

DRAINAGE AND TRANSPORTATION INFORMATION SHEET
(REV 02/2012)

PROJECT TITLE: Mic Valley DMP ZONE MAP: 5151/0000
DRB#: _____ EPC#: _____ WORK ORDER#: _____

LEGAL DESCRIPTION: _____
CITY ADDRESS: _____

ENGINEERING FIRM: Smith Engineering CONTACT: _____
ADDRESS: _____ PHONE: _____
CITY, STATE: _____ ZIP CODE: _____
EMAIL: _____

OWNER: _____ CONTACT: _____
ADDRESS: _____ PHONE: _____
CITY, STATE: _____ ZIP CODE: _____

ARCHITECT: _____ CONTACT: _____
ADDRESS: _____ PHONE: _____
CITY, STATE: _____ ZIP CODE: _____
EMAIL: _____

SURVEYOR: info only CONTACT: _____
ADDRESS: _____ PHONE: _____
CITY, STATE: _____ ZIP CODE: _____

CONTRACTOR: _____ CONTACT: _____
ADDRESS: _____ PHONE: _____
CITY, STATE: _____ ZIP CODE: _____

TYPE OF SUBMITTAL:
____ DRAINAGE REPORT
____ DRAINAGE PLAN 1st SUBMITTAL
____ DRAINAGE PLAN RESUBMITTAL
____ CONCEPTUAL G & D PLAN
____ GRADING PLAN
____ EROSION CONTROL PLAN
____ ENGINEER'S CERT (HYDROLOGY)
____ CLOMR/LOMR
____ TRAFFIC CIRCULATION LAYOUT
____ ENGINEER'S CERT (TCL)
____ ENGINEER'S CERT (DRB SITE PLAN)
____ OTHER (SPECIFY) _____

CHECK TYPE OF APPROVAL SOUGHT:
____ SIA/FINANCIAL GUARANTEE RELEASE
____ PRELIMINARY PLAT APPROVAL
____ S. DEV. PLAN FOR SUB'D APPROVAL
____ S. DEV. FOR BLDG. PERMIT APPROVAL
____ SECTOR PLAN APPROVAL
____ FINAL PLAT APPROVAL
____ FOUNDATION PERMIT APPROVAL
____ BUILDING PERMIT APPROVAL
____ CERTIFICATE OF OCCUPANCY (PERM)
____ CERTIFICATE OF OCCUPANCY (TEMP)
____ GRADING PERMIT APPROVAL
____ PAVING PERMIT APPROVAL
____ WORK ORDER APPROVAL
____ GRADING CERTIFICATION
____ OTHER (SPECIFY) SO-19

WAS A PRE-DESIGN CONFERENCE ATTENDED:
____ YES
____ NO
____ COPY PROVIDED

DATE SUBMITTED: _____ BY: _____

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature, location, and scope to the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following

- 1 **Conceptual Grading and Drainage Plan:** Required for approval of Site Development Plans greater than five (5) acres and Sector Plans
- 2 **Drainage Plans.** Required for building permits, grading permits, paving permits and site plans less than five (5) acres
- 3 **Drainage Report.** Required for subdivision containing more than ten (10) lots or constituting five (5) acres or more.

Rec'd
4-18-12
19

Mid-Valley Drainage Management Plan

Executive Summary

Prepared for:



The City of Albuquerque, NM

and



Albuquerque Metropolitan Arroyo
Flood Control Authority



Prepared by:

Smith Engineering Company

SEC Project No. 110112

April, 2012

EXECUTIVE SUMMARY

1.1 PURPOSE

The City of Albuquerque (COA) and the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) requested that Smith Engineering Company (SEC) conduct a drainage analysis, prepare a Drainage Management Plan (DMP) and develop conceptual design options for drainage improvements to address drainage issues in the Albuquerque Mid-Valley area.

1.2 PROJECT LOCATION

The limits of the study area are generally bounded on the north by I-40, on the south by Bridge Blvd., on the east by I-25 and on the west by the Rio Grande. **Figure E1** illustrates the project location. The study area has been delineated into three major drainage basins that are named the Broadway Basin, Barelás Basin and Alcalde Basin.

1.3 PROBLEM DESCRIPTION

The Mid-Valley area is nearly 100 percent developed with a mixture of residential, commercial and industrial areas with a few parks. The majority of the Mid-Valley area sub-basins (also called sub-catchments) have very mild slopes and may be described as nearly flat, however, steep slopes exist east of Broadway. Street and property flooding is exacerbated due to several factors such as:

1. High imperviousness in many sub-catchments generates considerable runoff
2. Mild sub-catchment and street slopes that reduce conveyance capacity
3. Small diameter storm drains and mild slopes with minimal capacity
4. Lack of storm water detention facilities

1.4 POTENTIAL FOR FLOODPLAIN REMOVAL

Figure E1 illustrates the FEMA floodplain locations. Based on the modeling results, it may be feasible that all of the existing FEMA floodplains could probably be removed with a "Letter of Map Revision" (LOMR) with the exception of the floodplain near the Indian School-Commercial intersection near I-40. However, with implementation of the proposed facilities in this DMP, that floodplain could likely be removed.

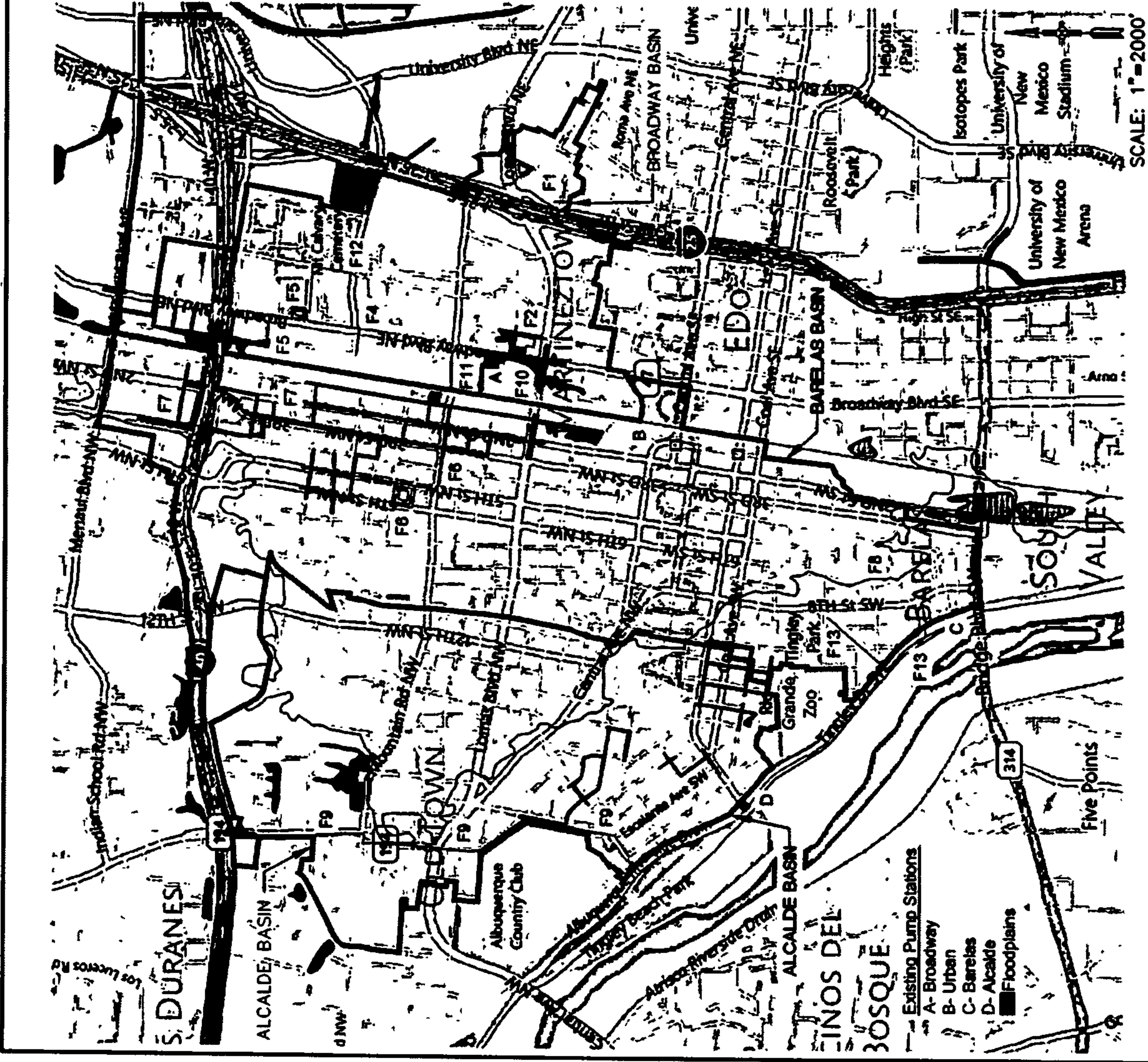
1.5 RECOMMENDATIONS FOR DRAINAGE AND FLOOD CONTROL

Multiple storm water system options and facilities were modeled. All facilities simulated with Option 29 are recommended and these are briefly summarized on **Figure E1** with conceptual level cost estimates. Option 29 was developed to include the most effective facilities from the various previous options and combine them in an effort to eliminate flooding throughout the study area. Some facilities have been divided into Phases (to assist in funding) and prioritized in numerical order with the lowest number as the highest priority.

Suggested priorities are presented for each facility, however final prioritization and implementation must be defined by the City and AMAFCA depending on funding availability and other factors.

1.6 RECOMMENDATIONS FOR STORMWATER QUALITY

Best Management Practices (BMPs) to accomplish storm water quality improvement should be included on all public storm water detention ponds and private development or redevelopment ponds whether small or large, to mitigate and collect the first flush pollutant load. In addition to pond BMPs, other on-site BMPs are recommended to control and collect the first flush.



PROPOSED FACILITY SUMMARY AND CONCEPTUAL LEVEL COST ESTIMATES

| PRIORITY | FACILITY NUMBERS AND BRIEF DESCRIPTIONS | Facility or Sub-Facility Cost | Total of Sub-Facility Costs |
|----------|--|-------------------------------|-----------------------------|
| A | Labeled as F's on Figure E1 | \$ | \$ |
| 1 | Facility 2.1 - Purchase Marlin-Area Road Property | \$1,008,000 | |
| | Facility 2.2 - Build Marlin - Area Pond, inlet and outlet structures | \$1,008,000 | |
| | Facility 2.3 - Abandon remove existing Broadway-Lomas Pond inlet outlet structure | \$72,000 | |
| | Facility 2 | | \$2,744,000 |
| 2 | A pond bottom liner may be required to avoid storm water seepage into the groundwater. This could be an additional \$200,000 that is not included in the Facility 2 estimate as this is uncertain at this time | | |
| 3 | Facility 10 - Gate (-) - Add the existing Broadway-Lomas Pond property | \$2,451,000 | |
| 4 | Facility 11 - Build a new Broadway-Lomas Pump Station | \$12,807,000 | |
| 5 | Facility 1 - Build Pond near Lomas Blvd. and Medical Arts | \$808,000 | |
| 6 | Facility 1 - Build Borelas storm drain connection to Pecos storm drain | \$215,000 | |
| 7 | Facility 6.1 - Purchase North Webb Park Property | \$2,914,000 | |
| | Facility 6.2 - Build North Webb Park Pond and outlet storm drain | \$2,422,000 | |
| | Facility 6.3 - Build inlet storm drain to North Webb Park Pond | \$1,242,000 | |
| | Facility 6 | | \$5,580,000 |
| 8 | Facility 7.1 - Purchase the McKnight Pond Property | \$1,054,000 | |
| | Facility 7.2 - Build part of the outlet storm drain from the McKnight Pond | \$664,000 | |
| | Facility 7.3 - Build McKnight Pond and remainder of outlet storm drain | \$1,574,000 | |
| | Facility 7.4 - Build part of the inlet storm drain to the McKnight Pond | \$655,000 | |
| | Facility 7.5 - Build inlet storm drain to McKnight Pond | \$729,000 | |
| | Facility 7 | | \$4,080,000 |
| 9 | Facility 5.1 - Build Broadway outlet storm drain from Santa Barbara Park Pond | \$722,000 | |
| | Facility 5.2 - Build Santa Barbara Park Pond (west end of pond) | \$771,000 | |
| | Facility 5.3 - Build part of inlet storm drain to Santa Barbara Park Pond | \$609,000 | |
| | Facility 5.4 - Build inlet storm drain to Santa Barbara Park Pond | \$763,000 | |
| | Facility 5 | | \$2,865,000 |
| 10 | Facility 4 - Build Borelas storm drain | \$334,000 | |
| | Facility 9.1 - Build Lomas and part of San Pascual storm drain | \$1,179,000 | |
| | Facility 9.2 - Build remainder of San Pascual storm drain to Rio Grande Blvd | \$1,491,000 | |
| | Facility 9.3 - Build Rio Grande Blvd. storm drain to Dora | \$1,495,000 | |
| | Facility 9.4 - Build Rio Grande Blvd. storm drain from Dora to Canyon | \$1,227,000 | |
| | Facility 9 | | \$4,396,000 |
| 11 | Facility 12 - Build Edith Blvd. - Harned storm drain to Santa Barbara Park Pond | \$744,000 | |
| 12 | Facility 13 - Build El Borelas storm drain from Tripple Park to Borelas Pump Station | \$1,084,000 | |
| 13 | Alcalde Pump Station - Build Borelas storm water quality improvements | \$339,000 | |
| 14 | Borelas Pump Station - Build Borelas storm water quality improvements | \$393,000 | |
| | TOTAL ALL FACILITIES | | \$38,088,000 |

A - Suggested profiles are presented for each facility, however final prioritization and implementation must be defined by the City and AMAFCA depending on funding availability and other factors.

