

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY  
PHOENIX, ARIZONA**



**METRO PHOENIX ADMP  
STAKEHOLDER NOTEBOOK  
FCD 2004C040**

**Prepared by:**



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**September 2008**

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## SECTION 1: INTRODUCTION

### 1.1 Purpose of Study

The purpose of this Area Drainage Master Plan (ADMP) is to identify and quantify flood hazards within the study boundaries and to develop a recommended plan for mitigation of these problems. The urbanized metropolitan Phoenix area was experiencing flooding problems so the Flood Control District of Maricopa County (District) moved forward with the Metro Phoenix ADMP.

### 1.2 Project Participation

The City of Phoenix (City) Transportation Department was a major stakeholder on this project with the District. Additional stakeholders included the Arizona Department of Transportation (ADOT), the Salt River Project (SRP) and other City agencies including the Parks and Recreation Department. The following table lists the project team members:

Name	Agency	Phone No.	E-Mail
Afshin Houraiyan	FCDMC - Project manager	602.506.4519	afa@mail.maricopa.gov
Nicole Scheider	FCDMC - Public Involvement	602.506.1501	NicoleScheider@mail.maricopa.gov
Steven Tucker	FCDMC - Hydrology	602.506.1501	slt@mail.maricopa.gov
Richard Harris	FCDMC - Floodplain	602.506.1501	rph@mail.maricopa.gov
Dennis Holcomb	FCDMC - Landscape Architect	602.506.1501	dbh@mail.maricopa.gov
Diana Stuart	FCDMC - Environmental	602-506-4766	dms@mail.maricopa.gov
Hasan Mushtaq	City of Phoenix	602.262.4026	hasan.mushtaq@phoenix.gov
Paul Driver	City of Phoenix	602.261.8853	paul.driver@phoenix.gov
Lloyd Vick	EEC - Project Manager	602.248.7702	lvick@eecphx.com
Charles Griffith	EEC - Project Engineer	602.248.7702	cgriffith@eecphx.com
Mark Gavan	Gavan & Barker - Project Manager	602.200.0031	mgavan@gavanbarker.com
John Barker	Gavan & Barker - Landscape Architect	602.200.0031	jbarker@gavanbarker.com
Jeff Minch	Wood/Patel	602.335.8500	jminch@woodpatel.com
Shimin Zou	Wood/Patel	602.335.8500	szou@woodpatel.com
Diane Simpson	Logan Simpson Design	480.967.1343	dsimpson@lsdaz.com
Julie Andersen	Logan Simpson Design	480.967.1343	jandersen@lsdaz.com

### 1.3 Study Area and History

The study area for the Metro Phoenix ADMP is shown in Figure 1. The area is bounded by the Arizona Canal Diversion Channel (ACDC) on the north, I-17 on the west, the Salt River on the south, and the ridgeline in the Papago Buttes on the east. Between 44<sup>th</sup> Street and 60<sup>th</sup> Street, the study area extends north of the Arizona Canal up to the ridgeline of Camelback Mountain. The total study area is approximately 90 square miles. The study also includes a portion of the Durango ADMP study area, west of I-17, which encompasses the Cave Creek Floodplain and its corresponding watershed (blue shaded area on Figure 1). The reason for including the Durango area in the Metro Phoenix ADMP is for the re-study of the Cave Creek Floodplain; no new flood mitigation plans will be developed for the Durango watershed, as this effort was previously accomplished as part of the Durango ADMP.

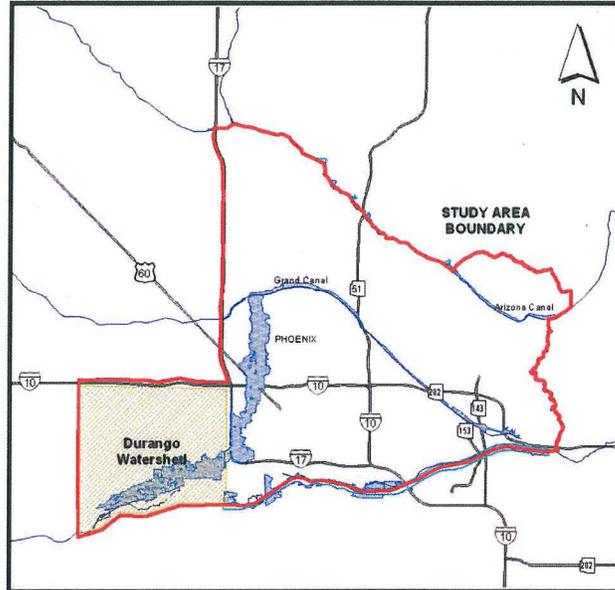


Figure 1 - Study Area Map

The study area is entirely developed making it unique from many ADMPs. There was no undeveloped open space to provide retention or create 100-year drainage infrastructure. There are large portions of the study area that were developed before the drainage ordinances were established; with the older development, there are problems such as low finish floor elevations.

### 1.4 Purpose of Stakeholder Notebook

The purpose of the Stakeholder Notebook is to describe and document information from the Phoenix Metro ADMP that is pertinent to stakeholders. It includes documentation of

- Meeting Minutes
- Data/Correspondence exchanged between the ADMP team and the stakeholders
- Memorandums provided to stakeholders to address issues
- It also includes all the Final ADMP Report (September 2008), along with the following accompanying reports under separate covers:
  - *Metro Phoenix ADMP Data Collection report*. EEC. October 2006.
  - *Hydrologic Study Report for Metro Phoenix Area Drainage Master Study/Plan*. Wood/Patel and Assoc. October 2006
  - *Potential Alternatives Report: Level I Analysis*. EEC. March 9, 2007.
  - *Metro Phoenix ADMP Level II Report*. EEC. January 2008.
  - *Cave Creek Floodplain Re-Delineation Study*. EEC. July 2007.

- *Scenery & Recreation Resource Assessment.* Gavan & Barker. January 11, 2008.
- *Public Meeting.* LSD. September 2008.
- *Metro Phoenix Area Drainage Master Plan: Recommended Plan.* EEC. September 2008.

## SECTION 2: STAKEHOLDER DATA

### 2.1 STAKEHOLDER INFORMATION

The following page is a table of stakeholders which includes phone numbers, email addresses, and organizations.

Name	Agency	Phone No.	E-Mail
Ken Akoh-Arrey	ADOT - Drainage Section	602-712-8660	KAkoh-Arrey@azdot.gov
Bob Gooch	SRP - Water	602-236-5227	rsgooch@srpnet.com
Hasan Mushtaq	COP - Street Transportation	602-262-4026	hasan.mushtaq@phoenix.gov
Paul Driver	COP - Street Transportation	602-261-8853	paul.driver@phoenix.gov
Boyd Winfrey	COP - Parks and Recreation	602-262-4925	boyd.winfrey@phoenix.gov
Ramon Cons	COP - Development Services Dept.	602-534-6077	ramon.cons@phoenix.gov
Samuel Hanna	COP - Aviation	602-273-4582	samuel.hanna@phoenix.gov
Brian Fry	JE Fuller for Phoenix Aviation	623-889-0166	brian.fry@jefuller.com
Josh Papworth	Dibble for Phoenix Aviation	602-957-1155	josh.papworth@dibblecorp.com
Ray Almanzar	Valley Metro Transit	602-495-8227	ray.almanzar@phoenix.gov
Jeff Holzmeister	J2 Engineering	602-438-2221	jholzmeister@j2design.us
Alicia Urban	J2 Engineering	602-438-2221	alurban@j2design.us
Frank Medina	Parsons Brinkerhoff	480-966-8295	medinaf@pbworld.com
Steve Wilcox	DMJM	602-337-2777	steve.wilcox@dmjmharris.com
Steve Beasley	ADOT	602-712-7645	sbeasley@azdot.gov
Chris Coover	County Parks & Recreation	602-506-8719	ccoover@mail.maricopa.gov
Ambika Adhikari	COP - Planning Dept.	602-262-4074	ambika.adhikari@phoenix.gov
Karen Craver	COP - Planning Dept.	602-534-5829	karen.craver@phoenix.gov
Katherine Coles	COP - Planning Dept.	602-256-5648	katherine.coles@phoenix.gov
Susan Sargent	COP - Planning Dept.	602-262-4065	susan.sargent@phoenix.gov
Sally Heinrich	COP - Planning Dept.	602-262-6823	sally.heinrich@phoenix.gov
Marc Thornton	COP - Planning Dept.	602-261-8701	marc.thornton@phoenix.gov
John McNary	ADOT - District Maintenance	602-712-8704	jMcNary@azdot.gov
Bob Pikora	COP - Planning Dept.	602-262-6823	robert.pikora@phoenix.gov

**Appendix A**  
**MEETING NOTES**

**Appendix A.1**  
**STAKEHOLDER MEETINGS**

**REPORT OF MEETING**

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Date: October 24, 2005  
 Time: 1:30 p.m.  
 Location: Flood Control District  
 Prepared by: Lloyd Vick

<u>Attendees</u>	<u>Present(y/n)</u>	<u>Organization</u>	<u>Phone #</u>	<u>e-mail</u>
Afshin Ahouraiyan	y	FCDMC	602.506.4519	afa@mail.maricopa.gov
Kelli Sertich	y	FCDMC	602.506.0867	kas@mail.maricopa.gov
Jessica White	y	FCDMC	602.506.7841	jlw@mail.maricopa.gov
Dennis Holcomb	y	FCDMC	602.506.4074	dbh@mail.maricopa.gov
Mark Gavan	y	EEC	602.248.7702	mgavan@eecphx.com
Lloyd Vick	y	EEC	602.248.7702	lvick@eecphx.com
Ramon Cons	y	COP-DSD	602.534.6077	ramon.cons@phoenix.gov
Boyd Winfrey	y	COP Parks	602.262.4925	boyd.wingrey@phoenix.gov
Chris Coover	y	Maricopa Co.	602.506.8719	ccover@mail.maricopa.gov
Ray Almanzar	y	COP-Lt Rail	602.495.8227	ralmanzar@valleymetro.org
Bob Gooch	y	SRP	602.236.5227	rsgooch@srpnet.com
Hasan Mushtaq	y	COP-Streets	602.262.4026	hasan.mushtaq@phoenix.gov
Jeff Beimer	n	ADOT-Drain	602.712.8609	jbeimer@azdot.gov
David Hensley	n	COP Aviation	602.273.3338	david.Hensley@phoenix.gov
Keith Zwick	n	COP Parks	602.534.5292	keith.zwick@phoenix.gov
Paul Driver	n	COP-Streets		paul.driver@phoenix.gov
Bob Pikora	n	COP Planning	602.262.6823	robert.pikora@phoenix.gov
Katherine Coles	n	COP Planning	602.256.5648	Katherine.coles@phoenix.gov
Ambika Adhikari	n	COP Planning	602.262.4074	ambika.adhikari@phoenix.gov
Karen Craver	n	COP Planning	602.534.5829	karen.craver@phoenix.gov
Susan Sargent	n	COP Planning	602.262.4065	susan.sergeant@phoenix.gov

***Please review the following and advise if there are any corrections or omissions.***

**Purpose of Meeting: Metro Phoenix ADMS/ADMP - Stakeholders Meeting #1**

- Afshin welcomed the stakeholders and introduced the project to the group.
- Mark described the following project components:
  1. description of the study area
  2. the purpose behind the first public meeting
  3. the new Hydrology model
  4. the data collection report
  5. the redelineation of the Cave Creek Wash floodplain
    - based upon better mapping
    - and, upon the new hydrologic model
  6. identification of problem flooding areas within the study area
  7. develop alternative solutions to solve flooding problems
- Mark described the SRP canal system at the Old Cross Cut Canal (OCCC) and suggested that we may be double counting flow in the hydrology model because SRP retains the right to discharge up to 1000 cfs from the Arizona Canal to the OCCC. During larger storm events, the reduction of irrigation water in the Arizona Canal would result in an increase in stormwater conveyance capacity which would reduce storm water spilling over the canal.

Bob Gooch stated that he was unfamiliar with SRP's operations plan for the Arizona Canal, but that he could set a meeting with SRP staff to look at this issue.

- Afshin asked Ramon of COP's Development Services questions about changes in land use and how that might affect the hydrologic modeling. Specifically, Afshin asked if the City's policy for redeveloped areas included 100-year, 2-hour retention storage. Ramon said that the City typically gives waivers so that developers stormwater retention requirements are reduced to the difference between pre versus post development discharges. Ramon informed the group that there are several areas within the study area that are designated in-fill development zones. He said that he could provide a GIS coverage of these areas to the team.

**REPORT OF MEETING**

Date: January 5, 2006  
 Time: 9:30 a.m.  
 Location: Flood Control District  
 Prepared by: ctg/lav

Attendees	Present(y/n)	Organization	Phone #	e-mail
Afshin Ahouraiyan	y	FCDMC	602.506.4519	afa@mail.maricopa.gov
Kelli Sertich	y	FCDMC	602.506.0867	kas@mail.maricopa.gov
Jessica White	n	FCDMC	602.506.7841	jlw@mail.maricopa.gov
Dennis Holcomb	y	FCDMC	602.506.4074	dbh@mail.maricopa.gov
Steven Tucker	y	FCDMC	602.506.4872	slt@mail.maricopa.gov
Mark Gavan	y	EEC	602.248.7702	mgavan@eecphx.com
Lloyd Vick	y	EEC	602.248.7702	lvick@eecphx.com
Charles Griffith	y	EEC	602.248.7702	cgriffith@eecphx.com
Brian Fry	y	Dibble	602.957.1155	bfry@dibblecorp.com
Ramon Cons	n	COP-DSD	602.534.6077	ramon.cons@phoenix.gov
Boyd Winfrey	y	COP Parks	602.262.4925	boyd.wingrey@phoenix.gov
Chris Coover	y	Maricopa Co.	602.506.8719	ccoover@mail.maricopa.gov
Ray Almanzar	n	COP-Lt Rail	602.495.8227	ralmanzar@valleymetro.org
Bob Gooch	y	SRP	602.236.5227	rsgooch@srpnet.com
Hasan Mushtaq	y	COP-Streets	602.262.4026	hasan.mushtaq@phoenix.gov
Jeff Beimer	n	ADOT-Drain	602.712.8609	jbeimer@azdot.gov
David Hensley	n	COP Aviation	602.273.3338	david.Hensley@phoenix.gov
Keith Zwick	n	COP Parks	602.534.5292	keith.zwick@phoenix.gov
Paul Driver	n	COP-Streets		paul.driver@phoenix.gov
Bob Pikora	n	COP Planning	602.262.6823	robert.pikora@phoenix.gov
Katherine Coles	n	COP Planning	602.256.5648	Katherine.coles@phoenix.gov
Ambika Adhikari	n	COP Planning	602.262.4074	ambika.adhikari@phoenix.gov
Karen Craver	n	COP Planning	602.534.5829	karen.craver@phoenix.gov
Susan Sargent	n	COP Planning	602.262.4065	susan.sergeant@phoenix.gov

***Please review the following and advise if there are any corrections or omissions.***

**Purpose of Meeting: Metro Phoenix ADMS/ADMP - Stakeholders Meeting #2**

- Afshin welcomed the stakeholders and turned it over to Jeff Minch to present the preliminary results of the hydrology study.
- Jeff described several key areas:
  1. Flows along the Grand Canal and the existing Cave Creek floodplain.
  2. The significance of the proposed future COP storm drains in 28<sup>th</sup> Street and 36<sup>th</sup> Street. Both of these storm drains lie north of the Loop 202 freeway.
  3. The flows along the north side of Sky Harbor Airport.
  4. The east and west tunnels were discussed regarding existing condition flows and excess capacity.
  5. The issue of the Arcadia Area and the OCCC was discussed again as to whether or not there is double counting of flow occurring
- Afshin informed the stakeholders that the public meetings were scheduled for the end of March but may be pushed back to the end of April or May.

- Mark presented the stakeholders with the potential flooding problems as seen by the study team. They included the following locations:
  1. The Cave Creek floodplain which is being re-delineated as part of this ADMS.
  2. The area to the north of the Grand Canal between 7<sup>th</sup> Street and 12<sup>th</sup> Street. Water ponds behind the canal and is trapped between 7<sup>th</sup> Street and 12<sup>th</sup> Street causing the homes to flood.
  3. The disconnected storm drain on 23<sup>rd</sup> Avenue at Northern Avenue. The drainage area is small but it is an area that makes sense to correct since there is a large diameter storm drain that dead ends.
  4. The Arcadia Area, which has been previously studied, may be part of the second phase. The streets run parallel to the contours so flow comes down the north-south streets and then spreads in the east-west streets.
  5. The neighborhood between the Arizona Canal and the Papago Buttes. This is a low-lying area that has several residential flooding complaints.
  6. Central Avenue north of Bethany Home Road. Central Avenue is the only major north-south street without a storm drain. It appears as if it has been discussed before but there is objection from the residents regarding changes to the bridal path and the current character of the area.
  
- The stakeholders will be invited to the brainstorming session at the end of the first phase to layout flooding problems and potential solutions to these problems.

## Flood Hazards to be Addressed in Phase II Meeting

1. Storage at Encanto Golf Course
2. Storage at Durango Curve with conveyance to Salt River
3. 18<sup>th</sup> Avenue Storm Drain (Grand Canal to Encanto)
4. Linear Park along Grand Canal
5. Tile Grand Canal (at flow concentration points) or Siphon Flow under Canal
6. Storage Basins along Grand Canal
7. Buy out homes in floodplain along Grand Canal
8. New Storm Drain Laterals in Downtown connected to existing SD (11<sup>th</sup> Ave, 7<sup>th</sup> St, 16<sup>th</sup> St)
9. New Storm Drain laterals in Downtown connected to the I-10 West Tunnel
10. Storm Drain in Washington (diversion for airport)
11. 23<sup>rd</sup> Avenue Storm Drain – Northern to ????
12. New Storm Drains to increase level of protection to 10-year (ACDC to Grand Canal)
13. Storage Basins in Old Cave Creek
14. Storm Drain in Butler
15. Storm Drain in Bethany Home (15<sup>th</sup> Avenue to Central Avenue)
16. Storm Drain in Central Avenue (North of Bethany Home Road)
17. Storm Drain in Myrtle (12<sup>th</sup> Avenue to 15<sup>th</sup> Avenue)
18. Floodproofing
19. Storm Drain in Thomas with laterals to collect flow from the Arizona Country Club Swale
20. 10-year Storm Drain system discharging to I-10 system (Grand Canal to I-10)
21. Storage in Fairgrounds Property
22. 100-year diversion into I-10 system



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Tel: (602) 248-7702 Fax: (602)248-7851

# MEMORANDUM

**To:** Afshin Ahouraiyan  
**Date:** February 27<sup>th</sup>, 2006  
**Copy:** Metro Phoenix ADMP Stakeholders  
**From:** Charles T. Griffith  
**Project No.** 305008  
**Project:** Metro Phoenix ADMP (FCD2004C040)  
**Subject:** Study Update/Cancellation of March Stakeholder Meeting

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The March stakeholder meeting has been cancelled. In lieu of the meeting, the following is a summary of what has taken place since the last stakeholder meeting:

## Hydrology

- Hydrology has been the main focus since the last stakeholder meeting. Several revisions have been made to the model which include:
  1. The method of calculating the IA (initial abstract) has been revised on flood irrigated properties to better define runoff from parks, golf courses, and from the impervious areas within the flood irrigated neighborhoods.
  2. The routing of flows through the Cave Creek floodplain has been revised.
  3. The amount of flow assumed to be diverted along the Grand Canal has been reduced to account for the limited lateral conveyance capacity along the canal.
- Other revisions are also being made to the model. The intent is to have a final model developed by the end of March.

## Cave Creek Floodplain Delineation

- The Cave Creek Floodplain Delineation has been on hold until the District completes its accuracy checking of the mapping. It appears as if the map checks will be done, and the floodplain delineation work will be able to begin in early March.

## **Public Involvement**

- The public meetings are tentatively scheduled for late June.
- The purpose of the June public meetings will be to present the preliminary floodplain delineation on Cave Creek and to present the flood hazards that are to be studied in the next phase of the project.

## **Flood Hazards**

- The following is a tentative list of flood hazard areas to be discussed at the brainstorming meeting (tentatively scheduled for April 2006):
  1. Cave Creek floodplain
  2. Canal North Neighborhood
  3. Grand Canal Floodplain
  4. Arcadia – north of Arizona Canal
  5. Arcadia – Swale west of Arizona Country Club
  6. SR-51 ponding at Camelback Road
  7. 66-inch storm drain dead ends at Northern Avenue
  8. Central Avenue, Arizona Canal to Bethany Home Road
  9. Downtown Area/Washington Street
  10. Light Rail (corridors)
  11. Local Flooding Issues (for potential floodproofing)
  12. 7<sup>th</sup> Avenue and Bethany Home Road

## **Schedule**

- The next stakeholder meeting is scheduled for May 4<sup>th</sup>, 2006
- The public meetings are tentatively scheduled for the week of June 19<sup>th</sup>, 2006.

## Charles Griffith

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**Subject:** Metro Phoenix ADMP Stakeholder Meeting - Update on Phase I Completion  
**Location:** Flood Control District of Maricopa County

**Start:** Thu 9/7/2006 9:30 AM  
**End:** Thu 9/7/2006 10:30 AM  
**Show Time As:** Tentative

**Recurrence:** (none)

**Meeting Status:** Not yet responded

**Required Attendees:** Ambika Adhikari; Boyd Winfrey; Brian Fry (bfry@dibblecorp.com); Chris Coover; David Hensley; Hasan Mushtaq (hasan.mushtaq@phoenix.gov); Jeff Beimer; Karen Craver; Katherine Coles; Paul Driver (paul.driver@phoenix.gov); Ramon Cons; Ray Almanzar; Sally Heinrich; Susan Sargent; Lloyd Vick; mgavan@gavanbarker.com; afa@mail.maricopa.gov; rsgooch@srpnet.com; dms@mail.maricopa.gov

Dear Stakeholders,

Attached is a list of seed ideas that we intend to carry forward in the second phase (for those of you that attended the brainstorming meeting, many of the ideas will look familiar). Please read through the list and plan on attending the Metro ADMP Stakeholder meeting to voice any concerns about the seed ideas and to add any other seed ideas to be carried forward in Phase II of the ADMP. We encourage you to share the ideas within your agency, with a special emphasis on identifying any conflicts with the proposed alternatives. We hope to walk away from this meeting with the final ideas for Phase II. We will also be providing an update from the final public meeting that took place on August 15th and the completion of phase I. Your participation will be most appreciated. If you have any questions, please let us know.

Charles Griffith, E.I.T.  
Engineering and Environmental Consultants, Inc.  
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September 7, 2006  
- Stakeholde...

## Flood Hazards to be Addressed in Phase II Meeting

### Seed Ideas

1. Storage at Encanto Golf Course
2. Storage at Durango Curve with conveyance to Salt River
3. 18<sup>th</sup> Avenue Storm Drain (Grand Canal to Encanto)
4. Linear Park along Grand Canal
5. Tile Grand Canal (at flow concentration points)
6. Storage Basins along Grand Canal
7. Buy out homes in floodplain
8. New Storm Drain in Downtown (11<sup>th</sup> Ave, 7<sup>th</sup> St, 16<sup>th</sup> St)
9. New Storm Drain laterals in Downtown (I-10 West Tunnel)
10. Storm Drain in Washington (diversion for airport)
11. 23<sup>rd</sup> Avenue Storm Drain – Northern to ????
12. New Storm Drains to increase level of protection to 10-year (ACDC to Grand Canal)
13. Storage Basins in Old Cave Creek
14. Storm Drain in Butler
15. Storm Drain in Bethany Home (15<sup>th</sup> Avenue to Central Avenue)
16. Storm Drain in Central Avenue (North of Bethany Home Road)
17. Storm Drain in Myrtle (12<sup>th</sup> Avenue to 15<sup>th</sup> Avenue)
18. Floodproofing
19. Storm Drain in Thomas with laterals (Arizona Country Club Swale)
20. 10-year Storm Drain system discharging to I-10 system
21. Storage in Fairgrounds Property
22. 100-year diversion into I-10 system
23. Add inlets to existing storm drains

**REPORT OF MEETING**

---

Date: September 7<sup>th</sup>, 2006  
 Time: 9:30 a.m.  
 Location: FCD  
 Prepared by: Charles Griffith

**Attendees:**

Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Jessica White	FCDMC	602.506.7841	jlw@mail.maricopa.gov
Steven Tucker	FCDMC	602.506.4872	slt@mail.maricopa.gov
Richard Harris	FCDMC	602.506.4528	rph@mail.maricopa.gov
Boyd Winfrey	COP Parks	602.262.4925	boyd.winfrey@phoenix.gov
Chris Coover	Maricopa Co.	602.506.8719	ccover@mail.maricopa.gov
Paul Driver	COP-Streets		paul.driver@phoenix.gov
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Mark Gavan	Gavan/Barker	602.200.0031	mgavan@gavanbarker.com
Lloyd Vick	EEC	602.248.7702	lvick@eecphx.com
Charles Griffith	EEC	602.248.7702	cgriffith@eecphx.com
Shimin Zou	Wood/Patel	602.335.8500	szou@woodpatel.com

---

***Please review the following and advise if there are any corrections or omissions.***

**Purpose of Meeting: Metro Phoenix ADMS/ADMP - Stakeholders Meeting #4**

- Afshin welcomed the stakeholders and reviewed what has occurred in the project since the June 1<sup>st</sup>, 2006 meeting. The main focus was on the public meeting that occurred on August 15<sup>th</sup>, 2006, and the transition from Phase I to Phase II.
- Mark summarized the brainstorming meeting that took place on June 1<sup>st</sup>, 2006. The idea matrix from the meeting was distributed and discussed. Mark then went through the items to be addressed in Phase II.

**Phase II Ideas - EEC**

1. Storage at Encanto Golf Course
2. Storage at Durango Curve with conveyance to Salt River
3. 18<sup>th</sup> Avenue Storm Drain (Grand Canal to Encanto)
4. Linear Park along Grand Canal
5. Storage Basins along Grand Canal
6. Buy out homes in floodplain
7. New Storm Drain in Downtown (11<sup>th</sup> Ave, 7<sup>th</sup> St, 16<sup>th</sup> St)
8. New Storm Drain laterals in Downtown (I-10 West Tunnel)
9. Storm Drain in Washington (diversion for airport)
10. 23<sup>rd</sup> Avenue Storm Drain – Northern to ????
11. New Storm Drains to increase level of protection to 10-year (ACDC to Grand Canal)
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14. Storm Drain in Bethany Home (15<sup>th</sup> Avenue to Central Avenue)
15. Storm Drain in Central Avenue (North of Bethany Home Road)
16. Storm Drain in Myrtle (12<sup>th</sup> Avenue to 15<sup>th</sup> Avenue)
17. Floodproofing

18. Storm Drain in Thomas with laterals (Arizona Country Club Swale)
19. 10-year Storm Drain system discharging to I-10 system
20. Storage in Fairgrounds Property
21. 100-year diversion into I-10 system
22. Add inlets to existing storm drains
23. Osborn Storm Drain (15<sup>th</sup> Avenue to 19<sup>th</sup> Avenue)

There was particular discussion about the storage at Encanto. The idea will be moved forward and considered as part of the level 1 analysis. Boyd Winfrey suggested additional coordination between the study team and the Parks department as the ADMP progresses. Boyd also suggested that once there is more information to be shared, the team present this idea to the park's board and get to buy in on this idea early on.

The other ideas that were discussed in general terms were the storm drain in Central Avenue, protection for the airport, floodproofing, and storage in the fairgrounds. These ideas will be looked at in greater detail at the alternative formulation meeting to be held on September 12<sup>th</sup> at the FCD.

**REPORT OF MEETING**

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Date: December 7<sup>th</sup>, 2006  
 Time: 9:30 a.m.  
 Location: FCD  
 Prepared by: Charles Griffith

**Attendees:**

Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Nicole Kelley-Scheider	FCDMC	602.506.6762	nkk@mail.maricopa.gov
Steven Tucker	FCDMC	602.506.4872	slt@mail.maricopa.gov
Richard Harris	FCDMC	602.506.4528	rph@mail.maricopa.gov
Dennis Holcombe	FCDMC	602.506.1501	dbh@mail.maricopa.gov
Jon Loxley	FCDMC	602.506.2956	jonloxley@mail.maricopa.gov
Doug Williams	FCDMC	602.506.1501	
Chris Coover	Maricopa Co.	602.506.8719	ccoover@mail.maricopa.gov
Paul Driver	COP-Streets		paul.driver@phoenix.gov
Hasan Mushtaq	COP	602.262.4026	hasan.mushtaq@phoenix.gov
Josh Papworta	Dibble/Aviation	602.957.1155	jpapworta@dibblecorp.com
Bob Gooch	SRP	602.236.5227	rsgooch@srpnet.com
Alicia Urban	J2	602.438.2221	aurban@j2design.us
Jeff Holzmeister	J2	602.438.2221	jholzmeister@j2design.us
Steve Wilcox	DMJM	602.337.2619	steve.wilcox@dmjmharris.com
Frank Medina	PB	480.966.8295	medinaf@pbworld.com
Ken Akoh-Arrey	ADOT-Drainage	602.712.8660	kakoh_arrey@azdot.gov
Lloyd Vick	EEC	602.248.7702	lvick@eecphx.com
Charles Griffith	EEC	602.248.7702	cgriffith@eecphx.com
Mark Gavan	Gavan/Barker	602.200.0031	mgavan@gavanbarker.com
Diane Simpson-Colebank	LSD	480.967.1343	dsimpson@lsd.com
Julie Andersen	LSD	480.967.1343	jandersen@lsd.com
Jeff Minch	Wood/Patel	602.335.8500	jminch@woodpatel.com

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***Please review the following and advise if there are any corrections or omissions.***

**Purpose of Meeting: Metro Phoenix ADMS/ADMP - Stakeholders Meeting #5**

- Afshin welcomed the stakeholders and reviewed what has occurred in the project since the September 7<sup>th</sup>, 2006 meeting. The main focus was the Level I analysis.
- Mark summarized the Level I Alternatives. Mark then went through the items of concern in Phase II.
- Steve Wilcox talked about improvements to I-10 and I-17, ie. Roadway widening projects. One travel lane to I-10 from the SR-51 to the 202 (Santan). One travel lane to I-17 from 7<sup>th</sup> Ave to I-10. Drainage for the improvements would be retained within the existing R-O-W with no increase to the Storm Drain/Tunnel system. Steve also stated that the Airport is delivering more runoff, to the east tunnel, than was originally anticipated.
- Jeff Holzmeister talked about the ADOT Tunnels, specifically the complexity of the analysis due to air entrainment. Jeff said that a substantial effort would have to be made to show that the Tunnels would not be overburdened, but that effort could be justified if a large savings could be shown for a proposed project.

