
DIT	Hydrograph	0.0500	Flow (cfs)						9
			Volume (Inches)						0.123
			Volume (Ac-Ft)						0.29
			Ac-Ft/Sq Mi						5.80
			Time to Peak (Hrs)						2.40
CPT	Combined	0.2400	Flow (cfs)						32
			Volume (Inches)						0.223
			Volume (Ac-Ft)						2.85
			Ac-Ft/Sq Mi						11.88
			Time to Peak (Hrs)						2.40
SUBL1	Hydrograph	0.0400	Flow (cfs)		38	45			75
			Volume (Inches)		1.142	1.367			2.147
			Volume (Ac-Ft)		2.25	2.70			4.24
			Ac-Ft/Sq Mi		56.25	67.50			106.00
			Time to Peak (Hrs)		1.27	1.27			1.23
DTL1	Diversion	0.0400	Flow (cfs)		38	45			75
			Volume (Inches)						0.171
			Volume (Ac-Ft)						0.34
			Ac-Ft/Sq Mi						8.50
			Time to Peak (Hrs)						1.93
DIL1	Hydrograph	0.0400	Flow (cfs)						13
			Volume (Inches)						0.171
			Volume (Ac-Ft)						0.34
			Ac-Ft/Sq Mi						8.50
			Time to Peak (Hrs)						1.93
SUBP	Hydrograph	0.0900	Flow (cfs)		69	83			142
			Volume (Inches)		1.109	1.332			2.108
			Volume (Ac-Ft)		5.56	6.68			10.57
			Ac-Ft/Sq Mi		61.78	74.22			117.44
			Time to Peak (Hrs)		1.37	1.37			1.33
DTP	Diversion	0.0900	Flow (cfs)		69	83			142
			Volume (Inches)						0.173
			Volume (Ac-Ft)						0.87
			Ac-Ft/Sq Mi						9.67
			Time to Peak (Hrs)						2.27
DIP	Hydrograph	0.0900	Flow (cfs)						27
			Volume (Inches)						0.173
			Volume (Ac-Ft)						0.87
			Ac-Ft/Sq Mi						9.67
			Time to Peak (Hrs)						2.27
CPP	Combined	0.3700	Flow (cfs)						54
			Volume (Inches)						0.205
			Volume (Ac-Ft)						4.06
			Ac-Ft/Sq Mi						10.97
			Time to Peak (Hrs)						2.40
SUBM1	Hydrograph	0.0400	Flow (cfs)		37	44			74
			Volume (Inches)		1.137	1.361			2.141
			Volume (Ac-Ft)		2.30	2.76			4.34
			Ac-Ft/Sq Mi		57.50	69.00			108.50

Major Basin ID	Type	Area		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
			Time to Peak (Hrs)		1.30	1.30			1.27
DTM1	Diversion	0.0400	Flow (cfs)		37	44			74
			Volume (Inches)						0.168
			Volume (Ac-Ft)						0.34
			Ac-Ft/Sq Mi						8.50
			Time to Peak (Hrs)						1.97
DIM1	Hydrograph	0.0400	Flow (cfs)						13
			Volume (Inches)						0.168
			Volume (Ac-Ft)						0.34
			Ac-Ft/Sq Mi						8.50
			Time to Peak (Hrs)						1.97
SUBQ	Hydrograph	0.0900	Flow (cfs)		60	72			125
			Volume (Inches)		1.102	1.324			2.100
			Volume (Ac-Ft)		5.11	6.15			9.74
			Ac-Ft/Sq Mi		56.78	68.33			108.22
			Time to Peak (Hrs)		1.40	1.40			1.37
CPQ	Combined	0.5000	Flow (cfs)		60	72			125
			Volume (Inches)		0.193	0.232			0.535
			Volume (Ac-Ft)		5.11	6.15			14.14
			Ac-Ft/Sq Mi		10.22	12.30			28.28
			Time to Peak (Hrs)		1.40	1.40			1.37
SUBU	Hydrograph	0.0400	Flow (cfs)		31	38			67
			Volume (Inches)		0.986	1.198			1.949
			Volume (Ac-Ft)		2.31	2.81			4.57
			Ac-Ft/Sq Mi		57.75	70.25			114.25
			Time to Peak (Hrs)		1.33	1.33			1.30
DTU	Diversion	0.0400	Flow (cfs)		31	38			67
			Volume (Inches)						0.159
			Volume (Ac-Ft)						0.37
			Ac-Ft/Sq Mi						9.25
			Time to Peak (Hrs)						2.20
DIU	Hydrograph	0.0400	Flow (cfs)						12
			Volume (Inches)						0.159
			Volume (Ac-Ft)						0.37
			Ac-Ft/Sq Mi						9.25
			Time to Peak (Hrs)						2.20
SUBY	Hydrograph	0.0300	Flow (cfs)		26	32			56
			Volume (Inches)		1.002	1.220			1.983
			Volume (Ac-Ft)		1.66	2.02			3.28
			Ac-Ft/Sq Mi		55.33	67.33			109.33
			Time to Peak (Hrs)		1.30	1.30			1.27
DTY	Diversion	0.0300	Flow (cfs)		26	32			56
			Volume (Inches)						0.411
			Volume (Ac-Ft)						0.68
			Ac-Ft/Sq Mi						22.67
			Time to Peak (Hrs)						1.70
DIY	Hydrograph	0.0300	Flow (cfs)						24
			Volume (Inches)						0.411

Major Basin ID	Type	Area		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
			Volume (Ac-Ft)						0.68
			Ac-Ft/Sq Mi						22.67
			Time to Peak (Hrs)						1.70
CPY	Combined	0.0800	Flow (cfs)						24
			Volume (Inches)						0.263
			Volume (Ac-Ft)						1.05
			Ac-Ft/Sq Mi						13.13
			Time to Peak (Hrs)						1.70
SUBX	Hydrograph	0.0400	Flow (cfs)		28	34			61
			Volume (Inches)		0.955	1.171			1.927
			Volume (Ac-Ft)		1.88	2.31			3.80
			Ac-Ft/Sq Mi		47.00	57.75			95.00
			Time to Peak (Hrs)		1.33	1.33			1.30
DTX	Diversion	0.0400	Flow (cfs)		28	34			61
			Volume (Inches)						0.356
			Volume (Ac-Ft)						0.70
			Ac-Ft/Sq Mi						17.50
			Time to Peak (Hrs)						1.80
DIX	Hydrograph	0.0400	Flow (cfs)						23
			Volume (Inches)						0.356
			Volume (Ac-Ft)						0.70
			Ac-Ft/Sq Mi						17.50
			Time to Peak (Hrs)						1.80
RTXZ	Routed	0.0400	Flow (cfs)						12
			Volume (Inches)						0.356
			Volume (Ac-Ft)						0.70
			Ac-Ft/Sq Mi						17.50
			Time to Peak (Hrs)						2.23
SUBZ	Hydrograph	0.0400	Flow (cfs)		27	33			58
			Volume (Inches)		0.961	1.169			1.911
			Volume (Ac-Ft)		1.84	2.24			3.67
			Ac-Ft/Sq Mi		46.00	56.00			91.75
			Time to Peak (Hrs)		1.33	1.33			1.30
DTZ	Diversion	0.0400	Flow (cfs)		27	33			58
			Volume (Inches)						0.244
			Volume (Ac-Ft)						0.47
			Ac-Ft/Sq Mi						11.75
			Time to Peak (Hrs)						1.93
DIZ	Hydrograph	0.0400	Flow (cfs)						16
			Volume (Inches)						0.244
			Volume (Ac-Ft)						0.47
			Ac-Ft/Sq Mi						11.75
			Time to Peak (Hrs)						1.93
CPZ	Combined	0.1500	Flow (cfs)						37
			Volume (Inches)						0.282
			Volume (Ac-Ft)						2.23
			Ac-Ft/Sq Mi						14.87
			Time to Peak (Hrs)						2.20

Major Basin ID	Type	Area		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
RTSDK	Hydrograph		Flow (cfs)		42	87			87
			Volume (Inches)		0.189	0.435			0.847
			Volume (Ac-Ft)		1.49	3.43			6.69
			Ac-Ft/Sq Mi						
			Time to Peak (Hrs)		2.07	1.80			1.43
RTSDL2	Hydrograph		Flow (cfs)		62	71			71
			Volume (Inches)						
			Volume (Ac-Ft)		5.32	6.32			8.06
			Ac-Ft/Sq Mi						
			Time to Peak (Hrs)		1.40	1.30			1.13
CPL2B	Combined		Flow (cfs)		68	136			158
			Volume (Inches)						
			Volume (Ac-Ft)		6.81	9.75			14.74
			Ac-Ft/Sq Mi						
			Time to Peak (Hrs)		2.07	1.80			1.43
RTSDM	Hydrograph		Flow (cfs)		64	72			72
			Volume (Inches)						
			Volume (Ac-Ft)		5.38	6.38			8.13
			Ac-Ft/Sq Mi						
			Time to Peak (Hrs)		1.40	1.30			1.13
CPSDO	Combined		Flow (cfs)		126	185			230
			Volume (Inches)						
			Volume (Ac-Ft)		12.19	16.13			22.87
			Ac-Ft/Sq Mi						
			Time to Peak (Hrs)		1.40	1.80			1.43
SUBAA	Hydrograph	0.0500	Flow (cfs)		11	15			36
			Volume (Inches)		0.447	0.630			1.326
			Volume (Ac-Ft)		1.07	1.51			3.18
			Ac-Ft/Sq Mi		21.40	30.20			63.60
			Time to Peak (Hrs)		1.57	1.57			1.53
CPAA	Combined	0.6900	Flow (cfs)		196	246			386
			Volume (Inches)		0.500	0.647			1.154
			Volume (Ac-Ft)		18.38	23.79			42.42
			Ac-Ft/Sq Mi		26.64	34.48			61.48
			Time to Peak (Hrs)		1.40	1.80			1.43
RTCPO	Hydrograph		Flow (cfs)						4
			Volume (Inches)			0.003			0.229
			Volume (Ac-Ft)			0.10			8.40
			Ac-Ft/Sq Mi						
			Time to Peak (Hrs)			5.83			3.70
CPAA2	Combined	1.1000	Flow (cfs)		196	246			386
			Volume (Inches)		0.314	0.409			0.869
			Volume (Ac-Ft)		18.38	23.89			50.81
			Ac-Ft/Sq Mi		16.71	21.72			46.19
			Time to Peak (Hrs)		1.40	1.80			1.43
RSAA	Routed	1.1000	Flow (cfs)		7	8			9
			Volume (Inches)		0.314	0.409			0.748
			Volume (Ac-Ft)		18.38	23.89			43.72
			Ac-Ft/Sq Mi		16.71	21.72			39.75

Major Basin ID	Type	Area		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
			Time to Peak (Hrs)		3.27	3.33			3.87
CPEND	Combined	1.8800	Flow (cfs)		177	222			370
			Volume (Inches)		0.646	0.782			1.273
			Volume (Ac-Ft)		64.84	78.50			127.82
			Ac-Ft/Sq Mi		34.49	41.76			67.99
			Time to Peak (Hrs)		2.13	2.30			1.90

Phoenix-Mesa Gateway Airport Authority
Drainage Design Management System
HEC-1 SCHEMATIC
Project Reference: PMGAA 2H RECPLN
Major Basin: 01

Basin	SUBA
Route	RSA
Route	RTAB
Basin	. SUBB
Combine	CPB............
Route	RSCPB
Route	RTBC
Basin	. SUBC
Combine	CPC............
Route	RSCPC
Route	RTCD
Basin	. SUBD
Combine	CPD............
Route	RSCPD
Route	RTDE
Basin	. SUBE
Combine	CPE............
Route	RSCPE
Route	RTEF
Basin	. SUBF
Combine	CPF............
Route	RSCPF
Basin	. SUBG
Route	. RTGH
Basin	. . SUBH
Combine	. CPH............
Route	. RTHI
Basin	. . SUBI
Combine	. CPI............
Route	. RSCPI
Route	. RTIJ
Basin	. . SUBJ
Combine	. CPJ............
Route	. RSCPJ
Basin	. . SUBK
Divert	. . .-------> DTK
Hydrograph	. . DIK
Divert	. . .-------> DTSDK
Hydrograph	. . DISDK
Route	. . RSK
Basin	. . . SUBL2
Divert	. . . .-------> DTSDL2
Hydrograph	. . . DISDL2
Combine	. . CPL2............
Route	. . RSCPL2
Basin	. . . SUBM2
Divert	. . . .-------> DTSDM2
Hydrograph	. . . DISDM2
Combine	. . CPM2............
Route	. . RSCPM2
Basin	. . . SUBO
Divert	. . . .-------> DTO
Hydrograph	. . . DIO
Combine	. . CPO............
Route	. . RSCPO
Divert	. . .-------> DTCPO
Hydrograph	. . DICPO
Basin	. . . SUBR
Divert	. . . .-------> DTR
Hydrograph	. . . DIR
Route	. . . RTRS

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Basin        .   .   .   .   SUBS
Divert       .   .   .   .    .-------> DTS
Hydrograph   .   .   .   .    DIS
Combine      .   .   .  CPS...........
Route        .   .   .  RTST
Route        .   .   .   .    .-------> DTV
Route        .   .   .   .   .   SUBW
Divert       .   .   .   .   .    .-------> DTW
Hydrograph   .   .   .   .   .    DIW
Combine      .   .   .   .   CPW...........
Divert       .   .   .   .    .-------> DTGB1
Hydrograph   .   .   .   .   DIGB1
Basin        .   .   .   .   .   SUBT
Divert       .   .   .   .   .    .-------> DTT
Hydrograph   .   .   .   .   .    DIT
Combine      .   .   .  CPT.......................
Basin        .   .   .   .   SUBL1
Divert       .   .   .   .    .-------> DTL1
Hydrograph   .   .   .   .    DIL1
Basin        .   .   .   .   .   SUBP
Divert       .   .   .   .   .    .-------> DTP
Hydrograph   .   .   .   .   .    DIP
Combine      .   .   .  CPP.......................
Basin        .   .   .   .   SUBM1
Divert       .   .   .   .    .-------> DTM1
Hydrograph   .   .   .   .    DIM1
Basin        .   .   .   .   .   SUBQ
Combine      .   .   .  CPQ.......................
Basin        .   .   .   .   SUBU
Divert       .   .   .   .    .-------> DTU
Hydrograph   .   .   .   .    DIU
Basin        .   .   .   .   .   SUBY
Divert       .   .   .   .   .    .-------> DTY
Hydrograph   .   .   .   .   .    DIY
Combine      .   .   .   .   CPY...........
Basin        .   .   .   .   .   SUBX
Divert       .   .   .   .   .    .-------> DTX
Hydrograph   .   .   .   .   .    DIX
Route        .   .   .   .   .   RTXZ
Basin        .   .   .   .   .   .   SUBZ
Divert       .   .   .   .   .   .    .-------> DTZ
Hydrograph   .   .   .   .   .   .    DIZ
Combine      .   .   .   .   CPZ.......................
Retrieve     .   .   .   .   .    .<------- DTSDK
Hydrograph   .   .   .   .   .   RTSDK
Retrieve     .   .   .   .   .   .    .<------- DTSDL2
Hydrograph   .   .   .   .   .   .   RTSDL2
Combine      .   .   .   .   .   CPL2B...........
Retrieve     .   .   .   .   .   .    .<------- DTSDM2
Hydrograph   .   .   .   .   .   .   RTSDM2
Combine      .   .   .   .   .   CPSDO...........
Basin        .   .   .   .   .   .   SUBAA
Combine      .   .   .  CPAA.................................
Retrieve     .   .   .   .    .<------- DTCPO
Hydrograph   .   .   .   .   RTCPO
Combine      .   .  CPAA2.......................
Route        .   .  RSAA
Combine     CPEND.......................
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Major Basin ID: 01

Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					
SUBA	0.063	0.44	22.7	22.7	URBAN	0.055	0.23	0.35	4.70	0.261	16	**Tc (Hrs)**	0.691*	0.691*	0.691*	0.674*	0.619*	0.575 *
												Vel (f/s)	0.93	0.93	0.93	0.96	1.04	1.12
												R (Hrs)	0.616	0.616	0.616	0.599	0.545	0.502
SUBL1	0.037	0.28	18.0	18.0	URBAN	0.031	0.05	0.29	8.40	0.060	95	**Tc (Hrs)**	0.334	0.334	0.334	0.330	0.314	0.300
												Vel (f/s)	1.23	1.23	1.23	1.24	1.31	1.37
												R (Hrs)	0.259	0.259	0.259	0.256	0.242	0.230
SUBAA	0.045	0.32	6.3	6.3	URBAN	0.059	0.20	0.21	6.40	0.137	7	**Tc (Hrs)**	0.839*	0.839*	0.839*	0.820*	0.755*	0.706 *
												Vel (f/s)	0.56	0.56	0.56	0.57	0.62	0.66
												R (Hrs)	0.717	0.717	0.717	0.698	0.638	0.592
SUBL2	0.087	0.62	16.1	16.1	URBAN	0.029	0.05	0.25	9.70	0.042	95	**Tc (Hrs)**	0.497*	0.497*	0.497*	0.490*	0.466*	0.446 *
												Vel (f/s)	1.83	1.83	1.83	1.86	1.95	2.04
												R (Hrs)	0.467	0.467	0.467	0.460	0.435	0.414
SUBB	0.136	0.78	23.0	23.0	URBAN	0.047	0.20	0.39	5.70	0.169	26	**Tc (Hrs)**	0.786*	0.786*	0.786*	0.769*	0.712*	0.665 *
												Vel (f/s)	1.46	1.46	1.46	1.49	1.61	1.72
												R (Hrs)	0.724	0.724	0.724	0.707	0.649	0.602
SUBM1	0.038	0.28	14.2	14.2	URBAN	0.031	0.05	0.33	7.30	0.092	95	**Tc (Hrs)**	0.361	0.361	0.361	0.356	0.338	0.323
												Vel (f/s)	1.14	1.14	1.14	1.15	1.21	1.27
												R (Hrs)	0.278	0.278	0.278	0.274	0.258	0.246
SUBC	0.087	0.48	35.2	35.2	URBAN	0.049	0.20	0.25	9.70	0.040	28	**Tc (Hrs)**	0.494*	0.494*	0.494*	0.485*	0.455*	0.430 *
												Vel (f/s)	1.43	1.43	1.43	1.45	1.55	1.64
												R (Hrs)	0.378	0.378	0.378	0.371	0.345	0.324
SUBM2	0.088	0.63	17.4	17.4	URBAN	0.029	0.05	0.25	9.70	0.041	95	**Tc (Hrs)**	0.489*	0.489*	0.489*	0.482*	0.459*	0.439 *
												Vel (f/s)	1.89	1.89	1.89	1.92	2.01	2.10
												R (Hrs)	0.462	0.462	0.462	0.455	0.430	0.409
SUBD	0.042	0.24	63.0	63.0	URBAN	0.052	0.20	0.25	9.70	0.040	29	**Tc (Hrs)**	0.301	0.301	0.301	0.295	0.277	0.262
												Vel (f/s)	1.17	1.17	1.17	1.19	1.27	1.34
												R (Hrs)	0.189	0.189	0.189	0.186	0.173	0.162

* Non default value or value out of range

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
SUBE	0.072	0.36	42.0	42.0	URBAN	0.050	0.20	0.25	9.70	0.040	27	Tc (Hrs)	0.410	0.410	0.410	0.403	0.377	0.357
												Vel (f/s)	1.29	1.29	1.29	1.31	1.40	1.48
												R (Hrs)	0.272	0.272	0.272	0.267	0.248	0.233
SUBF	0.075	0.48	39.6	39.6	URBAN	0.052	0.21	0.27	8.80	0.052	21	Tc (Hrs)	0.505*	0.505*	0.505*	0.496*	0.462*	0.436 *
												Vel (f/s)	1.39	1.39	1.39	1.42	1.52	1.61
												R (Hrs)	0.422	0.422	0.422	0.413	0.382	0.358
SUBG	0.042	0.37	43.7	43.7	URBAN	0.057	0.23	0.38	5.60	0.177	15	Tc (Hrs)	0.517*	0.517*	0.517*	0.505*	0.463*	0.430 *
												Vel (f/s)	1.05	1.05	1.05	1.07	1.17	1.26
												R (Hrs)	0.489	0.489	0.489	0.476	0.433	0.398
SUBH	0.069	0.49	20.5	20.5	URBAN	0.044	0.16	0.29	8.40	0.061	47	Tc (Hrs)	0.549*	0.549*	0.549*	0.540*	0.508*	0.481 *
												Vel (f/s)	1.31	1.31	1.31	1.33	1.41	1.49
												R (Hrs)	0.494	0.494	0.494	0.485	0.452	0.426
SUBI	0.112	0.82	13.5	13.5	URBAN	0.045	0.18	0.25	9.70	0.041	38	Tc (Hrs)	0.818*	0.818*	0.818*	0.804*	0.755*	0.716 *
												Vel (f/s)	1.47	1.47	1.47	1.50	1.59	1.68
												R (Hrs)	0.880	0.880	0.880	0.863	0.805	0.759
SUBJ	0.089	0.59	30.4	30.4	URBAN	0.046	0.17	0.29	8.40	0.061	39	Tc (Hrs)	0.554*	0.554*	0.554*	0.545*	0.511*	0.483 *
												Vel (f/s)	1.56	1.56	1.56	1.59	1.69	1.79
												R (Hrs)	0.500	0.500	0.500	0.491	0.457	0.430
SUBK	0.166	0.65	15.4	15.4	URBAN	0.033	0.10	0.25	9.70	0.044	74	Tc (Hrs)	0.566*	0.566*	0.566*	0.557*	0.528*	0.503 *
												Vel (f/s)	1.68	1.68	1.68	1.71	1.81	1.90
												R (Hrs)	0.388	0.388	0.388	0.381	0.359	0.341
SUBO	0.066	0.46	17.5	17.5	URBAN	0.035	0.09	0.25	9.70	0.044	77	Tc (Hrs)	0.470*	0.470*	0.470*	0.463*	0.439*	0.419 *
												Vel (f/s)	1.44	1.44	1.44	1.46	1.54	1.61
												R (Hrs)	0.405	0.405	0.405	0.398	0.375	0.356
SUBP	0.094	0.58	15.6	15.6	URBAN	0.030	0.05	0.32	7.30	0.086	91	Tc (Hrs)	0.498*	0.498*	0.498*	0.491*	0.467*	0.446 *
												Vel (f/s)	1.71	1.71	1.71	1.73	1.82	1.91
												R (Hrs)	0.425	0.425	0.425	0.418	0.395	0.376