MID-VALLEY DRAINAGE MANAGEMENT PLAN

FOR THE CITY OF ALBUQUERQUE & ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

APRIL 2012

SEC PROJECT NO. 110112

PROPOSED FACILITIES

MAP

FIGURE E1

Mid-Valley Drainage Management Plan

Project Overview

Prepared for:

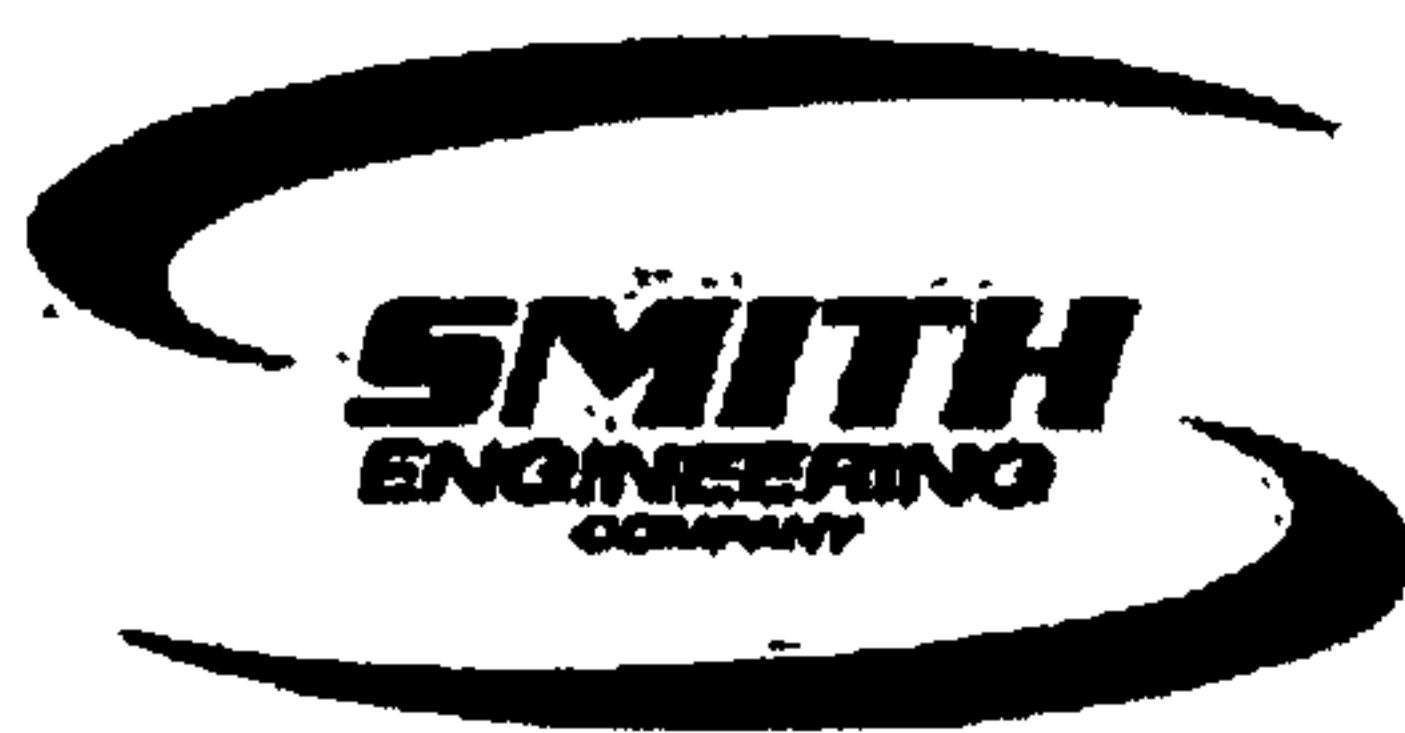


The City of Albuquerque, NM

and



Albuquerque Metropolitan Arroyo
Flood Control Authority



Prepared by:

Smith Engineering Company

SEC Project No. 110112

April, 2012

PROJECT OVERVIEW

1.1 PURPOSE

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1.2 PROJECT LOCATION

The limits of the study area are generally bounded on the north by I-40, on the south by Bridge Blvd., on the east by I-25 and on the west by the Rio Grande. Figure A illustrates the project location. The study area has been delineated into three major drainage basins that are named the Broadway Basin, Barelás Basin and Alcalde Basin.

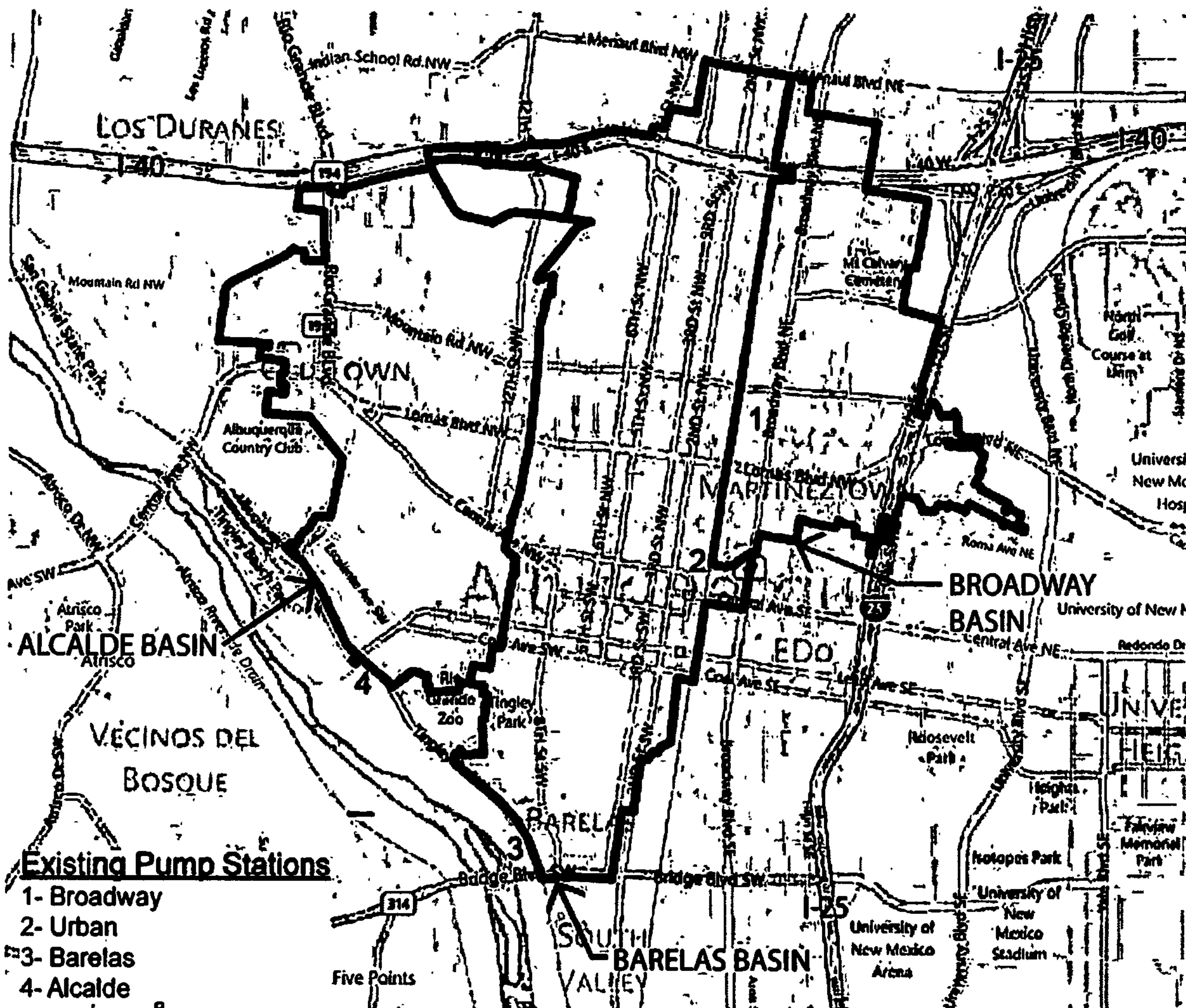


Figure A: Project Location

1.3 PROBLEM LOCATIONS AND DESCRIPTIONS

General Description

The Mid-Valley area is nearly 100 percent developed with a mixture of residential, commercial and industrial areas with a few parks. The majority of the Mid-Valley area sub-basins (also called sub-catchments) have very mild slopes and may be described as nearly flat, however, steep slopes exist east of Broadway. Street flooding is exacerbated due to several factors such as:

1. High imperviousness in many sub-catchments generates considerable runoff
2. Mild sub-catchment and street slopes that reduce conveyance capacity
3. Small diameter storm drains with mild slopes and minimal capacity
4. Lack of storm water detention facilities

Existing Storm Drainage Infrastructure

Storm Drains

Storm drains exist throughout the study area. Many are small diameter from 15-in. to 24-in. These small lines have minimal capacity to collect and convey very small storms (2-year frequency or less). Small storm drains generally connect to larger trunk line storm drains (36-in. to 96-in.), which are adequate in small to mid-sized storms. However, many storm drains become surcharged (exceed the street elevations) in the 100-year storm as the runoff rates and volumes exceed the storm drain capacities. Storm drains generally flow north to south and east to west. All trunk lines drain to pump stations.

Pump Stations

Figure A illustrates the general location of the four pump stations. The pump station names, capacities (in cubic feet per second, cfs) and outfall location are listed here:

- Broadway Pump Station, 130 cfs, outfall is the North Diversion Channel
- Barelás Pump Station, 405 cfs, outfall is the Rio Grande Bosque
- Urban Pump Station, 12 cfs, immediate outfall is Copper Ave. storm drain that drains to the Barelás Pump Station
- Alcalde Pump Station, 270 cfs, outfall is the Rio Grande Bosque

Detention, Surge and Retention Basins

The Broadway Basin contains two significant detention basins:

- The Broadway Detention Basin (maximum storage volume = 16.13 acre-feet) located at the northwest intersection of Broadway and Lomas.
- The Air Quality Detention Basin (maximum storage volume = 12.45 acre-feet) located at the southeast intersection of Broadway and Odelia.

The Barelás Basin contains one significant detention basin called the Tingley Park Surge Pond (maximum storage volume = 44.45 acre-feet) located across from the Rio Grande Zoo at the northwest intersection of Atlantic and 8th St.

The NM Department of Transportation (NMDOT) has several detention and retention basins adjacent to Interstate 40 and Interstate 25 that collect the highway storm runoff.

These detention basins have small controlled discharge rates with outfalls into the City of Albuquerque (COA) storm drain system.

1.4 FEASIBILITY TO REMOVE FEMA FLOODPLAINS

The Mid-Valley area contains 12 FEMA floodplains. The 100-year 24-hour storm existing conditions SWMM model results were evaluated as the basis to make judgments on the potential to remove FEMA floodplains through the "Letter of Map Revision" (LOMR) process.

Depending on the FEMA reviewer, the SWMM model may be considered as a macro analysis and may or may not be acceptable to FEMA. In other words, a more refined or micro analysis SWMM model may be required to demonstrate that floodplain depths are less than 1-foot deep.

However, the general conclusion is that all of the existing FEMA floodplains could probably be removed with a LOMR with the exception of the floodplain near the Indian School-Commercial intersection near I-40. Implementation of the proposed facilities in this DMP, would most probably result in that floodplain being removed.

1.5 EXISTING CONDITIONS 100-YEAR FLOOD SUMMARY

Detention Pond Routing Results Summary

The model results indicate that adequate freeboard in the 100-year, 24-hour storm exists for the three major COA detention basins:

| | |
|-------------------------|------------------------|
| Broadway-Lomas Pond | = 2.1 feet freeboard |
| Air Quality Pond | = 1.8 feet freeboard |
| Tingley Park Surge Pond | = 5.4 feet freeboard * |

**Note – The 100-yr. 24-hour storm maximum water surface elevation remained within the box inlet structure.*

Manhole Flooding Results Summary (Street Ponding Depths)

Manhole flood depths serve as a proxy for the flood depth that would occur within all streets in a sub-catchment. The results indicate that only one manhole located near the Commercial-Baca intersection has severe street flooding (1.5 feet deep). Seven manholes within the study area have flood depths between 0.5 feet and 1 foot. Seventeen manholes have flood depths between 0 and 0.5 feet. Note that flood depths along the Rio Grande Blvd. corridor range from 0.1 to 0.8 feet; however the length of time that flooding occurs is significant at 16 hours. Most other manhole flood durations range between 3 and 6 hours.

1.6 DRAINAGE OPTIONS

Drainage Improvement Options were developed based on consideration of the following:

1. Location of known drainage or flood problem areas identified previously by public meetings, the COA and AMAFCA.
2. Street ponding depth locations are determined from the model results for existing and proposed options.
3. Detention pond routing results for existing and proposed ponds.
4. Coordination and direction from the COA and AMAFCA.

Option and Facility Development Procedure

A Drainage Option represents a distinct SWMM model; however in a few cases an Option was not modeled, but evaluated external to SWMM. Each SWMM model contains parameters required to simulate distinct Drainage Facilities. Distinct Facilities were developed to assist in cost estimating and funding (facilities may need to be funded over time in various phases). Note that 32 options were evaluated.

The Alcalde, Barelas and Broadway Basins are hydraulically connected and therefore solutions developed for specific flood problem locations will affect other locations. The facilities sometimes involve removal of either existing ponds or storm drains as required for a specific facility or group of facilities to function as intended.

The progression of Option or SWMM model development was driven by the goal to eliminate street ponding. If the model results indicated that the proposed drainage facilities did not eliminate the street ponding; then another option was developed with different facilities with the same goal.

The most significant flooding problem and high priority area is the Broadway-Lomas intersection. In addition, the COA and AMAFCA have directed that Options be evaluated to determine if the Broadway-Lomas detention pond could be removed so that property may be utilized at its highest and best use that is most likely commercial use. Therefore, the Broadway-Lomas pond was removed from most Options (models) and in conjunction, other facilities have been included and / or deleted.

