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PHASE II: RECONNAISSANCE REPORT

PHOENIX SEGMENT:
43RD AVENUE TO THE
SQUAW PEAK PARKWAY



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PARADISE CORRIDOR – SR 317

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PHASE II:
RECONNAISSANCE REPORT
PHOENIX SECTION
43RD AVENUE TO THE SQUAW PEAK PARKWAY
PARADISE CORRIDOR
SR-317
AZM-600-4-202

PREPARED FOR:
ARIZONA DEPARTMENT OF TRANSPORTATION
PHOENIX, ARIZONA

PREPARED BY:
BRW, INC
2700 NORTH CENTRAL AVENUE, SUITE 1000
PHOENIX, ARIZONA 85004

5 DECEMBER 1986

TABLE OF CONTENTS

<u>CHAPTER</u>	<u>PAGE</u>
1	OVERVIEW 1
	A Introduction 1
	B Corridor Development History 6
	C Community Involvement 8
	D Report Format 12
2	TRANSPORTATION SYSTEM 13
	A Roadway Network 13
	B Corridor Location 19
	C Facility Type 29
	D Transit Service 33
3	STUDY AREA CHARACTERISTICS 40
	A Socio-Economic Characteristics 40
	B Land Use Development 46
	C Community Facilities and Services 57
	D Environmental Features 69
	E Utilities 84
	F Off-Site Hydrology 88
4	CONCLUSIONS 98
	A Transportation System 98
	B Study Area Characteristics 102
	C Summary of Opportunities and Constraints 107
APPENDIX A-1

LIST OF FIGURES

<u>FIGURE</u>		<u>PAGE</u>
1	MAG Freeway/Expressway Plan.	2
2	Paradise Corridor Study Process	5
3	2005 Roadway Level of Service With No East-West Improvements	16
4	Level of Service With No East-West Improvements . .	17
5	Level of Service Summary With No East-West Improvements	18
6	Roadway Network Models	20
7	Controlled Access Facilities, Volumes Restrained . .	27
8	Arterial Street Volumes, Restrained	28
9	Universe of Alternative Roadway/Transit Facility Types	30
10	Results of Third Facility Screening By Phoenix CAC, 11/6/86	31
11	1986 Public Transit Routes	34
12	Grand-Paradise Transit Corridor	38
13	Proportional Share by Municipality (Population and Employment)	43
14	Socio-Economic Characteristics (Population).	44
15	Socio-Economic Characteristics (Employment).	45
16	Corridor-Wide Land Use Pattern	47-50
17	Urban Villages In the Paradise Corridor	55
18	Elementary and Junior High School Attendance Areas .	58
19	Public High School District Boundaries	59
20	Fire and Police Stations in the Paradise Corridor. .	63
21	Emergency Facilities in the Paradise Corridor. . . .	65
22	Public Park and Recreational Facilities	68
23	Noise Monitoring Sites	72
24	Potential Prehistoric Resources in the Paradise Corridor.	77
25	Urban Scenes	78
26	Potential Historic Structures	79-81
27	Utilities	85-86
28	Off-Site Hydrology, Case I	89-90
29	Off-Site Hydrology, Case II	94-95

LIST OF TABLES

<u>TABLES</u>	<u>PAGE</u>
1 Level of Service Definition	14
2 1985 and 2005 Screenline Analysis	14
3 Unrestrained Controlled-Access Facility, 2005 Traffic Forecasts at Screenline Locations for Alternative Build Corridors	22
4 Restrained Controlled-Access Facility, 2005 Traffic Forecasts at Screenline Locations for Alternative Build Corridors	23
5 Percent Reduction in Major Street, Unrestrained Volumes Between Indian School and Glendale Due to Building a Corridor	24
6 Percent Reduction in Major Street, Restrained Volumes Between Indian School and Glendale Due to Building a Corridor	24
7 Route Frequencies in Buses/Hour	35
8 Phoenix Urban Area Socio-Economic Data	40
9 Paradise Corridor Population and Employment By Municipality	41
10 Land Use Acreages By Category	53
11 Paradise Corridor Schools and Enrollments	60
12 Total School Enrollment For Districts Within The Paradise Corridor	61
13 Inventory Police and Fire Stations	62
14 Emergency Medical Facilities	64
15 Parks and Recreational Facilities Within The Phoenix Portion of the Paradise Corridor	66
16 Noise Monitoring Results	73
17 Federal Noise Abatement Criteria	74
18 Potential Historic Structures (Phoenix)	82
19 Preliminary Peak Flow Discharge in Cubic Feet/Second at Major Streets in Paradise Corridor for Case I	92
20 Preliminary Peak Flow Discharge in Cubic Feet/Second at Major Streets in Paradise Corridor for Case II	96
21 Summary of Opportunities and Constraints	107
22 Potentially Historic Sites - Phoenix	A-1-5

CHAPTER 1: OVERVIEW

- A.** Introduction
- B.** Corridor Development History
- C.** Community Involvement
- D.** Report Format



A: INTRODUCTION

The preparation of this report was sponsored by the Arizona Department of Transportation (ADOT) in cooperation with the Maricopa Association of Governments (MAG) and the cities of Glendale and Phoenix. The purpose of this report is to document the Phase II Reconnaissance element of the Paradise Corridor Study for the Phoenix segment. This Phase II Phoenix Reconnaissance Report is a companion document to the Phase II Glendale Reconnaissance Report, which was published in September of 1986. With the completion of reconnaissance efforts for the Phoenix segment of the Corridor, all Phase II Study activities have been addressed.

BACKGROUND

The City Councils of both cities have appointed Citizens' Advisory Committees (CACs) to work with ADOT and the consultants on the Paradise Corridor Study. However, the Study has progressed very differently within the two communities.

The Glendale CAC adopted a preferred roadway alignment on 7 April 1986 and recommended it to the City Council. The City of Glendale subsequently made a formal request to ADOT to accelerate the planning process for the segment of the Paradise Corridor from 43rd Avenue west to the Outer Loop, because:

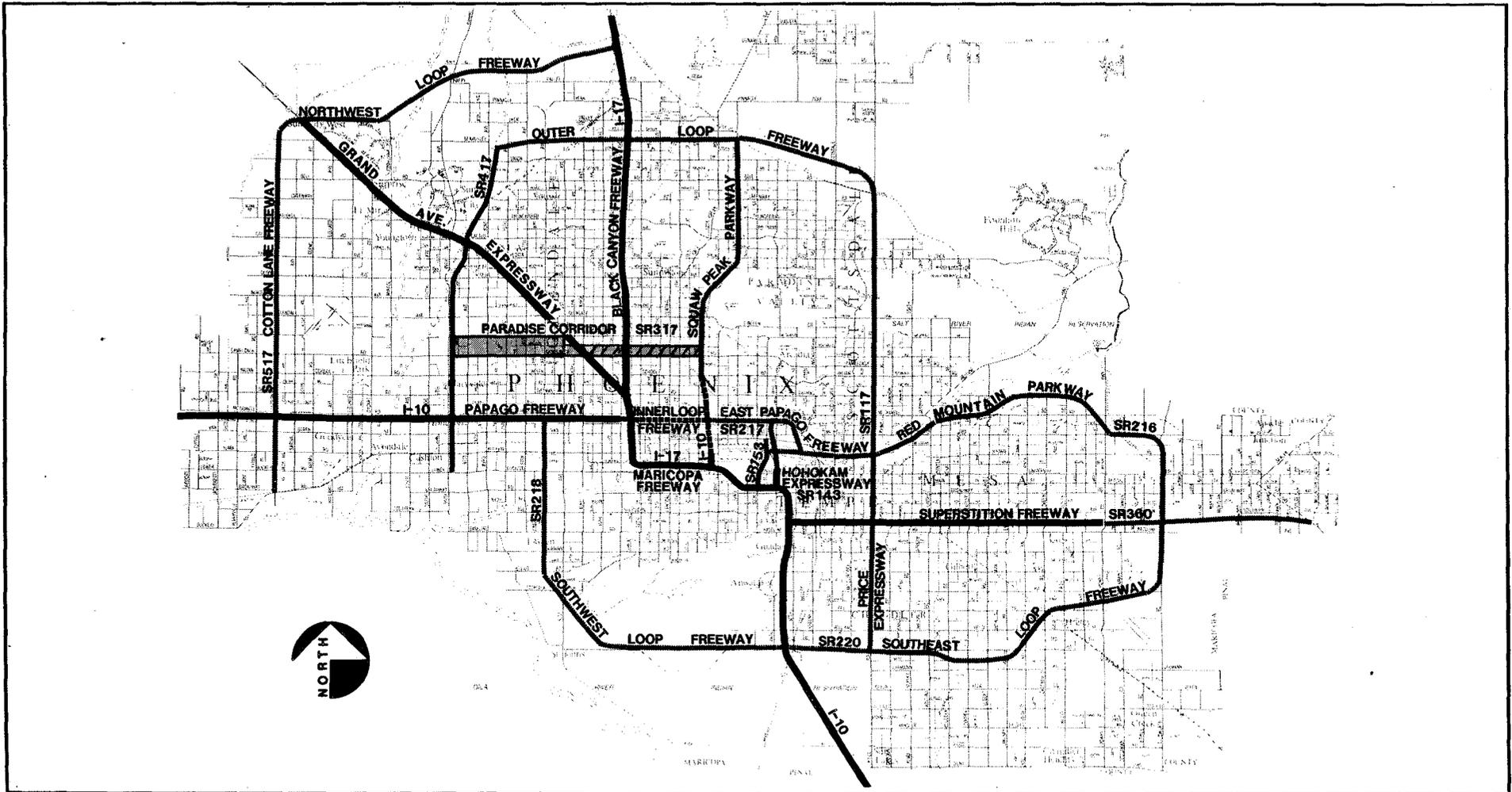
- An extensive needs analysis was not needed; and
- Property owners within the corridor deserve rapid-as-possible resolution of the location of the facility.

ADOT has accelerated the Study Process in the Glendale segment to comply with the request, resulting in differing study activities between the two communities.

By comparison, Study activities have proceeded more slowly in Phoenix. The Phoenix CAC considered the analysis of need to be an important and necessary part of the Study and spent a great deal of time examining the analysis before agreeing with its conclusions. Following the determination that the existing network of Phoenix streets is not capable of meeting existing and future travel demands, the Phoenix CAC has addressed issues relating to the identification of a transportation corridor and the type(s) of transportation facility improvement(s) best suited to serve the unmet needs. Where in Glendale, the CAC's preferred location and facility type were agreed upon in April, the Phoenix CAC continues to study these issues.

REGIONAL FREEWAY/EXPRESSWAY SYSTEM

The Paradise Corridor is a high priority element of the regional freeway and expressway system adopted by MAG and approved by the voters in 1985. This system is shown in Figure 1. As proposed, the Paradise Corridor would



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 STUDY AREA

 PARADISE CORRIDOR

MAG FREEWAY/ EXPRESSWAY PLAN

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234 1591

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SOURCE: ADOT

1

provide a high capacity east-west link between the Squaw Peak Parkway on the east and the Outer Loop Freeway on the west, with connections to the Black Canyon Freeway (I-17) and the Grand Avenue Expressway in between.

Designated State Route 317, the Corridor is scheduled by MAG and the ADOT Transportation Board to be constructed from the Squaw Peak Parkway to Grand Avenue by 1995, and from Grand Avenue to the Outer Loop by the year 2000.

STUDY AREA

The study area in this report is the one-half mile wide and approximately seven-mile-long portion of the Paradise Corridor within the City of Phoenix, from the Squaw Peak Parkway (18th Street) west to 43rd Avenue (just east of Grand Avenue). The study area, bounded by Missouri Avenue on the north and Camelback Road on the south, is illustrated in Figure 1.

Inventory and analysis have been completed for the entire Corridor from the Squaw Peak Parkway west to the Outer Loop. Information is presented corridor-wide for the subject areas which are of regional scope, including:

- Transportation System, except Transit,
- Socio-Economic Characteristics,
- Community Facilities and Services,
- Environmental Features, and
- Hydrology and Drainage.

Information is presented for the area east of 43rd Avenue only for the subject areas which are most specific to that area:

- Recommended Public Transit Improvements,
- Land Use Development,
- Utilities, and
- Cost/Implementation Considerations.

TASKS DOCUMENTED

This report summarizes the Phase II Reconnaissance element of the Paradise Corridor Study. Phase II tasks which are documented include:

- Identify the Paradise Corridor development history;
- Provide community involvement opportunities;
- Inventory available data on real estate development, the environment, utilities and other major features;
- Establish liaison with local jurisdictions and utility companies; and
- Conduct hydrologic analyses and develop drainage design concepts.

STUDY PROCESS AND TIMETABLE

The four-phase Study Process is shown graphically in Figure 2. Phase I of the Study determined there is a need for transportation improvements in the study area. Contingent upon the determination that a need does exist, the second part of Phase I focused on the selection of a transportation corridor and the type(s) of transportation facility improvement(s) that would best meet the determined need. Further analytical work conducted during Phase I indicated that transportation improvements in the Paradise Corridor could help alleviate existing congestion and improve the levels of service on the four east-west major streets and at intersections in the Corridor. These improvements would not only serve Corridor-specific travel needs, but regional needs as well. Documents which describe these conclusions are:

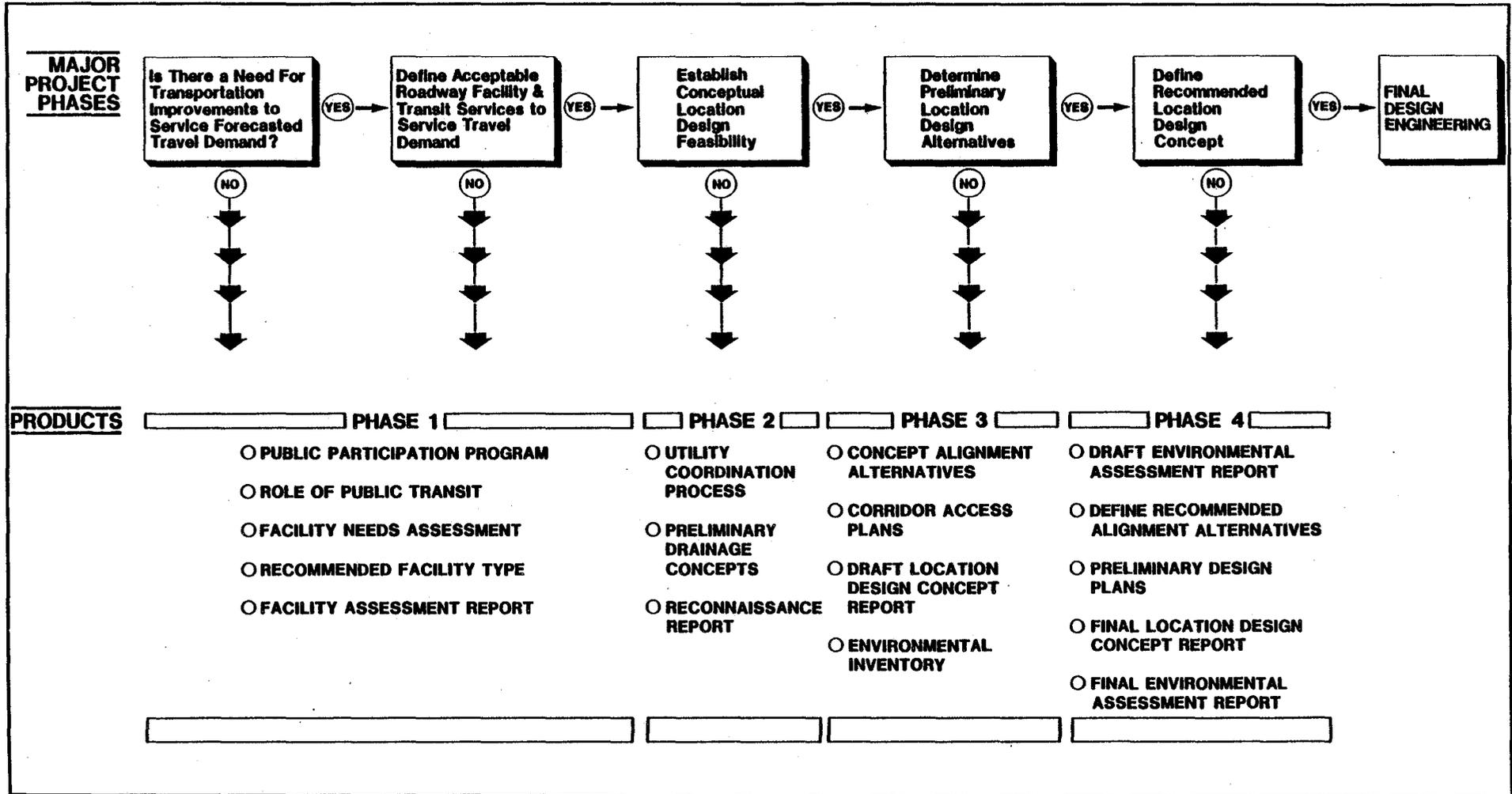
- Central Area Transportation Study; MAG, 1985.
- Westside Transportation Analysis; MAG, 1985.
- Analysis of Need for Additional East/West Transportation Facilities and Services Along the Paradise Corridor; Technical Memorandum (Draft), BRW, 1986.
- Analysis of Alternative Corridors to Serve East/West Travel Demand In the Paradise Corridor Study Area; Technical Memorandum (Draft), BRW, 1986.

This report concludes the Phase II process, which consisted of an inventory and analysis of the designated Corridor area.

In Phase III, concept level designs will be developed for each feasible alignment, providing preliminary engineering information on the plan, profile, cross-section, access, drainage and traffic. This information will provide the basis for the selection of the preferred location and continued design refinement and environmental analysis in Phase IV.

The project schedule for the Phoenix segment is to complete Phase III by Spring 1987 and Phase IV by late Summer 1987. This schedule is contingent upon the following two conditions:

- The work to identify a preferred alignment location in the Phoenix section proceeds without controversy; and
- The preferred facility type(s) and alignment location are compatible with those identified in the Glendale section of the Corridor.



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PARADISE CORRIDOR STUDY PROCESS

B: CORRIDOR DEVELOPMENT HISTORY

The Paradise Corridor has remained a part of the Maricopa Association of Governments (MAG) and City of Phoenix Highway Systems since 1960 when it was first conceived. A summary of the Corridor's transportation development history follows:

- 1960

The "Major Street and Highway Plan for the Phoenix Urban Area" was prepared by Wilbur Smith and Associates. It included the Paradise as a four-lane freeway from the west leg of the Outer Loop to I-17, a six-lane parkway from I-17 to the Squaw Peak, and as a four-lane parkway from the Squaw Peak to the east leg of the Outer Loop.

- 1963

The City of Phoenix Transportation Team completed a preliminary alternative route study of the Paradise from 43rd Avenue to Lincoln Drive and 32nd Street--including the continuation of the facility westward into Glendale area. The study analyzed eleven (11) alternative alignments.

- 1968

The Arizona Highway Commission accepted the Paradise Corridor location from Grand Avenue to the Squaw Peak as State Route 317 by resolution number 68-70. From 1969 through 1973, 87 acres of right-of-way were acquired by the State at a cost of \$1.7 million.

- 1974

The Transportation System Plan for the Phoenix Urban Area was adopted by the Regional Council of the Maricopa Association of Governments, showing the Paradise extending from the Squaw Peak to the Outer Loop.

- 1978

The Arizona Transportation Board approved the inclusion of the portion of the Paradise Corridor from Grand Avenue to the west leg of the Outer Loop into the State Highway system and included it in the 5-year construction program.

- 1980

The Right-of-Way Section of ADOT completed a study indicating that over 2,000 parcels, most of which were developed, would have to be acquired for the Paradise. The corridor study area was from the west leg of the Outer Loop to the Squaw Peak Corridor.

- 1981

The ADOT Transportation Board adopts Resolution 81-07-A-30 rescinding Resolutions 68-70 and 68-69, eliminating the Paradise and Squaw Peak Parkways from the state system because "they have been determined to be no longer financially practical to construct for state transportation purposes." However, both facilities remained on the MAG Transportation System Plan.

- 1983

The Outer Loop Freeway was relocated from just east of 75th Avenue to east of 99th Avenue. Because of this relocation, the Paradise Corridor was terminated at 51st Avenue between Camelback and Missouri.

- 1985

Two studies were completed by MAG. The "Central Area Transportation Study" evaluated several alternatives and recommended a freeway in the Paradise Corridor. The "West Area Transportation Analysis" recommended the extension of Paradise Corridor from 51st Avenue to the Outer Loop near 99th Avenue.

The Paradise Corridor was re-adopted by the ADOT Transportation Board as State Route 317 and included in the MAG Regional Freeway/Expressway System. This system was submitted to the voters of Maricopa County in October, 1985 as Proposition 300 for funding with fuel taxes and was approved.

- 1986

ADOT initiated the Paradise Corridor Study and the City Councils of Glendale and Phoenix appointed citizen committees to advise them. The Glendale Citizen Advisory Committee recommended a preferred roadway alignment (500 feet wide) and it was forwarded by the Glendale City Council to ADOT for further consideration on 13 May, 1986.

Further documentation of the background of the Paradise Corridor and the Regional Transportation System Plan is provided in the Technical Memorandum, Summary of Previous Studies; 27 June 1986, BRW, Inc.

C: COMMUNITY INVOLVEMENT

Opportunities for community involvement have been provided throughout the Paradise Corridor Study through the following forms:

- Citizen Advisory Committees
- Technical Advisory Committee
- City Council Meetings
- Public Forums/Information Meetings/Hearings
- Meeting Notifications
- Corridor Newsletter
- Library Resource Centers
- Utility Company Meetings

CITIZEN ADVISORY COMMITTEES

Prior to ADOT's initiation of the consultant study in April 1986, Citizen Advisory Committees (CACs) were appointed by the City Councils of both Glendale and Phoenix. The CACs are comprised of community residents who have generously volunteered their time to study corridor transportation needs and to make recommendations to their respective City Councils. There are 15 members on the Glendale CAC and 16 members on the Phoenix CAC. The meeting dates of each CAC are listed below:

Glendale CAC: 17 December 1985; 23 January 1986; 10 February; 3 and 8 March; 7 and 22 April; 19 June; and 1 October. On 7 April; a resolution was adopted recommending a preferred roadway alignment to the City Council.

Phoenix CAC: 23 January 1986; 13 February; 13 March; 3 April; 1, 15 and 22 May; 5, 19 and 21 June; 10 and 24 July; 7 and 21 August; 3 and 18 September; 9 and 23 October; and 6 and 20 November. On 21 June, a resolution was adopted acknowledging the need for transportation improvements to the City Council.

TECHNICAL ADVISORY COMMITTEE (TAC)

The TAC is an ad hoc committee comprised of representatives of governmental agencies that are affected by the Study. The purpose of the TAC is to address technical issues, including coordination with other corridor studies, and to provide professional-level project guidance. Attendance fluctuates depending on the topics to be addressed. Among the agencies represented on the TAC are:

- ADOT Urban Highways Section
- MAG Transportation Planning Office
- City of Glendale Engineering Department
- Phoenix Public Transit
- City of Phoenix, Advance Transportation Planning Team and Transportation Research

To date, the TAC has met on 16 May, 17 June, 22 August, 10 October, and 20 November, 1986. Most of the TAC members attend the CAC meetings.

CITY COUNCIL MEETINGS

The Glendale City Council met on three occasions to consider the CAC's recommended roadway alignment; 15 April, 29 April and 13 May 1986, at which time the CAC-recommendation was accepted and forwarded to ADOT for detailed feasibility analysis.

The Phoenix City Council met on 22 July 1986, to consider the CAC's finding that transportation improvements are needed within the Corridor. The City Council met on 2 November 1986, to consider the CAC's request to authorize a study of the impacts of extending the Northern Corridor eastward of the Squaw Peak Parkway to connect with the Outer Loop in Scottsdale. The City Council approved the CAC's request, and the study is to be completed by BRW by mid-January 1987.

PUBLIC FORUMS/MEETINGS/HEARINGS

Opportunities for the public to speak were provided in each community. On 13 March and 10 July 1986, in Phoenix, public forums were sponsored by the Phoenix CAC, the first to identify issues/concerns and the second to address the CAC's finding of the need for improvements. On 22 April 1986, the Glendale CAC sponsored a public hearing regarding their recommended alignment. An informal public forum was conducted by City of Glendale staff and the consultant team on 19 June to discuss the study process and the status of the CAC-recommended alignment. A third public forum, sponsored by ADOT and the consultant team, was held on 3 December at William C. Jack School to review Reconnaissance Study conclusions and eight alternative facility alignments.

MEETING NOTIFICATIONS

All meetings were publicized by City staffs to comply with the Open Meeting Law. Meeting notices were published in the Arizona Republic, Phoenix Gazette and the Glendale Star. Both cities maintain mail lists of interested individuals which were used to send direct mail notices of the public forums. These mail lists total about 1,000 households/organizations. News articles often preceded and followed CAC, city council and public meetings.

CORRIDOR NEWSLETTER

Newsletters were published by the consultant in July, September, and November 1986 and distributed by direct mail to the Glendale and Phoenix mail lists. Additional newsletters will be prepared, generally to follow CAC decision points and to precede public forums/hearings.

LIBRARY RESOURCE CENTERS

CAC meeting minutes, newsletters, technical memoranda and other reports prepared in conjunction with the study are available for public review at four libraries which are conveniently located relative to the Paradise Corridor.

- Glendale Library (Velma Teague)
7010 N. 58th Avenue, Glendale
- Fleming Library (Grand Canyon College)
3300 Camelback, Phoenix
- Phoenix Library (Century Branch)
1750 E. Highland, Phoenix
- Phoenix Library (Yucca Branch)
5648 N. 15th Avenue, Phoenix

Among the documents available for review in the libraries are nine draft Technical Memoranda prepared in conjunction with the Study, which follow:

- 1986 Transportation Conditions, June 1986, BRW;
- Study Area Socioeconomic Characteristics, June 1986, BRW;
- Summary of Previous Studies, June 1986, BRW;
- Analysis of Need for Additional East/West Transportation Facilities and Services along the Paradise Corridor, July 1986, BRW;
- Analysis of Alternative Corridors to Serve East/West Travel Demand, August 1986, BRW;
- Land Use Inventory and Analysis - Glendale Segment, August 1986, BRW;
- Facility Assessment Analysis - Glendale Segment, September 1986, BRW;
- Phase II: Reconnaissance Report - Glendale Segment, September 1986, BRW; and
- Analysis of One-Way Street and Reversible Lane Operations, October 1986, BRW.

- Land Use Inventory and Analysis - Phoenix Segment, November 1986, BRW;

COORDINATION WITH UTILITIES

Coordination with utility companies was initiated early with requests for facility locations on quarter section maps and as-built plans for facilities within the designated mile-wide corridor. Direct contact was established to follow up on the mapped facilities.

D: REPORT FORMAT

Following this Overview (Chapter 1) is the second of four chapters contained in this report. Chapter 2, Transportation System, describes transportation issues and the analyses conducted by the consultant team in addressing the issues. Assumptions, findings and observations of the analyses are also summarized. Specific transportation areas covered in Chapter 2 are:

- Roadway Network, an analysis of needs,
- Corridor Location, a comparison of alternative east-west transportation corridors,
- Facility Type(s), an evaluation of alternative transportation facility improvements, and
- Transit Services, a review of existing and future transit facility applications in the Paradise Corridor.

Chapter 3, Study Area Characteristics, summarizes an inventory and analysis of the major features of the Corridor, particularly those within the Phoenix portion, including:

- Socio-Economic Characteristics,
- Land Use Development,
- Community Facilities and Services,
- Environmental Features
- Utilities, and
- Hydrology/Drainage

The final chapter consists of conclusions drawn from the analyses of transportation issues and the inventory of major features in the Corridor. The final conclusions are presented in the last section of Chapter 4, "Summary of Opportunities and Constraints".

CHAPTER 2: TRANSPORTATION SYSTEM

- A. Roadway Network
- B. Corridor Location
- C. Facility Type
- D. Transit Service



A: ROADWAY NETWORK

Travel within the Paradise Corridor is heavily dependent upon the arterial street system, as it is within the balance of the Phoenix Metropolitan Area. The nearest east-west, controlled-access facility, the I-10 Papago Freeway, is more than three miles to the south and is not anticipated to provide significant arterial traffic relief in the study area.

In the area between Glendale Avenue on the north, Indian School Road on the south, the Outer Loop Freeway on the west, and Squaw Peak Parkway on the east, there are 52 miles of arterial streets and more than 56 major intersections. In 1986, a majority of these arterials carry traffic volumes in excess of their capacities, and about half of the intersections operate with congestion levels which cause significant travel delays.

ANALYSIS OF NEEDS

Existing and forecasted conditions on the major arterial streets within the Paradise Corridor were analyzed and documented in two previous reports:

- 1986 Transportation Conditions; Draft Technical Memorandum, June 1986, BRW.
- Analysis of Need for Additional East/West Transportation Facilities and Services Along the Paradise Corridor; Draft Technical Memorandum, July 1986, BRW.

Information used for the analyses included: 1985 traffic volume counts provided by the cities of Phoenix and Glendale; street inventory and peak-hour turning movement counts collected by BRW, Inc; and population, employment and traffic forecasts for 2005 and 2015 provided by the Maricopa Association of Governments (MAG).

Major east-west arterials included in the analysis were:

- Glendale Avenue
- Bethany Home Road
- Camelback Road
- Indian School Road

North-south arterials included all the major one-mile streets and avenues between the Outer Loop Freeway (99th Avenue) on the west and the Squaw Peak Parkway (18th Street) on the east.

Analyses were conducted to compare traffic volumes to roadway capacity in terms of Level of Service (LOS) which is based on the 1985 Highway Capacity Manual. Traffic conditions generally described by these LOS designations and their acceptability are shown below:

TABLE 1
LEVEL OF SERVICE (LOS) DEFINITION

<u>Level of Service</u>	<u>Traffic Conditions</u>	<u>Acceptability</u>
A	Little or No Delay	Desirable
B	Short Traffic Delays	Desirable
C	Medium Traffic Delays	Acceptable
D	Long Traffic Delays	Tolerable
E	Very Long Traffic Delays	Undesirable
F	Failure - Extreme Congestion	Unacceptable

Source: 1985 Highway Capacity Manual,
Federal Highway Administration (FHWA).

Three methods were used to compare the existing and forecasted system operating conditions:

- Screenline Analysis
- Roadway Link Analysis
- Intersection Analysis

The findings of each analysis approach follow.

Screenline Analysis

- The 1985 and 2005 volumes on Glendale Avenue, Bethany Home, Camelback and Indian School Roads, relative to the capacity (LOS C/D) at seven screenlines, are illustrated in Table 2 on an average daily basis.

TABLE 2
1985 AND 2005 SCREENLINE ANALYSIS
(DATA ON GLENDALE, BETHANY HOME, CAMELBACK, AND INDIAN SCHOOL ROADS)

<u>Location</u>	<u>Capacity (LOS C/D)</u>	<u>1985 Volume</u>	<u>Volume in Excess of Capacity</u>	<u>2005 Volume</u>	<u>Volume in Excess of Capacity</u>
East of 7th Street	116,000	157,100	41,100	194,000	78,000
East of 7th Avenue	124,000	160,000	36,000	191,000	67,000
East of 19th Avenue	132,000	169,200	37,200	196,000	64,000
East of 35th Avenue	132,000	183,800	51,800	211,000	79,000
East of 51st Avenue	104,000	130,500	26,500	170,000	66,000
East of 67th Avenue	104,000	90,300	(13,700)	131,000	27,000
East of 91st Avenue	60,000	46,500	(13,500)	82,000	22,000

Source: "Analysis of Need for Additional East-West Transportation Facilities and Services Along the Paradise Corridor"; Draft Technical Memorandum; BRW, Inc.; July 1986.

- Forecasted 2005 traffic will exceed east-west arterial street capacity at all seven screenline locations (by an average of 51%).

Roadway Link Analysis

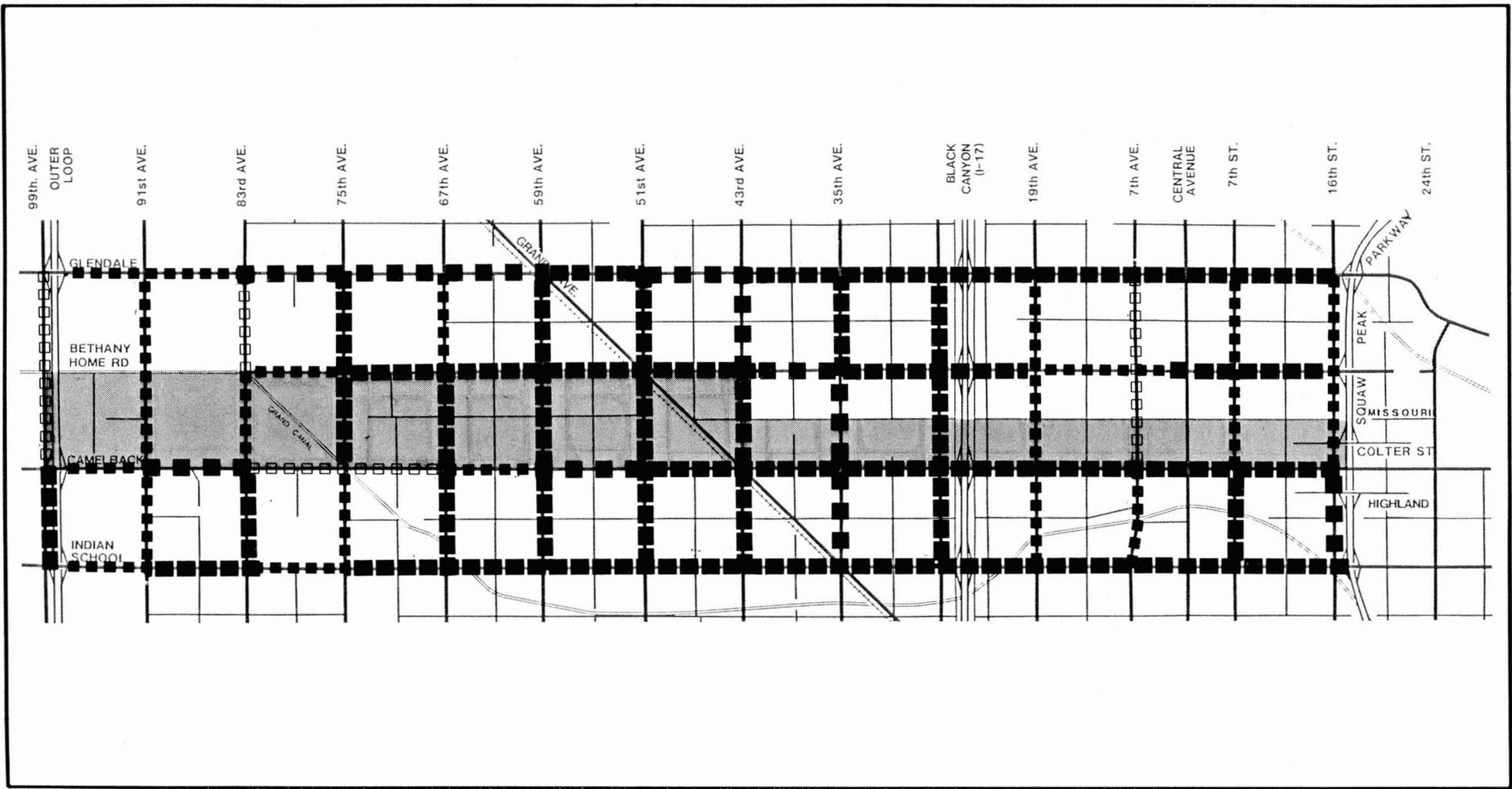
- Of the 52 miles of roadway represented by Glendale Avenue, Bethany Home, Camelback and Indian School Roads between the Outer Loop and Squaw Peak, 47.5 miles (91%) will operate at LOS D or lower in 2005; 32 miles (62%) will operate at LOS F or lower if no roadway improvements are made. Projected 2005 Roadway Levels of Service are illustrated on Figure 3.

Intersection Analysis

- Of the 56 intersections of arterial streets in the study area, 32 (57%) will operate at LOS D or lower in the year 2005; 28 of the 32 will operate at LOS F or lower if no roadway improvements are made. Projected 2005 Intersection Levels of Service are illustrated in comparison with 1986 performance on Figures 4 and 5.

OBSERVATIONS

- The existing and forecasted traffic exceeds the capacity of the existing street system at numerous locations on the streets in the area between Glendale Avenue and Indian School Road.
- There is a need for additional east-west transportation facilities and services to accommodate the existing and forecasted traffic that exceeds the capacity of the existing roadway system.