* Non default value or value out of range

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
SUBQ	0.087	0.61	16.3	16.3	URBAN	0.030	0.05	0.32	7.30	0.090	90	**Tc (Hrs)**	0.505*	0.505*	0.505*	0.498*	0.473*	0.452 *
												Vel (f/s)	1.77	1.77	1.77	1.80	1.89	1.98
												R (Hrs)	0.469	0.469	0.469	0.462	0.436	0.415
SUBR	0.066	0.43	16.4	16.4	URBAN	0.032	0.10	0.16	8.80	0.082	75	**Tc (Hrs)**	0.445*	0.445*	0.445*	0.438*	0.415	0.396
												Vel (f/s)	1.42	1.42	1.42	1.44	1.52	1.59
												R (Hrs)	0.361	0.361	0.361	0.355	0.334	0.317
SUBS	0.056	0.33	18.3	18.3	URBAN	0.033	0.10	0.16	8.00	0.109	73	**Tc (Hrs)**	0.385	0.385	0.385	0.379	0.359	0.342
												Vel (f/s)	1.26	1.26	1.26	1.28	1.35	1.42
												R (Hrs)	0.273	0.273	0.273	0.269	0.253	0.240
SUBT	0.045	0.41	14.8	14.8	URBAN	0.033	0.09	0.27	4.40	0.502	77	**Tc (Hrs)**	0.471*	0.471*	0.471*	0.463*	0.438*	0.418 *
												Vel (f/s)	1.28	1.28	1.28	1.30	1.37	1.44
												R (Hrs)	0.460	0.460	0.460	0.452	0.425	0.403
SUBU	0.044	0.39	17.9	17.9	URBAN	0.033	0.09	0.25	6.20	0.222	78	**Tc (Hrs)**	0.425*	0.425*	0.425*	0.419*	0.397	0.378
												Vel (f/s)	1.35	1.35	1.35	1.37	1.44	1.51
												R (Hrs)	0.400	0.400	0.400	0.394	0.370	0.351
SUBV	0.050	0.36	13.9	13.9	URBAN	0.036	0.10	0.26	4.35	0.535	68	**Tc (Hrs)**	0.485*	0.485*	0.485*	0.477*	0.450*	0.427 *
												Vel (f/s)	1.09	1.09	1.09	1.11	1.17	1.24
												R (Hrs)	0.403	0.403	0.403	0.396	0.371	0.351
SUBW	0.023	0.28	14.3	14.3	URBAN	0.040	0.10	0.26	5.10	0.381	64	**Tc (Hrs)**	0.449*	0.449*	0.449*	0.442*	0.416	0.395
												Vel (f/s)	0.91	0.91	0.91	0.93	0.99	1.04
												R (Hrs)	0.472	0.472	0.472	0.463	0.434	0.410
SUBX	0.037	0.32	19.0	19.0	URBAN	0.037	0.10	0.16	8.00	0.109	67	**Tc (Hrs)**	0.401	0.401	0.401	0.395	0.373	0.356
												Vel (f/s)	1.17	1.17	1.17	1.19	1.26	1.32
												R (Hrs)	0.353	0.353	0.353	0.347	0.326	0.309
SUBY	0.031	0.26	15.3	15.3	URBAN	0.035	0.10	0.16	8.80	0.088	73	**Tc (Hrs)**	0.372	0.372	0.372	0.366	0.347	0.330
												Vel (f/s)	1.03	1.03	1.03	1.04	1.10	1.16
												R (Hrs)	0.304	0.304	0.304	0.299	0.281	0.267

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
SUBZ	0.036	0.31	16.3	16.3	URBAN	0.034	0.09	0.28	5.80	0.245	76	**Tc (Hrs)**	0.400	0.400	0.400	0.394	0.372	0.354
												Vel (f/s)	1.14	1.14	1.14	1.15	1.22	1.28
												R (Hrs)	0.348	0.348	0.348	0.343	0.322	0.305

Route ID	LOB N	Chan N	ROB N	Length (ft)	Slope (ft/ft)	Max Elev (ft)		1.	2.	3.	4.	5.	6.	7.	8.
NORMAL DEPTH															
Major Basin 01															
RTAB	0.025	0.030	0.025	3,818.00	0.0042	-	X:	-	77.20	102.40	174.70	200.40	242.40	260.70	434.30
							Y:	1,373.77	1,373.01	1,372.00	1,370.28	1,370.29	1,371.00	1,372.00	1,372.92
RTBC	0.025	0.030	0.025	2,153.00	0.0028	-	X:	-	170.00	431.90	450.10	465.30	490.90	660.00	790.00
							Y:	1,364.53	1,361.00	1,359.03	1,357.00	1,357.00	1,360.01	1,362.16	1,365.11
RTCD	0.025	0.030	0.025	917.00	0.0038	-	X:	-	228.50	428.50	448.60	475.10	516.40	663.60	786.60
							Y:	1,359.00	1,354.10	1,353.99	1,352.07	1,352.00	1,355.02	1,356.01	1,359.24
RTDE	0.025	0.030	0.025	1,474.00	0.0027	-	X:	-	207.90	430.20	453.10	465.10	495.80	690.60	787.10
							Y:	1,355.00	1,350.84	1,350.00	1,348.00	1,348.01	1,350.89	1,352.99	1,355.31
RTEF	0.025	0.030	0.025	1,524.00	0.0013	-	X:	-	65.30	112.50	125.20	140.50	145.90	181.60	212.30
							Y:	1,346.95	1,346.05	1,342.35	1,341.00	1,341.00	1,341.96	1,344.69	1,347.00
RTGH	0.025	0.030	0.025	2,801.00	0.0036	-	X:	-	89.30	216.40	250.40	278.30	301.70	367.80	441.60
							Y:	1,377.94	1,376.00	1,372.00	1,369.00	1,369.00	1,373.00	1,373.96	1,374.00
RTHI	0.025	0.030	0.025	4,314.00	0.0030	-	X:	-	76.50	107.60	133.10	162.70	177.50	196.30	252.30
							Y:	1,364.00	1,361.85	1,361.00	1,358.00	1,358.00	1,360.00	1,362.00	1,362.82
RTIJ	0.025	0.030	0.025	2,907.00	0.0028	-	X:	-	76.00	134.60	150.20	203.70	218.20	250.50	328.70
							Y:	1,356.65	1,354.44	1,353.00	1,351.00	1,351.00	1,353.00	1,354.40	1,356.00
RTRS	0.025	0.030	0.025	1,248.00	0.0016	-	X:	-	1.00	50.00	75.00	100.00	125.00	131.00	132.00
							Y:	1,379.00	1,378.00	1,378.00	1,378.00	1,378.00	1,378.00	1,378.00	1,379.00
RTST	0.025	0.030	0.025	1,471.00	0.0020	-	X:	-	1.00	50.00	75.00	100.00	125.00	131.00	132.00
							Y:	1,379.00	1,378.00	1,378.00	1,378.00	1,378.00	1,378.00	1,378.00	1,379.00
RTXZ	0.025	0.030	0.025	2,050.00	0.0044	-	X:	-	12.00	20.00	25.00	30.00	40.00	48.00	60.00
							Y:	1,379.00	1,376.00	1,376.00	1,376.00	1,376.00	1,376.00	1,376.00	1,379.00

Route ID	LOB N	Chan N	ROB N	Length (ft)	Slope (ft/ft)	Max Elev (ft)	1.	2.	3.	4.	5.	6.	7.	8.

Storage Basin ID: RSA

Elevation Top of Dam:	-NA-
Length of Dam:	-NA-
Discharge Coefficient:	-NA-
Weir Coefficient:	-NA-

Infield Basin

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		0.05	0.27	0.80	2.14	4.55	7.97	7.97		
Discharge (cfs)	3	6	10	12	13	13	14	15		
Elevation (ft)	1,376.0	1,376.5	1,377.0	1,377.5	1,378.0	1,378.5	1,379.0	1,379.5	-	-

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Infield Basin
Peak Volume (ac-ft)	0.00	0.20	0.52	0.00	0.00	3.58	
Peak Stage (ft)	0.00	1,376.84	1,377.24	0.00	0.00	1,378.30	
Peak Discharge (cfs)	0.00	9.00	11.00	0.00	0.00	13.00	

Storage Basin ID: RSAA

Elevation Top of Dam:	-NA-
Length of Dam:	-NA-
Discharge Coefficient:	-NA-
Weir Coefficient:	-NA-

Regional Basin

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		0.53	2.29	6.80	14.44	23.46	32.89	42.71	53.08	
Discharge (cfs)		2	5	6	7	8	9	10	10	
Elevation (ft)	1,347.0	1,348.0	1,349.0	1,350.0	1,351.0	1,352.0	1,353.0	1,354.0	1,355.0	-

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Regional Basin
Peak Volume (ac-ft)	0.00	13.75	22.56	0.00	0.00	35.70	
Peak Stage (ft)	0.00	1,350.91	1,351.90	0.00	0.00	1,353.29	
Peak Discharge (cfs)	0.00	7.00	8.00	0.00	0.00	9.00	

Storage Basin ID: RSCPB

Elevation Top of Dam:	-NA-
Length of Dam:	-NA-
Discharge Coefficient:	-NA-
Weir Coefficient:	-NA-

Infield Basin

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)			0.05	0.16	0.36	0.69	1.22	2.03	2.03	
Discharge (cfs)	5	16	32	51	71	87	97	107	116	
Elevation (ft)	1,361.0	1,361.5	1,362.0	1,362.5	1,363.0	1,363.5	1,364.0	1,364.5	1,365.0	-

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Infield Basin
Peak Volume (ac-ft)	0.00	0.07	0.13	0.00	0.00	0.94	
Peak Stage (ft)	0.00	1,362.08	1,362.38	0.00	0.00	1,363.74	
Peak Discharge (cfs)	0.00	35.00	47.00	0.00	0.00	92.00	

Storage Basin ID: RSCPC

Elevation Top of Dam:	-NA-
Length of Dam:	-NA-
Discharge Coefficient:	-NA-
Weir Coefficient:	-NA-

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		0.33	0.69	1.26	2.18	3.54	5.52	8.31	12.21	12.21
Discharge (cfs)		110	128	140	152	163	174	185	195	204
Elevation (ft)	1,353.5	1,356.0	1,356.5	1,357.0	1,357.5	1,358.0	1,358.5	1,359.0	1,359.5	1,360.0

Infield Basin

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Infield Basin
Peak Volume (ac-ft)	0.00	0.19	0.25	0.00	0.00	1.41	
Peak Stage (ft)	0.00	1,354.95	1,355.40	0.00	0.00	1,357.08	
Peak Discharge (cfs)	0.00	64.00	84.00	0.00	0.00	142.00	

Storage Basin ID: RSCPD

Elevation Top of Dam:	-NA-
Length of Dam:	-NA-
Discharge Coefficient:	-NA-
Weir Coefficient:	-NA-

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)			0.09	0.28	0.61	1.17	1.20			
Discharge (cfs)	5	21	45	77	110	140	500			
Elevation (ft)	1,350.5	1,351.0	1,351.5	1,352.0	1,352.5	1,353.0	1,353.5	-	-	-

Infield Basin

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Infield Basin
Peak Volume (ac-ft)	0.00	0.26	0.46	0.00	0.00	1.17	
Peak Stage (ft)	0.00	1,351.94	1,352.28	0.00	0.00	1,353.05	
Peak Discharge (cfs)	0.00	73.00	95.00	0.00	0.00	177.00	

Storage Basin ID: RSCPE

Elevation Top of Dam:	-NA-
Length of Dam:	-NA-
Discharge Coefficient:	-NA-
Weir Coefficient:	-NA-

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)			0.05	0.15	0.32	0.60	1.13	2.11	2.20	
Discharge (cfs)	-	27	54	88	126	158	172	176	500	
Elevation (ft)	1,345.0	1,346.0	1,346.5	1,347.0	1,347.5	1,348.0	1,348.5	1,349.0	1,349.5	-

Infield Basin

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Infield Basin
Peak Volume (ac-ft)	0.00	0.20	0.34	0.00	0.00	2.13	
Peak Stage (ft)	0.00	1,347.16	1,347.54	0.00	0.00	1,349.13	
Peak Discharge (cfs)	0.00	100.00	128.00	0.00	0.00	258.00	

Storage Basin ID: RSCPF

Elevation Top of Dam: -NA-
Length of Dam: -NA-
Discharge Coefficient: -NA-
Weir Coefficient: -NA-

Infield Basin

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		0.02	0.09	0.25	0.54	1.07	1.83	2.84	4.10	5.61
Discharge (cfs)		37	55	75	93	109	123	135	146	300
Elevation (ft)	1,339.0	1,339.5	1,340.0	1,340.5	1,341.0	1,341.5	1,342.0	1,342.5	1,343.0	1,343.5

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Infield Basin
Peak Volume (ac-ft)	0.00	1.03	2.17	0.00	0.00	4.96	
Peak Stage (ft)	0.00	1,341.46	1,342.17	0.00	0.00	1,343.29	
Peak Discharge (cfs)	0.00	108.00	127.00	0.00	0.00	234.00	

Storage Basin ID: RSCPI

Elevation Top of Dam: -NA-
Length of Dam: -NA-
Discharge Coefficient: -NA-
Weir Coefficient: -NA-

Infield Basin

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		0.06	0.20	0.47	0.88	1.43	2.14	3.05	4.23	5.72
Discharge (cfs)	1	36	56	75	85	92	99	105	111	117
Elevation (ft)	1,352.5	1,354.0	1,354.5	1,355.0	1,355.5	1,356.0	1,356.5	1,357.0	1,357.5	1,358.0

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Infield Basin
Peak Volume (ac-ft)	0.00	0.30	0.60	0.00	0.00	4.14	
Peak Stage (ft)	0.00	1,354.69	1,355.16	0.00	0.00	1,357.46	
Peak Discharge (cfs)	0.00	63.00	78.00	0.00	0.00	111.00	

Storage Basin ID: RSCPJ

Elevation Top of Dam: -NA-
Length of Dam: -NA-
Discharge Coefficient: -NA-
Weir Coefficient: -NA-

Infield Basin

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)				0.02	0.10	0.40	1.19	2.94		
Discharge (cfs)		5	14	43	82	115	139	160		
Elevation (ft)	1,342.0	1,342.5	1,343.0	1,344.0	1,345.0	1,346.0	1,347.0	1,348.0	-	-

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Infield Basin
Peak Volume (ac-ft)	0.00	0.08	0.18	0.00	0.00	0.95	
Peak Stage (ft)	0.00	1,344.71	1,345.27	0.00	0.00	1,346.70	
Peak Discharge (cfs)	0.00	71.00	91.00	0.00	0.00	132.00	

Storage Basin ID: RSCPL2

Elevation Top of Dam: -NA-
Length of Dam: -NA-
Discharge Coefficient: -NA-
Weir Coefficient: -NA-

FUT IF Basin

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		1.82	6.17	6.20						
Discharge (cfs)		3	9	200						
Elevation (ft)	-	1.0	2.0	2.1	-	-	-	-	-	-

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	FUT IF Basin
Peak Volume (ac-ft)	0.00	0.00	0.05	0.00	0.00	2.39	
Peak Stage (ft)	0.00	0.00	0.03	0.00	0.00	1.13	
Peak Discharge (cfs)	0.00	0.00	0.00	0.00	0.00	4.00	

Storage Basin ID: RSCPM2

Elevation Top of Dam: -NA-
Length of Dam: -NA-
Discharge Coefficient: -NA-
Weir Coefficient: -NA-

FUT IF Basin

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		1.21	4.11	4.15						
Discharge (cfs)		3	9	200						
Elevation (ft)	-	1.0	2.0	2.1	-	-	-	-	-	-

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	FUT IF Basin
Peak Volume (ac-ft)	0.00	0.00	0.10	0.00	0.00	2.14	
Peak Stage (ft)	0.00	0.00	0.08	0.00	0.00	1.32	
Peak Discharge (cfs)	0.00	0.00	0.00	0.00	0.00	5.00	

Storage Basin ID: RSCPO

Elevation Top of Dam: -NA-
Length of Dam: -NA-
Discharge Coefficient: -NA-
Weir Coefficient: -NA-

FUT IF Basin

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		0.87	2.82	2.85						
Discharge (cfs)		3	9	200						
Elevation (ft)	-	1.0	2.0	2.1	-	-	-	-	-	-

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	FUT IF Basin
Peak Volume (ac-ft)	0.00	0.00	0.10	0.00	0.00	1.13	
Peak Stage (ft)	0.00	0.00	0.11	0.00	0.00	1.13	
Peak Discharge (cfs)	0.00	0.00	0.00	0.00	0.00	4.00	

Storage Basin ID: **RSK**

Elevation Top of Dam: -NA-
Length of Dam: -NA-
Discharge Coefficient: -NA-
Weir Coefficient: -NA-

FUT IF Basin

	1	2	3	4	5	6	7	8	9	10
Volume (ac-ft)		1.74	5.64	5.66						
Discharge (cfs)		3	9	200						
Elevation (ft)	-	1.0	2.0	2.1	-	-	-	-	-	-

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	FUT IF Basin
Peak Volume (ac-ft)	0.00	0.00	0.01	0.00	0.00	3.73	
Peak Stage (ft)	0.00	0.00	0.01	0.00	0.00	1.51	
Peak Discharge (cfs)	0.00	0.00	0.00	0.00	0.00	6.00	

Diversion ID/ DT Card ID	Maximum Volume (ac-ft)	Maximum Diversion (cfs)		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
DIK	8		**Inflow (cfs)**		10,000								
DTK			**Diversion (cfs)**		10,000								
DIL1	4		**Inflow (cfs)**		10,000								
DTL1			**Diversion (cfs)**		10,000								
DIM1	4		**Inflow (cfs)**		10,000								
DTM1			**Diversion (cfs)**		10,000								
DIO	6		**Inflow (cfs)**		10,000								
DTO			**Diversion (cfs)**		10,000								
DIP	10		**Inflow (cfs)**		10,000								
DTP			**Diversion (cfs)**		10,000								
DIR	6		**Inflow (cfs)**		10,000								
DTR			**Diversion (cfs)**		10,000								
DIS	5		**Inflow (cfs)**		10,000								
DTS			**Diversion (cfs)**		10,000								
DIT	4		**Inflow (cfs)**		10,000								
DTT			**Diversion (cfs)**		10,000								
DIU	4		**Inflow (cfs)**		10,000								
DTU			**Diversion (cfs)**		10,000								
DIV	4		**Inflow (cfs)**		10,000								
DTV			**Diversion (cfs)**		10,000								

Diversion ID/ DT Card ID	Maximum Volume (ac-ft)	Maximum Diversion (cfs)		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
DIW	2		**Inflow (cfs)**		10,000								
DTW			**Diversion (cfs)**		10,000								
DIX	3		**Inflow (cfs)**		10,000								
DTX			**Diversion (cfs)**		10,000								
DIY	3		**Inflow (cfs)**		10,000								
DTY			**Diversion (cfs)**		10,000								
DIZ	3		**Inflow (cfs)**		10,000								
DTZ			**Diversion (cfs)**		10,000								
DISDK		87	**Inflow (cfs)**		10,000								
DTSDK			**Diversion (cfs)**		10,000								
DISDL2		71	**Inflow (cfs)**		10,000								
DTSDL2			**Diversion (cfs)**		10,000								
DISDM2		72	**Inflow (cfs)**		10,000								
DTSDM2			**Diversion (cfs)**		10,000								
DIGB1	7		**Inflow (cfs)**		10,000								
DTGB1			**Diversion (cfs)**		10,000								
DICPO			**Inflow (cfs)**		10,000								
DTCPO			**Diversion (cfs)**		10,000								

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
Major Basin ID: 01									
SUBA	620	0.0077	12.2	0.05	95	0.0	DRY	0.030	Airports (Taxiways, runways, and paved areas)
	621	0.0554	87.8	0.25	5	0.0	DRY	0.058	Airports (Infield & open spaces)
		0.0631	**100.0**						
SUBAA	605	0.0009	2.0	0.05	95	0.0	DRY	0.031	Transportation (Paved Areas)
	705	0.0445	98.0	0.20	5	15.0	NORMAL	0.060	Regional Basin (Not Irrigated)
		0.0454	**100.0**						
SUBB	620	0.0320	23.6	0.05	95	0.0	DRY	0.028	Airports (Taxiways, runways, and paved areas)
	621	0.1038	76.4	0.25	5	0.0	DRY	0.053	Airports (Infield & open spaces)
		0.1358	**100.0**						
SUBC	620	0.0222	25.4	0.05	95	0.0	DRY	0.029	Airports (Taxiways, runways, and paved areas)
	621	0.0651	74.6	0.25	5	0.0	DRY	0.056	Airports (Infield & open spaces)
		0.0873	**100.0**						
SUBD	620	0.0112	26.8	0.05	95	0.0	DRY	0.031	Airports (Taxiways, runways, and paved areas)
	621	0.0306	73.2	0.25	5	0.0	DRY	0.060	Airports (Infield & open spaces)
		0.0418	**100.0**						
SUBE	620	0.0180	24.9	0.05	95	0.0	DRY	0.030	Airports (Taxiways, runways, and paved areas)
	621	0.0542	75.1	0.25	5	0.0	DRY	0.057	Airports (Infield & open spaces)
		0.0722	**100.0**						
SUBF	620	0.0136	18.2	0.05	95	0.0	DRY	0.029	Airports (Taxiways, runways, and paved areas)
	621	0.0611	81.8	0.25	5	0.0	DRY	0.057	Airports (Infield & open spaces)