Recommended Option 29 - Build the Marble-Arno Pond and Other Facilities

Purpose

The purpose of Option 29 was to refine and include the most effective facilities from the many options evaluated and combine them in an effort to eliminate flooding throughout the study area. Some Facilities have been divided into Phases and prioritized in numerical order with the lowest number as the highest priority. The final prioritization and implementation must be defined by the City and AMAFCA depending on funding availability and other factors.

Note – Figures 1 through 9 are located at the end of this text, and these illustrate the proposed facilities as described next.

PRIORITY 1**Facility 2**

Build the Marble-Arno Pond (or an equivalent pond) as an alternative pond to replace the Broadway -Lomas Pond. The Marble-Arno Pond would be located in a vacant lot at the southwest Marble Ave.-Arno intersection. This facility also includes a 54-in. RCP storm drain from the Lomas Blvd. - Arno intersection (COA manhole 7861) that will drain north in Arno and outfall into the pond. The Lomas storm drain west of Arno would be disconnected at the Lomas-Arno intersection to divert all Lomas storm drain flow east of Arno into the Marble-Arno Pond. The 54-inch storm drain in Broadway between the inlet and outlet to the existing Broadway-Lomas Pond) would be re-connected to become functional. That segment is currently abandoned to divert the Broadway storm drain flows into the existing pond. The Marble-Arno Pond outfall pipe would be a 36-in. RCP storm drain in Marble that would drain west to join the Broadway storm drain at the Broadway-Marble intersection (COA manhole 32865). **Figure 1** illustrates the location.

Total Conceptual Level Construction and Land Acquisition Cost Estimate= \$2,744,000 *

*A pond bottom liner may be required to avoid stormwater seepage into the groundwater. This could be an additional \$200,000 that is not included in the Facility 2 estimate, as this is uncertain at this time.

Facility F2.1 Priority 1 - Purchase the Marble-Arno Pond property (1.8 acres) or an equivalent property in this vicinity, no construction.

Total Conceptual Level Land Acquisition Cost Estimate= \$1,006,000

Facility F2.2 Priority 2 - Build the Marble-Arno Pond (or an equivalent pond) and build the 54-in. RCP inlet pipe and 36-in. RCP outfall pipes. The pond basic characteristics are as follows:

- Property area = 1.8 acres, pond top area required = 1.04 acres.
- Excess property that could may be used for other purposes = 0.76 acres).
- Maximum depth – 12 feet, 1V:1H side slopes with shotcrete.
- Pond will be rectangular on the east-west shape of the property, and the top of slope will be 10-ft from the east, north and west ROW lines. The south section of property will be available for other possible uses.
- Total available storage volume – 10.11 ac-ft.
- This also includes the installation of multiple inlets in Lomas Blvd. just east of Arno to capture all street

runoff from Lomas and divert the flows into the Marble-Arno Pond.

- The entire Marble-Arno Pond property could be utilized in order to attain mild side slopes of 1V:2H, greater storage volume and freeboard. This variation may be evaluated during the preliminary design.

Total Conceptual Level Construction Cost Estimate= \$1,666,000

Facility F2.3 Priority 3 - Abandon the existing inlet and outlet pipes into and out of the existing Broadway-Lomas Pond from manholes COA32878.A and 32878.B. Reconnect the existing Broadway storm drain that was abandoned between these manholes to allow the Broadway storm drain that begins north of Lomas to drain to the Broadway Pump Station.

Total Conceptual Level Construction Cost Estimate= \$72,000

PRIORITY 2

Facility 10 Remove the existing Broadway-Lomas Pond and sell this lot as a high value commercial property. No construction costs included. **Figure 1** illustrates the location.

Estimated Sale Price = \$2,451,000

PRIORITY 3

Facility 11 Build a new Broadway Pump Station at the existing capacity of 150 cfs (Molzen & Corbin, July 2008). **Figure 1** illustrates the location.

Total Conceptual Level Construction Cost Estimate= \$12,607,000

PRIORITY 4

Facility 1 Build a new pond in Sub-catchment BR21 (near southeast intersection of Lomas Blvd. and Medical Arts). The pond outfall pipe will be a 24-in. RCP that will connect to an existing manhole in Lomas Blvd. This connects to an existing 48-in. RCP that drains north to the existing Odelia Pond. **Figure 2** illustrates the location.

Note – The Marble-Arno Pond in Option 29 was simulated assuming Subcatchment BR21 runoff will not drain to the pond, but will drain to the Odelia Park storm drain system at the direction of the COA.

Total Conceptual Level Construction Cost Estimate= \$808,000

PRIORITY 5

Facility 8 Upsize the Barelás 24-in. storm drain to 36-in. RCP storm drain from Santa Fe to Pacific and the upsize the Barelás 30-in. storm drain (south of

Pacific) to 36-in. between manholes COA22168 and COA22169. These upsized storm drains will be connected to the existing Pacific 60-in. storm drain (the Barelás storm drain is not currently connected to the Pacific storm drain). This will allow Sub-catchment B5 an additional outfall pipe. **Figure 6** illustrates the location.

Total Conceptual Level Construction Cost Estimate= \$215,000

PRIORITY 6

Facility 6

Build a new 54-in. RCP storm drain in Constitution from the 3rd St. – Constitution –intersection west to 5th St., then south in 5th St. to the Summer - 5th St. intersection. This pipe will outfall to the North Wells Park Pond that would be located in the vacant block at the southwest corner of Summer and 5th St. The 36-in. RCP outfall pipe from the pond will continue south in 5th St. to Mountain, then east in Mountain to 3rd St. where it will join into the existing 3rd St. 48-in. storm drain. The existing 3rd St. storm drain should be plugged from the 3rd St.-Constitution intersection, south to the 3rd St.- Mountain intersection to direct upstream storm drain flows into the North Wells Park Pond. **Figure 5** illustrates the location.

Total Conceptual Level Construction and Land Acquisition Cost Estimate= \$5,680,000

Facility F6.1 Priority 1 - Purchase the North Wells Park Pond property (or an equivalent property in this vicinity), no construction.

Total Conceptual Level Land Acquisition Cost Estimate= \$2,016,000

Facility F6.2 Priority 2 - Build the pond (or an equivalent pond) and the 36-in. RCP outfall storm drain from the pond south in 5th St. to the 5th St.-Mountain intersection. Continue east in Mountain to the 3rd St.-Mountain intersection and join existing 3rd St. storm drain.

Total Conceptual Level Construction Cost Estimate= \$2,422,000

Facility F6.3 Priority 3 – Build a 54-in. RCP storm drain as the pond inflow pipe from the 3rd St.-Constitution intersection west in Constitution to the 5th St. Constitution intersection. Continue south in 5th St. to the Summer-5th St. intersection and outfall into the pond.

Total Conceptual Level Construction Cost Estimate= \$1,242,000

PRIORITY 7**Facility 7**

Upsize the 4th St. storm drains from 36-in. to 54 in. RCP from Cutler south to McKnight, then east and outfall to the McKnight Pond that would be located in the vacant lot at the southeast intersection of 4th St. and McKnight. The pond outfall pipe will be a 30-in. RCP storm drain that will join into the McKnight-3rd St. intersection storm drain that will be upsized from existing 48-in. to 54-in. RCP storm drain that continues south in 3rd St. to Constitution. **Figure 5** illustrates the location.

Total Conceptual Level Construction and Land Acquisition Cost Estimate = \$4,967,000

Facility F7.1 Priority 1 - Purchase the McKnight Pond property (or an equivalent property in this vicinity), no construction.

Total Conceptual Level Land Acquisition Cost Estimate= \$1,054,000

Facility F7.2 Priority 2 – Build a 54-in. RCP storm drain in 3rd St. from the 3rd St.-Constitution intersection north to the 3rd St. - Hannett intersection.

Total Conceptual Level Construction Cost Estimate= \$955,000

Facility F7.3 Priority 3 - Build a 54-in. RCP storm drain in 3rd St. from the 3rd St. - Hannett intersection north to the McKnight Pond. Build the McKnight Pond (or an equivalent pond) and 30-in. RCP outfall storm drains.

Total Conceptual Level Construction Cost Estimate= \$1,574,000

Facility F7.4 Priority 4 - Build a 54-in. RCP storm drain in 4th St. from the 4th St. - McKnight intersection north to the 4th St. - Indian School intersection. This storm drain will outfall into the McKnight Pond.

Total Conceptual Level Construction Cost Estimate= \$655,000

Facility F7.5 Priority 5 - Build a 54-in. RCP storm drain in 4th St. from the 4th St. - Indian School intersection north to the 4th St. - Cutler intersection.

Total Conceptual Level Construction Cost Estimate= \$729,000

PRIORITY 8**Facility 5**

Upsize the Commercial 36-in. RCP storm drain to 54-in. RCP storm drain from the Commercial-Indian School intersection south in Commercial to McKnight, then east in McKnight. Build a new 54-in. RCP storm drain from the Commercial-McKnight intersection east to the Broadway-

McKnight intersection. The storm drain would continue south in Broadway to join into the Santa Barbara Park Pond. The outlet from the pond will be a 24-in. RCP storm drain that joins the Broadway storm drain at Hannett. Upsize the 36-in. storm drain to 48-in. RCP storm drain south from the Broadway-Hannett intersection to the Broadway-Odelia intersection. The Commercial existing 36-in. RCP storm drain south of the McKnight-Commercial intersection should be plugged to direct upstream flows towards the Santa Barbara Park Pond. Figure 4 illustrates the location.

Total Conceptual Level Construction Cost Estimate= \$2,862,000

Facility F5.1 Priority 1 - Build a 48-in. RCP storm drain in Broadway from the Broadway-Odelia intersection north to the Broadway-Hannett intersection.

Total Conceptual Level Construction Cost Estimate= \$722,000

Facility F5.2 Priority 2 - Build the Santa Barbara Park Pond in the west end of park that is grass without facilities. This is a city park and therefore property acquisition is not required. Also build the pond 24-in. RCP outfall pipe to join into the Broadway storm drain at Hannett.

Total Conceptual Level Construction Cost Estimate= \$771,000

Facility F5.3 Priority 3 - Build a 54-in. RCP storm drain in Broadway from northwest corner of the Santa Barbara Park Pond north to the Broadway-McKnight intersection. Continue the 54-in. RCP storm drain west in McKnight to half way between Broadway and Commercial.

Total Conceptual Level Construction Cost Estimate= \$606,000

Facility F5.4 Priority 4 - Build a 54-in. RCP storm drain in McKnight beginning half way between Broadway and Commercial to the McKnight-Commercial intersection then continue the 54-in. RCP storm drain north in Commercial to the Commercial-Indian School intersection.

Total Conceptual Level Construction Cost Estimate= \$763,000

PRIORITY 9

Facility 4 Upsize the Baca storm drain from 36-in. RCP to 48-in. RCP from the Broadway-Odelia intersection west in Baca to Commercial. **Figure 3** illustrates the location.

Total Conceptual Level Construction Cost Estimate= \$334,000

PRIORITY 10

Facility 9 Upsize the Rio Grande Blvd.-Chacoma -San Pasquale-Laguna storm drains to 54 in. RCP. Begin in Laguna at the Kit-Carson-Laguna intersection and continue north to the Laguna-San Pasquale intersection, then continue northwest in San Pasquale to the San Pasquale-Chacoma intersection, then continue northwest in Chacoma to the Chacoma-Rio Grande Blvd. intersection, then continue north in Rio Grande Blvd. and end at Carson. **Figure 7** illustrates the location.

Total Conceptual Level Construction Cost Estimate= \$5,391,000

Facility F9.1 Priority 1 - Build a 54-in. RCP storm drain in Laguna from the Kit Carson-Laguna intersection north to the Laguna-San Pasquale intersection. Continue north in San Pasquale to the San Pasquale-Los Alamos intersection.

Total Conceptual Level Construction Cost Estimate= \$1,178,000

Facility F9.2 Priority 2 - Build a 54-in. RCP storm drain in San Pasquale from the San Pasquale-Los Alamos intersection northwest to Chacoma, then northwest in Chacoma to the Chacoma-Alhambra-Rio Grande Blvd. intersection.

Total Conceptual Level Construction Cost Estimate= \$1,491,000

Facility F9.3 Priority 3 - Build a 54-in. RCP storm drain in Rio Grande Blvd. from the Chacoma-Alhambra-Rio Grande Blvd. intersection north to the Rio Grande Blvd.- Dora intersection.

Total Conceptual Level Construction Cost Estimate= \$1,495,000

Facility F9.4 Priority 4 - Build a 54-in. RCP storm drain in Rio Grande Blvd. from the Rio Grande Blvd.- Dora intersection north to the Rio Grande Blvd.- Carson intersection.

Total Conceptual Level Construction Cost Estimate= \$1,227,000

PRIORITY 11

- Facility 12** Build a new 24-in. RCP storm drain system in Edith Blvd. from the Edith-Odelia intersection north to the Edith-Hannett intersection. Continue west in Hannett and outfall into the Santa Barbara Park Pond. **Figure 4** illustrates the location.

Total Conceptual Level Construction Cost Estimate= \$746,000

PRIORITY 12

- Facility 13** Replace the 96-in. CMP storm drain with a 90-in. diameter smooth wall pipe (slip line construction) from the 8th St. – Atlantic intersection (Tingley Pond) to the Barelás Pump Station and reduce Manning's Friction Factor "n" from 0.024 (existing CMP) to 0.013 (smooth wall pipe). **Figure 6** illustrates the location.

