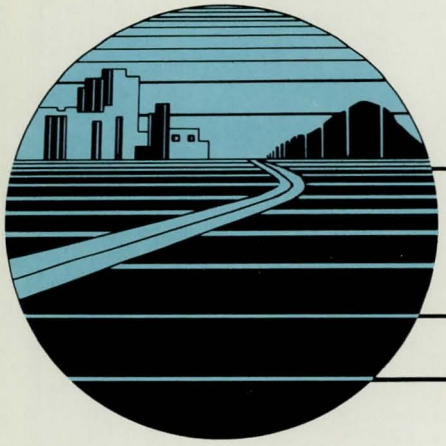

PRICE EXPRESSWAY

Location/Design Study

Reconnaissance Report

Prepared for:
Arizona Department
of Transportation

Prepared by:
Dames & Moore

January 1987

Contract No. 85-37
Price Expressway SR117
Project No. RAM-600-1-303

PRICE EXPRESSWAY
LOCATION/DESIGN STUDY RECONNAISSANCE REPORT

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SUMMARY

This Reconnaissance Report documents the Phase I activities involved in the Price Expressway Location/Design Study. The Arizona Department of Transportation (ADOT) has contracted Dames & Moore to complete the study. The purpose of the Location/Design Study is to identify the location, design concept, and land needed for right-of-way (ROW) for the Price Expressway. Price Expressway is a link in the Regional Transportation Plan for the greater Phoenix area. The plan has been adopted and approved by both the Maricopa Association of Governments (MAG) and the State of Arizona Transportation Board.

The reconnaissance activities have involved:

- A study of the history of Price Expressway,
- A review of existing transportation and environmental data,
- An environmental inventory,
- Establishment of a public information program, and
- Examination of drainage and soils.

The results of the reconnaissance are:

- Identification of a narrow study corridor on or along the existing Price Road.
- Identification of criteria to be used in formulating and evaluating expressway alternatives in Phase II. The criteria are displayed in Table 3.1 (following page 3-7). The criteria were developed considering the engineering needs and the environmental aspects of the project. At the same time as the criteria were being developed a public information program was identifying "stakeholders" issues and concerns. There is an excellent correlation between the criteria developed and the issues and concerns identified.
- Identification of the range of expressway alternatives to be considered in Phase II. The range extends from a signalized arterial to a limited access freeway.

As a result of the reconnaissance the following key issues have been identified:

Level of Expressway
Traffic Projections
Access to Expressway
Right-of-Way Needed
Drainage
Utilities

Aesthetics
Interchanges
Cultural Resources
Air Quality

Each of these issues are summarized below.

The definition of an expressway is very general. It allows for the type of expressway currently planned as Price Parkway by Chandler. Price Parkway is proposed at grade with signalized intersections. The definition also allows for a high-level expressway which, in essence, is a freeway. The local jurisdictions have envisioned a low-level expressway which is currently reflected in their planning. However, from a regional viewpoint it makes sense to continue the Outer Loop (freeway) concept through to the Southeast Loop Highway.

Interrelated with the level of expressway issue are concerns regarding traffic projections. Traffic projections are provided by MAG Transportation Planning Office through their regional model. The model is based on updated 1984 demographic data. Furthermore, the Price Expressway and Southeast Loop link in the Regional Transportation Plan have been added since the model data base update. These two links are significant factors in the future of the East Valley area of the Phoenix Metropolitan Area. Consequently, the current model does not reflect any growth since the last update, nor any growth induced by the addition of these two facilities. New traffic projections based on 1986 demographics will be available early in 1987. Phase II analysis will use the updated 1984 data base. A recommendation regarding any need to revise the design concept will be offered when the 1987 traffic projections are available.

Another issue related to the range of expressways to be considered is access. A high-level expressway alternative has controlled access via grade separations. Distance requirements for on and off ramps preclude access points closer than one mile apart. Both the City of Tempe and Chandler have expressed a desire for much more access than once per mile. Frontage roads can resolve the issue to some degree but add to total ROW requirements.

ROW requirements are another issue. The issue is related to the existing and proposed land uses that would be impacted. For instance, Chandler's future development plans are based on an assumed low-level expressway with corresponding ROW requirements. If traffic projections are greater than those used by Chandler in sizing the expressway, the future land use plans could be significantly impacted by ROW requirements. In Tempe, the same applies to existing land use as well.

Drainage is a major issue associated with the Price Expressway. The natural drainage from much of the project area is southwesterly to the Gila River. However, drainage in the natural drainage feature crosses the Gila River Indian Community (GRIC) to reach the Gila River. The GRIC has indicated that they are not receptive to receiving stormwater runoff other than under existing conditions. Consequently, alternatives such as pumping runoff north

to the Salt River are being considered. Such an alternative is compounded by the fact that the freeway and its drainage facilities to the north are being readied for the construction phase. Consequently, the drainage concept design for Price Expressway needs to be accelerated.

The utilities within the corridor warrant significant design consideration. Price Road is a major ROW corridor for all infrastructure utilities including sewer, water and electrical. In addition, the corridor contains a primary trunk irrigation canal, natural gas and nitrogen pipelines, and a large storm runoff channel.

The aesthetic visual impact of the expressway is another major concern. Tempe has expressed considerable concern regarding the visual impact of elevated facilities. The City of Chandler envisions a Parkway and has given considerable thought and planning to the visual impacts as well.

Other major factors to consider are the interchanges at both ends of the Price Expressway. At the north end Price Expressway will meet the Superstition Freeway and the Outer Loop. This interchange has already been examined as part of the Outer Loop. A design concept has been proposed and is being finalized by ADOT and other consultants. The interchange design concept allows for a transition to the Price Expressway from Baseline Road to Guadalupe Road. Since the concept is designed for a fully directional freeway-to-freeway interchange, it allows for the full range of alternatives for Price Expressway.

At the south end of Price Expressway there will be an interchange with the Southeast Loop. There are two major factors involved with the design of this interchange. The first is the design concept for Price Expressway. Since Price Expressway can vary from a major signalized arterial to a freeway, the interchange could vary significantly. The second factor is the GRIC. All of the lands in the Southwest quadrant at the intersection of Price Road and Pecos Road (interchange location) are GRIC lands. Furthermore, these lands are allotted lands with numerous owners. The amount of time necessary to acquire ROW on these GRIC allotted lands could prevent completing the Price Expressway as scheduled.

The cultural resources inventory indicates that prehistoric and historic sites are present within the Price Expressway study area. How extensive these sites are or how many are still intact remains to be addressed. Many sites are linear features (i.e., canals) which would be impossible to avoid, and the quality of the data is not precise enough to designate any areas as warranting avoidance at this time. However, cultural resources clearly need more analysis during Phase II after specific alignment locations are identified. The mitigation required for archaeological sites can be expensive and time consuming.

Air quality is a concern. The Price Expressway study area is in a "Nonattainment Area" for CO, O_3 and TSP. Results of the computer model MOBILE3 will be obtained from ADOT for assessment.

Phase II will proceed to address these key issues using the criteria developed to formulate and evaluate alternative Price Expressway location/design concepts.

1.0 INTRODUCTION

On July 24, 1985, the Maricopa Association of Governments (MAG) adopted a Regional Transportation Plan for Maricopa County (Figure 1.1). The plan includes the addition of 233.5 miles of freeway and expressway corridors. This extensive metropolitan highway system is intended to allow more efficient regional movement within the Valley. The entire system is targeted for completion by 2005, with high priority expressway and freeway segments proposed to be operational by 1991.

On October 8, 1985, Maricopa County voters approved a half-cent sales tax increase to fund the additions to the Regional Transportation Plan. The special referendum was passed by a three to one vote and is expected to generate more than $5.8 billion (inflated dollars) during the next 20 years. The October vote established the Regional Area Road Fund (RARF) which is being administered by the Arizona Department of Transportation (ADOT). Except for approximately $0.2 billion (inflated dollars) that has been earmarked for public transit, RARF may only be used for the design, right-of-way (ROW) purchase or construction of controlled-access highways which are included in the Regional Transportation Plan and accepted into the State Highway System (Maricopa Association of Goverments 1985). ADOT has initiated the sale of bonds to raise funds to start construction of the system. The bonds will be repaid with revenues raised from the sales tax increase.

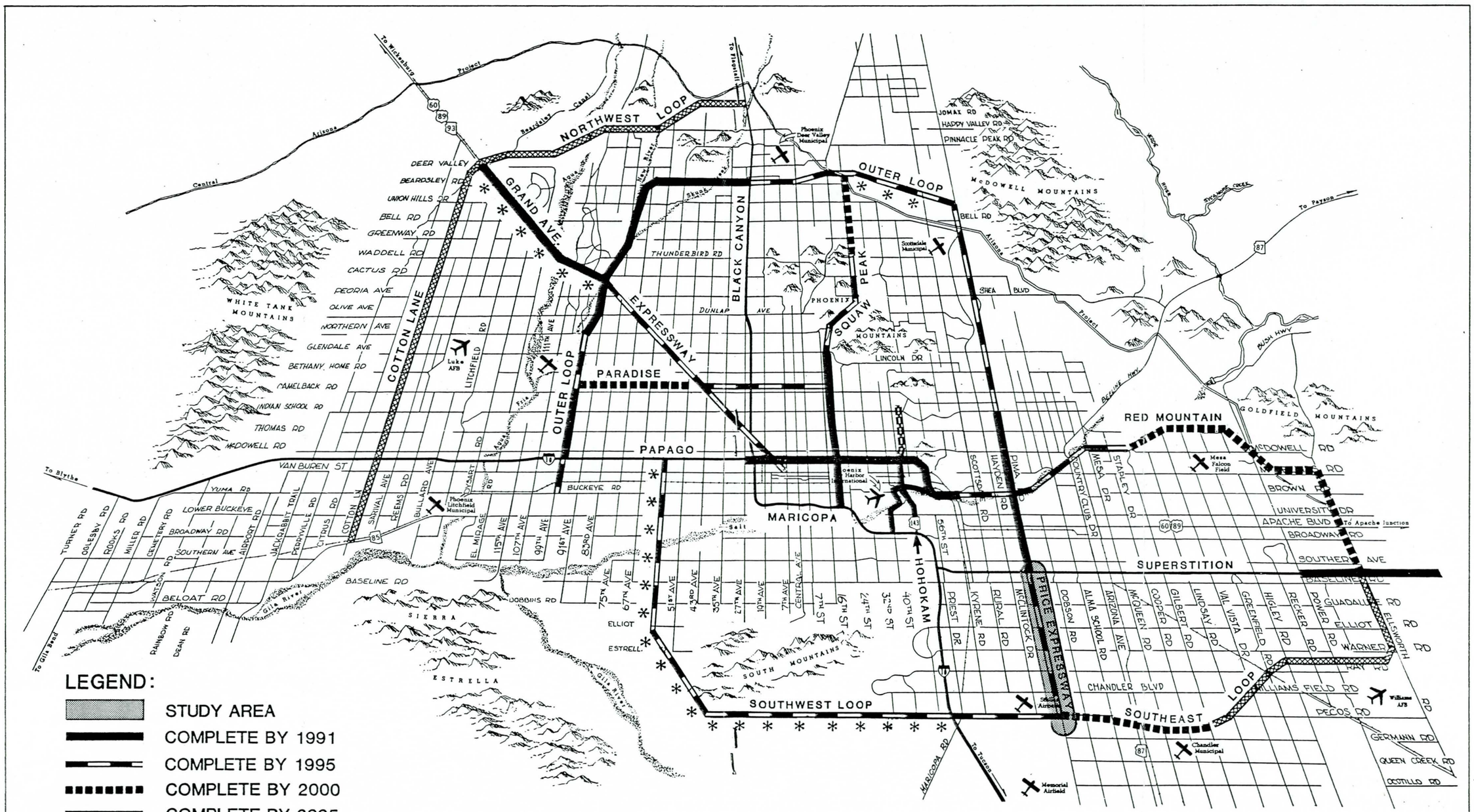
The Price Expressway, highlighted in Figure 1.1, is a north-south link of the Regional Transportation Plan that will serve the East Valley. The Regional Transportation Plan located the proposed Price Expressway along the existing Price Road.

Dames & Moore has been contracted by ADOT to conduct a location/design study for the proposed Price Expressway. TAMS Consultants, Inc. has been subcontracted to provide transportation engineering input. Prior to this study conducted by Dames & Moore, three previous transportation studies have proposed various highway improvements for Price Road.

The Eastside Transportation Analysis, prepared for MAG in 1984, identified needed highway improvements in the East Valley including Price Road. Two alternatives to upgrade Price Road included: (1) the widening of Price Road to a six-lane expressway between the Superstition Freeway and the Western Canal (two miles south of the Superstition Freeway) and a six-lane arterial south of the canal; and (2) the widening of Price Road to six lanes from the Superstition Freeway south into the City of Chandler to relieve congestion and divert traffic from parallel streets. The study noted that "by 2015 both six-lane alternatives would attract enough traffic to Price Road that it would be congested, but less so than under the current plans for a four-lane street."

The City of Chandler, in an effort to meet the transportation needs of their rapidly expanding city, prepared the Chandler Transportation Plan. This plan, adopted in January 1986, presented Price Road improvements as a park-way/expressway facility with signal controlled intersections at major mile

REGIONAL TRANSPORTATION PLAN



LEGEND:

- STUDY AREA
- COMPLETE BY 1991
- COMPLETE BY 1995
- COMPLETE BY 2000
- COMPLETE BY 2005
- CORRIDOR UNDER STUDY
- * INITIAL CONSTRUCTION: FINAL STAGE BY 2000–2005

NOTE: FREEWAY AND EXPRESSWAY LOCATIONS ARE APPROXIMATE.

Source: MAG, Transportation Planning Update Report - June 1986

PRICE EXPRESSWAY RECONNAISSANCE

PREPARED: BY DAMES & MOORE

PREPARED FOR: ARIZONA DEPARTMENT OF TRANSPORTATION

FIGURE 1.1

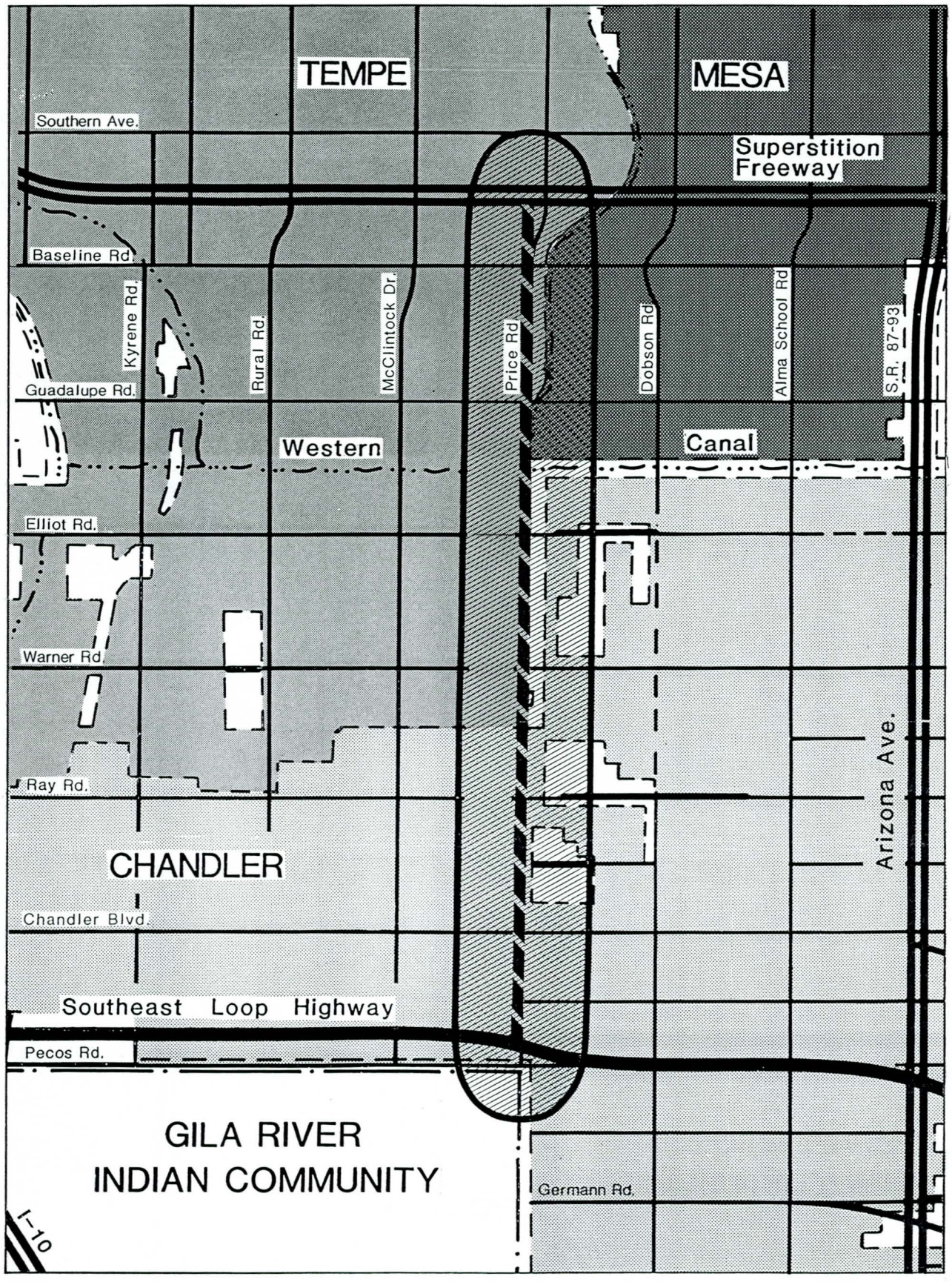
point cross streets. In response to their transportation plan, the City of Chandler has initiated ROW dedications and reservations through density transfers and bonuses.

In 1985, the Tempe Transportation Study identified two design alternatives for Price Road: (1) a six-lane Price Expressway, and (2) an expanded six-lane Price Road arterial. Travel time, safety, ROW and accessability were considered in the evaluation of the two design alternatives. The study concluded that the expressway would improve the mobility of the East Valley residents.

The study area for this Price Expressway Location/Design Study is presented in Figure 1.2. The area is approximately eight miles long and one mile wide. It is one-half mile either side of the existing Price Road from the Superstition Freeway at the northern end to Pecos Road at the southern end. A half mile radius defines the study area boundary at both ends. Portions of the incorporated cities of Tempe, Mesa, Chandler, the northeast corner of the Gila River Indian Community (GRIC), and unincorporated areas of Maricopa County are included in the study area. The study area boundary delimits the area in which site specific data are collected. The alignment is generally along Price Road as indicated in the Regional Transportation Plan.

The Price Expressway Location/Design Study will establish an expressway design concept, the horizontal and vertical alignment, preliminary design features, and the ROW needed for construction. This study is separated into three phases. Phase I is an engineering and environmental inventory. Engineering design and environmental criteria will be defined from the inventory and presented in this report. These criteria will be used to identify and evaluate alternative design concepts developed in Phase II. The results of Phase II will be documented in a Draft Design Report and Draft Environmental Assessment document. Phase III will recommend a final design concept after a public hearing and review of the draft reports. The final report will provide plans and maps illustrating the vertical and horizontal alignments, preliminary design features, and the ROW needed for construction.

STUDY AREA AND JURISDICTIONS



PRICE EXPRESSWAY RECONNAISSANCE

PREPARED BY: DAMES & MOORE

PREPARED FOR: ARIZONA DEPARTMENT OF TRANSPORTATION

FIGURE 1.2

2.0 DESIGN CONSIDERATIONS

The design considerations to be used in this study are divided into:

- Transportation Engineering
- Environmental Resources
- Public Issues and Concerns

2.1 TRANSPORTATION ENGINEERING

Geometrics, level of service, traffic, access, cost, mass transit, ROW and drainage features are major transportation engineering design considerations. These major topics are presented in the following sections and applied to the Price Expressway study area in Section 3.0 Range of Alternatives for Further Study.

2.1.1 Geometrics

All highway design will be performed in accordance with American Association of State Highway and Transportation Officials (AASHTO), A Policy On Geometric Design of Highways and Streets, 1984, Transportation Research Board (TRB), Highway Capacity Manual, 1985, and other supplemental design standards and guidelines adopted by ADOT and local jurisdictions. Compatibility and consistency with established freeway development guidelines will be investigated and followed where applicable.

Price Expressway has a broad range of facility concepts which will be investigated. Table 2.1 presents a listing of the geometric design criteria which will be used for the Price Expressway Study.

Streets that cross the Price Expressway will be designed in accordance with "Design of Urban Streets," Federal Highway Administration and local jurisdiction adopted standards. Signalization will be proposed where required by traffic forecasts in accordance with warrants specified in the Manual of Uniform Traffic Control Devices (MUTCD).

2.1.2 Level-Of-Service

The typical motorist is aware of the effects that high traffic volume has on their ability to travel with reasonable speed, convenience and safety. The systems analysis concept, which qualitatively measures volume to capacity ratios and travel speeds, is called level-of-service (LOS). LOS is designated by a letter grade ranging from "A" (free flow) to "F" (forced flow).

The concept of LOS provides an evaluation criteria for the various components of the facility and, thereby, an overall evaluation of the network. The LOS

TABLE 2.1
EXPRESSWAY GEOMETRIC DESIGN CRITERIA

	High-Level Facility	Low-Level Facility
Design Year:	2015	2015
Design Traffic Volumes:	Per MAGTPO supplied computer runs.	
Design Speed:	65 MPH Mainline 50 MPH Ramps & Crossroads 45 MPH Frontage Roads	45 MPH
Horizontal Cuirvature:	4 Degrees Maximum - Mainline	Per AASHTO
Lane Width:	12 feet	12 feet
Shoulder Width:	Left - 8 feet Right - 10 feet	N/A
Median Width:	46 feet (includes left shoulders)	*46 feet (includes left shoulders)
Desirable Gradients:	3% Mainline 4% Crossroads 5% Ramps	3% Roadway 4% Crossroads
Lane Capacity (LOS D)	Per Highway Capacity Manual	Per Highway Capacity Manual
Slope Standards:	2:1 (Max), 3:1 (Desirable) Depressed 4:1 Elevated 2:1 Structures	2:1 (Max), 3:1 (Desirable) Depressed 4:1 Elevated 2:1 Structures
Access Control:	Full	Partial

Table 2.1 (continued)
Expressway Geometric Design Criteria

	High-Level Facility	Low-Level Facility
Drainage:		
	Pavement: 10 year event	Pavement: 10 year event
	Depressed Areas: 50 year event	Depressed Areas: 50 years event
	Cross Drainage: 50 year event	Cross Drainage: 50 year event
	Design will be reviewed for no significant impacts outside of ROW for 100 year event	

*Median widths may vary with alternatives.

concept describes the ability of the various elements of the network to handle vehicular traffic at various levels of delay from free flowing to forced flow.