EEC will keep the stakeholders informed and will email any data that they would like from the meeting.



**REPORT OF MEETING**

Date: February 1<sup>st</sup>, 2007  
 Time: 9:30 a.m.  
 Location: FCD  
 Prepared by: Charles Griffith

**Attendees:**

Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Nicole Kelley-Scheider	FCDMC	602.506.6762	nkk@mail.maricopa.gov
Steven Tucker	FCDMC	602.506.4872	slt@mail.maricopa.gov
Richard Harris	FCDMC	602.506.4528	rph@mail.maricopa.gov
Jon Loxley	FCDMC	602.506.2956	jonloxley@mail.maricopa.gov
Chris Coover	Maricopa Co.	602.506.8719	ccover@mail.maricopa.gov
Paul Driver	COP-Streets		paul.driver@phoenix.gov
Hasan Mushtaq	COP	602.262.4026	hasan.mushtaq@phoenix.gov
Brian Fry	Dibble/Aviation	602.957.1155	bfry@dibblecorp.com
Bob Gooch	SRP	602.236.5227	rsgooch@srpnet.com
Alicia Urban	J2	602.438.2221	aurban@j2design.us
Steve Wilcox	DMJM	602.337.2619	steve.wilcox@dmjmharris.com
Frank Medina	PB	480.966.8295	medinaf@pbworld.com
Ken Akoh-Arrey	ADOT-Drain	602.712.8660	kakoh_arrey@azdot.gov
Syed Alam	ADOT-Drain	602.712.8701	salam@azdot.gov
Lloyd Vick	EEC	602.248.7702	lvick@eecphx.com
Charles Griffith	EEC	602.248.7702	cgriffith@eecphx.com
Mark Gavan	Gavan/Barker	602.200.0031	mgavan@gavanbarker.com
John Barker	Gavan/Barker	602.200.0031	jbarker@gavanbarker.com
Diane Simpson-Colebank	LSD	480.967.1343	dsimpson@lsd.com
Julie Andersen	LSD	480.967.1343	jandersen@lsd.com
Jeff Minch	Wood/Patel	602.335.8500	jminch@woodpatel.com

***Please review the following and advise if there are any corrections or omissions.***

**Purpose of Meeting: Metro Phoenix ADMS/ADMP - Stakeholders Meeting #6**

- Mark summarized the Level I Alternatives that are being carried forward to Level II.
- Steve Wilcox talked about this being a good time to get into contact with ADOT. He gave the contact information for Floyd Roehrich (Assistant State Engineer). EEC will send Floyd a copy of the Level I Report and a summary of the project.
- Ken Akoh-Arrey noted that once flows have been determined, it would be a good time to discuss with the drainage department. Once the Level II analysis has been completed, EEC will contact Ken about setting up a meeting with the ADOT drainage department.
- Paul Driver noted that the 24<sup>th</sup> Avenue and Camelback basin will be constructed. It was already included and connected to the alternatives.

EEC will email the Level I Report to the stakeholders.



**Engineering and Environmental Consultants, Inc.**  
3003 North Central Avenue, Suite 600, Phoenix, Arizona 85012-2905  
Tel: (602) 248-7702 Fax: (602)248-7851

# MEMORANDUM

**To:** Afshin Ahouraiyan

**Date:** April 2<sup>nd</sup>, 2007

**Copy:** Metro Phoenix ADMP Stakeholders

**From:** Charles T. Griffith

**Project No.** 305008

**Project:** Metro Phoenix ADMP (FCD2004C040)

**Subject:** Study Update/Cancellation of April 2007 Stakeholder Meeting

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The April stakeholder meeting (which was scheduled for 4/5/07) has been cancelled. Since the last stakeholder meeting in February, progress has been made on the technical analysis of the alternatives but the primary focus of our planning team has been to coordinate with elected officials and neighborhood groups in order to make sure that the alternatives being considered will have community and political acceptance. We have met with Councilmen Stanton, Johnson and Simplot, and have a meeting scheduled with Linger. We have also met with Supervisors Kunasek and have a meeting scheduled with Wilcox. In addition we've met with representatives of the Arcadia Neighborhood Association and are scheduling meetings with representatives of the North Central Neighborhood Association. All of this coordination effort has diverted some of our resources away from the technical analysis, so we don't have the results of our Level II investigation completed yet. We have, however, made significant progress on the analysis which is summarized below.

The next stakeholder meeting is scheduled for 9:30 am, June 7, 2007 at the Food Control District of Maricopa County. Please mark your calendars.

## **Level II Analysis**

- Hydrology has been a large focus of the team for the Level II Analysis. HEC-1 models are being developed for the alternatives that were carried forward. With these models, we hope to answer the following questions:
  1. Determine whether or not the peak discharge increases at I-10 at 15<sup>th</sup> Avenue?
  2. Identify stage-storage-discharge relationships for our proposed storage solutions.
  3. What is the effect at the Durango Curve?

4. Can the existing downtown storm drains handle the excess stormwater runoff?

- Utility conflicts are also being addressed with the Level II Analysis. There are no major utility conflict to report at this time that would eliminate an alternative.

**Cave Creek Floodplain Delineation**

- The City of Phoenix and FCDMC have decided that the Cave Creek Floodplain Delineation will be submitted to FEMA between the Grand Canal and I-10.

**Public Involvement**

- The public meetings are tentatively on hold. The study team has been meeting councilmen and HOA's to present the ideas and gain feedback. The hope is to go back to the public in late June or July.

**REPORT OF MEETING**

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Date: June 7<sup>th</sup>, 2007  
 Time: 9:30 a.m.  
 Location: FCD  
 Prepared by: Charles Griffith

**Attendees:**

Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Nicole Kelley-Scheider	FCDMC	602.506.6762	nkk@mail.maricopa.gov
Steven Tucker	FCDMC	602.506.4872	slt@mail.maricopa.gov
Richard Harris	FCDMC	602.506.4528	rph@mail.maricopa.gov
Kelli Sertich	FCDMC	602.506.1501	kas@mail.maricopa.gov
Chris Coover	Maricopa Co.	602.506.8719	cchoover@mail.maricopa.gov
Paul Driver	COP-Streets		paul.driver@phoenix.gov
Ramon Cons	COP – DSD	602.5346077	ramon.coms@phoenix.gov
Sam Hanna	COP – Aviation	602.273.4582	sam.hanna@phoenix.gov
Boyd Winfrey	COP – Parks	602.262.4925	boyd.winfrey@phoenix.gov
Ray Almanzar	COP	602.495.8227	ray.almanzar@phoenix.gov
Brian Fry	Dibble/Aviation	602.957.1155	bfry@dibblecorp.com
Alicia Urban	J2	602.438.2221	aurban@j2design.us
Frank Medina	PB	480.966.8295	medinaf@pbworld.com
Ken Akoh-Arrey	ADOT-Drain	602.712.8660	kakoh_arrey@azdot.gov
Lloyd Vick	EEC	602.248.7702	lvick@eecphx.com
Charles Griffith	EEC	602.248.7702	cgriffith@eecphx.com
John Barker	Gavan/Barker	602.200.0031	jbarker@gavanbarker.com
Julie Andersen	LSD	480.967.1343	jandersen@lsd.com
Jeff Minch	Wood/Patel	602.335.8500	jminch@woodpatel.com

***Please review the following and advise if there are any corrections or omissions.***

**Purpose of Meeting: Metro Phoenix ADMS/ADMP - Stakeholders Meeting #6**

- Afshin summarized the meetings that have taken place with the councilmen, and various groups (such the Central Avenue, Canal North Neighborhood, and Arcadia group).
- Frank Medina requested that an invitation for the public meetings be sent to the stakeholders.
- Afshin informed the stakeholders that the Cave Creek Floodplain Delineation had been cut down to the reach between the Grand Canal and I-10.
- Lloyd summarized the Level II alternatives and what had been completed since the last stakeholder meeting.
- Lloyd also summarized the locations of potential discharge locations to ADOT pipes.
- Chris asked if the Grand Canal banks will be affected by the canal basin alternative. They will not be affected.
- Boyd asked the impacts of Encanto and Palo Verde.
  - What is the depth? – 10 feet
  - Will additional ROW be necessary? – No additional ROW will be needed.
  - What is the impact on the parking/pro shop? – None
  - Will Encanto Park be affected? – No, the park will not be altered at all.
- The next stakeholder meeting will be held August 2<sup>nd</sup>, 2007 at 9:30am at the FCD.

EEC will email the Level II Report to the stakeholders once a draft is completed.

**REPORT OF MEETING**

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Date: August 2<sup>nd</sup>, 2007  
 Time: 9:30 a.m.  
 Location: FCD  
 Prepared by: Charles Griffith

**Attendees:**

Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Steven Tucker	FCDMC	602.506.4872	slt@mail.maricopa.gov
Bob Gooch	SRP	602.236.5227	rsgooch@srpnet.com
Chris Coover	Maricopa Co.	602.506.8719	cchoover@mail.maricopa.gov
Ramon Cons	COP – DSD	602.5346077	ramon.cons@phoenix.gov
Sam Hanna	COP – Aviation	602.273.4582	sam.hanna@phoenix.gov
Josh Papworth	Dibble/Aviation	602.957.1155	josh.papworth@dibblecorp.com
Alicia Urban	J2	602.438.2221	aurban@j2design.us
Lloyd Vick	EEC	602.248.7702	lvick@eecphx.com
Charles Griffith	EEC	602.248.7702	cgriffith@eecphx.com
Mark Gavan	Gavan/Barker	602.200.0031	mgavan@gavanbarker.com
John Barker	Gavan/Barker	602.200.0031	jbarker@gavanbarker.com
Julie Andersen	LSD	480.967.1343	jandersen@lsd.com
Jeff Minch	Wood/Patel	602.335.8500	jminch@woodpatel.com
Shimin Zou	Wood/Patel	602.335.8500	szou@woodpatel.com

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***Please review the following and advise if there are any corrections or omissions.***

**Purpose of Meeting: Metro Phoenix ADMS/ADMP - Stakeholders Meeting #7**

- The first public meeting occurred Tuesday night (July 31<sup>st</sup>). There were approximately 100 people that attended. The majority of the people there were there to discuss the Cave Creek Re-delineation. The feedback on the meeting was positive.

**Dissenting Comments:**

1. A woman who's home is located in the Canal North neighborhood stated that her neighborhood is a dumping ground for the City's stormwater.
  2. An comment/concern stating that a reconstructed Encanto golf course might offer more places for indigents to loiter out of plain sight.
- Ray Cons noted that the majority of the downtown and uptown corridor are only required to retain first flush, if anything. And in these areas, they are only required to look at pre versus post conditions. Ray also noted that there is an Inner Core Area between 7<sup>th</sup> Street to 7<sup>th</sup> Avenue and Lincoln Street to Roosevelt Street that COP of considers only first flush as a requirement.
  - Mark also discussed the fact the back 9 of the Encanto Golf Course may become historic property (currently only the front 9 is historic property).
  - Afshin gave the stakeholders a comment sheet from the public meeting and will be mailing the same to the other stakeholders along with the handout from the public meeting. Afshin would like the stakeholder to fill these out and give any feedback by August 14<sup>th</sup>.
  - The next stakeholder meeting will be held October 4<sup>th</sup>, 2007 at 9:30am at the FCD.
  - EEC will email a pdf, of the Level II Report, to the stakeholders once the draft report is completed.

- LSD to determine effect of historic designation on Encanto Golf course. The team will need this information for the August 21<sup>st</sup>, Level II meeting.
- LSD will also determine if homes located within historic neighborhoods can be floodproofed and if there are any special requirements associated with floodproofing in a historic neighborhood. This information will also need to be available for the August 21<sup>st</sup>, Level II meeting.

**REPORT OF MEETING**

Date: October 4<sup>th</sup>, 2007  
 Time: 9:30 a.m.  
 Location: FCD  
 Prepared by: Charles Griffith

**Attendees:**

Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Steven Tucker	FCDMC	602.506.4872	slt@mail.maricopa.gov
Chris Coover	Maricopa Co.	602.506.8719	cchoover@mail.maricopa.gov
Ramon Cons	COP – DSD	602.5346077	ramon.cons@phoenix.gov
Hasan Mushtaq	COP – Streets	602.262.4026	hasan.mushtaq@phoenix.gov
Boyd Winfrey	COP – Parks	602.262.4925	boyd.winfrey@phoenix.gov
Ray Almanzar	COP – Streets	602.495.8227	ray.almanzar@phoenix.gov
Ken Akoh-Arrey	ADOT – Drainage	602.712.8660	
Abu Mohsenin	ADOT – Drainage	602.712.7570	
Josh Papworth	Dibble/Aviation	602.957.1155	josh.papworth@dibblecorp.com
Jeff Holzmeister	J2	602.438.2221	@j2design.us
Lloyd Vick	EEC	602.248.7702	lvick@eecphx.com
Charles Griffith	EEC	602.248.7702	cgriffith@eecphx.com
Mark Gavan	Gavan/Barker	602.200.0031	mgavan@gavanbarker.com
Julie Andersen	LSD	480.967.1343	jandersen@lsd.com
Jeff Minch	Wood/Patel	602.335.8500	jminch@woodpatel.com

***Please review the following and advise if there are any corrections or omissions.***

**Purpose of Meeting: Metro Phoenix ADMS/ADMP - Stakeholders Meeting #8**

- Afshin presented the Recommended plan to the stakeholders and opened the floor to discussion.
- Hasan Mushtaq noted that FEMA has an assistance program for homes that are raised to help with the costs of bring the utilities up to current code. EEC will look into this program and include it in the final implementation plan.
- Boyd Winfrey will provide Afshin with dates to meet with COP Parks upper management and then after that meeting the Parks Board.
- Ken asked about the Durango Curve alternative and if it would provide protection for I-17. It will provide protection. Mark informed Ken that we will be looking at the 108" ADOT SD as a possible outfall for the basin. Jeff H. informed the group that the storm drain is currently overtaxed and collects drainage all the way to Bell Road.
- EEC will email Steve Wilcox the IGA's for the west tunnel. At this point, the only IGA's obtained are for the west tunnel.
- As part of the final recommended plan, FCDMC will work with ADOT to get a Memorandum of Understanding.

**REPORT OF MEETING**

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Date: July 14<sup>th</sup>, 2008  
 Time: 9:30 a.m.  
 Location: FCD  
 Prepared by: Charles Griffith

**Attendees:**

Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Nicole Scheider	FCDMC	602.506.6762	nkk@mail.maricopa.gov
Dennis Holcombe	FCDMC	602.506.1501	dbh@mail.maricopa.gov
Diana Stuart	FCDMC	602.506.1501	dms@mail.maricopa.gov
Chris Coover	Maricopa Co.	602.506.8719	ccoover@mail.maricopa.gov
Ramon Cons	COP – DSD	602.5346077	ramon.cons@phoenix.gov
Ken Akoh-Arrey	ADOT-Drainage	602.712.8660	kakoh_arrey@azdot.gov
Josh Papworth	Dibble/Aviation	602.957.1155	josh.papworth@dibblecorp.com
Jeff Holzmeister	J2	602.438.2221	jholzmeister@j2design.us
Bob Gooch	SRP	602.236.5227	rsgooch@srpnet.com
Lloyd Vick	EEC	602.248.7702	lvick@eecphx.com
Charles Griffith	EEC	602.248.7702	cgriffith@eecphx.com
Mark Gavan	Gavan/Barker	602.200.0031	mgavan@gavanbarker.com
Julie Andersen	LSD	480.967.1343	jandersen@lsd.com
Jeff Minch	Wood/Patel	602.335.8500	jminch@woodpatel.com

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***Please review the following and advise if there are any corrections or omissions.***

**Purpose of Meeting: Metro Phoenix ADMS/ADMP - Stakeholders Meeting #9**

- Lloyd Vick presented the recommended plan. The following comments were brought up during the presentation:
  - How quickly do Palo Verde and Encanto Golf Course drain? – They drain in 30 (16 hours unplayable) and 58 hours (48 hours unplayable) respectively.
  - Jeff Holzmeister mentioned that Steve Wilcox at DMJM is concerned with bringing flows to the existing freeway systems. The concern is that the flows from the proposed storm drains will not increase the existing capacity of the freeway system drainage.
  - Jeff Holzmeister noted that ADOT is looking at draining the TI at I-10 and I-17 with a new storm drain in 16<sup>th</sup> Street. EEC will note this as part of the 16<sup>th</sup> Street upgrades and depending on the Phoenix Sky Harbor International Airport ADMP, note that this is a potential solution in the future depending on what flows leave the airport.
  - EEC will also add a note for the proposed storm drains that outlet to the Salt River due to the Rio Salado Wetlands project denoting the need for coordination with Phoenix Parks department (Rio Salado Project).
  - The cost for the Van Buren Street will also be increased to reflect the potential effort for an archeological exploration.
- EEC will provide Ken Akoh-Arrey of ADOT with the hydrologic models and necessary information to review the hydrology, as well as a graphic showing the IGA locations and discharges.

**Appendix A.2**  
**CITY OF PHOENIX - STREETS**

## Metro Phoenix Area Drainage Master Plan

### Historic Properties Meeting Notes

Location: City of Phoenix 6W Conference Room

Meeting Date: August 20, 2007

#### Attendees:

City of Phoenix:  
Kevin Weight  
Barbara Stocklin  
Boyd Winfrey  
Hasan Mushtaq  
Paul Driver

#### Flood Control District of Maricopa County:

Doug Williams  
Afshin Ahouraiyan  
Jon Loxley  
Diana Stuart

#### Consultants

Lloyd Vick, EEC  
Mark Gavan, Gavan & Barker  
John Barker, Gavan & Barker  
Diane Simpson-Colebank, LSD  
Greg Brown, LSD

#### Meeting Objective

The objective of the meeting was to discuss the potential impacts on historic properties from flood control alternatives under consideration as part of the Metro Phoenix Area Drainage Master Plan (Metro Phoenix ADMP) with the City of Phoenix's Historic Preservation staff. The Flood Control District of Maricopa County (District) and the City of Phoenix are jointly undertaking the study to identify viable solutions to flooding issues within the study area.

#### Project Background

Afshin Ahouraiyan, District Project Manager, provided a brief overview on the Metro Phoenix ADMP. Afshin indicated that at this time no recommended alternative has been determined. Mark Gavan, with Gavan &

Barker, explained the specifics of the alternatives under consideration and the issues related to the Encanto golf Course and historic homes near the Grand Canal.

#### Encanto Golf Course

One alternative under evaluation that would remove homes out of the floodplain as well as reduce flooding problems is to use the Encanto Golf Course as storm water detention. Encanto Park would not be impacted by this alternative. Modifications to the golf course would include:

- Lowering the fairways approximately 12 feet
- 3 different drains (located at 7<sup>th</sup>, 15<sup>th</sup>, and 19<sup>th</sup> avenues) would discharge into the golf course
- 2 outfalls would be located at 7<sup>th</sup> and 15<sup>th</sup> avenues
- outfalls would be designed to meter out the storm water within 36 hours
- grade difference would be approximately 15 feet
- tee boxes would remain at street level
- existing buildings would not be disturbed
- trees would be removed
- trees along the periphery of the golf course would be preserved if possible
- lake would not be disturbed

City of Phoenix's Park and Recreation input is that the changes in terrain would create a more interesting course and also would be a way to pay for the renovation of the facility. It would be similar to Randolph golf course in Tucson. The current political and community

input is also supportive of the retention alternative.

Kevin Weight, City of Phoenix Historic Preservation staff, indicated that Encanto Park and the area east of the golf course is on the National Register of Historic Places (NRHP). The area between 15<sup>th</sup> and 19<sup>th</sup> avenues is considered eligible but not currently listed on the NRHP. The golf course is important historically because it was the city's first municipal golf course and represents a classic regional park with golf course of the 1933 era. The question is will the construction of the flood control facility impact the integrity of the course. The property needs to continue to function as a golf course.

The Encanto Neighborhood is concerned more about acquisition of the facility for development than its listing on the NRHP. Kevin felt that the edge treatment would be of concern by the neighborhood.

Encanto Palmcroft Historic District is currently undergoing the process of its NRHP nomination update. The current boundary of the district is not changing.

Question was raised concerning any federal involvement in the project funding or permitting requirements. If there is a federal nexus, then Section 106 of the Historic Preservation will be a major consideration and will involve the State Historic Preservation Office (SHPO).

#### Historic Homes near Grand Canal

To reduce flooding of residences, approximately 24 homes south and 100 homes north of the Grand Canal would need flood proofing. Flood proofing could consist of raising finished floor elevation 18 to 24 inches or berming to prevent storm water from entering the structures.

Concern indicated by Barbara Stocklin, City of Phoenix Historic Preservation Officer, is that there be no change to the appearance or character of the structure. She recommends the least intrusive of solutions. Barbara is also concerned that the number of houses within a neighborhood may be a factor – 1 or 2 versus 10 in terms of changing the character. She also noted that there are no known historic properties north of the canal. Regardless of NRHP status, each property would need to be evaluated on a case by case basis.

#### Other Topics Discussed

The group briefly discussed the flood control alternative to put approximately 8 storm drains adjacent to the bridal path along Central Avenue. The bridal path is on the NRHP.

Near the Durango Curve, there are also eligible properties for the NHRP. These are 4 19<sup>th</sup> century homes.

Group agreed that SHPO needs to be involved early in the design process. Once the recommended alternative is determined, a meeting with SHPO should be held. The meeting with SHPO should be before the public meeting on the recommended alternative.

*Any changes to these meeting notes should be made within 5 working days of August 30, 2007 to Diane Simpson-Colebank at [atdsimpson@lsdaz.com](mailto:atdsimpson@lsdaz.com).*

**Appendix A.3**  
**CITY OF PHOENIX – PARKS**

**REPORT OF MEETING**

---

Date: December 12, 2006  
 Time: 2:00 p.m.  
 Location: City of Phoenix, City Hall, 5 East  
 Prepared by: John Barker

**Attendees:**

Paul Driver	COP	602.261.8853	<a href="mailto:paul.driver@phoenix.gov">paul.driver@phoenix.gov</a>
Joe Sena	COP	602.262.4997	<a href="mailto:joe.sena@phoenix.gov">joe.sena@phoenix.gov</a>
Jim Burke	COP	602.534.1870	<a href="mailto:james.burke@phoenix.gov">james.burke@phoenix.gov</a>
Glenn Shearer	EEC	602.248.7702	<a href="mailto:gshearer@eecphx.com">gshearer@eecphx.com</a>
John Gavelys	COP	602.262.7985	<a href="mailto:john.gavelys@phoenix.gov">john.gavelys@phoenix.gov</a>
Bob Little	COP	602.261.8979	<a href="mailto:bob.little@phoenix.gov">bob.little@phoenix.gov</a>
Afshin Ahouraiyan	FCDMC	602.506.4519	<a href="mailto:afa@mail.maricopa.gov">afa@mail.maricopa.gov</a>
Dennis Holcomb	FCDMC	602.506.4074	<a href="mailto:dbh@mail.maricopa.gov">dbh@mail.maricopa.gov</a>
John Loxley	FCDMC	602.506.2956	<a href="mailto:jonloxley@mail.maricopa.gov">jonloxley@mail.maricopa.gov</a>
Kelli Sertich	FCDMC	602.506.0867	<a href="mailto:kas@mail.maricopa.gov">kas@mail.maricopa.gov</a>
Mark Gavan	Gavan&Barker	602.200.0031	<a href="mailto:mgavan@gavanbarker.com">mgavan@gavanbarker.com</a>
Lloyd Vick	EEC	602.248.7702	<a href="mailto:lvick@eecphx.com">lvick@eecphx.com</a>
Charles Griffith	EEC	602.248.7702	<a href="mailto:cgriffith@eecphx.com">cgriffith@eecphx.com</a>
Hasan Mushtaq	COP	602.262.4026	<a href="mailto:hasan.mushtaq@phoenix.gov">hasan.mushtaq@phoenix.gov</a>
John Barker	Gavan&Barker	602.200.0031	<a href="mailto:jbarker@gavanbarker.com">jbarker@gavanbarker.com</a>

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*Please review the following and advise if there are any corrections or omissions.*

**Purpose of Meeting: Landscape/Scenery and Multi-use Goals and Objectives for possible future stormwater management projects**

Items Discussed:

**Project/Team Introductions & Description of ADMP Process – Afshin A.**

**Role of Landscape and Multi-use Assessment in Flood Control District projects – Dennis H.**

**Project Summary to Date/ Description of Flood Hazard Areas – Mark G**

**Aesthetic and Multi-use goals from City – John B.**

- Discussion about City objectives for landscape character and multi-use facilities within the study area and discussion about the possible above ground stormwater storage alternatives within the study area: Palo Verde Golf Course, Encanto Golf Course, Grand Canal, State Fairgrounds, I-17/Railroad area, and the Durango Curve area.
- City comments include:
  1. In regard to landscape themes, the Central City area, south of the Arizona Canal should be suburban park like with turf and canopy trees. South of I-10 should also be suburban park like or semi-park like.

2. In general, the City doesn't have any plans for new parks within the Central City area, due to the lack of available property, but would welcome the opportunity for a new multi-use facility.
3. Preserve all existing parks – do not encroach on any existing park for flood control alternatives.
4. The City would consider and likely welcome the opportunity for new multi-use parks with size to accommodate soccer fields in the Durango Curve and I17/Railroad areas.
  - Provide high and dry areas in any new basins for park uses including; staging, parking, restrooms, playgrounds.
  - Provide for different levels of flooding and low flow features to manage nuisance flows and maximize the usability of basins.
  - Provide ADA access throughout basin.
5. The City would consider and likely welcome the opportunity for opening up access and providing parks along the Grand Canal. The City currently has an agreement with SRP for trail use along the Canal.
6. The City would consider the possibility of using the Encanto Golf courses, executive 9 and 18, for stormwater storage if it would be beneficial to the Parks and Recreation Department. Mark Gavan gave an explanation of how the basins could be graded in a manner to compliment the course, similar to municipal Dell Urich Golf Course in Tucson.
  - Preserve existing trees in the City Golf Courses; palms trees could be removed (if no historic issues).
7. The City cautioned our team on the alternative of using Palo Verde Golf Course for stormwater storage. They explained that Palo Verde loses money and that they are going to begin a public involvement process this winter/spring to explore alternative uses for the 27-acre parcel. Therefore, they are reluctant to state, at this time, if they would consider such an option. It was explained that this alternative could be seen by the City as an opportunity to increase revenue for the Palo Verde Golf Course.
8. Discussion of the flooding issues in the Central Avenue Murphy Bridal Path area and possible improvements.
  - Parks and Recreation Department is neutral on this alternative and would not want to be identified as supportive or as part of the instigation of improvements that may affect the Bridal Path.
  - It was explained that the Bridal Path requires significant maintenance and repair after larger storm events that could be reduced if storm drainage were improved.
  - Recommendation to discuss this alternative with the Village Planner to get a feel for what may be tolerated for improvements in this area.

**REPORT OF MEETING**

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Date: July 17, 2008  
Time: 1:30 p.m.  
Location: City of Phoenix  
Prepared by: Charles Griffith

**Attendees:**

Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Dennis Holcomb	FCDMC	602.506.68851	dbh@mail.maricopagov
Doug Williams	FCDMC	602.506.1501	
Boyd Winfrey	COP-Parks	602.262.4925	
Jim Burke	COP-Parks		
Ken Vonderscher	COP-Parks	602.534.1870	
Rick Castro	COP-Parks	602.534.2564	
Paul Driver	COP-Streets	602.261.8853	
Charles Griffith	EEC	602.248.7702	cgriffith@eecphx.com
Mark Gavan	Gavan/Barker	602.200.0031	mgavan@gavanbarker.com
John Barker	Gavan/Barker	602.200.0031	jbarker@gavanbarker.com

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***Please review the following and advise if there are any corrections or omissions.***

**Purpose of Meeting: Meet with COP Parks Department to present Recommended Plan**

Items Discussed:

**Palo Verde Golf Course**

- Parks department informed the project team that Palo Verde may become part of First Tee.
- The project team explained that the tees and greens are above the stormwater level and that the fairways are approximately 5' below. The unplayable areas are approximately 10' below.

**Encanto Golf Course**

- Parks department informed that Encanto Homeowners association might be a potential cost-sharing partner as well.
- Parks department asked about the phasing and shut down time for the reconstruction. The project team did not develop that detailed of information.
- The project team explained that the tees and greens are above the stormwater level and that the fairways are approximately 5' below. The unplayable areas are approximately 10' below.

**Durango Curve Basin**

- The Parks department noted that they prefer single use facilities.
- They also have a requirement of 6:1 side slopes.

## **Design Guidelines**

Per PRD comments, we're going to add the following items to the Landscape Design Guidelines:

1. For the golf course guidelines: The City Parks and Recreation Department's policy regarding tree removal and replacement for canopy replacement equivalency shall be reviewed;
2. For Durango Curve Basin: Basin slopes shall be a maximum of 6:1 to meet City Park's and Recreation Department's standards;
3. For Durango Curve Basin: The development of the basin as a sports complex shall meet the City Parks and Recreation Department's current policy the type of field development.

## **Action items**

- EEC will prepare a memo with the drain times, storage volumes, and other pertinent information for the Parks department.

REPORT OF MEETING

Date: July 29, 2008
Time: 8:30 a.m.
Location: City of Phoenix
Prepared by: Charles Griffith

Attendees:

Table with 4 columns: Name, Department, Phone Number, and Email Address. Attendees include Afshin Ahouraiyan, Dennis Holcomb, Boyd Winfrey, Jim Gavelys, Bob Lytle, Charles Griffith, and John Barker.

Please review the following and advise if there are any corrections or omissions.

Purpose of Meeting: Meet with COP Parks and Golf staff to present golf course component of the Recommended Plan

Items Discussed:

Afshin was informed that the Metro ADMP is on the Parks Board agenda for the August 28th meeting, starting at 5:00 p.m. at the City of Phoenix. The presentation is for 10 minutes.

Comments/concerns

The following are comments/concerns received from the Golf Department staff:

Design Guidelines

Following the comments/concerns from the Golf Department, the project team will add the following items to the Landscape Design Guidelines:

- 1. If the water quality is poor entering Palo Verde, it will create maintenance issues.

Water Quality – The stormwater quality entering the Palo Verde Golf Course Lake will need to be addressed in the final design. There will need to be treatments at the outlet to maintain water quality within the golf course.

- 2. The concern of water in the driving range was discussed because the golf balls can be run over and embedded in the ground. The range brings a large amount of revenue so the design guidelines need to address ways of draining the driving range quickly. The issue of draining the golf course the fastest way without having debris on the course for too long was also brought up.

