
**MARYVALE AREA
FLOODING MITIGATION PROJECT
PHASE I
FCD 93-34**

ALTERNATIVES INVESTIGATION

**DRAFT
SUBMITTED
9/29/95**



Coe & Van Loo Consultants, Inc.
4550 North 12th Street
Phoenix, Arizona 85014

**MARYVALE AREA
FLOODING MITIGATION PROJECT
PHASE I
FCD 93-34**

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September 29, 1995

Prepared for:

**Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009**

Prepared by:

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MARYVALE AREA FLOODING MITIGATION PROJECT
Phase I

TABLE OF CONTENTS

	<u>Page</u>
1.0 Introduction	1
2.0 Study Procedure	1
3.0 Cost Estimates	2
4.0 Design Elements	2
5.0 Alternatives	3
6.0 Bibliography	5

LIST OF TABLES

1. Comparison of Alternative Costs

APPENDICES

I Alternative Cost Estimates

II Plates

- Plate 1 Location Map
- Plate 2 Flooding Problem Areas
- Concept A-1, A-2, B-1 & B-2
- Concept A-3 & B-3
- Concept A-4
- Concept A-5 & B-5
- Concept B-4
- Concept B-6
- Concept B-7
- Concept B-8
- Concept B-9 & B-10

1.0 Introduction

Coe & Van Loo Consultants, Inc. (CVL) has been contracted by the Flood Control District of Maricopa County (District) for Phase 1 of the Maryvale Flooding Mitigation Project. Phase 1, the Pre-Design Phase, involves the preparation of a report that will include a hydrology study, an engineering analysis, and a feasibility study for two flooding locations adjacent to the Grand Canal within the City of Phoenix (City) (Plate 1). One is located at 64th Drive and Sunset Drive (Area A) and the other at 47th Drive and Crittenden Lane (Area B). Details of the project tasks are described in the contract agreement "Scope of Work."

These two specific flooding locations adjacent to the Grand Canal have been identified from known past flooding events. In addition, past flooding reports and discussions with City streets maintenance staff indicate that flooding has also resulted from overflow in the canal following breaching of the banks by local residents. The hydrologic modeling phase of this study has confirmed that the two problem areas would be significantly impacted by a 100-year flood event.

The purpose of this report is to document the results of the alternatives investigation phase of this contract. This phase is intended to evaluate multiple flooding mitigation alternatives based on cost effectiveness and engineering judgments and to make a recommendation of a preferred alternative for each location. The report provides a description of the preliminary alternatives and a preliminary order of magnitude cost estimate for each. The preferred alternative for each location will be identified during discussions with District staff.

2.0 Study Procedure

The alternatives evaluation stage began with a "brainstorming" session between District and CVL staff. Initially numerous alternatives were conceived. As further discussions with District and City staff were held, these alternatives were revised and developed into four alternatives for Area A and ten alternatives for Area B.

The following procedure was used to evaluate each of the alternatives for each location:

- Identify major flooding sources.
- Identify site constraints.
- Identify existing drainage features and opportunities.
- Develop preliminary conceptual costs.
- Identify pros and cons for each alternative.

3.0 Cost Estimates

While it is necessary to consider and evaluate many different factors when comparing each of the alternatives, the overall cost of each can be of primary importance. These preliminary cost estimates, which are based on both construction and land acquisition costs, can only be used for comparison purposes. Land acquisition costs include relocation costs, where applicable. Utility relocation costs have not been included at this time since they cannot be readily identified at this stage of the study and they are a common element to most alternatives.

A summary of Alternative Preliminary Costs is included in Table 3.1. Cost estimates for individual alternatives are in Appendix I.

- **Construction Costs**

A tabulation of unit prices was prepared based upon bid prices for past public works projects. In establishing these unit prices, consideration was given to the magnitude of the project and any economies of scale that might be anticipated.

- **Land Costs**

Private land acquisition costs were computed by District staff based on current County Assessor's maps and ownership sheets. For those aspects of the alternatives which lie within publicly held property, no land acquisition costs were assumed.

4.0 Design Elements

The following types of flood control facilities were given consideration in the preparation of alternatives. In order to provide a common basis for comparisons, and to provide the level of protection desired by the District, all elements were evaluated for a 100-year, 6-hour design storm. Alternatives may consist of one or more of the following features:

- Open Channels.
- Detention Facilities.
- Closed Conduit.
- Non-Structural

5.0 Alternatives

Each alternative and its preliminary cost estimate are included in Appendix I. A list of pros and cons for each is included in Table 5.1. Alternatives beginning with A correspond to problem area A and alternatives beginning with B correspond to problem area B. Alternatives A-4-1, A-4-2, A-5, B-7, and B-10 may require more storm drain laterals than those indicated. For this analysis, only the main drainage structures were considered.

- Alternatives A-1 and B-1

Buy all existing properties which are subject to flooding and have had repetitive losses. FEMA has a fund which might help finance this option.
- Alternatives A-2 and B-2

Floodproof existing homes that are subject to flooding. Floodproofing might include some sort of permanent storm wall. Sandbags are not an option because of the need for human intervention.
- Alternative B-3

Construct a detention basin on the upstream end of the Grand Canal. A side weir could be used to divert flood flows into the basin, thus leaving the excess capacity in the canal to convey flood flows contributed by downstream neighborhoods.
- Alternative A-4-1 and -2

Construct a detention basin within the Maryvale Municipal Golf Course to intercept the floodwaters that reach area A. Storage volume is estimated at 165 acre-feet for Alternative A-4-1 and 229 acre-feet for Alternative A-4-2. Alternative A-4-1 allows low flows to bypass the basin and drains the basin to the 67th Avenue storm drain. Alternative A-4-2 does not bypass the basin and drains the basin to the 59th Avenue storm drain. A storm drain collection system along Indian School Road and 59th Avenue is included in both alternatives.
- Alternative B-4

Construct a channel along the north side of the Grand Canal to intercept runoff. Construct a downstream channel or storm drain south to the I-10 freeway channel.
- Alternative A-5

Construct a 274 acre-foot detention basin southwest of Indian School and 63rd Avenue. Construct a storm drain collection system along Indian School Road to

intercept runoff from the north and divert it to the basin. Outlet the basin either to the 67th Avenue or 59th Avenue storm drains.

- Alternatives B-5 and B-6

Construct a drainage channel along the north side of the Grand Canal which outlets into a retention basin within an undeveloped industrial park on the north side of the canal between 51st and 55th Avenues. Alternative B-5 includes a 192 acre-foot retention basin with a 24-inch bleed-off pipe into the 51st Avenue storm drain. Alternative B-6 includes a 119 acre-foot retention basin with a 72-inch bleed-off pipe into the 51st Avenue storm drain.

- Alternative B-7

Construct a storm drain collection system along Indian School Road and southerly along 51st Avenue. Low flows remain in the 51st Avenue storm drain while larger flows are diverted into a 157 acre-foot detention basin in the undeveloped industrial park mentioned in Alternatives B-5 and B-6. The basin would drain into the 51st Avenue storm drain.

- Alternative B-8

Construct a linear detention basin on the north side of the Grand Canal. This basin would: 1) Remove the first row of houses adjacent to the canal, 2) Remove the first row of houses, Crittenden Lane, and the second row of houses, or 3) lie on the north side of a relocated section of the Grand Canal.

- Alternative B-9

Construct a detention basin on the southwest corner of Camelback Avenue and 43rd Avenue to intercept flows that cross Grand Avenue in the 60-inch storm drain. The basin would outlet to the 43rd Avenue storm drain.

- Alternative B-10

Construct a detention basin in Maryview Park, south of the canal near 55th Avenue. Construct an interceptor channel or storm drain along the north side of the Grand Canal. Bleed off the basin into the 59th Avenue storm drain.

One additional alternative is to do nothing at this time and to address individual flooding problems as they arise.

