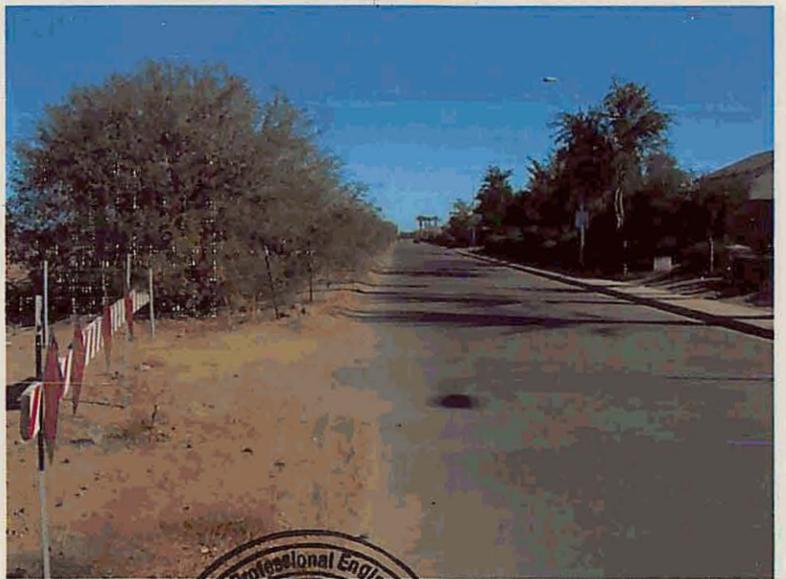




**Queen Creek Road
Basin Outlet
Candidate
Assessment Report
JUNE 2007**



**For:
Flood Control
District of
Maricopa County**



By: Project Engineering Consultants, Inc.



Queen Creek Road Basin Outfall Candidate Assessment Report

Prepared for

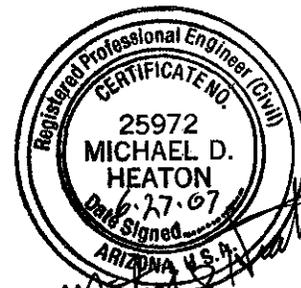


Flood Control District of Maricopa County

Prepared by



Project Engineering Consultants, Ltd.



Michael D. Heaton

Queen Creek Road Basin Outlet Candidate Assessment Report

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1 EXECUTIVE SUMMARY

The Queen Creek Road Basin (QCRB) was identified in the Higley Area Drainage Master Plan (ADMP) as an off-line basin and one of the elements of the recommended plan. The purpose of the QCRB is to collect and control storm water runoff along the Salt River Project (SRP) Consolidated Canal. As the lowest portion of the drainage basin, runoff would naturally collect near this location. The recommended alternative for this area also includes the Consolidated Canal Diversion Channel from the outlet of the QCRB southward across the Gila River Indian Reservation (GRIC) to the East Maricopa Floodway (EMF). A water quality basin was also included upstream of the GRIC border near Hunt Highway.

A 70 acre parcel on the southeast corner of McQueen and Queen Creek Roads was purchased through an Intergovernmental Agreement (IGA) FCD2002A001 between the City of Chandler (City) and the Flood Control District of Maricopa County (District). Another IGA FCD 2004A014 addresses the QCRB as an on-line basin with the City taking the lead for the design, construction, and, operation and maintenance of a 204 ac-ft basin. The City is also responsible for draining the basin by providing an outlet.

Since the identification of the QCRB and the purchase of the parcel however, agreement with the GRIC has not been established. In an effort to move the project forward, the QCRB Candidate Assessment Report (CAR) project was established by the District as a way to identify other potential alternatives for an alternative outlet for the QCRB.

As part of the CAR, discussions were held with potential project partners to determine if there were alternative ways to drain the QCRB. The discussions included the District and City, the Arizona Department of Transportation (ADOT), and the SRP. The GRIC (or their representatives) were contacted and provided some input, but did not participate in the brainstorming of ideas. Several potential solutions were suggested by them and were added to the list of potential outlets and presented at the brainstorming session held with the partners. Thirteen (13) alternatives were identified and are discussed in Section 5 of this report.

After further discussion with the District, the list of alternatives was narrowed down to the four most feasible alternatives. These include:

- The original recommended alternative identified in the Higley ADMP to drain the basin using the Consolidated Canal Diversion Channel along the canal to a water quality basin at Hunt Highway. The channel then goes south across the GRIC to the EMF;
- Pump the flows along the Appleby Road alignment east to the EMF ;
- Make room for the flows in the Consolidated Canal by first discharging canal flow into the Santan Channel and then pumping the water from the QCRB to the Consolidated Canal; and
- Pumping the water from the QCRB via a pipeline north and discharging directly to the Santan Channel.

Design considerations along with a feasibility cost estimate for these most feasible alternatives are included in Section 6 of this report. As the City moves forward with design of any of the feasible alternatives, it should take into account, not only the cost of the alternative, but the potential partners

that are necessary to successfully complete the design and construction of the alternative. This may be critical to the actual implementation of the final recommended alternative.

2 DATA COLLECTION AND SUMMARY

Data collection for the CAR continued throughout the course of the project. Data was requested and received from the following entities:

Flood Control District of Maricopa County

- Orthophotography tiles (Mr. SID) for the QCRB.
- DXF, E00, shape files for the streams, bridges, canal, control points, culverts, drainage path lines, elevations, elevation points, FEMA flood zone, flood elevations, industries, structures, lakes, land use, future land use, parcels, rivers, rail roads, soils.
- DTM data for the QCRB Outlet project area.
- The Higley ADMP Recommended Design Report by Dibble and Associates, October 2000.
- Higley ADMP Alternative Analysis Report by Dibble and Associates, March 2000.
- On-going Chandler-Gilbert Flood Delineation Study input and output HEC-1 files and schematic HEC-1 key map by David Evans and Associates, November 2006.
- Consolidated Canal Floodplain Delineation Study Technical Data Notebook by Tetrattech, Inc., 2003.
- Gilbert-Chandler Flood Insurance Study, 1990 by Franzoy-Corey
- A copy of the recent FIRM map (Panel No. 2665) dated September 30, 2005

David Evans and Associates

- Digital files for the contours, elevation points, and the data file for the survey control points and the survey data has been received.

Salt River Project

SRP Zanjero Maps provide the location of most SRP facilities.

Utilities near the Basin

A request was sent through Blue Stake of Arizona for the utilities located adjacent to the basin site. Utility requests were not sent for all the alternatives discussed in this report due to the extent and range of the possible outlet facilities. More detailed utility searches should be completed to further refine the recommended alternatives.

Utilities in Queen Creek Road north of the basin and McQueen Road West of the basin include:

- Qwest Telephone (underground)
- City of Chandler Water
- City of Chandler Sanitary Sewer
- Overhead Electric

Utilities along Appleby Road on the south side of the basin include:

- City of Chandler Water
- City of Chandler Sanitary Sewer
- Underground Electric (street lighting)

The intersection of Queen Creek and McQueen Roads is a fully improved intersection with traffic lights and street lighting. Most of the utilities are underground.

3 PROJECT PURPOSE AND NEED

3.1 PROJECT PURPOSE

3.1.1 Project Need

The Higley ADMP and the current Consolidated Canal Floodplain Delineation Study indicates that significant storm water ponds along the eastern bank of SRP's Consolidated Canal. In order to reduce or eliminate the flood damages along the eastern bank of the canal, the Higley ADMP recommend a plan that includes a detention basin at the southeast corner of Queen Creek Road and McQueen Road designated as the QCRB. The basin would outlet into a channel and pipe system constructed along the east side of the canal, would flow through a water quality basin, and be conveyed southward across the GRIC to the EMF. Past discussions with the GRIC have indicated that the outfall channel proposed in the Higley ADMP may not be feasible in the desired time frame.

The District and the City acquired the land needed for the QCRB. The City desires to construct the basin within the next few years to begin offering flood protection to its citizens. In order for the basin to be designed and constructed, an outfall must be identified and constructed. This CAR identifies possible alternatives and provides guidance on the most feasible outlet alternatives for the basin.

3.1.2 Project Participation

The District, through their on-call consultant contract, selected Project Engineering Consultants, Ltd. for this CAR.

Other project partners include the various agencies that could be affected or benefited by the outcome of this project. These agencies include the City, SRP, ADOT, and the GRIC. Meetings and discussions with these agencies provided information and input regarding the various alternatives for an outfall for the QCRB.

3.2 PROJECT OVERVIEW AND HISTORY

3.2.1 Project Overview & History

The QCRB was identified as a drainage element of the recommended plan for the Higley ADMP. The vacant land at the southeast corner of Queen Creek Road and McQueen Road is the natural low-lying area upstream of the SRP's Consolidated Canal. This canal, which is slightly elevated above the natural grade, flows nearly perpendicular to the natural gradient of the land and provides an impediment to the flow of storm water runoff in the area. The ADMP proposed an off-line basin at this location to provide a location for adjacent lands to drain to, and to lessen the potential flooding to the south along the Consolidated Canal. The

basin site is also located at the end of the runway of the Chandler Municipal Airport located on the north side of Queen Creek Road.

The ADMP proposed an outfall for the off-line basin that would run adjacent to the Consolidated Canal to a water quality basin at Hunt Highway and eventually discharges to the EMF, approximately 6 miles to the south on the GRIC. The proposed outfall consisted of an open channel that conveyed low flows that would bypass the QCRB. The channel would have pipes and culverts in various locations along the way to the EMF.

3.2.2 Project Location

The QCRB site is located within the City of Chandler, Arizona, at the southeast corner of Queen Creek Road and McQueen Road. It is immediately east of the Consolidated Canal (Figure 1).

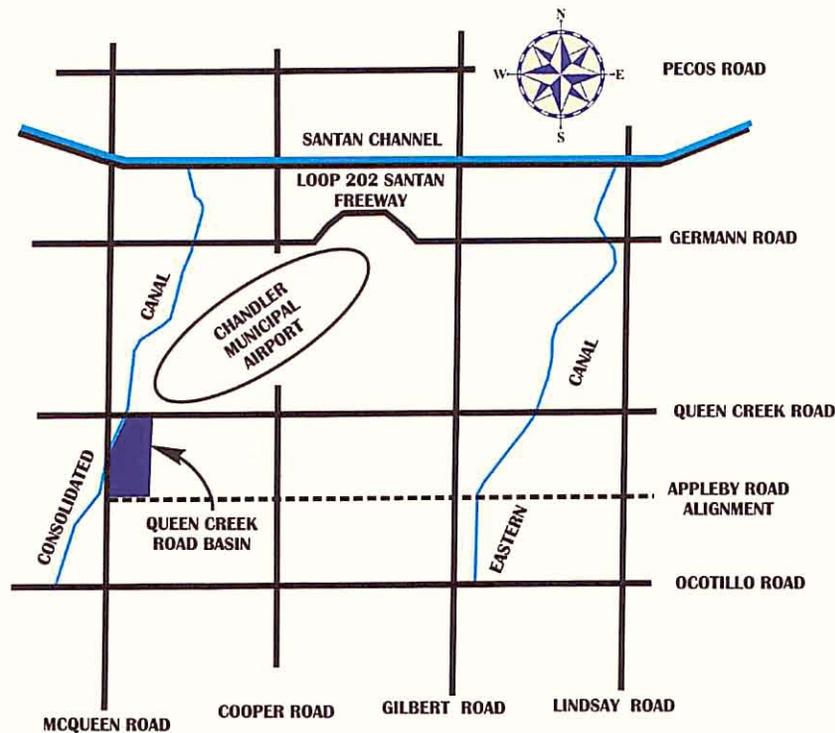


Figure 1 – Site Map

4 EXISTING CONDITIONS

4.1 HYDROLOGY AND HYDRAULICS

4.1.1 Introduction

The Higley ADMP identified the proposed QCRB site as part of the recommended plan. The adopted plan recommended a storage volume of approximately 125 ac-ft for the off line QCRB. It was determined later that the QCRB will act as an on-line basin and would therefore require a

storage volume of approximately 204 ac-ft, to contain the 100-yr, 24-hr storm. Copies of the IGA FCD 2004A014 that identifies the QCRB as an on-line basin with a storage volume of 204 ac-ft, and a County Assessor's map of the 70 acre parcel for the QCRB are included in Appendix A of this report. This CAR did not modify the hydrologic models. However knowledge of previous studies completed in the area was helpful in understanding the development of this element of the Higley ADMP. The District provided the Higley ADMP and various past studies that impact the QCRB site. These were reviewed and pertinent information was used in this report. The studies that were reviewed or collected are shown in Section 2, Data Collection, of this report. The updated hydrology model provided by the District was the basis for the volume of runoff stored in the QCRB and was used to determine the design parameters for its outlet.



Figure 2 - Watershed Map

4.1.2 Watershed Description

The watershed boundary for the QCRB includes Consolidated Canal and McQueen Road on the west, Ocotillo Road on the south, SRP's Eastern Canal on the east, and Loop 202 (Santan Freeway) on the north (See Figure 2). Chandler Municipal Airport is located within the watershed immediately north of Queen Creek Road extending to Germann Road. The drainage pattern is predominantly overland in an east to west direction accumulating at elevated roadways and canals including flows that overtops the Eastern Canal.

4.1.3 Existing and Proposed Facilities

There are only a few existing drainage facilities within the watershed area. These include a few on-site retention basins (most located at the Chandler Municipal Airport) and some tailwater ditches from various irrigated fields. The airport, adjacent to and just north of the QCRB site, is managed as a no discharge site according to the City's storm water department.

However both the Higley ADMP and the Chandler-Gilbert Floodplain Delineation Study (CGFDS) hydrology indicate that the 100-year flows from the Chandler airport overtops McQueen Road onto the site of the proposed QCRB.

Drainage facilities adjacent to the watershed include the Santan Channel on the north side of the Loop 202 Freeway, the EMF, and tailwater ditches associated with the SRP Irrigation District lands. No storm drains are located in the area.

4.1.4 Existing Hydrologic/Hydraulic Models

The earliest study reviewed for the area was the 1990 Gilbert-Chandler Floodplain Delineation Study. The newer Higley ADMP and the Consolidated Canal Floodplain Delineation Study were also reviewed. Another study, a re-study of the Gilbert-Chandler Floodplain Delineation Study, is currently underway. This re-study, the Chandler-Gilbert Floodplain Delineation Study, is scheduled to be completed in 2007. The Higley ADMP Alternatives Selection Report, Section 1C provides a summary of the previous hydrologic studies for the area and is included in Appendix B of this report. In September of 2003, the District did an analysis of the QCRB by modifying the Higley ADMP Preferred HEC-1 Model and using various scenarios. The scenarios modeled were to identify the impact that various on-line basin sizes would have on the downstream floodplains. This revised hydrology for the Higley ADMP was used for this CAR. The pertinent sections of the hydrologic model are also included in Appendix C. A District interoffice memo documenting the results of the analysis is included in Appendix D. The Table 1 below presents a summary of the results of the analysis.

Table 1- Queen Creek Road Basin /Flood Plain Sensitivity Analysis

NO BASIN	25-YR BASIN	50-YR BASIN	100-YR BASIN	100-YR W/ CC INFLOW
0 ac-ft	109 ac-ft	162 ac-ft	204 ac-ft	231 ac-ft
1218.61 ft	1217.81 ft	1217.73 ft	1217.73 ft	1216.12 ft

*Note: CC = Consolidated Canal.

The 100-year QCRB would reduce the floodplain elevation of the area south of it as shown in the comparison of results in Table 1.

The Higley ADMP updated HEC-1 for the 100-year, 24-hr storm indicates the required on-line basin storage volume is 204 AF. To drain the 204 AF basin in a 36 hour time frame, a 70 cfs outlet capacity would be needed. The alternatives discussed in this report use this volume and flow rate.

5 ALTERNATIVE ANALYSIS

5.1 Design Considerations

5.1.1 District Coordination

The City is responsible for design of the outfall for the QCRB, and the design must meet current standards. One of these standards is to drain the basin within 36 hours following the event. The County Department of Health Services requires the 36-hour drain time for vector control to prevent the spread of disease due to airborne pests such as mosquitoes. The District also prefers to drain the basin quickly so the capacity is quickly available for possibility of back to back storm events. The City, the District, and County must agree upon any deviation from these standards.

5.1.2 Gila River Indian Community

The GRIC is an important partner for the City along its southern border. Any of the alternatives that impact the GRIC would require coordination with the community during the development of the design and construction of the final drainage elements of the plan.

The GRIC is currently developing a Storm Water Master Plan. It includes the area adjacent to the GRIC border with the City. The Lone Butte Casino may be relocated near the Gilbert Road and Hunt Highway intersection. This may necessitate that nearby roadways within the GRIC be upgraded and could include drainage improvements. Since the area is developing, this could be an opportunity to work with the GRIC for an outlet for the QCRB (as well as other parts of the Higley ADMP) to the EMF.

5.1.3 City Design Criteria

The proposed QCRB site included about half of the open land in the location of Queen Creek Road and McQueen Road. The City is currently entertaining a developer's proposal that would combine the basin site and an adjacent parcel which would then have the basin surrounding the proposed commercial development. The City requirements include provisions for a retention/detention basin to have a maximum water depth of 3 feet where it is open and accessible for multi-use opportunities. This is a similar concept to the City's Arrowhead Park near the intersection of West Erie Street and North Arrowhead Drive. This community park includes a basin that is about 10 feet deep. According to the City, the basin depth for water storage is only 3 feet deep in the park basin.

The City plans to develop the QCRB basin as a multi-use park or facility. The design will contain the peak storage of 204 Acre-Feet.

5.1.4 City Pavement Cutting Moratorium

The City has a rigid pavement-cutting moratorium requiring fees or complete mill and overlay for the street cut if it falls within the moratorium years. The city streets around and adjacent to the basin site have been recently or will soon be improved. This could require fees if the alternative selected impacts these roadways. A copy of the Cities Pavement Cut Requirement flow chart is included in Appendix E of this report.

5.1.5 ADOT Coordination

ADOT could be a key partner for the outfall of the QCRB. The extension of Arizona Avenue onto the GRIC is an ADOT roadway designated as State Route 587. This roadway is located on GRIC lands as a "transportation easement" and any use of this easement as a utility corridor would require negotiations with both ADOT and the GRIC. ADOT prefers that a parallel drainage easement along this corridor be developed and this project should not seek to modify their easement to include a pipeline. An outlet alternative along this alignment would impact allotted lands on the GRIC. Acquiring easements through allotted lands can be very complicated and expensive. This would be difficult and could significantly slow the process of easement or right-of-way acquisition.

An outlet to the ADOT Santan Channel would also require modification of existing IGA between ADOT and the City. It is reported that the IGA allows Chandler a discharge connection capacity of 100 cfs. This is not to say they have a right to 100 cfs, but only the "connection capacity" to discharge that amount. According to the City, the current connection to the Santan Channel by the City is a total of 85 cfs. This would allow an additional 15 cfs. The IGA would have to be modified to include additional flow or a "post event" discharge. ADOT's current position is that the channel is at capacity and can receive no more flows. However ADOT agreed to review a report that would state how this could be accomplished.

ADOT currently is not allowed to discharge to the GRIC at the Gila Floodway as was anticipated during the design of the Santan Channel. Discussions are currently underway to work out the details for this discharge, but ADOT does not want any additional flows entering the system if there is no outfall available.

5.1.6 SRP Coordination

SRP is also a key partner for the outfall of the QCRB. During discussions with SRP, several alternatives were developed that would use the Consolidated Canal or the Canal right-of-way to provide an outfall. SRP's concern is that they have a location to discharge the basin flow when it is delivered to the canal system. SRP would require that the flow meet the National Pollution Discharge Elimination System (NPDES) requirements. Discussions with the City indicated that the NPDES permit could be obtained and that when a discharge point was located, the current permit would be modified to include the new discharge location. They also indicated that they are willing to work with SRP to meet whatever requirements are needed for an NPDES Permit.

An additional challenge to using the Consolidated Canal as the basin discharge point would be the annual dry-up for canal maintenance. If the basin required evacuation during the dry-up period additional coordination between the City, ADOT, and SRP would be required.

During discussions with SRP it was noted that SRP would be interested in a location to store excess canal water at a location adjacent to the canal. This would augment the operators' ability to utilize the canal more efficiently and provide an additional emergency outfall. SRP is also interested in developing a discharge location from the Consolidated Canal to the Santan Channel that would provide additional opportunities for the QCRB discharge.

5.1.7 Other Considerations

The proposed QCRB is located at the end of the runway for the Chandler Municipal Airport. Both the City and the Federal Aviation Agency (FAA) would be apprehensive about any development that could potentially increase bird strike incidents at the airport. The National Transportation Safety Board has issued recommendations for reduction of these incidents, but no regulations were found regarding the development of a basin at the end of a runway. However, the basin design must include efforts to prevent the development of any facility that would attract birds to this area. ADOT would also require that the flow meet the National Pollution Discharge Elimination System (NPDES) requirements. Discussions with the City indicated that the NPDES permit could be obtained and that when a discharge point was located, the current permit would be modified to include the new discharge location. They also indicated that they are willing to work with ADOT to meet whatever requirements are needed for an NPDES permit.

5.2 Alternatives Development

Meeting with the various potential partners and discussing the purpose of the CAR helped to develop the seed ideas. These seed ideas as well as other ideas were discussed and refined, during a brainstorming session held at the District on January 19, 2007. The following sections list all the alternatives developed at the brainstorming session. In each section is a brief description of the alternative and an evaluation table. The table presents a qualitative assessment of the alternative based on five common characteristics. The evaluation shown for each characteristic is low, moderate, or high. The lower the overall assessment, the more implementable the alternative will be. Exhibits showing the location of the alternatives are located in Appendix F of this report.

5.2.1 Alternative 1 (Appendix F, Outlet Alternatives Exhibit, Sheet 1 of 3)

This is the original preferred alternative from the Higley ADMP. This alternative would include an outlet on the south side of the QCRB with a channel and pipe system to convey the flows south along the east side of the Consolidated Canal to Hunt Highway. The ADMP included a water quality basin at the border of the GRIC near Hunt Highway. The Consolidated Canal ends at Hunt Highway with a final delivery to the GRIC. The discharge from the basin would then continue in an open channel southward alongside State Route 587 (the continuation of Arizona Avenue) and eventually discharging to the EMF.

Cost	ROW Requirements	Utility Conflicts	Difficulty of Construction	Permitting and Coordination
<i>High</i>	<i>High</i>	<i>Low</i>	<i>Low</i>	<i>High</i>
A nearly six mile long conveyance crossing several major streets and requiring a longer pipeline	New easements would be required nearly the entire distance	Following the Consolidated Canal would minimize major utility conflicts; mainly at road crossings	Gravity flow, could be open channel much of the way and is mainly off the major road alignments	Would require permit from SRP and from GRIC that may be difficult to obtain. Coordination for operation minimal.

5.2.2 Alternative 2 (Appendix F, Outlet Alternatives Exhibit, Sheet 2 of 3)

This alternative would include pumping the basin water into the Consolidated Canal that would convey the flows south to Hunt Highway. The Consolidated Canal ends at Hunt Highway with a final delivery to the GRIC. Flows from the canal would then discharge to Lateral 9 of the Gila River Farms Irrigation System. Gila River Farms would then utilize the water as a delivery from SRP or waste it as determined by the canal operators. SRP requires that an NPDES permit cover any discharge to the Consolidated Canal as does the GRIC for discharges to their community.