Total Conceptual Level Construction Cost Estimate= \$1,484,000

PRIORITY 13**Alcalde Pump Station Outfall - Bosque Stormwater Quality Outfall Improvements**

Build stormwater quality improvements in the Bosque at the pump station discharge pipes. The existing outfall basin should be improved to attain additional solids settling. From the basin, meandering unlined channels should be constructed through the bosque with an outfall to the river. The improvements will help satisfy the Environmental Protection Agency stormwater quality improvement permit requirements for the Rio Grande. **Figure 8** illustrates the location.

Total Conceptual Level Construction Cost Estimate= \$338,000

PRIORITY 14**Barelás Pump Station Outfall - Bosque Stormwater Quality Outfall Improvements**

Build stormwater quality improvements in the Bosque at the pump station discharge pipes. From the basin, meandering unlined channels should be constructed through the bosque with an outfall to the river. The improvements will help satisfy the Environmental Protection Agency stormwater quality improvement permit requirements for the Rio Grande. **Figure 9** illustrates the location.

Total Conceptual Level Construction Cost Estimate= \$363,000

TOTAL COST

The total conceptual level cost estimate for construction all facilities presented is **\$36,088,000** (includes gain for proposed sale of the Broadway-Lomas Pond (Facility 10) and rebuilding the existing Broadway-Lomas Pump Station (Facility 11)).

Street Flooding Results (100-year, 24-hour storm)

Option 29 effectively removed flooding from the Broadway-Lomas intersection and all along Broadway north to I-40. Significant flooding along 3rd St. and 4th St. near I-40 (near Coronado Park) was also reduced. The flood depths along Rio Grande Blvd. were reduced to the manhole rim elevation except for the San Pasquale and Chacoma intersection where depth is 0.23 feet above the manhole rim elevation for 2.8 hours.

Detention Pond Routing Results (100-year, 24-hour storm)

The Option 29 detention pond routing freeboard results are summarized here.

| Detention Pond Name (Existing or Proposed) | Freeboard (feet) |
|---|-------------------------|
| Air Quality Pond (existing) | 3.9 |
| Tingley Surge Pond (existing) | 6.0 |
| Santa Barbara Park Pond (proposed) | 9.0 |
| North Wells Park Pond (proposed) | 2.3 |
| McKnight Pond (proposed) | 1.5 |
| BR21 Pond (Lomas & Medical Arts) (proposed) | 7.5 |
| Marble-Arno Pond (proposed) | 1.6 |

Conclusion

Option 29 removed flooding from the Broadway-Lomas intersection. This option also proved to be effective in flood depth reduction throughout the study area. Nine manholes throughout the study area remained only slightly flooded, however, these depths ranged from 0.01 ft. to 0.29 feet above the manhole rim elevations. Therefore, the results indicate that the proposed facilities throughout the study area nearly eliminated the manhole flooding. The results also indicate that a significant detention structure is necessary near the Broadway-Lomas intersection. The Marble-Arno Pond could replace the Broadway-Lomas Pond.

1.7 STORM WATER QUALITY RECOMMENDATIONS**Alcalde and Barelás Pump Station Outfall Improvements**

Larger storm water quality improvements are recommended for the pump station outfalls within the Rio Grande bosque. The existing outfall basins could be improved to attain additional solids settling. From those basins meandering unlined channels could be constructed through the bosque with an outfall to the river. Conceptual level cost estimates were provided previously.

Storm Water Quality and Detention Pond Multiple Use**Proposed Ponds**

Best Management Practices (BMPs) to accomplish stormwater quality improvement should be included on all public stormwater detention ponds and private development or redevelopment ponds whether small or large, to mitigate and collect the first flush pollutant load. In addition to pond BMPs, other on-site BMPs are recommended to control and collect the first flush.

The proposed Santa Barbara Park Pond is now a City park and would be rebuilt to facilitate stormwater detention, water quality improvement and additional park recreational features. The possible Marble-Arno Pond, McKnight Pond and Wells Park Pond should also be designed to include recreational and water quality improvement features.

Recommendation

Include stormwater quality BMPs on all stormwater detention ponds and include multiple use features as much as possible.

Existing Ponds

Existing ponds should also be retrofitted with additional BMPs such as low flow channels with 8-in. thick aggregate base course filters. The low flow channels will collect first flush sediment and some oils and greases prior to entering the principal spillway structure. Maintenance of these pond water quality improvement structures (BMPs) would involve cleaning mostly floatable debris / trash and in some cases replacement of the aggregate base course or similar type of treatment material. Maintenance schedules may be once year in drought years to several times a year during frequent storm seasons.

Total Conceptual Level Construction Cost Estimate (approximate) = \$11,000 *

*The cost will depend on the channel length and width.

Recommendation

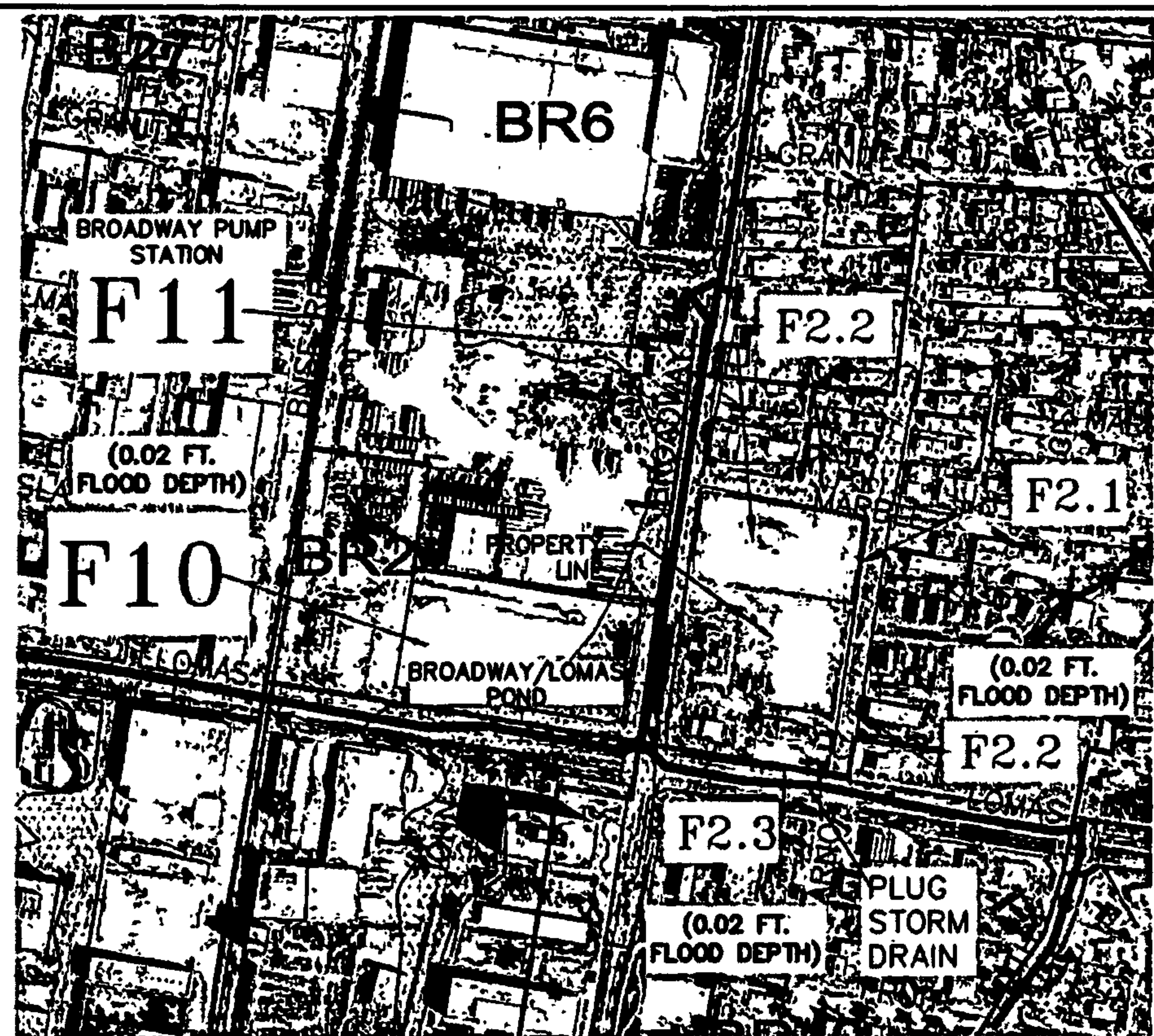
Retrofit existing detention ponds with stormwater quality BMPs.

1.8 FLOODPLAIN REMOVAL DUE TO PROPOSED IMPROVEMENTS

Evaluation of the SWMM model results for proposed facilities indicates that floodplain removal (LOMR process) would be more likely with implementation of the proposed facilities in all areas and particularly for the floodplain on Commercial south of Indian School.

1.9 BENEFITS OF PROPOSED DRAINAGE FACILITIES

The proposed facilities will provide significant 100-year flood reduction benefits for the study area. Floodplain removal (through the LOMR process) would result in significant cost savings over time for all properties currently located within FEMA floodplains that are required to pay flood insurance.



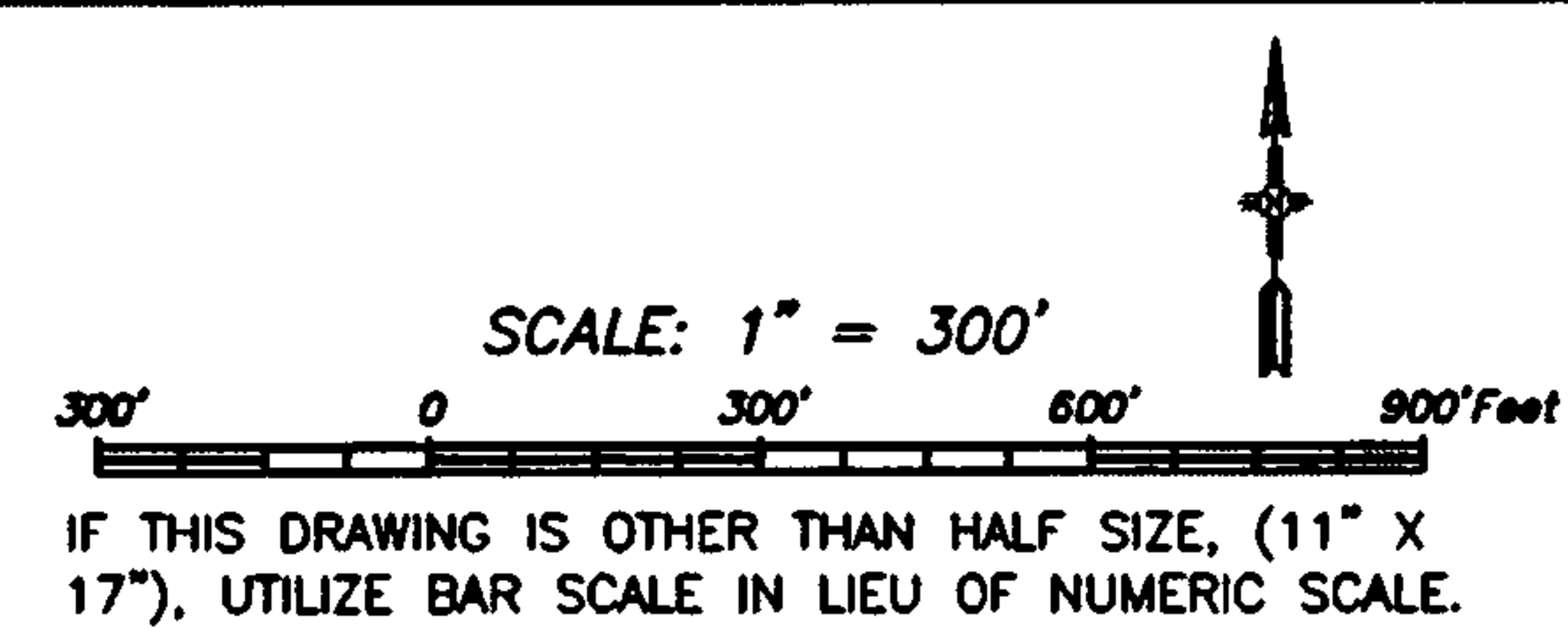
| Facility 2 | | | | | | | | | |
|---------------------------|------------------------------------|-------------|-------|----------|--|-------|--------|-------------|------------|
| OWNER | OWNER ADDRESS | CITY | STATE | ZIP CODE | LEGAL | ACRES | RUNNER | STREET NAME | DEBINATION |
| SEMI PROPERTY COMPANY LLC | 1211 SAN RAYMOND BLVD NE SUITE 100 | ALBUQUERQUE | NM | 87109 | TR 1 PLAT OF TRACTS 1 & 2 LANDS OF SANDIA FOUNDATION CONT 1.884 AC | 1.88 | 638 | BROADWAY | BLVD |

LEGEND

- EXISTING STORM DRAIN & SWMM MODEL PIPES
- B2 SUBCATCHMENT NAME
- PROPOSED DRAINAGE FACILITY
- F1 PROPOSED DRAINAGE FACILITY NAME
- FACILITY PHASE LIMIT
- F1.1 FACILITY PHASE NUMBER (LOWEST NUMBER IS HIGHEST PRIORITY)

FEMA FLOOD ZONE TYPES:

- ZONE A
- ZONE AE
- ZONE AH
- ZONE AO
- ZONE X



CONCEPTUAL LEVEL COST ESTIMATE

| | | |
|-------|----|-------------|
| F2.1 | \$ | 1,006,000 |
| F2.2 | \$ | 1,666,000 |
| F2.3 | \$ | 72,000 |
| TOTAL | \$ | 2,744,000 * |

* A POND BOTTOM LINER MAY BE REQUIRED TO AVOID STORM WATER SEEPAGE INTO THE GROUNDWATER. THIS COULD BE AN ADDITIONAL \$200,000 THAT IS NOT INCLUDED IN THE FACILITY 2 ESTIMATE, AS THIS IS UNCERTAIN AT THIS TIME.

