

■ *FINAL*
Alternative Analysis

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STP Papago

Regional Flood Control Project

Watershed Study (FCD 95-46)

Prepared for:
Flood Control District of Maricopa County

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091131.00

 Kimley-Horn
and Associates, Inc.
Engineering, Planning, and Environmental Consultants

KVL Consultants, Inc.



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Summary

In September 1995, heavy rainfall caused extensive street drainage problems and led to the flooding of homes in some neighborhoods in southwest Scottsdale. The STP Papago Watershed Study was initiated by the Flood Control District of Maricopa County in response to these problems and in response to a request by the City of Scottsdale to evaluate and resolve drainage issues in the area.

During the project formulation phase, the drainage issues were identified and quantified, producing four key objectives for the project:

- Reduce or eliminate the limits of an existing Zone A floodplain on the west side of the Cross Cut Canal along 66th Street.
- Alleviate higher frequency drainage problems throughout the study area.
- Minimize the size and number of distinct outfall facilities which will discharge to Indian Bend Wash, the Salt River, and the Old Cross Cut Canal.
- Maximize the use of existing conveyance systems including storm drains, canals, drainage easements, and abandoned utility lines.

These key objectives were then used in the alternatives analysis to develop the following recommended plan:

1. Design and construct an Oak Street Outfall for a probable cost of \$9.5 million.
 - Coordinate construction in the vicinity of 64th Street with the City of Scottsdale's ongoing roadway design project.
 - Use the existing storm drain in Oak Street as much as feasible, based on avoiding other utility conflicts.
 - Continue to pursue the Oak Street variations described in this analysis.
2. Design and construct an Osborn Road Outfall for a probable cost of \$7.3 million.
 - Coordinate construction in the vicinity of 64th Street with the City of Scottsdale's ongoing roadway design project.
 - Use the existing storm drain in Osborn Road as much as feasible, based on avoiding other utility conflicts.

1. Introduction

Introduction

In September 1995, heavy rainfall caused extensive street drainage problems and led to the flooding of homes in some neighborhoods in southwest Scottsdale. The STP Papago Watershed Study was initiated by the Flood Control District of Maricopa County in response to these problems and a request by the City of Scottsdale to evaluate and resolve drainage and flooding problems in the area.

The Kimley-Horn project team was selected to prepare the STP Papago Watershed Study based on the following formal milestone reports:

- | | |
|--------------------------------------|-----------|
| • Hydrology Verification Memorandum | Submitted |
| • Draft Alternative Plan Formulation | Submitted |
| • Alternative Plan Formulation | Submitted |
| • Draft Alternative Analysis | Submitted |
| • Alternative Analysis | |
| • Draft Recommended Plan | |
| • Recommended Plan | |

This report is the Alternative Analysis.

The purpose of the Alternative Analysis is to describe the alternatives considered for solving the drainage and flooding problems in the study area, and to recommend a plan of action to alleviate the problems.

Study Area

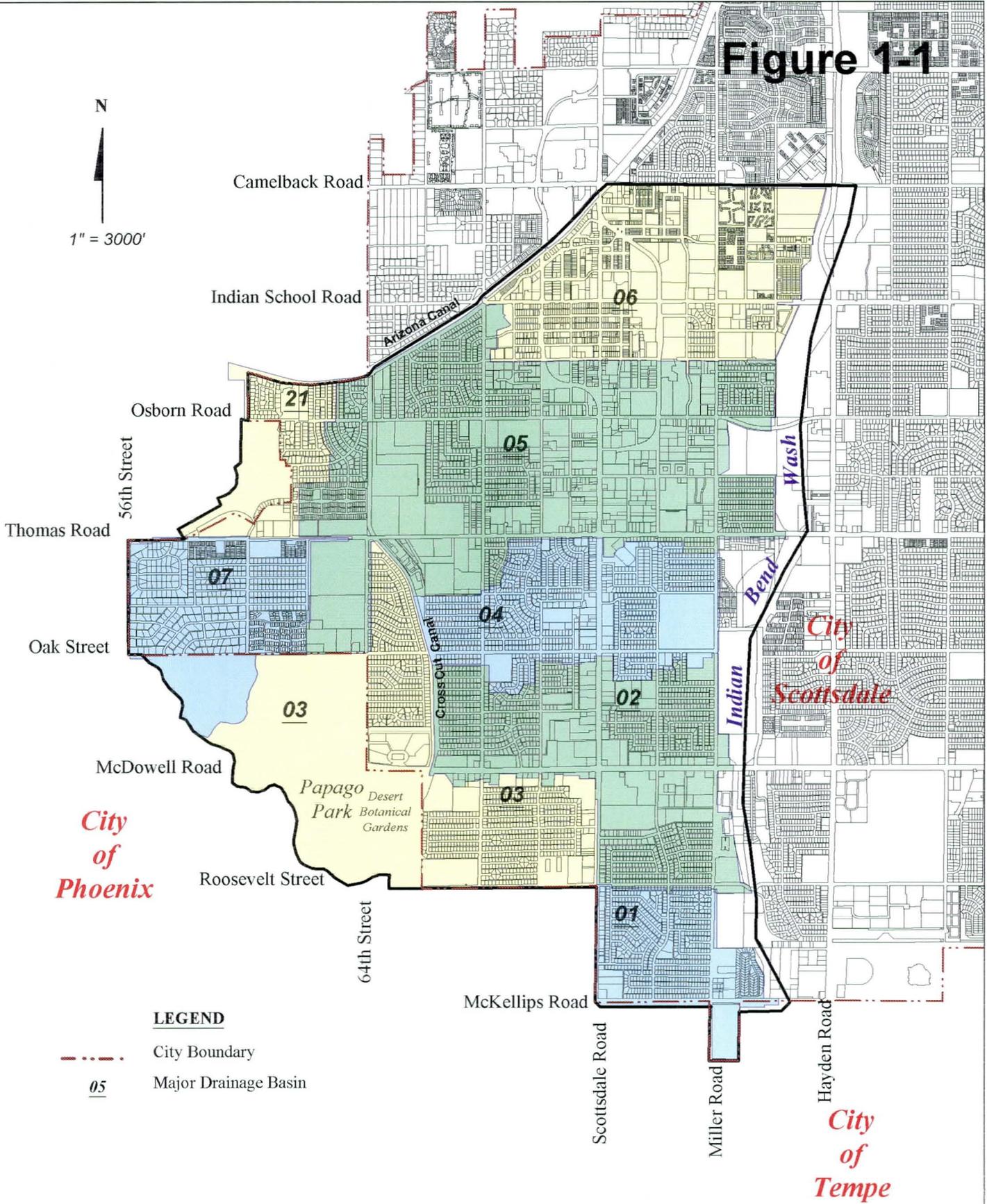
The study area for the STP Papago Watershed Study is bounded by the Arizona Canal and Camelback Road (north), Indian Bend Wash (east), McKellips Road and Roosevelt Street (south), and 56th Street (west), as shown in Figure 1-1. The study area comprises about seven square miles and is primarily located in the City of Scottsdale, with a portion of the study area in the Cities of Phoenix and Tempe. Key objectives for the project were developed as a part of the Alternative Plan Formulation and include:

- Reduce or eliminate the limits of an existing Zone A floodplain on the west side of the Cross Cut Canal along 66th Street.
- Alleviate higher frequency drainage problems throughout the study area.
- Minimize the size and number of distinct outfall facilities discharging to Indian Bend Wash, the Salt River, and the Old Cross Cut Canal.
- Maximize the use of existing conveyance systems including storm drains, canals, drainage easements, and abandoned utility lines.

The Alternative Analysis Report is divided into several parts. The report includes a description of the identified drainage issues within the study area and the conceptual analysis performed. Alternatives, to alleviate the problems, are developed based on several factors including the key objectives of the project, a qualitative comparison of benefits, the opinions of probable cost, and an evaluation of viability considering community based opportunities and constraints.

Figure 1-1

N
1" = 3000'



LEGEND
- - - - - City Boundary
05 Major Drainage Basin

Study Area

Acknowledgements

Special thanks to those individuals who helped in the preparation of this report. This includes our sub-consultants, the district representatives, and those who served on the steering committee for the project.

The members of the steering committee were:

Dave Meinhart, City of Scottsdale
Tom Ankeny, City of Tempe
Ray Acuna, City of Phoenix
Tom Sands, Salt River Project
Carolyn O'Malley, Desert Botanical Gardens

The representatives from the Flood Control District of Maricopa County were:

Scott Clement, Project Manager
Richard Harris
Afshin Ahouraiyan
Marta Dent

Our sub-consultants were:

KVL Consultants, Inc.
Logan, Simpson, and Dye, Inc.
Wood-Patel and Associates, Inc.
NEL Laboratories, Inc.

2. Drainage Issues

Introduction

Drainage issues in the study area are similar to those found throughout the Greater Phoenix Metropolitan Area and can be attributed to the following site conditions:

- The blockage of natural, sheet flow patterns by the Cross Cut Canal and the subsequent ponding along the west side of the Canal.
- The lack of adequately sized drainage facilities and outfalls throughout the study area.
- The concentration of runoff in undersized natural or manmade channel systems.

Method for Identifying Drainage Issues

To better understand specific drainage issues in the study area, agency and citizen input was sought. This input included meetings with jurisdictional authorities including the Cities of Scottsdale, Tempe and Phoenix (STP). Regional authorities including the Flood Control District of Maricopa County and the Salt River Project were also contacted.

In October 1996, a public involvement meeting was held with about 80 citizens from the study area in attendance. The citizens attending this meeting identified specific drainage issues. These issues were then discussed by the Kimley-Horn project team and the Steering Committee. Field visits were conducted for all identified problem areas to look for visual evidence. Where available, records of drainage and flooding problems were researched. Pertinent design reports for roadways and developments in the study area were reviewed to identify existing drainage facilities and to identify other potential problems. The information was assessed and used to develop a comprehensive list of drainage issues in the study area.