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
Major Basin ID: 01									
		0.0747	**100.0**						
SUBG	620	0.0048	11.5	0.05	95	0.0	DRY	0.031	Airports (Taxiways, runways, and paved areas)
	621	0.0368	88.5	0.25	5	0.0	DRY	0.060	Airports (Infield & open spaces)
		0.0416	**100.0**						
SUBH	620	0.0327	47.2	0.05	95	0.0	DRY	0.030	Airports (Taxiways, runways, and paved areas)
	621	0.0366	52.8	0.25	5	0.0	DRY	0.057	Airports (Infield & open spaces)
		0.0693	**100.0**						
SUBI	620	0.0417	37.2	0.05	95	0.0	DRY	0.028	Airports (Taxiways, runways, and paved areas)
	621	0.0703	62.8	0.25	5	0.0	DRY	0.054	Airports (Infield & open spaces)
		0.1120	**100.0**						
SUBJ	620	0.0336	37.8	0.05	95	0.0	DRY	0.029	Airports (Taxiways, runways, and paved areas)
	621	0.0553	62.2	0.25	5	0.0	DRY	0.056	Airports (Infield & open spaces)
		0.0889	**100.0**						
SUBK	605	0.0028	1.7	0.05	95	0.0	DRY	0.027	Transportation (Paved Areas)
	620	0.1236	74.6	0.05	95	0.0	DRY	0.027	Airports (Taxiways, runways, and paved areas)
	621	0.0392	23.7	0.25	5	0.0	DRY	0.052	Airports (Infield & open spaces)
		0.1656	**100.0**						
SUBL1	605	0.0020	5.5	0.05	95	0.0	DRY	0.031	Transportation (Paved Areas)
	620	0.0345	94.5	0.05	95	0.0	DRY	0.031	Airports (Taxiways, runways, and paved areas)
		0.0365	**100.0**						
SUBL2	620	0.0870	100.0	0.05	95	0.0	DRY	0.029	Airports (Taxiways, runways, and paved areas)

Major Basin ID: 01

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
		0.0870	**100.0**						
SUBM1	605	0.0020	5.3	0.05	95	0.0	DRY	0.031	Transportation (Paved Areas)
	620	0.0358	94.7	0.05	95	0.0	DRY	0.031	Airports (Taxiways, runways, and paved areas)
		0.0378	**100.0**						
SUBM2	620	0.0883	100.0	0.05	95	0.0	DRY	0.029	Airports (Taxiways, runways, and paved areas)
		0.0883	**100.0**						
SUBO	605	0.0007	1.1	0.05	95	0.0	DRY	0.030	Transportation (Paved Areas)
	620	0.0525	79.3	0.05	95	0.0	DRY	0.030	Airports (Taxiways, runways, and paved areas)
	621	0.0130	19.6	0.25	5	0.0	DRY	0.058	Airports (Infield & open spaces)
		0.0662	**100.0**						
SUBP	605	0.0070	7.5	0.05	95	0.0	DRY	0.029	Transportation (Paved Areas)
	620	0.0820	87.6	0.05	95	0.0	DRY	0.029	Airports (Taxiways, runways, and paved areas)
	700	0.0046	4.9	0.10	5	90.0	NORMAL	0.056	General Open Space (Open space where no detail available)
		0.0936	**100.0**						
SUBQ	605	0.0072	8.3	0.05	95	0.0	DRY	0.029	Transportation (Paved Areas)
	620	0.0750	86.5	0.05	95	0.0	DRY	0.029	Airports (Taxiways, runways, and paved areas)
	700	0.0045	5.2	0.10	5	90.0	NORMAL	0.056	General Open Space (Open space where no detail available)
		0.0867	**100.0**						
SUBR	400	0.0547	83.4	0.10	80	75.0	NORMAL	0.030	Office General (Office where no detail available)
	605	0.0040	6.1	0.05	95	0.0	DRY	0.030	Transportation (Paved Areas)

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
Major Basin ID: 01									
SUBR	620	0.0013	2.0	0.05	95	0.0	DRY	0.030	Airports (Taxiways, runways, and paved areas)
	700	0.0056	8.5	0.10	5	90.0	NORMAL	0.058	General Open Space (Open space where no detail available)
		0.0656	**100.0**						
SUBS	400	0.0458	81.9	0.10	80	75.0	NORMAL	0.030	Office General (Office where no detail available)
	605	0.0041	7.3	0.05	95	0.0	DRY	0.030	Transportation (Paved Areas)
	700	0.0060	10.7	0.10	5	90.0	NORMAL	0.059	General Open Space (Open space where no detail available)
		0.0559	**99.9**						
SUBT	200	0.0026	5.8	0.10	80	60.0	NORMAL	0.031	General Commercial (Commercial where no detail available)
	510	0.0311	69.7	0.10	80	75.0	NORMAL	0.031	Tourist and Visitor Accommodations (Hotels, motels, resorts)
	605	0.0077	17.3	0.05	95	0.0	DRY	0.031	Transportation (Paved Areas)
	700	0.0032	7.2	0.10	5	90.0	NORMAL	0.060	General Open Space (Open space where no detail available)
		0.0446	**100.0**						
SUBU	200	0.0027	6.2	0.10	80	60.0	NORMAL	0.031	General Commercial (Commercial where no detail available)
	510	0.0317	72.4	0.10	80	75.0	NORMAL	0.031	Tourist and Visitor Accommodations (Hotels, motels, resorts)
	605	0.0066	15.1	0.05	95	0.0	DRY	0.031	Transportation (Paved Areas)
	700	0.0028	6.4	0.10	5	90.0	NORMAL	0.060	General Open Space (Open space where no detail available)
		0.0438	**100.1**						
SUBV	200	0.0179	35.9	0.10	80	60.0	NORMAL	0.031	General Commercial (Commercial where no detail available)
	400	0.0198	39.7	0.10	80	75.0	NORMAL	0.031	Office General (Office where no detail available)
	605	0.0035	7.0	0.05	95	0.0	DRY	0.031	Transportation (Paved Areas)
	700	0.0087	17.4	0.10	5	90.0	NORMAL	0.059	General Open Space (Open space where no detail available)

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
Major Basin ID: 01									
		0.0499	**100.0**						
SUBW	400	0.0161	70.9	0.10	80	75.0	NORMAL	0.033	Office General (Office where no detail available)
	605	0.0014	6.2	0.05	95	0.0	DRY	0.033	Transportation (Paved Areas)
	700	0.0052	22.9	0.10	5	90.0	NORMAL	0.064	General Open Space (Open space where no detail available)
		0.0227	**100.0**						
SUBX	200	0.0176	47.3	0.10	80	60.0	NORMAL	0.031	General Commercial (Commercial where no detail available)
	400	0.0098	26.3	0.10	80	75.0	NORMAL	0.031	Office General (Office where no detail available)
	605	0.0030	8.1	0.05	95	0.0	DRY	0.031	Transportation (Paved Areas)
	700	0.0068	18.3	0.10	5	90.0	NORMAL	0.061	General Open Space (Open space where no detail available)
		0.0372	**100.0**						
SUBY	400	0.0247	79.9	0.10	80	75.0	NORMAL	0.032	Office General (Office where no detail available)
	605	0.0028	9.1	0.05	95	0.0	DRY	0.032	Transportation (Paved Areas)
	700	0.0034	11.0	0.10	5	90.0	NORMAL	0.062	General Open Space (Open space where no detail available)
		0.0309	**100.0**						
SUBZ	400	0.0253	70.7	0.10	80	75.0	NORMAL	0.031	Office General (Office where no detail available)
	605	0.0045	12.6	0.05	95	0.0	DRY	0.031	Transportation (Paved Areas)
	620	0.0025	7.0	0.05	95	0.0	DRY	0.031	Airports (Taxiways, runways, and paved areas)
	700	0.0035	9.8	0.10	5	90.0	NORMAL	0.061	General Open Space (Open space where no detail available)
		0.0358	**100.1**						

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments

Major Basin ID: 01

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments
SUBA	645	55	64555	0.049	78.30	0.270	-	100	
	645	75	64575	0.014	21.70	0.230	-	100	
SUBAA	645	77	64577	0.024	53.50	0.050	-	100	
	645	112	645112	0.021	46.50	0.390	-	100	
SUBB	645	22	64522	0.025	18.40	0.040	-	100	
	645	55	64555	0.007	5.20	0.270	-	100	
	645	75	64575	0.104	76.40	0.230	-	100	
SUBC	645	22	64522	0.087	100.00	0.040	-	100	
SUBD	645	22	64522	0.042	100.00	0.040	-	100	
SUBE	645	22	64522	0.072	100.00	0.040	-	100	
SUBF	645	22	64522	0.010	13.40	0.040	-	100	
	645	77	64577	0.062	83.40	0.050	-	100	
	645	112	645112	0.002	3.20	0.390	-	100	
SUBG	645	22	64522	0.007	15.60	0.040	-	100	
	645	55	64555	0.003	6.20	0.270	-	100	
	645	75	64575	0.033	78.20	0.230	-	100	
SUBH	645	22	64522	0.043	62.60	0.040	-	100	
	645	75	64575	0.015	21.90	0.230	-	100	
	645	77	64577	0.011	15.40	0.050	-	100	
SUBI	645	22	64522	0.112	99.80	0.040	-	100	
	645	77	64577	0.000	0.20	0.050	-	100	
SUBJ	645	22	64522	0.037	41.70	0.040	-	100	
	645	77	64577	0.040	44.70	0.050	-	100	
	645	112	645112	0.012	13.60	0.390	-	100	
SUBK	645	22	64522	0.111	67.10	0.040	-	100	
	645	77	64577	0.054	32.90	0.050	-	100	
SUBL1	645	22	64522	0.005	14.50	0.040	-	100	
	645	76	64576	0.005	13.70	0.230	-	100	
	645	77	64577	0.010	27.10	0.050	-	100	
	645	78	64578	0.016	44.70	0.050	-	100	
SUBL2	645	22	64522	0.077	88.20	0.040	-	100	
	645	76	64576	0.000	0.30	0.230	-	100	
	645	77	64577	0.001	1.40	0.050	-	100	
	645	78	64578	0.009	10.10	0.050	-	100	
SUBM1	645	22	64522	0.020	52.50	0.040	-	100	
	645	76	64576	0.018	47.50	0.230	-	100	
SUBM2	645	22	64522	0.087	99.10	0.040	-	100	
	645	76	64576	0.001	0.90	0.230	-	100	
SUBO	645	22	64522	0.044	67.30	0.040	-	100	
	645	77	64577	0.021	32.40	0.050	-	100	
	645	112	645112	0.000	0.30	0.390	-	100	
SUBP	645	76	64576	0.026	28.20	0.230	-	100	
	645	77	64577	0.016	17.00	0.050	-	100	
	645	78	64578	0.046	49.60	0.050	-	100	
	645	112	645112	0.005	5.20	0.390	-	100	
SUBQ	645	22	64522	0.047	54.00	0.040	-	100	
	645	76	64576	0.040	46.00	0.230	-	100	
SUBR	645	22	64522	0.011	16.00	0.040	-	100	
	645	77	64577	0.055	84.00	0.050	-	100	
SUBS	645	77	64577	0.004	7.20	0.050	-	100	
	645	78	64578	0.045	80.50	0.050	-	100	
	645	112	645112	0.007	12.40	0.390	-	100	
SUBT	645	76	64576	0.014	30.50	0.230	-	100	
	645	78	64578	0.001	2.20	0.050	-	100	
	645	112	645112	0.030	67.30	0.390	-	100	
SUBU	645	22	64522	0.013	29.20	0.040	-	100	
	645	76	64576	0.031	70.80	0.230	-	100	

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments

Major Basin ID: 01

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments
SUBV	645	76	64576	0.016	31.70	0.230	-	100	
	645	78	64578	0.000	0.40	0.050	-	100	
	645	112	645112	0.034	67.90	0.390	-	100	
SUBW	645	76	64576	0.022	97.80	0.230	-	100	
	645	77	64577	0.001	2.20	0.050	-	100	
SUBX	645	22	64522	0.008	21.80	0.040	-	100	
	645	76	64576	0.008	22.60	0.230	-	100	
	645	77	64577	0.021	55.60	0.050	-	100	
SUBY	645	22	64522	0.027	88.00	0.040	-	100	
	645	112	645112	0.004	12.00	0.390	-	100	
SUBZ	645	22	64522	0.015	40.80	0.040	-	100	
	645	112	645112	0.021	59.20	0.390	-	100	

RECOMMENDED PLAN
HYDROLOGY

HEC-1 OUTPUT

```
1***************************************                                                     ***************************************
 *                                     *                                                     *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1) *                                                     *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN    1998             *                                                     *   HYDROLOGIC ENGINEERING CENTER     *
 *          VERSION 4.1                *                                                     *         609 SECOND STREET           *
 *                                     *                                                     *     DAVIS, CALIFORNIA 95616         *
 * RUN DATE   03SEP13  TIME  09:05:52  *                                                     *        (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        Phoenix-Mesa Gateway Airport Authority
            2           ID        PMGAA 2H RECPLN - Gateway East ADMP - Recommended Plan 2Hr
            3           ID        100 YEAR
            4           ID        2 Hour  Storm
            5           ID        Unit Hydrograph: Clark
            6           ID        Storm: Single
            7           ID        09/03/2013
            8           IT        2       0       0    2000
            9           IN        5
           10           IO        5
                        *DIAGRAM
                        *
                        *

           11           KK     SUBA   BASIN
           12           BA    0.063
           13           PB    2.193
           14           PC    0.000   0.007   0.014   0.021   0.028   0.039   0.049   0.077   0.109   0.144
           15           PC    0.196   0.267   0.418   0.688   0.793   0.853   0.891   0.923   0.951   0.961
           16           PC    0.972   0.979   0.986   0.993   1.000
           17           LG     0.23    0.35    4.70    0.26      16
           18           UC    0.575   0.502
           19           UA        0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
           20           UA      100
                        *

           21           KK      RSA STORAGE
           22           KO
           23           RS        1    STOR
           24           SV             0.05    0.27    0.80    2.14    4.55    7.97    7.97
           25           SQ     2.80    6.37   10.20   11.88   12.57   13.29   13.99   14.63
           26           SE  1376.0 1376.50 1377.00 1377.50 1378.00 1378.50 1379.00 1379.50
                        *

           27           KK     RTAB   ROUTE
           28           RS        9    .004
           29           RC    0.025   0.030   0.025    3818  0.0042    0.00
           30           RX     0.00   77.20  102.40  174.70  200.40  242.40  260.70  434.30
           31           RY  1373.8 1373.01 1372.00 1370.28 1370.29 1371.00 1372.00 1372.92
                        *

           32           KK     SUBB   BASIN
           33           BA    0.136
           34           LG     0.20    0.39    5.70    0.17      26
           35           UC    0.665   0.602
           36           UA        0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
           37           UA      100
                        *

           38           KK      CPB COMBINE
           39           HC        2
                        *
1                                                     HEC-1 INPUT                                                     PAGE  2

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

           40           KK    RSCPB STORAGE
```

```
  41            KO
  42            RS       1     STOR
  43            SV                   0.05    0.16    0.36    0.69    1.22    2.03    2.03
  44            SQ    5.05   16.07   32.06   51.49   71.33   87.21   97.27  106.96  115.99
  45            SE  1361.0 1361.50 1362.00 1362.50 1363.00 1363.50 1364.00 1364.50 1365.00
                *

  46            KK    RTBC   ROUTE
  47            RS       5    FLOW
  48            RC   0.025   0.030   0.025    2153  0.0028    0.00
  49            RX    0.00  170.00  431.90  450.10  465.30  490.90  660.00  790.00
  50            RY  1364.5 1361.00 1359.03 1357.00 1357.00 1360.01 1362.16 1365.11
                *

  51            KK    SUBC   BASIN
  52            BA   0.087
  53            LG    0.20    0.25    9.70    0.04      28
  54            UC   0.430   0.324
  55            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
  56            UA     100
                *

  57            KK     CPC COMBINE
  58            HC       2
                *

  59            KK   RSCPC STORAGE
  60            KO
  61            RS       1    STOR
  62            SV            0.33    0.69    1.26    2.18    3.54    5.52    8.31   12.21   12.21
  63            SQ          110.49  127.59  140.03  151.93  163.28  174.31  184.90  195.20  203.95
  64            SE  1353.5 1356.00 1356.50 1357.00 1357.50 1358.00 1358.50 1359.00 1359.50 1360.00
                *

  65            KK    RTCD   ROUTE
  66            RS       2    FLOW
  67            RC   0.025   0.030   0.025     917  0.0038    0.00
  68            RX    0.00  228.50  428.50  448.60  475.10  516.40  663.60  786.60
  69            RY  1359.0 1354.10 1353.99 1352.07 1352.00 1355.02 1356.01 1359.24
                *

  70            KK    SUBD   BASIN
  71            BA   0.042
  72            LG    0.20    0.25    9.70    0.04      29
  73            UC   0.262   0.162
  74            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
  75            UA     100
                *
1                                      HEC-1 INPUT                                          PAGE  3

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


  76            KK     CPD COMBINE
  77            HC       2
                *

  78            KK   RSCPD STORAGE
  79            KO
  80            RS       1    STOR
  81            SV                    0.09    0.28    0.61    1.17    1.20
  82            SQ    5.05   20.72   45.32   76.51  109.89  140.01  500.00
  83            SE  1350.5 1351.00 1351.50 1352.00 1352.50 1353.00 1353.50
                *

  84            KK    RTDE   ROUTE
  85            RS       5    FLOW
  86            RC   0.025   0.030   0.025    1474  0.0027    0.00
  87            RX    0.00  207.90  430.20  453.10  465.10  495.80  690.60  787.10
  88            RY  1355.0 1350.84 1350.00 1348.00 1348.01 1350.89 1352.99 1355.31
                *

  89            KK    SUBE   BASIN
  90            BA   0.072
  91            LG    0.20    0.25    9.70    0.04      27
  92            UC   0.357   0.233
  93            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
  94            UA     100
                *

  95            KK     CPE COMBINE
  96            HC       2
                *

  97            KK   RSCPE STORAGE
  98            KO
  99            RS       1    STOR
 100            SV                    0.05    0.15    0.32    0.60    1.13    2.11    2.20
 101            SQ    0.32   27.15   54.17   88.14  125.55  158.05  172.28  175.83  500.00
 102            SE  1345.0 1346.00 1346.50 1347.00 1347.50 1348.00 1348.50 1349.00 1349.50
                *

 103            KK    RTEF   ROUTE
 104            RS       4    FLOW
 105            RC   0.025   0.030   0.025    1524  0.0013    0.00
 106            RX    0.00   65.30  112.50  125.20  140.50  145.90  181.60  212.30
```

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      107         RY  1347.0 1346.05 1342.35 1341.00 1341.00 1341.96 1344.69 1347.00
                      *

      108         KK    SUBF   BASIN
      109         BA   0.075
      110         LG    0.21    0.27    8.80    0.05      21
      111         UC   0.436   0.358
      112         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
      113         UA     100
                      *
1                                           HEC-1 INPUT                                             PAGE  4

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


      114         KK     CPF COMBINE
      115         HC       2
                      *

      116         KK   RSCPF STORAGE
      117         KO
      118         RS       1    STOR
      119         SV            0.02    0.09    0.25    0.54    1.07    1.83    2.84    4.10    5.61
      120         SQ           37.05   55.20   74.99   93.30  109.16  122.94  135.18  146.29  300.00
      121         SE  1339.0 1339.50 1340.00 1340.50 1341.00 1341.50 1342.00 1342.50 1343.00 1343.50
                      *

      122         KK    SUBG   BASIN
      123         BA   0.042
      124         LG    0.23    0.38    5.60    0.18      15
      125         UC   0.430   0.398
      126         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
      127         UA     100
                      *

      128         KK    RTGH   ROUTE
      129         RS       9    FLOW
      130         RC   0.025   0.030   0.025    2801  0.0036    0.00
      131         RX    0.00   89.30  216.40  250.40  278.30  301.70  367.80  441.60
      132         RY  1377.9 1376.00 1372.00 1369.00 1369.00 1373.00 1373.96 1374.00
                      *

      133         KK    SUBH   BASIN
      134         BA   0.069
      135         LG    0.16    0.29    8.40    0.06      47
      136         UC   0.481   0.426
      137         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
      138         UA     100
                      *

      139         KK     CPH COMBINE
      140         HC       2
                      *

      141         KK    RTHI   ROUTE
      142         RS       9    FLOW
      143         RC   0.025   0.030   0.025    4314  0.0030    0.00
      144         RX    0.00   76.50  107.60  133.10  162.70  177.50  196.30  252.30
      145         RY  1364.0 1361.85 1361.00 1358.00 1358.00 1360.00 1362.00 1362.82
                      *

      146         KK    SUBI   BASIN
      147         BA   0.112
      148         LG    0.18    0.25    9.70    0.04      38
      149         UC   0.716   0.759
      150         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
      151         UA     100
                      *
1                                           HEC-1 INPUT                                             PAGE  5

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


      152         KK     CPI COMBINE
      153         HC       2
                      *

      154         KK   RSCPI STORAGE
      155         KO
      156         RS       1    STOR
      157         SV            0.06    0.20    0.47    0.88    1.43    2.14    3.05    4.23    5.72
      158         SQ    0.98   36.15   55.83   74.70   85.18   92.15   98.84  105.30  111.45  117.37
      159         SE  1352.5 1354.00 1354.50 1355.00 1355.50 1356.00 1356.50 1357.00 1357.50 1358.00
                      *

      160         KK    RTIJ   ROUTE
      161         RS       7    FLOW
      162         RC   0.025   0.030   0.025    2907  0.0028    0.00
      163         RX    0.00   76.00  134.60  150.20  203.70  218.20  250.50  328.70
      164         RY  1356.7 1354.44 1353.00 1351.00 1351.00 1353.00 1354.40 1356.00
                      *