6.0 Bibliography

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- U.S. Army Corps of Engineers, *Flood Damage report on Storm and Flood of 16-17 August 1963, August 1963, Glendale-Maryvale Area*, June 1964
- U.S. Army Corps of Engineers, *HEC-1 Flood Hydrograph Package*, September 1990

APPENDIX I
ALTERNATIVE COST ESTIMATES

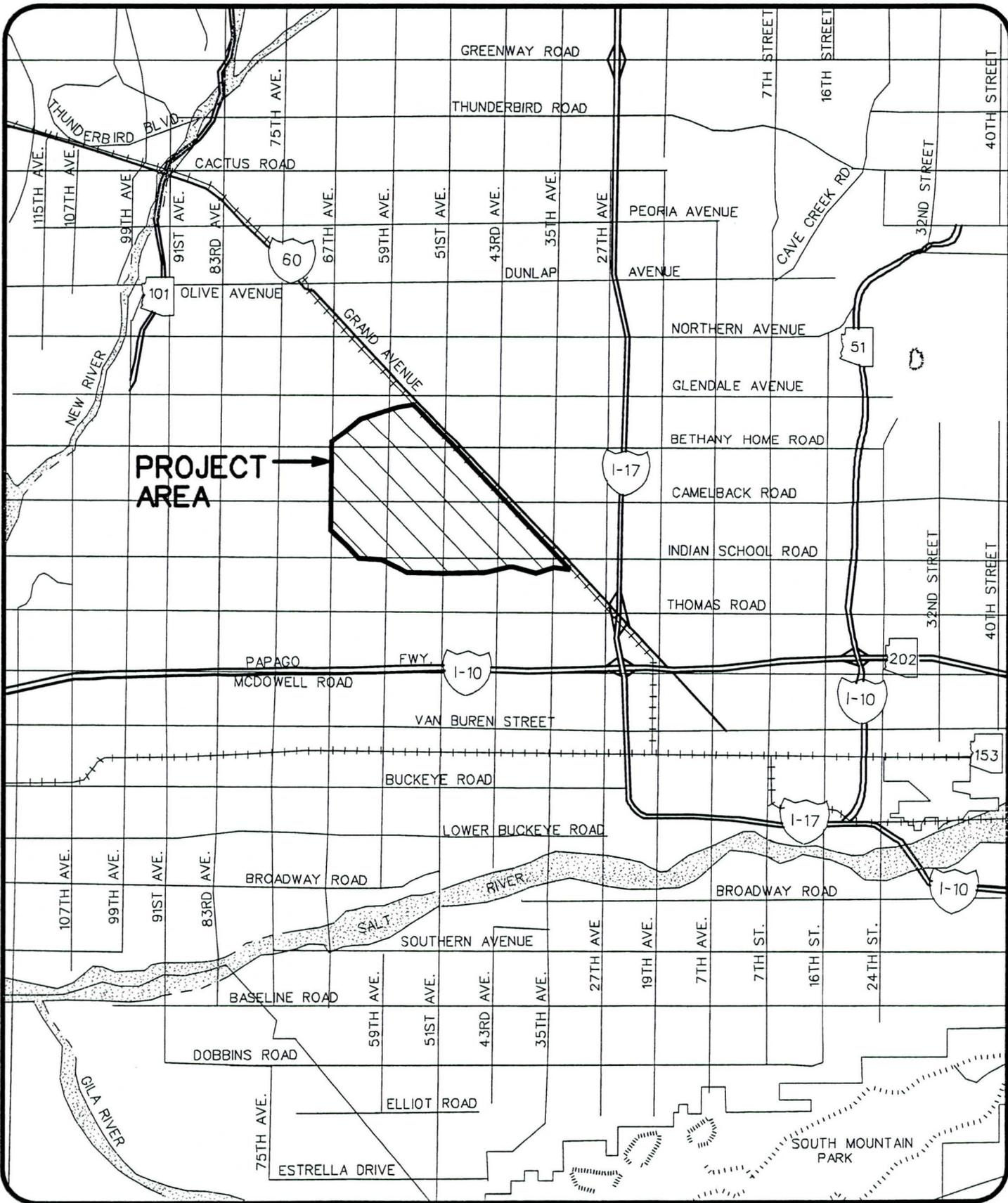
**MARYVALE FLOODING MITIGATION PROJECT
ALTERNATIVE B7**

Item No.	Capacity	Facilities Description & Location	Quantity	Unit	Unit Cost (\$)	Cost (\$)
	157 AF	Detention Basin Excavation	253,000	CY	\$3.00	\$759,000
		30" RGRCP	5,000	LF	\$75.00	\$375,000
		54" RGRCP	3,000	LF	\$125.00	\$375,000
		66" RGRCP	500	LF	\$140.00	\$70,000
		72" RGRCP	800	LF	\$160.00	\$128,000
		78" RGRCP	3,000	LF	\$215.00	\$645,000
		84" RGRCP	500	LF	\$255.00	\$127,500
		90" RGRCP	800	LF	\$285.00	\$228,000
		11' RGRCP	2,000	LF	\$345.00	\$690,000
		12' RGRCP	3,000	LF	\$365.00	\$1,095,000
		3-10'x8' CBC	2,500	LF	\$985.60	\$2,464,000
		4-9'x8' CBC	3,500	LF	\$1,131.60	\$3,960,600
		Fencing & Screening	4,400	LF	\$26.00	\$114,400
		Subtotal				\$11,031,500
		Engineering & Contingencies @ 40%				\$4,412,600
		Land Acquisition				\$3,232,500
		Surveying & Other Acquisition Costs @ 20%				\$646,500
		TOTAL PROJECT BUDGET				\$19,323,100

Note: These cost estimates have been developed as a part of a preliminary submittal dated 9/29/95. Estimates are provided for the purposes of comparison only and are not intended to reflect an engineering estimate of the final construction cost. All costs are based upon a 1995 datum.

**APPENDIX II
PLATES**

PLATE 1
LOCATION MAP



PROJECT AREA →



N.T.S.