F10 \$ (2,451,000)
(SELL POND PROPERTY)

F11 \$ 12,607,000
(BUILD NEW BROADWAY PUMP STATION)

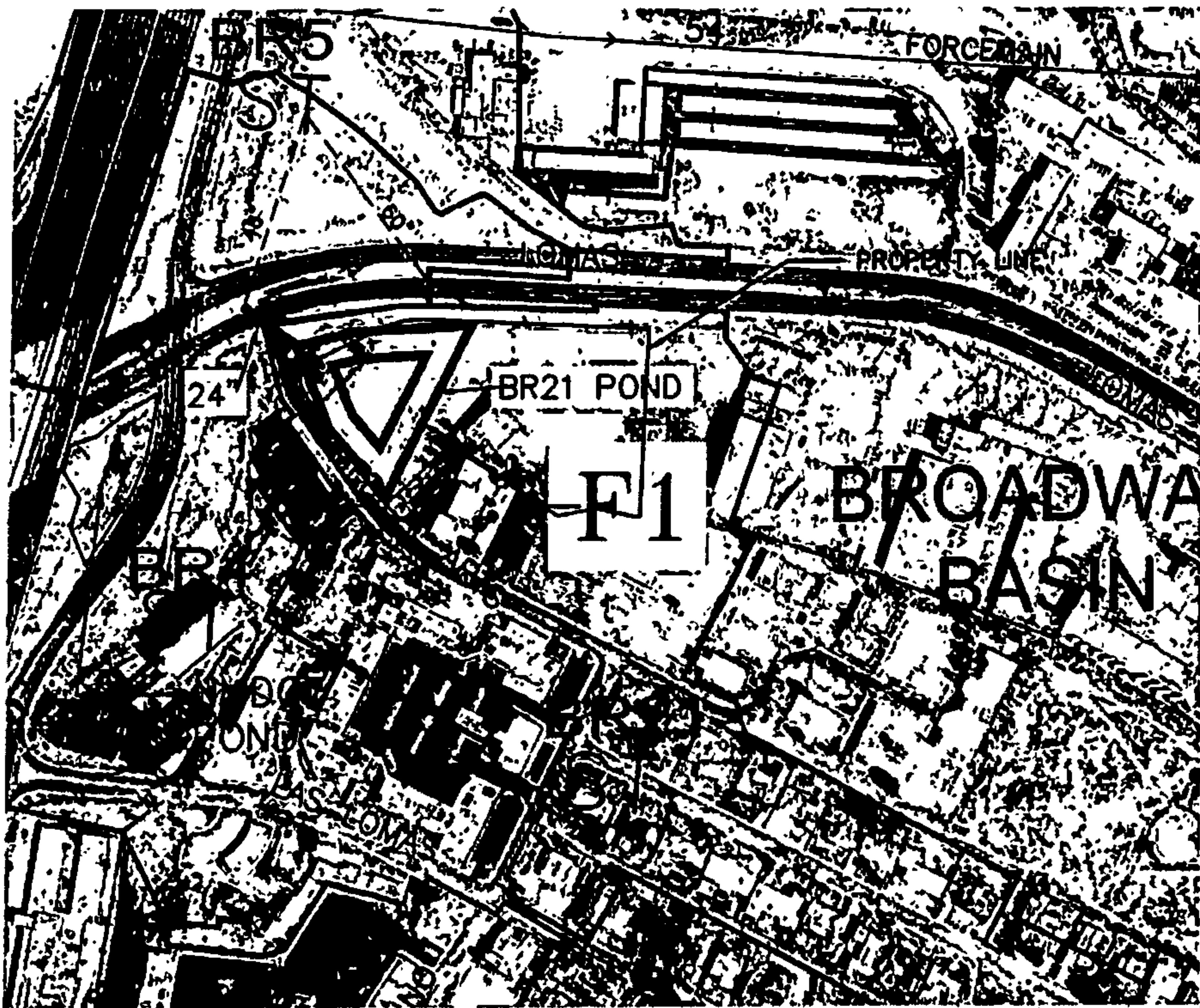
SUMMARY OF STREET PONDING DEPTHS FOR EXIST. DEVELOPMENT CONDITIONS AND PROPOSED DRAINAGE FACILITIES, 100-YR. 24-HR. STORM

- MANHOLE STREET PONDING DEPTH GREATER THAN 1-FT
- COA7650 MANHOLE STREET PONDING DEPTH BETWEEN 0.5-FT AND 1-FT DEEP
- COA8046 MANHOLE STREET PONDING DEPTH BETWEEN 0-FT AND 0.5-FT DEEP

MID-VALLEY DRAINAGE MANAGEMENT PLAN FOR THE CITY OF ALBUQUERQUE & ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

APRIL 2012
SEC PROJECT NO. 110112

PROPOSED FACILITIES F2, F10 & F11 FIGURE 1



CONCEPTUAL LEVEL COST ESTIMATE

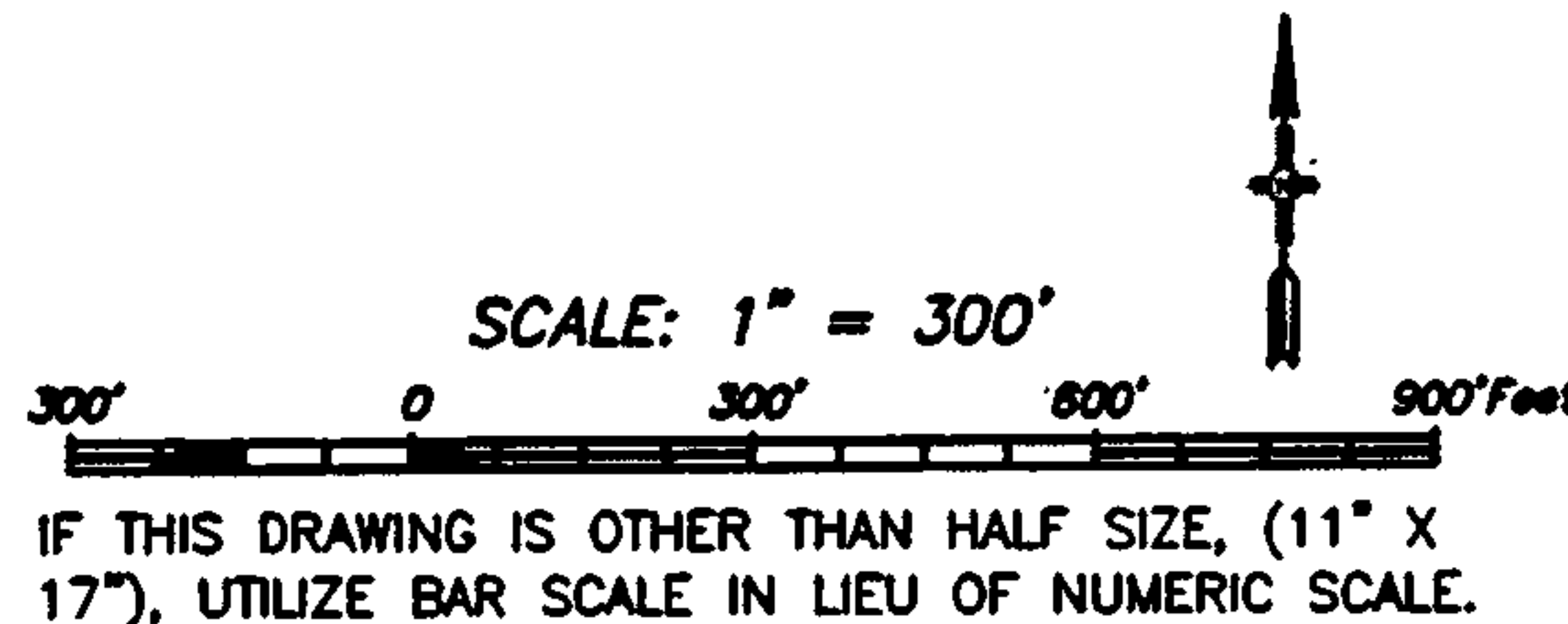
F1 \$808,000

| Facility 1 | | | | | | | | | | |
|-----------------------------|---------------|-------------|-------------|----------------|--|-------|--------|-------------|-------------|----------|
| OWNER | OWNER ADDRESS | OWNER CITY | OWNER STATE | OWNER ZIP CODE | LEGAL | ACRES | RUNNER | STREET NAME | COMBINATION | QUADRANT |
| FEDERAL OF LAND RECLAMATION | 1000-1000-1 | ALBUQUERQUE | NM | 87101 | TRIC-1A1 PLAT SUBD OF TRIC-2 & FORT K-1A LANDS OF SOUTH WESTERN COAST RACT | 3.00 | 1000 | LEONARD | BLVD | NE |

| MAX. POND AREA |
|----------------|
| (acres) |
| 0.65 |

LEGEND

| EXISTING STORM DRAIN & SWMM MODEL PIPES | FEMA FLOOD ZONE TYPES: |
|--|------------------------|
| 82 SUBCATCHMENT NAME | ZONE A |
| PROPOSED DRAINAGE FACILITY | ZONE AE |
| F1 PROPOSED DRAINAGE FACILITY NAME | ZONE AH |
| FACILITY PHASE LIMIT | ZONE AD |
| F1.1 FACILITY PHASE NUMBER (LOWEST NUMBER IS HIGHEST PRIORITY) | ZONE X |

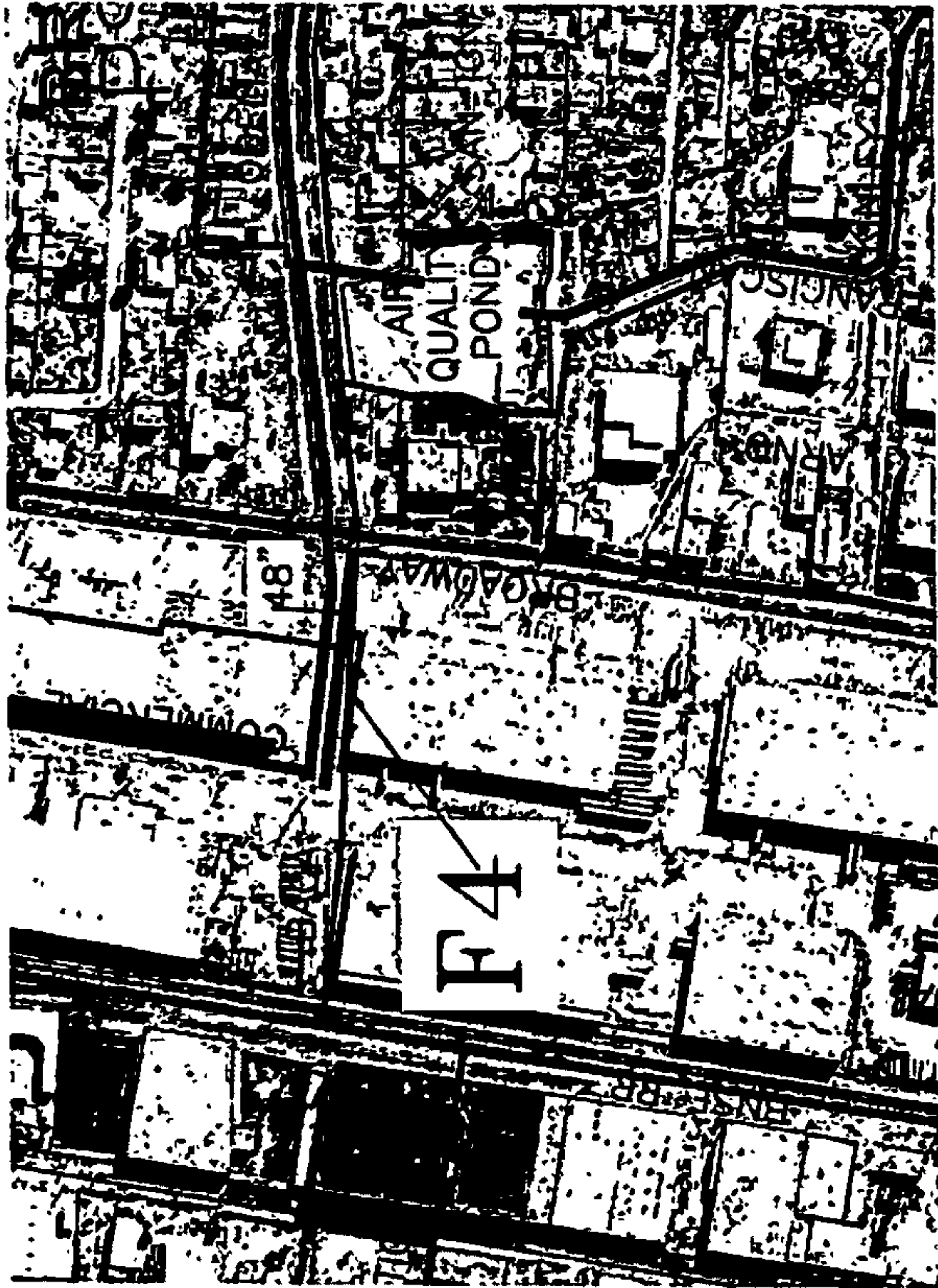


MID-VALLEY DRAINAGE MANAGEMENT PLAN
FOR THE CITY OF ALBUQUERQUE &
ALBUQUERQUE METROPOLITAN ARROYO
FLOOD CONTROL AUTHORITY
April - 2012
SEC PROJECT NO. 110112

