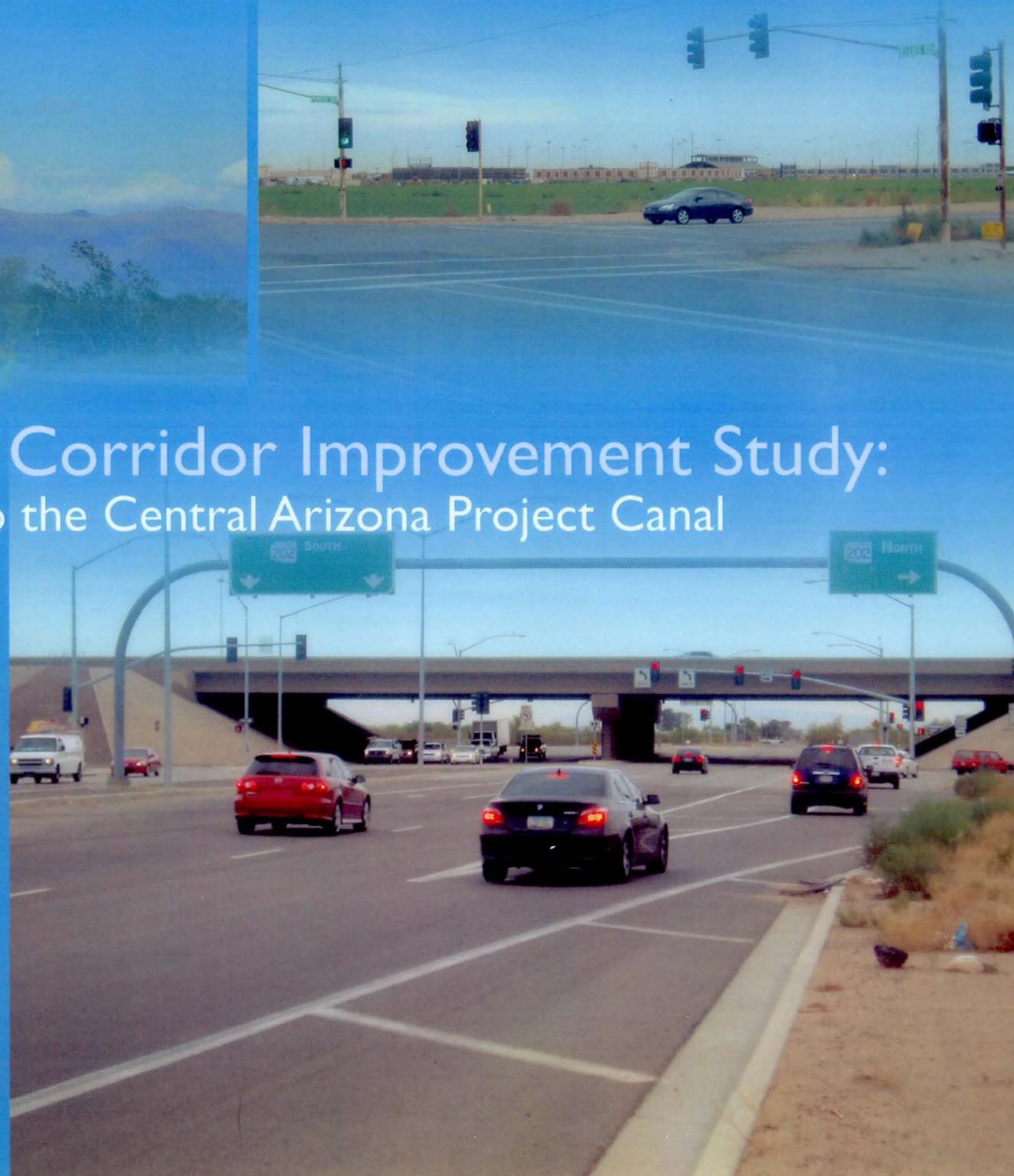
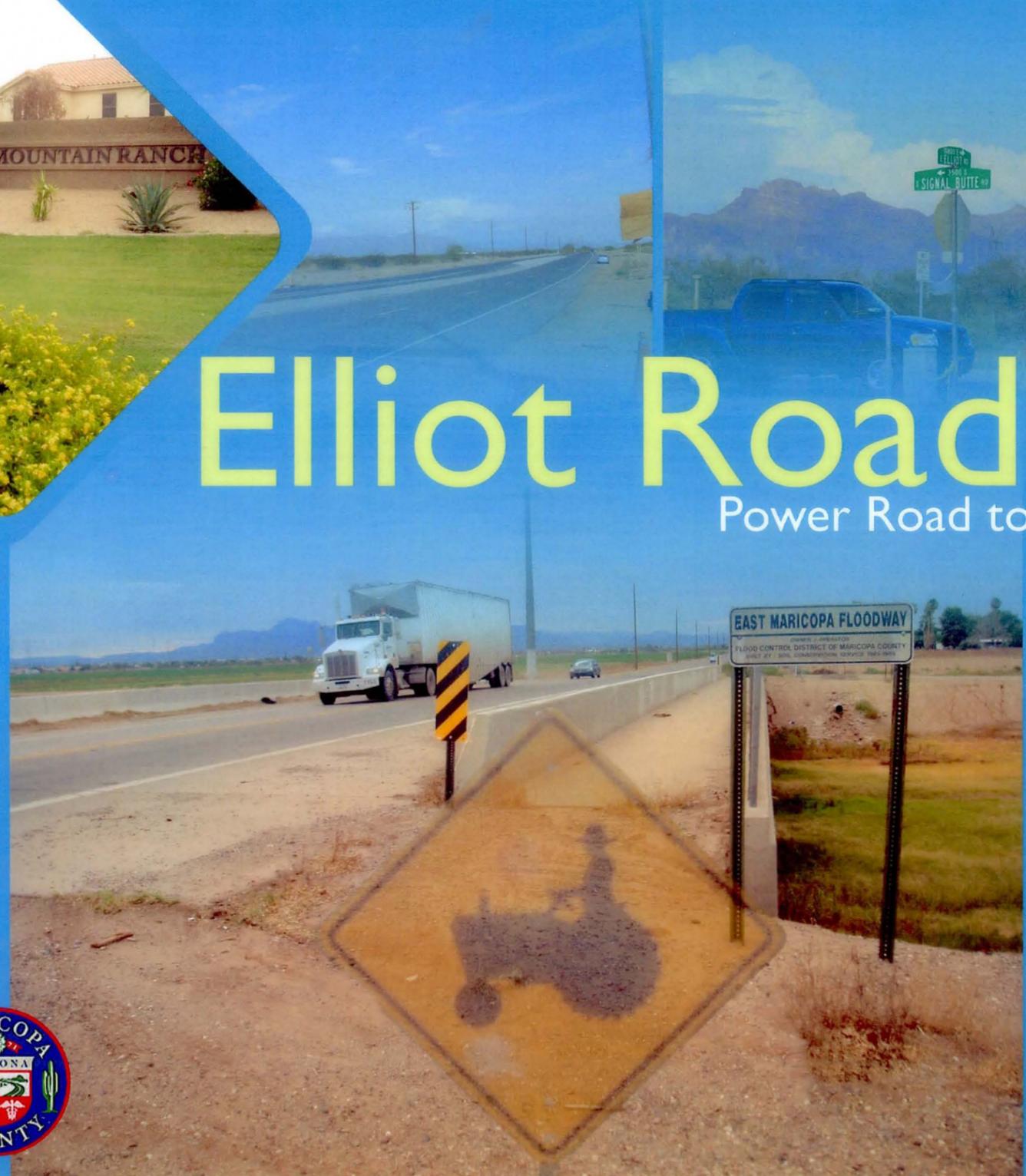


Elliot Road

Corridor Improvement Study:
Power Road to the Central Arizona Project Canal





Elliot Road Corridor Improvement Study: Power Road to the Central Arizona Project Canal

Contract No.: 2006-026
Work Order TT005

Final Report

Prepared by:



June 2008
091337101

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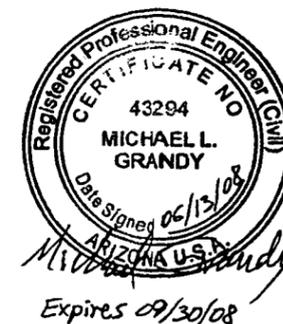


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LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials	FHWA	Federal Highway Administration
ACP	Asbestos Cement Pipe	GM	General Motors
ADEQ	Arizona Department of Environmental Quality	HDPE	High Density Polyethylene
ADOT	Arizona Department of Transportation	IGA	Inter-Governmental Agreement
ADT	Average Daily Traffic	IP	Individual Permit
AGFD	Arizona Game and Fish Department	IRI	International Roughness Index
AJEDG	<i>Apache Junction Engineering Design Guidelines</i>	ITS	Intelligent Transportation Systems
AJSD	<i>Apache Junction Standard Details</i>	LEP	Limited English Proficiency
ASLD	Arizona State Land Department	LOS	Level of Service
AZPDES	Arizona Pollutant Discharge Elimination System	MAG	Maricopa Association of Governments
BG	Block Group	MCDOT	Maricopa County Department of Transportation
CAAG	Central Arizona Association of Governments	MCRDM	<i>Maricopa County Roadway Design Manual</i>
CAP	Central Arizona Project	MEDS	<i>Mesa Engineering and Design Standards</i>
CAWUD	Central Arizona Water Users District	MOU	Memoranda of Understanding
cfs	cubic feet per second	MSDS	<i>Mesa Standard Details and Specifications</i>
CMP	Corrugated Metal Pipe	MSRP	<i>Major Streets and Routes Plan</i>
CFR	Code of Federal Regulations	MTP	<i>Mesa Transportation Plan</i>
CT	Census Tract	NEPA	National Environmental Policy Act
DIP	Ductile Iron Pipe	NRHP	National Register of Historic Places
DPSMC	<i>Drainage Policies and Standards for Maricopa County</i>	NWP	Nationwide Permits
EMADMP	<i>East Mesa Area Drainage Master Plan</i>	PCDM	<i>Pinal County Drainage Manual</i>
EMF	East Maricopa Floodway	PCFCD	Pima County Flood Control District
EO	Executive Order	PCN	Pre-Construction Notification
EPA	Environmental Protection Agency	PE	Polyethylene
ESA	Environmental Site Assessment	PVC	Polyvinyl Chloride
FAA	Federal Aviation Administration	RGRCP	Rubber Gasket Reinforced Concrete Pipe
FCDMC	Flood Control District of Maricopa County	RMS	Road Management System
FDOT	Florida Department of Transportation	RSRSM	<i>Regionally Significant Routes for Safety and Mobility</i>
FEMA	Federal Emergency Management Agency	RTP	<i>Regional Transportation Plan</i>

LIST OF ACRONYMS

RWCD	Roosevelt Water Conservation District
SAC	Stakeholder Advisory Committee
SATS	<i>Small Area Transportation Study</i>
SCP	Steel Cylinder Pipe
SEMNPST	<i>Southeast Maricopa – Northern Pinal County Area Transportation Study</i>
SHPO	State Historic Preservation Office
SRP	Salt River Project
STL	Steel Pipe Lines
SW3P	Storm Water Pollution Prevention Plan
TAC	Technical Advisory Committee
TAZ	Traffic Analysis Zone
TCP	Traditional Cultural Places
TIP	<i>Transportation Improvement Plan</i>
TSP	<i>Transportation System Plan</i>
TWLTL	Two-Way Left-Turn Lane
USDOT	United States Department of Transportation
USFWS	United States Fish and Wildlife Service
WAPA	Western Area Power Administration

EXECUTIVE SUMMARY

Study Background

The purpose of the Elliot Road Corridor Improvement Study was to provide the Maricopa County Department of Transportation (MCDOT) and other involved jurisdictions with a consensus-based vision and plan for a future "footprint" of Elliot Road and a recommended timeframe for the implementation of future roadway improvements to enable the corridor to provide safe and efficient mobility and adequate access to adjacent land uses. To help ensure that Elliot Road can safely accommodate forecasted traffic growth, this study established the facility type, number of lanes, right-of-way needs, and general alignment for Elliot Road. This study also resulted in recommended access management guidelines and a plan for future implementation.

The study area of the Elliot Road Corridor Improvement Study encompasses the existing Elliot Road alignment between Power Road and the Central Arizona Project (CAP) Canal, totaling approximately eight miles in length. East of Meridian Road, where Elliot Road does not currently exist, the eastern terminus of the study area is an assumed alignment for the future proposed North-South Freeway Corridor near the CAP Canal. The City of Mesa, City of Apache Junction, Pinal County, and Maricopa County all have jurisdiction over areas adjacent to Elliot Road within the limits of the corridor study area.