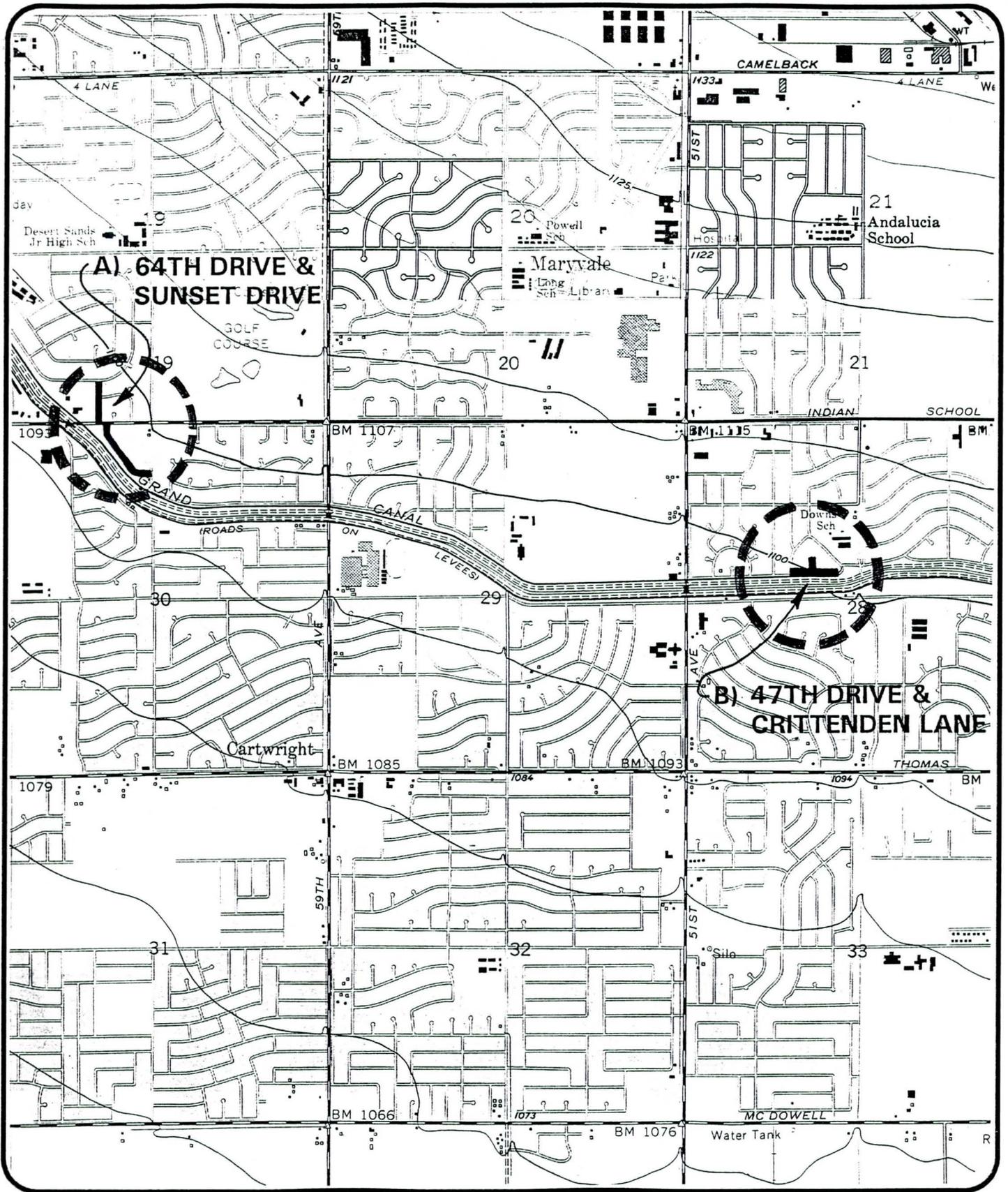
JOB NO. 95-0024

MARYVALE FLOODING MITIGATION PROJECT LOCATION MAP

PLATE 1



PLATE 2
FLOODING PROBLEM AREAS



N.T.S.

JOB NO. 95-0024

**MARYVALE
FLOODING MITIGATION PROJECT
FLOODING PROBLEM AREAS**

PLATE 2



CONCEPT A-1, A-2, B-1 & B-2

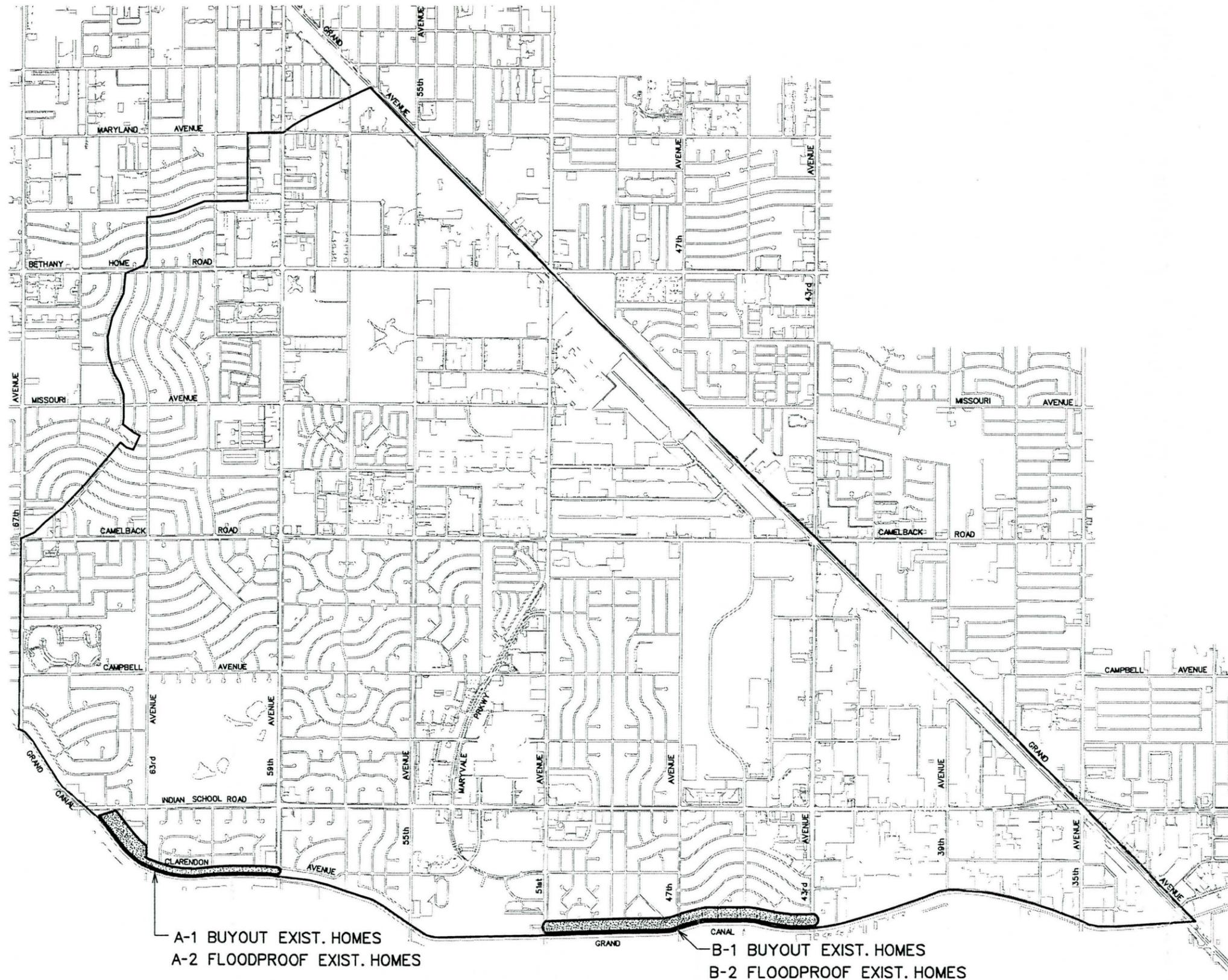
FLOOD CONTROL DISTRICT
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 MARYVALE
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 F.C.D. CONTRACT NO. 93-94

CONCEPTUAL
 FLOOD CONTROL
 ALTERNATIVES

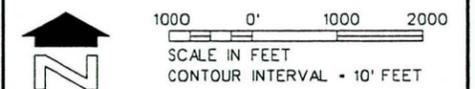
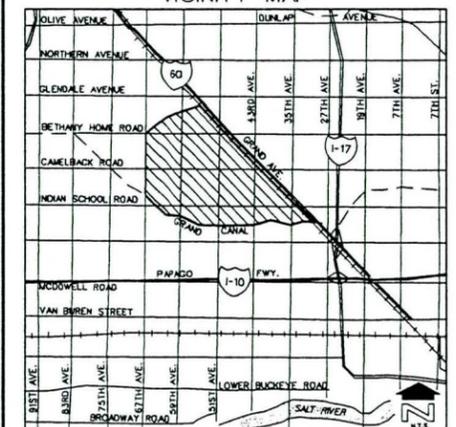
CONCEPT A-1, A-2,
 B-1 & B-2

LEGEND

-  Detention Basin
-  Channel / Storm Drain
-  Potential Area of Buyout



VICINITY MAP



COE & VAN LOO, INC.