Price Expressway will be designed for a LOS "D" in the design year 2015 as allowed by AASHTO for congested urban areas and recommended by ADOT and local jurisdictions. Cross streets will be designed for a LOS "C".

2.1.3 Traffic

Existing Traffic Conditions

Figure 2.1 displays the existing traffic volumes in terms of 1984 Average Weekday Traffic (AWDT) in thousands of vehicles per weekday along Price Road. The daily volumes range from a high of approximately 22,000 vehicles per day (vpd) between Guadalupe and Baseline roads to a low of approximately 500 vpd between Warner Road and Chandler Boulevard.

Existing traffic operational characteristics (i.e., peak hour factors, etc.) were obtained from the "1984 Traffic Flow Statistics Report For the Phoenix Metropolitan Area," and the "Phoenix Metropolitan Area Characteristics, 1975 through 1983", both published by MAG Transportation Planning Office (MAGTPO) in October 1985 and July 1984, respectively.

Traffic variations for monthly and daily operations indicate that traffic volumes vary from a high of 106 percent of the AWDT in February to a low of 94 percent of the AWDT in July. Daily variations range from about 95 percent of the AWDT on Monday to over 106 percent on Friday, with the remainder of the workweek between 98 and 100 percent (Tuesday, Wednesday and Thursday).

There are other traffic engineering factors which are applied to traffic in order to get a better understanding of existing traffic operations and how they may change over time. The most commonly used of these factors are defined as follows:

- Peak Hour Factor (PHF)
- Critical Direction Ratio (K1 Factor)
- Directional Distribution (D)

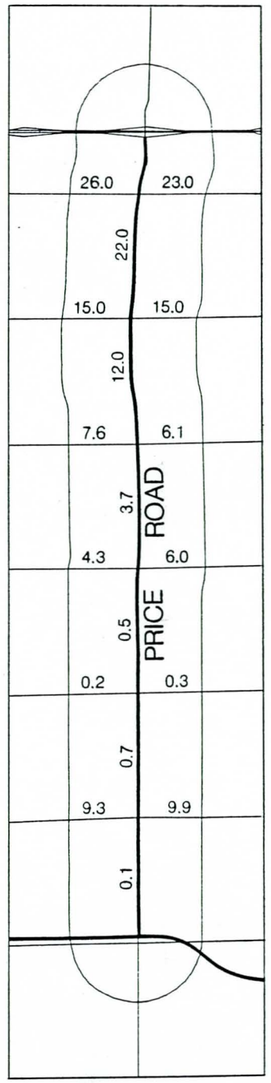
For Price Expressway, the following values for the above factors were presented in the MAGTPO report:

- PHF = 0.93
- K1 = 0.12
- D = 0.72

While a K1 factor of 0.12 for an arterial roadway is acceptable and within the normal range, it is probably too high for a regional expressway facility. The Draft Reconnaissance Report for the Southwest Loop Highway recommended a

TRAFFIC VOLUMES

YEAR 1984



SUPERSTITION

BASELINE RD.

GUADALUPE RD.

ELLIOT RD.

WARNER RD.

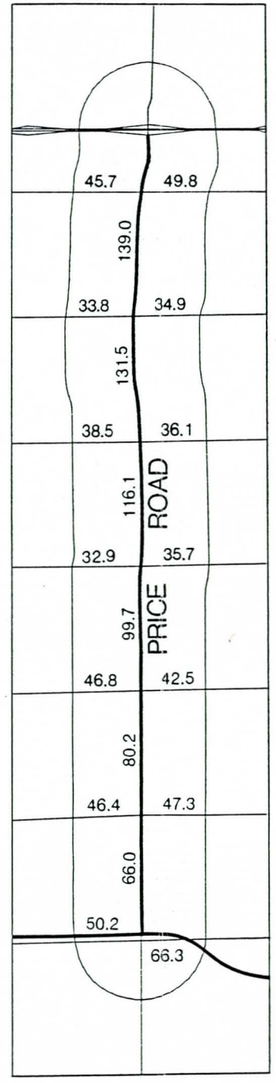
RAY RD.

CHANDLER BLVD.

PECOS RD.

SE LOOP

YEAR 2005



SUPERSTITION

BASELINE RD.

GUADALUPE RD.

ELLIOT RD.

WARNER RD.

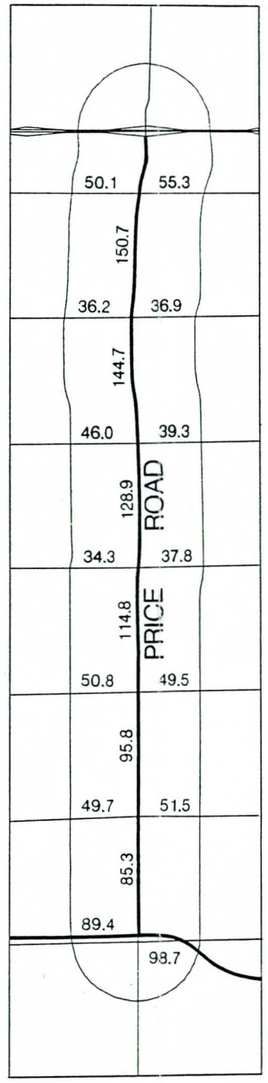
RAY RD.

CHANDLER BLVD.

PECOS RD.

SE LOOP

YEAR 2015



SUPERSTITION

BASELINE RD.

GUADALUPE RD.

ELLIOT RD.

WARNER RD.

RAY RD.

CHANDLER BLVD.

PECOS RD.

SE LOOP

PRICE EXPRESSWAY RECONNAISSANCE

PREPARED BY: DAMES & MOORE AND TAMS CONSULTANTS, INC.
PREPARED FOR: ARIZONA DEPARTMENT OF TRANSPORTATION

TRAFFIC VOLUMES
(AVERAGE WEEKDAY
TRAFFIC IN THOUSANDS
OF VEHICLES
PER WEEK DAY)

SOURCE: MAGTPO
CONSTRAINED RUN:
6 LANE FREEWAY
SYSTEM 48A

FIGURE 2.1

K1 factor of 0.08 in the morning and 0.085 in the afternoon which is consistent with the 0.08 currently measured on I-17/I-10. This compares to 0.12 for the existing Price Road.

The Directional Distribution of 72 percent will probably be too high in future years due to the magnitude of growth that is forecasted for the East Valley of Maricopa County. This growth will begin to equalize the Directional Distribution of traffic flows. Therefore, a directional split of 60 percent/40 percent for the future year travel forecasts will be assumed.

Traffic Forecasts

MAGTPO utilizes the Urban Transportation Planning System (UTPS) traditional sequential models to develop forecasts of future travel within the Phoenix Metropolitan Region. Traffic forecasts for the Price Expressway were obtained from MAGTPO System 48A for the years 2005 and 2015 based upon an adjusted 1984 demographic and employment data base. The population and employment forecasts, as well as other demographic data, are being updated to provide current forecasts of the intense growth that has and is projected to occur in the southeast area of the Phoenix Metropolitan Region. This revised demographic data base is expected to show a substantial increase in the traffic volumes forecasted for the Price Expressway. The forecasts which are presented in Figure 2.1 will be revised as the updated forecasts are available.

The following general comments can be made regarding the current available forecasts from MAGTPO:

- Volumes along the Price Expressway, south of Baseline Road, are expected to increase to about 140,000 daily vehicle trips in the year 2005, and to about 150,000 in the year 2015. This represents an increase of over 500 percent in 20 years, and about 600 percent within a 30-year period.

- Volumes near the south end of the corridor, north of Pecos Road, are forecasted at 66,000 daily vehicle trips in 2005 and 85,200 in 2015.

- Volumes discussed above are constrained runs based upon a six-lane freeway facility for Price Road.

The forecasts indicate that virtually every existing roadway within the corridor will be approaching or will exceed capacity by 2005. An eight-lane high-level expressway with frontage roads carrying approximately 140,000 vehicles per day would operate at a LOS "C". For LOS "D", a six-lane facility could marginally carry the forecasted traffic volumes in the year 2005, assuming that the frontage would relieve the mainline traffic to some extent. In the year 2015, with travel forecasts exceeding 150,000 vehicles per day, a six-lane facility would be inadequate at LOS "D", and an eight-lane facility would be required. In Phase II, revised traffic forecasts will be run and

evaluated to address the range of alternatives to be investigated for further study.

2.1.4 Access

The level of access provided by the facility will be an evaluation criteria. The low-level expressway would provide the least control. Access would occur at all local collectors and business entrances. The high-level expressway would limit access to only major arterials through the use of interchanges and grade separations.

The level of access a facility type offers will impact the associated LOS. As the control over access increases on the expressway, the traffic movement becomes smoother and the vehicle capacity per lane increases. This is reflected in an improved LOS for the facility. Therefore, to carry the same design traffic volumes, the low-level expressway would generally require more traffic lanes than the high-level expressway.

2.1.5 Estimate of Costs

An estimate of the facility development costs will be established for the various alternatives considered during Phase II. These costs will be used as evaluation criteria in selection of a preferred alternative. The cost estimates will be based on 1986 construction and ROW dollars.

The estimate of facility development costs will include:

- ROW Costs
  - Property Acquisition
  - Relocation Costs
- Roadway Construction Costs
  - Grading
  - Drainage
  - Paving
  - Utility Relocation
- Major Structure Costs
  - Grade Separations
  - Drainage Structures
  - Canal Bridges
  - Retaining Walls
- Interchanges or Intersections Signalization
- Construction Contingencies

Current cost data available from ADOT Urban Highways Section, MAG, and other sources will be used. Unit prices will be developed to establish an estimate of facility development cost. The costs will be estimates with accuracy sufficient only for relative comparisons among alternatives.

2.1.6 Mass Transit

There is a separate $0.2 billion in the RARF for transit study. The portion of the RARF funding this study is for the design, ROW purchase, and construction of controlled access highways. The location/design decision regarding the Price Expressway will be made before the transit studies are complete. With this in mind, each expressway alternative will be evaluated to identify the future transit opportunities offered or foregone by the particular design and location. Mass transit options to be considered include HOV lanes or fixed guideway systems.

2.2 ENVIRONMENTAL RESOURCES

An inventory was conducted to document and record the environmental resources in the study area. The results of the environmental inventory are presented below according to the following resource elements:

- Land Use
- Socioeconomics
- Visual
- Geotechnical
- Water Resources
- Biology
- Cultural
- Air Quality
- Noise

Each resource element is documented to provide an understanding of the environmental character of the study area. Criteria developed from the inventory will be used to refine and assess expressway alternatives.

2.2.1 Land Use

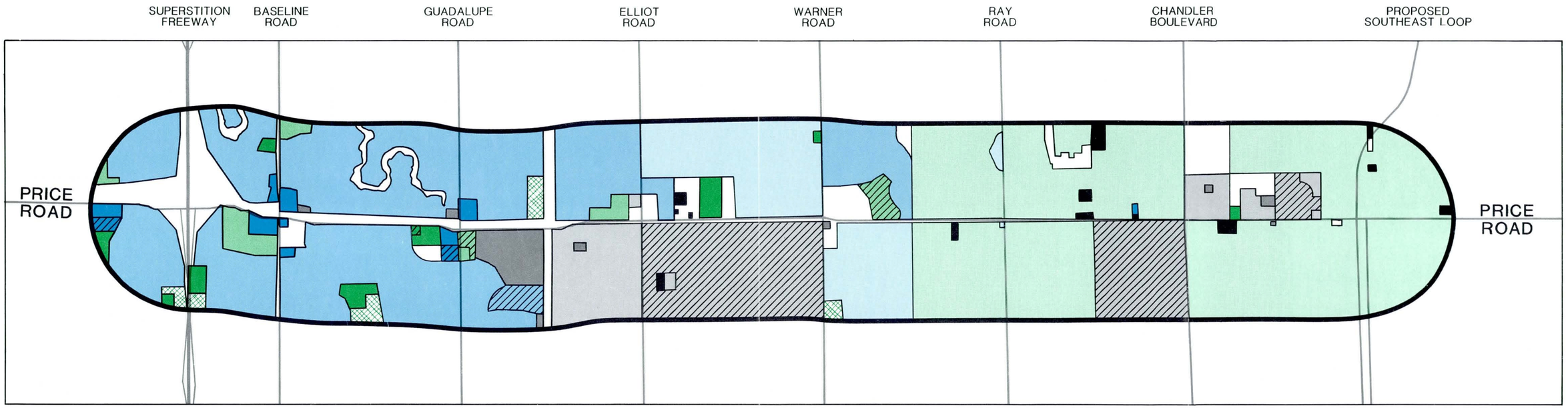
Existing land use in the study area was documented using aerial photography with field verification. Land use planning documents were reviewed and interviews were conducted to obtain data concerning present conditions, future land use, utilities, and existing ROW.

Land use in the study area includes residential, commercial, industrial and agricultural. A map of existing land use is presented in Figure 2.2. Nearly one-third of the Price Road frontage is presently used for single-family housing, primarily north of Knox Road in Tempe. About one-third of the frontage is agricultural land, mainly in Chandler and the GRIC. Approximately one-fifth of the frontage is commercial, industrial or office uses.

Several developments have been proposed for the vacant land which comprises roughly one-tenth of the Price Road frontage within the study area. A map of future land use is presented in Figure 2.3, which also identifies special planning districts designated by the City of Chandler.

Price Road is a major route for underground and above-ground utilities. A detailed map of sewer, water and irrigation facilities within the study area is presented in Figure 2.4. There are eight water mains located in and adjacent to the Price Road ROW. The largest is 24 inches in diameter. The water mains serve the area from Tempe's South Water Treatment Plant near Guadalupe Road and Price Road. Chandler proposes to add sanitary sewer lines to supplement its existing 66-inch line that parallels Price Road. Chandler is also proposing a 72-inch pressure storm pipe. It will convey water along Price Road from a detention basin at Price and Pecos intersection north to Carriage Lane Park.

Other utilities in the study area include electrical transmission, communication, and gas lines. Figure 2.5 presents a detailed map of these utilities. Two



EXISTING LAND USE

MILES

0 1/2 1 2 3

EXISTING LAND USE

PRICE EXPRESSWAY RECONNAISSANCE

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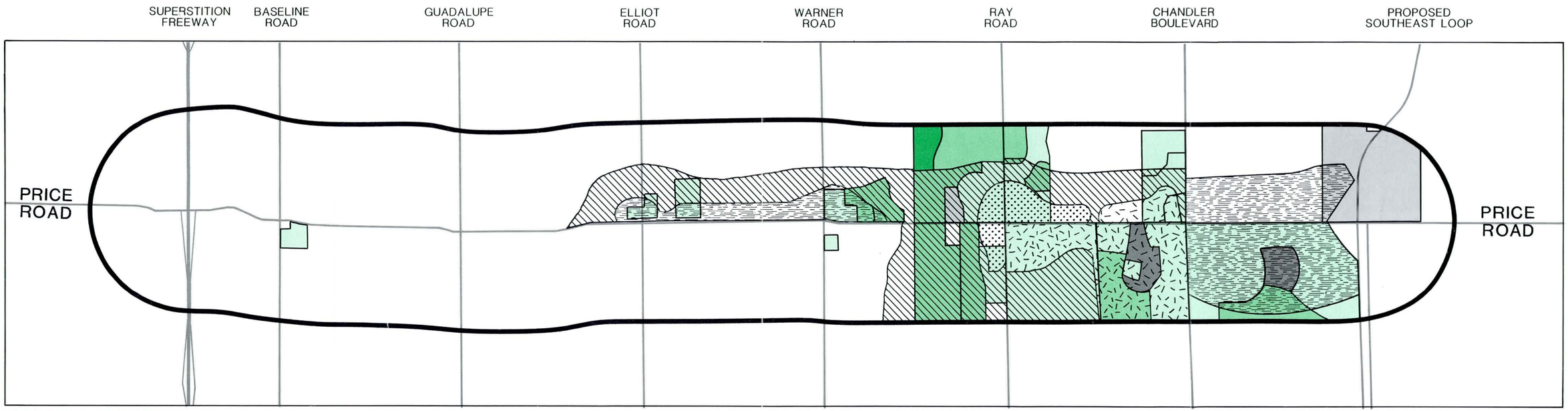
PREPARED FOR : ARIZONA DEPARTMENT OF TRANSPORTATION
August 1986

LEGEND

- AGRICULTURAL
- VACANT/OPEN SPACE
- RURAL RESIDENTIAL[a]
- LOW DENSITY SINGLE-FAMILY RESIDENTIAL[b]
- MEDIUM-HIGH SINGLE-FAMILY DENSITY[c]
- MULTI-FAMILY RESIDENTIAL
- PUBLIC/QUASI-PUBLIC
- COMMERCIAL/OFFICE
- INDUSTRIAL/BUSINESS PARK
- UTILITY
- PARK
- TRANSITIONAL (UNDER DEVELOPMENT)

a 5 ACRES PER RESIDENTIAL UNIT
b 1 TO 5 ACRES PER UNIT
c >1 UNIT PER ACRE

FIGURE 2.2



FUTURE LAND USE

MILES

0 1/2 1 2 3

FUTURE LAND USE

PRICE EXPRESSWAY RECONNAISSANCE

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LEGEND

PROPOSED DEVELOPMENTS

- PROPOSED COMMERCIAL/OFFICE
- PROPOSED MULTI-FAMILY/MIXED DENSITY SINGLE-FAMILY RESIDENTIAL
- PROPOSED BUSINESS PARK
- PROPOSED INDUSTRIAL/EMPLOYMENT
- PROPOSED PUBLIC/QUASI-PUBLIC

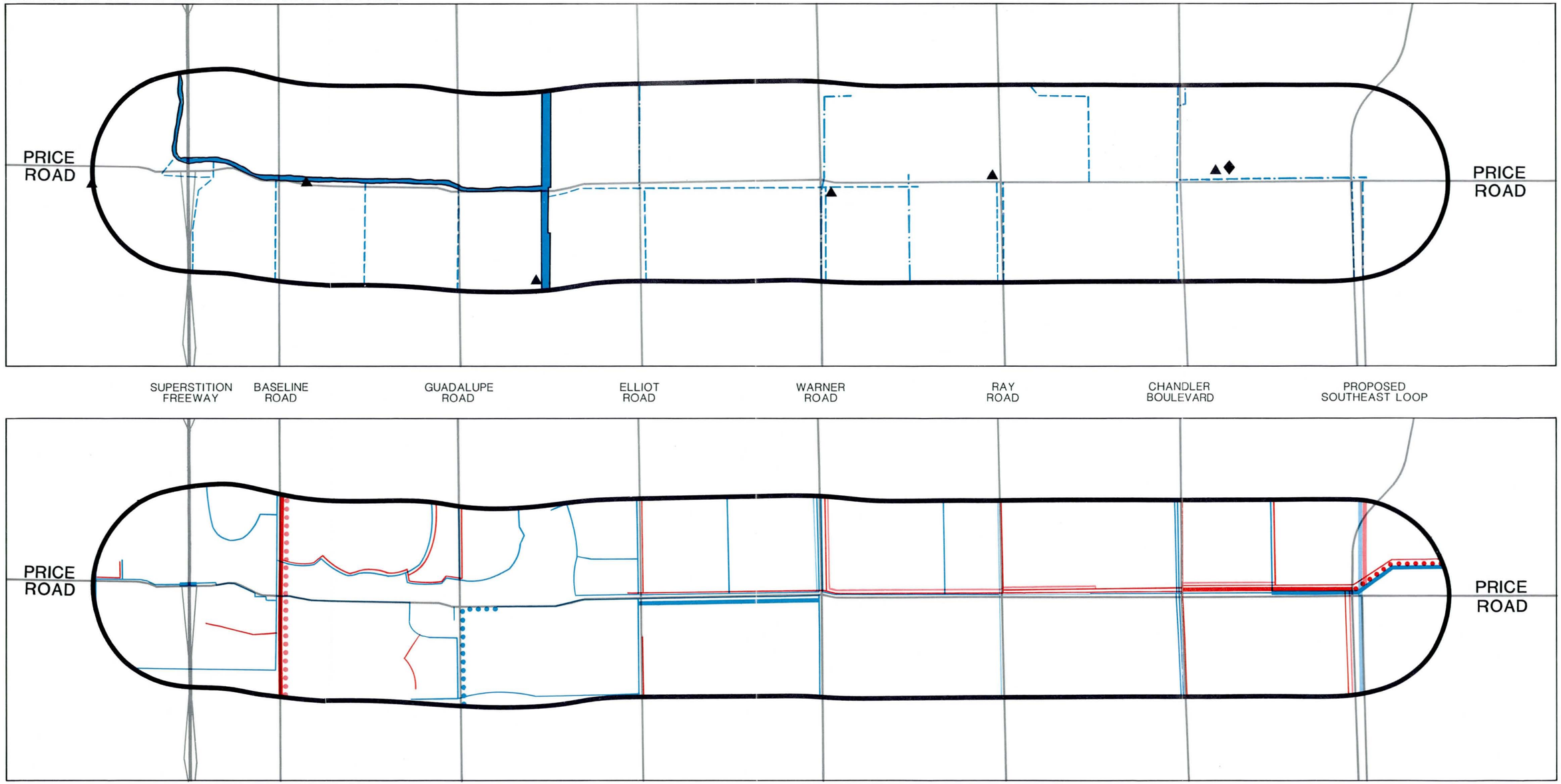
PLANNED USE DISTRICTS

- PLANNED COMMERCIAL/HIGH DENSITY* RESIDENTIAL
- PLANNED INDUSTRIAL/EMPLOYMENT*
- PLANNED "SPECIAL DISTRICTS"*
- PLANNED RESIDENTIAL