FACILITY
F1
FIGURE 2

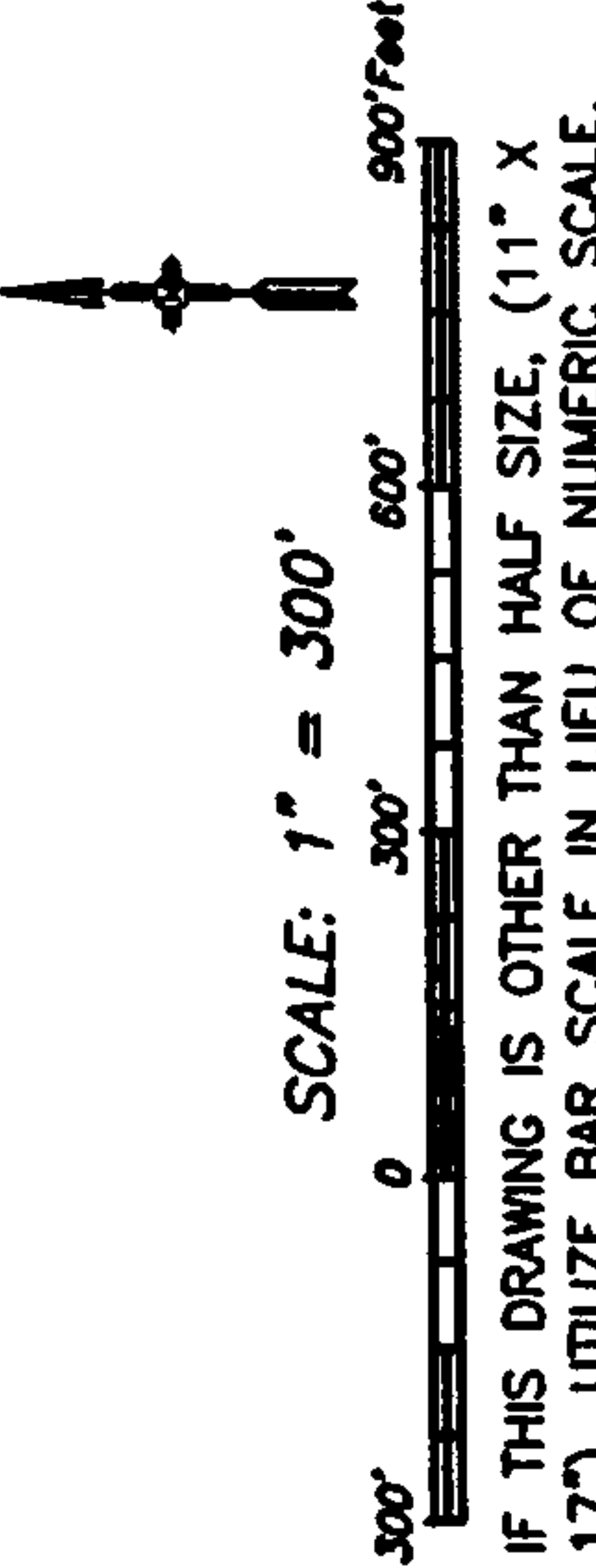
CONCEPTUAL LEVEL COST ESTIMATE.

F4 \$334,000



LEGEND

- EXISTING STORM DRAIN & SWMM MODEL PIPES
- B2 SUBCATCHMENT NAME
- F1 PROPOSED DRAINAGE FACILITY
- F1.1 PROPOSED DRAINAGE FACILITY NAME
- F1.1.1 FACILITY PHASE LIMIT
- F1.1.1.1 FACILITY PHASE NUMBER (LOWEST NUMBER IS HIGHEST PRIORITY)
- FEMA FLOOD ZONE TYPES:
- ZONE A
- ZONE AE
- ZONE AH
- ZONE AO
- ZONE X



MD-VALLEY DRAINAGE MANAGEMENT PLAN

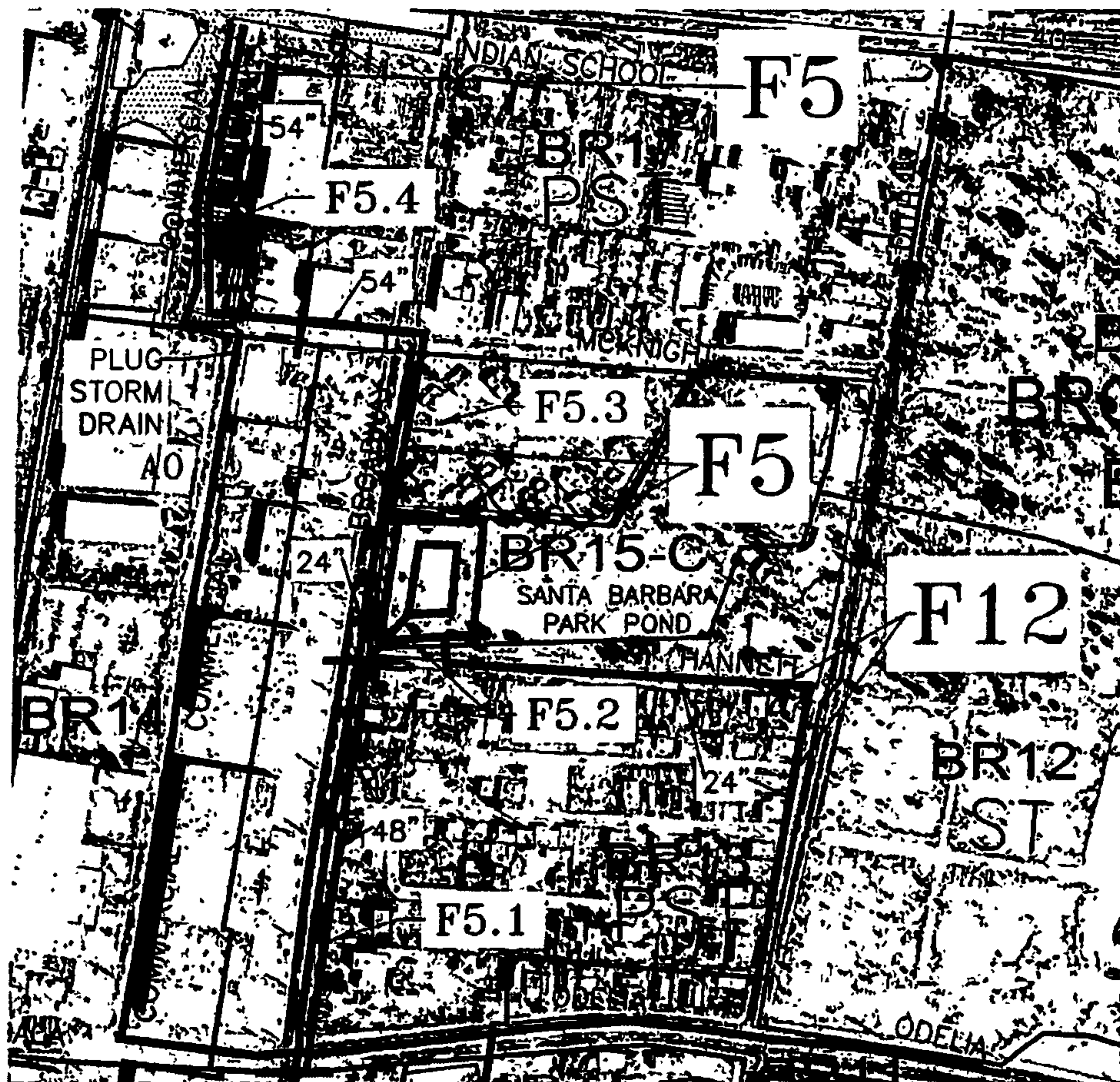
FOR THE CITY OF ALBUQUERQUE & ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

April - 2012

SEC PROJECT NO. 110112

FACILITY 4

FIGURE 3

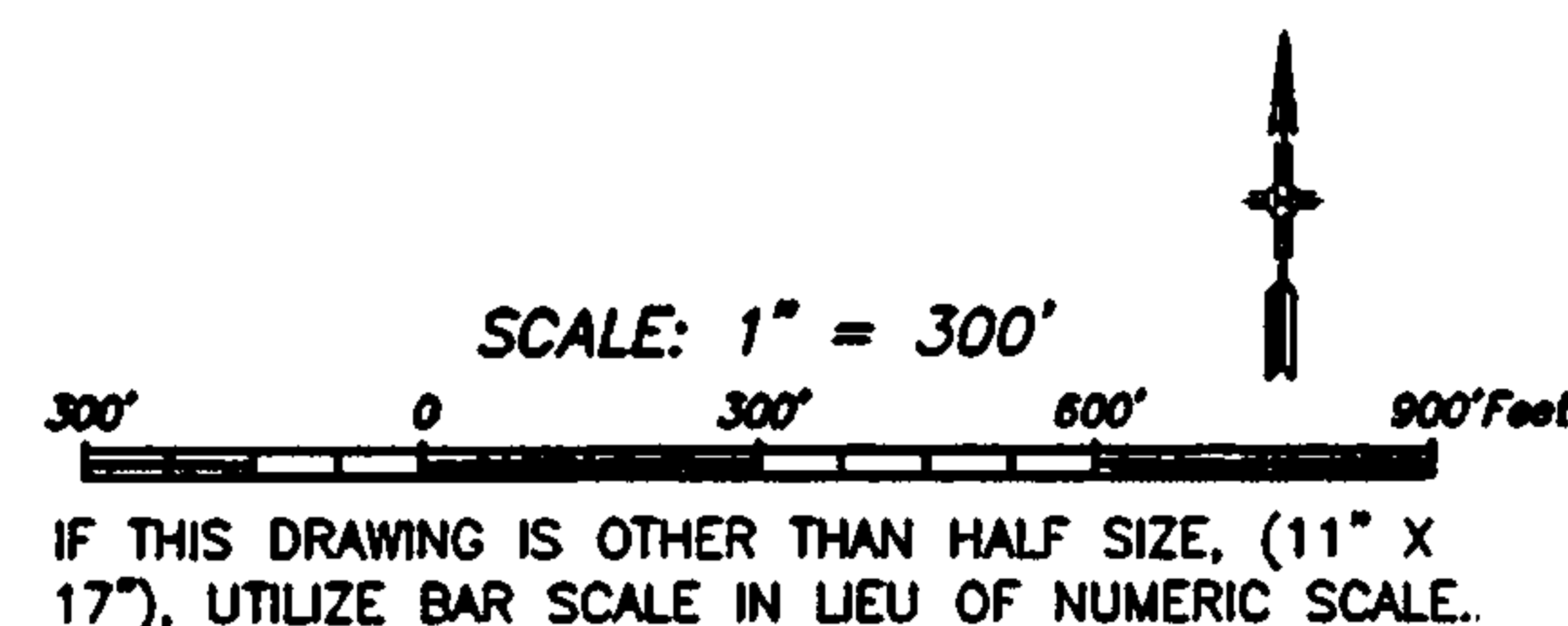


CONCEPTUAL LEVEL COST ESTIMATE

| | | |
|-------|----|--------------|
| F5.1 | \$ | 722,000 |
| F5.2 | \$ | 771,000 |
| F5.3 | \$ | 606,000 |
| F5.4 | \$ | 763,000 |
| TOTAL | | \$ 2,862,000 |
| F12 | \$ | 746,000 |

LEGEND

| | | | |
|--|---|------------------------|---------|
| | EXISTING STORM DRAIN & SWMM MODEL PIPES | FEMA FLOOD ZONE TYPES: | |
| | SUBCATCHMENT NAME | | |
| | PROPOSED DRAINAGE FACILITY | | ZONE A |
| | PROPOSED DRAINAGE FACILITY NAME | | ZONE AE |
| | FACILITY PHASE LIMIT | | ZONE AH |
| | FACILITY PHASE NUMBER | | ZONE AO |
| | (LOWEST NUMBER IS HIGHEST PRIORITY) | | ZONE X |