Note: It was mentioned that the idea of a gate valve may be added to drain the course more quickly, but FCD/COP would need to work out a plan for this in final design. EEC noted this would drastically reduce drain times but if the gate were left open in a storm, it would create serious problems downstream.

Driving Range –Alternative surfacing and subsurface drainage concepts should be considered to reduce down time as much as possible, such as artificial turf and subsurface drainage rock.

3. SRP Line - The question was raised if the existing SRP drain that comes to the golf course and its outlet has been addressed in the design of the golf course.

*SRP Lines – The team is aware of the SRP lines. They will need to be re-routed in final design.*

4. Keeping the volume of the existing lake at Palo Verde Golf course was discussed.

*Palo Verde Lake Volumes – It is important to maintain, or exceed, the volume of the existing lake for irrigation.*

5. Encanto Golf Course lake (Adjacent to hole 12) – EEC will show this lake as still being a feature of the course. The lake is not a major issue and is not significant compared to other issues.

*EEC is going to show the lake on the rendering. It will be noted that there needs to be discussions with the Parks/Golf departments if in final design it is removed.*

6. Side slopes – Make the slopes gradual enough for mowing of the grass.

*Side slopes – Need to restrict side slopes to address this issue.*

7. The issue of having golf cart paths for the entire course in order to have the control of requiring carts to stay on the path when the course is wet was discussed.

*Cart paths should run the entire length of the course.*

8. Also, keeping the mature trees was brought up again.

*This is already addressed in the design guidelines.*

**Appendix A.4**  
**ARIZONA DEPARTMENT OF TRANSPORTATION**

## REPORT OF MEETING

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Date: October 19, 2006  
Time: 1:00 pm  
Location: ADOT  
Prepared by: Mark Gavan

### Attendees:

Stephen Beasley	ADOT	602.712.7645	sbeasley@azdot.gov
Elaine Mercado	ADOT	602.712.8695	emercado@azdot.gov
Mark Gavan	Gavan&Barker	602.200.0031	mgavan@gavanbarker.com
Lloyd Vick	EEC	602.248.7702	lvick@eecphx.com

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1. Steve Beasley introduced himself as the I-17 and Loop 303 project manager and Elaine Mercado as the I-10 project manager, although Elaine is leaving the Department in two weeks (she's going to work for the City of Scottsdale). Her replacement has not yet been determined.
2. Mark Gavan gave an introduction to the project including a description of the study area, a summary of the scope of work, work that has been done to date, and a description of the identified flood hazard areas.
3. Mark also briefly described some of the potential solutions to the flooding problems, including alternatives that would involve ADOT, such as the possibility of diverting flows into the I-10 Tunnel system, making storm drain connections to the West Tunnel in Downtown Phoenix, and collecting and conveying water out of the Durango Curve area.
4. Steve acknowledged the flooding problem at the Durango curve and said that the Department is interested in working with the District on solutions and said that it is reasonable to assume that the Department might participate as a financial partner. He also said that he doesn't know of any reasons why we can't at least consider diversions into the I-10 tunnel system as a possible solution.
5. Lloyd told Steve to expect an invitation to a stakeholders meeting on the first Thursday of December at 9:30 am. Steve penciled the meeting date on his calendar and told us that he will plan to be there.

**REPORT OF MEETING**

Date: June 13<sup>th</sup>, 2007  
 Time: 8:00 a.m.  
 Location: ADOT  
 Prepared by: Charles Griffith

Attendees:	Agency:	Email Address:
Afshin Ahouraiyan	FCDMC	afa@mail.maricopa.gov
Floyd Roehrich	ADOT UPM	froehrich@azdot.gov
Ken Akoh-Arrey	ADOT-Drain	kakoh_arrey@azdot.gov
Dan Lance	ADOT	dlance@azdot.gov
Michael Zimnick	ADOT – PCD	mzimnick@azdot.gov
Maysa Hanna	ADOT – PMD	mhanna@azdot.gov
Robert Samour	ADOT – PCD	rsamour@azdot.gov
Tim Wolfe	ADOT – PMD	twolfe@azdot.gov
Lisa Andersen	ADOT – PMD	landersen@azdot.gov
A. John Stepsins	ADOT – PMD	jstepsins@azdot.gov
Perry Powell	ADOT – PCD	ppowell@azdot.gov
Briiana Leon	COP	briiana.leon@phoenix.gov
Paul Driver	COP-Streets	paul.driver@phoenix.gov
Hasan Mushtaq	COP – Streets	hasan.mushtaq@pahoenix.gov
Sam Hanna	COP – Aviation	samuel.hanna@phoenix.gov
Ray Almanzar	COP	ray.almanzar@phoenix.gov
Brian Fry	Dibble/Aviation	brian.fry@dibblecorp.com
Ken Snyder	Dibble/Aviation	ken.snyder@dibblecorp.com
Jeff Holzmeister	J2	jholzmeister@j2design.us
Steve Wilcox	DMJM	steve.wilcox@dmjmharris.com
Charles Griffith	EEC	cgriffith@eecphx.com
Mark Gavan	Gavan/Barker	mgavan@gavanbarker.com
Jeff Minch	Wood/Patel	jminch@woodpatel.com

***Please review the following and advise if there are any corrections or omissions.***

**Purpose of Meeting: Meeting with ADOT to discuss the Proposed Connections to ADOT’s Freeway (I-10) Drainage Tunnels**

1. Afshin Ahouraiyan summarized the purpose of the Metro Phoenix ADMP.
2. Mark Gavan summarized the drainage alternatives that are being considered as part of the Metro ADMP and explained that the alternatives include six potential connection points to ADOT’s drainage tunnels. They are as follows:
  - Storm Water Interceptor at 13<sup>th</sup> or 11<sup>th</sup> Avenue (new connection)
  - West Tunnel at Fillmore (existing 72” stubout)
  - West Tunnel at Grant (existing 78” stubout)
  - West Tunnel at Tonto (existing 72” stubout)
  - West Tunnel at Maricopa Freeway (existing 48” stubout)
  - East Tunnel at Van Buren (manifold connection to existing 7’X8’ stubouts at Van Buren, Adams and/or Madison)

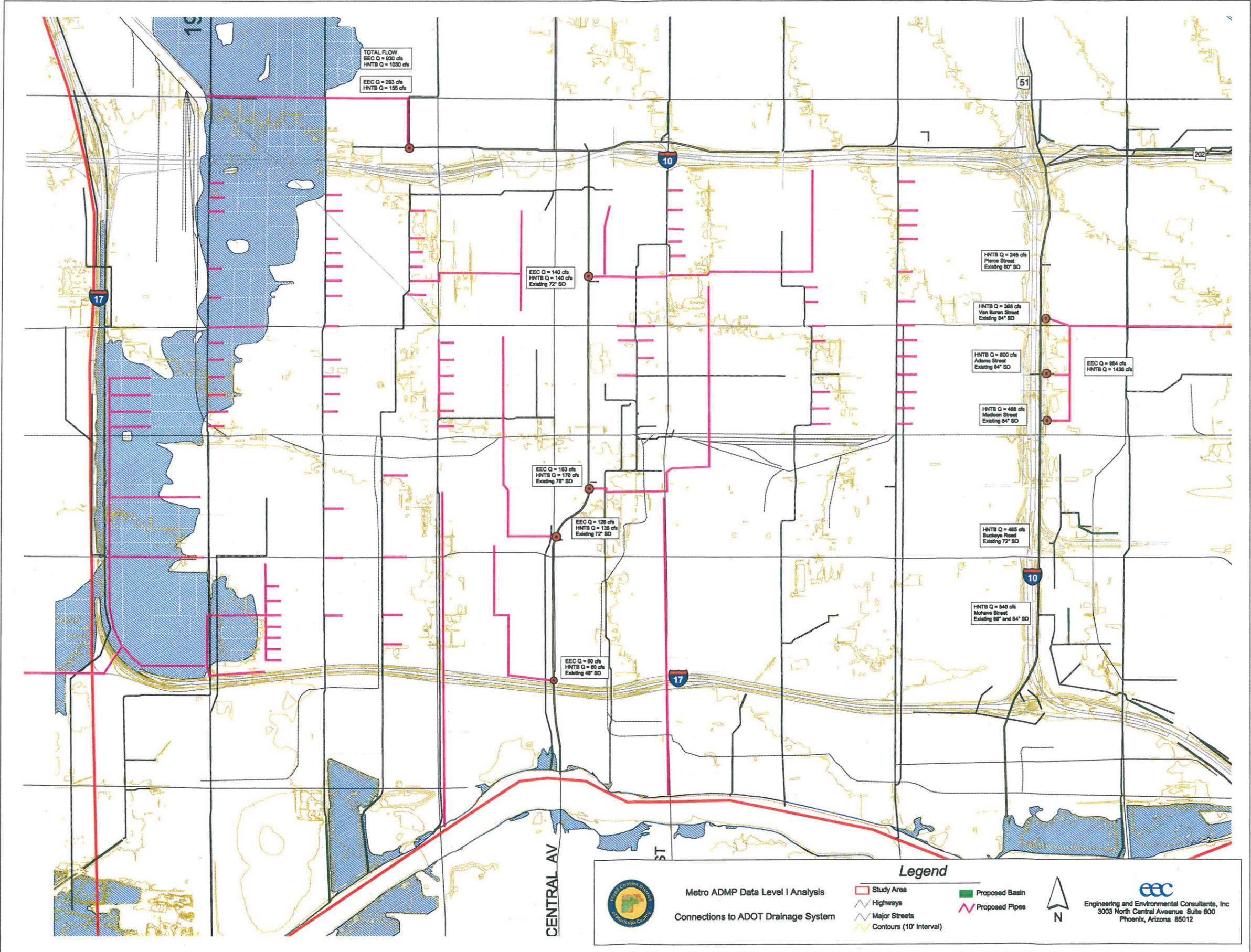
Mark went on to explain that all of the proposed connections, except at the storm water interceptor, are located at existing storm drain stub-out connections to the tunnels. He also

explained that the preliminary hydrologic results indicate that the flow rates at the proposed connections are less than the ADOT design flows.

3. Ken Akoh-Arrey asked what the effect would be on the 7<sup>th</sup> Avenue drop structure. Mark responded that there shouldn't be any significant effect on the 7<sup>th</sup> Avenue drop structure since the new pipe would tie in upstream of the drop structure; into the 10'X12' storm water interceptor.
4. Steve Wilcox asked if the flows given were the 50-year peak discharges. Mark responded that the comparisons were based the 50-year peak discharges; comparing the Metro ADMP model versus the ADOT design flows for the tunnel drainage system.
5. Mark Gavan pointed out that the connection to the East tunnel at Van Buren included diverted pipe flows from the City's 2-year storm drains in 24<sup>th</sup> Street, 32<sup>nd</sup> Street, and 40<sup>th</sup> Street. He also explained that preliminary results from the Metro ADMP hydrologic model indicate that the 50-year flow reaching the east tunnel is still less than the ADOT design flow, even with the addition of these 2-year pipe flows. Moreover, the excess capacity in the pipes, downstream of Van Buren Street, will be utilized to intercept drainage on the Airport and discharge it directly to the Salt River. This will reduce the Airport surface runoff that currently reaches the East Tunnel; thereby compensating for the storm drain flows that are diverted into the Tunnel at Van Buren Street.
6. Jeff Holzmeister asked if a transient wave analysis would be done for timing and peak discharges in the Tunnel. Mark responded that there was no intention to modify the transient wave model. He explained that the plan is to keep the inflows at or below the inflows that were assumed for the design of the Tunnels. Jeff voiced a concern that hydrograph timing could be a critical factor in the performance of the tunnels during times of flooding. Ken Akoh-Arrey made the following suggestion. In lieu of modifying the transient wave model, he suggested that the Metro ADMP hydrographs be compared to the HNTB hydrographs to make sure that the timing of the flood hydrographs has not changed substantially from the original design assumptions.
7. Steve Wilcox asked the Metro ADMP team to produce a map of the tunnel system, including all of the existing storm drain connections along with proposed future connections. Mark responded that we will add this exhibit to the report for the final recommended plan.
8. Dan Lance indicated that the connections to the existing stubouts would be acceptable if the flows from the new hydrologic analysis (after review and approval from ADOT drainage staff) are equal to or less than the ADOT design flows. He also said that the new connection to the storm water interceptor (SWI) would probably be acceptable if the Metro ADMP hydrologic model shows no increase in total flow reaching the SWI.
9. Mark Gavan asked the question of who we should coordinate with to make technical submittals and obtain approval from ADOT for the tunnel connections. Dan said that technical submittals should go to Ken Akoh-Arrey. Afshin said that, assuming the connections are approved, he would like to have a memorandum of understanding (MOU) with ADOT that could be included in the final ADMP report. Dan agreed that an MOU is a good idea. Afshin said that he would prepare a draft for ADOT review.

10. Dan Lance indicated that ADOT would consider partnering in projects which benefit the freeway system. Afshin said that they would welcome the participation and, with ADOT's approval, will include them as a possible funding partner in the implementation section of the final ADMP report.
11. Lisa Anderson asked what the impact would be to storm water quality within the tunnels. Mark Gavan responded that the proposed detention basins at Encanto Golf Course and Palo Verde Golf Course would tend to improve water quality. Hasan Mushtaq went on to explain that the City has an MS4 permit with ADEQ and carries out a regular program of maintenance and inspections of its storm drain system to insure compliance with the AZPDES regulations.
12. Jeff Holzmeister noted that J2 had re-created the eastern portion of the HNTB model. He said that he will look for it. It could help in the comparison of flood hydrographs for the connections to the East Tunnel.
13. Ken Okay-Arrey provided EEC with reports containing the hydrographs from the HNTB model.
14. Afshin asked if there is a buried underpass at the Durango Curve on I-17. Dan Lance explained that the original freeway design concept was to have I-10 connect at the Durango Curve. Consequently, some of the structures required for that connection were constructed with I-17. But he confirmed that all of those structures, including the underpass, have since been removed.
15. Once ADOT reviews the models to make sure their concerns have been addressed, Afshin will prepare a draft of the Memorandum of Understanding to be approved by ADOT that will eventually be included as part of the final ADMP report.

If there are any revisions and/or additions to these minutes, please contact me at [cgriffith@eecphx.com](mailto:cgriffith@eecphx.com) or at 602-248-7702.



**Legend**

Study Area	Proposed Basin
Highways	Proposed Pipes
Major Streets	
Contours (10' Interval)	

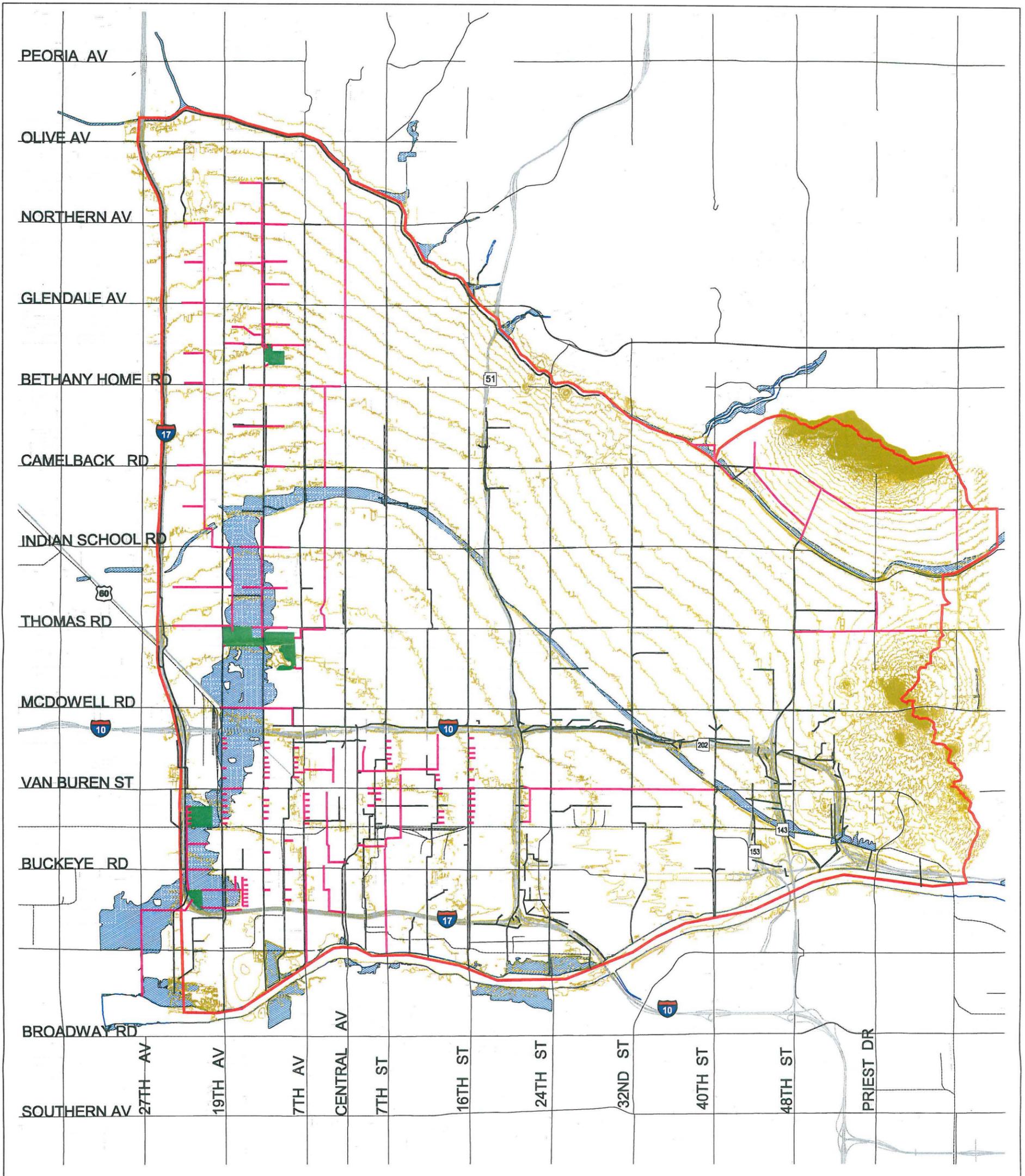
N

**EEC**  
Engineering and Environmental Consultants, Inc.  
3003 North Central Avenue Suite 600  
Phoenix, Arizona 85012



Metro ADMP Data Level I Analysis  
Connections to ADOT Drainage System

CENTRAL AV



**Legend**

- Study Area
- Highways
- Major Streets
- Contours (10' Interval)
- Proposed Basin
- Proposed Pipes



Metro ADMP Data Level II Analysis

Storage Alternatives

Exhibit 2



Engineering and Environmental Consultants, Inc  
 3003 North Central Avenue Suite 600  
 Phoenix, Arizona 85012

**Appendix A.5**  
**CITY OF PHOENIX PLANNERS/HOMEOWNERS**

**REPORT OF MEETING**

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Date: January 29, 2007  
 Time: 1:30 pm  
 Location: Phoenix City Hall – Room 7C  
 Prepared by: Mark Gavan

**Attendees:**

Marc Thornton	COP	602.261-8701	marc.thornton@phoenix.gov
Hasan Mushtaq	COP	602.262-4026	hasan.mushtaq@phoenix.gov
Kelli Sertich	FCDMC	602.506.0867	kas@mail.maricopa.gov
Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Mark Gavan	Gavan&Barker	602.200.0031	mgavan@gavanbarker.com
Lloyd Vick	EEC	602.248.7702	lvick@eecphx.com

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***The purpose of this meeting was to inform Marc Thornton (Alhambra Village Planner) of the flooding problems along Central Avenue and, since Central Avenue is a sensitive location due to the Murphy Bridal Path, we wanted to seek his guidance on how to gain public acceptance for a new storm drain in Central Avenue.***

1. Mark Gavan gave an introduction to the Metro ADMP including a description of the study area, a summary of the scope of work, work that has been done to date, and a description of the identified flood hazard areas.
2. Mark Gavan also briefly described some of the flooding problems along Central Avenue and that the Metro study team believes that a new storm drain from Bethany Home Road to the Arizona Canal, about 2.5 miles long, would help alleviate the flooding problems.
3. Marc Thornton acknowledged the flooding problems along Central and said that he used to be the assistant to Councilman Stanton and when he was in that position he fielded a number of calls from residents complaining of flooding problems in the area along north Central Avenue. One complaint that he can remember is a homeowner located next to Madison Meadows School that regularly gets flooded.
4. Marc Thornton mentioned that he thought the Murphy Bridal path is considered historic.
5. Marc Thornton outlined the following approach to gaining public participation on the Central Avenue storm drain project. He suggested that we contact the following people and get their buy-in before we present to the Village Planning Committee and before we hold our own Metro ADMP public meeting.
  - Contact Councilman Stanton’s office, Kelly Dalton (262-7508), and make her aware of our intentions, obtain the list of flooding complaints from her, and suggest a meeting with the Councilman.
  - Contact the homeowners that have been flooded and gain their support for a storm drain
  - Contact Robin Best, president of the neighborhood association, and inform her of our idea of a new storm drain and get her opinion.

- Contact Mary Crosier (? spell), citizen watchdog for the North Central Special Planning District, and inform her of our idea for a new storm drain. This special District governs development standards for homes along Central Avenue.

6. Marc also suggested that, if there is reluctance on the part of the neighborhood to support a new storm drain, we might suggest a pilot project, wherein only the first half mile of the storm drain is constructed. This would give the residents a chance to evaluate the impact before the entire storm drain is constructed.

**REPORT OF MEETING**

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Date: January 29, 2007  
Time: 2:30 pm  
Location: Phoenix City Hall – Room 7C  
Prepared by: Mark Gavan

Attendees:			
Katherine Coles	COP	602.256-5648	katherine.coles@phoenix.gov
Hasan Mushtaq	COP	602.262-4026	hasan.mushtaq@phoenix.gov
Kelli Sertich	FCDMC	602.506.0867	kas@mail.maricopa.gov
Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Mark Gavan	Gavan&Barker	602.200.0031	mgavan@gavanbarker.com
Lloyd Vick	EEC	602.248.7702	lvick@eecphx.com

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***The purpose of this meeting was to inform Katherine Coles (Arcadia Village Planner) of the flooding problems that our study team has identified in the Arcadia area and, since a previous drainage project proposed in the 90's was opposed by the neighborhood, we wanted to find out if there would be interest on the part of the residents to resurrect the previous drainage plan.***

1. Mark gave an introduction to the Metro ADMP including a description of the study area, a summary of the scope of work, work that has been done to date, and a description of the identified flood hazard areas.
2. Mark also briefly described some of the flooding problems in the Arcadia area and presented two of the previous drainage alternatives that were proposed by the City and the Flood Control District about 10 years ago.
3. The team explained to Katherine that these previous drainage plans were opposed by the neighborhood which resulted in termination of the plan. *(The name of the individual that organized the opposition to the previous plan is Paul Barnes)*
4. Katherine said that she is not aware of any specific drainage problems in the Arcadia area, but she said that the chairman of the Arcadia Village Planning Committee was interested in getting drainage projects for the area included on the last bond election, which indicates that there are flooding issues that the neighborhood would like to solve.
5. Katherine outlined the following approach to gauging the residents desire for new drainage projects:
  - Contact Councilman Stanton's office, Kelly Dalton (262-7508), and make her aware of the issue, obtain the list of flooding complaints from her, and suggest a meeting with the Councilman.
  - Contact Craig Steblay (602-275-2200), chairman of the Village Planning Committee, and ask him if there is a desire for new drainage projects in the Arcadia area.
  - Contact Joanna Peters, Arcadia/Camelback Homeowner's Association, and ask her if there would be any neighborhood interest in new drainage projects for Arcadia.
6. Katherine thought that, after we make contact with these individuals, and assuming that there is interest, we could attend a Village Planning meeting and present the previous drainage plans.

**REPORT OF MEETING**

---

Date: February 26, 2007  
Time: 10:00 am  
Location: Paul Barnes' Home, 5518 East Mariposa  
Prepared by: Mark Gavan

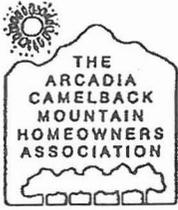
**Attendees:**

Paul Barnes	Arcadia Resident	602.840-1579	greg.stanton@phoenix.gov
Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Mark Gavan	Gavan&Barker	602.200.0031	mgavan@gavanbarker.com

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***The primary purpose of this meeting was to get an understanding of the neighborhood's concerns regarding the drainage alternatives that were presented to the Arcadia residents back in 1996. Paul Barnes is an active member of the Arcadia Camelback Mountain Homeowner's Association and was involved in the discussions that took place 11 years ago.***

1. Afshin gave an introduction to the Metro ADMP including the purpose of the study, a description of the study area, and a description of the work that has been done to date.
2. Paul explained that their Board of Directors of their Homeowners Association had recommended Alternative 2 from the Huitt-Zollars Report (see attached letter from the Board dated October 10, 1996).
3. Paul went on to explain that the neighborhood's biggest concern is Camelback Road. They don't want the proposed storm drain to be linked to a widening of Camelback Road. He provided us with a copy of the plan for the "Arcadia Camelback Special Planning District" which addresses the neighborhood's recommendations for Camelback. These recommendations are to not widen the roadway lanes, not widen the median, and not add sidewalks. They do recommend, however, that the proposed storm drain on Camelback should be linked to a landscape enhancement of Camelback Road (attached is a copy of the recommendations from page 21 of the plan)
4. In regard to drainage problems, he only knew of two. One was standing water at the corner of 56<sup>th</sup> Street and Lafayette. Paul said that this issue was recently resolved by the Streets department; they installed a new valley gutter to drain the street. The other problem is that storm water flows out of the Phoenician resort. Paul feels that they did not provide adequate storm water retention within the Phoenician property.
5. Paul recommended that we contact Joanna Peters and get on the agenda for their April Homeowners Association meeting (April 5<sup>th</sup>). He also suggested that we attend their annual meeting that will be held sometime in May.



Arcadia/Camelback Mountain Homeowners Association  
4730 E. Indian School Road, Suite 120 • Phoenix, Arizona 85018 }

October 10, 1996

Richard M. Spiegel  
*President*

Paul Barnes  
*Vice-President*

John Warner  
*Recording Secretary*

Craig Steblay  
*Corresponding Secretary*

Wayne Lewis  
*Treasurer*

Board of Directors

Ken Applewhite

Bill Blackerby

John Bonadio

Barbara Cookson

David Dodge

Emily Geyer

David Jarvis

John Matchette

Monty Montgomery

Timothy Ogden

Michael Phalen

Robert Reinstein

Gene Salzmann

Bill Strauss

John J. Traaen

John Van Sickle

Past Presidents

David Dodge

Michael Phalen

John Smith

Herbert Steenblik

Perry Baker  
Flood Control District  
Maricopa County  
2801 W. Durango  
Phoenix, AZ 85009

Dear Mr. Baker,

Thank-you for attending our Board meeting last week, and for the presentation by you and the Flood Control staff concerning the alternatives proposed to alleviate the drainage problems in the Arcadia area. As you are well aware, our association has been eager, for some time, to find a way to eliminate the existing 100 year floodplain on the north side of the Arizona Canal.

The Board of Directors emphatically feels, however, that alternatives 4 and 5 to accomplish this are not only prohibitively expensive, but represent a cure worse than the ill. We urge any consideration of these measures to be abandoned completely.

The Board, on the other hand, feels that alternative #2, concerning a storm drain system primarily along Camelback and Lafayette, represents a reasonable and appropriate response to the more regular drainage problems, and strongly endorses this alternative. Alternative #1 is an inadequate answer to the situation, and alternative #3 not only seems less efficiently designed, but also much more disruptive of the community, particularly in view of the City of Phoenix's plans to redo Camelback Road in the near future.

We look forward for your advice on how we can best get the funds to implement alternative #2 prioritized by our City and County, and, also, how we can get the floodplain reevaluated once the drains are emplaced, to potentially deminish, at least, its area.

Sincerely,

Richard M. Spiegel, M.D.  
President  
Arcadia/Camelback Mtn. H.A.

**ARCADIA AREA DRAINAGE STUDY "FACT SHEET"**

In 1994, the Flood Control District was invited by the City of Phoenix to evaluate drainage and flooding problems in the Arcadia area and to recommend solutions to those problems. In 1994, and again in 1995, the District presented the project to the citizens of the Arcadia area at public meetings. During those meetings, the citizens in attendance asked that we also look into mitigating the existing 100-year floodplain. Presently, storm water runoff in the Arcadia area flows south from Camelback Mountain to the Arizona Canal, occasionally flooding streets and homes in the area. In addition, when the runoff reaches the canal, it ponds along the north side of the canal creating a 100-year floodplain.

The District, along with input from the City and Salt River Project has completed its assessment of the flooding and drainage problems and offers the following five alternatives for consideration and possible implementation:

Alternate No. 1 - Located west of 44th Street and along Camelback Road; consisting of underground storm drains along Camelback Road and 40th Street to the ACDC basins west of 40th Street. Will alleviate the 10-year flooding problems in the area of the Camelback Castille Condominiums. Estimated cost of about \$2,125,000. *Camelback Castille Storm Drain*

Alternate No. 2 - Located from 40th to 64th Streets, primarily along Camelback Road and Lafayette Blvd.; consisting of underground storm drains along Camelback Road, Lafayette Blvd., and Arcadia Dr., and 40th, 44th, and 64th Streets. Will alleviate the 10-year flooding problems along Camelback Road corridor, with residual benefits to the areas south of Camelback. Estimated cost of about \$9,650,000. *Camelback Road System*

Alternate No. 3 - Located from 40th to 64th Streets, primarily along Lafayette Blvd. and Osborn Road, consisting of underground storm drains along Lafayette Blvd., Osborn Road, Arcadia Dr., and Indian School Road, and 40th, 44th, and 56th Streets. Will alleviate the 10-year flooding problems along Lafayette Blvd. corridor, with residual benefits to the areas south of Lafayette, for example the area of the Camelback Castille Condominiums, and Calle Redondo east of Arcadia. Estimated cost of about \$9,950,000. *LaFayette Intercep*

Alternate No. 4 - Located along the north side of the Arizona Canal; consisting of large detentions basins along the canal, and underground storm drains to drain the basins to the Old Cross Cut Canal and the ACDC. An underground 2-year storm drain system will be included parallel to and north of the basins. The basins will require the removal of 65 single family homes, 39 condominium units, and one church. Will alleviate the 100-year floodplain problems along the canal. Estimated cost of about \$36,000,000. *Detention Basin System*

Alternate No. 5 - Located along the Arizona Canal, consisting of a large detention basin within the limits of the existing SRP Arizona Canal, and underground storm drains along Camelback Road and 40th Street to the ACDC. The existing canal waters will be rerouted to an underground pipe and culvert system, thereby creating an open basin within the canal section from east of 56th Street to west of 40th Street. An underground 2-year storm drain system will be included parallel to and north of the basin. Will alleviate the 100-year floodplain problems along the canal. Estimated cost of about \$30,500,000.