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- L.O.S. A, B, C (MEDIUM DELAY OR BETTER)
- L.O.S. D (LONG TRAFFIC DELAY)
- L.O.S. E (VERY LONG TRAFFIC DELAY)
- L.O.S. F (FAILURE-EXTREME CONGESTION)

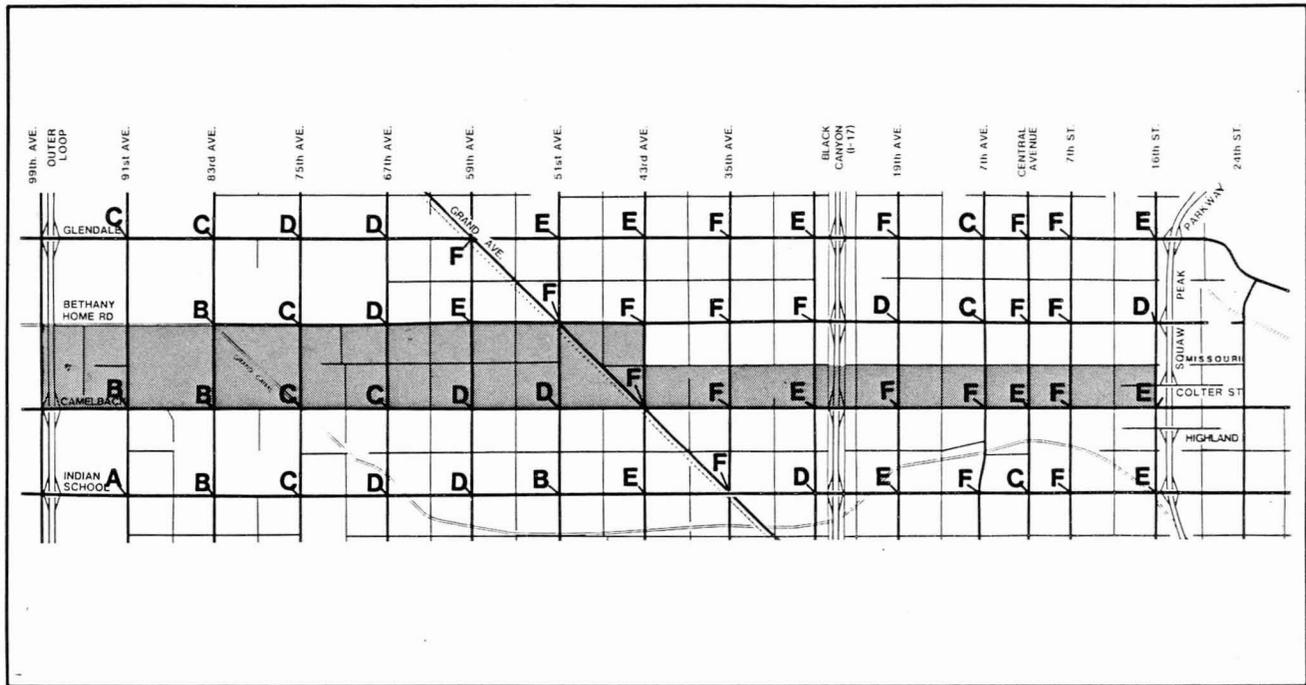
**2005 ROADWAY LEVEL OF SERVICE
NO E/W IMPROVEMENTS**

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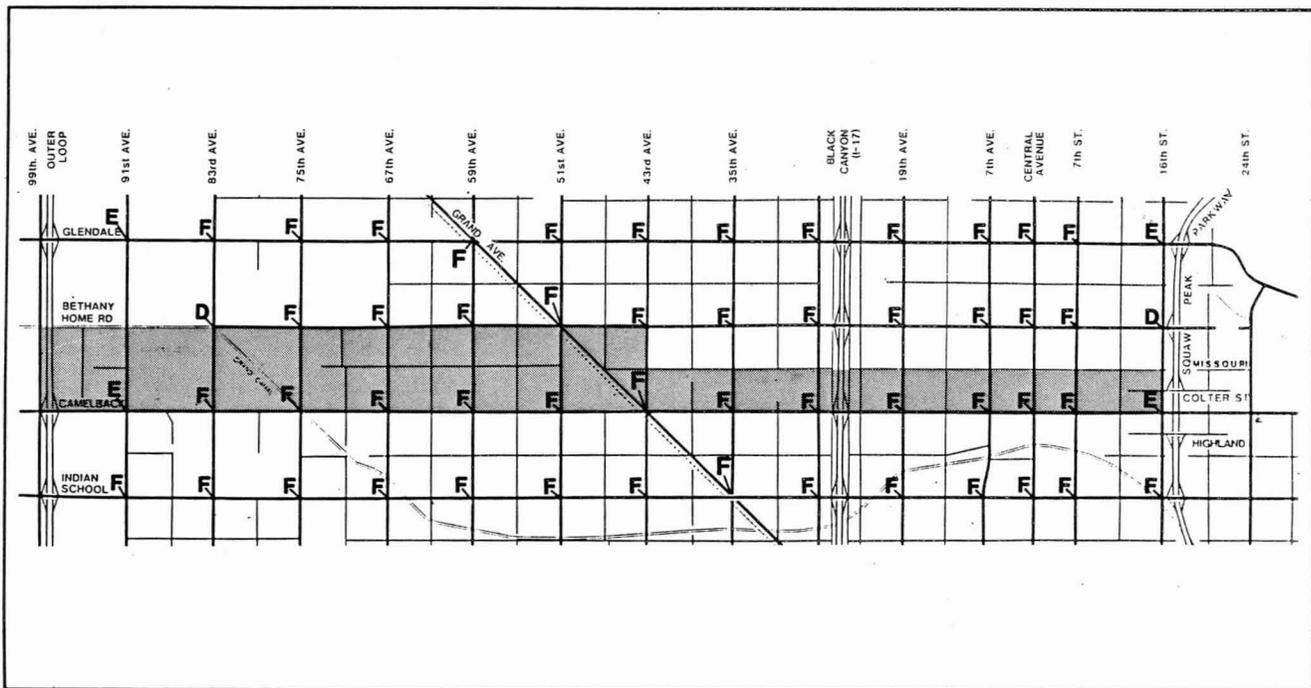
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SOURCE: MAG TPO
BRW, Inc.





1986 PM PEAK HOUR INDIVIDUAL INTERSECTION



2005 P.M. PEAK HOUR INDIVIDUAL INTERSECTION

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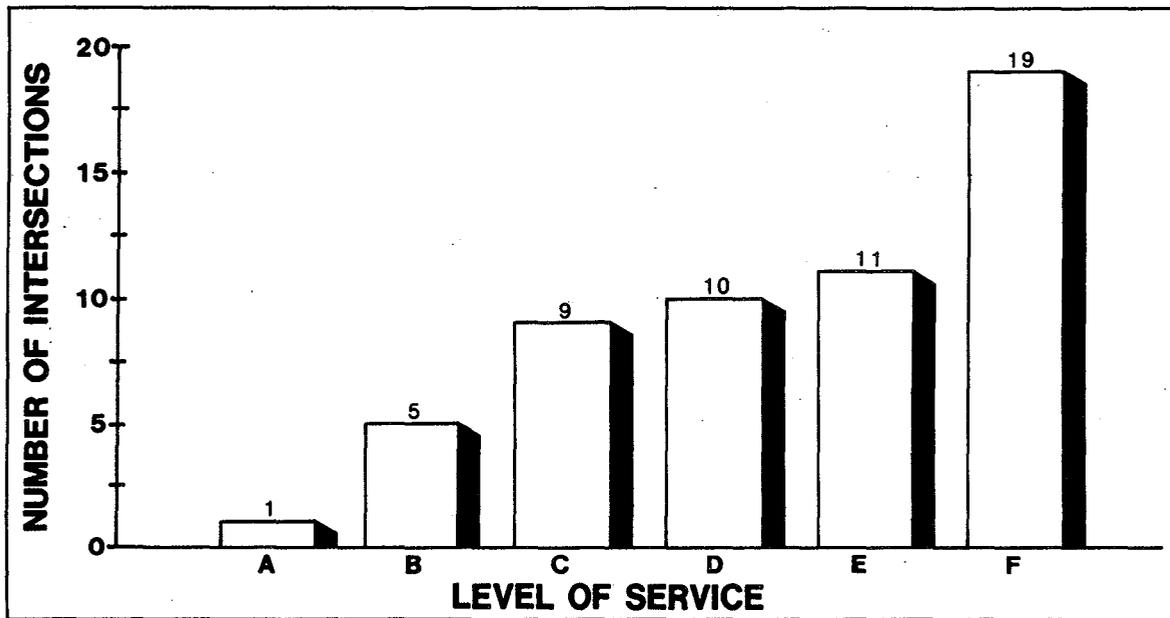
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- LEVEL OF SERVICE DEFINITION
- [A] LITTLE OR NO DELAY
 - [B] SHORT TRAFFIC DELAYS
 - [C] MEDIUM TRAFFIC DELAYS
 - [D] LONG TRAFFIC DELAYS
 - [E] VERY LONG TRAFFIC DELAYS
 - [F] FAILURE-EXTREME CONGESTION

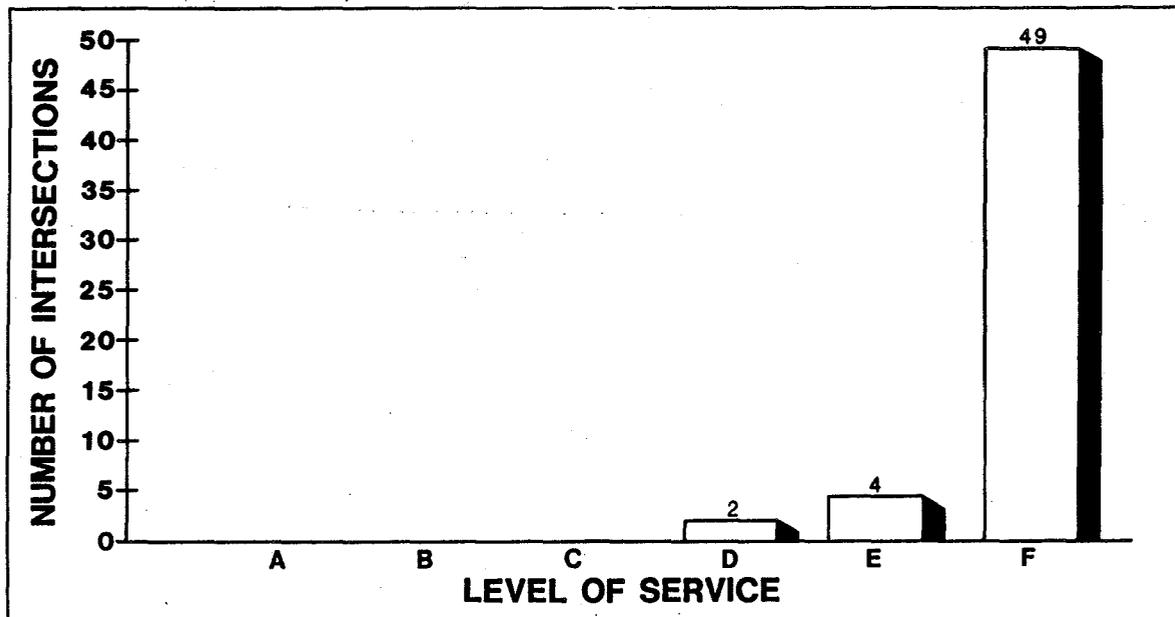
LEVEL OF SERVICE
NO E/W
IMPROVEMENTS

SOURCE: MAG TPO, BRW INC.





1986 P.M. PEAK HOUR INTERSECTION



2005 P.M. PEAK HOUR INTERSECTION

PARADISE CORRIDOR – SR 317

Arizona Department of Transportation

BRW
BRW & ASSOCIATES, INC.
 1000 North Central Expressway
 Phoenix, Arizona 85024
 (602) 955-1000

199

LEVEL OF SERVICE DEFINITION

- A** LITTLE OR NO DELAY
- B** SHORT TRAFFIC DELAYS
- C** MEDIUM TRAFFIC DELAYS
- D** LONG TRAFFIC DELAYS
- E** VERY LONG TRAFFIC DELAYS
- F** FAILURE-EXTREME CONGESTION

LEVEL OF SERVICE SUMMARY NO E/W IMPROVEMENTS

SOURCE: MAG TPO, BRW INC.

B: CORRIDOR LOCATION

SUMMARY OF CORRIDOR LOCATION ANALYSIS

One of the key issues being analyzed in the Paradise Corridor Study is the question of the best location for an east-west controlled access facility to meet the transportation needs of the area. This subject is addressed in the Technical Memorandum, "Analysis of Alternative Corridors to Serve East-West Travel", August 1986, BRW. Three alternative corridors were analyzed:

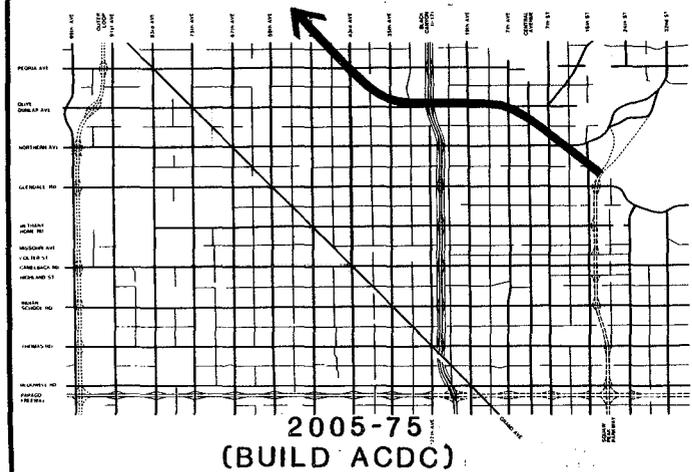
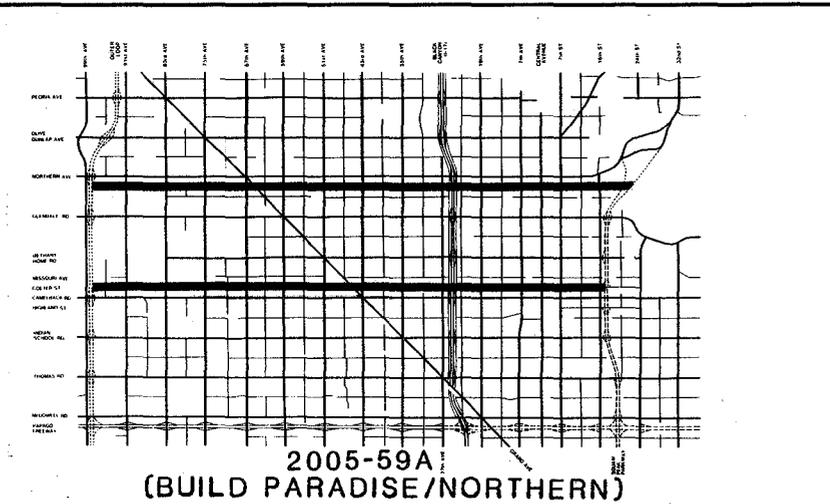
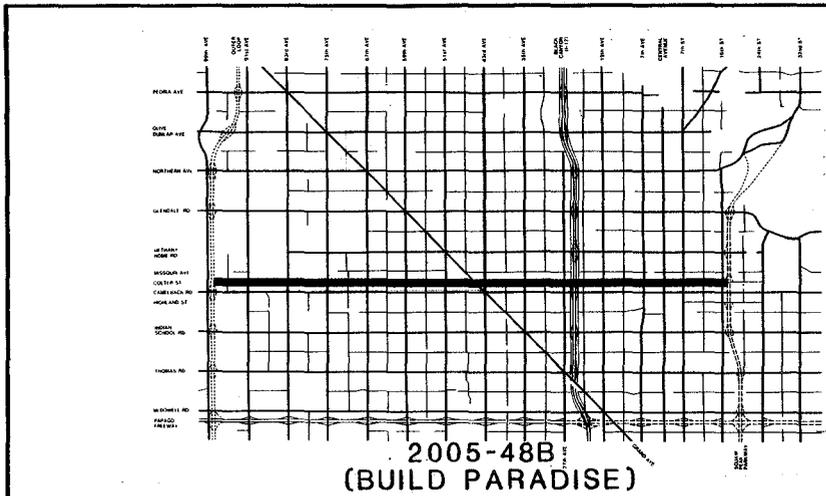
- Paradise Corridor - is generally located north of Camelback Road between the Squaw Peak Parkway and the Outer Loop.
- Northern Corridor - is generally located south of Northern Avenue between the Squaw Peak Parkway and the Outer Loop, this facility is approximately 1 1/2 miles north of the Paradise Corridor.
- Arizona Canal Diversion Channel (ACDC) Corridor - is located within the right-of-way for the ACDC which runs parallel to Dunlap Road until west of Metrocenter Mall. At this point, the ACDC curves northwesterly paralleling Grand Avenue and connecting with the Outer Loop near 81st Avenue between Bell and Union Hills Road.

A fourth alternative of building both the Paradise Corridor and the Northern Corridor is also evaluated. The corridors are depicted in Figure 6.

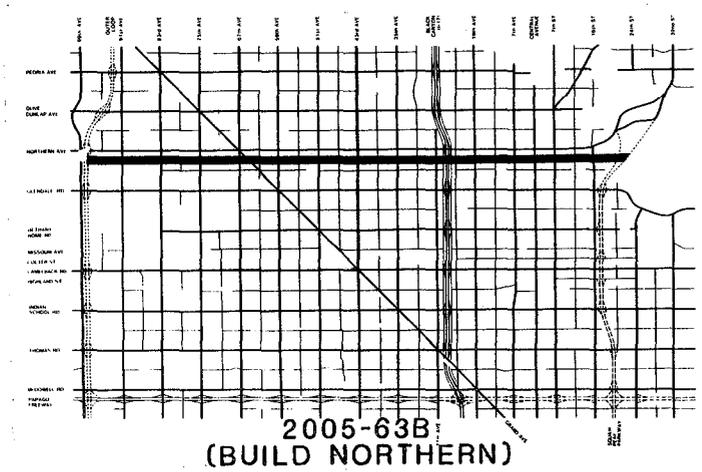
This section presents the summary of analyses concerning the comparative travel demand situation for the corridors relative to the following areas:

- Service provided for east-west travel demand on a controlled access roadway.
- Diversion of traffic from the major streets between Indian School and Glendale to the controlled access roadway.
- System performance characteristics, such as daily vehicles miles of travel, average speed on the system, fuel consumption, operating cost, etc.

A preferred corridor location is recommended based on this analysis. Only traffic related evaluations are being completed for the comparative analysis of corridor locations because the primary purpose of any transportation improvements is to provide the best travel service possible. The selection of a corridor does not imply that other impacts are less important or that



2005-49
(NO BUILD)



PARADISE CORRIDOR – SR 317

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ROADWAY NETWORK MODELS



implementation should proceed; the selection does define the preferred location to serve defined travel needs. These and other factors will be addressed in this Reconnaissance Report and will be further studied in detail in Phase III of this project.

ASSUMPTIONS

The following assumptions are made relative to the input data and analysis that leads to the findings and conclusions contained in this report:

- Maricopa Association of Governments (MAG) forecasts of population and employment for 2005 are acceptable for the purpose of preparing traffic forecasts.
- MAG traffic forecasting models have been calibrated for Phoenix conditions and can be used to forecast traffic and base transit ridership.
- MAG traffic forecasts will have to be analyzed to account for higher levels of transit service than assumed in the base forecasts and increased vehicle occupancy due to increased car and van pooling.

The traffic forecasts are presented both as unrestrained and restrained assignments. An unrestrained forecast represents the vehicles that desire to travel on each roadway link under the assumptions that the vehicle can travel at the speed limit of the roadway, and that the vehicle will take the minimum travel time path between origins and destinations. Restrained traffic forecasts represent the vehicles that are expected to use each roadway link under the conditions that the travel time along the route is increased to reflect the level of service on the roadway and that the vehicle will take the minimum resultant travel time path. Then as the volume reaches and exceeds the traffic carrying capability of the roadway, the travel time is increased to reflect operating conditions.

Unrestrained assignments are useful in determining the maximum travel desire along a roadway; restrained assignments are useful in forecasting expected traffic operating conditions with constraints of the roadway system capacity taken into effect.

FINDINGS

The following findings are made about the alternative corridors relative to their ability to serve the east-west transportation needs:

Controlled Access Facility Traffic Volume Forecasts

- The unrestrained traffic forecasts on alternative controlled access facilities at the seven screenline locations are illustrated below:

TABLE 3
UNRESTRAINED CONTROLLED-ACCESS FACILITY
2005 TRAFFIC FORECASTS AT
SCREENLINE LOCATIONS
FOR ALTERNATIVE BUILD CORRIDORS

Screenline Location	Controlled-Access Corridor Alternative		
	Paradise	Northern	ACDC
1 - 91st Avenue	70,800	56,000	59,300
2 - 67th Avenue	114,800	116,800	78,900
3 - 51st Avenue	95,700	161,600	114,000
4 - 35th Avenue	205,000	175,000	199,700
5 - 19th Avenue	281,700	158,700	238,800
6 - 7th Avenue	277,700	152,800	208,800
7 - 7th Street	271,600	133,900	233,000

Source: BRW, Inc.

These data indicate that at representative locations, a paradise facility would attract 7 percent more unrestrained traffic than a Northern facility at 19th Avenue, 17 percent more at 35th Avenue, and 4 percent more at 91st Avenue. Paradise would attract between 10 and 20 percent more traffic than the ACDC at various locations.

- The unrestrained traffic forecasts on the Paradise facility and the Northern facility when both are built at Screenline 5, 4, and 1 are shown below:

Controlled Access Facility (Build both Paradise and Northern)	Unrestrained 2005 Traffic Forecasts at 19th Avenue		Unrestrained 2005 Traffic Forecasts at 35th Avenue		Unrestrained 2005 Traffic Forecasts at 91st Avenue	
	Forecasts at 19th Avenue	% of Total	Forecasts at 35th Avenue	% of Total	Forecasts at 91st Avenue	% of Total
Paradise	266,400	70.4%	162,900	51.5%	52,500	56.1%
Northern	112,100	29.6%	153,400	48.5%	41,100	43.9%
TOTAL	378,500	100.0%	316,300	100.0%	93,600	100.0%

These data indicate that the Paradise would attract significantly more unrestrained traffic than the Northern Facility if both facilities were built.

- The restrained traffic forecasts on alternative controlled access facilities at the seven screenlines are presented below.

TABLE 4
 RESTRAINED CONTROLLED-ACCESS FACILITY
 2005 TRAFFIC FORECASTS AT
 SCREENLINE LOCATIONS
 FOR ALTERNATIVE BUILD CORRIDORS

Screenline Location	Controlled-Access Corridor Alternative		
	Paradise	Northern	ACDC
1 - 91st Avenue	61,000	42,000	34,100
2 - 67th Avenue	93,900	72,500	60,700
3 - 51st Avenue	91,800	102,000	85,900
4 - 35th Avenue	134,900	117,600	111,400
5 - 19th Avenue	140,100	125,200	111,600
6 - 7th Avenue	135,900	118,500	108,700
7 - 7th Street	124,300	112,400	105,900

Source: BRW, Inc.

These data show that with restrained traffic forecasts on each of the three alternative corridor locations (with each corridor assumed to have three lanes in each direction) the Paradise Corridor attracts between 15,000 and 20,000 vehicles per day more than the Northern Corridor and approximately 25,000 vehicles per day more than the ACDC Corridor.

- The restrained traffic forecasts on the paradise facility and Northern facility when both are built at Screenline 5, 4, and 1 are presented below:

Controlled Access Facility (Build both Paradise and Northern)	Unrestrained 2005 Traffic Forecasts at 19th Avenue		Unrestrained 2005 Traffic Forecasts at 35th Avenue		Unrestrained 2005 Traffic Forecasts at 91st Avenue	
	Forecasts at 19th Avenue	% of Total	Forecasts at 35th Avenue	% of Total	Forecasts at 91st Avenue	% of Total
Paradise	112,400	50.0%	117,000	53.7%	49,900	58.3%
Northern	112,800	50.0%	100,800	46.3%	35,700	41.7%
TOTAL	225,200	100.0%	217,800	100.0%	85,600	100.0%

Major Street Traffic Volume Forecasts

- The change in unrestrained volumes on the major streets between Indian School and Glendale between the build and no build are shown below at the seven screenlines:

TABLE 5
 PERCENT REDUCTION IN MAJOR STREET
 UNRESTRAINED VOLUMES BETWEEN
 INDIAN SCHOOL AND GLENDALE
 DUE TO BUILDING A CORRIDOR

Screenline Location	Controlled-Access Corridor Alternative			
	Paradise	Northern	ACDC	Paradise/ Northern
1 - 91st Avenue	64%	43%	3%	77%
2 - 67th Avenue	63%	26%	1%	70%
3 - 51st Avenue	47%	33%	5%	58%
4 - 35th Avenue	54%	33%	15%	66%
5 - 19th Avenue	57%	34%	23%	65%
6 - 7th Avenue	51%	32%	22%	60%
7 - 7th Street	46%	28%	25%	54%

Source: BRW, Inc.

If only one corridor is built, Paradise implementation results in the largest overall declines in traffic demands on the major streets.

- The change in restrained volumes on the major streets between Indian School and Glendale when comparing the various corridor build options and the no build option are shown below at seven screenline locations:

TABLE 6
 PERCENT REDUCTION IN MAJOR STREET
 RESTRAINED VOLUMES BETWEEN
 INDIAN SCHOOL AND GLENDALE
 DUE TO BUILDING A CORRIDOR

Screenline Location	Controlled-Access Corridor Alternative			
	Paradise	Northern	ACDC	Paradise/ Northern
1 - 91st Avenue	24%	11%	5%	34%
2 - 67th Avenue	22%	7%	4%	28%
3 - 51st Avenue	9%	13%	5%	16%
4 - 35th Avenue	14%	7%	5%	14%
5 - 19th Avenue	14%	11%	7%	14%
6 - 7th Avenue	13%	13%	9%	22%
7 - 7th Street	10%	10%	9%	17%

Source: BRW, Inc.

If only one corridor is built, Paradise implementation results in slightly greater overall decline in restrained traffic on the major streets.

System Performance Comparisons

- For each traffic assignment for the entire Phoenix area, a series of system-wide performance statistics are produced. For the No Build condition, a regional total of 8,589,889 daily trips are made resulting in 65,368,674 total daily vehicle miles of travel. The table below presents the change in selected system performance characteristics relative the the No Build:

Corridor Alternative	Daily Vehicle Miles of Travel	Average Speed (mph)	Daily Fuel Consumption (Gallons)	Daily Operating Cost \$
No Build	Base	Base	Base	Base
Build Paradise	-352,000	+1.13	-49,000	-\$77,000
Build Northern	-294,050	+1.05	-43,000	-\$64,000
Build ACDC	-448,900	+0.78	-57,000	-\$85,000
Build Paradise & Northern	-426,400	+1.53	-65,000	-\$93,000

The ACDC results in best system performance because it performs as a diagonal facility in a grid network serving both east/west and north/south trips. However, many of these trips are of short length, resulting in the lowest improvement in average speed. Next best among the single facilities is Build Paradise followed by Build Northern.

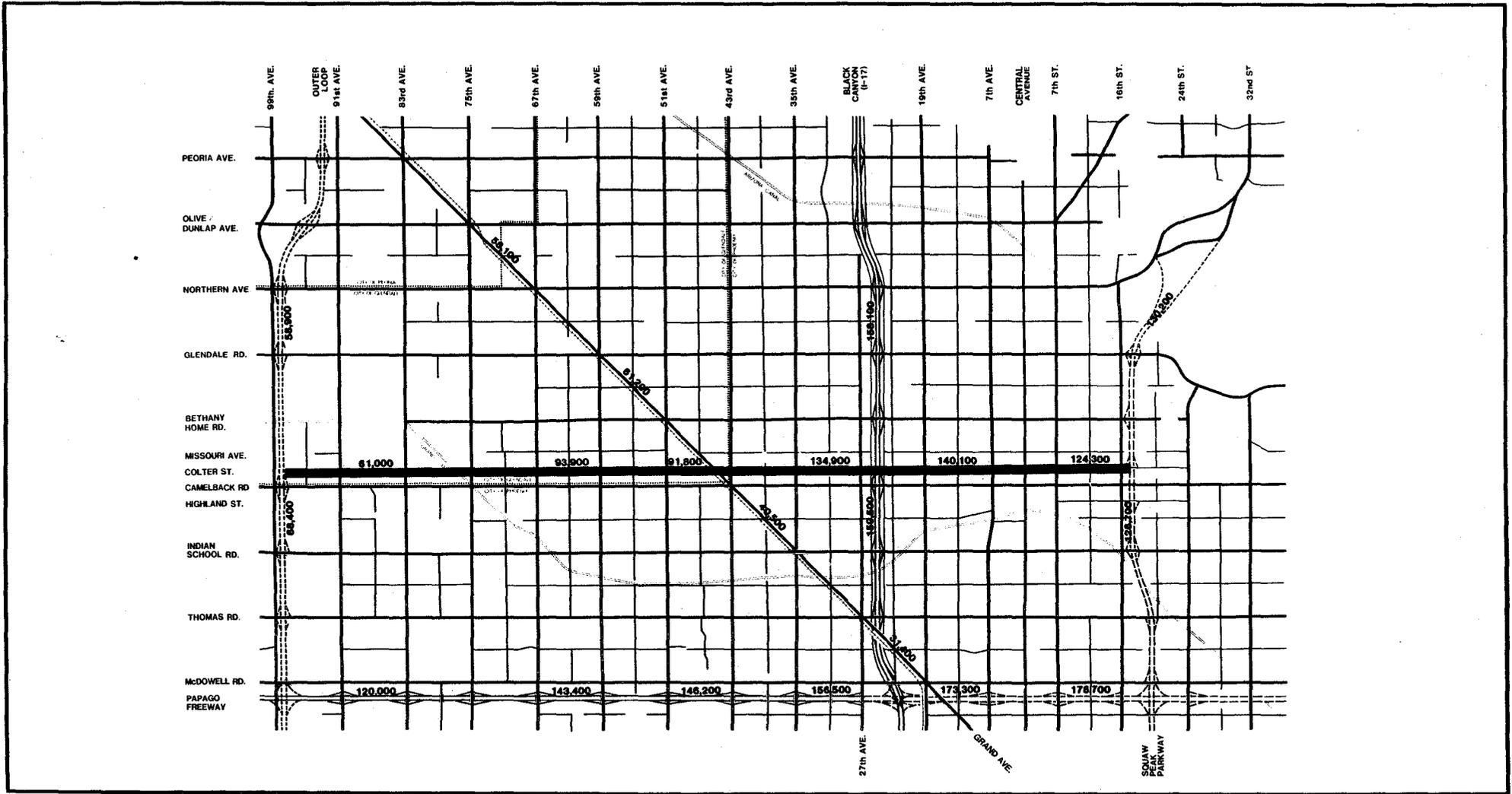
OBSERVATIONS

The following observations are reached on alternative corridors to serve east-west travel:

- The Paradise Corridor has the potential to serve more east-west travel than the Northern Corridor or the ACDC Corridor.
- If both the Paradise Corridor and the Northern Corridor were built, the Paradise Corridor would attract between 50 to 70 percent more unrestrained traffic than the Northern Corridor.
- With identical capacity constraints placed on the alternative corridors, the Paradise Corridor attracts between 15,000 and 20,000 vehicles per day more than Northern and approximately 25,000 vehicles per day more than the ACDC Corridor. Paradise Corridor traffic volumes are presented in Figure 7.

- If both the Paradise Corridor and the Northern Corridor were built, the Paradise Corridor would attract slightly more restrained traffic than the Northern Corridor.
- Analysis of the locations of the origins and destinations of vehicles forecasted to use both the Paradise Corridor and the Northern Corridor indicate a reasonable balance between north and south orientation. This shows that both corridors are generally serving logical trips and not significantly diverting trips from either the north or south.
- Analysis of the locations or origins and destinations of vehicles forecasted to use the ACDC Corridor shows a pronounced imbalance of traffic flows. In the eastbound direction at 19th Avenue, 64% of traffic originates from the north, with 72% destined for the south. A similar, but reversed, imbalance exists in the westbound direction.
- If only one corridor is built, Paradise implementation results in the greatest reduction of volumes on the major streets between Indian School and Glendale. Major street volumes for the Build Paradise alternative are shown in Figure 8.
- ACDC implementation results in fewer vehicle miles of travel than the other alternatives tested and results in best overall system performance of the single corridors. Build Paradise results in highest increase in average speed and next best overall performance, followed by Build Northern.

The conclusion is that the Paradise Corridor best serves the east-west transportation needs. The Northern Corridor and the ACDC Corridor should be dropped from further consideration as alternatives to Paradise Corridor. A number of benefits do result with implementation of both the Paradise and Northern, such that MAG and ADOT may wish to pursue this subject.



PARADISE CORRIDOR - SR 317

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**CONTROLLED ACCESS FACILITIES
VOLUMES RESTRAINED
2005-48B (BUILD PARADISE)**

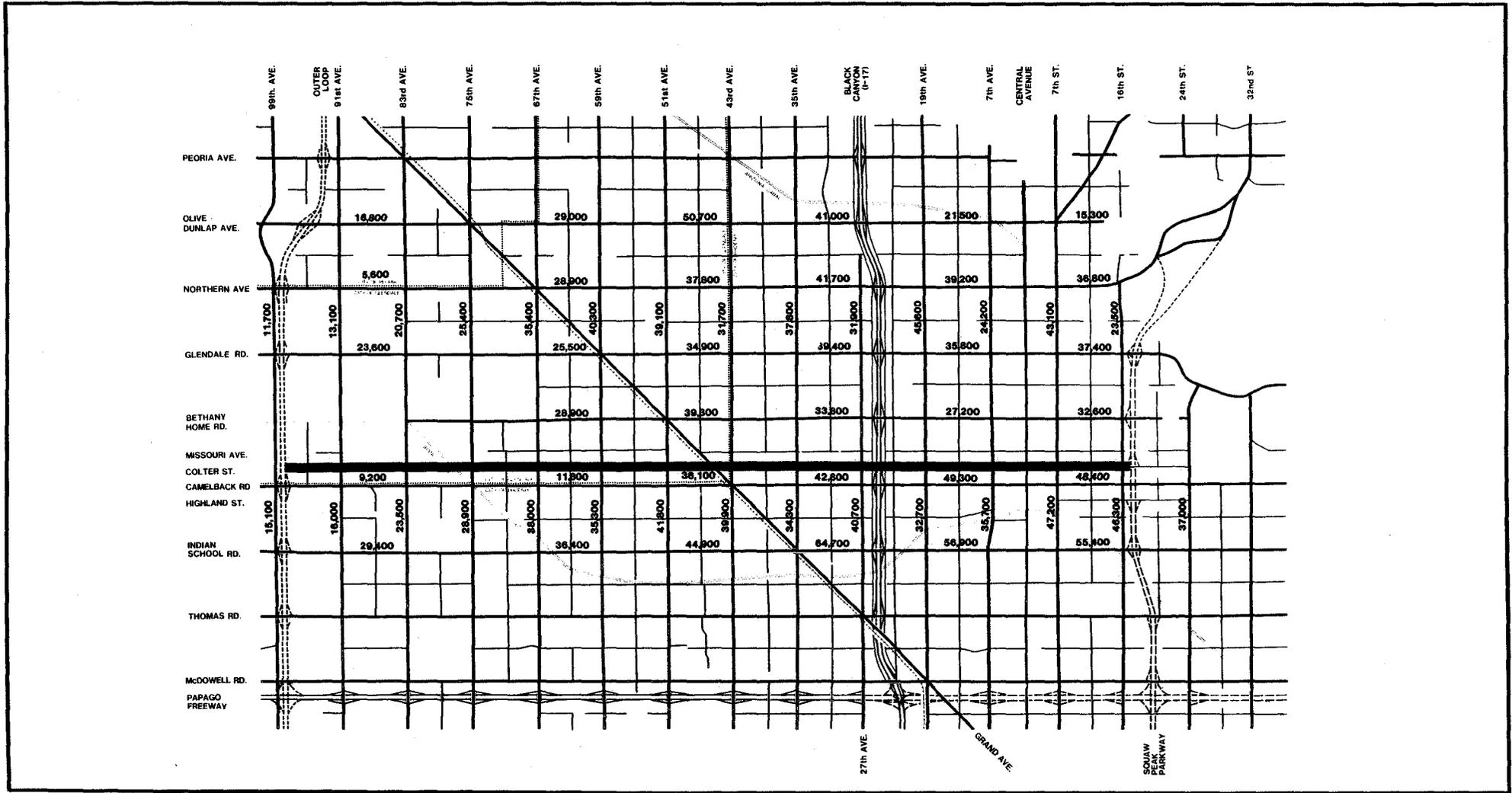
BRW
2700 North Central Avenue
Phoenix, Arizona 85004
204-1591



SOURCE: MAG TPO, BRW INC.



7



PARADISE CORRIDOR – SR 317

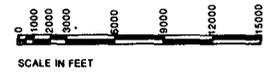
Arizona Department of Transportation

ARTERIAL STREET VOLUMES RESTRAINED 2005-48B (BUILD PARADISE)

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 234-1591



SOURCE: MAG TPO, BRW INC.



8

C: FACILITY TYPE

Efforts to identify the type(s) of transportation facility improvement(s) best suited for implementation have been addressed through a facility assessment/evaluation and screening process. At the onset of these activities, 18 September, the Phoenix CAC and the consultant team identified twenty alternative roadway and five alternative transit facility improvements that would be considered for implementation. The roadway and transit alternatives were used to form a matrix, illustrated on Figure 9, where each matrix cell represents a transportation strategy.

Matrix cells (transportation strategies) were then assessed and evaluated. Those found to be suitable were retained, and those found to be undesirable were "screened out". Criteria by which assessments and evaluations were based are presented below, not necessarily in order of importance.