Building Consensus

There was a strong focus on building consensus throughout the course of the Elliot Road Corridor Improvement Study. Identifying key stakeholders and getting them involved in the project from the onset was critical to the success of this project. Key stakeholders were identified prior to the start of the project and one of the initial project tasks was to hold an open house to inform the public of the intent of the study, answer questions, and gather input. Two additional open house meetings were held during this study in order to keep the public informed and to receive their input on some of the decisions being made that affect the corridor.

The study involved a wide range of stakeholders, including representatives of county, city, and state government agencies as well as private land owners and developers. A Technical Advisory Committee (TAC) was formed to guide the technical aspects of the study and provide planning and engineering expertise to the study. A Stakeholder Advisory Committee (SAC), which consisted of the TAC members along with private utility companies and some land developers that are likely to be affected by aspects of this study, was tasked with identifying concerns, discussing relevant issues, gathering input, and building consensus.

Stakeholder consensus was reached on the concept that any future roadway improvements for Elliot Road should conform to City of Mesa standards in Maricopa County (west of Meridian Road) and to City of Apache Junction standards in Pinal County (east of Meridian Road). It was proposed that off-site drainage improvements should conform to Flood Control District of Maricopa County (FCDMC) standards in Maricopa County and to Pinal County Flood Control District (PCFCD) standards in Pinal County. The jurisdictions involved in the study were encouraged to work together to develop formalized agreements related to the aforementioned proposed standards for Elliot Road.

The outcome of the coordination strategies was a general consensus on the final recommendations because the participating jurisdictions, as well as the public, supported the process through which the final recommendations were developed.

Study Process

The study was conducted in two phases; a planning phase and an operations and preliminary design phase. The planning phase included the review of general background information, the gathering of engineering and

environmental data, and establishment of opportunities and constraints leading to the identification of existing deficiencies and future corridor needs. Throughout the planning phase, coordination with affected jurisdictions, stakeholders, and the general public helped form a broad consensus on existing deficiencies, future needs, and corridor vision.

In the operations and preliminary design phase, three potentially feasible conceptual alternatives were developed based on the needs and deficiencies identified during the planning phase. The alternatives were evaluated using a tiered approach which ultimately led to a preferred alternative. The alternatives analysis process provided adequate information to distinguish between the costs and benefits of competing solutions to the study-identified needs. An investigation of costs versus benefits for each alternative was an important part of this analysis. This study culminated in the recommendation of a preferred alternative.

The Final Report for the corridor study includes conceptual design plans that show existing and proposed corridor infrastructure and right-of-way. The Final Report also integrates the contents of the nine draft technical memoranda listed below which were prepared during the corridor study to document the findings and recommendations:

- Purpose and Need;
- Existing and Future Corridor Features;
- Traffic Analysis;
- Environmental Overview;
- Conceptual Drainage Report;
- Utilities Overview;
- Corridor Alternatives and Evaluation;
- Major Design Features and Access Guidelines; and
- Public and Stakeholder Participation.

Preferred Alternative

Based on input received from the TAC, SAC, and public, along with the recognition that existing development has already set the Elliot Road alignment about the section line at several locations along the corridor, the Symmetrical alignment alternative (Alternative A) was recommended as the preferred alternative for Elliot Road between Power Road and Meridian Road.

Input received on the alignment alternatives from TAC/SAC members and the public was generally in favor of the Symmetrical alignment alternative because of the more equitable right-of-way impacts to adjacent property owners and the fact that significant portions of Elliot Road have already been constructed with the recommended principal arterial cross-section centered on the section line (which aligns with the Symmetrical alignment alternative).

In addition, a 2,000-foot radius reverse curve alternative and a 10,000-foot radius reverse curve alternative were evaluated for the new segment of Elliot Road east of Meridian Road where there is a section line offset. Input received from TAC/SAC members and the public was generally in favor of the 10,000-foot radius reverse curve because it will eliminate the need for superelevation and avoid crossing a drainage wash that would likely have to be crossed if the 2,000-foot radius reverse curve alternative were implemented. The 10,000-foot radius reverse curve will also align better with the planned Lost Dutchman Heights development roadway network and the proposed Siphon Draw Wash drainage basin.

Proposed Roadway and Traffic Signal Improvements

Near-Term Improvement Recommendations

Based on the traffic analysis results and the projected development patterns, the following improvements are anticipated to be needed in the near-term (by 2015), although the timing of many of these improvements will be dependent on what, where, and when development occurs:

- The Sossaman Road/Elliot Road intersection will likely need to be signalized by 2015. In the short-term, this could be a two-phase signal with one left-turn lane, two through lanes, and one right-turn lane on each approach;
- The Hawes Road/Elliot Road intersection will likely need to be signalized by 2015. In the short-term, this could be a two-phase signal with one left-turn lane, two through lanes, and one right-turn lane on each approach;
- Elliot Road (and its associated cross-streets) will likely need to be widened to the full six-lane cross-section between Loop 202 and Meridian Road by 2015; and
- By 2015, Elliot Road is expected to be extended east of Meridian Road to Ironwood Road and perhaps beyond, depending on the to-be-determined North-South freeway alignment. While only a four-lane road is likely needed initially from a capacity standpoint, a six-lane road should be built so the road does not have to be rebuilt later. The existing waterline easement that the City of Mesa has identified will likely need to be modified to run parallel to, and on the north side of, the reverse curve alignment discussed previously in this document.

Mid-Term Improvement Recommendations

Based on the development patterns projected by the Maricopa Association of Governments (MAG), the following improvement is anticipated to occur in the mid-term (2015-2025), although the timing of this improvement will be dependent on what, where, and when development occurs:

- The Crismon Road/Elliot Road intersection will likely be constructed during this time period.

While the Crismon Road/Elliot Road intersection is assumed to be a principal arterial-principal arterial intersection in this study based on available adopted agency plans, preliminary plans from DMB, the developer of the Mesa Proving Grounds, indicate that Crismon Road may be a collector rather than a principal arterial south of Elliot Road, with only two through lanes northbound and southbound through the intersection. The DMB preliminary plans also indicate Crismon Road may be constructed prior to 2015.

While not an improvement directly on Elliot Road, gaps that currently exist in Meridian Road will likely be filled during the mid-term timeframe, resulting in a continuous arterial with freeway access through a future interchange with US 60. These improvements are anticipated to significantly alter traffic volumes on Meridian Road and some of the adjacent parallel arterials, such as Ironwood Road, as well as on Elliot Road between Ellsworth Road and Ironwood Road. The new east leg of the Meridian Road/Elliot Road intersection should be built to align with the existing west leg of the intersection. When the north and south legs are improved, they should be built to City of Mesa standards on the west side (southbound direction) of Meridian Road and to City of Apache Junction standards on the east side (northbound direction) of Meridian Road. Using City of Apache Junction standards on the east side of Meridian Road will result in acquiring 75' of right-of-way to the east of the section line. Recognizing that FCDMC had assumed only 65' of right-of-way east of the section line would ultimately be needed for Meridian Road, it should be noted that acquiring 75' of right-of-way could impact the Siphon Draw detention basins currently under design. Coordination with FCDMC is recommended to determine if the proposed 75' right-of-way taking will significantly impact the Siphon Draw basins.

Long-Term Improvement Recommendations

Based on the traffic analysis results and the projected development patterns, the following improvement is anticipated to occur in the long-term (beyond 2025), although the timing of this improvement will be dependent on what, where, and when development occurs:

- Elliot Road (and its associated cross-streets) will likely be widened to the full six-lane cross-section between Power Road and Loop 202. The only exception to the six-lane cross-section is the cross-street of Sossaman Road, which is classified as a four-lane arterial in the City of Mesa's *Transportation Plan*.

Sensitivity Analysis Recommendations

A review of the MAG model output indicated that the model may be underestimating actual travel demand by as much as 37 percent in the Elliot Road corridor. A sensitivity analysis was therefore conducted that resulted in increasing the MAG 2030 projected volumes by 37 percent. Under this Sensitivity scenario, much of the Elliot Road corridor will still function relatively well with the roadway geometry required to accommodate the MAG 2030 projected volumes. To better promote safety and efficient traffic operations under the Sensitivity scenario, dual left-turn lanes with protected left-turn signal phasing are proposed to be added at all of the arterial-arterial intersections that previously had only single left-turn lanes with protected/permitted left-turn phasing.

If a level of service (LOS) value of "D" is desired, additional major improvements would likely be needed at the Loop 202/Elliot Road interchange and on the segment of Elliot Road between Loop 202 and Ellsworth Road (like interchange reconstruction or providing eight through lanes on Elliot Road), along with some spot improvements at the Crismon Road and Meridian Road intersections.

Recognizing the uncertainty of what the magnitude of traffic volumes in 2030 will be, but also recognizing the potential that additional major improvements may be needed on Elliot Road between Loop 202 and Ellsworth Road, it is recommended that obtaining an easement at least ten feet wide next to each side of the standard right-of-way width be considered. Sidewalks and landscaping could be relocated to the easement area to make room for additional improvements within the standard right-of-way. Utilities would not be allowed in this easement unless they could easily be relocated (and at the cost of the utility provider). This establishment of a "clear zone" adjacent to the right-of-way will provide flexibility to accommodate future potentially needed improvements while also allowing the property owner to still utilize the land in the meantime for landscaping, retention, or other appropriate uses.

Alternate solutions are to consider utilizing a modified cross-section with narrower lanes that allows for eight through lanes or other appropriate improvements; or, the respective jurisdiction could determine that LOS E or LOS F in peak hours is acceptable in densely developed areas and not require additional improvements.

Proposed Drainage / Structure Improvements

Roadway improvements will need to incorporate improvements to drainage features. The existing drainage cross culverts that have an operational capacity to handle off-site flow using the 50-year design flow will need to be extended to span the new roadway cross-sections. Additional right-of-way or easements may be required for culvert extensions within the Elliot Road corridor. Culvert lengths will be required to be at least as long as the width of the roadway pavement, plus additional length to construct the inlet and outlet at ground level. If an existing culvert cannot convey the 50-year flow, an upsized or additional culvert is recommended in the location of the inadequate culvert.

The design flow for new culverts should be based on an updated hydrologic analysis to account for land use changes in the upstream basins. Existing roadside channels and pavement drainage systems will need to be relocated and realigned due to the new roadway cross-section. The existing channels and pavement drainage systems may also require upsizing to handle additional pavement runoff. Because some of these channels can be significant in size, additional right-of-way may be needed to accommodate the roadway widening and additional flow. Final design of improvements related to additional roadside drainage channels and pavement drainage systems, if needed, will likely be the responsibility of future developers along Elliot Road.

Analysis will be required during final design to determine if runoff from the Elliot Road improvements can be discharged into the East Maricopa Floodway (EMF), Santan Freeway Channel, Elliot Road detention basins, or Siphon Draw basins, because the FCDMC is concerned about the capacity of these structures. "First flush" requirements must be met prior to discharge into a FCDMC facility. Future developers desiring to discharge on-site drainage to a FCDMC facility are required to meet FCDMC detention/retention requirements prior to discharging to a FCDMC facility.

The dip crossings on Elliot Road between Power Road and Loop 202 are recommended to be replaced with rubber gasket reinforced concrete pipe. Existing culverts in this area are recommended to be modified by either extending the culvert barrel(s) and/or by replacing culverts with larger barrel(s), depending on whether the existing culverts meet the capacity requirements of FCDMC. The EMF Bridge and Roosevelt Canal Bridge will need to be widened if they are to accommodate the proposed six-lane roadway cross-section.

The drainage features along Elliot Road between Loop 202 and Ellsworth Road are to convey pavement drainage. Developers of the properties adjacent to Elliot Road will be required to accommodate the half-street and on-site drainage along the frontage of the property.

The multi-purpose culverts on the south side of the road will be extended to the north to intercept flows and eliminate the need for the dip crossings. The concrete drop inlet structure located approximately one-half mile west of Signal Butte Road on the south side of the road may need to be relocated due to the proposed widening of Elliot Road in that area.

Cross culverts are recommended for the Elliot Road alignment from Meridian Road to the CAP Canal. Currently, there are no drainage structures in the area. Cross culvert pipes ranging from 18" diameter to 48" diameter are recommended in this segment.

Other Recommendations

The following recommendations provide additional guidance to manage access on Elliot Road:

- When widening Elliot Road to the proposed six-lane section, install the minimum number of median openings needed to adequately serve traffic and adjacent land. Additional median openings should then be added later only if their anticipated benefits outweigh their anticipated adverse impacts on traffic operations and safety;
- When improving Elliot Road, initially install new traffic signals at a minimum spacing of 2640 feet (1/2 mile). If additional signals are later needed, they could be added when warranted as long as they are spaced per the City of Mesa and City of Apache Junction standards so as to not disrupt the progression of through-traffic along Elliot Road;
- Avoid direct access to Elliot Road where feasible alternate access points exist. Access to new corner developments should occur on north-south cross-streets rather than directly on Elliot Road if the cross-streets have a lower functional classification than Elliot Road;
- If direct access to Elliot Road is needed, limit each property to one access point on Elliot Road;

- New developments should share access points on Elliot Road where feasible and should provide interconnectivity between their parking lots and those of adjacent properties;
- Improve existing business access points by installing curb/gutter and consolidating driveways;
- Prohibit left-turn movements from driveways when feasible;
- Encourage shared parking for adjacent businesses;
- Encourage or require new developments to provide pedestrian and bicycle linkages between their developments and public thoroughfares;
- Driveways should be located at least 600 feet from adjacent driveways if possible;
- Driveway openings on Elliot Road should be located at least 400 feet from an intersection with another major arterial street if possible;
- In the vicinity of Loop 202, prohibit driveways within 1,000 feet of the interchange ramps if possible; and
- Discourage the subdividing of lots that would make it impossible to meet the desired access point spacing along Elliot Road.