      165         KK    SUBJ   BASIN
      166         BA   0.089
      167         LG    0.17    0.29    8.40    0.06      39
      168         UC   0.483   0.430
```

```
 169          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 170          UA     100
              *

 171          KK     CPJ COMBINE
 172          HC       2
              *

 173          KK   RSCPJ STORAGE
 174          KO
 175          RS       1    STOR
 176          SV                            0.02    0.10    0.40    1.19    2.94
 177          SQ            4.54   14.00   43.47   82.13  114.53  139.46  160.22
 178          SE  1342.0 1342.50 1343.00 1344.00 1345.00 1346.00 1347.00 1348.00
              *

 179          KK    SUBK   BASIN
 180          BA   0.166
 181          LG    0.10    0.25    9.70    0.04      74
 182          UC   0.503   0.341
 183          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 184          UA     100
              *

 185          KK     DIK  DIVERT
 186          DT     DTK     7.6     0.0
 187          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 188          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  6

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


 189          KK   DISDK  DIVERT
 190          DT   DTSDK     0.0    87.0
 191          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 192          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 193          KK     RSK STORAGE
 194          KO
 195          RS       1    STOR
 196          SV            1.74    5.64    5.66
 197          SQ            3.30    8.60  200.00
 198          SE            1.00    2.00    2.10
              *

 199          KK   SUBL2   BASIN
 200          BA   0.087
 201          LG    0.05    0.25    9.70    0.04      95
 202          UC   0.446   0.414
 203          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 204          UA     100
              *

 205          KK  DISDL2  DIVERT
 206          DT  DTSDL2     0.0    71.0
 207          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 208          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 209          KK    CPL2 COMBINE
 210          HC       2
              *

 211          KK  RSCPL2 STORAGE
 212          KO
 213          RS       1    STOR
 214          SV            1.82    6.17    6.20
 215          SQ            3.30    8.60  200.00
 216          SE            1.00    2.00    2.10
              *

 217          KK   SUBM2   BASIN
 218          BA   0.088
 219          LG    0.05    0.25    9.70    0.04      95
 220          UC   0.439   0.409
 221          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 222          UA     100
              *

 223          KK  DISDM2  DIVERT
 224          DT  DTSDM2     0.0    72.0
 225          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 226          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


 227          KK    CPM2 COMBINE
 228          HC       2
              *
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```
 229          KK  RSCPM2 STORAGE
 230          KO
 231          RS       1    STOR
 232          SV            1.21    4.11    4.15
 233          SQ            3.30    8.60  200.00
 234          SE            1.00    2.00    2.10
              *

 235          KK    SUBO   BASIN
 236          BA   0.066
 237          LG    0.09    0.25    9.70    0.04      77
 238          UC   0.419   0.356
 239          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 240          UA     100
              *

 241          KK     DIO  DIVERT
 242          DT     DTO     6.2     0.0
 243          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 244          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 245          KK     CPO COMBINE
 246          HC       2
              *

 247          KK   RSCPO STORAGE
 248          KO
 249          RS       1    STOR
 250          SV            0.87    2.82    2.85
 251          SQ            3.30    8.60  200.00
 252          SE            1.00    2.00    2.10
              *

 253          KK   DICPO  DIVERT
 254          DT  DTCPO      0.0     0.0
 255          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 256          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 257          KK    SUBR   BASIN
 258          BA   0.066
 259          LG    0.10    0.16    8.80    0.08      75
 260          UC   0.396   0.317
 261          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 262          UA     100
              *
1                                             HEC-1 INPUT                                         PAGE  8

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


 263          KK     DIR  DIVERT
 264          DT     DTR     5.7     0.0
 265          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 266          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 267          KK    RTRS   ROUTE
 268          RS       3    FLOW
 269          RC   0.025   0.030   0.025    1248  0.0016    0.00
 270          RX    0.00    1.00   50.00   75.00  100.00  125.00  131.00  132.00
 271          RY  1379.0 1378.00 1378.00 1378.00 1378.00 1378.00 1378.00 1379.00
              *

 272          KK    SUBS   BASIN
 273          BA   0.056
 274          LG    0.10    0.16    8.00    0.11      73
 275          UC   0.342   0.240
 276          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 277          UA     100
              *

 278          KK     DIS  DIVERT
 279          DT     DTS     4.7     0.0
 280          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 281          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 282          KK     CPS COMBINE
 283          HC       2
              *

 284          KK    RTST   ROUTE
 285          RS       4    FLOW
 286          RC   0.025   0.030   0.025    1471  0.0020    0.00
 287          RX    0.00    1.00   50.00   75.00  100.00  125.00  131.00  132.00
 288          RY  1379.0 1378.00 1378.00 1378.00 1378.00 1378.00 1378.00 1379.00
              *

 289          KK    SUBV   BASIN
 290          BA   0.050
 291          LG    0.10    0.26    4.35    0.54      68
 292          UC   0.427   0.351
 293          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 294          UA     100
```

```
                   *

       295         KK     DIV  DIVERT
       296         DT     DTV     4.2     0.0
       297         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
       298         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  9

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


       299         KK    SUBW   BASIN
       300         BA   0.023
       301         LG    0.10    0.26    5.10    0.38      64
       302         UC   0.395   0.410
       303         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
       304         UA     100
                   *

       305         KK     DIW  DIVERT
       306         DT     DTW     1.8     0.0
       307         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
       308         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *

       309         KK     CPW COMBINE
       310         HC       2
                   *

       311         KK   DIGB1  DIVERT
       312         DT   DTGB1     6.5     0.0
       313         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
       314         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *

       315         KK    SUBT   BASIN
       316         BA   0.045
       317         LG    0.09    0.27    4.40    0.50      77
       318         UC   0.418   0.403
       319         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
       320         UA     100
                   *

       321         KK     DIT  DIVERT
       322         DT     DTT     4.2     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     CPT COMBINE
       326         HC       3
                   *

       327         KK   SUBL1   BASIN
       328         BA   0.037
       329         LG    0.05    0.29    8.40    0.06      95
       330         UC   0.300   0.230
       331         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
       332         UA     100
                   *
1                                        HEC-1 INPUT                                             PAGE 10

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


       333         KK    DIL1  DIVERT
       334         DT    DTL1     3.9     0.0
       335         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
       336         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *

       337         KK    SUBP   BASIN
       338         BA   0.094
       339         LG    0.05    0.32    7.30    0.09      91
       340         UC   0.446   0.376
       341         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
       342         UA     100
                   *

       343         KK     DIP  DIVERT
       344         DT     DTP     9.7     0.0
       345         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
       346         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *

       347         KK     CPP COMBINE
       348         HC       3
                   *

       349         KK   SUBM1   BASIN
       350         BA   0.038
       351         LG    0.05    0.33    7.30    0.09      95
       352         UC   0.323   0.246
       353         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
       354         UA     100
```

```
                *

    355         KK    DIM1  DIVERT
    356         DT    DTM1     4.0     0.0
    357         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
    358         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                *

    359         KK    SUBQ   BASIN
    360         BA   0.087
    361         LG    0.05    0.32    7.30    0.09      90
    362         UC   0.452   0.415
    363         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
    364         UA     100
                *

    365         KK     CPQ COMBINE
    366         HC       3
                *
1                                            HEC-1 INPUT                                          PAGE 11

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


    367         KK    SUBU   BASIN
    368         BA   0.044
    369         LG    0.09    0.25    6.20    0.22      78
    370         UC   0.378   0.351
    371         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
    372         UA     100
                *

    373         KK     DIU  DIVERT
    374         DT     DTU     4.2     0.0
    375         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
    376         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                *

    377         KK    SUBY   BASIN
    378         BA   0.031
    379         LG    0.10    0.16    8.80    0.09      73
    380         UC   0.330   0.267
    381         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
    382         UA     100
                *

    383         KK     DIY  DIVERT
    384         DT     DTY     2.6     0.0
    385         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
    386         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                *

    387         KK     CPY COMBINE
    388         HC       2
                *

    389         KK    SUBX   BASIN
    390         BA   0.037
    391         LG    0.10    0.16    8.00    0.11      67
    392         UC   0.356   0.309
    393         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
    394         UA     100
                *

    395         KK     DIX  DIVERT
    396         DT     DTX     3.1     0.0
    397         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
    398         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                *

    399         KK    RTXZ   ROUTE
    400         RS       5    FLOW
    401         RC   0.025   0.030   0.025    2050  0.0044    0.00
    402         RX    0.00   12.00   20.00   25.00   30.00   40.00   48.00   60.00
    403         RY  1379.0 1376.00 1376.00 1376.00 1376.00 1376.00 1376.00 1379.00
                *
1                                            HEC-1 INPUT                                          PAGE 12

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


    404         KK    SUBZ   BASIN
    405         BA   0.036
    406         LG    0.09    0.28    5.80    0.25      76
    407         UC   0.354   0.305
    408         UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
    409         UA     100
                *

    410         KK     DIZ  DIVERT
    411         DT     DTZ     3.2     0.0
    412         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
    413         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                *

    414         KK     CPZ COMBINE
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```
        415           HC        3
                      *

        416           KK    RTSDKRETRIEVE
        417           DR    DTSDK
                      *

        418           KK   RTSDL2RETRIEVE
        419           DR   DTSDL2
                      *

        420           KK    CPL2B COMBINE
        421           HC        2    .253
                      *

        422           KK   RTSDM2RETRIEVE
        423           DR   DTSDM2
                      *

        424           KK    CPSDO COMBINE
        425           HC        2    .341
                      *

        426           KK    SUBAA   BASIN
        427           BA    0.045
        428           LG     0.20    0.21    6.40    0.14       7
        429           UC    0.706   0.592
        430           UA        0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
        431           UA      100
                      *

        432           KK     CPAA COMBINE
        433           KO        1
        434           HC        4    .686
                      *
1                                                 HEC-1 INPUT                                          PAGE 13

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


        435           KK    RTCPORETRIEVE
        436           DR    DTCPO
                      *

        437           KK    CPAA2 COMBINE
        438           HC        3   1.093
                      *

        439           KK     RSAA STORAGE
        440           KO
        441           RS        1    STOR
        442           SV             0.53    2.29    6.80   14.44   23.46   32.89   42.71   53.08
        443           SQ             2.30    4.60    6.00    7.10    8.10    8.80    9.50   10.20
        444           SE   1347.0 1348.00 1349.00 1350.00 1351.00 1352.00 1353.00 1354.00 1355.00
                      *

        445           KK    CPEND COMBINE
        446           HC        3    1.88
                      *
        447           ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE       (V) ROUTING           (--->) DIVERSION OR PUMP FLOW

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

    11         SUBA
                  V
                  V
    21           RSA
                  V
                  V
    27         RTAB
                  .
                  .
    32            .            SUBB
                  .               .
                  .               .
    38           CPB...........
                  V
                  V
    40        RSCPB
                  V
                  V
    46         RTBC
                  .
                  .
    51            .            SUBC
                  .               .
                  .               .
    57           CPC...........
                  V
                  V
    59        RSCPC
                  V
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                    V
       65        RTCD
                    .
                    .
       70           .           SUBD
                    .           .
                    .           .
       76         CPD............
                    V
                    V
       78       RSCPD
                    V
                    V
       84        RTDE
                    .
                    .
       89           .           SUBE
                    .           .
                    .           .
       95         CPE............
                    V
                    V
       97       RSCPE
                    V
                    V
      103        RTEF
                    .
                    .
      108           .           SUBF
                    .           .
                    .           .
      114         CPF............
                    V
                    V
      116       RSCPF
                    .
                    .
      122           .           SUBG
                    .           V
                    .           V
      128           .           RTGH
                    .           .
                    .           .
      133           .           .           SUBH
                    .           .           .
                    .           .           .
                    .          CPH............
                    .           V
                    .           V
      141           .           RTHI
                    .           .
                    .           .
      146           .           .           SUBI
                    .           .           .
                    .           .           .
      152           .          CPI............
                    .           V
                    .           V
      154           .         RSCPI
                    .           V
                    .           V
      160           .           RTIJ
                    .           .
                    .           .
      165           .           .           SUBJ
                    .           .           .
                    .           .           .
      171           .          CPJ............
                    .           V
                    .           V
      173           .         RSCPJ
                    .           .
                    .           .
      179           .           .           SUBK
                    .           .           .
                    .           .           .
      186           .           .           .------->     DTK
      185           .           .          DIK
                    .           .           .
                    .           .           .
      190           .           .           .------->   DTSDK
      189           .           .        DISDK
                    .           .           V
                    .           .           V
      193           .           .          RSK
                    .           .           .
                    .           .           .
                    .           .           .          SUBL2
                    .           .           .           .
                    .           .           .           .
      206           .           .           .           .------->  DTSDL2
      205           .           .           .         DISDL2
                    .           .           .           .
                    .           .           .           .
      209           .           .          CPL2............
                    .           .           V
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              .           .           V
 211          .           .      RSCPL2
              .           .           .
              .           .           .
 217          .           .           .       SUBM2
              .           .           .           .
              .           .           .           .
 224          .           .           .           .-------> DTSDM2
 223          .           .           .      DISDM2
              .           .           .           .
              .           .           .           .
 227          .           .        CPM2............
              .           .           V
              .           .           V
 229          .           .      RSCPM2
              .           .           .
              .           .           .
 235          .           .           .        SUBO
              .           .           .           .
              .           .           .           .
 242          .           .           .           .------->     DTO
 241          .           .           .         DIO
              .           .           .           .
              .           .           .           .
 245          .           .         CPO............
              .           .           V
              .           .           V
 247          .           .       RSCPO
              .           .           .
              .           .           .
 254          .           .           .------->   DTCPO
 253          .           .       DICPO
              .           .           .
              .           .           .
 257          .           .           .        SUBR
              .           .           .           .
              .           .           .           .
 264          .           .           .           .------->     DTR
 263          .           .           .         DIR
              .           .           .           V
              .           .           .           V
 267          .           .           .        RTRS
              .           .           .           .
              .           .           .           .
 272          .           .           .           .        SUBS
              .           .           .           .           .
              .           .           .           .           .
 279          .           .           .           .           .------->     DTS
 278          .           .           .           .         DIS
              .           .           .           .           .
              .           .           .           .           .
 282          .           .           .         CPS............
              .           .           .           V
              .           .           .           V
 284          .           .           .        RTST
              .           .           .           .
              .           .           .           .
 289          .           .           .           .        SUBV
              .           .           .           .           .
              .           .           .           .           .
 296          .           .           .           .           .------->     DTV
 295          .           .           .           .         DIV
              .           .           .           .           .
              .           .           .           .           .
 299          .           .           .           .           .        SUBW
              .           .           .           .           .           .
              .           .           .           .           .           .
 306          .           .           .           .           .           .------->     DTW
 305          .           .           .           .           .         DIW
              .           .           .           .           .           .
              .           .           .           .           .           .
 309          .           .           .           .         CPW............
              .           .           .           .           .
              .           .           .           .           .
 312          .           .           .           .           .------->   DTGB1
 311          .           .           .           .       DIGB1
              .           .           .           .           .
              .           .           .           .           .
 315          .           .           .           .           .        SUBT
              .           .           .           .           .           .
              .           .           .           .           .           .
 322          .           .           .           .           .           .------->     DTT
 321          .           .           .           .           .         DIT
              .           .           .           .           .           .
              .           .           .           .           .           .
 325          .           .           .         CPT........................
              .           .           .           .
              .           .           .           .
 327          .           .           .           .       SUBL1
              .           .           .           .           .
              .           .           .           .           .
 334          .           .           .           .           .------->    DTL1
 333          .           .           .           .        DIL1
              .           .           .           .           .
              .           .           .           .           .
 337          .           .           .           .           .        SUBP
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               .           .           .           .           .           .
               .           .           .           .           .           .
344            .           .           .           .           .           .------->    DTP
343            .           .           .           .           .         DIP
               .           .           .           .           .           .
               .           .           .           .           .           .
               .           .           .         CPP........................
               .           .           .           .
               .           .           .           .
349            .           .           .           .      SUBM1
               .           .           .           .           .
               .           .           .           .           .
356            .           .           .           .           .------->    DTM1
355            .           .           .           .        DIM1
               .           .           .           .           .
               .           .           .           .           .
359            .           .           .           .           .        SUBQ
               .           .           .           .           .           .
               .           .           .           .           .           .
365            .           .           .         CPQ........................
               .           .           .           .
               .           .           .           .
367            .           .           .           .        SUBU
               .           .           .           .           .
               .           .           .           .           .
374            .           .           .           .           .------->     DTU
373            .           .           .           .         DIU
               .           .           .           .           .
               .           .           .           .           .
377            .           .           .           .           .        SUBY
               .           .           .           .           .           .
               .           .           .           .           .           .
384            .           .           .           .           .           .------->    DTY
383            .           .           .           .           .         DIY
               .           .           .           .           .           .
               .           .           .           .           .           .
387            .           .           .           .         CPY............
               .           .           .           .           .
               .           .           .           .           .
389            .           .           .           .           .        SUBX
               .           .           .           .           .           .
               .           .           .           .           .           .
396            .           .           .           .           .           .------->    DTX
395            .           .           .           .           .         DIX
               .           .           .           .           .           V
               .           .           .           .           .           V
               .           .           .           .           .        RTXZ
               .           .           .           .           .           .
               .           .           .           .           .           .
404            .           .           .           .           .           .        SUBZ
               .           .           .           .           .           .           .
               .           .           .           .           .           .           .
411            .           .           .           .           .           .           .------->    DTZ
410            .           .           .           .           .           .         DIZ
               .           .           .           .           .           .           .
               .           .           .           .           .           .           .
414            .           .           .           .         CPZ........................
               .           .           .           .           .
               .           .           .           .           .
417            .           .           .           .           .           .<-------   DTSDK
416            .           .           .           .           .       RTSDK
               .           .           .           .           .           .
               .           .           .           .           .           .
419            .           .           .           .           .           .           .<-------   DTSDL2
418            .           .           .           .           .           .      RTSDL2
               .           .           .           .           .           .           .
               .           .           .           .           .           .           .
420            .           .           .           .           .       CPL2B............
               .           .           .           .           .           .
               .           .           .           .           .           .
423            .           .           .           .           .           .           .<-------   DTSDM2
422            .           .           .           .           .           .      RTSDM2
               .           .           .           .           .           .           .
               .           .           .           .           .           .           .
424            .           .           .           .           .       CPSDO............
               .           .           .           .           .           .
               .           .           .           .           .           .
426            .           .           .           .           .           .       SUBAA
               .           .           .           .           .           .           .
               .           .           .           .           .           .           .
432            .           .           .        CPAA....................................
               .           .           .           .
               .           .           .           .
436            .           .           .           .           .<-------   DTCPO
435            .           .           .           .      RTCPO
               .           .           .           .           .
               .           .           .           .           .
               .           .       CPAA2........................
               .           .           V
               .           .           V
439            .           .        RSAA
               .           .           .
               .           .           .
445        CPEND........................
```

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	SUBA	51.	1.43	8.	2.	1.	0.06		
ROUTED TO	RSA	13.	2.30	8.	4.	3.	0.06	1377.98	2.30
ROUTED TO	RTAB	13.	3.03	8.	4.	3.	0.06	1370.55	3.00
HYDROGRAPH AT	SUBB	107.	1.50	20.	5.	2.	0.14		
2 COMBINED AT	CPB	109.	1.50	28.	9.	5.	0.20		
ROUTED TO	RSCPB	92.	1.77	28.	9.	5.	0.20	1363.75	1.77
ROUTED TO	RTBC	92.	1.93	28.	9.	5.	0.20	1358.34	1.93
HYDROGRAPH AT	SUBC	126.	1.33	16.	4.	1.	0.09		
2 COMBINED AT	CPC	166.	1.53	43.	13.	6.	0.29		
ROUTED TO	RSCPC	142.	1.83	43.	13.	6.	0.29	1357.08	1.83
ROUTED TO	RTCD	142.	1.90	43.	13.	6.	0.29	1353.23	1.90
HYDROGRAPH AT	SUBD	91.	1.20	8.	2.	1.	0.04		
2 COMBINED AT	CPD	178.	1.33	50.	15.	7.	0.33		
ROUTED TO	RSCPD	177.	1.40	50.	15.	7.	0.33	1353.05	1.40
ROUTED TO	RTDE	168.	1.60	50.	15.	7.	0.33	1349.84	1.60
HYDROGRAPH AT	SUBE	126.	1.27	13.	3.	1.	0.07		
2 COMBINED AT	CPE	243.	1.53	63.	18.	8.	0.40		
ROUTED TO	RSCPE	258.	1.63	63.	18.	8.	0.40	1349.13	1.63
ROUTED TO	RTEF	209.	1.77	63.	18.	8.	0.40	1343.29	1.77
HYDROGRAPH AT	SUBF	99.	1.33	13.	3.	1.	0.08		
2 COMBINED AT	CPF	260.	1.77	75.	21.	9.	0.48		
ROUTED TO	RSCPF	234.	1.90	75.	21.	9.	0.48	1343.28	1.90
HYDROGRAPH AT	SUBG	43.	1.37	5.	1.	0.	0.04		
ROUTED TO	RTGH	39.	1.67	5.	1.	0.	0.04	1369.58	1.67
HYDROGRAPH AT	SUBH	87.	1.37	13.	3.	1.	0.07		
2 COMBINED AT									

```
+                    CPH      109.    1.60      18.      5.      2.     0.11

      ROUTED TO
+                    RTHI     101.    1.90      18.      5.      2.     0.11
+                                                                            1359.06     1.90

      HYDROGRAPH AT
+                    SUBI      94.    1.57      21.      5.      2.     0.11

      2 COMBINED AT
+                    CPI      181.    1.83      40.     10.      4.     0.22

      ROUTED TO
+                    RSCPI    111.    2.33      40.     11.      4.     0.22
+                                                                            1357.47     2.33

      ROUTED TO
+                    RTIJ     111.    2.60      40.     11.      4.     0.22
+                                                                            1351.84     2.60

