

DESIGN CONCEPT REPORT

Contract No. 1998-17

ELLSWORTH ROAD GERMANN ROAD TO BASELINE ROAD

Volume I of II

Prepared for



Department of Transportation

Prepared by



CH2MHILL

October 1999

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DESIGN CONCEPT REPORT

**ELLSWORTH ROAD
GERMANN ROAD TO BASELINE ROAD**

VOLUME I

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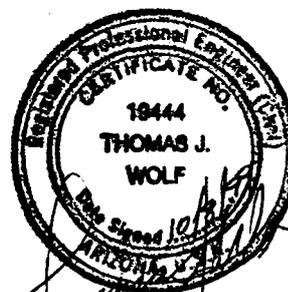
Department of Transportation

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CH2MHILL

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Executive Summary

In April 1998, Maricopa County Department of Transportation (MCDOT) requested CH2M HILL to prepare a Design Concept Report (DCR) study for the 7-mile section of Ellsworth Road from Germann Road to Baseline Road. The purpose of this report is to provide MCDOT with the information necessary to identify and evaluate design improvements required to improve operation and safety, provide a 5-lane rural principle arterial section, and accommodate anticipated development along the corridor.

Although the report is structured similar to typical DCRs, its focus is threefold:

1. Develop a preliminary design layout of the roadway, major intersections, and drainage system, and incorporate the proposed flood control features recommended in the Southeast Mesa Area Drainage Master Plan (ADMP).
2. Prepare preliminary right-of-way (ROW) strip maps to be used to begin assessments and negotiations for additional corridor ROW required for the proposed improvements.
3. Establish the groundwork for preparation of an Intergovernmental Agreement between MCDOT, FCDMC (Flood Control District of Maricopa County), and the City of Mesa to establish the responsibilities and funding participation for the project.

The primary issues that influenced the recommended plan were:

- Incorporation of the Southeast Mesa ADMP's proposed flood control features
- City of Mesa standards and their request that the ultimate 7-lane urban principal arterial section be constructed in developed areas
- Glide slope encroachment of the proposed future runway expansion at Williams Gateway Airport (WGA)
- Preservation of access to adjacent properties along the corridor

The *Ellsworth Road Corridor Study; Elliot Rd. to Hunt Hwy.* (Corridor Study) (CH2M HILL, 1997) presented much of the environmental, traffic data, and existing condition information used as the foundation for this DCR. Additional investigations were performed to include the section from Elliot Road to Baseline Road. The following characteristics were examined:

- Physical and natural environment
- Cultural resources
- Drainage patterns
- Socioeconomic environment
- Utilities
- Traffic
- Existing roadway conditions

A public information meeting was conducted on November 3, 1998, at WGA. Attendees included staff from the City of Mesa, WGA, General Motors (GM) Desert Proving Grounds,

and several representatives from adjacent properties and developments. The plan, as presented, generally consisted of a 7-lane urban principle arterial roadway including a raised median, with access at approximately four locations per mile. Signals at Elliot Road and Gemann Road would be installed with the initial construction, and other major intersections would be stopped controlled until such time that signals were warranted. A concrete-lined drainage channel from south Germann Road to Elliot Road would be located along the east side of the roadway.

Meetings were conducted with the City of Mesa staff to discuss the City's role and participation on the project. It is intended that the City will take over the roadway upon completion and, therefore, requires the roadway be designed in accordance with City standards. The City is moving forward with improvements of Ellsworth Road north of Elliot Road where three developments are under construction. The City has requested that the ultimate 7-lane roadway section be provided where adjacent properties are improved, and a 5-lane roadway section be provided in undeveloped sections of the corridor.

Meetings were also conducted with FCDMC to determine how the drainage channel would be incorporated into the corridor with the least impact to adjacent properties. The FCDMC's current policy is to construct (where feasible) earth channels with flattened slopes. Although this configuration usually requires more ROW than a concrete-lined channel, it is considered to be more acceptable within the community.

Consequently, the reach of channel from Germann Road to Pecos road, on the east side of Ellsworth Road, is proposed to be constructed as an earth-lined channel. The recommended plan indicates the ROW required to implement this.

Additionally, discussions with WGA, the City, and GM were conducted to reconsider the channel from Pecos Road to the Powerline Floodway. In lieu of a concrete-lined channel on the east side where ROW is restricted, it is proposed that an earth-lined channel on the west side of Ellsworth Road be considered. This requires additional ROW from WGA, but total project costs would be substantially less. The recommended plan proposes that the existing earth channel on the west side of Ellsworth Road be modified and extended.

→ ROW costs not included

Project Purpose and Need

Project Purpose

The purposes of the Ellsworth Road Design Concept Report are to:

- Evaluate Ellsworth Road improvement needs
- Evaluate alternative alignment and concept improvements
- Identify and prioritize corridor improvements
- Develop a cost-effective alignment and implementation plan for widening Ellsworth Road (Germann Road to Baseline Road) from two lanes to five lanes
- Establish recommendations for Intergovernmental Agreements (IGAs) and associated cost sharing

The Corridor Study was completed for MCDOT in December, 1997, and was used as the basis of this DCR. Where the Corridor Study limits were from Elliot Road to the Hunt Highway, this DCR's limits are from Germann Road to Baseline Road. Thus, the 2-mile section from Baseline Road to Elliot Road required initial study to determine the general alignment and roadway/drainage improvements needed for this DCR.

The recommendations proposed in this DCR will serve as a basis for preparation of construction documents.

Project Need

The project limits extend from Germann Road to Baseline Road in eastern Maricopa County. The roadway is generally located within the Mesa City limits. Currently it is a 2-lane rural arterial providing a link between US60 and east Mesa to the major businesses along its alignment and to the Town of Queen Creek. The project location is illustrated on Figure 1-1.

Ellsworth Road is the only major continuous north-south roadway within the 6 miles between Power Road and the east Maricopa County line. The proximity and size of WGA and the GM Desert Proving Grounds virtually blocks other parallel alignments within that 6-miles. Consequently, the Town of Queen Creek and adjacent developments heavily depend on Ellsworth Road for direct access to the US 60 (Superstition Freeway) and east Mesa. As development increases in the Queen Creek area and to the south, the significance of Ellsworth Road corridor will become substantially greater.

WGA is planning, within the next 10 years, to provide a substantial amount of commercial airline service to the East Valley. The projected number of commercial aircraft takeoffs and landings at WGA is expected to increase from 15,000 to 54,000 per year by the year 2015. A new passenger terminal is being planned on the east side of WGA, with primary its primary entrance off of Ellsworth Road.

WGA plans to extend its Runway 30R, 500 feet on each end. The 500-foot extension toward the southeast (toward Ellsworth Road) and the airport authority's plan to upgrade the runway to a precision approach (50:1 glide slope), will create minimum clearance over Ellsworth Road at Pecos Road.

Several employment centers are located in southeastern Maricopa County, including GM (over 1,100 employees), TRW's building No. 2, Olin, Baker Rubber, and Arizona State University-East. In addition, there are numerous agricultural/dairy operations in the area contributing to the volume of trucks. Queen Creek is active in development of residential areas including the Chuperosa, Circle G, San Marqui, The Groves, Crimson Ranch, and Queen Creek Ranchettos. These subdivisions have been platted and are in varying stages of development, and are expected to add several hundred dwelling units to the community within the next 5 years.

Commercial and industrial developments are expected to continue to sprout. WGA anticipates becoming a significant employment hub for aviation - related services. GM is planning a 20,000 square-foot expansion facility. The Johnson Ranch is a planned residential community just south of Queen Creek in Pinal County. It will include 4,600 homes, a commercial center, schools, and park areas. An estimated population of 8,000 to 10,000 people may be realized, with a large number of these people working and shopping in Queen Creek and Mesa. Other developments along the corridor, including the Pegasus Airpark, Town Center, and Brandon Place, are already under construction. These are indicators of potentially explosive growth in the southeast valley and the need for corridor improvements.

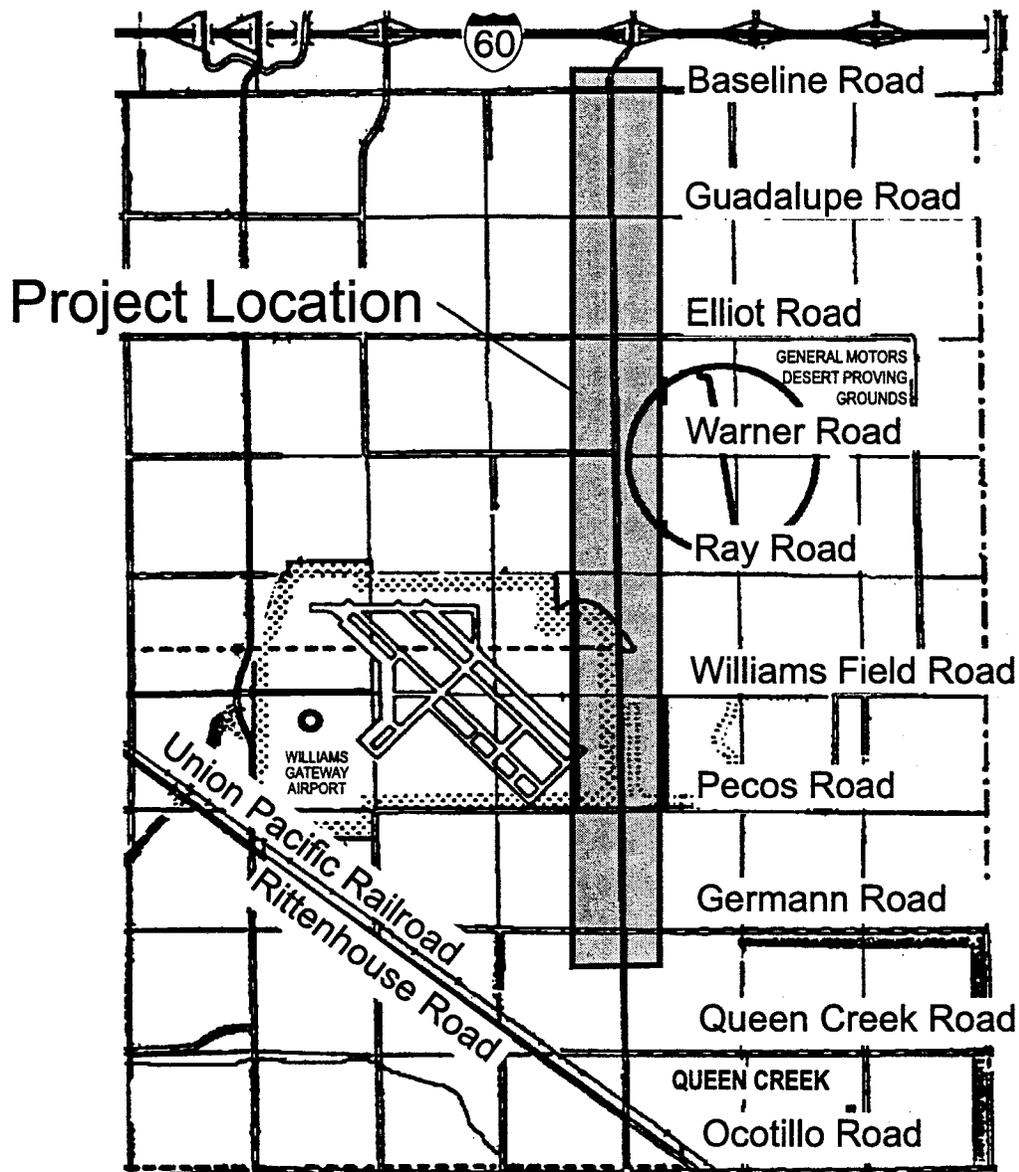


Figure 1-1. Project Vicinity

Ellsworth Road (Germann Road to Baseline Road)



Project Participation

The goal of the project participation process was to provide opportunities to review the preliminary plan and to foster open dialogue between the DCR team, the stakeholders, and the public. The information gathered from the participation process assisted in identifying the key issues regarding the roadway alignment and improvement needs.

The project participation process for this DCR included the following activities:

1. Letter to agencies and stakeholders
2. Stakeholder and coordination meetings
3. Public Involvement Plan development and implementation
4. A public information meeting

Interagency Coordination

The CH2M HILL team sent the agencies and stakeholders a letter inviting them to the public meeting and asking for comments on any issues related to the Ellsworth Road DCR. A contact list is provided in Appendix A.

Public Meeting

Prior to holding the public meeting, a Public Involvement Plan was developed to identify the goals and purpose of conducting a public meeting during the DCR study. The Public Involvement Plan also outlined areas of responsibilities, meeting format, and the public notification process. The execution and results of the Public Involvement Plan are contained in Appendix A.

The public meeting was held in Mesa at WGA Authority Offices on November 3, 1998. The project scope was discussed, including study methodology, alternatives being assessed, and project schedule. Attendees were solicited to identify specific concerns and offer input to alternatives development.

In addition to the public meeting, the DCR team held a stakeholder meeting and four coordination meetings. These meetings are summarized in Table 1-1.

TABLE 1-1

Meeting Summaries

Meeting Name	Meeting Summary	Date
Ellsworth Road Stakeholders Meeting	Comments were solicited from property owners along the corridor that may be affected by the ROW acquisition needed for the new roadway.	July 13, 1998
Initial IGA Coordination Meeting	The meeting focused on the design criteria and roadway improvement elements needed for the Ellsworth Road DCR recommendation plan.	July 13, 1998
Right-of-Way Coordination Meeting	The ROW impacts and typical sections for the DCR were discussed with MCDOT.	August 31, 1998
GM Coordination Meeting	Materials to be presented at the public information meeting were reviewed. The discussion focused on the Ray Road extension and right-of way issues.	October 26, 1998
Williams Gateway Coordination Meeting	Materials to be presented at the public information meeting were reviewed. The discussion focused on the access points and right-of way issues.	October 26, 1998
FCDMC Coordination Meeting	Proposed alternative was presented. Discussions held to address strategies for participation. West side channel alignment was proposed.	February 3, 1999
WGA/City of Mesa Alternative Review	Discussion of west side channel alignment.	March 1, 1999
WGA/City of Mesa Alternative Review	Evaluation of alternatives was presented and included west side channel option.	March 15, 1999

Characteristics of the Existing Corridor

Socioeconomic Environment

The description of the socioeconomic environment of the project area includes an overview of the jurisdiction, land use, zoning, economic profile, and demographic composition. The socioeconomic resources within the project area were identified using the Arizona Department of Economic Security (ADES) 1990 Census data to describe Title VI and environmental justice considerations. Planning documents and maps prepared by the City of Mesa and Maricopa County were used to identify jurisdiction and zoning.

Jurisdiction and Ownership

Lands within the Ellsworth Road project area are both publicly- and privately-owned. Private lands are under the jurisdiction of the City of Mesa or Maricopa County. The major publicly-owned property in the corridor includes WGA (formerly Williams Air Force Base) owned primarily by the City of Mesa. Other public parcels include the Arizona State Land Department on the west side of Ellsworth Road from Elliot Road to Warner Road, Bureau of Land Management (BLM) lands located at the northwest corner of Pecos Road and Ellsworth Road, and an easement for the Flood Control District of Maricopa County (FCDMC) just north of Ray Road (Figure 2-1).

Land Use

Existing land uses within the project area are primarily industrial, undeveloped, agricultural, public/quasi-public use and residential (Figure 2-2). Industrial/commercial land uses are located in the central portion of the corridor. The GM Desert Proving Grounds along the eastern portion of Ellsworth Road between Elliot and Pecos roads make up the major industrial land use. WGA, along the western side of Ellsworth Road, bound by Ray and Pecos roads, is classified as a limited quasi-public land use.

Undeveloped land use is generally located west of Ellsworth Road from Guadalupe Road to the northern boundary of WGA (Ray Road alignment). However, many parcels of relatively undisturbed desert vegetation are being graded in preparation for residential development. Other areas of undeveloped land use include the area directly south of Germann Road.

Agriculture land uses are currently located along both sides of Ellsworth Road between Pecos and Germann roads, and the eastern side of Ellsworth Road bound by Baseline and Guadalupe roads. Agricultural crops include cotton, corn, and alfalfa.

Key



City of Mesa



Town of Queen Creek



Maricopa County



Annexed by
City of Mesa



Arizona State Lands



BLM



City Limit



Project Area



Flood Control Easement

of Maricopa County

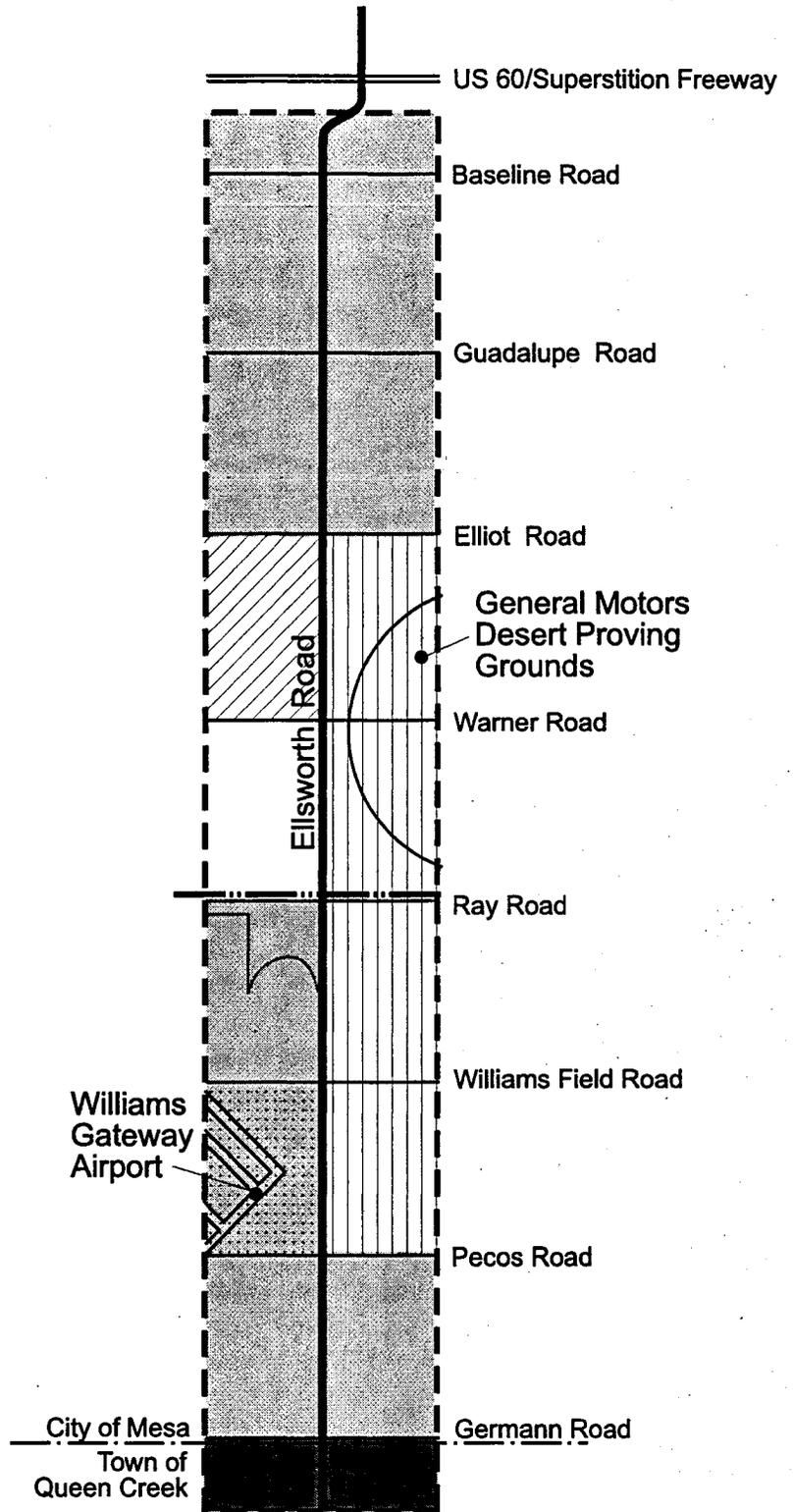


Figure 2-1. Jurisdiction

Ellsworth Road (Germann Road to Baseline Road)



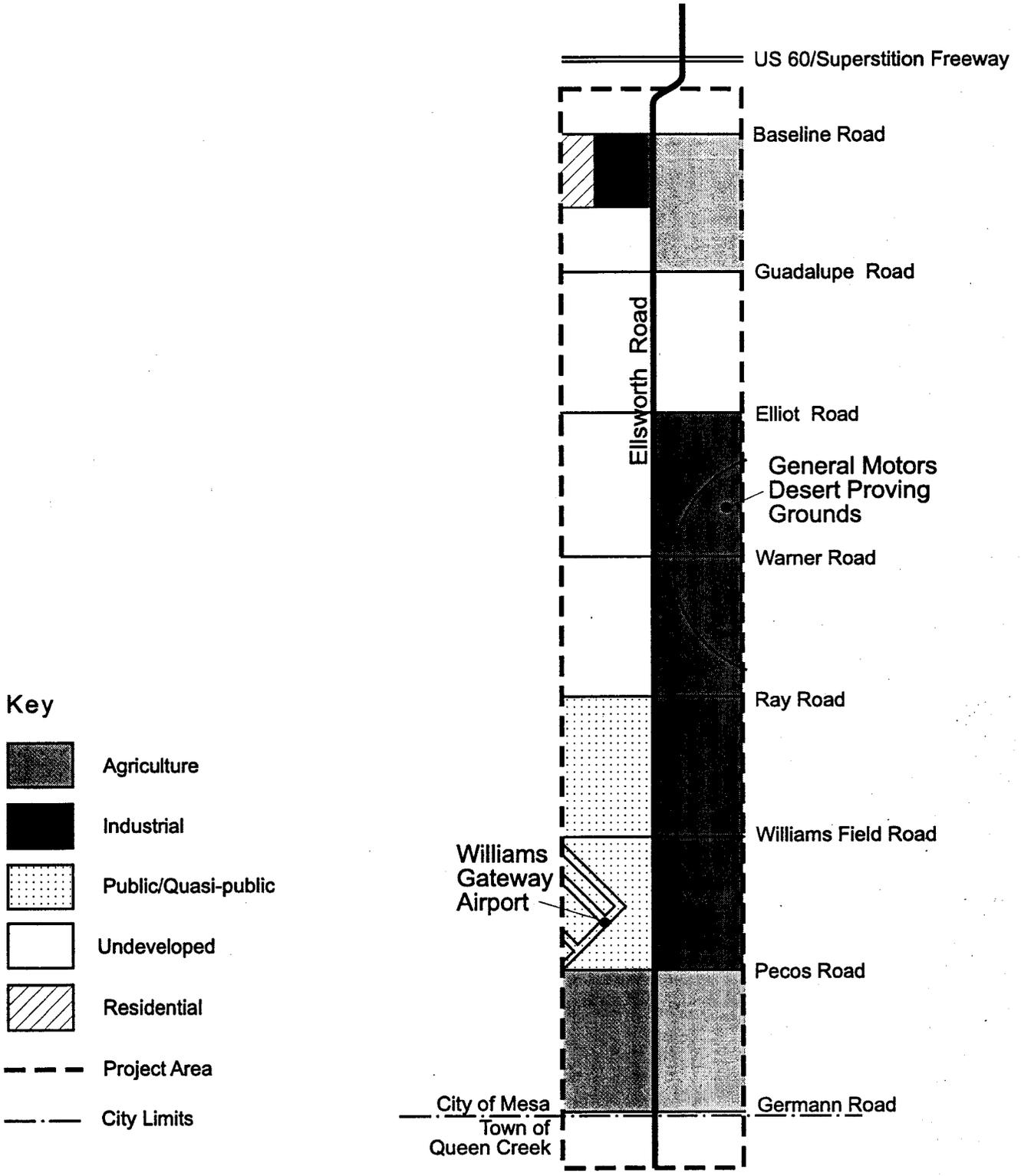


Figure 2-2. Existing Land Use

Ellsworth Road (Germann Road to Baseline Road)



Williams Air Force Base was closed in September 1993, and an Economic Reuse Plan for the Base was completed and adopted as the Williams Gateway Airport (WGA). WGA is a public/quasi-public use facility in the Ellsworth Road corridor. It is administered by the WGA Authority, which is composed of entities from the City of Mesa, the Towns of Gilbert and Queen Creek, and the Gila River Indian Community.

The Economic Reuse Plan for WGA was completed in August 1992, and includes a reliever airport and aerospace center planned to accommodate cargo and commercial passenger service, general aviation, aerospace manufacturing, and modification. The Reuse Plan also includes the Williams Campus on approximately 900 acres. Following the adoption of the Economic Reuse Plan, the WGA Master Plan was developed for the Williams Gateway Airport Authority. The airport property is planned for 3,020 acres, including 1,000 acres of planned industrial/commercial land which surrounds the airfield.

Developing residential neighborhoods, such as Las Palmas Grande, Mesquite Canyon, and Augusta Ranch housing developments, dominate the northern portion of the corridor. Other residential uses include a mobile home park on the southwestern corner of Baseline and Ellsworth roads.

Zoning

Zoning classifications within the corridor include various residential, rural, agricultural, commercial, and industrial designations in the City of Mesa, Maricopa County, and Town of Queen Creek (Figure 2-3). The City of Mesa 1992 General Plan identifies proposed conceptual zoning to change various types of R (residential) to include C (commercial) zones. These areas include those lands adjacent to the US 60/Superstition Freeway. Other zoning includes: AG (agriculture), I (industrial), and M-1 (limited industrial). Maricopa County lands between Warner and Ray roads on the west side of Ellsworth Road are zoned residential. Planned Area Development (P.A.D.) and Development Master Plans (D.M.P.) are shown in the City of Mesa and Town of Queen Creek General Plans for several areas within the corridor. The Town of Queen Creek General Plan (1996) also identifies additional residential development planned for the area just south of Germann Road. The Overflight District is a designated area surrounding the airport having potential aircraft noise impacts to adjacent, surface jurisdictions. The jurisdictions of Mesa, Town of Queen Creek, and Maricopa County may amend their zoning ordinances for the areas within the Overflight District to eliminate land uses that may be affected by, or affect, the district.

Population Statistics

The ADES 1990 Census data are available, and were used to compare and contrast the demographic and economic characteristics of the project area (tract data) to Maricopa County. Census tracts are small, relatively permanent statistical subdivisions of a county that do not cross county boundaries. The spatial size of census tracts varies widely depending on the density of settlement, and are delineated with the intention of being maintained over a long time so that statistical comparisons can be made from census to census. The boundaries of the tract extend beyond the project area, therefore, the exact population and demographic characteristics of the project area may vary from the tract data (Figure 2-4). The overall population of the tract area comprises a very small percentage (1.4%) of Maricopa County (Table 2-1).

Key

-  Residential
-  Industrial
-  P.A.D or D.M.P.
-  Agricultural
-  Public Facilities
-  WGA Overflight District
-  Project Area
-  City Limits

- R-4 Proposed conceptual zoning may include: C-2
- R1-7 Proposed conceptual zoning may include: C-2, M-1, R-3
- AG Proposed conceptual zoning may include: C-2, M-1, O-S

- AG Agriculture
- R1-43 Suburban Ranch
- R1-7 Single Residence
- R-3 Limited Multiple Res.
- R-4 General Multiple Res.
- O-S Office-Service
- C-2 Limited Commercial
- M-1 Limited Industrial

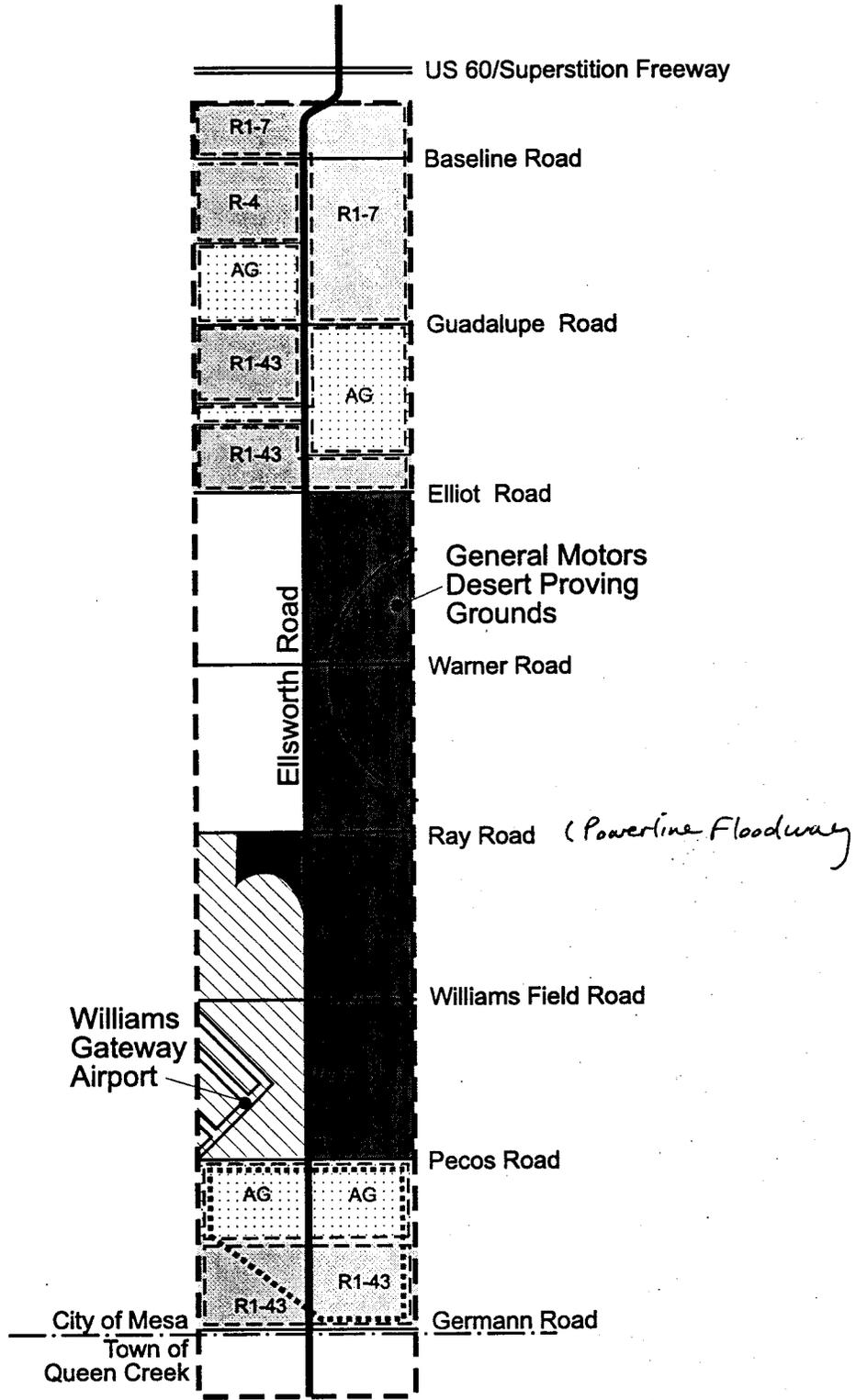


Figure 2-3. Zoning

Ellsworth Road (Germann Road to Baseline Road)



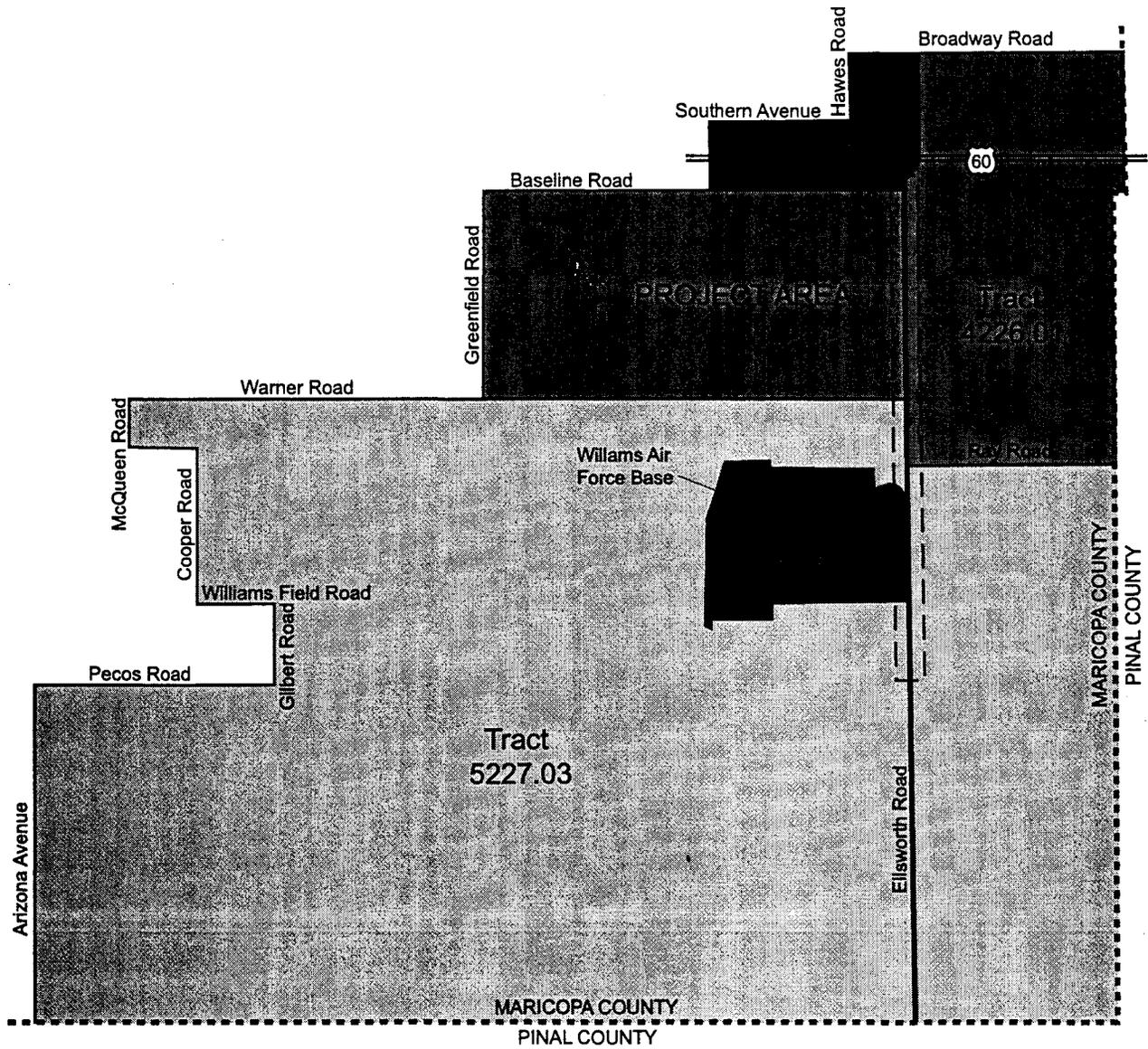


Figure 2-4. 1990 Census Tracts

Ellsworth Road (Germann Road to Baseline Road)



TABLE 2-1
Population Statistics, 1990

Area	1990
Tract 4226.01	8,152
Tract 4226.11	6,070
Tract 5227.03	12,446
Tract 5228	2,471
Tract Total	29,139
Maricopa County	2,122,101

Source: U.S. Department of Commerce: Bureau of the Census, 1992. 1990 Census of population and Housing Summary Tape File 3A for Arizona and Utah.