*CHANDLER TRANSPORTATION PLAN, 1986

FIGURE 2.3

MUNICIPAL WELLS and IRRIGATION SYSTEMS



SEWER and WATER

MILES

0 1/2 1 2 3

UTILITIES

PRICE EXPRESSWAY RECONNAISSANCE

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PREPARED FOR : ARIZONA DEPARTMENT OF TRANSPORTATION

August 1986

LEGEND

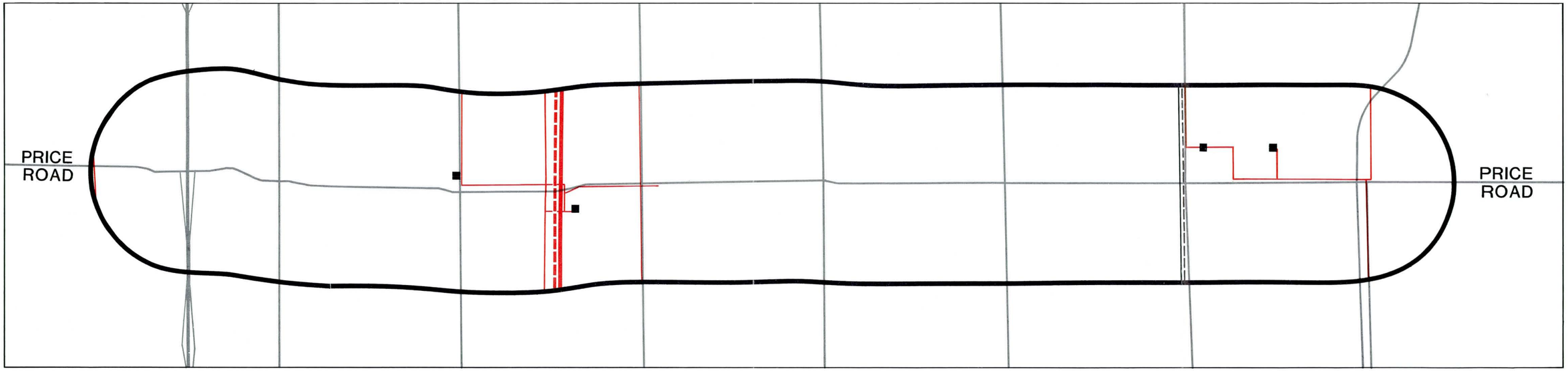
MUNICIPAL WELLS AND IRRIGATION SYSTEMS

- CANAL
- EXISTING WELL
- EXISTING WATER RESERVOIR
- PIPED LATERAL
- PIPED DRAIN AND PUMP DITCH

EXISTING WATER AND SEWER		FUTURE WATER AND SEWER	
Water Mains	Sewer Mains	Water Mains	Sewer Mains
10"-16"	12"-30"	≤ 16"	12"-30"
24"-30"	33"-48"	30"-36"	33"-48"
60"-66"	66"		54"

FIGURE 2.4

ELECTRICAL TRANSMISSION and COMMUNICATION FACILITIES



GAS PIPELINES

MILES

0 1/2 1 2 3

UTILITIES

PRICE EXPRESSWAY RECONNAISSANCE

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August 1986

LEGEND

ELECTRICAL TRANSMISSION AND COMMUNICATION FACILITIES

- 500KV TRANSMISSION LINE
- 230KV TRANSMISSION LINE
- 69KV TRANSMISSION LINE
- EXISTING SUBSTATION
- PROPOSED U.S. SPRINT FIBER OPTIC CABLE
- MOUNTAIN BELL'S MAIN TELECOMMUNICATION CABLES

GAS PIPELINES

- EL PASO NATURAL GAS (4 1/2", 6 5/8", 10 3/4", 12 3/4", 16", 20")
- SOUTHWEST GAS CORPORATION (4", 6", 8")
- SOUTHERN PACIFIC PIPELINES, INC. (JET FUEL, 6")
- AIR PRODUCTS AND CHEMICALS, INC. (6", 10")

FIGURE 2.5

69kV Salt River Project (SRP) electrical power lines run parallel to Price Road. Three electrical transmission lines (69kV, 230kV and 500kV) cross Price Road along the Western Canal. A 16-inch El Paso Natural Gas pipeline and a 10-inch Air Products and Chemical Corporation nitrogen gas line parallel Price Road. In addition, two lateral irrigation pipes and aerial television cables parallel Price Road. Three SRP irrigation wells and one of Chandler's wells are located along Price Road. At each major intersection, numerous other utility corridors cross Price Road. Mountain Bell's coaxial trunk and fiber optic cable line crosses Price Road at Chandler Boulevard, parallel to a proposed US Sprint fiber optic cable route.

A diamond-shaped ROW has been reserved by ADOT at the Price/Superstition intersection. South of the Superstition, the City of Tempe has established a 110-foot-wide ROW (55-feet half-width) with some exceptions: (1) the ROW widens to approximately 145 feet at the Guadalupe Road intersection east of the existing alignment; (2) south of Curry Street to Elliot, from the point where Price Road curves eastward, the 110-foot ROW includes the western 55-foot half-width in the City of Tempe and the eastern half-width within an 80-foot strip of Maricopa County Flood Control District land; and (3) from Elliot Road south to the Tempe city boundary, the ROW is 88 feet wide (55 feet within Tempe).

The City of Chandler has proposed a standard 200-foot ROW (100-foot half-width) for the rapidly developing southern portion of Price Road. According to the Chandler Transportation Plan, "appropriate dedications of right-of-way should be a requirement for development along the corridor." For new developments, the ROW agreement is a stipulation of the rezoning ordinance. The City requires a minimum ROW dedication of 65 feet (half-width) and requests that an additional 35 feet be reserved for Planned Area Developments (PADs) in order to meet the 200-foot standard. In some cases, dedication of the additional 35 feet is contingent upon approval of final plans for Price Road.

2.2.2 Socioeconomics

A socioeconomic inventory of the study area and potentially affected jurisdictions was obtained from field studies and secondary sources (1980 census and 1984 MAG projections). Inventory categories include demographic/economic characteristics, public services and facilities, and tax jurisdictions. Baseline data from this inventory will be used to evaluate potential economic, fiscal, and neighborhood disruption effects of the expressway. The updated 1984 MAG projections will be used in Phase II of this study. MAG is presently in the process of approving an updated data base. This data base may not be available until late in this study process. The updated projections are expected to reflect substantial population and employment increases. Shifts in the growth patterns within the southeast valley are expected as well. Expressway design requirements could be significantly different based on the 1984 data base versus the 1986 data base.

Demographics/Economics

Demographic and economic characteristics of the potentially impacted jurisdictions are presented in Tables 2.2 and 2.3. An overview of growth trends within the study area is discussed below. Detailed analyses of growth patterns within the study area will be presented in Phase II.

Tempe

Tempe is the fourth largest city in Arizona. The city's development has paralleled growth in the Phoenix metropolitan area. Still an agricultural service area of 2,906 people within approximately 2 square miles in 1940, Tempe grew to 24,000 people on over 17 square miles by 1960. With increasing college enrollment, industrial expansion and migration into the region, Tempe became the fastest growing city in Arizona in the 1970s. At its peak in 1971, the city's population was growing by an average of 1,068 new residents per month.

Today, Tempe is virtually landlocked, surrounded by Phoenix, Scottsdale, Mesa, and Chandler. The city's population density has increased from 2,700 to 3,500 persons per square mile in the past 15 years, and commercial and industrial development is now catching up with the residential boom of the 1970s.

Manufacturing, retail trade and services account for over 70 percent of employment in Tempe. In recent years, Tempe has had the highest industrial growth rate in Arizona. There are now 40 industrial parks in the city and more are planned. Major employers include ASU, Digital Equipment, Garrett, ITT, Motorola, ADR (a division of Squibb), Litton, Marathon Steel and State Farm. Over 85 percent of Tempe's workers are employed in either Tempe or Phoenix. The proportion of workers with jobs in Phoenix has declined in recent years, from 38 percent in 1970 to 28 percent in 1984.

The influence of ASU, with current enrollment of over 40,000 students, is evident in the socioeconomic profile presented in Table 2.2. Of the three study area communities, Tempe's population is the youngest and most highly educated. The percent of home ownership is lower in Tempe than in Mesa or Chandler, but median incomes and home values are higher.

Mesa

Mesa, with a population exceeding 200,000, is the third largest city in Arizona. The city's growth has been marked by rapid expansion both in population and land area. Between 1970 and 1985, Mesa's population grew from under 64,000 to over 150,000. During the same period, the city's incorporated boundaries expanded from 24 to 82 square miles. Population density in Mesa remained fairly constant at 2,600 persons per square mile during this period, in contrast to Tempe which experienced more intensive development.

TABLE 2.2
SOCIOECONOMIC PROFILES: TEMPE, MESA, CHANDLER AND GILA RIVER INDIAN COMMUNITY

	Tempe	Mesa	Chandler	GRIC*
Area - 1984	38.54 sq. mi.	81.84 sq. mi.	60 sq. mi.	581.25 sq. mi.
POPULATION				
Total Population -				
1980	106,743	152,453	29,673	7,380
1985	132,866	219,834	63,855	9,747
1980-85 Compounded Percentage Change	+4.4%	+7.6%	+16.6%	+5.7%
Population Density - 1984 (persons per sq. mile)	3,447/sq. mi.	2,686/sq. mi.	1,064/sq. mi.	14/sq. mi.
EDUCATION				
High School Graduates	93%	88%	89%	.06%
College Attendance	71%	57%	49%	N/A
Median Age (yrs)	38.5	41.3	37.4	15-19
EMPLOYMENT				
Total Employment 1985	73,178	86,048	17,081	2,226
Unemployment Rate				
1980	5.0%	5.6%	5.3%	31%
1985	4.3%	4.8%	4.6%	31%
INCOME				
Median Income - 1984	$24,800	$22,200	$24,700	$6,698
HOUSING				
Median Home Value 1984	$77,900	$69,700	$75,900	$17,000
Percent Home Ownership 1984	67%	78%	74%	64%

*Gila River Indian Community

Sources: Valley National Bank. 1985. Arizona Gold. Mesa, Arizona
Valley National Bank. 1985. Arizona Statistical Review. September 1985. Phoenix, Arizona
Arizona Department of Commerce. 1986. Arizona Community Profiles. Phoenix, Arizona
Personal Communication. Gloria Thompson. Gila River Indian Community. August 29, 1986.

TABLE 2.3
EMPLOYMENT BY PLACE OF RESIDENCE
December 1984 Estimates

City of Employment	Residence		
	Chandler	Tempe	Mesa
Chandler	59%	1%	8%
Mesa	22	6	57
Phoenix	5	28	11
Tempe	12	59	13
Other	2	6	11
Total	**100**	**100**	**100**

Source: Valley National Bank. 1985. Arizona Gold. Mesa, Arizona.

Mesa's current growth is highlighted by residential development. In 1984, builders started 11,000 new housing units, nearly double the number begun in 1983 which, itself, was a record year. Mesa is also a tourist town, catering to seasonal residents during the winter. Mobile home and trailer space number 23,000 in the 20-mile corridor between Apache Junction and Mesa to accommodate these seasonal visitors.

Mesa has developed an increasingly diversified economy, based in tourism, high-technology manufacturing, construction, retail trade, health care and government services. Major employers include Hughes-McDonnell Douglas, Empire Machinery, AT&T, General Motors, Kelly Defense Systems, Motorola, and Johnson & Stewart Materials. Although several agricultural research facilities are located here, residential, commercial and industrial development have displaced most of the city's agricultural lands in recent years. As shown in Table 2.3, Mesa's workers are more dispersed throughout the Valley than Tempe's. Only 11 percent have jobs in Phoenix, down from over 19 percent in 1970.

Median income and median home value are lower in Mesa than in Tempe or Chandler. Mesa's population is older on the average and a greater proportion of the city's residents own their own homes.

Chandler

Traditionally a ranching and farming community, Chandler is also experiencing rapid residential, commercial and industrial development. The city's growth began in the 1970s when major high technology firms began locating there. From 1970 to 1985, the city's population grew from 14,250 to almost 64,000. Chandler's compounded growth rate between 1980 and 1985 was 16.6 percent, over twice that of Mesa and almost four times Tempe's rate of growth. However, with a population density of 1,068 persons per square mile, Chandler is still in the early stages of development. Three of every four acres in its boundaries are vacant or in agricultural production.

Agricultural products grown in Chandler include citrus, cotton, vegetable, soy beans and alfalfa. Agriculture accounted for almost 5 percent of employment in 1985. Employment is shifing toward high technology and service industries. Major firms in Chandler include Intel, Motorola, Rogers, G.B. Investment, Intertel and General Instrument. According to 1984 estimates, over 80 percent of workers from Chandler had jobs in either Chandler or Mesa and only 5 percent were employed in Phoenix.

Home values in Chandler are comparable to Tempe but more occupants own their own homes. In 1984, 92 percent of the residences in Chandler were single family dwellings, compared with 78 percent in Mesa and 67 percent in Tempe. The median age and income of Chandler's population was comparable to Tempe in 1984, but in educational attainment, Chandler was more similar to Mesa.

Gila River Indian Community

In 1985, the population of the GRIC was 9,747, including 7,994 people on the GRIC and an additional 1,753 tribal members living in off-reservation communities. The community's population grew at an annual compounded rate of 5.7 percent between 1980 and 1985.

The GRIC produces over $25 million of agricultural crops, including cotton, wheat, hay and vegetables, on 30,000 acres. Almost 5 percent of employment is in agriculture. Once totally dependent upon agriculture, the Community has been expanding industrial, retail and recreational activities, creating a more diversified economy. Three industrial parks now house 32 industrial operations on the GRIC. Major employment sectors include public administration, manufacturing and retail trade. Despite this growth, unemployment, at 31 percent, is a critical problem on the reservation. In 1985, the median annual income for the Community was $6,500, compared with $20,000 to $25,000 in the surrounding cities.

Price Expressway Study Area

The areas of Tempe, Mesa and Chandler lying within one mile of either side of Price Road between the Superstition Freeway and Pecos Road had a population of about 21,700 in 1980, according to MAG. Over 95 percent of that total was located north of Warner Road. By the year 2000, however, the population of the area is projected to exceed 70,000. The growth of nearly 50,000 persons is projected to be about equally divided between the areas north and south of Warner Road (Mountain West Research 1984). After 2000, most remaining expansion of population in the study area is projected in the southern portion, i.e., between Warner and Pecos Roads.

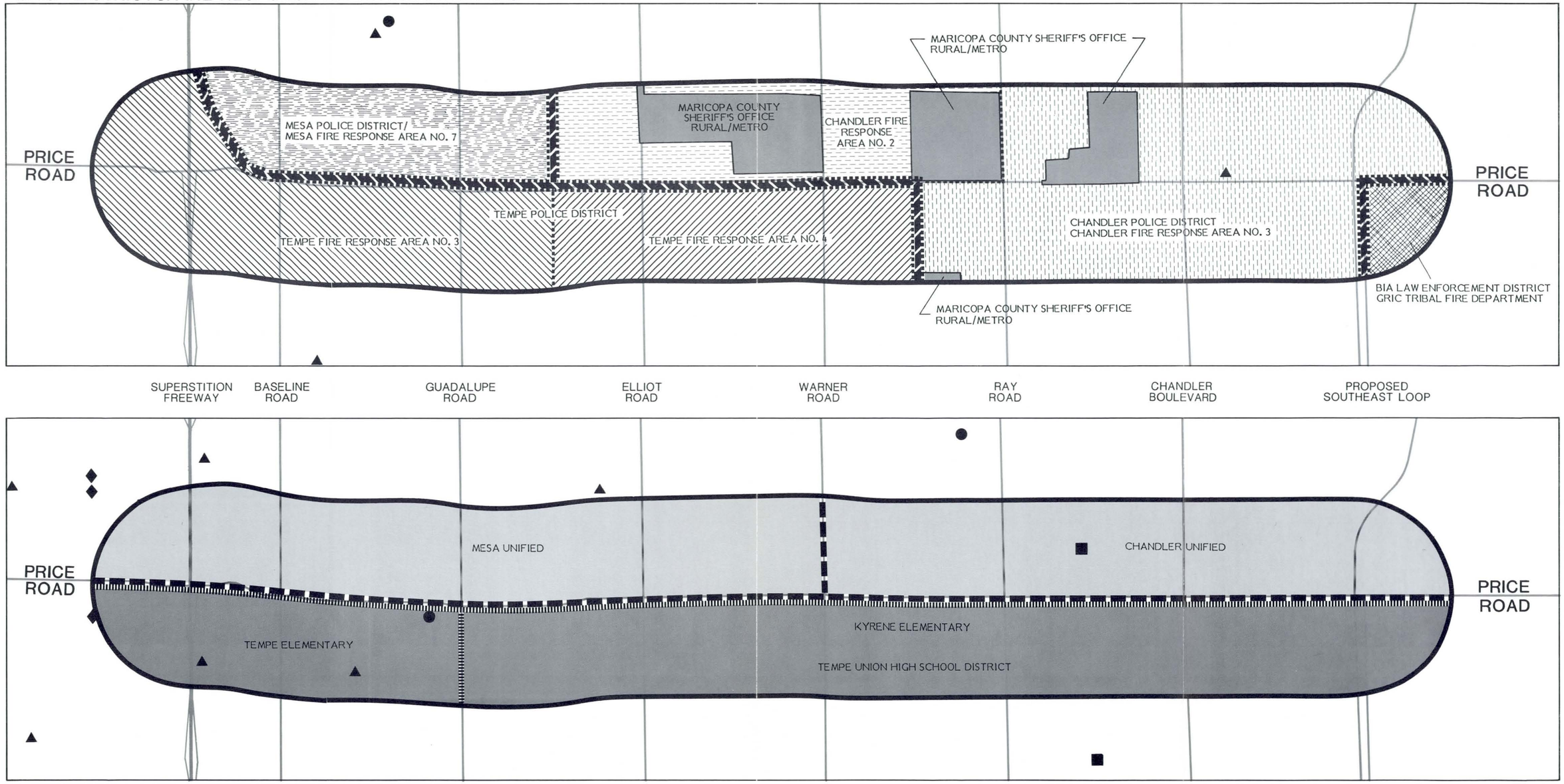
Public Facilities and Services

The following inventory provides baseline information for evaluating effects on existing facilities and services, and for identifying additional public needs resulting from the project. The inventory focuses on public facilities located within the study area and services provided to the area. Results are shown on Figure 2.6. Education, health care, and fire protection are discussed below.

Education

The Price Road study area falls within five public school districts: Tempe Elementary District No. 3, Tempe Union High School District No. 213, Kyrene Elementary District No. 28, Mesa Unified District No. 4 and Chandler Unified District No. 80. Since Price Road serves as a common boundary line for all of these districts, no district will be divided by this project. Twelve elementary, seven junior high and five senior high schools are attended by students within the study area. Bustoz Elementary and Fuller Elementary, located west of

POLICE DISTRICTS/FIRE RESPONSE AREAS and FACILITIES



SCHOOL DISTRICTS and FACILITIES

MILES

0 1/2 1 2 3

PUBLIC SERVICES

PRICE EXPRESSWAY RECONNAISSANCE

PREPARED BY: DAMES & MOORE

PREPARED FOR: ARIZONA DEPARTMENT OF TRANSPORTATION

August 1986

LEGEND

POLICE DISTRICTS/FIRE RESPONSE AREAS AND FACILITIES

- POLICE DISTRICT BOUNDARY
- POLICE STATION
- FIRE RESPONSE AREA BOUNDARY
- FIRE STATION
- UNINCORPORATED AREAS

SCHOOL DISTRICTS AND FACILITIES

- ELEMENTARY SCHOOL DISTRICT
- HIGH SCHOOL DISTRICT
- UNIFIED SCHOOL DISTRICT
- PUBLIC SCHOOL
- PRIVATE SCHOOL
- VOCATIONAL SCHOOL
- PLANNED PUBLIC SCHOOL

FIGURE 2.6

Price Road between the Superstition Freeway and Guadalupe Road, are the only public schools located within the study area. Post-secondary students may also attend neighboring community colleges, Arizona State University and a wide range of vocational schools all located outside the area of study.

Mesa Unified, Chandler Unified and Kyrene Elementary School Districts all have planned school sites in close proximity to Price Road. One possible elementary school site is just east of Price and south of Ray Road within the study area.

Health Care

Two large hospitals, Desert Samaritan Hospital in Mesa and Chandler Community Hospital, are located on Dobson Road one-half mile from the study area. Desert Samaritan Hospital is a full-service and acute-care facility with 343 patient beds, and is located south of Southern Avenue. Three intermediate to large nursing home centers are located north of the hospital complex and several emergency medical facilities are east of Dobson Road.

Chandler Community Hospital, on Dobson Road north of Pecos Road, is a full-service and acute-care facility with 120 patient beds. Other health care facilities have recently developed near this hospital, including three nursing homes and a dialysis center. A behavioral health center is also planned in this area. In addition, a new nursing home, Chandler Care, is under construction within the study area on Pecos Road between Elliott and Warner roads.

Health services to communities on the GRIC are provided by the Indian Health Service. The largest health facility on the GRIC is Sacaton Hospital, which has 20 patient beds.

Fire Protection

Most of the study area is within five municipal fire response areas: fire response areas Nos. 3 and 4 are in Tempe; No. 7 is in Mesa; and Nos. 2 and 3 are in Chandler. Each response area has a centrally located fire station. Chandler Fire Station No. 3 is the only fire protection facility within the study area. On unincorporated lands, Rural Metro Corporation provides fire protection to paid subscribers. The closest Rural Metro Fire Stations are south of Ahwatukee and in downtown Gilbert. On GRIC land, the Bureau of Indian Affairs is responsible for brush and range fires, and the volunteer Tribal Fire Department protects homes, businesses and other structures. Tribal fire stations are located in Casa Blanca, Sacaton, St. John's and Blackwater. No specific sites for additional fire stations within the study area have been designated.

Tax Jurisdictions

Tax rates for the major jurisdictions which assess property taxes within the study area are presented below:

PROPERTY TAX RATE PER $100 ASSESSED VALUATION, 1985, BY JURISDICTION

	Tempe	Mesa	Chandler
State of Arizona	.40	.40	.40
County	1.61	1.61	1.61
Community College	.82	.82	.82
Flood Control District of Maricopa County	.50	.50	-
School Districts	5.65	7.75	6.29
CAP	0.7	0.7	-0-
City	1.19	-0-	1.07
TOTAL	9.79	11.15	10.19

In Arizona, properties are classified for assessment purposes. The assessed value of real estate is determined by a percentage of the market value of the real estate; this percentage is fixed according to the property's land use classification. Thus, for example, single family residences are assessed at 10 percent, utility property at 32 percent and businesses at 25 percent. In Phase II, information on property values, land use, tax rates, tax code areas, and assessment classifications will be used to derive broad-based estimates of revenues displaced by the Price Expressway and potential revenues resulting from additional growth.