*Arizona Canal Detention Basin*

landscaping. Subsequent to that action, the Street Transportation Department has made several of the safety improvements, but the street remains essentially as a four lane, unimproved arterial.

To evaluate the proposed plan, citizen committee members, abutting neighbors and city staff conducted a field evaluation of the entire plan and its impact on abutting properties, and existing landscaping. Their general conclusion was that, even in its limited scope, the plan would have an intrusive and negative impact on these properties and landscaping. Following is the consensus recommendation for Camelback Road:

*From Plan for "Arabian Camelback Special Planning District"*

1. That improvements not be made that require widening the existing travel lanes or median or adding turn or merging lanes.
2. Because pathways are available within the interior of the neighborhood and based on safety concerns, sidewalks should not be included in any street improvement plans.
3. That all practical safety improvements be made.
4. That a major street landscape enhancement and maintenance program be initiated.
5. That the recommended Flood Control District drainage plan be initiated and linked with the program for enhancement of the major street landscaping.

### 3. RESORTS

Many locations north of Camelback Road have historically been associated with resorts and guest lodges. Presently the area is occupied by two resort facilities, the Royal Palms Inn and the Phoenician Resort.

The Royal Palms Inn, the smaller of the two, primarily focuses on guest lodging, dining and some recreational activity. The inn is a nonconforming use since it was built prior to the area's annexation. If the owners of the Royal Palms, with expressed intent, were to discontinue the resort use for 1 year, the property would revert back to the underlying zoning of RE-35. Recently, the adjoining executive golf course on the west side of the site was sold and replaced with the Royal Palms Estate Subdivision.

The Phoenician has become a major multi use destination facility offering tennis, swimming, spas, and golfing on a 27 hole course. Physically the Phoenician integrates well with the community through setbacks, landscaped buffering and control of access at its perimeter. The underlying zoning is PCD (Planned Community District). As new development is approved the PCD is amended and replaced with specific zoning pertaining to the use such as RH (Resort Hotel).

These resorts are significant operations. Currently, they are compatible land uses within the overall residential character of this community. However, this compatibility must be maintained to avoid future negative impacts. Therefore, the principal thrust of this plan pertaining to resort use is to provide some level of certainty as to their boundaries and perimeter activities. The proposed policies, below, are designed to create this predictability by defining resort boundaries, limitations on resort use adjacent to outside residential properties, and control in

**REPORT OF MEETING**

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Date: October 17<sup>th</sup>, 2007  
 Time: 10:00 a.m.  
 Location: FCD  
 Prepared by: Charles Griffith

**Attendees:**

Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Paul Driver	COP – Streets	602.262.4960	paul.driver@phoenix.gov
Katrina Leyva	COP – Streets	602.262.4026	katrina.leyva@phoenix.gov
Boyd Winfrey	COP – Parks	602.262.4925	boyd.winfrey@phoenix.gov
Lloyd Vick	EEC	602.248.7702	lvick@eecphx.com
Charles Griffith	EEC	602.248.7702	cgriffith@eecphx.com
Mark Gavan	Gavan/Barker	602.200.0031	mgavan@gavanbarker.com
Patrick Barnes	Homeowner	602.279.1688	jpb123jpb@yahoo.com
Joseph Abeyta	Homeowner	602.751.7650	joseph.abeyta@memury.com
Jeff Kilgore	Homeowner	602.330.7145	lowellkilgore@hotmail.com
Bob Miller	Homeowner	602.230.8847	Timco200@cox.net
Bill Goodin	Homeowner	602.230.2563	goodinld@yahoo.com
Linda Goodin	Homeowner	602.230.2563	goodinld@yahoo.com
Sunshine McCarthy	Homeowner	602.369.3617	mharn56@yahoo.com
Mark Harn	Homeowner	602.920.4392	mharn56@yahoo.com
James Myrd	Homeowner	602.235.9509	jtmmyrd@cox.net
Regina Blakely	Homeowner	602.234.9805	rblakely03@cox.net

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*Please review the following and advise if there are any corrections or omissions.*

**Purpose of Meeting: Meet with Homeowners between 3<sup>rd</sup> to 7<sup>th</sup> Street along Grand Canal**

- Introductions.
- Overview – Afshin gave an overall summary of the Metro Phoenix ADMP and the general plan of action.
- Two of the three options for the area involved acquiring the homes. The third option is floodproofing.
- The homeowners informed the study team of their meetings with Xavier. One of the drainage issues they believe is that Xavier is not providing any retention for their on-site runoff.
- They requested that Cit of Phoenix help with the potential drainage issues with Xavier. Paul Driver agreed to help them by contacting Development Services to see if they provided on-site retention.
- Many of the homeowners said that they had not been flooded. The project team is going to look to see if the City had completed elevation certificates as part of their program to determine which homes were susceptible to flooding.
- The residents asked why Steel Indian School Park was not considered as an outfall for a drainage pipe. Boyd Winfrey informed the homeowners that the Steel Indian School Park went through the Native American tribal communities and had many agreements in place so to alter the park is impractical.
- The homeowners also inquired about becoming historic. If the recommended plan is to floodproof, they would like a stipulation within their historical status allowing floodprone homes to be assisted.

- The District stated that the recommended plan would not include any alternatives that are not supported by the community. The neighborhood between Central Ave and 7<sup>th</sup> Street would like to exclude any alternatives that include homeowner buyout.

**Appendix A.6**  
**COUNCIL MEMBERS**

REPORT OF MEETING

Date: February 16, 2007
Time: 10:00 am
Location: Phoenix City Hall – Councilman Stanton's Office
Prepared by: Mark Gavan

Attendees: Councilman Stanton, Kelly Dalton, Paul Driver, Hasan Mushtaq, Afshin Ahouraiyan, Mark Gavan. Includes contact info like phone numbers and email addresses.

The purpose of this meeting was to inform Councilman Stanton as to our plans to present flood control alternatives for flood prone areas within his District in public meetings scheduled for later this spring.

- 1. Afshin gave an introduction to the Metro ADMP including the purpose of the study, a description of the study area, a summary of the scope of work, and a description of the work that has been done to date.
2. Mark Gavan briefly described the flooding problems that have been identified in Councilman Stanton's District and described the alternatives that are being considered to solve the drainage problems.
3. Central Avenue Storm Drain Alternative – Councilman Stanton pointed out that the Murphy Bridal Path is listed on both the City and National Historic Register and that it represents a significant recreational feature for the residents of the North Central area.
4. Storage at Palo Verde Golf Course – Councilman Stanton was both interested and concerned with the Palo Verde Golf Course storage option.



5. Arcadia Drainage Alternatives – Councilman Stanton agreed with our plan to meet with Craig Steblay and Joanna Peters prior to the public meeting. He also suggested meeting with Dan Colton who is very active in the community. He said that the biggest concern of the residents will probably be the storm drain in Camelback Road. The residents don't want Camelback to be improved with curb, gutter and sidewalk. They, instead, want it remain the way it is.
6. Drainage Complaints – We will send our list of drainage complaints for Councilman Stanton's District to Kelly Dalton. And Kelly Dalton said that she would send her list of drainage complaints to us.

**REPORT OF MEETING**

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Date: March 19, 2007  
 Time: 10:00 am  
 Location: Phoenix City Hall – Councilman Johnson’s Office  
 Prepared by: Mark Gavan

**Attendees:**

Councilman Johnson	COP	602.262-7493	michael.johnson@phoenix.gov
Paul Driver	COP	602-262-6284	paul.driver@phoenix.gov
Hasan Mushtaq	COP	602.262-4026	hasan.mushtaq@phoenix.gov
Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Mark Gavan	Gavan&Barker	602.200.0031	mgavan@gavanbarker.com

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***The purpose of this meeting was to inform Councilman Johnson as to our plans to present flood control alternatives for flood prone areas within his District in public meetings scheduled for this summer.***

1. Afshin gave an introduction to the Metro ADMP including the purpose of the study, a description of the study area, a summary of the scope of work, and a description of the work that has been done to date. He also gave Councilman Johnson handouts from our previous public meetings.
2. Mark Gavan briefly described the flooding problems that have been identified in Councilman Johnson’s District and described the alternatives that are being considered to solve the drainage problems.
3. *Flooding at 7<sup>th</sup> Avenue and Buckeye Road* – Councilman Johnson expressed concern over flooding problems at 7<sup>th</sup> Avenue and Buckeye Road and wanted to make sure that these problems would be addressed with any new storm drain alternatives for the Downtown area. Mark Gavan explained that as part of the Downtown storm drain plan, a new second storm drain is planned for 7<sup>th</sup> Avenue which should resolve the existing flooding problems.
4. *Expedite Downtown Storm Drain program* – Councilman Johnson was very supportive of the idea to increase the capacity of the Downtown storm drain system and sees it as a very important part of the continuing development Downtown. He explained that the Downtown area is the center for government and commerce and is now experiencing substantial expansion with the new ASU campus. He is concerned that the area may not be adequately protected from flooding and wanted to see the improvements to the Downtown storm drain system expedited. Paul Driver explained that the City has \$6 million in Bond money available for new storm drains for Downtown. He also explained that the City should be able to get matching funds from the FCDMC which, when combined with the City funding, would result in \$12 million. He said that this money may be able to fund the new Fillmore Street Storm drains, but the remainder would have to wait for future bond elections. The total cost of the Downtown storm drain upgrade is about \$50 million.

5. *Sky Harbor Petroleum Line* – Councilman Johnson warned us that the petroleum line that serves Sky Harbor Airport runs along the north side of the Railroad tracks. He said any new storm drains in the Downtown area should be designed not to interfere with the operation of this line.
  
6. *Retention Waiver* – Paul Driver expressed a concern to the Councilman in regard to the storm water retention waiver that City Council approved for Downtown. Paul acknowledged that this waiver makes sense for Downtown, but he has seen evidence that waivers are being granted outside of the Downtown area. He said that if this continues, the cumulative effect will be increased flooding. Councilman Johnson said that the Council needs to be advised on these issues and would welcome a work session in regard to storm water retention requirements.

**REPORT OF MEETING**

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Date: March 27, 2007  
 Time: 9:00 am  
 Location: Phoenix City Hall – Councilman Simplot’s Office  
 Prepared by: Mark Gavan

**Attendees:**

Councilman Simplot	COP	602.262-7447	tom.simplot@phoenix.gov
Alma Hernandez	COP	602-262-7447	alma.hernandez@phoenix.gov
Paul Driver	COP	602-262-6284	paul.driver@phoenix.gov
Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Mark Gavan	Gavan&Barker	602.200.0031	mgavan@gavanbarker.com

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***The purpose of this meeting was to inform Councilman Simplot as to our plans to present flood control alternatives for flood prone areas within his District in public meetings scheduled for this summer.***

1. Afshin gave an introduction to the Metro ADMP including the purpose of the study, a description of the study area, a summary of the scope of work, and a description of the work that has been done to date. He also gave Councilman Simplot handouts from our previous public meetings.
2. Mark Gavan briefly described the flooding problems that have been identified in Councilman Simplot’s District and described the alternatives that are being considered to solve the drainage problems.
3. *Canal Flooding* – Councilman Simplot explained that he is well aware of the flooding problems along the Grand Canal, particularly problems in the Canal North Neighborhood. He said that he personally visited the house at 5<sup>th</sup> Street and the Canal that experiences very frequent flooding. Afshin explained that the flood control alternatives that are being considered for the Canal area homeowners will, most likely, remain unfunded for several years and that the ADMP is more of a blueprint for future flood control projects.
4. *Floodplain Buyout Program* – Afshin described the District’s floodplain buyout program which could be used by the homeowners in the interim period, before the ADMP alternatives are funded. Councilman Simplot was very interested in this program and asked Afshin to send the District’s buyout program brochure to Alma Hernandez. He said he would like to present this as an option to the homeowners who live in the area. He thought that it might be a good option for the homeowner that lives at 5<sup>th</sup> Street and the Canal.

5. *21<sup>st</sup> Avenue Detention Basin Site* – Councilman Simplot discussed the property at 21<sup>st</sup> Avenue and the Grand Canal. He said that the City purchased it to construct a detention basin but it is currently vacant property and the detention basin project remains unfunded. He expressed a desire to have the District purchase it and make it part of the overall storm water management plan.

**REPORT OF MEETING**

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Date: April 3, 2007  
 Time: 4:00 pm  
 Location: Phoenix City Hall – Councilman Linger’s Office  
 Prepared by: Mark Gavan

Attendees:

Councilman Linger	COP	602.262-7492	doug.linger@phoenix.gov
Paul Driver	COP	602-262-6284	paul.driver@phoenix.gov
Hasan Mushtaq	COP	602.262-4026	hasan.mushtaq@phoenix.gov
Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Mark Gavan	Gavan&Barker	602.200.0031	mgavan@gavanbarker.com

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***The purpose of this meeting was to inform Councilman Linger as to our plans to present flood control alternatives for flood prone areas within his District in public meetings scheduled for later this spring.***

1. Afshin gave an introduction to the Metro ADMP including the purpose of the study, a description of the study area, a summary of the scope of work, and a description of the work that has been done to date. He also gave Councilman Linger handouts from our previous public meetings.
2. Mark Gavan briefly described the flooding problems that have been identified in Councilman Linger’s District and described the alternatives that are being considered to solve the drainage problems.
3. *Partnering with the District* – Councilman Linger was very supportive of the ADMP and liked the idea of partnering with the District on drainage projects. He felt it would give the City an opportunity to stretch it’s funding by qualifying for matching funds from the District.
4. *Encanto Golf Course* – Councilman Linger was supportive of the idea to reconstruct Encanto Golf Course to store floodwater.
5. *Durango Curve Alternatives* – Councilman Linger was supportive of the detention basin alternative at the Durango Curve. He said that a multi-use facility at that location would give an opportunity to provide recreation to the residents of the County Housing project that is located within the Durango curve area. He said that the housing complex has been criticized over the years for not providing recreation for it’s residents. He also said that the only parking in the housing complex is on the street. This has resulted in vandalism and theft problems as well as problems for trash collection. Therefore, he would like to see parking for the residents of the housing complex worked into the multi-use plan for the detention basin.
6. *State Fairgrounds Property* – Councilman Linger said that the owners of the State Fairgrounds property have been working on moving the Fairgrounds site to a new

location within Maricopa County. He said that in anticipation of the move, he facilitated a workshop with the area residents to find out how they would react to re-development of the site. He said that one of the ideas that came out of that workshop was to extend the Encanto golf course southerly along the east side of the site in order to provide a buffer between the new development and the existing residential neighborhood that lies east of the site. He said that the extended golf course could possibly be designed to provide storm water detention..

**Appendix B**  
**LEVEL I BRAINSTROMING MEETING**

**REPORT OF MEETING**

Date: June 1<sup>st</sup>, 2006  
 Time: 1:00 p.m.  
 Location: Flood Control District  
 Prepared by: CTG/LAV

<u>Attendees</u>	<u>Organization</u>	<u>Phone #</u>	<u>e-mail</u>
Afshin Ahouraiyan	FCDMC	602.506.4519	afa@mail.maricopa.gov
Kelli Sertich	FCDMC	602.506.0867	kas@mail.maricopa.gov
Jessica White	FCDMC	602.506.7841	jlw@mail.maricopa.gov
Dennis Holcomb	FCDMC	602.506.4074	dbh@mail.maricopa.gov
Steven Tucker	FCDMC	602.506.4872	slt@mail.maricopa.gov
Amir Motamedi	FDCMC		
Richard Harris	FCDMC		
Diana Stuart	FCDMC		
Chris Coover	Maricopa Co.	602.506.8719	ccoover@mail.maricopa.gov
Hasan Mushtaq	COP-Streets	602.262.4026	hasan.mushtaq@phoenix.gov
Paul Driver	COP-Streets		paul.driver@phoenix.gov
Ramon Cons	COP-DSD	602.534.6077	ramon.cons@phoenix.gov
Sally Heinrich	COP Planning		sally.heinrich@phoenix.gov
Dennis Crandall	ADOT		
Bob Gooch	SRP	602.236.5227	rsgooch@srpnet.com
Brian Fry	Dibble/Aviation	602.957.1155	bfry@dibblecorp.com
Mark Gavan	EEC	602.248.7702	mgavan@eecphx.com
Lloyd Vick	EEC	602.248.7702	lvick@eecphx.com
Charles Griffith	EEC	602.248.7702	cgriffith@eecphx.com
Shimin Zou	Wood/Patel	602.335.8500	szou@woodpatel.com
Jeff Minch	Wood/Patel	602.335.8577	jminch@woodpatel.com
Ash Patel	Wood/Patel	602.335.8577	apatel@woodpatel.com
Diane Simpson-Colebank	LSD	480.967.1343	dsimpson@lsdaz.com

**Please review the following and advise if there are any corrections or omissions.**

**Metro Phoenix ADMS/ADMP Brainstorming Meeting** (facilitated by Diane Simpson-Colebank)

1:00 Welcome & Introductions (A.Ahouraiyan - 5 min)

1:05 Project Introduction (M.Gavan – 10 min) – Described project location, scope of project, and goals of project

1:15 Landscape Character (J.Barker – 10 min) – Described the data collection completed for the project, the compatibility of landscape character, and the goals that the FCD would like to see with the proposed alternatives

1:25 Flood Hazard Area Descriptions (M.Gavan – 20 min) – Described the key/major drainage issues, they are as follows:

- Old Cave Creek Floodplain – The area between the Arizona Canal Diversion Channel (ACDC) and the Grand Canal between 19<sup>th</sup> Avenue and 7<sup>th</sup> Avenue. The area was part of the Cave Creek floodplain until the construction of the ACDC. It was noted that even though the floodplain has been removed, there are still many drainage complaints in this area.

- 23<sup>rd</sup> Avenue Corridor – The area is adjacent to the Old Cave Creek Floodplain. It is between 19<sup>th</sup> Avenue and I-17 from the ACDC to the Grand Canal.
- Cave Creek Floodplain – The are between 15<sup>th</sup> and 19<sup>th</sup> Avenue south of the Grand Canal and then it follows southwest to the I-17 Durango curve and then to the southwest until it reaches the confluence with the Salt River. It was noted that with the re-delineation of Cave Creek that the floodplain may be removed between the canal and McDowell Road
- Grand Canal Floodplain – The area is just north of the Grand Canal between I-17 and SR-51. It is a historic problem that is caused by the canal banks being elevated a couple feet and water then ponding behind the canal.
- Downtown – The area is bounded by I-10 and I-17, also known as the inner loop corridor. The area has major drainage infrastructure.

1:45 Light Rail Impact (J.Minch – 5 min) – Described the flows across the Light Rail and then described the potential drainage issues that are associated with the Light Rail.

1:50 5-minute break

1:55 Break into 3 Groups to Brainstorm Solutions for the following interconnected Flood Hazard areas:

- Cave Creek floodplain (Grand Canal to Salt River)
- Old Cave Creek floodplain (Arizona Canal to Grand Canal)
- 23<sup>rd</sup> Avenue Corridor (Alternatives to 20<sup>th</sup> Avenue and Turney basin)
- Grand Canal Floodplain
- Downtown Area/Washington Street

2:45 Group Presentation (5 minutes each)

3:00 5-minute break

3:05 Discuss Pros and Cons of each Groups Ideas (15 minutes per group-see the Brainstorming Matix) – There were three groups, they were broken up as follows:

**Group 1** – Lloyd Vick, Ramon Cons, Brian Fry, Sally Heinrich, Steven Tucker, Jeff Minch and Dennis Holcomb

**Group 2** – Charles Griffith, Hasan Mushtaq, Amir Motamedi, Chris Coover, Diana Stuart, Shimin Zou, Kelli Sertich and Richard Harris

**Group 3** – John Barker, Ash Patel, Paul Driver, Bob Gooch, Jessica White, Haysa Hannu and Dennis Crandall

*Advantages and Disadvantages of the most popular ideas:*

### **Encanto Open Space, Offline Basin**

#### Advantages

- Re-engineer golf course (make more interesting)
- Already owned by the city

- Back-9 lies within the existing floodplain
- Large acreage in one location
- Removes property from floodplain
- Reduces peak flow downstream
- Can provide outfall for upstream conduit
- No new maintenance
- Cost effective to construct

#### Disadvantages

- Do not want basin near park; Back-9 only
- Institutional resistance/"Hard Sell"
- Lost revenue during construction
- Historic district, trees
- Occasional ponded water in golf course
- Possible need for golf course architect

### **I-17 Collection and Storage System at Durango Curve**

#### Advantages

- Protects I-17 from flooding
- Removes homes from floodplain
- Removes floodplain west of I-17
- Lots of open land
- Reduces maintenance on I-17
- Provides outfall for upstream conduit
- Possible outfall directly to Salt River
- Extra water to Rio Solado
- Downstream end of watershed (advantage and disadvantage)

#### Disadvantages

- Lots of ROW issues, but it could be cheap
- Environmental justice considerations
- School in area, may need special attention and conditions
- Downstream end of watershed (advantage and disadvantage)

### **Storm Drain in 18<sup>th</sup> Avenue, Between Grand Canal and I-10, Outfall location**

#### Advantages

- Outfall for Grand Canal floodplain
- Reduce floodplain in area
- Exists in the floodplain; easy to collect
- Part of golf course drainage system
- Minimal impact to historic district
- Has to be a large conduit
- ROW minimal
- Good, straight alignment

#### Disadvantages

- Construction issues with water lines, etc
- Upset public
- Travels through historic district

- ROW permits

## **Linear Park along Canal**

### Advantages

- Create open space/trail system
- Enhances Sun Circle Trail (compliments existing trails)
- Removes homes from floodplain
- Enhances property values
- Provides collection system for 18<sup>th</sup> Avenue
- Make public happy
- Reduce flow to the south
- Protects Grand Canal

### Disadvantages

- Dislocation of people due to buy-outs
- ROW is expensive
- Some neighborhoods do not want parks (transients, public safety issues)

3:50 5-minute break

3:55 Other Flood Hazard Areas and seed ideas (L. Vick – 20 min)

Discussed the following Local Flooding Issues:

- 7<sup>th</sup> Avenue and Bethany Home Road
- 66" S.D. in 23<sup>rd</sup> Avenue that dead ends at Northern Avenue
- 14<sup>th</sup> Avenue and Glendale
- Central Avenue, Arizona Canal to Bethany Home Road
- SR-51 Ponding at Camelback Road
- Arcadia, swale west of Arizona Country Club

4:15 Solicit Ideas from whole group on other Flood Hazard Areas

- *7<sup>th</sup> Avenue and Bethany Home Road*
  1. lateral from 7<sup>th</sup> Ave. east on Bethany Home Rd.
    - Lower 7<sup>th</sup> Avenue
    - Buy-out residences (if there are only a few)
    - Raise individual structures
- *66-inch Storm Drain dead ends at Northern Avenue*
  1. extend S.D. south along 23<sup>rd</sup> Avenue
  2. storage basin with bleed off pipe
    - Use existing private golf course; bleed off from golf course to 19<sup>th</sup> Avenue storm drain
- *14<sup>th</sup> Avenue and Glendale*
  1. add lateral from 15<sup>th</sup> Ave in Myrtle to lowpoint
  2. potential storage solution
- *Central Avenue, Arizona Canal to Bethany Home Road*
  1. floodproofing
  2. extend Central Ave. S.D. north

3. add curb and gutter to street
  - Decorative grates for storm drain along Central
  - Need to sell neighbor on invisible solution
- *SR-51 Ponding at Camelback Road*
  - Dig out/lower park to increase storage
  - “New Orleans” pump system – pump upgrade
- *Arcadia, swale west of Arizona Country Club*
  1. upgrade Thomas Road S.D., add lateral in 52<sup>nd</sup> St.
  2. potential storage within AZ Country Club

It was noted by Brian Fry of Dibble and Associates (representing the Phoenix Aviation Department) that the COP Aviation would like to make sure that solutions are coordinated between the COP and FCD. Also if it would be possible to look at diverting flows in the upstream storm drain system before that water gets to the airport which would then free up capacity in the existing storm drains. Another issue brought up was a baseflow condition in one existing storm drain (36<sup>th</sup> Street) caused by irrigation tailwater. When fuel is spilt on the runways or aprons it could get into the storm drain system, normal operation is to clean the inlet and storm drain, but with a baseflow in the pipe the fuel would get carried to the Salt River causing additional remediation.

4:40 Next Steps (A.Ahouraiyan - 5 min) – Afshin informed the stakeholders that the team would use the data collected in this brainstorming meeting to develop the alternatives that would be carried forward into phase II and that there would be another stakeholder meeting in the upcoming months.

4:45 Adjourn

Idea No.	Group Credited w/idea	Ideas	Votes			Total Votes
			Group 1	Group 2	Group 3	
<b>Old Cave Creek Floodplain</b>						
1	1	existing open space can be used for storage	2		1	3
2	1	existing "large" parking lots can be used for storage				
3	1	connect small diameter "bleed-off" pipes from storage areas to existing storm drains				
4	1	new 10-year storm drain to increase conveyance				
5	1	discharge flows into ADOT's I-17 system				
6	1	new 10-year storm drain in 15th Avenue			1	1
7	1	landscaping along major streets (widen corridor to include adjacent drainage swales)				
8	2,3	new storm drain in 23rd Avenue (south of Northern)			1	1
9	2	new offline basin at 20th Avenue and Turney				
<b>Grand Canal</b>						
9	1,2 & 3	linear park along Grand Canal	1	4	3	8
10	1	tile Grand Canal	2	3	2	7
11	1	siphon Grand Canal to allow flow through corridors				
12	1	diversion channel along Grand Canal				
13	1	increase size of downstream storm drains				
14	1,3	new storm drian in 18th Avenue - outfall location	5	2	2	9
15	1,3	new storage areas on upstream side of canal - some home buy-outs	2	2	2	6
16	2,3	new storage facility at Indian School Park				
17	2	divide Grand Canal into two sections, use for both irrigation and flood control				
18	2	allow more storm water into Grand Canal				
19	2	buy-out homes	2	2	2	6
<b>Cave Creek Floodplain</b>						
20	1,2 & 3	storage at Encanto Golf Course - (offline basin)	4	6	5	15
21	1	continue storm drain in 18th Avenue (downstream of Encanto Golf Course)				
22	1	add inlets onto existing 2-yr storm drain				
23	1	add connections to ADOT storm drain				
24	1,2	collection, storage and storm drain/channel from Durango curve to Salt River	2	7	5	14
25	1	upgrade ADOT's I-17 collection system at the Durango curve				
26	2	reconstruct fairgrounds and parking to include storage	1			1
27	3	divert Cave Creek flow to ADOT west tunnel			1	1
28	3	new storm drain in 2nd Street, connect to ADOT's west tunnel				
29	3	new storm drian in 3rd Avenue, connect to ADOT's west tunnel				
30	2	use "green" roofs as alternative to retention	1	1		2
31	2	laterals to intercept inflow to Durango curve ponding area u/s of freeway		1		1
<b>Downtown</b>						
32	1,2	new storm drain laterals and inlets, connect to existing storm drains	2	1	2	5
33	1	landscaping along major streets (widen corridor to include adjacent drainage swales)	1		1	2
34	3	upgrade catch basin inlets			1	1
35	3	new 10-year storm drain system around state capitol			1	1
36	2	allow more runoff into west tunnel				
<b>Airport</b>						
37	3	new storm drain in Washington Street, discharge to east tunnel	5			5
<b>General/Other</b>						
38	2	lower all streets or have inverted crowns		2		2
39	2	drill 1000's of new drywells	1	2		3
40	2	require 100-year, 2-hour retention on all new development	2			2
41	2	new retention at FCD site	2	2	5	9
totals			35	35	35	105







**Appendix C**  
**CORRESPONDENCE/DATA EXCHANGED**

**Appendix C.1**  
**CITY OF PHOENIX – STREETS**

**Charles Griffith**

---

**From:** Lloyd Vick  
**Sent:** Wednesday, October 26, 2005 9:08 AM  
**To:** Charles Griffith  
**Subject:** FW: Metro Phoenix ADMP - COP Infill Incentive Areas

---Original Message-----

**From:** ramon.cons@phoenix.gov [mailto:ramon.cons@phoenix.gov]  
**Sent:** Wednesday, October 26, 2005 8:13 AM  
**To:** Lloyd Vick  
**Cc:** andy.granger@phoenix.gov  
**Subject:** Metro Phoenix ADMP - COP Infill Incentive Areas

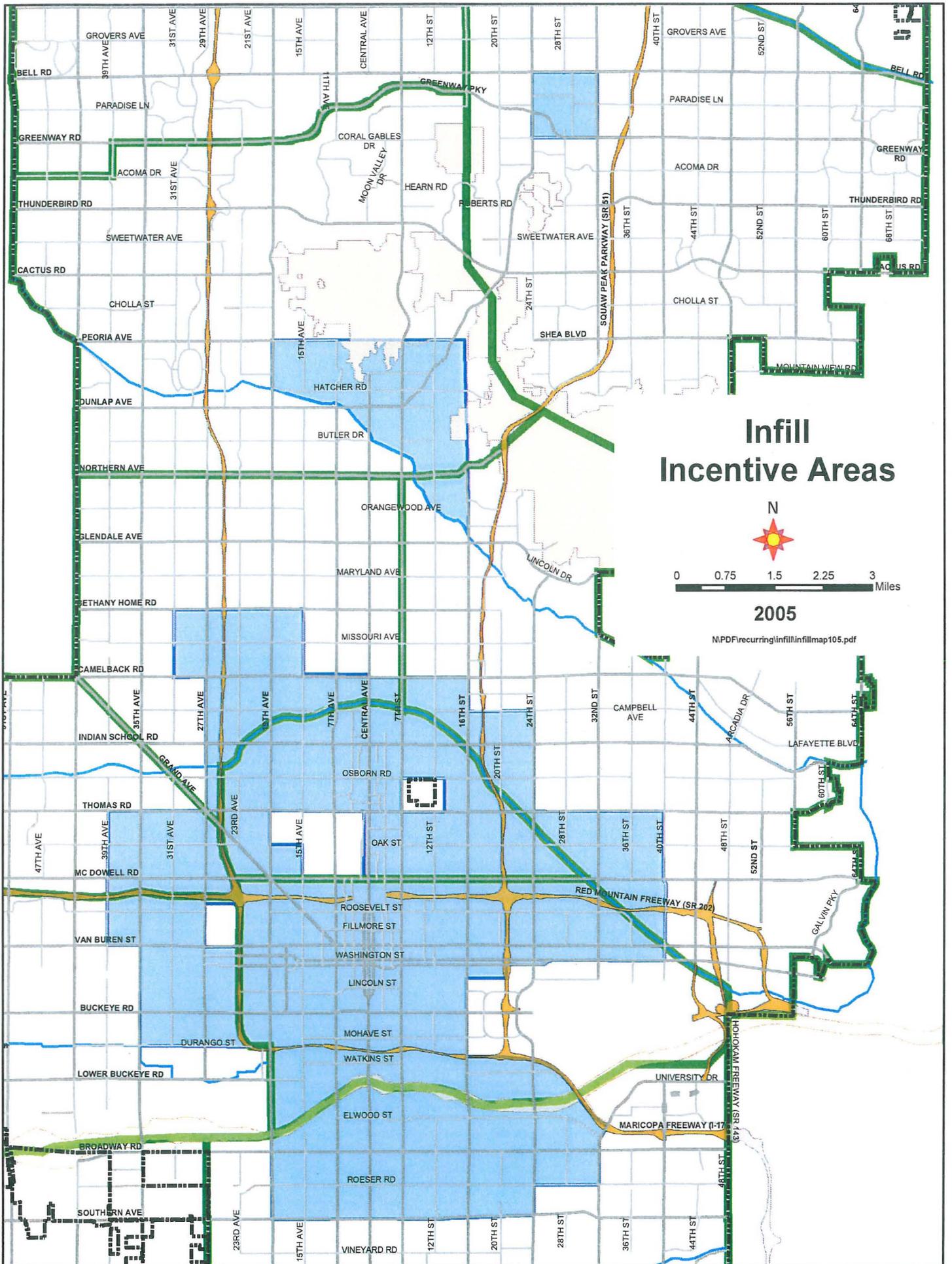
Lloyd,

As a follow-up to our 10/24 meeting at MCFCD, I have attached a link to our website that shows the Infill Incentive Areas. It is <http://phoenix.gov/BUSINESS/inprogram.html>, select <Infill Incentive Program>, select <How to Qualify>, map is at the top. I am working on obtaining a list of projects within these Areas. If you have any questions, feel free to e-mail or call.