While it is recognized that these proposed guidelines may not be feasible in all situations, efforts should be made to meet the guidelines to promote adequate access control. Doing so will require significant collaboration with stakeholders, business owners, and the public. Individual jurisdictions are ultimately responsible for implementation of access management within their respective jurisdictions.

As the Elliot Road corridor continues to develop, consideration should be given to deploying intelligent transportation systems (ITS). While there are currently no known local or regional plans to deploy ITS devices on Elliot Road, any deployment of ITS devices in the future should be integrated with future local or regional ITS plans. The deployment of ITS devices should follow applicable City of Mesa or City of Apache Junction ITS-related standards.

Implementation Phasing and Staging of Improvements

Exhibit ES-1 presents the proposed implementation phasing and staging of corridor improvements. Improvements are prioritized considering need and when development of adjacent land and construction of other roadways in the area are anticipated to occur. Actual phasing may vary depending on the timing and location of adjacent development and proposed improvements to other roadways in the vicinity of Elliot Road (e.g., Crismon Road may be constructed before 2015 per preliminary DMB plans). Many of these improvements will likely be financed by developers as part of their development agreements with the respective jurisdiction. **Exhibit ES-1** also includes an estimate of probable construction costs. A detailed estimate of probable total cost, that includes costs for construction, design, construction management, right-of-way, utility relocation, and administration, is shown in **Exhibit ES-2**. The costs listed include right-of-way dedications and work performed by developers that are not typically reimbursed by the respective jurisdiction.

Funding is also needed for maintenance of the segments of Elliot Road that are already constructed. Pavement conditions are poor on Elliot Road between Power Road and Loop 202 and between Ellsworth Road and Signal Butte Road and pavement restoration will likely be needed soon.

The jurisdictions involved in this study should continue to work together to develop some type of formalized agreement related to the aforementioned proposed standards and implementation of the proposed improvements for Elliot Road.

Exhibit ES-1 – Proposed Implementation Phasing and Estimate of Construction Cost

Improvements	Proposed Phasing	Estimate of Probable Construction Cost
Signalize and Widen Sossaman Road Intersection	Near-term (by 2015)	\$930,000
Signalize and Widen Hawes Road Intersection	Near-term (by 2015)	\$930,000
Elliot Road: Meridian Road to Ironwood Road (construct with 6 lanes)	Near-term (by 2015)	\$6,390,000
Elliot Road: Loop 202 to Mountain Road (widen to 6 lanes)	Near-term (by 2015)	\$14,270,000
Construct Crismon Road Intersection	Mid-term (by 2025)	\$1,310,000
Elliot Road: Power Road to Loop 202 (widen to 6 lanes)	Long-term (after 2025)	\$15,320,000
Total Construction Cost		\$39,150,000

Exhibit ES-2 – Total Cost Estimate for Elliot Road Improvements

	<i>Elliot Road Segment</i>				
	Power Road to Meridian Road			Meridian to CAP Canal	Entire Corridor
2008 SUMMARY COST ESTIMATES (Current Dollars)					
<i>Term of Construction</i>	<i>Near (by 2015)</i>	<i>Mid (by 2025)</i>	<i>Long (after 2025)</i>	<i>Near (by 2015)</i>	<i>Total</i>
Construction	\$16,130,000	\$1,310,000	\$15,320,000	\$6,390,000	\$39,150,000
Design (12%)	\$1,935,600	\$157,200	\$1,838,400	\$766,800	\$4,698,000
Construction Management (15%)	\$2,419,500	\$196,500	\$2,298,000	\$958,500	\$5,872,500
Right-of-Way	\$12,600,000	\$1,000,000	\$11,500,000	\$22,000,000	\$47,100,000
Utility Relocation	\$300,000	\$0	\$0	\$0	\$300,000
Administration (10%)	\$1,613,000	\$131,000	\$1,532,000	\$639,000	\$3,915,000
Total Cost	\$34,998,100	\$2,794,700	\$32,488,400	\$30,754,300	\$101,035,500
PRELIMINARY SUMMARY COST ESTIMATES (Adjusted for Inflation)					
<i>Term of Construction</i>	<i>Near (by 2015)</i>	<i>Mid (by 2025)</i>	<i>Long (after 2025)</i>	<i>Near (by 2015)</i>	<i>Total</i>
Assumed Annual Inflation Rate	2.90%	2.90%	2.90%	2.90%	-
Assumed Number of Years	7	17	22	7	-
Adjusted Construction	\$19,703,437	\$2,129,770	\$28,734,061	\$7,805,639	\$58,372,907
Design (12%)	\$2,364,412	\$255,572	\$3,448,087	\$936,677	\$7,004,748
Construction Management (15%)	\$2,955,516	\$319,465	\$4,310,109	\$1,170,846	\$8,755,936
Right-of-Way	\$15,391,402	\$1,625,778	\$21,569,302	\$26,873,876	\$65,460,358
Utility Relocation	\$366,462	\$0	\$0	\$0	\$366,462
Administration (10%)	\$1,970,344	\$212,977	\$2,873,406	\$780,564	\$5,837,291
Adjusted Total Cost	\$42,751,572	\$4,543,563	\$60,934,965	\$37,567,602	\$145,797,702

Potential Cost-Saving Solutions

The proposed improvements are based on the agreed upon design criteria. There are a few instances, however, where design exceptions may be warranted because there are alternate solutions that could significantly reduce the cost of the improvements with minimal impacts on traffic operations. Potential cost-saving solutions, such as the following, should be considered as the proposed improvements enter the design phase:

- Provide a shared eastbound through/right-turn lane rather than an exclusive right-turn lane at the Elliot Road/Loop 202 Southbound Ramps intersection because the projected eastbound right-turn volumes are quite low, even in the 2030 sensitivity analysis scenario. This alternate solution could be implemented using the pavement that already exists and would not require any reconstruction except for some minor signing and pavement marking modifications. Any modifications to the Loop 202 ramp intersections would require prior approval from the Arizona Department of Transportation (ADOT);
- Provide two through lanes in each direction rather than three through lanes in each direction on Elliot Road between Power Road and Loop 202. This alternate solution would still provide LOS C or better, even in the 2030 sensitivity analysis scenario, at the Sossaman Road/Elliot Road and Hawes Road/Elliot Road intersections, and would reduce the amount of additional pavement required and the amount of utility relocation required; and
- Related to the previous alternate solution, restripe Elliot Road across the Roosevelt Canal Bridge and EMF Bridge to provide two 10.5' lanes and a 5' shoulder in each direction and no median rather than widening the two bridges to accommodate the full six-lane principal arterial cross-section. This proposed cross-section would require an additional 2' of roadway width on the EMF Bridge beyond what currently exists. This could be accomplished by moving the concrete barrier at the edge of the south side of the road 2' farther south (effectively reducing the existing sidewalk width from 8' to 6'). This alternate solution would eliminate or postpone the need to widen the bridges and relocate the gate structure on the Roosevelt Canal south of Elliot Road.

1. INTRODUCTION

This section documents the need for corridor improvements along Elliot Road between Power Road and the Central Arizona Project (CAP) Canal and the anticipated benefits to be gained by project implementation. Also included in this section are the study purpose and objectives, study area, study issues, coordination strategies, and a summary of the scope of the study. Additional information is available in Technical Memorandum No. 1 – Purpose and Need.

1.1 Need for Study

In 1997, Maricopa County completed the *Comprehensive Plan and Transportation System Plan (TSP)* for the unincorporated areas of the County. Following the completion of the TSP, MAG, the Central Arizona Association of Governments (CAAG), and ADOT completed the *Southeast Maricopa – Northern Pinal County Area Transportation Study (SEMNPTS)* to determine future traffic demands and identify the transportation improvements needed to satisfy the projected population growth within the study area. Pinal County then completed a *Small Area Transportation Study (SATS)* that included portions of Elliot Road. In all of these studies/plans, Elliot Road was among the corridors identified for improvement. The MAG *Regional Transportation Plan (RTP)*, developed in 2003 and updated in 2007, has also recognized the need to improve the existing arterial street network to accommodate anticipated growth.

The Elliot Road corridor study area, along with the entire region of southeast Maricopa County and northwest Pinal County, is expected to grow dramatically by 2030. Existing land uses will change in order to allow for higher density development than what currently exists along the corridor. This anticipated development is expected to generate more traffic than the existing roadway can handle. Major infrastructure improvements will need to occur along Elliot Road in order to accommodate the anticipated growth. This study helps identify infrastructure and transportation needs and proposes solutions that will enable the corridor to provide safe and efficient mobility and adequate access to adjacent land uses.

Because the Elliot Road corridor study area passes through multiple jurisdictions, this study specifically addressed some of the interagency coordination issues that may arise. To develop a corridor that is consistent throughout, consensus is needed on what is envisioned for the Elliot Road corridor in the future. Elliot Road does not currently exist east of the Maricopa County/Pinal County border at Meridian Road. This study addressed that need and evaluated alternatives for a new Elliot Road alignment from Meridian Road to the CAP Canal.

1.2 Study Purpose and Objectives

The purpose of the Elliot Road Corridor Improvement Study was to provide MCDOT and other involved jurisdictions with a consensus-based vision and plan for a future “footprint” of Elliot Road and a recommended timeframe for the implementation of future roadway improvements to enable the corridor to provide safe and efficient mobility and adequate access to adjacent land uses. To help ensure that Elliot Road can safely accommodate forecasted traffic growth, this study established the facility type, number of lanes, right-of-way needs, and general alignment for Elliot Road. This study also resulted in recommended access management guidelines (e.g. intersection spacing, median breaks/locations) and a plan for future implementation.

1.3 Study Area

The study area of the Elliot Road Corridor Improvement Study encompasses the existing Elliot Road alignment between Power Road and the CAP Canal, totaling approximately eight miles in length. East of Meridian Road, where Elliot Road does not currently exist, the eastern terminus of the study area is an assumed alignment for the future proposed North-South Freeway Corridor near the CAP Canal. Because the alignment of the North-South freeway has not yet been determined, this study only addressed the alignment of Elliot Road through

Ironwood Road, which is the major cross-street on Elliot Road just west of the North-South Freeway Corridor. The project study area is shown in **Exhibit 1**.

1.4 Study Issues

Several major issues were identified and addressed in this study that will impact how the Elliot Road corridor is developed and improved in the future. These issues include the following and are discussed briefly below:

- Accommodating jurisdictional differences in roadway design criteria and land use controls;
- Balancing competing jurisdictional and property owner interests;
- Balancing mobility with property access needs;
- Accommodating projected traffic needs;
- Addressing environmental, utility, and drainage constraints; and
- Developing implementation and financing strategies.