Cost	ROW Requirements	Utility Conflicts	Difficulty of Construction	Permitting and Coordination
<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Moderate</i>	<i>High</i>
No outfall channel to construct, a pump station to lift the water into the Consolidated Canal	New easements would not be required.	Major utility easements are avoided by using the Consolidated Canal as the conveyance.	Pump station constructed at the basin site discharging to the Consolidated Canal. May have to construct facilities on GRIC to discharge flow.	Would require permit from SRP and major coordination with SRP and GRIC. Would require IGA with GRIC for the discharge of storm water into GRIC irrigation canal.

5.2.3 Alternative 3 (Appendix F, Outlet Alternatives Exhibit, Sheet 2 of 3)

This alternative would include pumping the basin water into the Consolidated Canal that would convey the flows south to Hunt Highway. The Consolidated Canal ends at Hunt Highway with a final delivery to the GRIC. Flows from the canal would then discharge to Pima-Maricopa Irrigation Project (PMIP) Santan Channel. The capacity of the Santan Canal is unknown. The PMIP would then utilize the water as a delivery from SRP or waste it as determined by the canal operators. SRP requires that an NPDES permit cover any discharge to the Consolidated Canal as does the GRIC for discharges to their community.

Cost	ROW Requirements	Utility Conflicts	Difficulty of Construction	Permitting and Coordination
<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Moderate</i>	<i>High</i>
No outfall channel to construct, a pump station to lift the water into the Consolidated Canal	New easements would not be required.	Major utility easements are avoided by using the Consolidated Canal as the conveyance.	Pump station constructed at the basin site discharging to the Consolidated Canal. May have to construct facilities on GRIC to discharge flow.	Would require permit from SRP and major coordination with SRP and GRIC. Would require IGA with GRIC for the discharge of storm water onto PMIP Canal that is currently incomplete.

5.2.4 Alternative 4 (Appendix F, Outlet Alternatives Exhibit, Sheet 3 of 3)

This alternative would include pumping the basin water into the Consolidated Canal that would convey the flow south to the Bear Creek Golf Course on the west side of the canal and south of Chandler Heights Road.

Cost	ROW Requirements	Utility Conflicts	Difficulty of Construction	Permitting and Coordination
<i>Moderate</i>	<i>Low</i>	<i>Low</i>	<i>Moderate</i>	<i>High</i>
No outfall channel to construct, a pump station to lift the water into the Consolidated Canal and a discharge structure to golf course required	New easements would not be required.	Major utility easements are avoided by using the Consolidated Canal as the conveyance.	Pump station constructed at the basin site discharging to the Consolidated Canal. Discharge structure to golf course required.	Would require permit from SRP and major coordination with SRP and golf course. Would require IGA with golf course. Not certain that the course is available for 204 AF.

5.2.5 Alternative 5 (Appendix F, Outlet Alternatives Exhibit, Sheet 3 of 3)

This alternative would include an outlet from the north side of the basin and a new pipeline west along Queen Creek Road to Arizona Avenue. At Arizona Avenue the pipeline would then flow to the south and onto the GRIC along State Route 587 eventually discharging to the EMF.

Cost	ROW Requirements	Utility Conflicts	Difficulty of Construction	Permitting and Coordination
<i>High</i>	<i>High</i>	<i>High</i>	<i>High</i>	<i>High</i>
Requires about six miles of channel and pipeline from the basin to EMF.	New easements required on ADOT, GRIC, and perhaps private lands.	Major utility conflicts can be expected to be high since a roadway alignment is used.	Gravity flow, but construction in existing ROW or adjacent to major transportation corridors will be very difficult.	Requires permit/easement from GRIC to cross community lands and discharge to EMF. Coordination with GRIC can be challenging.

5.2.6 Alternative 6 (Appendix F, Outlet Alternatives Exhibit, Sheet 1 of 3)

This alternative includes a pump station at the southeast corner of the basin on the Appleby Road alignment and a discharge pipeline east from the basin along the Appleby Road alignment for approximately 5.0 miles and discharging into the EMF.

Cost	ROW Requirements	Utility Conflicts	Difficulty of Construction	Permitting and Coordination
<i>High</i>	<i>High</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Low</i>
Would require pump station at basin and over 5 miles of pressure pipeline uphill to the EMF.	New easements, some on private property may be required all along the way.	Major utility conflicts can be expected to be at roadway crossings.	Appleby is not a major corridor, but may have some difficulty of construction since adjacent areas are all constructed.	Some permits would be required from SRP and various agencies. No major coordination efforts anticipated.

5.2.7 Alternative 7 (Appendix F, Outlet Alternatives Exhibit, Sheet 3 of 3)

This alternative includes a pump station at the northeast corner of the basin on the Queen Creek Road alignment and a discharge pipeline east from the basin along the Appleby Road alignment for approximately 5.3 miles and discharging into the EMF.

Cost	ROW Requirements	Utility Conflicts	Difficulty of Construction	Permitting and Coordination
<i>High</i>	<i>High</i>	<i>High</i>	<i>High</i>	<i>Low</i>
Would require pump station at basin and 5 miles of pressure pipeline uphill to the EMF.	New easements may be required all along the way.	Major utility conflicts can be expected to be high since a roadway alignment is used.	Construction in existing ROW or adjacent to major transportation corridors is very difficult.	Some permits would be required from SRP and various agencies. No major coordination efforts anticipated.

5.2.8 Alternative 8 (Appendix F, Outlet Alternatives Exhibit, Sheet 2 of 3)

This alternative includes a pump station at the northeast corner of the basin. The discharge would include a pipeline on the Queen Creek Road alignment to Gilbert Road, then south along Gilbert Road to Riggs Road, then along Riggs Road east discharging to the EMF. This alignment is approximately 6.5 miles in length.

Cost	ROW Requirements	Utility Conflicts	Difficulty of Construction	Permitting and Coordination
<i>High</i>	<i>High</i>	<i>High</i>	<i>High</i>	<i>Low</i>
Would require pump station at basin and 6.5 miles of pressure pipeline uphill to the EMF. Pavement cut moratorium could be expensive.	New easements required various agencies and perhaps private lands.	Major utility conflicts can be expected to be high since a roadway alignment is used.	Construction in existing roadway ROW or adjacent to major transportation corridors is very difficult.	Some permits would be required from SRP and various agencies. No major coordination efforts anticipated.

5.2.9 Alternative 9 (Appendix F, Outlet Alternatives Exhibit, Sheet 1 of 3)

This alternative includes a pump station that discharges into the Consolidated Canal. The Consolidated Canal would then be operated to flow north to discharge to the Santan Channel. This alternative would require the addition of a gate in the canal on north of the Loop 202 Freeway that would discharge the basin flow into the Santan Channel.

Cost	ROW Requirements	Utility Conflicts	Difficulty of Construction	Permitting and Coordination
<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>High</i>
Would require pump station at basin. Use of the canal for conveyance would minimize costs.	A few easements would be required for SRP.	No conflicts since the canal would be conveyance.	Only need to construct pump station and discharge gate.	Would require permit from SRP & Coordination with ADOT to discharge to Santan Channel and updated NPDES permit

5.2.10 Alternative 10 (Appendix F, Outlet Alternatives Exhibit, Sheet 1 of 3)

This alternative includes a pump station at the northwest corner of the basin and a pipeline along the Consolidated Canal to the Santan Channel north of the Loop 202 Freeway. This includes about 1.7 miles of pipeline.

Cost	ROW Requirements	Utility Conflicts	Difficulty of Construction	Permitting and Coordination
<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>High</i>
Would require pump station at basin and nearly 2 miles of pressure pipeline uphill to the Santan Channel.	New easements required from SRP.	Using canal alignment minimizes major utility conflicts keeping them mostly at road crossings.	Construction in existing SRP ROW is less difficult.	Would require permit from SRP & Coordination with ADOT to discharge to Santan Channel and updated NPDES permit

5.2.11 Alternative 11 (Appendix F, Outlet Alternatives Exhibit, Sheet 3 of 3)

This alternative would include a pump station to pump into the Consolidated Canal and use SRP Laterals 5-14, 5-15, 5-16 draining west and discharging to several SRP Drains. This alternative could also use the discharge to deliver water to the customers of SRP in the vicinity of the canal.

Cost	ROW Requirements	Utility Conflicts	Difficulty of Construction	Permitting and Coordination
<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>High</i>
Would require pump station at basin. Use of the canal for conveyance would minimize costs.	A few easements would be required for SRP.	No conflicts since the canal would be conveyance.	Only need to construct pump station.	Would require permit from SRP Coordination with SRP to determine when and where the water could be discharged.

5.2.12 Alternative 12 (Appendix F, Outlet Alternatives Exhibit, Sheet 2 of 3)

This alternative would include a pump station on the north side of the basin and the discharge would be a pipeline north along McQueen Road and discharging into the Santan Channel north of the Loop 202 Freeway.

Cost	ROW Requirements	Utility Conflicts	Difficulty of Construction	Permitting and Coordination
<i>High</i>	<i>High</i>	<i>High</i>	<i>High</i>	<i>High</i>
Would require pump station at the basin and about 2 miles of pressure pipeline uphill to the Santan Channel.	New easements required on ADOT and perhaps private lands.	Major utility conflicts can be expected to be high since a roadway alignment is used.	Construction in existing ROW or adjacent to major transportation corridors is very difficult.	Would require permit from SRP & Coordination with ADOT to discharge to Santan Channel and updated NPDES permit

5.2.13 Alternative 13

This alternative would use injection wells to discharge the flow from the basin into the aquifer. The wells could be used cooperatively with the nearby City of Chandler Wastewater Reclamation Facility (WRF) that would use them when the basin has no water to discharge. While some may be located at the QCRB site, the injection well locations would be required to be far enough from the existing injection site at Tumbleweed Park, but close enough to the WRF and QCRB to be cost effective. It is likely that new property or easements would be required to develop the injection well site as well as easements for distribution pipelines. Each injection well has a discharge capacity of about 1.5 cfs. This would necessitate the use of 45 wells to drain the basin in 36 hours. The cost of each well is estimated at \$2M, hence a total project cost of \$90M.

Cost	ROW Requirements	Utility Conflicts	Difficulty of Construction	Permitting and Coordination
<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>High</i>	<i>Moderate</i>
Would require pump station at basin and pressure pipeline to the injection site. Wells are expensive and high maintenance	New easements or property is required to construct the injection wells.	Major utility conflicts can be expected to be low as the conveyance would be minimal.	Construction may be difficult since a study would be required to determine where the wells could be located.	Would require permit from Department of Water Resources & Coordination with WRF if shared wells are used

6 RECOMMENDATIONS

6.1 Recommended Alternatives

Following discussions with the District, the most feasible recommendations were selected for future analysis. The recommendations include the original Higley ADMP alternative, since it is the current preferred alternative. Additional recommended alternatives were included by selecting the alternatives determined to be most implementable from the tables in Section 5. To provide for water quality issues, in all cases the basin would retain the first flush or the bottom 1 foot of volume, whichever is greater, to percolate at the basin site. Dry wells may be used if the percolation rate of the basin is not sufficient. All the alternatives assume the QCRB will be designed for 204 acre-ft of storage volume. This volume is the retention volume without a low level outfall. Therefore all discharges require a pump station to evacuate the basin.

The alternatives recommended for further study are listed below. Feasibility level costs are included. These costs are for comparison purposes only and are only an indication of the magnitude of the actual cost of the alternative. The right-of-way cost estimate is based on information from the District on a similar project. A breakdown of the costs is included in Appendix G for each of the recommended alternatives.

6.1.1 Alternative 1

The basin would be graded to the southeast corner of the basin near the Consolidated Canal. A pump station would lift the flow and discharge it to a gravity outfall. The outlet channel or pipeline would follow the Consolidated Canal. The method of conveyance would likely be a pipeline from Appleby Road to Ocotillo Road and then an open channel from Ocotillo Road to Hunt Highway. Existing channels and conveyance would be used and would include culvert crossings at Chandler Heights and Riggs Road. A water quality basin would be constructed adjacent to the GRIC border near Hunt Highway. From Hunt Highway to the EMF the conveyance could be pipeline or open channel along SR 587 depending on the IGA that can be worked out with the GRIC. The general slope from Hunt Highway to the EMF is approximately 0.0003 feet/foot. Assuming a bottom width of 5 feet and 5:1 side slopes this channel is approximately 57 feet wide. Adding 30 feet for an O&M Road and vegetative buffer will bring the right-of-way width to 87 feet. Pipeline portions would require a diameter of 54 inches. The feasibility cost for this alternative, assuming \$250,000 per acre for right-of-way, would be approximately \$22.8M using an open channel across the GRIC to

EMF. A pipeline may also be used to cross the GRIC. If a pipeline were used, the cost would decrease by about \$2.1M to \$20.7M.

This is the original alternative from the Higley ADMP. It is included in the recommended list since it has been presented to the GRIC before and may be known to them. It also has a discharge outfall that is gravity flow and can be an open channel. It utilizes the existing floodplain and basin system along the east side of the Consolidated Canal as it flows south and provides an outfall for more than just the QCRB. It would benefit the GRIC by providing a known discharge location and quantity from the north where now only overland flows exist.

The outfall also must include a designated conveyance within the GRIC to carry the concentrated flow from the Consolidated Canal and Hunt Highway to a safe discharge point. The optimum location, as identified by the ADMP, is the EMF. The GRIC is a sovereign nation and as such must evaluate all proposals according to their laws and community rules. Past experience has shown that this can be a long process. This must be taken into account during the development and design of this alternative.

6.1.2 Alternative 6

For Alternative 6 the QCRB would be graded to the southeast with the low point near Appleby Road. A pump station would pressurize the flow in a force main that would discharge it to the EMF about 5 miles to the east. The outfall pipeline would follow the Appleby Road alignment.

This alternative would require a pump station. The pipeline would be a force main for the 5 miles. Assuming a velocity of 4 fps, the pipeline would be a 60-inch pipeline. The Appleby alignment includes both private and public land. Easement and right-of-way would need to be obtained at various locations along the alignment. The feasibility cost for this alternative, assuming \$250,000 per acre for right-of-way, would be approximately \$15.5M.

This alternative provides a safe and consistent outfall for the basin. Since it discharges to the EMF, a District facility, no IGA would be required and the coordination of when a discharge can or cannot be made is not an issue. No coordination is required with either ADOT or the GRIC. It is the only recommended alternative where the coordination is not an issue. Since it is a force main, the ability to avoid major utilities by moving the pipe over or under the utility is an advantage. On the other hand Alternative 6 is a relatively expensive alternative with its five miles of force main and associated maintenance.

6.1.3 Alternative 9

For Alternative 9 the basin would be graded to the northwest with the low point near the Consolidated Canal. A pump station would lift flow into the canal where the canal would be operated to flow to the north 1.7 miles and the 70 cfs would discharge to the Santan Channel. A 70 cfs gate would be installed in the canal to allow for the discharge to the Santan channel.

The feasibility cost for this alternative, including a pump station and discharge gate to the Santan Channel would be approximately \$2.5M.

This alternative appears to be the least cost alternative. SRP has evaluated the hydraulics of the canal and determined that it is possible that the canal flow can be reversed for the 1.7 miles distance to the freeway channel and discharged to the Santan Channel. A structure would be required to allow flow to be discharged to the freeway drainage system.

In order for this alternative to work several matters would have to be resolved. These matters include the following:

- ADOT must modify its IGA with the City to allow a post peak discharge to the Santan Channel
- The City must obtain a NPDES Permit for the discharge of storm water into the Consolidated Canal
- SRP must agree to allow the City to discharge the storm water flow into the Consolidated Canal
- The canal must be modified near where it crosses the freeway to provide a discharge to the Santan Channel
- Another issue is the ADOT Kyrene Basin/GRIC discharge agreement.

Using a phone tree system and calling the various agencies to obtain permission to discharge would probably be required to as part of the operation of this alternative. This could also be accomplished by connecting to the City and/or SRP's radio telemetry system or SCADA system and discharges can be made automatically. Another issue that must be resolved is the SRP's annual dry-up of the canal. This may preclude this alternative from being feasible unless an agreement can be made for this section of the canal system. This could be included in the IGA between the City and SRP. The dry-up happens in the winter months that would limit the problem with vector control, but does not mitigate the back-to-back storm issue.

6.1.4 Alternative 10

For Alternative 10 the basin would be graded to the northwest corner of the basin near the Consolidated Canal. A pump station would pressurize the flow in a force main that would convey it to the Santan Channel about 1.7 miles to the north. The outfall pipeline would follow the canal alignment from Queen Creek Road to the freeway and discharge into the Santan Channel near the canal crossing.

The pipeline would be a force main for the 1.7 miles. Assuming a velocity of 6 fps, the pipeline would be a 48-inch pipeline. The feasibility cost for this alternative, assuming \$250,000 per acre for right-of-way, would be approximately \$5.3M

This alternative is similar to Alternative 9 but does not include the use of the canal, but only the canals right-of-way. This would overcome the issue of canal operation and dry-up and provide a constant outfall option. The ADOT matters as mentioned in alternative 9 must still be worked out. ADOT must first allow the discharge for this option to work and the City must still obtain the NPDES Permit.

7 Conclusion

The QCRB recommended in the Higley ADMP would be a great benefit to the residents of the City. It would provide a storm water collection location that will reduce or prevent flooding south of Queen Creek Road along the east side of the Consolidated Canal. Without an outlet,

however, the basin could be potential for spread of disease by pests and as well as becoming a draw for birds that would increase the possibility for aircraft bird strike.

The IGA between the District and the City indicates that the City is responsible for the design, construction, operations and maintenance of the QCRB and the outlet with the District participating financially and with technical expertise. This CAR is a document that can be used by the City to determine its next steps in the process of the design. Thirteen alternatives were developed and reviewed and the four most feasible alternatives were recommended for further development. With the completion of this CAR, the City should continue to work on the most feasible alternatives until one is identified as the recommended alternative for design of the outlet. Some suggested next steps are presented below.

Next steps for alternative 1 could include:

- Keep in contact with the GRIC and its consultant during the development of the GRIC Drainage Master Plan,
- Continue discussions with SRP regarding the use of the Consolidated Canal right-of-way,
- More detailed look at the required right-of-way and easements required to implement the plan including allotted land along SR 587 within the GRIC.

Alternative 6 next steps could include:

- More detailed look at the required right-of-way and easements required to implement the plan. This alignment includes areas of private property as well as City and County right-of-way.
- An investigation of the ramifications of discharging QCRB flows into the EMF north of the GRIC border. Questions that may need to be answered include: Does the channel have sufficient capacity? What impact on the current design will the QCRB discharge have on the system? What obligations to the GRIC exist when adding "out of area flows"?

Alternative 9 next steps could include:

- Continue discussions with SRP regarding the use of the Consolidated Canal right-of-way
- Begin discussions with ADOT regarding the use of the Santan Channel and the agreement for discharge from the City

Alternative 10 next steps could include:

- Continue discussions with SRP regarding the use of the Consolidated Canal to back up flows to the Santan Channel
- Begin discussions with ADOT regarding the use of the Santan Channel and the agreement for discharge from the City

Each alternative has its pros and cons and while these four recommended alternatives may now be the best next steps, additional information may come to light bringing some of the other alternatives to the forefront and possibly make them a more feasible option.

APPENDICES

- Appendix A City & District IGA & Assessors' Parcel Map
- Appendix B Summary of Previous Studies (Higley ADMP Report)
- Appendix C Hydrologic Model
- Appendix D District Inter office Memo
- Appendix E City Pavement Cut Flow Chart
- Appendix F Outfall Alternative Figures
- Appendix G Cost Information for Most Feasible Alternatives
- Appendix H Memos, Emails, and Meeting Minutes

Appendix A

City & District IGA & Assessors' Parcel Map



OFFICIAL RECORDS OF
MARICOPA COUNTY RECORDER
HELEN PURCELL
2005-0657504 05/18/05 10:32
6 OF 6

When Recorded Return to:
CLERK OF THE BOARD
BASKET PICK UP

Intergovernmental Agreement

for the

**Design, Utility Relocation, Construction, Construction Management,
Operation and Maintenance
of the**

Queen Creek Road Basin,

between

The Flood Control District of Maricopa County

and

City of Chandler

FCD 2004A014

AGENDA ITEM: C-69-05-084-2-00

This Intergovernmental Agreement (IGA) is entered into by and between the Flood Control District of Maricopa County, hereinafter called the DISTRICT, a municipal corporation and political subdivision of the State of Arizona, acting by and through its Board of Directors and the City of Chandler, acting by and through the City Council, hereinafter called the CITY.

This Agreement shall become effective as of the date it has been executed by all parties.

DATE FILED WITH MARICOPA COUNTY RECORDER _____

STATUTORY AUTHORIZATION

1. The DISTRICT is empowered by Arizona Revised Statutes Section 48-3603, as revised, to enter into this Agreement and has authorized the undersigned to execute this Agreement on behalf of the DISTRICT.
2. The CITY of Chandler is empowered by Arizona Revised Statutes Sections 9-240 and 9-276 and by City Charter Section 1.03, as revised, to enter into the Agreement and has by resolution authorized the undersigned to execute this Agreement on behalf of the CITY.

EXHIBIT "C"

BACKGROUND

3. The Higley Area Drainage Master Plan (Higley ADMP) was developed by the DISTRICT to quantify the extent of flooding problems and to develop a drainage plan to address the flooding problems in the Cities of Chandler, Mesa, the Town of Gilbert and portions of unincorporated Maricopa County.

The Queen Creek Road Basin was identified as one element of the recommended plan of the Higley ADMP. The revised basin would serve as an off-line retention basin, in order to alleviate the flooding problems along the eastern boundary of the Consolidated Canal; as well as flooding to the west caused by possible overtopping of the canal from runoff generated within the study area. The Queen Creek Road Basin is located on the southeast corner of McQueen and Queen Creek Roads in the City of Chandler (Exhibit A). The Queen Creek Road Basin (PROJECT) will serve as a retention basin that will retain the 100-year flows. The basin volume is estimated to be 204 acre-feet.

The Board of Directors of the Flood Control District of Maricopa County (BOARD) adopted Resolution FCD 98-05 on August 5, 1998 (C-69-99-002-6-00) authorizing the Chief Engineer and General Manager to negotiate and prepare an IGA for cost-sharing, land acquisition of real property required for the PROJECT, and obtain necessary rights-of-entry and/or easements required for the PROJECT. Intergovernmental Agreement (IGA) FCD 2002A001 was approved by the BOARD on May 1, 2002 (C-69-02-089-2-00) between the CITY and the DISTRICT for the purchase of approximately seventy (70) acres needed for this basin. The PROJECT was recommended for inclusion into the DISTRICT's Capital Improvement Plan by DISTRICT staff and was endorsed by the Flood Control Advisory Board on December 04, 2002.

The DISTRICT has proposed to fund fifty percent (50%) of the total design cost and the cost of excavating the basin. The DISTRICT's total cost-share amount, which includes design and excavation, will not exceed \$1,500,000.

The CITY will be the lead agency for design, utility relocation, construction, construction management, and operation and maintenance of the PROJECT. The CITY will fund the landscaping and aesthetic features of the basin and construct a multi-use park on the basin site. The DISTRICT will provide technical assistance, technical review and participate in consultant selection for the PROJECT.