2.2.3 Visual Resources

An inventory that describes the existing visual image of the study area and the edge condition along Price Road was conducted with aerial photographs, existing and proposed land use information, and field studies. An evaluation of views to and from the expressway will include consideration of the changes to this visual image and the affects on edge conditions.

Visual Image

Visual image is based on development patterns that are defined by visual character, planning concepts, and viewer orientation. The visual character is concerned with the composition of design elements including form, line, color, and texture. These elements influence the visual dominance, and focus within each setting. The planning concept is primarily based on circulation and building types. Circulation and building types act as major organizing elements that structure the visual environment. Within the study area circulation types include gridded, curvilinear, loop-road, and cul-de-sacs. Building

types include cluster, detached, and attached building placements. Orientation of views is based on the planning concept and visual character. Inward oriented patterns tend to be structured, often with a layout that responds to a central focus or feature. Outward oriented development patterns lack this focus and often have a random or open character. Detailed descriptions of visual image types found in the study area are presented in Figure 2.7 A-D.

The visual image of the study area consists of the combination of different development patterns which exhibit similar visual character, planning concepts, and viewer orientation. These patterns have been collectively grouped and classified by five image types that include residential, commercial, park-like, industrial, and open/agricultural images. Figure 2.8 displays the visual image and associated development patterns within the study area. These image types are:

- Residential images include a variety of development patterns that display an integration of the visual character and planning concept. There is often a strong repetition of design elements that are organized around circulation patterns.

- Commercial images include clustered development patterns with high visibility and orientation directly onto Price Road. Structures and architectural treatments are often highly unified.

- Park-like images are those in which open and landscaped areas dominate the development pattern. This includes active recreation areas such as Carriage Lane Park as well as other greenbelt open space. Many of the light industrial, office park and institutional development patterns fit this context as well. Here, a central building or group of buildings are placed in an open space setting giving the development a park-like image.

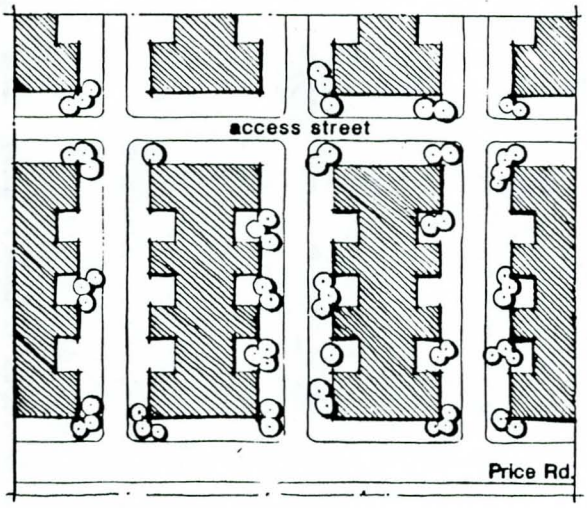
- Industrial images consist of development patterns in which structures dominate the visual character. Buildings and facilities are often large scale and complex. Open space treatment is limited primarily to the perimeter of the development and is not integrated into the overall planning concept.

- Open/agricultural images include patterns which lack formal development and are considered either vacant, rural or used for crop production. The agricultural image may vary according to the time of year and type of crop produced.

Edge Conditions

The edge condition is a description of the environment and distance between the visual image types and the proposed expressway. Visibility to and from the development patterns and Price Road are governed by the edge conditions. Edge conditions are described in terms of screened, filtered and open. A

VISUAL IMAGE TYPES

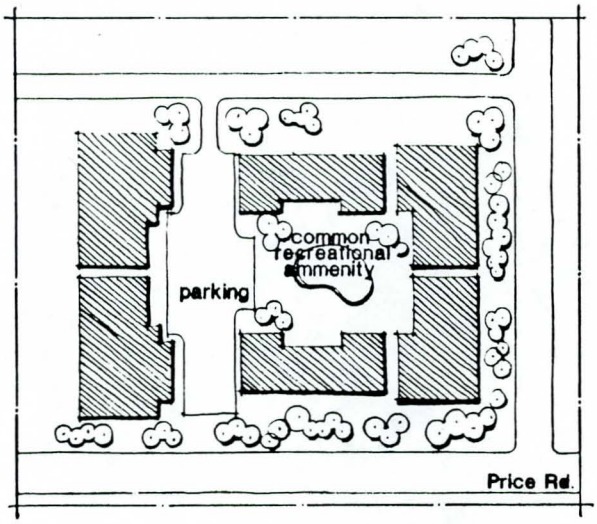


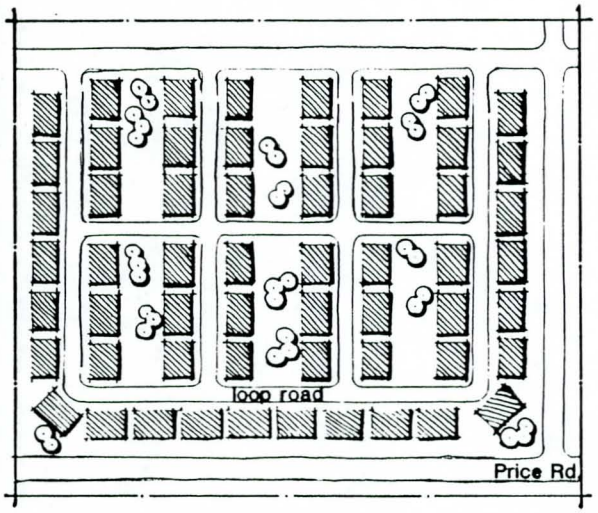
R-1 2 STORY/HIGH DENSITY/ATTACHED/PRIVATE OPEN SPACE/GRID CIRCULATION PATTERN

High density, attached multifamily units, either apartments or condominiums. The character consists of street front units, which are symmetrical and are located in a gridded circulation pattern that often opens onto major arterial streets including Price Road. The buildings display a strong sense of repitition and continuity, with an orientation focused inward toward internal access streets. Distance views are often afforded from the second story of buildings. End units toward Price Road have direct and filtered views onto the road.

R-2 2 STORY STACKED/HIGH DENSITY/COMMON INTERNAL OPEN SPACE/CLUSTER DEVELOPMENT PATTERN

High density multifamily housing. Tightly clustered and focused on a common recreational amenity. The buildings have a strong visual continuity and dominate the character. Some extended views may be obtained from the second story units. Structures along Price Road are separated with screening, limiting views to the road.





R-3 MIXED HEIGHT/MEDIUM DENSITY/DETACHED/PRIVATE OPEN SPACE/LOOP CIRCULATION WITH INTERNAL GRID PATTERN

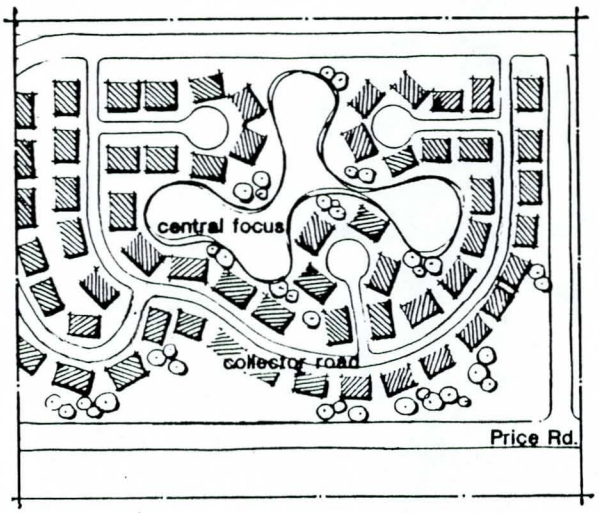
Medium density single family detached units in a regular ordered pattern. The development pattern displays a strong sense of continuity in housing and street patterns, which are repeated throughout the development. These patterns are arranged on a internal geometric grid with a loop road system providing a perimeter of housing, which serves as a separation or seam to surrounding uses. Views are primarily contained although the perimeter units which are along Price Road may have filtered views toward the road.

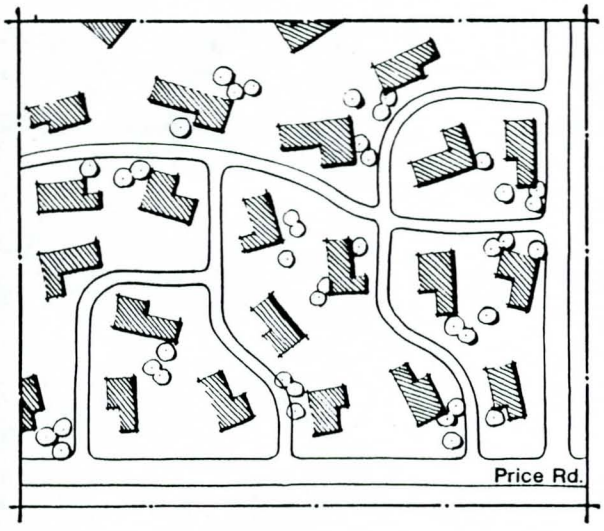
FIGURE 2.7A

VISUAL IMAGE TYPES

R-4 MIXED HEIGHT/MEDIUM DENSITY/DETACHED/COMMON INTERNAL OPEN SPACE/CUL-DE-SAC CIRCULATION PATTERN

Medium density developments with single family detached units. Development patterns are organized around a hierarchy of streets which includes a central collector road with access to secondary streets and cul-de-sacs. There are two types of open space in R-4 development patterns. Some are oriented around a central focal/water amenity which is the dominant character element, while open space in R-4 developments is limited to individual units. The road system creates a perimeter of housing which may have extended views. The units with close proximity to Price Road have partially screened views toward the road.





R-5 SINGLE STORY/LOW DENSITY/CURVILINEAR CIRCULATION PATTERN

Low density, single family detached units. Large individual lots and curvilinear circulation pattern provides no centralized focus. Housing character is non-unified with random orientation of buildings, generating inward and outward views. Units adjacent to Price Road have open and filtered views toward the road.

R-6 SINGLE STORY/LOW DENSITY DETACHED/BROKEN GRID CIRCULATION PATTERN

Rural, low density single family detached housing. Patterns of development are random and loosely ordered. The setting is extremely diverse with a variety of building types and uses. Views are primarily outward and distance oriented without any central focus. Views along Price Road may be either filtered or open.

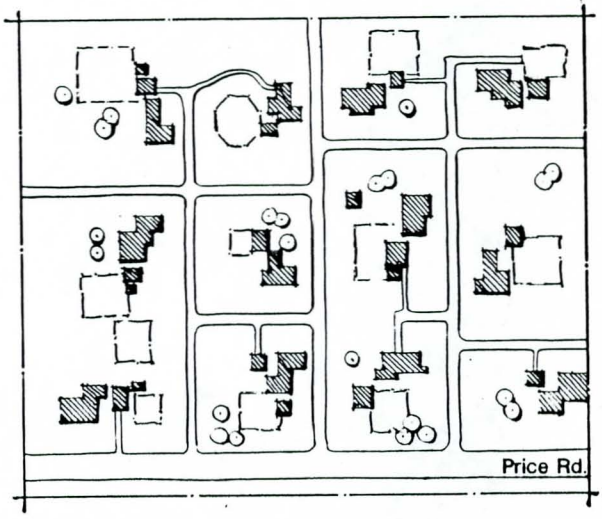
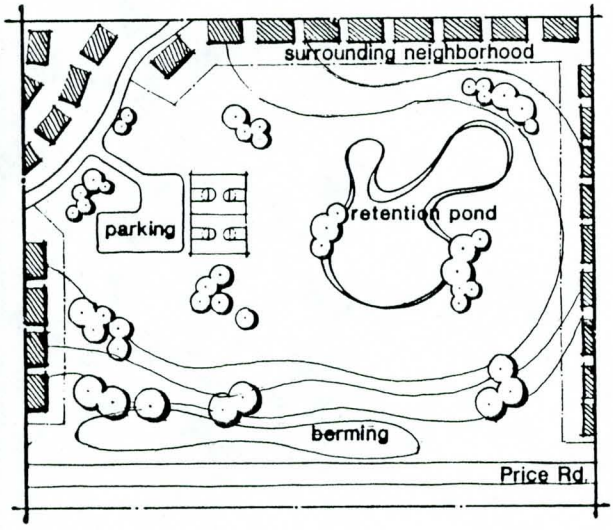


FIGURE 2.7B

VISUAL IMAGE TYPES

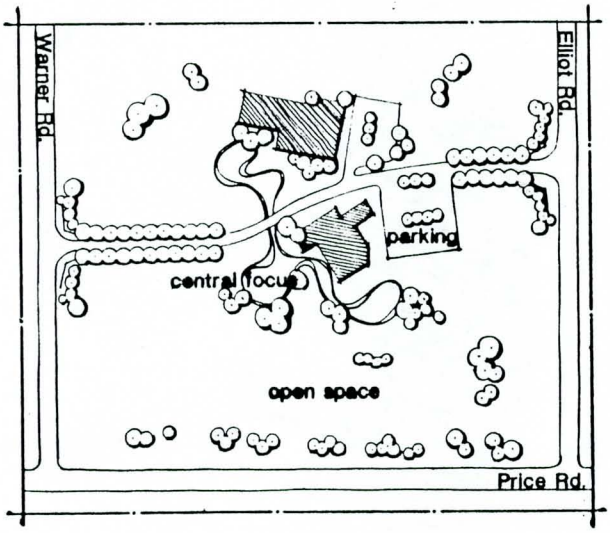


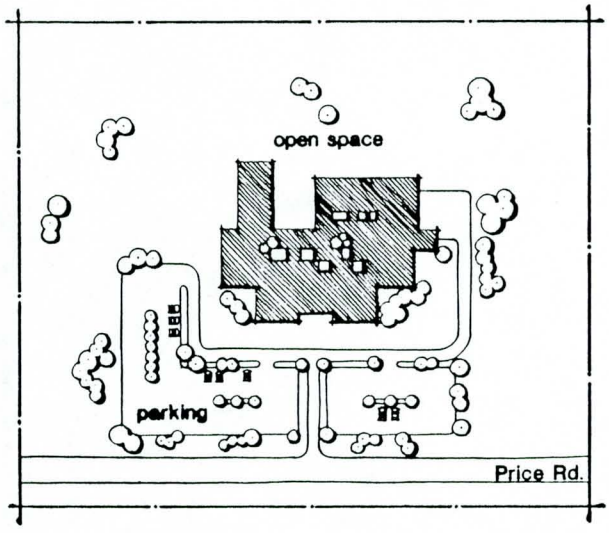
P-1 PARK/RECREATIONAL

Carriage Lane Park is the only existing park in the study area. It serves primarily as a passive recreation area for neighborhood use. The character is extremely open with random planting. The edges are defined by surrounding housing and streets which enclose it. The park is oriented to a functional retention pond, which serves as a focus and potential dominant feature. Extended views off-site are confined by residential units. Views to and from Price Road are buffered only by distance and local berming.

P-2 RESEARCH PARK

Arizona State University Research Park is a new development located between Elliot and Warner roads on the west side of Price Road. The character is dominated by landscaping which is integrated with the buildings and separates them from the road. The entries include formal plantings, leading to an area with buildings clustered around a centralized focal amenity. Views to and from Price Road are open and direct with minimal screening.





P-3 LIGHT INDUSTRIAL

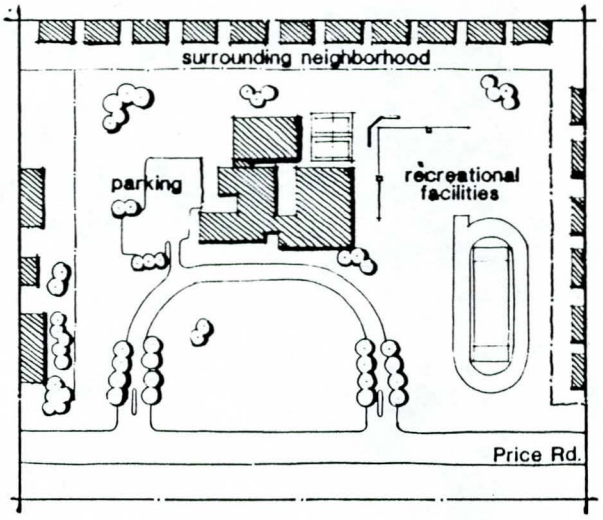
This includes light industrial developments such as Motorola and Gould. The character is dominated by one building type which is set back from the road and serves as a focus, surrounded by a buffering greenspace. The simplicity of the form to setting relationship, gives harmony to the site and creates little contrast. These developments are highly visible and are buffered only by parking and partial screening techniques. Views off-site are distance oriented, with no sense of enclosure. Views to and from Price Road are both open and filtered.

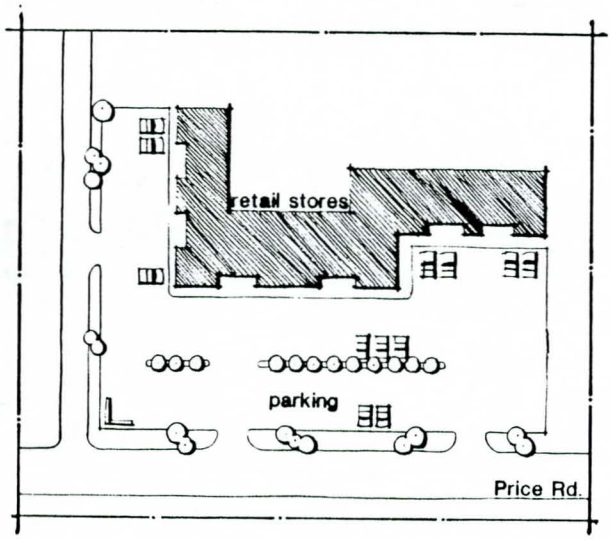
FIGURE 2.7C

VISUAL IMAGE TYPES

P-4 INSTITUTIONAL

Developments which include schools, librabries and churches provide a strong community landmark. The setting is dominated by a central building which serves as a focus for the site. The character consists of open green space with minimal planting, often including recreational facilities. Visibility is high both to and from the surrounding roads.





C-1 COMMERCIAL

Commercial developments are clustered along Price Road at the intersections of Guadalupe and Baseline roads. These developments are oriented to the street corner with the layout concept designed to provide high visibility and access. Structures are unified, displaying a repetition of architectural facades and signage types. Open parking lots are the predominante source of buffering between Price Road. Low berming may also provide minimal separation.

I-1 INDUSTRIAL

Developments which have active industrial uses include the Tempe Water Treatment and the Nitrogen Producing Plant along Price Road. Buildings are centralized and dominate the setting in terms of complexity, scale, and layout concept. Limited landscape treatment may include screening treatments which are utilized on the perimeter of the development in order to block views on site.

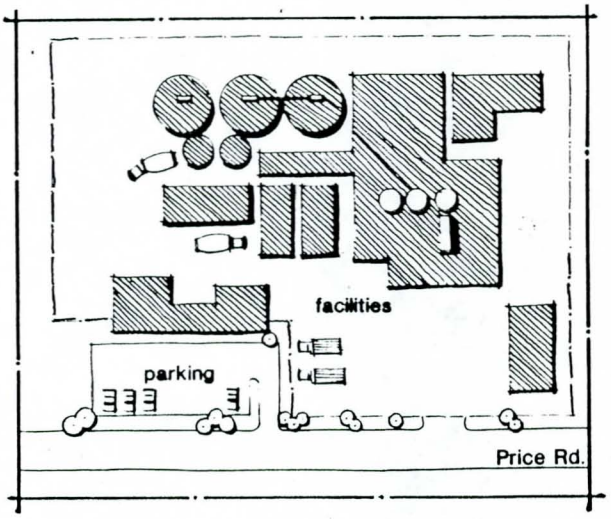
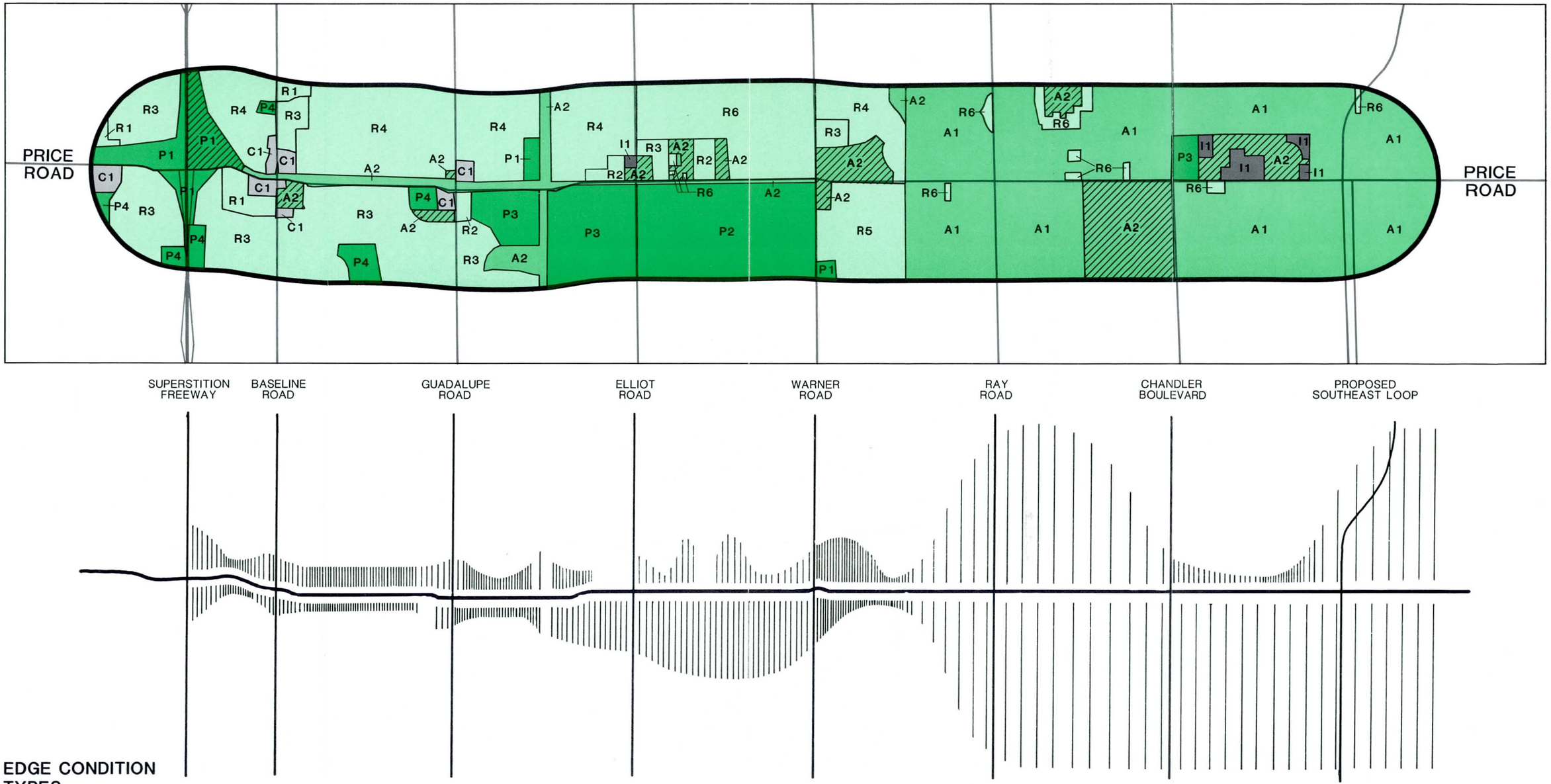


FIGURE 2.7D

VISUAL IMAGE UNITS



EDGE CONDITION TYPES

MILES

0 1/2 1 2 3

VISUAL RESOURCES

PRICE EXPRESSWAY RECONNAISSANCE

PREPARED BY: DAMES & MOORE

PREPARED FOR: ARIZONA DEPARTMENT OF TRANSPORTATION

August 1986

LEGEND

VISUAL IMAGE UNITS

Residential

- R1 - HIGH DENSITY ATTACHED, PRIVATE OPEN SPACE GRID CIRCULATION PATTERN.
- R2 - HIGH DENSITY STACKED COMMON INTERNAL OPEN SPACE CLUSTERED DEVELOPMENT PATTERN.
- R3 - MEDIUM DENSITY DETACHED PRIVATE OPEN SPACE LOOP CIRCULATION WITH INTERNAL GRID PATTERN.
- R4 - MEDIUM DENSITY DETACHED COMMON INTERNAL OPEN SPACE CUL-DE-SAC WITH COLLECTOR ROAD CIRCULATION PATTERN.
- R5 - LOW DENSITY CURVILINEAR CIRCULATION PATTERN.
- R6 - LOW DENSITY BROKEN GRID CIRCULATION PATTERN.