DESIGN	BY PWRH/JKM	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.	PWRH/JKM	RECOMMENDED BY:	
PLANS	PJE	DATE	APPROVED BY:
PLANS CHK.	PWRH/JKM	DATE	CHEF ENGINEER AND GENERAL MANAGER
SUBMITTED BY:	DATE:	SHEET	OF

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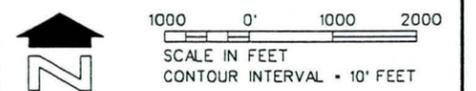
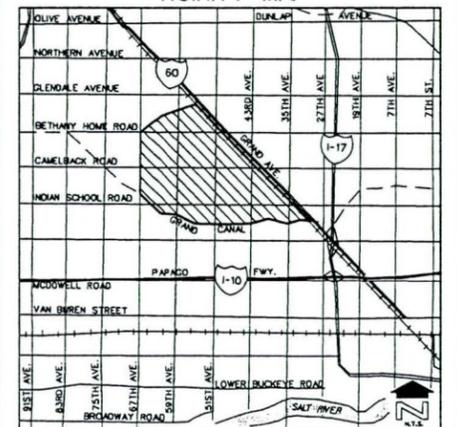
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 ALTERNATIVES
 CONCEPT A-3 & B-3

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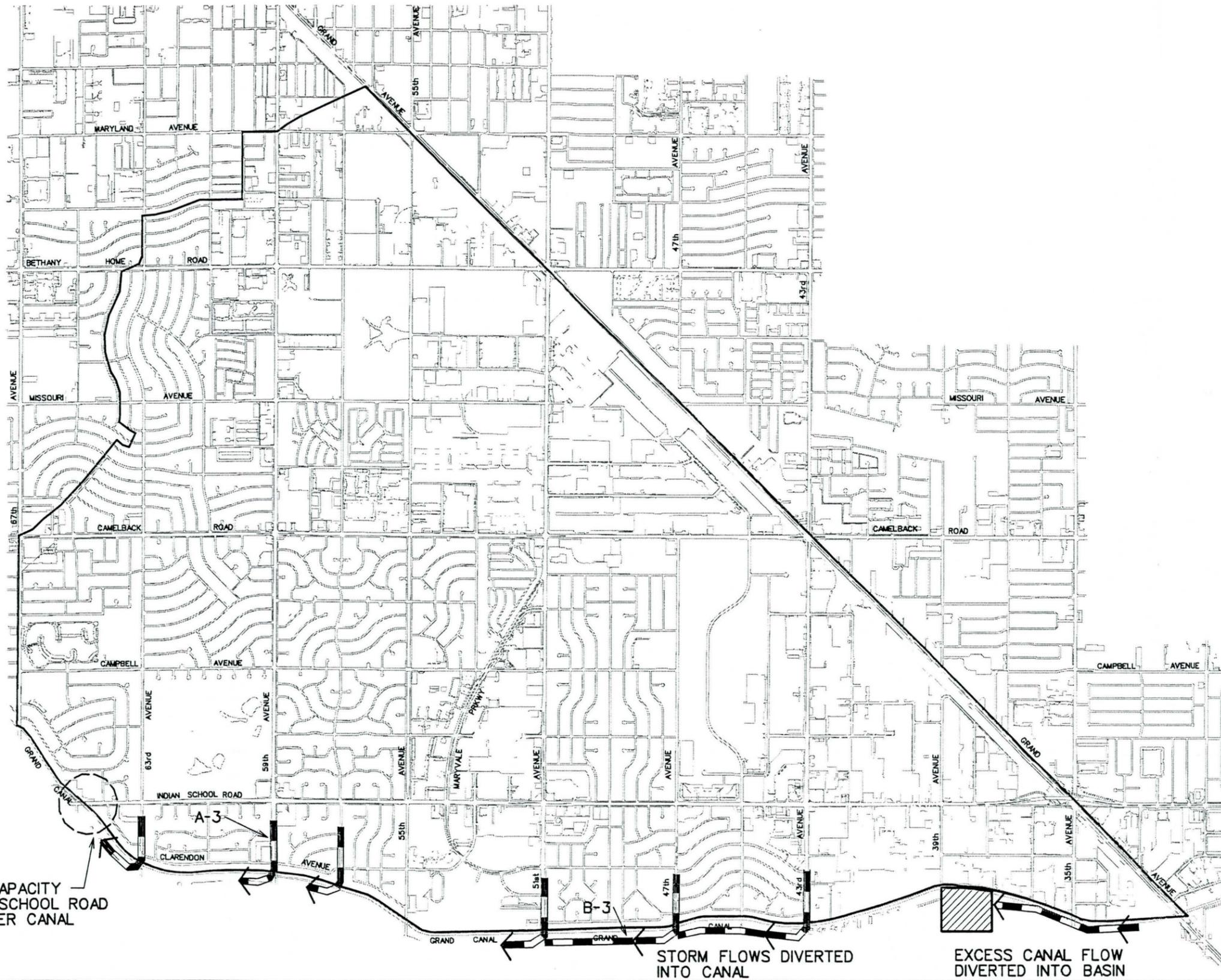
-  Detention Basin
-  Channel / Storm Drain

VICINITY MAP



COE & VAN LOO, INC.

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PLANS	PJE		RECOMMENDED BY:
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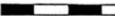
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CONCEPTUAL
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 ALTERNATIVES

CONCEPT A-4

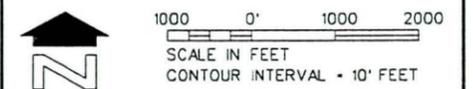
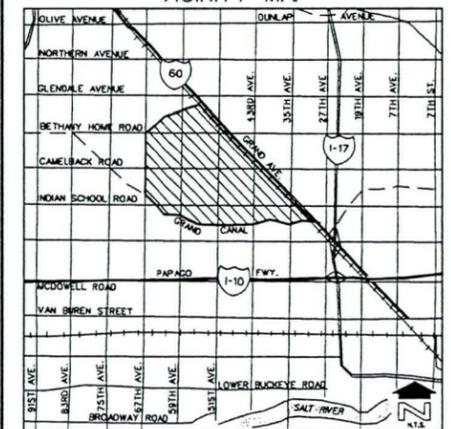
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-  Detention Basin
-  Channel / Storm Drain

OPTION

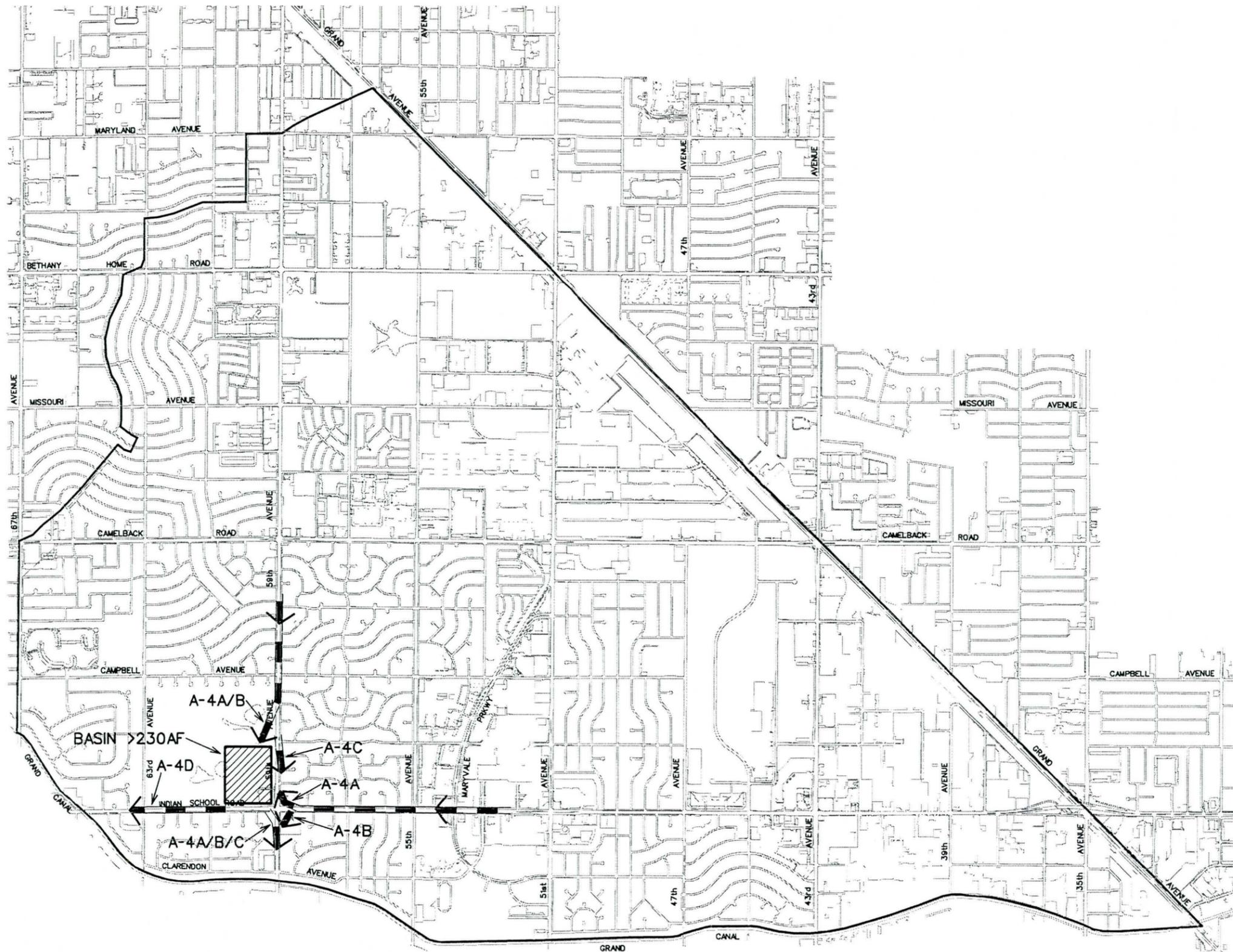
- A Indian School S.D. into Golf Course
- B Indian School S.D. into 59th Ave. S.D.
- C Low Flows Bypass Detention Basin
- D Bleed-off to 67th Ave. S.D.