PURPOSE OF THE AGREEMENT

4. The purpose of this Intergovernmental Agreement is to identify and define the responsibilities of the DISTRICT and the CITY for cost sharing, and for the design, utility relocations, construction, construction management, and operation and maintenance for the PROJECT.

TERMS OF AGREEMENT

5. The CITY shall:

- 5.1 Be the lead agency for design, utility relocations, construction, construction management, and operation and maintenance of the PROJECT. The CITY shall be responsible for funding the following:

- Fifty percent (50%) of the PROJECT design costs.
- Any basin excavation, utility relocation, and construction management costs associated with the excavation that exceeds the DISTRICT's total cost share limit.
- All the landscaping and aesthetic features.

- 5.2 Design the PROJECT to retain the 100-year storm flows, which equates to a volume of approximately 204 acre-feet, and shall be responsible for draining the basin, by drywells, pumping or some other means.
- 5.3 Act as the contracting agency and perform all services necessary to administer the design and construction of the PROJECT. The construction services should include but are not limited to, issue invitation for bids, receive, protect and open bids, determine the lowest responsible and responsive bidder, award the contract and the Notice to Proceed.
- 5.4 Provide to the DISTRICT in a timely manner for review and approval, the 30%, 60%, 90% and pre-final design submittals, and allow at least three (3) weeks for the DISTRICT review.
- 5.5 Provide all design and construction change orders to the DISTRICT for review and concurrence before the CITY approves them.
- 5.6 Provide the construction documents to the DISTRICT for review and approval prior to advertising the contracts.
- 5.7 Use the CITY's bidding process or state-approved alternative contracting method for construction manager at risk or design-build for construction of work included in this PROJECT.
- 5.8 Include the DISTRICT in the consultant selection process of the design contracts. Invite the DISTRICT to the pre-construction and construction progress meetings.
- 5.9 Invoice the DISTRICT for the design and excavation costs of the PROJECT, as described below. The DISTRICT's reimbursement to the CITY shall not exceed \$1,500,000 and shall be paid as design and excavation phases of the PROJECT are implemented, if they are awarded prior to July 1, 2005. If they are awarded after July 1, 2005, then DISTRICT funds will not be available until July 1, 2006, unless unforeseen funding becomes available. The DISTRICT's payments may be altered based on the availability of funding, however, the projected schedule of invoices and payments is:
 - 5.9.1 Upon the issuance of the Award of Contract for the design of the PROJECT, invoice the DISTRICT for the DISTRICT's cost share (50%) of the design cost.
 - 5.9.2 Upon issuance of the Award of Contract for the excavation, invoice the DISTRICT for the cost of excavation. The DISTRICT's total cost-share for design and excavation will not exceed \$1,500,000.
 - 5.9.3 Upon issuance of a DISTRICT approved change order for the PROJECT excavation, invoice the DISTRICT for the agreed upon cost of the change order upon completion of the PROJECT excavation. Should the change order invoice be issued after June 30, 2005, payment to the CITY may not occur until after July 1, 2006, due to the non-availability of DISTRICT funds.
- 5.10 Fund any excavation costs that exceeds the DISTRICT's cost share limit of \$1,500,000.

- 5.11 Own, operate, and maintain the PROJECT after completion and acceptance of construction. The CITY is responsible for any liability for public use of the PROJECT and all related properties, and any liability from any damages that may occur from the PROJECT not functioning because of the lack of maintenance of the PROJECT by the CITY. The CITY will invite the DISTRICT annually to perform a joint inspection of the completed PROJECT improvements.
 - 5.12 Conduct all public involvement activities for the PROJECT.
 - 5.13 Fund any "non-flood control improvements" that may be included in the PROJECT by the CITY.
 - 5.14 Fund any change orders that are directly caused by a request from the CITY.
 - 5.15 Provide "As-Built" record drawings of all construction for this PROJECT to the DISTRICT upon completion of the PROJECT.
 - 5.16 Have the CITY's Contractor obtain required Rights-of-Way Permit from the DISTRICT's Rights-of-Way Permits Branch prior to construction, for construction activities on DISTRICT owned basin property, at no cost, for the purpose of naming the DISTRICT as an additional insured and to ensure bonding requirements.
 - 5.17 If this PROJECT is terminated for any reason, funds already paid to the CITY and not contractually obligated for the PROJECT shall be reimbursed to the DISTRICT with any accrued interest.
6. The DISTRICT shall:
- 6.1 Participate in the CITY conducted selection of a design consultant and construction manager at risk or design-build contractor for the PROJECT.
 - 6.2 Review and approve the design plans and the bid and construction documents prior to the CITY advertising the construction contract(s) for bid.
 - 6.3 Reimburse to the CITY a cost share reimbursement amount not to exceed \$1,500,000 for design and excavation costs, including any utility relocation and construction management associated with the excavation. DISTRICT reimbursements shall be made to the CITY within 30-days of receipt of an invoice from the CITY in accordance with the terms in paragraph 5.9.
 - 6.4 Review, comment, and approve all the design and construction change orders to be funded by the DISTRICT, prior to approval and issuance by the CITY.
 - 6.5 Not be responsible for the cost of any non-flood control related improvements, including any aesthetic and/or landscape improvements
 - 6.6 Not be responsible for the operation and maintenance of the PROJECT, nor for any liability related to public use of the PROJECT and all related property. The DISTRICT will not be liable for any damages that may occur from the PROJECT not functioning because of lack of maintenance of the PROJECT by the CITY.

- 6.7 Prior to the commencement of construction, provide to the CITY, if necessary and at no cost, a Rights-of-Way Permit for the right of ingress and egress and the right to construct said flood control PROJECT upon property owned by the DISTRICT.
- 6.8 Prior to commencement of construction, provide to the CITY, at no cost, a Floodplain Use Permit.
7. Upon recordation of this Agreement by the Maricopa County Recorder's Office, the DISTRICT shall convey its property rights to the CITY:
- 7.1 The CITY shall provide a retention basin to contain a volume of 204 acre-ft.
- 7.2 If the CITY has not completed excavation of the basin by June 30, 2007, the DISTRICT shall initiate appraisal of the DISTRICT's portion of the parcel as shown on Exhibit B1. The appraisal shall be based on fair market value of unencumbered land in this location and shall have a 2007 date of value. In the event the CITY has not complied with the construction of this basin, it shall provide land re-payment to the DISTRICT based on the above-described valuation by no later than December 31, 2007. This valuation shall be the basis of repayment without regard as to whether the property has been the subject of a land exchange as outlined in paragraph 7.3 below.
- 7.3 Any land and/or property purchased by the DISTRICT and conveyed to the CITY shall be for specific flood control purposes, and should that land and/or property cease to be used for flood control purposes, said land and/or property shall revert to the DISTRICT. Said reversion shall be effectuated through judicial proceedings instituted by the DISTRICT in a court of general jurisdiction in the State of Arizona. As required by Arizona Revised Statute Section 48-3603.I, if all or a part of this property is subsequently sold by the CITY as undeveloped property for a price exceeding the original sale price, the District shall be paid the difference between the original price and the subsequent sale price. In the event the CITY negotiates a land exchange involving all or portions of the property described as Exhibit B2, with a third party, that would effectively reconfigure the basin location, the DISTRICT will process and record a release negating the reversionary clause within the transfer deed, after District review and concurrence that the new basin design and new location will comply with all other requirements of this Intergovernmental Agreement.
8. The DISTRICT may participate with the CITY in an annual inspection of the PROJECT. The CITY will correct any deficiencies identified by the DISTRICT within thirty (30) calendar days. If the CITY has not taken corrective action within this time, the DISTRICT reserves the right to perform the corrective action, and will invoice the CITY for all actual costs incurred by the DISTRICT to administer and correct the deficiency. And, the CITY will reimburse the DISTRICT these actual costs within 30-days of receipt on an invoice from the DISTRICT.
9. Each party to this agreement may with mutual written agreement of all parties delegate responsibilities to another party. Any delegation, however, shall not relieve the delegating party of its original responsibilities as defined herein.
10. In the case of any dispute over any items in this Agreement, the parties agree to use their best efforts and enter into good faith negotiations to resolve the disputed matters. However, this shall not limit the rights of the parties to seek any remedies provided by law.

11. Each party to this Agreement shall take reasonable and necessary actions within their authority to ensure that only storm water is discharged into the PROJECT, and that such discharges into the PROJECT comply at the point of discharge with any applicable requirements of the Clean Water Act, Arizona Pollutant Discharge Elimination System (AZPDES), or any other applicable discharge requirements, including any permit requirements.
12. The parties to this Agreement agree to equally share the cost of PROJECT compliance and cost audit, if requested by either party. An independent auditing firm acceptable to both parties and on contract to the DISTRICT will perform the audit. Any payments or reimbursements necessary to bring the PROJECT into compliance with the audit findings shall be made within forty-five (45) days of acceptance by both parties of the audit report.
13. Each party to this agreement (indemnitor) shall, to the extent permissible by law, indemnify, defend and save harmless the other (indemnitee) including agents, officers, directors, governors and employees thereof, from and against any loss or expense incurred as a result of any claim or suit of any nature whatsoever, which arises out of indemnitor's negligent or wrongful acts or omissions pursuant to this agreement. Such indemnification obligation shall encompass any personal injury, death or property damages resulting from the indemnitor's negligent or wrongful acts or omissions, as well as reasonable attorney's fees, court costs, and other expenses relating to the defense against claims or litigation, incurred by the indemnitee. Indemnitee shall be liable for their negligence or wrongful acts as provided by law.
14. All notices or demands upon any party to this agreement shall be in writing and shall be delivered in person or sent by mail addressed as follows:

Flood Control District of Maricopa County
Chief Engineer and General Manager
2801 West Durango Street
Phoenix, AZ 85009-6399

City of Chandler
Attn: Public Works Director
215 East Buffalo Street
Chandler, AZ 85225
15. Each party to this Agreement will pay for and not seek reimbursement for its own personnel and administrative costs associated with this PROJECT, including but not limited to the following unless specifically identified otherwise in this Agreement: design, rights-of-way acquisition, inspection, public involvement, permitting, management and administration, and operation and maintenance.
16. This Agreement shall expire ten (10) years from the date of recording with the County Recorder or upon completion of the PROJECT and after all funding obligations and reimbursements have been satisfied in accordance with this Agreement, whichever is the first to occur. However, by mutual written agreement of all parties, this Agreement may be amended or terminated. The operation and maintenance, inspection, and indemnification provisions of this Agreement shall survive the expiration of this Agreement.
17. This Agreement is subject to cancellation by any party pursuant to the provisions of Arizona Revised Statutes Section 38-511.

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18. Attached to this Agreement or contained herein are the written determinations by the appropriate attorneys for the parties to this Agreement, that these agencies are authorized under the laws of the State of Arizona to enter into this Agreement and that it is in proper form.
19. If legislation is enacted after the effective date of this Agreement, which changes the relationship, or structure of one or more parties to this Agreement, the parties agree that this Agreement shall be renegotiated at the written request of any party. Funds already advanced to the CITY for this PROJECT shall remain available for the PROJECT.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
A Municipal Corporation

Recommended by:

Timothy S. Phillips 4/13/05
Timothy S. Phillips, P.E. Date
Acting Chief Engineer and General Manager

Approved and Accepted:

By: Mary W. Wilson 5/13/05
Chairman, Board of Directors Date

Attest:

By: [Signature] 5/13/05
Clerk of the Board 160105 Date

The foregoing Intergovernmental Agreement FCD 2004A014 has been reviewed pursuant to Arizona Revised Statutes 11-952, as amended, by the undersigned General Counsel, who has determined that it is in proper form and within the powers and authority granted to the Flood Control District of Maricopa County under the laws of the State of Arizona.

Julie M. Simon 4/7/05
General Counsel Date

CITY OF CHANDLER

City of Chandler, a Municipal Corporation,

By: *[Signature]* 4/16/05
Boyd W. Dunn Date
Mayor



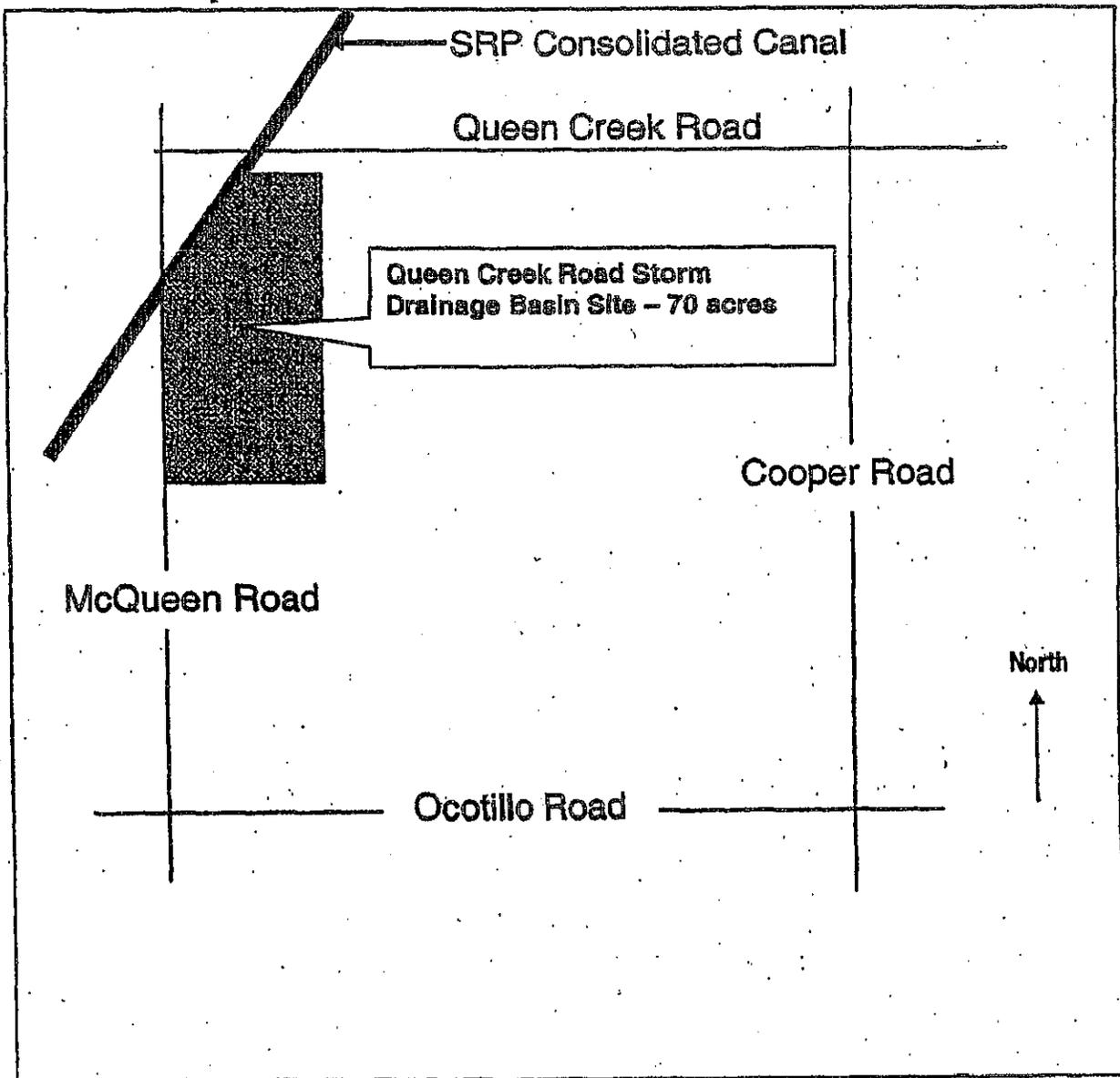
Attest:

By: *[Signature]* 4-18-05
City Clerk Date

The foregoing Intergovernmental Agreement FCD 2004A014 has been reviewed pursuant to Arizona Revised Statutes 11-952, as amended, by the undersigned attorney who has determined that it is in proper form and within the power and authority granted to the City of Chandler under the laws of the State of Arizona.

By: *[Signature]* 4-15-05
City Attorney Date

Exhibit A: Site Map IGA FCD 2004A014



Parcel No. 303-42-022A
Project No. A009
Queen Creek ROAD DRAIN
Item No. A009.002-EX2

LEGAL DESCRIPTION FOR FEE SIMPLE PROPERTY

That portion of the West half of the Northwest quarter Section 14, Township 2 South, Range 5 East, of the Gila and Salt River Base and Meridian, Maricopa County, Arizona, being more particularly described:

COMMENCING at the Northwest corner of said Section 14; Thence, along the West line of said section, South 00°17'29" West a distance of 1452.62 feet to the **POINT OF BEGINNING**; Thence North 89°42'31" East a distance of 1324.37 feet; Thence South 00°19'17" East a distance of 1151.02 feet to the intersection with the north line of the South 30 feet of the Northwest quarter of said section; Thence, along said North line, South 88°55'58" West a distance of 1325.10 feet to the intersection with the West line of said section; Thence, along said West line, North 00°17'29" West a distance of 1168.96 feet to the **POINT OF BEGINNING**.

The above described parcel contains 1,536,616 square feet or 35.2758 Acres more or less.

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION		
Prelim: JCampbell 02/23/05	Chk:	Appr:
Rev:		
Maricopa County Public Works Land & R/W Division		



GRANTOR _____ DATE _____

EXHIBIT "B2"

June 2, 2005

When recorded, Interoffice Mail to:
Flood Control District
of Maricopa County [jpp]
EXEMPT ARS § 11-1134, A3
Resolution FCD 2001R003

QCRB_20D&22A-18-1-1--
Kelleyc

WARRANTY DEED

Project : Queen Creek Road Basin Project

Item: A009.001; A009.002

Assessor's Parcel No.: 303-42-020D, 022A

The **FLOOD CONTROL DISTRICT OF MARICOPA COUNTY**, a municipal corporation and political subdivision of the state of Arizona, **GRANTOR**, for the sum of **One and no/100 dollars (\$ 1.00)** and other valuable consideration, receipt and sufficiency of which is hereby acknowledged [IGA FCD 2004A014], paid by **The CITY OF CHANDLER**, an Arizona municipal corporation, **GRANTEE**, herein has granted, sold, and conveyed and by this Deed does grant, sell, and convey unto the said **GRANTEE** all that certain real property situated in the County of Maricopa, State of Arizona, described as follows:

See Exhibits "A", "B-1", "B-2"
Attached hereto and incorporated herein

The **GRANTOR** binds itself and its successors to warrant the title against all persons whomsoever.

This property is conveyed subject to: Current (or prorated as necessary) real estate taxes, assessments, reservations, easements, rights-of-way, and deed restrictions as may appear of record.

It is hereby understood and agreed that the real property described herein is being conveyed to the **GRANTEE** for the specific purpose of the Queen Creek Road Basin Project, including all purposes consistent therewith, and should that real property cease to be used for said flood control purpose, said real property shall revert to **GRANTOR**. It is further understood and agreed that Intergovernmental Agreement FCD 2004A014 (recorded on May 18, 2005 in the Maricopa County Recorder's Office at recordation 2005-0657504 and attached as Exhibit "C") governs the terms of conveyance of the real property, and particularly Paragraph 7 [7.1 through 7.3] on Page 5 of 10 which describes the causes which would commence the enforcement or release of the reversionary clause.

cc 4/14/05 R-3841

Page 1 of 3

**Parcel No. 303-42-020D & a portion of 022A
Project No. A009
Queen Creek Road Drain
Item No. A009.001-EX**

EXHIBIT "A"

LEGAL DESCRIPTION FOR FEE SIMPLE PROPERTY

That portion of the West half of the Northwest quarter of Section 14, Township 2 South, Range 5 East, Gila and Salt River Base and Meridian, Maricopa County, Arizona, said portion being described as follows:

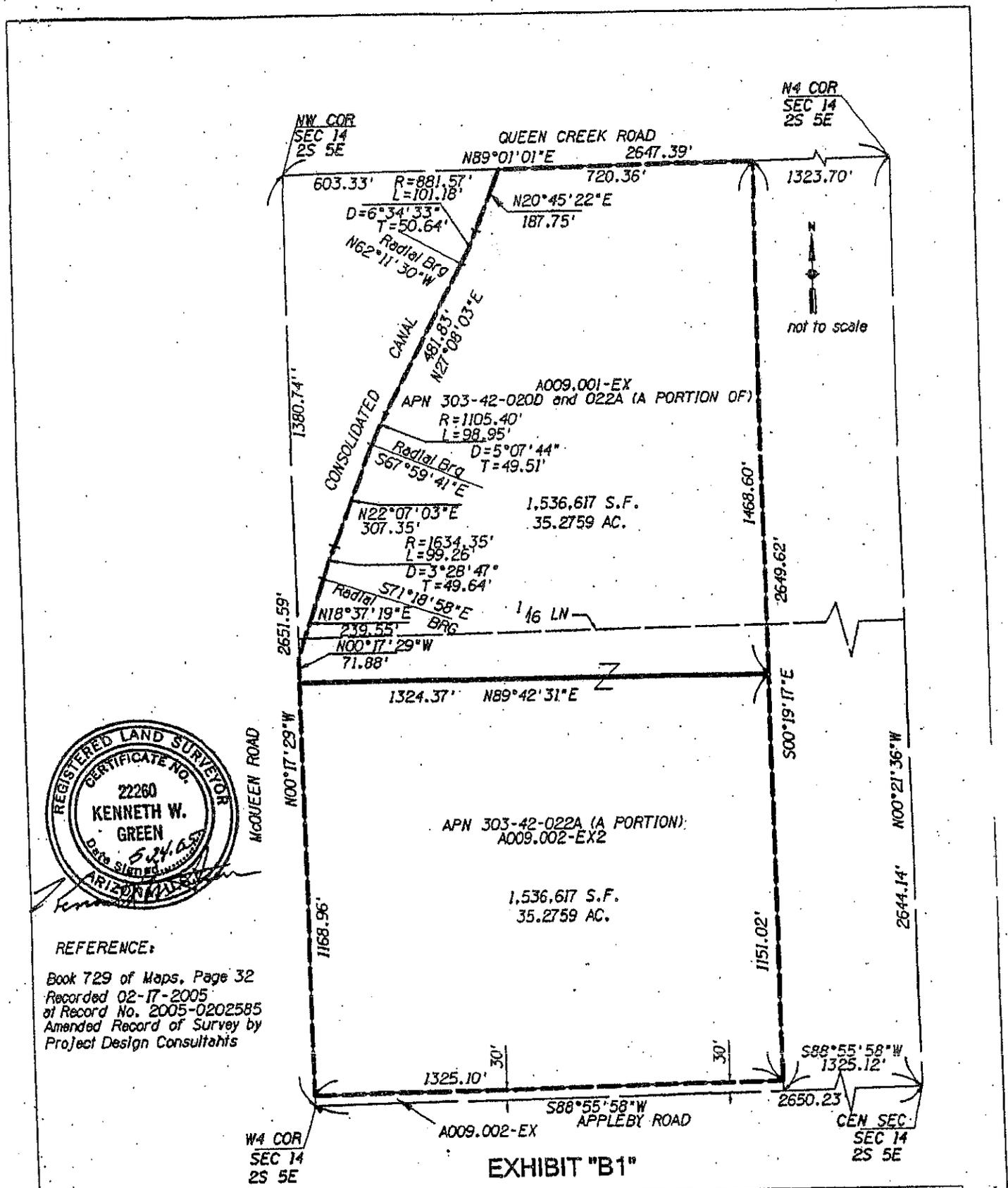
COMMENCING at the Northwest corner of said Section 14, Thence, along the North line of said section, North 89°01'01" East, a distance of 603.33 feet to a point of intersection with the Easterly right of way line of the Consolidated Canal and the **POINT OF BEGINNING**; Thence continuing North 89°01'01" East a distance of 720.36 feet to the intersection with the East line of the West half of the Northwest quarter of said section; Thence, along said East line, South 00°19'17" East a distance of 1468.60 feet, Thence South 89°42'31" West a distance of 1324.37 feet to a point on the West line of said section; Thence, along said West line, North 00°17'29" West a distance of 71.88 feet to a point of intersection with the Easterly right of way line of the Consolidated Canal; Thence, leaving the West line of said section run Northeasterly along the Easterly line of said Canal the following courses; North 18°37'19" East a distance of 239.55 feet to the beginning of a non-tangent curve, concave to the Southeast, with a radial bearing of South 71°18'58" East and a radius of 1634.35 feet; Thence Northeasterly through a central angle of 3°28'47" along said curve an arc distance of 99.29 feet; Thence North 22°07'03" East a distance of 307.35 feet to the beginning of a non-tangent curve, concave to the Southeast, with a radial bearing of South 67°59'41" East and a radius of 1105.40 feet; Thence Northeasterly through a central angle of 5°07'44" along said curve an arc distance of 98.95 feet; Thence North 27°08'03" East a distance of 481.83 feet to the beginning of a non-tangent curve, concave to the Northwest, with a radial bearing of North 62°11'30" West and a radius of 881.57 feet; Thence Northerly through a central angle of 6°34'33" along said curve an arc distance of 101.18 feet; Thence North 20°45'22" East a distance of 187.75 feet to the North line of said section and the **POINT OF BEGINNING**.