- Ability to address forecasted travel demands,
- Demonstration of a commitment to capital-intensive transit solutions,
- Safety and efficiency,
- Sociological and environmental impacts,
- Political acceptability, and
- Economic feasibility

Throughout the assessment/evaluation process, base level information on each transportation strategy, relative to the stated criteria, was provided by the consultant team through the following documents:

- Memorandum, "Universe of Alternative Roadway and Transit Facility Types (Attachment 4)", August 1986, BRW,
- Draft Technical Memorandum, Analysis of One-Way Street and Reversible Lane Operations in the Paradise Corridor, October 1986, BRW,
- Memorandum, "Results of Facility Screening Workshops", 9 October 1986, BRW,
- Memorandum, "Results of Facility Screening Workshop, 23 October 1986, BRW, and
- Memorandum, "Results of Third Screening Effort #36-8618", 6 November, BRW.

Presented on Figure 10 are the results of three screening exercises. As illustrated, the ten alternative strategies that have been retained are:

- High level parkway, 8 lanes, with guideway transit;
- High level parkway, 6 lanes, with guideway transit;
- High level parkway, 6 lanes, with 2 high occupancy vehicle (HOV) lanes;

ROADWAY FACILITY TYPES

TRANSIT FACILITY TYPES

		GUIDEWAY TRANSIT	LTD BUS	LOCAL BUS	HOV	NO- BUILD
FREEWAY:	10 LANES					
	8 LANES					
	6 LANES					
HIGH LEVEL PARKWAY:	10 LANES					
	8 LANES					
	6 LANES					
LOW LEVEL PARKWAY:	8 LANES					
	6 LANES					
	4 LANES					
HIGH LEVEL ARTERIAL:	8 LANES					
	6 LANES					
	4 LANES					
ONE-WAYS:	5 LANES					
	4 LANES					
ARTERIALS:	* W/LIMITED REVERSE FLOW					
	ADD 2 LANES TO EACH					
	* MAJOR WIDENING TO ONE ARTERIAL					
	* DECK OVER ONE ARTERIAL					
	* REVERSIBLE LANES					
NO-BUILD						

NEW CONSTRUCTION

MODIFY EXISTING

PARADISE CORRIDOR – SR 317

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UNIVERSE OF ALTERNATIVE ROADWAY/TRANSIT FACILITY TYPES: PHOENIX SEGMENT

10/9/86

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Phoenix, Arizona 85004
234 1501

* ADDED BY PHOENIX C.A.C. 9/18/86

TRANSIT FACILITY TYPES

ROADWAY FACILITY TYPES

		GUIDEWAY TRANSIT	LTD BUS	LOCAL BUS	HOV	NO-BUILD	SPECIAL REMARKS	
NEW AND/OR MODIFY EXISTING	FREEWAY:	10 LANES						
		8 LANES						
		6 LANES						
	HIGH LEVEL PARKWAY:	10 LANES						
		8 LANES						
		6 LANES						
	LOW LEVEL PARKWAY:	8 LANES						
		6 LANES						
		4 LANES						
	HIGH LEVEL ARTERIAL:	8 LANES						COMBINED W/ ONE-WAY PAIR BELOW
		6 LANES						
		4 LANES						
	ONE-WAYS:	2 1-WAY PAIRS						MODIFIED ROADWAY ALTERNATIVE
		4 LN LOW LEVEL PKWY+ 1 1-WAY PAIR W/LIMITED REVERSE FLOW						
	ARTERIALS:	ADD 2 LANES TO EACH MAJOR WIDENING TO ONE ARTERIAL						MODIFIED ROADWAY ALTERNATIVE
6 LANE ROADWAY DECK OVER ONE ARTERIAL							MODIFIED ROADWAY ALTERNATIVE	
REVERSIBLE LANES								
	NO-BUILD							

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313-1701

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ELIMINATED PREVIOUSLY (58)

ELIMINATED 11/6/86 (32)

RETAINED 11/6/86 (10)

RESULTS OF THIRD FACILITY SCREENING BY PHOENIX C.A.C. 11/6/86

11/13/86 REVISED 11/21/86 **10**

- Low level parkway, 6 lanes, with guideway transit;
- Low level parkway, 6 lanes, with HOV;
- Two one-way pairs, with guideway transit;
- One one-way pair, with guideway transit, in combination with a four lane low level parkway;
- Major widening to one arterial;
- Construction of a new six lane arterial over an existing arterial, with guideway transit; and
- No build roadway/no build transit.

The results of the Phoenix CAC's third facility screening will be combined with the results of similar efforts by the Glendale CAC and the Technical Advisory Committee (TAC) to develop a proposed final set of facility alternatives to carry forward into location specific analyses. That final set is likely to include two priority levels for the location analyses.

The highest priority facility types are those that appear most promising as potentially acceptable build alternatives for the Paradise Corridor. Each of these alternatives will enter the location analyses on equal footing and will initially be compared at a similar level of detail. The second priority facility alternatives, however, will initially be "on hold" pending the results of analyzing the first priority alternatives. Thus the second priority alternatives will be ready for quick introduction into the analyses if appropriate, but will not be analyzed if progress is shown on the first priority alternatives.

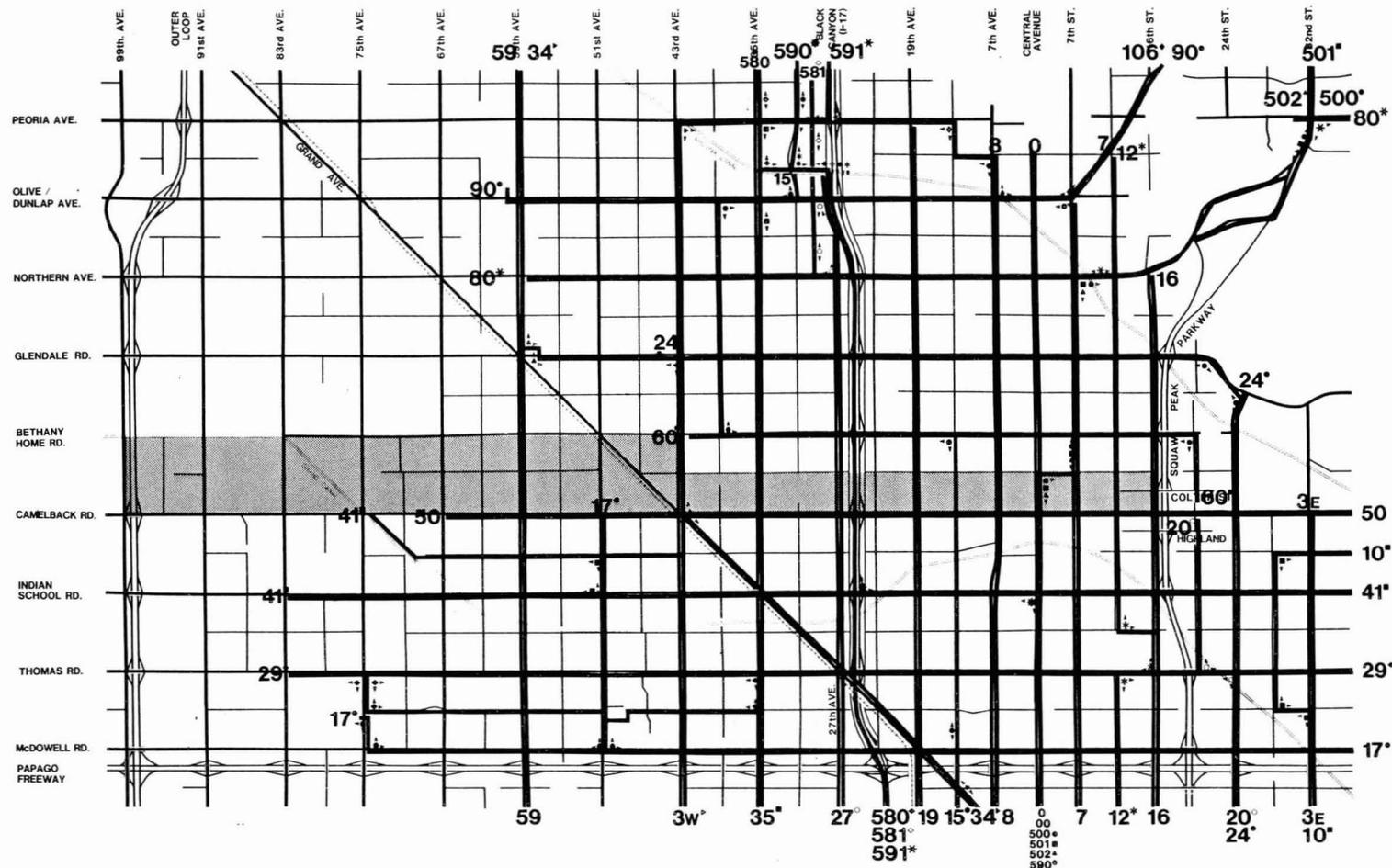
D: TRANSIT SERVICE

EXISTING SYSTEM

Transit service within the Paradise Corridor is provided by the City of Phoenix Transit System, the City of Glendale, and Maricopa County. These transit services include:

- Fixed Route/Fixed Schedule Service (19 Routes)
- Express Bus Service (7 Routes)
- Dial-A-Ride Service (Zone System)

Routes within the study area are illustrated on Figure 11. As shown, service is available on most arterial streets and some collector streets. Service is available at eight- to ten-minute frequencies on Camelback Road and 15-minute frequencies on Indian School, Bethany Home and Glendale Roads. Table 7, "Route Frequencies," describes the AM, Noon, and PM Peak period service levels for routes which are located within the Corridor.



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1986 PUBLIC TRANSIT ROUTES

SOURCE: PHOENIX TRANSIT SYSTEM



11

TABLE 7
ROUTE FREQUENCIES IN BUSES/HOUR

<u>Route Number</u>	<u>AM</u>	<u>Noon</u>	<u>PM</u>	<u>Route Number</u>	<u>AM</u>	<u>Noon</u>	<u>PM</u>
0 N	12	6	14	16th St. - 51st Ave.			
0 S	18	6	14	41 E	5	5	5
00 N	19	6	16	41 W	5	5	5
00 S	15	9	14	51st Ave. - 83rd Ave.			
3W N	4	4	4	41 E	5	5	5
3W S	4	4	4	41 W	5	5	5
7 N	5	2	4	50 E	5	4	5
7 S	4	2	3	50 W	4	4	4
8 N	2	2	2	59 N	1		
8 S	2	2	2	59 S			1
12 N	2	0	2	60 E	3	3	3
12 S	2	0	2	60 W	3	3	3
15 N	3	3	3	500 N			3
15 S	3	3	3	500 S	3		
16 N	3	3	3	501 N			3
16 S	3	3	3	501 S	2		
17 E	5	5	5	502 N			2
17 W	5	5	5	502 S	2		
19 N	4	3	6	580 N	2		4
19 S	4	3	5	580 S	3		3
20 N	2	0	2	581 N			4
20 S	2	0	2	581 S	2		4
24 N	3	3	4	590 N			5
24 S	4	2	4	590 S	4		
27 N	3	2	4	591 N	2		2
27 S	3	1	3	591 S	2		
34 N	2	1	3				
34 S	2	2	3				
35 N	3	3	3				
35 S	3	3	3				

Source: City of Phoenix Transit System Schedule; September 1986

FUTURE SYSTEM PLANNING EFFORTS

While transit serves an important role in providing an alternative to the automobile, its contribution to handling total east-west daily travel demand within the corridor is less than one percent.

In order to keep pace with increasing travel demands because of population and employment growth, the Maricopa Association of Governments (MAG) has conducted the Systemwide Transit Planning Study. Using year 2005 land use projections and MAG's recently developed regional transportation models, the study represents the first effort at long-range transit planning for the entire Phoenix region. Completed in March 1986, the study examined the appropriateness of capital-intensive investments in transit for the region. For the purposes of the study, capital-intensive investments referred to

those transit technologies beyond the basic conventional bus system (e.g. commuter rail, light rail, automated guideway, elevated busway, etc.).

The study process and evaluation criteria were designed by the Federal Urban Mass Transportation Administration (UMTA) and were applied to the following four issues:

1. "Justification -- Can a capital-intensive transit system be identified that will attract enough daily ridership, support land use policies and fit within the environment? On the basis of corridor-level analyses within the entire Phoenix metropolitan region, are there locations where a substantial capital investments in transit might be appropriate?"
2. "Priority Corridors -- If there are corridors within the region that appear to be appropriate for capital-intensive transit, which corridor(s) should be given the highest priority for further study?"
3. "Technology -- A wide range of capital-intensive transit technologies are available to move people along a particular corridor. Considering such evaluation factors as projected ridership levels, desired travel speeds, adjacent land uses, etc., what are the most appropriate transit technologies for the region?"
4. "Long-range Transit Plan -- If capital-intensive transit appears appropriate for the region, what should be the basic components of a long-range transit plan (i.e., on a regional basis, how extensive is the capital-intensive system likely to be, and what other components of the regional transit system should be included in long-range planning programs)?"

Source: Systemwide Transit Planning Study, Phoenix Metropolitan Region, Barton-Aschman Associates, Inc., March 1986,

Findings of the study relative to the Paradise Corridor follow.

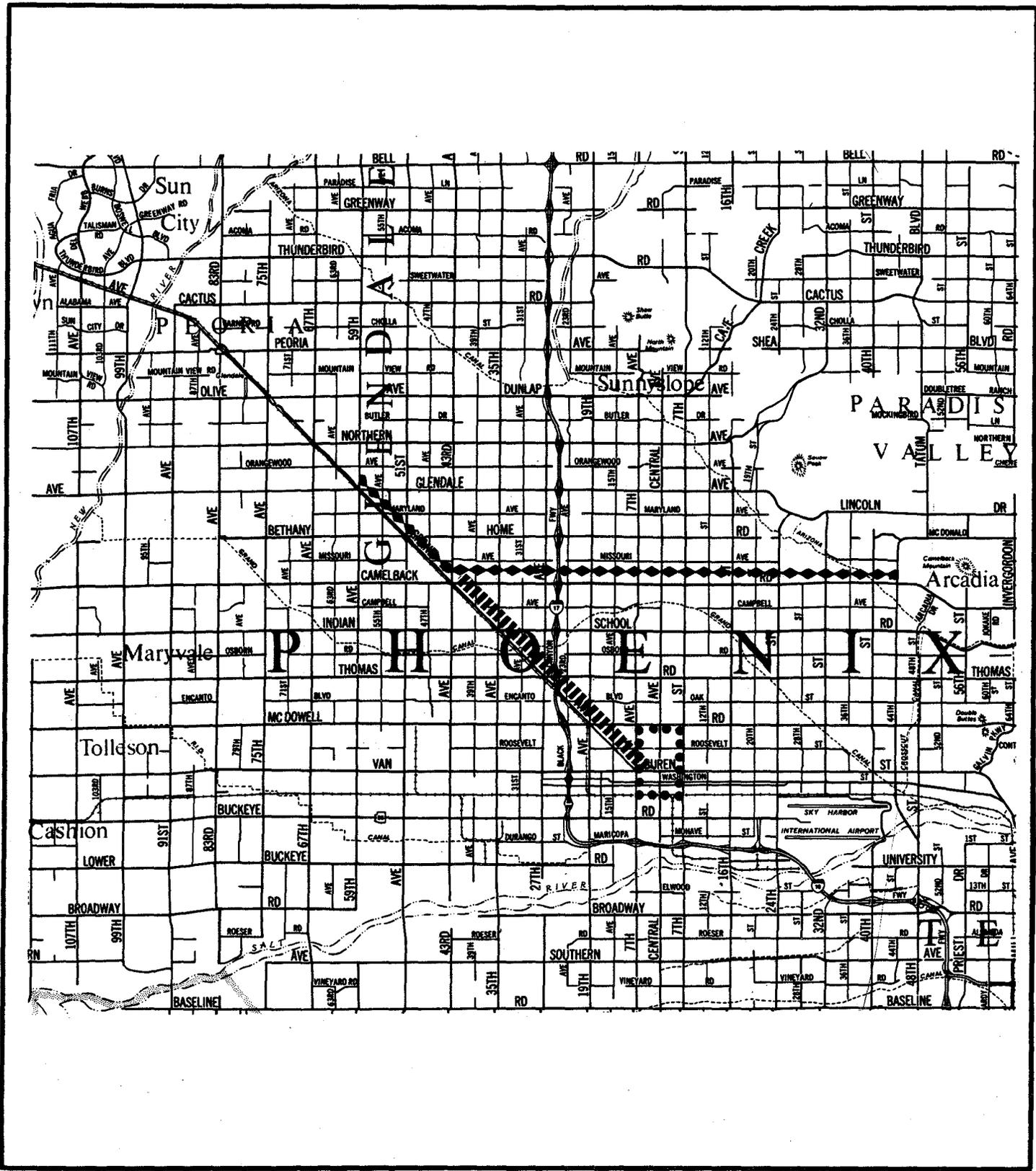
JUSTIFICATION

- Central Phoenix, Northwest Phoenix, and North Central Phoenix are comprised of those traffic analysis zones (TAZs) expected to exhibit the greatest population densities by the year 2005. Projected employment densities are expected to remain high in the Central and Camelback Corridors and along Grand Avenue.
- Substantial increases in transit mileage are needed in these areas to simply keep pace with continued population and employment growth.

- An analysis of 1980 and forecasted 2005 travel patterns indicated the Paradise Corridor will experience increases in the number of two-way person-trips per day in the magnitude of 100 percent and more. As reported in the study, by 2005 there will be eighteen district-to-district interchanges in the Phoenix region which will each account for over 200,000 person-trips per day. In addition to no fewer than eight interchanges with 100,000 to 200,000 person-trips per day, one of the eighteen interchanges described above will be in the Paradise Corridor.
- A commonly-used ridership criterion indicates that 15,000 transit trips per day in a particular corridor merits consideration of that corridor for capital-intensive transit. The study results showed that there are several corridors and/or corridor segments that exceed the 15,000 trips per day criterion. Among these are the East Valley, North Central, Grand-Paradise, and Black Canyon Corridors.
- Even with the construction of new roadway mileage, the number of intersections experiencing peak hour congestion is expected to increase.

PRIORITY CORRIDORS

- Pursuant to UMTA directives, only the highest ranked transit corridor is eligible for federal support. The recent establishment of the Regional Public Transportation Authority (RPTA) and voter approval of the 1/2 percent sales tax increase afford the Phoenix region an opportunity to identify, study, and fund the development of other transit corridors as well.
- Of twelve transit corridors identified as candidates for capital-intensive investments, the following were given the highest priority ranking.
 - First: Papago East/East Valley and Papago West
 - Second: North Central Phoenix
 - Third: Grand-Paradise
 - Fourth: Black Canyon
- The priority rankings were based on the following criteria:
 - Ability to attract the highest number of transit riders
 - Demonstration of ability to connect the most dense areas of the Phoenix region, and
 - Ability to serve as the building blocks of a more widespread regional system.
- The Grand-Paradise Transit Corridor, illustrated on Figure 12, extends from Glendale and 59th Avenues, along Grand Avenue, to Camelback Road where it is routed easterly to 24th Street. It then continues east to 44th Street.



PARADISE CORRIDOR - SR 317

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GRAND-PARADISE TRANSIT CORRIDOR

- PHOENIX CENTRAL BUSINESS DISTRICT
- ◆◆◆-PROPOSED ROUTE
- ▬▬▬-SUGGESTED ROUTE ADDITION



AKW
 200 North Central in Arcadia
 Phoenix, Arizona 85004
 412-252-1111
 190

It has been suggested that the route should branch at the intersection of Camelback Road and Grand Avenue. The Camelback Road segment would extend to 44th Street, as described above. The Grand Avenue segment would continue along Grand Avenue to the Phoenix central business district. This alternative scenario would increase the mileage of the basic 12 mile route by approximately 6 miles.

TECHNOLOGY

- Of the six transit alternatives studied, three capital-intensive strategies were found to be appropriate for implementation in the Phoenix region:
 - busway (exclusive right-of-way)
 - light rail transit, and
 - automated guideway transit.
- Although each of the three strategies has its own advantages and disadvantages, the differences between them were not found to be significant enough to eliminate any of them at this time.
- Further analysis is required which will address issues not examined in this study (e.g. route location within the transit corridor, localized environmental issues, etc.). It is anticipated that at the route location level of the future analysis, substantial differences between the alternative strategies will be identified.

LONG-RANGE TRANSIT PLAN

- The long-range transit plan for the Phoenix Metropolitan Area should be based upon a 50 mile capital-intensive system. The Grand-Paradise Transit Corridor would account for approximately twelve miles.
- Future development of the system should include the addition of up to 30 miles of capital-intensive transit routes. While none of the additional 30 miles are within the Grand-Paradise Transit Corridor, service provided within the Grand-Paradise Transit Corridor would directly access routes that would comprise a substantial percentage of the additional 30 miles.

CHAPTER 3: STUDY AREA CHARACTERISTICS

- A.** Socio-Economic Characteristics
- B.** Land Use Development
- C.** Community Facilities and Services
- D.** Environmental Features
- E.** Utilities
- F.** Off-Site Hydrology



A: SOCIO-ECONOMIC CHARACTERISTICS

DATA SOURCE

The source of socio-economic data for the Paradise Corridor Study is the Maricopa Association of Governments (MAG). MAG is the metropolitan planning organization for the Phoenix urban area and includes on its policy board, representation from all area units of government. MAG's forecasting activities are coordinated with the Arizona Department of Economic Security.

EXISTING AND FORECAST REGIONAL CHARACTERISTICS

The most current MAG-adopted forecasts were used for the travel demand analysis in the Paradise Corridor Study. Population, households and employment for the entire Phoenix urban area are shown in Table 8 for 1980, 1985, 2005 and 2015.

TABLE 8
PHOENIX URBAN AREA
SOCIO-ECONOMIC DATA

	1980	1985	2005	2015
Population	1,481,010	1,768,923	3,167,514	3,898,005
Resident Households	535,639	641,923	1,165,236	1,448,039
Employment	646,305	753,010	1,420,453	1,737,160

Source: "Update of the Socio-Economic Database for Maricopa County,"
Maricopa Association of Governments, 1984.

The forecasts indicate that by the Year 2005, the urban area will increase in population by 79 percent, resident households by 82 percent and employment by 89 percent. By the year 2015 the increases will range from 120 to 130 percent of the 1985 values.

STUDY AREA CHARACTERISTICS

The Paradise Corridor Study Area for purposes of travel demand analysis has been defined as the area bounded by:

- Peoria Avenue on the north
- Squaw Peak Parkway on the east
- Thomas Road on the south
- Outer Loop Freeway on the west

The population and employment figures for the study area are summarized for the following years:

- 1957 actual
- 1980 actual
- 1985 estimated
- 2005 forecast
- 2015 forecast

Data for 1957 is shown for comparison purposes because it was the base year for the Phoenix Urban Area Major Street and Highway Plan of 1960. The 1985 Special Census information has not been formally accepted for the MAG region. For that reason, previously approved estimates are shown for 1985.

Portions of the cities of Glendale, Peoria and Phoenix fall within the study area. The population and employment numbers for this area are shown in Table 9 by municipality, based on 1986 municipal strip annexation boundaries.

**TABLE 9
PARADISE CORRIDOR POPULATION AND EMPLOYMENT
BY MUNICIPALITY**

Municipality	<u>POPULATION</u>				
	1957	1980	1985	2005	2015
Glendale	11,279	78,012	86,713	130,776	158,190
Peoria	3,800	4,358	6,331	21,069	37,568
Phoenix	<u>136,387</u>	<u>298,294</u>	<u>318,953</u>	<u>380,439</u>	<u>384,799</u>
TOTAL	151,466	380,664	411,997	532,284	580,557
Municipality	<u>EMPLOYMENT</u>				
	1957	1980	1985	2005	2015
Glendale	2,293	22,119	24,071	53,189	67,536
Peoria	421	877	1,122	3,946	5,770
Phoenix	<u>16,666</u>	<u>145,219</u>	<u>156,662</u>	<u>199,462</u>	<u>212,851</u>
TOTAL	19,380	168,215	181,855	256,598	286,157

Source: Phoenix Urban Area Major Street and Highway Plan; 1957.
Maricopa Association of Governments; 1980, 1985, 2005 and 2015.

As shown in Table 9, the portions of all three municipalities within the study area continue to grow over the forecast period in both population and employment. Continued rapid growth in Glendale and Peoria is forecast, primarily because of the availability of lower-cost vacant land for development and the improved accessibility from planned roadways including the Outer Loop and Papago Freeways and improvements to Grand Avenue.

The increases in Phoenix are expected to occur with more dense infill development and redevelopment to higher intensity land uses such as multi-family residential, office and commercial complexes.

The percentage growth in study area population and employment through 2005 and the proportional shares by municipality are shown graphically on Figure 13. The City of Phoenix's portion of the study area includes the bulk of the population and employment and is projected to retain more than 70 percent of both through 2005.

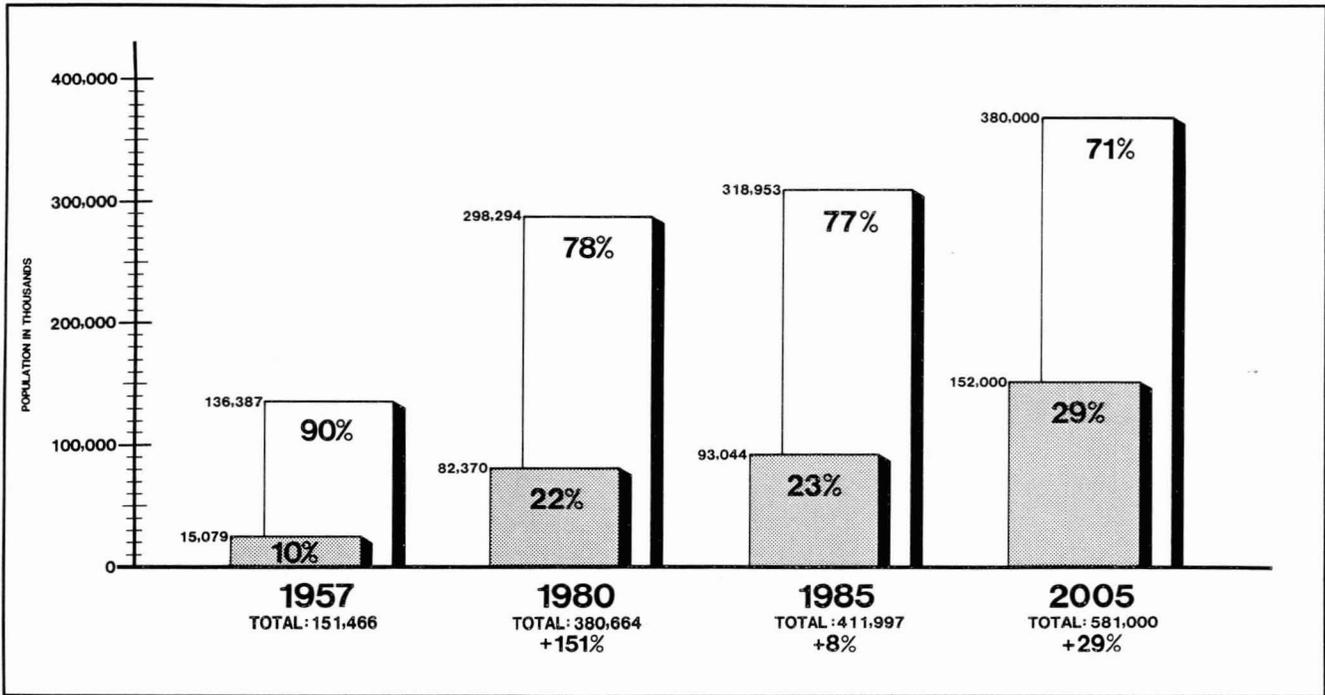
The City of Glendale is projected to increase its relative shares of the study area:

- Population - from 21 percent in 1985 to 28 percent in 2015
- Employment - from 13 percent in 1985 to 24 percent in 2015

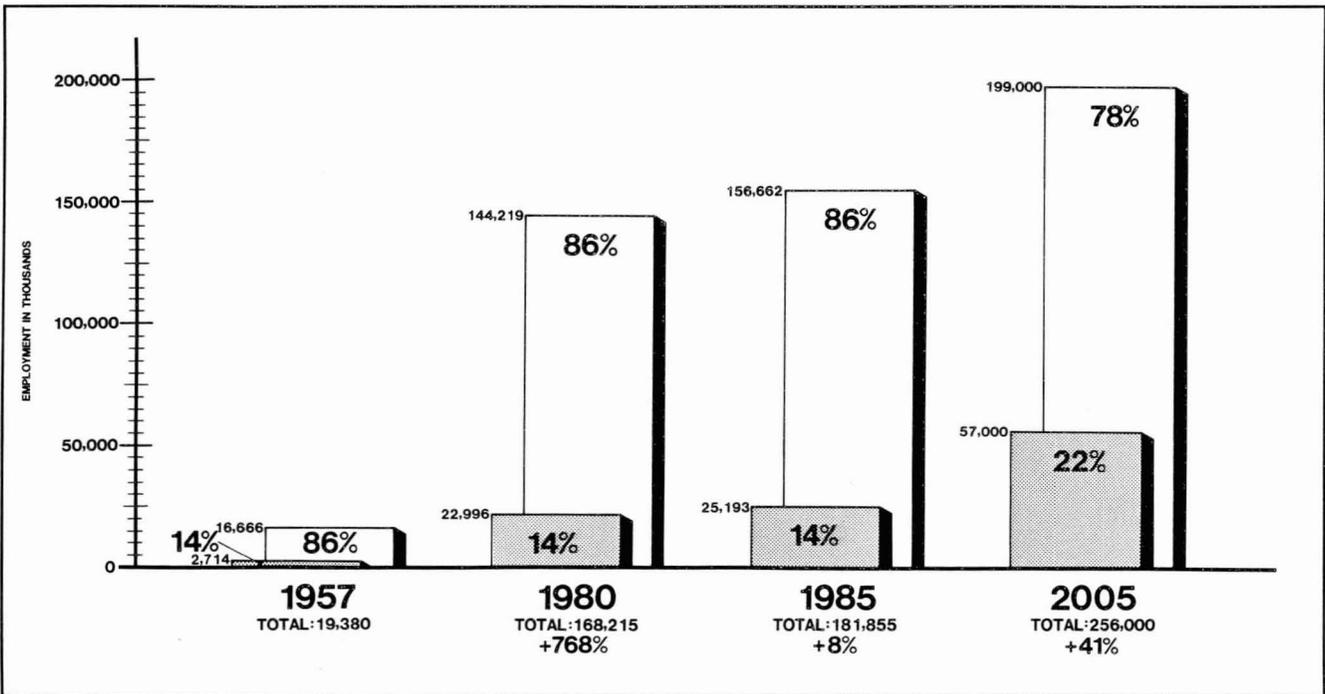
A large portion of study-area employment, approximately 40 percent, is expected to remain concentrated in and around the following high traffic areas:

- City of Phoenix Urban Village Cores - Alhambra, Maryvale, Encanto, and Camelback East
- Regional Shopping Centers - Metro Center, Biltmore Fashion Park, Park Central, Maryvale, Chris Town
- Downtown Areas - Glendale and Peoria
- Phoenix Central Corridor
- Hospitals - St. Joseph's, Phoenix General, Maryvale Samaritan, Phoenix Indian and John C. Lincoln
- Colleges - Grand Canyon, Glendale Community, and Phoenix College
- Business/Industrial Parks

In addition to attracting more employment, the above activity areas are also predicted to attract high-density residential uses. The projected changes in population density from 1980 to 2005 are illustrated on Figure 14. Employment density changes for the same period are illustrated on Figure 15.