VICINITY MAP



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CONCEPT B-4



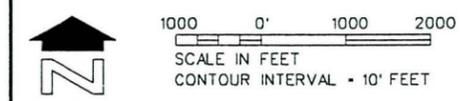
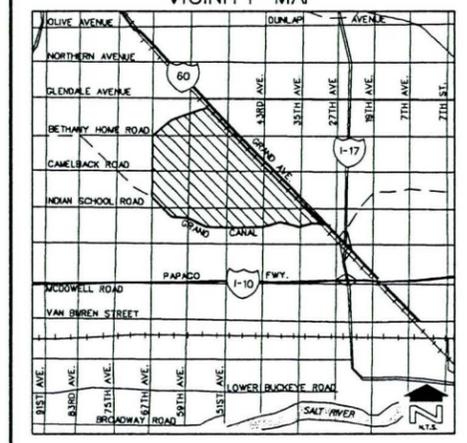
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 ALTERNATIVES
 CONCEPT B-4

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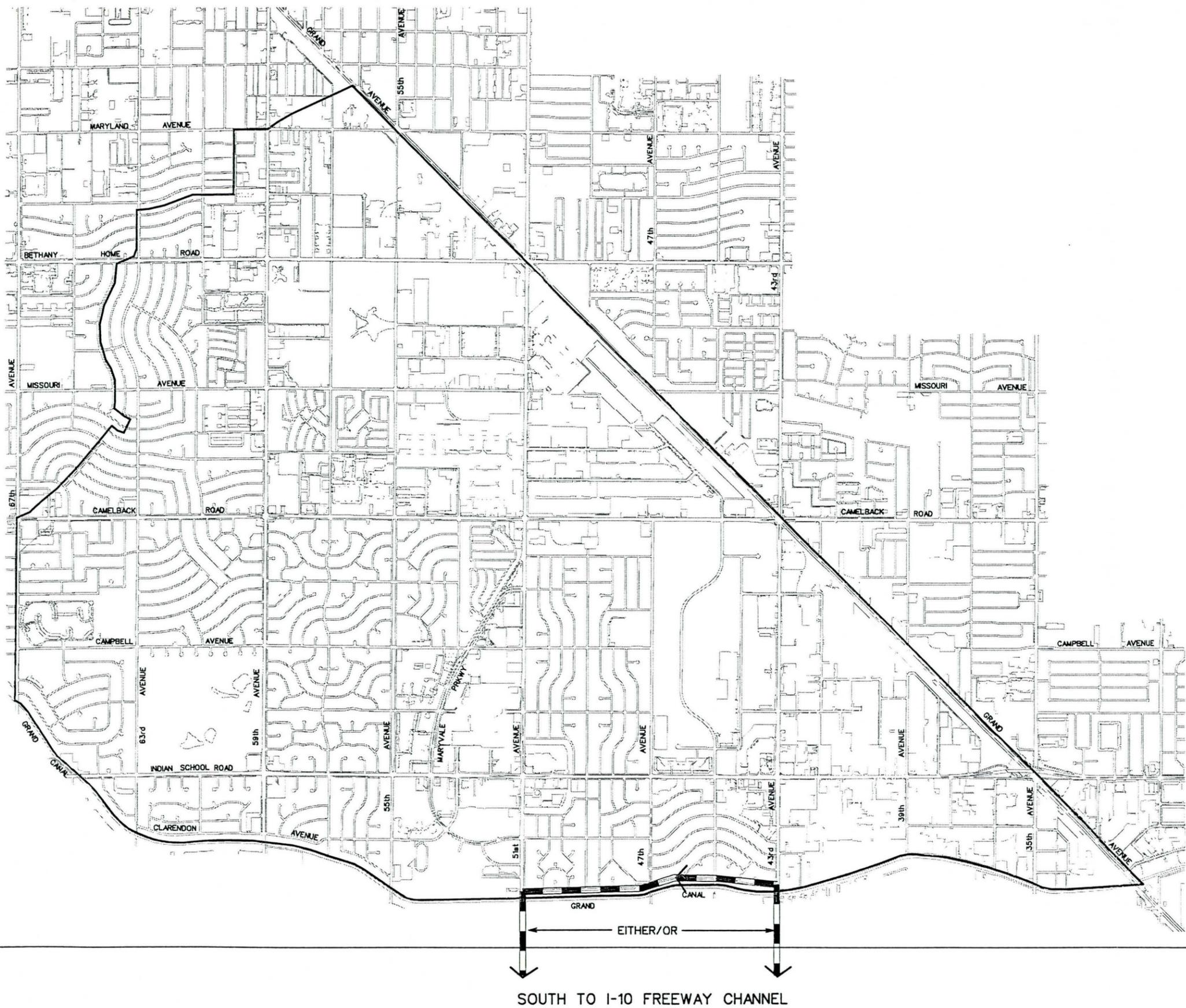
-  Detention Basin
-  Channel / Storm Drain

VICINITY MAP



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SOUTH TO I-10 FREEWAY CHANNEL

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CONCEPT A-5 & B-5

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 FLOOD CONTROL
 ALTERNATIVES
 CONCEPT A-5 & B-5

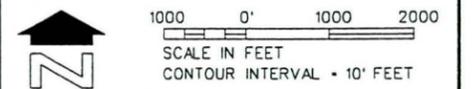
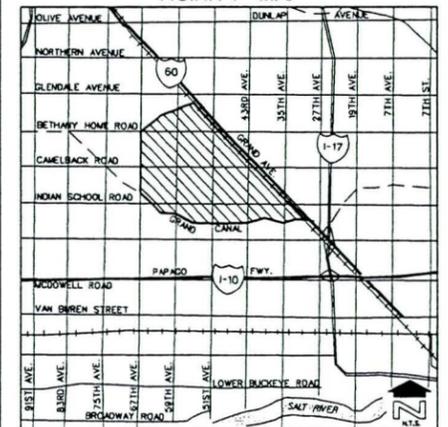
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-  Detention Basin
-  Channel / Storm Drain