The above described parcel contains 1,536,617 square feet or 35.2759 Acres more or less.

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION		
Prelim: JCampbell 02/23/05	Chk:	Appr:
Rev:		
Maricopa County Public Works Land & R/W Division		



GRANTOR _____ DATE _____



REFERENCE:
 Book 729 of Maps, Page 32
 Recorded 02-17-2005
 at Record No. 2005-0202585
 Amended Record of Survey by
 Project Design Consultants

EXHIBIT "B1"

PRELIM: 2/23/05 JC	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
REV:	QUEEN CREEK TR-005
FINAL:	MARICOPA COUNTY PUBLIC WORKS LAND and RIGHT OF WAY DIVISION

**Parcel No. 303-42-022A
Project No. A009
Queen Creek ROAD DRAIN
Item No. A009.002-EX2**

LEGAL DESCRIPTION FOR FEE SIMPLE PROPERTY

That portion of the West half of the Northwest quarter Section 14, Township 2 South, Range 5 East, of the Gila and Salt River Base and Meridian, Maricopa County, Arizona, being more particularly described:

COMMENCING at the Northwest corner of said Section 14; Thence, along the West line of said section, South 00°17'29" West a distance of 1452.62 feet to the **POINT OF BEGINNING**; Thence North 89°42'31" East a distance of 1324.37 feet; Thence South 00°19'17" East a distance of 1151.02 feet to the intersection with the north line of the South 30 feet of the Northwest quarter of said section; Thence, along said North line, South 88°55'58" West a distance of 1325.10 feet to the intersection with the West line of said section; Thence, along said West line, North 00°17'29" West a distance of 1168.96 feet to the **POINT OF BEGINNING**.

The above described parcel contains 1,536,616 square feet or 35.2758 Acres more or less.

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION		
Prelim: JCampbell 02/23/05	Chk:	Appr:
Rev:		
Maricopa County Public Works Land & R/W Division		



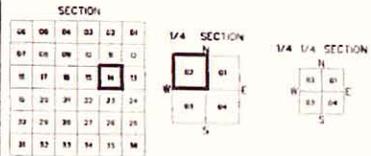
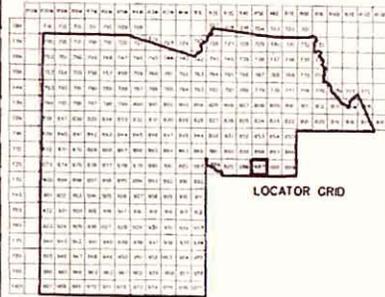
GRANTOR _____ DATE _____

EXHIBIT "B2"

MARICOPA COUNTY
OFFICIAL PARCEL MAP
STATE OF ARIZONA

PT. SECTION 14 T02S R05E

MAP ID * SR2 - 14 - 02 - 00



ASSESSOR BOOKS & MAPS WITHIN THIS AREA
BEGIN: 303 MAP: 42

SUBDIVISIONS

SCALE: 1" = 200'



MAP GENERATION DATE: 01-07-2025

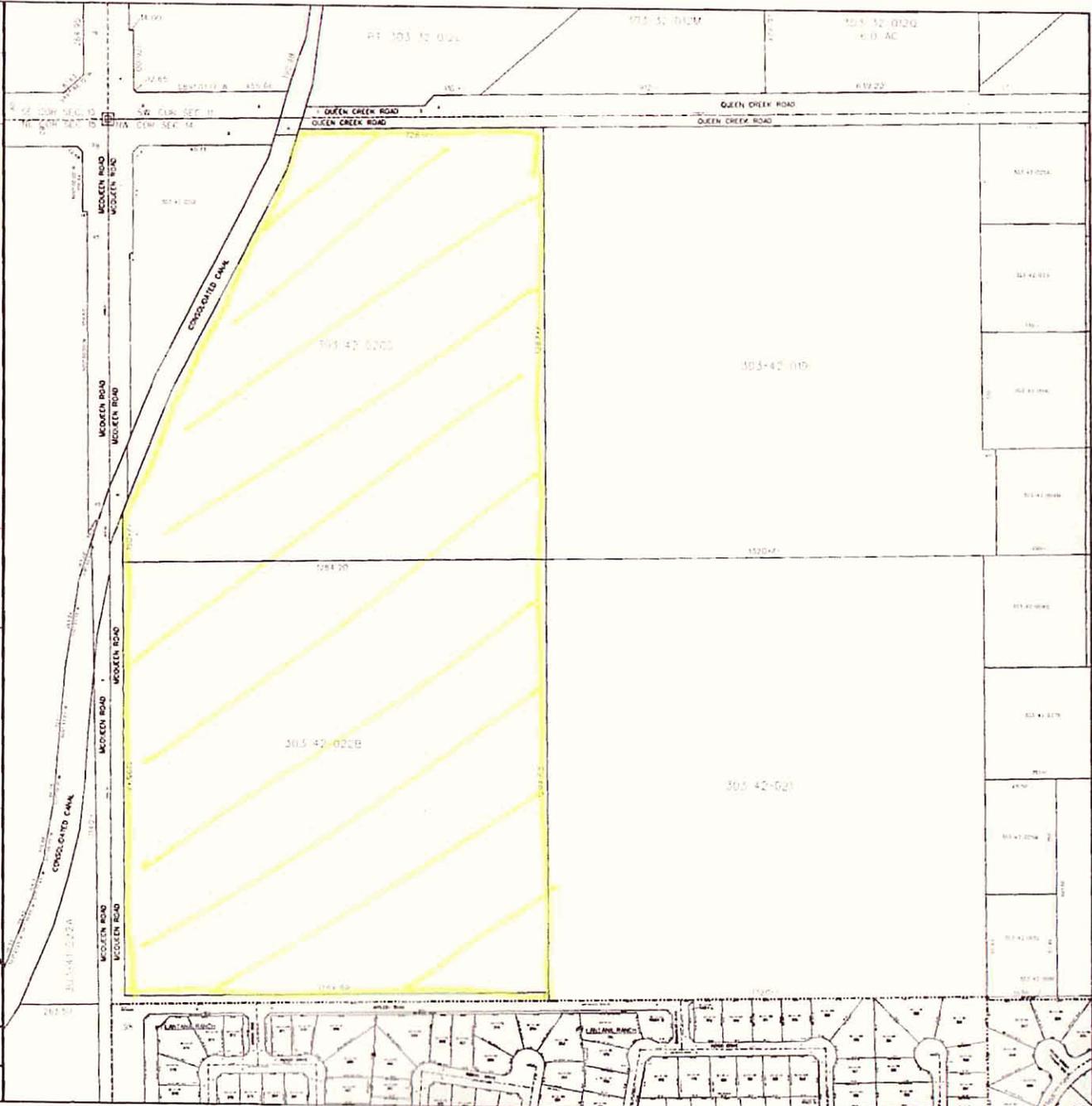
MARICOPA COUNTY ASSESSOR'S OFFICE
301 W. JEFFERSON ST.
PHOENIX, AZ 85003
WWW.MARICOPA.AZ.GOV/ASSESSOR

LEGEND

--- Subdivision Boundary Line	● Indicate SP/SL or original lot boundary
● Subdivision Boundary Corner	--- Parcel Boundary Line
--- Street Centerline	--- Parcel Easement Line
● State Encroachment Marker	--- Parcel Number
□ Section Corner Marker	--- Parcel Boundary New

IF MOOR INFORMATION IS LOCATED ON A SEPARATE DOCUMENT

Disclaimer - Indemnification
Maricopa County Assessor's Office does not warrant the accuracy of the data and information provided and hereby disclaims any responsibility for any errors, omissions or delays. The user of this information is advised that the user shall be responsible for the accuracy of the information and shall be held liable for any errors, omissions or delays. The user of this information shall be held liable for any errors, omissions or delays.



Appendix B

Summary of Previous Studies (Higley ADMP Report)

Previous Studies from the Higley ADMP, Recommend Design Report; Dibble & Associates, October 2000.

The Gilbert-Chandler Flood Insurance Study (FIS) was completed in 1990 for the area south of the Superstition Freeway. The study area for the FIS is bounded by the Superstition Freeway on the north, Hunt Highway (Maricopa County line) on the south, the RWCD Main Canal and the East Maricopa Floodway on the east, and the SPRR paralleling Arizona Avenue on the west. The study included hydrologic analysis of the entire study area with mapping and delineation of the 100-year floodplain along the Eastern Canal, Consolidated Canal, SPRR (Rittenhouse alignment) and SPRR (Arizona Avenue alignment).

The Gilbert-Chandler Area Drainage Master Study, Volume I, Current Conditions Hydrology (ADMS) was completed in July 1993 for a 120 square mile area bounded by Interstate 10 on the west, by the Western Canal and US 60 on the north, by the RWCD Canal on the east, and Queen Creek Road on the south. The study included only existing conditions hydrology for the study area.

The future hydrologic conditions were presented in the Gilbert-Chandler Area Drainage Master Study, Volume II, Future Conditions Hydrology completed in January 1994. The planned Santan Freeway location and drainage features were included in the analysis.

The area south of Queen Creek Road to the County boundary at Hunt Highway was studied in the Gilbert-Chandler ADMS Addendum, completed in 1998. The study area is bounded by Queen Creek Road on the north, the RWCD Canal/EMF on the east, Hunt Highway on the south, and Arizona Avenue on the west.

The area north of the Superstition Freeway has been more recently studied in the Eastern Canal North, from Baseline Road north to McDowell Road, Floodplain Delineation Study, completed in August 1999. The study area is bounded on the north by McDowell Road, on the east by the RWCD Canal/EMF, on the south by Baseline Road and on the west by the Eastern Canal.

All of the previous studies provided hydrologic analysis and/or floodplain delineation. None of the reports presented drainage improvement concepts or plans. The only regional drainage plans presented for the study area are contained in Concept Drainage Report, San tan Freeway - Price Rd to Gilbert Rd and Preliminary Drainage Concepts Santan Freeway - Gilbert Road to Baseline Road, completed in June 1995 by ADOT. Existing condition hydrology for this project was prepared by the District using the hydrology models from the Eastern Canal FDS, the Gilbert-Chandler ADMS, and the Gilbert-Chandler ADMS Addendum. The District hydrology has been modified for use in this study to simulate the impacts of each plan alternative.

Appendix C

Higley ADMP Hydrologic Model (Pertinent Portions)

```

1*****
*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
ENGINEERS * JUL 1997 *
ENGINEERING CENTER * *
* VERSION 4.1 *
STREET *
95616 *
* RUN DATE 05DEC06 TIME 08:30:53 *
*
*
*****
*****

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```

* U.S. ARMY CORPS OF
* HYDROLOGIC
* 609 SECOND
* DAVIS, CALIFORNIA
* (916) 756-1104
*

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X X XXXXXXX XXXX X
X X X X X XX
X X X X X
XXXXXX XXXX X XXXX X
X X X X X
X X X X X
X X XXXXXXX XXXX XXX

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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 -AMSK- 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

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID HIGLEY ADMP FILE PREF-S1
2 ID *****File modified by Dibble and Associates (D&A) for use in the *****
3 ID *****Higley ADMP. Refer to the End of this file for a *****
4 ID *****Listing of modifications - Dan Frank (DCF), D&A 03.10.00 *****
5 ID ***** THE FOLLOWING ORIGINAL CODE IS BY FDC *****
6 ID *****
7 ID Modified to remove Higley ADMP basins/channels and put back original routings
8 ID Queen Creek Basin was not removed since multiple models are being run to
9 ID evaluate the capacity of the basin, and it's effect on the floodplain(s)
10 ID downstream. The Ray Basin was removed. 9/3/03 JRC
11 ID
12 ID *****
13 ID SCENARIO TWO
14 ID ORIGINAL COUNTY FILE: FW224CLU.DAT
15 ID DATE: JAN. 1994
16 ID
17 ID
18 ID GILBERT-CHANDLER AREA DRAINAGE MASTER STUDY
19 ID VOLUME II - FUTURE CONDITIONS HYDROLOGY
20 ID FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
21 ID
22 ID SECOND MODEL COMPONENT CONTAINING THE AREA SOUTH OF THE RITTENHOUSE
23 ID RAILROAD TO APPROXIMATELY QUEEN CREEK ROAD BETWEEN THE SPRR AND THE RWCD
24 ID CANAL.
25 ID
26 ID THIS MODEL IS FOR THE 100 YR 24 HR STORM WITH AREAL REDUCTION OF POINT
27 ID RAINFALL USING MCUHP2 PER DRAINAGE DESIGN MANUAL, VOL. I WITH A STORM
28 ID AREA OF THIS MODEL COMPONENT (34.7 SQ. MI.)
29 ID
30 ID *** FUTURE CONDITIONS SUBBASINS AND CURRENT LAND USES ***
31 ID ***** INCLUDING THE SANTAN FREEWAY AND FACILITIES *****
32 ID ***** EAST OF DOBSON ROAD *****
33 ID
34 ID CALCULATIONS FOR RESERVOIR STORAGE-OUTFLOW RELATIONSHIPS, DIVERSIONS,
35 ID CULVERT AND TRESTLE CAPACITIES CAN BE FOUND IN THE REPORT APPENDICES
36 ID MANY OF THESE CALCULATIONS ARE ALSO EXPLAINED IN THE KM RECORDS.
37 ID IN SOME INSTANCES THE DATA WAS TAKEN FROM OTHER SOURCES WHICH ARE
38 ID NOTED IN THE KM RECORDS IN THE MODEL ITSELF.
39 ID
40 ID ***** WARNING!!!! HEC-1 DOES NOT RECOGNIZE THE SECOND FIELD OF THE
41 ID ***** HC RECORD WITHOUT USING THE JD RECORD OPTION. THEREFORE,
42 ID ***** THE TOTAL AREAS REPORTED AT ANY GIVEN LOCATION ARE NOT
43 ID ***** NECESSARILY CORRECT.
44 ID ***** DUE TO THE NUMEROUS DIVERSIONS AND RETRIEVALS OF HYDROGRAPHS IN THE
45 ID ***** MODEL AND THE FACT THAT THE JD OPTION WAS NOT USED IN THIS STUDY
46 ID ***** THE TOTAL AREAS CALCULATED BY HEC-1 DO NOT REFLECT THE ACTUAL

```

47 ID **** CONTRIBUTING AREAS. REFER TO THE INPUT SUMMARIES IN THE REPORT TEXT
 48 ID ***** OR THE ARC/INFO DATABASE TO FIND TOTAL AREAS FOR A GIVEN LOCATION
 49 ID
 50 ID THE GRAVITY DRAIN REFERRED TO IN ASSOCIATION WITH THE FUTURE SANTAN
 51 ID FREEWAY DRAINAGE FACILITIES IS AN UNDERGROUND PIPE WHICH IS DESIGNED
 52 ID TO DRAIN THE DETENTION BASINS. THE DRAIN DAYLIGHTS INTO THE FREEWAY
 53 ID CHANNEL AND ULTIMATELY DRAINS TO THE SANTAN COLLECTOR CHANNEL AND THE
 54 ID GILA DRAIN.
 55 ID

HEC-1 INPUT

1

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

56 ID 6/14/93 STORM AREA REVISED BASED ON COMMENTS RECEIVED FROM THE
 57 ID CITY OF CHANDLER DATED JUNE 3, 1993 FROM 34.6 TO 34.7 SQ.MILES
 58 ID
 59 ID
 60 ID *****
 61 ID *****
 62 ID
 63 ID MODEL MODIFIED BY THE FCD FOR USE IN THE HIGLEY ADMP 5/6/99
 64 ID NEW FILENAME: 224FWCLU.DAT
 65 ID
 66 ID THIS MODEL HAS BEEN MODIFIED FROM THE ORIGINAL FOR USE WITH THE HIGLEY ADMP.
 67 ID SUBBASINS WITHIN AND AFFECTING THE STUDY AREA HAVE BEEN MODIFIED TO REFLECT
 68 ID EXISTING LAND USE CONDITIONS AS OF 1998. RESULTING RETENTION VOLUMES HAVE
 69 ID BEEN MODIFIED AS WELL TO REFLECT THE NEW LAND USE CONDITIONS.
 70 ID ALL SUBBASINS WITHIN THE STUDY AREA WERE ANALYZED BUT ONLY A FEW REQUIRED
 71 ID MODIFICATION. MODIFIED SUBBASINS WILL BE NOTED IN THE KM RECORDS.
 72 ID SUBBASINS THAT WERE ANALYZED BUT HAD NO LAND USE CHANGES ARE AS FOLLOWS:
 73 ID 1,2,2A,7,8,9,10,30B,31,32A,29,30A,31,33,34,35A,39A,39,40,41,42.
 74 ID SUBBASINS THAT WERE MODIFIED ARE AS FOLLOWS:
 75 ID 3,4,5,6,7A,32,30,35,44,45.
 76 ID
 77 ID ALL OTHER SUBBASINS IN THESE MODELS WERE EITHER NOT WITHIN THE STUDY AREA
 78 ID OR DID NOT AFFECT THE STUDY AREA AND WERE THEREFORE NOT MODIFIED.
 79 ID
 80 ID *****
 81 ID *****
 82 ID
 83 ID *DIAGRAM
 84 ID IT 5 01JUL93 0100 2000
 84 ID IO 3
 84 ID *
 85 ID KK RD7A
 86 ID KM RETRIEVE FLOWS FROM CROSSROADS DETENTION BASIN
 87 ID KM THE AREA ON THE BA RECORD IS ALL THE AREA BETWEEN THE EASTERN
 88 ID CANAL AND THE RWCD CANAL BOTH SOUTH (15.33) OF
 89 ID KM THE SUPERSTITION FREEWAY
 90 ID BA 15.33
 91 ID ZR =Q1 A=GCADMSFUTURE B=CROSSROADS BASIN C=FLOW F=24HR CLU FWY
 91 ID *
 91 ID * KRRR-29
 91 ID * KM Removed 9/3/03 JRC
 91 ID * KM CHANNEL PARAMETERS MODIFIED FOR PRELIMINARY CHANNEL SIZING -DCF 08.16.00
 91 ID * KM ROUTE FLOWS FROM CROSSROADS PARK TO RAY RD.
 91 ID * KM ECDC-9C
 91 ID * RS 5 FLOW -1
 91 ID * RC .040 .040 .040 2367 .0005
 91 ID * RX 0 2 16.9 31.9 76.9 91.8 107 123
 91 ID * RY 4.94 5 2.49 0 0 2.49 5 4.66
 91 ID *

HEC-1 INPUT

1

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

92 ID KK RRR-29
 93 ID KM Added KK 9/9/03 JRC
 94 ID KM Put back 9/3/03 JRC
 95 ID KM ROUTE FLOWS RETRIEVED FROM THE INTERSECTION OF THE RAILROAD & E.C TO
 96 ID KM CONCENTRATION POINT 29
 97 ID KM SLOPE ASSUMED EQUAL TO THAT OF THE EASTERN CANAL WHICH WAS TAKEN FROM
 98 ID KM THE S.R.P. SURVEY DATA FOR THE EASTERN CANAL.
 99 ID KM SEE EASTERN CANAL ROUTINGS FOR REFERENCE.
 100 ID RS 2 FLOW -1
 101 ID RC .030 .027 .030 2500 .00036
 102 ID RX 0 5 10 15 20 25 30 35
 103 ID RY 17 17 17 10 10 17 17 17
 103 ID *
 104 ID KK SUB29
 105 ID KM BASIN SUB29
 106 ID KM THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 107 ID KM L= 1.1 Lca= .7 S= 10.1 Km= .150 LAG= 124.0
 108 ID KM PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 109 ID BA .17
 110 ID IN 30
 111 ID KM RAINFALL DEPTH OF 3.80 WAS SPACIALLY REDUCED AS SHOWN BY THE FB RECORD
 112 ID KM AN AREAL REDUCTION COEFFICIENT OF .890 WAS USED
 113 ID PE 3.38
 114 ID KM THE FOLLOWING PC RECORD USED A 24-HOUR SCS TYPE II RAINFALL
 115 ID PC .000 .005 .011 .016 .022 .028 .035 .041 .048 .056
 116 ID PC .063 .071 .080 .089 .098 .109 .120 .133 .147 .163

117	PC	.181	.204	.235	.283	.663	.735	.772	.799	.820	.838
118	PC	.854	.868	.880	.891	.902	.912	.921	.929	.937	.945
119	PC	.952	.959	.965	.972	.978	.984	.989	.995	1.000	
120	LG	.20	.10	9.40	.04	12.00					
121	UI	5.	5.	5.	5.	5.	8.	15.	16.	18.	21.
122	UI	22.	24.	25.	26.	28.	29.	31.	34.	35.	38.
123	UI	43.	51.	54.	61.	55.	50.	46.	43.	40.	38.
124	UI	36.	34.	31.	29.	28.	26.	24.	22.	21.	19.
125	UI	17.	13.	13.	8.	8.	8.	8.	7.	7.	7.
126	UI	5.	5.	5.	5.	5.	3.	1.	1.	1.	1.
127	UI	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.