Thank you,

Ray Cons, PE  
Civil Engineer III  
City of Phoenix  
Development Services Department  
Commercial Services  
P: (602) 534-6077  
F: (602) 495-5784

12/6/2005



# Infill Incentive Areas



2005

MPDFrecurringinfillinfillmap105.pdf

**Appendix C.2**  
**CITY OF PHOENIX – PARKS**

**Appendix C.3**  
**ARIZONA DEPARTMENT OF TRANSPORTATION**

Message left from to Tim Wolfe to Charles Griffith in response to ADOT Memorandum.  
Friday, August 22, 2008 at 1:10pm.

Hi Charles. This Tim Wolfe over at ADOT. I did get your memorandum on the draft master plan for Phoenix and have briefly reviewed it. Your memorandum covers everything that I am interested in. As long as this is going over to Ken and Ken is reviewing it, that is the important thing. If you have any more questions, please feel free to give me a call.

**Appendix C.4**  
**SALT RIVER PROJECT**

RE Metro ADMS - Stakeholders Meeting #1

From: GOOCH ROBERT S (BOB) [rsgooch@srpnet.com]  
Sent: Tuesday, November 01, 2005 11:37 AM  
To: Lloyd Vick; Ambika Adhikari; Bob Pikora; Boyd Winfrey; Chris Coover; David Hensley; Hasan Mushtaq; Jeff Beimer; Karen Craver; Katherine Coles; Keith Zwick; Paul Driver; Ramon Cons; Ray Almanzar; Susan Sargent  
Cc: Mark Gavan; afa@mail.maricopa.gov; kas@mail.maricopa.gov; jlw@mail.maricopa.gov; dbh@mail.maricopa.gov; RAUCH JR JOSEPH H (JOE); LARCHICK ROBERT E (BOB); CHERRINGTON PAUL A; SANDS THOMAS G (TOM)  
Subject: RE: Metro ADMS - Stakeholders Meeting #1

Regarding the Old Crosscut Canal, I found out that draining the area north of the canal in the vicinity of the head of the OCC is an old project that was put on the back burner years ago. The agreement then was that the drainage from this area would go under the Arizona Canal into the OCC. I believe Don Rerick from FCD and Joe Rauch & Tom Sands from SRP were involved at that time.

I don't believe you should make the assumption that "During larger storm events, the reduction of irrigation water in the Arizona Canal would result in an increase in stormwater conveyance capacity which would reduce storm water spilling over the canal." We cannot assume that storm water and irrigation water will not be in the canal at the same time. Although normal storm operations call for lowering the canal to allow for storm water, the nature of the system sometimes does not allow the operators enough time to get the water out.

There are also some other issues that need to be considered:

- Recent studies we've done show that there are potential capacity problems just downstream of this part of the canal, and it seems unlikely that SRP would be willing to accept storm water here, unless there can be some other provisions made to divert the water out of the canal upstream of the problem area, such as connections to the ACDC.
- If one or more water treatment plants fail, we have another capacity problem. The water that normally goes to the WTP stays in the canal and has to eventually be worked to a drain. This problem could be relieved by allowing the raw water to bypass the WTPs to the ACDC for the period of time it takes the reduction in delivery to reach the plant.
- In addition to capacity problems, there are water quality issues. The Arizona Canal delivers to four water treatment plants downstream of the OCC, and a fifth one is being designed for the City of Glendale. Storm water entering the canal closer to the WTP inlets would likely change the water quality, e.g. turbidity.

There are a lot of issues here and I'm looking forward to continuing the discussion. Please let me know if you have any questions or need more information.

Thanks,  
Bob Gooch  
SRP Water Engineering  
(602) 236-5227  
rsgooch@srpnet.com

-----Original Message-----

From: Lloyd Vick [mailto:lvick@eecphx.com]  
Sent: Tuesday, October 25, 2005 3:28 PM  
To: Ambika Adhikari; GOOCH ROBERT S (BOB); Bob Pikora; Boyd Winfrey; Chris Coover; David Hensley; Hasan Mushtaq; Jeff Beimer; Karen Craver; Katherine Coles; Keith Zwick; Paul Driver; Ramon Cons; Ray Almanzar;

RE Metro ADMS - Stakeholders Meeting #1

Susan Sargent

Cc: Mark Gavan; afa@mail.maricopa.gov; kas@mail.maricopa.gov;

jlw@mail.maricopa.gov; dbh@mail.maricopa.gov

Subject: Metro ADMS - Stakeholders Meeting #1

<<fact sheet\_050725.pdf>> <<October 24, 2005 - Stakeholders #1.doc>>

Lloyd A. Vick, P.E.

Engineering and Environmental Consultants, Inc.

3003 North Central Avenue, Suite 600

Phoenix Arizona 85012

602.248.7702

602.248.7851 (FAX)

**Appendix C.5**  
**CITY OF PHOENIX – AVIATION DEPARTMENT (DIBBLE)**



**PHOENIX SKY HARBOR**  
INTERNATIONAL AIRPORT

**MEETING MINUTES  
COORDINATION MEETING**

PSHIA DRAINAGE MASTER PLAN UPDATE STUDY  
CITY OF PHOENIX PROJECT No. AV08000043

Date: Friday, May 18, 2007  
Time: 10:30 a.m.  
Attendees: Sam Hanna (COP Aviation DCS), Briiana Leon (COP Streets), Paul Driver (COP Streets), Ken Snyder (Dibble), Josh Papworth (Dibble), Brian Fry (Dibble), Mark Gavan (Gavan & Barker)

---

The purpose of this meeting was to discuss coordination of various stormwater planning projects that affect each other and the use of the ADOT I-10 stormwater tunnel system.

- I. Introductions-Brian Fry initiated introductions of all of those present.
  - Sam Hanna: COP Aviation Design & Const. Services, Sky Harbor Drainage Master Plan Update Airport Project Manager
  - Paul Driver: COP Engineering Supervisor, Streets Transportation Dept. Storm Water Management
  - Briiana Leon: Civil Engineer III, Streets Transportation Dept. Liaison to ADOT
  - Mark Gavan: Gavan & Barker, Consultant to EEC for Metro Phoenix ADMP
  - Brian Fry: Dibble, Sky Harbor Drainage Master Plan Update Project Manager
  - Josh Papworth: Dibble, Sky Harbor Drainage Master Plan Update Project Engineer
  - Ken Snyder: Dibble, Sky Harbor Drainage Master Plan Update Airport Liaison
  
- II. Discussion
  - Brian explained the scope and status of the Sky Harbor Drainage Master Plan Update (DMP Update). He included a discussion of the offsite runoff affecting the airport study area and the proposal to intercept these flows north of the airport at Van Buren Street, releasing them into the ADOT tunnel system. This proposal makes available capacity in existing trunk lines at 24<sup>th</sup> Street, 32<sup>nd</sup> Street, and 40<sup>th</sup> Street for airport onsite runoff.
  - The DMP Update recently completed the Data Collection phase and is beginning existing conditions analysis.
  - Mark explained that the Metro ADMP has completed a Phase I alternatives analysis and has an anticipated project completion (recommended alternative) by December 31<sup>st</sup> 2007. Public meetings are planned for July 2007.
  - Mark described how the proposal encouraged by Brian is an alternative in the Metro ADMP for two reasons: (1) there is considerable flow blocked by the railroad at Washington Street – a storm drain diversion would remedy this situation (2) it would free up capacity in existing trunk lines for Airport onsite runoff.
  - A 10-year diversion system at Van Buren would entail approx. 940cfs addition to the ADOT East Tunnel. The Airport would then be required to pick up the area between Van Buren and Washington in the existing 2-year system.
  - The Metro ADMP hydrology model results show approximately 3,600 cfs in the East Tunnel at its interception with the railroad; ADOT design reports a capacity of 5,000cfs in the East Tunnel.
  - The East Tunnel connection is the only connection being pursued by the Metro ADMP that doesn't already have an IGA in place.



- Paul Driver mentioned that he has current projects using stub-outs at 28<sup>th</sup> Street and 36<sup>th</sup> Street; these stubs are included in an IGA for tunnel use. But he is not aware of an IGA for the East Tunnel.
- J2 Engineering is currently under contract with ADOT to analyze I-10 widening south of I-10/I-17 junction. They may be recreating hydraulic models for the I-10 tunnel system.
- Ken Snyder described the process gone through for outfalling airport runoff to the East Tunnel with the North Runway and 24<sup>th</sup> Streets improvement projects. At ADOT's request, Dibble hired Gary Sun at HNTB (the original designers/modelers of the tunnel system) to analyze the flows and determine the effects on the existing tunnel system. Because the Dibble projects did not increase the flows above that which the original hydrology model for the I-10 tunnel system predicted, they were able to outfall to the East Tunnel system.
- Briiana can set up a meeting with ADOT when the team is ready with a game plan. ADOT attendees should be Floyd Roehrick, Dennis Crandall, and the ADOT Phoenix Maintenance District Representative. J2 Engineering should be invited to this meeting as well.
- The timing and funding for construction of the improvements proposed in the ADMP's was discussed. Paul Driver said that he currently does not have funds in his department for this type of project. However, if the project is part of an ADMP, and the Aviation Department was willing to cost share, the FCDMC may be willing to make the project a priority and cost share as well.

## II. Action Items

- Mark will send Dibble and Sam the 2 IGA's he has.
- Mark will contact J2 and get a clearer idea of the SOW that is requested by ADOT to be included.
- Paul and Briiana will search COP records for all IGA's concerning connection to the east tunnel system.
- Ken will review Dibble records for information about the process and agreements concerning the connections made to the East Tunnel as part of past airport projects.
- Briiana will schedule and setup meeting with COP, ADOT, Dibble, J2 Engineering, and DCS where the team will present a proposal for use of the East Tunnel.
- Mark will invite FCDMC to the ADOT meeting.

## III. Meeting Adjourned at 11:30 am.



**Airport Drainage Master Plan  
Update for Phoenix Sky Harbor  
International Airport  
Project No. AV08000043**

**Preliminary Alternatives Analysis Report**

**May 2008**

Prepared for:

City of Phoenix  
Aviation Department  
Design and Construction Services



**PHOENIX SKY HARBOR**  
INTERNATIONAL AIRPORT

Prepared by:



7500 North Dreamy Draw Drive, Suite 200  
Phoenix, Arizona 85020

Airport Drainage Master Plan Update  
for Phoenix Sky Harbor International Airport

PRELIMINARY ALTERNATIVES ANALYSIS REPORT

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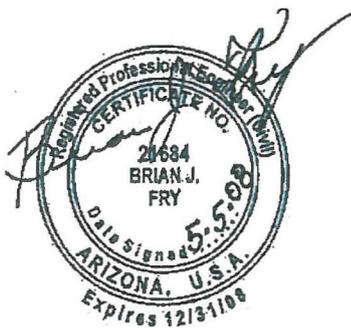
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Airport Drainage Master Plan Update  
for Phoenix Sky Harbor International Airport

PRELIMINARY ALTERNATIVES ANALYSIS REPORT

**I. INTRODUCTION**

**A. Purpose**

The purpose of the Airport Drainage Master Plan Update for Phoenix Sky Harbor International Airport (DMP Update) is to update the existing *Airfield Master Drainage Plan* which was prepared in February 2001. The DMP Update is intended to be used as a planning and programming tool for the coordination of construction of the storm drainage system in conjunction with other airport infrastructure upgrades which are planned over the next 10 to 20 years.

**B. Scope of the Project**

The DMP Update consists of the verification and update of existing storm drain facilities information; investigation and identification of drainage issues through the development of a storm water system computer model; development of recommended storm drainage infrastructure; and schematic development of the approved projects. The project will include development of a five-year and ten-year drainage improvement CIP Program with budgets and scopes of work for individual civil design consultant procurements.

The Preliminary Alternatives Analysis phase of the project builds from the alternatives screened in Stakeholder Workshop No. 1. Preliminary sizes are developed for each alternative using the Developed Conditions SWMM model. Costs are developed for each alternative for comparison purposes. The advantages and disadvantages of each alternative are compared and discussed and presented here.

The stakeholders will meet a second time during Stakeholder Workshop No. 2 to review these results and perform a matrix evaluation of each alternative. Stakeholder Workshop No. 2 will result in the selection of a preferred alternative to be developed further as the Facilities Master Plan. The results of Stakeholder Workshop No. 2, including identification of the preferred alternative, will be incorporated into the Final Alternatives Analysis Report.

**C. Study Area**

The study limits of the project extend from 16<sup>th</sup> Street on the west to SR143 on the East, and from I-10 and the Salt River north bank on the south to Washington Street on the north. The project study area is shown on the **Vicinity Map, Figure 1**. The area is nearly entirely developed with a combination of medium density residential, industrial, airport operations, and commercial development. The project is contained entirely within the City of Phoenix.

The contributing watershed extends north of the study area and can be seen on the **Vicinity Map, Figure 1**. This area is a portion of the area currently under study as part of the *Metro Phoenix Area Drainage Master Plan (ADMP)* being conducted by the Flood Control District of Maricopa County (FCDMC). The Metro Phoenix ADMP will evaluate the PSHIA watershed and develop offsite flood mitigation alternatives in coordination with this study. The offsite watershed is bounded by the Arizona Canal to the north, approximately 24<sup>th</sup> Street to the west, and approximately 48<sup>th</sup> Street to the east.

The Union Pacific Railroad acts as a barrier to surface runoff draining toward the airport from the north. However, stormwater runoff is conveyed beneath the Union Pacific Railroad by the underground storm drain system within the 24<sup>th</sup> Street, 32<sup>nd</sup> Street, and 40<sup>th</sup> Street alignments. These underground systems are designed to convey the 2-year storm event, per City of Phoenix street design standards.

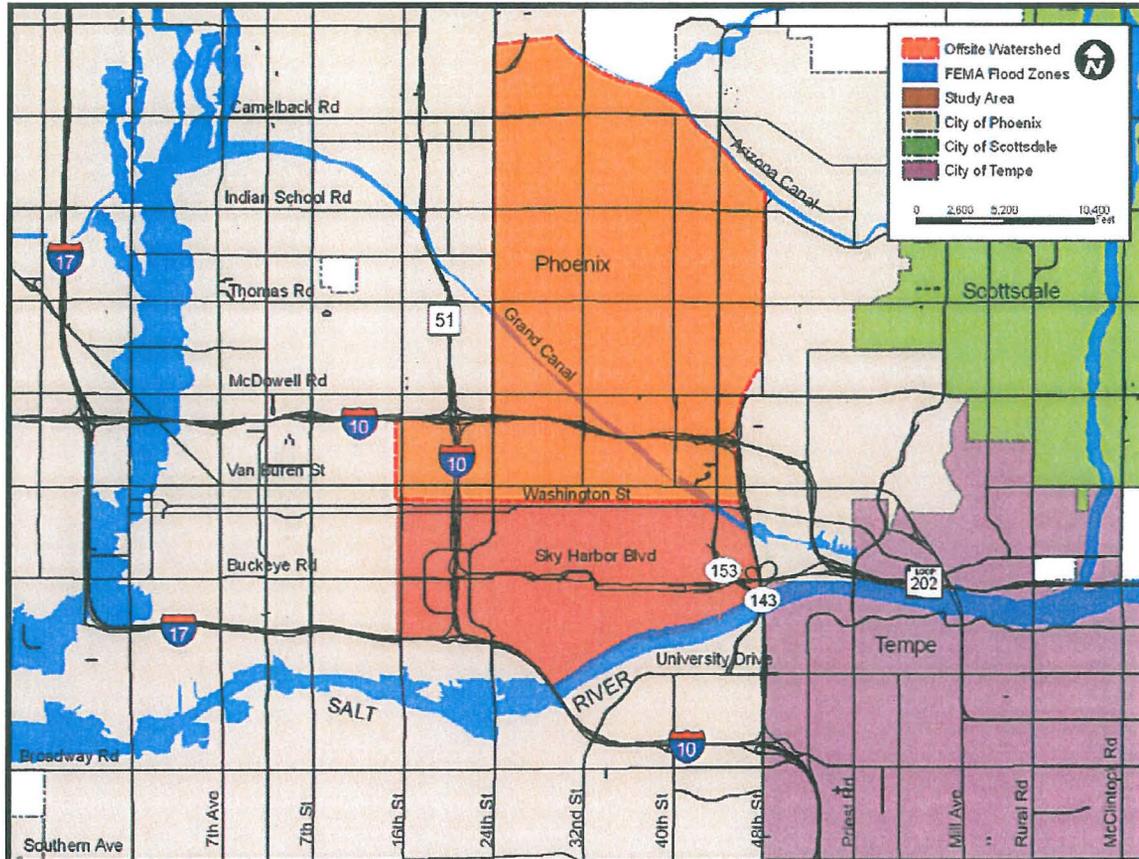


Figure 1 – Vicinity Map

## II. PLANNED AIRPORT DEVELOPMENT

### A. Planned Development Projects

The Airport Development Plan (ADP) has identified a number of planned projects having potential impacts to the existing and proposed stormwater management system at PSHIA. The following list of planned projects is the result of a review of the ADP (dated November 2005), meetings and discussions with Planning Department representatives and consulting engineers, and review of preliminary project plans and reports. **Figure 2 – Planned Projects** shows preliminary locations of future facilities associated with these projects. The information shown is planning level and is subject to change as the projects develop.

#### 1. Automated Train System

The current alignment of the Automated Train (AT) is shown on **Figure 2**. The AT is divided into two segments, east and west. The east segment is planned for completion in 2013. The west segment is planned for completion between 2016 and 2020. Most of the automated train is at or above grade. As

of the writing of this report the east segment is in a preliminary design stage. The current vertical alignment does not pose significant conflicts with existing storm drain facilities. The AT does not prohibit proposed stormwater management facilities in the same area; however, facilities will need to be planned to avoid or incorporate any underground portions of the train and foundations used to support elevated track sections.

Also included in the AT system are associated support facilities. A Ground Transportation Center is planned for the southwest corner of Washington Street and the SR153. This facility will include a light rail station, bus staging, a bus transit center, and parking. An AT Maintenance and Storage Facility is planned for the area between the SR153 and SR143, just north of Sky Harbor Boulevard.

## **2. West Terminal**

The West Terminal is tentatively planned to begin construction between 2013 and 2020, and will correspond with the construction of the AT at that location. It is expected that the terminal will encompass a large area of apron construction, four concourses, new Cross-taxiways U and V, and the terminal building and associated support structures. A significant portion of the terminal may be below grade, similar to Terminal 3 (T3) and Terminal 4 (T4). Extensive impacts to existing utilities are expected. A concept-level project footprint is shown on **Figure 2**. Existing stormwater facilities in the project footprint are limited to underground storm drain and the associated inlets of historic Terminal 1, Terminal 2, and Sky Harbor Boulevard. These systems are not transmission lines, they collect runoff only from the area south of the North Runway. The West Terminal project will likely require drainage connections to these existing storm drain systems for the site drainage. Proposed stormwater management facilities will avoid this area as a conveyance/storage potential due to the extent of the constraints here.

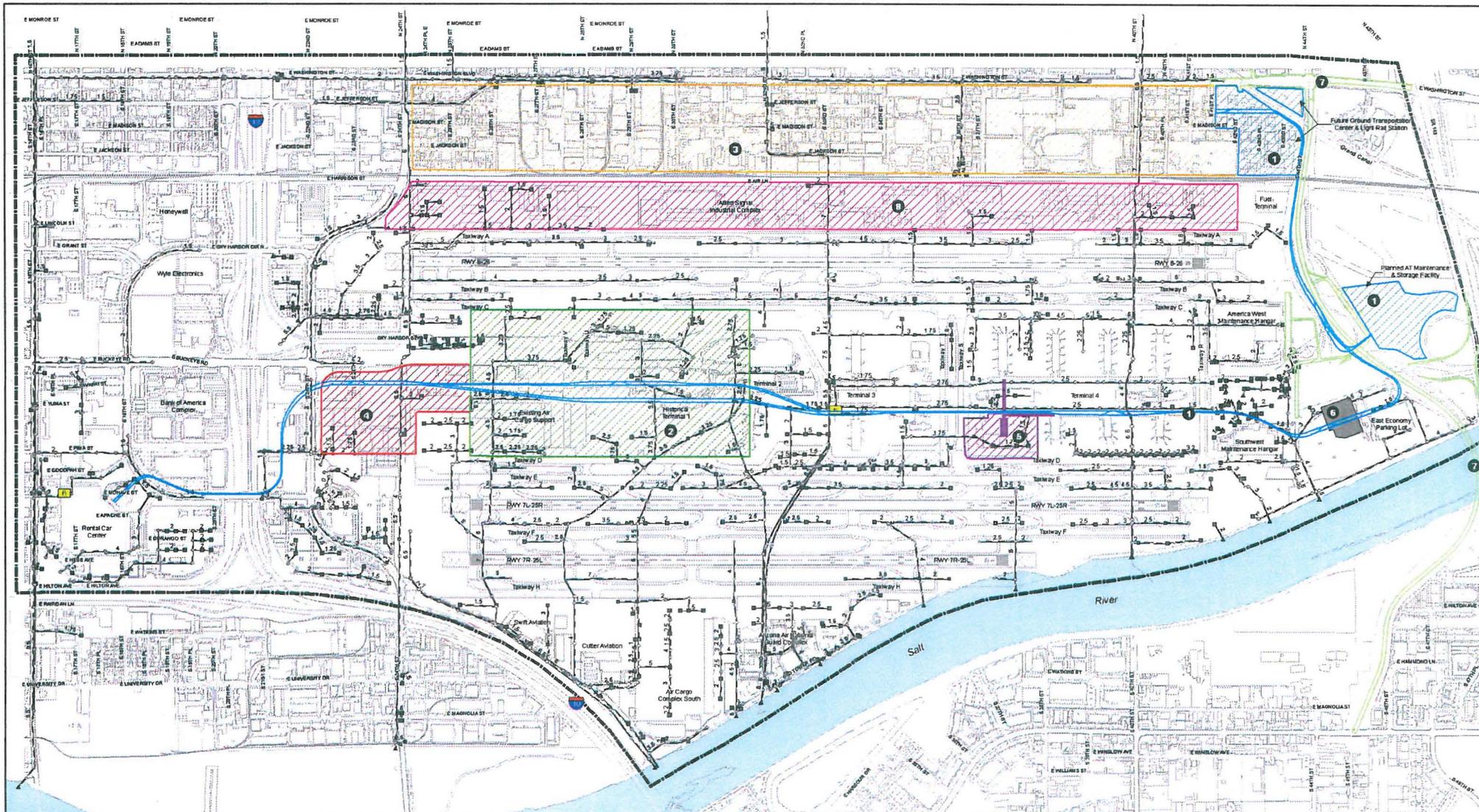
## **3. Future North Development Area (Off Airport)**

Between Air Lane and Washington Street is an area planned for possible future airport ownership. Currently, the project is in the voluntary acquisition phase: buying the adjacent properties when they become available. There is no official timeline for this project, but it is anticipated that the acquisition process will occur over the next 20 to 30 years. This area is intended for non-airfield use. Storm drain trunk lines cross through the area at 24<sup>th</sup> Street, 32<sup>nd</sup> Street, and 40<sup>th</sup> Street. These lines collect runoff from the area between the airport and the Loop 202 freeway. The existing UPRR embankment acts as a barrier for surface runoff, intercepting runoff in excess of the storm drain system capacity and diverting it overland to the west.

As non-airfield related development, this area is not subject to FAA requirements for 5-year design storm runoff management. City of Phoenix design standards are applied for new development: 100-year 2-year onsite retention and 2-year design storm for storm drain design.

## **4. West Ground Transportation/Economy Parking**

In discussions with PSHIA planning representatives it was determined that it is likely that a West Economy Parking structure will precede any additional parking structure on the east side. The West Economy structure is tentatively being considered for the area near the southeast corner of 24<sup>th</sup> Street and Sky Harbor Boulevard. Preliminary location and footprint is provided on **Figure 2**. This project is anticipated for construction within 5-years. Of significance here is the existing trunk line of the 24<sup>th</sup> Street storm drain system (78" diameter). Discussions with the City have been undertaken to determine the feasibility of constructing a parking structure overtop of an existing storm drain pipe. Results of this evaluation are presented further in **Section III. E.** of this report.



**PHX**  
**PHOENIX SKY HARBOR**  
 INTERNATIONAL AIRPORT  
**Drainage Master Plan**  
**Update**



**Legend**

- Automated Train
- Automated Train Area
- West Terminal Area
- Future North Development Area (Off Airport)
- West Ground Transportation/Economy Parking
- Terminal 4 S1 Concourse
- East Economy Parking Structure
- Future North Development Area (Airport Owned)
- DMPU Study Limits
- Existing Storm Drain
- SR153 Modifications for AT



**Dibble**  
**Engineering**

Note:  
 1. Planned project features and locations are a graphical representation only, and does not necessarily portray the actual location of future projects.  
 2. Existing storm drain alignments are a graphical representation only, and do not necessarily portray the actual location of pipes, manholes, drops, and inlets.  
 Source: 2018 American Coast Airport Inc. CIP, LAD & Station Dept. As-Built

**Figure 2:**  
**Planned Projects**  
 Page 1 of 1  
 May 2008

### **5. Terminal 4 – S1 Concourse**

The construction of the Terminal 4 S1 Concourse, shown schematically on **Figure 2**, will include apron construction as well as connecting bridges to the S2 and N1 Concourses. The design of this project is in a preliminary stage. Construction is contingent on the request for the facilities by US Airways, the target tenant for the concourse. Construction time is expected to be approximately 18 months, once initiated.

Redesign of the local surface collection system is necessary with the project; however, the area is free of storm drain trunk lines and is not considered to be significant to existing stormwater management. The S1 Concourse and other facilities associated with Terminals 3 and 4 are areas that will likely be avoided for large scale stormwater conveyance measures due to the level of constraint here.

### **6. East Economy Parking Structure**

A third East Economy Parking Structure is planned for the area just west of the existing two structures near the southeastern boundary of airport. The approximate timelines is 10-years. The proposed location of the East Economy Parking Structure will require redesign of local surface collection systems; however, the area is free of significant stormwater conveyance or storage features.

### **7. SR153 Modifications for Automated Train**

As part of the Automated Train program the City of Phoenix will be taking over ownership of State Route 153. The existing facility will be converted to a city street (44<sup>th</sup> Street) and AT alignment. The modifications will also include changes to the airport access ramps at Sky Harbor Boulevard. Stormwater drainage facilities exist in SR153, however these facilities are not expected to change significantly due to the modifications. A 78" storm pipe outfalls from the SR153 into the Salt River. Proposed Stormwater management facilities intended to make use of this outfall will be limited to available capacity in the 78" pipe.

### **8. Future North Development Area (Airport-Owned)**

Between Taxiway A and Air Lane is an area planned for future airport expansion. Currently, the project is in the voluntary acquisition phase: buying the adjacent properties when they become available. There is no official timeline for this project, but it is anticipated that the acquisition process will occur over the next 20 to 30 years. It is possible that this area will include airfield areas. Storm drain trunk lines cross through the area at 24<sup>th</sup> Street, 32<sup>nd</sup> Street, and 40<sup>th</sup> Street. These collect runoff from the area between the airport and the Loop 202 freeway.

## **B. Developed Conditions Hydrology**

### **1. Methodology**

Existing conditions hydrology is modified to reflect anticipated future projects and land uses as presented in the previous section. Changes incorporated in the hydrology model include:

- Planned projects limits are used to determine new subbasin boundaries.
- Areas of planned projects within the existing airport limits are modeled as 100% impervious.
- The north development area between Air Lane and Taxiway A is modeled as airfield, subject to FAA's 5-year design storm.
- All airfields are modeled as 100% impervious.
- The north development area between Air Lane and Washington Street is added to the model; it is modeled with parameters consistent with downtown office/business park land use, adopting the City of Phoenix requirement for 100yr 2hr retention.

The resulting model is used as the base model for analyzing the various alternatives presented in the next section.

The *City of Phoenix Storm Water Policies and Standards Manual*, March 2004, and the *FAA Advisory Circular No. 150/5320-5C Unified Facilities Criteria* are used as the basis for analysis and design.

Stormwater runoff is evaluated using the Storm Water Management Model Version 5.0 (SWMM). The SWMM model is a Windows-based public-domain computer model developed by the Environmental Protection Agency (EPA) that accounts for the hydrologic processes of rainfall, losses, runoff, and hydraulic routing of runoff through the system.

#### **a) Subbasin Delineation**

The **Developed Conditions Hydrology** for the project, showing individual subbasin delineations and drainage flow paths is provided as **Figure 3** on the following page.