Labor Force Data

Labor force data for the corridor reports unemployment is 1.4 percent lower in the project area than in Maricopa County (Table 2-2).

TABLE 2-2
Labor Force Statistics for the Ellsworth Road Corridor Tracts, 1990

Area	% Civilian Labor Force	% Employed	% Unemployed
Tract 4226.01	35.0%	95.7%	4.3%
Tract 4226.11	36.2%	94.0%	6.0%
Tract 5227.03	46.2%	95.4%	4.6%
Tract 5228	20.2%	98.0%	2.0%
Tract Average	38.7%	95.3%	4.7%
Maricopa County	50.5%	93.9%	6.1%

Source: U.S. Department of Commerce: Bureau of the Census, 1992. 1990 Census of population and Housing Summary Tape File 3A for Arizona and Utah.

The local economy has long been based on agriculture. The area is now experiencing economic and employment growth from WGA and the GM Desert Proving Grounds. Future projections by the Maricopa Association of Governments (MAG) indicate a 25% growth in employment for the area over the next 15 years.

Title VI/Environmental Justice

The basic provisions of Title VI of the Civil Rights Act of 1964 and Executive Order 12898, require Federal agencies to ensure that their actions do not exclude persons and populations from participation, deny persons and populations of the benefits of the proposed

action/activities, or subject persons and populations to discrimination because of race, color, or national origin. Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," reaffirms the principles of Title VI and related statutes. The Executive Order requires the consideration of low income, as well as/or in addition to, minority, disabled, women, and elderly populations. Minority populations means a person who is African American, Hispanic, Asian American, Native American, or Alaskan Native. Low income means a person 18 and older who is below the poverty level estimated from the 1990 Census. Elderly refers to individuals older than 60 years of age.

Arizona Department of Transportation (ADOT) Environmental Planning Services (EPS) guidelines stipulate that census data identifying protected minority populations living within a project area be compared and contrasted with the county level data for these populations. Tract-level census data for the Ellsworth Road project area were compared with the 1990 census data for Maricopa County. An examination of project level census data relative to the county provides a baseline for determining whether protected populations are substantially represented within the project area and, therefore, have the potential to be disproportionately affected. For a protected population to be considered substantially represented, they must comprise greater than 50% of the population of the project area.

Race Population

According to the ADES 1990 Census of Population and Housing statistics, the racial composition of the total tract area is predominately white (Table 2-3). African Americans represent approximately one percent (except for Tract 5228) of the population in each of these areas, with Native Americans and Asians representing fewer than one percent of the population. Approximately 16 percent of the total tracts' populations are of Hispanic decent.

TABLE 2-3
Racial Demographics for the Ellsworth Road Corridor Tracts, 1990

Area	White	African American	Native American	Asian	Other	Hispanic
Tract 4226.01	96.1%	0.6%	0.4%	0.6%	2.3%	7.9%
Tract 4226.11	94.3%	0.4%	0.3%	0.0%	5.0%	10.9%
Tract 5227.03	78.5	0.5%	1.2%	1.0%	18.8%	27.1%
Tract 5228	79.5%	10.2%	1.5%	4.2%	4.6%	4.6%
Tract Average	86.8%	1.3%	0.8%	1.0%	10.1%	16.4%
Maricopa County	84.9%	3.5%	1.8%	1.7%	8.1%	16.0%

Source: U.S. Department of Commerce: Bureau of the Census, 1992. 1990 Census of population and Housing Summary Tape File 3A for Arizona and Utah.

Age 60 Years and Over

The 1990 ADES Census data indicate that the percentage of elderly persons (>60 years) living within the total tract area are approximately six percent greater than that of Maricopa County (Table 2-4). The highest percentage of elderly is represented in Tract 4226.01 (37.8%), with the lowest percentage of elderly represented in Tract 5228, where no elderly are present.

TABLE 2-4
Percentage of Population Greater than 60 Years of Age for the Ellsworth Road Corridor Tracts, 1990

Area	> 60 Years Old
Tract 4226.01	37.8%
	34.7%
Tract 5226.11	
Tract 5227.03	8.2%
Tract 5228	0.0%
Tract Average	21.3%
Maricopa County	15.5%

Source: U.S. Department of Commerce: Bureau of the Census, 1992. 1990 Census of population and Housing Summary Tape File 3A for Arizona and Utah.

Low Income Population

The 1990 Census data indicate the percentage of persons living at or below poverty who live within the total tract are slightly fewer (1.6%) than persons living at or below poverty in Maricopa County (Table 2-5).

TABLE 2-5
Percent of the Population Living Below Poverty for the Ellsworth Road Corridor Tracts, 1990

Area	% Below Poverty
Tract 4226.01	7.7%
Tract 5226.11	8.4%
Tract 5227.03	10.8%
Tract 5228	22.1%
Tract Average	8.7%
Maricopa County	10.3%

Source: U.S. Department of Commerce: Bureau of the Census, 1992. 1990 Census of population and Housing Summary Tape File 3A for Arizona and Utah.

Mobility Disability

The 1990 Census data indicate the percentage of persons who claim a mobility disability in the total tract are essentially equal to Maricopa County (Table 2-6).

TABLE 2-6
Percent Population with Mobility Disability for the Ellsworth Road Corridor Tracts, 1990

Area	% Disability
Tract 4226.01	3.8%

Tract 4226.11	4.7%
Tract 5227.03	2.8%
Tract 5228	0.9%
Tract Average	3.5%
Maricopa County	3.6%

Source: U.S. Department of Commerce: Bureau of the Census, 1992. 1990 Census of population and Housing Summary Tape File 3A for Arizona and Utah.

Female Head of Household

The 1990 Census data indicate the percentage of female head of households within the total tract are fewer than that of Maricopa County (Table 2-7). Female head of households comprise 6.3% of the total tracts' population, compared to 9.9% for Maricopa County.

TABLE 2-7

Percentage of Female Head of Households for the Ellsworth Road Corridor Tracts, 1990

Area	Female Household (%)
Tract 4226.01	6.2%
Tract 4226.11	6.6%
	7.0%
Tract 5227.03	
Tract 5228	1.7%
Tract Average	6.3%
Maricopa County	9.9%

Source: U.S. Department of Commerce: Bureau of the Census, 1992. 1990 Census of population and Housing Summary Tape File 3A for Arizona and Utah.

Summary of Socioeconomics

The project area is located in lands primarily under the jurisdiction of the City of Mesa. Land uses are predominately limited to industrial, single family residential, and agricultural. In general, the percentage of minority, elderly, low income, disabled, and female head of household populations within the project area are comparable with the general population of Maricopa County (Table 2-8). Hispanic (16.4%) and elderly (21.3%) populations represent the highest percentages of protected populations in the project area. The 1990 Census data for the project area indicate future roadway improvement projects along Ellsworth Road would not have disproportionately high or adverse effects on Hispanic and elderly population in the project area. No protected populations are represented by 50% or more. It is not anticipated there would be any disproportionately adverse impacts created by the proposed project. A spreadsheet showing the supporting statistics is in Appendix B.

TABLE 2-8

Summary of Title VI/Environmental Justice for the Ellsworth Road Corridor Tracts, 1990 (Mean Percentage)

Area	Minority		Elderly	Low Income	Mobility Disability	Female Household (%)
	Race	Hispanics				
Tract Total	13.2%	16.4%	21.3%	8.7%	3.5%	6.3%
Maricopa County	15.1%	16.0%	15.5%	10.3%	3.6%	9.9%

Source: U.S. Department of Commerce: Bureau of the Census, 1992. 1990 Census of population and Housing Summary Tape File 3A for Arizona and Utah.

Physical and Natural Environment

This section describes the existing physical and natural environment within the project area in terms of topography/physiology, vegetation, wildlife, sensitive species, water resources/wetlands, visual character, noise and air quality, and hazardous materials. The inventory of the physical and natural environment of the project area consisted of gathering resource data and information from various local, state, and federal regulatory agencies having jurisdiction within the project area. These agencies include the Arizona Department of Environmental Quality (ADEQ), ADOT, Arizona Game and Fish Department (AGFD), the Arizona State Museum, the State Historic Preservation Office (SHPO), US Fish and Wildlife Service (USFWS), and the FCDMC. The characteristics of the physical and natural environment were also identified based on a windshield survey of the project area.

Topography/Physiology

The project area is located within the Basin and Range Province of central Arizona (Figure 2-5). The entire corridor area is characterized by relatively flat slopes of less than two percent. The terrain gently slopes from approximately 1,450 ft on the northern end to 1,401 ft above mean sea level at the southern end.

Geologic conditions in the corridor consist of sedimentary rocks composed of sand, gravel, and conglomerate. Land subsidence has occurred in the area, varying from 1 to 5 ft in some areas due to excessive, past groundwater pumping activities. Land subsidence has lessened with the use of Central Arizona Project water to meet irrigation needs. The area is not in a geologic or seismic hazard area according to the Arizona Department of Mines.

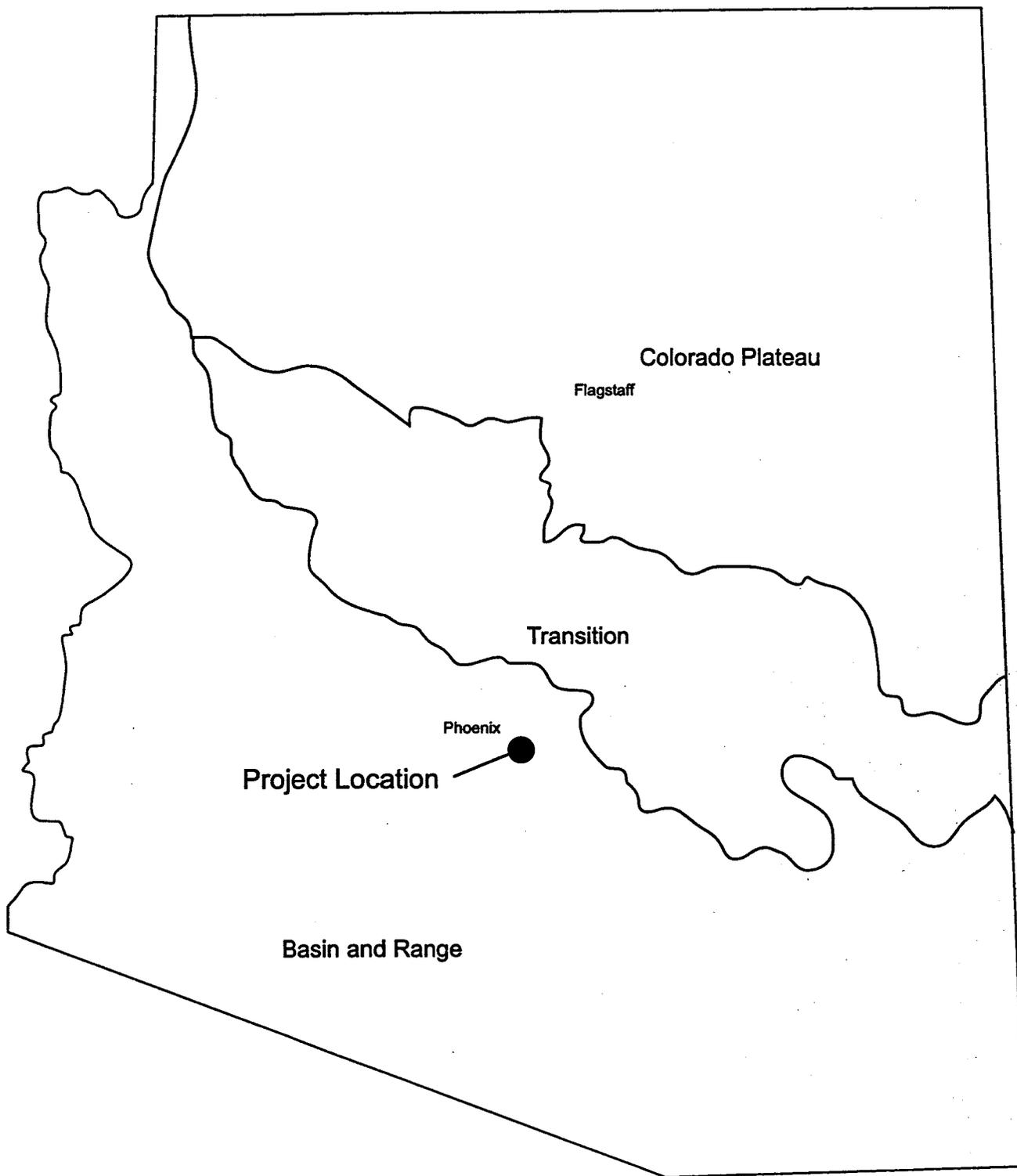


Figure 2-5. Physiographic Regions of Arizona

Ellsworth Road (Germann Road to Baseline Road)



The drainage pattern of the corridor is generally from the northeast to the southwest. Soils in the corridor primarily consist of the Gillman-Estrella-Avondale Association. This soil association has characteristics of well-drained soils, nearly level loams, and clay loams on alluvial fans and floodplains.

Biotic Communities

The majority of lands in the corridor are either developed or graded for agricultural fields. Undeveloped natural desert areas exhibit vegetative characteristics of the Lower Colorado subdivision, Cresote-Bursage Community of the Sonoran Desertscrub vegetative zone. This vegetative community includes various species of acacia (*Acacia* spp.), agave (*Agave* spp.), bursage (*Ambrosia* spp.), barrel cactus (*Ferocactus* spp.), ocotillo (*Fouquieria* spp.), cholla (*Opuntia* spp.), and mesquite (*Prosopis* spp.).

Wildlife

Habitats typical of the Sonoran Desertscrub community support numerous smaller mammals, birds, and reptiles. Wildlife habitats and populations are limited in agricultural areas, and mostly consist of birds and small animals. Species include doves, woodpeckers, and field mice. Common species occurring in the undeveloped natural desert areas include the black-tailed jack rabbit (*Lepus californicus*), coyote (*Canis latrans*), javelina (*Dicotyles tajacu*), round-tailed ground squirrel (*Spermophilus tereticaudus*), pocket mouse (*Perognathus hemionus crooki*), Inca dove (*Scardafella inca*), Gambels quail (*Lophortyx gambeli*), cactus wren (*Campylorhynchus brunneicapillus*), Harris hawk (*Parabuteo unicinctus*), western diamondback rattlesnake (*Crotalus atrox*), and southern desert horned lizard (*Phrynosoma platyhinus calidiarum*).

Sensitive Species and Habitat

A list of special Status Species (Federally-listed Threatened or Endangered, and State-listed Wildlife of Special Concern in Arizona (WSC)) that may occur within the project area was prepared from information provided by the AGFD and the USFWS. Letters from these agencies are provided in Appendix B.

The AGFD's Heritage Data Management System records show one WSC, the Sonoran desert tortoise (*Gopherus agassizii*), as potentially occurring within the vicinity of the project area. However, further conversation with AGFD personnel indicates the species, or suitable habitat, do not occur within the project area limits.

The USFWS indicates there are no endangered, threatened, or candidate species potentially occurring in the corridor. In addition, there is no critical habitat located within the project limits.

Water Resources

Water resource issues include the identification of wetlands, US Army Corps of Engineers (COE) regulatory jurisdictions, sole-source aquifers, and unique waters. There are no sole-source aquifers or unique waters within the project area. Wetlands are areas that are periodically or permanently inundated by surface or groundwater, and support vegetation adapted for life in saturated soil. Wetland determination is made based on soil, hydrology, and vegetation. Wetlands generally include swamps, marshes, bogs, and similar areas.

All natural washes and drainages are considered jurisdictional "Waters of the U.S.," and activities within these areas are regulated by the COE as promulgated by the Clean Water Act

of 1977. Any activity that discharges dredged or fill material into the designated jurisdictional areas will require a Section 404 permit. Correspondence with the COE indicates that several unnamed crossings that traverse the corridor may require 404 permits. A preliminary delineation of jurisdictional waters within the project area has been completed and submitted to the COE for final delineation (Figure 2-6).

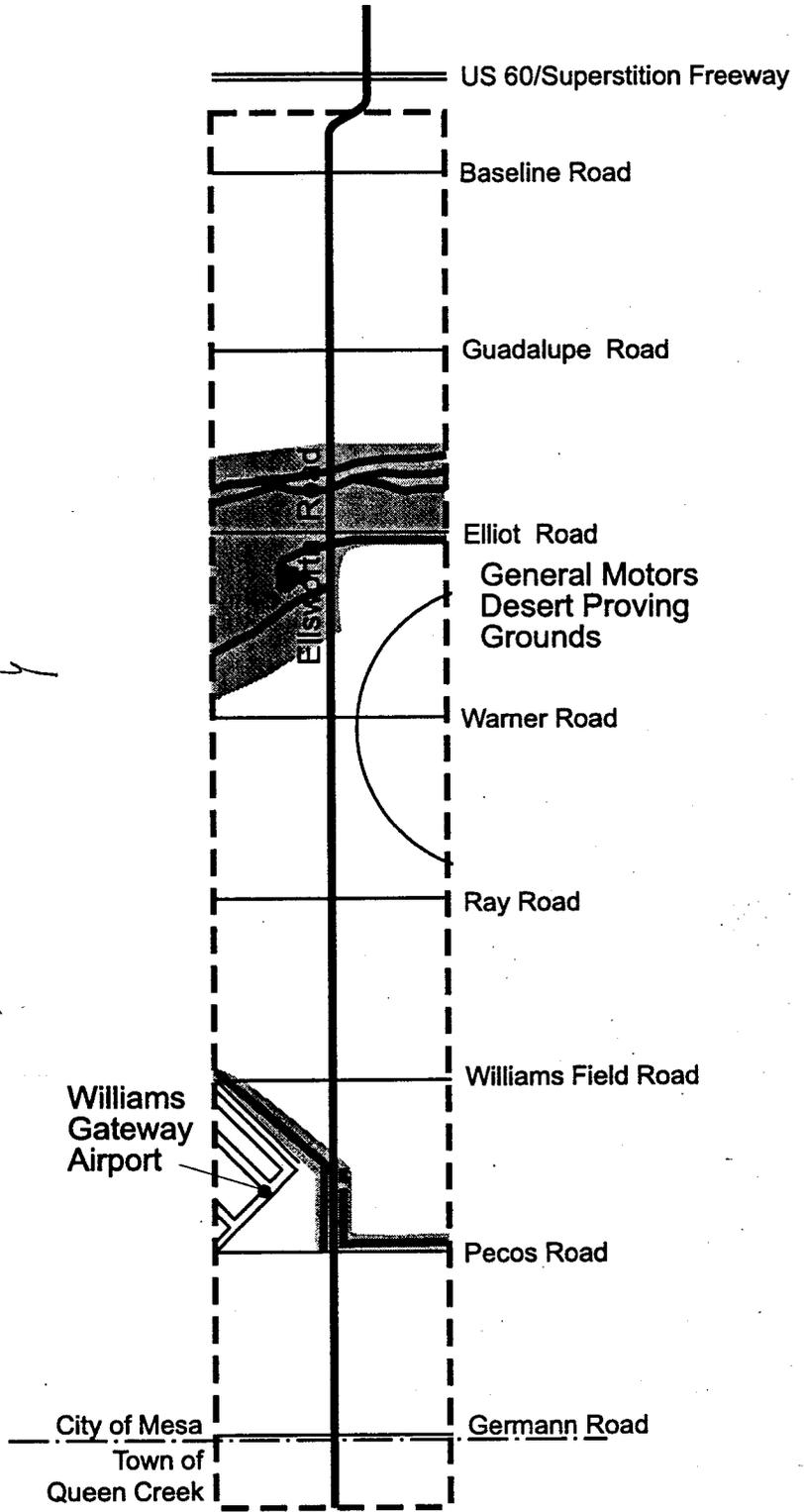
Visual Character

The visual character of the project area is, in general, typified by urban/agricultural and natural areas. Due to the low topographic relief, views from the project area are expansive to distant mountain ranges and landforms including the Superstition, Utery, and Santan mountains. Views of natural landforms and native vegetation are interspersed with built facilities and improvements, such as WGA and the developing areas of north Mesa. Agricultural areas, with their varied crops, contrast with the urban/developed and natural areas providing a change in form, color, and texture within the immediate view area of the corridor. The green hues of the agricultural lands contrast with the grey-green grasses, shrubs, and trees of the native desert scrub. The locations of BLM-managed lands are illustrated on Figure 2-1: Jurisdiction. The BLM's standardized system for managing visual resources within their jurisdiction is known as the Visual Resource Management (VRM) system. The objective of this system is to classify visual resources according to their inherent scenic quality, and to develop management objectives for the visual environment. BLM management classes are ranked on a I (preservation) to V (rehabilitation) scale, where these classes describe the different degrees of modification allowed in the visual environment. BLM land within the corridor is located in the southeast corner of WGA, and is identified as a Class V resource. This classification is applied to areas where the natural character of the landscape has been disturbed to a point where rehabilitation is needed to bring it up to one of the four other classifications.

Air Quality

A nonattainment area is an area that exceeds any national ambient air quality standard (NAAQS) for any air pollutant. Nonattainment areas recognized in Arizona include areas that exceed NAAQS for carbon monoxide (CO), particulate matter less than or equal to 10 microns in diameter (PM₁₀), and ozone (O₃). PM₁₀ is composed of a wide range of liquid and solid particles of various sizes and chemical composition, and are of concern due to the potential adverse health effects of breathing particulates of this size. O₃ is composed of photochemical oxidants formed through a series of reactions involving hydrocarbons and nitrogen oxides in the presence of sunlight. High concentrations of ozone are common in the Phoenix area during the summer.

Appears they missed some



KEY:

-  Jurisdictional Waters
-  Boundary of Jurisdictional Delineation
-  Project Area

Figure 2-6. Jurisdictional Waters

Ellsworth Road (Germann Road to Baseline Road)



The entire corridor lies within the Maricopa County nonattainment area for O₃, CO, and PM₁₀. The ADEQ Air Quality Division has determined that levels of air pollutants for CO and O₃ within the project area are considered above the federal 8-hour standards. This condition is due to the existing land uses in the corridor, rural character, vacant land, and agriculture lands. National standards for PM₁₀ also are exceeded, with road dust and agricultural activities contributing significantly to PM₁₀ levels in the project area. CO is the pollutant of main concern on a project-level basis because of its potential hazard to public health at excessive concentrations. To abate PM₁₀ concerns associated with the construction phase of the project, water will be used to control dust pollution in accordance with Maricopa County standards (Rule 310 Fugitive Dust Ordinance). When specific roadway projects are identified that require NEPA documentation, the ambient air quality for the specific project area may need to be evaluated for state and NAAQS compliance.

Noise

MCDOT, while not mandated by federal regulations to mitigate noise for projects that are not federally funded, will employ guidelines that determine the need, feasibility, and reasonableness of noise abatement measures. The Federal Highway Administration (FHWA) has adopted Noise Abatement Criteria (NAC) that establish acceptable hourly, A-weighted noise levels for various land use activity categories (A-weighting emphasizes certain frequencies to approximate how sound is perceived by human hearing). The FHWA's NAC emphasize traffic-generated noise, and are intended to serve as guidelines for determining traffic noise impacts and the need for mitigation. FHWA NAC are shown in Table 2-9.

TABLE 2-9
FHWA Noise Abatement Criteria

Activity Category	Description	Leq(h)
A	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.	57 dBA
B	Residences, schools, parks, churches, libraries, hospitals, motels, and hotels.	67 dBA
C	Developed lands not included in categories A or B, above.	72 dBA

Source: - Code of Federal Regulations, Title 23, Part 772

There are two noise category types found within the project area. Category B includes residential-type land uses, such as single family homes. Category C activities relate to commercial businesses and other less noise-sensitive areas with land uses such as commercial and light industrial, and noise generated by aircraft from WGA. Based on the Williams Regional Planning Study (November, 1995), noise contours crossing the central portion of the corridor are in excess of 75 dBA Leq.

According to FHWA procedures, noise impacts occur if the anticipated sound levels for the project meet or exceed the thresholds for each of the land use categories or approach 67 dBA Leq for Category B type land uses. These levels are typically applied to exterior areas of buildings where lowered noise levels would be of benefit. Traffic noise impacts also occur when the predicted traffic noise levels substantially exceed the existing noise level (15 dBA Leq or more). Existing noise quality data is not currently available for the corridor. During

subsequent environmental documentation activities for specific projects along the Ellsworth Road corridor, ambient noise levels may need to be monitored at specific locations within the project area. The future noise quality for the project area may need to be evaluated against the existing noise data to meet federal regulations for noise abatement.

Prime/Unique Farmland

Prime farmlands are those whose values derive from their general advantage as cropland resulting from climatic, soil, and water conditions. Prime farmlands, as defined by the U.S. Natural Resource Conservation Service (NRCS), are lands that have the best combination of physical and chemical characteristics to produce food, feed, forage, and oil seed crops, and are also available for these uses.

Unique farmlands are lands whose values derive from their particular advantage for specialty crops due to climate, soil, and water conditions. Unique farmland has a special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality, and/or high yields of specific crops when treated and managed according to modern farming methods.

All of the agricultural lands within the corridor are prime farmlands according to the NRCS. Exemption from the Farmland Protection Policy Act is allowed for lands, which are already in or committed to urban development. The Ellsworth Road corridor is currently planned for urban development according to the City of Mesa and Maricopa County adopted General Plans. Determination of exemption from requirements of the Farmland Protection Policy Act, as revised in 1994, will be made by the NRCS.

Hazardous Materials

Hazardous materials are regulated by the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The ADEQ implements CERCLA, commonly known as Superfund, and its amendment, the Superfund Amendments and Reauthorization Act (SARA) of 1986. The inherent environmental concerns associated with hazardous materials and solid waste landfills require a preliminary investigation into the location of permitted and nonregulated hazardous material sites and solid waste facilities within the project area (Figure 2-7).

In August 1998, the following were reviewed for evidence of hazardous materials within the project area:

- National Priority List (NPL)
 - Remedial Projects Section Information Packet (formerly called Superfund and WQARF Priorities List)
 - Resource Conservation and Recovery Information System (RCRIS) database and Compliance Log
 - Arizona CERCLA Information and Data System (ACIDS) List
 - ADEQ Drywell Registration list
 - ADEQ Hazardous Materials Incident Logbook
 - Arizona Directory of Active/Inactive Landfills and Closed Solid Waste Landfills

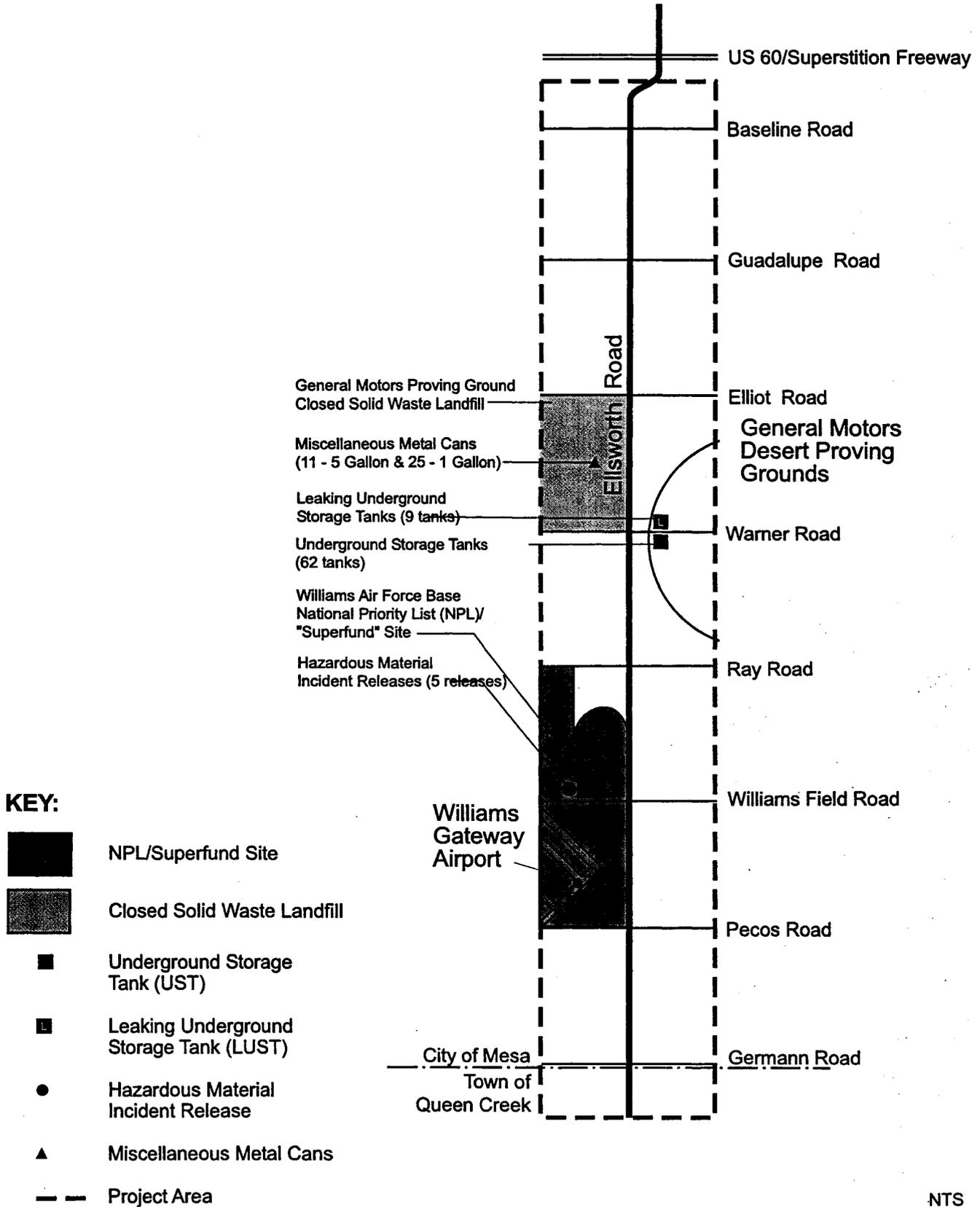


Figure 2-7. Hazardous Materials

Ellsworth Road (Germann Road to Baseline Road)

Based on the review, WGA is on the NPL as a Superfund site. Investigative efforts to date have identified Volatile Organic Compounds, heavy metals, and petroleum products in the soil and groundwater. A fuel leak at the liquid fuels storage area is the largest leak, and is currently at the final design stage for a pump and treatment system for affected groundwater. Further investigative and remedial efforts are planned for WGA as part of the overall airbase closure requirements. In addition, five hazardous material incident releases have occurred within the airport boundaries. Several metal cans containing paint or other materials were noted along the western edge of Ellsworth Road between Elliot and Warner Roads, namely, 11 five-gallon and 25 one-gallon cans.

Record searches identified a closed, solid waste landfill located just west of the intersection of Elliot and Ellsworth roads. The landfill has been operated and closed by the GM Desert Proving Ground facility. Additionally, approximately 62 underground storage tanks are associated with the facility, nine of which are leaking. Specific case files were not reviewed as part of this preliminary assessment.

Summary of Physical and Natural Environmental Considerations

The AGFD indicates the Arizona special status species, Sonoran desert tortoise (*Gopherus agassizii*), is not present nor has a potential habitat within the project area. The USFWS indicates there are no endangered, threatened, or candidate species, or designated critical habitat within the project limits. Jurisdictional "Waters of the U.S." that traverse the corridor may require COE 404 permits. To preserve the visual environment, future corridor improvements should implement measures to ensure that impacts to the existing visual resources are minimized. Potential air and noise impacts are concerns that may need to be evaluated on a project-specific scale. No unique farmland exists within the corridor, though all lands not committed to urban development are classified as prime farmland. Based on the available data gathered and reviewed, WGA is on the NPL as a Superfund site. Additionally, five hazardous material incident releases have occurred within the airport boundaries. Several metal cans containing paint or other materials were noted along the western edge of Ellsworth Road between Elliot and Warner roads. Other hazardous material concerns include a closed solid waste landfill, and 62 underground storage tanks, of which nine are leaking, that are associated with GM Desert Proving Grounds. Future studies for the corridor will require additional efforts to determine if project-specific impacts are associated with these issues.

Cultural Resources

In compliance with the National Historic Preservation Act of 1966 (16 U.S.C. 470f) and the Advisory Council Regulations: Protection of Historic Properties (36 C.F.R. 800), historic properties must be evaluated to ensure adequate protection of cultural resources. Historic properties include prehistoric and historic districts, sites, buildings, structures, or objects included in, or eligible for inclusion in the National Register of Historic Places (NRHP). Historic properties may be eligible for nomination to the NRHP if they "...possess integrity of location, design, setting, materials, workmanship, feeling and association..." and if these resources are associated with either (a) significant themes in our nation's history, or (b) significant persons in our nation's history, or if they (c) embody distinctive construction characteristics or works of a master, or (d) have the potential to yield information important to history or prehistory (36 CFR 60.4). A further breakdown of NRHP criteria is given in the Appendix B.