OPTION

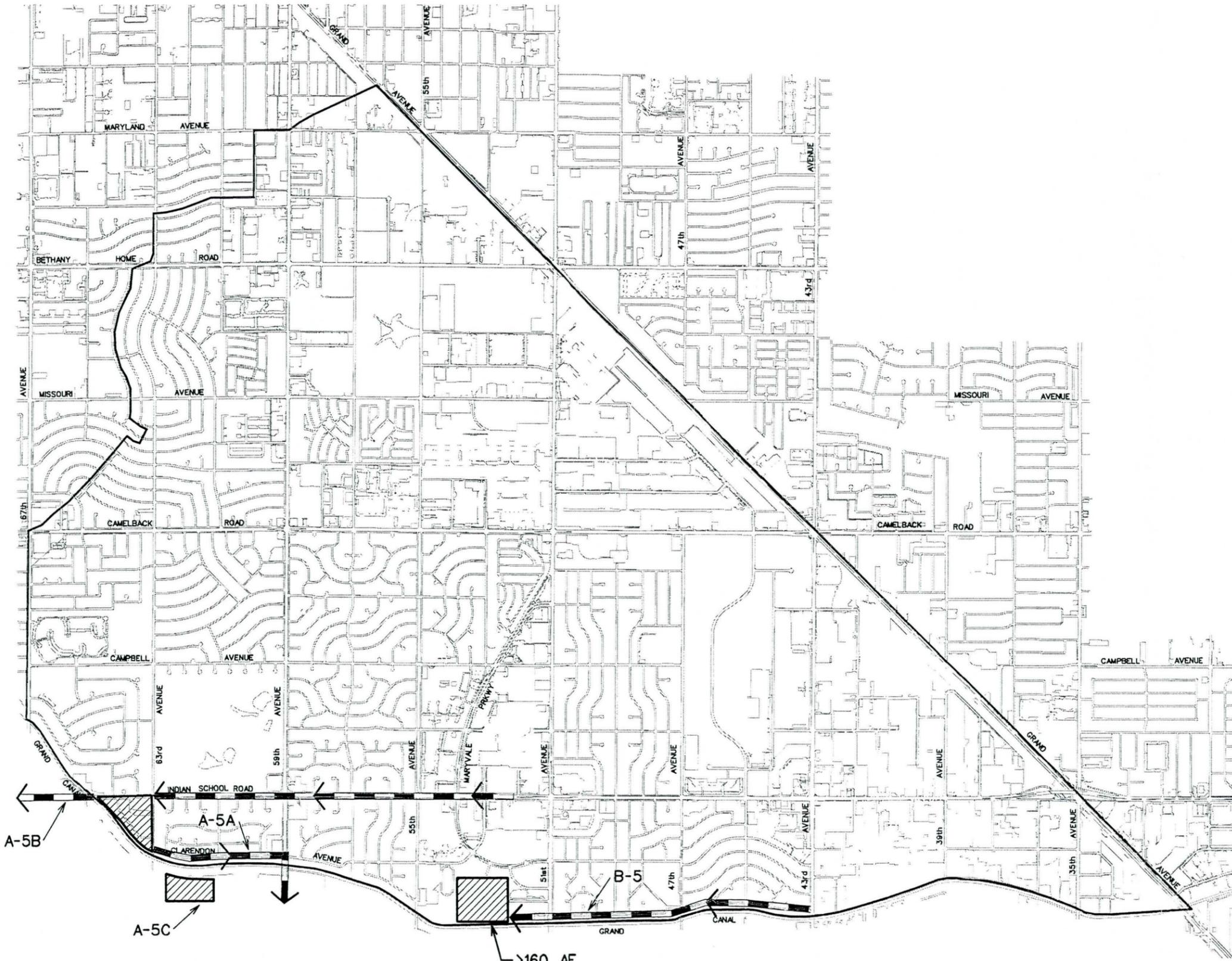
- A Bleed-off to 59th Ave. S.D.
- B Bleed-off to Indian school S.D.
- C Detain South of Canal

VICINITY MAP



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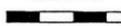
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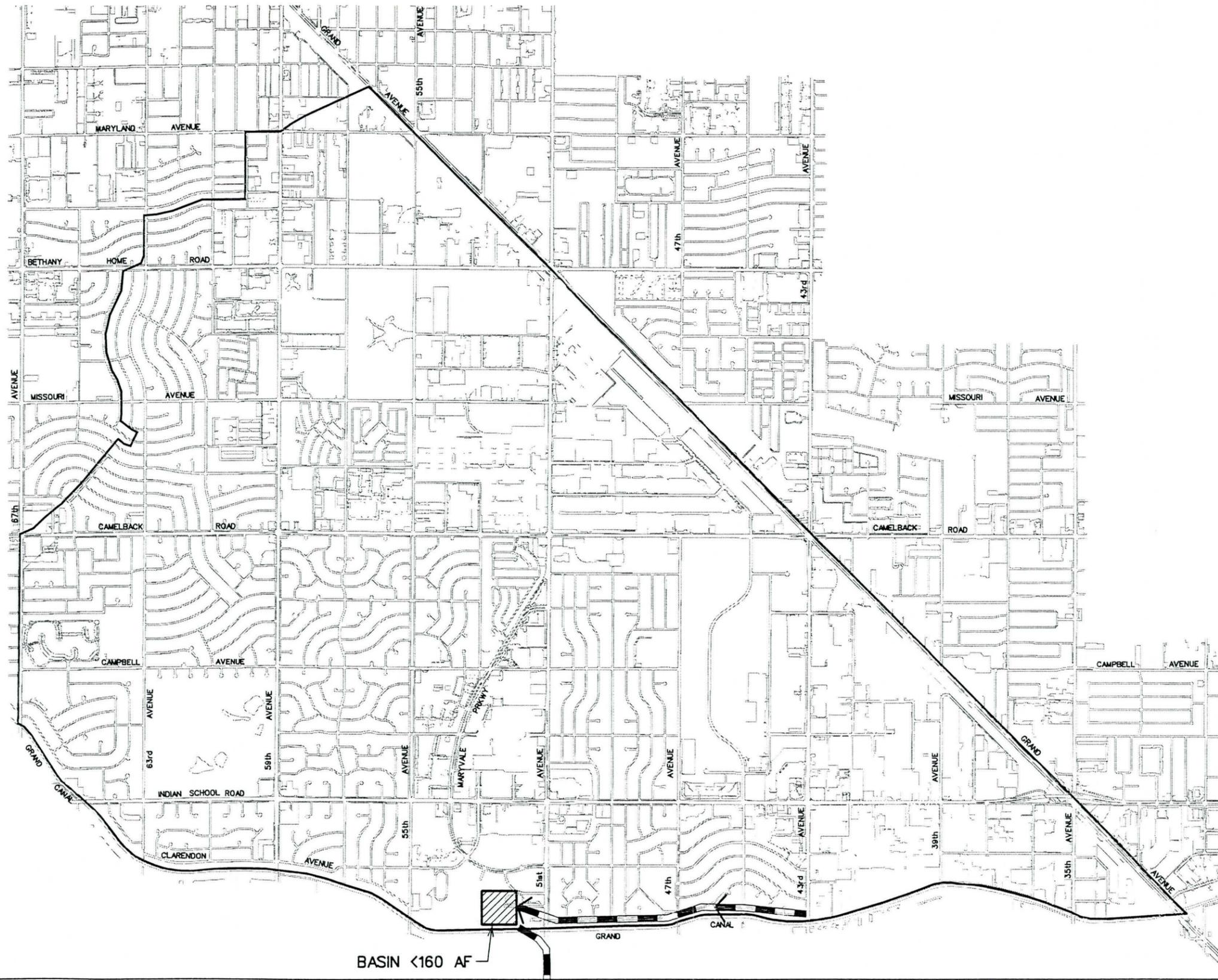
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 ALTERNATIVES

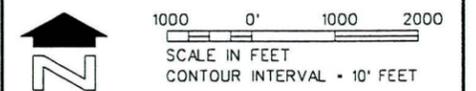
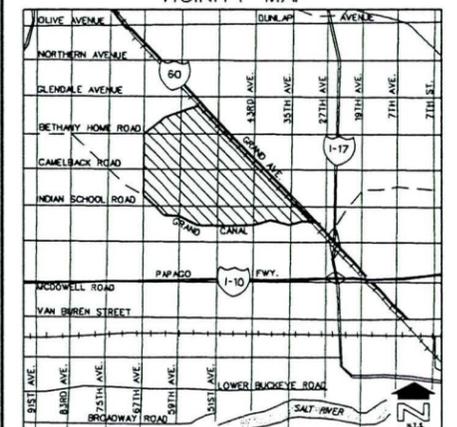
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LEGEND

-  Detention Basin
-  Channel/ Storm Drain



VICINITY MAP



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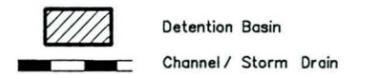
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FLOOD CONTROL DISTRICT
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 FLOOD CONTROL
 ALTERNATIVES