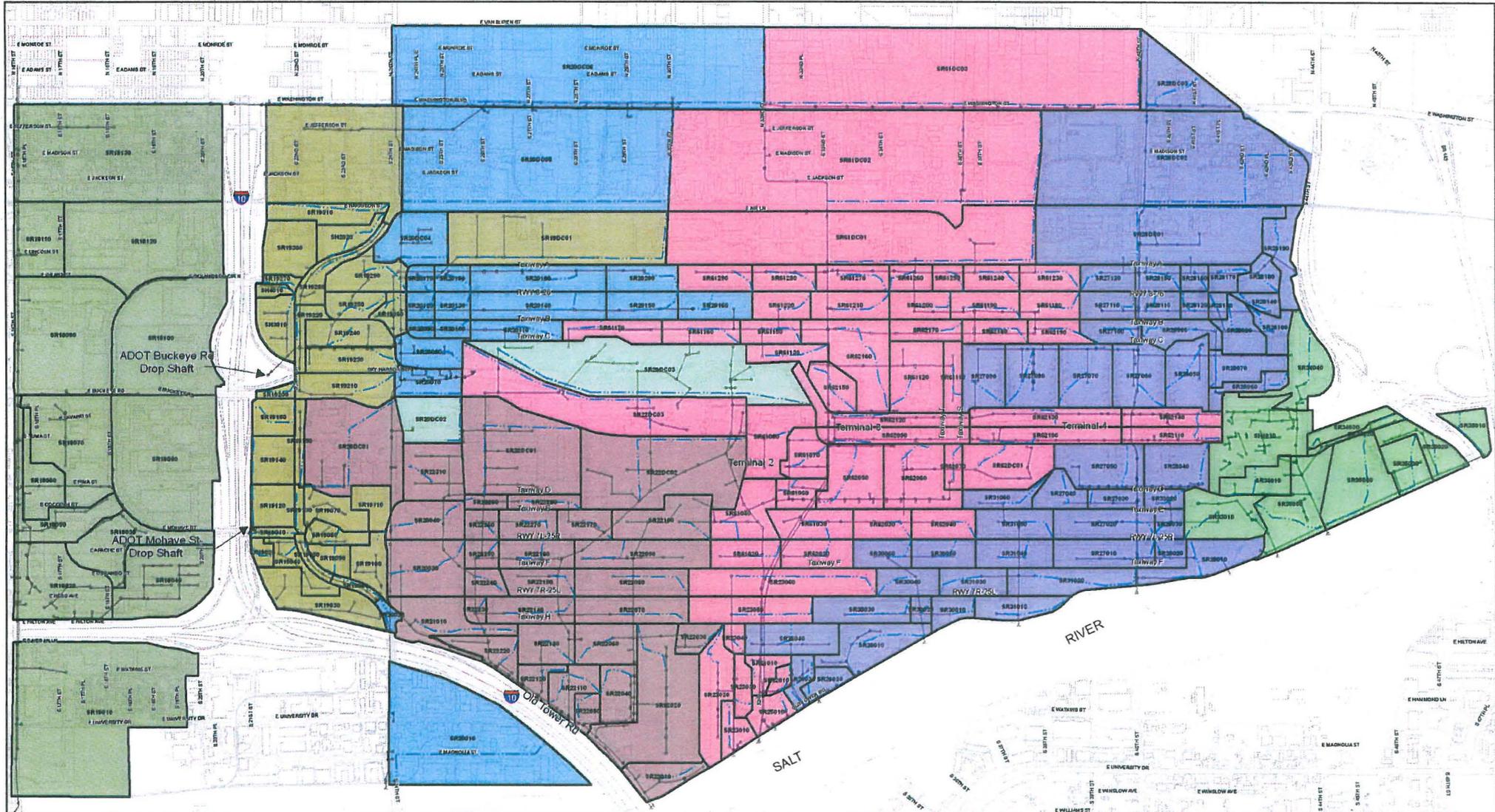
Subbasins are sized to appropriately reflect the level of detail necessary to model the storm drain trunk lines to which they drain. Single subbasins may include a number of storm drain inlets draining to the same trunk line. Smaller subbasins are used in areas that are dense with storm drainage systems.

Some subbasins are self-contained areas; they have retention basins that contain the runoff generated on their surface. The retention capacity in these areas is calculated and compared to the runoff volume from the design storm. Subbasins that are self-contained are not included in the SWMM runoff model.

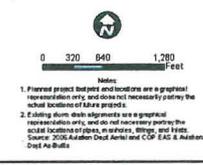
Subbasins have been grouped into storm drain outfall-related 'systems' on **Figure 3** to delineate general drainage areas. Systems may have more than one outfall and are generally named based on the primary outfall in the drainage area.

#### **b) Parameter Estimation**

Parameters necessary for runoff modeling are consistent with those used in the existing conditions model and presented in the *Existing Conditions and Constraints Report*.



Legend		Storm Systems	
Max Flow Path	Storm Storage Unit	16th St System	ADOT Outfall System
Storm Filling	Storm Outfall	24th St System	East Economy System
Storm Inlet	Existing Storm Drain	32nd St System	Old Tower Rd System
Storm Manhole		40th St System	Variable
Storm Flow Divider			



### **c) Offsite Hydrology**

For one alternative it is necessary to incorporate offsite regional runoff into the alternatives analysis. The total offsite watershed for the project extends north to the Arizona Canal and is shown on the **Vicinity Map, Figure 1**. The Flood Control District of Maricopa County has developed a HEC-1 hydrology model for the offsite areas of the airport, quantifying the flow hydrographs both on the surface and in the pipe system at the northern boundary of the airport—the UPRR and Air Lane. Runoff generated north of Air Lane is incorporated into the DMPU runoff model by adding hydrographs generated from the FCDMC model as input hydrographs at the model boundary.

### **d) The Future North Development Area**

The area planned for future development north of Air Lane is planned for non-airfield use. As such, it is not required to meet FAA guidelines for 5-year storm management. The area is required only to meet the requirements of a 2-year storm event. Additionally, the area is subject to City of Phoenix stormwater management guidelines for 100-yr 2-hr onsite stormwater retention. If the Aviation Department and City of Phoenix elect to waive the retention requirements in this area, additional facilities will be required in the north development area and on the airport to accommodate the additional stormwater runoff. This variation is modeled and the additional costs quantified for both of the alternatives presented in **Section III**. The results are presented in **Appendix D**.

### **e) UPRR Embankment**

During the modeling process it was discovered that the UPRR embankment acts to meter the amount of runoff able to enter the airport storm drain system. As the hydraulic grade line in each of the three trunk lines exceeds the ground surface elevation just upstream of the UPRR, water begins to flow west as surface flow rather than entering the pipe system. While this could be seen as a benefit to the Airport, reducing the extent of improvements in the operating area, the area upstream of the UPRR must still meet the design requirements set forth by the City of Phoenix. Therefore, the amount of 'flow by' has been quantified and additional models have been run using 2-year runoff to ensure that the system completely captures the 2-year design storm—a minimum requirement for the area north of Air Lane and the UPRR.

## **2. Assumptions**

The following assumptions are incorporated into the SWMM hydrology model for alternatives analysis.

### **a) Planned Projects**

The future land use of the airport is not certain. The hydrology and hydraulic modeling here is based on information provided by the Aviation Department for planned projects, as discussed in Section II. Significant changes to the future land use at the airport could require revisiting the analysis documented here.

### **b) Assumptions inherent in SWMM runoff computations**

The SWMM runoff algorithm is based on a number of assumptions, necessary to simplify the calculation of rainfall runoff from a land surface. The assumptions inherent in the algorithm represent standard practice and are generally accepted as a reasonable approximation of subbasin runoff for planning studies. These assumptions include the following:

- Subbasins are planes of uniform slope, roughness, and infiltration capacity.
- Rainfall and excess runoff depth is uniform throughout the subbasin surface

- Each point in the subbasin contributes to the peak flow simultaneously at a given time, regardless of the location of the point relative to the subbasin outflow point.

**c) Parameter Estimation**

Parameters selected to define subbasin runoff parameters are based on guidance set forth in the Hydrology Manual and EPA SWMM User's Manual.

**d) Subbasin Flow Paths**

Subbasin flow paths calculated for use in SWMM runoff calculations have been chosen based on a conservative approximation. There are many instances when multiple storm drain inlets exist within a subbasin. Flow paths are established from the furthest point in the subbasin to the first inlet encountered that is integral to the storm drain system. This approach neglects potentially longer flow paths with segments of pipe flow, and it results in a higher peak discharge than other methods of approximation.

**e) Overland flow routing**

The developed conditions SWMM model does not include overland flow routing between subbasins. Runoff from each subbasin enters the corresponding underground pipe system if it has capacity or is quantified as flooding. Deficiencies are then identified and the various alternatives are developed to remove any flooding locations.

### **III. STORM WATER MANAGEMENT ALTERNATIVES**

#### **A. Approach to Developing Alternatives**

##### **1. Introduction**

This section describes the approach used to identify and develop alternatives for a stormwater management system for the Sky Harbor International Airport. The primary objective of each of the storm water management alternatives is twofold. First, recommended improvements should ensure that the existing airport meets current FAA drainage criteria as it relates to storm drain and inlet capacity and allowable ponding limits. The second objective is to provide storm drainage infrastructure needed to accommodate planned airport expansion projects. The separately produced *Existing Conditions and Constraints Report* includes an analysis of the existing storm drain system and identifies areas where current FAA criteria are not met. The planned airport expansion projects are identified in the previous section of this report. This information informs the master planning process. The planning process must further respond to the identified constraints and seek to take advantage of any opportunities that can be identified to add value to the plan. The constraints and opportunities are further described as follows:

##### **2. Constraints**

The planning constraints are described in the *Existing Conditions and Constraints Report* and consist of existing airport facilities, existing underground utilities, and the planned future expansion projects.

The key existing airport facilities include runways, taxiways, aprons and buildings. The runways and taxiways are particularly critical constraints due to the cost of constructing underground pipes across or under the thick, heavily reinforced concrete sections as well as the significant impact to airport operations resulting from the closures that would be required for the typical open-cut construction. Where storm drains must cross runways or taxiways, boring or tunneling, if found to be feasible, may be a suitable alternative approach to open-cut construction techniques. Additionally, the general layout of the runways, terminals, and roadways is in an east-west orientation which blocks the path to the Salt River. Much of the runoff generated on the airport and north of the airport is traveling north-to-south to reach the outfalls at I-10 and the Salt River. Therefore, conveyance measures would be required to cross these existing airport surface facilities. This condition is further complicated by the fact that Terminals 3 and 4 (T3 and T4) and portions of Terminal 2 are below natural grade. Storm water conveyance measures traveling north to south are effectively cut off in the area of T3 and T4. Large conveyance pipes and box culverts exist beneath Terminal 4, which were built with the terminal itself. However, construction of new facilities crossing these depressed areas may be impractical.

Existing underground utilities are shown in the *Existing Conditions and Constraints Report*. The most notable of these are the large-diameter water line within Air Lane, the large diameter sewer along the southern boundary of the airport, the fiber optic associated with the terminals, and the jet fuel distribution lines. Again, these significant utilities are oriented so that they cross the flow path to the Salt River.

The planned future projects previously described also act as constraints. Storm water collection and conveyance facilities must connect to these projects and find a path to a suitable outfall at the Salt River.

##### **3. Opportunities**

There are two unique opportunities that present themselves to the airport at this particular point in time. These opportunities would create a scenario whereby the off-site flows currently entering the airport in large storm drains from the north may be diverted away from the airport thus freeing up a significant amount of capacity in the major trunk lines which pass through the airport along 24<sup>th</sup> Street,

32<sup>nd</sup> Street, and 40<sup>th</sup> Street. These trunk lines already have connections to catch basins within the airport and discharge directly into the Salt River via outfalls that are already permitted and in place. These opportunities are tied to the Flood Control District of Maricopa County (FCDMC) and the Arizona Department of Transportation (ADOT) and are described in the following paragraphs.

The FCDMC and the City of Phoenix are completing the Metro/Phoenix Area Drainage Master Plan (ADMP) which identifies flooding problems and develops conceptual plans for solutions to those problems within the City of Phoenix. The study area includes the entire watershed that drains to the airport from the north as described in the Study Area description in the Introduction to this report. The Metro/Phoenix ADMP commenced shortly before this project, which created an opportunity for this study team to participate as stakeholders in the Metro/Phoenix ADMP project. Through the project team's participation in the planning process, a possible offsite storm drain in Van Buren Street was included as an alternative in the plan that would intercept all of the runoff in the 24<sup>th</sup> Street, 32<sup>nd</sup> Street, and 40<sup>th</sup> Street storm drains at Van Buren Street and divert it away from the airport. The ADMP identified the large storm drain tunnels under Interstate 10 (I-10) as an outfall for the diverted flows.

ADOT owns and operates the I-10 tunnel. The pipes are very deep and collect runoff from the surface via sophisticated helical drop shafts. The drop shafts and tunnel were designed with capacity for regional off-site flows generated within the Metro ADMP watershed. The City of Phoenix "owns" some capacity in the I-10 tunnel system, and ADOT has indicated that if it can be demonstrated that the runoff proposed to be discharged into the tunnel as part of the implementation of the Metro/Phoenix ADMP does not cause the system capacity to be exceeded, then agreements could be negotiated to allow implementation of the plan.

This opportunity is developed in Alternative 1 as the *Offsite Flow Diversion Alternative*.

#### **4. Strategy**

The existing storm drain network within the airport is extensive with a history of modifications over the years required to adapt to changing development conditions. As a result there are drainage systems in place that are not fully utilized or have been abandoned in place. Additionally, many of the storm drains extend underneath runways and taxiways that would be very costly to replace or to enhance by constructing parallel pipes. As a result, a strategy employed in identifying alternatives has been to make maximum use of existing storm drain pipes, especially the large trunk lines that pass under the runways and taxiways. Diverting runoff in other portions of the airport, where constructing storm drains would be less costly and disruptive, is preferred in order to free up needed capacity and avoid construction in the runway areas. This strategy is particularly emphasized with Alternative 1, which includes the Metro/Phoenix ADMP diversion.

Another way to apply the strategy of diverting storm drain flows to free up capacity in critical existing pipes is applied to avoid having to construct new storm drains crossing the depressed terminals and Sky Harbor Boulevard. Runoff that is currently collected south of Sky Harbor Boulevard and directed into the 24<sup>th</sup> Street, 32<sup>nd</sup> Street, and 40<sup>th</sup> Street trunk lines is diverted into a new storm drain system to free up additional capacity in the existing trunk lines that can then be used to convey additional runoff from the area north of Sky Harbor Boulevard.

The planned airport expansion which consists of all the projects described in Section II is still preliminary. The strategy employed in this Master Plan update is intended to provide maximum flexibility for the future development of the planned projects. This is done by using a modular approach to planning. Each planned project is identified as a "box" that is situated as closely as possible to the

location and size of the ultimate improvement. The Master Plan will then estimate the runoff generated within the “box” under the developed condition and will provide a connection point or points near the planned project boundary. This connection point will accept the runoff generated within the “box” and provide conveyance capacity within the master-planned facilities to convey that runoff to a suitable outfall. It is then left to the designer of the planned improvement project to provide on-site grading and an internal stormwater collection system that will direct the project runoff to the designated connection point. It should be noted that the cost of these on-site collection systems are not included in the Master Plan cost estimates and must be included in the cost estimates and CIP budgets of the individual projects.

## 5. Process

The project team conducted an in-house charette to synthesize the existing conditions, constraints, and opportunities into three alternative storm water management solutions. An Airport Layout map was used with the existing storm drain system, existing utilities, and planned developments overlaid. The strategies just described were applied at a conceptual level to identify significantly different alternatives that each make use of a different approach to storm water management. The first alternative was the *Offsite Flow Diversion Alternative* which is based on implementation of the Metro ADMP storm water diversion along Van Buren Street. The second alternative was the *Onsite Conveyance Alternative* which is based on the Van Buren Street system not being implemented and continuing to convey off-site runoff through the airport. New storm drains are identified to divert runoff south of Sky Harbor Boulevard to free up capacity in the existing pipes for runoff generated north of Sky Harbor Boulevard. The third alternative was the *Regional Onsite Retention Alternative* which was intended to achieve a similar benefit as the Offsite Flow Diversion Alternative by storing the off-site runoff in detention basins, thereby freeing up capacity in the north-south trunk lines.

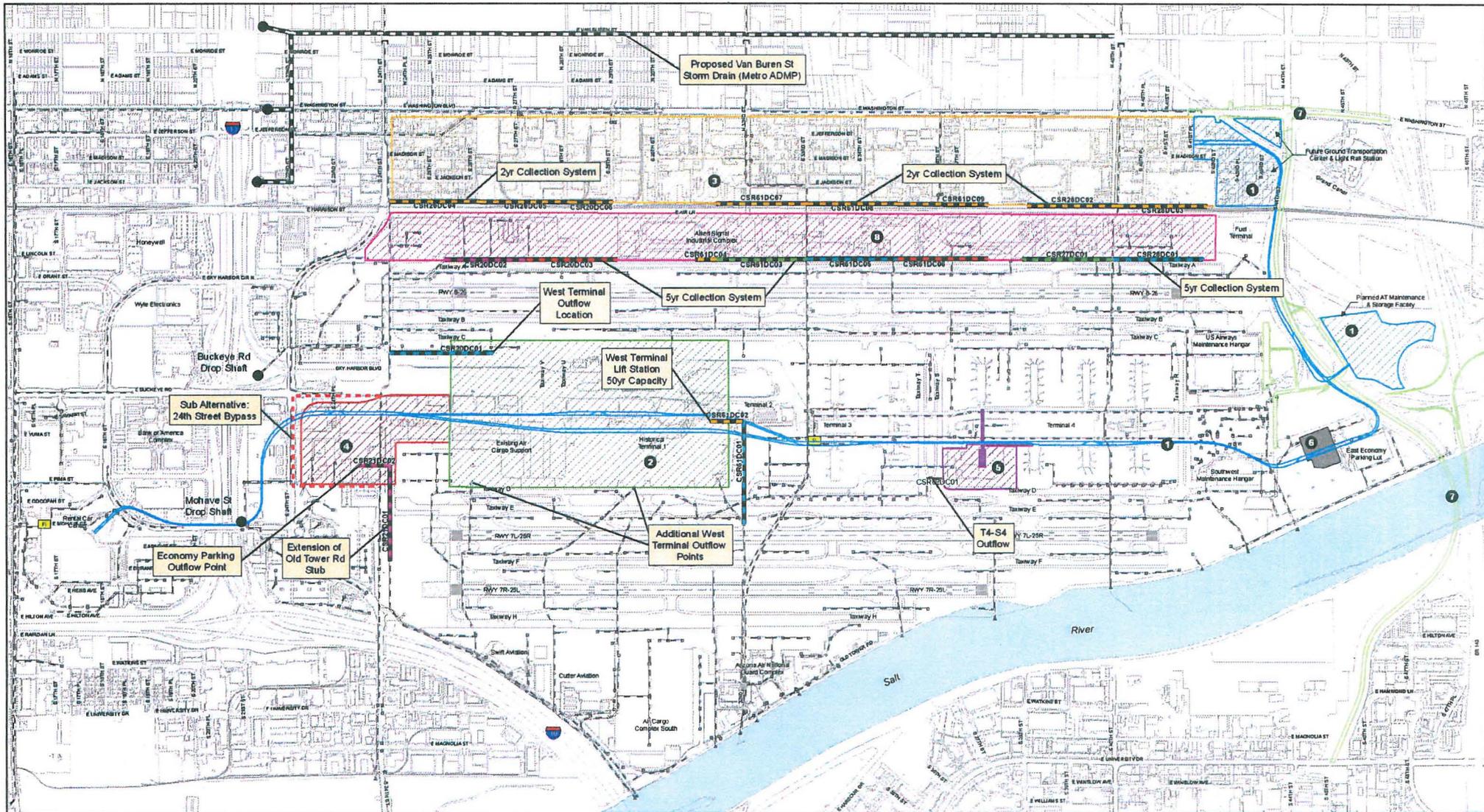
The conceptual alternatives were presented to the Aviation Department for concurrence before proceeding with the development of the alternatives. The Aviation Department elected to abandon the Onsite Retention Alternative due to the economic cost of setting aside a significant amount of land for storm water storage. The remaining two alternatives were evaluated using the SWMM computer model and refined based on the modeling results. The alternatives are described in the following sections.

## B. Alternative 1: Offsite Flow Diversion Alternative

### 1. Description

This alternative hinges on the recommendation set forth by FCDMC within the Metro ADMP for a regional storm drain system in Van Buren Street, between 40<sup>th</sup> Street and the I-10 Freeway. With this storm drain in place, offsite runoff is cut off from the Airport during the 10-year storm event, freeing capacity in the existing trunk lines in 24<sup>th</sup> Street, 32<sup>nd</sup> Street, and 40<sup>th</sup> Street. For analysis, runoff from a 5-year storm event is quantified for the Airport area and the remaining offsite area between Van Buren Street and Air Lane. Improvements on the Airport are designed to alleviate any remaining deficiencies in the system.

**Figure 4** displays the elements associated with this alternative. Each proposed pipe is labeled with a pipe ID which can be located in the cost estimate tabulation table (**Section III.B.3**) and the SWMM hydraulic model (**Appendix B**).



**PHX**  
PHOENIX SKY HARBOR  
INTERNATIONAL AIRPORT

**Drainage Master Plan  
Update**



**Legend**

Automated Train	Terminal 4 S1 Concourse	Existing Storm Drain	42" RCP
Automated Train Area	East Economy Parking Structure	24th St Storm Drain Diversion	48" RCP
West Terminal Area	SR153 Modifications for AT	24" RCP	54" RCP
Future North Development Area (Off Airport)	Future North Development Area (Airport Owned)	36" RCP	78" RCP
West Ground Transportation/Economy Parking	Existing ADOT Drop Shaft		

**Scale**

0 380 760 1520 Feet

**Notes:**

1. Planned project boundary and locations are a graphical representation only, and do not necessarily portray the actual location of future projects.
2. Existing storm drain alignments are a graphical representation only, and do not necessarily portray the actual location of pipes, in-wholes, blocks, and laterals.

Source: 2018 Aerial Ortho-rectified COP Data & Aerial Dept. Air-Data

**Dibble Engineering**

Figure 4  
**Alternative 1  
Offsite Flow Diversion**

Page 1 of 1  
May 2008

## 2. Project Elements

### a) Van Buren Street Storm Drain

The Van Buren Street diversion storm drain is to be designed for a 10-year storm event. The purpose of the diversion is two-fold. First, it will alleviate flooding at Washington Street, an existing low point and location of the light rail project. Second, it will reduce the offsite flows entering Sky Harbor Airport, essentially diverting flows to the west and around the airport, freeing capacity in the storm drain system for on-airport runoff. Below is an excerpt from the Metro ADMP Phase II Report:

*"The drainage area is approximately four square miles in size and the general fall of the land is from northeast to southwest. The [Union Pacific] Railroad forms a drainage divide along the north boundary of Sky Harbor Airport. North of the railroad, a wide swale is formed along the Washington Street alignment where the grade is due west. This swale accumulates surface flow that exceeds the capacity of the existing 2-year storm drain system. According to Metro Phoenix hydrologic model, the 100-year surface flow along Washington Street exceeds 1000cfs."*

*"[The Van Buren Street storm drain] potential includes cutting off the north-south flows from the existing 2-year storm drains in 24<sup>th</sup> Street and 40<sup>th</sup> Street and convey this flow plus the local 10-year discharge in a new storm drain located in Van Buren Street. The three existing storm drains that are truncated at Van Buren Street provide a significant benefit to the Airport...Truncating the existing storm drains at Van Buren Street would ultimately discharge into ADOT's east tunnel located under I-10."*

The system ranges in size from 72-inches at 40<sup>th</sup> Street to a 10'x8' concrete box culvert at the I-10 freeway. The anticipated cost is \$25,184,000. This project holds potential for cost sharing to the benefit of both the City of Phoenix and the Flood Control District of Maricopa County. Additional excerpts from the Metro ADMP Phase II report can be found in **Appendix A**.

### b) On-Airport Elements

This alternative requires only minimal improvements on the airport. The area planned for the West Ground Transportation project overtakes the existing storm drain in 24<sup>th</sup> Street (west of the project footprint) and will do the same if diverted to trunk line in 'old' 24<sup>th</sup> Street. Therefore, a 54-inch line (pipe ID CSR21DC01) is proposed to extend from the existing 78-inch storm drain stub just north of Old Tower Road. This stub is currently unused. This stub is shallow; however, based on preliminary sizing, the length and size make the design feasible. In addition, runoff from the clear zone just west of runways 7L-25R and 7R-25L will feed this line, removing load from the existing 'old' 24<sup>th</sup> Street trunk line.

Four outflow points are proposed for the West Terminal project area. The two southern outflow points make use of existing storm drain pipes. In order to drain the area of the West Terminal that is north of Sky Harbor Boulevard, a line is proposed to extend west to the existing 'old' 24<sup>th</sup> Street trunk line. Finally, in anticipation of the possibility of a depressed roadway section within the west terminal, a pump station is proposed at its eastern boundary. This pump delivers runoff to a new 54-inch line (pipe ID CSR61DC01); connecting to an existing 60-inch storm drain line that then connects to the 32<sup>nd</sup> Street trunk line.

For the future airfield area just south of Air Lane a 5-year collection system is sized to transport runoff to the trunk lines at 24<sup>th</sup> Street, 32<sup>nd</sup> Street, and 40<sup>th</sup> Street. Pipe sizes range from 24-inch

to 54-inch in diameter. The final location of these lines is subject to change, to be determined in the future based on the configuration and grading of the final land use.

For the area north of Air Lane a relatively small 2-year collection system collects roadway runoff only; all additional runoff is retained onsite per City of Phoenix requirements. Should the Airport and the City elect to waive the onsite retention requirement, additional facilities will be necessary. These facilities have been modeled and quantified and the additional estimated cost tabulated. This information can be found in **Appendix D-1**.

Finally, a 36-inch line (pipe ID CSR62DC01) is necessary to provide an outfall to the Terminal 4, S4 Concourse and associated apron area. This short reach of pipe connects to an existing 36-inch line near Taxiway T.

### **3. Performance**

#### **a) Impact to Airport Operations**

This alternative provides relative low impact to airport operations due to the fact that most of the improvements occur off airport. There are three conflicts with airside operations; these occur at (1) Taxiway C (2) Terminal 2 apron and Taxiway E and (3) Taxiway S.

#### **b) Constructability/Project Phasing**

There are a number of conflicts with major utilities associated with this alternative. The 'old' 24<sup>th</sup> Street alignment contains power lines, gas lines, and a 30-inch sewer line in addition to smaller utilities. It is likely that it will be necessary to cross this corridor with the extension of the 54-inch Old Tower Road stub (pipe ID CSR21DC02). Every effort will be necessary to avoid the large diameter sewer line. Further, the existing 24<sup>th</sup> Street trunk line exists here; it is deep, over 20 feet, and it may be possible to cross above it. In order to provide an outfall at the east end of the West Terminal area (pipe ID CSR61DC01) it will be necessary to cross an existing jet fuel line. It will likely be necessary to leave this line untouched, possibly requiring a special storm drain structure to span it. Existing power and fiber optic also exist here.

The full potential of this alternative is not obtained until the Van Buren Street storm drain is constructed. Before this time, all of the proposed elements that drain to the 3 major trunk lines will provide benefit to the airport during small storm events, but will be only marginally effective during the 5-year storm event. However, the Van Buren Street storm drain could be constructed in phases; first, starting at the I-10 freeway and building to 24<sup>th</sup> Street. The storm drain could be extended to 32<sup>nd</sup> Street and 40<sup>th</sup> Street in subsequent phases. Once each of these phases are in place, the remaining on-airport elements could be constructed. The on-airport improvements are self contained and will provide benefit to the airport drainage system independent of each other. Each would likely be constructed with the planned project that it serves.

#### **c) Construction Cost**

The estimated cost of this alternative is \$32,749,236. This cost includes 50% of the estimated cost of the Van Buren Street storm drain system proposed by the FCDMC. If the 50% cost-sharing is not achieved, the estimated cost of this alternative is \$45,341,235. **Table 1** provides a cost breakdown of the improvement elements.

**Table 1  
Cost Estimate: Alternative 1 - Offsite Flow Diversion**

	WATER RELOC (EA)	ELECTRIC RELOC (EA)	SEWER RELOC (EA)	FO COMM RELOC (EA)	GAS RELOC (EA)	FUEL RELOC (EA)	MISC RELOC (LF)
<b>UNIT COSTS</b>	\$10,000	\$20,000	\$100,000	\$10,000	\$25,000	\$100,000	\$50

I.D.	LENGTH (LF)	SIZE (IN)	MATERIAL TYPE	OFA CROSSING	UNIT COST (LF)	WATER (EA)	ELECTRIC (EA)	SEWER (EA)	FO COMM (EA)	GAS (EA)	FUEL (EA)	TOTAL COST
CSR20DC01	1497	48"	RCP		\$650	0	1	0	0	0	0	\$1,068,589
CSR20DC02	1184	54"	RCP		\$714	0	0	0	0	0	0	\$904,351
CSR20DC03	1320	36"	RCP		\$543	0	1	0	0	0	0	\$802,179
CSR20DC04	1320	24"	RCP		\$482	1	0	1	0	0	0	\$812,847
CSR20DC05	1320	24"	RCP		\$482	0	0	0	0	1	0	\$727,847
CSR20DC06	600	24"	RCP		\$482	1	0	0	0	0	0	\$329,476
CSR21DC01	1411	54"	RCP		\$714	0	0	0	0	0	0	\$1,078,079
CSR21DC02	447	54"	RCP		\$714	0	2	1	0	1	0	\$506,423
CSR27DC01	1320	36"	RCP		\$543	0	1	0	0	0	0	\$802,179
CSR28DC01	1320	48"	RCP		\$650	0	0	0	0	0	0	\$924,607
CSR28DC02	1320	24"	RCP		\$482	1	1	0	0	1	0	\$757,847
CSR28DC03	1320	24"	RCP		\$482	0	0	0	0	0	0	\$702,847
CSR61DC01	1507	48"	RCP	X	\$976	0	1	0	1	0	3	\$1,875,715
CSR61DC02	478	24"	RCP		\$482	0	1	0	0	0	1	\$374,516
CSR61DC03	1320	36"	RCP		\$543	0	0	0	0	0	0	\$782,179
CSR61DC04	300	24"	RCP		\$482	0	0	0	0	0	0	\$159,642
CSR61DC05	1320	48"	RCP		\$650	0	0	0	0	0	0	\$924,607
CSR61DC06	1320	42"	RCP		\$606	0	1	0	0	1	0	\$910,537
CSR61DC07	1320	24"	RCP		\$482	0	0	0	0	1	0	\$727,847
CSR61DC08	1320	24"	RCP		\$482	0	0	0	0	0	0	\$702,847
CSR61DC09	1320	24"	RCP		\$482	1	0	0	0	1	0	\$737,847
CSR62DC01	214	36"	RCP	X	\$814	0	0	0	0	0	0	\$184,688
<b>TOTALS</b>	<b>24,798</b>					<b>4</b>	<b>9</b>	<b>2</b>	<b>1</b>	<b>6</b>	<b>4</b>	<b>\$16,797,697</b>
<b>CONTINGENCY (20%)</b>												<b>\$3,359,539</b>
<b>SUBTOTAL</b>												<b>\$20,157,236</b>
<b>50% VAN BUREN ST STORM DRAIN COST (METRO ADMP)</b>												<b>\$12,592,000</b>
<b>TOTAL COST</b>												<b>\$32,749,236</b>

**d) Maintenance**

Because the Van Buren Street storm drain is off-airport, it eliminates a significant maintenance burden to airport staff. The remaining storm drain elements on the airport will require regular maintenance typical of underground storm drain systems; however, no unusual or unique circumstances are foreseen at this time. It is understood that the City of Phoenix Street Transportation Department, responsible for City storm drain systems, may require that Sky Harbor Airport cost-share in the maintenance of the off-site storm drain.