Description of Drainage Issues

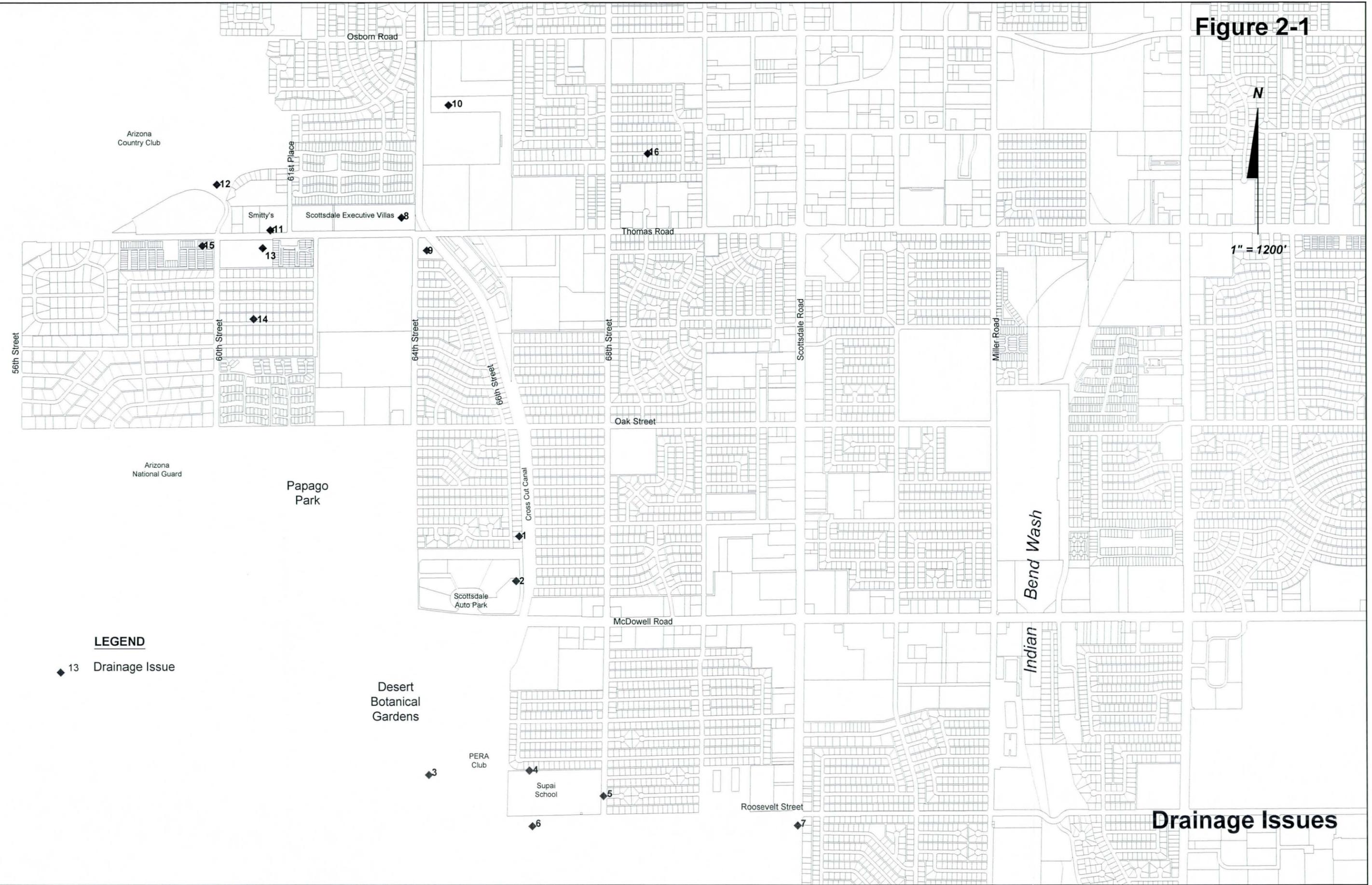
The following descriptions of the drainage issues identified in the study area are numbered for reference. Figure 2-1 shows the approximate locations and distribution of identified issues.

1. **66th Street and Palm Lane:** Runoff backs up and ponds in an area north of McDowell Road and west of the Cross Cut Canal, commonly called the Hy-View neighborhood. A floodplain has been mapped by the Federal Emergency Management Agency (FEMA) in this neighborhood that includes about 160 residential properties. In September 1995, a large storm event resulted in serious street flooding and inundation of 14 homes on 66th Street, adjacent to the Cross Cut Canal. Existing conditions hydrology for this study indicates that the 100 year flood limits in this neighborhood would impact about 50 residential properties. This indicates a potentially reduced floodplain limit, even if no improvements were made to the drainage system.
2. **Scottsdale Auto Park Ditch:** Evidence of minor erosion damage has been observed after storm events in the ditch between the Scottsdale Auto Park and the Cross Cut Canal. In addition, this ditch does not provide a gravity outfall for the Scottsdale Auto Park basin. After each storm event, standing water in the Scottsdale Auto Park basin has to be pumped to the culvert under McDowell Road.

Figure 2-1



1" = 1200'



LEGEND

◆ 13 Drainage Issue

Drainage Issues

3. **Cross Cut Canal, South of McDowell Road:** During large storm events, erosion damage along the west bank of the Cross Cut Canal has historically occurred South of the McDowell Road crossing.
4. **Alley North of Supai School:** Drainage problems have occurred in the alley where runoff leaves the PERA Club and flows between Supai School and the adjacent residential neighborhood. Drainage problems have also been reported in the adjacent neighborhood.
5. **68th Street South of Latham Road:** Drainage problems occur in 68th Street where runoff leaves the alley and enters 68th Street. The street has an inverted crown in this area and runoff collects in the center of the street. The large volume of runoff makes the flow excessively deep and wide during a large event.
6. **Continental Road West of 68th Street:** Drainage problems have been reported at the residences near the entrance to the PERA Club. The runoff from the PERA Club sheet flows through the adjacent neighborhood in a southeasterly direction, following historical sheet flow patterns.
7. **Roosevelt Street at Scottsdale Road:** Street drainage problems have been reported along Roosevelt Street in the vicinity of Scottsdale Road during large events.
8. **Scottsdale Executive Villas:** There is a bubble up structure in the northeast corner of the Scottsdale Executive Villas parking lot. A temporary sand bag wall has been placed around the structure to deflect flows away from the parking lot. The cover to the bubble up structure is secured to prevent it from floating away during large events. The overflow from the bubble up is deflected north into an alley running parallel to the Cross Cut Canal.
9. **Genzyme Genetics Office Building:** Runoff from the Genzyme Genetics office building in the southeast corner of the intersection of Thomas Road and 64th Street is designed to drain to the Scottsdale Executive Villas. The parking lot is depressed and acts as a sump, collecting site runoff to a single grated inlet in the center of the lot. Previous studies indicate that a 15 inch diameter culvert in the bottom of the inlet conveys discharge from the site, under Thomas Road, to the bubble up structure in the Scottsdale Executive Villas parking lot. Due to the drainage problems at the Scottsdale Executive Villas, the drainage system backs up. In September 1995, runoff reportedly backed up to a depth that caused a diversion of runoff south, along an access road for the Cross Cut Canal.
10. **East of 64th Street at Paiute Park:** 64th Street, between Osborn Road and Thomas Road floods because it does not have a gravity outfall and is a local topographic low point. There is also a bubble up structure in Paiute Park that receives flows from the west side of the Cross Cut Canal through a culvert. The flows from the bubble up structure then flood Paiute Park. During large events, runoff will overtop the limits of Paiute Park and sheet flow east through the residential neighborhoods. The Salt River Project maintains a sump pump in the low spot and, following rainfall events, pumps residual standing water over the Cross Cut Canal and into an irrigation lateral. The pumped water is conveyed through the irrigation lateral into the Old Cross Cut Canal.
11. **North of Thomas Road at 61st Place:** Smitty's in the northwest corner of Thomas Road and 61st Place receives runoff from the residential neighborhood south of Thomas Road through a culvert and bubble up structure near the Thomas Road entrance to the Smitty's parking lot. During large events, the bubble up is overtopped and runoff sheet flows across the parking lot, through the adjacent residential neighborhood, and into the Arizona Country Club.

12. **Orange Blossom Lane/Arizona Country Club:** During large events, the neighborhood behind the Smitty's receives a large volume of excess runoff. Several homes have been protected by diversion berms and cinder block walls to direct runoff away from their property. This interrupts the natural sheet flow patterns and concentrates the excess runoff at unprotected locations, causing drainage problems.
13. **Marriott Brighton Gardens Home:** The culvert and bubble up structure in the Smitty's parking lot backs water into the basin for the Marriott Brighton Gardens Home on the south side of Thomas Road.
14. **60th Street Between Oak Street and Thomas Road:** The neighborhood between Oak Street and Thomas Road has drainage and erosion problems due to the runoff from Papago Park and the Arizona National Guard facility. For example, a block wall was reportedly knocked down during a storm event along the east side of 60th Street. Drainage easements have also clogged with debris and diverted runoff to Lewis Road.
15. **Villas Solana Townhouses:** Complaints of drainage problems have been reported in the Villas Solana townhouses, located in the southwest corner of the intersection of Thomas Road and 60th Street. The problems are a result of the large volume of runoff received from the adjacent residential neighborhood to the south. The offsite runoff is concentrated at openings in a cinder block wall along the south property line.
16. **70th Street and Avalon Drive:** Drainage problems have been identified on the 6900 block of Avalon Drive where there is reportedly an undersized, blocked storm drain.

3. Alternative Analysis

Introduction

The analysis of the alternatives was conducted in two steps. The first step was to develop a conceptual analysis to group drainage issues into major areas. The second step was to analyze each major area and develop alternatives to determine the most feasible solutions. These two steps are further described below.

Conceptual Analysis

In considering the grouping of the locations of the drainage and flooding problems and the general topography of the study area, two major areas were defined within the study area. They are referred to as the **Hy-View Area** and the **Osborn Area** as shown in Figure 3-1.

Once these major areas were identified, possible outfalls were identified and analyzed to determine their usefulness in solving the drainage issues in the study area. Outfalls were identified conceptually as listed below and shown in Figure 3-1.