Park-Like

- P1 - PARK/RECREATIONAL
- P2 - RESEARCH PARK
- P3 - LIGHT INDUSTRIAL
- P4 - INSTITUTIONAL

Commercial

- C1 - COMMERCIAL/RETAIL

Industrial

- I1 - INDUSTRIAL

Agricultural/Open

- A1 - AGRICULTURAL
- A2 - OPEN/VACANT

Transitional

EDGE CONDITION TYPES

- SCREENED
- FILTERED
- OPEN

FIGURE 2.8

screened edge condition blocks views. These edges include the use of walls, berms and planted material. Filtered edge conditions buffer views through the use of plantings and small berms. Open edge conditions lack any screening in the form of plantings and small berms. Figure 2.9 provides examples of the six edge condition types.

Edge conditions within the study area vary significantly as shown in Figure 2.8. Many of the residential image units have effectively used screened edges to buffer the adjacent existing road in the northern portion of the study area. Park-like and open/agricultural image units that dominate the southern portion of the study area display extended open and filtered edge conditions which allow for greater visibility to and from the road.

The existing and proposed visual image and the edge condition will be used to evaluate changes of the views to and from the Price Expressway. The assessment is designed to provide a means of evaluating potential visual changes associated with the proposed design alternatives for the expressway.

2.2.4 Geotechnical

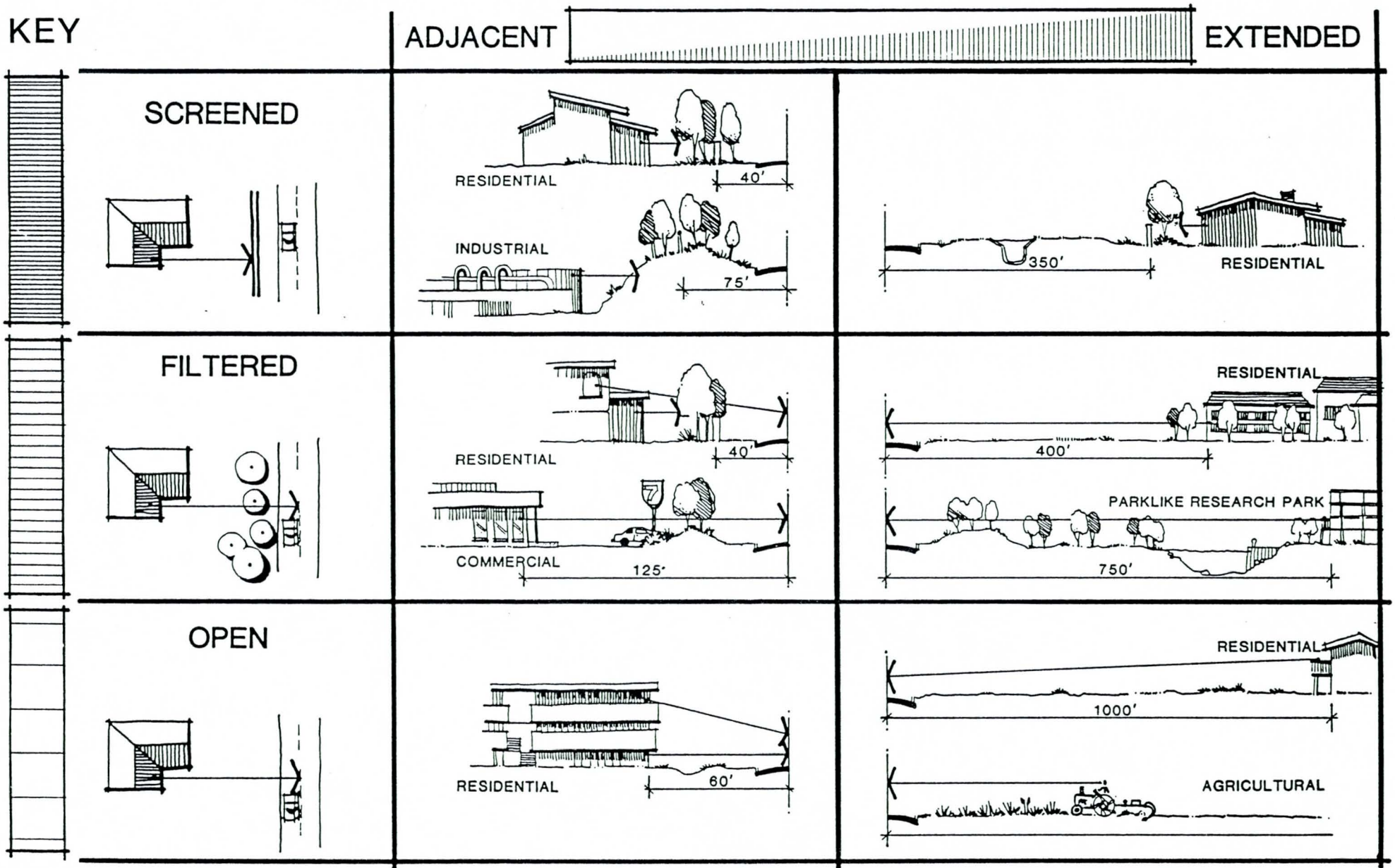
An inventory of the geology, ground-water hydrology, geologic hazards and soils was completed using available data. These data were evaluated to estimate if the geotechnical parameters would significantly effect the expressway design.

The study area is located on a portion of a broad, gently sloping, alluvial-filled basin. The basin consists of unconsolidated to weakly consolidated clays, silts, sands, gravels, cobbles and boulders. Thickness of the alluvium increases with distance from the mountains. Depth to bedrock in the study area is estimated to be greater than 2,000 feet; thickness of alluvium in the central portion of the basin (to the southeast of the study area) is greater than 11,000 feet (Oppenheimer and Sumner 1980).

In the South Mountain area there is a major low-angle fault which projects into the subsurface beneath Phoenix, Tempe and Mesa. However, there are no known recently active faults within the area (Reynolds 1985). Subsidence and earth fissures due to ground-water withdrawal have not been reported in the study area. However, measured subsidence has been noted approximately 10 miles to the east, in the East Mesa-Buckhorn-Queen Creek area. Earth fissures have developed in the Mesa-Buckhorn area, near Hawk Rock, and at the margins of the San Tan Mountains; all are at least 10 miles from the study area. Significant amounts of subsidence and the development of earth fissures are not anticipated in this area.

Depth to ground water in the study area ranges from approximately 110 feet to 160 feet. Anomalies in ground-water levels may be due to perched water conditions and canal leakage which are common in the area. Well water level records show that in the 1920s and 1930s, depth to water was about 5 to 20 feet (ADWR 1986). Overdraft of the ground water caused water levels to

TYPICAL EDGE CONDITIONS



NOTE: DISTANCES ARE APPROXIMATE TO PRICE ROAD. NOT INTENDED TO IMPLY R.O.W NEEDED.

FIGURE 2.9

decline. However, from 1976 to 1983, water levels have remained fairly constant in the study area (ADWR 1986).

Surface soils of the Mohall-Contine, Laveen-Coolidge, and Antho-Valencia associations have been mapped (SCS 1974) for the study area and are shown on Figure 2.10. The Mohall-Contine Association consists of well-drained, deep, nearly level soils on old alluvial fans and includes loams, sandy loams, and clay loams with an underlying loam, clay loam, or clay. The soils in this association have a high shrink-swell potential. Calcium carbonate or caliche underlies the surface in many areas (SCS 1974).

The Laveen-Coolidge Association consists of well-drained, deep, nearly level to gently sloping soils on old alluvial fans and terraces. These soils include loams and clay loams, and are moderately alkaline and strongly calcareous (SCS 1974).

The Antho-Valencia Association consists of well-drained, deep, nearly level to gently sloping soils on alluvial fans and floodplains. These soils are moderately alkaline and calcareous. The soils of this association include sandy loams and sand clay loams (SCS 1974).

Drillers logs of water wells in the area (ADWR 1986) indicate that caliche and boulder layers are common in the subsurface of the study area. Caliche generally occurs from near the surface to approximately 75 feet deep. Layers of boulders and cobbles occur at 40 to 60 feet from the surface and continue to more than 250 feet in depth along with layers of sand and gravel.

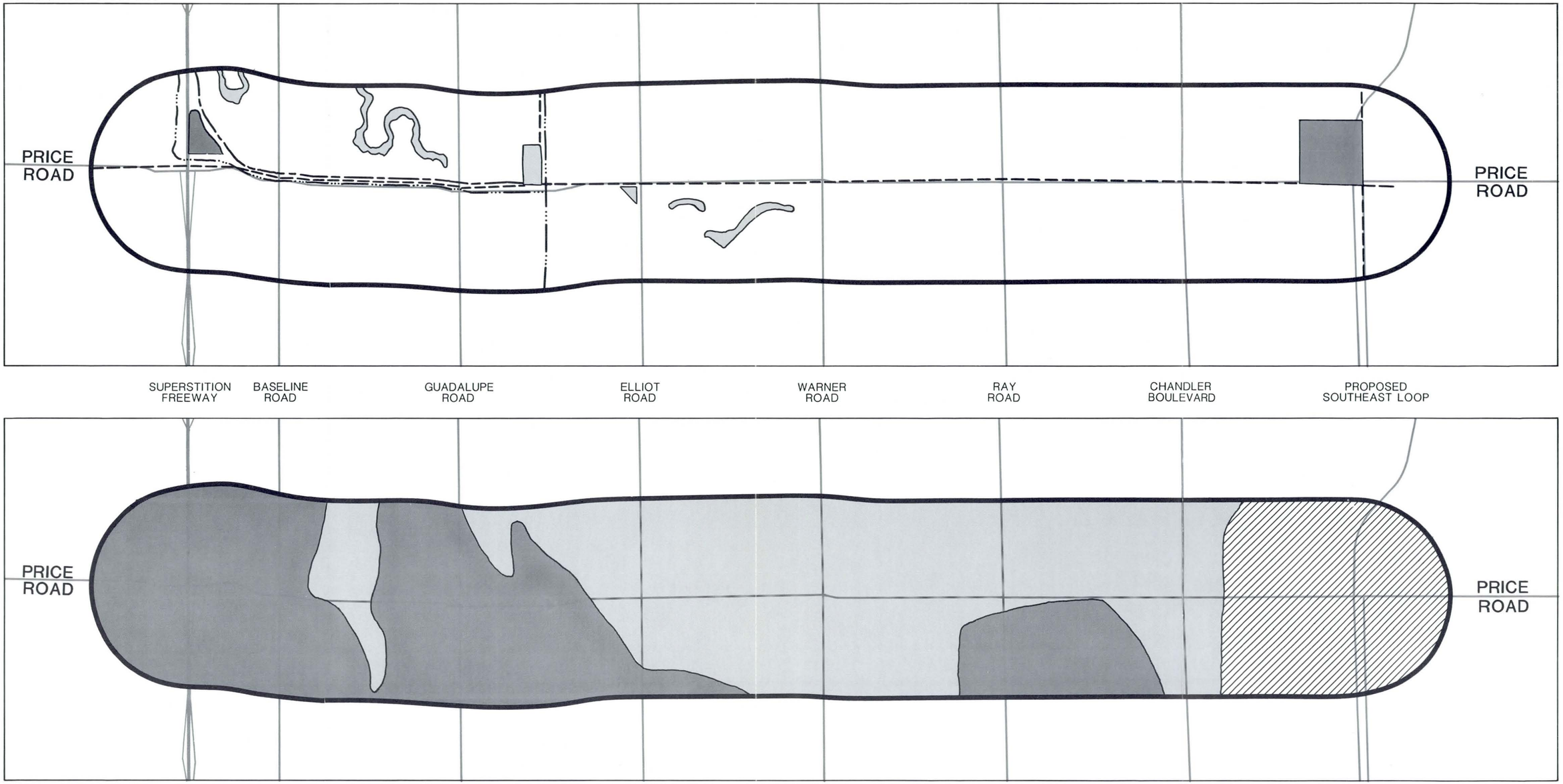
From the review of existing data on the geology/soils/ground-water conditions of the proposed Price Expressway, it appears that there are no significant geotechnical issues to preclude the selection of one route over another. However, soils with a high shrink/swell potential may be encountered along portions of the study area, and boulder/cobble layers may be encountered in areas where the road is depressed. These conditions are not expected to be significantly adverse.

2.2.5 Water Resources

The water resource inventory included domestic and irrigation conveyances, as well as facilities to detain and convey surface runoff from rainfall events. The inventory included existing and known proposed facilities, and it involved an area much larger than the study area boundary. Major existing facilities were identified from maps, aerial photographs, agency contacts, and a site reconnaissance. Significant proposed facilities were identified by agency contacts and meetings with other consultants. The prominent features are shown on Figure 2.10.

Preliminary drainage design was completed to assess the impacts of project implementation. These inventories and impacts are discussed in the following

SURFACE WATER



SOIL ASSOCIATIONS

MILES

0 1/2 1 2 3

SURFACE WATER AND SOILS

PRICE EXPRESSWAY RECONNAISSANCE

PREPARED BY: DAMES & MOORE

PREPARED FOR: ARIZONA DEPARTMENT OF TRANSPORTATION

August 1986

LEGEND

SURFACE WATER

- MAJOR IRRIGATION CONVEYANCES
- EXISTING LOCAL RUNOFF CONTROL FACILITIES (LINEAR)
- EXISTING LOCAL RUNOFF CONTROL FACILITIES (AREA)
- PROPOSED LOCAL RUNOFF CONTROL FACILITIES (LINEAR)
- PROPOSED LOCAL RUNOFF CONTROL FACILITIES (AREA)

SOIL ASSOCIATIONS

- MOHALL - CONTINE (AREA WITH HIGH SHRINK-SWELL POTENTIAL)
- LAVEEN-COOLIDGE
- ANTHO-VALENCIA

REFERENCES

U.S. Soil Conservation Service, 1974. Soil Survey of Eastern Maricopa and Northern Pinal Counties Area, Arizona.

FIGURE 2.10

sections. ADOT requested that the water resources team accelerate their work to meet the requirements of other ongoing studies.

Natural Drainage

Natural topography for the area in the vicinity of the study area is relatively flat. The Salt River flows east to west, north of the study area, and the Gila River flows east to west, south of the study area.

The only major drainage feature with any definition, other than the Gila and Salt rivers, is the low area through which the Gila Drain flows. This low area drains to the southwest from the western part of Chandler and the natural contours suggest that parts of Tempe and Mesa, most of Gilbert, and most of northern Chandler are tributary to the Gila Drain.

The GRIC refers to this as the Gila Drain watershed and indicates it is part of the historic lower reach of Queen Creek (GRIC 1984). It follows the general alignment of the Gila Drain east of I-10 and eventually outfalls to the Gila River. This drainage will be referred to in this report as the Southwest Drainage.

Drainage Facilities

Existing Facilities

Existing and proposed drainage facilities described below are shown on Figure 2.10. Drainage facilities in the City of Tempe are based on a policy of on-site retention of runoff from developed areas during the 100-year storm event. Street drainage south of the Salt-Gila divide is directed to one of two detention basins. The first is a former borrow pit adjacent to I-10 south of Warner Road. The second basin is a new facility south of Knox Road and west of the Gila Drain. Runoff detained in these basins may be released to the Southwest Drainage at a slow rate on the order of 10 cubic feet per second (cfs). North of the Salt-Gila divide, the drainage is to the Salt River with a large part of the runoff flowing through the Tempe Drain which outfalls just upstream of the I-10 bridge over the Salt River (Tempe 1986).

The City of Mesa drains both to the Salt and Gila rivers. A system of detention basins along the north side of the Superstition Freeway and along the north side of the Western Canal attenuate flows for subsequent conveyance to the Carriage Lane Park detention basin just north of the Western Canal and east of Price Road. From the Carriage Lane Park basin, the runoff is pumped into the Western Canal at a low flow rate. The conveyance from the system north of the Superstition Freeway south to Carriage Lane Park is an open channel which crosses the freeway about one-third of a mile west of Dobson Road and parallels the Tempe Canal on the east side.

A consultant is preparing recommendations for a master drainage plan for the City of Chandler. Existing city regulations call for on-site retention of runoff from the 100-year storm event for developed areas including arterial streets. Large portions of the city are not yet developed and are either agricultural lands or relatively undisturbed desert. Existing detention basins in the downtown area are reported as inadequate to handle major storms and have no real outlet facilities. Improvements are proposed to solve this problem (Chandler 1986).

The Town of Gilbert is less developed than the communities mentioned above. Drainage is generally down the natural slope to the west along roads and across open areas.

The GRIC lands generally drain to the west and south through poorly defined channels along roads and through natural channels. Stormwater runoff from the GRIC flows to the Southwest Drainage and Gila River.

The Superstition Freeway is depressed along a large length of its western section. Runoff from the freeway ROW is pumped to a large detention basin located west of the Kyrene Road alignment and south of the freeway. This water is then discharged to the Salt River through the Tempe Drain.

Significant flood control facilities in the area include the Roosevelt Water Conservation District (RWCD) floodway and the Soil Conservation Service (SCS) Floodwater Retarding Structures (FRS). The RWCD Floodway parallels the RWCD Canal on the upstream (east) side and directs surface flows south to the Gila River. The Guadalupe FRS protects the community of Guadalupe and discharges to the Tempe Drain. The Vineyard, Powerline and Rittenhouse FRSs protect the Central Arizona Project (CAP) Canal and discharge through the Powerline Floodway to the RWCD Floodway and on to the Gila River.

Surface water drainage facilities are inadequate for significant portions of the area tributary to the Price Expressway corridor. As additional areas are developed, runoff volumes, flow rates and locations may change significantly.

Proposed Facilities

Following is an assessment of future conditions and facilities. The assessment is presented to establish, to the extent possible, how drainage will be handled in the near future.

The Flood Control District (FCD) of Maricopa County has several area projects for both flood control and stormwater management. This will include completion of the RWCD floodway, development and possible implementation, by various sponsors, of the Eastern Maricopa County Area Drainage Master Plan (ADMP) and maintenance of existing county flood control facility. The Eastern Maricopa County ADMP includes provisions for a drainage conveyance to parallel the proposed Outer Loop freeway alignment east of Power Road

north of Warner Road (FCDMC 1986). This channel would outlet into the RWCD Floodway.

The City of Tempe will continue with ongoing plans for flood protection. This will include a requirement for on-site retention of runoff from the 100-year storm over developed areas. The two south Tempe detention basins with their collection and discharge systems will become operational.

The City of Mesa will continue its policies for storm drainage. Mesa drainage along the north side of the Superstition Freeway and the Western Canal to the Carriage Lane Park detention basin will be altered. The drainage system along the north side of the Superstition Freeway may outfall into a new regional detention basin located just south of the freeway and just east of the Tempe Canal. Runoff collected in this basin will be conveyed north in the new Price Road Drain, a joint project of ADOT, FCDMC, Mesa, Gilbert and Chandler to an outfall on the Salt River. The drainage along the north side of the Western Canal to the Carriage Lane Park detention basin will also be discharged to the Salt River through the Price Road Drain. Estimated peak flow rate for the Mesa drainage to the Price Road Drain is 50 cfs (FCDMC 1986). It is 30 cfs at Carriage Lane and 130 cfs at Broadway (FCDMC 1986).

The policy of on-site storage of runoff from the 100-year storm over developed areas will be continued by the City of Chandler. In addition, it is assumed for the purposes of this study that a new detention basin will be constructed near the present intersection of Price and Pecos roads to store runoff from the downtown areas where existing facilities are presently inadequate. Releases from this new basin will pass north through the Price Road Drain to the Salt River. Estimated peak flow rate for the Chandler drainage to the Price Road Drain is 100 cfs (FCDMC 1986).

The Town of Gilbert will continue to develop and it is assumed for the purposes of this study that a policy of on-site retention of runoff from the 100-year storm event will be enforced as the area develops. However, it is also assumed that some runoff will be conveyed along the Western Canal alignment to the Carriage Lane Park detention basin for discharge to the Salt River through the Price Road Drain. Estimated peak flow rate for the Gilbert drainage to the Price Road Drain is 100 cfs (FCDMC 1986).