**e) Stormwater Management Effectiveness**

The presence of the Van Buren Street storm drain provides effective storm water management on many fronts. It is to be a 10-year capacity system. Eliminating flooding at Van Buren Street for storms up to and including that frequency. Further, it eliminates flooding at Washington Street for storm events including the 5-year event—exceeding the City required 2-year criteria. On the airport, it reduces the offsite flow to the 32<sup>nd</sup> Street and 40<sup>th</sup> Street storm drain lines to an extent that no significant stormwater on-airport elements are necessary, and these trunk lines have capacity in excess of the 5-year event. For the 24<sup>th</sup> Street trunk line, the improvements described above increase the capacity to the 5-year level.

As with all of the alternatives presented here, the stormwater solutions are intended for large-scale stormwater management. It may be necessary to provide additional stormwater improvements for small, isolated problem areas within the study area that are not captured by the scope of this Master Plan.

#### **4. Advantages**

- Majority of construction is off-airport, reducing impact to operations, construction overseeing by airport staff, and regular maintenance.
- The system provides excess capacity in the 32<sup>nd</sup> Street and 40<sup>th</sup> Street trunk lines, providing some capacity for storm events in excess of the 5-year storm.
- The future development area north of Air Lane is provided with 5-year level protection, above the 2-year benchmark required by the City of Phoenix.
- Once the Van Buren Street storm drain is in place, the remaining elements on the airport lend themselves to project phasing as individual, self contained, projects.
- There is a potential for cost sharing on the Van Buren Street storm drain line between the City of Phoenix and the Flood Control District of Maricopa County

#### **5. Disadvantages**

- Cost
- On-airport elements are only marginally effective until after the Van Buren street storm drain is in place.
- Complication of off-airport construction from a funding and coordination perspective.

## C. Alternative 2: Onsite Conveyance Alternative

### 1. Description

In order to eliminate flooding locations at the airport using an onsite conveyance approach additional facilities are required above those needed for Alternative 1 in order to relieve the load on the trunk lines at 24<sup>th</sup> Street, 32<sup>nd</sup> Street, and 40<sup>th</sup> Street. Additionally, this alternative results in some amount of 'flow by' at the UPRR, i.e. runoff not able to enter the storm drain system and directed west as surface flow. The system has been sized to eliminate this flow by during a 2-year storm event.

**Figure 5** displays the elements associated with this alternative. Each proposed pipe is labeled with a pipe ID which can be located in the cost estimate tabulation table (**Section III.B.3**) and the SWMM hydraulic model (**Appendix C**).

### 2. Project Elements

Like Alternative 1 the area planned for the West Ground Transportation project overtaxes the storm drain in 24<sup>th</sup> Street (west of the project footprint) and will do the same if diverted to the trunk line in 'old' 24<sup>th</sup> Street. Therefore, a 54-inch line (pipe ID CSR21DC01) is proposed to extend from the existing 78-inch storm drain stub just off Old Tower Road. This stub is currently unused. This stub is shallow; however, based on preliminary sizing, the length and size make the design feasible. In addition runoff from the clear zone just west of Runways 7L-25R and 7R-25L will feed this line, removing some load from the existing 24<sup>th</sup> Street trunk line.

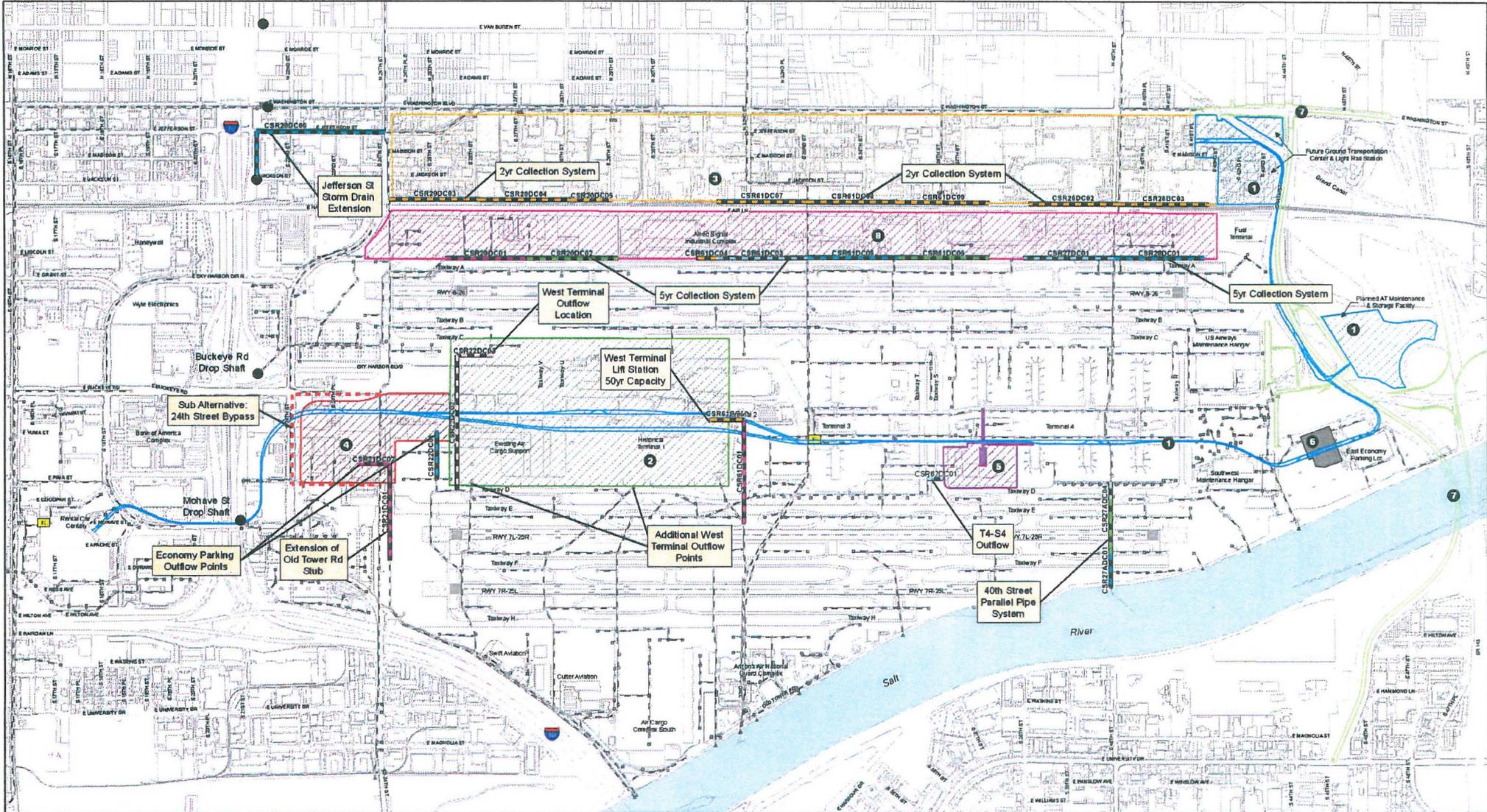
Four outflow points are proposed for the West Terminal. As in Alternative 1, the two southern outflow points make use of existing storm drain pipes. In order to drain the area of the west terminal that is north of Sky Harbor Boulevard, a 60-inch line (pipe ID CSR22DC02) is proposed to extend south to the existing Old Tower Road System. Due to the increased load to the 'old' 24<sup>th</sup> Street trunk line, this line is not able to connect to the 'old' 24<sup>th</sup> Street trunk as it does in Alternative 1. Finally, in anticipation of the possibility of a depressed roadway section within the West Terminal, a pump station is proposed at its eastern boundary. This pump delivers runoff to a new 54-inch line (pipe ID CSR61DC01); connecting to an existing 60-inch storm drain line that then connects to the 32<sup>nd</sup> Street trunk line. Pipe IDCSR61DC01 is required to be larger in this alternative as compared to Alternative 1 due to the higher peak flow in the system, raising the downstream hydraulic grade line of the new pipe.

A 36-inch line (pipe ID CSR62DC01) is necessary to provide an outfall to the Terminal 4, S4 Concourse and associated apron area. This short reach of pipe connects to an existing line near Taxiway T.

A parallel pipe system is necessary for the 40<sup>th</sup> Street trunk line. This system intercepts runoff generated south of Terminal 4, reducing the load on the existing trunk line. This system requires a new outfall to the Salt River. Pipe sizes range from 48-inches at the river to 36-inches at the T4 south concourse.

For the future airfield area just south of Air Lane a 5-year collection system is sized to transport runoff to the trunk lines at 24<sup>th</sup> Street, 32<sup>nd</sup> Street, and 40<sup>th</sup> Street. Pipe sizes range from 24-inch to 54-inch in diameter. The final location of these lines is subject to change, to be determined in the future based on the configuration and grading of the final land use.

For the area north of Air Lane a relatively small 2-year collection system collects roadway runoff only; all additional runoff is retained onsite per City of Phoenix requirements. Should the Airport and the City elect to waive the onsite retention requirement, additional facilities will be necessary. These facilities have been modeled and quantified and the additional cost tabulated. This information can be found in **Appendix D-2**.



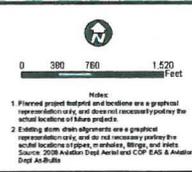
**PHX**  
PHOENIX SKY HARBOR  
INTERNATIONAL AIRPORT  
Drainage Master Plan  
Update



- Legend**
- Automated Train
  - Automated Train Area
  - West Terminal Area
  - Future North Development Area (Off Airport)
  - West Ground Transportation/Economy Parking

- Terminal 4 S1 Concourse
- East Economy Parking Structure
- SR 153 Modifications for AT
- Future North Development Area (Airport Owned)
- Existing ADOT Drop Shaft

- Storm\_Conduit\_Alt3
- 24th St Storm Drain Diversion
- 24" RCP
- 30" RCP
- 36" RCP
- 48" RCP
- 54" RCP
- 60" RCP



**Dibble Engineering**

Figure 5  
Alternative 2  
Onsite Conveyance

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**Note:**  
1. Planned project footprint and locations are a graphical representation only, and do not necessarily portray the actual location of future projects.  
2. Existing storm drain alignments are a graphical representation only, and do not necessarily portray the actual location of pipes, manholes, bridges, and structures.  
Source: 2008 Aviation Trust Report and CIP 648 & Aviation Dept. AS-B-016

Based on model results, the elements described above provide 5-year level protection on the airport; however, fail to provide 2-year protection in the area north of Air Lane, near 24<sup>th</sup> Street. Therefore, an additional 2-year pipe system (pipe ID CSR20DC06) has been sized to extend from the existing storm drain at Jefferson Street. This 48-inch line will then outfall to an existing ADOT drop shaft at Interstate 10.

### **3. Performance**

#### **a) Impact to Airport Operations**

Due to the increased number of elements on the airport this alternative is expected to result in higher impacts to airport operations as compared to Alternative 1. The most significant of which is the construction of the parallel pipe system for the 40<sup>th</sup> Street trunk line (pipe ID CSR27ADC01). This new pipeline would bisect a significant portion of Runway 7L-25R, in addition to taxiway D, E, and F. Three additional conflicts due to other stormwater elements are (1) Taxiway C (2) Terminal 2 apron and Taxiway E and (3) Taxiway S.

#### **b) Constructability/Project Phasing**

There are a number of conflicts with major utilities associated with this alternative. The 'old' 24<sup>th</sup> Street alignment contains power lines, gas lines, and a 30-inch sewer line in addition to smaller utilities. It is likely that it will be necessary to cross this corridor with the extension of the 54-inch Old Tower Road stub (pipe ID CSR21DC02). Every effort will be necessary to avoid the large diameter sewer line. Further, the existing 24<sup>th</sup> Street trunk line exists here; it is deep, over 20 feet, and it may be possible to cross above it. In order to provide an outfall at the east end of the west terminal area (pipe ID CSR61DC01) it will be necessary to cross an existing jet fuel line. It will likely be necessary to leave this line untouched, possibly requiring a special storm drain structure to span it. Existing power and fiber optic also exist here. Finally, a significant sewer crossing exists at the proposed 40<sup>th</sup> Street trunk line parallel pipe system (pipe ID CSR27ADC01). The SRP 72-inch sewer line crosses the preliminary alignment. Relocation of this line is largely impractical. It is likely that the proposed storm drain will be located above the line. If a conflict does exist it may possibly require a special storm drain structure to span it.

Unlike Alternative 1, this Alternative does not require the construction of a large offsite diversion before benefit could be obtained from the independent projects on the airport. The improvements lend themselves to project phasing. They are self contained and will provide benefit to the airport drainage system independent of each other. Each would likely be constructed with the planned project that it serves.

#### **c) Construction Cost**

The estimated cost of this alternative is \$26,096,776. **Table 2** provides a cost breakdown of the improvement elements.

**Table 2  
Cost Estimate: Alternative 2 - Onsite Conveyance Alternative**

	WATER RELOC (EA)	ELECTRIC RELOC (EA)	SEWER RELOC (EA)	FO COMM RELOC (EA)	GAS RELOC (EA)	FUEL RELOC (EA)	MISC RELOC (LF)	
<b>UNIT COSTS</b>	\$10,000	\$20,000	\$100,000	\$10,000	\$25,000	\$100,000	\$50	

I.D.	LENGTH (LF)	SIZE (IN)	MATERIAL TYPE	OFA CROSSING	UNIT COST (LF)	WATER (EA)	ELECTRIC (EA)	SEWER (EA)	FO COMM (EA)	GAS (EA)	FUEL (EA)	TOTAL COST	
CSR20DC01	1184	54"	RCP		\$714	0	0	0	0	0	0	\$904,351	
CSR20DC02	1320	42"	RCP		\$606	0	1	0	0	0	0	\$885,537	
CSR20DC03	1320	24"	RCP		\$482	1	0	1	0	0	0	\$812,847	
CSR20DC04	1320	24"	RCP		\$482	0	0	0	0	1	0	\$727,847	
CSR20DC05	600	24"	RCP		\$482	1	0	0	0	0	0	\$329,476	
CSR20DC06	1861	48"	RCP		\$650	0	0	0	0	0	0	\$1,303,556	
CSR20DC07	337	48"	RCP		\$650	0	0	0	1	0	0	\$246,055	
CSR21DC01	1411	54"	RCP		\$714	0	0	0	0	0	0	\$1,078,079	
CSR21DC02	447	54"	RCP		\$714	0	2	1	0	1	0	\$506,136	
CSR22DC01	698	48"	RCP		\$650	0	0	0	0	0	0	\$489,233	
CSR22DC02	1968	60"	RCP		\$794	0	1	0	2	1	0	\$1,726,347	
CSR22DC03	522	60"	RCP		\$794	0	0	0	0	0	0	\$440,839	
CSR27ADC01	478	48"	RCP	X	\$976	0	0	1	0	0	0	\$589,887	
CSR27ADC02	74	42"	RCP	X	\$909	0	0	0	0	0	0	\$70,663	
CSR27ADC03	455	42"	RCP	X	\$909	0	0	0	0	0	0	\$436,504	
CSR27ADC04	270	42"	RCP	X	\$909	0	1	0	0	0	0	\$278,707	
CSR27ADC05	28	36"	RCP	X	\$814	0	0	0	0	0	0	\$24,601	
CSR27ADC06	215	36"	RCP	X	\$814	0	0	0	0	0	0	\$185,538	
CSR27DC01	1320	36"	RCP		\$543	0	1	0	0	0	0	\$802,179	
CSR28DC01	1320	48"	RCP		\$650	0	0	0	0	0	0	\$924,607	
CSR28DC02	1320	24"	RCP		\$482	1	1	0	0	1	0	\$757,847	
CSR28DC03	1320	24"	RCP		\$482	0	0	0	0	0	0	\$702,847	
CSR61DC01	1507	54"	RCP	X	\$1,071	0	1	0	1	0	3	\$2,018,918	
CSR61DC02	478	24"	RCP		\$482	0	1	0	0	0	1	\$374,516	
CSR61DC03	1320	36"	RCP		\$543	0	0	0	0	0	0	\$782,179	
CSR61DC04	300	24"	RCP		\$482	0	0	0	0	0	0	\$159,642	
CSR61DC05	1320	48"	RCP		\$650	0	0	0	0	0	0	\$924,607	
CSR61DC06	1320	42"	RCP		\$606	0	1	0	0	1	0	\$910,537	
CSR61DC07	1320	24"	RCP		\$482	0	0	0	0	1	0	\$727,847	
CSR61DC08	1320	24"	RCP		\$482	0	0	0	0	0	0	\$702,847	
CSR61DC09	1320	24"	RCP		\$482	1	0	0	0	1	0	\$737,847	
CSR62DC01	214	36"	RCP	X	\$814	0	0	0	0	0	0	\$184,688	
<b>TOTALS</b>	<b>30,207</b>					<b>4</b>	<b>10</b>	<b>3</b>	<b>4</b>	<b>7</b>	<b>4</b>	<b>\$21,747,314</b>	
												<b>CONTINGENCY (20%)</b>	<b>\$4,349,463</b>
												<b>TOTAL COST</b>	<b>\$26,096,776</b>

**d) Maintenance**

The storm drain elements on the airport will require regular maintenance typical of underground storm drain systems; however, no unusual or unique circumstances are foreseen at this time.

**e) Stormwater Management Effectiveness**

Alternative 2 provides adequate stormwater management effectiveness for the 5-year storm event on the airport and the 2-year storm event north of Air Lane. However, there is very little excess capacity in the system for larger storm events. Further, in the vicinity of the UPRR and 24<sup>th</sup> Street there is excess runoff during a 5-year event that is not captured by the system. This runoff will flow west as surface flow toward I-10, as it does in the existing condition.

As with all of the alternatives presented here, the stormwater solutions are intended for large scale stormwater management. It may be necessary to provide additional stormwater improvements for small, isolated problem areas within the study area that are not captured by the scope of this master plan.

#### **4. Advantages**

- Cost
- All elements provide benefit independent of one another, lending themselves to project phasing
- Airport has control of construction elements
- Minimized off-airport coordination

#### **5. Disadvantages**

- Increased impact to airport operations
- Increased potential for major utility conflicts
- Very little excess capacity for storm events in excess of minimum requirement
- Residual 'flow by' upstream of the UPRR embankment for storms in excess of the 2-year storm event

## **D. Alternative 3: Regional Retention Alternative**

### **1. Description**

This alternative centers on the use of three retention basins, one for each of the primary storm drain trunk lines, to reduce the peak discharge from areas off of the airport.

### **2. Project Elements**

Preliminary sizing of the retention basins indicates that each will require approximately 5 to 10 acres of surface area. Additional on airport elements are necessary to eliminate deficiencies in system. Due to the size of the basins and reduction in developable land area, the City has elected to not pursue this alternative further.

### **3. Advantages**

- Majority of construction is outside of the airfield operating area, reducing impact to operations, construction overseeing by airport staff, and regular maintenance.
- Once the Van Buren Street storm drain is in place, the remaining elements on the airport lend themselves to project phasing as individual, self contained, projects.
- On-airport elements are only marginally effective until after the Van Buren street storm drain is in place.

### **4. Disadvantages**

- Cost
- Reduced long term revenue potential due to land lost to retention basins
- On-airport elements are only marginally effective until after the regional retention basins are in place.

## **E. Sub-Alternative: 24<sup>th</sup> Street Bypass**

### **1. Description**

A parking structure is planned for the West Ground Transportation area at the southeast corner of Buckeye Road and 24<sup>th</sup> Street. As mentioned in **Section II** the footprint for this area spans the existing trunk line at the 'old' 24<sup>th</sup> Street alignment. Dibble Engineering (Dibble) contacted the City of Phoenix (COP) Street Transportation Department in order to determine required surface clearances for construction of surface structures above existing storm drain pipes. These discussions resulted in the following recommendations.

Surface structures may span an existing storm drain pipe. However, a minimum horizontal and vertical clearance at the ground floor should be provided to allow maintenance of the pipeline and to eliminate loading of the pipe. A minimum 1:1 vertical to horizontal excavation sideslope should be expected for the entire depth to the pipeline invert elevation. An additional two feet horizontal width should be expected on both sides of the pipe extents. The existing pipeline at the potential project location is approximately 20' deep. The pipe is roughly 6.5' in diameter. This results in a clearance width of approximately 50'. Vertical clearance should be such that the boom of an excavator has space to operate. This could be as much as 16' vertical clearance.

These requirements are likely to result in the loss of a single 50' wide bay and two vertical parking levels. The ground floor of the structure within the 50' side corridor may be paved and used for parking. Coordination and agreement with airport operations and maintenance personnel will be in order during further planning and design of the potential project.

Due to these design constraints entailed with building a structure above a storm drain the City has requested that a storm drain bypass be considered in the alternatives analysis. This sub-alternative could be added to any of the main alternatives.

### **2. Project Elements**

The proposed alignment of the bypass of the 78-inch storm drain trunk line is shown on both **Figure 4** and **Figure 5**. The project will require abandonment or removal of approximately 1400 feet of existing storm drain line. 3,900 feet of new 78-inch line is required to avoid the footprint of the West Ground Transportation area.

### **3. Performance**

There is enough fall in the existing storm drain trunk line that the bypass does not significantly affect hydraulic performance. However, there are significant impacts to existing utilities. A 30-inch sanitary sewer exists in the 'old' 24<sup>th</sup> Street alignment. A 27-inch sanitary sewer exists at 24<sup>th</sup> Place. The proposed bypass line would have to cross both of these lines twice. There will be additional conflicts with Southwest Gas, APS power, and fiber optic lines. The estimated cost of the bypass is \$5,476,448. **Table 3** provides a cost breakdown of the improvement elements.

**Table 3**  
**Cost Estimate: Sub-alternative - 24th Street Bypass**

	WATER RELOC (EA)	ELECTRIC RELOC (EA)	SEWER RELOC (EA)	FO COMM RELOC (EA)	GAS RELOC (EA)	FUEL RELOC (EA)	MISC RELOC (LF)
<b>UNIT COSTS</b>	\$10,000	\$20,000	\$100,000	\$10,000	\$25,000	\$100,000	\$50

I.D.	LENGTH (LF)	SIZE (IN)	MATERIAL TYPE	UNIT COST (LF)	WATER (EA)	ELECTRIC (EA)	SEWER (EA)	COMM (EA)	GAS (EA)	FUEL (EA)	TOTAL COST
CSR20DC01	1269	78"	RCP	\$976	0	1	1	1	0	0	\$1,431,906
CSR20DC02	2253	78"	RCP	\$976	0	0	0	0	0	0	\$2,311,686
CSR20DC03	1406	78"	RCP	\$976	0	1	2	2	2	0	\$1,732,856
<b>TOTALS</b>	<b>4,928</b>				<b>-</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>-</b>	<b>\$5,476,448</b>

**4. Advantages**

- No need for dedicated storm drain clearance corridor within parking structure footprint

**5. Disadvantages**

- Cost
- Potential for major utility relocations

#### **IV. EVALUATION OF ALTERNATIVES**

Selection of the preferred alternative is based on an evaluation of the *Offsite Flow Diversion Alternative* and the *Onsite Conveyance Alternative* to determine which alternative best meets the performance criteria which were identified as important for implementation of the storm water master plan. This section describes the performance criteria used in the evaluation and presents an evaluation matrix for use in selecting the preferred alternative during a Stakeholder Evaluation Workshop.

##### **A. Performance Criteria**

The following performance criteria were established as a basis for evaluating the alternatives:

**Impact to Airport Operation** – Measures the impact to the day-to-day operations of the airport during construction of the alternative as well as from the completed project. Alternatives receiving a low rating would include alternatives that require construction adjacent to and across runways, leave surface features that could pose hazards to aircraft or inhibit mobility with features such as open channels and basins. Alternatives receiving a high rating would include alternatives constructed away from runways or heavy traffic areas or better yet, off the airport property and result in closed underground systems with limited surface features. Alternatives constructed concurrent with and adjacent to airport development projects would receive a favorable rating because they don't add appreciably to disruptions to operations that are already caused by the improvement project itself.

**Constructability / Construction Phasing** – Measures the construction impacts of the alternative separate from impacts to airport operations. Alternatives receiving a low rating would include alternatives that have construction challenges such as deep trenches, complex utility crossings or relocations, confined work spaces, etc and alternatives that require constructing larger projects at one time with the higher upfront costs to allow it to be put in service for its intended purpose. Alternatives receiving a high rating would include alternatives that have minimal construction challenges and can be easily phased with the construction of airport development projects to allow spreading of implementation costs over a longer time.

**Construction Cost** – Measures the relative cost to construct the project. Alternatives receiving a low rating would include alternatives that are more costly. Alternatives receiving a high rating would include alternatives that cost less.

Cost estimates are prepared for each alternative based upon the unit and quantity of materials necessary to construct that alternative and an estimate of cost to relocate utilities in conflict with the alternative. This estimate includes such things as linear feet of storm drain pipe and associated manholes, tees, and catchbasins, cubic yard of cut/fill material for the construction of storage basins, surface replacement costs, construction mobilization, miscellaneous removals, and traffic control. In additional 50% cost increase is added to the pipe unit cost if the storm drain passes through an airside operations area, including taxiways, runways, aprons, etc. This is shown as OFA Crossing on the cost estimate.

**Maintenance** – Measures the ease, frequency, and ongoing cost of maintenance. Alternatives receiving a low rating would include alternatives that require frequent maintenance such as mowing, trimming and cleaning; require costly maintenance procedures such as watering or specialized equipment, or pose maintenance challenges such as difficult access. Alternatives receiving a high rating would include alternatives that require little or no maintenance by airport forces.

Maintenance by other departments or agencies would be good, and alternatives that require only infrequent maintenance activities without special challenges.

**Storm Water Management Effectiveness** – Measures the effectiveness at eliminating flooding, preventing ponding, and conveying runoff to a suitable outfall for a wide range of storm frequencies. Alternatives receiving a low rating would include alternatives that require some form of intervention to be effective such as pumps or manual gate operations or does not completely address flooding problems by leaving areas unprotected or with nuisance ponding or would result in significant flooding in the event of a storm in excess of the design storm. Alternatives receiving a high rating would include alternatives that are passive and function with no intervention and fully address flooding issues for a wide range of storm recurrence frequencies including those in excess of the design storm event.

**B. Evaluation Matrix**

The Alternatives are evaluated using an evaluation matrix which facilitates the consideration of a range of performance criteria without the need to assign a dollar value to each. The various criteria are assigned a weighting factor to give more weight to criteria that are deemed to be more important than others in guiding the selection of the preferred alternative. The Evaluation Matrix is shown in **Figure 6**.

**Figure 6 – Evaluation Matrix**

PERFORMANCE CRITERIA	FACTOR	ALT. 1 Off-Site Diversion	ALT. 2 On-Site Convey.
Impact to Airport Operation			
Constructability/Construction Phasing			
Construction Cost			
Maintenance			
Storm Water Mgmt Effectiveness			
Score			
Rank			

The evaluation process is set up to compare one alternative against another rather than requiring that an absolute score be assigned to each. The matrix is used with a team of evaluators to reflect the collective wisdom of the group and to preclude any individual from skewing the results based on personal bias or preference. The weighting factor is assigned first by initially assuming a neutral value of 2. The neutral factor of 2 is raised to a 3 for criteria that should be weighed more heavily than others. The factor is reduced to 1 for criteria that should be weighed less heavily than others. The alternatives are then compared with each other by ranking them according to how well they meet the performance criteria. The alternative that best meets each performance criteria is assigned a 2 and the remaining alternative, which isn't as effective at meeting the criteria is assigned a 1. This comparison process is repeated and scores assigned to each of the criteria. A total score is then computed for each alternative by summing the products of rank and weighting factor for each criterion.

### **C. Stakeholder Evaluation Workshop**

The Evaluation Matrix will be used in the Stakeholder Evaluation Workshop to identify the preferred alternative which will then be further developed as the Recommended Plan. Stakeholder groups will designate a representative to submit a completed matrix form representing the results of that group's evaluation. The completed forms from each stakeholder group will then be combined to form a composite evaluation. The composite weighting factor will be based on an average of the weighting factors assigned by each stakeholder group. The composite ranking for each criterion will be based on the sum of the ranking scores assigned by each stakeholder group. The following stakeholder groups will be invited to submit a completed matrix evaluation form at the Stakeholder Evaluation Workshop:

- PSHIA Operations
- PSHIA Design & Construction Services
- PSHIA Planning and Environmental
- PSHIA Maintenance and Facilities
- Phoenix Street Transportation Department

Each stakeholder group is provided with this report to be reviewed prior to the workshop as a way to become familiar with the elements of each alternative as well as the advantages, disadvantages, and costs. The Aviation Department and Consultant team will make a summary presentation at the workshop and will facilitate a discussion to answer any questions and allow for stakeholder input which can be considered by the other evaluators in assigning weighting factors and rankings. Following the discussion, each stakeholder group will be asked to complete their form. The scores from the completed forms will then be tallied and the final ranking will be reported back to the group before the end of the meeting.

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**Appendix D**  
**MEMORANDUMS**

**Appendix D.1**  
**ARIZONA DEPARTMENT OF TRANSPORTATION**



**Engineering and Environmental Consultants, Inc.**

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# MEMORANDUM

**To:** Afshin Ahouraiyan; Ken Akoh-Arrey; Steve Wilcox

**Date:** July 17, 2008

**Copy:** Mark Gavan; Jeff Minch

**From:** Lloyd Vick/Charles T. Griffith

**Project No.** 305008

**Project:** Metro Phoenix ADMP (FCD2004C040)

**Subject:** Recommended Plan Hydrology

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EEC has completed the recommended plan. It is currently under review by the District. The proposed conditions hydrology models are complete. EEC will provide ADOT, and any other interested stakeholders, with the final models and supporting documentation.