Hy-View Area

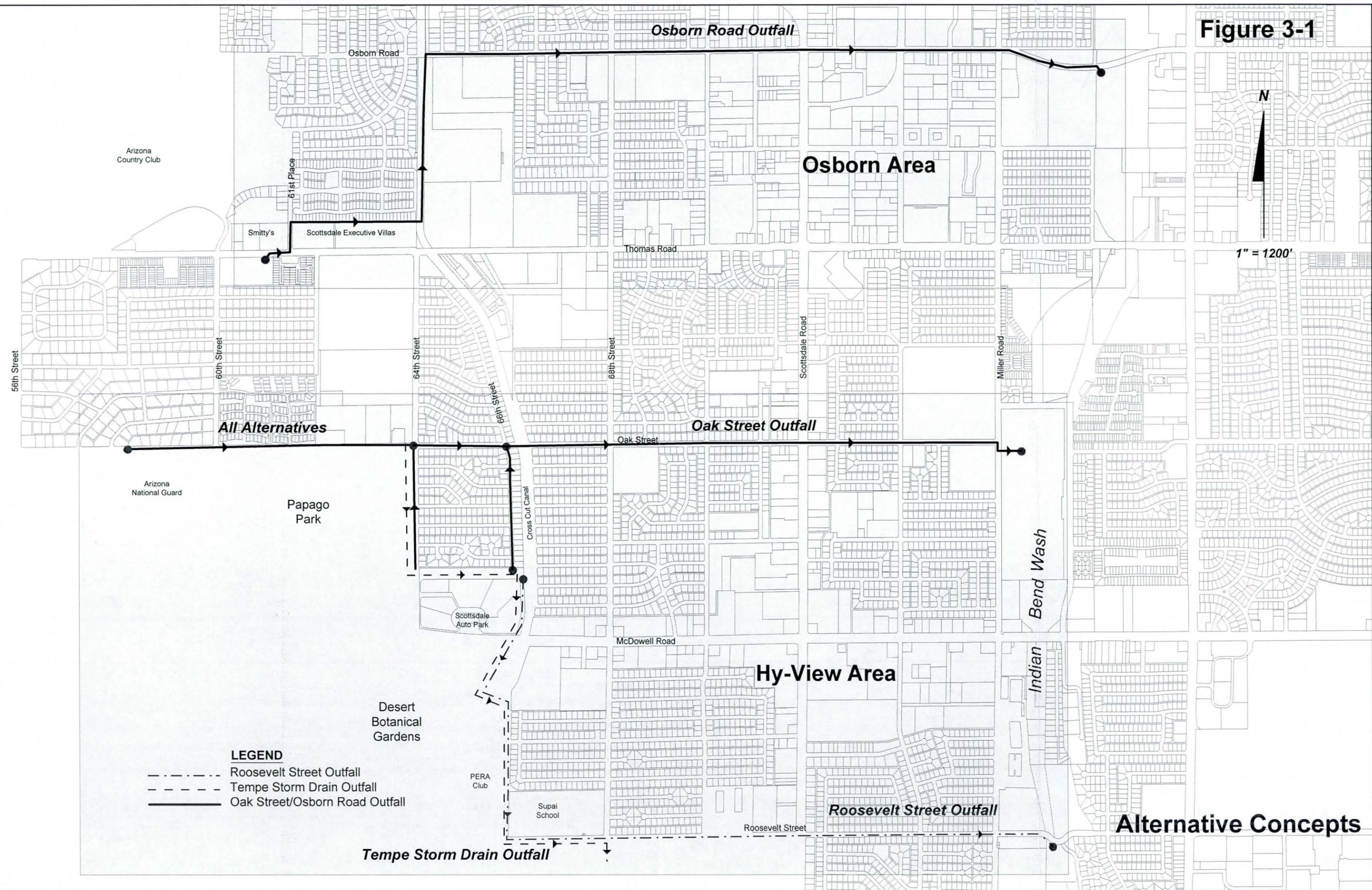
- Roosevelt Street Outfall to Indian Bend Wash
- Tempe Storm Drain to the Salt River
- Oak Street Outfall to Indian Bend Wash

Osborn Area

- Osborn Road Outfall to Indian Bend Wash

Following the conceptual analysis, an alternatives analysis was conducted to determine the specific components of the most feasible alternatives. These alternatives are described below and are shown on the attached figures. Other variations that were considered, but not included in the alternatives, are described following the descriptions of the alternatives.

Figure 3-1



- LEGEND**
- - - - - Roosevelt Street Outfall
 - · - · - Tempe Storm Drain Outfall
 - Oak Street/Osborn Road Outfall

Alternative Concepts

Hy-View Area

Roosevelt Street Outfall (Figure 3-2)

Runoff from Papago Park and the Arizona National Guard facilities is collected along Oak Street in a 10 year storm drain and conveyed east to 64th Street. Additional runoff from Papago Park is combined along 64th Street in a 10 year storm drain and conveyed south to the Scottsdale Auto Park basin. These storm drain improvements in Oak Street and 64th Street will provide a 10 year diversion of runoff away from the adjacent neighborhoods. Runoff from the Hy-View neighborhood is collected along 66th Street and combined in the Scottsdale Auto Park basin. The Scottsdale Auto Park basin then discharges to a 100 year storm drain which conveys runoff south under McDowell Road and the Cross Cut Canal to the PERA Club. Runoff is also conveyed from the Desert Botanical Gardens through an existing culvert under the Cross Cut Canal to the PERA Club. Runoff is combined at the PERA Club in a 100 year storm drain and conveyed east along Roosevelt Street to Indian Bend Wash. The alternative is also sized to provide, at a minimum, 10 year capacity for the entire tributary area.

Tempe Storm Drain Outfall (Figure 3-3)

Runoff from Papago Park and the Arizona National Guard facilities is collected along Oak Street in a 10 year storm drain and conveyed east to 64th Street. Additional runoff from Papago Park is combined along 64th Street in a 10 year storm drain and conveyed south to the Scottsdale Auto Park basin. These storm drain improvements in Oak Street and 64th Street will provide a 10 year diversion of runoff away from the adjacent neighborhoods. Runoff from the Hy-View neighborhood is collected along 66th Street and combined in the Scottsdale Auto Park basin. The Scottsdale Auto Park basin then discharges to a 100 year storm drain which conveys runoff south under McDowell Road and the Cross Cut Canal to the PERA Club. Runoff is collected at the PERA Club and retained in a PERA Club basin. Runoff is also collected in the Desert Botanical Gardens along the west bank of the Cross Cut Canal and retained in a Desert Botanical Gardens basin. Both retention basins will be sized to retain the entire 100 year event. The basins will only discharge post-event, through a 24" diameter storm drain which outfalls to the existing City of Tempe storm drain in 68th Street. A budget is included to allow for the programming of shared uses and amenities for the retention basins.

Oak Street Outfall (Figure 3-4)

Runoff from Papago Park and the Arizona National Guard facilities is collected along Oak Street in a 10 year storm drain and conveyed east to 64th Street. Additional runoff from Papago Park is collected along 64th Street in a 10 year storm drain and conveyed north to Oak Street. These storm drain improvements in Oak Street and 64th Street will provide a 10 year diversion of runoff away from the adjacent neighborhoods. Runoff from the Hy-View neighborhood is collected in 66th Street in a 10 year storm drain and conveyed north to Oak Street, with overflows conveyed south along 66th Street to the Scottsdale Auto Park basin. The Scottsdale Auto Park basin then discharges to the storm drain in 66th Street which conveys basin discharge north to Oak Street. Runoff is combined at Oak Street in a 100 year storm drain and conveyed east along Oak Street to Indian Bend Wash. The alternative is also sized to provide, at a minimum, 10 year capacity for the entire tributary area. With this alternative, the existing drainage system south of McDowell Road will not be modified, except by eliminating the flow crossing McDowell Road under existing conditions from the Scottsdale Auto Park basin.