////////////////////////////////////

1111 KK SUB39

1112 KM BASIN SUB39

1113 KM THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN

1114 KM L= 2.2 Lca= 1.3 S= 14.9 Kn= .070 LAG= 91.0

1115 KM PHOENIX VALLEY S-GRADE WAS USED FOR THIS BASIN

1116 BA 1.48

1117	LG	.49	.23	6.78	.24	.00					
1118	UI	55.	55.	55.	55.	156.	196.	228.	260.	284.	308.
1119	UI	330.	358.	394.	425.	477.	574.	664.	715.	621.	550.
1120	UI	500.	462.	431.	393.	357.	328.	299.	273.	254.	211.
1121	UI	164.	133.	97.	96.	90.	90.	73.	55.	55.	55.
1122	UI	43.	17.	17.	17.	17.	17.	17.	17.	17.	17.
1123	UI	17.	17.	17.	17.	0.	0.	0.	0.	0.	0.
1124	UI	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

1125 KK D39

1126 KM THROW URBAN AWAY RETENTION VOLUME: 2.0 AC-FT from basin 39

1127 KM (hydrograph identified as OR39)

1128 DT OR39 2.0

1129 DI 0 10000

1130 DQ 0 10000

1131 KK HC39

1132 KM COMBINE FLOWS ROUTED FROM GERMANN RD., RYAN RD., WITH RUNOFF HYDROGRAPH FROM

1133 KM SUB39, WITH THE OVERFLOWS IN EXCESS OF THE FWY CHANNEL AT BASIN L,

1134 KM AND WITH THE EMPTY CONTINUING HYDROGRAPH FROM DIV38

1135 KM THIS FLOW IS NOW ROUTED THROUGH A BOX CULVERT AT GERMANN AND THE

1136 KM CONSOLIDATED CANAL SOUTHWARD -DCF

1137 HC 2

* KKR3941a

* KM Removed 9/4/03 JRC

* KM CHANNEL PARAMETERS MODIFIED FOR PRELIMINARY CHANNEL SIZING -DCF 08.21.00

* KM ROUTE FLOW FROM HC39 TO RETENTION AREA AT AIRPORT VIA BOX CULVERT

* KM CCDC-5c

* RS	3	FLOW	-1								
* RD	2832	.0005	.015		DEEP	48	0				

* KKR3941b

* KM Removed 9/4/03 JRC

* KM CHANNEL PARAMETERS MODIFIED FOR PRELIMINARY CHANNEL SIZING -DCF 08.21.00

* KM ROUTE FLOW FROM RETENTION AREA TO QUEEN CREEK RD

* KM CCDC-5b

* RS	3	FLOW	-1								
* RC	.040	.040	.040	1751	.0005						
* RX	0	2	19.1	36.2	136.2	153	170	186			
* RY	5.66	5.7	2.85	0	0	2.85	5.7	5.38			

* KKR3941c

* KM Removed 9/4/03 JRC

* KM CHANNEL PARAMETERS MODIFIED FOR PRELIMINARY CHANNEL SIZING -DCF 08.21.00

* KM ROUTE FLOW FROM RETENTION AREA TO QUEEN CREEK RD

* KM CCDC-5a

* RS	1	FLOW	-1								
* RC	.015	.015	.015	1200	.0005						
* RX	0	2	7.71	13.4	53.4	59.1	64.8	80.8			
* RY	5.67	5.7	2.9	0	0	2.9	5.7	5.4			

HEC-1 INPUT

1

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

1138 KM Put back 9/4/03 JRC

1139 KM THE FOLLOWING RESERVOIR ROUTE AND DIVERT WAS REMOVED TO MODEL THE IMPROVED

1140 KM CONDITION WITHOUT PONDING BEHIND THE CONSOLIDATED CANAL -DCF 11.10.99

1141 KK RR39

1142 KM RESERVOIR ROUTING EAST OF CONSOLIDATED CANAL AND APPROXIMATELY 1320 FT. NOR

1143 KM OF GERMANN RD.

1144 KM ROUTING RETENTION BASIN - WHEN PONDING REACHES ELEVATION 1230.0

1145 KM FLOW WILL BEGIN OVER THE CANAL BANK INTO THE CONSOLIDATED CANAL

1146 KM NORTH OF GERMANN ROAD. NO WATER CROSSES GERMANN ROAD.

1147 KM GERMANN ROAD MINIMUM ELEVATION IS 1234.5'

1148 KM DATA FROM FRANZOY-COREY CROSSROADS PARK CLOWR MODEL (1992)

1149 KM SANTAN FREEWAY IS ASSUMED NOT TO IMPACT ON THE PONDING AREA RATING CURVE

1150	RS	1	STOR	0							
1151	SA	0	11.0	15.5	20.0	24.5	29.0	33.5	38.0	42.5	47

1152 SA 51.5 56.0
 1153 SE 1229.5 1230.0 1230.1 1230.2 1230.3 1230.4 1230.5 1230.6 1230.7 1230
 1154 SE 1230.9 1231.0
 1155 SQ 0 0 9.5 53.7 147.9 303.6 530.3 836.6 1229.9 1717
 1156 SQ 2305.3 3000.0
 *

1157 KK DIV39
 1158 KM Put back 9/4/03 JRC
 1159 KM DIVERT ALL THAT EXCEEDS EASTERN C.C. BANK ELEVATION INTO C.C.
 1160 DT D39-CC
 1161 DI 0 10000
 1162 DQ 0 10000
 *

1163 KK RDQC
 1164 KM Put back 9/4/03 JRC
 1165 KM RETRIEVE FLOWS DIVERTED AT QUEEN CREEK RD. INTO SUB40
 1166 DR DEC-40
 *

1167 KK RQC40A
 1168 KM Put back 9/4/03 JRC
 1169 KM ROUTE RETRIEVED FLOWS THROUGH REACH "A" WITHIN SUB40
 1170 KM SLOPE = (1260-1253)/2640
 1171 RS 4 FLOW -1
 1172 RC .015 .07 .07 2640 .0026 15
 1173 RX 0 4 4.83 8.83 18.83 108.83 198.83 208.83
 1174 RY 15.5 10 10 15 14 14 14 15
 *

1175 KK R40A-B
 1176 KM Put back 9/4/03 JRC
 1177 KM ROUTE FLOWS FROM END OF REACH "A" THROUGH REACH "B" WITHIN SUB40
 1178 KM SLOPE = (1253-1250)/1400
 1179 RS 2 FLOW -1
 1180 RC .015 .07 .07 1400 .0021 15
 1181 RX 0 4 4.83 8.83 18.83 108.83 198.83 208.83
 1182 RY 15.5 10 10 15 14 14 14 15
 *

HEC-1 INPUT

PAGE 31

1

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

1183 KK R40B-C
 1184 KM Put back 9/4/03 JRC
 1185 KM ROUTE FLOWS FROM END OF REACH "B" TO SUB41
 1186 KM SLOPE = (1250-1232)/6400
 1187 RS 7 FLOW -1
 1188 RC .03 .015 .035 6400 .0028 16
 1189 RX 0 32 35 39 40 44 69 89
 1190 RY 17 14 15.5 10 10 15.5 15.75 16
 *

1191 KK SUB40
 1192 KM BASIN SUB40
 1193 KM THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 1194 KM L= 2.2 Lca= 1.1 S= 13.2 Kn= .080 LAG= 98.0
 1195 KM PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 1196 BA 1.00
 1197 LG .47 .25 3.81 .42 4.00
 1198 UI 34. 34. 34. 34. 73. 115. 131. 156. 168. 185.
 1199 UI 196. 208. 227. 247. 265. 294. 341. 404. 454. 411.
 1200 UI 362. 328. 303. 282. 266. 240. 222. 204. 188. 172.
 1201 UI 160. 138. 113. 98. 61. 50. 59. 56. 41.
 1202 UI 34. 34. 34. 30. 10. 10. 10. 10. 10.
 1203 UI 10. 10. 10. 10. 10. 10. 10. 10. 0.
 1204 UI 0. 0. 0. 0. 0. 0. 0. 0. 0.
 *

1205 KK D40
 1206 KM THROW AWAY URBAN RETENTION VOLUME: 6.0 AC-FT from basin 40
 1207 KM (hydrograph identified as OR40)
 1208 DT OR40 6.0
 1209 DI 0 10000
 1210 DQ 0 10000
 *

* THE FOLLOWING CODE REMOVED PER COMMENTS BY KAG. -DCF 10.9.00
 * KK HC40
 * KM COMBINE RUNOFF HYDROGRAPH FROM SUB40 WITH FLOWS ROUTED FROM THE INTERSECTIO
 * KM OF E.C. AND QUEEN CREEK RD. AND WITH EMPTY CONTINUING HYDROGRAPH FROM DIV39
 * HC 2
 *

1211 KK R40-41
 1212 KM ROUTE COMBINED FLOWS THROUGH SUB41
 1213 KM SLOPE = (1232-1230)/1965
 1214 RS 3 FLOW -1
 1215 RC .03 .015 .035 1965 .001
 1216 RX 0 32 35 39 40 44 69 89
 1217 RY 17 14 15.5 10 10 15.5 15.75 17
 *

HEC-1 INPUT

PAGE 32

1

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

1218 KK SUB41
 1219 KM BASIN SUB41
 1220 KM THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 1221 KM L= 1.7 Lca= .9 S= 10.2 Kn= .080 LAG= 86.0
 1222 KM PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 1223 BA .82
 1224 LG .35 .23 6.78 .22 18.00
 1225 UI 32. 32. 32. 36. 106. 121. 144. 160. 176. 188.
 1226 UI 205. 226. 247. 275. 323. 392. 424. 366. 323. 293.
 1227 UI 269. 250. 225. 204. 189. 167. 154. 135. 108. 88.
 1228 UI 57. 57. 53. 53. 43. 32. 32. 20. 10.
 1229 UI 10. 10. 10. 10. 10. 10. 10. 10. 10.
 1230 UI 10. 0. 0. 0. 0. 0. 0. 0. 0.
 1231 UI 0. 0. 0. 0. 0. 0. 0. 0. 0.

1232 KK DIV41N
 1233 KM DIVERT 13.6 ACRE-FEET FOR RETENTION IN THE NEW AIRPORT EXPANSION AREA
 1234 KM DATA FROM FRANZOY-COREY (8/91) ENGINEER'S DRAINAGE REPORT FOR THE
 1235 KM AIRPORT EXPANSION
 1236 DT OR41N 13.6
 1237 DI 0 10000
 1238 DQ 0 10000
 *

1239 KK HC41
 1240 KM Changed HC from 3 to 4. 9/4/03 JRC
 1241 KM COMBINE RUNOFF HYDROGRAPH FROM SUB41 WITH ROUTED FLOWS FROM SUB40
 * HC 3
 1242 HC 4
 *
 1243 KM Put back 9/4/03 JRC
 1244 KM THE FOLLOWING RESERVOIR ROUTE AND DIVERT WAS REMOVED TO MODEL THE IMPROVED
 1245 KM CONDITION WITHOUT PONDING BEHIND THE CONSOLIDATED CANAL -DCF 11.10.99

1246 KK RR41
 1247 KM RESERVOIR ROUTING EAST OF C.C. AND NORTH OF QUEEN CREEK RD.
 1248 KM ROUTING RETENTION BASINS - AIRPORT RETENTION BASINS AND OVERFLOW
 1249 KM RETENTION WILL POND TO AN ELEVATION OF 1229.0 AND THEN WILL OVERFLOW
 1250 KM QUEEN CREEK ROAD.
 1251 KM THE CANAL BANK MINIMUM ELVEATION IS 1230.5'.
 1252 KM DATA FROM FRANZOY-COREY CROSSROADS PARK CLOWR MODEL (1992)
 1253 RS 1 STOR 0
 1254 SA 0 0.32 12.9 16.6 47 83.5 87.1 90.8 94.4 98
 1255 SA 101.5 105.4 109.1 112.7 116.3 120.0
 1256 SE 1221.5 1222.0 1224.0 1226.0 1228.0 1229.0 1229.1 1229.2 1229.3 1229
 1257 SE 1229.5 1229.6 1229.7 1229.8 1229.9 1230.0
 1258 SQ 0 0 0 0 0 0 7.4 41.9 115.4 236
 1259 SQ 413.6 652.5 959.3 1421.1 1900.5 2466.0
 *

HRC-1 INPUT

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

1260 KK RD35A
 1261 KM Put back 9/4/03 JRC
 1262 KM RETRIEVE FLOWS DIVERTED AT QUEEN CREEK RD. INTO SUB42
 1263 DR D35A42
 *

1264 KK R35A42
 1265 KM Put back 9/4/03 JRC
 1266 KM ROUTE RETRIEVED FLOWS THROUGH SUB42
 1267 KM SLOPE = (1260-1226)/13310
 1268 KM ENDPOINTS RAISED TO CEASE WARNING OUTPUT
 1269 RS 15 FLOW -1
 1270 RC .07 .07 .07 13310 .0025
 1271 RX 0 50 100 300 500 600 650 700
 1272 RY 12 10.75 10.5 10 10 10.5 10.75 12
 *

1273 KK DBSNQC
 1274 KM Changed DQ to remove low flow 9/10/03 JRC
 1275 KM DIVERT AROUND QUEEN CREEK BASIN
 1276 DT DIV42
 1277 DI 0 350 1000 10000
 1278 DQ 0 0 0 0
 *

1279 KK SUB42
 1280 KM BASIN SUB42
 1281 KM THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 1282 KM L= 2.6 Lca= 1.2 S= 13.1 Kn= .065 LAG= 89.0
 1283 KM PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 1284 BA 1.65
 1285 LG .42 .25 3.61 .41 1.81
 1286 UI 62. 62. 62. 62. 191. 227. 267. 299. 331. 356.
 1287 UI 381. 419. 461. 497. 575. 699. 793. 773. 671. 600.
 1288 UI 549. 508. 471. 425. 388. 359. 319. 296. 258. 208.
 1289 UI 172. 110. 110. 104. 102. 91. 62. 62. 54.
 1290 UI 19. 19. 19. 19. 19. 19. 19. 19. 19.

1291 UI 19. 19. 19. 0. 0. 0. 0. 0. 0. 0.
 1292 UI 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
 *
 1293 KK D42
 1294 KM THROW AWAY URBAN RETENTION VOLUME: 4.5 AC-FT from basin 42
 1295 KM (hydrograph identified as OR42)
 1296 DT OR42 4.5
 1297 DI 0 10000
 1298 DQ 0 10000
 *

HEC-1 INPUT

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

1299 KK HCBSN
 1300 KM Changed HC from 2 to 3. 9/4/03 JRC
 1301 KM COMBINE HYDROGRAPHS AT BASIN
 * HC 2
 1302 HC 3
 *
 1303 KK BASQC
 1304 KM Enlarged basin to accept low flow bypass 9/10/03 JRC
 1305 KM Removed low level outlet 9/4/03 JRC
 1306 KM PROPOSED DETENTION BASIN AT QUEEN CREEK RD
 1307 RS 1 STOR -1
 1308 SV 0 1.5 8.8 41.5 210 230
 1309 SE 23 24 25 26 27 28.01
 * SL 23 3.14 .62 .5
 SS 28 200 2.5 1.5
 *

1311 KK RBSNQC
 1312 KM RETURN BYPASS FLOWS AFTER DETENTION QUEEN CREEK BASIN
 1313 DR DIV42
 *
 * KKRTQCMQ
 * KM Removed 9/4/03 JRC
 * KM ROUTE FLOWS FROM QUEEN CREEK TO McQUEEN IN BYPASS CHANNEL
 * KM CCDC-4B
 * RS 2 FLOW -1
 * RC .030 .030 .030 1319 .0005
 * RX 0 2 19 36 46 63 80 82
 * RY 5.63 5.7 2.83 0 0 2.83 5.7 5.63
 *

1314 KK CP42
 1315 KM RECOMBINE FLOWS AFTER DETENTION BASIN
 1316 HC 2
 1317 ZW A=GCADMSFUTURE B=BASIN42 C=FLOW F=24HR CLU FWY
 *
 * KK RR42
 * KM Removed 9/9/03. Floodplain removed by QC Basin. JRC
 * KM Added 9/4/03. Source of data is the Gilbert-Chandler ADMS224 model.JRC
 * KM Routing retention basin - Water ponds between the City of
 * KM Chandler landfill and Queen Creek Rd until it overtops the
 * KM Consolidated Canal and the McQueen Rd bridge at an elevation
 * KM of 1227.5'. Data from Franzoy-Corey Crossroads Park CLOMR
 * KM model (1992).
 * RS 1 STOR 0
 * SA 0 1.1 33.6 43.0 52.5 61.9 71.3 80.8 90.2
 * SA 109.1 118.5
 * SE1225.5 1226 1227 1227.5 1227.6 1227.7 1227.8 1227.9 1228
 * SE1228.2 1228.3
 * SQ 0 0 0 0 64 361 708 1158 1713
 * SQ 2920 3619
 *

HEC-1 INPUT

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

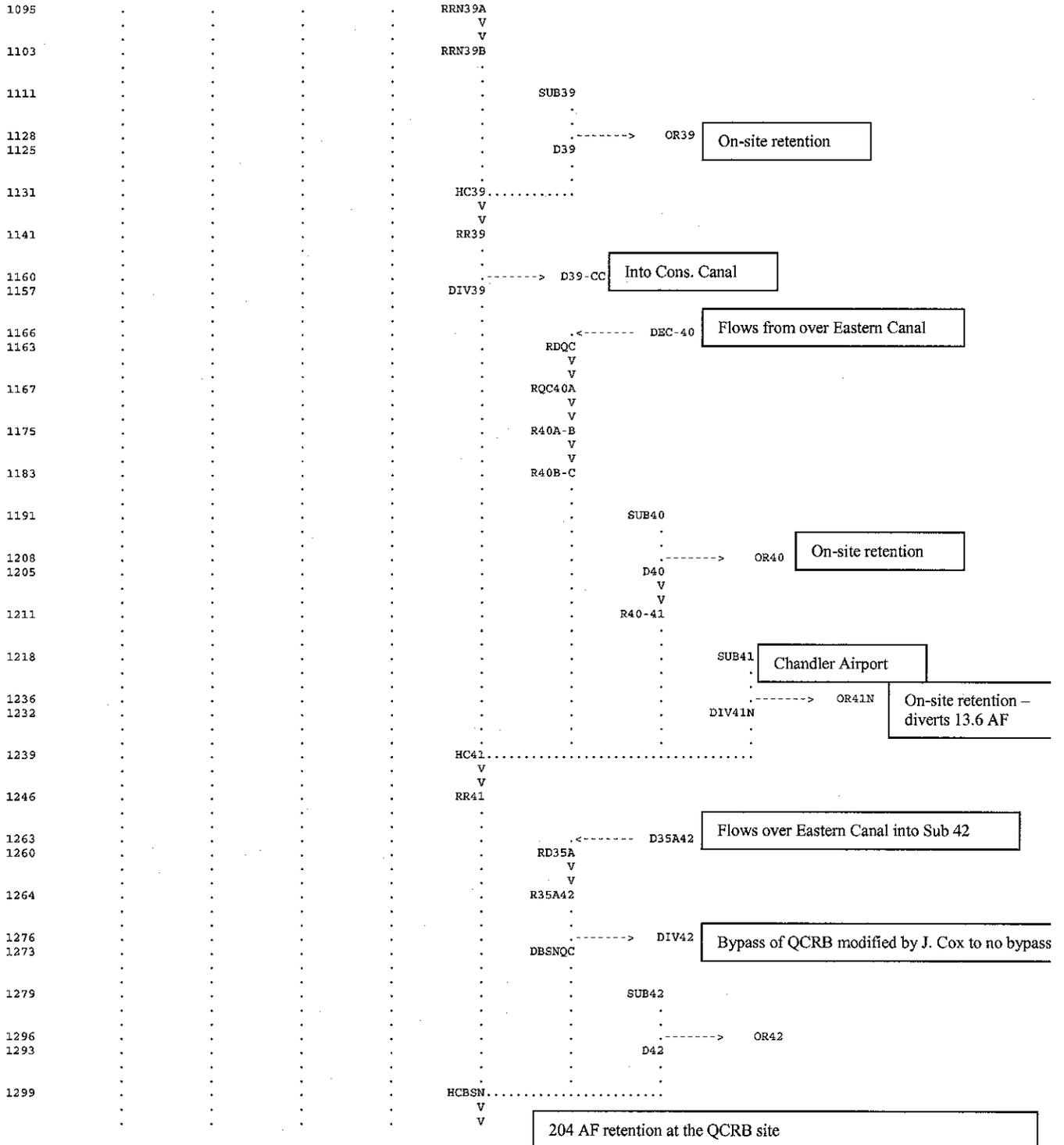
1318 KK DIV42A
 1319 KM Added 9/4/03. Source of data is the Gilbert-Chandler ADMS224 model. JRC
 1320 KM Divert all that exceeds McQueen Rd elevation into the canal.
 1321 DT D42-CC
 1322 DI 0 10000
 1323 DQ 0 10000
 *

1324 KK RDCC
 1325 KM RETRIEVE FLOWS AT RAY RD. WITHIN CONSOLIDATED CANAL
 1326 KM THE AREA ON THE BA RECORD REPRESENTS ALL POTENTIAL CONTRIBUTING AREA
 1327 KM UPSTREAM OF THE CONSOLIDATED CANAL UP TO THE RWCD CANAL BOTH NORTH
 1328 KM AND SOUTH OF THE SUPERSTITION FREEWAY.
 1329 BA 46.76
 1330 ZR =QI A=GCADMSFUTURE B=CCINFLOWTOGC2 C=FLOW F=24HR CLU FWY
 *

1331 KK RCC-36
 1332 KM ROUTE FLOWS FROM RAY RD. TO THE INTERSECTION OF C.C. AND CHANDLER BLVD.
 1333 KM SLOPE = (1230.57 - 1229.89)/6700
 1334 KM ELEVATIONS FOR SLOPE AND CROSS-SECTIONS TAKEN FROM S.R.P. SURVEY

1335 KM DATA FOR THE CONSOLIDATED CANAL JOB NO. RTO-50170-001
 1336 KM BOOK NO. 478-479
 1337 KM THE SRP DATUM IS NOT NECESSARILY COINCIDENT WITH THE FRANZOY-COREY DATA
 1338 KM OR OTHER DATUM. THEREFORE, COMPARISONS OF ABSOLUTE ELEVATIONS BETWEEN
 1339 KM THESE DATA MAY BE MISLEADING.
 1340 KM THIS CROSS-SECTION IS THAT FROM STATION 564+00 IN THE SRP SURVEY DATA
 1341 KM CANAL BANK POINTS ON BOTH BANKS REPEATED AS CROSS-SECTION
 1342 KM END POINTS.
 1343 KM ENDPOINT 40' ADDED TO ELIMINATE 2000 WARNINGS OF MAXIMUM OUTFLOW EXCEEDED.
 1344 KM FLOWS IN EXCESS OF THIS MAXIMUM DIVERTED BELOW IN KK DIVCHL
 1345 RS 15 FLOW -1
 1346 RC .023 .023 .023 6700 .0001

//////////////////////////////////////
 //////////////////////////////////////
 //////////////////////////////////////



```

1303 . . . . . BASQC
1313 . . . . .
1311 . . . . . RBSNQC
1314 . . . . . CP42
1321 . . . . .
1318 . . . . . DIV42A

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HYDROGRAPH AT STATION D42

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
581.	13.17	145.	37.	12.	5.
		.819	.826	.826	.826
		(INCHES)			
		(AC-FT)	72.	73.	73.

CUMULATIVE AREA = 1.65 SQ MI