STUDY AREA POPULATION



STUDY AREA EMPLOYMENT

PARADISE CORRIDOR – SR 317

Arizona Department of Transportation

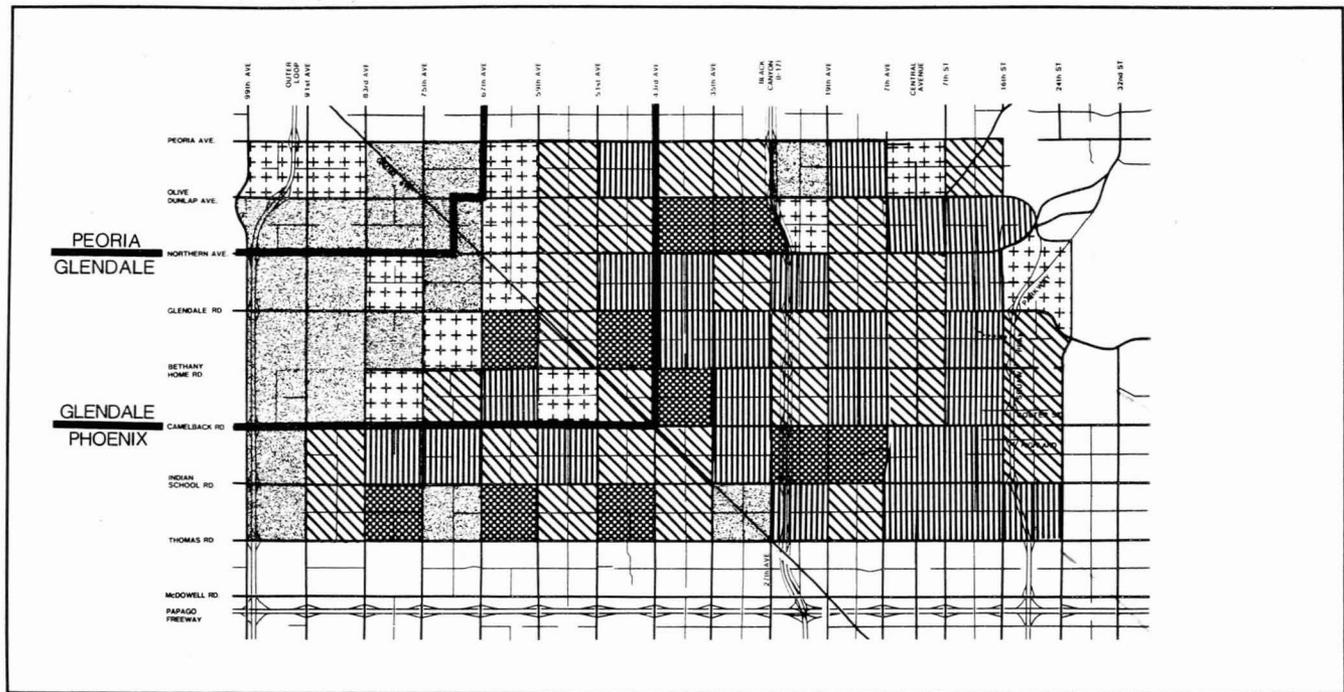
PHOENIX
 GLENDALE, PEORIA, AND UNINCORPORATED AREAS

PROPORTIONAL SHARE BY MUNICIPALITY

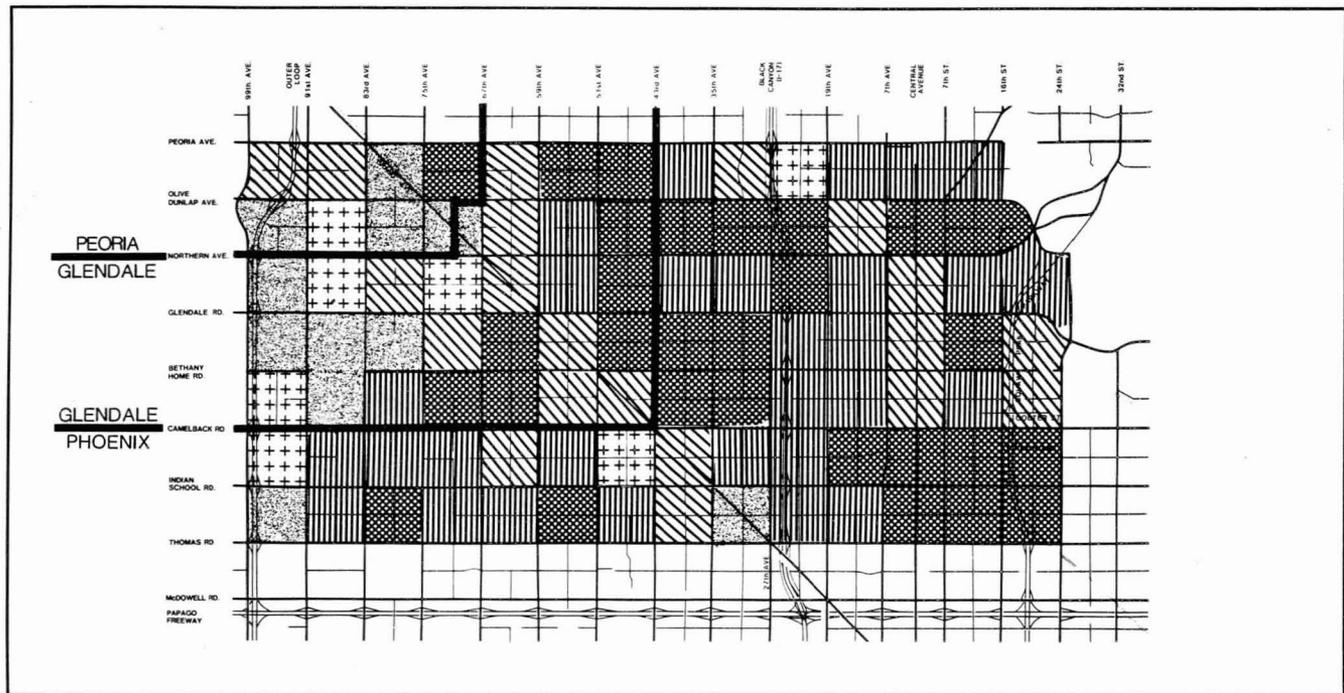
ERW
 10 North Central Avenue
 Phoenix, Arizona 85004
 (602) 258-1100

199

SOURCE: MAG 1980-2005
 PHOENIX URBAN AREA MAJOR
 STREET AND HIGHWAY PLAN, 1957



1980 POPULATION DENSITY



2005 PROJECTED POPULATION DENSITY

PARADISE CORRIDOR – SR 317

Arizona Department of Transportation

BRW
300 North Central in Phoenix
 Phoenix, Arizona 85004
 602.258.1100

rga

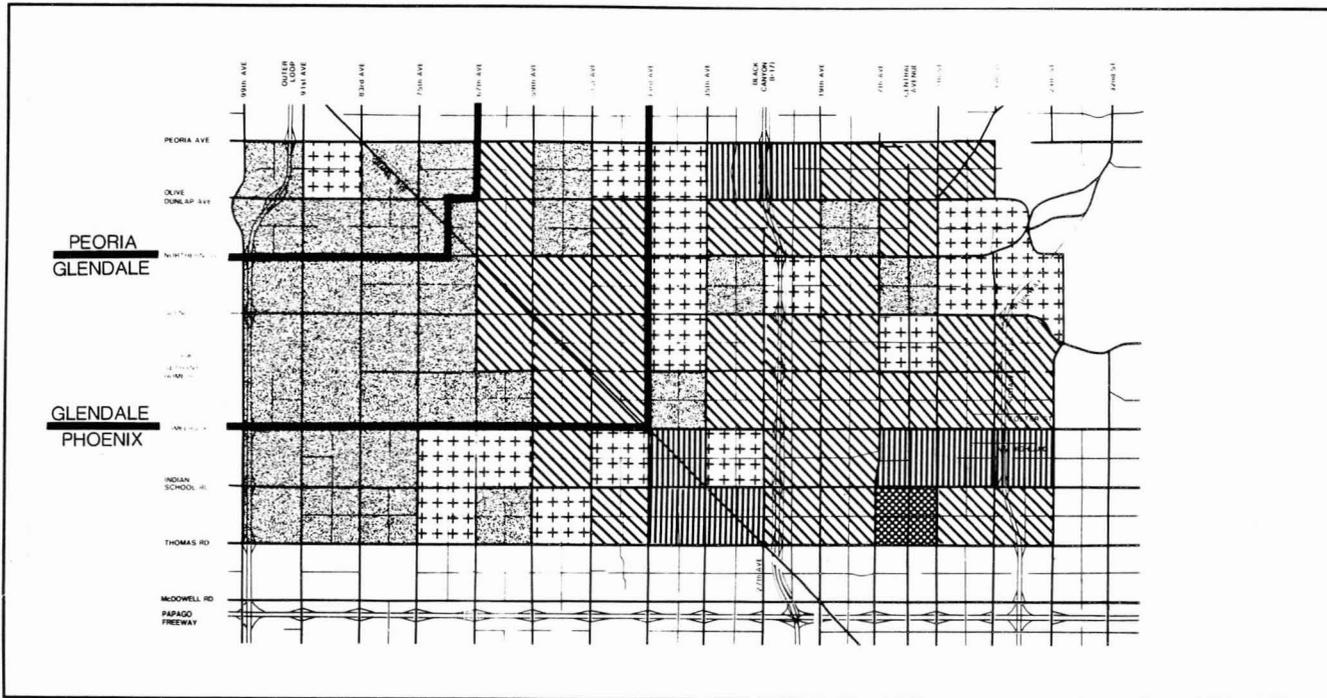
PERSONS PER SQUARE MILE

- 0-1,000
- 1,000-3,000
- 3,000-5,000
- 5,000-7,000
- 7,000+

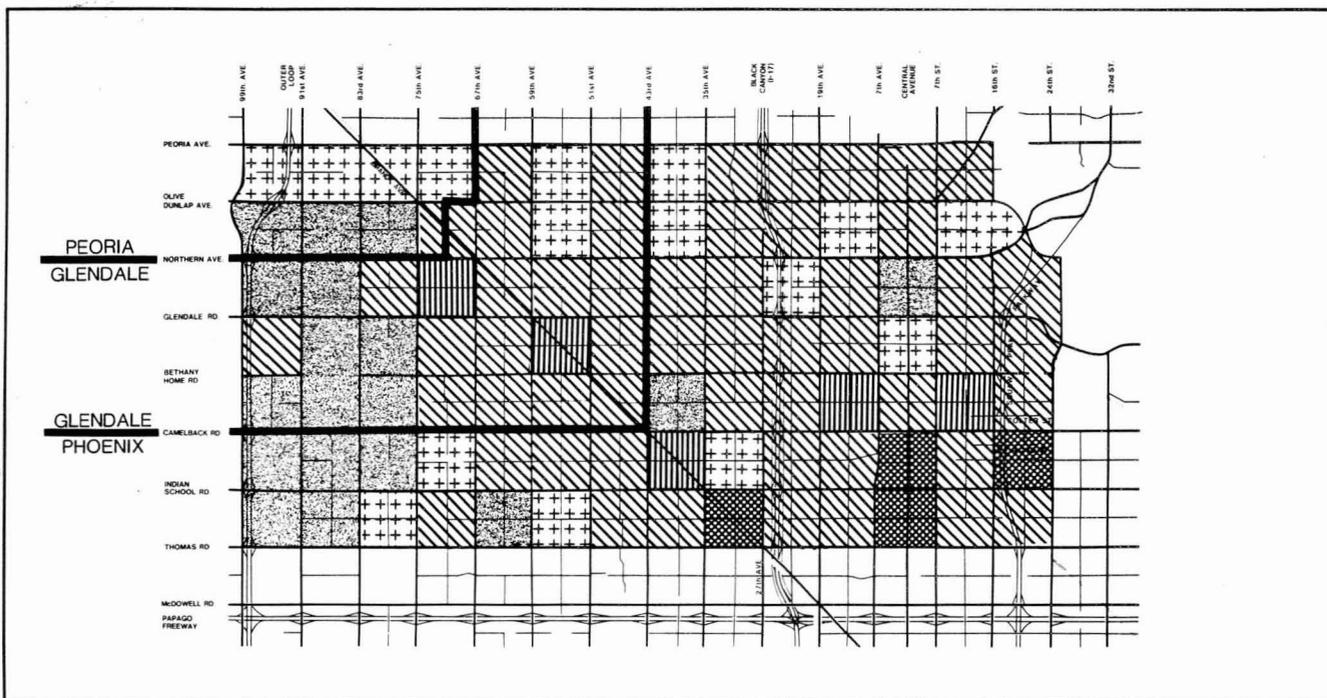
SOCIO-ECONOMIC CHARACTERISTICS

SOURCE: BRW INC.





1980 EMPLOYMENT DENSITY



2005 PROJECTED EMPLOYMENT DENSITY

PARADISE CORRIDOR – SR 317

Arizona Department of Transportation

BRW
101 North 25th Street
Phoenix, Arizona 85014
480-944-1100

190

EMPLOYMENT PER SQUARE MILE

White	0-500
Cross-hatch	500-1,000
Diagonal lines	1,000-5,000
Vertical lines	5,000-10,000
Stippled	10,000+

SOCIO-ECONOMIC CHARACTERISTICS

SOURCE: MAG  15

B: LAND USE DEVELOPMENT

An inventory and analysis of land uses within the Phoenix segment of the Paradise Corridor was conducted by BRW during September and October of 1986. Draft Technical Memorandum, Land Use Inventory and Analysis: Phoenix Segment, 43rd Avenue to 24th Street, documents five subject areas: 1) existing land use; 2) potential historic structures; 3) housing trends; 4) development activity; and 5) comprehensive planning factors. Following is a summary of the findings from the two major subject areas: existing land use and comprehensive planning factors.

EXISTING LAND USE

The portion of the Paradise Corridor study area within the City of Phoenix is one-half mile wide by seven miles long, comprising approximately 2,244 acres. The Corridor is bounded on the north by Missouri Avenue (5500 North), on the south by Camelback Road (5000 North), on the west by 43rd Avenue and on the east by 24th Street.

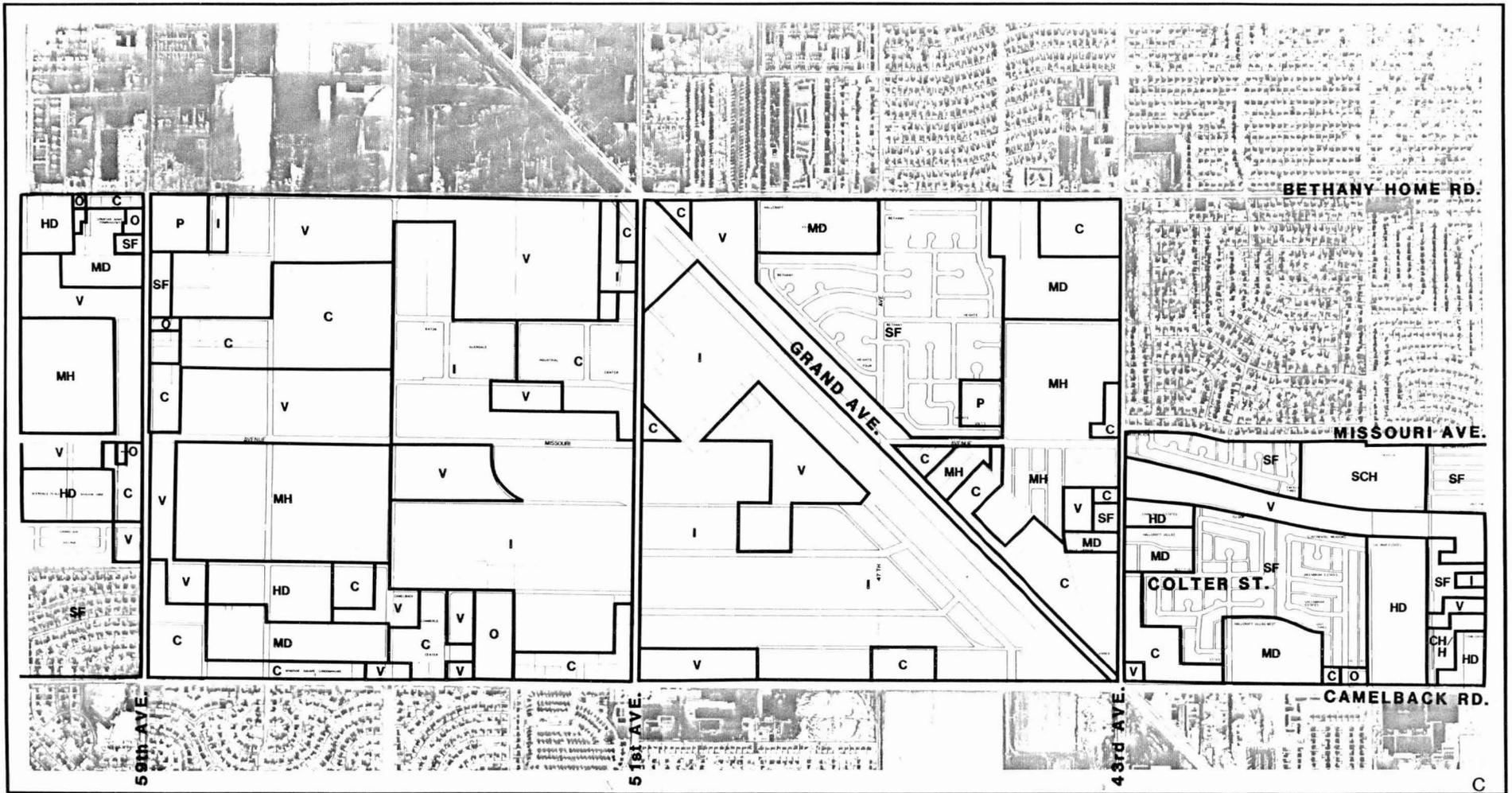
The resulting corridor-wide land use pattern shows the influence of major arterial streets on adjacent development as illustrated on Figures 16a-d. Commercial uses dominate the length of the Corridor along Camelback Road, a major arterial street. To the north of Camelback, medium and low density residential uses prevail up to Missouri Avenue, a collector street. Where major north-south arterial streets cross the Corridor, office uses typically dominate. This contributes to an overall high development density.

Residential

Residential uses occupy 62 percent of the total Corridor land area. The residential classifications used for analysis purposes were: single family, medium density, high density, and mobile home. Single family uses occupy 918 acres or 41 percent of the Corridor. Most single family subdivisions were constructed in the late 1940s to the mid 1960s. New medium and high density residential developments near Chris-Town Mall, the Central Avenue Corridor, and the East Camelback Corridor reflect higher land values.

Medium density uses include apartments and condominiums/townhouses. Apartment complexes are usually found corridor-wide along major arterial streets and act as a buffer to underlying single family neighborhoods. Concentrations of medium density uses occur from 35th Avenue to 27th Avenue and from 7th Street to 24th Street. These uses comprise 185 acres or 8 percent of the land within the Corridor.

High density uses occur as very large apartment complexes that range up to 400 units. These land uses comprise 258 acres, 12 percent of the corridor-wide acreage.



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Arizona Department of Transportation

BRW
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Phoenix, Arizona 85004
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rga

RESIDENTIAL

- SF SINGLE FAMILY
- MH MOBILE HOME
- MD MEDIUM DENSITY (X<15 DU/AC)
- HD HIGH DENSITY (X>15 DU/AC)

COMMERCIAL

- O OFFICE
- C RETAIL/SERVICE/WAREHOUSE

- I INDUSTRIAL/WAREHOUSING
- CH/H INSTITUTIONAL (HOSPITALS/CHURCHES)
- SCH SCHOOLS
- P PARKS
- V VACANT

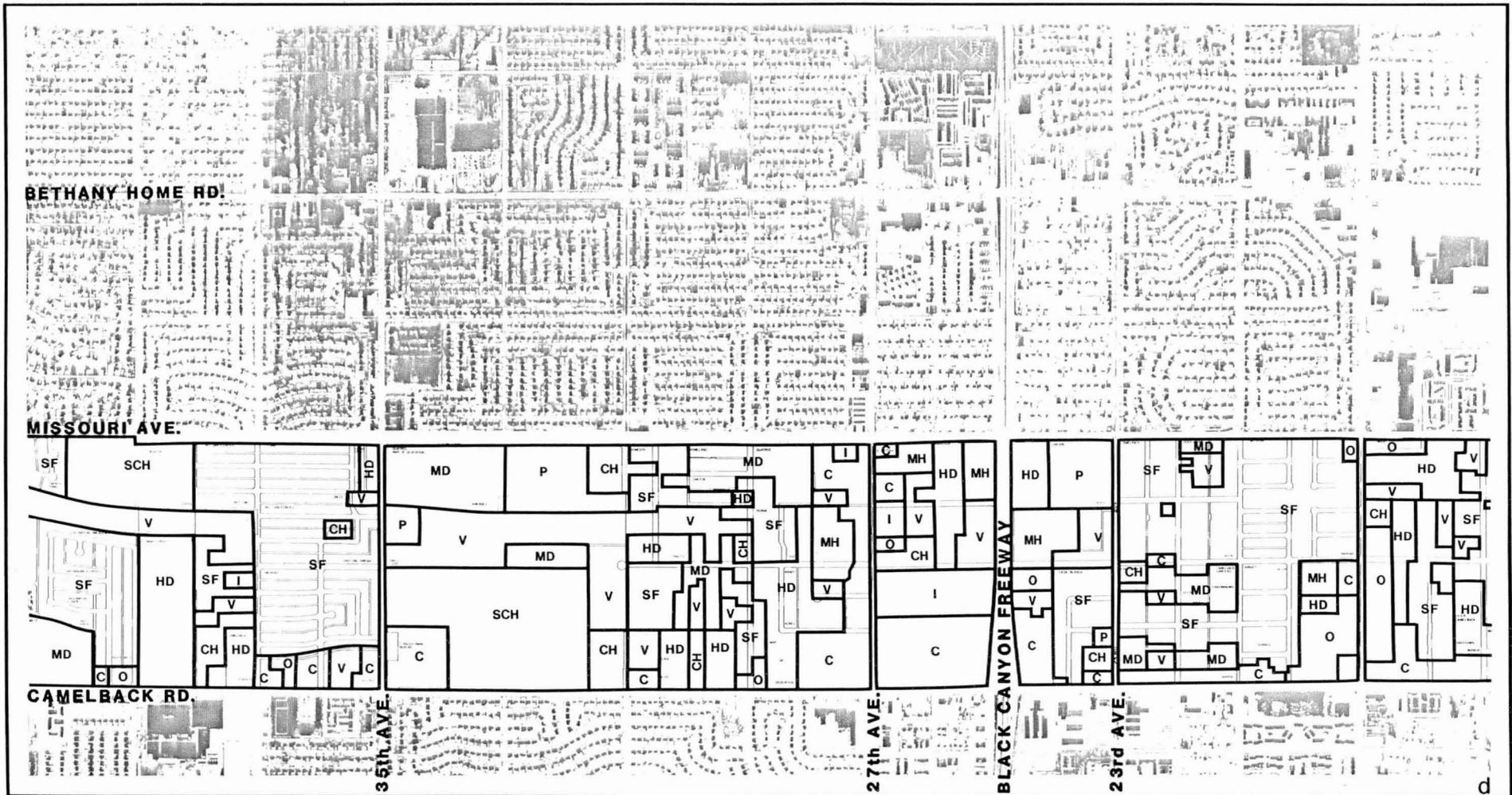
LAND USE

NOVEMBER 1986

SOURCE: BRW, INC.



16a



PARADISE CORRIDOR - SR 317

Arizona Department of Transportation

BRW
2700 North Central Avenue
Phoenix, Arizona 85004
244-1591

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RESIDENTIAL

- SF** SINGLE FAMILY
- MH** MOBILE HOME
- MD** MEDIUM DENSITY (X<15 DU/AC)
- HD** HIGH DENSITY (X>15 DU/AC)

COMMERCIAL

- O** OFFICE
- C** RETAIL/SERVICE/WAREHOUSE

- I** INDUSTRIAL/WAREHOUSING
- CH/H** INSTITUTIONAL (HOSPITALS/CHURCHES)
- SCH** SCHOOLS
- P** PARKS
- V** VACANT

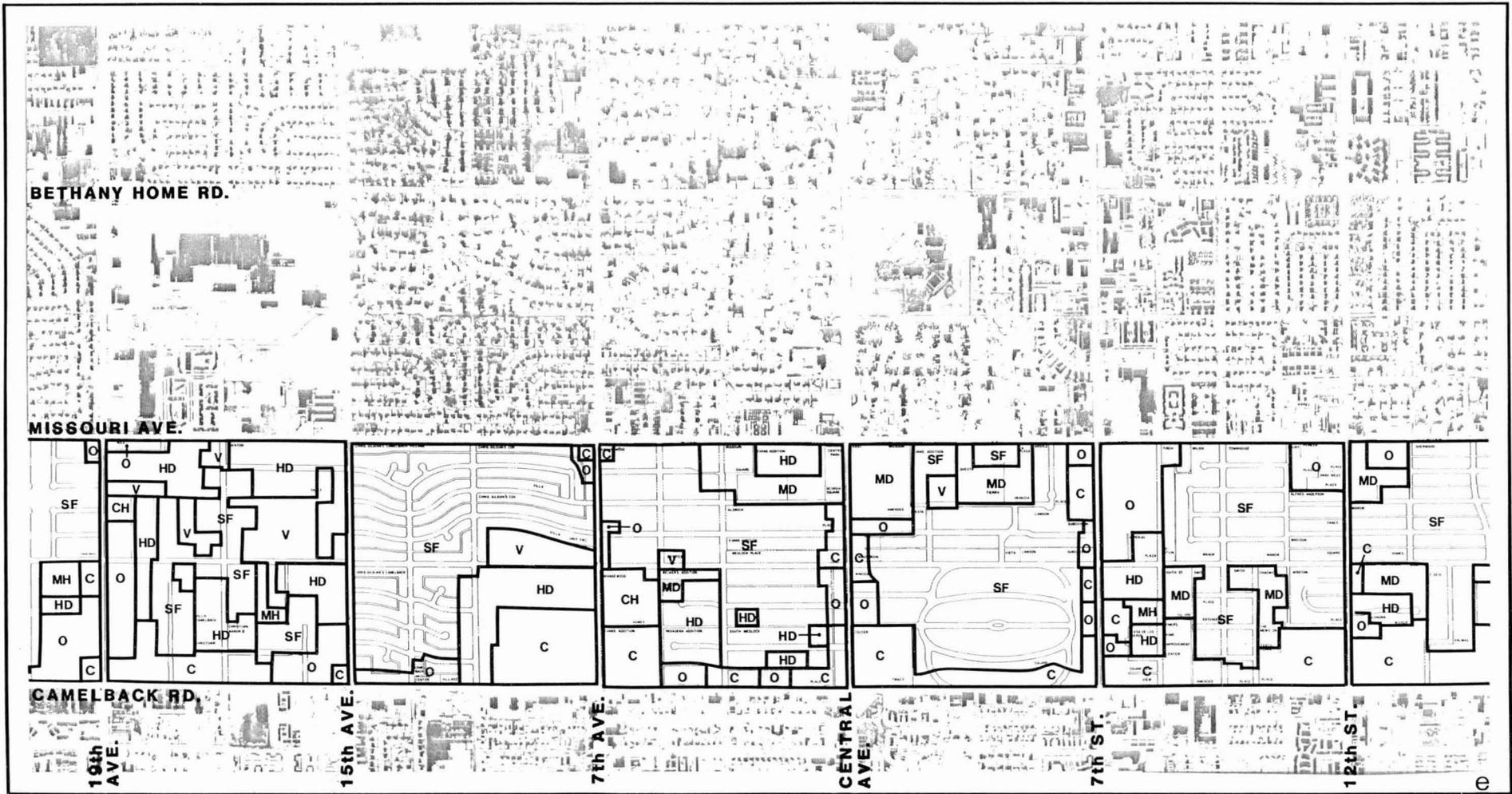
LAND USE

NOVEMBER 1986

SOURCE: BRW INC.



16b



PARADISE CORRIDOR – SR 317

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234-1591

199

RESIDENTIAL

- SF** SINGLE FAMILY
- MH** MOBILE HOME
- MD** MEDIUM DENSITY (X15 DU/AC)
- HD** HIGH DENSITY (X15 DU/AC)

COMMERCIAL

- O** OFFICE
- C** RETAIL/SERVICE/WAREHOUSE

- I** INDUSTRIAL/WAREHOUSING
- CH/H** INSTITUTIONAL (HOSPITALS/CHURCHES)
- SCH** SCHOOLS
- P** PARKS
- V** VACANT

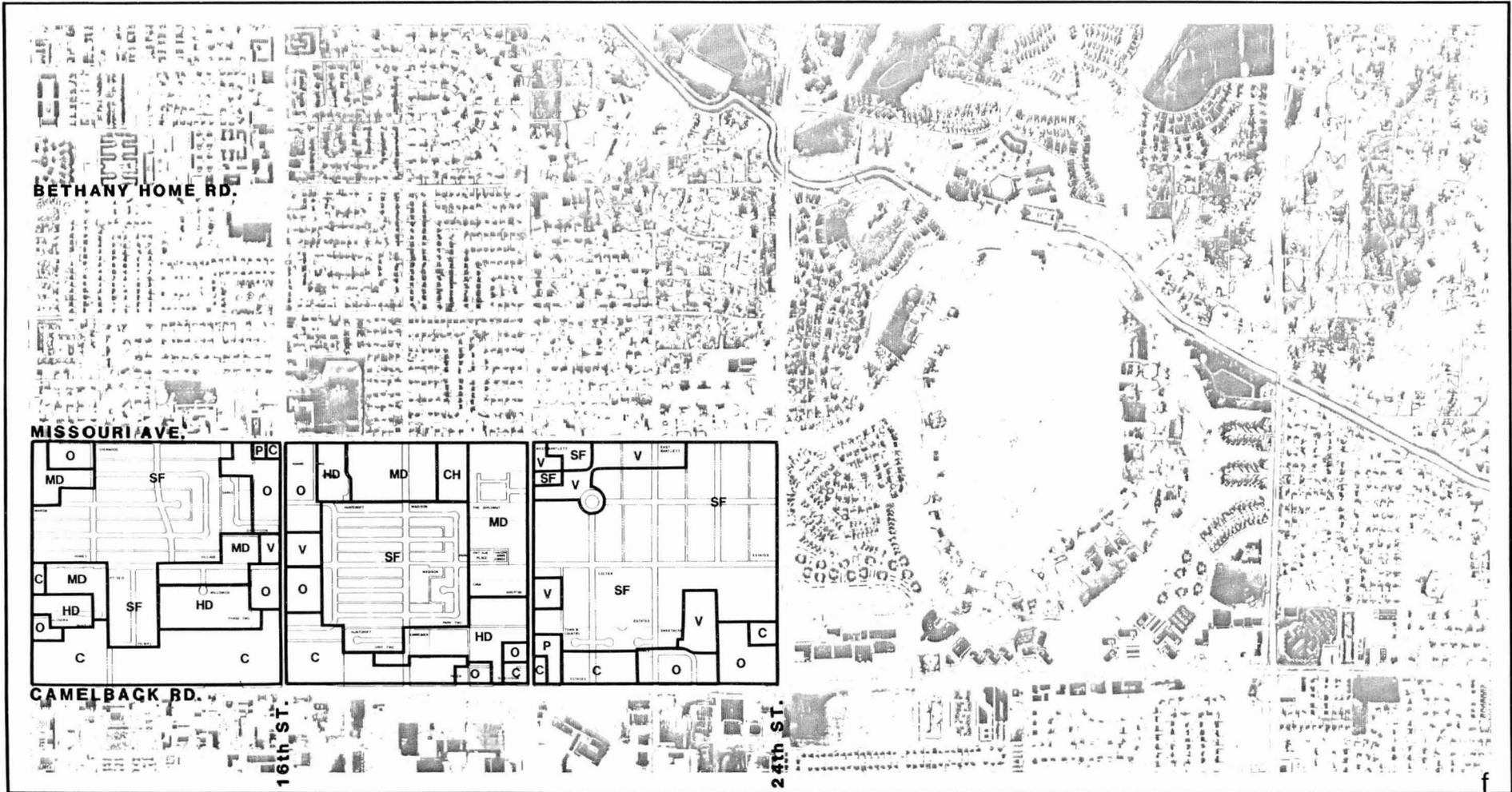
LAND USE

NOVEMBER 1986



16c

SOURCE: BRW INC.



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Arizona Department of Transportation

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RESIDENTIAL

- SF** SINGLE FAMILY
- MH** MOBILE HOME
- MD** MEDIUM DENSITY (X<15 DU/AC)
- HD** HIGH DENSITY (X>15 DU/AC)
- COMMERCIAL**
- O** OFFICE
- C** RETAIL/SERVICE/WAREHOUSE

- I** INDUSTRIAL/WAREHOUSING
- CH/H** INSTITUTIONAL (HOSPITALS/CHURCHES)
- SCH** SCHOOLS
- P** PARKS
- V** VACANT

LAND USE
NOVEMBER 1986

SOURCE: BRW INC.



16d

Assessed property values (source: Maricopa County Assessor) for single family uses vary widely from a low value of \$35,000 to a high value of over \$500,000. Most single family housing values average approximately \$60,000, while some areas east of 7th Avenue average slightly higher. Two pockets of relatively expensive housing are located between Central Avenue and 7th Street, and between 20th and 24th Streets. Houses in these areas range from \$100,000 to over \$500,000 in assessed value.

There are seven mobile home parks within the Corridor, which constitute 32 acres or only 1 percent of the land. This acreage will likely decline over time because the mobile home parks will convert to higher return land uses as the value appreciates.

Commercial

Commercial uses comprise 20 percent of the land uses within the Corridor. Commercial uses include:

- neighborhood retail/service
- shopping centers
- large auto sales lots
- large office complexes

All commercial uses, at 300 acres or 13 percent, and office uses, at 144 acres or 7 percent, are located along major arterial streets where as a whole they compose long commercial/office corridors.

Two types of neighborhood retail/service uses predominate: 1) small commercial strip centers; and 2) single family houses which have been converted to shops and restaurants. The latter are common in the areas between 21st and 23rd Avenues and between Central Avenue and 7th Street.

Four large shopping centers were constructed within the Corridor in the years between 1954 and 1972. All four, College Park Center, Camelback Village Square, Uptown Plaza, and Camelback Center, are oriented to Camelback Road. Neighborhood level goods and services are provided at all four shopping centers. One center, Uptown Plaza, is included within the Windsor Square Special Conservation District due to its history and character relative to the adjacent neighborhood.

Large auto sales lots extend from 10th Place to 16th Street and from 27th Avenue to the Black Canyon Freeway along Camelback Road. The lots on east Camelback Road comprise part of an area known as "Automotive Row", where many dealers along both sides of Camelback Road conduct business. Office uses range from small low-rise complexes to large mid-rise complexes which occur throughout the Corridor. Five areas exist where several mid-rise complexes form office corridors. These areas are:

- 1) 19th Avenue north of Camelback Road,
- 2) Camelback Road west of 15th Avenue,
- 3) East side of 7th Street south of Missouri Avenue,
- 4) Both sides of 16th Street north of Medlock Drive, and
- 5) Camelback Road between 22nd and 24th Streets.

Assessed values for neighborhood retail/service uses generally range from \$150,000 to \$750,000 with the larger shopping centers and auto sales lots ranging from \$2.5 million to \$4 million. Office complexes, particularly large complexes, range from \$2 million to over \$10 million in assessed value.

Industrial

Industrial uses comprise a very small portion of the Corridor's land area at 22.9 acres or 2 percent of the total. A majority of this industrial property is located between 27th Avenue and the Black Canyon Freeway and is occupied by either manufacturing or warehousing facilities.

Institutional

Institutional uses comprise 45 acres or 2 percent of the land area and are composed primarily of 14 churches. However, other uses, such as children's homes and a fraternal hall, are also present. These uses are scattered, but are usually located within residential areas.

Public/Semi-Public

Public/School uses comprise 98 acres or 4 percent of the land within the Corridor. This category includes electric power substations, post offices, elementary and high schools and colleges. The land comprising Sevilla and Robert E. Simpson Elementary Schools and Grand Canyon College are relatively large compared to the surrounding land uses. Grand Canyon College is by far the largest singularly owned parcel in the Corridor at approximately 55 acres.

Parks/Open Space

Park land comprises only 25 acres or 1 percent of Corridor land area and is divided between Little Canyon Park and a park at 15th Avenue and Colter Street for use by handicapped individuals.

Vacant land comprises 180 acres or 8 percent of Corridor land which is grouped together in several areas. Most notable are the areas between 35th and 23rd Avenues and between 19th and 15th Avenues, where many vacant parcels create significant open spaces in a linear pattern. Most of this property (87 acres) is owned by the State of Arizona. The land was acquired between 1969 and 1973 at a cost of \$1.7 million for the Paradise Corridor, which was designated State Route 317 in 1968.

Right-of-Way

Right-of-way uses comprise 37 acres or 2 percent of the Corridor. This area is occupied by the Black Canyon Freeway and the yet-to-be constructed Squaw Peak Parkway.

Table 10 summarizes the land uses described above and indicates acreages by land use category.

TABLE 10
LAND USE ACREAGES BY CATEGORY

Land Use	Acreage	Percent
Residential Uses	1392.6	62%
Single Family	918.0	41%
Mobile Home	31.5	1%
Medium Density	184.8	8%
High Density	258.3	12%
Commercial Uses	443.3	20%
Retail/Service	299.4	13%
Retail/Office Warehouse		
Office	143.9	7%
Industrial/Warehouse Uses	22.9	1%
Public/Semi-Public Uses	143.1	6%
Public/Schools	97.8	4%
Churches	45.3	2%
Open Space Acreage	205.0	9%
Parks/Developed Open Space	24.6	1%
Agricultural/Vacant	180.4	8%
Rights-of-Way (I-17/Squaw Peak)	37.3	2%
TOTAL	2244.2	100%

Source: BRW, Inc.; October, 1986

COMPREHENSIVE PLANNING FACTORS

For the Phoenix section of the Paradise Corridor there are several planning efforts which describe desired land uses and the goals and objectives to achieve these uses.

The primary plan which guides urban development within the Phoenix section of the Paradise Corridor is The General Plan for Phoenix 1985-2000, adopted October 1985. Comparing the plan to existing land use shows use changes are expected during the time frame of the plan. Most of the land use changes are to higher residential densities while in some cases the changes are to industrial and commercial uses. Included in the plan is the designation of a future east-west transportation corridor aligned north of Colter Street from approximately Squaw Peak Parkway west to the City boundary at 43rd Street.

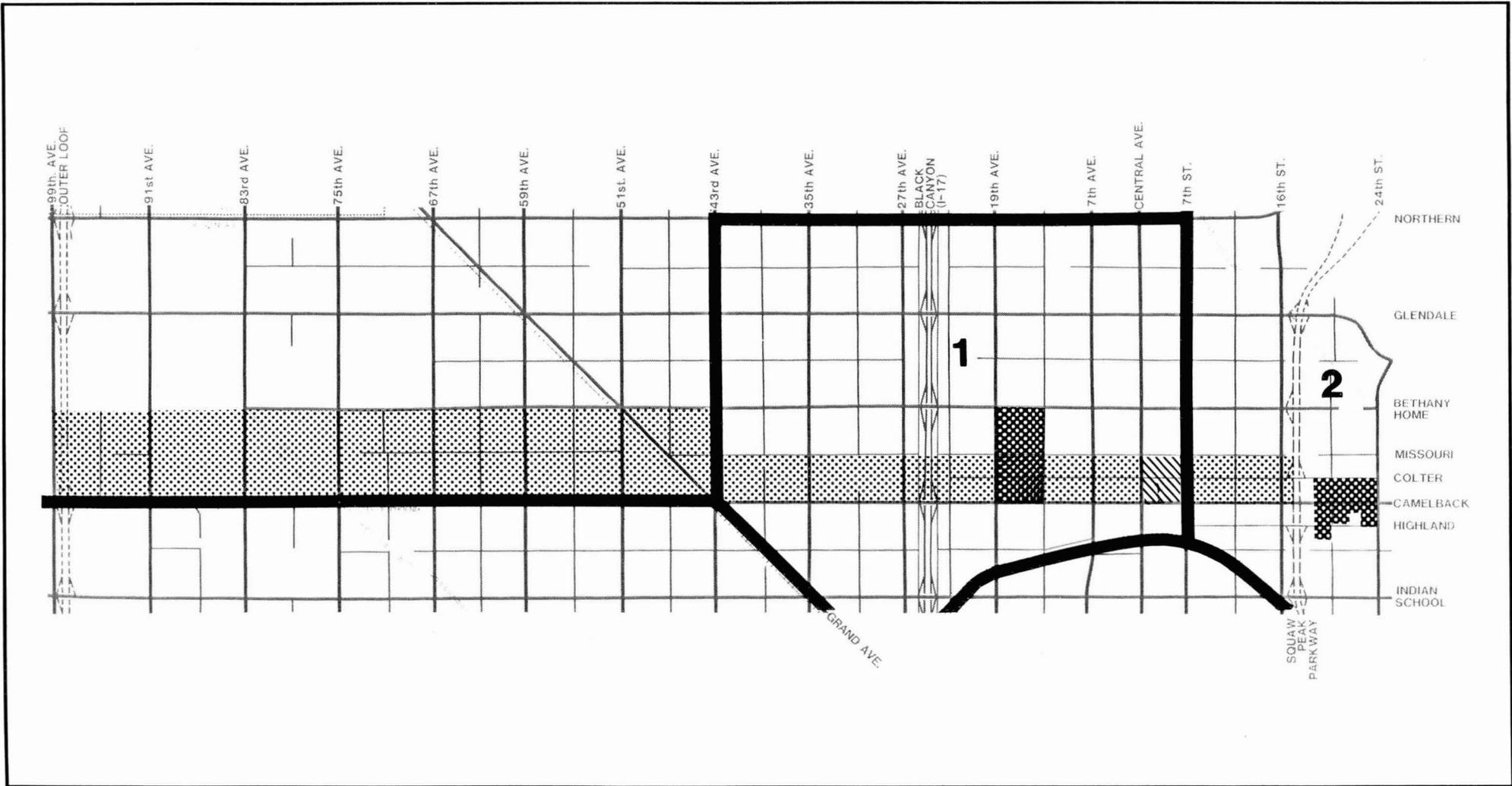
The major concept underlying The General Plan for Phoenix is the division of the City into nine urban villages and four peripheral areas. Two of the nine urban villages, Alhambra and Camelback East, are crossed by the Paradise Corridor. Draft plans for these urban villages have been prepared by volunteer citizen committees with City staff assistance. According to the Alhambra Village and the Camelback East Village Plans, two different approaches are proposed for the Paradise Corridor. Parks/Open Space and a fixed guideway transit facility are designated within the Alhambra Village while freeways/parkways are designated within the Camelback East Village. The locations of these urban villages are illustrated on Figure 17.