Figure 3-2

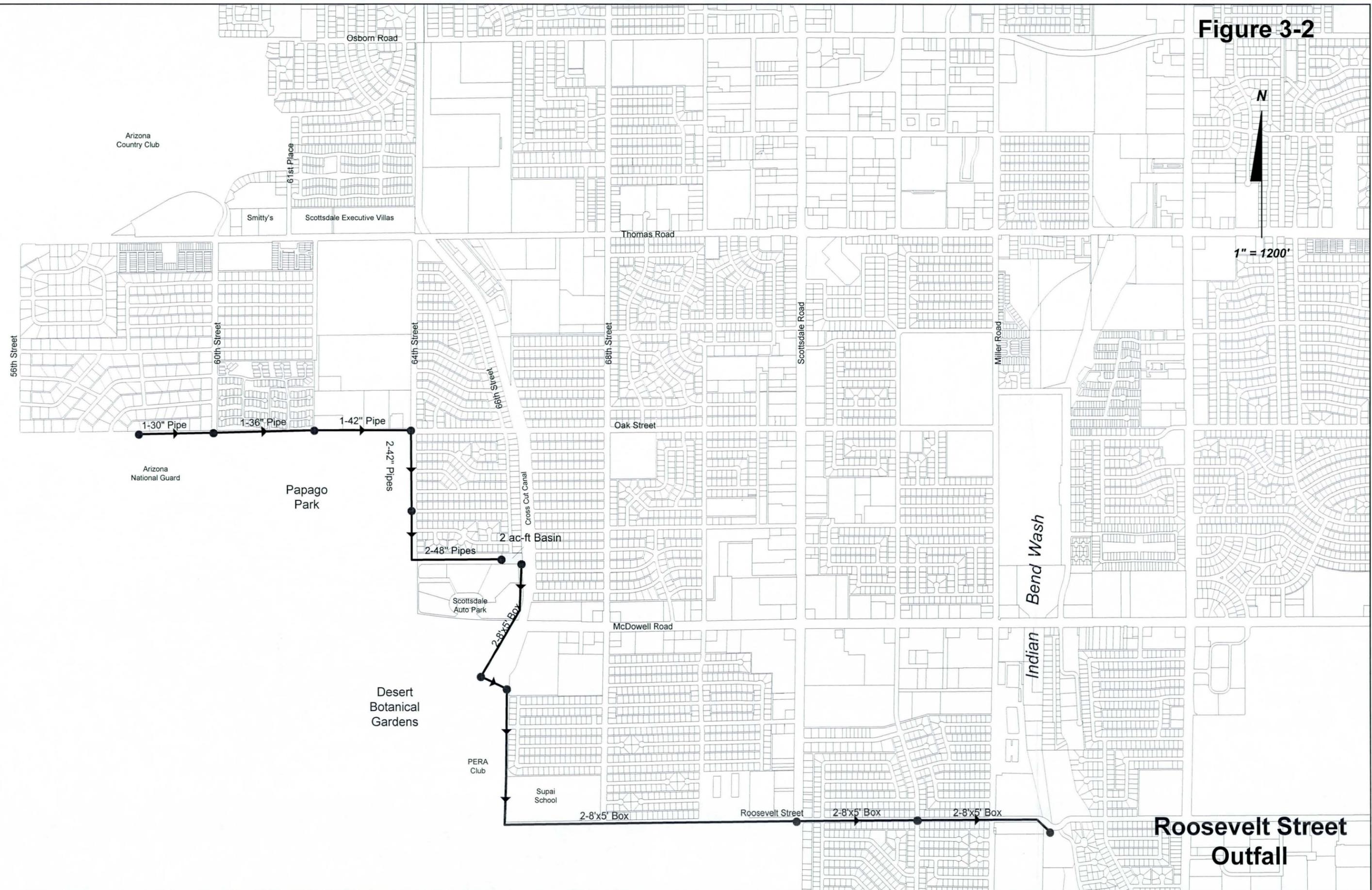
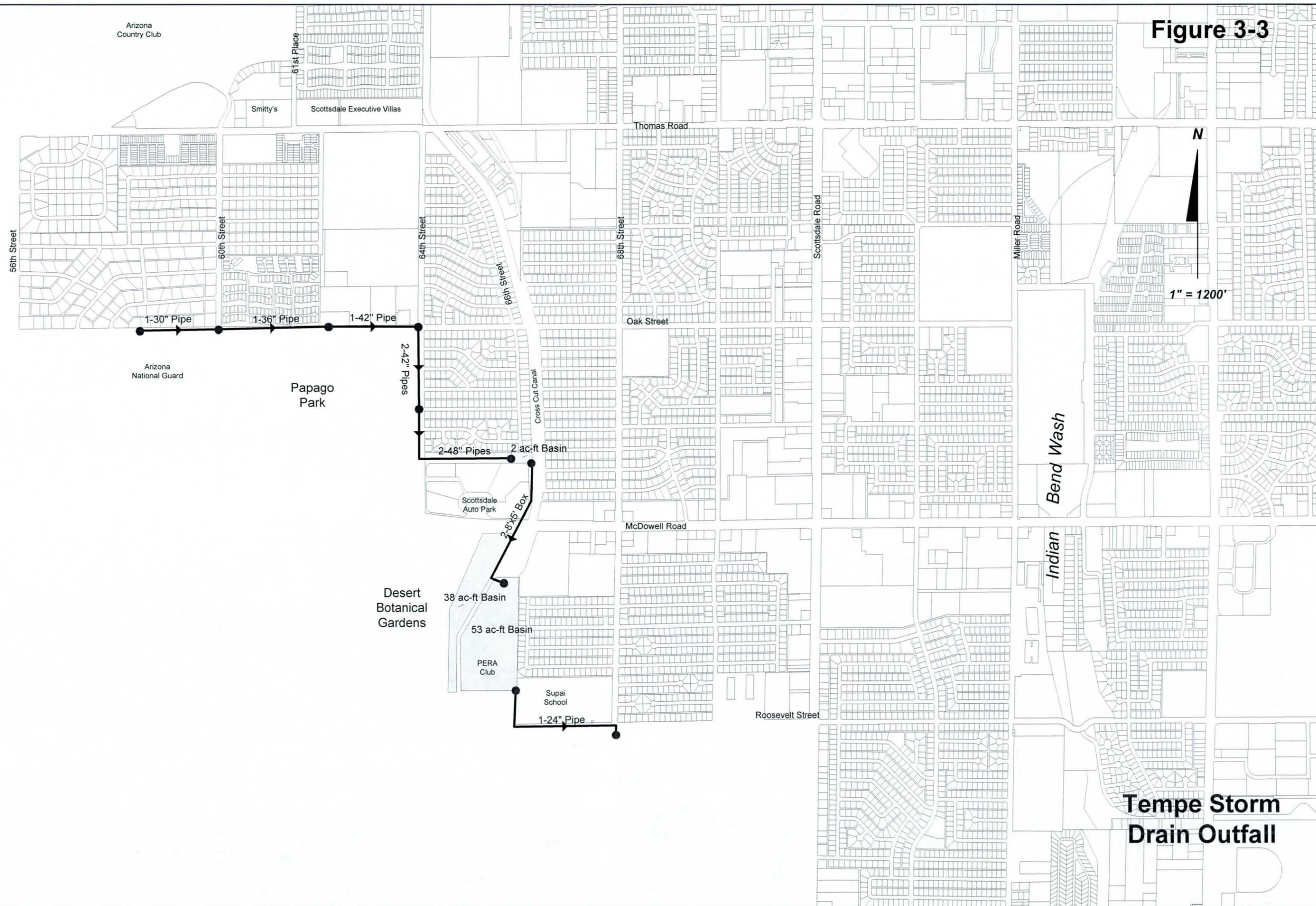
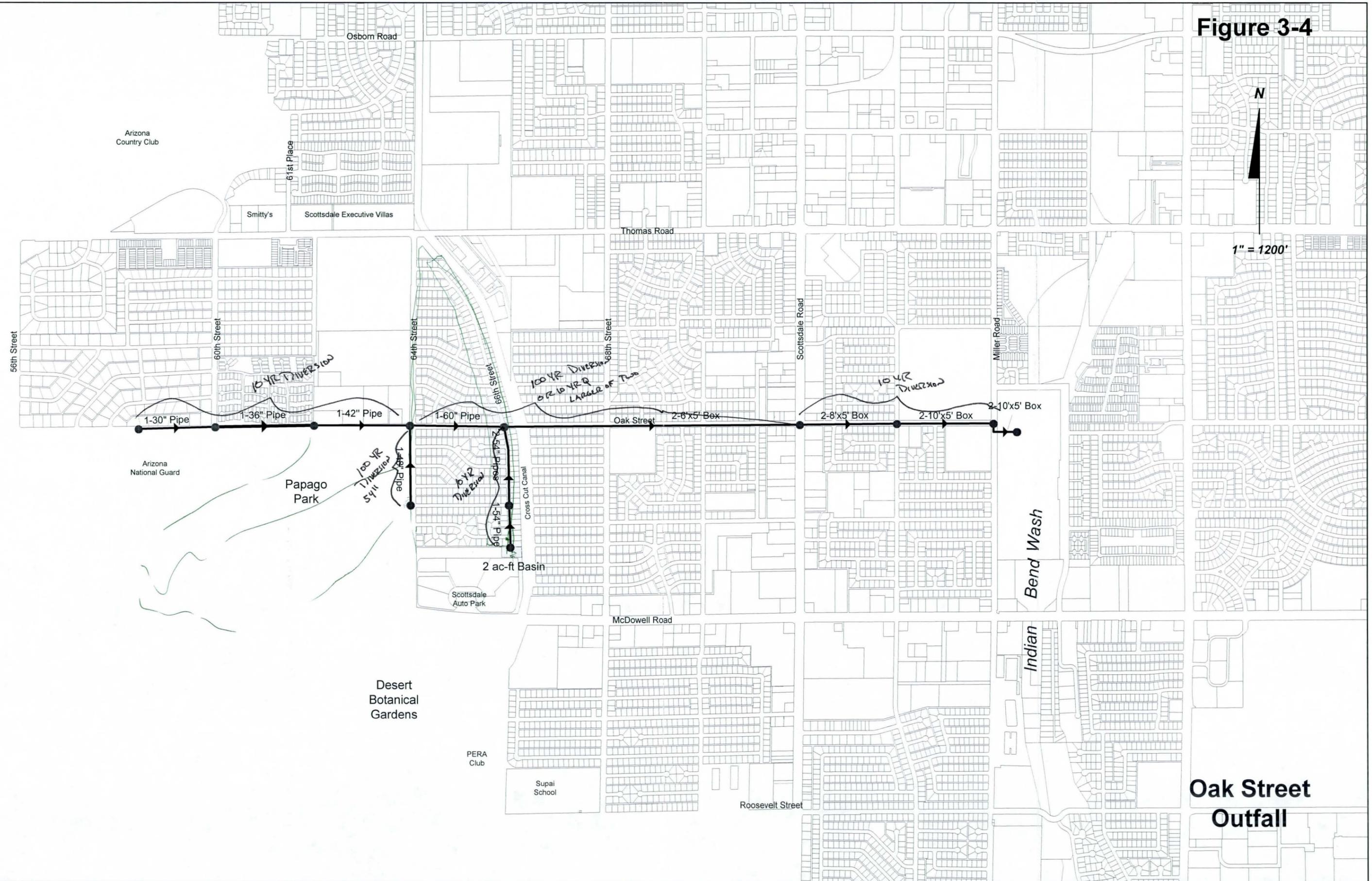


Figure 3-3



Tempe Storm
Drain Outfall

Figure 3-4



Alternative Variations

As a part of the development of the above alternatives, variations were considered. Each of these variations applies to at least one of the previously described alternatives. The variations are described below, along with a recommendation as to the feasibility and usefulness for further consideration.

Oak Street Retention Basins

Collect runoff from Papago Park and the Arizona National Guard facilities along Oak Street for the 100 year event. Divert runoff east along Oak Street in an open channel to two 100 year retention basins. One will be located at 60th Street and the other will be located east of 60th Street, at the Oak Street entrance to Papago Park.

The basins would provide a 100 year solution for Oak Street and no runoff to the adjacent neighborhoods which provides a greater benefit than the 10 year solutions in the three Hy-View Area alternatives. The basins would also provide a solution which is located at the source of the runoff (in the Papago Buttes). The storm drain variation, in all three alternatives for the Hy-View area, has a probable cost of about \$0.8 million. The basins are expected to require 4 acres for construction and are sized to contain 11 acre-feet of runoff volume. The basins have a probable cost of about \$1.2 million.