```

*****
*
*   HCBSN
*
*****

```

Changed HC from 2 to 3. 9/4/03 JRC
 COMBINE HYDROGRAPHS AT BASIN

1302 HC HYDROGRAPH COMBINATION
 ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION HCBSN

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
581.	13.17	199.	100.	34.	15.
		.373	.752	.767	.767
		(INCHES)			
		(AC-FT)	98.	199.	203.

CUMULATIVE AREA = 4.95 SQ MI


```

*****
*
*   BASQC
*
*****

```

Enlarged basin to accept low flow bypass 9/10/03 JRC
 Removed low level outlet 9/4/03 JRC
 PROPOSED DETENTION BASIN AT QUEEN CREEK RD

HYDROGRAPH ROUTING DATA

STATION	ROUTING	ROUTING DATA					
		STOR	INITIAL	WORKING	R	D	COEFFICIENT
1307 RS	STORAGE ROUTING	1	NUMBER OF SUBREACHES				
	NSTPS		STOR	TYPE OF INITIAL CONDITION			
	ITYP	-1.00	INITIAL CONDITION				
	RSVRIC	.00	WORKING R AND D COEFFICIENT				
	X						
1308 SV	STORAGE	.0	1.5	8.8	41.5	210.0	230.0
1309 SE	ELEVATION	23.00	24.00	25.00	26.00	27.00	28.01
1310 SS	SPILLWAY						
	CREL	28.00	SPILLWAY CREST ELEVATION				
	SPWID	200.00	SPILLWAY WIDTH				
	COQW	2.50	WEIR COEFFICIENT				
	EXPW	1.50	EXPONENT OF HEAD				

COMPUTED OUTFLOW-ELEVATION DATA

.04	OUTFLOW	.00	.00	.00	.00	.00	.01	.01	.02	.03
28.00	ELEVATION	23.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
.50	OUTFLOW	.06	.09	.11	.15	.19	.24	.29	.35	.42
28.01	ELEVATION	28.00	28.00	28.00	28.00	28.01	28.01	28.01	28.01	28.01

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	1.50	8.80	41.50	210.00	229.80	230.00
OUTFLOW	.00	.00	.00	.00	.00	.00	.50
ELEVATION	23.00	24.00	25.00	26.00	27.00	28.00	28.01

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

HYDROGRAPH AT STATION BASQC

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
+ (CFS)	(HR)		6-HR	24-HR	72-HR	166.58-HR
+ 0.	.00	(CFS)	0.	0.	0.	0.
		(INCHES)	.000	.000	.000	.000
		(AC-FT)	0.	0.	0.	0.

PEAK STORAGE	TIME
+ (AC-FT)	(HR)
204.	65.25

			MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
			204.	204.	204.	181.
PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
+ (FEET)	(HR)		6-HR	24-HR	72-HR	166.58-HR
+ 26.97	66.67		26.97	26.96	26.96	26.69

CUMULATIVE AREA = 4.95 SQ MI

*** **

 * *
 1311 KK * RBSNQC *
 * *

RETURN BYPASS FLOWS AFTER DETENTION QUEEN CREEK BASIN

1313 DR RETRIEVE DIVERSION HYDROGRAPH
 ISTAD DIV42 DIVERSION HYDROGRAPH IDENTIFICATION

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

HYDROGRAPH AT STATION RBSNQC

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
+ (CFS)	(HR)		6-HR	24-HR	72-HR	166.58-HR
+ 0.	.00	(CFS)	0.	0.	0.	0.
		(INCHES)	.000	.000	.000	.000
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = .00 SQ MI

*** **

 * *
 1314 KK * CP42 *
 * *

RECOMBINE FLOWS AFTER DETENTION BASIN

1316 HC HYDROGRAPH COMBINATION
 ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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

HYDROGRAPH AT STATION CP42

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW				
		6-HR	24-HR	72-HR	166.58-HR	
0.	.00	0.	0.	0.	0.	
		(CFS)				
		(INCHES)	.000	.000	.000	.000
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 4.95 SQ MI

-----DSS---ZWRITE Unit 71; Vers. 1: /GCADMSFUTURE/BASIN42/FLOW/01JUL1993/5MIN/24HR CLU FWY/
 -----DSS---ZWRITE Unit 71; Vers. 1: /GCADMSFUTURE/BASIN42/FLOW/02JUL1993/5MIN/24HR CLU FWY/
 -----DSS---ZWRITE Unit 71; Vers. 1: /GCADMSFUTURE/BASIN42/FLOW/03JUL1993/5MIN/24HR CLU FWY/
 -----DSS---ZWRITE Unit 71; Vers. 1: /GCADMSFUTURE/BASIN42/FLOW/04JUL1993/5MIN/24HR CLU FWY/
 -----DSS---ZWRITE Unit 71; Vers. 1: /GCADMSFUTURE/BASIN42/FLOW/05JUL1993/5MIN/24HR CLU FWY/
 -----DSS---ZWRITE Unit 71; Vers. 1: /GCADMSFUTURE/BASIN42/FLOW/06JUL1993/5MIN/24HR CLU FWY/

////////////////////////////////////

+	HYDROGRAPH AT	RD35A	532.	14.75	245.	66.	22.	.00	
+	ROUTED TO	R35A42	342.	18.50	197.	65.	22.	.00	10.90
+	DIVERSION TO	DIV42	0.	18.50	0.	0.	0.	.00	
+	HYDROGRAPH AT	DBSNQC	342.	18.50	197.	65.	22.	.00	
+	HYDROGRAPH AT	SUB42	581.	13.17	152.	39.	13.	1.65	
+	DIVERSION TO	OR42	134.	13.17	8.	2.	1.	1.65	
+	HYDROGRAPH AT	D42	581.	13.17	145.	37.	12.	1.65	
+	3 COMBINED AT	HCBSN	581.	13.17	199.	100.	34.	4.95	

+	ROUTED TO	BASQC	0.	.00	0.	0.	0.	4.95	26.97
---	-----------	-------	----	-----	----	----	----	------	-------

+	HYDROGRAPH AT	RBSNQC	0.	.00	0.	0.	0.	.00	
+	2 COMBINED AT	CP42	0.	.00	0.	0.	0.	4.95	
+	DIVERSION TO	D42-CC	0.	.00	0.	0.	0.	4.95	
+	HYDROGRAPH AT	DIV42A	0.	.00	0.	0.	0.	4.95	
+	HYDROGRAPH AT	RDCC	0.	.00	0.	0.	0.	46.76	
+	ROUTED TO	RCC-36	0.	.00	0.	0.	0.	46.76	31.21
+	DIVERSION TO	DCC-49	0.	.00	0.	0.	0.	46.76	
+	HYDROGRAPH AT	DIVCHL	0.	.00	0.	0.	0.	46.76	
+	ROUTED TO	RCC-38	0.	.00	0.	0.	0.	46.76	26.77
+	DIVERSION TO	DXTRA	0.	.00	0.	0.	0.	46.76	
+	HYDROGRAPH AT	CHNGBF	0.	.00	0.	0.	0.	46.76	

+	HYDROGRAPH AT	RD38	527.	17.00	256.	82.	27.	.00	
+	2 COMBINED AT	CC38	527.	17.00	256.	82.	27.	46.76	
+	DIVERSION TO	DCC48A	134.	16.67	16.	4.	1.	46.76	
+	HYDROGRAPH AT	DIVPEC	393.	16.67	239.	78.	26.	46.76	
+	ROUTED TO	RCC-39	393.	18.00	235.	78.	26.	46.76	
+									31.36
18.00									
+	DIVERSION TO	DXTRA	62.	18.00	62.	29.	10.	46.76	
+	HYDROGRAPH AT	CHNGBF	331.	18.00	174.	49.	16.	46.76	
+	HYDROGRAPH AT	RD39	503.	13.42	131.	33.	11.	.00	
+	2 COMBINED AT	CC39	503.	13.42	252.	82.	27.	46.76	

Appendix D

District Interoffice Memo



Flood Control District

1 of Maricopa County

INTEROFFICE MEMORANDUM

Date: September 10, 2003

To: Felicia Terry, P.E., Area Regional Manager
PP&M Division

From: Julie Cox, Hydrologist
Engineering Division

Subject: Queen Creek Basin

I developed multiple HEC-1 models to describe the scenarios you requested for analysis. All analyses were for a 100-yr storm event.

Scenario 1 did not include the Queen Creek Basin.

Scenario 2 modeled a 25-yr Queen Creek Basin with a 100-yr storm.

Scenario 3 modeled a 50-yr Queen Creek Basin with a 100-yr storm.

Scenario 4 modeled the Queen Creek Basin so that no water flows out of the basin. The low level outlet was removed.

Scenario 5 included the Queen Creek Basin and eliminated the 88 cfs breakout from the Consolidated Canal.

The required basin volumes and effects on the downstream floodplain against the railroad are listed in Table 1 below. The effects on the downstream floodplain were determined by reviewing the floodplain elevations at RR45, located in sub-basin 45 and listed in Table 1 below:

TABLE 1

NO BASIN	25-YR BASIN	50-YR BASIN	100-YR BASIN	100-YR W/ CC INFLOW
0 ac-ft	109 ac-ft	162 ac-ft	204 ac-ft	231 ac-ft
1218.61 ft	1217.81 ft	1217.73 ft	1217.73 ft	1216.12 ft

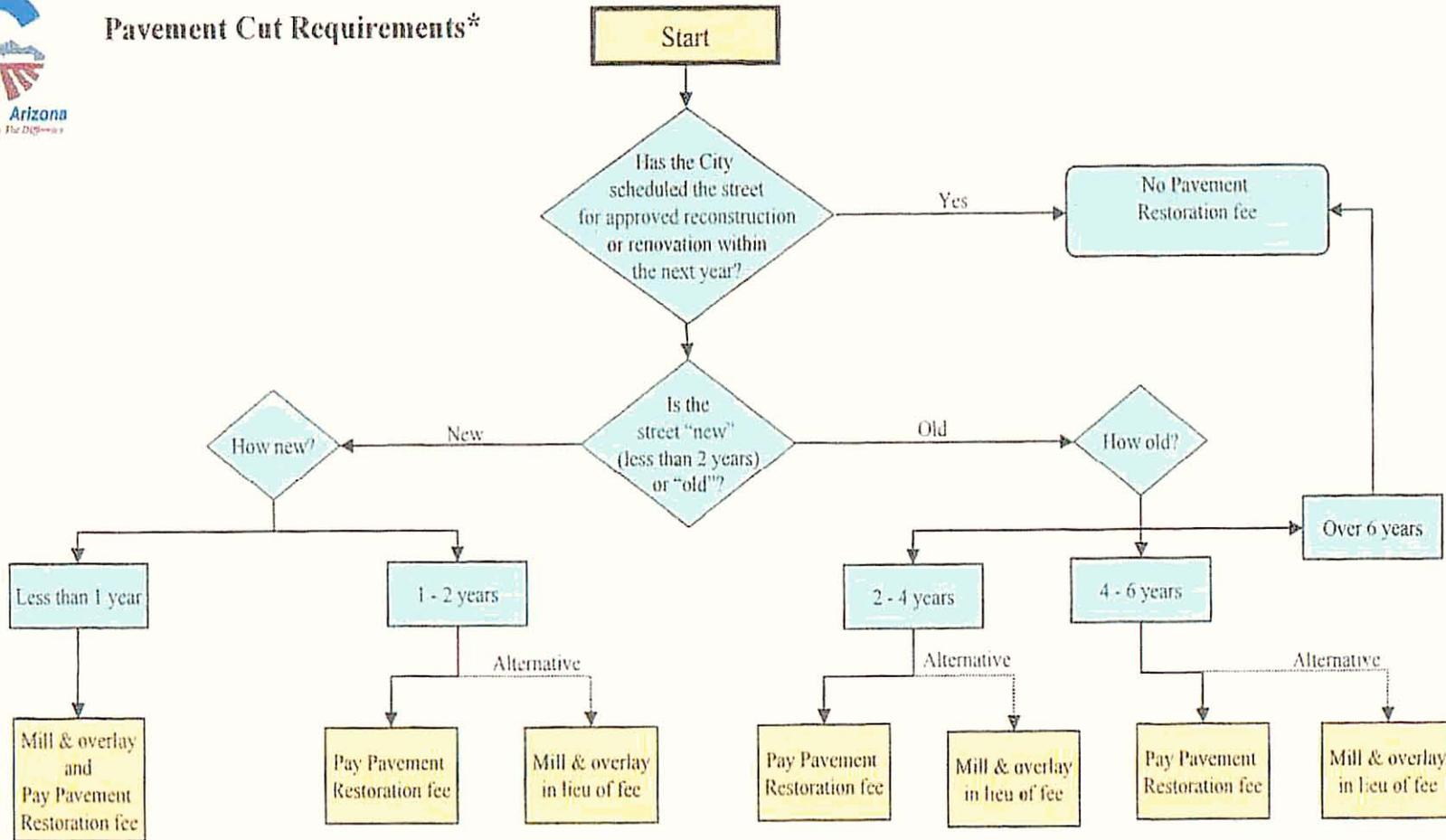
Thank you for the opportunity to complete this analysis.

Appendix E

City Pavement Cut Flow Chart



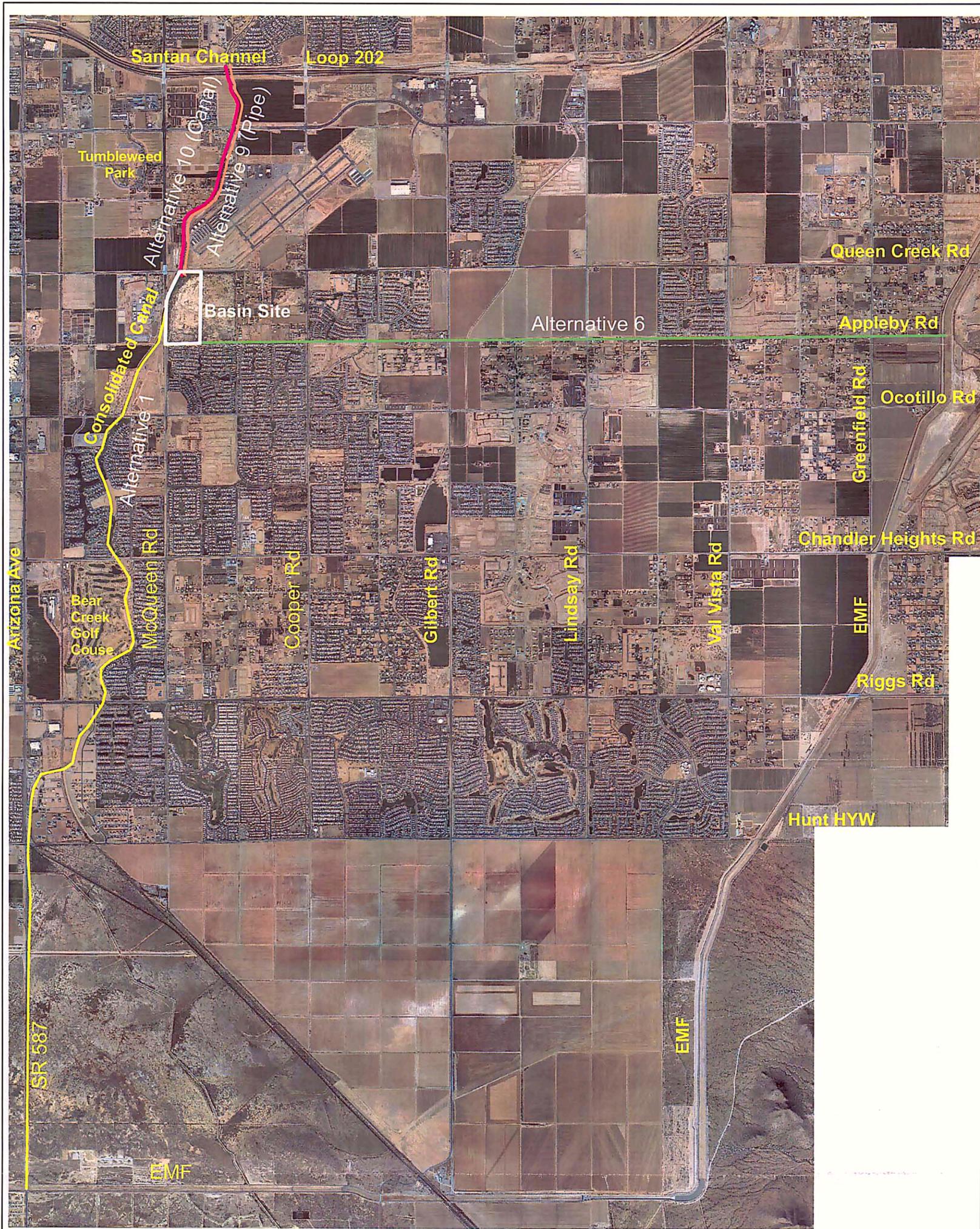
Pavement Cut Requirements*



* Entities with Franchise agreements - Approval to cut pavement requires Reconstruction (if pavement is less than 1 year old) or Mill & Overlay (if pavement is 1 to 6 years old)
 A Company with a Franchise agreement does have the option to apply IN WRITING for approval to pay the Pavement Restoration Fee and meet the associated reconstruction requirements of the Pavement Restoration Fee Ordinance (Section 46-2.7 of City Code)

Appendix F

Outfall Alternative Figures



Queen Creek Basin Outlet Candidate Assessment Report

Flood Control District
of Maricopa County



Project Engineering
Consultants, Ltd.



2310 W Mission Lane Suite 4
Phoenix, AZ 85021

Outlet Alternatives Exhibit

Outlet Alternatives: 1, 6, 9 and 10

Design: YX Check: MDH Date: 05/07

Draft: YX Check: MDH Date: 05/07

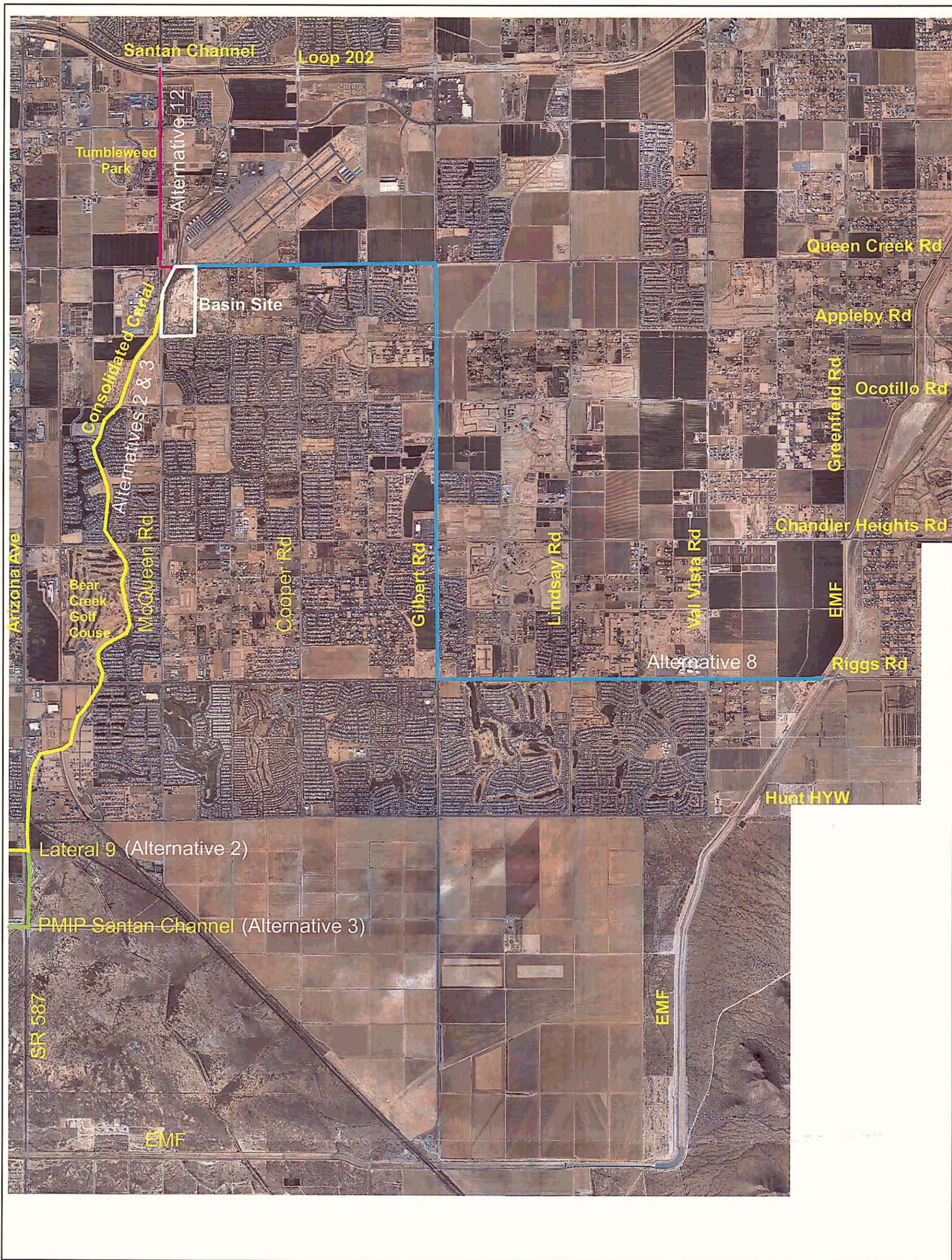
Sheet 1 of 3

Legend

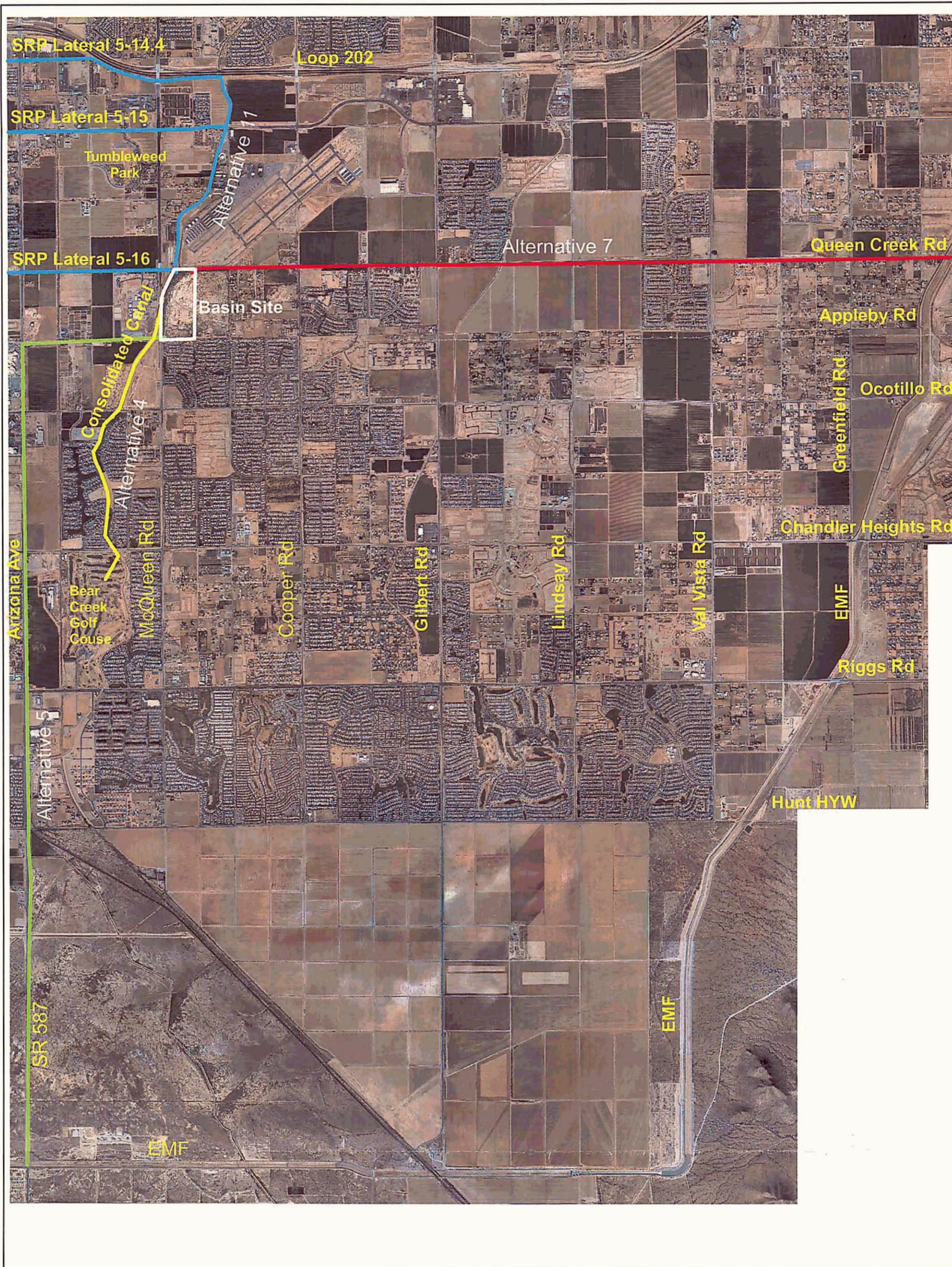
- Alternative 1
- Alternative 6
- Alternative 9
- Alternative 10



0 4,000 8,000
Feet



Queen Creek Basin Outlet Candidate Assessment Report		Legend	
Flood Control District of Maricopa County  Project Engineering Consultants, Ltd. 2310 W Mission Lane Suite 4 Phoenix, AZ 85021	Outlet Alternatives Exhibit		 Alternative 2  Alternative 3  Alternative 8  Alternative 12  
	Outlet Alternatives: 2, 3, 8 and 12		
Design: YX Check: MDH Date: 05/07 Draft: YX Check: MDH Date: 05/07			
Sheet 2 of 3			



Queen Creek Basin Outlet Candidate Assessment Report

Flood Control District
of Maricopa County



Project Engineering
Consultants, Ltd.



2310 W Mission Lane Suite 4
Phoenix, AZ 85021

Outlet Alternatives Exhibit

Outlet Alternatives: 4, 5, 7 and 11

Design: YX Check: MDH Date: 05/07
Draft: YX Check: MDH Date: 05/07

Sheet 3 of 3

Legend

- Alternative 4
- Alternative 5
- Alternative 7
- Alternative 11



0 4,000 8,000
Feet

Appendix G

Cost Information for Most Feasible Alternatives

Alternative 1 Cost Table (GRIC Channel Option)

Queen Creek Road Basin Candidate Assessment Report - Opinion Of Probable Cost

ALTERNATIVE	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	COST
Alternative 1 - Outfall South to EMF					Alt 1 Total = \$ 22,835,821.25
	Channel Excavation	C.Y.	\$ 5.00	75662	\$ 378,310.00
	Channel ROW	ACRES	\$ 250,000.00	26	\$ 6,500,000.00
	Landscaping & Aesthetics	10% of Cost	\$ 1,660,787.00	1	\$ 1,660,787.00
	Structures	EACH	\$ 15,000.00	7	\$ 105,000.00
	Pipe 54"	LF	\$ 270.00	7128	\$ 1,924,560.00
	Water Quality Basin (Higley ADMP)	EACH	\$ 7,700,000.00	1	\$ 7,700,000.00
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
	Design & Contingency	25% of Cost	\$ 4,567,164.25	1	\$ 4,567,164.25

Channel south of Hunt Highway
 Channel south of Hunt Highway
 10% of Construction \$ 1,660,787.00 (doesn't include LS)
 Basin Outlet, Pipe outlet, Chandler Hgts Crossing, Riggs Crossing, Pipe inlet @ Hunt Highway, Pipe outlet to Channel, Inlet to EMF
 \$ 5.00 Dollars/Inch-Diameter per Foot (Pipe required north of Hunt Highway - Basin to Ocotillo then west to Con. Canal. Also pipe from end of Con. Canal & Hunt Hwy to the beginning of Channel along 587)
 RRBSN from Higley ADMP - was \$6.6M - Adjusted for inflation ~ 17%

Contingency @ 25% of Cost = \$ 4,567,164.25

Alternative 1 Cost Table (GRIC Pipe Option)

Queen Creek Road Basin Candidate Assessment Report - Opinion Of Probable Cost

ALTERNATIVE	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	COST
Alternative 1 - Outfall South to EMF					Alt 1 Total = \$ 20,690,395.00
	Channel Excavation	C.Y.	\$ 5.00	0	\$ -
	Channel ROW	ACRES	\$ 250,000.00	7.4	\$ 1,850,000.00
	Landscaping & Aesthetics	10% of Cost	\$ 1,504,756.00	1	\$ 1,504,756.00
	Structures	EACH	\$ 15,000.00	6	\$ 90,000.00
	Pipe 54"	LF	\$ 270.00	20028	\$ 5,407,560.00
	Water Quality Basin (Higley ADMP)	EACH	\$ 7,700,000.00	1	\$ 7,700,000.00
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
	Design & Contingency	25% of Cost	\$ 4,138,079.00	1	\$ 4,138,079.00

Channel south of Hunt Highway
 Channel south of Hunt Highway
 10% of Construction \$ 1,504,756.00 (doesn't include LS)
 Basin Outlet, Pipe outlet, Chandler Hgts Crossing, Riggs Crossing, Pipe inlet @ Hunt Highway, Inlet to EMF
 \$ 5.00 Dollars/Inch-Diameter per Foot (7128' if pipe required north of Hunt Highway, 12900' of pipe south of HHH)
 RRBSN from Higley ADMP - was \$6.6M - Adjusted for inflation ~ 17%

Contingency @ 25% of Cost = \$ 4,138,079.00

Alternative 6 Cost Table

Queen Creek Road Basin Candidate Assessment Report - Opinion Of Probable Cost

ALTERNATIVE	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	COST
Alternative 6 - Pump & Pipeline East to EMF					Alt 6 Total = \$ 15,448,295.45
	70 CFS Pump Station	EACH	\$ 3,000,000.00	1	\$ 3,000,000.00
	Pipe 60"	LF	\$ 300.00	26400	\$ 7,920,000.00
	Structures	EACH	\$ 15,000.00	5	\$ 75,000.00
	Pipe ROW	ACRES	\$ 250,000.00	5.45	\$ 1,363,636.36
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
	Design & Contingency	25% of Cost	\$ 3,089,659.09	1	\$ 3,089,659.09

Based on Denver Basin Pump Station Cost - \$1M @ 35 CFS (escalated for Higher Pressure)
 \$ 5.00 Dollars/Inch-Diameter per Foot
 Assume One per Mile
 60" + 4 Feet * Miles = 5.454545

Contingency @ 25% of Cost = \$ 3,089,659.09

Channel Quantities

	Flow Depth feet	Freeboard	Bottom Width feet	Side Slope	Segment Length feet	Channel Area s.f.	Channel Excavation		Lining Thickness feet	Lining Area s.f.	Lining Volume		Section Lining 1=Yes 0=No	Top Width feet	O&M Road Width feet	Vegetative Buffer feet	Round Dig = 0		ROW Acquired? 1=No 0=Yes
							c.f.	c.y.			c.f.	c.y.					ROW Total Top Width Feet	ROW Total Area acres	
Alternative 1 (Channel)																			
Hunt Highway to EMF	3.15	2	5	5 :1	12900	158.4	2042876	75662	0.5	57.5	742007	27482	0	56.5	20	10	87.0	25.8	1
	0	0	0	5 :1	0	0.0	0	0	0	0.0	0	0	1	0.0	0	0	0.0	0.0	1
	0	0	0	5 :1	0	0.0	0	0	0	0.0	0	0	1	0.0	0	0	0.0	0.0	1
	0	0	0	5 :1	0	0.0	0	0	0	0.0	0	0	1	0.0	0	0	0.0	0.0	1
	0	0	0	5 :1	0	0.0	0	0	0	0.0	0	0	1	0.0	0	0	0.0	0.0	1
	0	0	0	5 :1	0	0.0	0	0	0	0.0	0	0	1	0.0	0	0	0.0	0.0	1
	0	0	0	5 :1	0	0.0	0	0	0	0.0	0	0	1	0.0	0	0	0.0	0.0	1
Totals							2042876	75662			Total =	27482	0						26
Alternative 1 (Pipeline)																			
Hunt Highway to EMF	0	0	0	5 :1	12900	0.0	0	0	0.5	0.0	0	0	0	0.0	25	0	25.0	7.4	1
(Just used to calculate the ROW for a 60" pipe, 3 feet of cover. This assumes a required trench width of 21 feet - say 25 feet)	0	0	0	5 :1	0	0.0	0	0	0	0.0	0	0	1	0.0	0	0	0.0	0.0	1
	0	0	0	5 :1	0	0.0	0	0	0	0.0	0	0	1	0.0	0	0	0.0	0.0	1
	0	0	0	5 :1	0	0.0	0	0	0	0.0	0	0	1	0.0	0	0	0.0	0.0	1
	0	0	0	5 :1	0	0.0	0	0	0	0.0	0	0	1	0.0	0	0	0.0	0.0	1
Totals							0	0			Total =	0	0						7

Alt 1 - SR 587 Channel

Worksheet for Trapezoidal Channel

Project Description

Worksheet	Alt 1 Open Channel
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data

Mannings Coefficient	0.035
Channel Slope	0.000300 ft/ft
Left Side Slope	5.00 H : V
Right Side Slope	5.00 H : V
Bottom Width	5.00 ft
Discharge	70.00 cfs

Results

Depth	3.15 ft
Flow Area	65.3 ft ²
Wetted Perimeter	37.11 ft
Top Width	36.48 ft
Critical Depth	1.24 ft
Critical Slope	0.019621 ft/ft
Velocity	1.07 ft/s
Velocity Head	0.02 ft
Specific Energy	3.17 ft
Froude Number	0.14
Flow Type	Subcritical

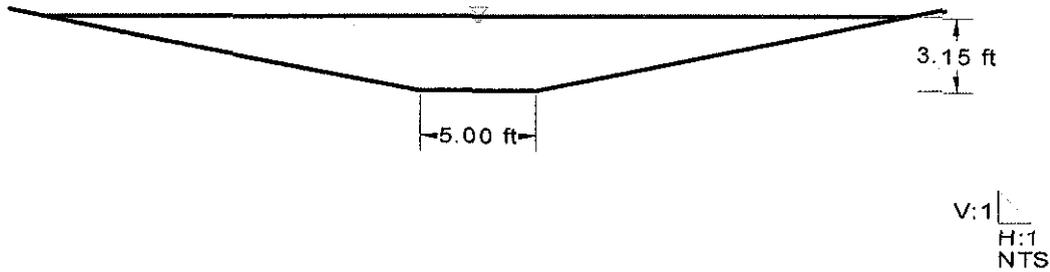
Alt 1 - SR 587 Channel Worksheet for Trapezoidal Channel

Project Description

Worksheet	Alt 1 Open Channel
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.035
Channel Slope	0.000 ft/ft
Depth	3.15 ft
Left Side Slope	5.00 H : V
Right Side Slope	5.00 H : V
Bottom Width	5.00 ft
Discharge	70.00 cfs



Alt 1 - SR 587 Pipeline Worksheet for Pressure Pipe

Project Description

Worksheet	Alt 1 - SR 587 Pipe
Flow Element	Pressure Pipe
Method	Hazen-Williams Formula
Solve For	Pipe Diameter

Input Data

Pressure at 1	0.000 psi
Pressure at 2	0.000 psi
Elevation at 1	1,230.00 ft
Elevation at 2	1,215.00 ft
Length	15,500.00 ft
C Coefficient	150.0
Discharge	70.00 cfs

Results

Diameter	51.4 in
Headloss	15.00 ft
Energy Grade at 1	1,230.37 ft
Energy Grade at 2	1,215.37 ft
Hydraulic Grade at 1	1,230.00 ft
Hydraulic Grade at 2	1,215.00 ft
Flow Area	14.4 ft ²
Wetted Perimeter	13.45 ft
Velocity	4.86 ft/s
Velocity Head	0.37 ft
Friction Slope	0.000968 ft/ft

Alt 6 - East to EMF Pipeline Worksheet for Pressure Pipe

Project Description

Worksheet	Alt 6- East to EMF Pipe
Flow Element	Pressure Pipe
Method	Hazen-Williams Formula
Solve For	Pipe Diameter

Input Data

Pressure at 1	43.785 psi
Pressure at 2	0.000 psi
Elevation at 1	1,230.00 ft
Elevation at 2	1,317.00 ft
Length	26,400.00 ft
C Coefficient	150.0
Discharge	70.00 cfs

Results

Diameter	58.1 in
Headloss	13.99 ft
Energy Grade at 1	1,331.22 ft
Energy Grade at 2	1,317.22 ft
Hydraulic Grade at 1	1,330.99 ft
Hydraulic Grade at 2	1,317.00 ft
Flow Area	18.4 ft ²
Wetted Perimeter	15.22 ft
Velocity	3.80 ft/s
Velocity Head	0.22 ft
Friction Slope	0.000530 ft/ft

Alt 10 - North to Santan Channel Pipeline Worksheet for Pressure Pipe

Project Description

Worksheet	Alt 10- North to Santan Channel Pipeline
Flow Element	Pressure Pipe
Method	Hazen-Williams Formula
Solve For	Pipe Diameter

Input Data

Pressure at 1	6.000 psi
Pressure at 2	0.000 psi
Elevation at 1	1,230.00 ft
Elevation at 2	1,231.00 ft
Length	8,980.00 ft
C Coefficient	150.0
Discharge	70.00 cfs

Results

Diameter	47.4 in
Headloss	12.84 ft
Energy Grade at 1	1,244.35 ft
Energy Grade at 2	1,231.51 ft
Hydraulic Grade at 1	1,243.84 ft
Hydraulic Grade at 2	1,231.00 ft
Flow Area	12.3 ft ²
Wetted Perimeter	12.41 ft
Velocity	5.71 ft/s
Velocity Head	0.51 ft
Friction Slope	0.001430 ft/ft

Appendix H

Memos, Emails, and Meeting Minutes



MEETING SUMMARY: QUEEN CREEK ROAD BASIN CANDIDATE ASSESSMENT REPORT PROJECT - PROGRESS MEETING #1

Date: November 27, 2006, 10:30-11:30

Place: Flood Control District, ACDC Room

Attendees: Felicia Terry, Flood Control District
Afshin Ahouraiyan, Flood Control District
Raju Shaw, Flood Control District
L. Steve Miller, Project Engineering Consultants

Meeting Minutes

Data Collection

Ongoing with the Data Collection section of the final report due at this time. PEC has collected existing ADMP reports and digital data is being provided to PEC by FCDMC in the next two days. The report will follow the collection of these data.

Hydrology

Julie Cox has requested a meeting with Felicia & Afshin on Monday December 4, 2006 at 10:00 am concerning which hydrologic analysis to use for this study. The Gilbert-Chandler FIS Update hydrology is being revised at this time and may not be available for this study. Afshin will e-mail an invitation to PEC to attend this meeting.