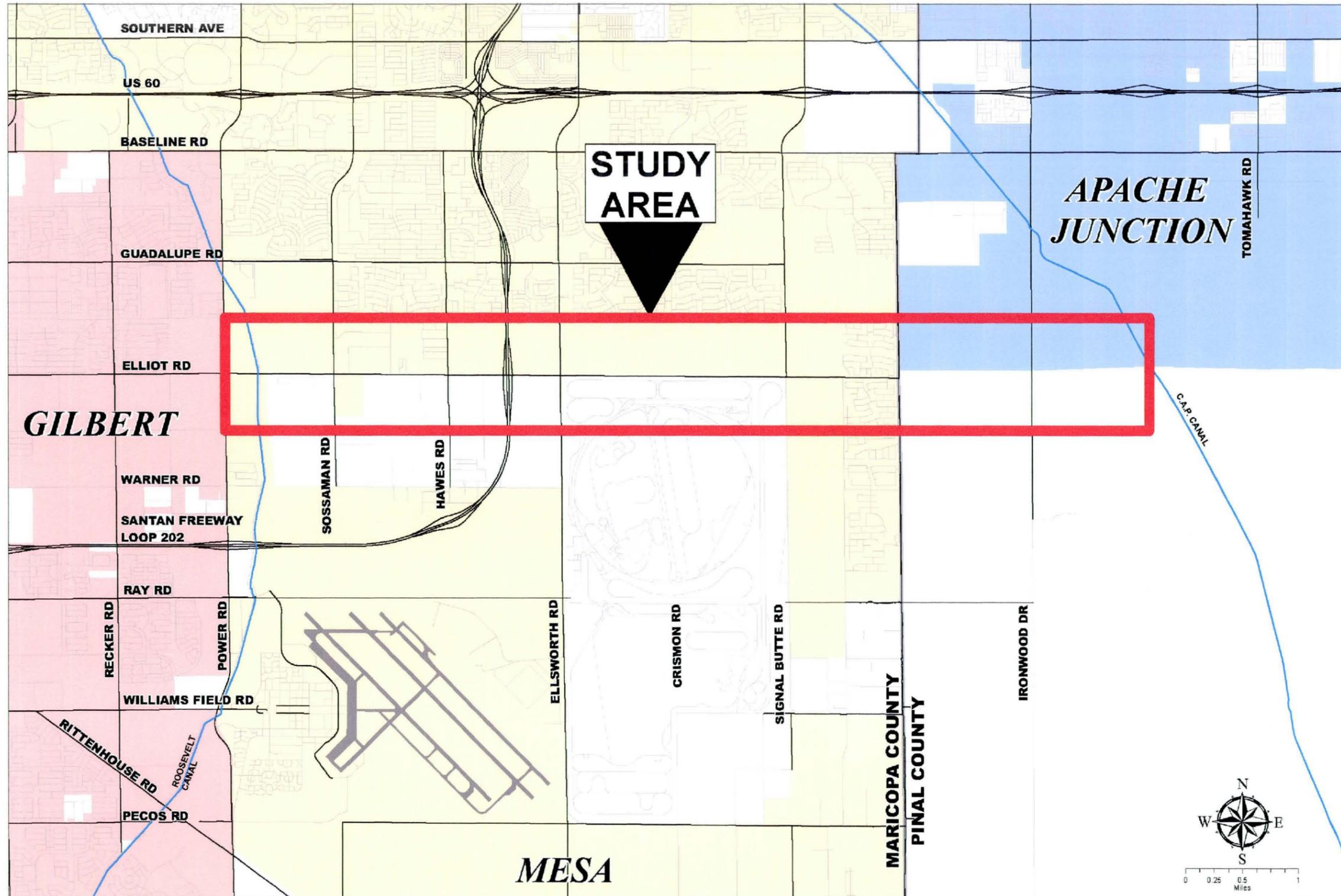
The City of Mesa, City of Apache Junction, Pinal County, and Maricopa County all have jurisdiction over areas adjacent to Elliot Road within the limits of the corridor study area. Adopted guidelines and standards regarding operational characteristics such as number of travel lanes, lane widths, speed limits, traffic signal spacing, and minimum acceptable levels of service at intersections vary across these jurisdictions. To ensure a consistent, sustainable, and appropriate design along Elliot Road, these jurisdictions were encouraged to come to a consensus on roadway design criteria and land use control strategies early on in the study, recognizing, of course, that individual jurisdictions are ultimately responsible for defining and implementing design criteria and land use control strategies within their respective jurisdictions.

Agencies with jurisdiction over the land adjacent to Elliot Road will need to coordinate with private land developers to ensure that the improvements made to Elliot Road by developers are consistent with the recommendations from this corridor study. Similarly, coordination is needed with utility providers to ensure that their facilities are properly sized and located to accommodate the corridor study’s recommended improvements.

Access management was recognized as a key issue that will have a significant effect on the character of the roadway along the corridor. Access management relates to issues such as whether or not to incorporate raised medians along the corridor, how much space will be required between median openings if raised medians are adopted, and what driveway spacing guidelines will be enforced along the corridor. The absence of raised medians, combined with a proliferation of driveways to adjacent land uses, will provide frequent access along the corridor, but will likely compromise mobility and operational efficiency. Raised medians with minimal median opening locations and fewer driveways will improve the operational efficiency of the roadway and promote safety because there will be fewer conflict points. Limited access to adjacent land uses, however, is not what property owners typically want. One of the challenges of this project was to get stakeholders to agree upon a balanced solution that falls somewhere in between these two extremes.

While existing traffic conditions on Elliot Road are generally considered acceptable, the amount of projected growth in the area is expected to translate into significant increases in traffic volumes. The exact magnitude of this increase in volumes, and where the increase in volumes will occur, is difficult to determine with a high level of certainty because much of the future increase in volumes is dependent on the location, timing, and type of development that occurs on the land adjacent to Elliot Road.

Exhibit 1 – Project Study Area



Environmental issues (e.g., biological, historical, cultural) are of critical concern and should be identified and mitigated early in the design process. Otherwise, proposed improvements may have such an adverse effect on the surrounding environment that they become unfeasible due to potential environmental ramifications. Existing and planned utility and drainage features must also be accounted for because they may place constraints on what can be done to modify the roadway.

Another issue that was considered is how the proposed improvements will be implemented and funded. There will likely be limited public funding available to implement the recommendations that come out of this study, and it is likely that most improvements will be financed and constructed by land developers when their properties are developed.

1.5 Coordination Strategies

There was a strong focus on building consensus throughout the course of the Elliot Road Corridor Improvement Study. This section discusses some of the strategies that were used to achieve this goal. One of the main emphases of this study was to create a future “footprint” for Elliot Road as well as a timeframe for the implementation of the recommended future roadway improvements that each jurisdiction could agree on.

Identifying key stakeholders and getting them involved in the project from the onset was critical to the success of this project. Key stakeholders were identified prior to the start of the project and one of the initial project tasks was to hold an open house to inform the public of the intent of the study, answer questions, and gather input. Two additional open house meetings were held during this study in order to keep the public informed and to receive their input on some of the decisions being made that affect the corridor.

The study involved a wide range of stakeholders, including representatives of county, city, and state government agencies as well as private land owners and developers. The stakeholders were initially separated into two committees: the TAC and the SAC. The TAC consisted of those agencies tasked with guiding the technical aspects of the study and providing planning and engineering expertise to the study. The SAC consisted of the TAC members along with private utility companies and some of the land developers that are likely to be affected by aspects of this study, such as DMB (the developer that recently purchased the Mesa Proving Grounds). SAC members were tasked with identifying concerns, discussing relevant issues, gathering input, and building consensus. As the study progressed, many of the SAC members not originally part of the TAC requested to be included in the TAC because of their interest in the planning and engineering components of the study. Recognizing the planning and engineering expertise that many of the SAC members could provide, the decision was made to merge the TAC and SAC into a single advisory committee.

TAC/SAC meetings were held to discuss and receive input on the following: project scoping, preliminary findings from analysis, alternatives development, alternatives evaluation, development and implementation of access management guidelines, and recommendation of the preferred alternative.

One of the first tasks for the TAC/SAC was to come to a consensus on roadway design criteria and land use control strategies. This was achieved by providing the TAC/SAC with side-by-side comparisons of each jurisdiction’s typical design criteria and development standards. The TAC/SAC then discussed the differences between the jurisdictions’ criteria and standards and how the different jurisdictions might be able to come to a consensus on which criteria and standards to utilize on Elliot Road. Based on input received from the TAC/SAC and the anticipated eventual annexation of Elliot Road into the City of Mesa in Maricopa County and into the City of Apache Junction in Pinal County, it was proposed that any future roadway improvements for Elliot Road conform to City of Mesa standards in Maricopa County (west of Meridian Road) and to City of Apache Junction standards in Pinal County (east of Meridian Road). It was proposed that off-site drainage improvements should conform to FCDMC standards in Maricopa County and to PCFCD standards in Pinal County. **Exhibit 2** provides an example of this side-by-side comparison, with the columns on the right side of

the exhibit showing what key features and performance measures for principal arterials were proposed as representing the consensus features and performance measures for the study area.

It was recognized that there have been issues in the past – especially from a liability standpoint – related to a jurisdiction utilizing standards that do not conform to that particular jurisdiction’s adopted standards. To minimize the likelihood of such issues arising related to Elliot Road, the jurisdictions involved were encouraged to work together to develop formalized agreements related to the aforementioned proposed standards for Elliot Road. Inter-Governmental Agreements (IGA) or Memoranda of Understanding (MOU) were cited as instruments that could be developed to address what standards will be used, describe who will be responsible for construction, maintenance, and funding, and define legal responsibilities.

The outcome of the coordination strategies mentioned above was a general consensus on the final recommendations because the participating jurisdictions, as well as the public, supported the process through which the final recommendations were developed.

1.6 Scope of Study

The study was conducted in two phases; a planning phase and an operations and preliminary design phase. The planning phase included the review of general background information, the gathering of engineering and environmental data, and establishment of opportunities and constraints leading to the identification of existing deficiencies and future corridor needs. Throughout the planning phase, coordination with affected jurisdictions, stakeholders, and the public helped form a broad consensus on existing deficiencies, future needs, and corridor vision.

In the operations and design phase, three potentially feasible conceptual alternatives were developed based on the needs and deficiencies identified during the planning phase. The alternatives were evaluated using a tiered approach which ultimately led to a preferred alternative. The alternatives analysis process provided adequate information to distinguish between the costs and benefits of competing solutions to the study-identified needs. An investigation of costs versus benefits for each alternative was an important part of this analysis. This study culminated in the recommendation of a preferred alternative.

The project schedule spanned 13 months, from May 2007 through June 2008. Data collection and initial planning and engineering studies of existing and future conditions were completed in October 2007. Corridor alternatives evaluation was completed in February 2008. Recommended improvements were presented to the TAC/SAC and the public in April 2008.

The Final Report for the corridor study includes conceptual design plans that show existing and proposed corridor infrastructure and right-of-way. The Final Report also integrates the contents of the nine draft technical memoranda listed below which were prepared during the corridor study to document the findings and recommendations:

- Purpose and Need;
- Existing and Future Corridor Features;
- Traffic Analysis;
- Environmental Overview;
- Conceptual Drainage Report;
- Utilities Overview;
- Corridor Alternatives and Evaluation;
- Major Design Features and Access Guidelines; and
- Public and Stakeholder Participation.

Exhibit 2 – Key Features and Performance Measures for Principal Arterials

Key Characteristics/ Performance Measures	Description	Jurisdiction				Proposed Features/ Measures for Elliot Road West of Meridian Road (Matches City of Mesa Standards)	Proposed Features/ Measures for Elliot Road East of Meridian Road (Matches Apache Junction Standards)
		Maricopa County	City of Mesa	Pinal County	Apache Junction		
Right-of-Way Width	Minimum right-of-way width requirements	130'	130'	150'	150'	130'	150'
Roadway Width	Face-of-curb to face-of-curb	101'	94'	102'	91'	94'	91'
	Back-of-sidewalk to back-of-sidewalk	125'	125'	127'	118'	125'	118'
Median Divider	Policy on median dividers and typical median divider width	Raised – 14'	Raised – 16'	14'	Raised – 16'	Raised – 16'	Raised – 16'
Median Openings	Typical minimum median opening spacing (where raised medians exist)	-	1/6 mile – full access 1/8 mile – partial access from signalized int.	1/2 mile – full access	1/6 mile – full access 1/8 mile – partial access from signalized int.	1/6 mile – full access 1/8 mile – partial access from signalized int.	1/6 mile – full access 1/8 mile – partial access from signalized int.
Driveway Spacing	Typical minimum driveway spacing along the corridor	230' from intersection 105' – 330' minimum from other driveways	100' from intersection 60' from other driveways	105' – 330' minimum from other driveways	100' from arterial intersection 50' from non-arterial intersection	100' from intersection 60' from other driveways	100' from arterial intersection 50' from non-arterial intersection
Travel Lanes	Typical number of lanes and lane widths	6 lanes, 12'-14' width	6 lanes, 11' width	6 lanes, 12'-14' width	6 lanes, 12' width	6 lanes, 11' width	6 lanes, 12' width
Level of Service (LOS)	Minimum acceptable long-term future LOS along corridor	LOS D	LOS D	LOS C	LOS D	LOS D	LOS D
Design Speed	Typical minimum design speed	55 mph	50 mph	55 mph	55 mph	50 mph	55 mph
Bicycle Lanes	Typical bicycle lane widths (measured from face-of-curb)	5.5'	6'	6'	None	6'	None
Sidewalk/Planter	Typical sidewalk/planter widths	5' / 7'	6' / 9.5'	12' total	5' / 18'	6' / 9.5'	5' / 18'
Transit	Proposed Transit Facilities	Bus pullout on far side of arterial intersections	Bus pullout on far side of arterial intersections	Bus pullout if needed	Bus pullout on far side of arterial intersections	Bus pullout on far side of arterial intersections	Bus pullout on far side of arterial intersections

- = not known

2. EXISTING AND FUTURE CORRIDOR FEATURES

This section provides an overview of existing and future corridor features for the Elliot Road corridor study area as documented in available plans, studies, reports, and documentation. This understanding of existing and future corridor features provided a solid foundation for the assessment of corridor needs and deficiencies. Additional information is available in Technical Memorandum No. 2 – Existing and Future Corridor Features.

2.1 Inventory of Documents Reviewed

A sampling of the documents reviewed to extract pertinent information related to existing and future Elliot Road corridor features is listed in Exhibit 3.