The difficulty with this variation will be to design basins that meet the general management strategies for these lands. The process by which these basins will be developed will take time and delay implementation of the recommended plan for this section. If this variation is chosen, it can be substituted into any of the three Hy-View Area alternatives and phased for design and construction at a later date.

Open Channel along Oak Street

Collect runoff from Papago Park and the Arizona National Guard facilities along Oak Street for the 10 year event. Divert runoff east along Oak Street in an open channel to the Oak Street entrance to Papago Park. A culvert will be placed at the one driveway crossing and where topography works against an open channel solution. Larger events will overtop Oak Street and follow the existing sheet flow patterns, through the adjacent residential neighborhoods. The runoff will enter a storm drain system at the Oak Street entrance to Papago Park and be conveyed east along Oak Street to 64th Street, just as proposed in the three Hy-View Area alternatives.

This variation provides the same level of drainage protection as the storm drain variation in all three Hy-View Area alternatives. The open channel would average about 30 feet wide at the top of bank (at 3:1 side slopes) and will be wider at its deeper points. Particularly wide areas of the open channel can be avoided by installing culvert sections. The storm drain variation in all three Hy-View area alternatives, has a probable cost of about \$0.8 million. The open channel will require 4 acre-feet of excavation and eliminate the need for some of the storm drain, with a probable cost of \$0.6 million.

The difficulty with the open channel variation will be approvals and public acceptance for an open channel in Papago Park. No further consideration of this variation is recommended

64th Street Retention Basins

Collect runoff from Papago Park along 64th Street for the 100 year event. Divert runoff along 64th Street in an open channel to 2-100 year retention basins. The basins will be located at the topographic low points. One will be located across 64th Street from Hubbell Street and the other will be located at the Oak Street intersection.

This variation is expensive and will require retention basins that occupy a large percentage of the 64th Street frontage between McDowell Road and Oak Street resulting in reduced development opportunities. No further consideration of this variation is recommended.

Buy Out Homes in the Floodplain

Purchase about 31 privately held properties within the Zone A floodplain in the Hy-View neighborhood. Relocate the homeowners and demolish the houses. Use the available property to augment the Scottsdale Auto Park basin storage capacity to reduce the size of the floodplain and provide a gravity outfall which does not create downstream flooding concerns.

Since the property is already fully developed, the price of the land will be at a premium. This cost is expected to be almost \$6 million, including demolition and relocation costs. The cost may be reduced if the property is excavated and the Scottsdale Auto Park basin is enlarged to reduce the floodplain limits. Even with a reduced floodplain, this variation is cost prohibitive and is not recommended for further consideration.

Scottsdale Auto Park Basin Enhancement

Enlarge the Scottsdale Auto Park basin by taking advantage of the deeper outfall invert for all three Hy-View Area alternatives. This may attenuate the peak flow and reduce the required pipe sizes in the storm drain downstream. Also, redesign the Scottsdale Auto Park basin to provide water quality treatment for the runoff from the Scottsdale Auto Park. This will help alleviate downstream water quality concerns. The Scottsdale Auto Park basin will maintain its shared use as a passive recreational area and as an access point to the Cross Cut Canal for pedestrians. Sidewalks and vegetation will be repaired and replaced as necessary. Some deepening may also be augmented by vertical retaining walls.

This variation includes both water quality and quantity benefits. The extent of the improvements would vary depending on which alternative was chosen for the Hy-View Area. Preliminary analysis of the basin indicates that the existing basin is too small to provide attenuation of the peak discharge. The storage all occurs before the peak discharge occurs in the basin. The enlargement of the basin will require side slopes or retaining walls up to 20' high to provide enough storage volume to affect the peak discharge. At that point, the design would be unfriendly to the shared uses and expensive to construct. If the basin is modified significantly, the City of Scottsdale may also be required to purchase the basin from the Scottsdale Auto Park. This will add additional costs and time delays to the implementation of the recommended plan. For these reasons, this variation is not recommended for further consideration.

Existing Wash Outfall

Construct a storm drain from the retention basin at the PERA Club to the existing wash along the south property line of the PERA Club. Construct manual controls in the basin to prevent any discharge until after the storm event. The storm drain will then provide for the recovery of the retention basin, without creating flooding problems in the wash or the downstream storm drain.

This variation is only applicable to the Tempe Storm Drain alternative. It would replace the need for a 24" storm drain along Continental Drive. This variation would require construction in the natural wash and introduce diversion flow to the wash. This could harm the vegetation in the wash and have degradation effects. For these reasons, this variation is not recommended for further consideration.

Osborn Area

Osborn Road Outfall (Figure 3-5)

Runoff from the residential neighborhoods south of Thomas Road is collected in an existing basin located at the Marriott Brighton Gardens Home. The Marriott Brighton Gardens Home basin will be enlarged to detain more water, reducing the runoff that currently crosses Thomas Road and floods the Smitty's parking lot. The Marriott Brighton Gardens Home basin will discharge to a 10 year storm drain in Thomas Road. This 10 year storm drain will then run north along 61st Place and east in an alley behind the Scottsdale Executive Villas. The 10 year storm drain will then cross under the Cross Cut Canal and collect runoff from 64th Street. The 64th Street storm drain will convey runoff north along 64th Street to an outfall at Paiute Park. A new detention basin at Paiute Park will collect runoff and attenuate the peak flow. The basin will reduce the required pipe sizes in the proposed 10 year storm drain downstream. The Paiute Park basin will then discharge to a 10 year storm drain which runs east along Osborn Road and outfalls to Indian Bend Wash.

Alternative Variations

As a part of the development of project alternatives, variations on this alternative were considered. They include:

Earl Drive Outfall

The Paiute Park basin will discharge to a 10 year storm drain along Avalon Drive. The storm drain will convey runoff east along Avalon Drive to 68th Street and turn South. The storm drain will then turn east at Pinchot Avenue and convey runoff along Pinchot Avenue to 70th Street and turn north. The storm drain will then turn east at Earl Drive and convey runoff along Earl Drive and outfall to Indian Bend Wash.

This variation would replace the need for an Osborn Road outfall. One disadvantage to this variation is the numerous additional bends in the storm drain necessary to stay in public rights of way. The other disadvantage is impacts of construction on traffic circulation and homes in the impacted neighborhoods. The advantages are the avoidance of potential utility conflicts in Osborn Road and maintenance of traffic during construction. This variation is only recommended if there is no feasible alignment for an Osborn Road outfall.

64th Street Storm Drain Connection

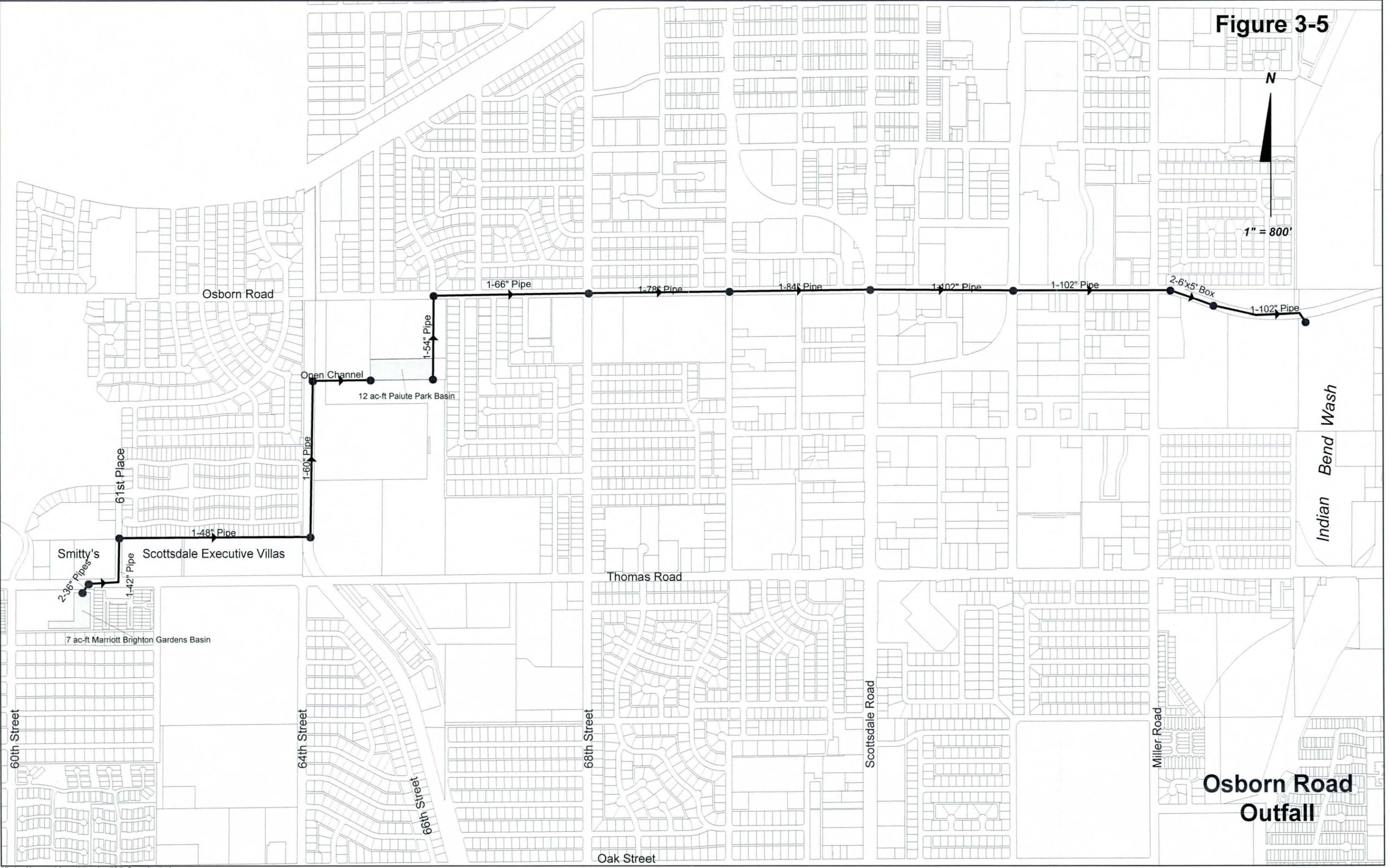
Extend a lateral storm drain from the alley behind the Scottsdale Executive Villas to the intersection of Thomas Road and 64th Street. Connect the lateral storm drain to the 64th Street storm drain and plug the connections to the abandoned water lines at this location.