      HYDROGRAPH AT
+                    SUBJ     109.    1.40      16.      4.      1.     0.09

      2 COMBINED AT
+                    CPJ      142.    1.80      56.     15.      6.     0.31

      ROUTED TO
+                    RSCPJ    132.    2.20      56.     15.      6.     0.31
+                                                                            1346.70     2.20

      HYDROGRAPH AT
+                    SUBK     252.    1.37      36.      9.      3.     0.17

      DIVERSION TO
+                    DTK      252.    1.47      15.      4.      1.     0.17

      HYDROGRAPH AT
+                    DIK      239.    1.47      21.      5.      2.     0.17

      DIVERSION TO
+                    DTSDK     87.    1.47      13.      3.      1.     0.17

      HYDROGRAPH AT
+                    DISDK    152.    1.47       7.      2.      1.     0.17

      ROUTED TO
+                    RSK        6.    1.97       4.      2.      1.     0.17
+                                                                               1.42     1.97

      HYDROGRAPH AT
+                    SUBL2    127.    1.37      20.      5.      2.     0.09

      DIVERSION TO
+                    DTSDL2    71.    1.37      16.      4.      1.     0.09

      HYDROGRAPH AT
+                    DISDL2    56.    1.37       4.      1.      0.     0.09

      2 COMBINED AT
+                    CPL2      56.    1.37       8.      3.      1.     0.25

      ROUTED TO
+                    RSCPL2     4.    5.13       4.      2.      1.     0.25
+                                                                               1.09     5.33

      HYDROGRAPH AT
+                    SUBM2    129.    1.37      20.      5.      2.     0.09

      DIVERSION TO
+                    DTSDM2    72.    1.37      16.      4.      1.     0.09

      HYDROGRAPH AT
+                    DISDM2    57.    1.37       4.      1.      0.     0.09

      2 COMBINED AT
+                    CPM2      59.    1.37       7.      3.      1.     0.34

      ROUTED TO
+                    RSCPM2     5.    1.80       4.      3.      1.     0.34
+                                                                               1.25     1.80