Prior to this project, approximately 20% of the project area had been surveyed, primarily with block surveys (Figure 2-8). The areas with the highest known site density occur along Ellsworth Road in the southern portion of the project area. From Germann Road extending north to Ray Road, a number of Hohokam habitation sites have been previously recorded in the vicinity of Williams Air Force Base. There is moderate to high probability that other Hohokam village/habitation sites and more ephemeral, temporary activity or camp sites are present in the project area. Additional survey work was warranted and summarized below.

In September 1998, a Class III Cultural Resource Survey was undertaken for the project area. The survey boundaries were 300 ft on either side of the Ellsworth Road centerline between Germann and Baseline roads, and excluded inaccessible and previously surveyed lands. Three previously identified sites were discovered and recorded as a result of the survey. The three sites are potentially eligible for inclusion on the NRHP, however, additional archival and archaeological testing is required to make final determinations of their eligibility. Twenty-three isolated occurrences were also located and recorded.

Summary of Inventory

Cultural resource considerations within the project area were identified from information gathered from Arizona State Museum, BLM, General Land Office plats, the SHPO, ADOT, and existing environmental studies relevant to the project area. In compliance with SHPO Class I Inventory report standards, the Class I inventory of the project area was expanded to encompass a 7-mile-long by 2-mile-wide corridor. Archaeological sites and surveys located outside the project area are not included in this summary. For detailed information on the locations of previous surveys and archeological sites identified outside the project area refer to *Biotic Communities Southwestern United States and Northwestern Mexico* (Brown, 1998).

A range of prehistoric and historic site types have been previously identified within the 1-mile radius of the project area. Sites include four, relatively small, sparse ceramic and lithic scatters that likely represent short-term processing loci, or ephemeral camps; two known village sites (*Pozos de Sonoqui* and *Ritten House Ruin*) and other surface artifact concentrations that have a moderate to high probability of containing subsurface cultural materials (*e.g.* rooms). Historic archaeological sites previously identified in the vicinity of the project area include: homesteads, pumps, wells, and historic roads. No historic districts listed on, or eligible for listing on, the NRHP are located within the project area. There is moderate to high probability that other Hohokam villages and moderately dense procurement sites are present in the project area.

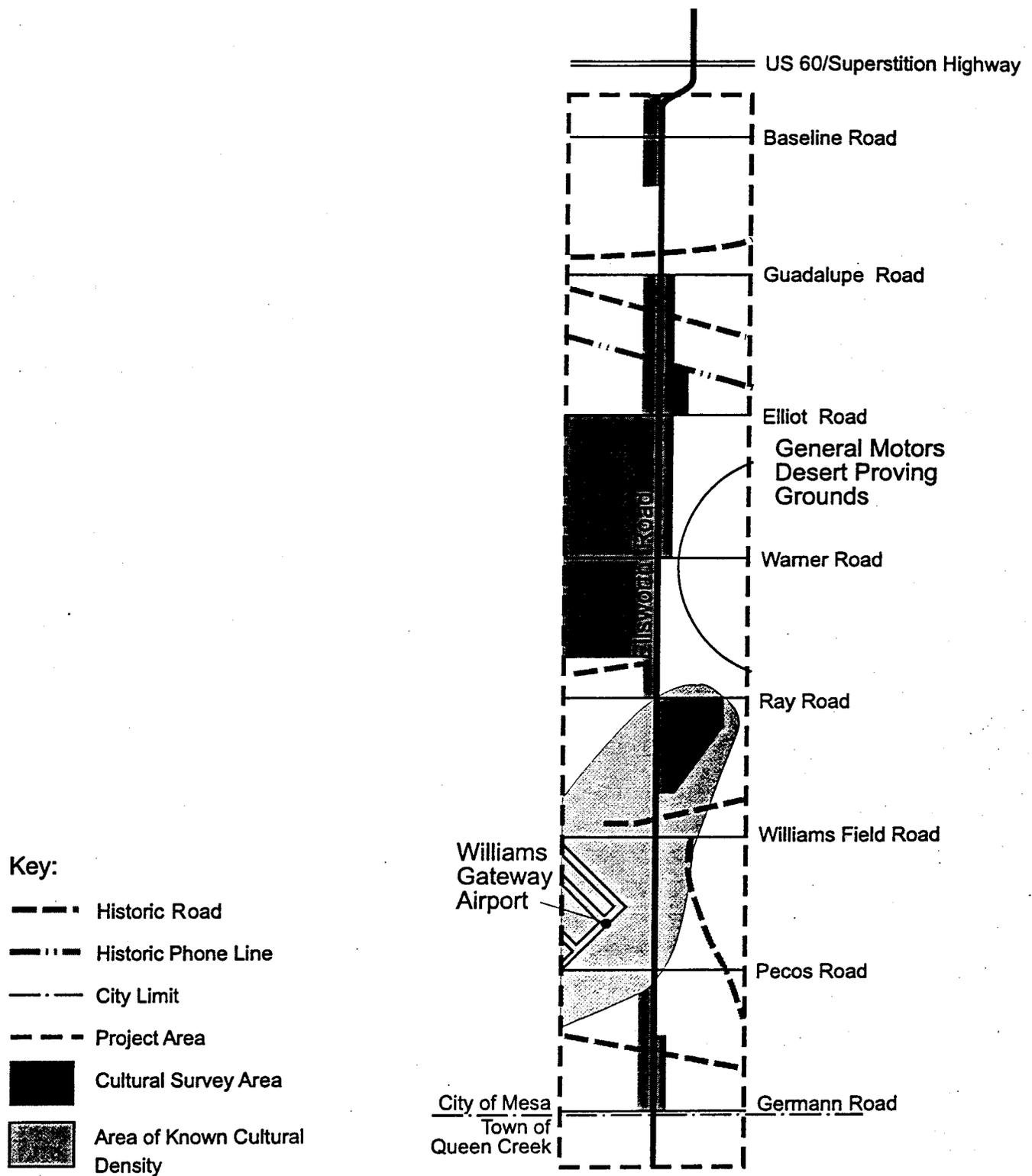


Figure 2-8. Cultural Resources

Ellsworth Road (Germann Road to Baseline Road)



Results of Class III Survey

If archaeological sites are identified within the corridor, the SHPO must be consulted to determine whether the sites are eligible for listing on the NRHP. To determine the eligibility of sites with moderately dense to dense concentrations of surface cultural materials, testing and data recovery may be required. If the sites are eligible for listing on the NRHP, avoidance will be recommended. If a site is eligible for listing on the NRHP under criterion "d," the adverse effects of future development may be mitigated through the excavation and recording of the site.

Section 4(f) Properties

If federal funding is used to construct future projects, any impacts to 4(f) properties in the project area would need to be identified. Section 4(f) of the Department of Transportation Act of 1966 (49 U.S.C. 303) stipulates that the FHWA may not approve the use of land from a significant publicly owned park, recreation area, or wildlife and waterfowl refuges, or any significant historic site that is either listed on, or eligible for listing on, the NRHP under criteria "a," "b," or "c." Public schools are designated as 4(f) properties if public access to and use of sports facilities (e.g., baseball diamonds, tracks) on these properties is permitted. No historic properties eligible for NRHP listing under criteria "a," "b," or "c" are located within the project area. There are no known 4(f) properties within the project area.

Drainage Patterns

The natural drainage has two general flow patterns that affect the corridor. In the central and southern portion of the corridor, from Ray Road to Germann Road, drainage flows from east to west, and south to north. In the northern half of the corridor, from Elliot Road to Ray Road, drainage flows from east to west, and north to south along existing roadways and in channels. Ellsworth Road is subject to periodic flooding as a result of drainage crossings and the inverted crown from Elliot to Germann.

Existing Drainage Features

The existing drainage facilities along Ellsworth include:

- Roadside swales and numerous dip sections that in some cases have low flow culverts
- Concrete box culvert (CBC) crossings for Siphon Draw Wash and Powerline Floodway

A detailed assessment of the existing culverts, pipes, and drainage facilities is tabulated in Table 2-10: Existing Drainage Facilities.

AKS
NEPA

TABLE 2-10

Existing Drainage Facilities

Location	Drainage Facility	Purpose
Germann Road	A pipe culvert and headwall across Ellsworth Road	To drain south side of Germann from east of Ellsworth to the west side
South of Ray Road to south of Williams Field Alignment	Five wash crossings with paved shoulders and concrete cutoff walls and spillways. One of the washes contains six 3 m x 1.2 m (10' x 4') CBCs	To convey water from breaks in GM's berms to dirt channel west of Ellsworth ROW, to WGA
Ray Road Alignment to Pecos Road	Powerline Floodway – concrete-lined trapezoidal channel 6 m (20') wide with a 1.8 m (6') bottom connected to a 2 m x 4.3 m (6.5' x 14') CBC that crosses Ellsworth Road	To drain GM storm runoff from the east to the west
GM Entrance (Station 12+400)	A pipe of unknown dimension with a concrete box	To intercept runoff on the east shoulder of Ellsworth and convey it west into minor washes
South of Warner Road (Station 11+820)	A 76 cm (30-inch) reinforced concrete pipe	To intercept runoff on the east shoulder of Ellsworth and convey it west into minor washes
North of Warner Road	A double 109 cm x 69 cm (43" x 27") CMPA culvert	To convey stormwater from east shoulder of Ellsworth to north shoulder of Warner Road
Between Elliot Road and Warner Road (Station 10+340 to 11+200)	Seven corrugated metal pipe arch (CMPA) culverts, ranging in size from 109 cm x 69 cm (43" x 27") to 74 cm x 46 cm (29" x 18")	To convey stormwater from the east side of Ellsworth to minor washes to the west

The existing drainage features ultimately convey stormwater to the floodplains; however, in many cases the existing facilities are inadequate. In particular, the drainage facilities that carry runoff from large areas to the Siphon Draw Wash and Powerline Floodway have been identified for improvement by the FCDMC.

Proposed Drainage Improvements

The Southeast Mesa Area Drainage Master Plan (ADMP), was prepared by Dibble & Associates in 1998. The study has two phases. Phase I consisted of the preparation of an alternative analysis of regional drainage facilities and selection of the proposed alternative. Phase II consisted of a preliminary engineering design study and analysis of the preferred alternative. With respect to this DCR, the Southeast Mesa ADMP proposed the following improvements:

1. **Elliot Road Channel/Siphon Draw Wash.** The proposed channel system along Elliot Road includes two retention basins, culverts, and an open channel. The retention basins are located approximately 1/2 mile east of Ellsworth Road, north of Elliot Road. The channel is along the south side of Elliot Road and extending west under Ellsworth Road and outletting into Siphon Draw Wash. Ultimately, the channel is planned to connect with the Santa Freeway drainage system. The Elliot Road Channel is currently under design for FCDMC.

The channel is intended to be an earth channel, which requires a relatively wide drainage easement within the GM Desert Proving Ground facilities. Alternatively, a double barrel conduit is being considered in lieu of the open channel due to the ROW and physical constraints. GM is presently in discussion with FCDMC regarding this issue.

West of Ellsworth Road, Siphon Draw Wash is a broad shallow floodplain that is not well defined. Therefore, the proposed culvert at Ellsworth Road will require a spreader channel. The spreader channel redistributes concentrated flow from the culvert to the natural floodplain. The spreader channel is likely to be temporary since future downstream improvements with the Santan drainage system may eliminate its need. The spreader channel will require a drainage easement from the Arizona State Land Department.

2. **Pecos Road Channel.** The channel system along Pecos Road is proposed along the south edge of GM Desert Proving Grounds. Like the Elliot Road channel, GM is in discussion with FCDMC regarding ROW needs. The Channel is planned to route stormwater from a proposed retention basin at Pecos and Meridian Roads to the Ellsworth Road Channel (discussion below) and ultimately to the Powerline Floodway. The channel is planned to be an earth channel.

3. **Ellsworth Road Channel.** The Ellsworth Road drainage channel extends from Germann Road to the Powerline Floodway, adjacent to Ellsworth Road. The ADMP presented the channel as being along the east side of Ellsworth Road to intercept storm runoff from the east. The east side alignment would require ROW from GM. Approximately 1 mile north of Pecos Road, the channel turns northwesterly to a confluence with the Powerline Floodway. The alignment is through WGA property.

Inasmuch as the Ellsworth Road Channel is integral to this DCR, further discussions regarding its alignment and configuration are presented in subsequent sections.

Powerline Floodway Modification. The slopes indicated in the ADMP for channel segments north of WGA and east of Ellsworth Road are 0.0002 ft/ft and 0.0007 ft/ft, respectively. The slopes for these channel segments are currently controlled by the flow line elevations in the Powerline Floodway. If necessary, modifications to the Powerline Floodway could be made to improve the grades in the channels. Downstream of the confluence with WGA's North Perimeter Channel, the Powerline Floodway becomes an earthen lined channel with concrete drop structures. The drop structures are approximately 1 m (3 ft) high and approximately 366 m (1,200 ft) to 610 m (2,000 ft) apart. Improvements to the Powerline Floodway, including the removal of one or more of the existing drop structures, could result in lowering the invert of the Powerline Floodway approximately 0.6 m (2 ft) to 1.2 m (4 ft) at the confluence with the proposed channel.

Existing Right-of-Way

Existing ROW information was obtained from Maricopa County assessor maps. ROW widths along Ellsworth Road vary, and are measured from the section line. The existing ROW is shown in the accompanying strip maps, and is summarized on a mile-to-mile basis in Table 2-11: Existing Ellsworth Road Right-of-way.

TABLE 2-11

Existing Ellsworth Road Right-of-way

Mile Sections	West of Section Line	East of Section Line
Germann Road to Pecos Road	15.2 meters (50 ft)	15.2 meters (50 ft)
Pecos Road to Williams Field Alignment	10 to 15.2 meters ² (33 to 50 ft)	16.8 meters + 3 meters (55 ft + 10 ft)
Williams Field Alignment to Ray Road	10 to 16.8 meters ² (33 to 55 ft)	16.8 to 19.8 meters ² + 33 meters ¹ (55 to 65 ft + 10 ft)
Ray Road to Warner Road	15.2 to 19.8 meters (50 to 65 ft)	15.2 Meters + 3 meters ¹ (50 ft + 10 ft)
Warner Road to Elliot Road	none recorded	15.2 meters + 3 meters ¹ (50 ft + 10 ft)
Elliot Road to Guadalupe Road	12.2 + 4.6 meters (40 ft + 15 ft)	12.2 meters + 3 meters (40 ft + 10 ft)
Guadalupe Road to Baseline Road	16.8 meters (55 ft)	16.8 meters (55 ft)

¹Strip annexed by the City of Mesa in 1979.

²Annexed by the City of Mesa in 1985.

In October of 1979, the City of Mesa annexed a 3 m (10 ft) strip of property between the existing ROW and GM property on the east side of Ellsworth Road from Pecos Road to Elliot Road. In addition, the City of Mesa annexed the entire ROW from 76.2 m (250 ft) south of Pecos Road to Ray Road. This was done in January 1985 and January 1990 with two ordinances. The January 1990 annexation included the 76.2 m (250 ft)-long ROW segment south of Pecos Road. The annexations extend the City of Mesa's corporate limits to include the adjacent properties.

Utilities

Both overhead and underground utilities are located along Ellsworth Road. The recorded locations of the utilities are depicted in the plans contained in Volume II of this report. Table 2-12: Utilities Along Ellsworth Road catalogues the existing and proposed utilities and their respective location in relation to the existing centerline. Plans and maps obtained from utility companies were used to determine the location and size; however, not all of the information was available and some interpretation was necessary. Thus, blue stakes and further coordination with utility companies is highly recommended for final design. In addition, developers may have installed laterals and/or mains in undeveloped areas along Ellsworth Road to service their development.

TABLE 2-12

Utilities Along Ellsworth Road

Utility	General Location in Relation to Ellsworth Centerline
City of Mesa 25 cm (10-inch) force main	Pecos to Elliot, east
City of Mesa 41 cm (16-inch) water line	Elliot to Guadalupe, east Pecos to Elliot, east
City of Mesa 20 cm (8-inch) abandoned water line	Elliot to Guadalupe, east GM entrance to Elliot, east
US West fiber optic	Warner to Elliot, west
SRP 12 KV overhead power	Elliot to Guadalupe, west Ray to Elliot, west Germann to N of Germann, west
Proposed SRP 69 KV overhead power	Warner to Elliot, west
SRP buried power	Germann to Pecos, east
Southwest Gas 5 cm (2-inch) gas line	Germann to GM entrance, east
US West buried telephone lines	Elliot to Baseline, west GM entrance to Warner, west (3 lines) Pecos to GM entrance, west (1 line) 400 m (1/4 mile) south of Pecos, west (2 lines)

Construction History

Ellsworth Road was initially paved in the 1960s. MCDOT records indicate that 5 cm (2 in) of asphalt concrete was placed. In 1995, MCDOT overlaid the pavement from Ray Road to Elliot with 3.8 cm (1.5 in) of asphalt rubber. The City of Mesa chip sealed from Germann Road to Ray Road in 1995. MCDOT has a funded project to widen Ellsworth Road in the year 2000, from 2 to 5 lanes between Germann Road and Baseline Road.

Existing Roadway

According to the MCDOT *Roadway Design Manual* (November 1993) typical section standards, the existing Ellsworth Road is a rural, local road. It provides access to the Town of Queen Creek, the industrial center north of Pecos Road, and agricultural areas along the roadway.

Cross Sections

Currently, Ellsworth Road is a 2-lane, 8.5 m (28 ft)-wide road except at the following locations:

- The intersection of Germann Road and Ellsworth Road (station 17+900 to 18+200) where a left turn lane has been added yielding a 12.2 m (40 ft)-wide road
- The intersection of Pecos Road and Ellsworth Road (station 16+200 to 16+600) where a left turn lane has been added yielding a 12.2 m (40 ft) wide road

- The GM entrances (station 12+200 to 13+200) where Ellsworth widens to three lanes yielding a 12.2 m (40 ft) wide road

Ellsworth Road has a normal crown with the exception of the section between Germann Road and Ray Road Alignment, which was built with an inverted crown for drainage purposes.

Horizontal Alignment

Ellsworth Road is a relatively straight road with no sharp horizontal curves. There are four noticeable yet fairly flat curves with degrees of curvature between $\frac{1}{2}$ to 2. The horizontal curves occur at the following approximate locations: just north of Williams Field Road, and about half a mile north of Pecos Road.

Vertical Alignment

As discussed in the topography section, Ellsworth Road is a relatively flat road that slopes. At Baseline Road the roadway begins at an approximate elevation of 440 m (1444 ft) and slopes downward to Elliot Road at elevation 428 m (1405 ft). Improvements, which are currently being constructed along Ellsworth road, provide several vertical curves that act as concentration points for roadway drainage. From Elliot Road in a southbound direction, the roadway elevation begins at approximately 428 m (1405 ft) above mean sea level and gradually slopes down to 422 m (1385 ft) just north of the Williams Field alignment. It continues at an elevation of 422 m (1385 ft) to south of Pecos Road. After Pecos Road, the roadway elevation gradually increases to roughly 428 m (1405 ft) at Ocotillo Road. From Elliot Road to Pecos Road, seven vertical dips occur along the roadway; five occur at wash crossings near Williams Field alignment, one occurs just north of Elliot Road, one occurs just south of Elliot Road, and one occurs just south of Warner Road at a pipe crossing. The vertical curves generally dip 0.5 to 1.0 m (1.5 to 3.0 ft) yielding vertical grades between 0.7 percent and 1.5 percent. In addition to the seven depressions, there is one crest vertical curve, with approach grades of 0.6 percent that raises the roadway approximately 0.6 m over a culvert structure at the Ray Road alignment

Airport Clear Zone

The Airport Master Plan for WGA includes extending Runway 30R by 168 m (550 ft), and upgrading it from a non-precision approach (34:1 glide slope) to a precision approach (50:1 glide slope). According to FAA regulations, public roadways (non-interstate) must be at least 4.6 m (15 ft) below the glide slope. However, it is understood that the FAA may allow a variance of this requirement of up to 0.91 m (3 ft). Preliminary planning suggests that the existing Ellsworth Road is 0.7 m (2.8 ft) in violation of the 4.6 m (15 ft) clear distance. The impact to the clear zone is on the north side of the glide slope, north of Pecos Road. Precise location of the road with respect to the proposed glide slope as well as addition of traffic signals and street lights will require study during design.

Intersections/Access

There are seven major intersections, three minor intersections, and three industrial access points along existing Ellsworth Road. The major intersections are located on section lines and are depicted in the traffic analysis section. The three minor intersections are South Lansing, E. Neville Avenue, and Portobello Avenue. These minor intersections are being constructed between Elliot Road and Baseline Road by developers. The three industrial access points that provide entry into the GM Desert Proving Grounds are located between Warner Road and the Ray Road alignment.

Traffic Analysis

Existing Traffic Conditions

Ellsworth Road is currently a two-lane roadway with posted speeds of 90 kph (55 mph) along the GM Desert Proving Grounds. For the Town of Queen Creek and the businesses along the corridor, the roadway is the primary connection to the Superstition Freeway.

Intersections along the corridor are generally controlled with two-way stops, allowing Ellsworth Road traffic to proceed without stopping. The exceptions are at Germann Road, where a four-way stop is provided, and at Baseline Road, where a traffic signal is provided. Current Level-of-service (LOS) at the intersections is acceptable, with most situations providing LOS B.

At the request of the Mesa Chamber of Commerce Transportation Committee, MCDOT conducted a safety and operational analysis review of the Elliot Road intersection in April of 1998. As a result of the analysis, MCDOT has recommended that left turn lanes and associated speed change lanes be added to the Elliot Road intersection. These improvements are expected to have a service life of only 3 years, but are desirable in light of the low improvement cost versus the potential for continued congestion at shift changes and the potential of severe collision. MCDOT's *Elliot Road & Ellsworth Road Safety and Operational Analysis*, dated April 24, 1998, provides additional information.

Shift Changes

As mentioned above, heavy traffic flows occur along Ellsworth Road during business shift changes. The traffic volume between Elliot Road and Warner Road is a direct result of the GM entrance located near Warner Road. The employee shift changes for the industrial center employees are tabulated in Table 2-13.

TABLE 2-13

Shift Times for Industrial Employees

Shifts	GM Desert Proving Ground	TRW Vehicle Safety Systems	Olin Chemicals
AM	6:30 to 7:30	6:00 to 7:00	6:00 to 7:00
PM	3:00 to 4:00	2:00 to 3:00	6:00 to 6:30

Vehicular Mix

A vehicular mix of approximately 4 percent trucks (agricultural and transport) was identified in the Corridor Study, and carried forward to this study.

Accident Characteristics

ADOT traffic accident records for a 5-year period, from May 1992 to December 1997, indicate that there were 142 accidents within the corridor. Four were fatalities and 61 were injury accidents where 112 people were injured. Most of the accidents were with other vehicles (84), and occurred during the day when the road conditions were dry.

Approximately one-half of the accidents were a result of speeding (33) and failure to yield (31); these violations led to angle (33) and rear end collisions (22). Of the 80 accidents that

occurred at intersections, 95% were at three of the intersections: Baseline Road (30), Elliot Road (34), and Germann Road (12). Each of these intersections is targeted for signalization improvements. Additionally, lane arrangements tailored to anticipated traffic demands at each of these intersections are included in Figure 2-9. Individual records of the accident data are voluminous and require a decoding template to read and can be obtained from the Consultant's file, or ADOT.

Base Traffic Data

Base traffic data from the *Williams Area Transportation Plan (WATP)*(March 1997) were used to perform a traffic analysis on the Ellsworth corridor. These base data were derived from a travel demand model created for the Williams Area Transportation Plan by Lima & Associates. The travel demand model was developed using TRANPLAN software and trip generation data from the 1995 transportation model created by MAG's Transportation and Planning Office.

Data from two signal warrant studies performed by Maricopa County were used to supplement the TRANPLAN model. The signal warrants were performed at the Elliot and Ellsworth intersection in October 1996 and at the Germann and Ellsworth intersection in April 1994.

Design Hourly Volumes

The TRANPLAN model provides existing and future 24-hour, two-directional traffic volumes, referred to as Annual Daily Traffic (ADT). The traffic numbers required for analysis are the Design Hourly Volume (DHV). To determine the DHV, two factors are used to convert ADT to DHV:

- K factor - Ratio of design hourly volume to ADT
- D factor - Directional split, percentage of design hourly traffic traveling in peak direction

The value of these factors was determined by using the guidelines in Section 2 of the *MCDOT Roadway Design Manual* (November, 1993) and existing traffic data. Higher traffic peaking characteristics have been observed along of the corridor between Elliot Road and Germann Road due to the significant employment generators such as WGA, GM Desert Proving Grounds, TRW Vehicle Safety Systems, Baker Rubber, and Olin Chemicals.

The K factors used are slightly higher than the Maricopa County guidelines to reflect the higher peaking characteristics of the area. The K factors shown in the Table 2-14, were derived from traffic data provided by MCDOT for the Elliot Road and Germann Road signal warrant studies. These higher peaking characteristics are indicative of the industrial land uses existing along the corridor, especially between Germann Road and Elliot Road. Existing companies, such as GM, TRW, and Olin, work in shifts that change at regular intervals creating the higher peaking characteristics. Land use in and around WGA is planned to be industrial-based; therefore, this peaking characteristic is assumed to continue to the 2020 design year.

TABLE 2-14
K Factors for Ellsworth Road

Road Type	AM Peak Hour	PM Peak Hour	MCDOT Guidelines
Local road	15%	20%	15%

Collector road	12%	15%	12%
Arterial road	10%	12%	8%

The directional split recommended in the *MCDOT Roadway Design Manual* is 60 percent; however, traffic data from the two signal warrant studies indicate a higher directional split; therefore, the D factor was raised to 70 percent for this analysis.

Corridor Study Results

The Corridor Study analyzed Ellsworth Road under several traffic conditions. Of particular importance to the volumes and distribution of traffic in the design year is the implementation of the Santan Freeway. The Corridor Study recommended improvements to the Ellsworth Road corridor that would improve the roadway to provide a LOS of 'C' for 2015 traffic generated by new developments and the completion of the Santan Freeway. The resulting facility is a 5-lane roadway with additional lane capacity at intersections. The reader is directed to the Corridor Study for an in-depth discussion of the alternatives investigated, including the no-build condition.

Design Year and Traffic Projections

The year 2020 is the design horizon for the DCR. As discussed above, the design year for the Corridor Study was 2015. Therefore, it was necessary to project traffic volumes out to the year 2020, based on the 2015 volumes presented in the WATP. Additionally, the limits of the DCR were greater than the limits of the Corridor Study. The DCR limits included two additional miles of Ellsworth Road from Baseline Road to Elliot Road. Again, additional data not provided in the WATP was needed. Specifically, ADTs on the east legs of the Baseline Road and the Guadalupe Road intersections needed to be determined.

Socioeconomic growth projections tabulated in the WATP were used as the basis to adjust 2015 ADTs to 2020 levels. Table 3-3 provides anticipated growth rates for population, housing units, and employment in the area that encompasses Ellsworth Road. For the year 2015, the aggregate growth rate of population, housing, and employment is 6%. To project the 2015 ADTs listed in the WATP, this growth rate was assumed to remain constant for 5 years, and 2015 volumes were adjusted by 6%, compounded each year, until the year 2020.

The WATP traffic model provides two traffic projections for the study area. The first traffic model is based on the implementation of the Santan Freeway (Loop 202) by the year 2015, and the second is based on the Santan Freeway not being implemented. As noted previously, the recommended alternative from the Corridor Study was keyed to traffic volumes assuming the Santan Freeway to be in place. The WATP models also focused on traffic generators in the study area (such as the development of WGA) to a greater degree than MAG models. As a result, traffic volumes predicted by the WATP are generally greater than those predicted by MAG. Lacking the ability to modify the WATP model to generate volumes on the east legs of the Baseline Road and Guadalupe Road intersections, MAG volumes for these legs were increased slightly in an effort to mirror the trend of the WATP volumes. After modifying the MAG volumes for 2015, the 6% growth rate per year, to the year 2020 was applied.

Level of Service

As established in the Corridor Study, the desirable intersection and arterial LOS for Ellsworth Road is LOS 'C'. This was based on Section 2.3 of the *MCDOT Roadway Design*

Manual, which states that "Intersection Level of Service 'B' shall be the design objective for retirement communities, and Intersection LOS 'C' shall be the design objective for all other developments." The areas surrounding the Ellsworth Road corridor are not considered retirement communities, therefore, an intersection LOS C is the design objective for intersections along the Ellsworth Road corridor.

Procedure

Once the design hour volumes were determined it was necessary to estimate turning movements to perform an intersection LOS. Microsoft Excel spreadsheets were used to automate the intersection balance procedure. These balances and the resulting turning movements can be found in Appendix C.

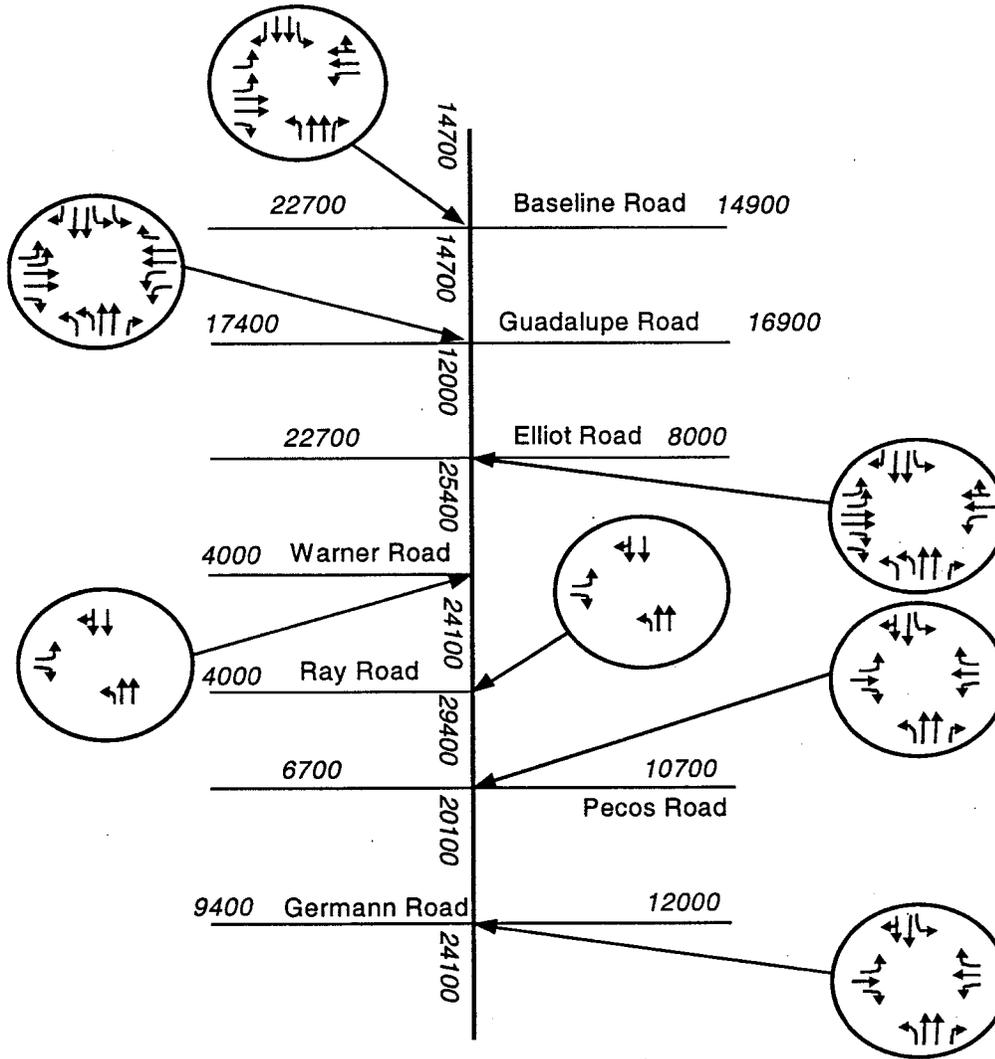
For this analysis, the *Highway Capacity Manual* was used and the LOS was determined by delay. The analysis calculations can also be found in Appendix C.

Results

Intersection LOS analyses for the principal intersections along the Ellsworth corridor were performed using the 2020 traffic volumes projected from the 2015 levels developed in the WATP model. In comparing the 2020 minimum lane requirements to those dictated by the 2015 volumes, it can be concluded that the general trend predicted in the Corridor Study has been validated. As predicted in the Corridor Study, additional lane capacity at the major intersections is required throughout the corridor as a result of the increased traffic volumes in 2020. Figure 2-9 depicts the lane requirements and ADTs for the year 2020. The traffic analysis indicates that two through lanes in each direction will sufficiently carry traffic at LOS 'C', even considering the increase in traffic from 2015 to 2020. However, review of the HCS outputs indicates that the roadway is operating at, or very near, capacity for LOS 'C'. It is anticipated that additional through lanes will eventually be required past the year 2020.

Ellsworth Road Design Concept Report

Germann Road to Baseline Road



2400 24 Hour Traffic Volumes

Intersection Lane Arrangement

Figure 2-9
Minimum Lane Requirements
2020 Traffic with
San Tan Freeway



Recommendation

The recommended lane arrangements for the Ellsworth corridor are reflected in Figure 2-9. The analysis of 2020 traffic is consistent with the findings that were presented in the Corridor Study. Specifically, Ellsworth Road should be widened to two lanes in each direction and provide for future widening to three lanes in each direction. Additional lanes need to be provided at all access and intersection locations to accommodate turning movements. The minimum lane requirements and proposed turning lane configurations have been incorporated into the proposed improvements.