Exhibit 3 – Summary of Collected Documentation

Jurisdiction / Agency	Document Title	Date
Arizona Department of Transportation (ADOT)	Pinal County Corridors Definition Study	January 2007
	Williams Gateway Corridor Definition Study	April 2006
Arizona State Land Department (ASLD), et. al.	The Treasures of the Superstitions: Scenarios for the Future of Superstition Vistas	April 2006
Maricopa Association of Governments (MAG), et. al.	Southeast Maricopa/Northern Pinal County Area Transportation Study	September 2003
	Regional Transportation Plan	July 2007
Maricopa County	Comprehensive Plan	Adopted October 1997, revised August 2002
	Transportation System Plan	Adopted February 2007
Maricopa County Department of Transportation (MCDOT)	Elliot Road (Power Rd to Ellsworth Rd) Candidate Assessment Report	March 2001
	Maricopa County Major Streets and Routes Plan (MSRP) – Street Classification Atlas and Policy	Adopted in 2001, revised in 2004
Flood Control District of Maricopa County (FCDMC)	Siphon Draw Drainage Easement	Draft 2007
Pinal County	Comprehensive Plan	December 2001, amended November 2006
	Pinal County, Regionally Significant Routes for Safety and Mobility (RSRSM)	Draft, July 2007
	Pinal County Small Area Transportation Study	2006
City of Mesa	Transportation Plan and General Plan	June 2002
City of Mesa	Mesa Gateway Strategic Development Plan	Draft 2007
City of Apache Junction	Small Area Transportation Study	May 2004
Town of Gilbert	General Plan	Approved in 2001, amended in 2006
DMB Associates	Land Development Vision Plan on Mesa Proving Grounds	Draft 2007
Salt River Project (SRP)	SRP, 69 KV Route Options Map: Browning to Scussel and Browning to Mcpherson (Preliminary)	Draft 2007

2.2 Summary of Programmed Roadway Improvements

Exhibit 4 lists programmed roadway improvements as contained in the Capital Improvement Programs, Transportation Improvement Programs, and RTPs of agencies and jurisdictions within the study area.

Exhibit 4 – Programmed Improvements

Agency / Jurisdiction	Planned/ Programmed Improvements	Description	Data Source
City of Mesa	Power Road Improvements, East Maricopa Floodway to Galveston Street	The City of Mesa, Town of Gilbert, and MCDOT are widening Power Road to six lanes from south of Guadalupe Road to Galveston Road (South of Ray Road). The project will include a raised landscaped median and dual left turn lanes at the arterial intersections. Other improvements include new street lights, traffic signals, sidewalk and landscaping along the corridor. The project is anticipated to be constructed by 2012.	City of Mesa Capital Improvement Program 2007-2012
MAG	Elliot Road, Power Road to Meridian Road	The MAG RTP allocates \$17.2 million (2007 dollars figure) in 2023 to widen Elliot Road to six lanes between Power Road and Meridian Road	MAG RTP

2.3 Corridor Land Use

2.3.1 Jurisdictional Responsibilities

The Elliot Road study corridor serves the southern portion of the City of Mesa, the eastern portion of unincorporated Maricopa County, the southwest portion of the City of Apache Junction, and the northwest portion of unincorporated Pinal County.

Land jurisdiction refers to the city, county, state, or federal agency or agencies exercising governmental authority over a particular geographic area. The City of Mesa, City of Apache Junction, Pinal County, and Maricopa County all maintain jurisdiction over land that is adjacent to the Elliot Road corridor under study. Maricopa County has jurisdiction over the existing Elliot Road roadway except for the quarter-mile segment east of Sossaman Road and the mile segment between Signal Butte Road and Meridian Road. The Town of Gilbert has jurisdiction over Elliot Road west of Power Road and should be involved in any decisions affecting sections of Elliot Road within its jurisdiction.

The City of Mesa jurisdictional boundaries on the north side of Elliot Road extend from Power Road to Meridian Road. On the south side of Elliot Road, Mesa has jurisdiction from Power Road to just east of the EMF, from Sossaman Road to approximately one quarter-mile east of Sossaman Road, and from Signal Butte Road to Meridian Road. Maricopa County has jurisdiction over the remainder of the south side of Elliot Road west of Signal Butte Road. Apache Junction has jurisdiction over the north side of the Elliot Road alignment section line between Meridian Road and the CAP Canal while Pinal County has jurisdiction over the south side. Jurisdictional boundaries are illustrated in Exhibit 5. Corridor jurisdictional ownership is summarized in Exhibit 6.

Exhibit 5 – Jurisdictional Boundaries

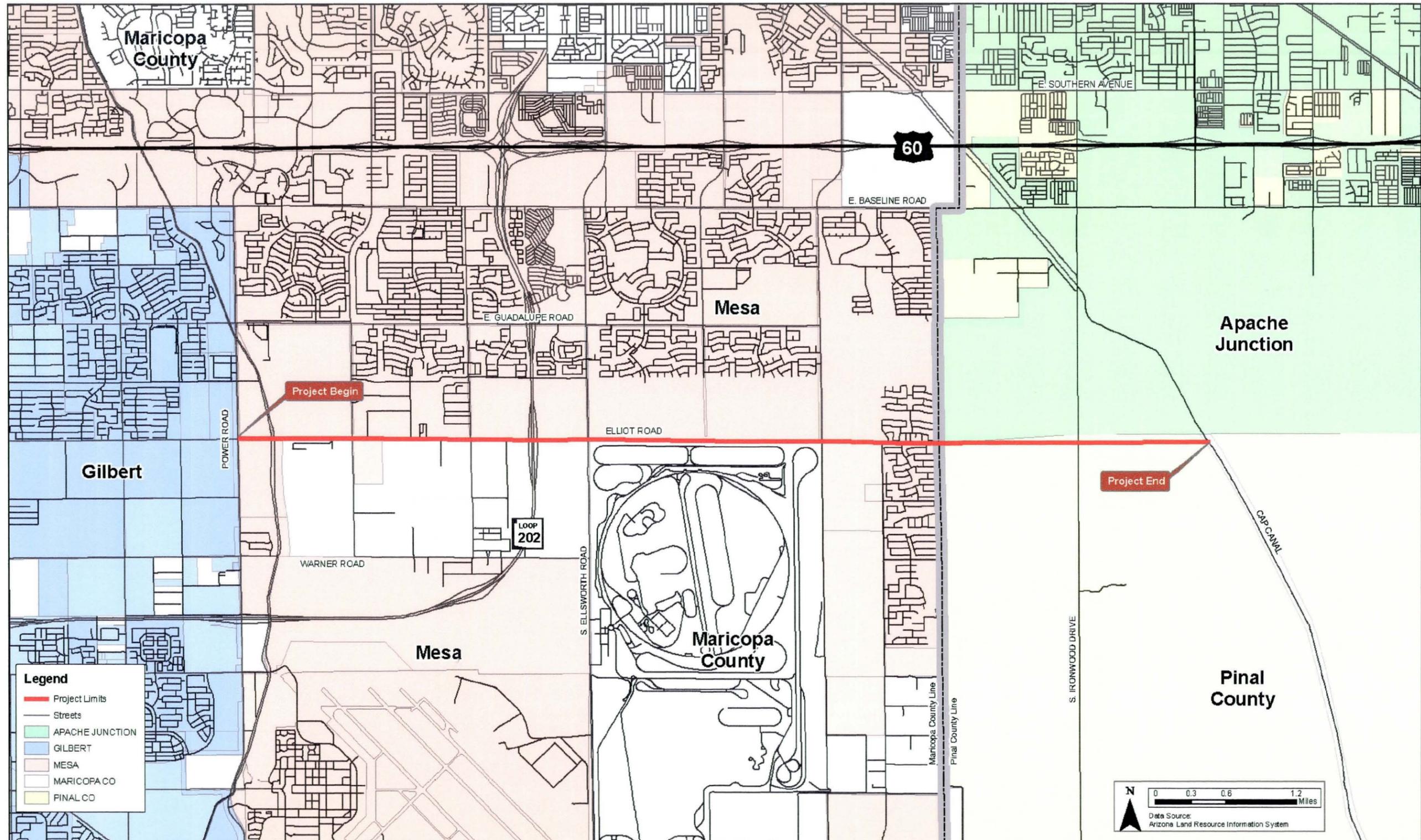


Exhibit 6 – Elliot Road Jurisdictional Ownership

Roadway Segment	Adjacent Land Jurisdictions	Roadway Jurisdiction
Power Road to east of EMF	City of Mesa	Maricopa County
East of EMF to Sossaman Road	City of Mesa (north side) Maricopa County (south side)	Maricopa County
Sossaman Road to approximately one quarter-mile east of Sossaman Road	City of Mesa	City of Mesa
Approximately one quarter-mile east of Sossaman Road to Signal Butte Road	City of Mesa (north side) Maricopa County (south side)	Maricopa County
Signal Butte Road to Meridian Road	City of Mesa	City of Mesa
Meridian Road to CAP Canal (no roadway exists – open land)	City of Apache Junction (north side of section line) Pinal County (south side of section line)	N/A

Source: Maricopa County Assessor's Office, <http://www.maricopa.gov/Assessor/GIS/map.html>

2.3.2 Land Ownership

Land ownership is identified as public or private ownership. The study area corridor contains primarily private lands. ASLD holds the largest amount of public land in the study area – namely the land along the south side of Elliot Road between Hawes Road and Ellsworth Road and the land in Pinal County between Meridian Road and the CAP Canal. These parcels of land remain relatively undeveloped with the exception of the Loop 202 Santan Freeway bisecting the ASLD parcel between Hawes Road and Ellsworth Road.

2.3.3 Zoning and Land Use

Exhibit 7 provides a generalized view of existing zoning along the study corridor derived from City of Mesa zoning maps (<http://gis.cityofmesa.org/imaps/planning>) in October 2007. Those portions of the corridor in unincorporated Maricopa County are zoned Rural-43, meaning there can be no more than one dwelling unit per acre. The portion of the study corridor east of Meridian Road, which is State Trust land, is not currently zoned because Pinal County does not zone State Trust land. The various zoning codes found adjacent to the Elliot Road corridor in Exhibit 7 are briefly described below:

- AG: Agricultural;
- C-1: Neighborhood Commercial;
- C-2: Limited Commercial;
- M-1: Limited Industrial;
- PF: Public Facilities;
- R1-6: High Density Urban Single Residence – minimum lot size of 6,000 square feet;
- R1-7: Medium Density Urban Single Residence – minimum lot size of 7,000 square feet; and
- R1-43: Low Density Rural Single Residence – minimum lot size of one acre.

FCDMC provided existing land use data for the land adjacent to Elliot Road in June 2007. As shown in Exhibit 8, existing land use along the corridor consists of residential subdivisions and undeveloped land at the east end of the corridor, light industrial in the middle of the corridor, and a mix of agriculture, low-

density rural residential, and undeveloped land at the west end of the corridor. A new residential community is currently under construction on the south side of Elliot Road between Signal Butte Road and Mountain Road. The City of Mesa is constructing a new water treatment facility on the north side of Elliot Road between Signal Butte Road and Mountain Road.

The east Maricopa County and northwest Pinal County areas, like other parts of the Phoenix metropolitan area, have experienced significant population growth over recent years. According to the July 2005 census information provided by MAG, the City of Mesa experienced a 13.0 percent growth rate from 2000 to 2005. Population growth is expected to continue in the future. Exhibit 9 lists existing (2006) and projected future (2015 and 2030) population and employment in the Elliot Road corridor, organized by traffic analysis zones (TAZs). The TAZ data was provided by MAG in August 2007. According to the data provided by MAG, the TAZs that cover the Elliot Road corridor are those depicted in Exhibit 10. For the area covered by the aforementioned TAZs, population is projected to increase approximately 5.1 percent per year and employment is projected to increase approximately 11.2 percent per year through 2030.

GIS data and available maps were reviewed to determine anticipated future land use along the corridor. According to data provided by FCDMC in June 2007, development along the Elliot Road corridor is anticipated to primarily consist of single-family and multi-family residential, light industrial, and mixed-use land uses with commercial nodes at major intersections, as shown in Exhibit 11. Exhibit 12 summarizes existing and anticipated future land use along the Elliot Road corridor.

While the future land use information in Exhibit 11 is based on available adopted agency plans, it is recognized that several known proposed developments and plans (e.g., Mesa Proving Grounds, Mesa Gateway Strategic Development Plan, and Lost Dutchman Heights) could result in different future land uses along Elliot Road if they are ultimately adopted.