      HYDROGRAPH AT
+                    SUBO     102.    1.33      14.      4.      1.     0.07

      DIVERSION TO
+                    DTO      102.    2.03      13.      3.      1.     0.07

      HYDROGRAPH AT
+                    DIO       29.    2.03       2.      0.      0.     0.07

      2 COMBINED AT
+                    CPO       34.    2.03       6.      4.      2.     0.41

      ROUTED TO
+                    RSCPO      4.    3.70       4.      4.      2.     0.41
+                                                                               1.20     3.80
```

+	DIVERSION TO	DTCPO	4.	0.00	4.	4.	2.	0.41		
+	HYDROGRAPH AT	DICPO	0.	0.00	0.	0.	0.	0.41		
+	HYDROGRAPH AT	SUBR	108.	1.30	14.	4.	1.	0.07		
+	DIVERSION TO	DTR	108.	1.83	11.	3.	1.	0.07		
+	HYDROGRAPH AT	DIR	42.	1.83	3.	1.	0.	0.07		
+	ROUTED TO	RTRS	20.	2.30	3.	1.	0.	0.07		
+									1378.20	2.30
+	HYDROGRAPH AT	SUBS	105.	1.27	12.	3.	1.	0.06		
+	DIVERSION TO	DTS	105.	1.67	9.	2.	1.	0.06		
+	HYDROGRAPH AT	DIS	46.	1.67	2.	1.	0.	0.06		
+	2 COMBINED AT	CPS	46.	1.67	5.	1.	0.	0.12		
+	ROUTED TO	RTST	24.	2.47	5.	1.	0.	0.12		
+									1378.21	2.47
+	HYDROGRAPH AT	SUBV	68.	1.33	9.	2.	1.	0.05		
+	DIVERSION TO	DTV	68.	2.13	8.	2.	1.	0.05		
+	HYDROGRAPH AT	DIV	15.	2.13	1.	0.	0.	0.05		
+	HYDROGRAPH AT	SUBW	29.	1.33	4.	1.	0.	0.02		
+	DIVERSION TO	DTW	29.	2.07	4.	1.	0.	0.02		
+	HYDROGRAPH AT	DIW	9.	2.07	1.	0.	0.	0.02		
+	2 COMBINED AT	CPW	22.	2.13	2.	0.	0.	0.07		
+	DIVERSION TO	DTGB1	22.	0.00	2.	0.	0.	0.07		
+	HYDROGRAPH AT	DIGB1	0.	0.00	0.	0.	0.	0.07		
+	HYDROGRAPH AT	SUBT	60.	1.33	9.	2.	1.	0.05		
+	DIVERSION TO	DTT	60.	2.40	8.	2.	1.	0.05		
+	HYDROGRAPH AT	DIT	9.	2.40	1.	0.	0.	0.05		
+	3 COMBINED AT	CPT	32.	2.40	6.	1.	1.	0.24		
+	HYDROGRAPH AT	SUBL1	75.	1.23	9.	2.	1.	0.04		
+	DIVERSION TO	DTL1	75.	1.93	8.	2.	1.	0.04		
+	HYDROGRAPH AT	DIL1	13.	1.93	1.	0.	0.	0.04		
+	HYDROGRAPH AT	SUBP	142.	1.33	21.	5.	2.	0.09		
+	DIVERSION TO	DTP	142.	2.27	20.	5.	2.	0.09		
+	HYDROGRAPH AT	DIP	27.	2.27	2.	0.	0.	0.09		
+	3 COMBINED AT	CPP	54.	2.40	8.	2.	1.	0.37		

HYDROGRAPH AT	SUBM1	74.	1.27	9.	2.	1.	0.04		
DIVERSION TO	DTM1	74.	1.97	8.	2.	1.	0.04		
HYDROGRAPH AT	DIM1	13.	1.97	1.	0.	0.	0.04		
HYDROGRAPH AT	SUBQ	125.	1.37	20.	5.	2.	0.09		
3 COMBINED AT	CPQ	125.	1.37	28.	7.	3.	0.50		
HYDROGRAPH AT	SUBU	67.	1.30	9.	2.	1.	0.04		
DIVERSION TO	DTU	67.	2.20	8.	2.	1.	0.04		
HYDROGRAPH AT	DIU	12.	2.20	1.	0.	0.	0.04		
HYDROGRAPH AT	SUBY	56.	1.27	7.	2.	1.	0.03		
DIVERSION TO	DTY	56.	1.70	5.	1.	0.	0.03		
HYDROGRAPH AT	DIY	24.	1.70	1.	0.	0.	0.03		
2 COMBINED AT	CPY	24.	1.70	2.	1.	0.	0.08		
HYDROGRAPH AT	SUBX	61.	1.30	8.	2.	1.	0.04		
DIVERSION TO	DTX	61.	1.80	6.	2.	1.	0.04		
HYDROGRAPH AT	DIX	23.	1.80	1.	0.	0.	0.04		
ROUTED TO	RTXZ	12.	2.23	1.	0.	0.	0.04	1376.23	2.23
HYDROGRAPH AT	SUBZ	58.	1.30	7.	2.	1.	0.04		
DIVERSION TO	DTZ	58.	1.93	6.	2.	1.	0.04		
HYDROGRAPH AT	DIZ	16.	1.93	1.	0.	0.	0.04		
3 COMBINED AT	CPZ	37.	2.20	4.	1.	0.	0.15		
HYDROGRAPH AT	RTSDK	87.	1.43	13.	3.	1.	0.00		
HYDROGRAPH AT	RTSDL2	71.	1.13	16.	4.	1.	0.00		
2 COMBINED AT	CPL2B	158.	1.43	30.	7.	3.	0.00		
HYDROGRAPH AT	RTSDM2	72.	1.13	16.	4.	1.	0.00		
2 COMBINED AT	CPSDO	230.	1.43	46.	12.	4.	0.00		
HYDROGRAPH AT	SUBAA	36.	1.53	6.	2.	1.	0.05		
4 COMBINED AT	CPAA	386.	1.43	85.	21.	8.	0.69		
HYDROGRAPH AT	RTCPO	4.	3.70	4.	4.	2.	0.00		
3 COMBINED AT	CPAA2	386.	1.43	88.	25.	9.	1.10		
ROUTED TO	RSAA	9.	3.87	9.	9.	8.	1.10	1353.78	3.90
3 COMBINED AT	CPEND	370.	1.90	139.	45.	23.	1.88		

RECOMMENDED PLAN
HYDROLOGY

RATIONAL METHOD CALCS

'C' Factors - Proposed Conditions

Frequency = 100 Years **C Adjustment Factor = 1.25**

Area No.	Total Subbasin Area (ac)	Transp 605 (ac)	Airport Runway 620 (ac)	Tourist 510 (ac)	General Commercial 200 (ac)	General Office 400 (ac)	Parks 700 (ac)	Bare Ground 621 (ac)	Retention 705 (ac)	Summary CA	Computed C Factor
C Factor =		**0.85**	**0.85**	**0.65**	**0.65**	**0.60**	**0.20**	**0.30**	**0.00**		
Adj. C Factor =		**0.90**	**0.90**	**0.81**	**0.81**	**0.75**	**0.25**	**0.38**	**1.00**		
SUBA	40.405		4.9					35.5		17.7	**0.44**
SUBAA	29.031								29.0	29.0	**1.00**
SUBB	86.949		20.5					66.4		43.4	**0.50**
SUBC	55.861		14.2					41.7		28.4	**0.51**
SUBD	26.769		7.2					19.6		13.8	**0.52**
SUBE	46.22		11.5					34.7		23.4	**0.51**
SUBF	47.787		8.7					39.1		22.5	**0.47**
SUBG	26.627		3.1					23.6		11.6	**0.44**
SUBH	44.374		20.9					23.4		27.6	**0.62**
SUBI	71.68		26.7					45.0		40.9	**0.57**
SUBJ	57.076		21.6					35.5		32.7	**0.57**
SUBK	106.002	1.8	75.0					25.1	4.1	82.6	**0.78**
SUBL1	23.388	1.3	19.9						2.2	21.3	**0.91**
SUBL2	55.706		55.7							50.1	**0.90**
SUBM1	24.144	1.3	20.6						2.2	22.0	**0.91**
SUBM2	56.493		56.5							50.8	**0.90**
SUBO	42.195	0.5	30.1					8.3	3.4	34.0	**0.81**
SUBP	59.891	4.5	47.3				2.9		5.2	52.5	**0.88**
SUBQ	55.463	4.6	48.0				2.9			48.0	**0.87**
SUBR	41.95	2.6	0.8			31.9	3.6		3.1	31.0	**0.74**
SUBS	35.728	2.6				26.7	3.8		2.6	25.9	**0.72**
SUBT	28.572	4.9		17.6	1.7		2.1		2.3	22.9	**0.80**
SUBU	28.105	4.2		18.0	1.7		1.8		2.3	22.7	**0.81**
SUBV	31.916	2.2			11.5	10.4	5.6		2.3	22.8	**0.71**
SUBW	14.556	0.9				9.3	3.3		1.0	9.6	**0.66**
SUBX	23.806	1.9			9.5	6.3	4.4		1.7	17.0	**0.71**
SUBY	19.759	1.8				14.3	2.2		1.5	14.4	**0.73**
SUBZ	22.957	2.9	1.6			14.5	2.2		1.8	17.2	**0.75**

Recommended Plan - Onsite Storage Retention Calculations

Subbasin ID	Area (Ac.)	100Y-2H Precip (in.)	Combined C-value	Rational 100Y-2H Req'd Vol. (ac-ft)	NOTES
SUBA	40.405	2.2	0.44	3.26	No Infield Reten.
SUBAA	29.031	2.2	1.00	5.32	Reten in Reg. Bsn.
SUBB	86.949	2.2	0.50	7.97	No Infield Reten.
SUBC	55.861	2.2	0.51	5.22	No Infield Reten.
SUBD	26.769	2.2	0.52	2.55	No Infield Reten.
SUBE	46.22	2.2	0.51	4.32	No Infield Reten.
SUBF	47.787	2.2	0.47	4.12	No Infield Reten.
SUBG	26.627	2.2	0.44	2.15	No Infield Reten.
SUBH	44.374	2.2	0.62	5.04	No Infield Reten.
SUBI	71.68	2.2	0.57	7.49	No Infield Reten.
SUBJ	57.076	2.2	0.57	5.96	No Infield Reten.
SUBK	106.002	2.2	0.78	*7.58*	**Use 50% Area only*
SUBL1	23.388	2.2	0.91	3.90	Reten in Green spc.
SUBL2	55.706	2.2	0.90	9.19	Reten in Reg. Bsn.
SUBM1	24.144	2.2	0.91	4.03	OS Reten in HEC-1
SUBM2	56.493	2.2	0.90	9.32	Reten in Reg. Bsn.
SUBO	42.195	2.2	0.81	6.27	OS Reten in HEC-1
SUBP	59.891	2.2	0.88	9.66	OS Reten in HEC-1
SUBQ	55.463	2.2	0.87	8.85	Reten in Reg. Bsn.
SUBR	41.95	2.2	0.74	5.69	OS Reten in HEC-1
SUBS	35.728	2.2	0.72	4.72	OS Reten in HEC-1
SUBT	28.572	2.2	0.80	4.19	OS Reten in HEC-1
SUBU	28.105	2.2	0.81	4.17	OS Reten in HEC-1
SUBV	31.916	2.2	0.71	4.15	OS Reten in HEC-1
SUBW	14.556	2.2	0.66	1.76	OS Reten in HEC-1
SUBX	23.806	2.2	0.71	3.10	OS Reten in HEC-1
SUBY	19.759	2.2	0.73	2.64	OS Reten in HEC-1
SUBZ	22.957	2.2	0.75	3.16	OS Reten in HEC-1

Subbasin ID	Length (ft)	Width (ft)	Top Area (Sq. Ft.)	Bottom Area (Sq. Ft.)	Depth	Side Slope (H:V)	Freeboard (ft)	Total Depth (ft)	Req'd Vol. (ac-ft)	Total Vol. (ac-ft)	Basin Footprint (Ac.)
SUBK	414	414	171,573	158,574	2	4	1	3	**7.58**	11.60	4.50
SUBL1	299	299	89,644	80,319	2	4	1	3	**3.90**	6.02	2.39
SUBM1	304	304	92,465	82,991	2	4	1	3	**4.03**	6.21	2.46
SUBO	377	377	142,378	130,560	2	4	1	3	**6.27**	9.61	3.75
SUBP	467	467	217,781	203,103	2	4	1	3	**9.66**	14.75	5.69
SUBR	360	360	129,583	118,320	2	4	1	3	**5.69**	8.74	3.42
SUBS	328	328	107,843	97,590	2	4	1	3	**4.72**	7.26	2.86
SUBT	310	310	96,102	86,438	2	4	1	3	**4.19**	6.46	2.55
SUBU	309	309	95,721	86,076	2	4	1	3	**4.17**	6.43	2.54
SUBV	309	309	95,294	85,671	2	4	1	3	**4.15**	6.40	2.53
SUBW	204	204	41,479	35,218	2	4	1	3	**1.76**	2.76	1.13
SUBX	268	268	71,645	63,336	2	4	1	3	**3.10**	4.80	1.91
SUBY	248	248	61,432	53,756	2	4	1	3	**2.64**	4.11	1.65
SUBZ	270	270	72,942	64,556	2	4	1	3	**3.16**	4.89	1.96

Recommended Plan - Roadway Storm Drain
Rational Calculations

Pipe/Divert ID	Basin Length (ft)	Width (ft)	Area (sq. ft)	Area (ac)	Slope (ft/ft)	Tc Calc (min.)	Intensity (in/hr)	C-value	Q10 (cfs)	Contrib Areas	Required Capacity
SD_P	4,315	130	560,950	12.88	0.002	42.97	1.66	0.86	18.4	SD_P	18.4
SD_R	647	130	84,110	1.93	0.002	15.14	2.13	0.86	3.5	SD_R	3.5
SD_Q	2,285	130	297,050	6.82	0.002	24.08	3.3	0.86	*122*	"SUBQ" 100Y2H	*122
SD_S	838	130	108,940	2.50	0.002	15.07	3.03	0.86	6.5	SD_R; SD_S	10
SD_T	1,492	130	193,960	4.45	0.002	21.43	2.56	0.86	9.8	SD_R; SD_S; SD_T	19.8
SD_U	1,471	130	191,230	4.39	0.003	17.52	2.84	0.86	10.7	SD_U	10.7
SD_V	2,025	130	263,250	6.04	0.004	19.27	2.71	0.86	14.1	SD_V	14.1
SD_W	731	130	95,030	2.18	0.004	10.37	3.62	0.86	6.8	SD_V; SD_W	20.9
SD_X	1,558	130	202,540	4.65	0.003	19.87	2.67	0.86	10.7	SD_X	10.7
SD_Y	688	130	89,440	2.05	0.003	11.03	3.53	0.86	6.2	SD_U; SD_Y	16.9
SD_Z	987	130	128,310	2.95	0.002	16.60	2.91	0.86	7.4	SD_Z	7.4
SD_QAA										SD_Q; SD_Z	129.4
SD_XY										SD_X; SD_Y	27.6

*Conveys 100Y, 2H discharge to Regional Basin for Storage Requirement.

RECOMMENDED PLAN
HYDRAULICS

SD MANNINGS CAPACITIES

Stormdrain Manning Analysis Rating Table

Project Description

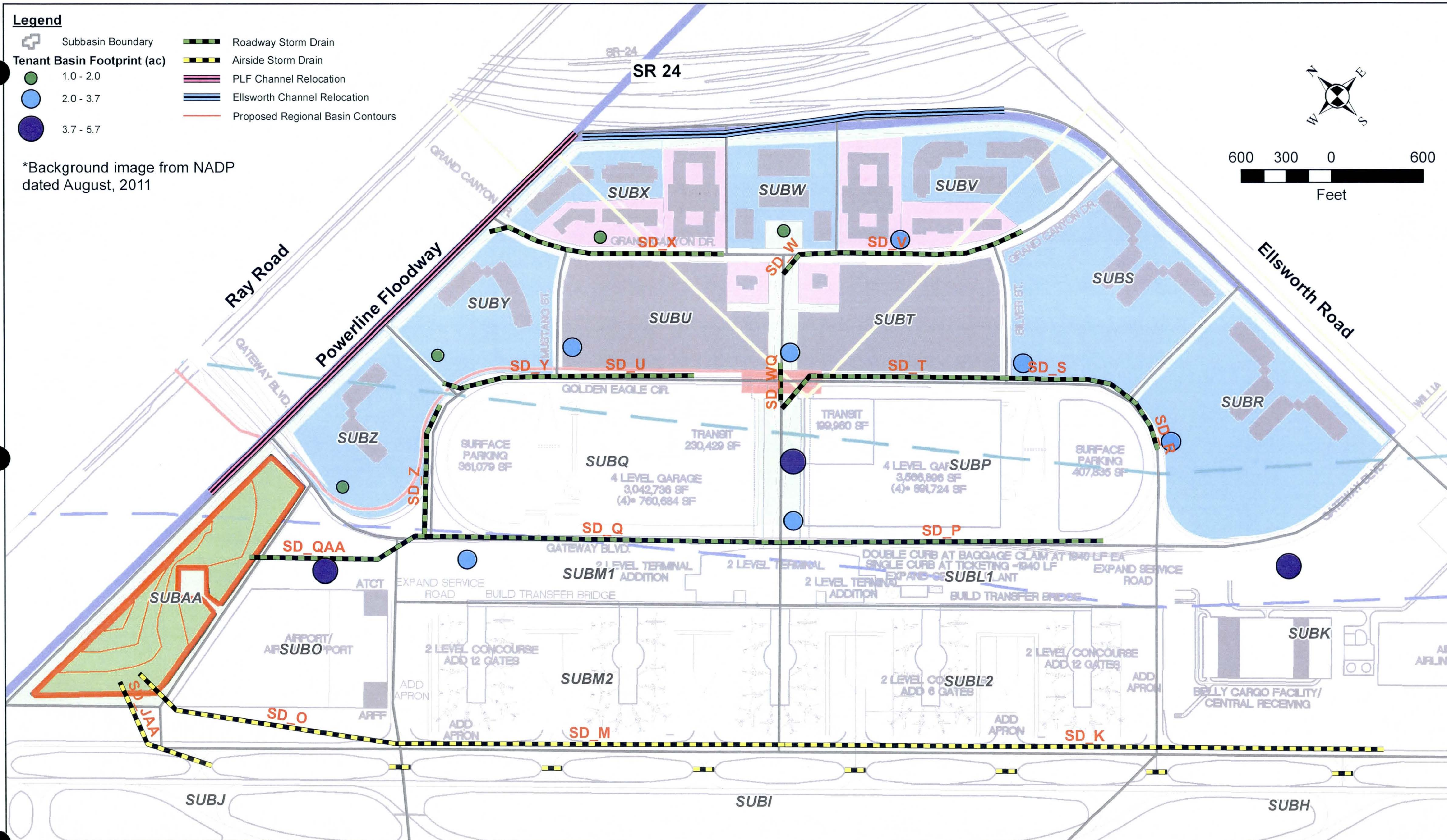
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00200	ft/ft
Normal Depth	1.50	ft
Diameter	1.50	ft
Discharge	4.70	ft³/s

Diameter (ft)	Normal Depth (ft)	Discharge (ft³/s)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
1.50	1.50	4.70	2.66	1.77	4.71	0.00
2.00	2.00	10.12	3.22	3.14	6.28	0.00
2.50	2.50	18.34	3.74	4.91	7.85	0.00
3.00	3.00	29.83	4.22	7.07	9.42	0.00
3.50	3.50	44.99	4.68	9.62	11.00	0.00
4.00	4.00	64.24	5.11	12.57	12.57	0.00
4.50	4.50	87.94	5.53	15.90	14.14	0.00

RECOMMENDED PLAN
COST ESTIMATES



East Area Airport Master Drainage Plan
Phoenix-Mesa Gateway Airport

Exhibit G.1
Recommended Alternative

Dibble Engineering

Recommended Plan - Storm Drain Cost

Description	Element ID	Design Flow (cfs)	Design Storm	Length of Pipe (ft.)	Pipe Slope (ft/ft)	Material/ Barrel Type	Pipe n-value	Number of Barrels	Design Culvert Diameter (IN.) Max Dia. = 48"	Velocity (Full Flow) ft/s	Manning's Q_{full} (cfs)	Total Pipe Unit Cost ($/ft)	Total Trench Drain Cost *(32' drain/swale @ $250/LF)	Total Pipe Cost	Total Lateral Cost	Catchbasins @ $3000/EA	Manholes @ $5000/EA	Miscellaneous Removals @ $6/LF	Construction Sub Total	Mobilization (5%)	Total Construction Cost ($)	Overall Contingency Cost (30%)	Construction Admin (8 %)	Testing/Insurance (1 %)	PM/CM (4 %)	Engineering Cost (10%)	Total Cost including Contingency and Engineering
Onsite Roadway Only																											
	SD_R	3.5	10-YR	2696	0.0020	RCP	0.013	1	24	3.22	10.1	$ 96	$0	$258,816	$58,234	$54,000	$25,000	$16,176	$412,226	$20,611	$432,837	$129,851	$34,627	$4,328	$17,313	$43,284	**$662,240**
	SD_S	10.0	10-YR	856	0.0020	RCP	0.013	1	36	4.22	29.8	$ 144	$0	$123,264	$18,490	$18,000	$10,000	$5,136	$174,890	$8,744	$183,634	$55,090	$14,691	$1,836	$7,345	$18,363	**$280,960**
	SD_T	19.8	10-YR	1584	0.0020	RCP	0.013	1	36	4.22	29.8	$ 144	$0	$228,096	$34,214	$33,000	$10,000	$9,504	$314,814	$15,741	$330,555	$99,167	$26,444	$3,306	$13,222	$33,056	**$505,749**
	SD_U	10.7	10-YR	905	0.0020	RCP	0.013	1	30	3.74	18.3	$ 120	$0	$108,600	$19,548	$21,000	$10,000	$5,430	$164,578	$8,229	$172,807	$51,842	$13,825	$1,728	$6,912	$17,281	**$264,395**
	SD_V	14.1	10-YR	1255	0.0020	RCP	0.013	1	30	3.74	18.3	$ 120	$0	$150,600	$27,108	$27,000	$15,000	$7,530	$227,238	$11,362	$238,600	$71,580	$19,088	$2,386	$9,544	$23,860	**$365,058**
	SD_W	20.9	10-YR	416	0.0020	RCP	0.013	1	36	4.22	29.8	$ 144	$0	$59,904	$8,986	$9,000	$5,000	$2,496	$85,386	$4,269	$89,655	$26,896	$7,172	$897	$3,586	$8,965	**$137,172**
	SD_X	10.7	10-YR	1578	0.0020	RCP	0.013	1	30	3.74	18.3	$ 120	$0	$189,360	$34,085	$33,000	$15,000	$9,468	$280,913	$14,046	$294,958	$88,488	$23,597	$2,950	$11,798	$29,496	**$451,286**
	SD_Y	16.9	10-YR	767	0.0020	RCP	0.013	1	30	3.74	18.3	$ 120	$0	$92,040	$16,567	$18,000	$10,000	$4,602	$141,209	$7,060	$148,270	$44,481	$11,862	$1,483	$5,931	$14,827	**$226,853**
	SD_Z	7.4	10-YR	767	0.0020	RCP	0.013	1	24	3.22	10.1	$ 96	$0	$73,632	$16,567	$18,000	$10,000	$4,602	$122,801	$6,140	$128,941	$38,682	$10,315	$1,289	$5,158	$12,894	**$197,280**
	SD_XY	27.6	10-YR	289	0.0020	RCP	0.013	1	36	4.22	29.8	$ 144	$0	$41,616	$6,242	$6,000	$5,000	$1,734	$60,882	$3,044	$63,927	$19,178	$5,114	$639	$2,557	$6,393	**$97,808**
	SD_WQ	35.0	10-YR	255	0.0020	RCP	0.013	1	48	5.11	64.2	$ 192	$0	$48,960	$5,508	$6,000	$5,000	$1,530	$67,510	$3,376	$70,886	$21,266	$5,671	$709	$2,835	$7,089	**$108,455**
																											$3,297,256
Gateway Blvd Storm Drain																											
	SD_P	18.4	10-YR	2131	0.0020	RCP	0.013	1	30	3.74	18.3	$ 120	$0	$255,720	$46,030	$45,000	$20,000	$12,786	$379,536	$18,977	$398,512	$119,554	$31,881	$3,985	$15,940	$39,851	**$609,724**
	SD_Q	122.0	10-YR	2350	0.0020	RCP	0.013	2	48	5.11	128.5	$ 192	$0	$902,400	$50,760	$48,000	$15,000	$14,100	$1,030,260	$51,513	$1,081,773	$324,532	$86,542	$10,818	$43,271	$108,177	**$1,655,113**
	SD_QAA	129.4	10-YR	1195	0.0020	RCP	0.013	2	48	5.11	128.5	$ 192	$0	$458,880	$25,812	$24,000	$10,000	$7,170	$527,058	$26,353	$553,411	$166,023	$44,273	$5,534	$22,136	$55,341	**$846,719**
																											$3,111,555
Airport Apron Storm Drain																											
	SD_K	87.0	10-YR	3963	0.0020	RCP	0.013	2	42	4.68	90.0	$ 168	$24,000	$1,331,568	$85,601	$0	$25,000	$23,778	$1,489,947	$74,497	$1,564,444	$469,333	$125,156	$15,644	$62,578	$156,444	**$2,393,600**
	SD_M	158.0	10-YR	2566	0.0020	RCP	0.013	3	48	5.11	192.7	$ 192	$24,000	$1,478,016	$55,426	$0	$20,000	$15,396	$1,592,838	$79,642	$1,672,479	$501,744	$133,798	$16,725	$66,899	$167,248	**$2,558,894**
	SD_O	230.0	10-YR	1805	0.0020	RCP	0.013	4	48	5.11	257.0	$ 192	$0	$1,386,240	$38,988	$39,000	$15,000	$10,830	$1,490,058	$74,503	$1,564,561	$469,368	$125,165	$15,646	$62,582	$156,456	**$2,393,778**
	SD_JAA	4.0	10-YR	900	0.0020	RCP	0.013	1	36	4.22	29.8	$ 144	$0	$129,600	$19,440	$18,000	$10,000	$5,400	$183,341	$9,167	$192,508	$57,752	$15,401	$1,925	$7,700	$19,251	**$294,537**
	INFIELD	4.0	10-YR	980	0.0020	RCP	0.013	1	24	3.22	10.1	$ 96	$0	$94,080	$21,168	$21,000	$10,000	$5,880	$154,090	$7,705	$161,795	$48,538	$12,944	$1,618	$6,472	$16,179	**$247,546**
																											$7,888,354

TOTAL **$14,297,165**

Notes: 1. Trench drain costs assume 32' of trench drain per swale. One swale between each terminal. Each trench 24" wide, 32' long, $2,000/L.F.
2. Catch basins costs assume an average of two (2) catch basins for every 300 linear feet of stormdrain. Unit cost is $3000/catch basin.
3. Manhole costs are based on structure frequency specified in City of Mesa Standards for size of pipe. Unit cost per manhole is $5000 per structure.
4. Miscellaneous removals assume an average cost of $6 per linear foot of storm drain.
5. Construction Subtotal includes trench drain, pipe, laterals, catch basins, manholes, and miscellaneous removals.
6. Mobilization is assumed to be 5% of construction costs.
7. Total Construction costs is the sum of Construction Subtotal and Mobilization.
8. Contingency is 30% of Total Construction costs.
9. Construction Administration is assumed to be 8% of construction costs.
10. Testing and Insurance is assumed to be 1% of construction costs.
11. Project/Construction Management is assumed to be 4% of construction costs.
12. Engineering cost is assumed to be 10% of construction costs.

Recommended Plan - Tenant Basin Cost

Description	Original Required Volume (ac-ft) Per 100Y-2H subbasin volume	Total Excavation Volume with freeboard (ac-ft)	Total Excavation Volume with freeboard (CY)	Required Top Area (ac.) (includes Safety Factor -10%)	Excavation Cost ($5/CY)	Land Cost ($100,000/AC)	Drain Pipe Size (in)	Drain Pipe Cost ($48/LF)	Est. Cost/acre	Total Construction Cost ($)	Overall Contingency Cost (30 %)	Construction Admin (8 %)	Testing/Insurance (1 %)	PM/CM (4 %)	Engineering Cost (10 %)	Total Cost including Contingency and Engineering	Total Land Value ($) $100,000/acre
SUBK	7.6	11.6	18,713	4.50	$93,566	$450,000	12	$4,800	$21,859	$98,366	$29,510	$7,869	$984	$3,935	$9,837	$150,501	$450,000
SUBL1	3.9	6.0	9,712	2.39	$48,560	$239,000	12	$4,800	$22,326	$53,360	$16,008	$4,269	$534	$2,134	$5,336	$81,641	$239,000
SUBM1	4.0	6.2	10,021	2.46	$50,107	$246,000	12	$4,800	$22,320	$54,907	$16,472	$4,393	$549	$2,196	$5,491	$84,008	$246,000
SUBO	6.3	9.6	15,502	3.75	$77,511	$375,000	12	$4,800	$21,950	$82,311	$24,693	$6,585	$823	$3,292	$8,231	$125,936	$375,000
SUBP	9.7	14.8	23,801	5.69	$119,004	$569,000	12	$4,800	$21,758	$123,804	$37,141	$9,904	$1,238	$4,952	$12,380	$189,420	$569,000
SUBR	5.7	8.7	14,096	3.42	$70,480	$342,000	12	$4,800	$22,012	$75,280	$22,584	$6,022	$753	$3,011	$7,528	$115,178	$342,000
SUBS	4.7	7.3	11,708	2.86	$58,542	$286,000	12	$4,800	$22,148	$63,342	$19,003	$5,067	$633	$2,534	$6,334	$96,913	$286,000
SUBT	4.2	6.5	10,420	2.55	$52,101	$255,000	12	$4,800	$22,314	$56,901	$17,070	$4,552	$569	$2,276	$5,690	$87,059	$255,000
SUBU	4.2	6.4	10,378	2.54	$51,892	$254,000	12	$4,800	$22,320	$56,692	$17,008	$4,535	$567	$2,268	$5,669	$86,739	$254,000
SUBV	4.2	6.4	10,332	2.53	$51,658	$253,000	12	$4,800	$22,315	$56,458	$16,937	$4,517	$565	$2,258	$5,646	$86,381	$253,000
SUBW	1.8	2.8	4,445	1.13	$22,227	$113,000	12	$4,800	$23,918	$27,027	$8,108	$2,162	$270	$1,081	$2,703	$41,352	$113,000
SUBX	3.1	4.8	7,740	1.91	$38,702	$191,000	12	$4,800	$22,776	$43,502	$13,051	$3,480	$435	$1,740	$4,350	$66,558	$191,000
SUBY	2.6	4.1	6,623	1.65	$33,116	$165,000	12	$4,800	$22,979	$37,916	$11,375	$3,033	$379	$1,517	$3,792	$58,011	$165,000
SUBZ	3.2	4.9	7,882	1.96	$39,412	$196,000	12	$4,800	$22,557	$44,212	$13,264	$3,537	$442	$1,768	$4,421	$67,644	$196,000

TOTAL **$1,337,341** **$3,934,000**

Notes: 1. Excavation cost is assumed to be $5 per cubic yard.
2. Land acquisition cost is assumed to be $100,000 per acre.
3. Drain Pipe cost is assumed to include 100 linear feet of pipe per basin, at $48 per linear foot of pipe.
4. Total Construction cost is sum of excavation, land, and drain pipe.
5. Overall contingency cost is assumed to be 30% of total construction cost.
6. Construction admininstration is assumed to be 8% of total construction cost.
7. Testing and insurance cost is assumed to be 1% of total construction cost.
8. Project/Construction managament cost is assumed to be 4% of total construction cost.
9. Engineering cost is assumed to be 10% of total construction cost.

Recommended Plan - Regional Basin Cost

HEC-1 Element ID	Upstream HEC-1 ID	FLOW ENTERING BASIN (cfs)	Actual Ponding Elev	Basin Bottom Elevation	Total Depth	Ponding Depth	Freeboard	Ponded Storage Volume (ac-ft)	Basin Volume @ Top (ac-ft)	Total Basin Excavation Volume (CY)	Detention Basin Excavation Cost [1]	Outflow Pipe (# of barrels)	Outflow Pipe Diameter (in.)	Pipe Length (ft)	Total Outlet system Cost [3]	# Of Manholes	Manhole Total Cost	No. of Headwalls	Headwall Cost	Length of Fencing (ft)	Fence Cost	Basin Top Area (ac)	Total Construction Cost [4]	Overall Contingency Cost ($) (30 %)	Construction Admin ($) (8 %)	Testing/Insurance ($) (1 %)	PM/CM ($) (4 %)	Engineering Cost ($) (10 %)	Total Cost including contingency and Engineering	Total Land Value ($) $100,000/acre
RSAA	CPAA	386.0	1353.3	1347.0	8.0	6.3	1.7	43.8	43.8	70,599	$352,997	1	24.0	100.0	$9,600	1	$5,000	2.0	$20,000	5,100	$20,400	25.55	**$407,997**	$122,399	$32,640	$4,080	$16,320	$40,800	**$624,236**	**$2,555,222**

Notes: 1. Excavation cost is assumed to be $5 per cubic yard.
2. Land acquisition cost is assumed to be $100,000 per acre.
3. Outlet system cost is assumed to include 100 linear feet of pipe at $96 per linear foot of pipe.
4. Total Construction cost is sum of excavation, manholes, outlet system, headwalls, and fencing.

PRELIMINARY PROBABLE COST ESTIMATE

Project Name: Airport Authority - Ellsworth Channel Realignment

Prepared by City of Mesa

Item No.	Description	Unit	Quantity	Unit Price	Amount
1	Partnering/Agency Coordination Allowance	LS	1	$10,000.00	$10,000
2	Construction Survey and Staking	LS	1	$18,000.00	$18,000
3	AZPDES/SWPPP Permits	LS	1	$10,000.00	$10,000
4	Mobilization	LS	1	$150,000.00	$150,000
5	Powerline Channel Excavation	C.Y.	225,750	$4.00	$903,000
6	Ellsworth Channel Excavation	C.Y.	455,000	$4.00	$1,820,000
7	Riprap, 24" Thick (D50=12")	S.Y.	93,556	$25.00	$2,338,900
8	Sediment Wattles	L.F.	5,000	$4.00	$20,000
9	Maintenance Road Surface	S.Y.	6,700	$10.00	$67,000
10	Miscellaneous Removal & Other Work	L.S.	1	$50,000.00	$50,000