This variation will divert runoff for the 64th Street improvements from Thomas Road to Osborn Road. It would provide backup to a storm drain system being connected to abandoned water lines which convey runoff east along Thomas Road through an inverted siphon under the Cross Cut Canal and other water line fittings before discharging to Indian Bend Wash. This connection would be duplicative at an additional cost of \$0.1 million. At this time, it is recommended that a stubout be located in the Osborn system to accept these flows if needed.

Figure 3-5

N

1" = 800'



Osborn Road
Outfall

Indian Bend Wash

4. Comparative Analysis

Introduction

This section provides a comparative analysis of the alternatives considered for the recommended plan and includes: consideration of the project hydrology, use of existing storm drain, potential for utility conflicts, permit and coordination issues, maintenance of traffic concerns, overall project viability and opinions of probable cost.

Hydrology

Methodology

The hydrologic methodology for this study is based on the HEC-1 model developed as part of the City of Scottsdale Stormwater Master Plan and Management Program. The methodology, hydrologic sub-basins, and concentration point identification numbers were modified as needed. The primary changes made for the Existing Conditions hydrology were as follows:

- The drainage areas were field verified and revised as necessary.
- Topographic mapping was developed in the portion of the study area within the City of Phoenix and used to verify and revise drainage areas as necessary.
- Basins 07 and 21 of the City of Scottsdale model were combined as Basin 07.
- New concentration points were added where hydrologic results were required.
- Routing paths were changed to reflect the alternative diversions.
- Routing characteristics were changed to reflect the larger storm drains in each alternative.
- Storage nodes were revised or added where the alternatives included the installation or modification of a basin.

In performing these revisions, care was taken to use the same methodology and sources as in the original HEC-1 models. The four alternatives being compared in this report only affect the hydrology of sub-basins 02, 03, 04, 05, and 07. Sub-basins 01 and 06 are in the study area, but are not affected by the alternatives.

Effects on Indian Bend Wash

Within the study area, there are dozens of outfalls which convey runoff to Indian Bend Wash (IBW), the Salt River, and the Old Cross Cut Canal. Only 6 of these outfalls were affected by the changes in the alternative hydrology. The peak discharges for a 10 year, 6-hour event and a 100 year, 6-hour event were compared at these 6 outfall locations. The resulting peak discharges are shown in Table 4-1 and can be compared based on the following observations:

- Roosevelt Street Outfall will increase the 100 year peak discharge to IBW by 1,337 cfs. This is an increase equivalent to about 4.5% of the design discharge for IBW (30,000 cfs) and will occur long before IBW reaches its peak discharge.
- Tempe Storm Drain Outfall will not increase the 100 year peak discharge to IBW.
- Oak Street Outfall will increase the 100 year peak discharge to IBW by 430 cfs. This is an increase equivalent to about 1.4% of the design discharge for IBW and will occur long before IBW reaches its peak discharge.
- All three Hy-View Area alternatives reduce the peak discharges to the Salt River through the City of Tempe, with the Roosevelt Street Outfall eliminating all discharge by diverting it east along Roosevelt Street.

- Each of the three Hy-View Area alternatives will reduce the peak discharge to the Old Cross Cut Canal through the City of Phoenix by diverting flow along Oak Street. These reductions, however, were not included in the alternative hydrology since they are the same for all the Hy-View Area alternatives. The reductions will be considered when evaluating the performance of the recommended plan.
- The Osborn Road outfall will decrease the 100 year peak discharge to IBW by 96 cfs.
- The increased peak discharge to IBW is offset by the decreased peak discharge through the City of Tempe to the Salt River. The net result for the Salt River is a decrease in the 100 year total peak discharge except for the Oak Street Outfall. The Oak Street Outfall will increase the 100 year peak discharge to the Salt River by 11 cfs. This is equivalent to less than 0.01% of the design discharge for the Salt River and will occur long before the Salt River reaches its peak discharge.

Table 4-1 Comparison of Peak Discharges at the Outfalls

Concentration Point Number 1	Location	Existing Conditions (cfs)		Roosevelt Street Outfall (cfs)		Tempe Storm Drain Outfall (cfs)		Oak Street Outfall (cfs)		Osborn Road Outfall (cfs)	
		10 yr 6 hr	100 yr 6 hr	10 yr 6 hr	100 yr 6 hr	10 yr 6 hr	100 yr 6 hr	10 yr 6 hr	100 yr 6 hr	10 yr 6 hr	100 yr 6 hr
020650	Roosevelt Street Outfall to IBW	112	222	790	1559	112	222	112	222	112	222
040070	Oak Street Outfall to IBW	563	1144	563	1144	563	1144	832	1574	563	1144
051570	Osborn Road Outfall to IBW	220	399	220	399	220	399	220	399	688	1286
050160	Thomas Road Outfall to IBW	1745	3536	1745	3536	1745	3536	1745	3536	1384	2553
System Flow to IBW 2		2640	5301	3318	6638	2640	5301	2909	5731	2747	5205
030060	Roosevelt Street at Scottsdale Road	326	660	0	0	326	660	326	660	326	660
030640	Roosevelt Street at 68th Street	150	700	0	0	116	216	146	281	150	700
Subtotal Flow to City of Tempe		476	1360	0	0	442	876	472	941	476	1360
System Flow to the Salt River 2		3116	6661	3318	6638	3082	6177	3381	6672	3223	6565

¹ The first two numbers of the concentration point number (CP) identify the sub-basin where it is located.

² These values are for simple comparative purposes at key points and do not represent all potential inflow to these receiving bodies.

Use of Existing Storm Drain

Details of existing storm drain capacities were provided in the Alternative Plan Formulation of this study. Since each of the alternatives provides adequate conveyance facilities and hydraulic conditions, there is no need for a comparison of the hydraulic performance of the alternatives. The only difference in the hydraulics will be through the use of existing storm drains to augment the system.

The best opportunities for use of existing storm drains are found in the Oak Street outfall and the Osborn Road outfall. The feasibility of leaving the existing storm drain in place and constructing a parallel storm drain will be incorporated into the recommended plan. The alternatives described in this report were developed based on the conservative assumption that the right of way does not allow for leaving the existing storm drain in place.

Roosevelt Street Outfall

Roosevelt Street has an existing 78" storm drain from Miller Road to IBW which might be used to augment the system. During the design of the recommended plan, it may be possible to leave this existing storm drain in place and to construct a parallel storm drain, sized to carry the additional design runoff.

Tempe Storm Drain Outfall

There are no existing storm drains which might be used to augment the system. The project outfall, however, is a City of Tempe storm drain system which will be used to avoid constructing an additional outfall to Indian Bend Wash or the Salt River.

Oak Street Outfall

There is an existing 36 to 48 inch diameter storm drain in Oak Street from 70th Street to IBW (about 4,500 feet). During the design of the recommended plan, it may be possible to leave this existing storm drain in place and to construct a parallel storm drain, sized to carry the additional design runoff.

Osborn Road Outfall

There is an existing storm drain in Osborn Road that runs west from Brown Avenue to the Scottsdale Road storm drain. The proposed Osborn Road storm drain may require redirecting the flow east towards Indian Bend Wash which will not allow for use of the existing storm drain.

There is also an existing 72 to 84 inch diameter storm drain in Osborn Road that runs from Civic Center Boulevard east to IBW. During the design of the recommended plan, it may be possible to leave the existing storm drain in place and to construct a parallel storm drain, sized to carry the additional design runoff.

Potential for Utility Conflicts

The potential conflicts with existing utilities will be quantified in detail as part of the recommended plan, but the issue was considered in comparing the alternatives. Available record drawings and facility maps were collected and reviewed to provide an idea of the types of utility conflicts to be expected. The identified potential utility conflicts are as follows:

Roosevelt Street Outfall

The Roosevelt Street Outfall would run parallel to some significant utilities along Roosevelt Street and along the west bank of the Cross Cut Canal and cross some significant utilities at McDowell Road. There is also a fiber optic duct, at the Scottsdale Road crossing.

Tempe Storm Drain Outfall

The Tempe Storm Drain Outfall would run parallel to some significant utilities along the west bank of the Cross Cut Canal and cross some significant utilities at McDowell Road. This alternative is expected to have the least potential for utility conflicts.

Oak Street Outfall

The Oak Street Outfall would run parallel to some significant utilities in Oak Street and would encounter utilities, including fiber optic duct, at the Scottsdale Road crossings.

Osborn Road Outfall

The Osborn Road Outfall will run parallel to fiber optic ducts which serve Scottsdale Memorial Hospital on Osborn Road. This storm drain outfall is expected to have the most potential for utility conflicts.

Permit and Coordination Issues

A preliminary investigation was conducted as part of the alternative analysis to determine the types of permit and coordination issues which are anticipated for the final design and construction. The results reveal no major obstacles or preferences for any of the alternatives. All four of the alternatives will require the following coordination:

- For construction in the City of Phoenix, plan reviews will be required by the Project Engineering Department and the Streets and Transportation Department.
- For construction in the City of Scottsdale, plan reviews will be coordinated through the Development Services Department.
- Several private utility owners share use of the rights of way within the study area and should be involved during final design. They include Salt River Project Water Engineering, Salt River Project Electric, Southwest Gas Corporation, Cox Communications, US West, and Arizona Public Service Company.

The Roosevelt Street, Oak Street and Osborn Road outfalls discharge to IBW and will require the following additional coordination:

- Compliance with Section 404 of the Clean Water Act for all Outlet Works in IBW through the US Army Corps of Engineers regulatory program.
- Coordination with the US Army Corps of Engineers engineering staff for hydrologic and hydraulic impacts on IBW.
- Compliance with Sections 401 and 402 of the Clean Water Act for all outlet works in IBW through the Arizona Department of Environmental Quality regulatory program.

The Tempe Storm Drain outfall alternative will require a review by the City of Tempe Engineering Department of the impacts of the project on the City of Tempe storm drain. Also, for construction in the City of Tempe, the City will review the construction plans.