Exhibit 7 – Existing City of Mesa Zoning along Elliot Road

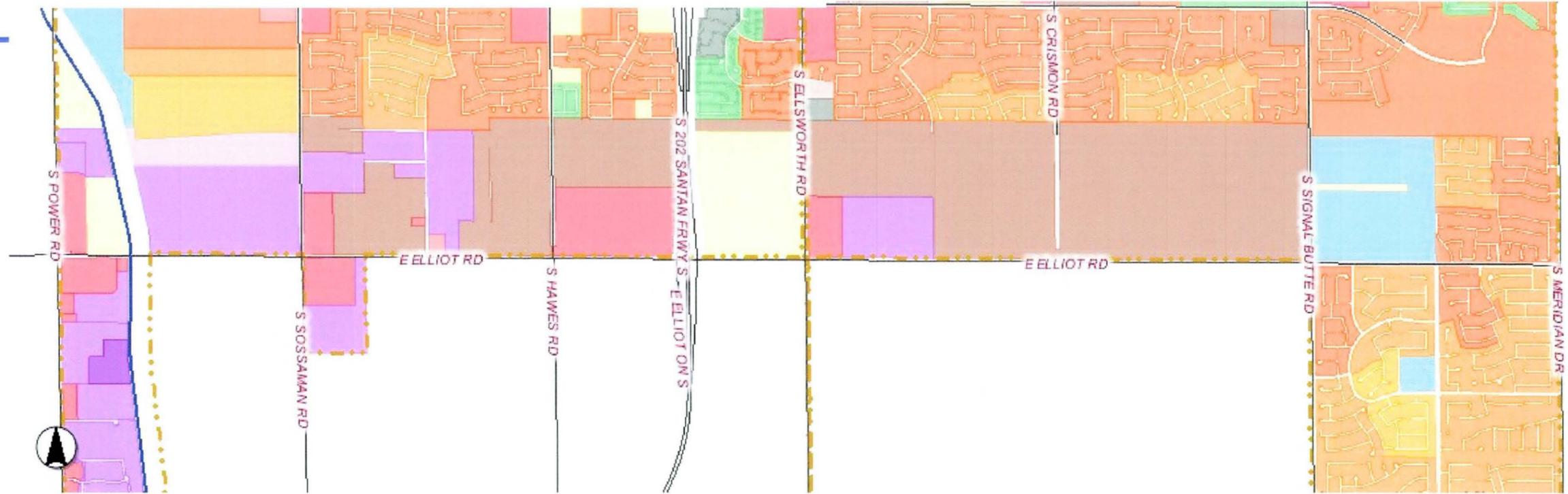
Planning/Zoning

Layers Legend

Map Legend

- Arterials
- Canals
- Redevlmt Area
- City Limits
- Zoning

AG	R1-6
C-1	R1-7
C-2	R1-9
C-3	R1-90
M-1	R-2
M-2	R-3
O-S	R-4
PEP	TCB-1
PF	TCB-2
R1-15	TCC
R1-35	TCR-1
R1-43	TCR-2
(cont)	TCR-3



Source: City of Mesa, <http://gis.cityofmesa.org/imaps/planning>

Exhibit 8 – Existing Land Use

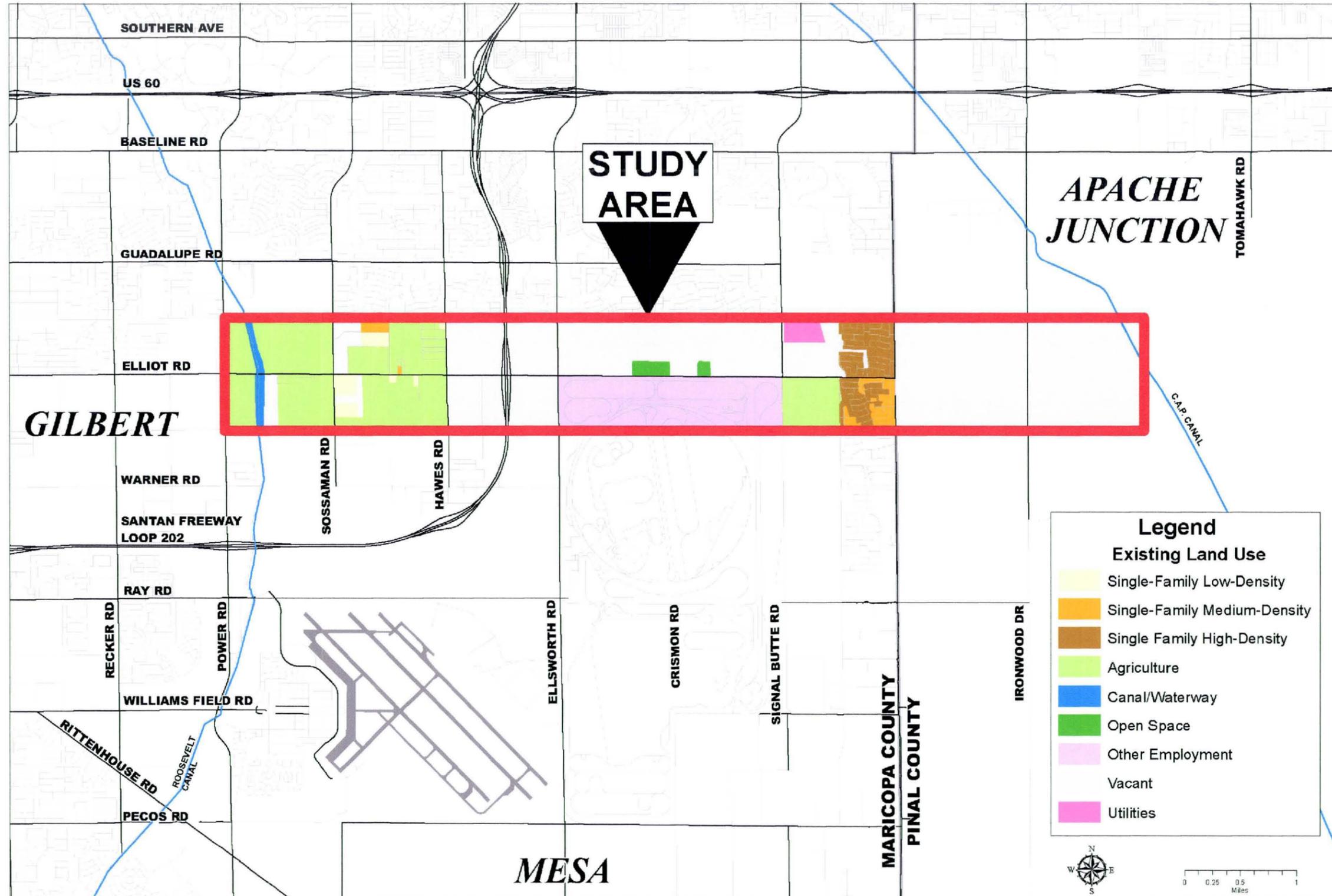


Exhibit 9 – Existing and Future Population and Employment for TAZs along Elliot Road

TAZ	2006		2015		2030		Annual Growth Rate 2006 – 2015		Annual Growth Rate 2006 – 2030	
	Residential Population	Total Employment	Residential Population	Total Employment	Residential Population	Total Employment	Residential Population	Total Employment	Residential Population	Total Employment
561	1,975	30	2,021	375	2,236	1,531	0.3%	32.4%	0.5%	17.8%
1493	10	103	548	959	1,549	3,389	56.0%	28.1%	23.4%	15.7%
1494	223	123	223	336	223	702	0.0%	11.8%	0.0%	7.5%
1498	3,960	551	4,159	2,704	4,199	6,966	0.5%	19.3%	0.2%	11.2%
1499	90	147	94	459	94	725	0.5%	13.5%	0.2%	6.9%
1501	1,179	127	1,959	1,455	2,344	2,493	5.8%	31.1%	2.9%	13.2%
1502	15	112	15	859	15	1,719	0.0%	25.4%	0.0%	12.1%
1507	2,500	436	2,746	1,705	2,821	5,947	1.0%	16.4%	0.5%	11.5%
1617	1,204	88	2,615	121	3,868	109	9.0%	3.6%	5.0%	0.9%
1908	0	0	0	2,230	0	6,115	-	-	-	-
1909	2,034	189	2,269	142	3,406	219	1.2%	-3.1%	2.2%	0.6%
1910	0	0	0	584	0	2,265	-	-	-	-
1974	2,546	986	7,409	2,608	19,011	4,430	12.6%	11.4%	8.7%	6.5%
1979	291	16	1,696	106	6,785	468	21.6%	23.4%	14.0%	15.1%
2088	304	17	1,780	108	7,118	481	21.7%	22.8%	14.0%	14.9%
TOTAL	16,331	2,925	27,534	14,751	53,669	37,559	6.0%	19.7%	5.1%	11.2%