## PLANNED CONNECTIONS TO ADOT'S DRAINAGE SYSTEM

The recommended plan for the Metro ADMP includes eight (8) storm drain connections to ADOT's drainage system. In addition, the City has plans to make two other connections. These are the 28<sup>th</sup> Street and 36<sup>th</sup> Street storm drain connections to the Loop 202 storm water interceptor. The attached exhibit presents these ten future connections as well as the City's existing storm drain connections.

### West Tunnel Connections (4 Connections)

The Metro ADMP recommends four (4) storm drain connections to the ADOT's West Tunnel in the Downtown area. The City and ADOT agreed to these connections in 1984 (refer to IGA#33226). The following table compares the ADOT design inflows at these locations versus the proposed storm drain peak discharges taken from the Metro ADMP 10-year, 24 hour model.

Connection	HNTB Peak Discharge	Metro ADMP Peak Discharge
Location	[cfs]	[cfs]
<b>West Tunnel</b>		
Fillmore Street	140	112
Grant Street	170	157
Tonto Street	135	136
Mohave Street	60	64

### **East Tunnel Connections (2 Connections)**

The Metro ADMP recommends two (2) connections to the ADOT's East Tunnel which will provide an outfall for a new storm drain in Van Buren Street. The new storm drain will run along Van Buren Street from I-10 to 40<sup>th</sup> Street. The following table compares the ADOT design inflows at these locations versus the proposed storm drain peak discharges taken from the Metro ADMP 10-year, 24 hour model.

	HNTB	Metro ADMP
Connection	Peak Discharge	Peak Discharge
Location	[cfs]	[cfs]
<b>East Tunnel</b>		
Adams Street	600	614
Van Buren Street	368	368

### **Loop 202 Storm Water Interceptor Connections (2 Connections)**

The City plans to construct 2-year storm drains in 28<sup>th</sup> Street and 36<sup>th</sup> Street which will connect to the storm water interceptor along the Loop 202. The City and ADOT agreed to these connections in 1986 (refer to IGA#42727). The agreed upon flow rates are 236 cfs and 251 cfs for 28<sup>th</sup> Street and 36<sup>th</sup> Street, respectively.

### **I-10 Storm Water Interceptor Connection (1 Connection)**

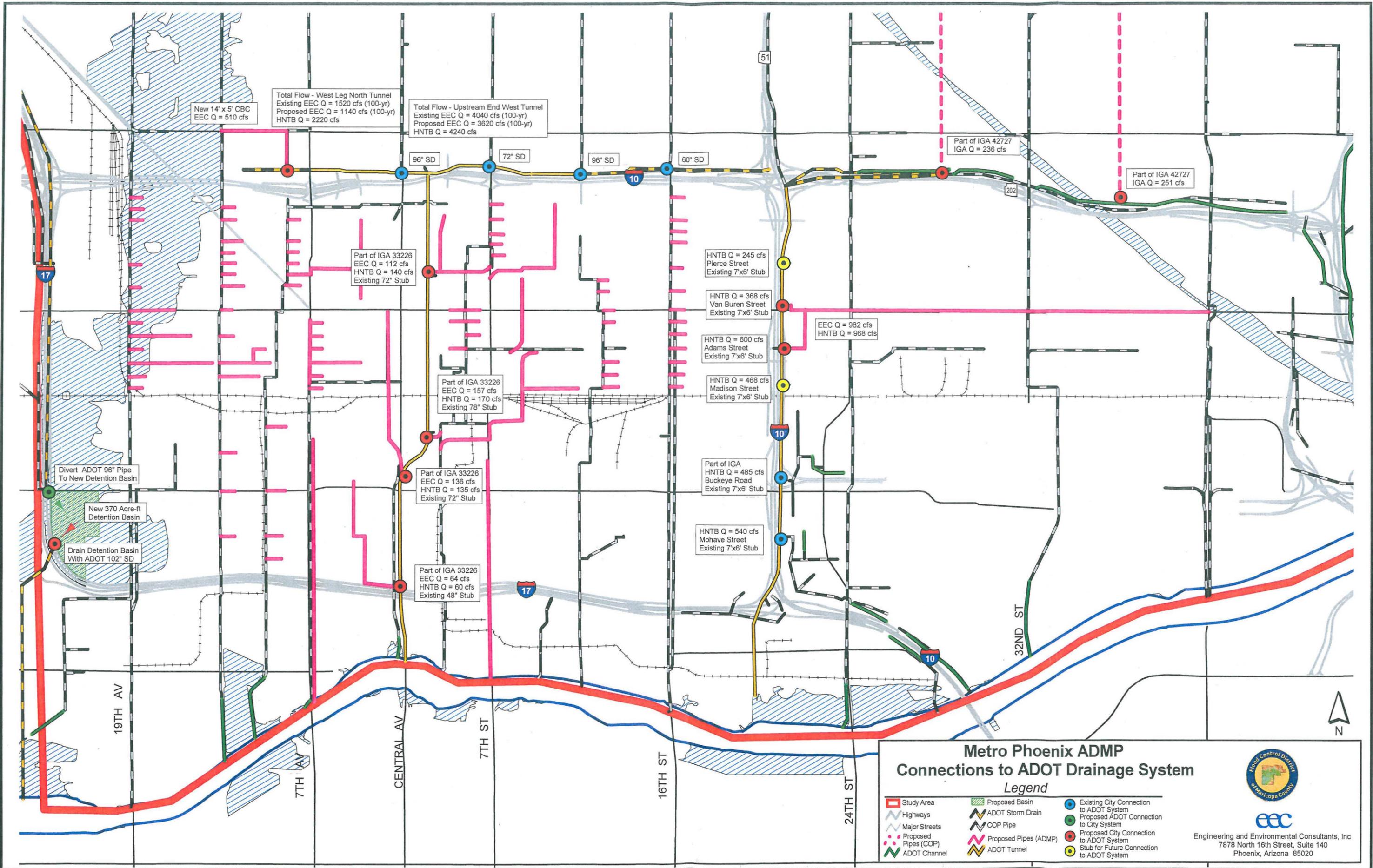
The Metro ADMP recommends enlarging the storm drain connection to the I-10 storm drain interceptor at 9<sup>th</sup> Avenue. The existing storm drain is 75 inches in diameter. The new storm drain is a 14ft x 5ft box culvert; upsized to capture the 10-year flood. Although this represents a significant increase in the size of the storm drain, the net effect on the storm water interceptor is a reduction in total flow. The 100-year peak discharge for the west leg of the north tunnel under existing conditions model is 1520 cfs; whereas, under proposed conditions the 100-year, 24-hour peak discharge is reduced to 1140 cfs. This reduction in total flow to the interceptor is due to planned, upstream flood water storage at Encanto and Palo Verde Golf Courses. Its also important to point out that ADOT's design flow for the interceptor is 2220 cfs which is the flow entering the west tunnel from the west leg of the north tunnel. Therefore, the Metro ADMP predicts peak discharges that are somewhat lower than the ADOT design flows.

### **I-17 Outfall Pipe Connection (1 Connection)**

The Metro ADMP recommends a new flood water detention basin at the Durango Curve, located on the upstream side of I-17. The existing I-17 storm drain (96-inch diameter) will be diverted into the new basin at Buckeye Road. Then, the same ADOT storm drain will be used to drain the basin to the Salt River.

### **Intergovernmental Agreements (IGA's)**

See Appendix A for copies of the IGA's between City of Phoenix and ADOT.



### Metro Phoenix ADMP Connections to ADOT Drainage System

*Legend*

<ul style="list-style-type: none"> <li><span style="color: red;">■</span> Study Area</li> <li><span style="color: blue;">—</span> Highways</li> <li><span style="color: grey;">—</span> Major Streets</li> <li><span style="color: red;">●</span> Proposed Pipes (COP)</li> <li><span style="color: green;">—</span> ADOT Channel</li> </ul>	<ul style="list-style-type: none"> <li><span style="color: green;">■</span> Proposed Basin</li> <li><span style="color: blue;">—</span> ADOT Storm Drain</li> <li><span style="color: grey;">—</span> COP Pipe</li> <li><span style="color: red;">—</span> Proposed Pipes (ADMP)</li> <li><span style="color: yellow;">—</span> ADOT Tunnel</li> </ul>	<ul style="list-style-type: none"> <li><span style="color: blue;">●</span> Existing City Connection to ADOT System</li> <li><span style="color: green;">●</span> Proposed ADOT Connection to City System</li> <li><span style="color: red;">●</span> Proposed City Connection to ADOT System</li> <li><span style="color: yellow;">●</span> Stub for Future Connection to ADOT System</li> </ul>
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Engineering and Environmental Consultants, Inc  
7878 North 16th Street, Suite 140  
Phoenix, Arizona 85020

**Appendix A**  
**INTERGOVERNMENTAL AGREEMENT**

ECS FILE NO: JPA 86-003  
PROJECT: AZM-600-5-303 PE  
SECTION: East Papago Storm Drain

42727

INTERGOVERNMENTAL AGREEMENT  
BETWEEN  
THE STATE OF ARIZONA  
AND  
THE CITY OF PHOENIX

THIS AGREEMENT entered into this 22nd day of August, 1986, between the STATE OF ARIZONA, hereinafter called "State", and the City of Phoenix, acting by and through its City Council, hereinafter called "City".

WHEREAS, State is empowered by Section 28-108 Arizona Revised Statutes to enter into this Agreement and has by resolution, a copy of which is attached hereto and made a part hereof, resolved to enter into this Agreement and the Director of the Arizona Department of Transportation has delegated to the undersigned the authority to execute same on behalf of the State; and

WHEREAS, City is empowered by Section 9-672B Arizona Revised Statutes and Chapter II, Section 2 of the Phoenix City Charter to enter into this Agreement and acting by and through its City Council, has, by resolution, a copy of which is attached hereto and made a part hereof, resolved to enter into this Agreement and has authorized the undersigned to execute same on behalf of City; and

WHEREAS, State proposes to construct an underground drainage system for the purpose of carrying away surface storm water in the vicinity of the East Papago Freeway, S.R. 217, where said highway traverses that portion of the City of Phoenix lying between 24th Street on the west and 44th Street on the east.

WHEREAS, City has requested State to increase the carrying capacity of its proposed East Papago drainage system to accommodate the additional flows of existing City storm sewer at 24th Street and in addition to provide connections for planned future storm sewers in 28th Street and 36th Street; and

WHEREAS, increasing the capacity of said system to accommodate City storm water will result in additional cost, the City agrees to pay in the manner set forth below.

NO. <u>11428</u>
FILED WITH SECRETARY OF STATE
Date Filed <u>09-15-86</u>
<i>[Signature]</i>

THEREFORE, the parties hereto agree as follows:

STATE SHALL:

1. Design, construct, operate and maintain the East Papago Drainage System as required to intercept and convey the storm flows as described above.

2. Grant and hereby does grant permission to the City to convey flows to the East Papago Storm Drain at the location and quantity specified herein:

<u>LOCATION</u>	<u>QUANTITY</u>	<u>SIZE</u>	<u>INVERT</u>
24TH Street	129 cfs. (Existing)	60"	1100.66
27th Street	236 cfs. (Future)	72"	1106.00
36th Street	251 cfs. (Future)	72"	1126.50

3. During construction, provide the necessary connections between said Drainage System and existing storm sewers as described above and provide for connections to planned future storm sewers as described above. The City shall have the right to connect existing and future storm drainage systems at those locations stated above and as shown on the plans of the State.

4. Submit billings to City at 90-day intervals. Such billings shall constitute City's prorated share of actual construction costs incurred. The total amount of all billings to City shall not exceed \$2,000,000.00.

5. The State assumes full responsibility for the design, plans and specifications, and the engineering in connection therewith and the construction of the improvements contemplated by this Agreement, except the storm drainage systems of the City. It is understood and agreed that the City's financial participation in relation to the construction of this project is confined solely to the amount stated in Paragraph 4 in regard to participating with the funding of this project. Any damages arising from the construction of this project, except with respect to the City storm drainage systems or any modifications thereof, shall be solely the liability of the State and the State agrees to save and hold harmless and indemnify from loss the City, any of its departments, agencies, officers or employees from any and all cost and/or damage incurred by any of the above and from any other damage to any other person or property whatsoever, which is caused by any activity, condition, or event arising out of the performance or nonperformance of any provision of this Agreement by the State, any of its departments, agencies, officers and employees in carrying out the provisions of this Agreement. Costs incurred by the City, any of its departments, agencies, officers or employees shall include, in the event of any action, court costs, expenses of litigation or attorney's fees. State will require the contractor to carry general liability insurance in the amount normally

required for this type of construction contract throughout the course of construction of the project, naming thereon as additional named insureds, the State, its departments, agencies, agents and employees and the City. The contractor coverage shall be primary for any and all losses arising out of the course of construction of the project.

CITY SHALL:

1. By separate action, grant an easement to State for construction and maintenance of said underground drainage system within the public right of way; provided, however, said easement shall be subject to use of the public right of way for transportation and governmental purposes. The City shall convey whatever title it has as to any such right of ways. In granting such easement to the State, the City is conveying to the State such interest as it may have in the public right of way for use by the State for an underground drainage system.

2. Pay to the State the amount due on each 90-day billing; provided that City's total contributions do not exceed \$2,000,000.00.

3. In no manner place a burden upon the drainage system to which this Agreement relates which is greater than it was designed to accommodate and the City shall place only surface storm drainage waters into the said drainage system in the volumes and at the locations indicated on the plans. The City shall not place deleterious, hazardous or toxic substances of any nature into the said storm drainage system.

4. In affirmatively exercising any of its rights to connect to the State's underground drainage system and in exercising its right to use and enjoy the benefits of that system under and by virtue of this Agreement, to be solely liable to the State, and the City agrees to save and hold harmless and indemnify from loss the State, any of its departments, agencies, officers or employees from any and all cost and/or damage incurred by any of the above and from any other damage to any other person or property whatsoever, which is caused by any activity, condition, or event arising out of the performance or non-performance of any provision of this Agreement by the City, any of its departments, agencies; officers and employees in connecting to the State's underground drainage system and in exercising its right to use and enjoy the benefits of that system. Costs incurred by the State, any of its departments, agencies, officers, or employees shall include in the event of any action, court costs, expenses of litigation and attorneys fees.

IT IS FURTHER AGREED THAT:

The determination of cost allocation for the East Papago Storm Drain System shall be as follows: The cost of the collection system along the freeway shall be borne 100% by ADOT. The cost of that construction which is solely for the convenience or conveyance of storm water by the City shall be borne 100% by the City. The cost of the combined conduit system conveying the freeway storm water and the city storm water shall be prorated according to the engineer's cost estimate.

ADOT's proration shall be the ratio of the cost for a smaller conduit, without city water, to the cost of the larger conduit, with city water. The City's proration shall be the complementary balance. The City has the right to participate in the review of the engineer's estimate and cost proration.

THIS AGREEMENT shall remain in full force and effect until completion of said construction project as aforesaid; provided, however, that this Agreement may be cancelled at any time prior to the commencement of construction upon 30 days' written notice to the other; provided, however, provisions herein relating to maintenance, connecting to or use of the State's underground drainage system shall be in perpetuity.

All parties hereto acknowledge that this Agreement is subject to cancellation by the Governor pursuant to the provisions of Section 38-511 Arizona Revised Statutes.

In the event of any controversy which may arise out of this Agreement, the parties hereto agree to abide by required arbitration as is set forth for public works contracts in Section 12-1518 (B) and (C) of Arizona Revised Statutes as amended.

This Agreement shall become effective on the date of filing same with the Secretary of State.

Attached hereto and incorporated herein by reference is a copy of State's resolution authorizing entry into this Agreement, a copy of City's resolution passed by its City Council, a copy of the written determination of the appropriate attorney that City is authorized under the laws of this State to enter into this Agreement and that said Agreement is in proper form, and a copy of the Attorney General's Intergovernmental Agreement Determination.

IN WITNESS WHEREOF, the parties have executed this Agreement the day and year first above written.

CITY OF PHOENIX, MARVIN A. ANDREWS,  
City Manager

By: *David James*

Title: Acting City Engineer

STATE OF ARIZONA  
ARIZONA DEPARTMENT OF TRANSPORTATION

By: *W. O. Ford*

W. O. Ford  
State Engineer

PROJECT: AZM-600-5-303  
SECTION: East Pagago Storm Drain

ATTEST:

*Ticky Miel*  
ACTING City Clerk

APPROVED AS TO FORM AND WITHIN  
THE POWER AND AUTHORITY GRANTED  
UNDER THE LAWS OF ARIZONA TO THE  
CITY OF PHOENIX

*[Signature]*  
ACTING City Attorney

PROJECT: AZM-600-5-303 PE  
SECTION: East Papago Storm Drain

## RESOLUTION

BE IT RESOLVED on this 20th day of May, 1986, that I, Charles L. Miller, as Director, ARIZONA DEPARTMENT OF TRANSPORTATION, have determined that it is in the best interests of the State of Arizona that the DEPARTMENT OF TRANSPORTATION, acting by and through the Highways Division, enter into an Intergovernmental Agreement with the City of Phoenix for the purpose of designing and constructing an underground storm water drainage system to carry away surface storm water in the vicinity of the East Papago Freeway (S.R. 217) between 24th Street and 44th Street in the City of Phoenix; said drainage system to be of sufficient size to handle inflows from existing City storm sewers in the same area.

THEREFORE, authorization is hereby given to draft said Agreement which, upon completion, shall be submitted for approval and execution by the State Engineer.



Charles L. Miller, Director  
Arizona Department of Transportation

RESOLUTION NO. 16848

A RESOLUTION AUTHORIZING THE CITY MANAGER TO ENTER INTO AN INTER-GOVERNMENTAL AGREEMENT WITH THE STATE OF ARIZONA THROUGH ITS DEPARTMENT OF TRANSPORTATION TO PERMIT THE CITY TO CONNECT THREE STORM DRAINS INTO THE EAST PAPAGO STORM DRAIN SYSTEM.

BE IT RESOLVED BY THE COUNCIL OF THE CITY OF PHOENIX as follows:

That the City Manager or his designee be, and he is hereby, authorized to execute an agreement on behalf of the City of Phoenix with the State of Arizona, acting through its Department of Transportation, for the purpose of establishing funding responsibilities to permit the City of Phoenix to connect three storm drains into the East Papago storm drain system.

PASSED by the Council of the City of Phoenix this 25 day of June, 1986.

J. Gould  
MAYOR

ATTEST:

[Signature], City Clerk

APPROVED AS TO FORM:

[Signature], ACTING City Attorney

REVIEWED BY:

[Signature], City Manager

33226

CENTRAL FILES

PROJECT: EAC-I-10-3(190)  
SECTION: INNER LOOP DRAINAGE TUNNELS

INTERGOVERNMENTAL AGREEMENT

BETWEEN  
THE STATE OF ARIZONA  
AND  
THE CITY OF PHOENIX

NO. 9154
FILED WITH SECRETARY OF STATE
Date Filed 3-22-84
<i>Reed D. Rogers</i> Secretary of State

THIS AGREEMENT entered into this 19<sup>TH</sup> day of MARCH, 1984, between the STATE OF ARIZONA, acting by and through its DEPARTMENT OF TRANSPORTATION, hereinafter called "State", and the City of Phoenix acting by and through its City Council hereinafter called "City".

WHEREAS, State is empowered by Section 28-108 Arizona Revised Statutes to enter into this Agreement and has by resolution, a copy of which is attached hereto and made a part hereof, resolved to enter into this Agreement and the Director of the Arizona Department of Transportation has delegated to the undersigned the authority to execute same on behalf of the State; and

WHEREAS, City is empowered by Section 9-672 B Arizona Revised Statutes and Chapter II, Section 2 of the Phoenix City Charter to enter into this Agreement and acting by and through its City Council, has, by resolution, a copy of which is attached hereto and made a part hereof, resolved to enter into this Agreement and has authorized the undersigned to execute same on behalf of City; and

WHEREAS, State proposes to construct an underground drainage system for the purpose of carrying away surface water in the vicinity of the Interstate Highway 10 Inner Loop where said highway traverses that portion of the City of Phoenix lying between 15th Avenue on the West and 24th Street on the East and shall construct an East-West collector drain paralleling or underlying Culver Street between 15th Avenue and 24th Street connecting with two North-South drains, one of which will underlie portions of 2nd Street and Central Avenue; the other will underlie portions of 21st Street and 20th Street. Each of said North-South drains will discharge into the Salt River; one near the intersection of Central Avenue and the River; the other near the intersection of 20th Street and the River; and

WHEREAS, City has requested State to increase the carrying capacity of its proposed I-10 Inner Loop drainage system to accommodate the additional flows of existing City storm sewers between 7th Avenue and 16th Street and in addition to provide connections for planned future storm sewers in 20th Street, 12th Street and Central Avenue and the intersections of 2nd Street and Fillmore; 2nd Street and Grant; Central Avenue and Tonto and Central Avenue immediately north of the East-West portion of I-17; and

WHEREAS, the cost of increasing the capacity of said system to handle City storm sewer flows is estimated to be Seven Million Dollars (\$7,000,000) which City agrees to pay in the manner set forth below.

THEREFORE, THE PARTIES HERETO AGREE AS FOLLOWS:

STATE SHALL:

1. Increase the design capacity of the I-10 Inner Loop Drainage System as required to intercept and convey the flows of existing and future storm sewers as described above.

2. During construction provide the necessary connections between said Drainage System and existing storm sewers as described above and provide for connections to planned future storm sewers as described above. The City shall have the right to connect existing and future storm drainage systems at those locations stated in the fourth and fifth paragraphs of page one and as shown on the plans of the State.

3. Submit billings to City at 90-day intervals. Such billings shall constitute City's prorated share of actual construction costs incurred, based upon a comparison of Seven Million Dollars (\$7,000,000) with the future construction contract Agreement estimate. The total amount of all billings to City shall not exceed Seven Million Dollars (\$7,000,000).

4. State agrees to reimburse City for actual cost of all labor and equipment required for reasonable inspection and monitoring of city-owned facilities, including, but not limited to streets, storm sewers, waterlines and sanitary sewers, which lie within the probable zone of influence of tunnel construction.

5. The State assumes full responsibility for the design, plans and specifications, and the engineering in connection therewith and the construction of the improvements contemplated by this Agreement, except the storm drainage systems of the City. It is understood and agreed that the City's financial participation in relation to the construction of this project is confined solely to the amount stated in Paragraph 3 in regard to participating with the funding of this project. Any damages arising from the construction of this project, except with respect to the City storm drainage systems or any modifications thereof, shall be solely the liability of the State and the State agrees to save and hold harmless and indemnify from loss the City, any of its departments, agencies, officers or employees from any and all cost and/or damage incurred by any of the above and from any other damage to any other person or property whatsoever, which is caused by any activity, condition, or event arising out of the performance or nonperformance of any provision of this Agreement by the State, any of its departments, agencies, officers and employees in carrying out the provisions of this Agreement. Costs incurred by the City, any of its departments, agencies, officers or employees shall include, in the event of any action, court costs, expenses of litigation or attorney's fees. State will require the construction manager and the contractor to carry general liability insurance in the amount of Twenty-Five Million Dollars (\$25,000,000) throughout the course of construction of the project, naming thereon as additional named insureds, the State, its departments, agencies, agents and employees and the City. The contractor and construction manager's coverage shall be primary for any and all losses arising out of the course of construction of the project.

CITY SHALL:

1. By separate action grant an easement to State for construction and maintenance of said underground drainage system within the public right of way; provided, however, said easement shall be subject to use of the public right of way for transportation and governmental purposes. The City shall convey whatever title it has as to any such right of ways. In granting such easement to the State the City is conveying to the State such interest as it may have in the public right of way for use by the State for an underground drainage system.

2. Pay to the State the amount due on each 90-day billing; provided that City's total contributions do not exceed Seven Million Dollars (\$7,000,000).

3. In the event it is unable to pay the full amount due within thirty (30) days after the due date, pay to State a ten percent (10%) per annum charge on any unpaid amount.

4. Pay all costs of connecting to said underground drainage systems not included in the plans and specification for this project.

5. In no manner place a burden upon the drainage system to which this Agreement relates which is greater than it was designed to accommodate and the City shall place only surface storm drainage waters into the said drainage system in the volumes and at the locations indicated on the plans. The City shall not place deleterious, hazardous or toxic substances of any nature into the said storm drainage system.

6. In affirmatively exercising any of its rights to connect to the State's underground drainage system and in exercising its right to use and enjoy the benefits of that system under and by virtue of this Agreement, to be solely liable to the State and the City agrees to save and hold harmless and indemnify from loss the State, any of its departments, agencies, officers or employees from any and all cost and/or damage incurred by any of the above and from any other damage to any other person or property whatsoever, which is caused by any activity, condition, or event arising out of the performance or nonperformance of any provision of this Agreement by the City, any of its departments, agencies, officers and employees in connecting to the State's underground drainage system and in exercising its right to use and enjoy the benefits of that system. Costs incurred by the State, any of its departments, agencies, officers, or employees shall include in the event of any action, court costs, expenses of litigation and attorney's fees.

This Agreement shall remain in full force and effect until completion of said construction project as aforesaid; provided, however, that this Agreement may be cancelled at any time prior to the commencement of construction upon 30 days' written notice to the other party; provided, however, provisions herein relating to maintenance, connecting to or use of the State's underground drainage system shall be in perpetuity.

All parties hereto acknowledge that this Agreement is subject to cancellation by the Governor pursuant to the provisions of Section 38-511 Arizona Revised Statutes.

In the event of any controversy which may arise out of this Agreement, the parties hereto agree to abide by required arbitration as is set forth for public works contracts in Section 12-1518(B) and (C) of Arizona Revised Statutes as amended.

This Agreement shall become effective on the date of filing same with the Secretary of State.

Attached hereto and incorporated herein by reference is a copy of State's resolution authorizing entry into this Agreement, a copy of City's Resolution passed by its City Council, a copy of the written determination of the appropriate attorney that City is authorized under the laws of this State to enter into this Agreement and that said Agreement is in proper form, and a copy of the Attorney General's Intergovernmental Agreement Determination.

IN WITNESS WHEREOF, the parties have executed this Agreement the day and year first above written.

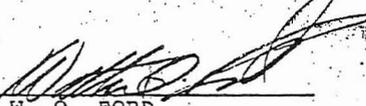
CITY OF PHOENIX

STATE OF ARIZONA  
DEPARTMENT OF TRANSPORTATION

MAR 15 1984

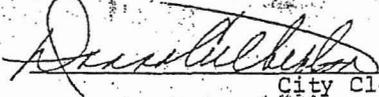
MARVIN A. ANDREWS  
BY CITY MANAGER

BY:

  
W. O. FORD  
Acting State Engineer

BY title:   
CITY ENGINEER

ATTEST:

  
City Clerk

**Appendix D.2**  
**CITY OF PHOENIX - PARKS**



**Engineering and Environmental Consultants, Inc.**

7878 North 16<sup>th</sup> Street, Suite 140, Phoenix, Arizona 85020

Tel: (602) 248-7702 Fax: (602)248-7851

# MEMORANDUM

**To:** Afshin Ahouraiyan; Boyd Winfrey

**Date:** July 28, 2008

**Copy:**

**From:** Charles T. Griffith/John Barker (Gavan & Barker)

**Project No.** 305008

**Project:** Metro Phoenix ADMP (FCD2004C040)

**Subject:** Recommended Plan Hydrology

---

EEC has completed the recommended plan. It is currently under review by the District. EEC will provide the COP, with any additional information and supporting documentation as requested.

## PLANNED PARK ELEMENTS

The recommended plan for the Metro ADMP includes three (3) stormwater storage basins. The three areas include the Palo Verde Golf Course, Encanto Golf Course, and acquiring land at the Durango Curve to create a new stormwater storage basin that may serve as a multi-use facility.

Palo Verde and Encanto Golf Courses are similar in design. The golf courses would be re-contoured to create stormwater storage areas as well as make the courses more interesting. The general design guidelines for the golf courses is to keep the tees/greens above the high water level, the fairways approximately five feet below that, and the non-playable areas approximately ten feet below the high water level. The storm drains will have a low flow bypass so that the nuisance water does not go to the golf courses every time that water is in the storm drain. The design storm for Palo Verde and Encanto is the 10-year, 24-hour storm. Re-construction of Encanto Golf Course will reduce the flooding downstream and may remove/reduce the existing floodplain south of McDowell Road.

The Durango Curve storage basin is designed for the 100-year, 24-hour storm for the purpose of removal of the floodplain downstream and upstream of I-17 to protect I-17, homes north of Durango Curve, and the proposed water/wastewater treatment plant expansion from being flooded. The existing I-17 storm drain (96-inch diameter) will be diverted into the new basin at Buckeye Road. Then, the same ADOT storm drain will be used to drain the basin to the Salt River.

The following sections give the general information for each basin. Information that is included is the peak storage volumes, peak drain times, peak discharges, and peak stage elevation. (See also attached Landscape Design Guidelines).

### **Palo Verde Golf Course**

The Metro ADMP recommends four (4) storm drain connections to ADOT's West Tunnel in the Downtown area. The City and ADOT agreed to these connections in 1984 (refer to IGA#33226). The following table compares the ADOT design inflows at these locations versus the proposed storm drain peak discharges taken from the Metro ADMP 10-year, 24 hour model.

Peak Volume: 76 acre-feet  
Peak Discharge: 49 cfs  
Peak Stage Elevation: 1152.3  
Hours: 14-30  
Bottom Elevation: 1142  
Top Elevation: 1155

### **Encanto Golf Course**

The Encanto Golf Course is modeled as two separate storage basins. It is modeled as the worst case (no connection between the front nine and back nine). If the golf cart underpass is built, the overall drain time will be reduced. The following information is for the *west side, which includes the back nine and the executive course, and the east side, which consist of the driving range and front nine.*

Back Nine/Executive:  
Peak Volume: 161 acre-feet  
Peak Discharge: 56 cfs  
Peak Stage Elevation: 1084.7  
Hours: 14-31  
Bottom Elevation: 1075  
Top Elevation: 1088

Front Nine:  
Peak Volume: 198 acre-feet  
Peak Discharge: 64 cfs  
Peak Stage Elevation: 1087.3  
Hours: 14-60  
Bottom Elevation: 1075  
Top Elevation: 1088

### **Durango Curve Basin**

The Durango Curve detention basin is the only basin designed for the 100-year storm.

Peak Volume: 270 acre-feet  
Peak Discharge: 520 cfs  
Peak Stage Elevation: 1049.9  
Hours: 13-23  
Bottom Elevation: 1042  
Top Elevation: 1053