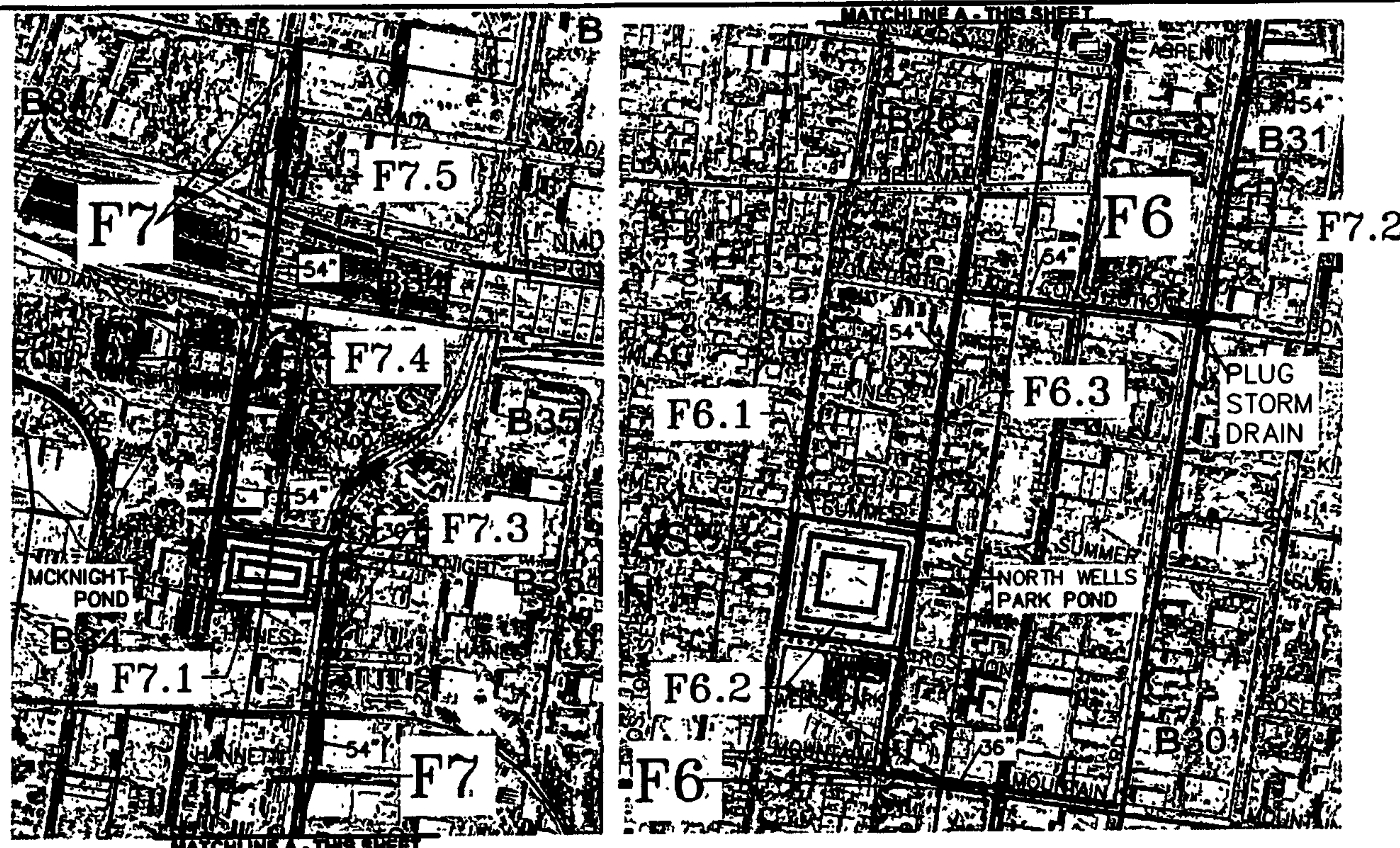
MID-VALLEY DRAINAGE MANAGEMENT PLAN

FOR THE CITY OF ALBUQUERQUE &
ALBUQUERQUE METROPOLITAN ARROYO
FLOOD CONTROL AUTHORITY

April - 2012

SEC PROJECT NO. 110112

FACILITIES
5 & 12
FIGURE 4



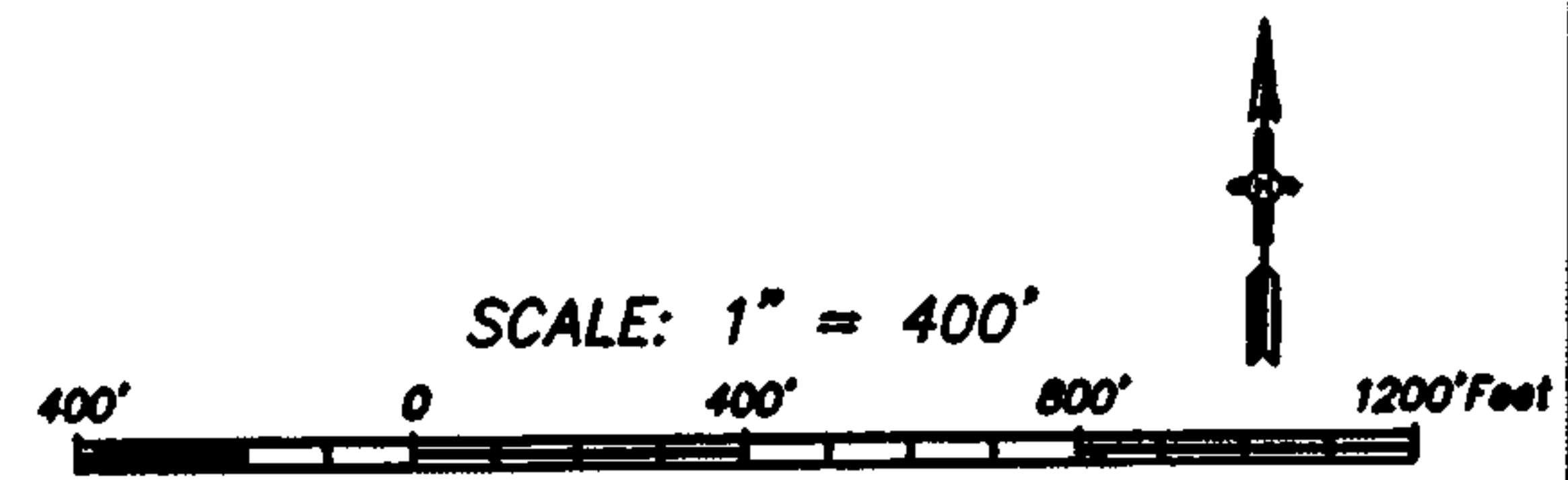
CONCEPTUAL LEVEL COST ESTIMATE

| | | |
|-------|----|-----------|
| F6.1 | \$ | 2,016,000 |
| F6.2 | \$ | 2,422,000 |
| F6.3 | \$ | 1,242,000 |
| | | <hr/> |
| TOTAL | \$ | 5,680,000 |
| | | |
| F7.1 | \$ | 1,054,000 |
| F7.2 | \$ | 955,000 |
| F7.3 | \$ | 1,574,000 |
| F7.4 | \$ | 655,000 |
| F7.5 | \$ | 729,000 |
| | | <hr/> |
| TOTAL | \$ | 4,967,000 |

| Facility 6 | | | | | | | | | | |
|---|----------------|-------------|-------------|----------------|--|-----------|--------|--------------|-------------|----------|
| OWNER | OWNER ADDRESS | OWNER CITY | OWNER STATE | OWNER ZIP CODE | LEGAL | ACRES | NUMBER | STREET NAME | DESIGNATION | QUADRANT |
| WALKER REMEL H & ANNE DAVIS TRUSTEE FOR REVOCABLE TRUST | PO BOX 700 | ARROYO SECO | NM | 87514 | * 007 005A MOORE ADD L 7 & 8 | 2.278056 | | 5TH & SUTTON | | |
| Facility 7 | | | | | | | | | | |
| OWNER | OWNER ADDRESS | OWNER CITY | OWNER STATE | OWNER ZIP CODE | LEGAL | ACRES | NUMBER | STREET NAME | DESIGNATION | QUADRANT |
| PERRY GEORGE M III & LEEANNE F | 1124 E 19TH ST | TULSA | OK | 74120 | LT 8 1 THRU 14 BLK 1 FRANCIS CAN ADD N | 1.1898754 | 1918 | 4TH | ST | NW |

LEGEND

- EXISTING STORM DRAIN & SWMM MODEL PIPES
- B2 SUBCATCHMENT NAME
- PROPOSED DRAINAGE FACILITY
- F1 PROPOSED DRAINAGE FACILITY NAME
- FACILITY PHASE LIMIT
- F1.1 FACILITY PHASE NUMBER (LOWEST NUMBER IS HIGHEST PRIORITY)
- FEMA FLOOD ZONE TYPES:
 - ZONE A
 - ZONE AE
 - ZONE AH
 - ZONE AO
 - ZONE X



IF THIS DRAWING IS OTHER THAN HALF SIZE, (11" X 17"), UTILIZE BAR SCALE IN LIEU OF NUMERIC SCALE.

MID-VALLEY DRAINAGE MANAGEMENT PLAN

FOR THE CITY OF ALBUQUERQUE & ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

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FACILITIES F6 AND F7

FIGURE 5



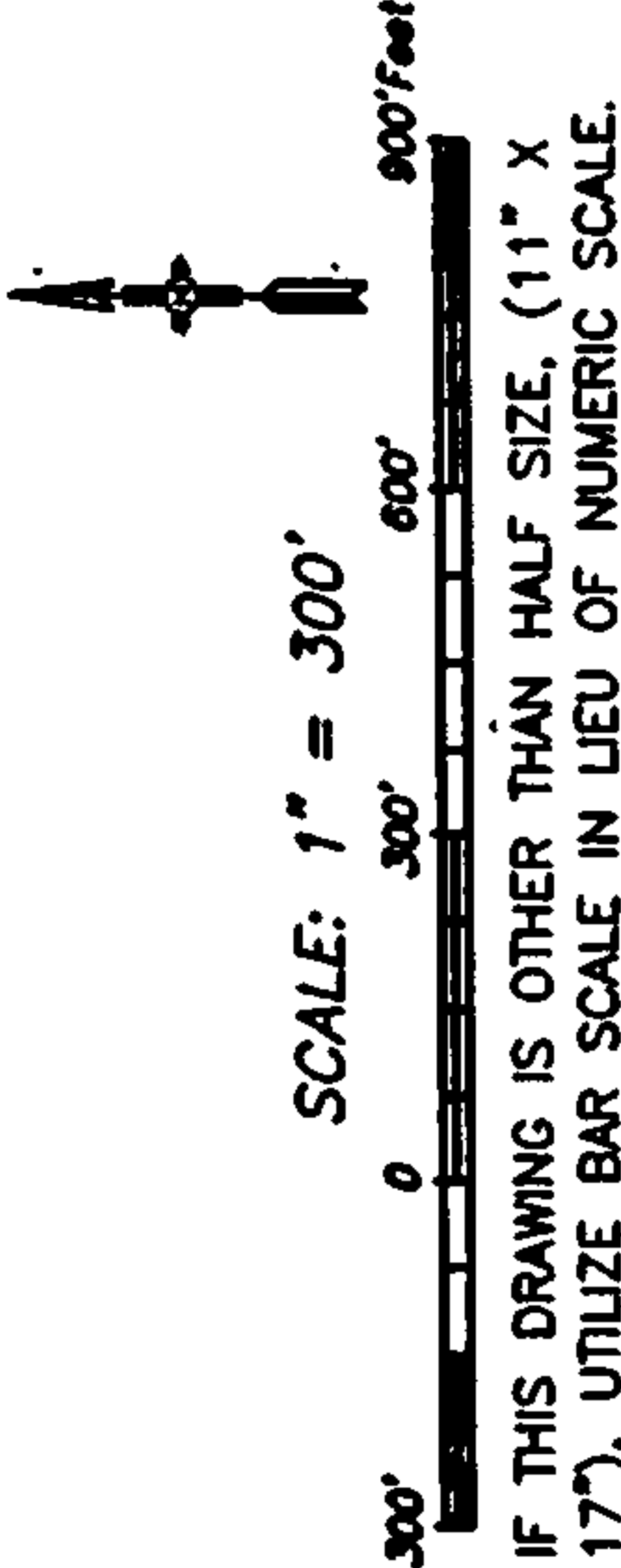
CONCEPTUAL LEVEL COST ESTIMATE

F8 \$ 215,000
(CROSS-CONNECT BARELAS
STORM DRAIN AND PACIFIC
STORM DRAIN)

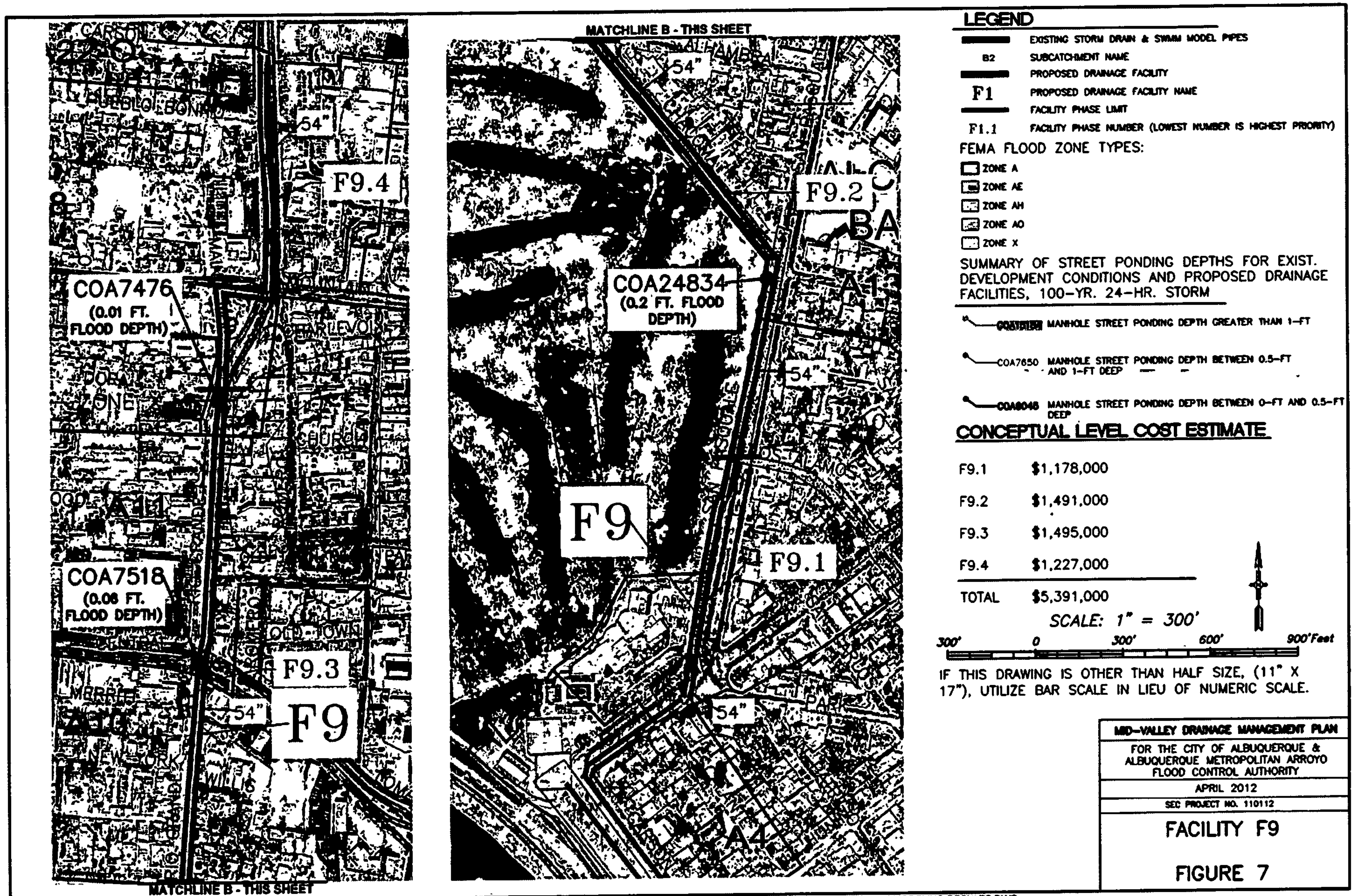
F13 \$1,484,000

LEGEND

- | | | | |
|--|--|--|------------------------|
| | EXISTING STORM DRAIN & SWMM MODEL PIPES | | FEMA FLOOD ZONE TYPES: |
| | SUBCATCHMENT NAME | | ZONE A |
| | PROPOSED DRAINAGE FACILITY | | ZONE AE |
| | PROPOSED DRAINAGE FACILITY NAME | | ZONE AH |
| | FACILITY PHASE LIMIT | | ZONE AD |
| | FACILITY PHASE NUMBER (LOWEST NUMBER IS HIGHEST PRIORITY) | | ZONE X |