CONCEPT B-7

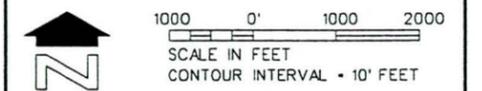
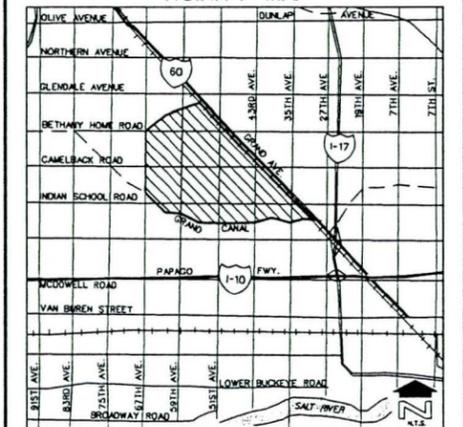
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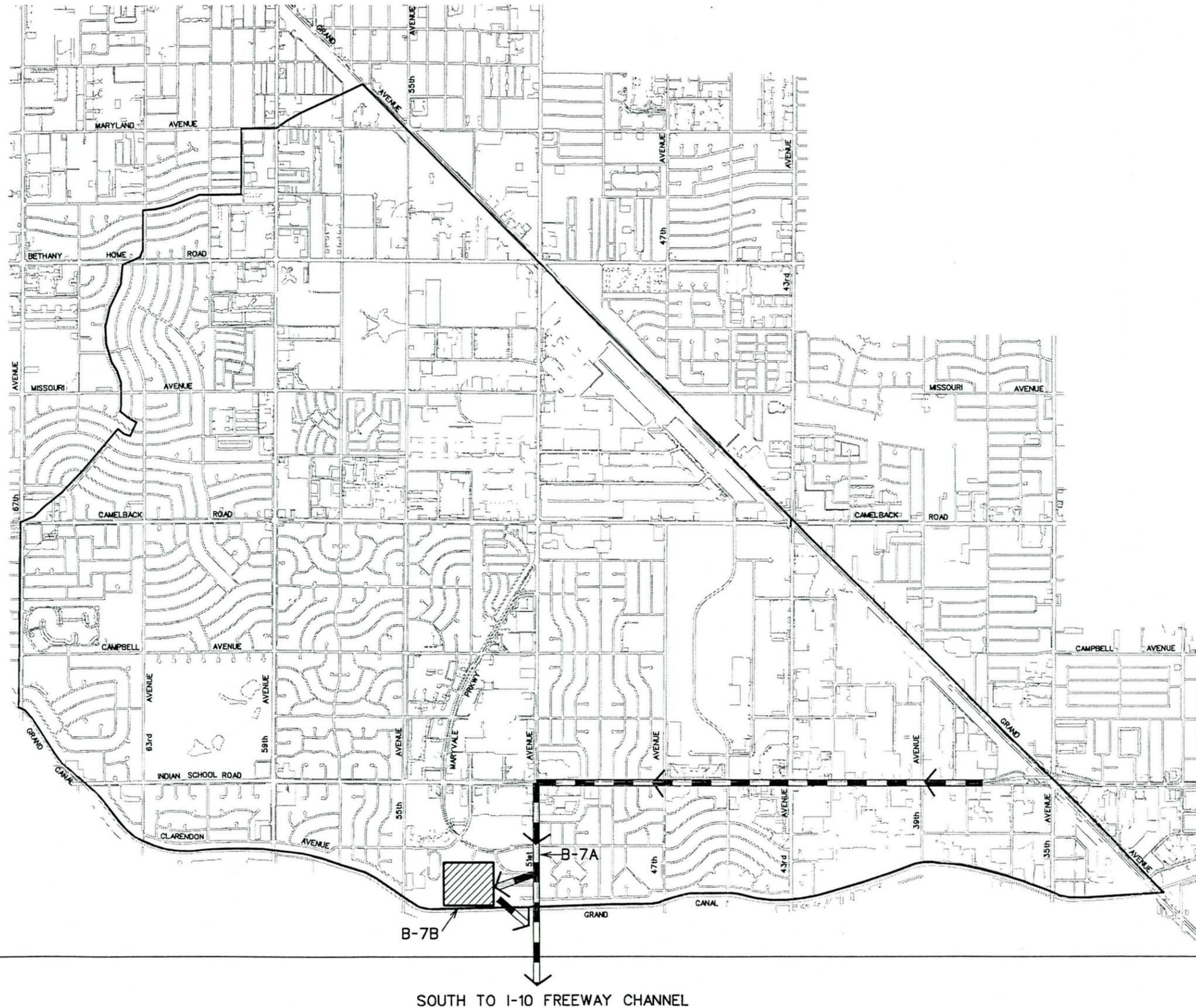
- A Drainage Interceptor to Drain South
- B Offline Detention Basin

VICINITY MAP



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DESIGN CHK.	PWRH/JKM		
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PLANS CHK.	PWRH/JKM		APPROVED BY: _____ DATE _____
SUBMITTED BY:			CHEF ENGINEER AND GENERAL MANAGER
			SHEET _____ OF _____



SOUTH TO I-10 FREEWAY CHANNEL

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 LV7

CONCEPT B-8

FLOOD CONTROL DISTRICT
 OF MARICOPA COUNTY
 FLOOD DELINEATION STUDY OF
 MARYVALE
 FLOODING MITIGATION PROJECT
 F.C.D. CONTRACT NO. 93-94

CONCEPTUAL
 FLOOD CONTROL
 ALTERNATIVES

CONCEPT B-8

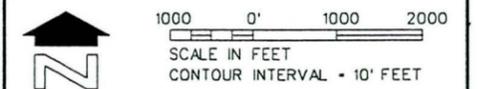
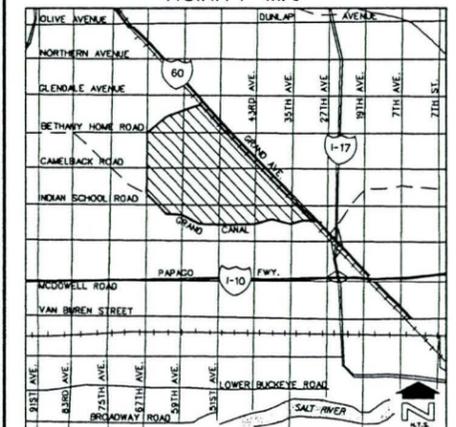
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OPTION