The Windsor Square Special Conservation District is bounded by Central Avenue on the west, 7th Street on the east, Missouri on the north and Camelback on the south. Special Conservation District designation is intended to allow residents and property owners, by implementing a neighborhood plan, to plot the future of the neighborhood. This plan is scheduled to be adopted December 1986. The Windsor Square Special Conservation District is illustrated on Figure 17.

In relationship to the Paradise Corridor, a general policy is to be followed if a roadway facility is to be built through Windsor Square. "Specifically, the portions of the neighborhood north and south of the alignment will be polled within 120 days of the establishment of the parkway right-of-way to consider whether there exists continued support for the Neighborhood Conservation Plan, and the possible need for plan amendment. In addition, the neighborhood will offer design recommendations for the proposed freeway."

OBSERVATIONS

- Market pressures for land located between a facility and Camelback Road will increase greatly. This pressure will be towards development of higher density land uses, most likely high density residential or commercial/office.



PARADISE CORRIDOR – SR 317

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-  URBAN VILLAGE CORE
- 1** ALHAMBRA VILLAGE
- 2** CAMELBACK EAST VILLAGE
-  WINDSOR SQUARE CONSERVATION DISTRICT
-  STUDY AREA

URBAN VILLAGES IN THE PARADISE CORRIDOR



17

- Publicly owned (State of Arizona and City of Phoenix) lands form a recognizable strip from 43rd to 7th Avenues. To lessen the facility impact upon predominant residential areas, consideration should be given to alternative alignments that follow this strip.
- A large number of potentially historic structures (69) are found south of Oregon Avenue between 7th Avenue and 7th Street.
- The housing inventory illustrates that a majority of the dwelling units are multi-family renter-occupied. If the facility alignment causes a large number of these dwelling units to be taken, some measure of replacement should be assured.
- Adopted comprehensive plans indicate land use policies and the character of desirable development. At present only The General Plan for Phoenix 1985-2000 has been adopted. The Alhambra and Camelback East Village Plans should be considered in the planning and design of transportation improvements since they reflect the desires of community residents.

C: COMMUNITY FACILITIES AND SERVICES

This section contains inventories of community facilities and services in and near the Paradise Corridor, including:

- Educational Facilities
- Police and Fire Facilities
- Emergency Medical Facilities
- Parks and Recreational Facilities

EDUCATIONAL FACILITIES

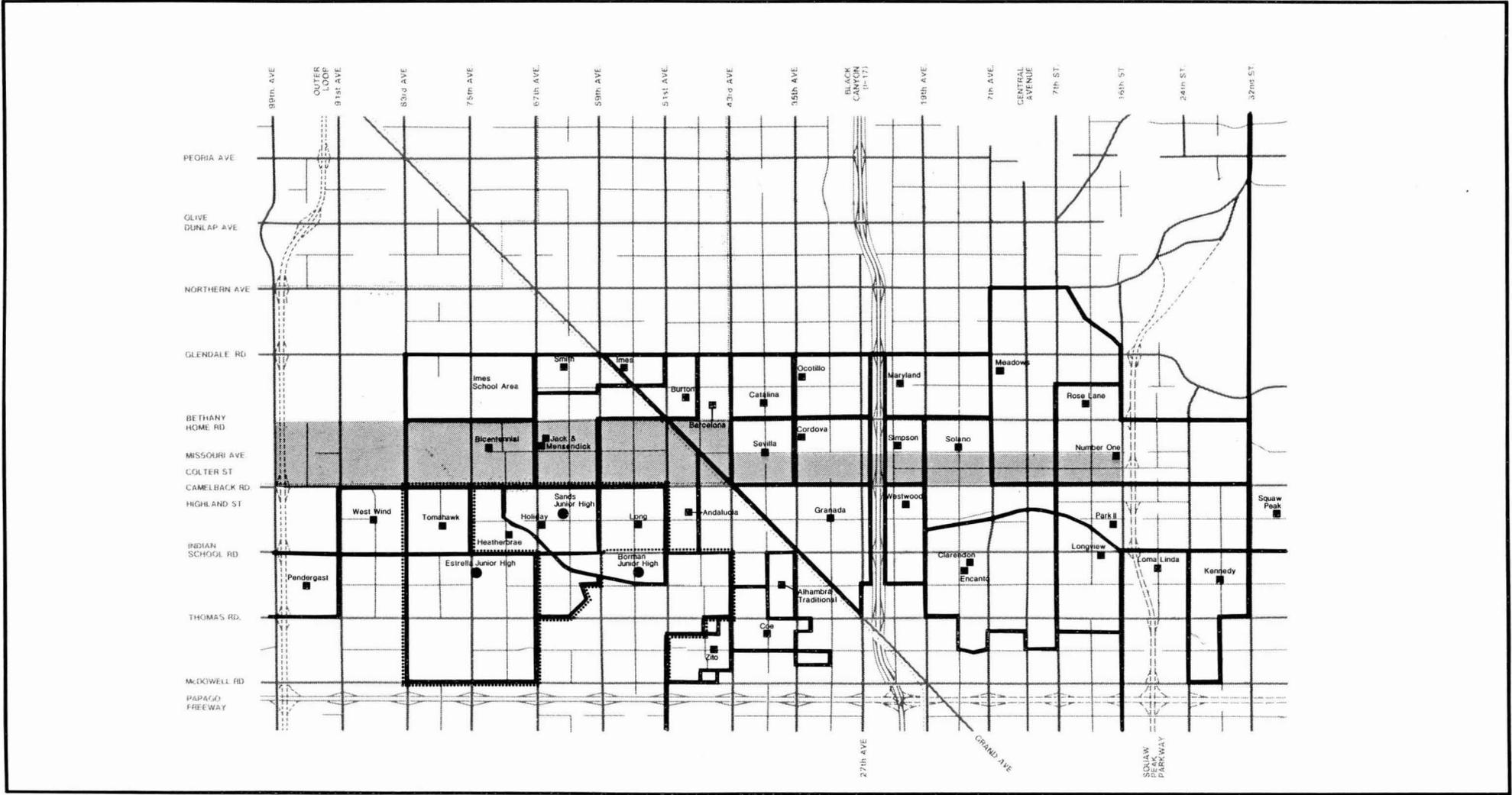
A thorough inventory was completed of educational facilities located within or near the Paradise Corridor area. Information was obtained regarding:

- Public school districts and boundaries,
- School locations and attendance areas (public and private),
- Enrollments for the last three years (where available),
- School bus routes and transportation policies, and
- Manned crosswalk locations.

Public school districts and individual schools with attendance areas that are crossed by Paradise Corridor are listed in Table 11. Also shown are enrollments for the past 1985-86 school year and the percentage change in enrollment during the last three years (from 1983-84) where it was available. Private schools located within the corridor and 1985-86 enrollments are indicated as well. As shown in Table 11, most schools for which data was available have experienced relatively steady enrollments, with the exception of North High School, which has had steadily increasing annual enrollments. North High School enrollment increases might be due to its designation as "traditional" High School for the school district.

The Corridor area includes seven independent public school districts, four elementary and three high schools. Elementary schools provide for grades K through 8, and high schools grades 9 through 12. One school district adjacent to the Corridor, Cartwright, utilizes junior high schools; however, this district does not serve the designated Corridor area. Elementary and junior high school districts, their school locations and attendance areas are shown in Figure 18. Similar information is provided in Figure 19 for high school districts. Private and parochial schools are shown in Table 11, however, since they draw the attendance from large areas, no attendance boundaries are indicated.

All seven of the public school districts potentially impacted by the Corridor had relatively small total student enrollments of less than 9,000 in 1985-86, as shown in Table 12.



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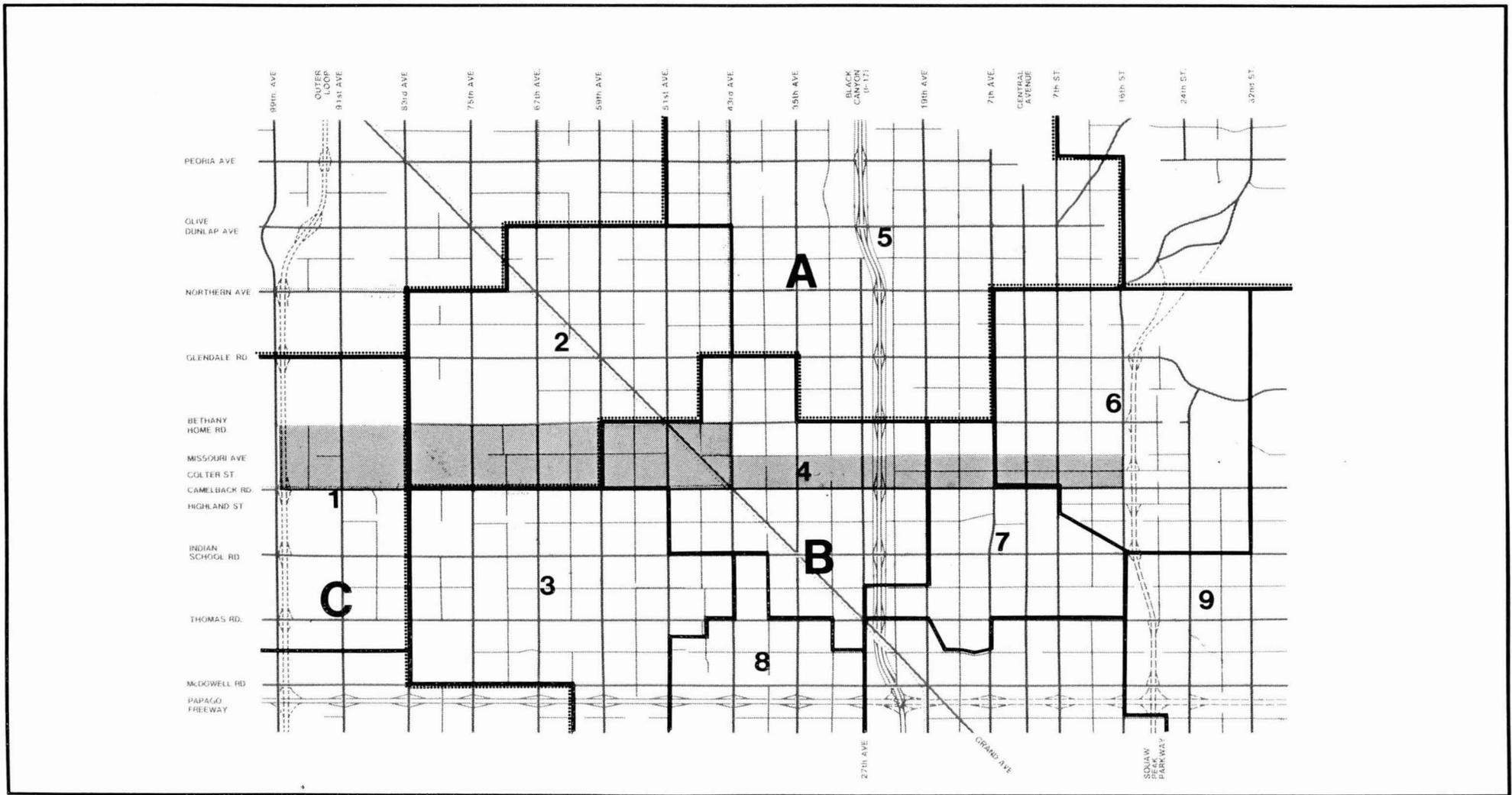
- Elementary School
- Elementary School Boundary
- Junior High School
- Junior High School Boundary
- Paradise Corridor

ELEMENTARY AND JUNIOR HIGH SCHOOL ATTENDANCE AREAS: GLENDALE AND PHOENIX PUBLIC SCHOOLS

SOURCE: SCHOOL DISTRICTS



18



PARADISE CORRIDOR – SR 317

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BKW
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Phoenix, Arizona 85004
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- ELEMENTARY SCHOOL DISTRICT BOUNDARY
- HIGH SCHOOL DISTRICT BOUNDARY
- PARADISE CORRIDOR

- | | |
|--------------|-------------|
| 1 PENDERGAST | 6 MADISON |
| 2 GLENDALE | 7 OSBORN |
| 3 CARTWRIGHT | 8 ISAAC |
| 4 ALHAMBRA | 9 CREIGHTON |
| 5 WASHINGTON | |

- A** GLENDALE UNION
- B** PHOENIX UNION
- C** TOLLESON UNION

PUBLIC SCHOOL DISTRICT BOUNDARIES GLENDALE, PHOENIX AND TOLLESON PUBLIC SCHOOLS

SOURCE: SCHOOL DISTRICTS



19

TABLE 11
PARADISE CORRIDOR SCHOOLS AND ENROLLMENTS

<u>Elementary School Districts</u>	<u>1985-86 Enrollment</u>	<u>3 Year % Change</u>
1. Alhambra Elementary District:		
Andalucia Elementary School	944	+16.0%
Barcelona Elementary School	1,040	+5.0%
Sevilla Elementary School	771	- .5%
2. Glendale Elementary District:		
Bicentennial Elementary School	1,079	NA*
William C. Jack (Unit 6) Elementary School	635	NA*
Don Mensendick (Unit 5) Elementary School	523	NA*
3. Madison Elementary District:		
Madison Number 1 Elementary School	787	-4.0%
4. Osborn Elementary District:		
Solano Elementary School	568	+15.0%
Subtotal	<u>5,347</u>	<u>+6.0%**</u>
 <u>High School Districts</u>		
1. Glendale Union High School District:		
Independence High School	917	+15.0%
2. Phoenix Union High School District:		
Alhambra High School	2,371	-8.0%
Camelback High School	2,726	-3.0%
Central High School	2,501	-10.0%
North High School	1,392	+77.0%
3. Tolleson Union High School District:		
Tolleson Union High School	2,092	+9.0%
Subtotal	<u>11,999</u>	<u>+10.0%</u>
 <u>Private and Parochial Schools</u>		
1. Grace Christian	450	NA
2. Western Bible Institute	55	NA
3. Grand Canyon College	1,516	NA
Subtotal	<u>2,021</u>	
<u>TOTAL CORRIDOR ENROLLMENT</u>		<u>20,367</u>

*Not Available

**Exclusive of Glendale Elementary District which was not available.

Source: School Districts and Individual Schools.

TABLE 12
TOTAL STUDENT ENROLLMENT
FOR DISTRICTS WITHIN THE PARADISE CORRIDOR

<u>Elementary School Districts</u>	<u>1985-86 Enrollment</u>
Alhambra	6,941
Glendale	3,430
Madison	2,607
Osborn	2,231
<u>High School Districts</u>	
Glendale Union	5,704
Phoenix Union	8,990
Tolleson Union	2,092

Source: School Districts

School bus routes for the public schools are determined on a semester-by-semester basis by transportation personnel in each school. General policies which govern the designation of routes are presented below:

Elementary/Junior High Schools:

- (Grades K-4) Bus transportation is generally provided to those students who live one-half mile or more from the school.
- (Grades 5-8) Bus transportation is generally provided to those students who live one mile or more from the school.
- No student will be required to walk more than one-quarter mile to a bus stop.

High Schools:

- Bus transportation is generally provided to those students who live more than one and one-half miles from the school.
- No student will be required to walk more than one-quarter mile to a bus stop.

Both the elementary/junior high schools and the high schools provide transportation services to handicapped and disabled children, regardless of their place of residence.

All crosswalk locations are manned for the elementary and junior high schools. Established crosswalks exist for high schools but these are unmanned.

POLICE AND FIRE FACILITIES

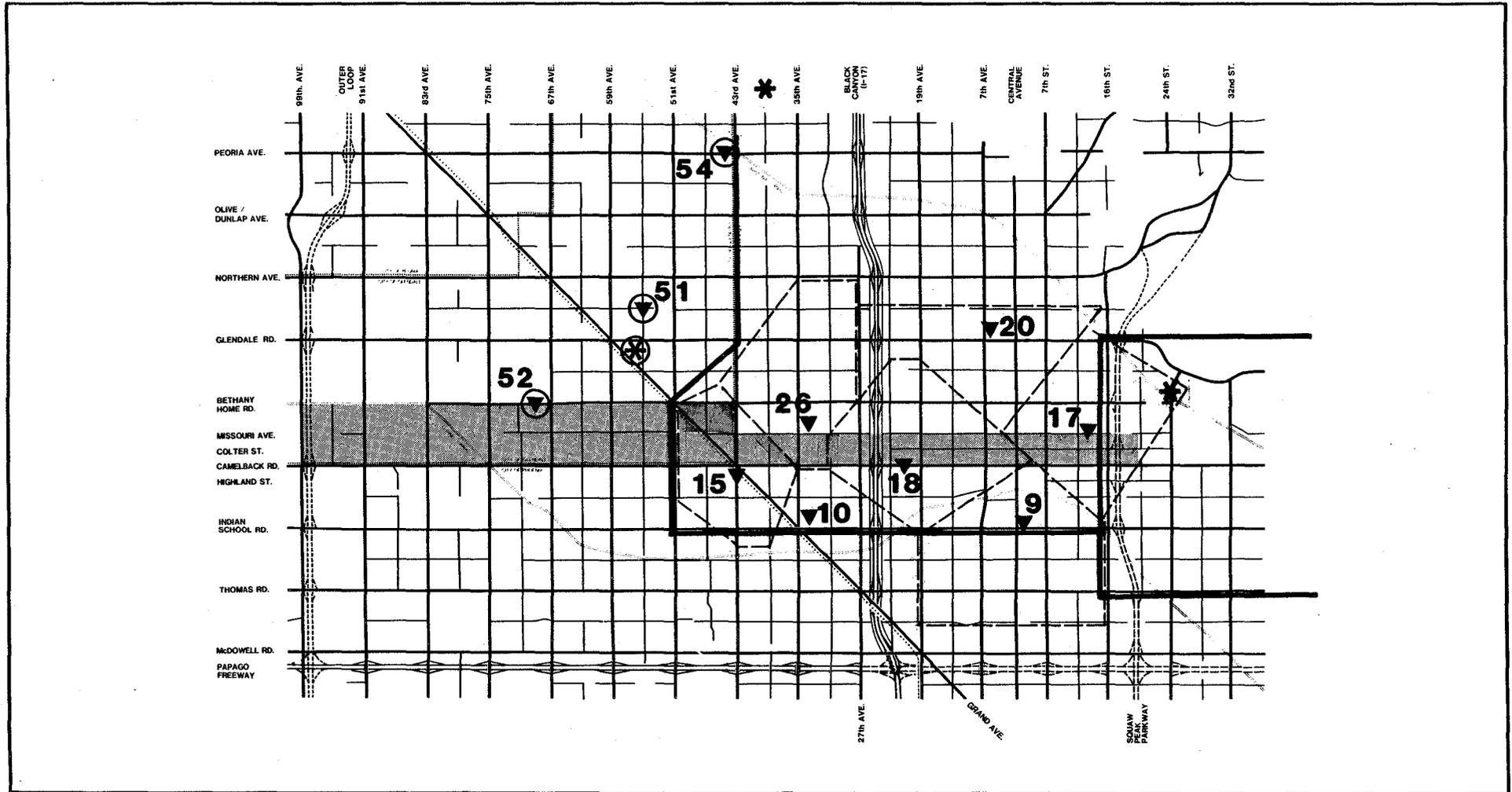
An inventory follows of police and fire stations that are either located in the Paradise Corridor or are assigned to serve areas within the Corridor. In total, three police stations and ten fire stations are listed in Table 13 according to their municipal locations.

**TABLE 13
INVENTORIED POLICE AND FIRE STATIONS**

	Glendale	Phoenix
Police:	Glendale Police Department 7119 North 57th Drive	Cactus Park Precinct 12220 North 38th Avenue Squaw Peak Precinct 6206 North 24th Street
Fire:	Station 51 7505 North 55th Avenue Station 52 6850 West Bethany Home Station 54 4439 West Peoria	Station 9 330 East Fairmount Avenue Station 10 2558 West Thomas Road Station 15 4730 North 43rd Avenue Station 17 1531 East Missouri Avenue Station 18 2040 West Camelback Road Station 20 726 West Glendale Avenue Station 26 3301 West Rose Lane

Source: Glendale and Phoenix Police and Fire Departments.

Each police and fire station in Phoenix serves a defined service area. These service areas are indicated, along with the location of each facility, in Figure 20. Police and fire station facilities in Glendale, also indicated in Figure 20, do not have designated geographical service areas.



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55 Fire Station Number

- Police Service Area Boundary
- * Police, Phoenix
- - - Fire Service Area Boundary
- ▼ Fire, Phoenix
- * Police, Glendale
- ▼ Fire, Glendale

No Specific Service Areas

FIRE & POLICE STATIONS IN PARADISE CORRIDOR

SOURCE: CITY POLICE & FIRE DEPTS.



20

Two fire stations in Glendale are located in areas not shown on Figure 20. These, like the other three fire stations in Glendale, serve the entire municipality rather than predesignated areas.

The implementation of a limited access facility within the designated Paradise Corridor could affect north-south responses from the following facilities:

- Phoenix:
 - Squaw Peak Police Precinct (east of 16th Street).
 - Cactus Park Police Precinct (16th Street to 51st Avenue).
 - Fire Stations 9, 15, 17, 18 and 26.
- Glendale:
 - Police Department service area (43rd Avenue to 99th Avenue).
 - Fire Stations 51 and 52, and all others.

The Phoenix Fire Department has indicated that improvements within the Corridor would enhance response times to the freeway (I-17) and in the east-west direction.

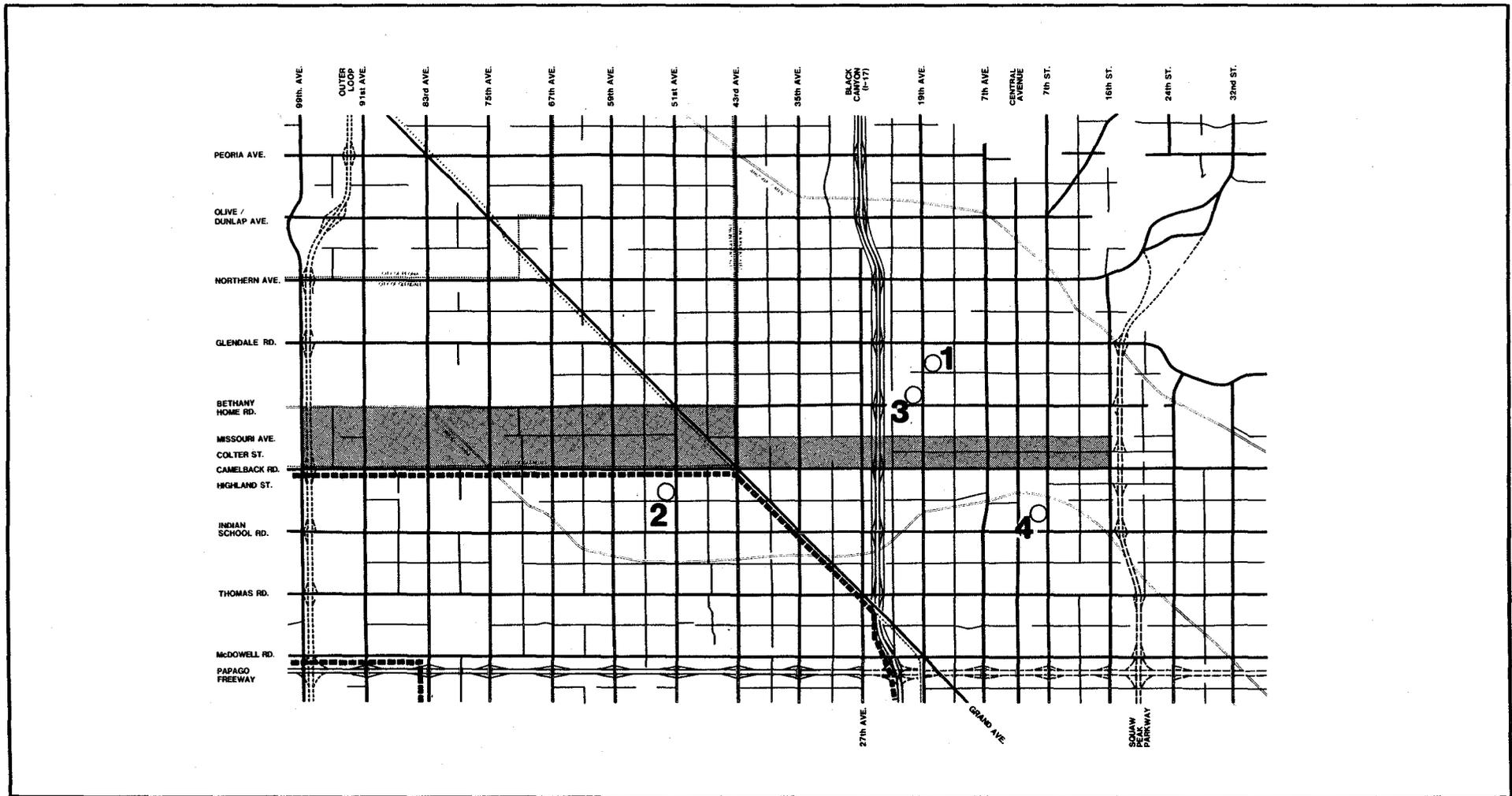
EMERGENCY MEDICAL FACILITIES

This report documents an inventory of emergency medical facilities that are located within or have service areas in the Paradise Corridor. The inventory includes hospitals and medical center facilities that receive patients on an emergency basis and are open twenty-four hours each day. The locations of these facilities are indicated on Figure 21. Table 14, below, lists facilities, addresses, and service areas.

TABLE 14
EMERGENCY MEDICAL FACILITIES

FACILITY	ADDRESS	SERVICE AREA
1. Community Hospital Medical Center	6501 North 19th Avenue	Phoenix Metropolitan Area
2. Maryvale Samaritan Hospital	5102 West Campbell Avenue	Maryvale
3. Phoenix Baptist Hospital and Medical Center	6025 North 20th Avenue	Maricopa County
4. Veterans' Administration Medical Center	7th Street and Indian School Road	Veterans in Maricopa County

Source: BRW, Inc.



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----- Emergency Facility Boundary

- 1** Community Hospital Medical Center
- 2** Maryvale Samaritan Hospital
(Maryvale Service Area Indicated)
- 3** Phoenix Baptist Hospital Medical Center
- 4** Veterans' Administration Medical Center

EMERGENCY FACILITIES IN PARADISE CORRIDOR

SOURCE: BRW INC.



21

Only the Maryvale Samaritan Hospital has a service area that is confined to a specific district within the Metropolitan Area. The northern boundary of the service area (Maryvale Village) is Camelback Road between 43rd and 99th Avenues. West of 99th Avenue, the northern boundary is Bethany Home Road. The western boundary of the service area is 123rd Avenue, and the eastern boundary is the Black Canyon Freeway. Van Buren Street forms the southern boundary of the service area.

The other emergency facilities serve the entire Metropolitan Area or Maricopa County.

PARKS AND RECREATIONAL FACILITIES

An inventory of existing public parks and recreational facilities within the Phoenix portion of the Paradise Corridor follows in Table 15. The inventory indicated the Little Canyon Park is the only public park within the one-half mile wide study area. Other facilities identified in the table are public and private school yards or outdoor recreational areas.

**TABLE 15
PARKS AND RECREATIONAL FACILITIES
WITHIN THE PHOENIX PORTION OF
THE PARADISE CORRIDOR**

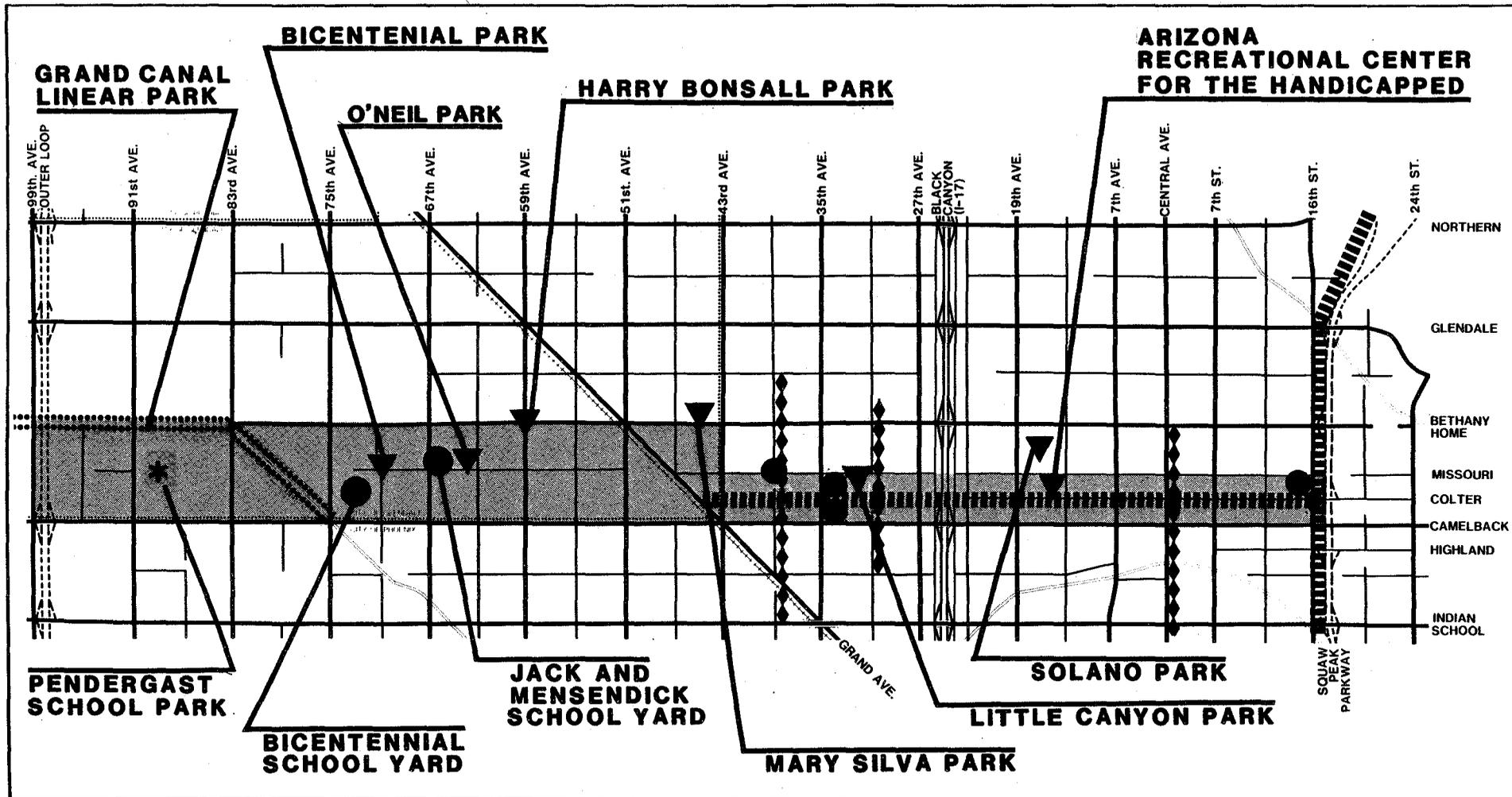
<u>Parks and School Yards</u>	<u>Acres</u>	<u>Facilities Provided</u>
Arizona Recreational Center for the Handicapped (ARCH) 15th and Colter Street	9.6	Recreational facilities, housed in a center, for use by handicapped individuals. Property is leased (20 years) to the ARCH organization by the City of Phoenix.
Grand Canyon College Athletic Field 3300 West Camelback Road	14.0	Collegiate sports events and recreational activities. Civic, church, and community groups are permitted to use the field for soccer, picnics, and open play on a "request to use" basis.
Grand Canyon College Softball Diamond 3300 West Camelback Road	2.0	Softball diamond available to community on a "request to use" basis.
Little Canyon Park Missouri and 32nd Avenues	15.0	Basketball and volleyball courts, open play field, softball diamond, picnic facilities, and on-site parking.

TABLE 15 (cont'd)

Parks and School Yards	Acres	Facilities Provided
Madison Number 1 School Yard 5525 North 16th Street	14.0	Tennis and basketball courts, jogging trails, open play field, and softball diamonds.
Sevilla School Yard 3801 West Missouri Avenue	10.0	Basketball courts, softball diamonds, open play field, and playground equipment.

The locations of the park and recreational areas described in the table are illustrated on Figure 22. Also included on Figure 22 are proposed bicycle routes and bikeways.

The City of Phoenix Bikeways Task Force is currently conducting efforts to inventory and plan improvements and expansions of City bicycle facilities. The work is scheduled for completion by Spring 1987, at which time recommended policies and alignments will be presented to the City Council. The Task Force has expressed a desire to incorporate bicycle routes in the design of a Paradise roadway facility from Grand Avenue to the Squaw Peak Parkway. Bicycle facilities are also under consideration for the western side of Squaw Peak Parkway, between Thomas Road and Greenway Road.



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199a

- - SCHOOL YARD OR RECREATION AREA
- ▼ - EXISTING PUBLIC PARK
- == - PLANNED OR PROPOSED
- ◆◆ - EXISTING BIKEWAY OR BIKE ROUTE
- |||| - PROPOSED BIKEWAY OR BIKE ROUTE

PUBLIC PARK AND RECREATIONAL FACILITIES



SOURCE: BRW INC.

D: ENVIRONMENTAL FEATURES

This section provides a discussion of the environmental features of the Paradise Corridor from a combination of previous data sources and new inventory work by BRW. The objective of this effort was to identify significant resources that may warrant protection or preservation and should be considered in the selection of preliminary roadway alternative alignments. This initial environmental inventory will be expanded in the future into an Environmental Assessment to address specific impacts of alternative roadway locations.

Environmental features discussed below include:

- Air Quality
- Noise Levels
- Cultural Resources
- Visual/Aesthetic, Plant/Animal and Water Resources

AIR QUALITY

The Phoenix Metropolitan Area is a "non-attainment area" due to violations of Federal air quality standards for three pollutants: carbon monoxide (CO), total suspended particulates or dust (TSP), and ozone (O₃). Automobile emissions are the major contributor of all three pollutants, accounting for:

- 86% of carbon monoxide
- 64% of ozone
- 70% of Total Suspended Particulates

A Non-attainment Area Plan, or NAP, was prepared in 1979, providing adopted strategies to achieve attainment of air quality standards. Annual reports are prepared by the Maricopa County Health Department, Bureau of Air Pollution Control, to track attainment progress and identify supplemental strategies where needed. The most recent available Air Quality Report (1984) indicates that since 1979:

- CO emissions have declined by 14%,
- Ozone (VOC) emissions have declined by 11%, and
- TSP (dust) emissions have increased by 27%.

The differences between the emission levels of these three pollutants are related to the reduction strategies. While federal emission controls for new cars and the State of Arizona's Vehicle Inspection and Maintenance Program have been effective in reducing pollutants from the tailpipe, TSP is related to traffic on unpaved roads and shoulders, construction activity and other dust-causing activities. During the same five year period:

- Population increased 19%
- Vehicle registrations increased 23%
- Vehicle miles travelled increased 17%

Other strategies which have already been implemented include the following:

- Traffic signal coordination
- Public transit improvements
- Carpool and vanpool programs
- On-street parking removal
- Reversible lanes
- Freeway ramp metering

In addition to the above strategies, the Arizona State Legislature, in 1985-86, strengthened the Vehicle Inspection and Maintenance Program to include automobiles over thirteen years old and increase the minimum expenditure required to bring violating vehicles into compliance.

Strategies to reduce transportation-related air pollution generally fit into one of three categories, reducing emissions by:

- Reducing vehicular travel demand (transit, carpools, vanpools, pedestrian-ways, etc.),
- Reducing tailpipe output, or
- Providing for more efficient traffic flow.

The construction of a controlled-access roadway in the Paradise Corridor would fit in the latter category, since it would provide for uninterrupted traffic flow as an alternative to the stop and go on arterial streets. Compared to doing nothing (No Build Alternative), constructing a controlled access roadway in the Paradise Corridor would result in:

- A 13% increase in average travel speed
- A reduction of about 350,000 vehicle miles travelled per day
- A reduction of about 50,000 gallons of fuel consumed per day
- A reduction of about 5,000 kilograms of hydrocarbons and 63,000 kilograms of carbon monoxide per day.

NOISE LEVELS

Noise is generally defined simply as "unwanted sound." Sounds are described as noise if they interfere with an activity or disturb the person hearing them. The sounds of traffic on highways and construction equipment operations are generally considered obtrusive and classified as noise.

A noise monitoring program was conducted in April and May 1986 to examine existing noise levels at identified sensitive receptors within the designated Paradise Corridor. Sensitive receptors included schools, parks and residential neighborhoods. Monitoring sites and procedures were reviewed with ADOT's Environmental Planning Services Section prior to the start of the monitoring program.

A 20-hour sample was conducted at the first site (at Grand Canyon College) to establish the noisiest time period of the day. Based on the results, either morning or evening peak traffic periods were monitored at the remaining eight sites. Monitoring data was collected with a Metrosonics dB-602 Statistical Sound Level Analyzer consistent with the previously approved sampling procedures. Traffic and vehicle classification count information was recorded at each sampled site where there was a roadway noise source. Aircraft and other unusual noise events were also recorded.