Major Design Features

Basis for Criteria

The Maricopa Association of Governments (MAG) has identified a system of roadways with a 3 to 6 mile spacing that can carry most of the regional traffic. These "Roads of Regional Significance" are a network of arterial streets with a higher design standard than the typical arterial street in the MAG region. Maricopa County Department of Transportation (MCDOT) and MAG consider Ellsworth Road an Urban Road of Regional Significance. For the purpose of this design concept study, a Road of Regional Significance falls within the functional classification of an urban principal arterial roadway as defined in *A Policy on Geometric Design of Highways and Streets*, (American Association of State Highway Traffic Officials-AASHTO).

Two documents identify Ellsworth Road as an Urban Road of Regional Significance, and state the major design criteria to be used:

1. *Roads of Regional Significance Evaluation* (Maricopa Association of Governments, 1996)
2. *Roadway Design Manual* (Maricopa County Department of Transportation, 1993)

Major Roadway Features

Table 3-1 summarizes design concept guidelines used to define Roads of Regional Significance. These major roadway features are consistent with AASHTO guides for urban principal arterials, and considered sound engineering practice.

TABLE 3-1

Urban Roads of Regional Significance	
Number of Lanes	Six (through) Lanes (Ultimate Section)
Right-of-way	140 ft (adopted by MAG 4/29/91)
Lane Separation	Divided with breaks restricted to four per mile
Lane Width	12 ft
Left Turn Lanes	At all locations where left turns are permitted
Right Turn Lanes	At all locations where right turns are permitted
Access	Eight per mile
Traffic Signal	Fully coordinated and progressed; restricted to mile and half-mile locations
Posted Speed	40 mph (minimum)
Parking	Prohibited
Transit	Provide for pullouts and queue hoppers where appropriate
Signing	Uniform upgraded signing
Bicycle Facilities	Bicycle facilities to conform to Arizona Bicycle Facilities Planning and Design Guidelines
Mitigation	Buffering, landscaping and pedestrian paths as warranted

Roadway Design Manual

The MCDOT Roadway Design Manual was used as a guide for the development of Ellsworth Road in the Corridor Study. The Design Manual was written to standardize roadway design elements for consistency throughout the county, and to ensure that minimum requirements are met for safety, welfare, convenience, and the good of the economy. Adopted in November, 1993, the Roadway Design Manual provides additional discussion of design criteria to be used for urban principal arterials. These include:

- Geometric design standards
- Intersections
- Access and access control
- Bicycle facilities
- Landscaping

The Corridor Study presented the typical section for the ultimate 6-lane configuration for Ellsworth Road. It was based on the above criteria for an Urban Road of Regional Significance. Site-specific modifications to the typical section are expected to accommodate intersections, bridge structures, transitions, and special conditions. These special typical sections will be presented with the preferred alternative.

City Of Mesa Design Criteria

The City of Mesa design standards and criteria are documented in:

1. City of Mesa Procedure Manual; Engineering & Design Standards (1990)
2. Mesa Standard Details; Amendment to the Uniform Standard Details (1998)

These design standards and criteria are in accordance with AASHTO guidelines, and generally consistent with MAG standards.

Concurrent with this design concept study, MCDOT and the City are under discussion regarding the relinquishment of Ellsworth Road to the City. The City is requesting that condition of the relinquishment be that their design criteria for arterial streets be used as the standard within the City limits. In general, the City is requesting the ultimate 6-lane section be developed in accordance with City Standards. Figure 3-1 presents the City's Typical Street Section Detail, M-19.1 (City of Mesa Standard Details). Where development adjacent to Ellsworth Road is imminent, a 4-lane section is proposed with the intent that the developer would eventually provide for the ultimate widening.

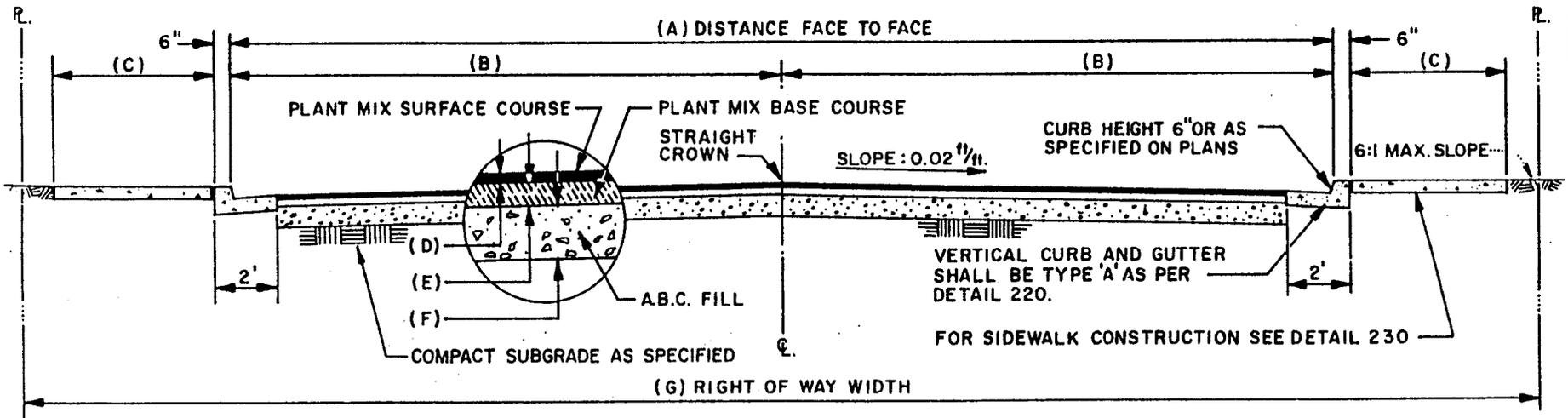
There are some differences between the City's criteria for arterial streets, and MCDOT's criteria for Urban Roads of Regional Significance. Both sets of design criteria are presented in Table 3-2. Also presented in the table is the resolution for the criteria to be used for the Ellsworth Road section if the City takes it over. The resolution comments are based on discussions between the City and MCDOT in an agency coordination meeting held on July 13, 1998.

NOTES

1. ALL STREETS TO BE CONSTRUCTED WITH A STRAIGHT CROWN OF 0.02 $\frac{1}{4}$ "/ft.
2. WHERE 10" A.B.C. IS REQUIRED, IT IS TO BE INSTALLED IN (2) TWO EQUAL LAYERS.
3. A.B.C. FILL TO CONFORM TO SUB-SECTION 702.2 (AGGREGATE BASE).
4. ASPHALT CONCRETE SHALL CONFORM TO THE EAST VALLEY ASPHALT CRITERIA, 1996 EDITION, AND BE APPROVED BY THE EVA COMMITTEE.
5. SIDEWALK MAY BE DELETED IN HEAVY INDUSTRIAL AREAS WITH APPROVAL OF CITY ENGINEER ONLY.

PAVEMENT TABLE	ROADWAY (WIDTH)		SIDEWALK (WIDTH) (C)	SURFACE COURSE (DEPTH) (TYPE) (D)	BASE COURSE (DEPTH) (TYPE) (E)	A.B.C. FILL (DEPTH) (F)	RIGHT OF WAY (WIDTH) (G)
	FACE TO FACE (A)	℄. TO FACE (B)					
RESIDENTIAL STREET	34'	17'	4'	1" R-12.5	2" R-25	4"	50'
COLLECTOR STREET	40' TO 48'	20' TO 24'	5'	1" R-12.5	2" R-25	4"	60' TO 80'
MAJOR COLLECTOR STREET *	64' TO 68'	32' TO 34'	5'	1 1/2" A-12.5	2 1/2" A-25	10" SEE NOTE 2	90' TO 110'
ARTERIAL STREET	88'	44'	5'	1 1/2" A-12.5	2 1/2" A-25	10" SEE NOTE 2	110' TO 130'
INDUSTRIAL / COM. STREET	44' TO 48'	22' TO 24'	4' SEE NOTE 5	1 1/2" A-12.5	2 1/2" A-25	10" SEE NOTE 2	60' TO 80'

* ALSO SOME ARTERIALS WITH CITY APPROVAL



TYPICAL STREET SECTION

DETAIL NO. M-19.1

REV.1-10-97

FIGURE 3-1

**Table 3-2 ELLSWORTH ROAD DCR
Design Criteria and Roadway Improvement Elements**

Design Element	MCDOT Roadway Standards / Recommendations of Corridor Study	City of Mesa (COM) - Arterial Street Std. Detail M-19	Resolution
Design Procedure	Roadway Design Manual, Section 4	COM - Engineering & Design Standards	COM - Engineering & Design Standards
Geometric Criteria	Roadway Design Manual, Section 5	AASHTO	AASHTO
Drainage Design Criteria	SEE DRAINAGE CRITERIA COMPARISON (PAGE 3-6)		Use COM Criteria
Posted Speed	45 mph (corridor study; Elliot to Germann). 40 mph for URRS	Directed by City (85 percentile speed)	45 mph
Number of Lanes	5-lanes recommended for design year of 2015, 7-Lane Ultimate Section	7-Lanes required where adjacent to new development	7 lanes where developed, 5 lanes (interim) where development is imminent. Additional right turn lanes at intersections as warranted.
Lane Width	12' preferred (11' minimum)	11' typical through lane, 10' at left turns	11' (3.35m) lanes
Lane Separation	Divided with breaks restricted to four per mile.	Divided with breaks restricted to four per mile	Divided with four breaks per mile located at 1/4 mile or known access point.
Traffic Signal	Fully coordinated and progressed; restricted to mile and half-mile locations		2 signalized intersections likely (Elliot and Germann); conduit and pull boxes for ultimate section
Lighting	Not provided	1.2 fc Required	At intersections; conduit and pull boxes for ultimate Section and City communication
Intersections			Provide tapers per COM requirements



**Table 3-2 ELLSWORTH ROAD DCR
Design Criteria and Roadway Improvement Elements**

Design Element	MCDOT Roadway Standards / Recommendations of Corridor Study	City of Mesa (COM) - Arterial Street Std. Detail M-19	Resolution
Signing	Uniform upgraded signing		Uniform upgraded signing
Bicycle Facilities	Bicycle lanes not required since Ellsworth Rd. is not on the MAG Bike Route Plan	6' lanes	6' (1.8m)/4' (1.2m) shoulders include bike lane
Landscaping	Not provided		None.
Sidewalk	Not provided in rural areas	Required (5' wide, MAG Std Det 230).	Show 5' (1.5m) walk as future on 7 lane section
Curb & Gutter	MCDOT Detail 2030 if design speed >45 mph MAG Detail 220, Type A if design speed < 45 mph	MAG Detail 220, Type A	Medians have vert curb no gutter; MAG standard C & G
Pavement Section	Per geotechnical analysis 4" AC over 10" ABC without analysis	4" AC (1.5" + 2.5") over 10" ABC	4" AC over 10" ABC; super-pave mix design
Curb Return Radius	35' with arterial/major collector; 30' with minor collector	30.5' Min. for all arterial and collector streets	35'
Storm Drain Reqmts.		5' MH, 10fps,	Allow for ultimate roadway in drainage design
Transit	Provide for pullouts and queue hoppers where appropriate		No plans for transit by City
Parking	Prohibited		No on-street parking



CH2MHILL



Other Design Criteria

1. The design vehicle for roadways and intersections should be WB-15 (WB-50, non-metric units).
2. Drainage Design Criteria will be in accordance with the current FCDMC *Drainage Design Manual* and recommendations as presented in Appendix D.
3. Placement of new utilities within the roadway ROW is not specifically addressed in the above-mentioned references. Based on discussion with MCDOT staff, the following criteria is recommended:
 - a) All utilities within the ROW are to be buried.
 - b) Public utilities (i.e., sewer, water, storm drains) may be placed under pavement. Publicly owned irrigation systems shall be behind the curb.
 - c) Privately owned utilities (gas, telephone, electric, fiber optic, CTV) are to be placed behind the curb.
 - d) Consideration should be given to street lighting and signals (pole/foundation locations), fire hydrants locations, shared use duct banks/common trenches, and installation of spare underground cross casings.

Recommendation

It is understood that the City of Mesa intends to take over Ellsworth Road from Germann Road to Baseline Road in accordance with stipulations addressed in the draft Inter-Governmental Agreement (IGA). As such, the City is requesting that Ellsworth Road, within the city limits, be designed in accordance with City standards for a major urban arterial. The City's design standards are in accordance with AASHTO guidelines and are generally consistent with MAG requirements. Also, the proposed typical section per City standards, requires less ROW (130 ft) than the Urban Road of Regional Significance (140 ft).

Therefore, it is recommended that Ellsworth Road, from Germann Road to Baseline Road meet the City of Mesa requirements for a major urban arterial street.

Drainage Criteria Comparison

Criteria	MCFCD	COM
Street Capacity Design Storm	10-yr (curb to curb with one 12' driving lane in each direction). 100-yr (maximum of 8" deep)	10-yr (runoff contained in 1 lane) 100-yr (in ROW)
SD Capacity	Excess over street capacity	Excess over street capacity
Catch Basin Design	F.H.W.A. H.E.C. #12	F.H.W.A. H.E.C. #12
Catch Basin Spacing	-	30' minimum spacing Inlets cannot be placed in series
SD Alignment	-	5' offset east or north of centerline
Easement Requirements (outside of ROW)	-	20' P.U.F.E. OR 20' D.E.
SD Sizing Methodology	<160 acres - Rational >160 acres - HEC-1	Rational
Hydraulic Gradient	6" below inlet grates	1' below inlet grates
SD Minimum Velocity	2 fps	2 fps
SD Maximum Velocity	-	10 fps
SD Minimum Slope	0.001'/ft	-
SD Minimum Pipe Size	24"	-
SD Materials	as approved by municipality	RGRCP RCP CIPP (with special provisions) HDPE (10 psi)
Manhole Size	-	5'
Maximum Spacing	Varies (<30") 300' (<30" to 48") 400' (>48") 500'	Varies (8" to 15") 500' (18" to 30") 600' (36" to 60") 800' (>60") 1300'
Culvert Sizing	50-year storm	50-year storm

Alternatives Evaluation

The alternative evaluation process focused on incorporating the Ellsworth Road drainage channel identified in the Southeast Mesa ADMP.

From Germann Road to Pecos Road (1 mile) the alignment was established based on the ROW take. As presented in the Corridor Study, the Ellsworth Road alignment was set on the section line and centered in the existing 110' ROW. An additional 48-foot ROW strip will be required to accommodate the drainage channel identified in the ADMP. The channel is located on the east side to intercept runoff from the east. ROW is proposed to be taken from one property owner (east side), since it would be easier than obtaining ROW from several properties.

From Elliot Road to Baseline Road (2 miles) the alignment has been established by the developer improvements to the roadway. It is situated 55 feet from the west ROW line, and 50 feet from the east ROW line. Thus, additional ROW will need to be dedicated by the private developers to obtain the ultimate 130-foot width required by the City.

From Pecos Road to Elliot Road (4 miles), three alternative alignments were evaluated in order to incorporate the Ellsworth Road drainage channel as identified in the Southeast Mesa ADMP. They are described as follows:

Alternative 1 – Locate a concrete-lined channel along the east side of Ellsworth Road that would require relocation of GM screening berms (Figure 4-1). Ellsworth Road alignment would essentially remain as is. This alignment option was presented in the ADMP and does not impact WGA property, but requires relocation of approximately 1000 meters (3300 ft) of earthen berms.

Alternative 2 – Locate a concrete-lined channel along the east side of Ellsworth Road but realign the road and channel to avoid the GM screening berms (Figure 4-2). The alignment is curvilinear to avoid the berms, but requires relocation of approximately 1300 meters (4270 ft) of 16-in water line, 10-in sewer force main, and a 4-in gas line.

Alternative 3 – Locate an earthen channel (unlined) along the west side of Ellsworth Road that would generally be coincident with the existing drainage channel on WGA property (Figure 4-3). Only slight offset of Ellsworth Road alignment would be needed to minimize ROW impacts. This alignment avoids relocation of utilities or berms and uses the existing channel, but requires additional ROW from WGA.

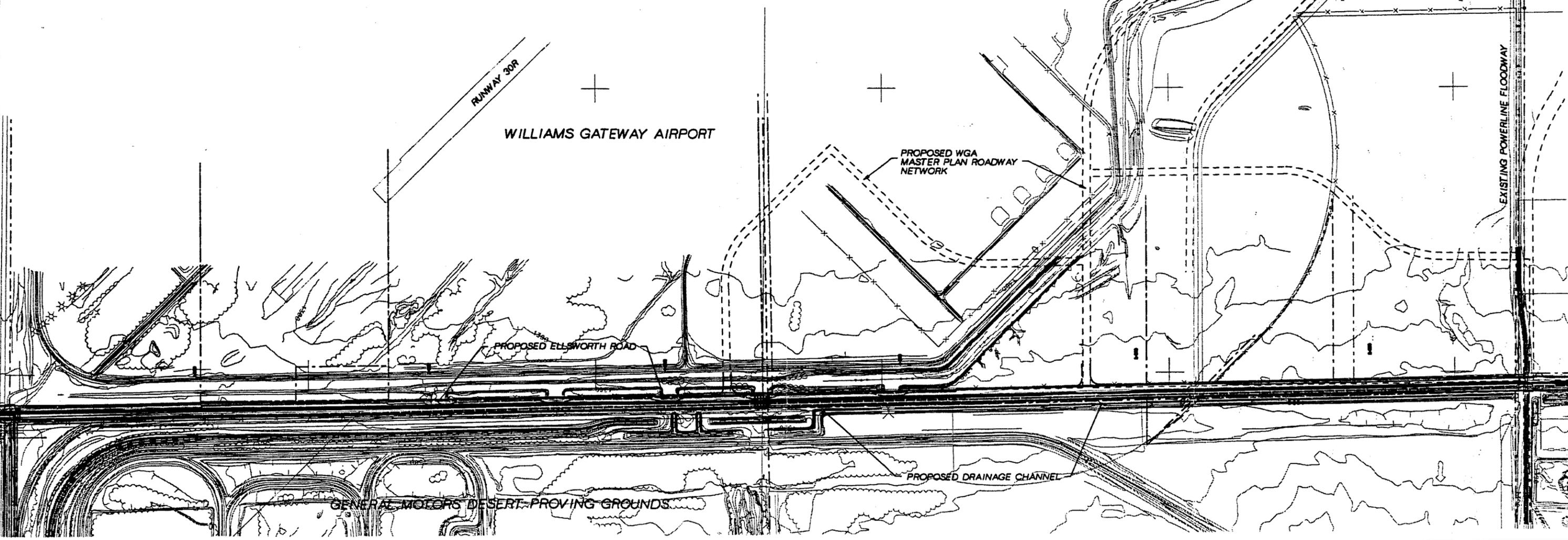
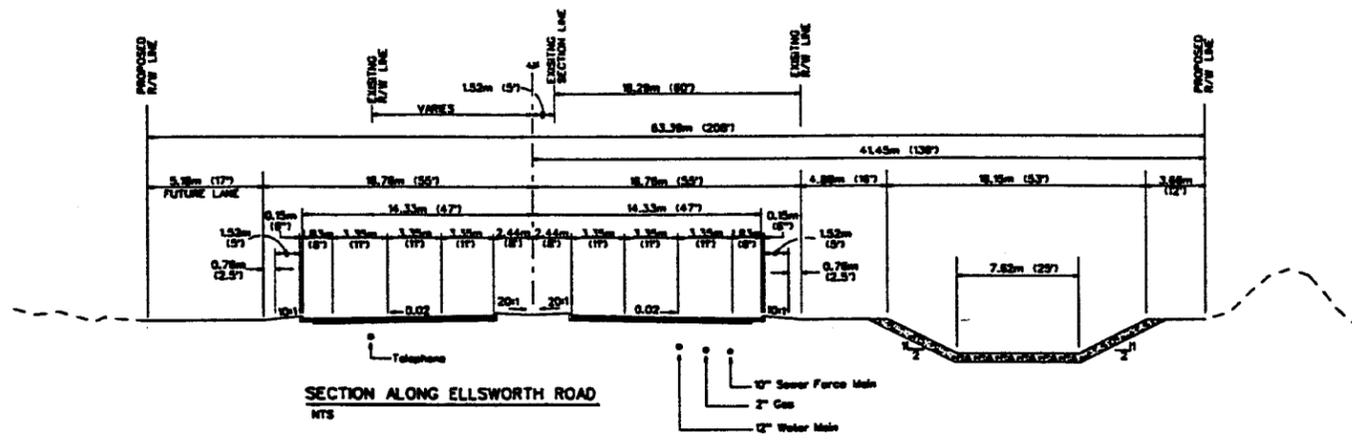
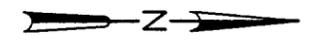
Initially, only Alternatives 1 and 2 were considered since the drainage channel was identified on the east side in the ADMP and GM had already been approached. GM has stated a willingness to negotiate ROW needs for either Alternatives 1 or 2. WGA had reviewed Alternative 2, and had accepted it with consideration of the ROW needs.

At a February 3, 1999 meeting with MCDOT and FCDMC, it was determined that Alternative 3 should be developed since it allows for an earthen channel option. The alternative was presented to WGA staff on March 1, 1999, for their review and concurrence. The meeting attendees concluded that a second meeting would be necessary to evaluate the three alignment options together. On March 15, 1999, the three alternative alignments were presented to WGA and the City of Mesa. Figures 4-4 through 4-6 present the evaluation of

the alternatives. Figure 4-4 shows the section from Pecos Road to approximately Williams Field Road (extended). WGA requested that this section be evaluated independent from the northern portion to minimize ROW takes from WGA. The two alignment options appear to be equivalent with respect to total weighted benefit, but the west side alternative is significantly less costly. Therefore, it was assumed that the channel would be on the west side through this reach when considering the northern portion.

Figure 4-5 summarizes the evaluation of the three alignment alternatives, and Figure 4-6 presents the summary of costs relative to the alternatives. *It is important to note that the costs were prepared for comparison purposes only, and do not reflect the total estimated construction project cost of each alternative.*

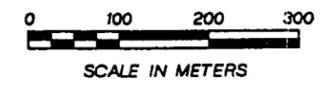
Based on the scoring process and discussions at the March 15, 1999 meeting, Alternative 3 was shown to be more beneficial at a significantly less cost. However, WGA reiterated concern regarding the impacts to the future commercial/industrial use of the property including access (bridges/box culverts over channel) and landscaping and maintenance concerns associated with the earthen channel. These are real concerns and must be adequately addressed for the alternative to be considered a benefit for all interested parties.



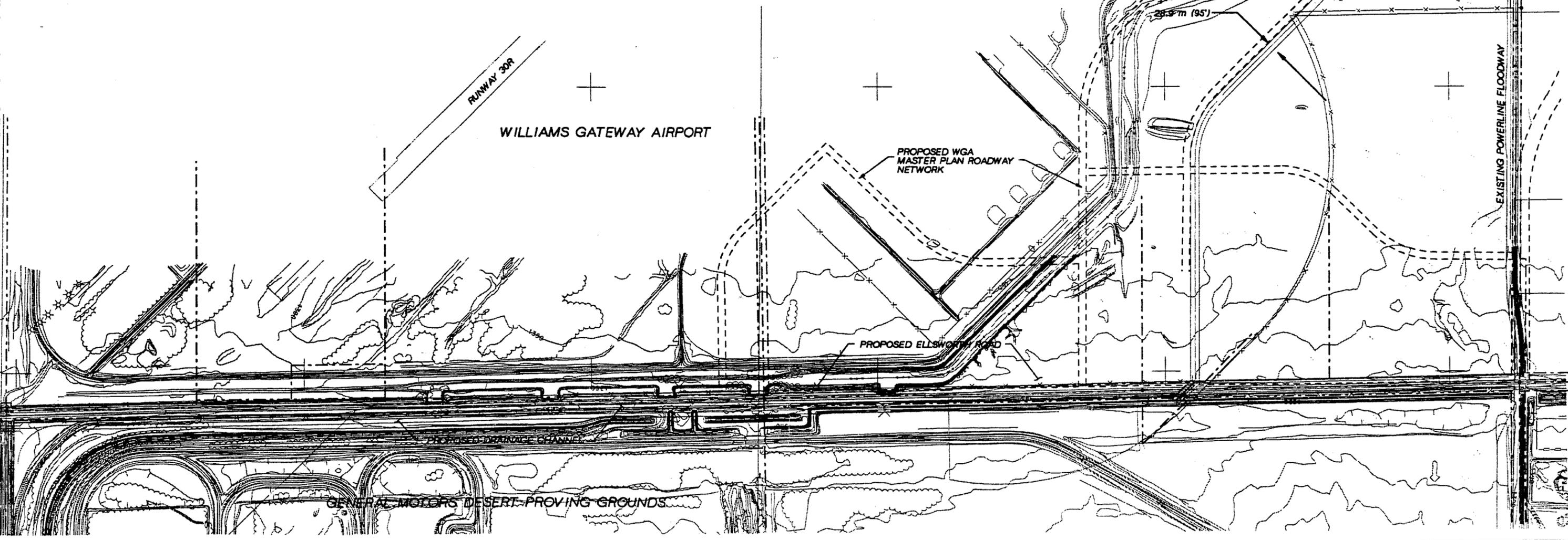
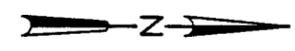
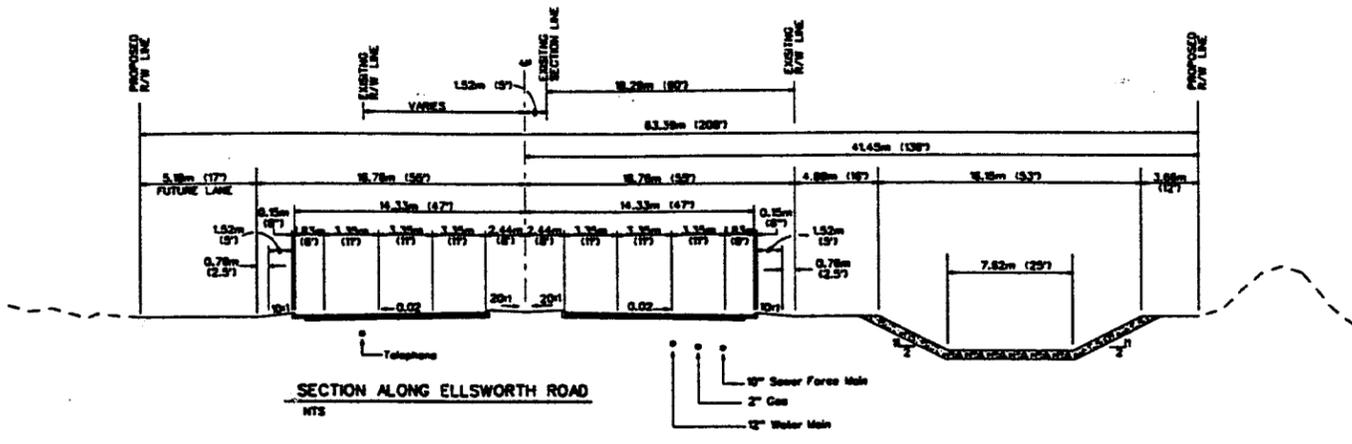
PROPOSED ALIGNMENT OF ELLIOT CHANNEL

ALTERNATIVE 1

NOTE:
This drawing is preliminary in nature, and is not intended for construction purposes. Dimensions and concepts are subject to change.



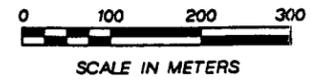
CH2MHILL
MARCH 1, 1999



PROPOSED ALIGNMENT OF ELLIOT CHANNEL

ALTERNATIVE 2

NOTE:
This drawing is preliminary in nature, and is not intended for construction purposes. Dimensions and concepts are subject to change.



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FIGURE 4-4 ELLSWORTH ROAD DCR

CHANNEL ALIGNMENT EVALUATION - PECOS RD. TO WILLIAMS FIELD RD. EXTENDED (SOUTH END)

ALTERNATIVE		A - EAST SIDE			B - WEST SIDE			
Description		Concrete channel east side of Ellsworth Road			Earthen channel west side of Ellsworth Road			
CRITERIA	Weight of Importance	EVALUATION	Evaluation Score	Weighted Score	EVALUATION	Evaluation Score	Weighted Score	
Right-of-way	15%	Channel utilizes GM R/W. Minimize R/W required from WGA for Ellsworth Road.	4	0.6	Additional R/W required from WGA for channel. Channel under glide slope, and would align with existing channel.	2	0.3	
Aesthetics	15%	"Hard" channel appearance. Requires fencing along Ellsworth Road and along GM property.	2	0.3	Earthen channel with landscaping would provide open natural appearance.	4	0.6	
Project Cost	15%	Significant cost due to concrete lining. R/W provided by G/M.	2	0.3	No Channel lining, but additional R/W cost (WGA).	4	0.6	
Access	10%	Does not restrict WGA access. Channel access at Pecos.	4	0.4	WGA access at south end of development area needs to be established. Channel is segmented by the WGA access drives.	3	0.3	
Safety	10%	Minimal protection/security provided.	3	0.3	6:1 channel slope offers optimal safety. WGA security fence is maintained.	3	0.3	
Channel Maintenance/ O&M Cost	10%	Channel maintained by MCFCD. Typical maintenance costs.	3	0.3	Maintained by MCFCD or City of Mesa. Higher maintenance cost due to landscaping.	2	0.2	
Constructibility	10%	Intercepts runoff on east side. No impact to Ellsworth Rd. construction.	3	0.3	Requires add'l culvert crossings. More significant Traffic Control issues.	2	0.2	
Impacts to Schedule	10%	Additional time to construct channel, but can be done concurrent with road.	3	0.3	Some additional time to construct drainage culverts.	3	0.3	
Environmental Considerations	5%	Normal considerations.	3	0.15	Potential archeological/Haz Waste requirements.	2	0.1	
Total		100%	Total Score		2.95	Total Score		2.90



FIGURE 4-5 ELLSWORTH ROAD DCR

CHANNEL ALIGNMENT EVALUATION - PECOS RD. TO POWERLINE FLOODWAY

ALTERNATIVE		A+1			A+2			A+3		
Description		Concrete channel east side of Ellsworth Road/ Relocate GM Berms			Concrete channel east side of Ellsworth Road/ Avoid GM Berms/Relocate Utilities			Earthen channel west side of Ellsworth Road		
CRITERIA	Weight of Importance	Evaluation	Evaluation Score	Weighted Score	Evaluation	Evaluation Score	Weighted Score	Evaluation	Evaluation Score	Weighted Score
Right-of-way	15%	Channel utilizes GM R/W (potential for issue). Minimal R/W required from WGA for Ellsworth Road.	3	0.45	R/W required from WGA & GM.	3	0.45	Channel aligns with existing channel (west bank) requires more R/W from WGA.	2	0.3
Aesthetics	15%	"Hard" channel appearance. Requires fencing along Ellsworth Road and along GM property (double fence).	2	0.3	"Hard" channel appearance. Requires fencing along Ellsworth Road and along GM property (double fence).	2	0.3	Positive appearance can be achieved with landscaping.	4	0.6
Project Cost	15%	Highest cost due to concrete channel and relocation of berms.	2	0.3	High cost due to concrete channel and utility relocation.	2	0.3	Lowest cost due to use of existing channel w/o concrete lining.	5	0.75
Access	10%	Access channel at Pecos & Powerline Fldwy. Does not restrict WGA access.	4	0.4	Channel is segmented by the WGA access drives. Does not restrict WGA access.	4	0.4	Does not restrict channel access. WGA access needs to be established.	3	0.3
Safety	10%	Minimal protection/security provided.	3	0.3	Minimal protection/security provided.	3	0.3	6:1 channel slope offers optimal safety. WGA security fence is maintained.	3	0.3
Channel Maintenance/ O&M Cost	10%	Channel maintained by MCFCD. Typical maintenance costs.	3	0.3	Channel maintained by MCFCD. Typical maintenance costs.	3	0.3	Maintained by MCFCD or City of Mesa. Higher maintenance cost due to landscaping.	2	0.2
Constructibility	10%	Intercepts runoff on east side. Requires significant earthwork. Must maintain GM security.	2	0.2	Intercepts runoff on east side. Relocate utilities. Additional Traffic Control (culverts and road alignment).	3	0.3	Additional culvert crossings. Some utility relocations (at culverts).	4	0.4
Impacts to Schedule	10%	Additional time to construct channel and relocate berms.	3	0.3	Additional time to construct drainage channel and relocate utilities.	2	0.2	Additional time to construct drainage culverts.	3	0.3
Environmental Considerations	5%	Normal considerations.	3	0.15	Normal considerations.	3	0.15	Potential archeological/Haz Waste requirements.	2	0.1
Total		100%	Total Score 2.70		Total Score 2.70			Total Score 3.25		



FIGURE 4-6 ELLSWORTH ROAD DCR

**CHANNEL ALIGNMENT ALTERNATIVES
COST SUMMARY**

CHANNEL ALIGNMENT OPTION (SOUTH END)		
	A	B
<i>Description</i>	<i>Concrete channel east side of Ellsworth Road</i>	<i>Earthen channel west side of Ellsworth Road</i>
Channel Cost*	\$1,255,000	\$860,100
R/W	\$0	\$356,000
Construction	\$1,255,000	\$504,100 ²

CHANNEL ALIGNMENT OPTION			
	A+1	A+2	A+3
<i>Description</i>	<i>Concrete channel east side of Ellsworth Road/ Relocate GM Berms</i>	<i>Concrete channel east side of Ellsworth Road/ Avoid GM Berms/Relocate Utilities</i>	<i>Earthen channel west side of Ellsworth Road</i>
Project Cost *	\$13,699,350	\$13,659,200	\$11,074,700
Alternative A	\$1,255,000	\$1,255,000	\$1,255,000
R/W	\$408,250	\$232,900	\$232,900
Roadway	\$8,856,000	\$8,856,000	\$8,856,000
Channel	\$3,180,100	\$3,315,300	\$730,800



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Evaluation Criteria

To evaluate the alternative alignments, an evaluation matrix was prepared to rank the alternatives based on nine criteria. The ranking was based on a numeric valuation assigned to the criteria, with 1 being least favorable, and 5 being most favorable. An "importance factor" was also assigned to the individual criteria that allows the more significant criteria to have a greater impact on the scoring. The criteria address the following potential impacts:

Right-of-way

ROW impacts include the effect each alternative has on proposed and developed land uses and facilities. For this criterion, potential impacts of ROW takes on new developments and businesses were evaluated.