The GRIC has an adopted Master Drainage Plan. However, at this time GRIC does not have the fiscal resources to implement the plan. In the plan, the GRIC will install a drainage system to convey runoff from the northern part of their property to the Gila Drain. It is anticipated that the GRIC will not accept storm runoff except at similar locations and flow rates to pre-expressway construction. The GRIC drainage system will function separately from other systems except that present users of the Gila Drain may be allowed to continue their discharges of stormwater (GRIC 1986).

The construction and operation of new highway systems will not cause additional flooding problems for the area. The Price Expressway and Outer

Loop Freeway will include a separate or joint use system to control and dispose of runoff generated on-site and to minimize impacts to cross drainage.

Irrigation Facilities

Much of the land in the vicinity of the study area is irrigated land. The major supplier of irrigation water is SRP. Their major facilities which impact the area are the Eastern, Tempe, Western and the East Branch of the Consolidated Canal. The RWCD also delivers Salt River water to its service area. These large facilities and their smaller laterals generally intercept surface flows and redirect flow patterns away from natural flow paths. The canals can also overtop and wash out during major storms.

The Gila Drain is intended to convey only irrigation tailwater to the GRIC from agricultural areas served by SRP. It consists of a trapezoidal open channel which generally follows the lower part of the Southwest Drainage east of I-10. Along some portions of the upper reach the levee is somewhat above the surrounding ground. Other portions, particularly at road crossings, are somewhat depressed. Major storms may produce runoff which enters the Gila Drain from agricultural areas or by overtopping the roads or levees.

Preliminary Drainage Assessment

The drainage plans for the Superstition Freeway-Price Expressway interchange and the First Avenue to Southern Avenue section of the Price Expressway are nearing final design. The Price Road Drain is included in these studies. Before the Price Road Drain plans are finalized, flow capacity in this conveyance required by the Price Expressway need to be estimated. ADOT, FCDMC and the cities have agreed in concept to proceed with the drain, primarily an 18-foot tunnel draining to the Salt River.

The impacts of the construction and operation of the proposed Price Expressway to local and area-wide drainage have been assessed at the feasibility level for this study. Preliminary roadway alignments and sections were used in conjunction with estimates of runoff volume and peak flow rates at various locations along the alignment. Analysis of upslope small scale facilities (street curbs, small irrigation canals, etc.) was not attempted since this is beyond the scope of this level of design. In addition, ROW and pavement widths were assumed based on previous reports and anticipated roadway sections. Locations where the roadway will be elevated or depressed may change as design proceeds, and this could have a significant effect on generation of runoff volumes from the ROW and how cross drainage would best be handled.

There are several alternatives which are feasible to dispose of runoff generated on or intercepted by the Price Expressway and its ROW. Any of these could involve joint use with other interested parties and the cost sharing benefits are worth detailed investigation. The alternatives identified during

this study are further discussed below with comments on possible benefits and costs.

Retention and Infiltration

The runoff could be retained "on-site" in large basins located in the vicinity of the ROW. The water would be allowed to infiltrate or will be injected into the ground to supplement ground-water supplies. This would require very large storage basins and unless the basins were sized for subsequent storm runoff, an extensive injection or basin maintenance system would be required. Supplemental water treatment and an Arizona Department of Health Service Notice of Disposal to ground water could be required. There may also be a public hazard if the runoff remains ponded at depth for any period of time. However, the Arizona Department of Water Resources (ADWR) is looking for ways to augment ground-water supplies with stormwater (ADWR 1986).

Retention and Gravity Discharge

With controlled flow outlets, the basin sizes may be reduced somewhat if the runoff were to be discharged via gravity flow to natural watercourses. Runoff could be released across the GRIC to the Gila River as surface flow through the Southwest Drainage which is the natural outfall for the area. Drainage should be at similar locations and flow rates as pre-expressway conditions.

A new surface channel or a pipeline could convey runoff directly south across the GRIC to the Gila River. Any of these alternatives across the GRIC could be politically sensitive and costly because of the distance involved. As in the infiltration alternative, large basins would be required to attenuate flow rates to match outfall conveyance capacity and to mitigate downstream damages. This ponded runoff could be a hazard to the public.

Retention and Pumped Discharge

The system of detention basins may also be used in conjunction with a system of pumps and a pressure pipe to a gravity conveyance or directly to a free outfall. The most obvious alignment for such a system would be along Price Road where the Price Road Drain system could be modified as necessary to accommodate the additional runoff. An independent alignment away from Price Road would also function in a similar manner but would probably be more costly than joint use of the Price Road Drain facilities. All of the pumped discharge systems are assumed to outfall to the Salt River.

Comments on Drainage

Comments are presented at this time based on our general understanding of the drainge situation and early results of our ongoing hydrologic analysis.

The most significant finding is that post development conditions, with their on-site retention requirements, will produce less runoff than the existing conditions. This is true even with the assumption that the on-site retention will only be 75 percent effective as suggested by the Flood Control District of Maricopa County (FCDMC 1986).

The accelerated hydrologic studies should continue to define the potential for runoff during a variety of design storms such that ADOT's participation in the Price Road Drain design can be further evaluated. The political sensitivities associated with using the natural drainage path (the Southwest Drainage) across the GRIC make it apparent that other alternatives should be fully investigated as the study progresses.

2.2.6 Biological

The study area was originally comprised of Sonoran desertscrub communities. The natural communities have previously been eliminated by urban development and agriculture.

No threatened or endangered species, as determined by the federal government, are known to occur in the Price Expressway study area. Several species protected by the Arizona Native Plant Law (e.g., Cactaceae, Crassulaceae, Liliaceae, Cercidium spp.) occur in the area, primarily due to landscaping.

Biological criteria are not expected to be involved in either the location or refinement of the Price Expressway. The preferred expressway alternative will be assessed regarding impacts on biological resources. Mitigation measures such as described above for species protected by the Arizona Native Plant Law and landscaping of the ROW for wildlife habitat enhancement will be assessed.

2.2.7 Cultural

Cultural resource analyses for this study were based upon extant site files and archival data supplemented with literature review and limited field reconnaissance. Intensive on-the-ground archaeological surveys will be undertaken when specific design alternatives are identified.

All known archaeological and historic sites were plotted within an area encompassed by four U.S. Geological Survey (USGS) 7.5 minute quadrangles (Tempe, Guadalupe, Mesa and Chandler). Files at the State Historic Preservation Office (SHPO) were checked to identify properties listed on the State Inventory, State Register and National Register of Historic Places. The archaeological files of other local research institutions were also reviewed as were various historic maps and records of homesteading. Local historical societies and museums were also contacted to solicit any concerns about particular resources.

Professional archaeologists have been conducting research in the Salt River Valley for a century. As a result, the existing data within the four USGS quadrangles are quite extensive, but they were not systematically collected for this study. Within the immediate vicinity of Price Road only four relatively recent surveys totalling no more than 160 acres have been conducted. Much of the data regarding archaeological site types and locations are decades old and imprecise by current standards. The extensive terrain disturbance due to prior development within the study area compounds these data limitations.

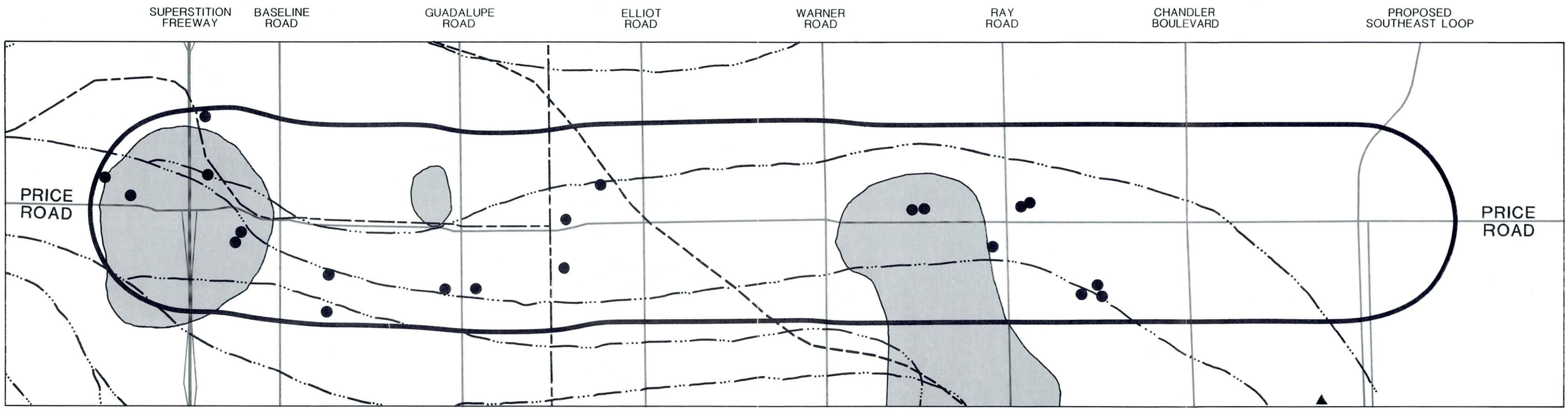
The site records and archival search found a total of 230 prehistoric and historic sites recorded within the four USGS quadrangles reviewed. Thirty of these actually occur within the Price Expressway study area (Figure 2.11). Of special note are an elaborate system of prehistoric canals, some of which probably are associated with the large prehistoric Hohokam habitation site of Los Muertos, which was first studied by the Hemenway Expedition in the 1880s (Haury 1945).

The cultural sequence during the prehistoric era generally is divided into three periods. Paleo-Indian refers to the big game hunters who occupied North America following the Pleistocene Ice Age. They were succeeded by Archaic era hunters and gatherers who exploited a wide variety of wild resources and eventually engaged in limited agricultural pursuits. There are no Paleo-Indian sites reported from the study area. However, the remains of a mammoth were found several miles to the east indicating that buried deposits of an appropriate age may be present (Arizona Republic 1984). Archaic sites are quite rare in the east Valley. It is not known whether Archaic populations were scarce in this area, or whether Archaic sites are not easily found because they are either extremely ephemeral or deeply buried.

After the Archaic period, the study area was occupied by the Hohokam who were sedentary agriculturalists (for example, Haury 1976). The Hohokam are noted especially for their red-on-buff pottery, canal irrigation and monumental architecture. The Hohokam sequence is normally divided into four periods, which are, in turn subdivided into a number of phases. Distinctions between phases are based on decorated ceramics, architectural styles, mortuary practices, and other artifact styles. Whether the Hohokam developed from an indigenous population or migrated into the area and the date of these events is the subject of ongoing debate. The Hohokam may have been residing in the area as early as 300 BC and as late as AD 1450.

The proto-historic period (AD 1450 to about 1700) is not well understood. However, it is generally assumed that the Pima and Papago, who were living in south-central Arizona north of the Gila River Valley when Europeans first arrived, are the descendants of the Hohokam. The Yavapai lived to the north, and Apache groups were located in the mountains to the east.

Hispanic and Anglo occupation of the east Valley began in the mid to late 1800s. Much of this early historic land use related to agricultural activities. In fact, many of the historic irrigation canals were constructed in whole or in



HISTORICAL and ARCHAEOLOGICAL SITES

MILES

0 1/2 1 2 3

CULTURAL RESOURCES

PRICE EXPRESSWAY RECONNAISSANCE

PREPARED BY : DAMES & MOORE
PREPARED FOR : ARIZONA DEPARTMENT OF TRANSPORTATION
August 1986

LEGEND

- HOHOKAM VILLAGE
- HOHOKAM CANAL
- ETHNOHISTORIC (NATIVE AMERICAN) SITE
- NON-NATIVE AMERICAN HISTORIC SITE
- HISTORIC CANAL
- HISTORIC ROAD AND RAILROAD

FIGURE 2.11

part along the same courses originally used by the Hohokam. Land patents were granted to settlers in the area under the Desert Land and Homestead Acts, and also as Cash Entries beginning during the 1870s. Several communities in or near the study area were established during this historic era including Tempe (founded in 1872); Mesa (1881); Gilbert (1912); and Chandler (1912).

Table 2.4 presents the results of the site file and archive search for the study area. Prehistoric sites were classified into four groups: Hohokam villages or habitation sites, Hohokam canal segments, Hohokam limited activity sites, and Archaic sites.

Hohokam habitation sites form the largest single category of prehistoric sites (57 percent of the total). This site type is probably over-represented for several reasons. First, multi-component sites with habitation remains were classed simply as habitations. In addition, much of the study area has never been systematically surveyed. Therefore, larger, more substantial sites are those likely to have been observed and reported by casual observers. Also, many of the larger sites are known only from very early records (the Hemenway Expedition, and records kept by Turney and Midvale). In some cases no descriptive information exists for these sites, but we have assumed they are village sites (1) because they were reported at all; and (2) because of their size. Three Hohokam habitation sites have been recorded along Price Road. The northernmost is the Canal Bend Ruin. Approximately one mile south of it is a site reported by Turney at site T-1. Finally, Los Muertos probably is situated within the study area roughly between Warner and Ray roads. Los Muertos has been "lost" for decades, but recent reanalysis of Hemenway maps by David R. Wilcox and Jerry B. Howard (personal communication) indicates this as the most probable location.

The study area contains an elaborate prehistoric canal network (no longer visible on the ground, but sometimes observable on aerial photographs where differential moisture content of canal sediments shows up as either dark or light lines, especially in agricultural fields). This series of canals apparently had its headgate (or gates) on the Salt River channel west and north of present-day Mesa. Turney (1929) shows a large reservoir at the terminus of one of these canals. At least two major canal segments appear to cut through the Price Expressway study area.

Just as habitation sites probably are overrepresented in this site inventory, Hohokam limited activity sites are very likely underrepresented. These sites are often interpreted as wild product exploitation and processing locals which probably were used only for short periods of time, but limited activity sites within the study area also include rock art sites and, in one case, an isolated burial. No limited activity sites have been recorded along Price Road.

A single Archaic site and several mixed Hohokam/Archaic sites are reported. The basis for this cultural assignment has not been determined. Thus, it is possible that these lithic scatters should be thought of as aceramic rather than preceramic. They are not located near Price Road.

TABLE 2.4
RESULTS OF SITE FILE AND ARCHIVE SEARCH

	USGS QUAD				
	Tempe+	Guadalupe	Mesa+	Chandler	Totals
Prehistoric Sites					
Hohokam Habitation	28	12	30	2	72
Hohokam Limited Activity	8	12	1	2	23
Hohokam Canal Segment*	16	12	1	1	30
Archaic		1			1
Subtotal	52	37	32	5	126
Historic Sites					
Ethnohistoric		7			7
Non-Native Historic	37	15	10	5	67
Canal*	3	4	2	3	12
Road/Railroad*	1	2	3	7	13
Subtotal	41	28	15	15	99
Mixed Historic/Prehistoric		3	2		5
TOTALS	93	68	49	20	230

+Includes only sites south of the Salt River.

*Linear features (canals, roads and railroads) are tabulated more than once when they occur on more than one quad.

Seven ethnohistoric sites are located within the study area. Most of these are small Pima house sites; one is a Yaqui shrine. Most are located either on or near the GRIC. Three additional sites on the Guadalupe quadrangle are listed in Table 2.4 as mixed. These are surface artifact scatters in which both Hohokam and Pima ceramics were observed. None of the ethnohistoric sites are situated directly along Price Road.

The non-native historic sites identified in Table 2.4 refer to either structural remains or the locales of former homesteads, wells, or pumping stations. Many of these are listed in the files of the State Historic Preservation Officer and are presumed to be extant structures. The 20 historic sites located along Price Road are all homesteads or wells shown on 1903 USGS maps.

A number of historic canals run near or through the project area. Many of these are still being used including (from west to east), the Highline Canal, South Branch (originally constructed around 1913), the Western Canal and Kyrene Branch (1911-1913), the Gila Drain (1910s or 20s), the Tempe Canal (1871), The Consolidated East Branch (1894) and the Eastern Canal (1889). At least some of these canals follow the courses of earlier historic ditches; for example, the Wormser Canal preceded the Western Canal. Sections of both the Tempe and Western Canals cross Price Road.

Historic roads and railroads also cross the study area. None of the three historic railroads (built between 1887 and 1912) are adjacent to Price Road. However, the route of the Maricopa Wells to Fort McDowell wagon road (mapped as early as 1868) does cross Price Road.

Data Evaluation

The entire project area has not been surveyed, but the existing data can be used to make several projections concerning additional prehistoric and historic sites that may be present in the Price Expressway study area. No additional large habitation sites are expected for two reasons. First, substantial sites are those most likely to be well known. Secondly, signs of Los Muertos have been searched for on numerous occasions and it is probable that in the course of these searches, any other large sites would have been noted and recorded.

Additional unrecorded limited activity sites may be present within the Price Expressway study area. Our examination of aerial photographs flown in 1967 suggests that many canal segments are present within the study area. This is not unexpected given recent findings concerning the complexity of Hohokam irrigation technology. A testing program will be necessary to confirm the location of canals.

The paucity of Archaic sites in the study area and, indeed, in the entire Salt River Valley, suggests that probably no Archaic sites will be found within the study area.

Field checks will be necessary to identify whether the known ethnohistoric and historic homestead sites are extant. It is possible that a few additional examples of these two site types could be encountered during surveys within the study area.

2.2.8 Air Quality

Air quality in the study area is monitored by the Maricopa County Bureau of Air Pollution Control. An annual air quality report is published by both the State of Arizona and Maricopa County summarizing the data collected. Air pollution is monitored daily at several sites in proximity to the study area. Ambient air concentrations of carbon monoxide (CO), ozone (O_3) and total suspended particulates (TSP) have exceeded the federal and state ambient air quality standards summarized in Table 2.5. As a result of these exceedances, a portion of Maricopa County has been designated as a "Nonattainment Area" for the three air pollutants CO, O_3 and TSP. The Nonattainment Area and the four air monitoring stations closest to the project area are shown in Figure 2.12.

As a summary of air quality, the status at the four monitoring stations is given in Table 2.6. The data summarized in the table are for the year 1984, the most recent compilation at the date of this writing. Carbon monoxide and ozone are largely, but not entirely, a result of vehicular emissions. The highest concentrations of CO and O_3 generally occur at monitoring stations located in areas of high traffic volume, e.g., central Phoenix and Scottsdale. The two pollutants differ in fundamental ways, however. Carbon monoxide is emitted directly from vehicles and other fuel combustion sources. The highest CO concentrations are frequently near roadways and roadway intersections where high traffic volumes occur. Ozone forms as a result of vehicular and other emissions, but it is not emitted directly from a source. In the atmosphere, ozone forms through an involved series of chemical reactions. As a result, ozone is somewhat more uniformly distributed geographically than CO.

Total suspended particulates are at high levels throughout the Salt River Valley. The largest contribution to TSP is from the unpaved roads. Other major contributions are paved roads and other fugitive sources. Farming operations are reported to contribute a relatively minor quantity toward the total TSP burden.

Trends in CO, O_3 and TSP based on only a few years of data are difficult to detect, since chance factors such as meteorology may produce anomalous results. Because of the nonattainment status of these pollutants, control strategies have been implemented to reduce the amount of pollutants emitted. An inspection/maintenance program operated by the State Bureau of Vehicular Emissions requires a test of vehicles to ensure that emission remain within certain limits. Annual decreases in CO emissions have been observed since the program began in 1978. Ozone has been controlled through the use of vapor recovery systems in industries and at gasoline service stations to help reduce

TABLE 2.5
SUMMARY OF AMBIENT AIR QUALITY STANDARDS -
STATE AND FEDERAL STANDARDS (a)
In mg/m^3 (and ppm)

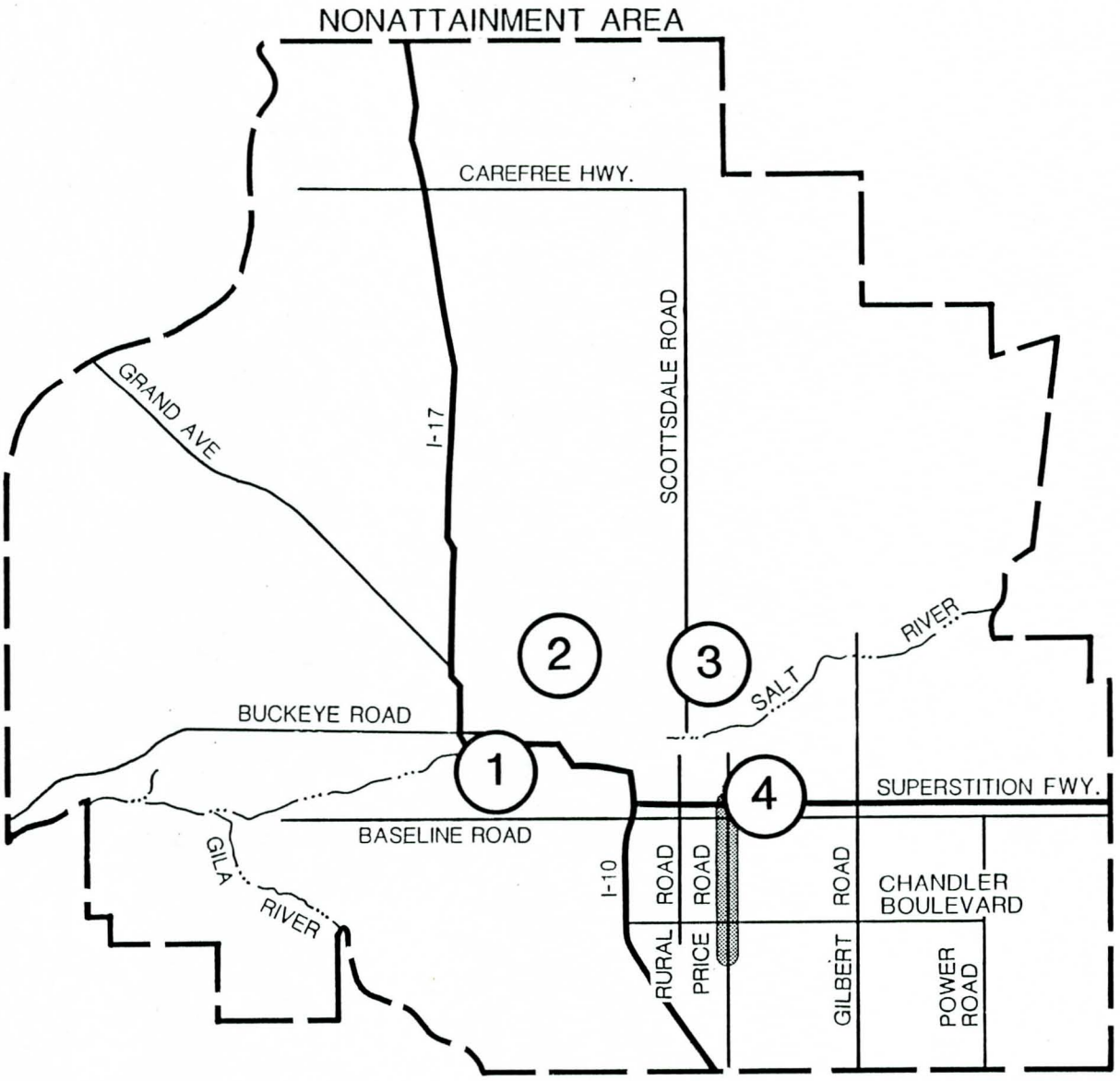
Pollutant	Averaging Time	Primary	Secondary
Carbon Monoxide(b)	1-hour	40 (35)	40 (35)
	8-hour	10 (9)	10 (9)
Nitrogen Dioxode	Annual	100 (.05)	100 (.05)
Ozone	1-hour	235 (.12)	235 (.12)
Particulates	24-hour	260 (-)	150 (-)
	Annual (Geom. Mean)	75 (-)	60 (-)
Sulfur	3-hour	---	1300 (.5)
	24-hour	365 (.14)	---
	Annual	80 (.03)	---
Lead	Calendar Quarter	1.5 (-)	1.5 (-)

(a) Standards are not to be exceeded more than once per year with one exception. In the case of ozone, compliance is determined by the number of days on which the ozone standard is exceeded. The number of ozone exceedance days per year, based on a 3-year running average, is not to exceed 1.0.