The locations where monitoring was conducted are shown on Figure 23 along with the resulting measured noise levels. The noise readings are reported in decibels on the "A" scale (dBA) which is weighted to reflect human perceptions (the human ear is more sensitive to middle and high frequency sounds). Decibels are logarithmic and cannot be added or subtracted arithmetically. For example 67 dB plus 67 dB equals 70 dB. Thus, a 3 dB increase in sound levels represents a doubling of the sound energy. Although a human ear can detect a sound level change as small as 1 dB, 3 dB is considered the smallest noticeable change for a time varying source such as a highway. A change of 10 dB is perceived by most people to be a doubling or halving of the "loudness" of a sound.

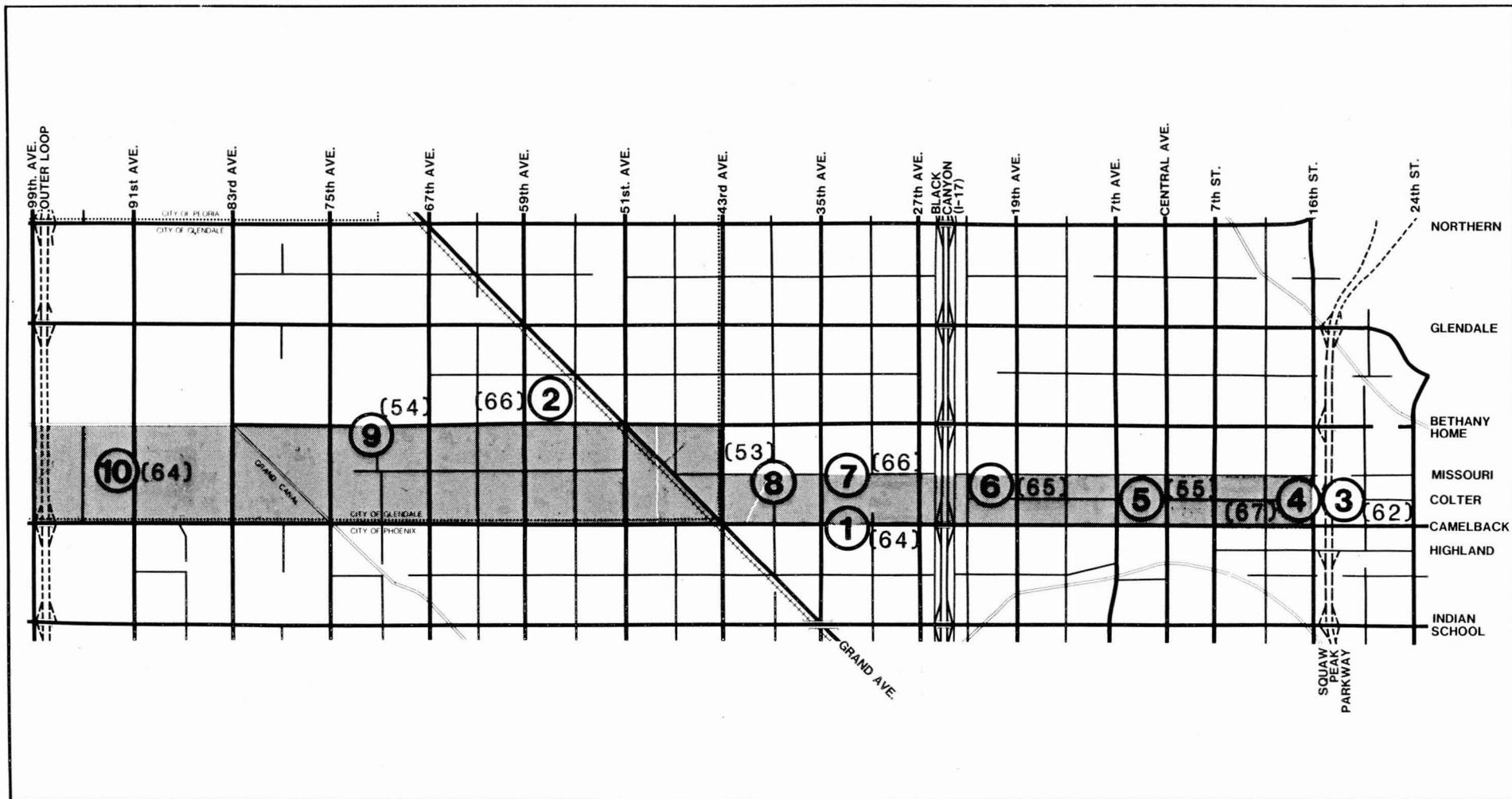
Further information on the noise monitoring sites is shown in Table 16, including the predominant land use, distance from the noise source, traffic volume (where applicable) and measured noise level.

Federal noise abatement criteria are shown in Table 17. Although no federal funds are expected to be involved in the implementation of improvements in the Paradise Corridor, it is ADOT's policy to adhere to the federal criteria when possible on state-funded projects.

Both measurement results and federal/state criteria are shown in terms of the Leq descriptor, which is the equivalent steady state sound level over a specific time period, typically one hour.

Of the nine sites monitored, all but two (Sites 3 and 4) would be classified within the federal activity category B, to which the 67 dBA guideline would apply. All seven sites were measured below this level, although Bonsall Park and Little Canyon Park were within one decibel of the guideline. Activity category C (72 dBA) would apply to Sites 3 and 4 which are developed lands with office and commercial land uses. The monitored noise levels at these two locations were also below the applicable guideline.

In conjunction with the future preparation of an Environmental Assessment, noise levels will be predicted for alternative roadway locations and/or designs. The STAMINA highway traffic noise prediction model will be used to predict existing and future traffic noise levels for comparison with the measured existing levels and the federal guidelines. Where impacts are identified, noise mitigation measures will be considered, including changes in the vertical and horizontal alignment and noise barriers.



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- ① Monitoring Location
- (00) Observed Noise Level
(Leq in dBA)

NOISE MONITORING SITES

APRIL/MAY 1986



Source: BRW

23

TABLE 16
NOISE MONITORING RESULTS

	SITE LOCATION	PREDOMINANT LAND USE	PRINCIPAL NOISE SOURCE	DISTANCE FROM SOURCE	1985 ADT ¹	MEASURED dBA Leq
1.	Camelback at 33rd Ave.	Grand Canyon College	Camelback	67'	43,900	64
2.	59th Ave. at Bethany Home	Bonsall Park	59th Avenue	45'	26,661	66
3.	Colter East of 16th St.	Office/Commercial	16th Street	160'	39,600	62
4.	16th St. North of Colter	Office/Commercial	16th Street	45'	39,600	67
5.	23rd Ave. at Georgia	Simpson Elementary School/Residential	23rd Avenue	33'	8,500	65
6.	Missouri at 33rd Ave.	Little Canyon Park/Residential	Missouri Avenue	51'	5,400	66
7.	Missouri at 39th Ave.	Sevilla School Ballfield	Aircraft, Students	NA	NA	53
8.	71st Avenue at Rancho Drive	Residential	71st Avenue	42'	1,445	54
9.	91st Avenue South of Grand Canal	Agricultural	91st Avenue	45'	4,000 ²	64

Source: BRW, Inc.

¹Average Daily Traffic (ADT) Source: Cities of Phoenix and Glendale

²Estimated by BRW

TABLE 17
 FEDERAL NOISE ABATEMENT CRITERIA
 HOURLY A-WEIGHTED SOUND LEVEL - DECIBELS (dBA)

ACTIVITY CATEGORY	Leq*	DESCRIPTION OF ACTIVITY CATEGORY
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

*Leq is the equivalent steady-state sound level, usually measured over a one-hour period.

Source: Chapter 1, Title 23, Code of Federal Regulations, Part 772
Procedures for Abatement of Highway Traffic Noise and Construction Noise.

CULTURAL RESOURCES

A records search was conducted to identify any known prehistoric or historic cultural resources in or near the Paradise Corridor study area. The sources for the records search included the following:

- Arizona Department of Transportation, Archaeologist
- Arizona State Museum, Site File
- Arizona State University, Department of Archaeology and Anthropology
- Pueblo Grande Museum, City of Phoenix Archaeologist
- Grand Avenue Corridor Study
- State Historic Preservation Office, Deputy SHPO
- Mesa Southwest Museum, Director

The findings of this research are indicated by prehistoric and historic categories below.

Prehistoric Resources

In addition to the Paradise Corridor study area limits, an examination of the nearby surrounding area was studied to determine the existence of any sites that may be pertinent to the Project's development (i.e. records of canals and sites that may extend in the direction of the project area).

Interviews with State Historic Preservation Office (SHPO) staff members and a review of the appropriate site files located one archaeological site loci AZ T:8:12(GP). Information regarding this "probable village" is located in the SHPO card files - card #823. This site is also recorded under the Arizona State University system as AZ T:8:12(ASU).

Numerous other prehistoric sites occur in the area, but SHPO records indicate none that are within the Corridor or within one mile, with the exception of the village site of "Alhambra" that is exactly one mile south. It lies on the south side of a canal and is minimally significant for this study.

The Laboratory Curator of the Arizona State University Department of Archaeology and Anthropology provided important data from the Frank Midvale map and notes collection. Frank Midvale's Sketch Map, 4th Edition dated 1/24/66 and revised 10/16/69 shows three significant variations from Omar Turney's "Prehistoric Irrigation Canals" dated 1929.

1. Midvale shows the main canal as curving further west in the project area and exiting in the Southwest quarter of Section 15, T2N, R2E.
2. Turney shows one branch canal extending southerly from the main canal in Section 13, T2N, R2E, while Midvale shows this branch plus a second extending from the middle of the Southeast quarter of Section 13, T2N, R2E. Midvale labels this as "S. W. Branch."

3. Midvale locates the prehistoric site AZ T:8:12(GP) as "Lessor well known and many smaller ruins."

In addition to the maps, Midvale's papers and notes were also examined.

The major prehistoric canal originating near Pueblo Grande travels northwest and enters the Paradise Corridor in the Southwest quarter of Section 16, T2N, R3W, where it begins a westerly direction curving through Sections 17 and 18 in T2N, R3E. To this point both the Turney (1929) and Midvale (1966) records are comparable. In Section 13, T2N, R2E, the canal continues to curve in a southwesterly direction. As reported by Midvale a branch termed the "S. W. Branch," in the Southeastern half of this section leaves the main canal near the south centerline. Also in the southwest quarter of this same section both Turney and Midvale report a second smaller branch running southerly from the corridor. They both report "knolls" are located in the "Y" of this branch. Turney indicates that the main canal then exits the south center of Section 14, T2N, R2E. Midvale, who was using Turney's map as a base map shows the main canal as moving westerly through Section 14 and into Section 15, T2N, R2E, where it swings southwesterly and exits the corridor in the Southwest quarter. Near the canal in Section 15, is the location of the "probable village" site AZ T:8:12(GP).

The west seven sections of the Corridor (Glendale Segments) have no known prehistoric features, however, there is a high probability of the existence of prehistoric cultural materials, as several sites are reported to the west and north of this area.

The Phoenix segment should be expected to contain prehistoric cultural resources along the entire length of the canal(s) corridor(s), and agricultural support facilities (i.e., small farming shelters, house structures and possible villages) most likely were constructed along these major irrigation routes. The intersections of canals also may mark locations of higher prehistoric activity with relation to agricultural practices.

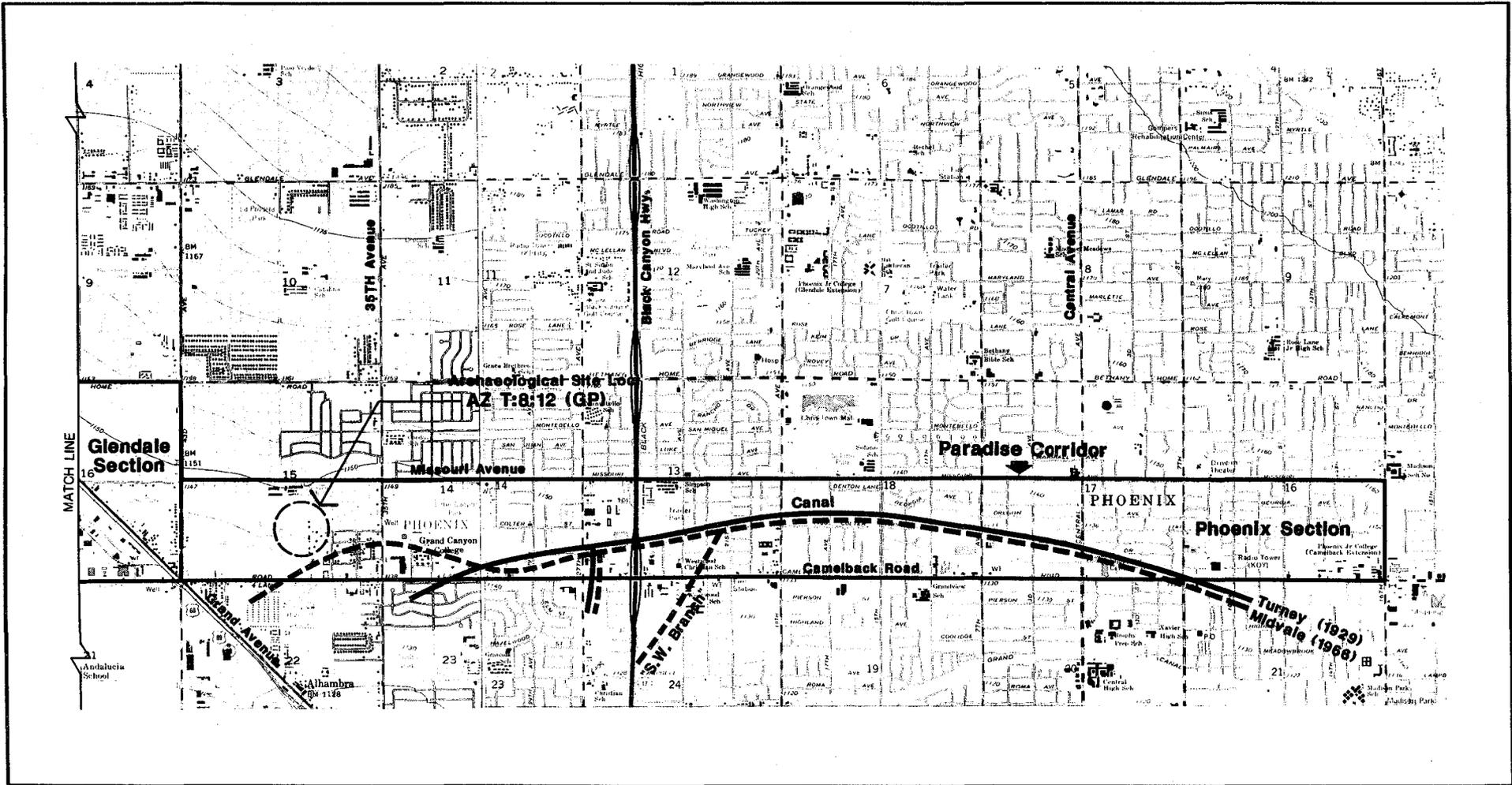
Figure 24 locates previously recorded archaeological cultural resources within the project study limits.

Historic Resources

No resources were found which were already listed on the National or State Registers. However, 152 potentially eligible historic sites were identified from a parcel by parcel review of the Maricopa County Assessment Records. The review was conducted to identify buildings constructed prior to 1937. The resulting list of structures was verified by windshield survey.

This list is categorized below by land use district and by the date of construction. The land use districts are illustrated in Figure 25. These districts are defined by arterial and collector streets.

A detailed list of structures by street address and assessor's parcel code is included in the Appendix. The structures listed are illustrated by location on Figures 26 a, b and c.



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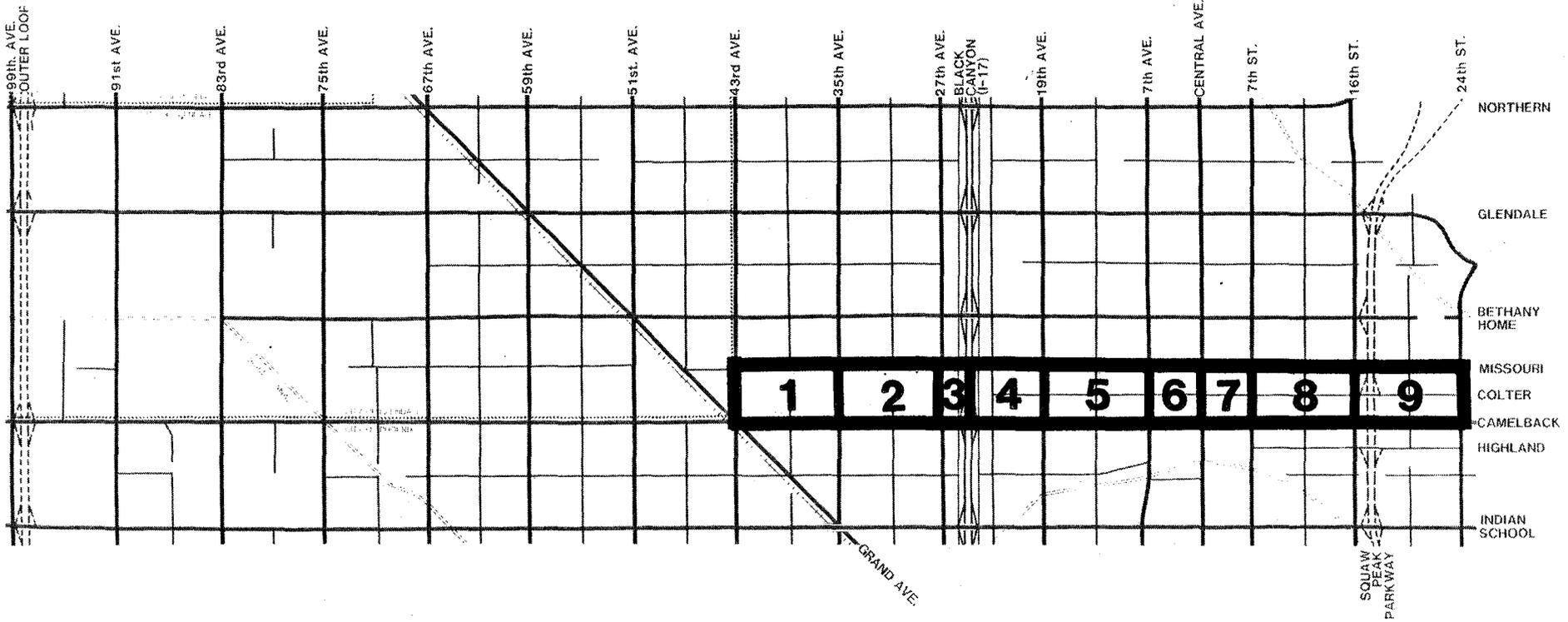
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SOURCES: FRANK MIDVALE'S SKETCH MAP,
4th EDITION , 1/24/66 AND 10/16/69
OMAR TURNEY'S PREHISTORIC IRRIGATION CANALS ,1929.

PREHISTORIC CULTURAL RESOURCES



24



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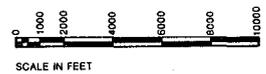
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URBAN SEAMS
OCTOBER 1986

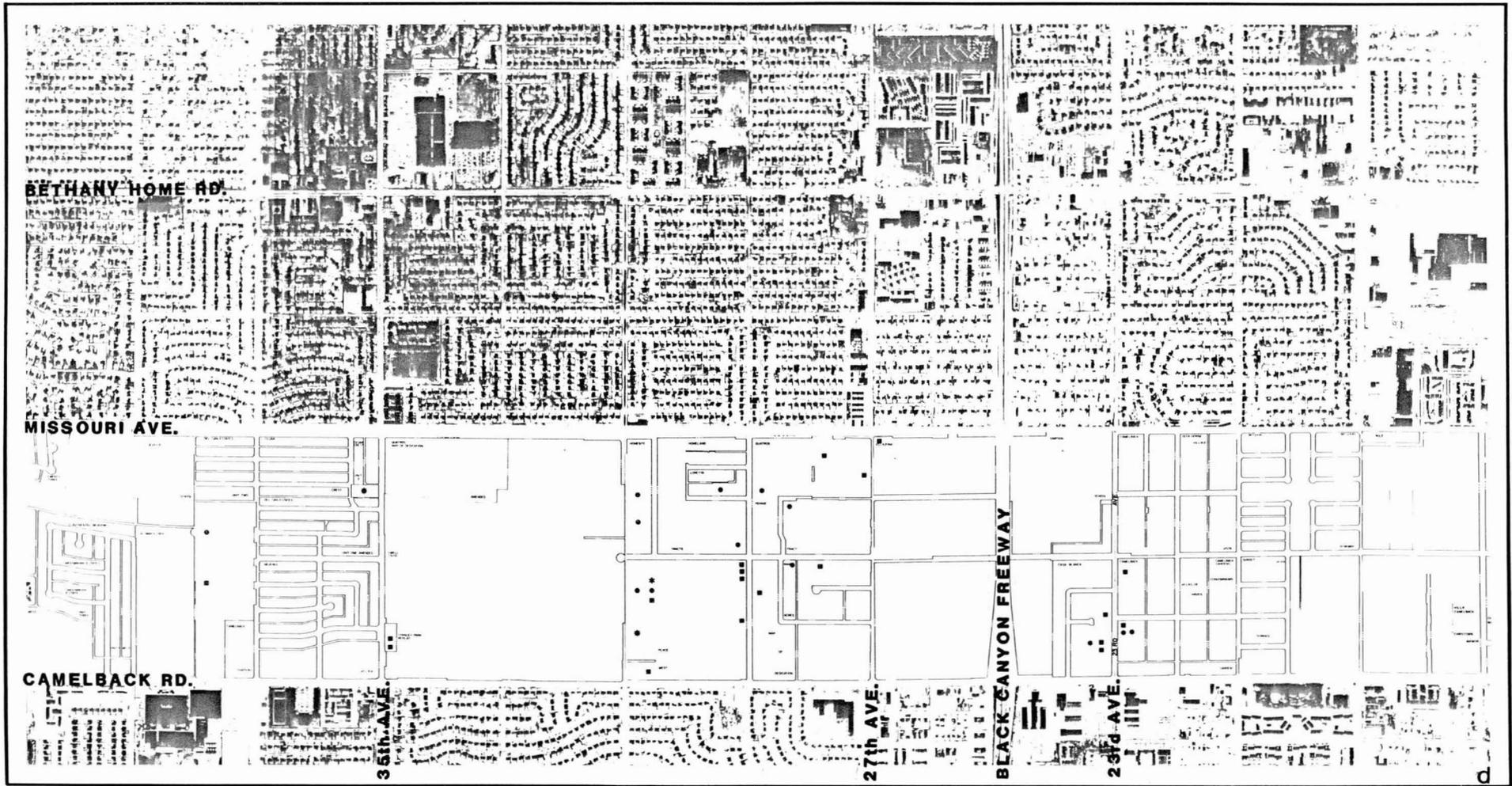
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SOURCE: BRW INC.



25



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CONSTRUCTION YEAR

- * 1900-1910
- 1911-1920
- 1921-1930
- 1931-1937

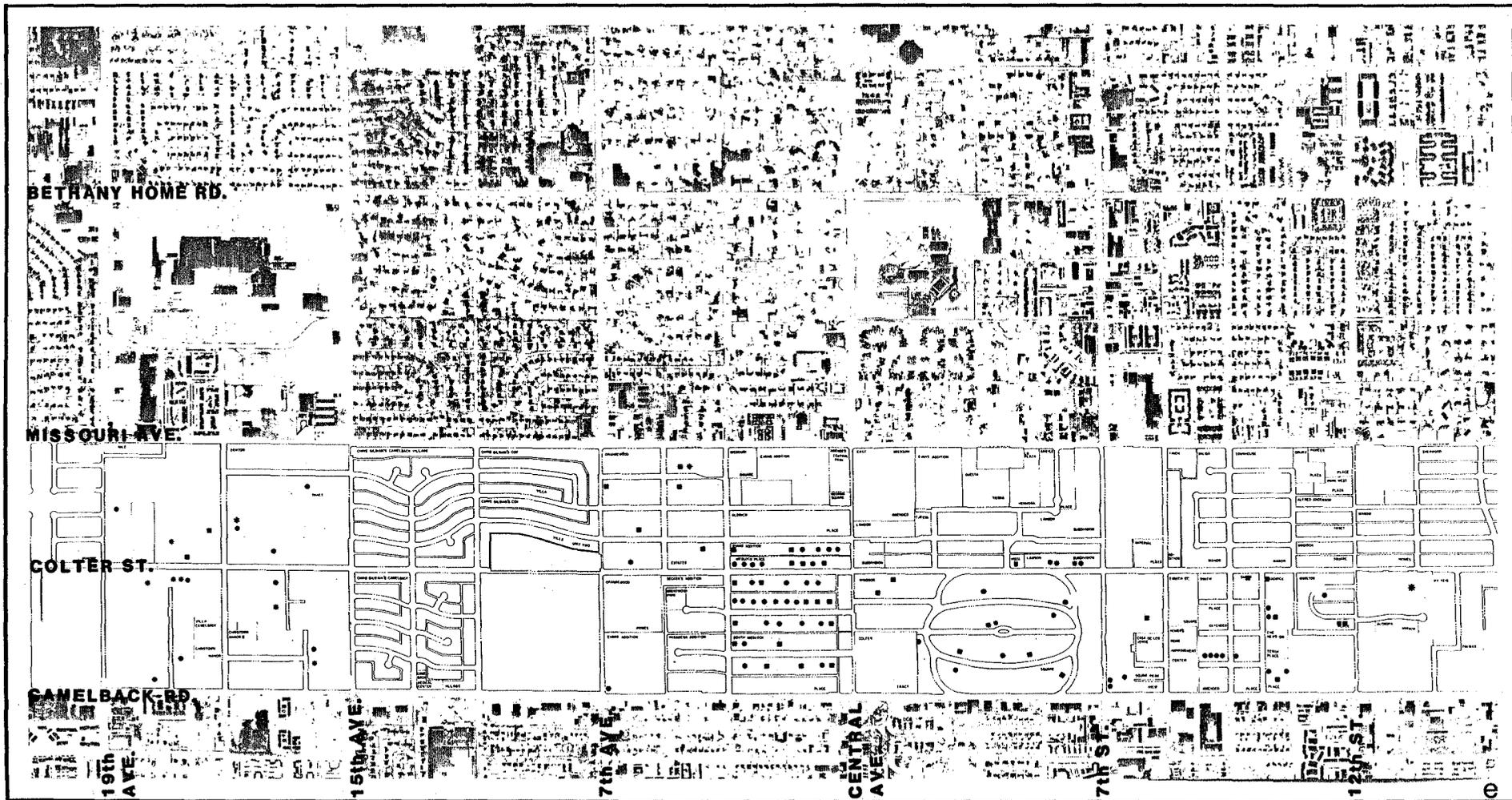
POTENTIAL HISTORIC STRUCTURES



26a

SOURCE: MARICOPA COUNTY ASSESSOR RECORDS, BRW INC.

SCALE IN FEET



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CONSTRUCTION YEAR

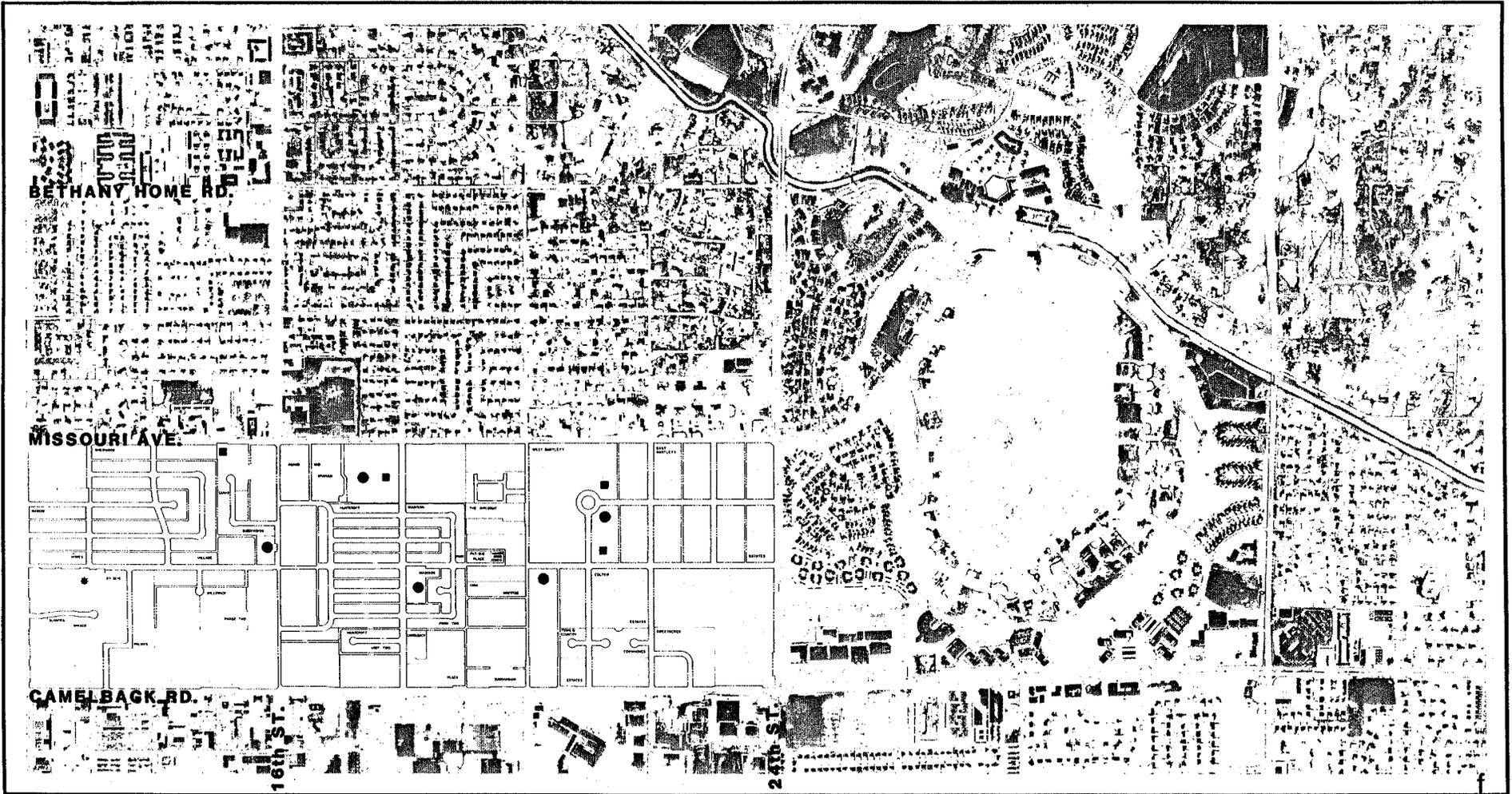
- * 1900-1910
- * 1911-1920
- 1921-1930
- 1931-1937

POTENTIAL HISTORIC STRUCTURES



26b

SOURCE: MARICOPA COUNTY ASSESSOR RECORDS, BRW INC.



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CONSTRUCTION YEAR

- * 1900-1910
- * 1911-1920
- 1921-1930
- 1931-1937

POTENTIAL HISTORIC STRUCTURES



26c

SOURCE: MARICOPA COUNTY ASSESSOR RECORDS, BRW INC.

TABLE 18
POTENTIAL HISTORIC STRUCTURES - PHOENIX **

District	Year 00-05	06- 10	11- 15	16- 20	21- 25	26- 30	31- 35	36- 37	Total
1			1			1	1		3
2	1		1	1	2	5	9	2*	21
3							1		1
4			1			1	2	1	5
5	1		1	5	4	6	4	1*	22
6				2	6	22	19	3	52
7				3	3	6	4	2	18
8				1	5	8	4	5	23
9					1	3	3		7
Total	2	0	4	12	21	52	47	14	152

* Includes potential contributing historic structure.

** Only the 50 year age criterion was considered. No attempt was made to establish whether other Register-listing criteria are met.

Source: BRW, Inc., December 1986.

VISUAL/AESTHETIC, PLANT/ANIMAL AND WATER RESOURCES

More specific information on the location and design features of the roadway is needed before a meaningful assessment of these features is conducted. After a smaller number of preferred location alternatives have been selected, more environmental analysis will be undertaken.

E: UTILITIES

The major utilities located within the Phoenix portion of the Paradise Corridor are shown on Figures 27a and b. This information was inventoried from the following sources.

- Utility company quarter-section maps,
- Utility company as-built plans, and
- Direct follow-up contact with major utility company representatives.

Most of the major utilities cross the Corridor along the section line street alignments or parallel the Corridor along the Camelback Road and Missouri Avenue alignments. A brief description of the facilities and potential impacts by utility follows.

IRRIGATION

The Salt River Project provides irrigation water for this area. Irrigation lines are 48 inches in diameter or smaller, and are located along the section and mid-section street alignments. There are four SRP well sites within the Phoenix portion of the Paradise Corridor.

WELL SITES

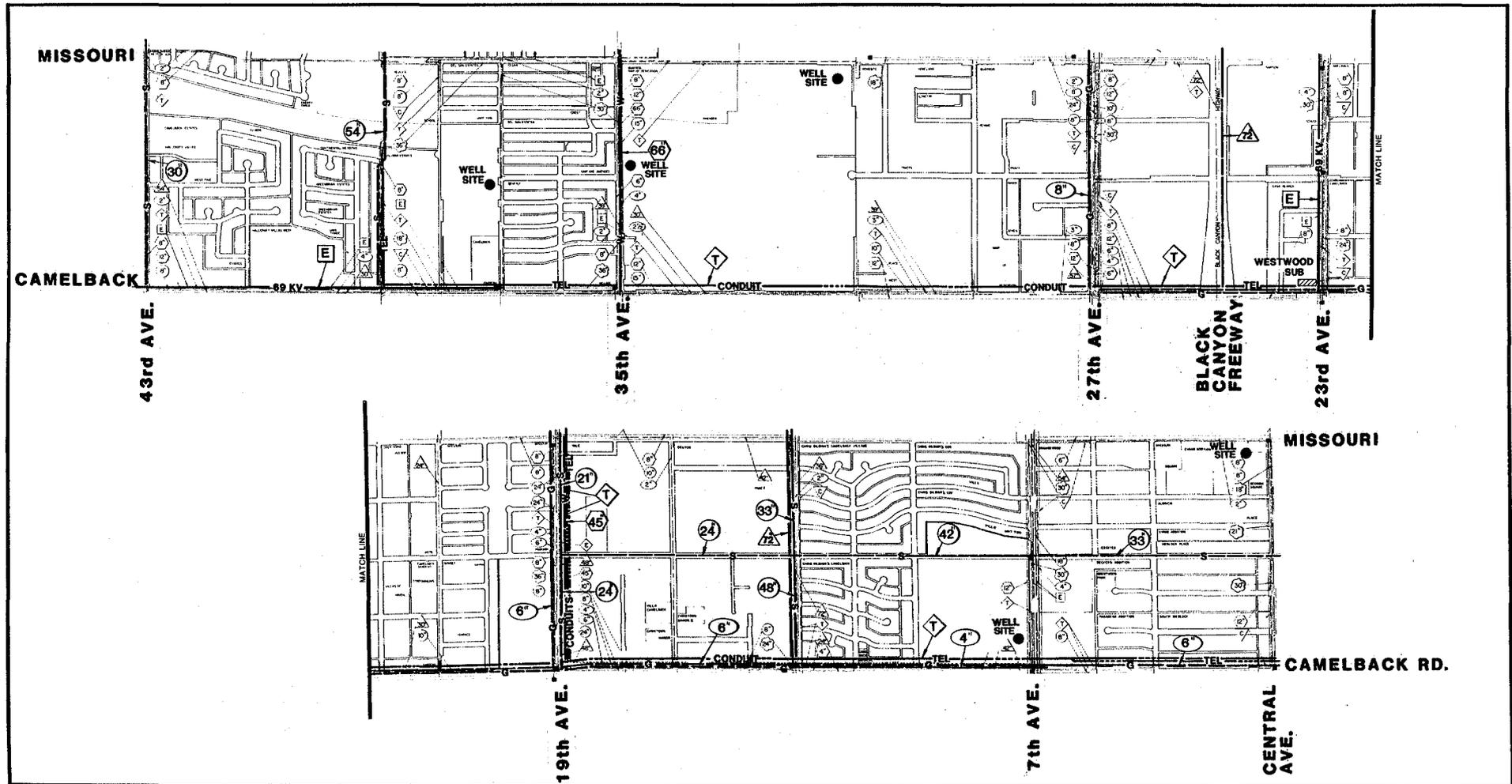
Salt River Project and City of Phoenix own well sites within the Corridor. The wells are used for municipal water supplies and irrigation. The estimated cost to construct a replacement well is from one-quarter to one-half million dollars.

WATER LINES

There are three major water transmission mains within the Phoenix area. A 66 inch diameter line along 35th Avenue, a 45 inch line along 19th Avenue and a 60 inch main along 20th Street. No municipal water treatment plants are in the corridor study area. The City of Phoenix does have two well sites in the Phoenix segment of the Corridor.