11	Remove Concrete Channel Lining	S.F.	470,000	$2.00	$940,000
12	Traffic Control	L.S.	1	$10,000.00	$10,000
13	Smooth Wire Fence	L.F.	5,000	$5.00	$25,000
14	Smooth Wire Gate Set	EA.	3	$2,500.00	$7,500
15	Hydroseed, Mix A, Riparian	AC.	8.15	$3,800.00	$30,970
16	Channel Outlet Structure	EA.	1	$100,000.00	$100,000
17	Channel Drop Spillway	EA.	1	$100,000.00	$100,000
18	Steel Handrail, MAG Std Dtl 145 (Inc. Stain)	L.F.	1,500	$40.00	$60,000
19	Allowance For Additional Aesthetic Cut Slope Finishing	L.S.	1	$10,000.00	$10,000
TOTAL COST PRIOR TO CONTINGENCY					**$6,670,370**
29	**Contingency (20%)**				**$1,334,074**
TOTAL PROBABLE COST				**TOTAL***	**$ 8,004,444**

RECOMMENDED PLAN
PHASING & IMPLEMENTATION
COST ESTIMATES

Gateway East Area Drainage Master Plan
Cost Summary by Priority

Item	Priority 1	Priority 2	Priority 3	Priority 4
Storm Drain	**$1,347,556**	**$3,288,166**	**$4,244,466**	**$5,416,977**
Tenant Parcel Retention Basins	**$183,294**	**$239,748**	**$827,561**	**$86,739**
Ellsworth Channel Relocation	**$8,004,400**		-	-
Regional Detention Basin	**$258,358**	**$91,899**	**$59,464**	**$214,516**
Total Cost	**$9,793,608**	**$3,619,813**	**$5,131,490**	**$5,718,232**

Total Cost, (full build-out): $24,263,143

Priority 1 - Cost Estimate

Airport Apron Storm Drain

Element ID	Design Flow (cfs)	Design Storm	Upstream Invert	Downstream Invert	Length of Pipe (ft.)	Pipe Slope (ft/ft)	MODIFIED Pipe Slope (ft/ft)	Material/ Barrel Type	Pipe n-value	Number of Barrels	Design Culvert Diameter (IN.) Max Dia. = 48"	Velocity (Full Flow) ft/s	Manning's Qfull (cfs)	Total Pipe Unit Cost ($/ft)	Total Pipe Length	Total Trench Drain Cost *(32' drain/swale @ $250/LF)	Total Pipe Cost	Total Lateral Cost	Catchbasins @ $3000/EA	Manholes @ $5000/EA	Junction Structures	Miscellaneous Removals @ $6/LF	Construction Sub Total	Mobilization (5%)	Total Construction Cost ($)	Overall Contingency Cost (30%)	Construction Admin (8 %)	Testing/Insurance (1 %)	PM/CM (4 %)	Engineering Cost (10%)	Total Cost including Contingency and Engineering
SD_K	87	10-YR	1355.88	1354.74	570	0.002	0.003	RCP	0.013	2	42	4.68	89.98	168	1,140	$24,000	$191,520	$12,312	$0	$5,000	$0	$3,420	$236,252	$11,813	$248,065	$74,419	$19,845	$2,481	$9,923	$24,806	**$379,539**
SD_M	158	10-YR	1354.74	1353.6	570	0.002	0.003	RCP	0.013	3	48	5.11	192.72	192	1,710	$24,000	$328,320	$12,312	$0	$5,000	$0	$3,420	$373,052	$18,653	$391,705	$117,511	$31,336	$3,917	$15,668	$39,170	**$599,308**
SD_JAA	4	10-YR	1352.8	1351	900	0.002	1.003	RCP	0.013	1	36	4.22	29.83	144	900	$0	$129,600	$19,440	$18,000	$10,000	$0	$5,400	$183,341	$9,167	$192,508	$57,752	$15,401	$1,925	$7,700	$19,251	**$294,537**
INFIELD	4	10-YR	1352.56	1352	280	0.002	2.003	RCP	0.013	1	24	3.22	10.12	96	280	$0	$26,880	$6,048	$6,000	$5,000	$0	$1,680	$46,170	$2,309	$48,479	$14,544	$3,878	$485	$1,939	$4,848	**$74,172**
																														Total	**$1,347,556**

Regional Basin

HEC-1 Element ID	Upstream HEC-1 ID	FLOW ENTERING BASIN (cfs)	Actual Ponding Elev	Basin Bottom Elevation	Total Depth	Ponding Depth	Freeboard	Ponded Storage Volume (ac-ft)	Basin Volume @ Top (ac-ft)	Total Basin Excavation Volume (cu.ft.)	Detention Basin Excavation Cost ($5/cu-yd)	Outflow Pipe (# of barrels)	Outflow Pipe Diameter (in.)	Pipe Length (ft)	Pipe Cost ($96/ft)	# Of Manholes	Manhole Total Cost	No. of Headwalls	Headwall Cost	Length of Fencing (ft)	Unit Cost ($/lf)	Fence Cost	Basin Top Area (ac)	Total Construction Cost	Overall Contingency Cost ($) (30 %)	Construction Admin ($) (8 %)	Testing/Insurance ($) (1 %)	PM/CM ($) (4 %)	Engineering Cost ($) (10 %)	Total Cost including contingency and Engineering	Total Land Value ($) $100,000/acre
RSAA	CPAA	386.0	1353.3	1347.0	8.0	6.3	1.7	13.1	16.6	725,013	$134,262	1	24.0	100.0	$9,600	1	$5,000	2.0	$20,000	0	4.0	$0	9.90	**$168,862**	$50,658	$13,509	$1,689	$6,754	$16,886	**$258,358**	**$990,000**
																													Total	**$258,358**	

Tenant Parcel Basins

Description	Original Required Volume (ac-ft) Per 100Y-2H subbasin volume	Total Excavation Volume with freeboard (ac-ft)	Total Excavation Volume with freeboard (CY)	Required Top Area (ac.) (includes Safety Factor -10%)	Excavation Cost ($5/CY)	Drain Pipe Size (in)	Drain Pipe Cost/LF	Drain Pipe Cost ($48/LF)	Fence Cost ($)	Est. Cost/acre	Total Construction Cost ($)	Overall Contingency Cost (30 %)	Construction Admin (8 %)	Testing/Insurance (1 %)	PM/CM (4 %)	Engineering Cost (10 %)	Total Cost including Contingency and Engineering	Total Land Value ($) $100,000/acre
SUBS	4.7	7.3	11,708	2.86	$58,542	12	$48	$4,800	$0	$22,148	$63,342	$19,003	$5,067	$633	$2,534	$6,334	**$96,913**	$286,000
SUBV	4.2	6.4	10,332	2.53	$51,658	12	$48	$4,800	$0	$22,315	$56,458	$16,937	$4,517	$565	$2,258	$5,646	**$86,381**	$253,000
																Total	**$183,294**	

PLF/Ellsworth Channel Realignment

***See cost estimate prepare by City of Mesa, Appendix G. ($8 Million)**

Notes: 1. Land Value shown for regional and parcel tenant basin construction assumes land does not require acquisition. The number estimates the value of land not used for development.
2. Basin costs do not include cost of export.
3 The regional basin is assumed to be expanded incrementally during each Priority to accomodate the additional development. The sum of associated excavations and costs of the basin expansion culminate in a full build out basin of 44 ac-ft in volume.

Priority 2 - Cost Estimate

Storm Drain

Element ID	Design Flow (cfs)	Design Storm	Upstream Invert	Downstream Invert	Length of Pipe (ft.)	Pipe Slope (ft/ft)	MODIFIED Pipe Slope (ft/ft)	Material/ Barrel Type	Pipe n-value	Number of Barrels	Design Culvert Diameter (IN.) Max Dia. = 48"	Velocity (Full Flow) ft/s	Manning's Qfull (cfs)	Total Pipe Unit Cost ($/ft)	Total Pipe Length
SD_U	10.7	10-YR	0	0	905	0.002	0.002	RCP	0.013	1	30	3.74	18.34	120	905
SD_Y	16.9	10-YR	0	0	767	0.002	0.002	RCP	0.013	1	30	3.74	18.34	120	767
SD_Z	7.4	10-YR	0	0	767	0.002	0.002	RCP	0.013	1	24	3.22	10.12	96	767
SD_XY	27.6	10-YR	0	0	289	0.002	0.002	RCP	0.013	1	36	4.22	29.83	144	289
SD_Q	122	10-YR	1362.7	1358	2350	0.002	0.003	RCP	0.013	2	48	5.11	128.48	192	4,700
SD_QAA	129.4	10-YR	0	0	1195	0.002	0	RCP	0.013	2	48	5.11	128.48	192	2,390

Element ID	Total Trench Drain Cost *(32' drain/swale @ $250/LF)	Total Pipe Cost	Total Lateral Cost	Catchbasins @ $3000/EA	Manholes @ $5000/EA	Junction Structures	Miscellaneous Removals @ $6/LF	Construction Sub Total	Mobilization (5%)	Total Construction Cost ($)	Overall Contingency Cost (30%)	Construction Admin (8 %)	Testing/Insurance (1 %)	PM/CM (4 %)	Engineering Cost (10%)	Total Cost including Contingency and Engineering
SD_U	$0	$108,600	$19,548	$21,000	$10,000	$0	$5,430	$164,578	$8,229	$172,807	$51,842	$13,825	$1,728	$6,912	$17,281	**$264,395**
SD_Y	$0	$92,040	$16,567	$18,000	$10,000	$0	$4,602	$141,209	$7,060	$148,270	$44,481	$11,862	$1,483	$5,931	$14,827	**$226,853**
SD_Z	$0	$73,632	$16,567	$18,000	$10,000	$0	$4,602	$122,801	$6,140	$128,941	$38,682	$10,315	$1,289	$5,158	$12,894	**$197,280**
SD_XY	$0	$41,616	$6,242	$6,000	$5,000	$0	$1,734	$60,882	$3,044	$63,927	$19,178	$5,114	$639	$2,557	$6,393	**$97,808**
SD_Q	$0	$902,400	$50,760	$48,000	$15,000	$0	$14,100	$1,030,260	$51,513	$1,081,773	$324,532	$86,542	$10,818	$43,271	$108,177	**$1,655,113**
SD_QAA	$0	$458,880	$25,812	$24,000	$10,000	$0	$7,170	$527,058	$26,353	$553,411	$166,023	$44,273	$5,534	$22,136	$55,341	**$846,719**
															Total	**$3,288,166**

Regional Basin

HEC-1 Element ID	Upstream HEC-1 ID	FLOW ENTERING BASIN (cfs)	Actual Ponding Elev	Basin Bottom Elevation	Total Depth	Ponding Depth	Freeboard	Ponded Storage Volume (ac-ft)	Basin Volume @ Top (ac-ft)	Total Basin Excavation Volume (cu.ft.)	Detention Basin Excavation Cost ($5/cu-yd)	Outflow Pipe (# of barrels)	Outflow Pipe Diameter (in.)	Pipe Length (ft)	Pipe Cost ($96/ft)	# Of Manholes	Manhole Total Cost	No. of Headwalls	Headwall Cost	Length of Fencing (ft)	Unit Cost ($/lf)	Fence Cost	Basin Top Area (ac)	Total Construction Cost	Overall Contingency Cost ($) (30 %)	Construction Admin ($) (8 %)	Testing/Insurance ($) (1 %)	PM/CM ($) (4 %)	Engineering Cost ($) (10 %)	Total Cost including contingency and Engineering	Total Land Value ($) $100,000/acre
RSAA	CPAA	386.0	1353.3	1347.0	8.0	6.3	1.7	5.9	7.4	324,348	$60,064	0	0.0	0.0	$0	0	$0	0.0	$0	0	4.0	$0	4.20	**$60,064**	$18,019	$4,805	$601	$2,403	$6,006	**$91,899**	**$420,000**
																													Total	**$91,899**	

Tenant Parcel Basins

Description	Original Required Volume (ac-ft) Per 100Y-2H subbasin volume	Total Excavation Volume with freeboard (ac-ft)	Total Excavation Volume with freeboard (CY)	Required Top Area (ac.) (includes Safety Factor -10%)	Excavation Cost ($5/CY)	Drain Pipe Size (in)	Drain Pipe Cost/LF	Drain Pipe Cost ($48/LF)	Fence Cost ($)	Est. Cost/acre	Total Construction Cost ($)	Overall Contingency Cost (30 %)	Construction Admin (8 %)	Testing/Insurance (1 %)	PM/CM (4 %)	Engineering Cost (10 %)	Total Cost including Contingency and Engineering	Total Land Value ($) $100,000/acre
SUBR	5.7	8.7	14,096	3.42	$70,480	12	$48	$4,800	$0	$22,012	$75,280	$22,584	$6,022	$753	$3,011	$7,528	**$115,178**	**$342,000**
SUBX	3.1	4.8	7,740	1.91	$38,702	12	$48	$4,800	$0	$22,776	$43,502	$13,051	$3,480	$435	$1,740	$4,350	**$66,558**	**$191,000**
SUBY	2.6	4.1	6,623	1.65	$33,116	12	$48	$4,800	$0	$22,979	$37,916	$11,375	$3,033	$379	$1,517	$3,792	**$58,011**	**$165,000**
																Total	**$239,748**	

Notes:

1. Land Value shown for regional and parcel tenant basin construction assumes land does not require acquisition. The number estimates the value of land not used for development.
2. Basin costs do not include cost of export.
3 The regional basin is assumed to be expanded incrementally during each Priority to accomodate the additional development. The sum of associated excavations and costs of the basin expansion culminate in a full build out basin of 44 ac-ft in volume.

Priority 3 - Cost Estimate

Storm Drain

Element ID	Design Flow (cfs)	Design Storm	Upstream Invert	Downstream Invert	Length of Pipe (ft.)	Pipe Slope (ft/ft)	MODIFIED Pipe Slope (ft/ft)	Material/ Barrel Type	Pipe n-value	Number of Barrels	Design Culvert Diameter (IN.) Max Dia. = 48"	Velocity (Full Flow) ft/s	Manning's Qfull (cfs)	Total Pipe Unit Cost ($/ft)	Total Pipe Length	Total Trench Drain Cost *(32' drain/swale @ $250/LF)	Total Pipe Cost	Total Lateral Cost	Catchbasins @ $3000/EA	Manholes @ $5000/EA	Junction Structures	Miscellaneous Removals @ $6/LF	Construction Sub Total	Mobilization (5%)	Total Construction Cost ($)	Overall Contingency Cost (30%)	Construction Admin (8 %)	Testing/Insurance (1 %)	PM/CM (4 %)	Engineering Cost (10%)	Total Cost including Contingency and Engineering
SD_R	3.5	10-YR	0	0	2696	0.002	0.002	RCP	0.013	1	24	3.22	10.12	96	2,696	$0	$258,816	$58,234	$54,000	$25,000	$0	$16,176	$412,226	$20,611	$432,837	$129,851	$34,627	$4,328	$17,313	$43,284	**$662,240**
SD_S	10	10-YR	0	0	856	0.002	0.002	RCP	0.013	1	36	4.22	29.83	144	856	$0	$123,264	$18,490	$18,000	$10,000	$0	$5,136	$174,890	$8,744	$183,634	$55,090	$14,691	$1,836	$7,345	$18,363	**$280,960**
SD_T	19.8	10-YR	0	0	1584	0.002	0.002	RCP	0.013	1	36	4.22	29.83	144	1,584	$0	$228,096	$34,214	$33,000	$10,000	$0	$9,504	$314,814	$15,741	$330,555	$99,167	$26,444	$3,306	$13,222	$33,056	**$505,749**
SD_V	14.1	10-YR	0	0	1255	0.002	0.002	RCP	0.013	1	30	3.74	18.34	120	1,255	$0	$150,600	$27,108	$27,000	$15,000	$0	$7,530	$227,238	$11,362	$238,600	$71,580	$19,088	$2,386	$9,544	$23,860	**$365,058**
SD_W	20.9	10-YR	0	0	416	0.002	0.002	RCP	0.013	1	36	4.22	29.83	144	416	$0	$59,904	$8,986	$9,000	$5,000	$0	$2,496	$85,386	$4,269	$89,655	$26,896	$7,172	$897	$3,586	$8,965	**$137,172**
SD_X	10.7	10-YR	0	0	1578	0.002	0.002	RCP	0.013	1	30	3.74	18.34	120	1,578	$0	$189,360	$34,085	$33,000	$15,000	$0	$9,468	$280,913	$14,046	$294,958	$88,488	$23,597	$2,950	$11,798	$29,496	**$451,286**
SD_WQ	35	10-YR	0	0	255	0.002	0.002	RCP	0.013	1	48	5.11	64.24	192	255	$0	$48,960	$5,508	$6,000	$5,000	$0	$1,530	$67,510	$3,376	$70,886	$21,266	$5,671	$709	$2,835	$7,089	**$108,455**
SD_P	18.4	10-YR	1366.96	1362.7	2131	0.002	0.003	RCP	0.013	1	30	3.74	18.34	120	2,131	$0	$255,720	$46,030	$45,000	$20,000	$0	$12,786	$379,536	$18,977	$398,512	$119,554	$31,881	$3,985	$15,940	$39,851	**$609,724**
SD_M	158	10-YR	1355.8	1353.6	1100	0.002	0.003	RCP	0.013	3	48	5.11	192.72	192	3,300	$0	$633,600	$23,760	$0	$10,000	$0	$6,600	$673,960	$33,698	$707,658	$212,297	$56,613	$7,077	$28,306	$70,766	**$1,082,717**
INFIELD	4	10-YR	1352.28	1352	140	0.002	2.003	RCP	0.013	1	24	3.22	10.12	96	140	$0	$13,440	$3,024	$3,000	$5,000	$0	$840	$25,586	$1,279	$26,865	$8,060	$2,149	$269	$1,075	$2,687	**$41,104**
																														Total	**$4,244,466**

Regional Basin

HEC-1 Element ID	Upstream HEC-1 ID	FLOW ENTERING BASIN (cfs)	Actual Ponding Elev	Basin Bottom Elevation	Total Depth	Ponding Depth	Freeboard	Ponded Storage Volume (ac-ft)	Basin Volume @ Top (ac-ft)	Total Basin Excavation Volume (cu.ft.)	Detention Basin Excavation Cost ($5/cu-yd)	Outflow Pipe (# of barrels)	Outflow Pipe Diameter (in.)	Pipe Length (ft)	Pipe Cost ($96/ft)	# Of Manholes	Manhole Total Cost	No. of Headwalls	Headwall Cost	Length of Fencing (ft)	Unit Cost ($/lf)	Fence Cost	Basin Top Area (ac)	Total Construction Cost	Overall Contingency Cost ($) (30 %)	Construction Admin ($) (8 %)	Testing/Insurance ($) (1 %)	PM/CM ($) (4 %)	Engineering Cost ($) (10 %)	Total Cost including contingency and Engineering	Total Land Value ($) $100,000/acre
RSAA	CPAA	386.0	1353.3	1347.0	8.0	6.3	1.7	3.8	4.8	209,872	$38,865	0	0.0	0.0	$0	0	$0	0.0	$0	0	4.0	$0	2.80	**$38,865**	$11,660	$3,109	$389	$1,555	$3,887	**$59,464**	**$280,000**
																													Total	**$59,464**	

Tenant Parcel Basins

Description	Original Required Volume (ac-ft) Per 100Y-2H subbasin volume	Total Excavation Volume with freeboard (ac-ft)	Total Excavation Volume with freeboard (CY)	Required Top Area (ac.) (includes Safety Factor -10%)	Excavation Cost ($5/CY)	Drain Pipe Size (in)	Drain Pipe Cost/LF	Drain Pipe Cost ($48/LF)	Fence Cost ($)	Est. Cost/acre	Total Construction Cost ($)	Overall Contingency Cost (30 %)	Construction Admin (8 %)	Testing/Insurance (1 %)	PM/CM (4 %)	Engineering Cost (10 %)	Total Cost including Contingency and Engineering	Total Land Value ($) $100,000/acre
SUBK	7.6	11.6	18,713	4.50	$93,566	12	$48	$4,800	$0	$21,859	$98,366	$29,510	$7,869	$984	$3,935	$9,837	**$150,501**	**$450,000**
SUBL1	3.9	6.0	9,712	2.39	$48,560	12	$48	$4,800	$0	$22,326	$53,360	$16,008	$4,269	$534	$2,134	$5,336	**$81,641**	**$239,000**
SUBM1	4.0	6.2	10,021	2.46	$50,107	12	$48	$4,800	$0	$22,320	$54,907	$16,472	$4,393	$549	$2,196	$5,491	**$84,008**	**$246,000**
SUBO	6.3	9.6	15,502	3.75	$77,511	12	$48	$4,800	$0	$21,950	$82,311	$24,693	$6,585	$823	$3,292	$8,231	**$125,936**	**$375,000**
SUBP	9.7	14.8	23,801	5.69	$119,004	12	$48	$4,800	$0	$21,758	$123,804	$37,141	$9,904	$1,238	$4,952	$12,380	**$189,420**	**$569,000**
SUBT	4.2	6.5	10,420	2.55	$52,101	12	$48	$4,800	$0	$22,314	$56,901	$17,070	$4,552	$569	$2,276	$5,690	**$87,059**	**$255,000**
SUBW	1.8	2.8	4,445	1.13	$22,227	12	$48	$4,800	$0	$23,918	$27,027	$8,108	$2,162	$270	$1,081	$2,703	**$41,352**	**$113,000**
SUBZ	3.2	4.9	7,882	1.96	$39,412	12	$48	$4,800	$0	$22,557	$44,212	$13,264	$3,537	$442	$1,768	$4,421	**$67,644**	**$196,000**
																Total	**$827,561**	

Note: 1. Land Value shown for regional and parcel tenant basin construction assumes land does not require acquisition. The number estimates the value of land not used for development.
2. Basin costs do not include cost of export.
3. The regional basin is assumed to be expanded incrementally during each Priority to accomodate the additional development. The sum of associated excavations and costs of the basin expansion culminate in a full build out basin of 44 ac-ft in volume.

Priority 4 - Cost Estimate

Storm Drain

Element ID	Design Flow (cfs)	Design Storm	Upstream Invert	Downstream Invert	Length of Pipe (ft.)	Pipe Slope (ft/ft)	MODIFIED Pipe Slope (ft/ft)	Material/ Barrel Type	Pipe n-value	Number of Barrels	Design Culvert Diameter (IN.) Max Dia. = 48"	Velocity (Full Flow) ft/s	Manning's Qfull (cfs)	Total Pipe Unit Cost ($/ft)	Total Pipe Length
SD_K	87	10-YR	1362.19	1355.402	3393	0.002	0.003	RCP	0.013	2	42	4.68	89.98	168	6,786
SD_M	158	10-YR	1355.4	1353.61	896	0.002	0.003	RCP	0.013	3	48	5.11	192.72	192	2,688
SD_O	230	10-YR	1353.61	1350	1805	0.002	0.003	RCP	0.013	4	48	5.11	256.96	192	7,220
INFIELD	4	10-YR	1353.12	1352	560	0.002	2.003	RCP	0.013	1	24	3.22	10.12	96	560

Element ID	Total Trench Drain Cost *(32' drain/swale @ $250/LF)	Total Pipe Cost	Total Lateral Cost	Catchbasins @ $3000/EA	Manholes @ $5000/EA	Junction Structures	Miscellaneous Removals @ $6/LF	Construction Sub Total	Mobilization (5%)	Total Construction Cost ($)	Overall Contingency Cost (30%)	Construction Admin (8 %)	Testing/Insurance (1 %)	PM/CM (4 %)	Engineering Cost (10%)	Total Cost including Contingency and Engineering
SD_K	$0	$1,140,048	$73,289	$0	$20,000	$0	$20,358	$1,253,695	$62,685	$1,316,380	$394,914	$105,310	$13,164	$52,655	$131,638	**$2,014,061**
SD_M	$0	$516,096	$19,354	$0	$5,000	$0	$5,376	$545,826	$27,291	$573,117	$171,935	$45,849	$5,731	$22,925	$57,312	**$876,869**
SD_O	$0	$1,386,240	$38,988	$39,000	$15,000	$0	$10,830	$1,490,058	$74,503	$1,564,561	$469,368	$125,165	$15,646	$62,582	$156,456	**$2,393,778**
INFIELD	$0	$53,760	$12,096	$12,000	$0	$0	$3,354	$82,332	$4,117	$86,449	$25,935	$6,916	$864	$3,458	$8,645	**$132,269**
															Total	**$5,416,977**

Regional Basin

HEC-1 Element ID	Upstream HEC-1 ID	FLOW ENTERING BASIN (cfs)	Actual Ponding Elev	Basin Bottom Elevation	Total Depth	Ponding Depth	Freeboard	Ponded Storage Volume (ac-ft)	Basin Volume @ Top (ac-ft)	Total Basin Excavation Volume (cu.ft.)	Detention Basin Excavation Cost ($5/cu-yd)	Outflow Pipe (# of barrels)	Outflow Pipe Diameter (in.)	Pipe Length (ft)	Pipe Cost ($96/ft)
RSAA	CPAA	386.0	1353.3	1347.0	8.0	6.3	1.7	11.7	14.9	646,941	$119,804	0	0.0	0.0	$0

HEC-1 Element ID	# Of Manholes	Manhole Total Cost	No. of Headwalls	Headwall Cost	Length of Fencing (ft)	Unit Cost ($/lf)	Fence Cost	Basin Top Area (ac)	Total Construction Cost	Overall Contingency Cost ($) (30 %)	Construction Admin ($) (8 %)	Testing/Insurance ($) (1 %)	PM/CM ($) (4 %)	Engineering Cost ($) (10 %)	Total Cost including contingency and Engineering	Total Land Value ($) $100,000/acre
RSAA	0	$0	0.0	$0	5,100	4.0	$20,400	8.65	**$140,204**	$42,061	$11,216	$1,402	$5,608	$14,020	**$214,516**	**$865,000**
														Total	**$214,516**	

Tenant Parcel Basins

Description	Original Required Volume (ac-ft) Per 100Y-2H subbasin volume	Total Excavation Volume with freeboard (ac-ft)	Total Excavation Volume with freeboard (CY)	Required Top Area (ac.) (includes Safety Factor -10%)	Excavation Cost ($5/CY)	Drain Pipe Size (in)	Drain Pipe Cost/LF	Drain Pipe Cost ($48/LF)	Fence Cost ($)	Est. Cost/acre	Total Construction Cost ($)	Overall Contingency Cost (30 %)	Construction Admin (8 %)	Testing/Insurance (1 %)	PM/CM (4 %)	Engineering Cost (10 %)	Total Cost including Contingency and Engineering	Total Land Value ($) $100,000/acre
SUBU	4.2	6.4	10,378	2.54	$51,892	12	$48	$4,800	$0	$22,320	$56,692	$17,008	$4,535	$567	$2,268	$5,669	**$86,739**	**$254,000**
																Total	**$86,739**	

Note: 1. Land Value shown for regional and parcel tenant basin construction assumes land does not require acquisition. The number estimates the value of land not used for development.
2. Basin costs do not include cost of export.
3. The regional basin is assumed to be expanded incrementally during each Priority to accomodate the additional development. The sum of associated excavations and costs of the basin expansion culminate in a full build out basin of 44 ac-ft in volume.

CONCEPTUAL MASS GRADING

- Earthwork Calculations
- Excavation & Embankment Specification
- Master Grading Plan

Dibble Engineering

PMGA MASTER DRAINAGE PLAN
DIBBLE PROJECT NO. 100821.1006
EARTHWORK CALCULATIONS

DES: KEB

DATE: 2011-1219

EARTHWORK

				CUT (CY)	FILL (CY)
TIN Comparison (Unadjusted)				1,150,000	1,400,000
Roadway Pavement		Depth(FT)=	0.83		