Aesthetics

This criterion assesses the roadside visual impact of the channel options. It considers concrete-lined vs. earth channels, landscaping, fencing, and spatial dimension.

Project Cost

This criterion assesses the *relative cost* of constructing each alternative. Costs were developed for major items in the categories of roadway construction, channel construction, and ROW. The costs do not intend to reflect the estimated construction cost and were only developed for comparison purposes.

Access

Access to Ellsworth Road from adjoining properties was evaluated. Access to the property adjacent to the corridor is significant since WGA has a master plan in place for developing the property fronting Ellsworth Road for commercial/industrial use.

Safety

This criterion considers the security of the channel options, and the overall safety of the general public.

Channel Maintenance/ O&M Cost

Channel maintenance issues were reviewed, including costs, frequency, and responsible agency.

Constructibility

The construction complexity of the alternatives was reviewed to analyze impacts to the public during construction.

Impact to Schedule

This criterion considers impacts to the project schedule including acquisition delays, utility relocations, and the construction schedule.

Environmental Considerations

This criterion evaluates potential impacts to the environment, including potential adverse effects to cultural resources and identified of hazardous materials.

Recommended Plan

To meet the needs of the 2020 traffic projections, Ellsworth Road needs be widened to a 4-lane section. However, to accommodate traffic beyond the 20-year planning horizon, a 6-lane section is needed. Along with this, the City of Mesa requests that the ultimate roadway section be constructed where adjacent properties are already improved. Where adjacent properties are yet to be developed, the City will require that the ultimate roadway improvements and 19.8 m (65-ft) half-ROW width be provided as part of the proposed developments.

The recommended alignment and improvements are presented in Volume II (Plans) of this report. The plans also show the existing roadway centerline, utilities, existing and proposed ROW, and drainage structures.

The recommended alignment was established based on the intent to minimize the amount of ROW needed and the number of properties affected. During the preparation of these plans, it was understood that ultimate ROW need would be 33.5 m (110 ft) as discussed in Section 3. However, the City of Mesa has required a total ROW width of 39.6 m (130 ft) be obtained where properties are already developed (e.g, WGA and GM Proving Grounds). Only the minimum ROW needs are identified for the undeveloped properties.

Ellsworth Road Alignment

The following paragraphs provide (1) a section-by-section description of issues potentially affecting the roadway alignment and (2) rationale for selecting the location of the recommended centerline. In general, the alignment was selected primarily as a result of ROW issues and constraints, with section line and utility conflicts governing wherever appropriate.

Germann Road to Pecos Road (Station 1+000 to 2+609)

Environmental

A cultural resource area extends into this section. It is possible that Hohokam villages and other sites may be present. However, there are no known cultural resources in the corridor that would limit the improvements of the roadway. A final determination by SHPO is pending.

An existing drainage channel along the north side of Pecos Road has been included in a preliminary delineation of jurisdictional waters, which has been submitted to the COE. Final determination on this delineation will determine the need for a Section 404 permit.

No hazardous materials have been identified in this section.

Land Use

Harris Cattle Company and WGA are the property owners on the east and west side of the northern half of this section. On the southern half, the property owner to the east is Ellsworth Road 160 LLC and the property owner to the west is EG 160 General Partnership.

A 15.2 m (50 ft) ROW is maintained on either side of the section line. The City of Mesa has annexed a 1.5m (5 ft) on either side of the roadway ROW.

Utilities

Utilities are located on each side of Ellsworth Road. A 50 mm (2") gas line runs along the east side of Ellsworth. On the west, underground telephone lines parallel the existing centerline and are joined by two additional lines at station 2+209. At Pecos Road, three of the telephone lines depart to the east and run along the north side of Pecos. Beginning at station 1+147, an SRP overhead electric line runs north along the east side until station 1+225 where it crosses Ellsworth and continues north along the west side. Finally, a buried SRP power line lies east of Ellsworth Road beginning at station 1+147 and continuing north to Pecos Road.

Record utility information received from the respective utility companies, is based off the section line monumentation. Field survey during this study, however, has identified a second monument at Pecos Road. It is recommended that the utility information be carefully reviewed to verify that the newer monument is in fact being used for recording utility locations.

Traffic/Geometry

As stated above, field survey conducted during this study identified two monuments located at the intersection of the Ellsworth Road and Pecos Road. The more recent monument is located at the existing centerlines of the roads, but an older monument is located approximately 9 m west of Ellsworth Road centerline. It appears that existing utilities and recent construction projects are based on the newer monument, but it is not clear, however, which monument – and, therefore, which resulting section line, the offsets to property lines and existing ROW are based. It is recommended that additional field survey be conducted during final design to verify property locations.

Drainage

Private dirt irrigation ditches along both sides of Ellsworth Road outside the roadway ROW carry runoff north to the Powerline Floodway. A pipe culvert across Ellsworth Road at Germann Road drain the south side of Germann east of Ellsworth to the west side.

In the ADMP, a channel/culvert system is being proposed along the east side of Ellsworth Road from just north of Germann to Pecos Road. This system is being designed to convey runoff from the east side of Ellsworth to the proposed Pecos/Ellsworth channel system and ultimately to the Powerline Floodway.

The proposed typical section through this area has no curb and gutter. Onsite runoff will, therefore, be collected by the ADMP channel on the east side of the road. A shallow roadside ditch will be required on the west side of the road to convey water north to the proposed Pecos/Ellsworth channel system.

Recommendation

Based on projected traffic demands, a 4-lane section is recommended for the entire Ellsworth Corridor, with additional lane capacity added at intersections. The recommended typical section for the reach from Germann to Pecos is a 4-lane section with median and provision for widening to an ultimate 6-lane section.

Both the recommended section and the ultimate section will necessitate relocation of an overhead power line. The buried telephone, gas, and underground electrical should be relocated for the recommended improvement.

As stated above, the ADMP channel is located along the east side of Ellsworth Road and will require an additional 24.4 m (80 ft) of ROW.

There are no known hazardous materials within the corridor limits in this area. Additionally, there are no known cultural resources in the corridor that would limit the improvement of the roadway. However, final determination by SHPO should be reviewed prior to commencing final design activities.

Relocation of Pecos Road and its intersection with Ellsworth Road to approximately 1000' south is currently being proposed, and is in the City of Mesa planning process. The proposed alignment of Pecos Road is presented in the plans.

Pecos Road to Williams Field Alignment (Station 2+609 to 4+219)

Environmental

According to the National Priority List, WGA is considered a Superfund site. The findings of hazardous waste materials presented in Section 2 should be considered in final design.

This section of the road lies within a cultural resource area as well. Although it is not expected to be a concern, final determination by SHPO should be reviewed prior to final design.

Land Use

The property owner to the east of Ellsworth Road is GM and to the west is WGA. On the east, GM maintains a landscaped berm to act as privacy screening of their facility. The roadway ROW (east side) is 16.8 m (55 ft). The City of Mesa has annexed the entire ROW as well as a 1.5 m (5 ft) strip of land along the GM property.

On the west side, the ROW varies from 10 m (33 ft) to 15.2 m (50 ft). WGA is planning a 168 m (550 ft) extension of Runway 30R, and upgrading it from a non-precision approach (34:1 glide slope) to a precision approach (50:1 glide slope).

Utilities

Utilities are located on both sides of Ellsworth Road through this section. A buried phone line lies to the west, while the gas line continues north. A water line and sewer force main are also on the east side of the roadway and adjacent to the gas line. Maintaining the existing centerline through this area would place the sewer and water line outside of the pavement section in the ultimate condition. However, the gas line and phone line will be under the proposed roadway.

Traffic/Geometry

WGA's planned extension and upgrade of Runway 30R is a critical consideration to the horizontal and vertical alignment of Ellsworth Road. The section of roadway from station 2+540 to station 3+200 is under the ultimate runway precision approach zone. The proposed roadway alignment from station 3+125 to 3+200 causes an encroachment of the FAA requirement of a 15-foot vertical clearance under the planned 50:1 glide slope. Although a variance of up to 0.9 m (3 feet) will be considered, it is desirable to minimize the extent of the encroachment.

WGA anticipates future commercial development at the north end of this section of Ellsworth Road. Accordingly, the recommended plan includes provisions for median breaks at anticipated access points to the WGA property.

Drainage

Wash crossings exist at the following locations: station 3+520, station 3+762, and station 4+010. These washes originate from breaks in the GM berm along the east ROW fence line and consist of paved shoulders, concrete cutoff walls, and spillways. These wash crossings would be replaced by the proposed drainage improvements. Concrete box culverts will be used to convey stormwater from the east side of the roadway, to the proposed Ellsworth Road channel on the west side, as discussed below. Additionally, two existing drainage features in this area may be delineated as jurisdictional "Waters of the U.S." by the COE. Final determination of delineation is pending and should be reviewed in the final design stage.

The Ellsworth Road drainage channel is proposed to be located on the roadway's west side. The channel will be used to convey flow north to the Powerline Floodway and will intercept flows from the proposed Pecos channel, the Ellsworth channel from Germann to Pecos, and drainage from GM. The Ellsworth drainage channel will be located where the existing channel is on WGA property. This will significantly reduce construction cost of the channel. The channel will need to be offset to allow for acceleration and deceleration lanes to be added to future WGA access points. Also, since the channel will be an earthen channel, it should be landscaped. Landscaping should consist of non-erodable materials such as rock, cactus, and desert plants which will not impact the design flows.

Recommendation

The 4-lane section recommended for the Ellsworth corridor is modified in this reach to best accommodate future anticipated development, and the requests of the City of Mesa. Those portions of the roadway along properties that are not anticipated to have any further development are built to their ultimate configuration. For this reach that includes the east side of the roadway along GM, and the west side of the roadway along WGA from station 2+609 to station 5+155. Where future development is anticipated, the roadway will be built to an interim configuration. This entire reach should be ultimate, both east (fronting GM) and west (fronting WGA). The ultimate ROW is 39.6 m (130 ft) for the roadway portion, plus the additional ROW required to implement the ADMP channel on the WGA property. ROW on the east side of the road is set at 19.8 m (65 ft), while ROW on the west side of the roadway varies.

The sewer force main and the water line on the east side will remain outside of the pavement section. However, the telephone line and gas line will be under the pavement.

A shift of 1.5 m (5 ft) to the east of existing centerline is proposed in this area. The shift will be accomplished by two, ½ degree deflections of the centerline at stations 2+609.32 and 2+783.96. Shifting the alignment minimizes impacts to property and utilities.

Williams Field Alignment to Ray Road (Station 4+219 to 5+821)

Environmental

WGA as a Superfund site should not be a concern but should be reviewed in final design. With respect to the cultural resources, determination by the SHPO should be reviewed prior to final design.

Land Use

The GM Desert Proving Grounds property is along the east side of Ellsworth Road through this section. The roadway ROW on the east remains at 16.8 m (55 ft), and the 1.5 m (5 ft) City of Mesa annexation strip occurs to station 5+020. The ROW then becomes 19.8 m (65 ft) from Sta 5+020 to the Ray Road alignment (section line). The ROW varies from 10 m (33 ft) to 16.8 m (55 ft) along the west side of Ellsworth Road and includes the following property owners: Bernard L. Shulimson; Williams and Ray, LTD.; and WGA.

Utilities

On the east side of Ellsworth the water line, force main, and gas line continue from the south along their respective alignments to the Ray road alignment. The buried telephone line is located along the west side of Ellsworth to the Ray Road alignment. An SRP 12 KV overhead power line extends from station 4+980, and runs north to Guadalupe Road.

Traffic/Geometry

There are no significant issues with respect to roadway geometrics in this section. Median breaks are proposed where future access points are anticipated.

Drainage

There is a wash crossing with six, 3 m x 1.2 m (10 ft x 4 ft) concrete box culverts at station 4+202 and a wash crossing at station 4+480.

The drainage channel proposed in the previous section continues north on the WGA property until approximately station 5+142 where the channel will parallel the alignment of proposed future roadways on WGA. The channel will eventually tie in with the existing Powerline Floodway (PLF).

Wash crossings will be replaced by the FCDMC's proposed improvements. Concrete box culverts will be used to convey stormwaters from the east side of the roadway to the proposed Ellsworth Road channel on the west side.

Roadway drainage captured in curb and gutter sections will be collected in catch basins and conveyed to the drainage channel on WGA by means of cross drains. Curb and gutter is planned along both sides up to Ray Road.

Recommendation

The typical roadway section consists of 3 through lanes both sides up to Ray Road. On the west side, WGA facilities and runways lie 610 to 914 m (2,000 to 3,000 ft) away from the current roadway ROW and will not be affected by proposed improvements. The two other properties on the west side are undeveloped.

This section of roadway begins at an offset of 1.5m (5 ft) east of the section line. At approximately the midpoint of this section (station 5+020) the centerline lies on the section line. From station 5+020 to Ray Road the proposed centerline transitions to the east to keep the centerline 1.5m (5') east of the section line. This alignment best accommodates utilities, and minimizes ROW needs.

Ray Road to Warner Road (Station 5+821 to 7+427)

Environmental

There is contamination from a leaking underground storage tank (LUST) on the east side of Ellsworth Road within the GM Desert Proving Grounds. The contamination will not impact the new alignment since the tanks are well within GM's property.

Land Use

The GM Desert Proving Ground is located to the east of Ellsworth Road; Venus Properties, Mormino Investments, and Mesa Development, Inc. are located to the west of Ellsworth Road. The roadway ROW to the east is 15.2 m (50 ft) from the section line and the ROW line to the west is 15.2 m (50 ft) from the section line, with the exception of the Venus property, which has a 19.8 m (65 ft) ROW. The City of Mesa has strip annexed 3 m (10 ft) of land along GM's property line through this entire section.

Utilities

The 25 cm (10-inch) force main and 41 cm (16-inch) water line continue along the east side of Ellsworth Road. An abandoned 20 cm (8-inch) water line begins at station 6+517, the entrance to GM. The Southwest Gas line terminates in this same area. The SRP overhead electric line continues along the west side of Ellsworth Road and is accompanied by two additional telephone lines that emerge from GM and continue north to Warner Road.

Traffic/Geometry

The Powerline Floodway (PLF) lies on the section line for Ray Road. Plans by Mesa Airpark are to relocate the Powerline Floodway to the southwest of Ellsworth Road such that the proposed Ray Road will be aligned on the section line. GM is planning an expansion to their facility with access near the Ray Road intersection. GM believes that aligning their planned entrance with Ray Road would result in many errant vehicles entering their property. As such, their proposed access should be offset from the Ray Road intersection as much as practical. Further coordination will be required during final design. Careful consideration will need to be given to the operational characteristics of having an access to GM located in the proximity of a signalized intersection.

Drainage

The existing roadway drainage scheme in this area is to pass water through to existing minor washes on the west side of Ellsworth Road. Small swales along the east side of Ellsworth Road collect roadway drainage. Two pipelines intercept this runoff and convey it west into minor washes. One is a pipe of unknown dimension (with a concrete box attached) located at the GM entrance (station 6+625) and the other is a 76 cm (30-in) reinforced concrete pipe located at station 7+210. The PLF channel conveys floodwater from east of the CAP canal through the GM Desert Proving Grounds west to East Maricopa Floodway, which is located east of Power Road. The PLF consists of a concrete-lined trapezoidal channel measuring 6 m (20 ft) wide with a 1.8 m (6 ft) bottom. It crosses Ellsworth Road in a 2 m x 4.3 m (6.5 ft x 14 ft) concrete box culvert. Most of the storm runoff from the GM Desert Proving Grounds drains into this channel from the east shoulder of Ellsworth Road. The recommended drainage plan for this area calls for a median storm drain that will convey stormwater gathered in catch basins to the PLF. Existing culverts under the road in this area will most likely be removed.

Recommendation

The roadway improvements consist of a two-lane half street southbound (west side) and a three-lane half street northbound, with a raised median. The third northbound lane is recommended since the road is adjacent to the GM Proving Grounds property. Mesa requires the ultimate roadway section wherever the roadway is adjacent to developed property.

This entire section along the east side has 15.2 m (50 ft) of ROW and a 3 m (10 ft) City of Mesa annexation strip. ROW on the west is variable, but at a minimum of 15.2 m (50 ft). The roadway alignment is offset 1.5 m (5 ft) east of the exiting centerline.

Warner Road to Elliot Road (Station 7+427 to 9+031)

Environmental

An existing drainage channel along the south side of Elliot Road and the Siphon Draw Wash, which runs west from Ellsworth Road, have been included in a preliminary delineation of jurisdictional waters. Final decision on this delineation will determine the need for a Section 404 permit.

The only other environmental consideration along this section is a closed landfill located west of the Elliot Road intersection. The landfill was operated by GM and is now closed.

Land Use

The GM Desert Proving Ground is located to the east of Ellsworth Road; State of Arizona land is located to the west. Currently, the state land is vacant. The ROW line on the east side is 15.2 m (50 ft) from the section line. The City of Mesa's 3 m (10 ft) annexation strip continues along GM's property line. The State Land Department stated that a 15.2 m (50 ft) ROW exists on the west side. It is our understanding that right of way does exist along this reach, however some question remains as to the exact dimension. This should be verified in final design.

Utilities

All utilities discussed in the previous section continue to the north through this section, with the exception that the US West phone line is a fiber optic cable. These utilities are: a 255 mm (10") sewer force main, a 410 mm (16") water line, an abandoned 200 mm (8") water line on the east side of Ellsworth, and the SRP overhead electric and buried US West Fiber Optic line on the west side of Ellsworth. In addition, a 69 KV transmission line is being considered by SRP to run along the west side of Ellsworth from Warner Road, north to Guadalupe Road. Further coordination with SRP is required in final design.

Traffic/Geometry

The proposed Elliot Road channel improvements will necessitate an adjustment in the alignment of Elliot Road unless the closed conduit option is taken forward. This will need to be a final design consideration. The plans currently show an open channel which requires a shift of the Elliot Road intersection approximately 11.9 m (39 ft) to the north.

Drainage

The existing drainage patterns in this area are dominated by flows from north of the GM property and contributions from runoff associated with the existing pavement. The 3 m (10 ft) high berm along the GM property acts as a drainage barrier and diverts storm runoff from

east of the roadway to the west. Currently, runoff from north of GM is diverted by the GM berm along the east side of Ellsworth Road from the south side of Elliot Road to station 8+730 where it crosses over Ellsworth Road via a roadway dip section. From station 7+830 to 8+690, seven corrugated metal pipe arch (CMPA) culverts ranging in size from 109 cm x 69 cm (43 in x 27 in) to 74 cm x 46 cm (29 in x 18 in) convey stormwater from the east side of Ellsworth Road to minor washes west of the roadway. Just north of Warner Road, a double 109 cm x 69 cm (43 in x 27 in) CMPA culvert conveys stormwater from the east shoulder of Ellsworth to the north shoulder of Warner Road.

The design of the Elliot Road channel being prepared for the FCDMC proposes improvements at the Elliot/Ellsworth intersection that would replace the CBC and CMPA culvert system north of station 8+580. The proposed improvement include a channel system to convey runoff from south of Elliot Road along the east side of Ellsworth Road approximately 450 m (1,480 ft) south to station 8+580 where it crosses Ellsworth Road in double barrel 108" concrete pipes and discharge to the natural floodplain west of Ellsworth Road. The proposed roadway drainage scheme for Ellsworth road consists of a median storm drain that will convey stormwater to the Elliot Road channel.

Recommendation

The roadway improvements consist of a two-lane half street southbound (west side) and a three-lane half street northbound, with a raised median. The third northbound lane is recommended since the road is adjacent to the GM Proving Grounds property. Mesa requires the ultimate roadway section wherever the roadway is adjacent to developed property.

The recommended alignment through this section is to offset the centerline 1.5 m (5 ft) west of the section line. In the vicinity of the proposed FCDMC channel along Ellsworth, two short horizontal curves are used at station 8+399 and 8+499 to shift the alignment back to the west. This shift is necessary to accommodate the proposed drainage channel on the east side of Ellsworth, but would not be necessary if the Elliot Road channel becomes a buried conduit. Additionally, the intersection of Elliot Road with Ellsworth Road is shifted to the north to accommodate the channel but should be reviewed if the Channel becomes a buried conduit.

Elliot Road to Guadalupe Road (Station 9+031 to 10+638)

Environmental

A cultural resources survey of this section revealed the presence of a historic phone line and a historic road. Neither feature is considered eligible for Section 4(f) protection or mitigation measures.

Land Use

The land use in this section is rapidly changing. The Mesquite Canyon subdivision (City of Mesa job no. 98-82) is the most significant of these developments. Existing ROW is constant on the west side of the roadway at 12.2 m (40 ft), with a 4.6 m (15 ft) annexation strip by the City of Mesa. On the east side of the roadway there is also 12.2 m (40 ft) of existing ROW, and a 3 m (10 ft) annexation strip by the City. Dedication of additional ROW by the developers will be required by the City.

Utilities

Utilities between Elliot Road and Guadalupe road are limited to the 410 mm (16-in) water line, and the abandoned 200 mm (8-in) water line on the east side of Ellsworth. On the west side of Ellsworth there is the SRP overhead electric and buried US West Fiber Optic line. The overhead power lines on the west side of Ellsworth cross the road at approximate station 9+865, and the proceed north on the east side of the roadway. As previously mentioned, a 69 KV transmission line is being proposed by SRP on the west side of Ellsworth to near the Guadalupe Road intersection.

Traffic/Geometry

The most significant geometry issue is the tie-in of the DCR alignment with the alignment proposed by the Mesquite Canyon development. Development plans indicate tapers at the southern end of the development that bring the proposed roadway back to the existing width of Ellsworth Road. The Mesquite Canyon plans provide for three northbound lanes and one southbound lane along their development area. The edges of pavement shown in the plans reflect the minimum lane requirements for traffic, which for this section are two through lanes in both the northbound and southbound directions. Additional pavement will be required to provide this configuration.

Drainage

The median storm drain system proposed in the previous sections will be extended to tie into the system being constructed with Mesquite Canyon infrastructure improvements. This storm drain would outlet to the proposed Elliot Road channel crossing at Ellsworth Road.

Recommendation

The roadway centerline from the previous section is proposed to be carried through the Elliot Road intersection. Once through the intersection, two horizontal curves are used to bring the roadway centerline collinear with the section line. Once the roadway ties into the proposed improvements at Mesquite Canyon, the only improvements foreseen are minor pavement widenings to provide an additional lane in the southbound direction. Some grading may be required to maintain positive drainage along the west pavement edge. Final pavement width and curb and gutter is anticipated to be constructed by future developments in this area.

Guadalupe Road to Baseline Road (Station 10+638 to 12+242)

Environmental

There are no known environmental considerations in this section.

Land Use

The land use in this area of the study has undergone the greatest change since the study's inception. The Augusta Ranch subdivision (City of Mesa job no. 98-74) improvements are nearly reconstructing the entire Ellsworth Road. The proposed improvements will provide for at least 2 lanes in the northbound direction, and minor widenings will be required to add an additional lane in the southbound direction.

Utilities - Traffic/Geometry - Drainage

Completion of the improvements by the Augusta Ranch subdivision are anticipated to address nearly all the utility, traffic/geometry, and drainage concerns in this segment. A

buried telephone line on the west side of Ellsworth Road will end up under pavement in those areas where additional widening is needed to provide the second southbound lane.

Recommendation

The only improvements foreseen are minor pavement widening to provide an additional lane in the southbound direction. Some grading may be required to maintain positive drainage along the west pavement edge. Final pavement width, curb, and gutter are anticipated to be constructed by future developments in this area.

SPECIAL DESIGN CONSIDERATIONS

Channel Landscaping

From discussions with WGA on the placement of the Ellsworth Road Drainage Channel, WGA expressed concern of its impact to their planned developments on the east side of the airport. Since the channel would become a buffer between Ellsworth Road and the airport's commercial developments, access to the airport (across the channel) and the channel landscaping must be coordinated with WGA planning staff. Points of access are shown on the plans, but access widths and their locations should be reviewed by WGA.

Channel landscaping is recommended for the earthen channel in front of WGA's property. WGA has a landscaping pallet used for other projects, and should be reviewed with their planning staff for use here. Decorative features should be considered at the access points, which may include staining on the box culverts, texturing of wing walls, sculptured rock features, and selective use of desert plants. It is important that WGA be involved with the development and decision making of the channel landscaping during final design.

Lighting and Signalization

The City of Mesa requires street lighting at all major intersections. A continuous run of conduit in the median is recommended to accommodate the intersection lighting and future continuous street lighting. It is recommended that median lighting be used due to cost and the potential for conflict with other utilities. The City will make final determination whether the future street lighting will be placed in the median or behind the curb.

Special street lighting will need to be provided under WGA's planned precision protection zone for Runway 30R (STA 2+550 to STA 3+200). Pole heights will be limited from 5 m to 10 m to avoid encroachment of the glide slope. A lighting analysis and design of the street lighting through this section should be performed and approved by the City.

Utility Relocations

The City of Mesa requirements for utilities in the ROW is presented in their Standard Drawing M-18. As it pertains to Ellsworth Road, and in general, the 50 mm (2") gas line, underground telephone, and some underground power lie within the planned pavement section or under future sidewalk and would typically be relocated. However, consideration should be given to allow for the gas line to remain in place to the extent practical since the City does allow for "major gas" under the roadway.

SRP has overhead power in the Ellsworth Road ROW which will need to be relocated in certain areas but may remain in others. Further coordination with SRP is required to

determine precise limits. The 12 KV_a overhead power from Germann Road to approximately 900 m north will need to be relocated (approximately 10 poles).

The City's water and force main are located under the proposed roadway, and would remain. Placement of the new box culvert crossings, however, will require relocation of these utilities under the box culverts.

Estimate of Costs

Construction Costs

The estimated construction cost for the recommended plan is presented in Figure 6-1. Quantities were developed for the recommended plan as shown in Volume II of this study. Earthwork quantities were obtained from the Inroads models developed during the preliminary design, which includes the drainage channels adjacent to Ellsworth Road. The quantities were then adjusted to include manual calculations of the drainage channel from Ellsworth Road to the Powerline Floodway.

Unit price cost data was based on 1997 and 1998 costs from comparable MCDOT roadway improvement projects. The data was supported by ADOT's 1998 construction cost database, as well as cost information developed by CH2M HILL.

Unit costs for landscaping the earthen channel were categorized as "standard" and "premium". Standard landscaping costs include minimal planting and or seeding for the earthen channels. Premium landscaping consists of decorative features such as rock (river run), cacti, and desert plants. Premium landscaping is planned for the channel in the vicinity of the WGA planned entrances.

Estimated costs for relocating the City of Mesa's force main and water line are presented in Figure 6-2. Costs for private utility relocations are not presented.

Maintenance

The roadway and channel will require regular maintenance to keep the facilities in good operational condition. The roadway pavement should be rejuvenated or resurfaced every few years, and restriped every two to three years.

The drainage channel will require occasional cleaning depending on the amount of debris and sediment that enters the system. The cost of maintaining the earth channel can vary widely depending on the type of landscaping that will be used. It is recommended that desert landscaping be used, which would include rock and drought tolerant plants to minimize the maintenance of the channel.

**FIGURE 6-1: PRELIMINARY ENGINEERING CONSTRUCTION COST ESTIMATE
RECOMMENDED PLAN**

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	EXTENDED AMOUNT
✓ 1	MOB./BOND/INSURANCE/CONSTR. SURVEY	L.SUM	1	\$ 800,000.00	\$ 800,000
✓ 2	NPDES	L.SUM	1	\$ 150,000.00	\$ 150,000
3	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	L.SUM	1	\$ 35,000.00	\$ 35,000
4	REMOVE EXISTING PAVEMENT	M ²	160,071	\$ 7.20	\$ 1,152,513
5	CHANNEL EXCAVATION (MINOR ROADSIDE EARTH CHANNEL)	M ³	28,290	\$ 5.20	\$ 147,109
6 *	CHANNEL EXCAVATION (ADM P- ELLSWORTH RD. EARTH CHANNEL)	M ³	144,662	\$ 5.20	\$ 752,244
7 *	CHANNEL EXCAVATION (CONCRETE CHANNEL, ELLSWORTH RD. TO PLF)	M ³	86,780	\$ 5.20	\$ 451,256
8 *	CONCRETE CHANNEL LINING (150 MM, ELLSWORTH RD. TO PLF)	M ²	44,480	\$ 39.20	\$ 1,743,616
9	CHANNEL LANDSCAPING (STANDARD)	HA	12	\$ 6,177.40	\$ 74,747
10	CHANNEL LANDSCAPING (PREMIUM)	HA	3	\$ 24,709.70	\$ 71,658
11 *	RIP RAP, FURNISH AND INSTALL	M ³	107	\$ 32.70	\$ 3,499
12	CONCRETE HEADWALL (MAG DET 501, TYPE U)	EA	1	\$ 3,000.00	\$ 3,000
13	CATCH BASIN (MAG DET 532, TYPE C)	EA	82	\$ 2,000.00	\$ 164,000
14	24" RGRCP	M	1,754	\$ 213.30	\$ 374,086
15	30" RGRCP	M	1,271	\$ 213.30	\$ 271,104
16	36" RGRCP	M	964	\$ 278.90	\$ 268,720
17	42" RGRCP	M	1,338	\$ 328.10	\$ 438,932
18	48" RGRCP	M	244	\$ 656.20	\$ 159,982
19	STORM DRAIN MANHOLE (P-1520, 522)	EA	30	\$ 2,700.00	\$ 81,000
20 *	CONCRETE BOX CULVERT (10' X 6') - Pecos Culvert	M	24	\$ 3,608.90	\$ 88,057
21 *	CONCRETE BOX CULVERT (3- 12' X 6') - Ellsworth Culvert	M	61	\$ 6,889.80	\$ 420,278
22 *	CONCRETE BOX CULVERT EXTENSION (14' X 6.5') - Ray Culvert	M	46	\$ 3,937.00	\$ 179,921
23 *	CONCRETE BOX CULVERT (3- 8' X 6') - Ellsworth Culvert	M	61	\$ 5,249.30	\$ 320,207
24 *	CONCRETE BOX CULVERT (3- 12' X 6') - WGA Access 1 Culvert	M	31	\$ 5,249.30	\$ 160,104
25 *	CONCRETE BOX CULVERT (3- 12' X 6') - WGA Access 2 Culvert	M	31	\$ 5,249.30	\$ 160,104
26 *	CONCRETE BOX CULVERT (3- 12' X 6') - WGA Access 3 Culvert	M	31	\$ 5,249.30	\$ 160,104
27 *	ACCESS ROADS (3)	M ²	2,044	\$ 75.30	\$ 153,898
28	ROADWAY EXCAVATION (5-LANE SECTION)	M ³	64,000	\$ 5.20	\$ 332,800
29	AGGREGATE BASE, CLASS 2 (5-LANE SECTION)	T	102,333	\$ 10.50	\$ 1,074,497
30	ASPHALTIC CONCRETE, 100 mm (5-LANE SECTION)	T	40,631	\$ 26.50	\$ 1,076,722
31	ROADWAY EXCAVATION (ADDITIONAL LANES)	M ³	9,000	\$ 5.20	\$ 46,800
32	AGGREGATE BASE, CLASS 2 (ADDITIONAL LANES)	T	10,886	\$ 10.50	\$ 114,303
33	ASPHALTIC CONCRETE, 100 mm (ADDITIONAL LANES)	T	4,720	\$ 26.50	\$ 125,080
34	CONCRETE MEDIAN CURB	M	12,893	\$ 19.70	\$ 253,992
35	CONCRETE CURB & GUTTER	M	11,125	\$ 27.90	\$ 310,393
36	SIDEWALK	M ²	11,520	\$ 21.50	\$ 247,671
37	SIGNING	L.SUM	1	\$ 35,000.00	\$ 35,000
38	STRIPING (5-LANE SECTION)	M	57,455	\$ 0.70	\$ 40,219
39	STRIPING (ADDITIONAL LANES)	M	19,172	\$ 0.70	\$ 13,420
40 *	FENCE	M	610	\$ 32.80	\$ 19,995
✓ 41	MAINTENANCE AND PROTECTION OF TRAFFIC	L.SUM	1	\$ 400,000.00	\$ 400,000
42	ELECTRICAL CONDUIT (PVC W/ PULLBOXES)	M	9,601	\$ 13.80	\$ 132,497
43	SIGNALIZATION (GERMANN RD.)	L.SUM	1	\$ 125,000.00	\$ 125,000
44	SIGNALIZATION (ELLIOT ROAD)	L.SUM	1	\$ 125,000.00	\$ 125,000
45	SUBGRADE PREPARATION	M ²	81,989	\$ 0.90	\$ 73,790
46	STREET LIGHTING	M	2,131	\$ 74.00	\$ 157,694
CONSTRUCTION COST					\$ 13,258,526
✓	DESIGN COST @ 10%				\$ 1,325,900
✓	CONSTRUCTION MANAGEMENT @ 15%				\$ 1,988,800
*	R/W NEEDED FOR CHANNEL (ELLSWORTH TO PLF)				\$ 233,000
✓	UTILITY RELOCATIONS				\$ 54,700
✓	COMMUNITY RELATIONS @ 1/2%				\$ 66,300
✓	PROJECT ADMINISTRATION BY MCDOT @ 12%				\$ 1,591,000
TOTAL PROJECT COST					\$ 18,518,226



* = Channel costs
✓ = Shared costs



8.1 acres
25,000 sq ft

FIGURE 6-2: UTILITY RELOCATION COSTS

ITEM NUMBER	RELOCATE WATER MAIN	UNIT	QUANTITY (BOTH CROSSINGS)	UNIT PRICE	EXTENDED AMOUNT
1	TRENCH EXCAVATION AND BACKFILL	M	86	\$ 164.00	\$ 14,104
2	REMOVAL OF EXISTING PIPE	M	86	\$ 19.70	\$ 1,694
3	HAUL AND DISPOSE OF EXISTING PIPE	M	86	\$ 6.60	\$ 568
4	INSTALL NEW WATER MAIN	M	86	\$ 127.95	\$ 11,004

ITEM NUMBER	RELOCATE FORCE MAIN	UNIT	QUANTITY (BOTH CROSSINGS)	UNIT PRICE	EXTENDED AMOUNT
1	TRENCH EXCAVATION AND BACKFILL	M	86	\$ 164.00	\$ 14,104
2	REMOVAL OF EXISTING PIPE	M	86	\$ 19.70	\$ 1,694
3	HAUL AND DISPOSE OF EXISTING PIPE	M	86	\$ 6.60	\$ 568
4	INSTALL NEW FORCE MAIN	M	86	\$ 127.95	\$ 11,004

TOTAL COST \$ 54,700



Implementation Plan

Construction

It is MCDOT's intent to proceed with the final design and construction of Ellsworth Road from Germann Rd. to Baseline Road. The project has been in the County's roadway improvement program for some time. Final design is expected to begin in the Fall/Winter 1999, with construction to begin by 2001.