SANITARY SEWER

Major sewer trunk lines are located along 43rd, 39th and 15th Avenues. The largest is a 54 inch diameter line in 39th Avenue. A sewer trunkline, which parallels the Corridor in Colter Street between 19th Avenue and 20th Street varies in size from 24 inches to 42 inches in diameter. No municipal sewer treatment plants are in the Corridor.



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SOURCE: BRW/RGA - THROUGH CONTACTS WITH UTILITY COMPANIES

UTILITY SYMBOL

-  WATER - CITY OF PHOENIX
-  SAN. SEWER - CITY OF PHOENIX
-  STORM DRAIN - CITY OF PHOENIX
-  IRRIGATION - SALT RIVER PROJECT
-  TELEPHONE - MOUNTAIN BELL
-  GAS - SOUTHWEST GAS CO.
-  ELECTRIC - SALT RIVER PROJECT
-  CABLE T.V. - DIMENSION CABLE

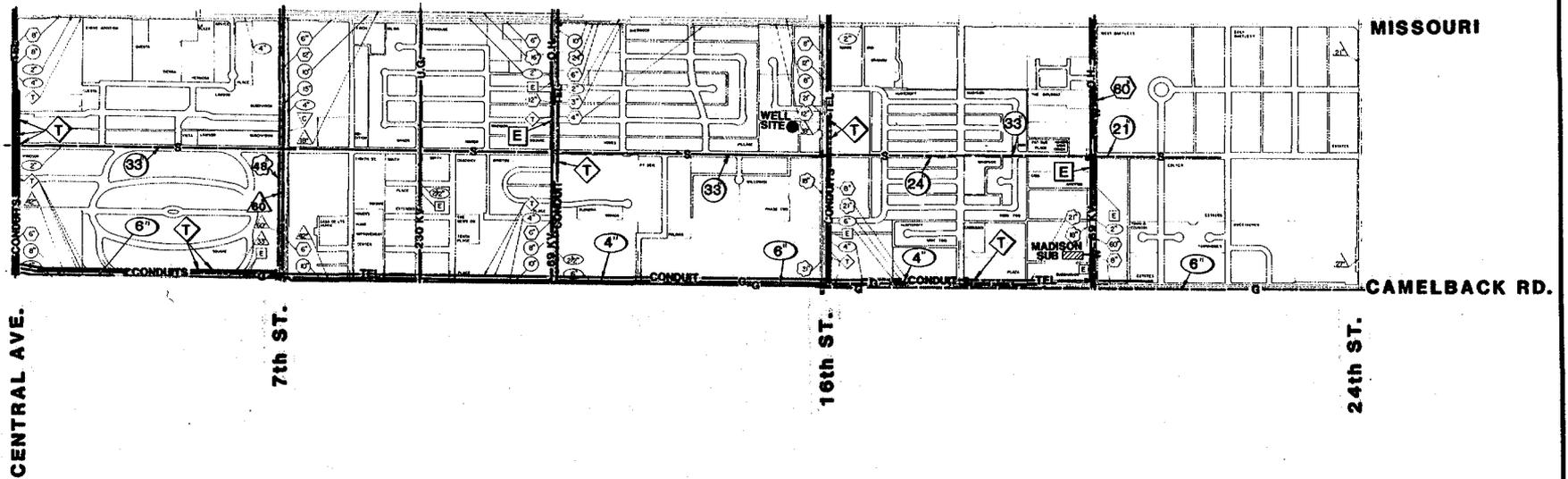
HIGHLIGHTED MAJOR UTILITIES

- (WELL SITES, BOOSTER STATIONS AND LINES 16" AND GREATER)
- (10" AND GREATER)
- (54" AND GREATER)
- (WELL SITES, CANALS AND LINES 48" AND GREATER)
- (CONDUIT - I.E., 16-4" B PLASTIC DUCTS - AND SWITCHING STATION)
- (REGULATORS AND LINE 4" AND GREATER)
- (SUBSTATIONS - 69 KV & 230 KV)

UTILITIES



27a



PARADISE CORRIDOR - SR 317

Arizona Department of Transportation

BRW
2700 North Central Avenue
Phoenix, Arizona 85004
234-1591



SOURCE: BRW/RGA - THROUGH CONTACTS WITH UTILITY COMPANIES

UTILITY SYMBOL

-  WATER - CITY OF PHOENIX
-  SAN. SEWER - CITY OF PHOENIX
-  STORM DRAIN - CITY OF PHOENIX
-  IRRIGATION - SALT RIVER PROJECT
-  TELEPHONE - MOUNTAIN BELL
-  GAS - SOUTHWEST GAS CO.
-  ELECTRIC - SALT RIVER PROJECT
-  CABLE T.V. - DIMENSION CABLE

HIGHLIGHTED MAJOR UTILITIES

- (WELL SITES, BOOSTER STATIONS AND LINES 16" AND GREATER)
- (10' AND GREATER)
- (54' AND GREATER)
- (WELL SITES, CANALS AND LINES 48' AND GREATER)
- (CONDUIT - I.e., 16-4" B PLASTIC DUCTS - AND SWITCHING STATION)
- (REGULATORS AND LINE 4' AND GREATER)
- (SUBSTATIONS - 69 KV & 230 KV)

UTILITIES



27b

TELEPHONE

There are no telephone switching stations within the Phoenix portion of the Corridor. Conduit runs of various magnitudes are located along most of the major street alignments. The telephone company must be able to have access to all telephone manholes which are located every 600 to 700 feet along conduit runs.

ELECTRIC

The Salt River Project provides power to the Phoenix segment of the Corridor except between 7th Avenue and 16th Street, which is served by Arizona Public Service. SRP has two substations within the Phoenix segment. The substations are adjacent to Camelback Road and are located at 23rd Avenue and at 20th Street. APS does not have any substations in the Corridor. Overhead transmission lines of 69 KV and 12 KV cross the alignments at several locations. A 230 KV underground transmission line is located along 10th Street. Any adjustments to the line would require extensive design time and construction cost (adjustment of the vertical alignment would require approximately one year of design time and the construction costs would be about \$1.2 million).

STORM DRAINS

The City of Phoenix has storm drains crossing the Corridor along most of the section and mid-section street alignments. The storm drains range in size up to 72 inches in diameter.

CABLE TELEVISION

Dimension Cable serves the Phoenix segment of the Corridor. It has no major facilities that would affect route selection.

RAILROADS

There are no railroads in the Phoenix portion of the Corridor.

GAS

Southwest Gas Company serves the area. Its lines within the Corridor are eight inches in diameter and smaller. Gas regulators shown are estimated to cost less than \$13,000 to replace.

F: OFF-SITE HYDROLOGY AND DRAINAGE

This section summarizes the off-site hydrologic study for the proposed Paradise Corridor using the simulated computer model TR-20 (Technical Release No. 20). The analysis is currently in progress, but preliminary flow results are now available. Final flow results will be utilized to design for the storm facilities to provide sufficient capacity for peak discharges during the required storm event.

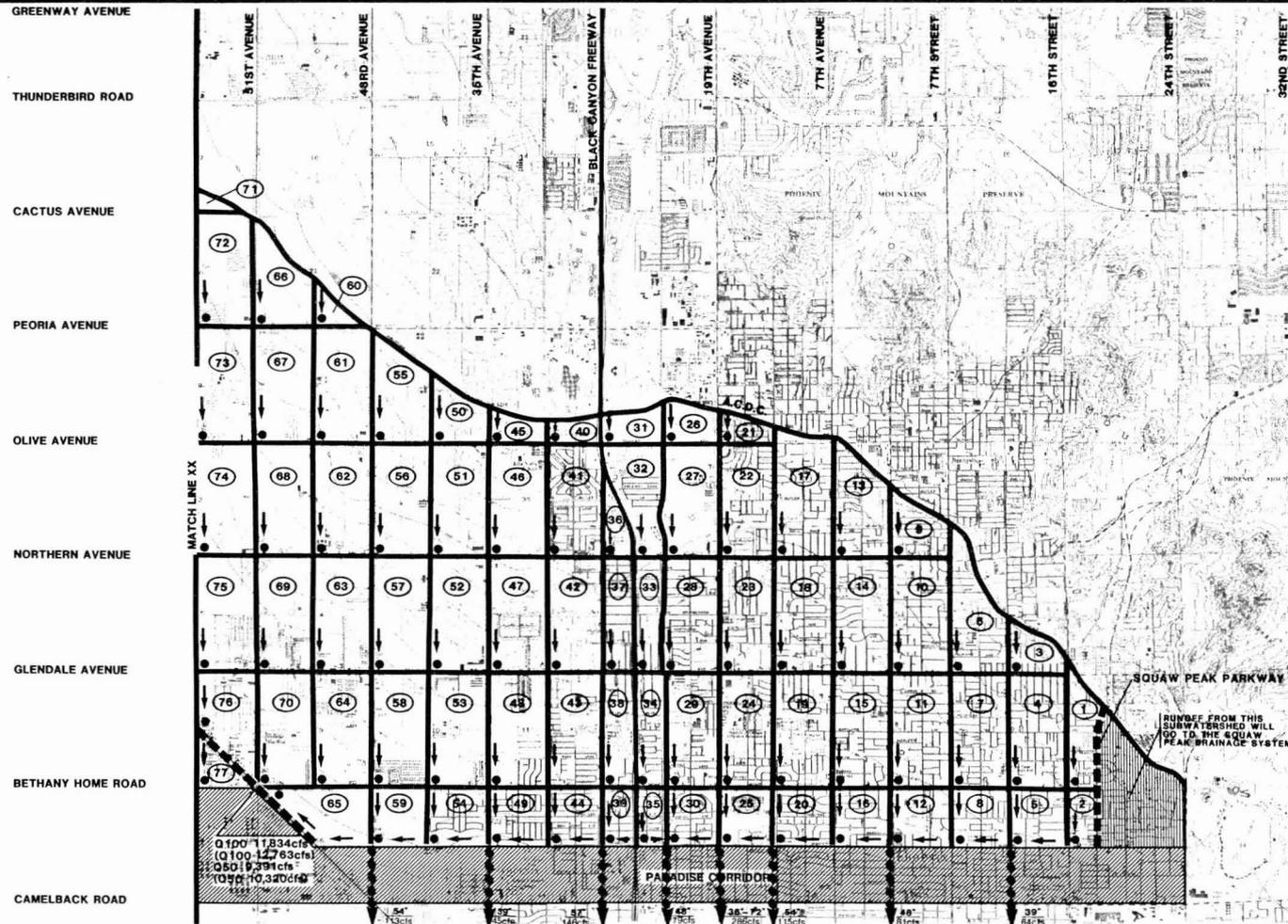
STUDY AREA

The off-site drainage area impacting the Paradise Corridor consists of approximately 45 square miles, of which 21 square miles lie within the City of Phoenix and the rest in the Cities of Glendale and Peoria. The watershed is bounded by the Squaw Peak Parkway on the east, the Arizona Canal Diversion Channel (ACDC) on the north, the Outer Loop Freeway on the west and the Paradise Corridor on the south (see Figures 28a and b).

As the roadway alignment has yet to be determined, the southern boundary for the watershed was assumed as the northern edge of the Corridor. The boundary line extends on Missouri Avenue from 24th Street to 47th Avenue, then along the proposed Grand Avenue Expressway to 51st Avenue, and follows Bethany Home Road from 51st Avenue to 99th Avenue (Outer Loop Freeway). The drainage area is expected to be larger if the alignment of the roadway selected is further south, and therefore the peak discharges as reported herein will be slightly longer.

The topography of the entire watershed generally consists of mild slopes with uniform grades oriented in the southwest direction at approximately 0.40 percent. The majority of the drainage area has been developed for residential, commercial and industrial usages except for the existing agriculture in the western and northwestern portion. Site retention requirements were considered for the undeveloped areas for future land uses. The hydrologic computer modeling was undertaken using the USDA Soil Conservation Service computer model TR-20. The modeling was for future conditions using data from USGS maps, the City of Phoenix, the City of Glendale and ADOT.

The runoff from the area east of the Squaw Peak Parkway will be intercepted by the Squaw Peak Parkway and conveyed to the Papago Freeway. The runoff north of the ACDC will be intercepted by that facility and conveyed west to Skunk Creek. There are existing storm drains within the City of Phoenix in 16th Street, 7th Street, 7th Avenue, 15th Avenue, 19th Avenue, 27th Avenue, 35th Avenue and 43rd Avenue. Information on existing storm drains was obtained from records in the City of Phoenix Central Files and was not field surveyed.



Subarea Characteristics					
Subarea Number	Area (sq. mi.)	Hydrologic Soil Type	Weighted Curve Number	Hydraulic Length (ft.)	Time of Concentration (hrs)
1	0.250	B	85	5.800	1.289
2	0.125	B	84	2.900	0.644
3	0.165	B	84	2.500	0.556
4	0.500	B	85	5.900	1.311
5	0.250	B	85	3.700	0.822
6	0.446	B	84	6.900	1.533
7	0.500	B	85	5.900	1.311
8	0.250	B	86	3.700	0.822
9	0.233	B	83	3.300	0.733
10	0.500	B	81	5.900	1.311
11	0.500	B	82	5.900	1.311
12	0.250	B	83	3.700	0.822
13	0.442	B.C	83	5.300	1.178
14	0.500	B.C	84	5.900	1.311
15	0.500	B	82	5.900	1.311
16	0.250	B	85	3.700	0.822
17	0.544	C	85	5.900	1.311
18	0.500	C	85	5.900	1.311
19	0.500	B.C	86	5.900	1.311
20	0.250	B.C	86	3.700	0.822
21	0.092	C	88	2.600	0.578
22	0.500	C	86	5.900	1.311
23	0.500	C	86	5.900	1.311
24	0.500	C	89	5.900	1.311
25	0.250	C	93	3.700	0.822
26	0.159	C	89	2.900	0.644
27	0.470	C	86	5.900	1.311
28	0.500	C	88	5.900	1.311
29	0.500	C	89	5.900	1.311
30	0.250	C	82	3.700	0.822
31	0.119	C	82	3.200	0.711
32	0.343	C	88	5.500	1.222
33	0.250	C	88	5.400	1.200
34	0.250	C	89	5.400	1.200
35	0.125	C	88	2.800	0.622
36	0.136	C	91	4.100	0.911
37	0.250	C	89	5.400	1.200
38	0.250	C	89	5.400	1.200
39	0.125	B.C	87	2.800	0.622
40	0.111	B	89	2.500	0.556
41	0.500	B.C	87	5.750	1.278
42	0.500	B.C	85	5.900	1.311
43	0.500	B.C	85	5.900	1.311
44	0.250	B	85	3.700	0.822
45	0.109	B	84	2.600	0.578
46	0.500	B	85	5.900	1.311
47	0.500	B	84	5.900	1.311
48	0.500	B	86	5.900	1.311
49	0.250	B	84	3.700	0.822
50	0.215	B	85	3.000	0.667
51	0.500	B	85	5.900	1.311
52	0.500	B	85	5.900	1.311
53	0.500	B	84	5.900	1.311
54	0.250	B	84	3.700	0.822
55	0.406	B	84	5.000	1.178
56	0.500	B	84	5.900	1.311
57	0.500	B	84	5.900	1.311
58	0.500	B	84	5.900	1.311
59	0.250	B	84	3.700	0.822
60	0.078	B	86	2.100	0.467
61	0.500	B	85	5.900	1.311
62	0.500	B	85	5.900	1.311
63	0.500	B	86	5.900	1.311
64	0.500	B	86	5.900	1.311
65	0.364	B	86	6.300	1.400
66	0.345	B.C	86	4.700	1.044
67	0.500	B	85	5.900	1.311
68	0.500	B	85	5.900	1.311
69	0.500	B	85	5.900	1.311
70	0.500	B	86	5.900	1.311
72	0.500	C	89	5.900	1.311
73	0.500	B.C	86	5.900	1.311
74	0.500	B	85	5.900	1.311
75	0.500	B	86	5.900	1.311
76	0.513	B	86	5.900	1.311
77	0.513	B	86	5.900	1.311

Q100=8,815cfs (Q100=7,440cfs) Q50=5,438cfs (Q50=6,093cfs)

PARADISE CORRIDOR - SR 317

Arizona Department of Transportation

Basemap: USGS 7.5 Minute Quadrangle Topographic Maps
Source: BRW Engineering

BRW
2700 North Central Avenue
Phoenix, Arizona 85004
234-1591

0' / 00cfs
STORM DRAIN SIZE (Inches)
CAPACITY (Cubic Foot Per Second)

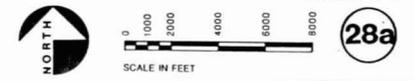
PIPE FLOW DIRECTION

- (105) SUB AREA NUMBER
- CONCENTRATION POINT
- ▬ SUBAREA BOUNDARY
- ▬ PROPOSED FREEWAY
- ▬ EXISTING FREEWAY
- (Q100) 100-YEAR PEAK FLOW

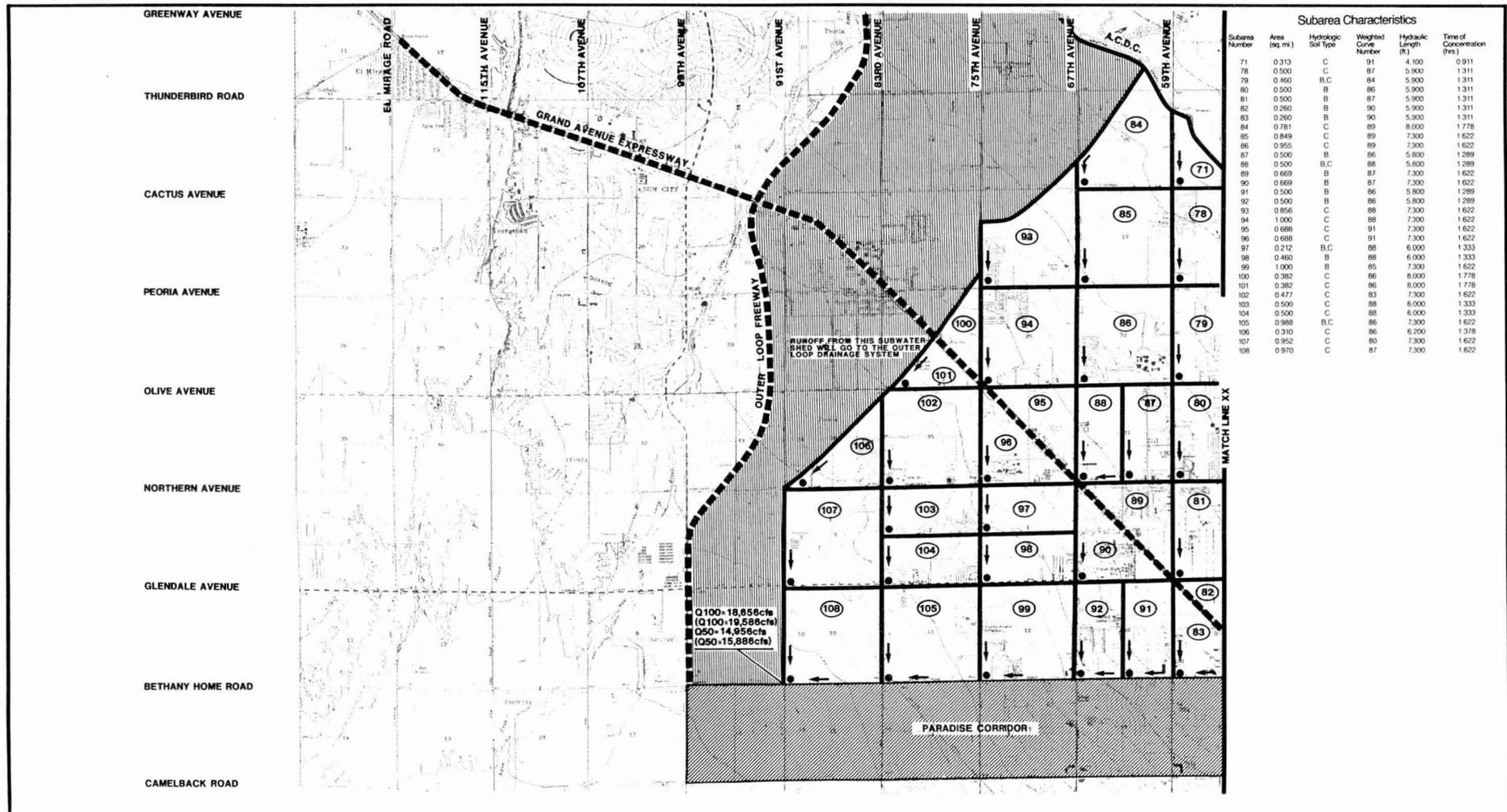
- ← SHEET FLOW DIRECTION
- Q100 100-YEAR PEAK DISCHARGE (Minus Existing Storm Drain Capacity)
- Q50 50-YEAR PEAK DISCHARGE (Minus Existing Storm Drain Capacity)
- ▨ PARADISE CORRIDOR
- ▨ SUBWATERSHED IN OTHER DRAINAGE SYSTEMS
- (Q50) 50-YEAR PEAK FLOW

OFF-SITE HYDROLOGY STUDY

CASE #1



28a



Subarea Characteristics

Subarea Number	Area (sq. mi.)	Hydrologic Soil Type	Weighted Curve Number	Hydraulic Length (ft.)	Time of Concentration (hrs.)
71	0.313	C	91	4,100	0.911
78	0.500	C	87	5,900	1.311
79	0.460	B,C	84	5,900	1.311
80	0.500	B	86	5,900	1.311
81	0.500	B	87	5,900	1.311
82	0.260	B	90	5,900	1.311
83	0.260	B	90	5,900	1.311
84	0.781	C	89	8,000	1.778
85	0.849	C	89	7,300	1.622
86	0.955	C	89	7,300	1.622
87	0.500	B	86	5,800	1.289
88	0.500	B,C	88	5,800	1.289
89	0.669	B	87	7,300	1.622
90	0.669	B	87	7,300	1.622
91	0.500	B	86	5,800	1.289
92	0.500	B	86	5,800	1.289
93	0.856	C	88	7,300	1.622
94	1.000	C	88	7,300	1.622
95	0.688	C	91	7,300	1.622
96	0.688	C	91	7,300	1.622
97	0.712	B,C	88	6,000	1.333
98	0.460	B	88	6,000	1.333
99	1.000	B	85	7,300	1.622
100	0.382	C	86	8,000	1.778
101	0.382	C	86	8,000	1.778
102	0.477	C	83	7,300	1.622
103	0.500	C	88	6,000	1.333
104	0.500	C	88	6,000	1.333
105	0.988	B,C	86	7,300	1.622
106	0.310	C	86	6,200	1.378
107	0.952	C	80	7,300	1.622
108	0.970	C	87	7,300	1.622

Q100-18,856cfs
(Q100-19,586cfs)
Q50-14,956cfs
(Q50-15,866cfs)

PARADISE CORRIDOR - SR 317

Arizona Department of Transportation

Base map: USGS 7.5 Minute Quadrangle Topographic Maps
Source: BRW Engineering

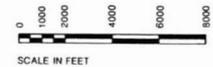
BRW
2700 North Central Avenue
Phoenix, Arizona 85004
234-1591



- SUBAREA NUMBER
- CONCENTRATION POINT
- SUBAREA BOUNDARY
- PROPOSED FREEWAY
- EXISTING FREEWAY
- 100-YEAR PEAK DISCHARGE
- SHEET FLOW DIRECTION
- 100-YEAR PEAK DISCHARGE (Minus Existing Storm Drain Capacity)
- 50-YEAR PEAK DISCHARGE (Minus Existing Storm Drain Capacity)
- PARADISE CORRIDOR
- SUBWATERSHED IN OTHER DRAINAGE SYSTEMS
- 50-YEAR PEAK DISCHARGE

OFF-SITE HYDROLOGY STUDY

CASE #1



28b

The Grand Avenue Corridor is presently under study for upgrading to an expressway. This may have a significant impact on the existing drainage flows affecting the Paradise Corridor. However, the final upgraded configuration is not expected until much later than the construction of the Paradise Corridor and the effect would reduce the flows. Therefore, the existing condition of Grand Avenue was considered for this analysis.

The storm drain plan for the cities of Glendale and Peoria, as outlined in the Glendale/Peoria Area Drainage Master Study (ADMS), is a drainage system designed for a 10-year floodway storm with substantial detention provided at many locations. Though a design plan has been prepared for the area, it has not been approved by the Flood Control District of Maricopa County and adequate information does not exist on the proposed storm drains detention basins. Therefore, the effects of the storm drains were not included in this study. However, the storm drainage system for the cities of Glendale and Peoria is anticipated to be very compatible with the off-site drainage system for the Paradise Corridor.

The City of Phoenix does not have a comprehensive storm drainage plan covering the off-site drainage area for the Paradise Corridor. The Phoenix portion of the off-site drainage area is almost completely developed, and has an existing storm drainage system. The existing storm drainage system in the City of Phoenix is anticipated to be very compatible with the off-site drainage system for the Paradise Corridor.

Two cases are being studied which collect runoff and direct it west through the proposed Outer Loop Freeway. A third case which is currently being developed will collect runoff and direct it to the west to New River utilizing several main conveyance facilities. In all cases, the existing storm drains within the drainage area were considered. Since the total existing storm drainage system capacity is less than about 5 percent of the total peak discharge from the 100-year design storm, the impact of the existing system on flood routing was considered insignificant for the hydrologic modeling. All sizes of the proposed channels mentioned below are based on 100-year preliminary design flows and are intended only as a means of illustrating the relative magnitude of the required drainage facility. Changes in the final calculated flows and the resulting preliminary design are expected. Alternative facilities under consideration include open channels, pipes, culverts, and tunnels.

CASE 1 - SINGULAR SYSTEM

In Case 1 (see Figures 28a and b), the runoff from the entire drainage area will be conveyed to the west to New River. The flow conveyed by each half-mile street would be collected along the north edge of the corridor and conveyed by a new major drainage facility. The 100-year peak discharge at the intersection of the north edge of the Paradise Corridor with Black Canyon Freeway would be 4,800 cfs.¹ Presently, the Black Canyon Freeway

¹ Discharges as of 1 December 1986; BRW, Inc.

passes Missouri Avenue at the same level. The dimension of a comparative channel crossing is estimated to be 55-foot top width, 12-foot deep with 2 to 1 side slopes.

The 100-year peak discharge at the intersection of the Grand Avenue Expressway and Bethany Home Road would be 8,900 cfs.¹ The dimension of the channel at this location would be 80-foot top width, 12-foot deep with 2 to 1 side slopes.

The total peak discharge from the watershed at the Outer Loop Freeway would be 15,700 cfs¹ for the 100-year storm. The size of a comparative channel to carry the 100-year flow into the Outer Loop drainage system from 91st Avenue would be 115-foot top width, 12-foot deep with side slopes of 2 to 1. A summary of the peak runoff for the 100-year and 50-year storms at each major street crossing the Corridor is indicated in Table 19.

TABLE 19
PRELIMINARY PEAK FLOW DISCHARGE IN CUBIC FEET PER SECOND
AT MAJOR STREETS ON PARADISE CORRIDOR
FOR CASE 1

LOCATION	PEAK ¹ 100-YEAR DISCHARGE (cfs)	ALTERNATE CONVEYANCE SYSTEMS	
		OPEN CHANNEL ² TOP WIDTH (FT.)	TUNNEL ³
7th Street	1,200	25 (7 ft deep)	1-144 in. Pipe
7th Avenue	2,200	40	1-15 ft. dia.
Black Canyon	4,800	55	1-20 ft. dia.
39th Avenue	6,900	75	1-23 ft. dia.
51st Avenue	8,900	80	1-25 ft. dia.
67th Avenue	12,400	95	1-28 ft. dia.
83rd Avenue	14,900	110	1-30 ft. dia.
91st Avenue	15,600	115	1-31 ft. dia.
99th Avenue	15,700	115	1-31 ft. dia.

¹ Discharges as of 1 December 1986.

² Channel sizes based on 100 year flow with 2 to 1 side slopes, bottom slope 0.2% and 12 ft depth including 2 ft freeboard unless otherwise specified.

³ Tunnel configuration based on 0.2% hydraulic grade line.

Source: BRW, Inc.

This drainage system for the Paradise Corridor will result in an interbasin transfer of stormwater runoff. Runoff from the eastern portion of the drainage area is tributary, under existing conditions to the Salt River. This drainage system will transfer that runoff to New River, thereby potentially increasing the peak discharge in New River. This may result in increased flooding along New River, therefore, Case 2 was considered which does not transfer stormwater runoff between basins.

CASE 2 - SPLIT SYSTEM

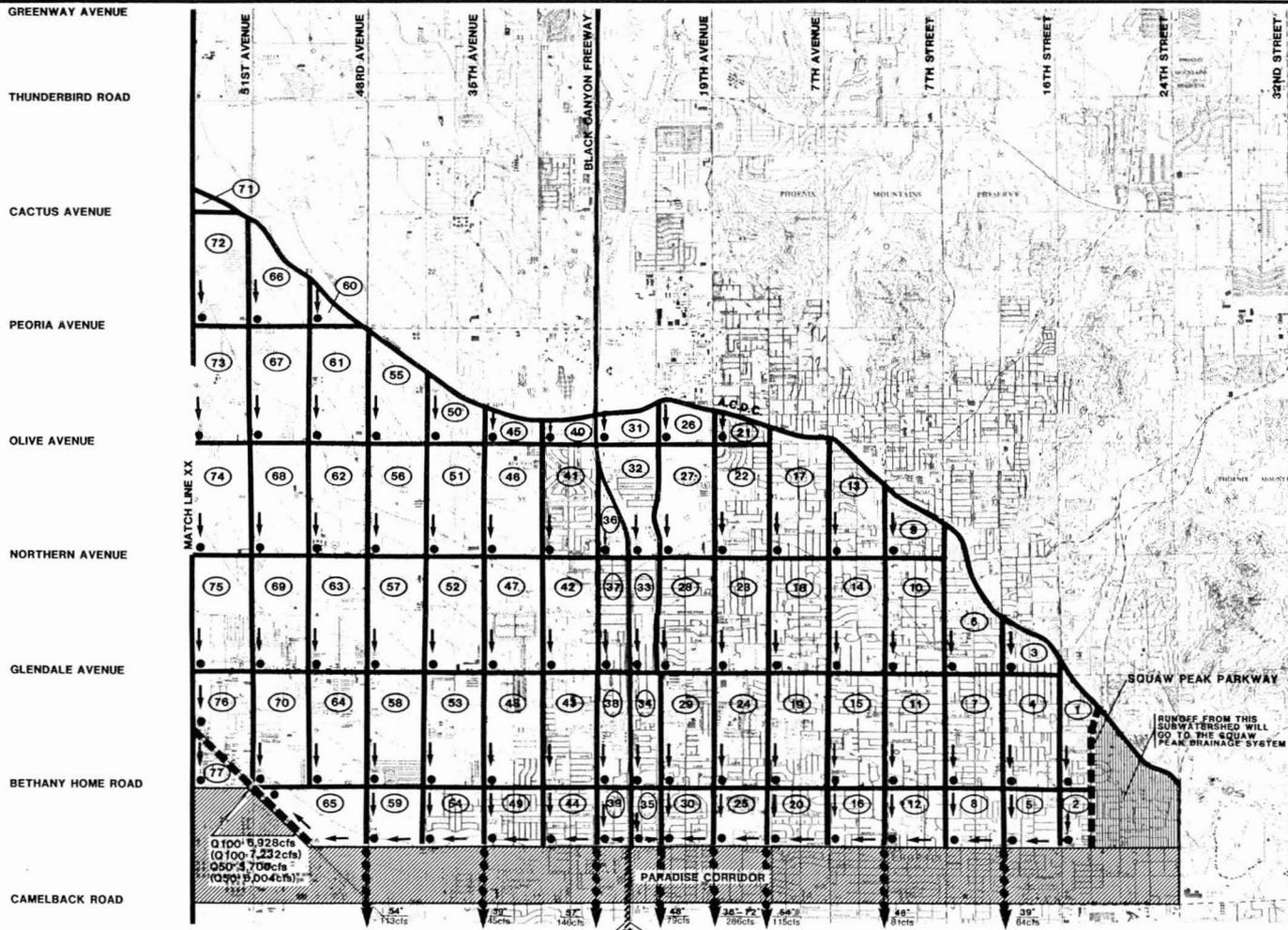
In Case 2 (see Figures 29a and b), runoff from the drainage area east of the Black Canyon Freeway will be conveyed south to the Papago drainage system or to the Salt River instead of west to New River. Runoff west of the Black Canyon Freeway will be conveyed to the west to New River. This case will require a major drainage facility connecting the east half of the Paradise Corridor drainage system with the existing Papago Freeway drainage system or the Salt River. The peak discharge to be conveyed to the south would be 4,800 cfs¹ for a 100-year design storm. An open channel dimension for this 100-year flow would be 60 feet top width, 12-feet deep with 2 to 1 side slopes.

The peak discharge to the west passing through the Grand Avenue Expressway would be 4,300 cfs¹ for 100-year flow. The size of a comparative channel at this location would be 55-feet top width, 12-feet deep with 2 to 1 side slopes.

The total peak discharge at the Outer Loop Freeway in this case would be 11,200 cfs¹ for the 100-year design storm. The estimated channel size for this flow from 91st Avenue to Outer Loop Freeway would be 90-feet top width, 12-feet deep with 2 to 1 side slopes. A summary of the peak runoff for the 100-year and 50-year storms, and the channel top width and equivalent tunnel configuration at each major street intersection with the corridor are shown in Table 20.

This system solves the problem of interbasin transfer of stormwater runoff, however, the solution will be very expensive and involve the construction of major drainage facilities to the south through fully developed areas of Phoenix for a distance of about six miles from Camelback Road to the Salt River. This system could be about one and one-half miles shorter if allowed to discharge into the Inner Loop tunnel system. However, doing this will be a result of some major design problems being resolved as not to adversely impact the Inner Loop drainage system or level of protection.

¹ Discharges as of 1 December 1986.