(b) In mg/m^3 (and ppm).

Source: Air Quality Control for Arizona, Annual Report, April 1985.
Federal Register Vol. 50, No. 178, September 13, 1985.

AIR QUALITY NONATTAINMENT AREA MARICOPA COUNTY



Source: Maricopa County Bureau of Air Pollution Control. 1984 Air Quality Report.

MONITORING STATIONS

1 South Phoenix

2 Central Phoenix

3 Scottsdale

4 Mesa

0 Miles 24

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PREPARED FOR: ARIZONA DEPARTMENT OF TRANSPORTATION

FIGURE 2.12

TABLE 2.6
CARBON MONOXIDE, OZONE, AND TOTAL SUSPENDED PARTICULATES (1984)

CARBON MONOXIDE

Station	2nd High Concentration (mg/m^3) 1-hour	8-hour	Number Exceedances* 8-hour std.
South Phoenix	14	9	0
Central Phoenix	22	15	20
Scottsdale	17	10	1
Mesa	14	7	0

OZONE

Station	1-hour (ppm) High	2nd High	Number Exceedances* Year	Compliance
South Phoenix	0.11	0.11	0	0.3
Central Phoenix	0.14	0.14	1	3.3
Scottsdale	0.12	0.11	0	1.0
Mesa	0.11	0.10	0	0

TOTAL SUSPENDED PARTICULATES

Station	TSP (mg/m^3) Annual	2nd High 24-Hour	Number Exceedances* Annual	24-Hour
South Phoenix	121	228	yes	21
Central Phoenix	90	174	yes	4
Scottsdale	84	151	yes	2
Mesa	74	140	yes	4

*See Table 2-5

hydrocarbon emissions. A feasible strategy to significantly reduce TSP emissions has not yet been developed.

Other pollutants measured in Phoenix are in compliance with federal and state amibent air quality standards. Nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) concentrations have remained well below the annual average standards of 100 mg/m^3 and 80 mg/m^3, respectively. In addition, SO_2 concentrations have not exceeded the 24-hour average of 365 mg/m^3 at any station in the city operated by Maricopa County. The quarterly standard of 1.5 mg/m^3 for lead has been attained, although an observation of 1.3 mg/m^3 (at the 1826 W. McDowell station) in the first quarter of 1984 approached this standard. Concentrations of lead are usually higher during fall and winter as compared to the spring and summer quarters. Levels of lead in the air are not expected to cause a future problem because of the increasing use of unleaded gasoline in vehicles.

Current and projected mobile source emission factors can be generated by using the computer model, MOBILE3. Results from MOBILE3 will be obtained from ADOT for assessing the impacts of the project.

2.2.9 Noise

Both existing and future planned land uses along the proposed Price Expressway are subject to potential noise impacts. ADOT has specific procedures to follow regarding analysis of acoustical impacts. These procedures are published in "Noise Abatement Policy for State-Funded Projects." These procedures require a computer analysis using STAMINA Z/OPTIMA program or equivalent method that predicts the resultant noise impacts. The computer model indicates the location and height of barriers needed.

2.3 PUBLIC INFORMATION

The public information approach consisted of identifying concerns and issues of "stakeholders." A stakeholder is any landowner, homeowner association, city, public agency, elected official, utility, developer, business/industry, or school district that has a stake in the outcome of the proposed project. Their views can be used to focus the criteria for the formulation and evaluation of location/design alternatives for the expressway. This approach involves stakeholders early in the process and gives them an opportunity to participate.

Initially, stakeholders were identified and sent a letter that outlined the Price Expressway study. The letter introduced the study team and requested names of specific contact people. It included a map of the study area and a response form. Preparation of a broad based mailing list has been established. The mailing list currently contains over 500 names and will be an essential tool for distributing future information on the study.

The next step in the Public Information Program was to conduct interviews with these stakeholders. The interviews had three purposes. First, they provided a forum to obtain detailed information surrounding concerns, ideas and questions, as well as to identify areas of misinformation. Second, the interviews were instrumental in developing a positive working relationship between the consultant and the stakeholder. Third, other interested parties, whose concerns needed to be represented, were identified. Many follow-up meetings were conducted. These post-interview contacts were vital because they enabled the consultant to secure further input from various key management, policy and technical representatives. All communications have been documented.

Over 42 interviews were conducted and included more than 70 individuals (Appendix B). Approximately 50 percent were conducted in person, while the remainder were held by telephone. Each interviewee was asked to discuss his/her concerns about the proposed facilities, suggest ways to inform and involve the public, and identify others who would have an interest in the study.

The diversified issues and concerns expressed during the interviews are highlighted in this section. Table 2.7 illustrates the stakeholder's concerns which have been organized into seven general categories. It is important to note that those interviewed were not asked to respond to specific issues, rather they expressed the items that were of most concern to them. Therefore, Table 2.7 reflects only those factors mentioned, and should not be interpreted to mean that those interviewed were not concerned about other factors as well. In Appendix A, the stakeholders' issues and concerns within the seven categories are discussed.

A Price Expressway Technical Advisory Committee (TAC) has been formed and is comprised of technical staff and policy representatives from the cities of Tempe, Mesa and Chandler, Maricopa County, the Flood Control District of Maricopa County, and the GRIC; ex officio members include MAG and ADOT.

TABLE 2.7
PRICE EXPRESSWAY LOCATION/DESIGN STUDY
STAKEHOLDER CONTACT SUMMARY*

ISSUES	ACCESSI-BILITY	VISUAL	DISPLACE-MENT	LAND USE		ECONOMIC IMPACTS	ENVIRONMENTAL			DRAINAGE
				Existing	Future		Air Quality	Acoustical Impacts	Biological	
Contact:										
Jurisdictions										
City of Chandler	X	X	X	X	X	X				X
City of Mesa	X	X				X				X
City of Tempe	X	X	X							
Maricopa County	X					X				
G.R.I.C.	X					X			X	X
MAG	X		X			X				
Public Agencies/ Elected Officials										
ASU Research Park	X	X		X	X	X				
Chandler School Dist.					X					
Tempe High School Dist.	X									
Tempe E.S. District	X						X	X		
Mesa E.S. District					X	X				
Flood Control Dist.										X
Army Corps of Engineers									X	X
Soil Conservation Service									X	X
State Rep., Dist. #27	X		X			X				
State Senator, Dist. #30	X	X	X			X				
Utilities										
Salt River Project			X			X				
El Paso Gas			X			X				
Southwest Natural Gas			X			X				
Developers										
Sunbelt Holdings	X		X	X	X	X				
Chalres E. Cross, Ltd.	X			X	X					
KayCo, Inc.	X	X	X	X	X					
Business/Industry										
Air Products	X		X			X				
Motorola	X		X	X		X				
Southern Pacific Trans. Co.						X				
Mountain Bell						X				
Chandler Chamber of Commerce	X		X		X					
Tempe Chamber of Commerce	X					X				
Price Road Industrial Park	X				X	X				
Residents										
Dobson Ranch Home-owners Assoc.	X	X	X							
Circle G Ranch Homeowners Assoc.	X	X	X							
Sharon Eggers		X	X			X		X		
Howard Cone		X	X			X				

*As of September 1, 1986.

The TAC will provide the consultant with review and comments on the study process and findings.

The first TAC meeting was held on August 14, 1986. The meeting included a study update, discussion about the jurisdictional issues and concerns, engineering and environmental criteria, and future public information activities. The TAC will meet approximately every five weeks through the duration of the study. TAC meetings will also provide an opportunity to clarify concerns and explore ways to resolve issues among jurisdictions.

3.0 RANGE OF ALTERNATIVES FOR FURTHER STUDY

3.1 TYPE OF FACILITY

3.1.1 Definition of Expressway

The Regional Transportation Plan refers to the Price Road facility as an expressway. By definition, an expressway is a high speed divided highway with access partially or fully controlled. Therefore, the term expressway covers a broad range of facility types from an urban arterial (low-level expressway) to a fully access controlled freeway (high-level expressway). In Phase II, alternatives will be developed which investigate the full spectrum of expressway facilities while adhering to the established criteria.

3.1.2 Low-Level Expressway

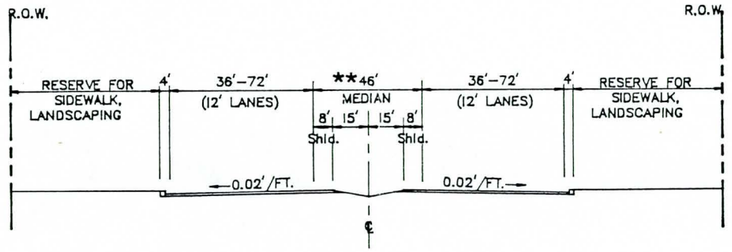
A low-level expressway is more commonly defined as an urban arterial. The primary function of the facility is for the movement of traffic with service and local collector access being incidential. If the service and local collector access movements begin to conflict with through vehicular movement, then a one-way frontage system may be desirable to serve as a collector-distributor roadway. Figure 3.1(A) illustrates a typical low-level expressway section. The number of lanes required would vary along the expressway as required to satisfy the MAG traffic volumes and geometric criteria at an acceptable LOS. Preliminary lane requirements for Price Expressway near Superstition indicate that an ultimate 12-lane section would be required for the low-level expressway facility in the year 2015.

A design speed of 45 mph is proposed for the low-level expressway facility. This design speed is lower than that proposed for the high-level expressway, but is necessary to provide a design LOS "D" and still maintain a reasonable travel time. As a result of the lower design speed, as well as other operational characteristics, a greater number of traffic lanes would be required to accommodate the same forecasted traffic volumes than for a high-level expressway.

The vertical alignment of the low-level expressway would produce an at grade facility. The vertical profile would be adjusted only to accommodate drainage, cross-streets, service access and ground contours. Depressed or elevated roadway sections are not envisioned.

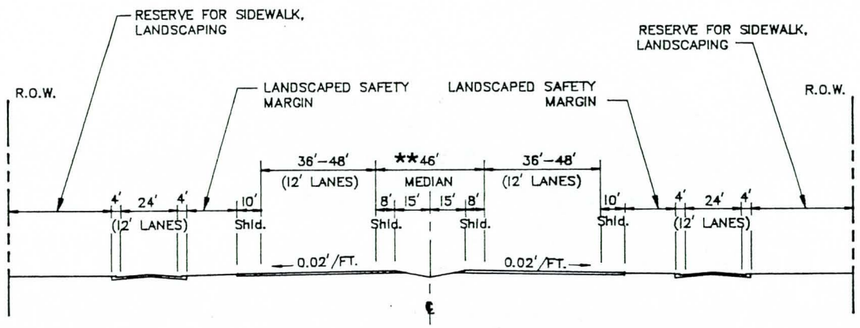
Cross movement and left turn movements would only be allowed at major intersecting arterials. Signalized intersections would be proposed to accommodate forecasted movements. Left-hand turn pockets would be developed using the roadway median at the intersections.

TYPICAL ROADWAY SECTIONS



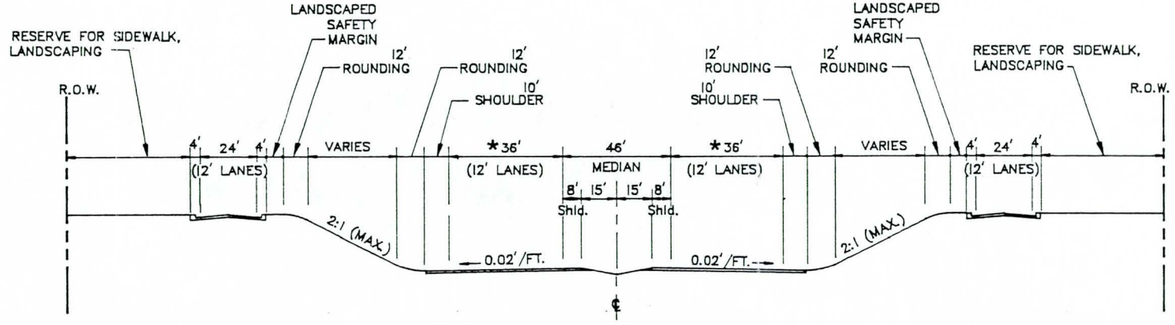
LOW–LEVEL EXPRESSWAY
TYPICAL ROADWAY SECTION

(A)



INTERMEDIATE–LEVEL EXPRESSWAY
AT–GRADE TYPICAL ROADWAY SECTION
WITH ONE WAY FEEDER ROADS

(B)



HIGH–LEVEL EXPRESSWAY
DEPRESSED TYPICAL ROADWAY SECTION
WITH ONE–WAY FEEDER ROADS

(C)

NOTES: *AUXILIARY LANE REQUIRED BETWEEN RAMP TAPERS WILL ADD AN ADDITIONAL 12 FEET TO THIS DIMENSION.

**MEDIAN WIDTHS COULD VARY WITH ALTERNATIVES.

PRICE EXPRESSWAY RECONNAISSANCE

PREPARED BY : DAMES & MOORE AND TAMS CONSULTANTS, INC.

PREPARED FOR: ARIZONA DEPARTMENT OF TRANSPORTATION

FIGURE 3.1

3.1.3 Intermediate-Level Expressway

The intermediate-level expressway, illustrated in Figure 3.1(B), is also an at-grade facility with signalized intersections. However, the operational characteristics have been improved by the provision of a one-way frontage road system.

3.1.4 High-Level Expressway

The high-level expressway (more commonly referred to as a freeway) would have fully controlled access. A one-way frontage road system would be developed adjacent to the controlled roadway to accommodate local collector street and service movements. Interchanges with grade separations would be provided at major arterials to accommodate segregated cross traffic movement and on/off freeway access. Between interchanges, cross vehicular, pedestrian and bicycle traffic movement could be accommodated by the installation of over or underpass structures. All freeway-to-freeway interchanges would be developed as fully directional.

The proposed design speeds for the various components of the high-level expressway are as follows:

- 65 MPH Mainline
- 50 MPH Ramps and Cross-streets
- 45 MPH Frontage Roads

Figure 3.1(C) shows a typical roadway section for a depressed high-level expressway. This section is consistent with ADOT freeway design guidelines used elsewhere for the MAG Regional Transportation Plan. The section is expandable to eight lanes by constructing two additional lanes in the median, which could be designated as high occupancy vehicles (HOV) lanes.

3.2 STUDY CORRIDOR

3.2.1 Horizontal Alignment

The horizontal roadway corridor is presented in Figures 3.2 through 3.5. The existing ROW widths are indicated on the figures. The study corridor represents potential locations for the expressway alignment. Alignments will be investigated that are centered on or close to the centerline of the existing Price Road to minimize additional ROW needs and potential land use impacts.

The northern section of the corridor is constrained by the interchange concept for the Outer Loop and Superstition freeway. The facility in this area is being designed and located to be compatible with ongoing work by other consultants.

Throughout the study area, existing and planned land use plays a major role in narrowing the study corridor. Existing land use patterns, planned future land uses, and major features constrict the corridor width and may limit the range of horizontal alignments investigated. The proposed alignment locations will be influenced by the various design considerations presented.

Geometric constraints presented at major arterials will also impact proposed alignment locations. The Price Expressway will blend horizontally with existing arterial network so that major reconstruction will be avoided.

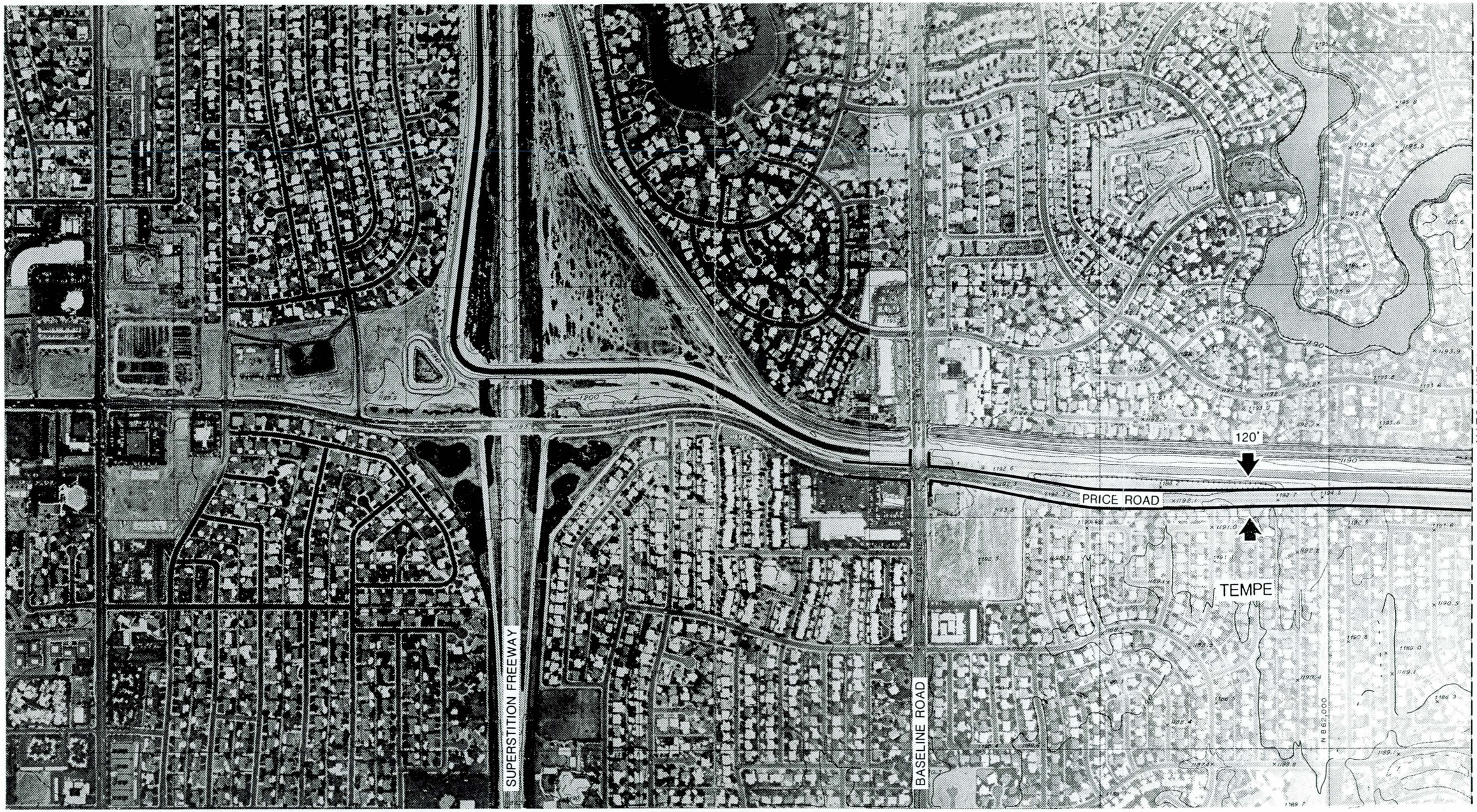
3.2.2 Vertical Alignment

The vertical alignment through the corridor will vary significantly dependent on the level of expressway investigated and the design considerations. Vertical profiles to be investigated will develop a range of alignments from fully depressed to sections at grade. Elevated sections are not anticipated at this time, with the exception of ramps for the traffic interchange at the Southeast Loop.

A low-level expressway would have a vertical profile which adheres to the existing topography. This would vary as the facility approaches the Superstition and Outer Loop Interchange. The design concept for that interchange carries the mainline for Price Expressway below Baseline Road. Therefore, between Guadalupe and Baseline, a vertical transition would occur.

The other end of the spectrum would be the high-level expressway where the roadway section would be fully depressed, and grade separations would carry cross-street traffic. This facility concept would be consistent with the section of the Outer Loop Highway which is to be located just north of the Superstition Freeway. Partially depressed sections will also be investigated if found appropriate.