FCDMC's IGA with Chandler

A copy of the original IGA was provided to PEC. The original IGA stipulated that a retention basin needed to be excavated by July 2007 in exchange for the basin property from the District. The District is not paying for the outlet. That is Chandler's responsibility. Because of complications with the disposal of the excavated material and the additional cost of hauling a majority of the material away from the site, Chandler has cancelled their contract with the contractor. The owner of the property east of the basin site is attempting to exchange a portion of the basin property so the orientation of the basin may change. The District is/has extended the date until 2010 for the basin to be operational. If Chandler doesn't meet (or make reasonable progress by) this date the property may be returned to the District.

Chandler has also requested the required storage volume be reduced from the 204 acre-feet in the original IGA. Julie Cox will be working with Chandler on this issue.

Chandler has indicated that the basin can only be 3 feet deep by their ordinance with it being fenced. PEC to provide pictures of Chandlers Arrowhead basin that is greater than 3 feet deep and is not fenced.

Coordination with Chandler

Need to meet with Dan Cook to coordinate the CAR project. Raju will set up the meeting with Chandler. Dates suggested were between December 11th and 22nd. The

District and PEC will conduct a field trip following the meeting with Chandler. Chandler will be invited to attend the field trip also.

Miscellaneous items

SRP is dredging the Consolidated Canal and desires to stockpile the material on the basin site to dry before hauling it off-site. After research it was believed that the District has transferred ownership of the property to Chandler.

Afshin provided PEC a copy of the project schedule with a get well wish for PEC's Project Manager Mike Heaton, who was ill and couldn't attend.

PEC will provide the District with the Data Collection section of the report the middle of the week.



MEETING AGENDA: QUEEN CREEK ROAD BASIN CAR OUTFALL ALTERNATIVES EVALUATION MEETING WITH CITY OF CHANDLER

Date: December 8, 2006, 9:30-11:00 (followed by field trip)

Place: City of Chandler, Buffalo Street Building, 2nd Floor

Attendees: **Dan Cook, City of Chandler**
Afshin Ahouraiyan, Flood Control District
Raju Shaw, Flood Control District
Mike Heaton, Project Engineering Consultants
Ying Xu, Project Engineering Consultants

Meeting Purpose

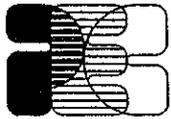
Coordination with the City of Chandler regarding the CAR project and determine what information they may have that would be useful to the project.

The following bullets summarize the discussion held at this meeting:

- Light industrial park is proposed for basin site - Chandler Airport Commerce Center
- City is working on park to surround the commerce center – Nozomi Park
- J2 is City's consultant for the park site. Could get 200 AF with the Nozomi Park Concept design.
- Developer wants a land exchange to build the commerce center. City has received a draft agreement, but has not reviewed it.
- Suggest using SR 587 to discharge water from basin to EMF. May be a way to use the roadway even though it crosses GRIC lands.
- With regard to an out fall to the San Tan Channel, need to get ADOT report for the channel to determine capacity.
- Chandler has an IGA with ADOT to discharge to the San Tan Channel. It is for 100 CFS and they have used 85 CFS. 100 CFS is not a "flowage" amount it is a total outlet capacity amount. Doesn't matter how much is flowing, can't add another outlet. Check IGA and ADOT report to be sure.
- Bird Strike at the airport will not be an issue if the water does not remain for an excessive amount of time. The goal is 36-hr removal to prevent mosquito infestation. While the final solution may require a longer time to evacuate the basin and will require mitigation for vectors, it will still be too short to cause an influx of birds.

- Chandler's Airport Water Reclamation Facility (WRF) is just west of the QC Basin site. It uses groundwater recharge injection wells to dispose of its reclaimed water. The wells are at Tumbleweed Park about a half-mile north of the WRF. It was suggested that the WRF is looking for additional capacity and may be willing to work out an agreement to inject storm water from the basin when necessary in exchange for the use other times.
- Call and talk to Bob Mulvey (480-782-3411) to discuss the injection wells. Could also speak with David Clark (cell 602-885-5134). His name was given to us by a parks employee at Tumbleweed Park.
- Chandler has a moratorium to cutting roads and it can be quite expensive to cut roads that have more recently been paved.
- There was some discussion about use of the dirt from the basin but it is not known what the status of that is now. Some may be used by the commerce center.
- Hunter highway is partially controlled by the county. (Talk to Bill Hayden)
- Should discuss what SRP would think of accepting water. If it is even something to discuss. Tom Sands might be the right person to contact.
- Basin final design in next fiscal year
- Chandler response to possible outfall alternatives:
 - 587 South to EMF
 - Injection Wells (in association with WRF)
 - North to 202 (San Tan Channel)
 - East to EMF (via Queen Creek Road to Gilbert Road to Riggs Road to EMF)
 - SRP discharge

Field Trip was cancelled since all from FCD could not attend.



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Telephone Conversation Record

Project Queen Creek Road Basin

Project No. 5038.01

Time 11:00 am

12-20-06
Date March 23, 2007

Call to: Tom Sands, Senior Principal Engineer, SRP

Call From: Mike Heaton

Discussion, Agreement and/or Action

Tom returned my call. I explained to him the purpose and scope of our project. A summary of our discussion follows:

There are two requirements for SRP to take stormwater into there system. If these two requirements are met, then they would grant a license to discharge. They are Water Quality and Water Quantity.

Water Quality - SRP will accept discharge of storm water if the municipality has in place the proper permit. The permit required is an Arizona Pollutant Discharge Elimination System (AZDPES) or National Pollutant Discharge Elimination System (NDPS) General Permit for Discharge from Small Municipal Separate Sewer Systems (MS4s).

Water Quantity - SRP will accept discharge of storm water it would require an agreement with the city that no discharges could be made without first notifying the SRP that they indent to discharge. Then SRP would make room in the canal and then notify the city that they could proceed with the discharge.

The next step would be to send a letter or email (Tom preferred email) outlining the concept for them to review. It the conditions of quality and operational quantity could be met, he said they would grant the license. The letter could be sent to Tom and he would rout it to the pertinent SRP personnel.

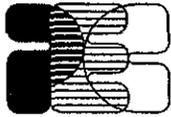
Tom provided the following capacities for the Consolidated Canal:

Consolidated Canal Capacity
@ Queen Creek Road – 188 cfs
@ Ocotillo Road – 100 cfs
@ Hunt Highway – 15 cfs

Tom's biggest concern is that the capacity at the GIRC (Hunt Hwy) is small. There is a project on the way to increase the 15 cfs capacity. He is also concerned that the GIRC does not have the capacity to convey the proposed 70 cfs to a drainage system on the reservations somewhere and we may want to have those discussions with GRIC.

Tom said that his experience with the GIRC lately was good and they were accepting of the runoff flows reaching their community lands. In fact there was a meeting with ADOT, the GRIC and SRP a week or so ago and the community was agreeable to accepting the runoff from an ADOT basin. He said that they understand the permits for water quality and if the municipality has their permits in order, they will take the runoff. He said we could contact them and mention his name and that we have something similar to his discussions at the Gila Drain to discuss with them. He said to contact:

- Glen Stark (Most Sr. of them) 520-562-3203
- Brian Bennon - hydrologist with GRIC DEQ 520-2234 x232
- Bruce Robinson – Project Hydrologist GRIC DEQ 520-2234 x239



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Telephone Conversation Record

Project Queen Creek Road Basin Project No. 5038.01
 Time 1:00pm Date ¹²⁻²⁰⁻⁰⁶ ~~March 23, 2007~~
 Call to: Jon Sherill, City of Chandler, Environmental Coordinator Call From: Mike Heaton

Discussion, Agreement and/or Action

John and I spoke concerning the water quality permit for the City of Chandler. We had a phone conversation and then exchanged emails.

Jon told me that Chandler did have a Phase 2 AzDPES permit and that I could find it on their website, www.chandleraz.gov.

I found the document at <http://www.chandleraz.gov/Content/StormwaterMgmtProgram.pdf>. After reading through it, the Jon and I had the following email exchanges:

Jon,

I found the permit and noticed that it said that it was only for the areas draining to the ADOT storm water drainage channel.

The basin we are working with is south of the 202 at Queen Creek and McQueen Roads. Is there a permit that applies there also?

Michael D. Heaton, P.E.
 Project Engineering Consultants, Ltd.
 2310 W. Mission Lane, Suite 4
 Phoenix, Arizona 85021
 602-906-1901 Office 602-906-3080 Fax
 mike@pecaz.com

Mike,

If we added or found another discharge location we would add it to the permit during the annual review. If we needed to add additional BMPs or other requirements those would be added as well. The permit is a living document and thus can be amended as needed. The details that would be needed are:

discharge location/receiving water
drainage area
BMPs that would be applied to the area
any other information that explains how discharges would not contribute
to a change in water quality / how we manage discharges so no impacts
from stormwater runoff to canal occur.

Let me know if you have any other questions

Thanks

Jon Sherrill
Environmental Program Coordinator
Management Services
Environmental Management
City of Chandler
Phone: 480-782-2387
Fax: 480-782-2382

Thanks Jon! That helps.

A couple more questions:

The receiving waters would be the Consolidated Canal. In your estimation would that require anything abnormal? SRP said that as long as Chandler had a permit, they would accept the water if they could operationally.

And secondly, would there be a cost associated with obtaining the permit for this alternative? I have to determine possible costs for each alternative (this would be one of the alternatives).

Thanks again for your help!

Michael D. Heaton, P.E.
Project Engineering Consultants, Ltd.
2310 W. Mission Lane, Suite 4
Phoenix, Arizona 85021
602-906-1901 Office 602-906-3080 Fax
mike@pecaz.com

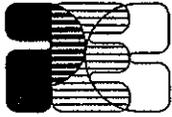
Mike,

I don't see anything, at this time, that would be outside of what we are doing for the ADOT discharges. However, things could always change to require more stringent requirements. My suggestion would be to get approval from SRP for our BMPs. If they require something different that could affect cost of implementation.

Overall I don't see a significant increase in cost for adding this to the permit. We will be updating/renewing the permit towards the end of 2007, so the addition of this location could be rolled into the contract. The BMPs outlined in the report are being applied first to the areas that we have discharges, but as good practice are also being applied City wide as well.

The big issue for the basin is being near the airport. As long as the airport continues to be a zero discharge facility (no stormwater leaves the site) there would be no problem. We just need to continue with this as the assumption and keep our eyes and ears open for any plans that would propose to change this.

Jon Sherrill
Environmental Program Coordinator
Management Services
Environmental Management
City of Chandler
Phone: 480-782-2387
Fax: 480-782-2382



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Telephone Conversation Record

Project Queen Creek Road Basin

Project No. 5038.01

Time 10:30am

Dec 20, 2006
Date ~~March 23, 2007~~

Call to: Bob Mulvey, City of Chandler, Asst Public Wks Director

Call From: Mike Heaton

Discussion, Agreement and/or Action

Discussed COC's use of injection wells for recharge of the city's reclaimed water. They have been using the wells for about 8 years now. Their experience has been good, but not without challenges. They have used 2 types of wells, vadose zone wells and aquifer storage and recovery wells. The data for each of the wells is as follows:

Vadose Zone Wells

- 50 to 80 feet deep
- Like a pressure dry well
- \$20K - \$30K
- .3 to .35 MGD/Day (~.5 cfs)
- Not as reliable as deep wells

Aquifer Storage & Recovery Wells

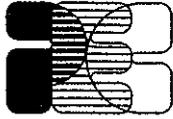
- ~1000 feet deep
- Stores water for later recovery
- \$2M per well
- 1MGD (~1.5 cfs)
- Requires back flush (~20 min x 3/day)

Mr. Mulvey believed there would be some significant challenges to using this technology for discharge of storm water. Clogging would be a big concern with the sediment carried in storm water. His wells back flush 2 to 3 times a day for 20 minutes. He also believed that permitting would be very difficult with storm water.

Notes:

The City of Chandler, Arizona Tumbleweed Park contains the Recharge Facility. The number of ASR wells required to discharge 204 AF in 36 hours is about 45 wells. At \$2M per well that comes to about \$90M (not including land or ROW costs). The vadose zone well costs would be on the order of drywell with a pump, say about \$25,000 each. 140 wells would be required bringing the total cost to about \$3.5M (without ROW Cost).

The vadose wells are not as good, and had more problems. Both will eventually clog, but the ASRs can be flushed and will last longer.



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Telephone Conversation Record

Project Queen Creek Road Basin

Project No. 5038.01

Time 10:30am

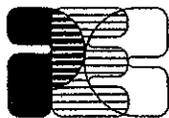
Date January 4 2007

Call to: Perry Powell, ADOT

Call From: Mike Heaton

Discussion, Agreement and/or Action

I called Perry Powell the ADOT Phoenix Division District Engineer for Construction (602-712-8965). I briefly explained the QCRB project to him and asked him about using the SR587 alignment to install a drainage pipeline from Hunt Highway to EMF (about 3 miles). He said that ADOT usually does not permit easements or permits for longitudinal utilities within their ROW. Typically this would be for utilities that cross transverse to the alignment. He said that an investigation of the easements for the highway would be required. He said that usually ADOT facilities across the GRIC have a "transportation" easement and any other use would be adverse to that use. He suggested that I talk with John Hauskins ADOT Phoenix Division District Engineer for Construction (602-712-6550).



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Telephone Conversation Record

Project Queen Creek Road Basin

Project No. 5038.01

Time 11:00am

Date January 4 2007

Call to: John Hauskins, ADOT

Call From: Mike Heaton

Discussion, Agreement and/or Action

I called John Hauskins ADOT Phoenix Division District Engineer for Construction (602-712-6550). I briefly explained the QCRB project to him and asked. John confirmed that the SR587 corridor was likely a transportation only easement and would require a change to its status to allow a drainage pipe. ADOT was not likely to pursue that change. An additional easement along the roadway would be the way ADOT would suggest. He said that SRP has a pipeline along the corridor for some distance and perhaps there was an opportunity for partnering there. As far as the GRIC goes, ADOT has a good working relationship with them now and is currently negotiating drainage issues with the community. He asked if I wanted him to bring up the project to the community when he met with them. I told him that being the consultant, I would not make that decision, but would report to our MCFCD project manager.



MEETING AGENDA QUEEN CREEK ROAD BASIN CANDIDATE ASSESSMENT REPORT PROJECT – BRAINSTORMING MEETING

Date: January 19, 2007, 8:30-12:00

Place: Flood Control District, Buckhorn Mesa Room

Attendees:

Name	Agency/Company	E-Mail
L. Steve Miller	PEC	smiller@pecaz.com
Julie Cox	FCDMC	jrc@mail.maricopa.gov
Cathy Regester	FCDMC	cwr@mail.maricopa.gov
Amir Motamedi	FCDMC	amm@mail.maricopa.gov
Mike Heaton	PEC	mike@pecaz.com
Felicia Terry	FCDMC	fet@mail.maricopa.gov
Tom Sands	SRP	tom.sands@srpnet.com
Hassan Alsaad	SRP	hassan.alsaad@srpnet.com
Kathryn Gross	FCDMC	kag@mail.maricopa.gov
Afshin Ahouraiyan	FCDMC	afa@mail.maricopa.gov
Ying Xu	PEC	ying@pecaz.com
Joe Rauch	SRP	Joe.rauch@srpnet.com