Source: MAG, August 2007

Exhibit 10 – Traffic Analysis Zones

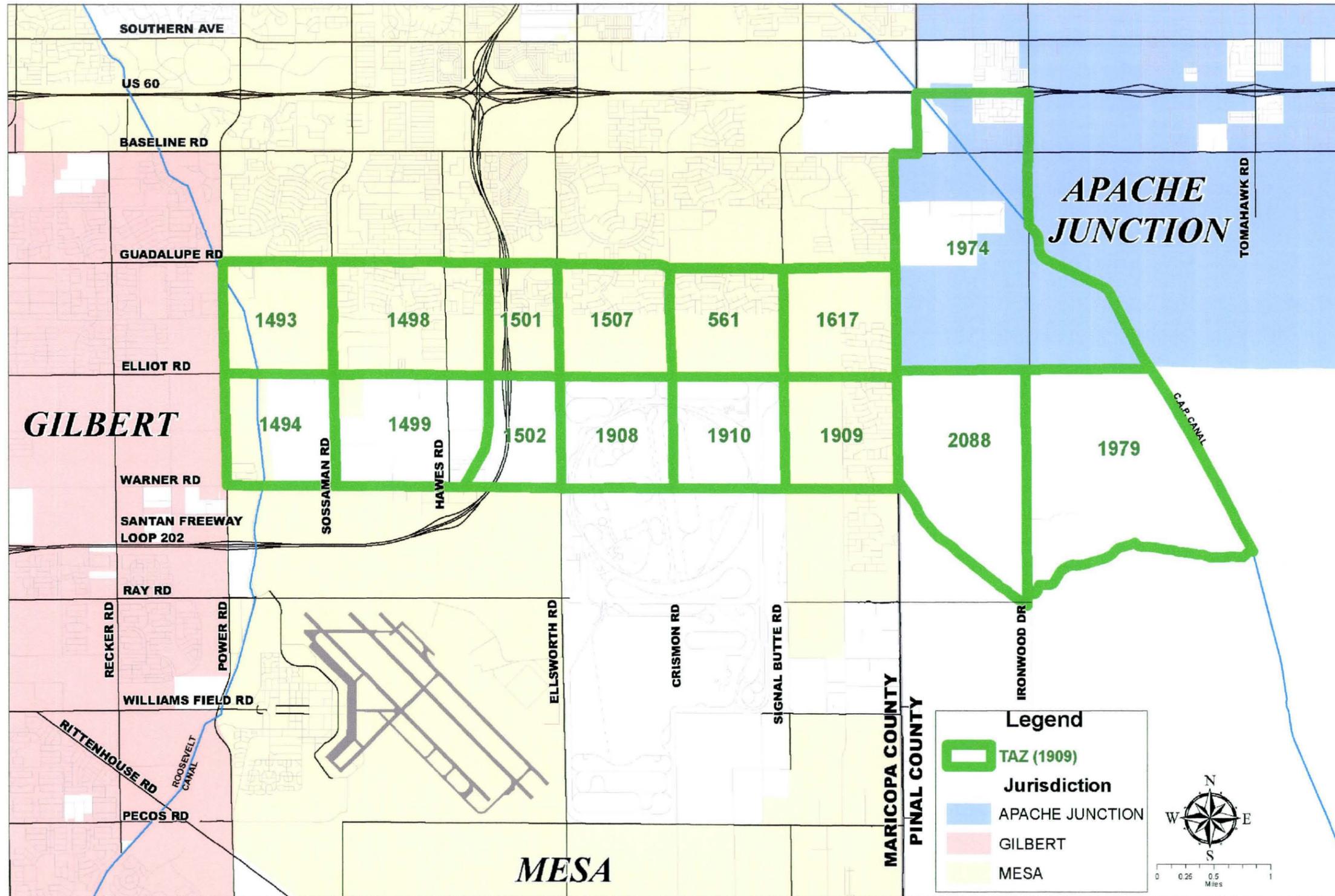


Exhibit 11 – Future Land Use

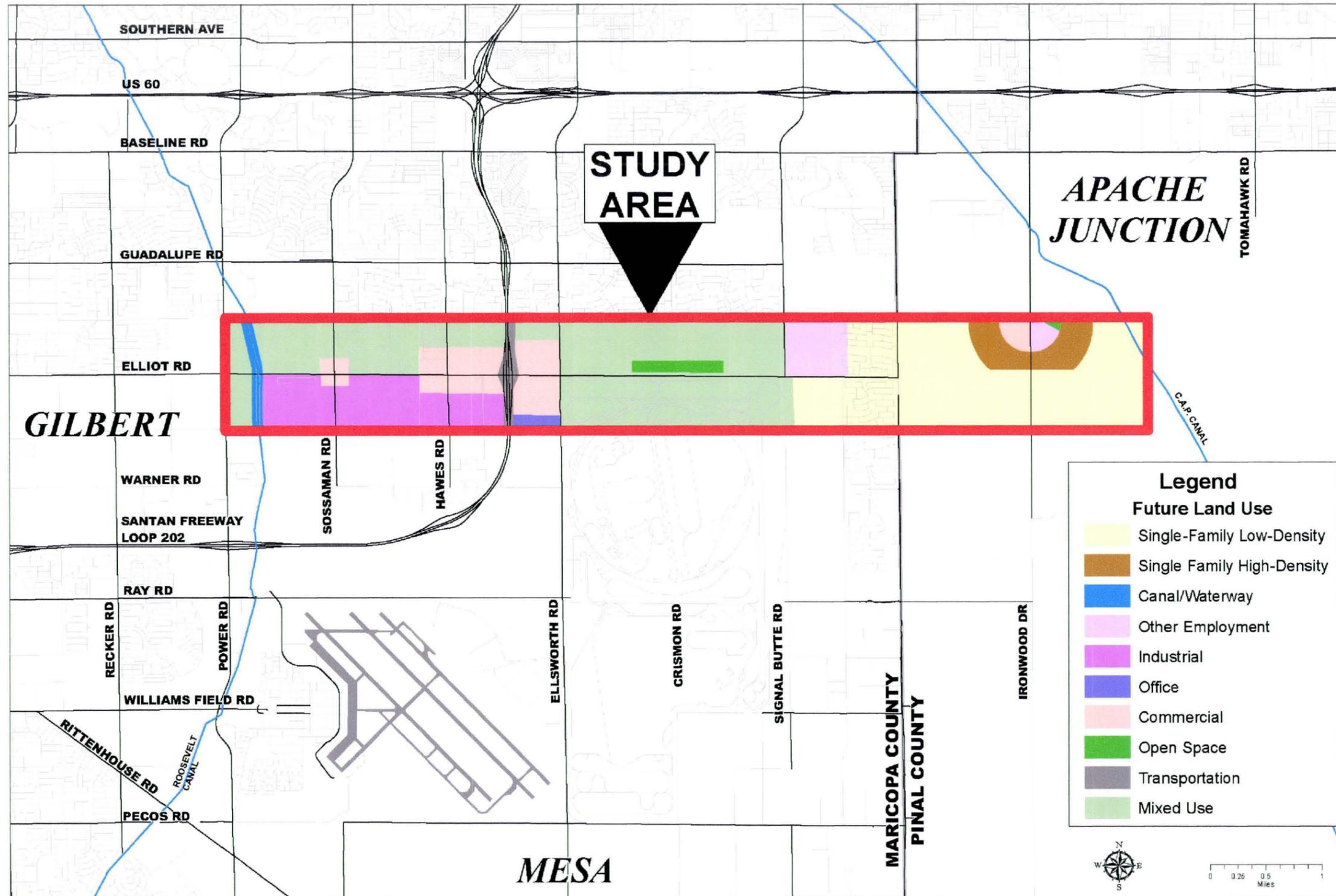


Exhibit 12 – Summary of Existing and Future Land Use

Corridor Segment	Existing Land Use	Major Features	Future Land Uses
Power Road to Sossaman Road	Mix of undeveloped, agricultural, and low-density residential	East Maricopa Floodway (EMF) Roosevelt Water Conservation District (RWCD) Canal Mobile home park on south side of Elliot Road just east of the EMF Dairy farm on south side	City of Mesa Land Use Plan: Mixed-Use/Employment, Light Industrial, and Neighborhood Commercial
Sossaman Road to Hawes Road	Mix of undeveloped, agricultural, and low-density residential	Multi-acre lots with homes and dairy farms	City of Mesa Land Use Plan: Mixed Use/Employment, Light Industrial, and Regional Commercial
Hawes Road to Loop 202	Undeveloped	Private undeveloped (north side) State Trust Land (south side)	City of Mesa Land Use Plan: Regional Commercial and Business Park Proposed: 170 acres of regional commercial development on north side and a business park on the south side
Loop 202 to Ellsworth Road	Undeveloped	Private undeveloped (north side) State Trust Land (south side)	City of Mesa Land Use Plan: Regional Commercial Proposed: La Fiesta 120-acre mixed-use development on north side. 60 acres of retail, 60 acres of office/business space, and a hotel
Ellsworth Road to Signal Butte Road	Undeveloped and retention basins/park on north side. GM Proving Grounds on south side	City of Mesa Basins 114, 115, and 116 Recreation Areas (north side) GM Proving Grounds (south side)	City of Mesa Land Use Plan: Business Park and Mixed Use/Employment Proposed: Master-planned mixed-use development to replace GM Proving Grounds

Exhibit 12 – Summary of Existing and Future Land Use (continued)

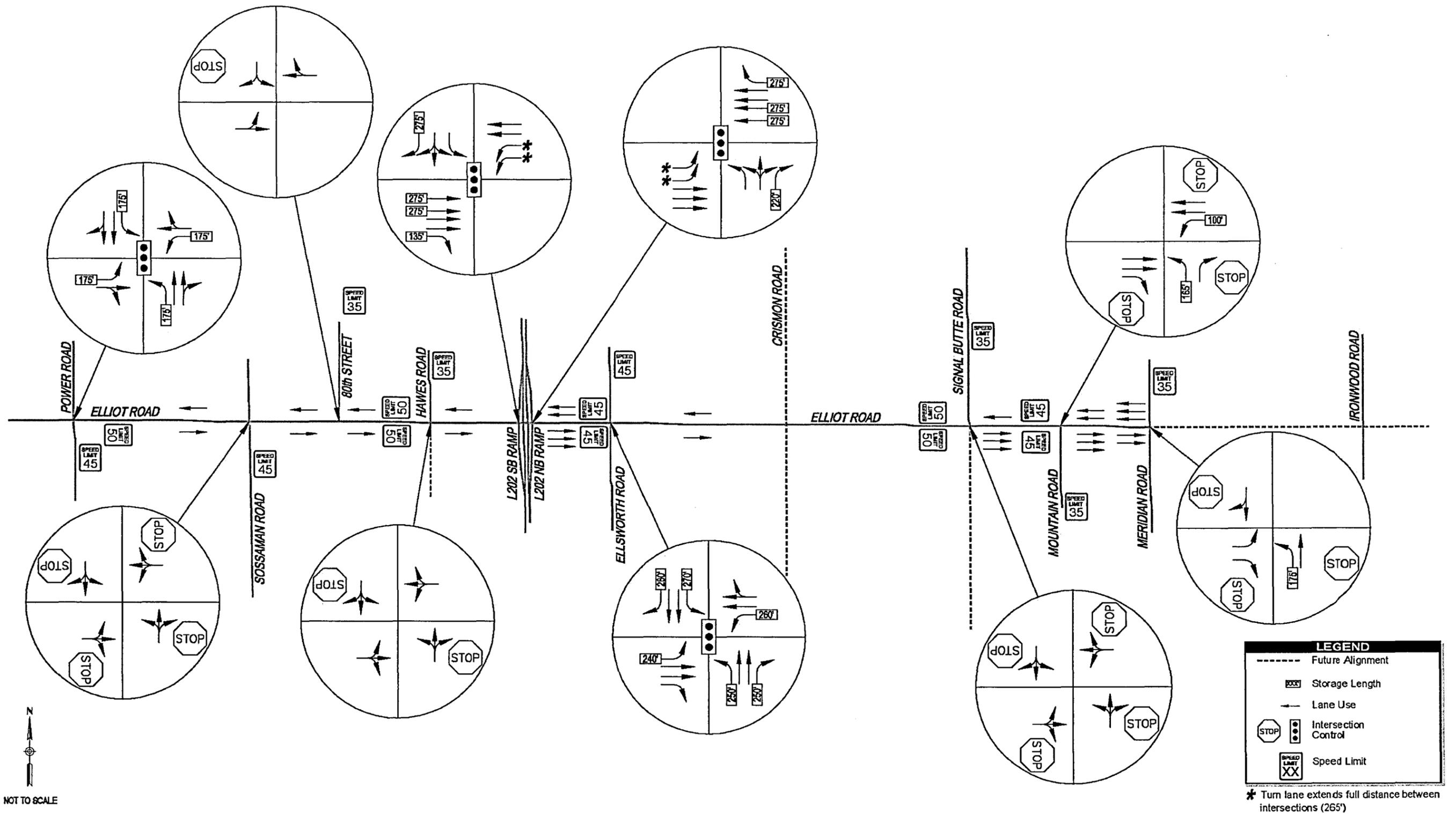
Corridor Segment	Existing Land Use	Major Features	Future Land Uses
Signal Butte Road to Mountain Road	Undeveloped on north side. Medium-density residential on south side	Highland Ridge residential development under construction (south side)	City of Mesa Land Use Plan: Public and Medium-Density Residential Proposed: City of Mesa Water Treatment Facility on north side
Mountain Road to Meridian Road	Medium-density residential	Existing residential development on both sides	City of Mesa Land Use Plan: Medium-Density Residential
Meridian Road to CAP Canal	Undeveloped	State Trust Land	Pinal County Comprehensive Plan: Corridor Mix and Transitional Proposed: Master-planned mixed-use development of Lost Dutchman Heights on north side and Desert Drive on south side
CAP Canal	Developed water supply source. Developed multi-use trail	CAP Canal CAP National Recreation Trail	Pinal County Open Space and Trails Master Plan: Development and improvements of recreational usage

2.4 Roadway Features

Elliot Road between Power Road and Loop 202 consists primarily of a two-lane section with a wide dirt shoulder and no curb, gutter, or sidewalk. Elliot Road exists as a five-lane section with three eastbound through lanes and two westbound through lanes, with a raised median, curb, gutter, sidewalks, and bike lanes between Loop 202 and Ellsworth Road. The section of pavement underneath the Loop 202 structure is currently striped for three through lanes in the eastbound direction and two through lanes in the westbound direction with sufficient pavement for a third westbound through lane if needed. East of Ellsworth Road, Elliot Road transitions back to a two-lane section with a shoulder that continues all the way to Signal Butte Road. Between Signal Butte Road and Mountain Road, Elliot Road has three eastbound through lanes, one westbound through lane, and a two-way left-turn lane (TWLTL), with curb, gutter, and sidewalk on the south side of Elliot Road. Between Mountain Road and Meridian Road, Elliot Road has three through lanes in each direction, with curb, gutter, sidewalks, and a bike lane on both sides, and a two-way left-turn lane in the center of the roadway. Exhibit 13 displays the existing (2007) laneage, speed limits, and intersection traffic control

The existing roadway profile along Elliot Road generally follows the terrain. There are a number of dip crossings along Elliot Road that currently flood regularly due to rain, requiring Elliot Road to be closed temporarily at these locations.

Exhibit 13 – Existing (2007) Conditions



2.4.1 Existing and Future Functional Classification

Today, Elliot Road is classified as a Minor Arterial between Power Road and Ellsworth Road and as a Minor Collector between Ellsworth Road and Meridian Road.

The *MCDOT MSRP Atlas*, *City of Mesa Transportation Plan*, *Apache Junction SATS*, *Pinal County RSRSM*, and the *MAG RTP* have all classified Elliot Road as a future Principal Arterial road.

2.4.2 Pavement and Roadway Conditions

MCDOT utilizes the Road Management System (RMS) tool to analyze the physical attributes of roadways as well as the condition of roadway pavement and ride quality. Data included in the RMS are the road inventory, surface type, the pavement conditions rating, the international roughness index (IRI), the sufficiency rating, the work history data, and the traffic volumes data.

RMS Reports from 2003 were provided for all Elliot Road roadway segments except for the segment between Mountain Road and Meridian Road. Pavement Condition Ratings for all Elliot Road segments were scored as good. All roadway segments, with exception of the section between Power Road and Sossaman Road and the section between Hawes Road and Ellsworth Road, scored higher than 220 (very rough) on the IRI. The remaining segments scored in the rough range on the IRI chart. Elliot Road west of Ellsworth Road had a sufficiency rating of very good while Elliot Road east of Ellsworth had a sufficiency rating of excellent.

A field review conducted in early 2008 indicated that pavement conditions have changed in some segments since 2003, so some of the information from the RMS Reports for these segments of roadway is no longer current. Pavement conditions are now quite poor on Elliot Road between Power Road and Loop 202 and between Ellsworth Road and Signal Butte Road and pavement restoration will likely be needed soon. Other segments of Elliot Road have been improved and repaved since 2003, namely those in the vicinity of Loop 202 as well as between Signal Butte Road and Mountain Road.