Construction of Ellsworth Road could be let as a single project or as smaller multiple projects depending on available funds and programming. It is recommended that the Ellsworth Road drainage channel be constructed as part of the roadway improvements, since its function is integral to the roadway drainage system.

The developers along the corridor as part of the development requirement are doing much of the construction improvements from Elliot Road to Baseline Road for the City of Mesa. The remaining 5-mile section from Germann Road to Elliot Road, in itself, is a significant earthwork and roadway paving project. If let as a single project, it would likely attract medium and large size contractors, which is a good environment for competitive pricing. This is the recommended construction approach.

If Ellsworth Road is let in multiple projects, it is recommended that construction be phased based on roadway limits (sections) beginning with construction at the north end and working south. Although disruption to the public would extend over a longer period, it could be minimized if no more than two projects are let.

Inter-Governmental Agreement

MCDOT has drafted IGAs with the City of Mesa and FCDMC to address the cost share among the agencies. It is intended that MCDOT will be the lead agency for design and construction of the improvements, which will meet the City's roadway standards for a major arterial. Upon completion, the City would take over the roadway and the roadway incorporated into the City's street system.

The FCDMC and the City of Mesa will provide financial support for the construction of the ADMP channels. Upon completion, it is expected that the FCDMC will enter an agreement with the City to maintain the channels.

References

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Casa Fiesta Tempe Limited Partnership
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Ellsworth Road DCR; Germann Rd. to Baseline Rd.

Public Participation Plan Results

PREPARED FOR: Maricopa County Department of Transportation

DATE: November 30, 1998

Overview of Public Involvement Plan

The Public Involvement Plan as submitted in September 1998, identifies the goals and purpose for conducting a public meeting during the DCR study, as well as a plan for executing it. A copy of the Plan is attached (Exhibit A).

The underlying purpose of holding a public information meeting is to provide an opportunity for review of the preliminary plan and to foster open dialogue with interested and/or affected parties. This is key to maintaining good will among the stakeholders and the public.

One of the primary functions of the Public Involvement Plan is to optimize the benefit of the public information meeting. Through preparation of the plan, the design team must layout the expectations and mechanics of the meeting in detail. Roles and responsibilities are predetermined along with the meeting schedule, location, and general format. It is this planning effort well in advance of the Public Information Meeting that ensures the most input to the project and benefit for the stakeholders.

A preview meeting was conducted with MCDOT staff and the City of Mesa on October 26, 1998 to review the expectations of the public meeting. It was generally concluded that because of the nature and general location of the project, there would likely be few individuals attending the public meeting. Property owners adjacent to the project were expected to be the majority of those attending. Thus it was predicted that approximately 10 to 20 individuals would show.

The roles and responsibilities of MCDOT and the CH2M HILL project team were discussed in the preview meeting and executed according to the plan. The following table summarizes those items that differed between what was expected and what actually occurred.

What was Expected (Public Involvement Plan)	What Actually Happened
<p>27 Direct Mailings</p> <p>Public Meeting: October 1998.</p> <p>Location: Desert Mountain Elementary School, Queen Creek (option)</p> <p>10 – 20 Stakeholders attending</p> <p>Modified Open House format – brief presentation and use of writing tablets to record comments.</p>	<p>83 Direct Mailings</p> <p>November 3, 1998</p> <p>Williams Gateway Airport General Meeting Room.</p> <p>11 Stakeholders attended.</p> <p>One-on-one presentation with personal assistance and discussion of proposed plan.</p>

Although the Ellsworth Road Public Information Meeting did not necessarily play out as originally anticipated, nevertheless, it was effective and considered successful.

Public Information Meeting

The Public Information meeting was held November 3, 1998 from 5:00 PM to 7:00 PM at the WGA General Meeting Room. Among the attendees were representatives from WGA, City of Mesa, Town of Queen Creek, TRW, and Harris Cattle Company. The location was best suited for the stakeholders owning or representing property interests along the proposed alignment.

Since the number of attendees was relatively low, one-on-one conversations with individuals were possible. This provided a tailored approach to responding to the inquiries. Project overviews and location specific issues were presented to those expressing interest. There were no adverse concerns raised. A copy of the graphics on display at the public meeting was later mailed to Mr. Kevin Petersen, representing the land ownership south of Germann Road on the east side.

Two residents at the Public Meeting prepared comment forms, and are included in the Preliminary Summary Report prepared by MCDOT (Exhibit B). Also included in the exhibit are comments received from representatives of ADOT and ASLD. ADOT reiterated the current plans for extending the Santan Freeway, and ASLD pointed out its requirements for acquiring land from them.

Conclusions

The Public Involvement Plan was well crafted and thought out given the information available at the time. Direct mailings far exceeded the original estimate, as additional potential stakeholders were identified during project development. Public notification was coordinated by MCDOT staff in accordance with the plan (via the Mesa-Tempe Tribune).

At the meeting, display graphics (and handouts) clearly depicted the alignment and emphasized the anticipated Right-of-Way needs. As expected, Right-of-Way was the most

significant issue for the attendees. With input from the City of Mesa, it was decided that the public meeting take on a more personal approach. That is, one-on-one discussions were carried out which turned out to be more conducive to the number and character of the attendees.

Exhibit A.

**Public Involvement Plan
Ellsworth Road (Baseline Road to Germann Road)
Design Concept Report**

Maricopa County Department of Transportation
Maricopa County, Arizona
MCDOT Work Order No. 68927

1. Introduction

The following Public Involvement Plan has been developed for the Ellsworth Road (Baseline Road to Germann Road) Design Concept Report. The Plan identifies the number, purpose, and proposed schedule of the public information meeting. Areas of responsibilities are identified along with the public notification process and an initial mailing list.

2. Public Information Meeting

2.1 Public Participation Meeting Goals

Maricopa County Department of Transportation (MCDOT) goals for public meetings are:

- a. to encourage active public participation in MCDOT Project Development;
- b. to provide opportunity for open dialogue with concerned and/or affected parties (stakeholders);
- c. to identify and integrate into project stake holder-defined measures that add value;
- d. to identify or remove design features or components that stake holders feel shall have negative effect or impact on the community; and
- e. to initiate and promote good will among stakeholders and MCDOT.

2.2 Purpose of the Public Information Meeting

A public information meeting will be held to present the roadway improvement alternatives considered in the project and to provide the opportunity for the public to make any comments, concerns and issues related to these alternatives. The preliminary findings of the environmental overview will also be presented. Additional public meetings are not warranted at this time. Public meetings were held during the previous study of the Ellsworth corridor that covered the majority of the area encompassed by this Design Concept Report.

EXHIBIT A

2.3 Schedule

The public information meeting will be held in October 1998.

2.4 Meeting Format

The format of the public information meeting will be a modified open house format with a brief formal presentation by CH2M HILL to describe the proposed alternatives. The public information meeting will have detailed notes prepared by CH2M HILL on the comments and issues raised during the meeting. Easels with writing tablets and markers will be placed next to graphic displays to record comments made by the attendees.

2.5 Meeting Location

MCDOT will arrange the location of the meeting. MCDOT will need a minimum of six (6) weeks prior notice to arrange site location certificate of insurance, etc. The Desert Mountain Elementary School, 22301 S. Hawes Road, Queen Creek, is in the vicinity of the project area and has facilities that would accommodate a meeting.

2.6 Responsibilities

MCDOT will be responsible for notification of the County Transportation Advisory Board, and the MAG Transportation Planning Office of the public meeting and public notification of the meeting. The MCDOT Project Manager shall:

- a. coordinate with CH2M HILL and Logan Simpson Design (LSD) to identify key partners and government agencies;
- b. initiate a Public Meeting Request to the MCDOT Public Events Coordinator no later than six weeks prior to meeting date;
- c. coordinate with CH2M Hill and LSD to determine necessary information to provide at public meeting;
- d. attend public meeting;
- e. meet with the Public Events Coordinator to develop follow-up communication plan in post-meeting sessions.

The MCDOT Public Events Coordinator shall:

- a. arrange meeting with MCDOT Project Manager to initiate Public Involvement Plan;
- b. coordinate public meeting activities with CH2M HILL and LSD;
- c. arrange meeting location, execute facility rental agreements, American with Disabilities Act notices, and provide insurance certificate as required;

-
- d. write and oversee print production of meeting notices and coordinate distribution with LSD if needed;
 - e. provide sign-in sheets, badges, easels, audio/visual equipment, trail signs and comment cards;
 - f. attend public meeting;
 - g. prepare "morning after" report following the public meeting; and
 - h. meet with the MCDOT Project Manager to develop follow-up communication plan in post-meeting sessions.

The Communications Coordinator for MCDOT shall:

- a. write and disseminate press releases as needed;
- b. review newsletter and special notices prepared by MCDOT Public Events Coordinator and LSD as needed;
- c. contract for paid advertisement as required; and
- d. write and disseminate press kits or releases as needed.

CH2M HILL and LSD shall:

- a. provide names and mailing addresses for key government agencies or stakeholders involved in the project;
- b. provide for public meetings: aerial photography of the project area and a minimum of 100 (or a quantity as otherwise agreed to) project fact sheets or handouts outlining project design, purpose and scope;
- c. provide mounted presentation graphics for public meeting (one station will suffice for this project's public meeting);
- d. provide for the public meeting graphics of the proposed improvements showing alignments cross sections, drainage plans and right-of-way; and
- e. attend public meeting.

MCDOT will monitor the meeting, and CH2M HILL will make the technical presentation on the project. CH2M HILL will prepare meeting summary.

2.7 Preview Meeting

At least three weeks prior to the public information meeting date, a preview meeting with MCDOT, CH2MHILL, and LSD staff will be held to review the meeting format, layout of meeting, setup time, presentation materials, graphics, handouts and sign-in sheet. The MCDOT Public Meeting Initiation Checklist will be reviewed at that time.

3. Public Notification

Several techniques will be employed to notify the public of the study and upcoming meetings as well as to solicit public input for the environmental documentation. Direct mail and public notices will be used throughout the project to notify the affected interests.

3.1 Mailing List

An initial mailing list is presented in Section 4.0 Mailing List. As concerned public agencies and affected interests are identified during the project, they will be added to the mailing list and contacted. CH2M Hill will develop a database of property owners and business owners/managers affected by the potential roadway improvement project and provide the information to LSD. LSD will be responsible for the updating of the mailing list throughout the project period.

3.2 Direct Mail

Participating agencies and affected interests will receive direct mailings on the meeting schedule and location. LSD will disseminate meeting notices to public agencies, affected parties and property/business owners that may be affected by the proposed roadway improvement project. MCDOT Public Events Coordinator will be responsible for the printing and postage for other direct mailings and materials to any other individuals or agencies.

3.3 Public Notices

Public notices, at least two weeks prior to any public meetings or hearing, will appear in local newspapers. MCDOT Communication Coordinator will be responsible for preparing and publishing the public notices.

3.4 Schedule of Notification

Notification will occur for two consecutive weeks, with the initial notice appearing at least 15 working days prior to the meeting. Individual written notification of agencies and affected interests will be mailed two weeks prior to all the agency and public meeting dates.

4. Mailing/Contact Lists

4.1 Federal, State and Local Agencies

Federal

U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service

State

Arizona Department of Environmental Quality
Arizona Department of Public Safety
Arizona Department of Transportation*
Arizona Game & Fish Department
Arizona State Land Department*

County

Maricopa County
Pinal County

Municipalities

City of Mesa
Town of Queen Creek
Town of Gilbert

Interested Parties

Augusta Ranch
Williams Gateway Airport
TRW Vehicle Safety Systems
Olin
General Motors Desert Proving Grounds
Las Palmas Grande
Mesquite Canyon
Navajo Nation
Salt River Project
Gila River Indian Community
Baker Rubber
ASU East

Mitsubishi
Union Pacific Railroad
Harris Cattle Company

4.2 Specific Agency/Interested Parties Contacts

MCDOT

2901 West Durango St.
Phoenix, AZ 85009

- Mr. Joel Lieberman, P.E.
MCDOT Zone Engineer
Phone: 506-8626
E-mail: lieber@engrow.mcdot.maricopa.gov

- Dave DeWeese, Assistant Project Manager
Phone: 506-6167
E-mail: davedeweese@mail.maricopa.gov

City of Mesa

320 East Sixth Street
P.O. Box 1466
Mesa, AZ 85211-1466

- Keith Nath, City Engineer
Phone: 644-2512

- Anthony Araza, Transportation Engineer
Phone: 644-3556
Fax: 644-3130

- Peter Knudson Engineering Design Services (*initial contact*)
Phone: 644-2514

Arizona State Land Department

1616 W. Adams
Phoenix, AZ 85007

- Sheila McCafferty, Manager of ROW Section (*initial contact*)
Phone: 542-2648
- Toni Soderman, ROW Administrator
Phone: 542-2656

Williams Gateway Airport

6001 S. Power Rd.
Building 41
Mesa, AZ 85206

- Trish Shaffstall, Planning Manager
Phone: 602/988-1013
Fax: 602/988-2315

TRW Vehicle Safety Systems

11202 East Germann Road
Queen Creek, AZ 85242-9361

- Walt Vail, Senior Facilities Engineer
Phone: 602/987-4808
Fax: 602/987-4851

Olin

6550 S. Mountain Road
P.O. Box 10099
Mesa, AZ 85216-0099

- Bob Szabo, Facility Manager
Phone: 987-7070
FAX: 987-7197

General Motors Desert Proving Ground

13303 South Ellsworth Road

P.O. Box 0100

Mesa, AZ 85216-0100

- Jack Sellers, Manager of Facilities

Phone: 827-5108

Fax: 827-5320

Salt River Project

Ken Swiegart

Phone: 236-0850

Developers

Baseline to Guadalupe; East side: Augusta Ranch

Developer: Communities Southwest; Ron Bruster (265-1952)

Engineer: American Engineering; Scott Larson (582-0260)

Half mile north of Guadalupe; West side: Las Palmas Grande

Developer: unkown

Engineer: American Engineering; Scott Larson (582-0260)

Half mile south of Guadalupe; East side: Mesquite Canyon

Developer: Continental Homes

Engineer: CVL; Paul Siders

Exhibit B.

Summary of MCDOT Public Meeting
Ellsworth Road: Germann Road to Baseline Road
MCDOT Project No. 68927
November 4, 1998

Preliminary Report

Meeting Date: November 3, 1998, 5:00 p.m. - 7:00 p.m.

Meeting Site: Williams Gateway Airport
Building 41, Front Street
Mesa, AZ

Meeting

Purpose: Public Involvement: To discuss the project with the public and obtain public comments.

Participants: Dave DeWeese, MCDOT Project Manager
Roberta Crowe, MCDOT Community Relations
Sarah King, ACS Representative
Tom Wolf, CH2MHILL consultant
J. D. Walker, CH2MHILL consultant
Diane Simpson-Colebank, LSD consultant
Dan Frank, Dibble and Associates

Public Comments

Seventeen people attended this meeting. Comment sheets were distributed to those in attendance and collected. Among those attending were Peter Knudson, City of Mesa and Anthony Araza, City of Mesa. Representatives from GM and Airport Authority were also in attendance.

Two attendees found the MCDOT staff to be "Very helpful" and "Very knowledgeable." Two attendees heard about the meeting via a MCDOT mailing and one attendee heard about the meeting via an associate.

Please note: No written public comments were submitted. However, several attendees requested additional comment sheets to mail in at a later date.

A final report will be disseminated in two weeks to allow time for mail-in responses.

For more information about the plan, contact Dave DeWeese, MCDOT Project Manager at 506-6167 or Roberta Crowe, MCDOT Public Events Coordinator at 506-8003.

EXHIBIT B



November 3, 1998

Citizen Comments

Maricopa County Department of Transportation

Ellsworth Road/ Germann to Baseline

Project number: 68927 -Project Manager: Dave DeWeese, 506-6167

Please complete and submit this card to a staff member before leaving or mail to Maricopa County Department of Transportation, Attn: Dave DeWeese, 2901 W. Durango St., Phoenix, AZ 85009. Include your name and mailing address so we can respond to your questions. Please Print.

Name: _____ Phone number: _____

Address: _____

Meeting Survey

How would you rate the knowledge and helpfulness of staff members who assisted you?

- | | |
|---|---|
| <input type="checkbox"/> Very knowledgeable // | <input type="checkbox"/> Very helpful // |
| <input type="checkbox"/> Somewhat knowledgeable | <input type="checkbox"/> Somewhat helpful |
| <input type="checkbox"/> Not very knowledgeable | <input type="checkbox"/> Not very helpful |

Was all the project information presented in an understandable manner? Yes / _____ No _____

Did staff answer your questions? Yes // _____ No _____. If not, what didn't they answer?

Do you want more information about MCDOT projects? Yes _____ No / _____. If yes, please make sure your name and address are filled in so we can add you to our mailing list.

How did you hear about the meeting?

Newspaper _____ Radio _____ Flyers // _____ Trail Signs _____

Friends/Neighbors _____ Other (please comment) // _____

Additional Comments or Questions: _____



Citizen Comments

Maricopa County Department of Transportation

Ellsworth Road/ Germann to Baseline

Project number: 68927 -Project Manager: Dave DeWeese, 506-6167

Please complete and submit this card to a staff member before leaving or mail to Maricopa County

Department of Transportation, Attn: Dave DeWeese, 2901 W. Durango St., Phoenix, AZ 85009. Include your name and mailing address so we can respond to your questions. Please Print.

Name: Don Knight II Phone number: 827-5580

Address: 13303 S. Ellsworth Rd Mesa Az

Meeting Survey

How would you rate the knowledge and helpfulness of staff members who assisted you?

Very knowledgeable

Somewhat knowledgeable

Not very knowledgeable

Very helpful

Somewhat helpful

Not very helpful

Was all the project information presented in an understandable manner? Yes No

Did staff answer your questions? Yes No . If not, what didn't they answer?

Do you want more information about MCDOT projects? Yes No . If yes, please make sure your name and address are filled in so we can add you to our mailing list.

How did you hear about the meeting?

Newspaper Radio Flyers Trail Signs

Friends/Neighbors Other (please comment) _____

Additional Comments or Questions: _____



Citizen Comments

Maricopa County Department of Transportation

Ellsworth Road/ Germann to Baseline

Project number: 68927 -Project Manager: Dave DeWeese, 506-6167

Please complete and submit this card to a staff member before leaving or mail to Maricopa County

Department of Transportation, Attn: Dave DeWeese, 2901 W. Durango St., Phoenix, AZ 85009. Include your name and mailing address so we can respond to your questions. Please Print.

Name: Allan, Eileen Phone number: 987-3031

Address: 18602 E. Cloud Rd, AZ

Meeting Survey

How would you rate the knowledge and helpfulness of staff members who assisted you?

- Very knowledgeable
- Somewhat knowledgeable
- Not very knowledgeable
- Very helpful
- Somewhat helpful
- Not very helpful

Was all the project information presented in an understandable manner? Yes No

Did staff answer your questions? Yes NA No . If not, what didn't they answer?

Do you want more information about MCDOT projects? Yes No . If yes, please make sure your name and address are filled in so we can add you to our mailing list.

How did you hear about the meeting?

Newspaper Radio Flyers Trail Signs

Friends/Neighbors Other (please comment) same

Additional Comments or Questions: _____

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION



SIGN-IN SHEET

PLEASE PRINT

NAME	ADDRESS	PHONE
Elliot Renler	35 W. Calle De Arcos Tempe AZ 85284	838-8359
TRISH SHAFFSTALL	6001 S. POWER RD BLDG 41 MESA AZ 85206	988-1013
Mary Baldwin	"	"
Diane Simpson-Colebank	LSD	967 1343
DAVE DEWESE	MCDOT	506-8626
JAN FRANK	DIBBLE & ASSOC. 2633 E. 6001 INDIAN SCHOOL RD #401	957-1155
Kevin Petersen	5861 S. Kyrene #2 Tempe, AZ 85283	(402) 540-8151
John A. Muehlen	3205 S Dennis Dr Tempe 85282	890 3197
LEO W. HUBERT, III	6001 S. POWER RD, BLDG 41	988-1013
Mike Dawson	MCDOT	506-3961

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION



SIGN-IN SHEET

PLEASE PRINT

NAME	ADDRESS	PHONE
Dave Tomlinson	8865 E. Baseline rd Mesa	833-2223
Tom Hillman	9201 N. 25th Ave Phoenix	944-6564
Peter Knudsen	P.O. Box 1466, Mesa, 85203	644-2514
Dick Schaner	Town of Q.C. 22350 S. Ellsworth	987-9887
Don Wright	3520 E Isabella Ave Mesa	892-8332
Aileen Allan	18602 E Cloud Rd Q.C.	987-303
Cherie Freeman	7373 E N Scottsdale Rd #162B	483-2222
Albert Fuentes	19807 E. Chandler Heights Rd. Queen Creek, AZ 85242	987-0789



JANE DEE HULL
GOVERNOR

Arizona
State Land Department

1616 WEST ADAMS
PHOENIX, ARIZONA 85007



J. DENNIS WELLS
STATE LAND COMMISSIONER

FACSIMILE COVER PAGE

DATE: 10/26/98

TO: Digne Simpson - Colobank

FAX NUMBER: 966-9232

FROM: MARK HLEWER

NUMBER OF PAGES INCLUDING COVER: 2

ANY QUESTIONS, CONTACT ME AT: (602) 542-2134

FAX NUMBER: (602) 542-2676

REMARKS: As requested.

Ellsworth Road (Germann Road to Baseline Road) Design Concept Report

Comments: Should additional right of way
be established, a right of way application
would need to be processed. ASUTD would
be opposed to any limited or controlled
access. Please contact Mark Kelley
at 542-2134 for any additional
information.

Ellsworth Road (Germann Road to Baseline Road) Design Concept Report

Comments: The Santan Freeway will parallel Ellsworth Road from Warner Road to US60. See attachment for conceptual alignment. Traffic interchanges for the freeway are planned at Hawes Road, Elliot Road, Guadalupe Road, Baseline Road and the Superstition Freeway.

Construction is scheduled for US60 to Elliot from November 2006 to October 2008, and from July 2008 to June 2010 south of Elliot.

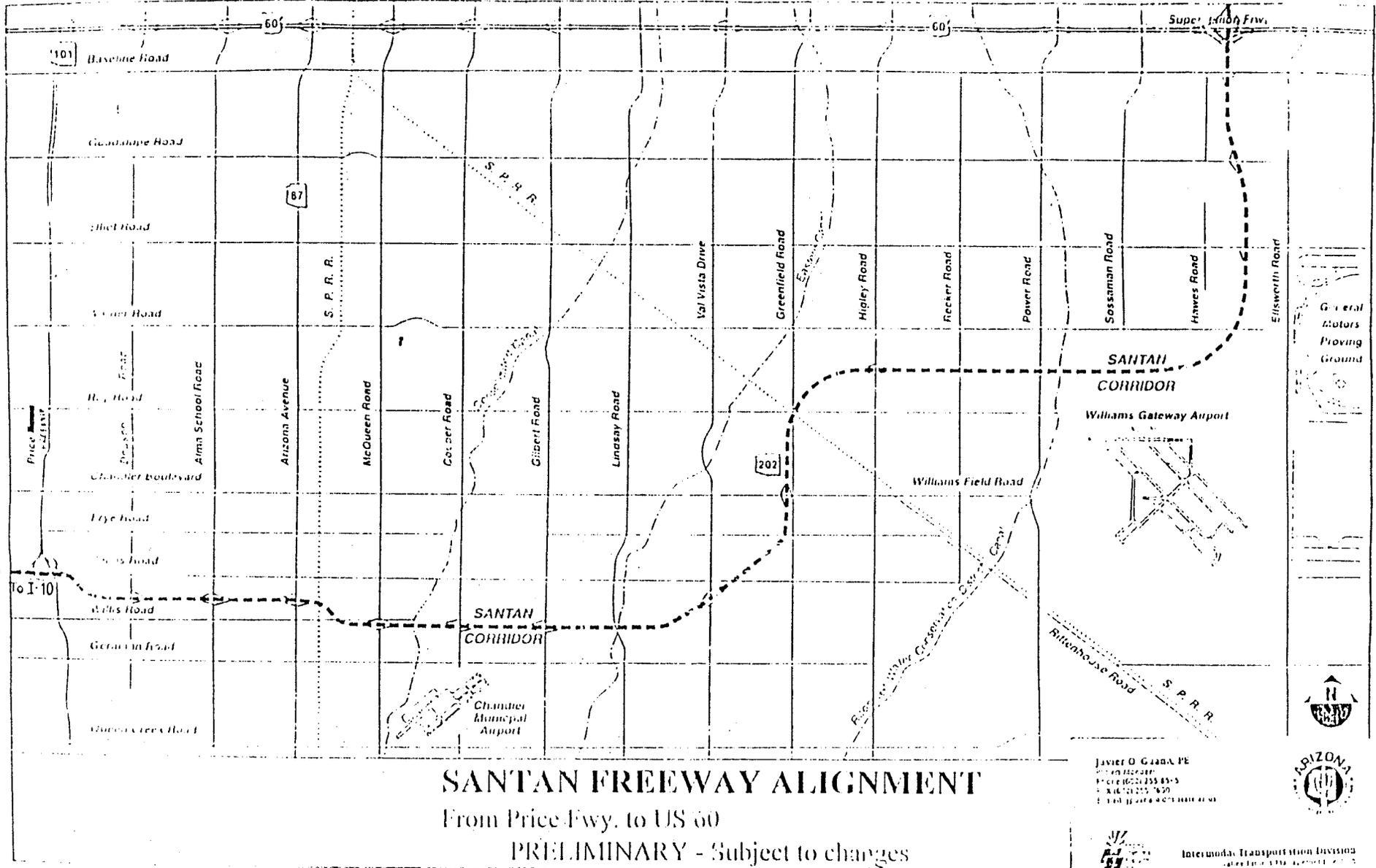
The City of Mesa is looking into the possibility of advancing the construction of the freeway in the area, so it can be open to traffic by the end of 2005.

I won't be able to attend, but you can contact me at 712-8545 if you have questions or require additional information.

JAVIER O. GUANA, P.E.

PROJECT MANAGER

ADOT-VALLEY PROJECT MANAGEMENT



SANTAN FREEWAY ALIGNMENT
 From Price Fwy. to US 60
 PRELIMINARY - Subject to changes

Javier O. Grana, PE
 License No. 10000
 Phone (602) 255-8315
 Fax (602) 255-7620
 E-mail jgrana@dotd.state.az.us



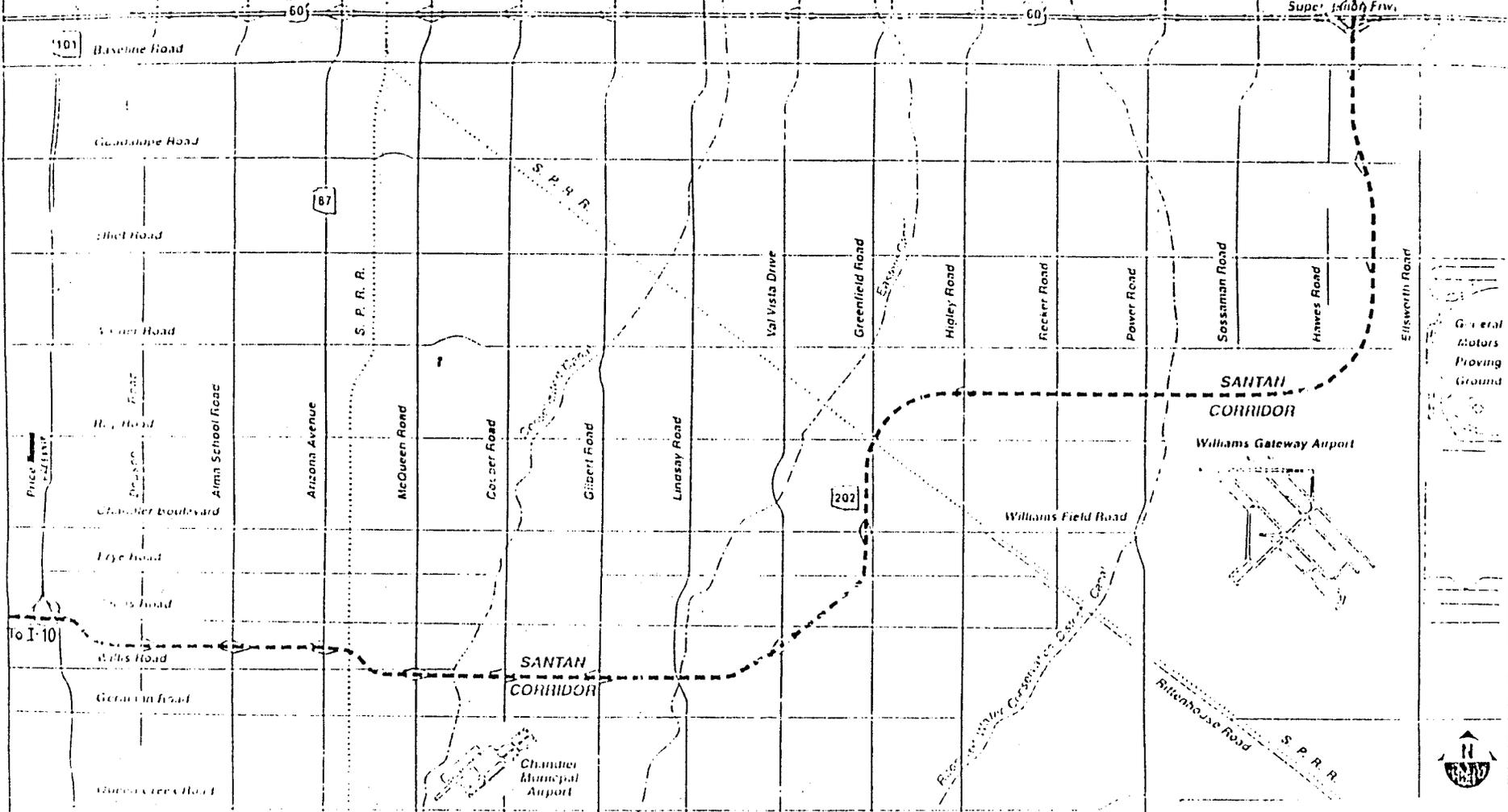
Intermodal Transportation Division
 1700 North Central Expressway
 Phoenix, Arizona 85004
 (602) 255-7620



General Motors Proving Ground



Williams Gateway Airport



60 Super Junction Fwy.

101 Blavenne Road

Gaudin Road

Elliot Road

Venter Road

H. J. Road

Chandler Boulevard

Eye Road

Lewis Road

Wilks Road

Germain Road

University Road

187

202

60

60

Super Junction Fwy.

SANTAN CORRIDOR

SANTAN CORRIDOR

Chandler Municipal Airport

Williams Gateway Airport

Williams Field Road

River Valley Corridor to Chandler Canal

Rittenhouse Road

S. P. R. R.

Ellsworth Road

Sossaman Road

Power Road

Recker Road

Higley Road

Greenfield Road

Val Vista Drive

Lindsay Road

Gilbert Road

Cooper Road

McQueen Road

Arizona Avenue

Airm School Road

Driscoll Road

Price Fwy.

To I-10

General Motors Proving Ground

Appendix B.

1990 Census of Population and Housing: Summary Tape File 3A

Project # 98-5112

	Maricopa County Tract Number 4226.01	Maricopa County Tract Number 4226.11	Maricopa County Tract Number 5227.03 ^a	Maricopa County Tract Number 5228		Tract Total	Maricopa County Total	Tract Total as % of County
Total Population	8152	6070	12446	2471		29139	2122101	1.4%
In Labor Force	2823	2209	5780	1341		12153	1079401	1.1%
% in Labor Force	43.4%	46.0%	60.6%	81.1%			66.5%	
Civilian Labor Force	2815	2199	5752	500		11266	1070667	1.1%
Employed	2693	2066	5487	490		10736	1005925	1.1%
Unemployed	122	133	265	10		530	64742	0.8%
% Unemployment	4.3%	6.0%	4.6%	2.0%		4.7%	6.0%	
All persons 18+ for whom poverty status is determined	8689	6266	8638	1290		24883	1799202	1.4%
Below Poverty	672	524	936	42		2174	185392	1.2%
	7.7%	8.4%	10.8%	22.1%		8.7%	10.3%	
Mobility Disability Of persons 16-64 (4159)	158	224	235	7		624	56942	1.1%
White	4159	4791	8338	813		3.5%	3.6%	1.1%
	7835	5726	9767	1965		25293	1801570	1.4%
	96.1%	94.3%	78.5%	79.5%		86.8%	84.9%	
African American	46	23	65	252		386	74295	0.5%
	0.6%	0.4%	0.5%	10.2%		1.3%	3.5%	
Native American	29	18	155	37		239	38309	0.6%
	0.4%	0.3%	1.2%	1.5%		0.8%	1.8%	
Asian	51	0	125	103		279	35208	0.8%
	0.6%	0.0%	1.0%	4.2%		1.0%	1.7%	
Others	191	303	2334	114		2942	172719	1.7%
	2.3%	5.0%	18.8%	4.6%		10.1%	8.1%	
Hispanic	640	664	3375	114		4793	340117	1.4%
	7.9%	10.9%	27.1%	4.6%		16.4%	16.0%	
Age>60	3082	2104	1022	0		6208	327945	1.9%
	37.8%	34.7%	8.2%	0.0%		21.3%	15.5%	
Households	3201	2391	3476	649		9717	808162	0.8%
Female Head of Household (HH Type&Age&Presence	198	159	243	11		611	79646	0.8%
	6.2%	6.6%	7.0%	1.7%		6.3%	9.9%	

NRHP CRITERION

- A. Are associated with events that have made a significant contribution to the broad patterns of our history or
- B. Are associated with the lives of persons significant in our past or
- C. Embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction or
- D. Have yielded, or may be likely to yield, information important in prehistory or history.