During Phase II, the various vertical profiles discussed will be developed and evaluated using the design considerations discussed in Section 2.0. Major



EXISTING RIGHT-OF-WAY (ROW)
PROPOSED ROW DEDICATION
PROPOSED ROW RESERVATION
PROPOSED DEVELOPMENT

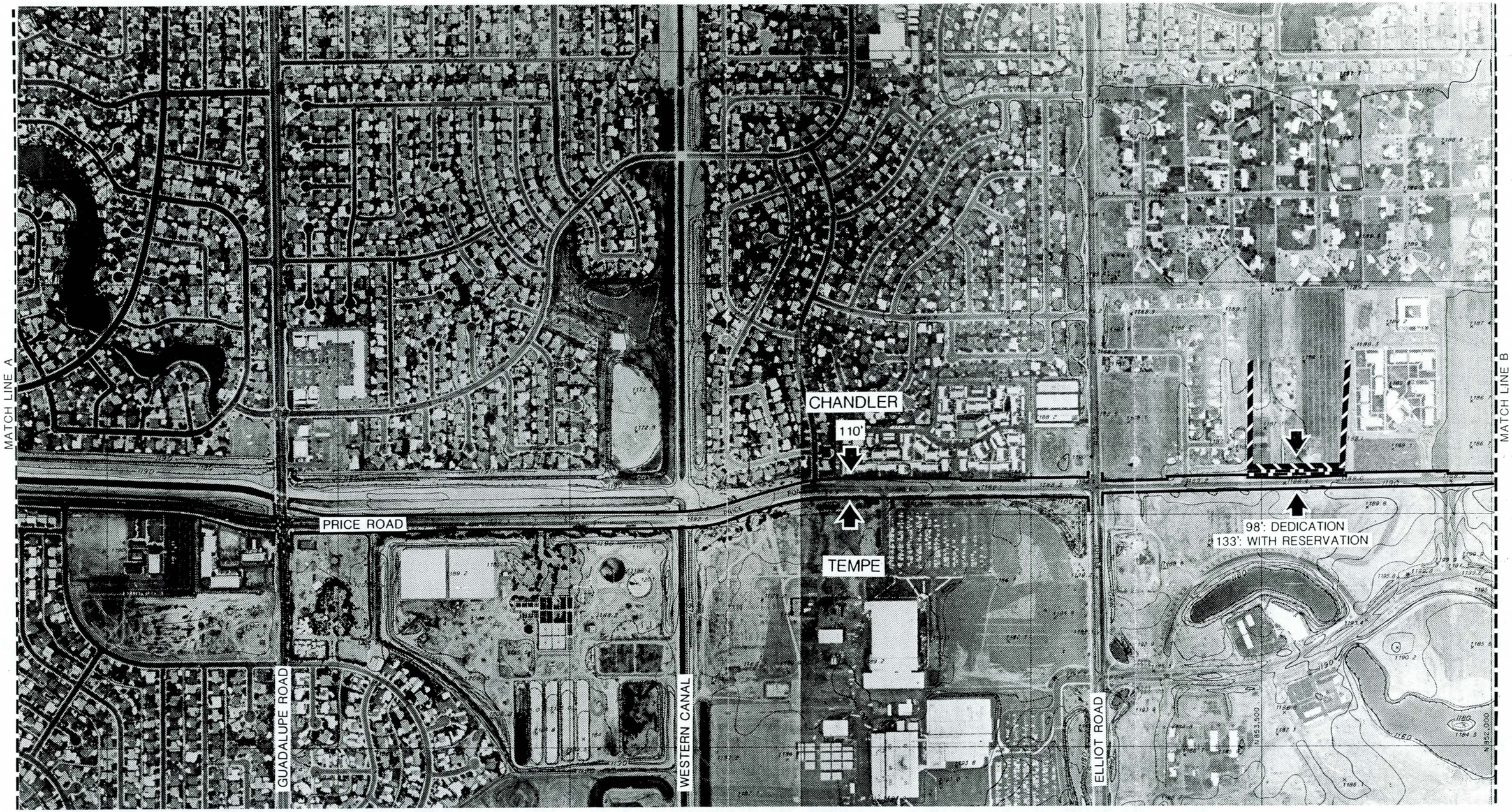
0 1/4 1/2 mile 1

NOTE: BASED ON PRELIMINARY DATA, RIGHT-OF-WAY SHOWN IS NOT TO SCALE
SOURCES: City of Tempe, Engineering ROW Maps
City of Chandler, Price Road Paving Project Maps (Morrison-Knudson)

PRICE EXPRESSWAY RECONNAISSANCE

PREPARED BY: DAMES & MOORE
PREPARED FOR: ARIZONA DEPARTMENT OF TRANSPORTATION

FIGURE 3.2



EXISTING RIGHT-OF-WAY (ROW)
PROPOSED ROW DEDICATION
PROPOSED ROW RESERVATION
PROPOSED DEVELOPMENT

0 1/4 1/2 mile 1

PRICE EXPRESSWAY RECONNAISSANCE

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PREPARED FOR: ARIZONA DEPARTMENT OF TRANSPORTATION

NOTE: BASED ON PRELIMINARY DATA, RIGHT-OF-WAY SHOWN IS NOT TO SCALE
SOURCES: City of Tempe, Engineering ROW Maps
City of Chandler, Price Road Paving Project Maps (Morrison-Knudson)

FIGURE 3.3

PRICE EXPRESSWAY RECONNAISSANCE

PREPARED BY: DAMES & MOORE

PREPARED FOR: ARIZONA DEPARTMENT OF TRANSPORTATION

EXISTING RIGHT-OF-WAY (ROW)

PROPOSED ROW DEDICATION

PROPOSED ROW RESERVATION

PROPOSED DEVELOPMENT

0 1/4 1/2 mile 1

NOTE: BASED ON PRELIMINARY DATA, RIGHT-OF-WAY SHOWN IS NOT TO SCALE

SOURCES: City of Tempe, Engineering ROW Maps
City of Chandler, Price Road Paving Project Maps (Morrison-Knudson)

FIGURE 3.4

EXISTING RIGHT-OF-WAY (ROW)
PROPOSED ROW DEDICATION
PROPOSED ROW RESERVATION
PROPOSED DEVELOPMENT

0 1/4 1/2 mile 1

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PREPARED BY: DAMES & MOORE
PREPARED FOR: ARIZONA DEPARTMENT OF TRANSPORTATION

NOTE: BASED ON PRELIMINARY DATA , RIGHT-OF-WAY SHOWN IS NOT TO SCALE
SOURCES: City of Tempe, Engineering ROW Maps
City of Chandler, Price Road Paving Project Maps (Morrison-Knudson)

FIGURE 3.5

issues concerning vertical alignment are expected to evolve around drainage, visual impact, noise, level of access, cultural resources, and type of expressway proposed.

3.3 ACCESS

3.3.1 Frequency

The frequency of local access and interchange locations will be investigated during Phase II. The impacts on the LOS will be analyzed, and alternatives will be developed which satisfy the design criteria established.

The frequency or spacing of interchanges (for high-level expressways) has a pronounced effect on the operations of freeways, according to the AASHTO. In areas of concentrated urban development, proper spacing usually is difficult to attain because of traffic demand for frequent access. The minimum spacing for arterial interchanges is determined by weaving volumes, the ability to properly and safely sign, signal progression, and the required length of speed-change lanes. According to the AASHTO, the "generalized rule of thumb" for minimum interchange spacing is one mile in urban areas and two miles in rural areas.

3.3.2 Interchanges

Under a high-level expressway design, there are several types of interchanges that may be appropriate for the Price Expressway. The most common of these include the diamond, the modified diamond, and the urban interchange. The type of interchange that may be recommended for any given location is dependent upon a number of factors including traffic volumes, ROW constraints, and desirable capacity.

While an interchange is a useful and an adaptable solution for many intersection problems, its use needs to be evaluated on a case-by-case basis. According to AASHTO, there are generally six conditions that should be considered in reaching a rational decision to justify an interchange:

1. Design Designation (Full or Partial Access Control)
2. Elimination of Bottlenecks or Spot Congestion
3. Elimination of Hazards
4. Site Topography
5. Road-User Benefits (Delays)
6. Traffic Volume Warrant

3.3.3 Expressway-to-Expressway Interchanges

Expressway-to-expressway interchanges are generally high-capacity facilities due to the need to satisfy large traffic flows. This type of facility generally carries a predominance of "thru" trips versus "local" trips with a goal to provide minimal adjacent disruption and maximum speed and capacity. The interchange that is currently proposed for the Outer Loop/Superstition/Price Expressway location is a fully directional interchange. The interchange to be developed for the Price Expressway/Southeast Loop location may be an expressway-to-expressway interchange of similar design. The design will be based upon the forecasted traffic volumes, type of facility, availability of ROW, drainage, existing and future land uses, etc.

Other types of traffic interchanges (TIs) include full or partial cloverleaf, semi-modified directional, and trumpet interchanges. All of these interchanges are generally high-capacity, and do not provide access to or from the arterial street system.

3.4 DESIGN CRITERIA

Table 3.1 summarizes the criteria to be utilized in Phase II to formulate and evaluate expressway alternatives. The formulation of alternatives consists of identifying, locating and refining expressway options in terms of horizontal and vertical alignment, capacity, and access. The evaluation of alternatives consists of assessing potential impacts and mitigation measures. The table illustrates the manner in which the criteria are expected to be used.

TABLE 3.1
CRITERIA FOR PHASE II

Criteria	Alternative Formulation		Alternative Evaluations	
	Identify	Refine	Assess	Mitigate
Transportation				
- Geometrics	X	X		
- Level of Service	X			
- Traffic	X		X	
- Access	X	X	X	
- Cost	X	X	X	
- Mass Transit			X	
Environmental				
- Land Use				
Existing	X	X	X	X
Future	X	X	X	X
Utilities	X	X	X	X
- Socioeconomics				
Property Value	X	X	X	X
Fiscal			X	
Neighborhood Disruption	X	X	X	X
Public Services			X	X
- Visual	X	X	X	X
- Geotechnical			X	
- Water Resources			X	X
- Drainage	X	X	X	X
- Noise			X	X
- Biological			X	X
- Cultural			X	X
- Air Quality			X	

APPENDIX A
STAKEHOLDERS' ISSUES AND CONCERNS
(As of September 1, 1986)

STAKEHOLDERS' ISSUES AND CONCERNS

The diversified issues and concerns expressed during the stakeholder interviews have been organized into seven categories. These categories are:

- Facility Design
- Displacement
- Economic Impact
- Land Use
  - Existing
  - Future
- Visual
- Drainage
- Environmental Issues
  - Noise
  - Air Quality
  - Biological

This appendix describes each category and discusses the concerns expressed by the stakeholders during interviews held in Phase I.

FACILITY DESIGN

Facility design is characterized by the level of expressway, access and traffic projections. Distinct views surrounding these factors were mentioned during the interviews.

The jurisdictions located in the study corridor have different opinions as to whether Price Road should become an expressway or a freeway. The cities of Chandler and Tempe favor a low-level expressway emphasizing local access. The City of Mesa and Maricopa County prefer a design which would use interchanges and permit free flowing traffic. These two entities noted that the projected traffic volumes and future growth of the area indicate the need for a free flowing, high carrying capacity facility. The following list of design assumptions was established by the management staffs of the cities of Chandler and Tempe:

1. Outer Loop/Superstition Traffic Interchange shall not be constructed to exceed one level in the air - desirable to be at or below grade.

2. In Tempe the existing Price Road shall be retained as a two-way arterial street - particularly north of the Superstition Freeway.

3. The Price Expressway shall be constructed at grade or depressed not elevated in the air.

4. Access shall be provided to the Price Expressway at all crossing arterial streets.

5. Some access shall be provided to adjacent land developers - three access points per mile as agreed to with Chandler and specified by BRW consultant report.

6. The project shall minimize ROW acquisition from developed adjacent properties.

7. Price Expressway shall be heavily landscaped to reduce the impact of the project on adjacent properties.

8. Desirable to relocate existing park and ride lots in area.

The City of Tempe questioned the accuracy of MAG traffic volume projections for the Price Expressway. They are more interested in preserving the existing and planned land uses along Price Expressway than in obtaining a higher carrying capacity. Both Tempe and Chandler suggested consideration of an additional north-south route, further east, as a way of reducing the traffic demand on Price Expressway.

The Arizona State University Research Park (Research Park) and Motorola Plant neighbor each other along the west side of Price Road. These two facilities seem more interested in maintaining direct access in and out of their facilities than with the actual design of the roadway. Motorola presently has more than 3,000 employees at its Elliott/Price Roads location and is projecting expansion to 7,000 employees by 1995. The Research Park anticipates more than 5,000 tenants by 1992 resulting in over 12,500 vehicles entering and exiting daily. Motorola is willing to explore the idea of sharing an intersection/interchange with the Research Park.

Access at the southern end of the corridor is also a concern for the Gila River Indian Community (GRIC). Specifically, community representatives mentioned the importance of maintaining access to the Memorial Air Field and their Industrial Park via the Price Expressway/Southeast Loop interchange.

Displacement

During the interviews, displacement was the second most mentioned issue. Factors surrounding this issue include the possible need to relocate homes, businesses, parks and recreational facilities, and utilities. The fact that residential, retail and industry developments are established along the Price Road corridor make this an issue of considerable interest.

Most of the jurisdictions and elected officials interviewed stated that the facility should be built with the least possible disruption to homes and businesses. The City of Chandler noted their concerns about displacement because of their efforts towards preserving and obtaining ROW along the alignment identified in the Chandler Transportation Plan.

The Salt River Project's (SRP) attention is centered around the possibility of having to relocate or construct around the Tempe Canal. Any disturbance of this canal would be costly and difficult to schedule because the canal is only dry during the month of November. SRP has subtransmission and distribution lines in the study corridor. Close coordination during construction, particularly in the summer months, would be required to avoid negative effects on their delivery service.

Some businesses located on Price Road have expressed concerns about losing portions of their property. Air Products, a supplier of nitrogen to Motorola and other semi-conductor manufacturers, has both a costly security entrance and an underground nitrogen pipeline along Price Road. Because of long-term service contracts, their pipeline was not designed to be shut down. Motorola and the Research Park also discussed their opposition to losing property for ROW.

Economic Impact

Closely related to displacement is the issue of economic impact. The factors characterizing this issue include:

- Impact on property values;
- Economic hardships to developers due to time delays and construction disruption;
- Cost of relocating facilities and disruption of operations; and
- Loss of tax revenues to local jurisdictions due to the relocation of homes and businesses.

The proposed improvements along Price Road have the potential of both increasing and decreasing the surrounding property values. Residents near the facility fear the value of their homes will depreciate. In contrast, commercial property adjacent to intersections/interchanges may increase in value due to improved access and visibility.

Developers who own land in the corridor are having to delay improvements to their property until the final alignment is known. Time delays represent a loss of income to these companies and increased financial costs. Homeowners have also aired their frustrations concerning the lengthy processes surrounding the alignment and preliminary design study. Not knowing the exact alignment means they are unable to determine the impacts the facility might have on their property value. Related social issues expressed include the possible quality of life impacts and the desire to have the project promptly finished because the present transportation system does not adequately serve the current and future traffic volumes.

The transportation system's overall cost is also related to the issue of time delays. Interviewees explained that because property values are continuing to escalate, time delays would greatly increase the cost of the project.

To support the existing development within the study corridor area, numerous utility lines parallel and traverse Price Road. Mountain Bell, Southern Pacific Transportation Company, El Paso Gas, and Southwest Natural Gas stated that they will have technical concerns once the alignment is set, plus they questioned who will bear the financial burden of relocating their facilities.

The City of Tempe, during a pre-council work session on July 10, 1986, commented that the displacement of homes and businesses along the corridor would result in a loss of city tax revenues. The tax revenue issue is similar to the discussion on property values since the improvements along Price Road can also increase tax revenues by attracting businesses and developments that desire accessibility offered by an expressway/freeway.

Land Use: Existing and Future

Factors depicting this issue include zoning, density, ROW dedication, and the proximity of houses and businesses to the facility.

The Arizona State University Research Park is concerned with the existing and future land use of neighboring parcels. They have developed an extensive plan for their facility which anticipates potential multi-family, office, and commercial land use areas to the east of their property. The Chandler Transportation Plan recommends that the land use for the Research Park Support Area be categorized as a "Special District" characterized by low/medium density offices, support retail services, and restaurants. According to the report, the first tier of single family homes (up to 600 feet east) from the section line is expected to redevelop and provide the required support services.

A development company, owning 200 acres east from Price Road along north and south sides of Pecos Road, is planning to develop the property into an "upscale" regional business/light-industrial park including business complexes, and research and development facilities. This company opposes the widening of Price Road south of Pecos because they believe this might eliminate their access at the Price Road/Southeast Loop interchange. They have retained consultants to propose alternative locations and designs for the interchange to best satisfy their needs.

Another development company would like to see the land on the east side of Price Road, between Warner and Elliot, rezoned for mixed use commercial property. They want the alignment located east of Price Road so that Chandler would have access on both sides to the company's proposed "high-end" development.

A 40-acre industrial park, located on the southeast corner of Price and Frye roads, is most concerned about adequate access at Frye Road to accommodate the existing and planned development along Frye.

The Mesa Unified School District discussed concerns about how the roadway might affect densities and zoning. The school district follows the City of Mesa boundaries along the east side of the study corridor. The superintendent explained that density decreases would help the schools, since they are presently overcrowded.

Visual

Landowners and jurisdictions within the study area consider the possible visual impacts to be a significant issue. Visual issues are characterized by the design of the facility, grade level, construction of buffers (wall, berms), and landscaping. The visual criteria for Price Expressway are discussed in Section 2.2.3 of this report.

The cities of Chandler and Tempe want Price Expressway to be heavily landscaped to reduce the impact of the project on adjacent properties. The Chandler Transportation Plan describes the facility as a "parkway" with orderly arrangements of buildings and adequate open space. In addition, the report recommends that the placement and size of signs be controlled and that billboards be prohibited.

The Research Park also favors a well landscaped and visually pleasing facility. They have established detailed "low impact" zoning regulations for their tenants which includes elaborate landscaping requirements. They want the new facility to meet similar standards.

Visually concerned stakeholders prefer the construction of an at-grade or depressed roadway. Tempe and Chandler do not want an elevated structure. Landowners near the proposed interchanges mentioned the possible need for barriers and walls to reduce possible visual and noise impacts.

Drainage

The City of Mesa, with the Flood Control District, the Army Corps of Engineers and the Soil Conservation Service, expressed the importance of designing a facility that will not produce drainage problems. The GRIC also mentioned drainage concerns since they could be affected if proper drainage designs were not incorporated into the facility design.

Environmental Issues

The following environmental issues were mentioned during the interviews:

- Noise
- Air Quality
- Biological

The Tempe Elementary School District and homeowners within the study area have related their concerns regarding air quality and noise levels. They state that Price Expressway's increased carrying capacity would possibly result in reduced air quality levels and increased noise levels.

The Maricopa County Flood Control District, the GRIC and the Army Corps of Engineers generally expressed their concerns about possible biological impacts resulting from the construction of the facility.

APPENDIX B
PUBLIC CONTACTS

PUBLIC CONTACTS
1986

Jurisdictions

- City of Tempe, 6/26
  Harvey Friedson, Traffic Engineer
  Jerry Geiger, Assistant City Manager
  Bill Coughlin, Assistant City Engineer
  Lee Quaas, City Engineer
  Terry Mullins, Principal Planner
  Steve Nielson, Planner IV
  Bill Pederson, Senior Management Assistant
  Jim Jones, Public Work Director

- City of Chandler, 7/2
  Al Pfahl, City Engineer
  Bob Warnick, Public Works Director
  Phil Testa, Planning Director
  Don Brown, City Manager

- City of Mesa, 6/26
  Arnold Harring, Transportation Director

- City of Mesa, 6/30
  Mike Hutchinson, Assistant City Manager

- City of Phoenix, 6/27
  Dave Shriner, Deputy for Transportation Planning

- Gila River Indian Community, 6/6
  Dorothy Hallock, Program Evaluator
  Bill Talbow, Director, Physical Resources

- Maricopa County, 7/1
  Tom Freestone, County Supervisor

- Maricopa County, 7/1
  Don McDaniel, Director of Planning
  Murrel Krump, Assistant Director of Planning
  Preston Gibson, Planner III

- Maricopa Association of Governments, 7/10
  Dennis Smith, MAG Program Coordinator
  Roger Herzog, Director MAGTPO
  Terry Johnson, MAGTPO Planner

Public Agencies/Elected Officials

- Chandler School District, 6/30
  Dr. Ted Perry, Superintendent

- Tempe High School District, 7/9
  Dudley Stringer, Superintendent

- Tempe Elementary School District, 7/8
  Ralph Goitia, Superintendent

- Mesa Elementary School District, 7/9
  James Zaharis, Superintendent

- Arizona State University Research Park, 7/2
  Reginald Ownes, Executive Director
  Doug McQueen, Planning Director

- Flood Control District of Maricopa County, 7/11
  Don Sagramoso, P.E., Chief Engineer, General Manager
  John Rodriguez, Chief of Planning and Project Management Division

- Army Corps of Engineers, 6/20
  Cindy Lester, Civil Engineer

- Soil Conservation Service, 6/4
  Wayne Killgare, State Conservationist

- Roosevelt Water Conservation District, 6/25
  Mike Leonard, General Manager

- Federal Highway Administration, 7/22
  Dave Bender, District Engineer

- State Senator, Stan Turley, District #30, 7/7

- State Representative, Doug Todd, District #27, 7/7

Utilities

- Arizona Public Service, 6/25
  Marty Wurbs, Manager, Environmental and Engineering Services

- Salt River Project, 7/3
  Ben Allender, Supervisor, Transmission Line Division
  Prem Bhardwaja, Senior Staff Scientist
  Chet Andrews, Manager, Supervisor, Water Group-Operational Support

- El Paso Gas, 7/9
  Bill Ward, Superintendent of Casa Grande and Phoenix Districts

- Southwest Natural Gas, 7/9
  Elton Buell, Manager Engineering-Franchise Department
  Joe Roche

- Mountain Bell, 7/9
  May Fragua, Reports Clerk

- Southern Pacific Transportation Company, 7/9
  Bob Prince, Public Project Engineer

- Southern Pacific Pipelines, 7/10
  Jerry Smithey, Station Supervisor

Developers

- Sunbelt Holdings, 7/7
  Scott O'Connor, Vice President
  Sverdrup, Daniel H. Lare, Planning Manager
  Sverdrup, R. Douglas Peters, Manager Civil Engineering Department
  SWA Group, Elizabeth Shreene, Associate

- Price Road Industrial Park
  Robert P. Gambell, President

- Charles E. Cross, Ltd., 6/24
  Cliff Mt. Joy

- Kayco, Inc. Developers, 7/16
  Kay Rustin, President

- Circle G Ranches, 7/9
  Wally Slade, Director of Marketing

Business/Industry

- Chandler Chamber of Commerce, 6/30
  Karl Cayford, Executive Vice President

- Tempe Chamber of Commerce, 6/30
  Ray Burnell, Director of Public Affairs

- Motorola, 7/7
  Michael Mulroy, Group Manager, GEG
  Don Johnson, Director, Construction, Real Estate and Facility Engineering, SPS
  Tony Aldredge, Manager, Engineering Department
  Jerry Hale, Manager, Engineering and Construction, GEG

- Air Products and Chemicals, 7/10
  Robert Cravener, Plant Manager
  Carl Cramer, Corporate Real Estate

Interest Groups

- Dobson Ranch Homeowners Association, 7/1
  Dale Douglas

- Circle G Ranch Homeowners Association, 7/1
  Walt Illgen, President

- Sierra Club, 7/24
  Alma Williams

APPENDIX C
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