Condition:	Cut	Area(SF)=	1,300,000	40,123	
Parking Lot Pavement		Depth(FT)=	0.67		
Condition:	Fill	Area(SF)=	1,300,000		-32,099
Taxiway / Runway		Depth(FT)=	1.71		
Condition:	Fill	Area(SF)=	2,760,000		-174,800
Apron		Depth(FT)=	1.00		
Condition:	Cut	Area(SF)=	2,950,000	109,259	
Apron		Depth(FT)=	1.00		
Condition:	Fill	Area(SF)=	1,470,000		-54,444
Building - Parking Strc		Depth(FT)=	1.00		
Condition:	Cut	Area(SF)=	1,390,000	51,481	
Building - Parking Strc		Depth(FT)=	1.00		
Condition:	Fill	Area(SF)=	695,000		-25,741
Ground Compaction		Depth(FT)=	0.40		
		Area(SF)=	11,865,000		175,778
Fill Shrink		8 %			103,096
TOTAL				**1,350,864**	**1,391,789**
			NET FILL	**40,925**	**(BALANCED SITE)**

ITEM P-152 EXCAVATION AND EMBANKMENT

DESCRIPTION

152-1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate as well as other areas for drainage, building construction, parking, or other purposes in conformity to the Airport requirements.

This specification has been provided as information only for the East Drainage Master Plan project and is based on soils located on the airport from previous projects. Any kind of earthwork to be performed shall be required to receive its own geotechnical investigations, design, and recommendations and in no way can this specification be held liable for that work.

152-1.2 CLASSIFICATION. All material excavated shall be classified as defined below:

a. Unclassified Excavation. Unclassified excavation shall consist of the excavation, disposal, and/or placement of all excavated material, depending on its nature, which is not otherwise classified and paid for under another identified item. All required hauling shall be considered incidental to the item.

b. Over-excavation of and Replacement of Unsuitable Materials, Backfill & Compaction. Over-Excavation and Replacement of Unsuitable Materials, Backfill and Compaction shall consist of the removal and disposal of deposits of mixtures of soils and organic matter not suitable for foundation material, and replacement with material suitable for foundation material as identified in this specification, as well as any hauling and legal disposal to an off-site location required.

C. Local Borrow. Local Borrow shall consist of approved material required for the construction of embankment or for other portions of the work in excess of the quantity of usable material available from required excavations. Local Borrow material shall be obtained from areas within the limits of the airport property but outside the normal limits of necessary grading, or from areas outside the airport. Any soil conditioning required to prepare the Local Borrow material for use as suitable foundation material in accordance with this specification shall also be included, as well as all hauling of the material required.

152-1.3 Unsuitable Excavation. Any material containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material, when approved by the Engineer as suitable to support vegetation, may be used on the embankment slope.

CONSTRUCTION METHODS

152-2.1 General. Before beginning excavation, grading, local borrow, and embankment operations in any area, the area shall be completely cleared and grubbed. This shall also be performed at the Stockpile/Spoils location as needed in preparation for placement of materials. Clearing and grubbing for any required locations including Local Borrow, Stockpile, or Spoil locations shall be considered incidental to excavation.

The suitability of material to be placed in embankments shall be subject to approval by Phoenix-Mesa Gateway Airport. Unsuitable material shall be disposed of off airport. All waste areas shall be graded to allow positive drainage of the area and of adjacent areas. The surface elevation of waste areas shall not extend above the surface elevation of adjacent usable areas of the airport, unless specified on the plans or approved by the Engineer.

If the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued. At the direction of Phoenix-Mesa Gateway Airport, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work. See General Conditions Section 13.15 for additional information.

The Contractor shall scarify and disk those areas outside of the pavement areas in which the top layer of soil material has become compacted by hauling or other activities to a depth of 4-inches in order to loosen and pulverize the soil.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify Phoenix-Mesa Gateway Airport, who shall arrange for their removal if necessary. The Contractor shall, at his/her own expense, satisfactorily repair or pay the cost of all damage to such facilities or structures which may result from any of the Contractor's operations during the period of the contract.

It is the Contractor's responsibility to identify and confirm all existing drainage conditions (including drainage structures) with the Airport before any excavation or embankment may take place. Furthermore, it is the sole responsibility to maintain all existing drainage conditions (including drainage structures) within the limits of construction.

After excavation and/or placement or any material (including material placed at the Local Borrow, Stockpile, or Spoil locations), the Contractor shall permanently stabilize the surface of all disturbed soil that will remain un-paved in accordance with MAG Standard Specifications 230 and 792.

152-2.2 EXCAVATION. No excavation shall be started until the work has been staked out by the Contractor and the Engineer has obtained elevations and measurements of the ground surface. All suitable excavated material shall be used in the formation of embankment, subgrade, or for other purposes shown on the plans. All unsuitable material shall be disposed of at the direction of the Airport.

When the volume of the excavation exceeds that required to construct the embankments to the grades indicated the excess shall be disposed of as directed by the Airport. When the volume of excavation is not sufficient for constructing the fill to the grades indicated, the deficiency shall be obtained from the local borrow area identified on the plans.

The grade shall be maintained so that the surface is well drained at all times. When necessary, temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the work.

a. Selective Grading. When selective grading is indicated on the plans, the more suitable material as designated by Phoenix-Mesa Gateway Airport shall be used in constructing the embankment or in capping the pavement subgrade.

b. Over-excavation of Unsuitable Materials. Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, or any areas intended for aircraft pavement subgrades or shoulders, shall be excavated to a minimum depth of 12-inches, (unless otherwise specified by Phoenix-Mesa Gateway Airport), below the subgrade. Muck, peak, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified by Phoenix-Mesa Gateway Airport. Unsuitable materials shall be disposed of at an off-site location by the Contractor, and the resultant excavated area shall be refilled with suitable material, obtained from the grading operations or borrow areas and thoroughly compacted by rolling.

c. Over-excavation and Replacement of Wet Unstable Materials. Soft, wet, or unstable materials that otherwise meet the criteria for suitable subgrade shall be removed or disked in-place to a depth specified by Phoenix-Mesa Gateway Airport and the Contractor shall perform either of the following:

1. Remove, dry, replace and recompact once the material has dried sufficiently or;
2. Mix in chemical lime slurry or cement in accordance with MAG 309 and 311 respectively, to a minimum depth of 18-inches.

In either case, the Contractor shall assure the material becomes compacted as directed in Section 152-2.2.e/f. This item is a Contingent Item and can only be performed upon advance approval by the Airport. All work and material required for either method shall be considered incidental to the item.

d. Removal of Utilities. The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by the Contractor, unless otherwise shown on the plans. All existing foundations shall be excavated for at least 2 feet below the top of subgrade or as indicated on the plans, and the material disposed of as directed. All foundations thus excavated shall be backfilled with suitable material and compacted as specified herein.

e. Compaction Requirements Aircraft Pavement. The subgrade under areas to be paved shall be compacted to a depth of 8-Inches and to a density of not less than 95 percent of maximum density as determined by ASTM D 1557. The material to be compacted shall be within 3% below or 1% above of optimum moisture content before rolling to obtain the prescribed compaction.

f. Compaction Requirements Non-Aircraft Pavement. The subgrade under areas to be paved shall be compacted to a depth of 8-Inches and to a density of not less than 95 percent of maximum density as determined by ASTM D 698. The material to be compacted shall be within 3% below or 1% above of optimum moisture content before rolling to obtain the prescribed compaction.

The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 2167. Stones or rock fragments larger than 4-inches in their greatest dimension will not be permitted in top 6-inches of the subgrade. The finished grading operations, conforming to the typical cross section, shall be completed and maintained ahead of the paving operations or as directed by Phoenix-Mesa Gateway Airport.

In cuts, all loose or protruding rocks on the back slopes shall be bared loose or otherwise removed to line of finished grade of slope. All cut-and-fill slopes shall be uniformly dressed to the slope, cross section, and alignment shown on the plans or as directed by Phoenix-Mesa Gateway Airport.

Blasting will be not be permitted.

Borrow area(s) within the airport property will be determined by the Airport. Borrow excavation shall be made only at these designated locations and within the horizontal and vertical limits as staked or as directed.

When borrow sources are outside the boundaries of the airport property, it shall be the Contractor's responsibility to locate and obtain a suitable supply, meeting the requirements of this specification, subject to the approval of the Engineer. The Contractor shall notify the Airport; at least 15 days prior to beginning the excavation, so necessary measurements and tests can be made. The contractor is responsible for providing adequate testing documentation as to the suitability of the material for imported borrow. All unsuitable material shall be disposed of by the Contractor. All borrow pits shall be opened up to expose the vertical face of various strata of acceptable material to enable obtaining a uniform product. Borrow pits shall be excavated to regular lines to permit accurate measurements, and they shall be drained and left in a neat, presentable condition with all slopes dressed uniformly.

152-2.3 PREPARATION OF EMBANKMENT AREA. Where an embankment is to be constructed to a height of 4 feet or less, all sod and vegetable matter shall be removed from the surface upon which the embankment is to be placed, and the cleared surface shall be completely broken up by plowing or scarifying to a minimum depth of 6 inches. This area shall then be compacted as indicated in paragraph 152-2.2.e/f. When the height of fill is greater than 4 feet, sod not required to be removed shall be thoroughly disked and recompacted to the density of the surrounding ground before construction of embankment.

Where embankments are to be placed on natural slopes steeper than 3 to 1, horizontal benches shall be constructed as shown on the plans.

The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

152-2.4 FORMATION OF EMBANKMENTS. Embankments shall be formed in successive horizontal layers of not more than 8-inches in loose depth for the full width of the cross section, unless otherwise approved by Phoenix-Mesa Gateway Airport.

The grading operations shall be conducted, and the various soil strata shall be placed, to produce a soil structure as shown on the typical cross-section or as directed. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Operations on earthwork shall be suspended at any time when satisfactory results cannot be obtained because of rain or other unsatisfactory conditions of the field. The Contractor shall drag, blade, or slope the embankment to provide proper surface drainage.

If imported fill is required, it shall meet the following requirements for imported fill/select backfill:

Sieve Size	Percent Passing
3 inch	100
No. 4	20-90
No. 40	10-80
No. 200	0-65

The maximum Plasticity Index per ASTM D 4318 should not exceed 10. A higher P.I. may be approved at the discretion of the Engineer provided that the percent passing the No. 40 sieve and No. 200 sieve does not exceed 20 percent and 60 percent respectively.

The material in the layer shall be within +/- 2% percent of optimum moisture content as determined by ASTM D 1557/698 before rolling to obtain the prescribed compaction. The local clayey and silty fine sandy soils are sensitive to excessive moisture content and will become unstable at elevated moisture content. It may be necessary to compact soils on the dry side of optimum. In order to achieve uniform moisture content throughout the layer, wetting or drying of the material and manipulation shall be required when necessary. Should the material be too wet to permit proper compaction or rolling, all work on all of the affected portions of the embankment shall be delayed until the material has dried to the required moisture content. Sprinkling of dry material to obtain the proper moisture content shall be done with approved equipment that will sufficiently distribute the water. Sufficient equipment to furnish the required water shall be available at all times. Samples of all embankment materials for testing, both before and after placement and compaction, shall be taken by the Contractor for each 1,000 cubic yards. Based on the results of these tests, the Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content in order to achieve the correct embankment density.

Rolling operations shall be continued until the embankment is compacted to not less than 100 percent of maximum density as determined by ASTM D 1557/698.

The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 2167.

Compaction areas shall be kept separate, and no layer shall be covered by another until the proper density is obtained.

During construction of the embankment, the Contractor shall route his equipment at all times, both when loaded and when empty, over the layers as they are placed and shall distribute the travel evenly over the entire width of the embankment. The equipment shall be operated in such a manner that hardpan, cemented gravel, clay, or other chunky soil material will be broken up into small particles and become incorporated with the other material in the layer.

In the construction of embankments, layer placement shall begin in the deepest portion of the fill; as placement progresses, layers shall be constructed approximately parallel to the finished pavement grade line.

When rock and other embankment material are excavated at approximately the same, time, the rock shall be incorporated into the outer portion of the embankment and the other material shall be incorporated under the future paved areas. Stones or fragmentary rock larger than 4-inches in their greatest dimensions will not be allowed in the top 24-inches of the subgrade. Rockfill shall be brought up in layers as specified or as directed and every effort shall be exerted to fill the voids with the finer material forming a dense, compact mass. Rocks or boulders shall not be disposed of outside the excavation or embankment areas, except at places and in the manner designated by Phoenix-Mesa Gateway Airport.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in layers of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in layers not exceeding 2-feet in thickness. Each layer shall be leveled and smoothed with suitable leveling equipment and by distribution of spalls and finer fragments of rock. These type lifts shall not be constructed above an elevation of 4-feet below the finished subgrade. Density requirements will not apply to portions of embankments constructed of materials which cannot be tested in accordance with specified methods.

After placement or any material (including material placed at the Local Borrow, Stockpile, or Spoil locations), the Contractor shall permanently stabilize the surface of all disturbed soil that will remain un-paved in accordance with MAG Standard Specifications 230 and 792. This work shall be considered incidental to the earthwork operations.

152-2.5 FINISHING AND PROTECTION OF SUBGRADE. After the subgrade has been substantially completed the full width shall be conditioned by removing any soft or other unstable material which will not compact properly. The resulting areas and all other low areas, holes or depressions shall be brought to grade with suitable select material. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines, grades, and densities shown on the plans and required by these specifications.

Grading of the subgrade shall be performed so that it will drain readily. The Contractor shall take all precautions necessary to protect the subgrade from damage. Contractor shall limit hauling over the finished subgrade to that which is essential for construction purposes.

All ruts or rough places that develop in a completed subgrade shall be smoothed and recompacted. Subgrade shall be finished to the plan lines and grades, and compacted to the required density and depth as shown on the plans.

No subbase or surface course shall be placed on the subgrade until the subgrade has been approved by Phoenix-Mesa Gateway Airport.

152-2.6 HAUL. All hauling will be considered a necessary and incidental part of the work. If any import or local borrow is required, hauling of the import or local borrow shall be considered incidental.

152-2.7 TOLERANCES. In those areas upon which a subbase or base course is to be placed, the top of the subgrade shall be of such smoothness that, when tested with a 16-foot straightedge applied parallel and at right angles to the centerline, it shall not show any deviation in excess of 1/2-inch, or shall not be more than 0.05-foot from true grade as established by grade hubs or pins. Any deviation in excess of these amounts shall be corrected by loosening, adding, or removing materials; reshaping; and recompacting by sprinkling and rolling.

On runway or taxiway safety areas, intermediate and other designated areas, the surface shall be of such smoothness that it will not vary more than 0.10 foot from true grade as established by grade hubs. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping. Flowlines of ditches or swales shall not vary by more than 0.05-foot from true grade.

METHOD OF MEASUREMENT

152-3.1 This specification is provided for information only and no method of measurement is required.

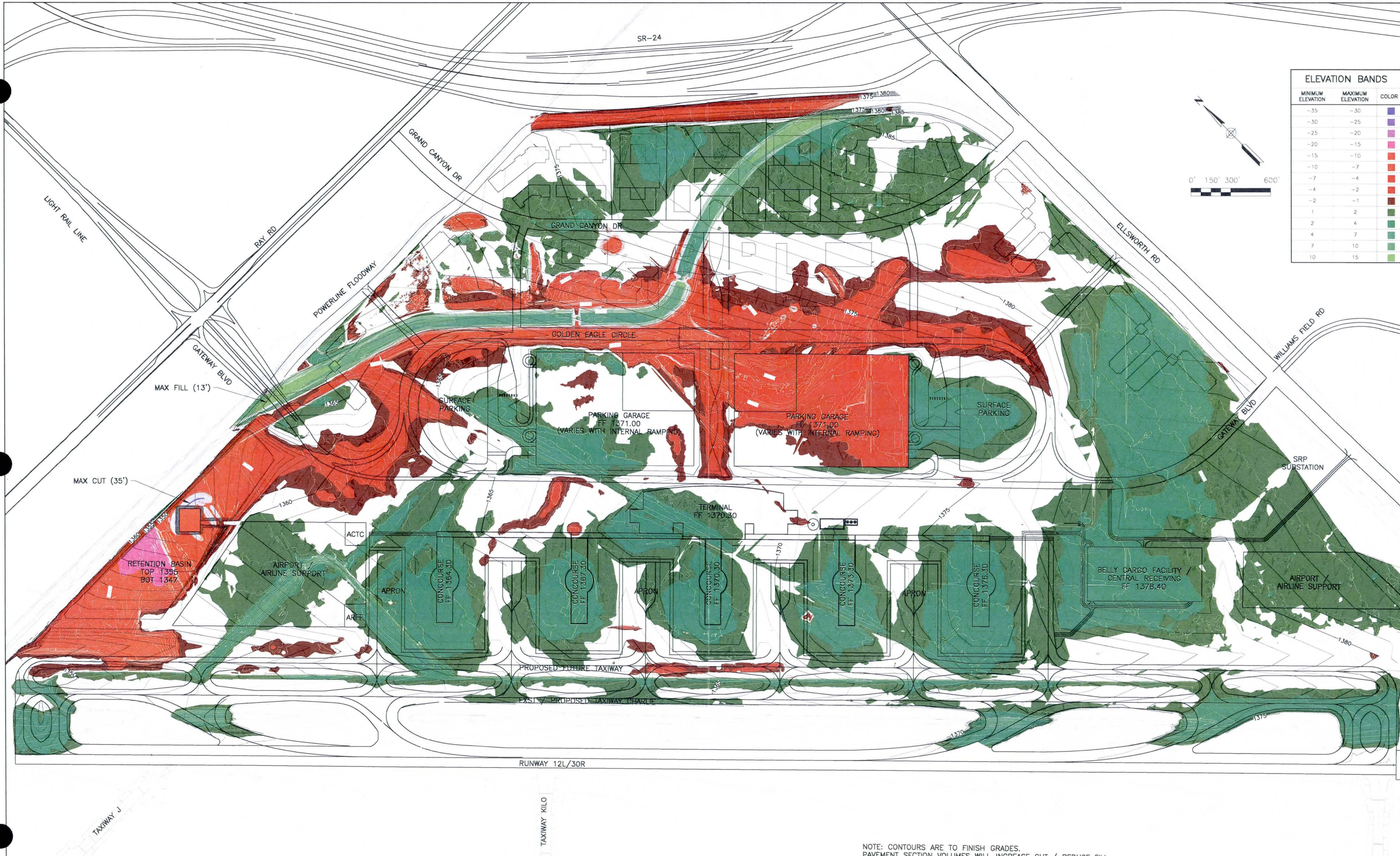
BASIS OF PAYMENT

152-4.1 This specification is provided for information only and no method of payment is required.

TESTING REQUIREMENTS

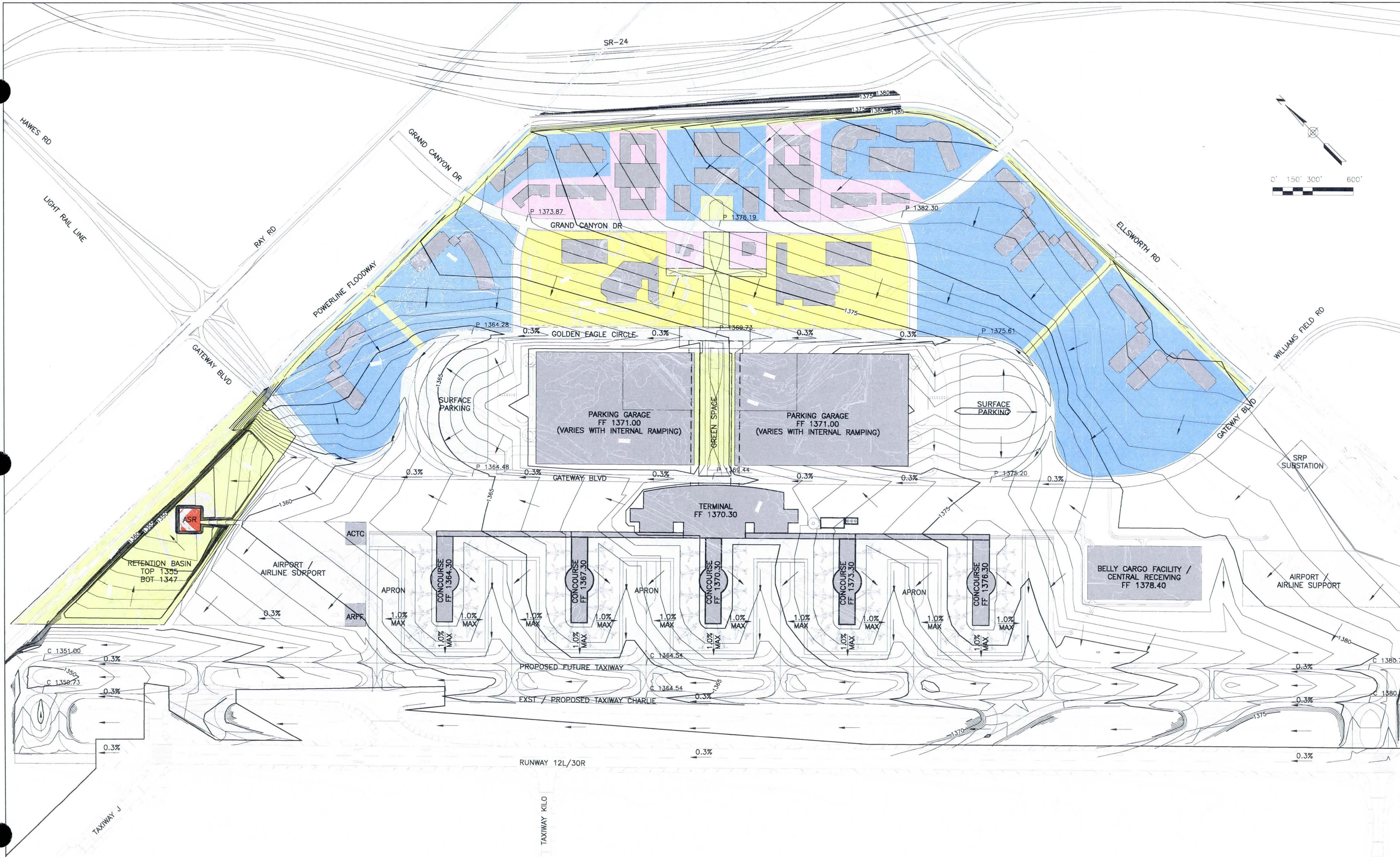
ASTM D 698	Test for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-pound (2.49 kg) Rammer and 12 in (305 mm) Drop
ASTM D 1556	Test for Density of Soil In Place by the Sand-Cone Method
ASTM D 1557	Test for Laboratory Compaction Characteristics of Soil Using Modified Effort
ASTM D 2167	Test for Density and Unit Weight of Soil In Place by the Rubber Balloon Method.

END OF ITEM P-152



EAST AREA AIRPORT MASTER DRAINAGE PLAN
PHOENIX-MESA GATEWAY AIRPORT
MASTER EARTHWORK PLAN

Dibble Engineering



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PHOENIX-MESA GATEWAY AIRPORT
MASTER GRADING PLAN

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