Ordinarily, cemeteries, birthplaces, and graves of historical figures, properties owned by religious institutions, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years are not considered eligible for the National Register. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories:

1. A religious property deriving primary significance from architectural or artistic distinction or historical importance.
2. A building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event.
3. The birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with his or her productive life.
4. A cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events.
5. A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived.
6. A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own historical significance.
7. A property achieving significance within the past 50 years if it is of exceptional importance.

THE STATE



OF ARIZONA

GAME & FISH DEPARTMENT

2221 West Greenway Road, Phoenix, Arizona 85023-4399 (602) 942-3000

Governor
Fife Symington

Commissioners:
Chairman, Nonie Johnson, Snowflake
Michael M. Golightly, Flagstaff
Herb Guenther, Tacna
Fred Belman, Tucson
M. Jean Hassell, Scottsdale

Director
Duane L. Shroufe

Deputy Director
Thomas W. Spalding

Mesa Office, 7200 E. University, Mesa, Arizona 85207 (602) 981-9400

March 19, 1997

Mr. Mickey Tomalczyk
Logan Simpson & Dye LLC
398 S. Mill Avenue, Suite 200
Tempe, Arizona 85281

Re: Ellsworth Road to Hunt Highway Corridor Study; Maricopa County
Department of Transportation; MCDOT Work Order No. 80510

Dear Mr. Tomalczyk:

The Department's Heritage Data Management System has been accessed and current records show that the special status species listed below have been documented as occurring in the study vicinity.

****note** the following is based on October 1996 Draft WSCA**

<u>COMMON NAME</u>	<u>SCIENTIFIC NAME</u>	<u>STATUS</u>
Sonoran desert tortoise	<u>Gopherus agassizii</u>	WC, S

STATUS DEFINITIONS

S - Sensitive. Species classified as "sensitive" by the Regional Forester when occurring on lands managed by the U.S.D.A. Forest Service.

WC - Wildlife of Special Concern in Arizona. Species whose occurrence in Arizona is or may be in jeopardy, or with known or perceived threats or population declines, as described by the Department's listing of **Wildlife of Special Concern in Arizona** (WSCA, in prep.) October 1996 Draft.

At this time, the Department's comments are limited to the special status species information provided above. This correspondence does not represent the Department's evaluation of impacts to wildlife or wildlife habitat associated with activities occurring in the subject area. Please note that the Department normally requests a minimum of thirty days to allow for processing document requests such as this.

Mr. Mickey Tomalczyk
March 19, 1997
2

Thank you for the opportunity to provide this information. If you have further questions, please contact me at 981-9309 extension 229. We look forward to the opportunity to comment on the future environmental assessment.

Sincerely,


Natalie Robb
Habitat Specialist

NJR:nr

cc: Kelly Neal, Regional Supervisor, Region VI
David L. Walker, Project Evaluation Program Supervisor,
Habitat Branch

AGFD# 02-28-97(04)



*Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
(602) 506-1501
FAX: (602) 506-4601*

March 18, 1997

Mickey J. Tomalczyk
Project Environmental Planner
Logan Simpson & Dye, LLC
398 S. Mill Avenue, Suite 200
Tempe, AZ 85281

**RE: Ellsworth Road-Elliot Road to Hunt Highway Corridor Study
McDOT Work order No. 80510**

Dear Mr. Tomalczyk:

Thank you for your letter of March 12, 1997 regarding the above reference McDOT project.

The Flood Control District currently has two (2) projects in the final design or conceptual planning stages that may be affected by improvements to Ellsworth Road. These two projects are described below:

Rittenhouse Drainage Improvement Project

Phase II of the Rittenhouse Drainage Improvement Project (RDIP) will extend the project southeast along the Southern Pacific Transportation Companies' Railroad to the Queen Creek Road alignment. At this point the RDIP turns east, on the south side of the section line and continues 3000' east to Ellsworth Road. This project is scheduled to go to construction in January 1998. Construction on Phase I of the project, which consists of channel improvements from east of Power Road to Germann Road began in December 1996 and will be completed in June 1997.

The drainage improvements consist of constructing an earthen channel along the Rittenhouse Road/Southern Pacific Railroad alignment from the East Maricopa Floodway to the intersection of Ellsworth Road and Queen Creek Road, a distance of approximately six miles. Safety and operational improvements to Ellsworth Road may require relocating or reconstructing the outfall from the Rittenhouse Drain.

Southeast Mesa Area Drainage Master Plan (SMADMP)

The SMADMP is a drainage alternatives study that covers eastern Maricopa County, including portions of Mesa, Town of Gilbert, Town of Queen Creek, and unincorporated Maricopa County. The plan will provide communities and developers a long range comprehensive plan for drainage infrastructure construction requirements. To date the District has developed three conceptual drainage alternatives, and is now in the process of presenting these concepts to the City of Mesa, MCDOT, ADOT, developers, and the public for comment and input. We anticipate that the alternative for further

development will be identified by April 1997. The three alternatives under analysis consist of a system of detention basins, lined conveyance channels, and earthen channels. The study area is bounded in the south by Queen Creek Road, to the east by Meridian Road, to the north by the CAP canal, and to the west by the East Maricopa Floodway.

Please forward a copy of the draft environmental document and preliminary plans for the Ellsworth Road Corridor Study when available for review. We look forward to continued coordination with McDOT regarding flood control and highway projects. If you have any questions regarding either of these projects please contact me or the project manager, Scott Clement at 506-1501.

Sincerely,



Douglas B. Stroup
Environmental Program Manager

cc: S. Clement, PPM
C. Sepplefrick, McDOT



FIFE SYMINGTON
GOVERNOR

Arizona
State Land Department

1616 WEST ADAMS
PHOENIX, ARIZONA 85007



J. DENNIS WELLS
STATE LAND COMMISSIONER

February 27, 1997

Mr. Mickey J. Tomalczyk
Project Environmental Planner
Logan Simpson & Dye, LLC
398 South Mill Avenue, Suite 200
Tempe, Az. 85281

Re: Ellsworth Road- Elliot Road to Hunt
Highway Corridor Study
McDot Work Order No. 80510

Dear Mr. Tomalczyk:

Enclosed is a map depicting Arizona State Trust lands in the above referenced project. Should your require further assistance, please call me at 542-2134. Thank you.

Sincerely,

Mark Keller
Right of Way Administrator

MK:ma

Encl: map



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Phoenix Field Office
2015 West Deer Valley Road
Phoenix, AZ 85027-2099

In reply refer to:

1000 (020)

February 25, 1997

Mickey J. Tomalczyk
Project Environmental Planner
Logan Simpson & Dye
398 South Mill Avenue, Suite 200
Tempe, Arizona 85281

Dear Mr. Tomalczyk:

This is in response to your February 21, 1997, letter regarding the Ellsworth Road - Elliot Road to Hunt Highway Corridor Study (MCDOT Work Order No. 80510).

The proposed Corridor Study (and any recommended improvements based on this study) will have no impact on any public lands or programs that our agency is involved with in this area.

We thank you for the opportunity to comment on this proposal.

If you have any questions, please call Jim Andersen at (602) 780-8090.

Sincerely,

Michael A. Taylor
Field Manager

Rediscover Your Public Lands





DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
ARIZONA-NEVADA AREA OFFICE
3636 NORTH CENTRAL AVENUE, SUITE 760
PHOENIX, ARIZONA 85012-1936

REPLY TO
ATTENTION OF:

February 27, 1997

Office of the Chief
Regulatory Branch

Maricopa County Department of Transportation
C/O Logan Simpson & Dye, LLC
ATTN: Mr. Mickey J. Tomalczyk
398 S. Mill Avenue, Suite 200
Tempe, Arizona 85281

File Number: 974-0240-LSF

Dear Mr. Tomalczyk:

This is in response to your letter of February 21, 1997 regarding the Maricopa County Department of Transportation's plan to improve the safety and operational characteristics of Ellsworth Road between Elliot Road and Hunt Highway in Queen Creek and the several unnamed washes at (Sections 3, 4, 9, 10, 15, 16, 21, 22, 27, 28, 33, & 34 T2S, R7E; and Sections 15, 16, 21, 22, 27, 28, 33, & 34, T1S, R7E), Queen Creek, Maricopa County, Arizona.

This activity may require a Department of the Army permit issued under Section 404 of the Clean Water Act. A Section 404 permit is required for the discharge of dredged or fill material into the "waters of the United States," including adjacent wetlands. Examples of activities requiring a permit are placing bank protection, temporary or permanent stockpiling of excavated material, grading roads, grading (including vegetative clearing operations) that involves the filling of low areas or leveling the land, constructing weirs or diversion dikes, constructing approach fills, and discharging dredged or fill material as part of any other activity.

Enclosed you will find a permit application form and a pamphlet that describes our regulatory program. If you have questions, please contact Larry S. Flatau at (602) 640-5385 x 225. Please refer to file number 974-0240-LSF in your reply.

Sincerely,

Cindy Lester

Cindy Lester
Chief, Arizona Section
Regulatory Branch

Enclosure(s)



United States Department of the Interior
Fish and Wildlife Service

Arizona Ecological Services Field Office
2321 W. Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
(602) 640-2720 Fax (602) 640-2730



In Reply Refer To:

AESO/SE
2-21-97-I-162
CCN 97-0315/0325

February 28, 1997

Mr. Mickey J. Tomalczyk
Logan Simpson & Dye
398 South Mill Avenue, Suite 200
Tempe, Arizona 85281

RE: Ellsworth Road - Elliot Road to Hunt Highway Corridor Study (Work Order No. 80510)
Gilbert Road Corridor Study (Work Order No. 80511)

Dear Mr. Tomalczyk:

This letter responds to your February 14 and 21, 1997, requests for an inventory of threatened or endangered species, or those that are proposed to be listed as such under the Endangered Species Act of 1973, as amended (Act), which may potentially occur in your project area (Maricopa County). The attached list may include candidate species as well. In the past, the U.S. Fish and Wildlife Service has provided project-specific species lists and information. However, staff reductions no longer permit us to provide this detailed level of assistance. We regret any inconvenience this may cause you and hope the enclosed county list of species will be helpful. In future communications regarding this project, please refer to consultation number 2-21-97-I-162.

The enclosed list of the endangered, threatened, proposed, and candidate species includes all those potentially occurring anywhere in the county, or counties, where your project occurs. Please note that your project area may not necessarily include all or any of these species. The information provided includes general descriptions, habitat requirements, and other information for each species on the list. Also on the enclosed list is the Code of Federal Regulations (CFR) citation for each listed or proposed species. Additional information can be found in the CFR and is available at most public libraries. This information should assist you in determining which species may or may not occur within your project area. Site-specific surveys could also be helpful and may be needed to verify the presence or absence of a species or its habitat as required for the evaluation of proposed project-related impacts.

Endangered and threatened species are protected by Federal law and must be considered prior to project development. If the action agency determines that listed species or critical habitat may be adversely affected by a federally funded, permitted, or authorized activity, the action agency must request formal consultation with the Service. If the action agency determines that the planned action may jeopardize a proposed species or destroy or adversely modify proposed

critical habitat, the action agency must enter into a section 7 conference with the Service. Candidate species are those which are being considered for addition to the list of threatened or endangered species. Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we recommend that they be considered in the planning process in the event that they become listed or proposed for listing prior to project completion.

If any proposed action occurs in or near areas with trees and shrubs growing along watercourses, known as riparian habitat, the Service recommends the protection of these areas. Riparian areas are critical to biological community diversity and provide linear corridors important to migratory species. In addition, if the project will result in the deposition of dredged or fill materials into waterways or excavation in waterways, we recommend you contact the Army Corps of Engineers which regulates these activities under Section 404 of the Clean Water Act.

The State of Arizona protects some plant and animal species not protected by Federal law. We recommend you contact the Arizona Game and Fish Department and the Arizona Department of Agriculture for State-listed or sensitive species in your project area.

The Service appreciates your efforts to identify and avoid impacts to listed and sensitive species in your project area. If we may be of further assistance, please contact Tom Gatz.

Sincerely,



Sam F. Spiller
Field Supervisor

Enclosure

cc: Director, Arizona Game and Fish Department, Phoenix, AZ

8/6/97

LISTED TOTAL= 14

NAME: ARIZONA AGAVE

AGAVE ARIZONICA

STATUS: ENDANGERED

CRITICAL HABITAT: No RECOVERY PLAN: No CFR: 49 FR 21055, 05-18-1984

DESCRIPTION: HAS ATTRACTIVE ROSETTES OF BRIGHT GREEN LEAVES WITH DARK MAHOGANY MARGINS. FLOWER: BORNE ON SUB-UMBELLATE INFLORESCENCES.

ELEVATION RANGE: 3000-6000 FT.

COUNTIES: GILA, YAVAPAI, MARICOPA

HABITAT: TRANSITION ZONE BETWEEN OAK-JUNIPER WOODLAND & MOUNTAIN MAHOGANY-OAK SCRUB

SCATTERED CLONES IN NEW RIVER MOUNTAINS AND SIERRA ANCHA. USUALLY FOUND ON STEEP, ROCKY SLOPES. POSSIBLY MAZATAL MOUNTAINS. SHOULD BE LOOKED FOR WHEREVER THE RANGES OF Agave toumeyana var. bella AND Agave chrystantha OVERLAP.

NAME: ARIZONA CLIFFROSE

PURSHIA SUBINTEGRA

STATUS: ENDANGERED

CRITICAL HABITAT: No RECOVERY PLAN: Yes CFR: 49 FR 22326 5-29-84

DESCRIPTION: EVERGREEN SHRUB OF THE ROSE FAMILY (ROSEACEAE). BARK PALE SHREDDY. YOUNG TWIGS WITH DENSE HAIRS. LEAVES 1-5 LOBES AND EDGES CURL DOWNWARD (REVOLUTE). FLOWERS: 5 WHITE OR YELLOW PETALS <0.5 INCH LONG.

ELEVATION RANGE: <4000 FT.

COUNTIES: GRAHAM YAVAPAI MARICOPA MOHAVE

HABITAT: CHARACTERISTIC WHITE SOILS OF TERTIARY LIMESTONE LAKEBED DEPOSITS.

WHITE SOILS OF TERTIARY LIMESTONE LAKEBED DEPOSITS CAN BE SEEN FROM A DISTANCE.

NAME: ARIZONA HEDGEHOG CACTUS

ECHINOCEREUS TRIGLOCHIDIATUS ARIZONICUS

STATUS: ENDANGERED

CRITICAL HABITAT: No RECOVERY PLAN: No CFR: 44 FR 61556, 10-15-1979

DESCRIPTION: DARK GREEN CYLINDROID 2.5-12 INCHES TALL, 2-10 INCHES IN DIAMETER, SINGLE OR IN CLUSTERS. 1-3 GRAY OR PINKISH CENTRAL SPINES LARGEST DEFLEXED AND 5-11 SHORTER RADIAL SPINES. FLOWER: BRILLIANT RED, SIDE OF STEM IN APRIL- MAY

ELEVATION RANGE: 3700-5200 FT.

COUNTIES: MARICOPA, GILA, PINAL

HABITAT: ECOTONE BETWEEN INTERIOR CHAPPARAL AND MADREAN EVERGREEN WOODLAND

OPEN SLOPES, IN NARROW CRACKS BETWEEN BOULDERS, AND IN UNDERSTORY OF SHRUBS. THIS VARIETY IS BELIEVED TO INTERGRADE AT THE EDGES OF ITS DISTRIBUTION WITH VARIETIES MELANCANTHUS AND NEOMEXICANUS CAUSING SOME CONFUSION IN IDENTIFICATION.

8/6/97

NAME: GILA TOPMINNOW

POECILIOPSIS OCCIDENTALIS OCCIDENTALIS

STATUS: ENDANGERED

CRITICAL HABITAT: No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-1967

DESCRIPTION: SMALL (2 INCHES), GUPPY-LIKE, LIVE BEARING, LACKS DARK SPOTS ON ITS FINS. BREEDING MALES ARE JET BLACK WITH YELLOW FINS.

ELEVATION

RANGE: <4500 FT.

COUNTIES: GILA, PINAL, GRAHAM, YAVAPAI, SANTA CRUZ, PIMA, MARICOPA, LA PAZ

HABITAT: SMALL STREAMS, SPRINGS, AND CIENEGAS VEGETATED SHALLOWS

NAME: RAZORBACK SUCKER

XYRAUCHEN TEXANUS

STATUS: ENDANGERED

CRITICAL HABITAT: Yes RECOVERY PLAN: No CFR: 55 FR 21154, 05-22-1990;

DESCRIPTION: LARGE (UP TO 3 FEET AND UP TO 16 POUNDS) LONG, HIGH SHARP-EDGED KEEL-LIKE HUMP BEHIND THE HEAD. HEAD FLATTENED ON TOP. OLIVE-BROWN ABOVE TO YELLOWISH BELOW.

ELEVATION

RANGE: <6000 FT.

COUNTIES: GREENLEE, MOHAVE, PINAL, YAVAPAI, YUMA, LA PAZ, MARICOPA (REFUGIA), GILA, COCONINO, GRAHAM

HABITAT: RIVERINE & LACUSTRINE AREAS, GENERALLY NOT IN FAST MOVING WATER AND MAY USE BACKWATERS

SPECIES IS ALSO FOUND IN HORSESHOE RESERVOIR (MARICOPA COUNTY).

NAME: AMERICAN PEREGRINE FALCON

FALCO PEREGRINUS ANATUM

STATUS: ENDANGERED

CRITICAL HABITAT: No RECOVERY PLAN: Yes CFR: 35 FR 16047, 10-13-70; 35

DESCRIPTION: A RECLUSIVE, CROW-SIZED FALCON SLATY BLUE ABOVE WHITISH BELOW WITH FINE DARK BARRING. THE HEAD IS BLACK AND APPEARS TO BE MASKED OR HELMETED. WINGS LONG AND POINTED. LOUD WAILING CALLS ARE GIVEN DURING BREEDING PERIOD.

ELEVATION

RANGE: 3500-9000 FT.

COUNTIES: MOHAVE COCONINO NAVAJO APACHE SANTA CRUZ MARICOPA COCHISE YAVAPAI GILA PINAL PIMA GREENLEE GRAHAM

HABITAT: CLIFFS AND STEEP TERRAIN USUALLY NEAR WATER OR WOODLANDS WITH ABUNDANT PREY

THIS IS A WIDE-RANGING MIGRATORY BIRD THAT USES A VARIETY OF HABITATS. BREEDING BIRDS ARE YEAR-ROUND RESIDENTS. OTHER BIRDS WINTER AND MIGRATE THROUGH ARIZONA. SPECIES IS ENDANGERED FROM REPRODUCTIVE FAILURE FROM PESTICIDES.

8/7/97

NAME: SOUTHWESTERN WILLOW FLYCATCHER *EMPIDONAX TRAILLII EXTIMUS*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: No CFR: 60 FR 10694, 02-27-95

DESCRIPTION: SMALL PASSERINE (ABOUT 6") GRAYISH-GREEN BACK AND WINGS,
WHITISH THROAT, LIGHT OLIVE-GRAY BREAST AND PALE YELLOWISH
BELLY. TWO WINGBARS VISIBLE. EYE-RING FAINT OR ABSENT.ELEVATION
RANGE: <8500 FT.COUNTIES: YAVAPAI, GILA, MARICOPA, MOHAVE, COCONINO, NAVAJO, APACHE, PINAL, LA PAZ, GREENLEE, GRAHAM,
YUMA, PIMA, COCHISE, SANTA CRUZ

HABITAT: COTTONWOOD/WILLOW & TAMARISK VEGETATION COMMUNITIES ALONG RIVERS & STREAMS

MIGRATORY RIPARIAN OBLIGATE SPECIES THAT OCCUPIES BREEDING HABITAT FROM LATE APRIL TO SEPTEMBER. DISTRIBUTION WITHIN ITS RANGE IS RESTRICTED TO RIPARIAN CORRIDORS. DIFFICULT TO DISTINGUISH FROM OTHER MEMBERS OF THE EMPIDONAX COMPLEX BY SIGHT ALONE. TRAINING SEMINAR REQUIRED FOR THOSE CONDUCTING FLYCATCHER SURVEYS. CRITICAL HABITAT ON PORTIONS OF THE 100-YEAR FLOODPLAIN ON SAN PEDRO AND VERDE RIVERS; WET BEAVER AND WEST CLEAR CREEKS, INCLUDING TAVASCI MARSH AND ISTER FLAT; THE COLORADO RIVER, THE LITTLE COLORADO RIVER, AND THE WEST, EAST, AND SOUTH FORKS OF THE LITTLE COLORADO RIVER, REFERENCE 60 CFR:62 FR 39129, 7/22/97.

NAME: YUMA CLAPPER RAIL

RALLUS LONGIROSTRIS YUMANENSIS

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-67; 48

DESCRIPTION: WATER BIRD WITH LONG LEGS AND SHORT TAIL. LONG SLENDER
DECURVED BILL. MOTTLED BROWN ON GRAY ON ITS RUMP. FLANKS
AND UNDERSIDES ARE DARK GRAY WITH NARROW VERTICAL STRIPES
PRODUCING A BARRING EFFECT.FR 34182, 07-27-83
ELEVATION
RANGE: <4500 FT.

COUNTIES: YUMA, LA PAZ, MARICOPA, PINAL, MOHAVE

HABITAT: FRESH WATER AND BRACKISH MARSHES

SPECIES IS ASSOCIATED WITH DENSE EMERGENT RIPARIAN VEGETATION. REQUIRES WET SUBSTRATE (MUDFLAT, SANDBAR) WITH DENSE HERBACEOUS OR WOODY VEGETATION FOR NESTING AND FORAGING. CHANNELIZATION AND MARSH DEVELOPMENT ARE PRIMARY SOURCES OF HABITAT LOSS.

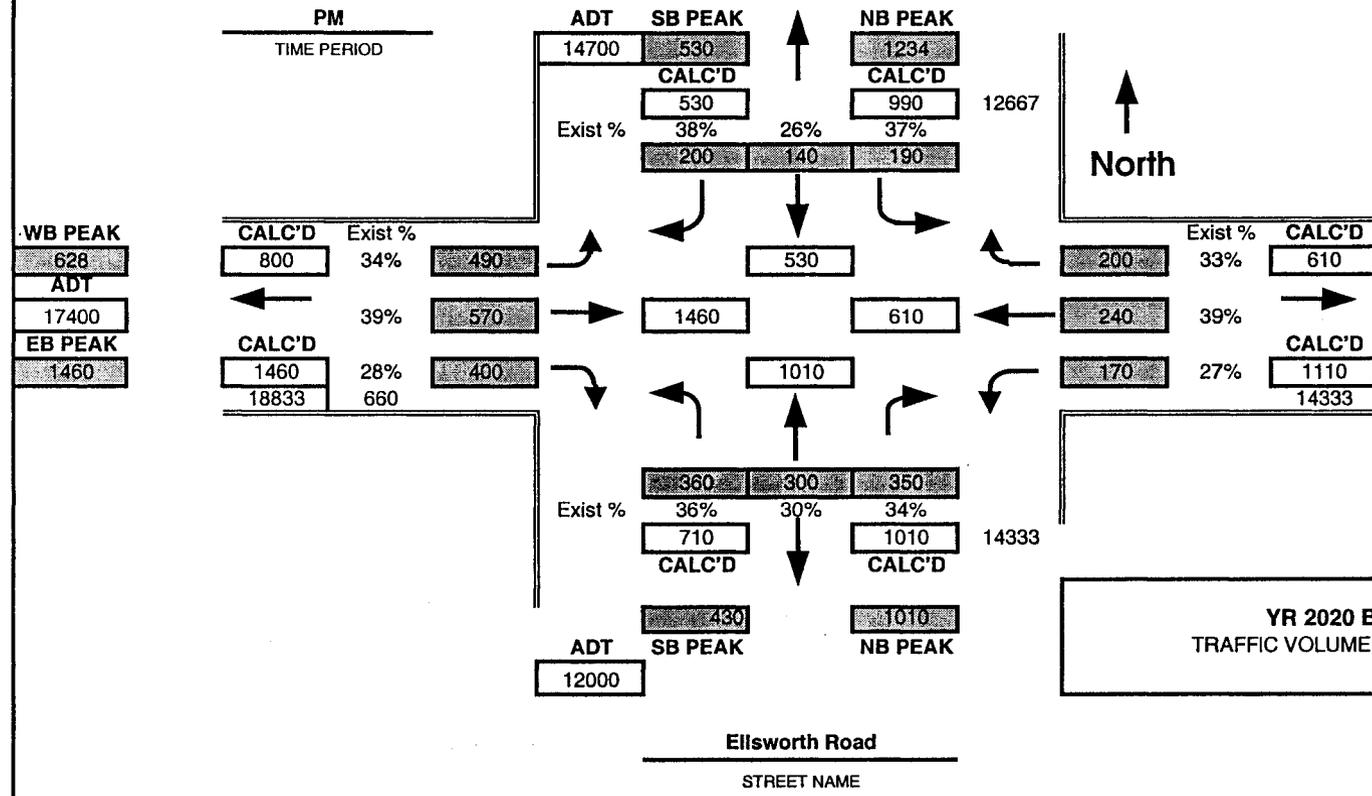
Appendix C.

2020 Average Daily Traffic Projections

Intersection/Leg	2015 Volume	Average Growth Rate	2020 Volume
Baseline			
North	11000	1.3382	14700
South	11000	1.3382	14700
East	Adj Mag	1.3382	14900
West	17000	1.3382	22700
Guadalupe			
North	11000	1.3382	14700
South	9000	1.3382	12000
East	Adj Mag	1.3382	16900
West	13000	1.3382	17400
Elliot			
North	9000	1.3382	12000
South	19000	1.3382	25400
East	6000	1.3382	8000
West	17000	1.3382	22700
Warner			
North	19000	1.3382	25400
South	18000	1.3382	24100
West	3000	1.3382	4000
Ray			
North	18000	1.3382	24100
South	22000	1.3382	29400
West	3000	1.3382	4000
Pecos			
North	22000	1.3382	29400
South	15000	1.3382	20100
East	8000	1.3382	10700
West	5000	1.3382	6700
Germann			
North	15000	1.3382	20100
South	18000	1.3382	24100
East	9000	1.3382	12000
West	7000	1.3382	9400

Ellsworth Road Design Concept Report
INTERSECTION TURNING MOVEMENT BALANCING FORM

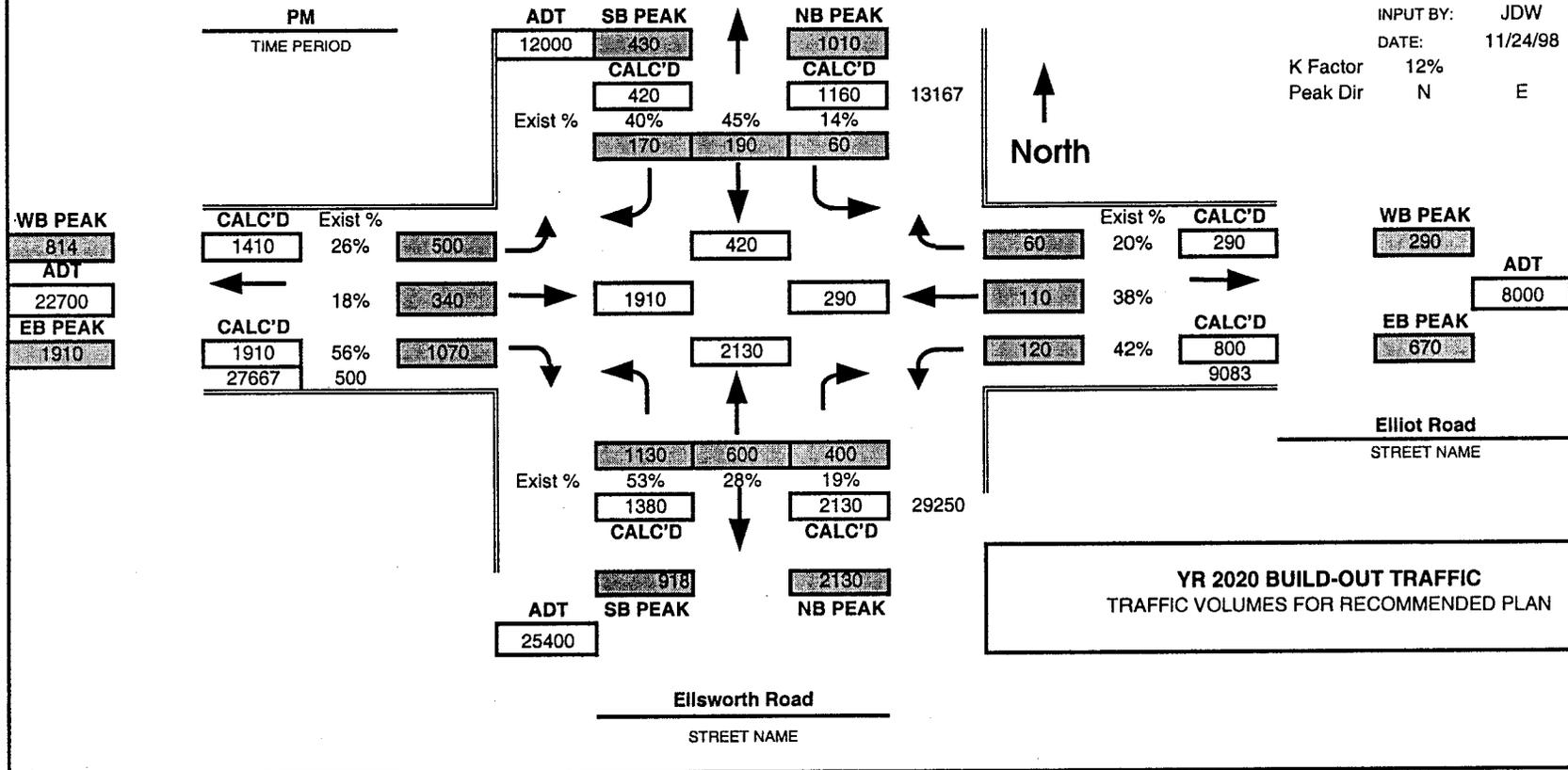
INPUT BY: JDW
 DATE: 11/24/98
 K Factor 12%
 Peak Dir N E 70%



YR 2020 BUILD-OUT TRAFFIC
TRAFFIC VOLUMES FOR RECOMMENDED PLAN

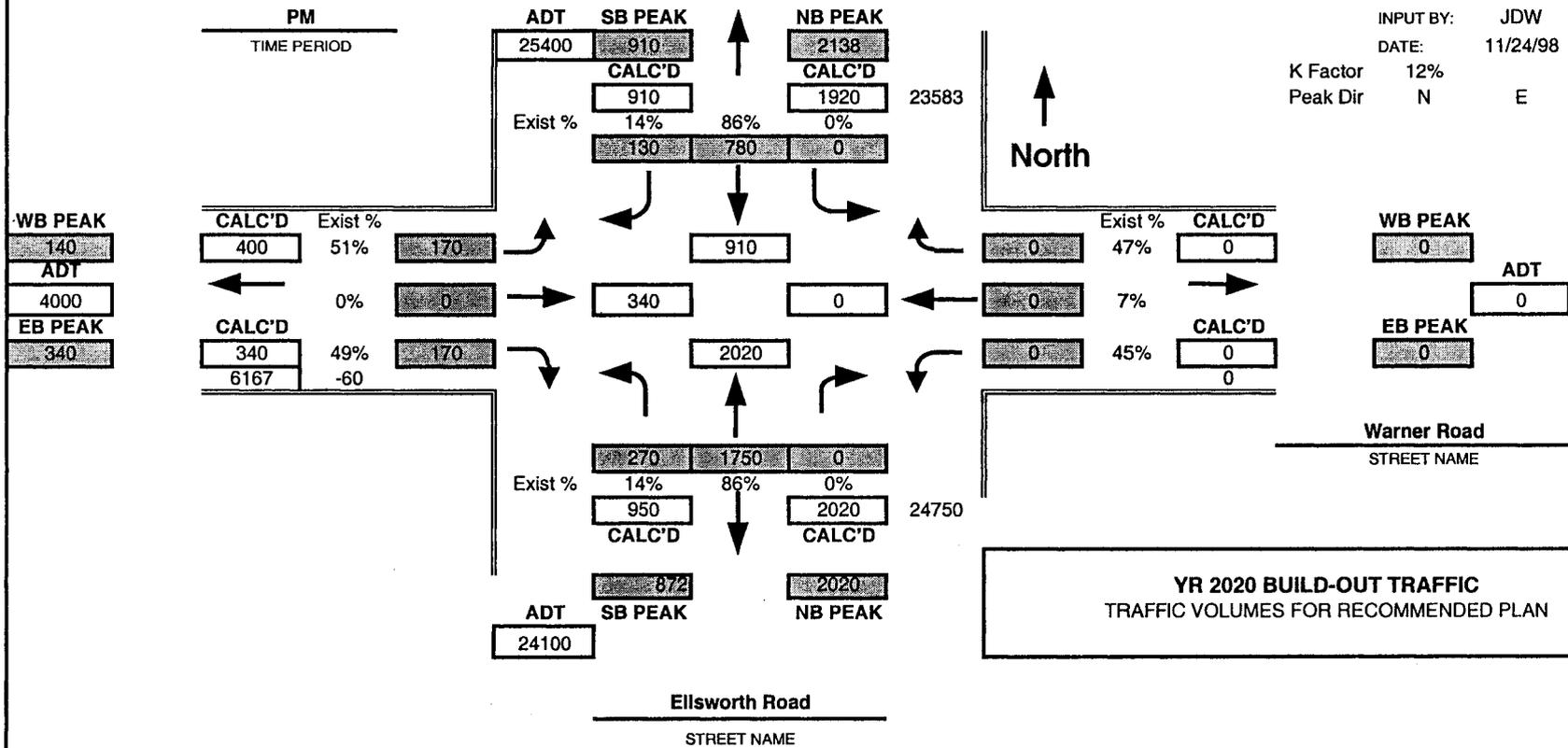
Ellsworth Road Design Concept Report
INTERSECTION TURNING MOVEMENT BALANCING FORM