Maintenance of Traffic Concerns

During the Alternative Formulation phase of this project, it was determined that the major roadways with large volumes of traffic (McDowell Road, Thomas Road, Scottsdale Road) would be avoided

as much as possible. The selected alternatives reflect this decision since their alignments are along Roosevelt Street, Oak Street, and Osborn Road, respectively. These roadways, however, still carry high traffic volumes and maintenance of traffic during construction will require consideration in the final design of the recommended plan. Only the Tempe Storm Drain outfall alternative will have reduced maintenance of traffic concerns since it does not include an alignment in any high traffic volume roadway sections, only a crossing of McDowell Road.

Project Viability

The following conclusions were drawn during the alternative analysis regarding the expected pitfalls and opportunities to be considered for each of the alternatives.

Roosevelt Street Outfall

The most challenging issues affecting project viability are construction on private property.

- The first section is proposed improvements within the Scottsdale Auto Park basin. The basin has a history of drainage problems and the owners may request that the City of Scottsdale take over maintenance of the basin and possibly purchase the basin. The strategy in developing all of the Hy-View Area alternatives was to minimize the impacts to the basin while providing a gravity outfall.
- The second section is a storm drain which will run parallel to the west bank of the Cross Cut Canal in Salt River Project right of way. By avoiding construction limits which impact the adjacent Desert Botanical Gardens, this issue may be minor.
- The third section is a storm drain which crosses the Salt River Project PERA Club. The alignment of this storm drain will most likely need to stay on the perimeter of the property, to try to minimize the impacts on future development of the north section of the site. The Flood Control District of Maricopa County should expect to purchase an easement for the storm drain from Salt River Project and coordinate the effects this will have on the development potential for the property.

Tempe Storm Drain Outfall

Similar challenges affect this alternative as were described for the Roosevelt Street Outfall. The additional pitfalls are:

- The construction along the west bank of the Cross Cut Canal will be much more extensive to facilitate the installation of a retention basin. This will require significant impacts to the Desert Botanical Gardens (DBG) with a possible footprint of 17 acres. The design would require close coordination with the staff of the DBG, who have already indicated a strong reluctance to this solution. From discussions with DBG staff creosote bush communities that are thousands of years old and other ongoing experimental sites would be impacted by the basin. Furthermore, the Desert Botanical Gardens staff might require purchase of the area by the flood control district, increasing the costs significantly.
- The construction at the PERA Club would require regrading the approximately 23 acres of the north section of the site. The entire area would then become subject to inundation during a storm event, severely limiting the future use of the property for SRP. The discussion regarding a shared use of the area as a golf course never fully materialized into a good partnership. Furthermore, the SRP staff might require purchase of the area by the flood control district, increasing the costs significantly.

These two issues, along with the other issues described for Alternative A combine to make the viability of this alternative significantly less than the other three alternatives in this report.

Oak Street Outfall

This alternative has no significant viability concerns and has been supported unanimously by the Steering Committee. It has also received support at the second public involvement meeting. The only possible issue will involve the Scottsdale Auto Park basin. The alternative is designed with the intention of minimizing the project impacts on the basin and the impacts are less than the other alternatives for this area. This alternative is considered the most viable for the Hy-View Area.

Osborn Road Outfall

Project viability for this alternative will involve three issues and areas of concern.

- The proposed regrading of the Marriott Brighton Gardens Home basin needs to be coordinated with the property owners. No meetings have been held to date and no conclusions can be drawn as to the extent of anticipated cooperation.
- The construction in the alley and parking lot for the Scottsdale Executive Villas will need to be coordinated with the property owners. No meetings have been held to date and no conclusions can be drawn as to the extent of anticipated cooperation.
- Paiute Park is a City of Scottsdale Municipal Park leased from SRP. It is anticipated that SRP will be agreeable to the additional use of Paiute Park as a detention basin. The City of Scottsdale has indicated acceptance of this shared use for Paiute Park as well.

Opinions of Probable Cost

The final area for comparison is the overall project costs. The cost is only intended for the purpose of comparing and evaluating the alternatives. A more detailed cost estimate will be prepared in support of the recommended plan.

The contingency for these costs was determined based on bid tabulations for recent District projects, as provided by the Flood Control District of Maricopa County. A review of these bid tabulations revealed that the cost for a storm drain project is primarily found in the pipe costs, with the incidental costs not exceeding 10% of the total project cost. Engineering design and permitting costs are also estimated to be 10% of the total project cost. An additional increase of 15% was added to cover other contingencies, totaling a 35% contingency for the opinions of probable cost. The opinions of probable cost for the alternatives are provided in Tables 4-2 to 4-5.

Table 4-2 Roosevelt Street Outfall Opinion of Probable Cost

Description	Quantity	Units	Rate	Amount
Dual 8' x 5' RCB	11,750	lf	\$684.01	\$8,037,118
48" RGRCP	3,500	lf	\$175.00	\$612,500
42" RGRCP	3,200	lf	\$160.00	\$512,000
36" RGRCP	1,300	lf	\$145.00	\$188,500
30" RGRCP	1,000	lf	\$120.00	\$120,000
Junction Boxes	15	ea	\$20,000.00	\$300,000
Manholes (24"-48")	16	ea	\$3,000.00	\$48,000
Outlet Works	2	ea	\$50,000.00	\$100,000
Auto Park Basin Excavation	2,000	cy	\$6.00	\$12,000
Rebuild Sidewalk	300	lf	\$8.00	\$2,400
Landscape Budget	1	ls	\$50,000.00	\$50,000
Subtotal Construction Costs				\$9,982,518
Auto Park Easement Costs	1.50	ac	\$130,000.00	\$195,000
DBG Easement Costs	1.20	ac	\$130,000.00	\$156,000
PERA Club Easement Costs	2.80	ac	\$130,000.00	\$364,000
Subtotal Acquisition Costs				\$715,000
Contingency @ 35%				\$3,493,881
Total Probable Costs				\$14,191,399

Table 4-3 Tempe Storm Drain Outfall Opinion of Probable Cost

Description	Quantity	Units	Rate	Amount
Dual 8' x 5' RCB	2,100	lf	\$684.01	\$1,436,421
48" RGRCP	3,500	lf	\$175.00	\$612,500
42" RGRCP	3,200	lf	\$160.00	\$512,000
36" RGRCP	1,300	lf	\$145.00	\$188,500
30" RGRCP	1,000	lf	\$120.00	\$120,000
24" RGRCP	2,150	lf	\$95.00	\$204,250
Junction Boxes	3	ea	\$20,000.00	\$60,000
Manholes (24"-48")	24	ea	\$3,000.00	\$72,000
Outlet Works	2	ea	\$50,000.00	\$100,000
Auto Park Basin Excavation	2,000	cy	\$6.00	\$12,000
Rebuild Sidewalk	300	lf	\$8.00	\$2,400
Landscape Budget	1	ls	\$50,000.00	\$50,000
DBG/ PERA Club Basin Excavation	185,000	cy	\$6.00	\$1,110,000
Rebuild Sidewalk	2,400	lf	\$8.00	\$19,200
Hardscape Budget	1	ls	\$200,000.00	\$200,000
Landscape Budget	1	ls	\$200,000.00	\$200,000
Subtotal Construction Costs				\$4,899,271
Auto Park Easement Costs	1.50	ac	\$130,000.00	\$195,000
DBG/ PERA Club Acquisition Costs	40	ac	\$175,000.00	\$7,000,000
Subtotal Acquisition Costs				\$7,195,000
Contingency @ 35%				\$1,714,745
Total Probable Costs				\$13,809,016

Table 4-4 Oak Street Outfall Opinion of Probable Cost

Description	Quantity	Units	Rate	Amount
Dual 10' x 5' RCB	2,000	lf	\$874.64	\$1,749,280
Dual 8' x 5' RCB	1,320	lf	\$684.01	\$902,893
Dual 6' x 5' RCB	4,140	lf	\$531.40	\$2,199,996
60" RGRCP	1,200	lf	\$235.00	\$282,000
54" RGRCP	2,800	lf	\$205.00	\$574,000
48" RGRCP	1,150	lf	\$175.00	\$201,250
42" RGRCP	1,200	lf	\$160.00	\$192,000
36" RGRCP	1,300	lf	\$145.00	\$188,500
30" RGRCP	1,000	lf	\$120.00	\$120,000
Junction Boxes	16	ea	\$20,000.00	\$320,000
Manholes (24"-48")	12	ea	\$3,000.00	\$36,000
Outlet Works	1	ea	\$50,000.00	\$50,000
Auto Park Basin Excavation	2,000	cy	\$6.00	\$12,000
Rebuild Sidewalk	300	lf	\$8.00	\$2,400
Landscape Budget	1	ls	\$50,000.00	\$50,000
Subtotal Construction Costs				\$6,880,319
Auto Park Easement Costs	1.5	ac	\$130,000.00	\$195,000
Subtotal Acquisition Costs				\$195,000
Contingency @ 35%				\$2,408,112
Total Probable Costs				\$9,483,431

Table 4-5 Osborn Road Outfall Opinion of Probable Cost

Description	Quantity	Units	Rate	Amount
Dual 6'x5' RCB	600	lf	\$531.40	\$318,840
102" RGRCP	3,460	lf	\$375.00	\$1,297,500
84" RGRCP	1,150	lf	\$300.00	\$345,000
78" RGRCP	1,440	lf	\$280.00	\$403,200
66" RGRCP	1,050	lf	\$260.00	\$273,000
60" RGRCP	1,500	lf	\$235.00	\$352,500
54" RGRCP	1,600	lf	\$205.00	\$328,000
48" RGRCP	1,600	lf	\$175.00	\$280,000
42" RGRCP	1,450	lf	\$160.00	\$232,000
36" RGRCP	300	lf	\$145.00	\$43,500
Junction Boxes	18	ea	\$20,000.00	\$360,000
Manholes (24"-48")	9	ea	\$3,000.00	\$27,000
Outlet Works	2	ea	\$50,000.00	\$100,000
Paiute Park Basin Excavation	20,000	cy	\$6.00	\$120,000
Landscape Budget	1	ls	\$50,000.00	\$50,000
Marriot Homes Basin Excavation	4,000	cy	\$6.00	\$24,000
Landscape Budget	1	ls	\$20,000.00	\$20,000
Subtotal Construction Costs				\$4,574,540
Marriot Homes Acquisition Costs	1.50	ac	\$175,000.00	\$262,500
Paiute Park Acquisition Costs	3.00	ac	\$175,000.00	\$525,000
Paiute Park Easement Costs	0.50	ac	\$130,000.00	\$65,000
Scottsdale Exec. Villas Easement Costs	2.00	ac	\$130,000.00	\$260,000
Subtotal Acquisition Costs				\$1,112,500
Contingency @ 35%				\$1,601,089
Total Probable Costs				\$7,288,129

Summary

The conclusions drawn based on the qualitative comparison of the alternatives are summarized in Table 4-6 and the opinions of probable cost are summarized in Table 4-7.