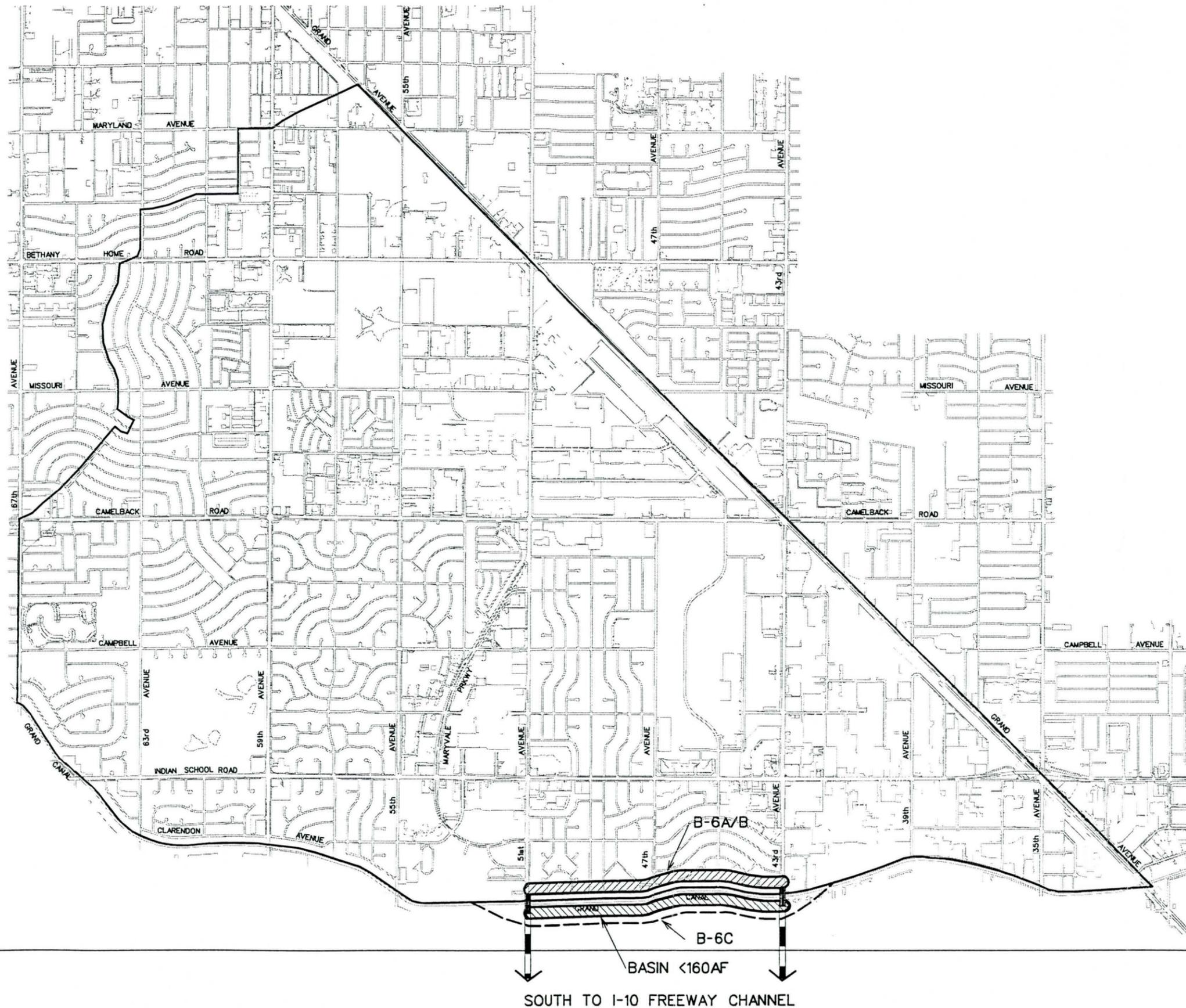
- A Strip Basin Along Canal
- B Strip Basin Along Interior Streets
- C Relocate Canal to South

VICINITY MAP



COE & VAN LOO, INC.

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SUBMITTED BY:		DATE	
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			SHEET OF



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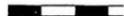
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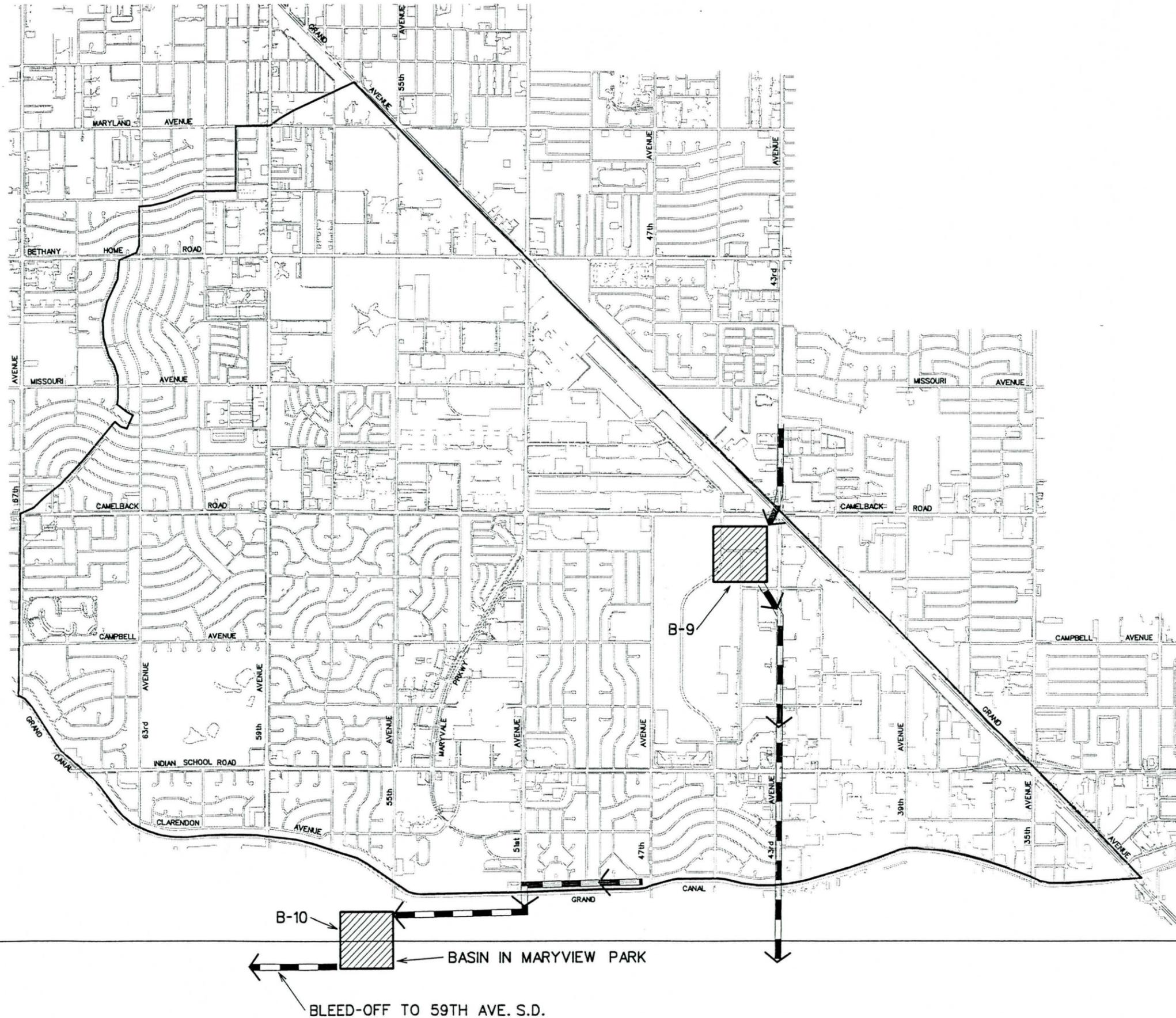
CONCEPT B-9 & B-10

FLOOD CONTROL DISTRICT
 OF MARICOPA COUNTY
 FLOOD DELINEATION STUDY OF
 MARYVALE
 FLOODING MITIGATION PROJECT
 F.C.D. CONTRACT NO. 93-94

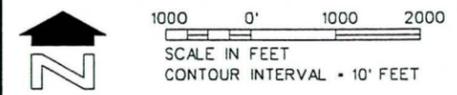
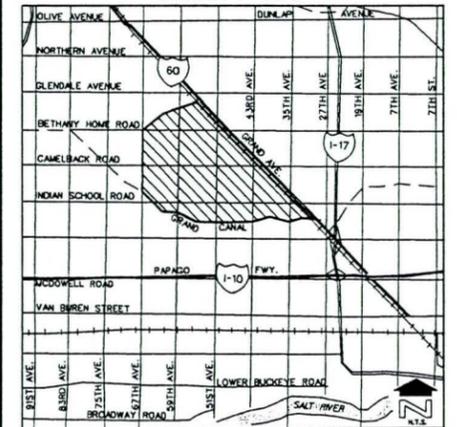
CONCEPTUAL
 FLOOD CONTROL
 ALTERNATIVES
 CONCEPT B-9 & B-10

LEGEND

-  Detention Basin
-  Channel / Storm Drain



VICINITY MAP



COE & VAN LOO, INC.

DESIGN	BY PWRH/JKM	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.	PWRH/JKM		
PLANS	PJE		RECOMMENDED BY: _____ DATE _____
PLANS CHK.	PWRH/JKM		APPROVED BY: _____ DATE _____
SUBMITTED BY:			CHEF ENGINEER AND GENERAL MANAGER
		DATE: _____	SHEET _____ OF _____

DATE: Jul 19, 1995
 FILE: 950024_VFD.dwg
 LV-15