INPUT BY: JDW
 DATE: 11/24/98
 K Factor 12%
 Peak Dir N E 70%

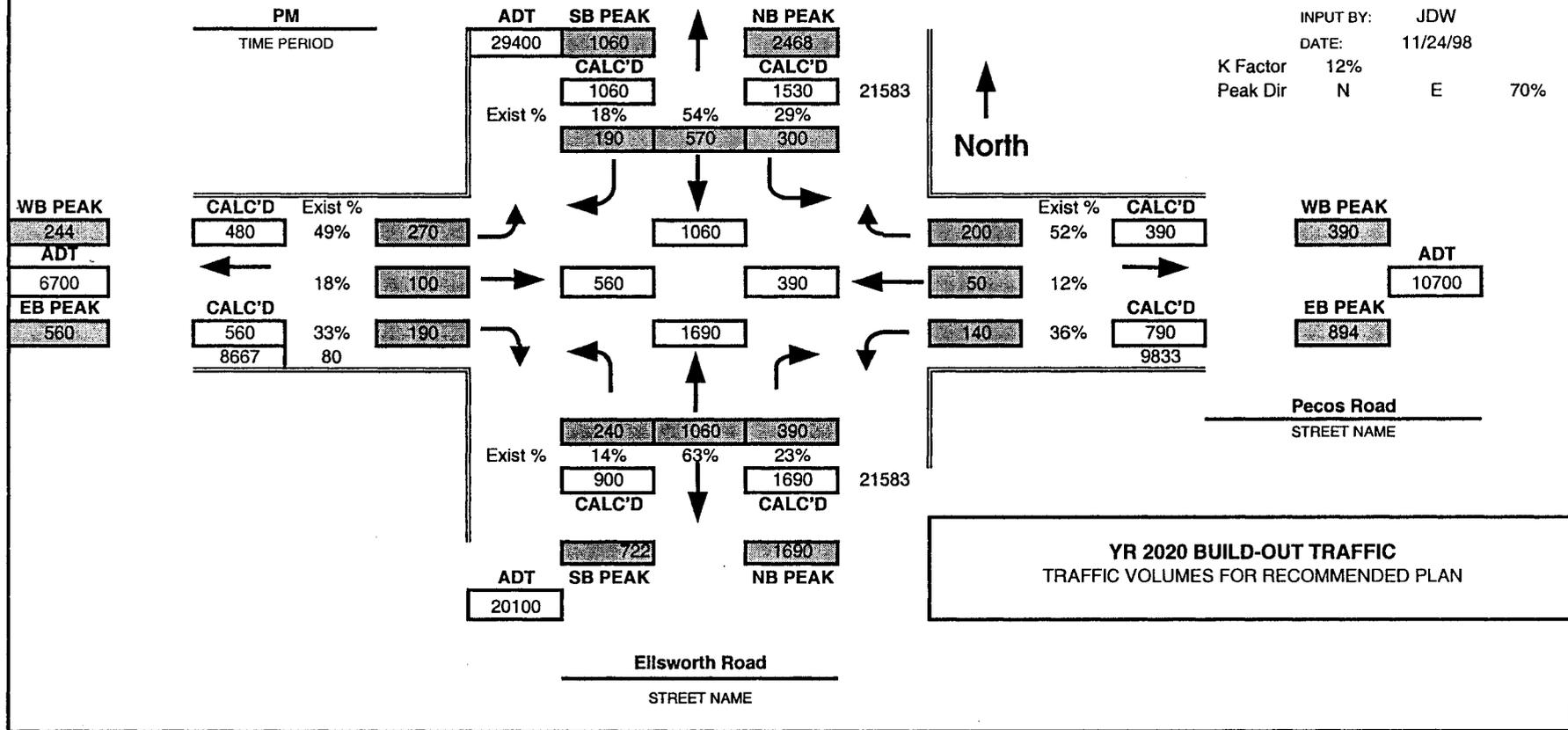


Ellsworth Road Design Concept Report
 INTERSECTION TURNING MOVEMENT BALANCING FORM

INPUT BY: JDW
 DATE: 11/24/98
 K Factor 12%
 Peak Dir N E 70%



Ellsworth Road Design Concept Report INTERSECTION TURNING MOVEMENT BALANCING FORM



Streets: (E-W) GERMANN ROAD

(N-S) ELLSWORTH ROAD

Analyst: J.D. WALKER

File Name: GERM20_2.HC9

Area Type: Other

11-25-98 PM

Comment: 2020 TRAFFIC MINIMIZED INTERSECTION

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	1	2	1	1	2	< 0
Volumes	280	170	340	190	80	160	460	980	580	150	380	190
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*	*			NB Left	*	*	
Thru		*			Thru		*	*
Right		*			Right		*	*
Peds	*	*			Peds	*	*	
WB Left		*	*		SB Left	*		
Thru			*		Thru			*
Right			*		Right			*
Peds			*		Peds	*	*	
NB Right	*	*			EB Right	*		*
SB Right					WB Right	*		*
Green	10.0A	26.0A			Green	24.0A	12.0A	30.0A
Yellow/AR	3.0	4.0			Yellow/AR	3.0	4.0	4.0
Cycle Length: 120 secs Phase combination order: #1 #2 #5 #6 #7								

Intersection Performance Summary

Lane	Group:	Adj Sat	v/c	g/C	Delay	LOS	Approach:	Delay	LOS
Mvmts	Cap	Flow	Ratio	Ratio			Delay	LOS	
EB	L	414	1770	0.751	0.325	28.3	D	17.6	C
	T	404	1863	0.468	0.217	27.1	D		
	R	1148	1583	0.329	0.725	3.9	A		
WB	L	300	1770	0.703	0.325	26.5	D	17.6	C
	T	404	1863	0.221	0.217	25.0	C		
	R	1148	1583	0.155	0.725	3.3	A		
NB	L	575	1770	0.889	0.325	35.9	D	21.4	C
	T	1428	3725	0.800	0.383	23.6	C		
	R	1122	1583	0.574	0.708	6.1	B		
SB	L	339	1770	0.492	0.192	28.9	D	29.3	D
	TR	885	3539	0.752	0.250	29.4	D		

Intersection Delay = 21.7 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.789

Streets: (E-W) PECOS ROAD

(N-S) ELLSWORTH ROAD

Analyst: J.D. WALKER

File Name: PECO20_2.HC9

Area Type: Other

11-25-98 PM

Comment: 2020 TRAFFIC MINIMIZED DESIGN

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	1	2	1	1	2	< 0
Volumes	270	100	190	140	50	200	240	1060	390	300	570	190
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*	*						
Thru		*				*		
Right		*				*		
Peds	*	*			*	*		
WB Left	*	*						
Thru		*				*		
Right		*				*		
Peds	*	*			*	*		
NB Right	*	*				*	*	
SB Right					*	*		
Green	10.0A	22.0A			32.0A	42.0A		
Yellow/AR	3.0	4.0			3.0	4.0		
Cycle Length: 120 secs Phase combination order: #1 #2 #5 #6								

Intersection Performance Summary

Lane	Group:	Adj Sat	v/c	g/C	Delay	LOS	Approach:	Delay	LOS
Mvmts	Cap	Flow	Ratio	Ratio					
EB	L	453	1770	0.662	0.292	26.1	D	17.9	C
	T	342	1863	0.325	0.183	27.7	D		
	R	1359	1583	0.155	0.858	0.9	A		
WB	L	340	1770	0.459	0.292	22.2	C	11.9	B
	T	342	1863	0.164	0.183	26.7	D		
	R	1359	1583	0.163	0.858	0.9	A		
NB	L	457	1770	0.584	0.258	26.5	D	27.7	D
	T	1304	3725	0.949	0.350	35.1	D		
	R	1016	1583	0.426	0.642	7.0	B		
SB	L	457	1770	0.728	0.258	30.3	D	25.0	C
	TR	1255	3586	0.706	0.350	23.0	C		

Intersection Delay = 23.8 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.787

=====
 Streets: (E-W) RAY ROAD (N-S) ELLSWORTH ROAD
 Analyst: J.D. WALKER File Name: RAY20_2.HC9
 Area Type: Other 11-25-98 PM
 Comment: 2020 TRAFFIC MINIMIZED CONFIGURATION
 =====

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	2	0	0	2	< 0
Volumes	150		190				350	2120			770	100
Lane W (ft)	12.0		12.0				12.0	12.0			12.0	
RTOR Vols			0						0			0
Lost Time	4.00		4.00				4.00	4.00			4.00	4.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*				NB Left	*		
Thru					Thru	*	*	
Right	*				Right			
Peds	*				Peds	*		
WB Left					SB Left			
Thru					Thru	*		
Right					Right	*		
Peds					Peds	*		
NB Right					EB Right	*	*	
SB Right					WB Right			
Green	30.0A				Green	30.0A	50.0A	
Yellow/AR	3.0				Yellow/AR	3.0	4.0	
Cycle Length: 120 secs Phase combination order: #1 #5 #6								

Intersection Performance Summary

Lane	Group:	Mvmts	Adj Sat	v/c	g/C	Delay	LOS	Approach:	
								Cap	Flow
EB	L	428	1770	0.391	0.242	24.9	C	11.0	B
	R	1583	1583	0.133	1.000	0.0	A		
NB	L	428	1770	0.910	0.242	45.0	E	22.1	C
	T	2577	3725	0.960	0.692	18.5	C		
SB	TR	1526	3661	0.665	0.417	19.0	C	19.0	C
Intersection Delay = 20.4 sec/veh Intersection LOS = C									
Lost Time/Cycle, L = 8.0 sec Critical v/c(x) = 0.813									

=====
 Streets: (E-W) WARNER ROAD (N-S) ELLSWORTH ROAD
 Analyst: J.D. WALKER File Name: WARN20_2.HC9
 Area Type: Other 11-24-98 PM
 Comment: 2020 TRAFFIC MINIMIZED INTERSECTION
 =====

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	2	0	0	2	< 0
Volumes	170		170				270	1750			780	130
Lane W (ft)	12.0		12.0				12.0	12.0			12.0	
RTOR Vols			0						0			0
Lost Time	4.00		4.00				4.00	4.00			4.00	4.00

 Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*				NB Left	*		
Thru					Thru	*	*	
Right	*				Right			
Peds	*				Peds		*	
WB Left					SB Left			
Thru					Thru		*	
Right					Right		*	
Peds					Peds		*	
NB Right					EB Right	*	*	
SB Right					WB Right			
Green	25.0A				Green	19.0A	36.0A	
Yellow/AR	3.0				Yellow/AR	3.0	4.0	
Cycle Length: 90 secs Phase combination order: #1 #5 #6								

 Intersection Performance Summary

Lane	Group:	Adj Sat	v/c	g/C	Delay	LOS	Approach:
Mvmts	Cap	Flow	Ratio	Ratio			Delay LOS
EB	L	472	1770	0.400	0.267	17.8	C 8.9 B
	R	1583	1583	0.119	1.000	0.0	A
NB	L	354	1770	0.847	0.200	34.3	D 13.4 B
	T	2401	3725	0.850	0.644	10.4	B
SB	TR	1458	3646	0.728	0.400	16.1	C 16.1 C

Intersection Delay = 13.7 sec/veh Intersection LOS = B
 Lost Time/Cycle, L = 8.0 sec Critical v/c(x) = 0.719

Streets: (E-W) ELLIOT ROAD (N-S) ELLSWORTH ROAD
 Analyst: J.D. WALKER File Name: ELLI20_3.HC9
 Area Type: Other 11-24-98 PM
 Comment: 2020 TRAFFIC WITH DBL RIGHT EB

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	2	1	1	< 0	2	2	1	1	2	1
Volumes	500	340	1070	120	110	60	1130	600	400	60	190	170
Lane W (ft)	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*				NB Left	*	*	
Thru		*			Thru		*	*
Right		*			Right		*	*
Peds		*			Peds		*	*
WB Left	*				SB Left	*		
Thru		*			Thru			*
Right		*			Right			*
Peds		*			Peds		*	*
NB Right	*	*			EB Right	*	*	
SB Right	*	*			WB Right			
Green	25.0A	23.0A			Green	17.0A	26.0A	12.0A
Yellow/AR	3.0	4.0			Yellow/AR	3.0	3.0	4.0
Cycle Length: 120 secs Phase combination order: #1 #2 #5 #6 #7								

Intersection Performance Summary

Lane	Group:	Adj Sat	v/c	g/C	Delay	LOS	Approach:	Delay	LOS
Mvmts	Cap	Flow	Ratio	Ratio					
EB	L	708	3539	0.810	0.200	34.5	D	20.3	C
	T	714	3725	0.556	0.192	29.1	D		
	R	1900	3167	0.707	0.600	11.6	B		
WB	L	354	1770	0.376	0.200	27.2	D	28.8	D
	TR	338	1764	0.559	0.192	29.9	D		
NB	L	1327	3539	0.975	0.375	38.0	D	26.8	D
	T	1273	3725	0.550	0.342	21.1	C		
	R	1214	1583	0.366	0.767	3.0	A		
SB	L	236	1770	0.284	0.133	30.4	D	24.6	C
	T	373	3725	0.596	0.100	35.3	D		
	R	831	1583	0.227	0.525	10.0	B		

Intersection Delay = 24.0 sec/veh Intersection LOS = C
 Lost Time/Cycle, L = 16.0 sec Critical v/c(x) = 0.801

=====
 Streets: (E-W) GUADALUPE ROAD (N-S) ELLSWORTH ROAD
 Analyst: J.D. WALKER File Name: GUAD20_2.HC9
 Area Type: Other 11-24-98 PM
 Comment: 2020 TRAFFIC MINIMIZED INTERSECTION
 =====

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	1	1	2	1	2	2	1	2	2	1
Volumes	490	570	400	170	240	200	360	300	350	190	140	200
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*				NB Left	*		
Thru		*			Thru		*	
Right		*			Right		*	
Peds		*			Peds		*	
WB Left		*			SB Left	*		
Thru			*		Thru		*	
Right			*		Right		*	
Peds			*		Peds		*	
NB Right	*	*			EB Right	*	*	
SB Right	*	*			WB Right	*	*	
Green	30.0A	33.0A			Green	18.0A	25.0A	
Yellow/AR	3.0	4.0			Yellow/AR	3.0	4.0	

Cycle Length: 120 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

	Lane	Group:	Adj Sat			v/c		Delay	LOS	Approach:	
			Flow	Ratio	g/C	Ratio	Delay			LOS	
EB	L	855	3539	0.655	0.242	27.8	D	21.0	C		
	T	1024	3725	0.649	0.275	25.8	D				
	R	1095	1583	0.406	0.692	5.3	B				
WB	L	428	1770	0.442	0.242	25.4	D	17.3	C		
	T	1024	3725	0.273	0.275	22.1	C				
	R	1095	1583	0.203	0.692	4.3	A				
NB	L	501	3539	0.822	0.142	39.6	D	23.5	C		
	T	776	3725	0.451	0.208	27.1	D				
	R	1200	1583	0.324	0.758	3.1	A				
SB	L	501	3539	0.433	0.142	30.8	D	19.0	C		
	T	776	3725	0.211	0.208	25.4	D				
	R	1200	1583	0.185	0.758	2.6	A				

Intersection Delay = 20.8 sec/veh Intersection LOS = C
 Lost Time/Cycle, L = 16.0 sec Critical v/c(x) = 0.631

=====
 Streets: (E-W) BASELINE ROAD (N-S) ELLSWORTH ROAD
 Analyst: J.D. WALKER File Name: BASE20_2.HC9
 Area Type: Other 11-24-98 PM
 Comment: 2020 TRAFFIC - MINIMIZED INTERSECTION
 =====

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	1	1	2	< 0	1	2	1	1	2	1
Volumes	630	640	630	150	240	150	150	320	350	150	150	230
Lane W (ft)	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			63			15			35			23
Lost Time	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*	*			NB Left	*	*	
Thru		*	*		Thru		*	
Right		*	*		Right		*	
Peds		*	*		Peds		*	
WB Left	*				SB Left	*	*	
Thru			*		Thru		*	
Right			*		Right		*	
Peds		*	*		Peds		*	
NB Right	*	*	*		EB Right	*	*	
SB Right	*	*	*		WB Right			
Green	20.0A	10.0A	32.0A		Green	10.0A	25.0A	
Yellow/AR	3.0	4.0	4.0		Yellow/AR	3.0	4.0	
Cycle Length: 115 secs Phase combination order: #1 #2 #3 #5 #6								

Intersection Performance Summary

	Lane Group:	Mvmts	Adj Sat	v/c	g/C	Delay	LOS	Approach:	
								Cap	Flow
EB	L	1016	3539	0.710	0.287	25.3	D	15.9	C
	T	1490	3725	0.501	0.400	17.0	C		
	R	1212	1583	0.520	0.765	3.7	A		
WB	L	292	1770	0.571	0.165	30.6	D	24.6	C
	TR	981	3524	0.447	0.278	22.3	C		
NB	L	383	1770	0.436	0.330	19.0	C	14.9	B
	T	810	3725	0.462	0.217	25.6	D		
	R	1294	1583	0.270	0.817	1.6	A		
SB	L	269	1770	0.621	0.330	21.8	C	14.3	B
	T	810	3725	0.216	0.217	23.9	C		
	R	1294	1583	0.178	0.817	1.5	A		

Intersection Delay = 16.7 sec/veh Intersection LOS = C
 Lost Time/Cycle, L = 16.0 sec Critical v/c(x) = 0.589
 =====

Appendix D.

DRAINAGE REPORT
ELLSWORTH ROAD
BASELINE ROAD TO GERMANN ROAD

PREPARED FOR:
MARICOPA COUNTY DEPARTMENT OF
TRANSPORTATION

PREPARED BY:
DIBBLE & ASSOCIATES
SUBCONSULTANT TO
CH2M HILL

DRAINAGE REPORT
ELLSWORTH ROAD - BASELINE RD. TO GERMANN RD..

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DRAINAGE REPORT
ELLSWORTH ROAD - BASELINE RD. TO GERMANN RD..

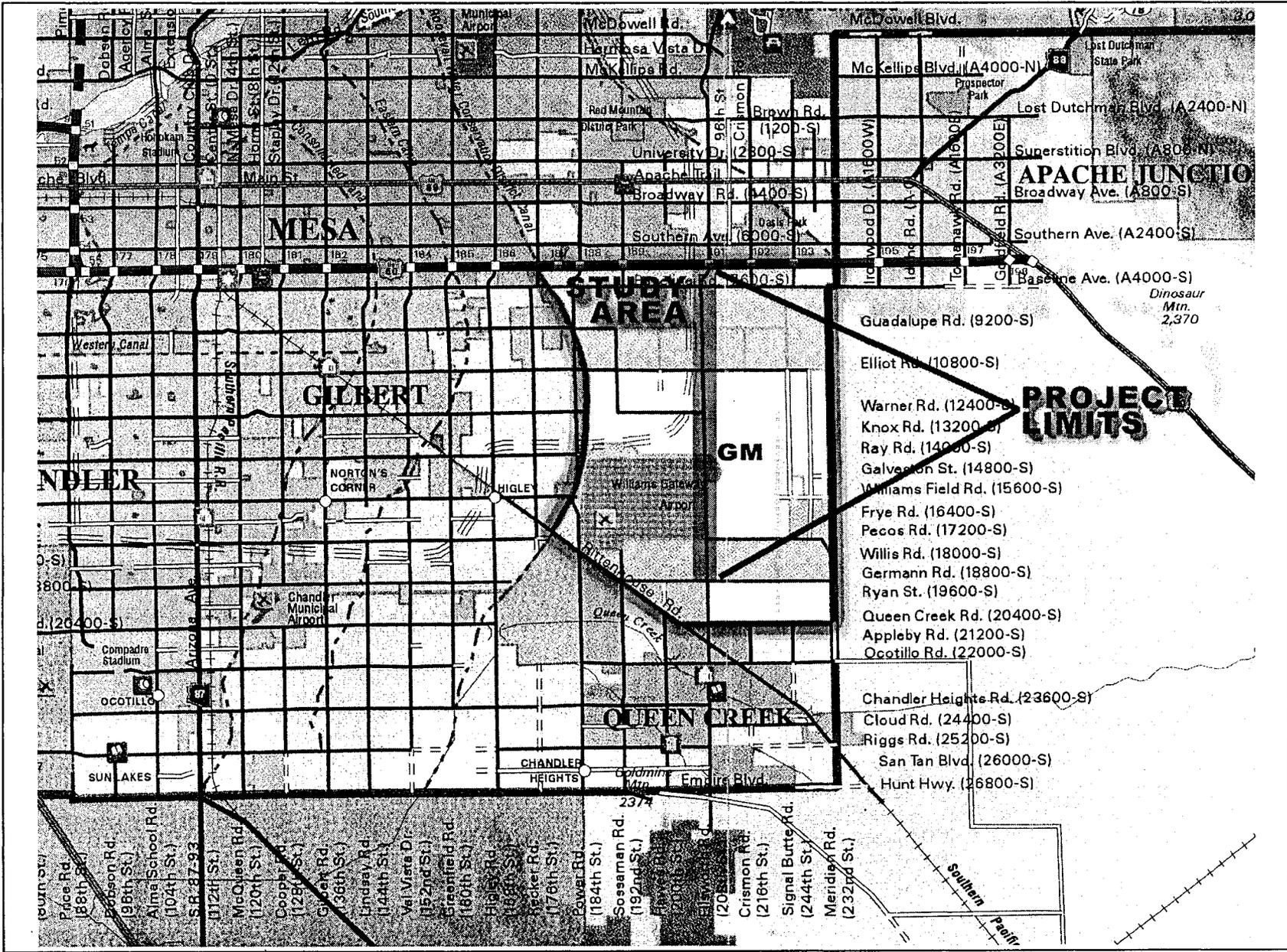
1. INTRODUCTION

1. General

This Drainage Report is prepared for the Maricopa County Department of Transportation as part of the Design Concept Report for Ellsworth Road from Baseline Rd. to Germann Rd. The project consists of analysis of the runoff generated within the road right-of-way area and off-site runoff reaching the roadway. The project limits are shown on **Figure 1**.

2. Study Area

The study area is characterized predominantly as open desert land. However, residential development is beginning to replace the open desert north of Elliot Road and is expected to continue to replace the desert environment. The drainage area is bounded by the CAP canal on the east and the East Maricopa Floodway on the west. The General Motors Desert Proving Grounds (GMDPG) is located immediately east of the Ellsworth Road Alignment and serves as a 4-mile barrier to flow from the east. Minor flows, however, are captured from GM's property and pass underneath Ellsworth Road in culverts. Flow from the east crosses the Ellsworth Road Alignment at four main locations. 1) Elliot Channel - 1/4 mile (400 meters) south of Elliot Rd. 2) Powerline Floodway - midway between Elliot Rd. and Pecos Ave. 3) Six CMP culverts passing surface runoff from GM property at the Williams Field Road alignment. 4) Ellsworth Channel - at Pecos Ave. The study area is also shown on **Figure 1**.



2. DESIGN CRITERIA

The *Drainage Design Manual for Maricopa County, Arizona, Volume I, Hydrology*, January 1, 1995, (Hydrology Manual), and *Drainage Design Manual for Maricopa County, Arizona, Volume II, Hydraulics*, January 28, 1996, (Hydraulics Manual), as well as the City of Mesa's drainage requirements as stated in the *City of Mesa Procedure Manual, Engineering and Design Standards* (Procedure Manual) are used as the basis for drainage design. Additionally, design criteria will also be based on information presented in the *East Mesa Area Drainage Master Plan, Recommended Design Report*, July 1998 (ADMP). The following specific criteria are used in this analysis.

1. On-site Drainage Criteria

The proposed roadway will be an Urban Road of Regional Significance (URRS). Its ultimate section consists of 6-lanes (3-lane urban half section) with median and full curb and gutter adjacent to GM and WGA. Other areas, where adjacent properties can be developed, will be an interim 2-lane rural half section with paved shoulders and roadside drainage ditches. For these locations, the roadway drainage will be designed for both the ultimate and interim conditions with area drains designed for the ultimate pavement section. For the ultimate pavement sections, runoff will be allowed to collect in the right-most driving lane and bicycle lane for a maximum allowable spread of 17 feet (5 meters). Pavement drainage will be collected with curb-side catch basins and conveyed to a suitable outfall via storm drains or roadside ditches. The following criteria from the Procedure Manual apply to the on-site drainage;

- ◆ Streets shall be designed to carry runoff from a 10-year peak storm with one 12-foot lane in each direction to remain open to traffic. Arterial streets and major collectors shall be designed to concentrate the runoff spread to one (1) lane. The peak flows from a 100-year storm shall be carried within the cross-section between the right-of-way lines.
- ◆ In cases where the peak flows from the design storm exceed the street capacity, underground pipes of sufficient size to carry the excess shall be installed.

In addition to the above City of Mesa requirements, the following criteria have also been adopted.

- ◆ Roadside ditches are to be sized to prevent the 10-year storm runoff from saturating the pavement subgrade.
- ◆ Roadside ditch side slopes are to be no steeper than 4 to 1 (H:V) within the roadway clear zone.
- ◆ Trapezoidal channel bottoms will be a minimum of 4 feet wide for maintenance purposes.
- ◆ V-shaped channels are allowed in lieu of a 4-foot trapezoidal channel.

2. Off-site Drainage Criteria

Off-site drainage criteria will apply to roadway culverts and channel improvements along Ellsworth Road and related channels. The following criteria apply:

- ◆ Crossroad culverts which are part of the ADMP will be designed to convey the 100-year peak discharge with no flow crossing over the roadway. Non-ADMP crossroad culverts will be designed to carry the 50-year storm without overtopping the roadway. At the 100-year storm in these areas, the depth of water over the road will not be more than 0.15 m (0.5 feet).
- ◆ New channels will be designed for the 100-year event as per the ADMP. Concrete channels will have 2:1 side slopes. Earthen channels will have 6:1 (desirable) to 4:1 (max) side slopes depending on right-of-way constraints and flow velocities.

3. METHODOLOGY

1. Hydrology

Hydrology for the study area was prepared by the Flood Control District of Maricopa County (FCDMC) and modified by Dibble & Associates for use in the ADMP. This model is based on providing 100-year flood protection under fully developed watershed conditions. Due to the County's retention requirement, the developed conditions runoff will be less than under existing conditions. As a result, project elements constructed prior to full build-out conditions may have less than 100-year capacity until full development is achieved. This model represents the best information for planning of flood control structures in East Mesa and no changes were made to the model for this study.

Hydrology for on-site drainage is prepared using the storm drain design software, Hydraflow by Intelisolve. Hydraflow computes peak flows using the Rational Method. This method is especially applicable to urban areas and is expressed by the formula:

$$Q = CIA$$

Where: Q = discharge in cfs

C = runoff coefficient

I = rainfall intensity in inches/hour

A = drainage area in acres

The rainfall intensity is computed by the formula $I = B/(Tc + D)^E$

Where: B, D, and E are constants (Hydraflow computes)

Tc = time of concentration

The constants are pre-computed by Hydraflow and are based on geographic location. The time of concentration is the time required for water to flow from the most remote point of the drainage area to the point of the system in question. Hydraflow computes Tc by choosing the greatest of the following:

1. The time of concentration of the upstream line plus the time of flow through the line from the upstream run.
2. The time of concentration as above for any other connecting line(s).
3. The inlet time of the line under consideration.

For the most upstream run, the time of concentration is the inlet time. For all succeeding lines, the time of concentration is computed as the largest value of the three items above.

When computing flows for downstream lines, Hydraflow uses a total CxA , that is CA for the line in question plus CA for the next upstream line plus CA for the next upstream line and so on.

2. Hydraulics

Per the ADMP, open channels are sized using Manning's equation. The maximum allowable slope is determined based on the Froude number criteria and the maximum allowable velocity for the channel material. The freeboard requirement is computed from the hydraulic parameters, with a minimum of 1 foot being added to the normal flow depth to determine the channel lining depth and top width. The right-of-way requirement for the channel, maintenance access road(s), and cut or fill slopes are added to determine the total right of way requirement for the reach. New culverts are sized using standard culvert design methodology considering inlet or outlet control as presented in Federal Highway Administration, Hydraulic Design Series No. 5, *Hydraulic Design of Highway Culverts*, September 1985. The calculations check for inlet control, pipe barrel (friction), or tail water control. The condition resulting in the highest computed headwater elevation controls.

Hydraflow uses the basic methodology of FHWA HEC No. 22 for inlet interception capacity calculations. A standard curb opening catch basin as detailed in MAG Standard Detail 532 was used as the typical inlet. A clogging factor of 20% was used to reduce the effective length of the catch basin opening from 8 feet to 6.4 feet.

Depending upon the capacity of an individual inlet, a portion of the gutter flow will bypass the inlet as carryover flow. Runoff that is not bypassed is captured by the catchbasin and labeled as "Q captured" on the reports.

4. RESULTS & RECOMMENDATIONS

1. On-site Drainage

In general, on-site drainage includes pavement drainage and the runoff falling within the right-of-way. Where possible, pavement run off will be routed directly into the proposed channels. However, where no channels are planned, pavement drainage will be directed to ditches running parallel to the roadway on either side until a logical out-fall is reached.

Due to the location of proposed channels and the geometry of the roadway profile, 4 general sub-systems combine to provide the most efficient on-site street drainage layout. These four sub-systems are named for their outfall locations and may be described as follows:

1. Elliot Storm Drain System:

A catch basin, connector pipe, and mainline drainage system collects and conveys on-site runoff between the existing Mesquite Canyon improvements at roadway station 10+140 and a point approximately 590 meters south of Elliot Road (station 8+439). The runoff is collected with approximately 14 catch basins and is conveyed with pipes ranging from 24 to 36 inches in diameter. The final outfall location for this subsystem is the Elliot Channel near Ellsworth Road station 8+583.

2. Ray Storm Drain System (Powerline Floodway):

A catch basin, connector pipe, and mainline drainage system collects and conveys on-site runoff between a point 590 meters south of Elliot Road (station 8+439) and a point 140 meters south of Ray Road (station 5+710.) The runoff is collected with approximately 20 catch basins and is conveyed with pipes ranging from 24 to 42 inches in diameter. The final outfall location for this subsystem is the Powerline Floodway near Ellsworth Roadway station 5+850.

3. ADMP Storm Drain:

A catch basin, connector pipe, and mainline drainage system collects and conveys on site runoff between a point 140 meters south of Ray Road (station 5+710) and station 5+206. The runoff is collected with approximately 4 catch basins and is conveyed with pipes ranging from 24 to 30 inches in diameter. The final outfall location for this subsystem is the ADMP Channel adjacent to Ellsworth Road.

4. Roadside Channel:

A catch basin, connector pipe, and roadside channel drainage system collects and conveys

on-site runoff between station 5+206 and station 0+600. The runoff is collected with approximately 44 catch basins and is conveyed with a roadside channel adjacent to Ellsworth Road.

2. Off-site Drainage

1. Channels

Reaches of two channels will need to be constructed to accommodate off-site drainage for this project. These reaches include:

- ◆ *Elliot Channel* extends along Elliot Road, east of Ellsworth Road, passes under Ellsworth Road south of the intersection, and discharges to the Siphon Wash approximately 1/4-mile (400 meters) west of Ellsworth Road. The channel is planned as a concrete lined channel east of Ellsworth Road due to ROW limitations. It is currently under design for FCDMC, where consideration is being given to double barrel concrete pipes in lieu of an open channel.

- ◆ *Ellsworth Channel* extends from north of Germann Road to Pecos Road on the east side of Ellsworth Road. It crosses Ellsworth Road just north of Pecos Road and continues north on the west side of Ellsworth Road to a point approximately 0.4-miles (600 meters) south of Ray Road alignment. From there it turns west and continues across WGA property, then northwest (around the Mesa Airpark property) to the Powerline Floodway.

2. Culverts

For this project, there will be several new culvert crossings as well as upgrading/protecting existing culverts. These culverts include:

New Culverts

- ◆ Elliot Channel crossing (approximately 1/4-mile (400 meters) south of Elliot Road). This is currently under design as part of the Elliot Channel.
- ◆ New Pecos Road alignment crossing (east of Ellsworth Road).
- ◆ Ellsworth Road Channel crossing (at Pecos Road).

- ◆ Five channel crossings of the earthen channel – three are for access to WGA from Ellsworth Road, and two are for access to remnant parcels on WGA property.
- ◆ General Motors Desert Proving Grounds collection culverts (approximately 1-mile (1600 meters) north of Pecos Avenue.

Existing Culverts

- ◆ Two culverts cross the Ellsworth Road Alignment from the Mesquite Canyon development, south of Guadalupe. These culverts will need to be removed and the flow diverted south.
- ◆ The culvert crossing at the Powerline Floodway will need to be extended.

3. Estimated Cost

An estimate of probable construction cost is presented in the appendix.

5. REFERENCES

City of Mesa, *City of Mesa Procedure Manual, Engineering and Design Standards*, December, 1990.

Dibble & Associates, *East Mesa Area Drainage Master Plan, Recommended Design Report*, July, 1998.

Federal Highway Administration, Hydraulic Engineering Circular No. 12, *Drainage of Highway Pavements*, FHWA-TS-84-202, March 1984.

Flood Control District of Maricopa County, Engineering Division, *Drainage Design Manual for Maricopa County, Arizona Volume I, Hydrology*, January 1, 1995.

Flood Control District of Maricopa County, Engineering Division, *Drainage Design Manual for Maricopa County, Arizona Volume II, Hydraulics*, January 28, 1996.

Intelisolve Version 8.0, *Hydraflow Storm Sewers for Windows User Manual*, 1998.