Table 4-6 Summary of Qualitative Comparisons

Comparison Description	Roosevelt Street Outfall	Tempe Storm Drain Outfall	Oak Street Outfall	Osborn Road Outfall
Peak Discharge Impacts at Outfalls	Low	Low	Low	Low
Use of Existing Storm Drain	Low	Low	Moderate	High
Potential for Utility Conflicts	Moderate	Moderate	Moderate	High
Permit and Coordination Issues	Moderate	Low	Moderate	Moderate
Maintenance of Traffic Concerns	Moderate	Low	Moderate	Moderate
Project Viability	High	Low	High	Moderate

Table 4-7 Summary of Opinions of Probable Cost

Comparison Description	Roosevelt Street Outfall	Tempe Storm Drain Outfall	Oak Street Outfall	Osborn Road Outfall
Construction Costs	\$9,982,518	\$4,899,271	\$6,880,319	\$4,574,540
Land Acquisition Costs	\$715,000	\$7,195,000	\$195,000	\$1,112,500
Contingency @ 35%	\$3,493,881	\$1,714,745	\$2,408,112	\$1,601,089
Total Costs	\$14,191,399	\$13,809,016	\$9,483,431	\$7,288,129

5. Recommended Plan

Recommendations

The following recommended plan was developed based on the conclusions presented in this report and the discussions with stakeholders through the Steering Committee and the public involvement meetings. The recommended plan for the STP Papago Watershed Study has unanimous agreement of the Steering Committee and is as follows:

1. Design and construct the Oak Street Outfall for a probable total cost of \$9.5 million. Coordinate construction in the vicinity of 64th Street with the City of Scottsdale's ongoing roadway design efforts. Use the existing storm drain in Oak Street as much as possible, based on other utility conflicts. Continue to pursue the Oak Street variations as described in this report.
2. Design and construct the Osborn Road Outfall for a probable total cost of \$7.3 million. Coordinate construction in the vicinity of 64th Street with the City of Scottsdale's ongoing roadway design efforts. Use the existing storm drain in Osborn Road as much as possible, based on other utility conflicts.

These recommendations will now be used as the basis for developing the recommended plan for the STP Papago Watershed Study. The plan will include developing a more detailed layout of the recommended improvements and corresponding opinion of probable cost. Details for the recommended plan will continue to be resolved through meetings and further evaluation of the feasible variations under consideration. The final recommended plan is scheduled for completion in the Fall of 1997.

Appendix

Written Comments

Comments from various organizations were received and are included in this appendix for reference. Following receipt of the comment letters, meetings were held to resolve the issues to everyone's satisfaction. Most of the required changes reflected in the comments have been incorporated in this report. The remainder, including hydraulic design comments, will be reflected in the recommended plan as originally intended.

FLOOD CONTROL DISTRICT
of
Maricopa County

Interoffice Memorandum

DATE: May 22, 1997

TO: HSC 5/28/97

VIA: MAL

FROM: RPH

SUBJECT: S.T.P. Papago Regional Flood Control Project
Watershed Study, Alternative Analysis Report, FCD 95-46

I have reviewed the subject materials and offer the following comments:

- 1) The numbered 'Description of Problems' on page 2-3 are different than the relative numbered locations on Figure 3-1, by a factor of one.
- 2) For the "Open Channel Along Oak Street" alternative variation on page 3-7, the open channel design is rejected due to an expected increase in design time needed to address aesthetics. What entity must the design satisfy, and what level of aesthetic design is required? It would seem a dumped riprap channel would suffice and would be much cheaper than a storm sewer.
- 3) In the "Buy Out Homes In The Floodplain" option listed on page 3-8 it is stated that 31 privately held properties would have to be purchased. Does this number include the anticipated Floodplain area reduction due to the current study?
- 4) Since the advantage listed for the "Earl Drive Outfall" on page 3-9 is "the avoidance of potential utility conflicts in

Osborn Road", please include a cost comparison between the Osborn Road Outfall utility relocation costs, and the Earl Drive Outfall alignment. FYI, relatively detailed Conduit Maps at a scale of 1" = 20' should be available from US West.

5) In the discussion of the Tempe Storm Drain Outfall on page 4-5, it is said that the desert vegetation is "...thousands of years old in the vicinity of the proposed basin...". Is this a misprint?

6) The cost estimate of the Osborn Road outfall should be revised, if needed, following meetings with Marriot Brighton Gardens and Executive Villas representatives.

7) The measured length of the 10' x 5' RCB scaled from node to node on figure 3-4 is closer to 4020 feet, leading to a cost difference of \$132,000.00; the length of the dual 8' x 5' RCB is closer to 1320 feet, leading to a cost difference of \$54,720.00. Please check all lengths and adjust cost estimates accordingly.

8) Please distinctively identify all Junction boxes and Manholes on all figures.

Interoffice Memorandum

Subject: STP Alternative Report

To: HSE

From: AA

Date: 05-30-97

The following are comments on the subject report.

1- Under the methodology for the hydrology portion of section 4 of the report, it should be mentioned that the Osborn Alternative was analyzed with the Hy-view alternative in place.

2- The Osborn alternative analysis is not discussed under the section called comparison of Peak Discharges at the Outfall. This alternative also has an effect to Indian Bend Wash and needs to be addressed in this section.

3- Under section 4 of the report, it would be helpful to include the design frequency of the existing storm drains for each alternative.

4- The District's comment on the use of the Oak street alternative in the hydrology analysis for the Osborn Alternative was not addressed in this submittal. The consultant should provide a copy of the HEC-1 model for the Osborn alternative showing that the Districts' previous concern has been addressed.

Post-it Fax Note	7671	Date	5/22	# of pages	2
To	Scott Clement	From	Tom Jantz		
HARD COPY TO FOLLOW		Co.	SRP		
		Phone #	236-2371		
Fax #	506-4601	Fax #			



P. O. Box 52025
Phoenix, AZ 85072-2025
(602) 236-5900

May 22, 1997

Mr. H. Scott Clement
Project Manager
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009-6399

RE: STP Papago Flood Control Study - Final Alternative Analysis Report

Dear Scott:

Your May 13, 1997 letter distributed the subject report for review and comment. The purpose of this letter is to provide comments on this report.

1. Page 2-3, Drainage Issues: The item numbers on pages 2-3 and 2-4 do not match up with those on Figure 2-1.
2. Page 4-1, Comparative Analysis: Under the discussion on Comparison of Peak Discharges at the Outfalls, the second bulleted paragraph describes the Tempe Storm Drain Outfall. In it, it says the outfall flow into the IBW will be increased by 612 cfs. Shouldn't this figure be zero, based on the STP discharge being captured at the PERA Club and metered out into the Tempe Storm Drain, post event?
3. Page 4-2, Comparative Analysis: Similar to above, the first bullet indicates the least impact on peak discharges to the IBW would be the Oak Street Outfall. Wouldn't this really be the Tempe Drain Outfall, based on the discharge reaching the IBW post event?
4. Page 4-2, Table 4-1: The flow quantities for the Tempe Storm Drain Outfall from Roosevelt Street Outfall to IBW seem very high, based on the discussion above. Shouldn't they be the same as the Existing Conditions?
5. Page 4-6, Project Viability: The third bulleted paragraph describes the impacts to SRP owned Paiute Park and anticipates SRP would be agreeable to the additional use of the park as a retention basin. This has not been reviewed with SRP's Land Department. Please let me know if this is critical to the analysis and we can certainly facilitate a discussion on this issue.

SALT RIVER PROJECT

Mr. H. Scott Clement
May 22, 1997
Page 2

6. Page 4-8, Opinions of Probable Cost: Both the Oak Street Outfall and the Osborn Road Outfall will require under crossing the SRP Crosscut Canal. The study might consider including a line item cost estimate for the crossing.

Please call me at 236-2371, if you have any questions.

Sincerely,



Thomas G. Sands
Principal Engineer
Water Engineering Department

:SC

bc: R. Heckenberg
R. Larchick
J. Rauch
L. Taylor



City of Phoenix

STREET TRANSPORTATION DEPARTMENT

FLOODPLAIN MANAGEMENT

200 WEST WASHINGTON STREET, 5TH FLOOR

PHOENIX, ARIZONA 85003-1611

PHONE: (602) 262-4960 FAX: (602) 262-7322

Date: 5/20/97

TO: Scott Clement

FIRM: FC DMC

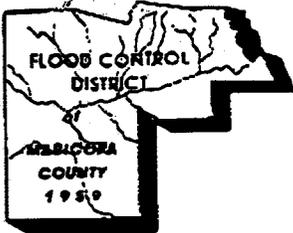
FAX NUMBER: 506-4601

SENDER: Ray Acuna

TELEPHONE: 262-4026

NUMBER OF PAGES (INCLUDING COVER): 2

DESCRIPTION/COMMENTS: _____



FLOOD CONTROL DISTRICT

of

Maricopa County

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BOARD OF DIRECTORS
Betsey Bayless
Jan Brewer
Fulton Brock
Don Stapley
Mary Rose Garrido Wilcox

May 13, 1997

Mr. Ray Acuna
City of Phoenix
200 West Washington Street
Phoenix, AZ 85003

SUBJECT: STP Final Alternative Analysis Report

Dear Mr. Acuna:

Enclosed is a copy of the final Alternative Analysis Report for your review. Please forward your comments to me by May 23, 1997.

If you have any questions, please contact me.

Sincerely,

H. Scott Clement, P.E.
Project Manager

HSC/dmf

att.

*Sixt -
Need more
time
Ray*