Raj Shah	FCDMC	rsc@mail.maricopa.gov

Notes:

The following are notes of the Brainstorming Meeting for the Queen Creek Road Basin:

Introduction

- Overview of the Higley ADMP
- The ADMP proposed a channel along Consolidated Canal through Gila River Indian Community (GRIC) to East Maricopa Floodway (EMF)
- Detention Basin @ Queen Creek & McQueen
 - Basin was on line
 - Capacity of 70 ac
- GRIC was not responsive to channel to EMF
- Re-analyzed and use as off line as retention
- Would require 204 ac-ft (for the 100-year, 24-hour storm)
- Per IGA, Chandler was to do construction
- Was too expensive for chandler-so put on hold
- FCD would provide CAR to find outfall for basin
- Chandler will be the lead for design and construction.

Reports on Meetings and Discussions with Stakeholders

- GRIC- new facilities need council approval – difficult to get
- Either way community needs to be informed.
- Question - Have dynamics of GRIC changed? Not much, requires a lot of effort to get channel to EMF

- The plan is to get to construction by 2011
- All options are open when discussing outfall
- Consolidated-at Hunt Hwy is a ditch
- Hassan (SRP) working on design to upgrade delivery to GRIC as part of Arizona Water Settlements Act of 2002 (settlement)
- Need a waste flow facility (Storm conditions)
- Seems logical to go south to the Gila River or EMF
- Best to use a group effort (SRP/FCDMC/ Chandler) to propose a project to GRIC
- SRP believes GRIC would entertain ideas for accepting basin outfalls
- Models show Chandler Airport doesn't contain all rainfall; some runoff crosses Queen Creek to basin site.
- New model (Chandler/Gilbert FDS) also shows outflow from airport
- Review past hydro studies – For the CAR, we don't need to know exact value of retention – just need an outfall for the basin.
- Chandler is working with developer who wants to adjust volume to 195 AF
- Would like to combine two properties & use both – Chandler working on an IGA with the developer.
- Chandler will own and operate the basin.
- Current IGA with Chandler will lead design and construction – FCD will cost share.
- City Concerned with cutting new pavement - Pavement cutting moratorium-large fee's for new pavement cutting.
- McQueen new from Queen Creek to the Santan Freeway.
- McQueen south and Queen Creek adjacent to the basin will be improved with new pavement soon.
- John Sherrill-Chandler Environmental Coordinator said City has NPDES (north of Santan Freeway)
- Chandler will re-submit for new outfall when it has final location
- Chandler willing to work with SRP and GRIC and ADOT to meet requirements for the NPDES.
- SRP has 50 cfs delivery to GRIC at Hunt Highway (part of adjudication)
- Existing GRIC system @ Hunt Hwy & 587 is open across GRIC to Lateral 9 (50 cfs) Existing has 30 cfs capacity
- They may have new channel to south to the PMIP channel (Santan Canal)
- Perhaps use basin for SRP water storage also.
- ADOT had suggested that SRP has a pipeline along SR 587 – SRP said they do not have facility.
- ADOT says R/W for roads on GRIC is an easement for transportation only

- Existing Drainage Facilities include:
 - ADOT channel along Santan Freeway to Gila Drain
 - EMF
 - City of Chandler facilities (i.e. WRF injection site, other local basins)
 - Santan Channel & Freeway
 - Cap of 100 cfs allotment to Santan Freeway Channel
 - Denver Basin 35 CFS
 - Other locations 50 cfs
 - 15 cfs left
- Need 70cfs capacity to drain 200 AF in 36 hrs- This is roughly a 42" pipe

Brainstorming

Discussion of possible outfall locations to drain basin:

- Pump to ADOT channel north of Santan Freeway
- Pump to Chandler filter plant. – Water treatment Plant @ Santan Freeway & Consolidated Canal – has large detention basin for supply of water during emergency shutdowns. Approximately 50 AF. SRP requirement could be relaxed. Use as a bargaining chip.
- Pumped discharge along Consolidated Canal in SRP ROW to Santan Freeway then siphon under Consolidated Canal to Santan Channel
- Another option is to go west under freeway where it rises above grade
 - Get As-built of Freeway (Earth Tech)
- Use Bear Creek Golf Course and alternate storage area
- Water Wheel using Consolidated Canal to Hunt Highway for 50 CFS and discharge to GRIC or PMIP.
- Outfall to EMF via Arizona Avenue/ SR 587 to EMF
- Outfall to EMF via SR 87 to Railroad to EMF
- Is SR 87 a transportation easement through GRIC? Is the railroad also a transportation easement only?
- Pump outfall to Queen Creek/ Ocotillo Road to EMF
- Elevations at various locations associated with the project and proposed outfall locations:
 - 1226' @ basin
 - 1226' @ Santan Freeway and Consolidated Canal Crossing
 - 1220' @ Santan Freeway and McQueen
 - 1306' @ Ocotillo Road & EMF
 - 1292' @ Hunt Highway & EMF
- Outfall using various SRP facilities to the west
- Distance of about 4 miles from the basin site to the GRIC
- Could outfall using multiple small outlets post storm event
 - Willis Road pipe (SRP lateral 5-14.4) to be tied to Gila Drain will require to be upgraded. Approx. 12 cfs.
 - Germann Road pipe (SRP lateral 5-15) to GRIC capacity about 15 cfs
 - Queen Creek Road pipe (SRP lateral 5-16) to GRIC Capacity about 12cfs.
 - All SRP construction for settlement water to GRIC to be completed by the end of 2007
- Queen Creek west of Price is MCDOT
- Installing a large waste way from canal to Santan Channel @ the freeway would lower flow in Consolidated Canal and allow basin to discharge to canal.
- Consolidated Canal has drain to ADOT channel at Santan Freeway – capacity unknown
- Another option to backwater basin discharge to Santan Freeway channel by putting flow in upstream of check structure in Consolidated Canal. Canal is probably flat enough.
- Could discharge in longer time but there could be a liability exposure for greater than 36 hours storage.
- Dry-up is an issue-Need secondary outlet
- Could pump to ADOT Basin K North of Santan east of Arizona Avenue – has 59 AF capacity.

Action Items

List of possible next steps:

- Meet with GRIC
 - Mike, Hassan, and Afshin to meet with Gary Parker
- Meet with ADOT to discuss ADOT drainage facilities
- Check the Chandler/ADOT IGA for discharge into the Santan Channel.
- Meet with FCD to “formalize” the alternatives.



**MEETING NOTES: QUEEN CREEK ROAD BASIN CAR
OUTFALL ALTERNATIVES EVALUATION
MEETING WITH ARIZONA DEPARTMENT OF TRANSPORTATION**

Date: February 5, 2007

Place: Phoenix Maintenance Office (2140 West Hilton Ave.; Phoenix)

Attendees: **Maysa Hanna, ADOT**
Timothy Wolfe, ADOT
John McNairy, ADOT
Afshin Ahouraiyan, Flood Control District
Felicia Terry, Flood Control District
Mike Heaton, Project Engineering Consultants

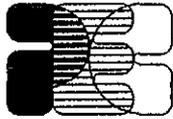
Meeting Purpose

Information gathering & brainstorming with ADOT regarding the CAR project and determine what information they may have that would be useful to the project.

The following bullets summarize the discussion held at this meeting:

- An overview of the purpose of the project was given and the alternatives that impact ADOT were presented.
- ADOT is currently looking at the IGA for the Santan Channel. They believe it is a SRP easement for the channel. They will add the Chandler "100 cfs" IGA to the look-up list.
- ADOT believes the channel is at capacity and cannot receive any more flow.
- It was explained that this could be a "post event" inflow when the capacity would be available.
- ADOT says that FCD should provide report and let the ADOT drainage group review and comment to see if it would be allowable.
- It was explained that the was a CAR and was only looking at alternative with the goal of finding one most viable alternative to move forward to design and Chandler would do that portion of the work.
- ADOT at this time is negotiating an IGA with SRP and the GRIC for discharge of stormwater to the GRIC.
- Bill Hayden is the ADOT Ombudsman for working with the Indian communities. He is working with GRIC on the IGA. He would have the most information regarding the current situation.

- Water quality is an issue to be addressed for water being discharged to the Santan Channel, but so is quantity.
- ADOT recommended that FCD use the original plan and work with the GRIC to discharge to the EMF



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Telephone Conversation Record

Project Queen Creek Road Basin CAR

Project No. PEC 5038.01

Time 10:30

Date: March 23, 2007

Call to: Tom Sands, SRP

Call From:

Discussion, Agreement and/or Action

I returned Tom's call from earlier in the week. He wanted to get some clarification on the meeting notes forwarded to him regarding the meeting we had with ADOT on February ??, 2007. I answered his questions and then reiterated the basin outcome of the meeting; which was that ADOT has the same problem with discharging stormwater to the GIRC as we do with this Queen Creek Road Basin. Tom understood that and said that this may be changing soon.

Tom said that Paul Cherington and Dan Lance would be meeting soon to discuss a proposal that may help to solve the problem. He was not at liberty to say what the proposal was just yet, but did want to explain some things that had happened at SRP to me with the thought it may help to solve our dilemma, or at least add a possibility.

Tom said that our brainstorming meeting had got them thinking and that they had done some preliminary hydraulics to check the feasibility of the proposal.

Tom said that the Consolidated Canal is sufficiently flat enough, that the 70 CFS that we propose to discharge could be discharged into the canal and a gate installed at the Santan Cannel, north of the Loop 202 Santan Freeway, to discharge the flows. There would have to be some discussions because Chandler would have to obtain the NPDES permit for this canal discharge, and SRP would have to get a NPDES permit for the channel discharge. And he felt that these were achievable.

If those items can be worked out, and a deal with ADOT to take the water can be worked out, this would be a very cost effective plan for the basin discharge.

He said that he could disclose more after the discussion with Paul and Dan is over.

Mike Heaton

From: Brady, Gary [gary.brady@stantec.com]
Sent: Tuesday, March 27, 2007 2:22 PM
To: mike@pecaz.com
Subject: Hwy 587 near GRIC Boundary

Hi Mike:

Good to hear from you. We met with FCDMC a few weeks ago (Amir and Felicia Terry) and discussed their desire for an outfall from the SR-587 location or another location along Gilbert Road at the Reservation boundary. I don't know what part of SR-587 is allotted land or not, but it is a moot point if the Community does not agree to have this outfall to the EMF on-Reservation along SR-587. However, we have been told that most of the corridor includes allotted lands.

I can probably come up with an allotment map for the area, but the Community has made it clear to us that we are not to show any allotments on any of our drainage study maps. This is considered personal information to them and they don't want it available to the general public. Let me know if this helps.

Gary G. Brady, P.E.
Project Manager
Stantec
Ph: (602) 438-2200 Ext. 4671
Fx: (602) 431-9562
Cell: (602) 363-5749
gary.brady@stantec.com
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Meeting Notes



Stantec

GRIC Reservation-Wide Drainage Study - Non-Tribal Agency Coordination Meeting With Flood Control District of Maricopa County at FCDMC Office

GRIC Reservation-Wide Drainage Study / FILE 182000456

Date: February 2, 2007
 Place/Time: Flood Control District Office / 9:00 AM
 Next Meeting: N/A
 Attendees: Amir Motamedi and Felicia Terry, Flood Control District of Maricopa County (FCDMC);
 Harry Millsaps (Tribal Projects Devel)
 Gary Brady and Tom Koenekamp (Stantec Consulting)
 Absentees: None
 Distribution: Wilfred Brown, Tribal Projects Office, Attendees, File

Item:

Action:

Purpose of the Meeting

As part of the scope of work of the GRIC Reservation-Wide Drainage Study, it was identified that meetings should be held with Tribal and Non-Tribal agencies to discuss the Reservation-Wide Drainage Study and to obtain input from the agencies on their perspective of important drainage issues. This meeting was held for this purpose.

Discussion

Harry and Gary Brady provided background information on the reason and need for the study. Discussion was then held related to what storm water drainage studies, projects and construction the FCD was involved with on or near the GRIC Reservation that would have affects on the GRIC Reservation. The FCD is also interested in making contact with appropriate GRIC representatives to discuss ongoing drainage work that needs input and cooperation with the GRIC.

A major FCD project that affects the GRIC Reservation is the East Maricopa Floodway project that collects and conveys storm water runoff from developments north of the GRIC in Mesa, and conveys it to the Gila River through the Reservation. The floodway channel follows the Roosevelt Water Conservation District (RWCD) main canal and has an approximate 100-year storm

Stantec

February 2, 2007

GRIC Reservation-Wide Drainage Study - Non-Tribal Agency Coordination Meeting With Flood Control District of Maricopa County at FCDMC Office

Page 2 of 3

event design capacity of 8,700 cfs at the Reservation boundary at about the end of the RWCD canal. The Flood Control District is currently constructing two large off-line regional basins along the floodway in order to maintain this current design discharge at the Community boundary. Amir identified that the FCDMC is responsible for maintenance of the East Maricopa Floodway on the Reservation. For the GRIC to have a project that discharges to the East Maricopa Floodway, the Community will need to identify that their project will not increase peak flows within the floodway. Because the hydraulic grade line of the East Maricopa Floodway is perched or elevated above surrounding grade, it appears that generally discharge from the Reservation to the channel would need to be pumped into the channel from detention basins or similar source.

Another area of concern for storm water drainage is along Empire Road/Hunt Highway (Empire Road in Pinal County same as Hunt Highway in Maricopa County). Drainage from within the Reservation and the Santan Mountains is crossing northerly across Hunt Highway and causing some damage to developments north of the highway. There is an existing on-Reservation drainage channel that conveys some of this drainage, but it is insufficient to convey major storm runoff. Amir identified that the Flood Control District would be interested in working with the Community to *explore opportunities* to improve this channel to reduce the flooding potential.

Housing and other development in the area near Hunt Highway and the Consolidated Canal (between Arizona Avenue and McQueen) created the need for a drainage project following the Salt River Project (SRP) Consolidated Canal. The project along the canal consists of a series of drainage channel and detention basins that collect localized runoff from the developments. The project drainage system requires a bleedoff outfall of about 70cfs to dewater the basins within the County standard of 36 hours. The FCD would like to discharge the bleed off either directly south to the East Maricopa Floodway in a drainage channel or pipeline or convey it in another corridor across the Reservation to the Gila River. Amir and Felicia identified that the Flood Control District attempted to coordinate with Fred Ringlero a few years ago, but they were never able to present a proposal to Council.

Stantec

February 2, 2007

GRIC Reservation-Wide Drainage Study - Non-Tribal Agency Coordination Meeting With Flood Control District of Maricopa County at FCDMC Office

Page 3 of 3

FCDMC would like an opportunity to discuss this project again with the Community.

Other FCD studies/projects discussed include the Gilbert-Chandler ADMP, the Higley ADMP, the Chandler-Gilbert Flood Insurance Study, the Laveen Master Drainage Plan/Laveen Area Drainage Channel, the Tres Rios Project and the Hunt Highway @ Sun Lakes Project (MCDOT Project).

Final published copies of the foregoing project study reports are available from the FCD and MCDOT libraries via their web sites. Reports are not loaned out but can be obtained from the agency library for a reproduction fee. Some MCDOT reports can be downloaded from the library.

Stantec identified that a library of GRIC related drainage reports is being established for this study.

Amir was going to have three reports copied and provide to Stantec for GRIC use and review including:

1. The East Maricopa Floodway Hydrology Report
2. The drainage report related to development within the Hunt Highway/SPRR area
3. The latest version of the Laveen Area Drainage Master Study.

The meeting adjourned at about 11:45 PM.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

STANTEC CONSULTING INC.

Gary G. Brady, P.E.
Project Manager
gary.brady@stantec.com

Attachment: None