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|---|
| MID-VALLEY DRAINAGE MANAGEMENT PLAN |
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| FACILITIES F8 AND F13 FIGURE 6 |



LEGEND

- EXISTING STORM DRAIN & SWMM MODEL PIPES
- B2 SUBCATCHMENT NAME
- PROPOSED DRAINAGE FACILITY
- F1 PROPOSED DRAINAGE FACILITY NAME
- FACILITY PHASE LIMIT
- F1.1 FACILITY PHASE NUMBER (LOWEST NUMBER IS HIGHEST PRIORITY)

FEMA FLOOD ZONE TYPES:

- ZONE A
- ZONE AE
- ZONE AH
- ZONE AO
- ZONE X

SUMMARY OF STREET PONDING DEPTHS FOR EXIST. DEVELOPMENT CONDITIONS AND PROPOSED DRAINAGE FACILITIES, 100-YR. 24-HR. STORM

- MANHOLE STREET PONDING DEPTH GREATER THAN 1-FT
- COA7650 MANHOLE STREET PONDING DEPTH BETWEEN 0.5-FT AND 1-FT DEEP
- COA8048 MANHOLE STREET PONDING DEPTH BETWEEN 0-FT AND 0.5-FT DEEP

CONCEPTUAL LEVEL COST ESTIMATE

| | |
|--------------|--------------------|
| F9.1 | \$1,178,000 |
| F9.2 | \$1,491,000 |
| F9.3 | \$1,495,000 |
| F9.4 | \$1,227,000 |
| TOTAL | \$5,391,000 |

SCALE: 1" = 300'

300' 0 300' 600' 900' Feet

IF THIS DRAWING IS OTHER THAN HALF SIZE, (11" X 17"), UTILIZE BAR SCALE IN LIEU OF NUMERIC SCALE.

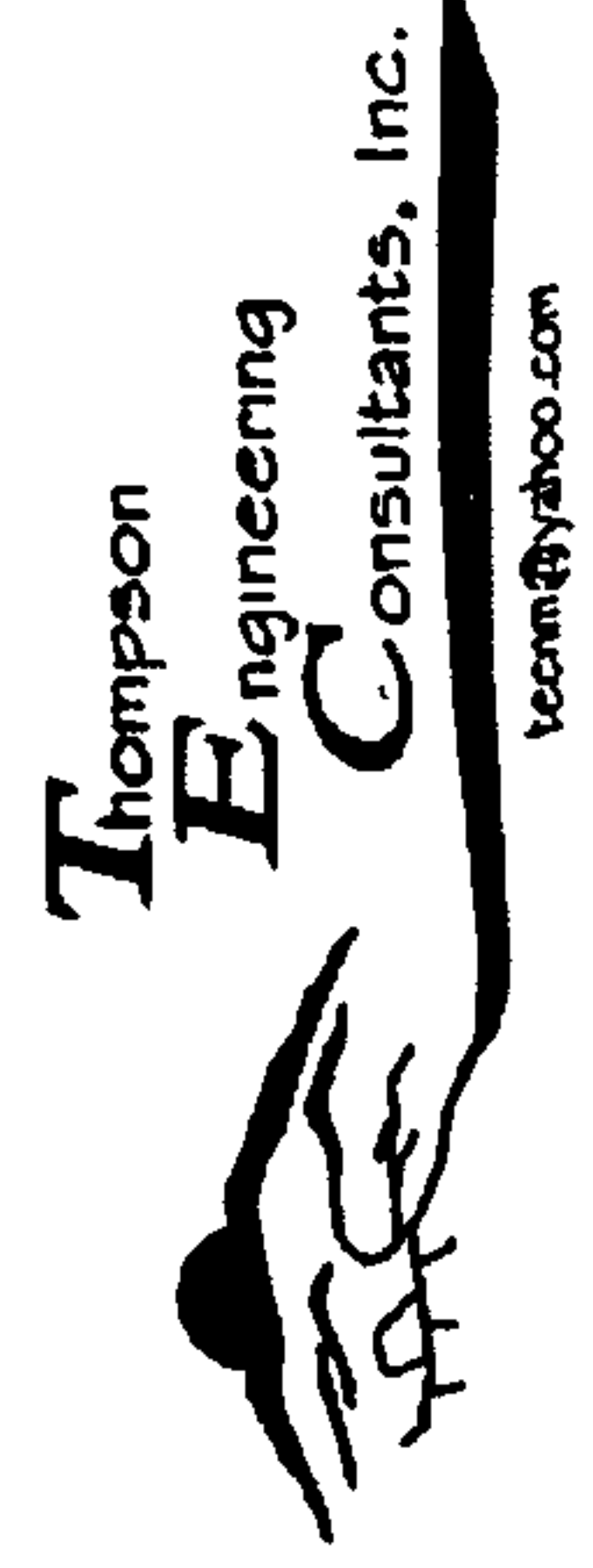
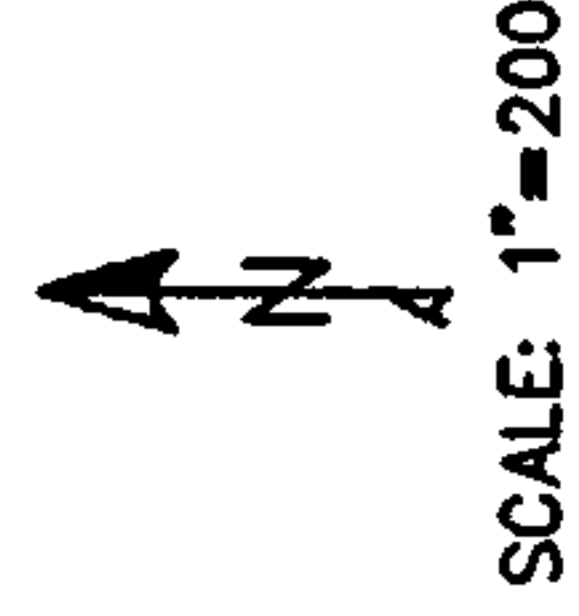
MID-VALLEY DRAINAGE MANAGEMENT PLAN
 FOR THE CITY OF ALBUQUERQUE &
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 FLOOD CONTROL AUTHORITY
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 SEC PROJECT NO. 110112

FACILITY F9

FIGURE 7



CONCEPTUAL LEVEL COST ESTIMATE
F13 \$338,000

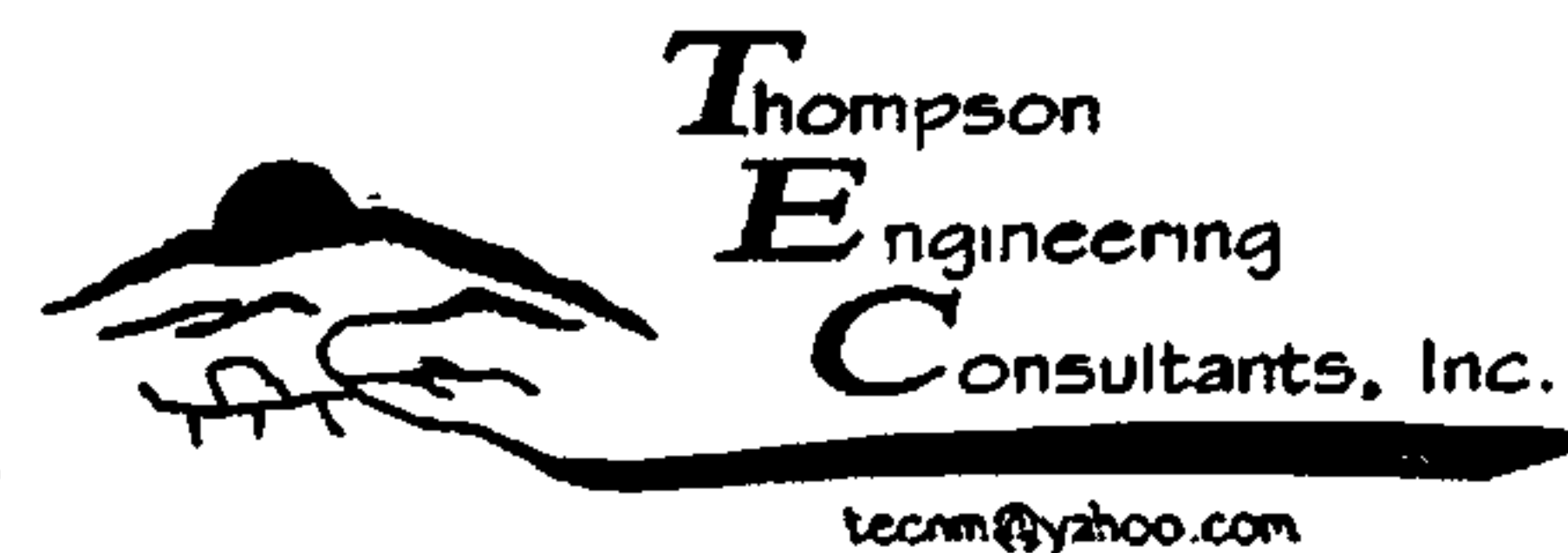
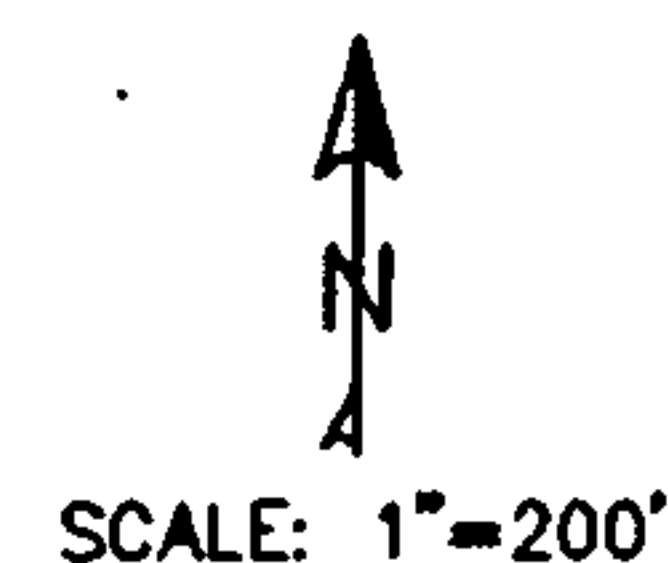
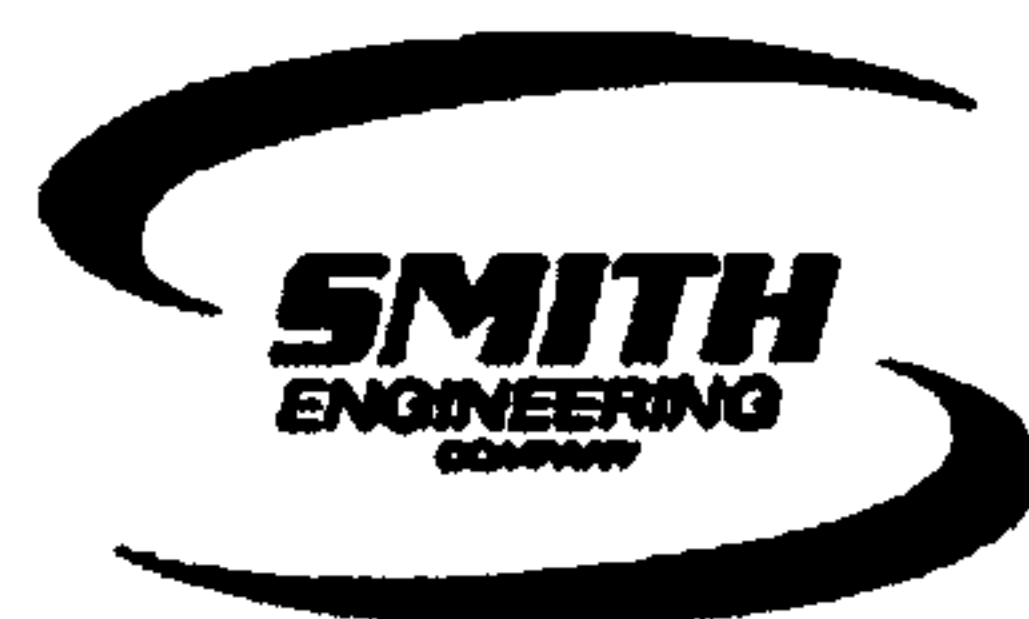


| |
|---|
| MID-VALLEY DRAINAGE MANAGEMENT PLAN |
| FOR THE CITY OF ALBUQUERQUE & ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY |
| APRIL - 2012 |
| SEE PROJECT NO. 11012 |
| ALCALDE WATER QUALITY IMPROVEMENT FIGURE 8 |



CONCEPTUAL LEVEL COST ESTIMATE

F14 \$363,000



| |
|---|
| MID-VALLEY DRAINAGE MANAGEMENT PLAN |
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| APRIL - 2012 |
| SEC PROJECT NO. 110112 |
| BARELAS WATER QUALITY IMPROVEMENT FIGURE 9 |