Subarea Characteristics				
Subarea Number	Area (sq. mi.)	Hydrologic Soil Type	Weighted Curve Number	Time of Concentration (hrs.)
1	0.250	B	85	5.800
2	0.125	B	84	2.900
3	0.165	B	84	2.500
4	0.500	B	85	5.900
5	0.250	B	85	3.700
6	0.446	B	84	6.900
7	0.500	B	85	5.900
8	0.250	B	86	3.700
9	0.233	B	83	3.300
10	0.500	B	81	5.900
11	0.500	B	82	5.900
12	0.250	B	83	3.700
13	0.442	B.C	83	5.900
14	0.500	B.C	84	5.900
15	0.500	B	82	5.900
16	0.250	B	85	3.700
17	0.544	C	85	5.900
18	0.500	C	85	5.900
19	0.500	B.C	86	5.900
20	0.250	B.C	86	3.700
21	0.092	C	88	2.600
22	0.500	C	86	5.900
23	0.500	C	86	5.900
24	0.500	C	89	5.900
25	0.250	C	93	3.700
26	0.159	C	89	2.900
27	0.470	C	86	5.900
28	0.500	C	88	5.900
29	0.500	C	89	5.900
30	0.250	C	88	3.700
31	0.119	C	82	3.200
32	0.343	C	88	5.500
33	0.250	C	88	5.400
34	0.250	C	89	5.400
35	0.125	B.C	88	2.800
36	0.136	C	91	4.100
37	0.250	C	89	5.400
38	0.250	C	89	5.400
39	0.125	B.C	87	2.800
40	0.111	B	89	2.500
41	0.500	B.C	87	5.700
42	0.500	B.C	85	5.900
43	0.500	B.C	85	5.900
44	0.250	B	85	3.700
45	0.109	B	84	2.600
46	0.500	B	85	5.900
47	0.500	B	84	5.900
48	0.500	B	86	5.900
49	0.250	B	84	3.700
50	0.215	B	85	3.000
51	0.500	B	85	5.900
52	0.500	B	85	5.900
53	0.500	B	84	5.900
54	0.250	B	84	3.700
55	0.406	B	84	5.000
56	0.500	B	84	5.900
57	0.500	B	84	5.900
58	0.500	B	84	5.900
59	0.250	B	84	3.700
60	0.079	B	86	2.400
61	0.500	B	85	5.900
62	0.500	B	85	5.900
63	0.500	B	86	5.900
64	0.500	B	86	5.900
65	0.364	B	86	6.300
66	0.345	B.C	86	4.700
67	0.500	B	85	5.900
68	0.500	B	85	5.900
69	0.500	B	85	5.900
70	0.500	B	86	5.900
71	0.500	C	89	5.900
72	0.500	C	89	5.900
73	0.500	B.C	86	5.900
74	0.500	B	85	5.900
75	0.500	B	86	5.900
76	0.513	B	86	5.900
77	0.513	B	86	5.900

Q100- 6,928cfs
 (Q100- 7,232cfs)
 Q50- 3,700cfs
 (Q50- 3,904cfs)

Q100- 6,845cfs
 (Q100- 7,470cfs)
 Q50- 5,475cfs
 (Q50- 6,100cfs)

PARADISE CORRIDOR - SR 317

Arizona Department of Transportation

Basemap: USGS 7.5 Minute Quadrangle Topographic Maps
 Source: BRW Engineering



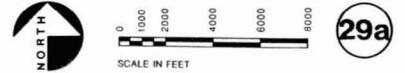
- STORM DRAIN SIZE (Inches) CAPACITY (Cubic Foot Per Second)
- PIPE FLOW DIRECTION
- FLOW CONVEYED TO PAGO FREEWAY DRAINAGE SYSTEM

- SUB AREA NUMBER
- CONCENTRATION POINT
- SUBAREA BOUNDARY
- PROPOSED FREEWAY
- EXISTING FREEWAY
- 100-YEAR PEAK FLOW

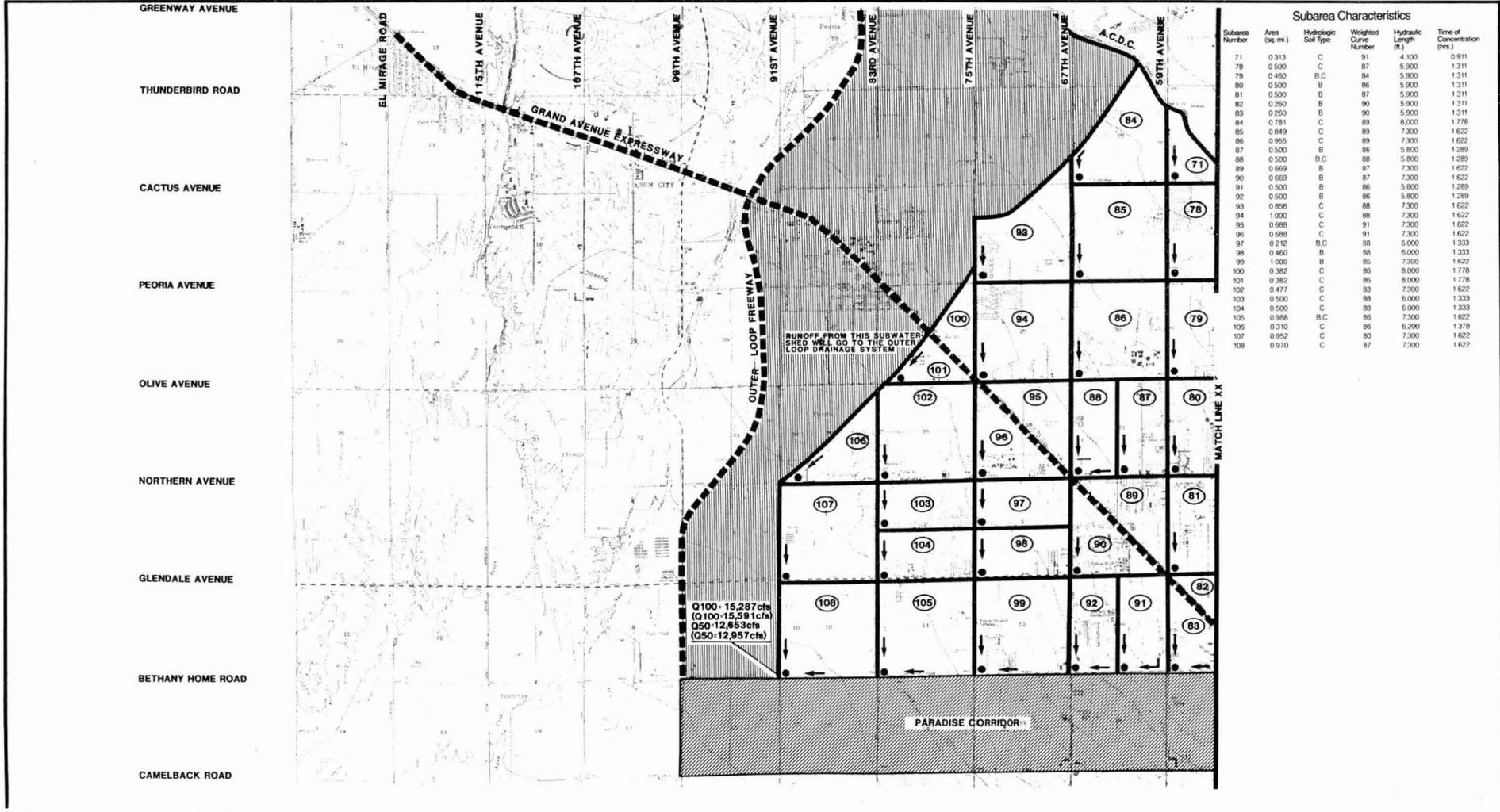
- SHEET FLOW DIRECTION
- 100-YEAR PEAK DISCHARGE (Minus Existing Storm Drain Capacity)
- 50-YEAR PEAK DISCHARGE (Minus Existing Storm Drain Capacity)
- PARADISE CORRIDOR
- SUBWATERSHED IN OTHER DRAINAGE SYSTEMS
- 50-YEAR PEAK FLOW

OFF-SITE HYDROLOGY STUDY

CASE # 2



29a



PARADISE CORRIDOR - SR 317

Arizona Department of Transportation

Source: USGS 7.5 Minute Quadrangle Topographic Maps
Source: BRW Engineering

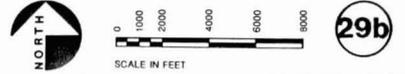
BRW
2700 North Central Avenue
Phoenix, Arizona 85004
234-1591

rga

- SUBAREA NUMBER
- CONCENTRATION POINT
- SUBAREA BOUNDARY
- PROPOSED FREEWAY
- EXISTING FREEWAY
- 100-YEAR PEAK DISCHARGE

- SHEET FLOW DIRECTION
- 100-YEAR PEAK DISCHARGE (Minus Existing Storm Drain Capacity)
- 50-YEAR PEAK DISCHARGE (Minus Existing Storm Drain Capacity)
- PARADISE CORRIDOR
- SUBWATERSHED IN OTHER DRAINAGE SYSTEMS
- 50-YEAR PEAK DISCHARGE

OFF-SITE HYDROLOGY STUDY CASE #2



29b

TABLE 20
PRELIMINARY PEAK FLOW DISCHARGE IN CUBIC FEET PER SECOND
AT MAJOR STREETS ON PARADISE CORRIDOR
FOR CASE 2

LOCATION	PEAK 1 100-YEAR DISCHARGE (cfs)	ALTERNATE CONVEYANCE SYSTEMS	
		OPEN CHANNEL ² TOP WIDTH (FT.)	TUNNEL ³
7th Street	1,200	25 (7 ft deep)	1-144 in. Pipe
7th Avenue	2,200	40	1-15 ft. dia.
Black Canyon	4,800	60	1-20 in. Pipe
38th Avenue	2,300	40	1-15 ft. dia.
51st Avenue	4,300	55	1-20 ft. dia.
67th Avenue	7,800	70	1-24 ft. dia.
83rd Avenue	10,300	85	1-26 ft. dia.
91st Avenue	11,100	90	1-27 ft. dia.
99th Avenue	11,200	90	1-27 ft. dia.

1 Discharges as of 1 December 1986.

2 Channel sizes based on 100 year flow with 2 to 1 side slopes, bottom slope 0.2% and 12 ft depth including 2 ft freeboard unless otherwise specified.

3 Tunnel configuration based on 0.2% hydraulic grade line.

Source: BRW, Inc.

CASE 3 - MULTIPLE OUTLETS

Case 3 is a recent consideration as a possible alternative drainage system. Therefore, Case 3 is not as well defined as Cases 1 and 2. Conceptually, Case 3 would involve the construction of two additional stormwater outlets to New River north of the Paradise Corridor from the northwestern portion of the drainage area. The outlets would be at Olive Avenue and approximately Northern Avenue. These two outlets would in essence reduce the drainage area directly tributary to the Paradise Corridor, thereby reducing the size (and cost) of the drainage facility adjacent to the Paradise Corridor and possibly the Outer Loop.

This drainage system alternative works in conjunction with either Case 1 or Case 2 as described above.

OBSERVATIONS

The preliminary results of this study indicate that a major storm drainage facility must be considered in the planning of the overall transportation facility. To illustrate the relative magnitude of the required facility, approximate sizes of lined, open channels and equivalent tunnel configurations are given in Tables 14 and 15. The facility, whatever type is finally selected, will probably parallel the parkway. Its final solution

could be lined open channels, linear parks with landscaped open channels, tunnels, pipes, or some combination.

As this study continues, detention basins will be considered in the design of the drainage systems as they may reduce the peak discharges and thus reduce the size of the pipe or channel required. Detention basins must be quite large (40 acres or more) to have a significant impact on the flows. Since the drainage area on the east of the Grand Avenue Expressway has been fully developed, the open suitable locations for detention would fall on the west side.

The western portion of this study's tributary drainage area overlaps areas previously studied for the Outer Loop Freeway. BRW is coordinating its analysis with the other consultants involved to bring the overlapping computer models to within reasonable agreement. This involves adjustment of modeling parameters. Additionally, the BRW model is under further refinement to consider the splitting of run-off flows at intersections within the drainage area. Therefore, the results presented in this report must be considered preliminary and subject to change.

CHAPTER 4: CONCLUSION 3

A. Transportation System

B. Study Area Characteristics

C. Summary of Opportunities
and Constraints



BRW.

A: TRANSPORTATION SYSTEM

Transportation issues studied thus far relate to activities outlined in Phase I of the Study Process. Specifically, Phase I activities were designed to respond to three questions:

- Are there and/or will there be unmet transportation service needs within the study area, relative to existing and forecasted travel demands?
- Which transportation corridor is best situated to satisfy unmet transportation service needs within the study area?
- What are the acceptable transportation facility improvements to implement within the selected transportation corridor?

In order to respond to these questions the consultant team conducted a series of analyses to provide the Phoenix Citizens' Advisory Committee (CAC) and the Technical Advisory Committee (TAC), with information that could be used at key decision points during the Study.

ROADWAY NETWORK

The findings of a needs analysis conducted by BRW (Analysis of Need for Additional East/West Transportation Facilities and Services Along the Paradise Corridor, Draft Technical Memorandum, July 1986) addressed screenline volumes and levels of service on roadway links and at intersections within the study area. Major finding follow:

- The current traffic volume exceeds existing roadway capacity at 5 out of 7 screenline locations.
- The forecasted traffic volume (year 2005) will exceed the existing roadway capacity at 7 out of 7 screenline locations. The excess volume is projected to exceed capacity by 51 percent, on average.
- 47.5 miles or 91 percent of the 52 miles of roadway represented by Glendale Avenue and Bethany Home, Camelback, and Indian School Roads are forecasted to operate at LOS D or lower in the year 2005 if no roadway improvements are made; 32 miles or 61 percent are forecasted to operate at LOS F.
- Of the 56 intersections of the arterial streets in the study area, 27 or 48 percent currently operate at LOS D or lower; 16 of the 27 operate at LOS F.

- By the forecast year 2005, 32 of the 56 intersections, or 57 percent, will operate at LOS D or lower; 28 of the 32 will operate at LOS F.

Conclusions, which follow, were based on the findings.

- The existing and forecasted traffic exceeds the capacity of the existing street system at numerous locations on the streets in the area between Glendale Avenue and Indian School Road.
- The existing network of streets within the study area fails to provide adequate service (LOS C/D) for current and forecasted volumes of traffic.
- There is a need for additional east-west transportation facilities and services to accommodate existing and forecasted traffic that exceeds the capacity of the existing roadway system.
- Transportation facilities and services generally located between Camelback and Northern Roads should be analyzed as potential locations.

CORRIDOR LOCATION

Having determined east-west transportation improvements are needed, the consultant team conducted an analysis to identify the optimally located transportation corridor within the study area. For the purpose of the corridor location analysis, the criteria used for identifying the optimal location only related to traffic service (e.g. ability to attract traffic volumes, reduce travel on major arterial streets within the Corridor, and improve system performance characteristics).

Documented in a BRW report (Analysis of Alternative Corridors to Serve East/West Travel Demands in the Paradise Corridor, Draft Technical Memorandum, August 1986) the analysis indicated the following.

- The Paradise Corridor best serves the east-west transportation needs.
- The Northern Corridor and the ACDC Corridor need not be studied as alternatives to the Paradise Corridor at this time.
- The Northern Corridor and/or the ACDC Corridor should be given further analysis by the City of Phoenix and MAG as to their potential function in serving local and regional transportation needs.
- While the Paradise Corridor is the preferred location to serve transportation needs, the subsequent definition of environmental, socio-economic, and physical impacts may make implementation of transportation improvements not feasible.

- Further analysis of the following transportation related issues needs to be completed: the arterial street impact on the east end of the Paradise Corridor; the sensitivity of vehicular travel demand to transit ridership, auto occupancy, and parking costs; and the connections to other controlled access facilities (e.g. Outer Loop, Grand Avenue, Black Canyon and Squaw Peak).

FACILITY TYPE

Efforts are still underway to select the preferred type(s) of facility improvement(s). Thus far the Phoenix CAC has evaluated and assessed over one hundred alternative transportation strategies, comprised of various combinations of roadway and transit facility types. To date, over ninety have been "screened out" and only ten remain under consideration.

Criteria by which the alternative strategies have been evaluated and assessed include:

- Ability to address forecasted travel demands,
- Demonstration of a commitment to capital-intensive transit,
- Safety and efficiency,
- Sociological and environmental impacts,
- Political acceptability, and
- Economic feasibility.

The ten alternative strategies retained by the Phoenix CAC will be combined with those retained by the Glendale CAC and the TAC to develop a proposed final set of facility alternatives to carry forward into location specific analyses.

TRANSIT SERVICE

The Systemwide Transit Planning Study (Barton-Aschman Associates, Inc., March 1986) is the first effort at transit planning for the entire Phoenix Region. Its conclusions are that the Grand Avenue-Paradise Transit Corridor is one of four transit corridors in the Phoenix region where the demand for transit services will be greater than 15,000 riders per day, qualifying it as a candidate for capital-intensive transit investments.

The Grand Avenue-Paradise Transit Corridor was ranked as the third priority transit corridor in the Phoenix Region. It was analyzed to determine the type(s) of capital-intensive transit investments that would attract the greatest number of riders and provide a desirable level of service and efficiency. At this point in the transit study process it was found that the following three capital-intensive technologies would be appropriate.

- Busway (exclusive right-of-way),
- Light-rail transit, or
- Automated guideway transit.

Further analyses are required in order to more adequately discern the advantages and disadvantages of each technology, relative to route location and localized environmental issues.

The Grand Avenue-Paradise transit route would extend along Grand Avenue from 59th Avenue to Camelback Road. At this point the route would proceed easterly along Camelback to 44th Street. It has been suggested that the route should branch at the intersection of Grand Avenue and Camelback Road and, in addition to continuing east along Camelback, a route segment should follow Grand Avenue to the Phoenix central business district.

Funding to support further study and the development of the top priority transit corridor will come from the Federal Urban Mass Transit Administration (UMTA). Voter approval of the Regional Public Transportation Authority and the 1/2 percent increase in the sales tax in 1985, have provided Maricopa County with an administrative mechanism and a source of funding to study and develop the second, third, and fourth priority transit corridors.

B: STUDY AREA CHARACTERISTICS

SOCIO-ECONOMIC CHARACTERISTICS

Population and employment projections for the three municipalities that are crossed by the study area indicate rapid growth for Glendale and Peoria and continued growth for Phoenix. The study area population and employment are projected to increase by 29 and 41 percent respectively by the year 2005.

Growth in Glendale and Peoria is expected to occur as a result of the availability of comparatively low-cost vacant land and the improved accessibility from planned roadways including the Outer Loop and Papago Freeways and Improvements to Grand Avenue.

Growth in Phoenix is projected to result from dense infill development and redevelopment to higher intensity land uses such as multi-family residential, office, and commercial complexes.

LAND USE DEVELOPMENT

The vast majority of land within the Phoenix section of the Corridor is developed and already in use. Only 8 percent of the land, 180 of the total 2,244 acres within the study area, is currently under agricultural/vacant use. The remaining acreage has been developed as follows:

	<u>Percent</u>
● Residential uses	62
● Commercial uses	20
● Public/Semi-Public uses	6
● Rights-of-Way	2
● Industrial/Warehouse use	1
● Parks/Developed Open Space	1

COMMUNITY FACILITIES AND SERVICES

Community facilities and services inventoried included:

- Educational Facilities,
- Police and Fire Facilities,
- Emergency Medical Facilities, and
- Parks and Recreational Facilities.

The results of the inventories indicated four public school districts (three elementary and one high school) within the Phoenix segment are crossed by the Corridor. Five elementary school attendance areas are crossed by the Corridor, as are the attendance areas of four Phoenix Union

high schools. Two elementary school facilities lie directly in the Corridor.

POLICE AND FIRE FACILITIES

The service areas of two police precinct stations are crossed by the corridor. Seven fire station service areas are crossed by the Corridor. One fire station is located within the Corridor.

The Phoenix Fire Department has indicated that transportation improvements in the Corridor would enhance response times to the freeway (I-17) and in the east-west direction.

EMERGENCY MEDICAL FACILITIES

No emergency medical facilities were found within the study area. Four medical facilities providing twenty-four hour-a-day emergency services were identified in areas near the study area, however. Only one of the four has a defined service area within the City of Phoenix. This particular service area does not fall within the Paradise Corridor.

PARKS AND RECREATIONAL FACILITIES

There are six parks or outdoor recreational facilities within the Corridor study area. One of these is a public park, two are public school yards, and the other three are privately operated. A variety of athletic and recreational service facilities are provided at the public park and school yards (e.g. softball diamonds and basketball, tennis, and volleyball courts).

One of the private facilities is operated for handicapped individuals, and the other two are supported by Grand Canyon College.

ENVIRONMENTAL FEATURES

Air

The Phoenix Metropolitan Area is a "non-attainment area" due to violations of Federal air quality standards for three pollutants: carbon monoxide, total suspended particles (TSP), and ozone. Automobile emissions account for 86 percent of carbon monoxide, 70 percent of TSP, and 64 percent of ozone.

By providing uninterrupted traffic flow, as an alternative to the stop and go on arterial streets, the implementation of a controlled access roadway in the Paradise Corridor would result in:

- A 13% increase in average travel speed
- A reduction of about 350,000 vehicle miles travelled per day
- A reduction of about 50,000 gallons of fuel consumed per day
- A reduction of about 5,000 kilograms of hydrocarbons and 63,000 kilograms of carbon monoxide per day.

Noise

Noise monitoring was conducted in April and May 1986 to evaluate existing noise levels at identified sensitive receptors within the designated Paradise Corridor. Monitoring sites and procedures were reviewed with ADOT's Environmental Planning Services Section.

Nine monitoring sites were established. Seven of the sites fall under Federal Activity Category B, "picnic and recreation areas, residences, motels, schools, churches, libraries, and hospitals". The other two sites fall under Category C, "developed lands, properties and activities not included in Categories A or B".

All seven Category B sites were measured below 67 dBA Federal guideline. Both the Category C sites were measured below the 72 dBA Federal guideline as well.

CULTURAL RESOURCES

One hundred fifty-two potentially eligible historic structures were identified in the Corridor through a parcel by parcel review of the Maricopa County Assessment Records. The structures were later verified by a windshield survey. The only criterion used to determine potential eligibility was the age of the structure, at least fifty years old.

A single archaeological site was identified. It is identified as loci AZ T:8:12(GP). An extensive survey of existing documentation and interviews with Phoenix area archaeologists indicates that the Phoenix segment of the Paradise Corridor should be expected to contain significant prehistoric cultural resources. These resources may be found along the entire length of the Corridor since a prehistoric irrigation route was located there (according to Midvale, 1966 and 1969).

UTILITIES

Major utilities were inventoried from quarter-section maps, as-built plans and direct contact with individual companies.

Most of the major utilities cross the Corridor along the section line street alignments or parallel the Corridor along the Camelback Road and Missouri Avenue alignments. Therefore utility impacts can be minimized by avoiding the Camelback and Missouri rights-of-way, however, impacts to utilities located along north-south streets may not be avoidable.

One potentially significant impact is to a 230 kV underground transmission line located along 10th Street. Its relocation would require approximately one year of design time and a \$1.2 million construction cost.

A sewer trunk line (24 to 48 inches in diameter) parallels the Corridor in Colter Street between 19th Avenue and 20th Street. In addition, several well sites exist between the Camelback and Missouri alignments which are potentially impacted.

OFF-SITE HYDROLOGY

The preliminary results from the hydrologic analysis indicates that a major storm drainage facility must be considered in the planning of the overall transportation facility. The size of the drainage system may impact the location of the proposed parkway because of the increased right-of-way width required. The planning process should also give some indication of the type of drainage system that should be designed; linear park/open channel or tunnel/closed conduit.

The major conclusions of the storm drainage analysis are as follows:

- The storm drainage system for the Paradise Corridor will be a major drainage system requiring additional right-of-way of up to 50 feet at 16th Street and 200 feet at 99th Avenue.
- Several major physical barriers such as the Black Canyon Freeway and Grand Avenue and the Grand Canal, may require special design features to convey the storm water runoff to the west to New River.
- The Case I drainage system would result in an interbasin transfer of stormwater runoff. This could result in increased peak discharges in New River and possible increased flooding.
- The Case II drainage system would result in the construction of an additional major drainage system to convey storm runoff to the south.
- The storm drainage systems in the fully developed areas of Glendale and Phoenix would preferably be underground in pipe or tunnel to minimize right-of-way taking and visual impacts.
- The storm drainage system in the undeveloped areas of Glendale between 83rd Avenue and 99th Avenue could be a natural open channel, possibly developed into a linear park. This would require extensive cooperation between ADOT and the City of Glendale. This concept would help mitigate visual and noise impacts on existing and future land uses.

C: SUMMARY OF OPPORTUNITIES AND CONSTRAINTS

SUMMARY

The inventory and analysis information presented in Chapters 2 and 3 identified significant features of the Paradise Corridor for consideration in the development and evaluation of location design concepts. Additionally, the determination of location design alternatives and the recommended location design concept will hinge, in part, on the presence of these features and their impacts on the urban fabric of the Corridor.

In this section of Chapter 4, the features and characteristics referred to above are summarized in terms of "opportunities and constraints" relative to the location of a roadway in the Paradise Corridor. This summary therefore provides the backdrop for the development of location design concepts.

At this stage of the development process the constraints are more specific than the opportunities, since an objective of the reconnaissance work was to identify features which should be avoided. More specifics will be developed to address opportunities, as well as constraints, in conjunction with subsequent concept location and design work in Study Phases III and IV.

TABLE 21: SUMMARY OF OPPORTUNITIES AND CONSTRAINTS

CHAPTER/SECTION	OPPORTUNITIES	CONSTRAINTS
1. INTRODUCTION	---	---
2. TRANSPORTATION SYSTEM		
A. ROADWAY NETWORK	<ul style="list-style-type: none"> ● Interconnect with other regional facilities; Outer Loop Freeway, Grand Avenue, Black Canyon Freeway and Squaw Peak Parkway. ● Improve mobility; reduce travel time and increase average speed. ● Provide traffic relief of parallel arterial streets; maintain 1986 levels of service despite increased population and employment. ● Provide improved transit service; Express Service, High Occupancy Vehicle and Park and Ride Potentials. 	<ul style="list-style-type: none"> ● Need to interchange with regional facilities at appropriate spacings (1 mile) and accommodate their major design features. ● Maintain a 660 - 700' spacing between the Paradise alignment and the parallel collector and arterial (Camelback Road and Missouri Avenue) to allow for traffic operations on connecting North-South arterials. ● Need to grade separate crossings of major north-south arterials and important north-south collector streets.

TABLE 21: SUMMARY OF OPPORTUNITIES AND CONSTRAINTS (cont'd)

CHAPTER/SECTION	OPPORTUNITIES	CONSTRAINTS
B. CORRIDOR LOCATION	<ul style="list-style-type: none"> ● Develop a transportation facility in the Paradise Corridor that best serves east-west needs (i.e. relieves congestion on east-west major streets, improves link and intersection levels of service, and improves system performance characteristics). 	<ul style="list-style-type: none"> ● Environmental and socio-economic impacts would be an unavoidable consequence of any major transportation facility improvement. ● North-south traffic flows on the arterial streets may be impaired.
C. FACILITY TYPE(S)	<ul style="list-style-type: none"> ● Transit facilities and services have been included as an important element in all remaining facility types. 	<ul style="list-style-type: none"> ● The Grand - Paradise Transit Corridor is the third priority transit corridor in the Phoenix Region. It is uncertain at this time how funding will be distributed for the development of the second, third, and fourth priority transit corridors.

TABLE 21: SUMMARY OF OPPORTUNITIES AND CONSTRAINTS (cont'd)

CHAPTER/SECTION	OPPORTUNITIES	CONSTRAINTS
D. TRANSIT SERVICE	<ul style="list-style-type: none"> ● Controlled access roadway strategies retained by the CAC are comparatively environmentally sensitive, providing opportunities to mitigate environmental and physical impacts through design efforts. ● Seven miles of the Grand-Paradise Transit Corridor lie within the Paradise Transportation Corridor. Development of transit services within the Corridor will further serve to relieve congestion on arterial streets and improve air quality in the Phoenix Region. 	<ul style="list-style-type: none"> ● A controlled access roadway facility in the Paradise Corridor would require taking of private property. ● Preferred locations have not been determined for either the Paradise facility or the Grand-Paradise transit route. Efforts should be made to coordinate location determination activities.

TABLE 21: SUMMARY OF OPPORTUNITIES AND CONSTRAINTS

CHAPTER/SECTION	OPPORTUNITIES	CONSTRAINTS
3. STUDY AREA CHARACTERISTICS		
A. SOCIO-ECONOMIC CHARACTERISTICS	<ul style="list-style-type: none"> ● Provide required facilities to serve projected increases in corridor and regional population and employment. 	<ul style="list-style-type: none"> ● Population and employment densities will intensify in Phoenix, increasing the number of persons to be served.
B. LAND USE DEVELOPMENT	<ul style="list-style-type: none"> ● Right-of-way exists along Colter Street between 7th and 43rd Streets. ● "Urban seams" exist throughout the Corridor. Utilization of urban seams would minimize neighborhood impacts. ● Improved access and mobility could enhance the Corridor's attractiveness for living and working. 	<ul style="list-style-type: none"> ● The majority of land within the Corridor is developed and in use. ● North-south continuity of existing neighborhood streets could be impaired.
C. COMMUNITY FACILITIES AND SERVICES	<ul style="list-style-type: none"> ● Plan new facilities and service areas to accommodate new growth, (especially schools and fire stations). 	<ul style="list-style-type: none"> ● Any new facility may cause some reduction in school enrollment due to relocation and may divide the attendance areas of six elementary schools and four Phoenix Union high schools.

TABLE 21: SUMMARY OF OPPORTUNITIES AND CONSTRAINTS

CHAPTER/SECTION	OPPORTUNITIES	CONSTRAINTS
D. ENVIRONMENTAL FEATURES	<ul style="list-style-type: none"> ● Improve east-west emergency response times within the Corridor. ● East - west bicycle paths and routes can be incorporated in the design of a roadway facility. 	<ul style="list-style-type: none"> ● North-south emergency response times may be affected from four existing fire stations with service areas that are crossed by the Corridor. Two of the four fire stations are located directly in the Corridor.
	<ul style="list-style-type: none"> ● Reduce daily regional emissions of air pollutants, CO by 63,000 and HC by 5,000 kg. 	<ul style="list-style-type: none"> ● 152 potentially historic structures have been identified at scattered sites. ● A prehistoric site identified near 38th and Missouri Avenues may require mitigation. ● Many potentially significant archaeological resources may exist in association with a prehistoric irrigation canal.

TABLE 21: SUMMARY OF OPPORTUNITIES AND CONSTRAINTS

CHAPTER/SECTION	OPPORTUNITIES	CONSTRAINTS
E. UTILITIES	<ul style="list-style-type: none"> ● Incorporate design elements to mitigate noise and visual impact. ● Many of the Corridor's major utilities are grouped along the parallel streets of Camelback and Missouri and should not be affected. 	<ul style="list-style-type: none"> ● Increased noise levels may occur adjacent to the new facility and existing views may be altered. ● A 230 kV underground electric transmission line located in 10th Street would require a one year design study and \$1.2 million to relocate. ● A major sewer trunk line in Colter Street from 19th Avenue to 20th Street could be impacted. ● Six well sites exist in the Phoenix segment, of which three are located near the middle of the Corridor.
F. OFF-SITE HYDROLOGY AND DRAINAGE	<ul style="list-style-type: none"> ● Address City-wide and facility drainage needs concurrently. 	<ul style="list-style-type: none"> ● Facilities to incorporate large volumes of storm runoff from the north side of the Corridor will be required, possibly increasing right-of-way.

TABLE 21: SUMMARY OF OPPORTUNITIES AND CONSTRAINTS

<u>CHAPTER/SECTION</u>	<u>OPPORTUNITIES</u>	<u>CONSTRAINTS</u>
	<ul style="list-style-type: none">● Evaluate alternative drainage solutions to reduce drainage channel and/or pipe size requirements.● Incorporate drainage solution with visual mitigation and potential recreational uses.	<ul style="list-style-type: none">● Major physical barriers may require special design features to convey runoff.● All available stormwater conveyance alternatives present major cost and implementation obstacles.

APPENDIX



TABLE 22

POTENTIALLY HISTORIC SITES - PHOENIX

STRUCTURE ADDRESS	CONSTRUCTION YEAR(S)	ASSESSOR PARCEL NUMBER
5145 North 38th Avenue	1930	145-14-9A
5215 North 38th Avenue	1935	145-13-4A
5043 North 35th Avenue	1935	153-17-1A
5045 North 35th Avenue	1935	153-17-1B
5302 North 35th Avenue	1915	145-16-2
5228 North 30th Drive	1929	153-18-17D
5302 North 30th Drive	1924	153-18-23
5102 North 29th Avenue	1937	153-29-11A
5127 North 29th Avenue	1934	153-28-3B
5132 North 29th Avenue	1934	153-29-12
5138 North 29th Avenue	1934	153-29-9C
5152 North 29th Avenue	1934	153-29-9C
5154 North 29th Avenue	1934	153-29-9C
5201 North 29th Avenue	1920	153-19-4C
5212 North 29th Avenue	1930	153-18-12A
5239 North 28th Drive	1930	153-19-30
5324 North 27th Avenue	1935	153-19-18
5353 North 27th Avenue	1934	153-20-10
5020 North 23rd Avenue	1914, 1939, 1939	153-26-63A
5035 North 23rd Avenue	1929	153-25-53
5039 North 23rd Avenue	1934	153-25-50
5112 North 23rd Avenue	1937	153-26-46
5137 North 23rd Avenue	1935	153-25-23
5239 North 19th Avenue	1924	156-36-14
5021 North 18th Avenue	1930	156-37-64
5236 North 17th Avenue	1935	156-36-27
5240 North 17th Avenue	1935	156-36-27
5239 North 17th Avenue	1929	156-39-35
5245 North 17th Avenue	1904	156-39-34

TABLE 22

POTENTIALLY HISTORIC SITES - PHOENIX
Continued

STRUCTURE ADDRESS	CONSTRUCTION YEAR(S)	ASSESSOR PARCEL NUMBER
5118 North 16th Drive	1916	156-38-13
5017 North 16th Avenue	1919, 1919	156-38-36C
5029 North 16th Avenue	1924	156-38-35
5031 North 16th Avenue	1934	156-38-35
5319 North 7th Avenue	1935	162-27-52A
5050 North 2nd Street	1924	162-20-64
5024 North 6th Street	1934	162-19-162
5003 North 7th Street	1930	162-16-63
5007 North 7th Street	1930	162-16-58
5117 North 7th Street	1935	162-16-44
5016 North 8th Street	1929	162-16-57
5015 North 10th Place	1930, 1936	162-17-02
5111 North 10th Place	1928, 1937	162-17-09
5121 North 10th Place	1928	162-17-10A
5139 North 10th Place	1935	162-17-14
5230 North 16th Street	1930	162-11-21B
5141 North 18th Street	1930	164-56-45A
5330 North 18th Street	1925, 1935	164-55-196
5127 North 20th Street	1930	164-67-10
5201 North 21st Street	1935	164-58-29
5245 North 21st Street	1930	164-58-27
5301 North 21st Street	1935	164-58-25
2733 West Missouri Avenue	1934	153-19-21N
1501 East Missouri Avenue	1935	162-11-23B
1537 West Denton Lane	1929	156-39-16A
413 West Vermont Avenue	1935	162-27-108
412 West Vermont Avenue	1931	162-27-101
408 West Vermont Avenue	1920	162-27-105
2924 West Georgia Avenue	1930	153-18-8B

TABLE 22

POTENTIALLY HISTORIC SITES - PHOENIX
Continued

STRUCTURE ADDRESS	CONSTRUCTION YEAR(S)	ASSESSOR PARCEL NUMBER
520 West Oregon Avenue	1937	162-27-79
311 West Oregon Avenue	1935	162-27-25
143 West Oregon Avenue	1936	162-25-69
53 West Oregon Avenue	1935	162-25-75
45 West Oregon Avenue	1930	162-25-70
31 West Oregon Avenue	1930	162-25-64
21 West Oregon Avenue	1930	162-25-72
5 West Oregon Avenue	1930	162-25-65
3043 West Colter Street	1930	153-29-1
3035 West Colter Street	1904, 1930, 1939	153-29-3
2801 West Colter Street	1925	153-28-58
2733 West Colter Street	1934	153-28-13
1805 West Colter Street	1919, 1939	156-37-11
1740 West Colter Street	1918	156-36-21
1735 West Colter Street	1919	156-37-15B
1729 West Colter Street	1914	156-37-30
1726 West Colter Street	1934	156-36-24
1611 West Colter Street	1924, 1924	156-38-11
1600 West Colter Street	1929, 1929	156-39-40
538 West Colter Street	1920	162-21-58
514 West Colter Street	1930	162-27-102
44 West Colter Street	1927	162-25-76
41 West Colter Street	1931	162-23-61A
40 West Colter Street	1926	162-25-78
38 West Colter Street	1926	162-25-79
37 West Colter Street	1930	162-23-58
32 West Colter Street	1926	162-25-80
29 West Colter Street	1935	162-23-57
18 West Colter Street	1934	162-25-82
17 West Colter Street	1927	162-23-55
16 West Colter Street	1931	162-25-83
14 West Colter Street	1924	162-25-84
13 West Colter Street	1930	162-23-53
12 West Colter Street	1934	162-25-85
11 West Colter Street	1925	162-23-53
17 East Colter Street	1931	162-20-18
25 East Colter Street	1930	162-20-14
402 East Colter Street	1936	162-21-37
424 East Colter Street	1927	162-21-57A
602 East Colter Street	1920	162-21-61
690 East Colter Street	1928	162-21-62B

TABLE 22

POTENTIALLY HISTORIC SITES - PHOENIX
Continued

STRUCTURE ADDRESS	CONSTRUCTION YEAR(S)	ASSESSOR PARCEL NUMBER
1011 East Colter Street	1935	162-17-17
1231 East Colter Street	1920	162-13-39
14 East Orange Drive	1935	162-20-20
248 East Orange Drive	1929	162-19-28
511 East Orange Drive	1930	162-19-43
520 East Orange Drive	1929	162-19-2
42 West Medlock Drive	1925	162-23-62
41 West Medlock Drive	1937	162-23-87A
40 West Medlock Drive	1930	162-23-63
38 West Medlock Drive	1930	162-23-64
34 West Medlock Drive	1930	162-23-65
33 West Medlock Drive	1930	162-23-83
30 West Medlock Drive	1920	162-23-66
29 West Medlock Drive	1926	162-23-82
26 West Medlock Drive	1930	162-23-67
21 West Medlock Drive	1922	162-23-80
20 West Medlock Drive	1930	162-23-68
18 West Medlock Drive	1935	162-23-69
16 West Medlock Drive	1935	162-23-70
15 West Medlock Drive	1925	162-23-78
14 West Medlock Drive	1935	162-23-71
11 West Medlock Drive	1935	162-23-77
250 East Medlock Drive	1920	162-19-63
256 East Medlock Drive	1920	162-19-61
1121 East Fern Drive	1927	162-17-64
1131 East Fern Drive	1937	162-17-83
1137 East Fern Drive	1937	162-17-94
42 West Pasadena Avenue	1931	162-23-1
39 West Pasadena Avenue	1928	162-23-27
38 West Pasadena Avenue	1927	162-23-3
33 West Pasadena Avenue	1932	162-23-25
30 West Pasadena Avenue	1935	162-23-6
23 West Pasadena Avenue	1935	162-23-22
15 West Pasadena Avenue	1929	162-23-20
11 West Pasadena Avenue	1935	162-23-19
255 East Pasadena Avenue	1925	162-20-104
234 East Pasadena Avenue	1935	162-20-93

TABLE 22

POTENTIALLY HISTORIC SITES - PHOENIX
Continued

STRUCTURE ADDRESS	CONSTRUCTION YEAR(S)	ASSESSOR PARCEL NUMBER
314 East Pasadena Avenue	1925	162-19-98
340 East Pasadena Avenue	1937	162-19-90
908 East Pasadena Avenue	1924	162-16-6
914 East Pasadena Avenue	1924	162-16-4
920 East Pasadena Avenue	1924	162-16-2
1004 East Pasadena Avenue	1924	162-17-42
3040 West Camelback Road	1914	153-29-13A
3030 West Camelback Road	1935	153-29-14
666 West Camelback Road	1925	162-26-12A
1044 East Camelback Road	1936	162-17-95
1050 East Camelback Road	1925	162-17-86B