2.4.3 Existing Right-of-Way

The Maricopa County Assessor's Office provided maps showing existing right-of-way in September 2007. These maps were reviewed to document existing right-of-way on Elliot Road. Generally speaking, the width of existing roadway right-of-way increases as one proceeds east through the corridor study area. The existing right-of-way is described in Exhibit 14.

Exhibit 14 – Existing Right-of-Way (Per Maricopa County Assessor's Data)

Roadway Segment	Approximate Range of Existing Right-of-Way
Power Road to Sossaman Road	65 feet – 100 feet
Sossaman Road to Hawes Road	65 feet
Hawes Road to Loop 202	65 feet – 185 feet (at Loop 202)
Loop 202 to Ellsworth Road	125 feet – 165 feet
Ellsworth Road to Signal Butte Road	105 feet – 125 feet
Signal Butte Road to Meridian Road	130 feet

2.5 Traffic Volumes

2.5.1 Existing and Future Daily Traffic Volumes

Daily (24-hour) pneumatic tube counts were collected on Elliot Road and on some of its cross-streets on September 13, 2007. A review of the existing traffic count data indicates that daily traffic volumes in the study area are generally higher east of the Loop 202/Elliot Road interchange than west of the interchange. The 24-hour traffic count data are summarized in Exhibit 15.

Exhibit 15 – Existing (2007) 24-Hour Traffic Counts

Location	24-Hour Volume
Elliot Road between Roosevelt Canal and Sossaman Road	7,101
Elliot Road between Hawes Road and Loop 202	4,345
Elliot Road between Loop 202 and Ellsworth Road	26,213
Elliot Road between Signal Butte Road and Mountain Road	16,410
Power Road north of Elliot Road	27,317
Ellsworth Road south of Elliot Road	29,831
Signal Butte Road north of Elliot Road	7,965

A comparison was made between the MAG regional travel demand model average daily traffic (ADT) volume outputs for the existing condition (2006) and the actual traffic count data collected in 2007 as part of the Elliot Road study. The MAG model data was obtained from MAG staff in August 2007. According to MAG staff, the model outputs represented the most currently available version of the MAG model. Exhibit 16 displays the 2007 24-hour tube count data and the corresponding 2006 MAG model volumes, along with the difference between the two, for various locations in the study area. On average, the existing counts are approximately 37 percent higher than the MAG model estimates.

Exhibit 16 – Comparison of Existing (2007) Daily Counts and 2006 MAG Model ADTs

Location	2006 MAG ADT Output	2007 24-Hour Count	Difference in Volume	Difference (%)
Elliot Road west of Sossaman Road	9,044	7,101	-1,943	-21%
Elliot Road east of Hawes Road	3,306	4,345	1,039	31%
Elliot Road west of Ellsworth Road	15,878	26,213	10,335	65%
Elliot Road east of Signal Butte Road	10,894	16,410	5,516	51%
Power Road north of Elliot Road	19,869	27,317	7,448	37%
Ellsworth Road south of Elliot Road	17,257	29,831	12,574	73%
Signal Butte Road north of Elliot Road	6,614	7,965	1,351	20%
			Average	37%

Daily traffic projections for 2030 were obtained from MAG model outputs provided by MAG in August 2007 and were used as the baseline volumes for determining future roadway capacity needs along the corridor. Remembering that existing counts were, on average, 37 percent higher than the 2006 MAG model estimates, it was recognized that 2030 actual ADTs could also potentially be significantly different

than what is estimated by the 2030 MAG model. An alternate set of 2030 ADTs was created for use in a sensitivity analysis that would determine what additional improvements may be needed beyond what the 2030 baseline volumes call for if future actual volumes turn out to be substantially higher than the 2030 baseline volumes projected by MAG. This alternate set of 2030 ADTs was created by increasing the 2030 baseline volumes by 37 percent.

Even with the 37 percent increase, the 2030 volumes on the north-south cross-streets of Meridian Road and Ironwood Drive are significantly lower than the volume projections shown in other travel demand models that focus on Pinal County. Recognizing that the MAG model does not focus on Pinal County, the 2030 ADT volumes from the Pinal County RSRSM model (provided by Lima & Associates in December 2007) were utilized for Meridian Road and Ironwood Drive in the alternate set of volumes.

Exhibit 17 shows the projected baseline 2030 ADT volumes provided by MAG while **Exhibit 18** shows the factored 2030 ADTs that are proposed to serve as alternate future ADT volumes for use as part of this study's sensitivity analysis. Additional information is available in Technical Memorandum No. 3 – Traffic Analysis.

With this alternate set of volumes, the ADTs on Elliot Road and on its major cross-streets are generally in the 25,000-45,000 range, with the segment of Elliot Road just east of Loop 202 having the highest volume – an ADT of about 65,000. Other arterials in fully-developed portions of the Phoenix metropolitan area show similar ranges of ADTs, which suggests the alternate set of volumes on Elliot Road reflects a future condition in which the arterial grid network, freeway network, and adjacent land use are fully developed.

2.5.2 Existing and Future Peak Hour Traffic Volumes

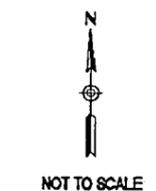
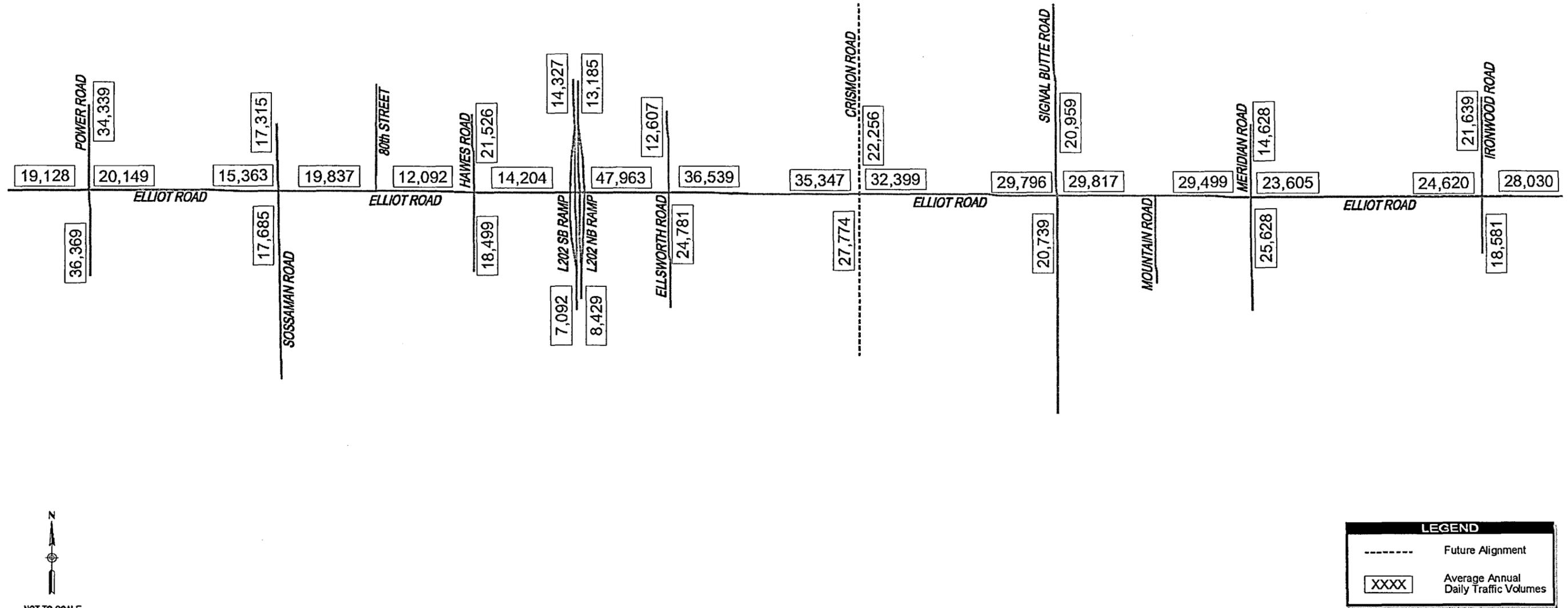
Peak hour turning movement counts were collected on Elliot Road in select locations on September 12, 2007. A review of the existing traffic count data indicates that peak hour traffic volumes in the study area are generally higher east of the Loop 202/Elliot Road interchange than west of the interchange. The intersection peak hour turning movement count data are summarized in **Exhibit 19**.

Future peak-hour traffic projections were developed based on ADT projections from the 2015 and 2030 MAG regional travel demand model ADT outputs provided by MAG. These ADT projections were converted to peak-hour traffic volumes using typical values for traffic factors, which include peak-hour factors, directional splits, and the k-factor (the proportion of average daily traffic anticipated to occur in the peak hour). Peak-hour turning movement volumes were developed for 2015, 2030, as well as for the aforementioned 2030 sensitivity analysis scenario that increased the baseline 2030 volumes by 37 percent to reflect the prospect that the MAG model may underestimate future traffic volumes.

Output volumes from the MAG model include values for peak-hour intersection turning movements. While regional macroscopic models such as the MAG model are great tools in projecting daily volumes within a large regional roadway network, output from such a model related to specific peak-hour turning movements at a single intersection should be used with caution. An iterative process comparing the calculated peak-hour volumes and the daily MAG model volume outputs was used to develop turning movements at each intersection. Peak-hour volumes entering and exiting each intersection were summed and compared to the corresponding daily traffic projection on the adjacent link. In addition, the peak-hour turning movement outputs from the MAG model were compared to the existing traffic patterns and typical factors to determine their reasonableness.

The 2015, 2030, and 2030 sensitivity analysis intersection turning movement peak-hour volumes are displayed in **Exhibit 20**, **Exhibit 21**, and **Exhibit 22**, respectively.

Exhibit 17 – MAG Projected 2030 ADT Model Outputs



LEGEND

- Future Alignment
- XXXX Average Annual Daily Traffic Volumes

Exhibit 18 – Sensitivity Analysis 2030 Volumes

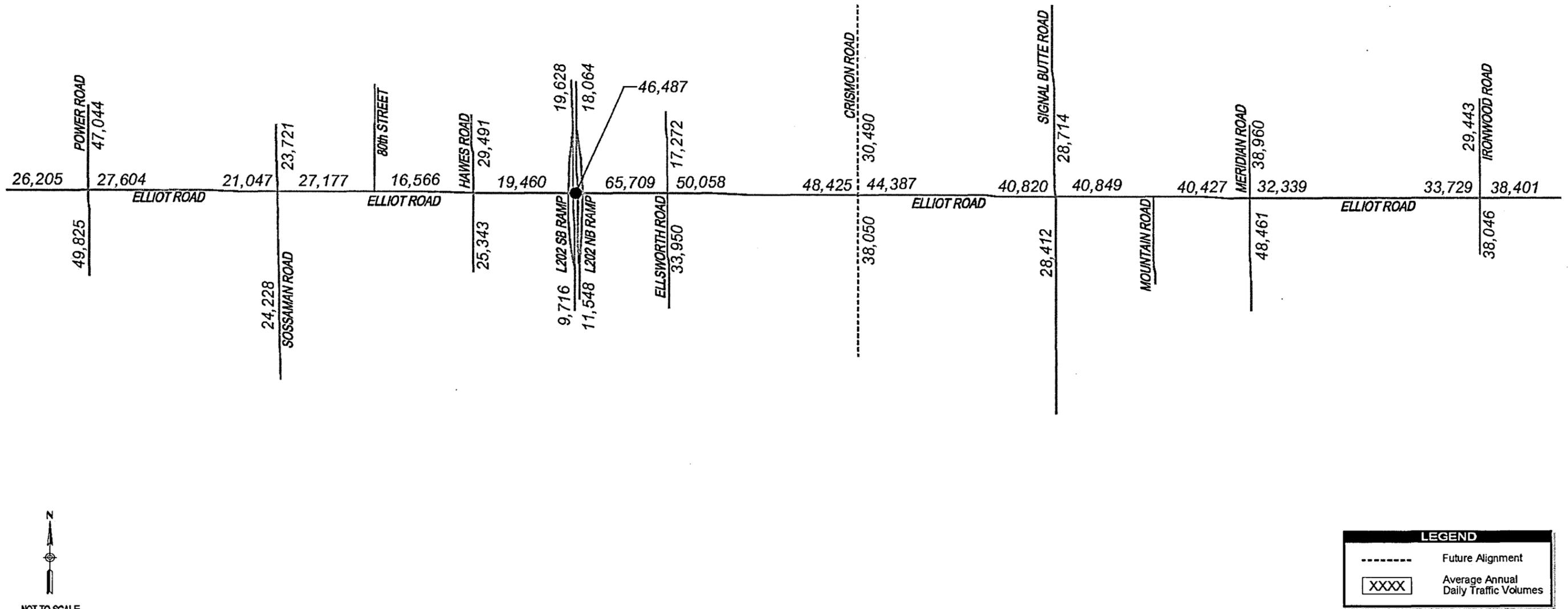
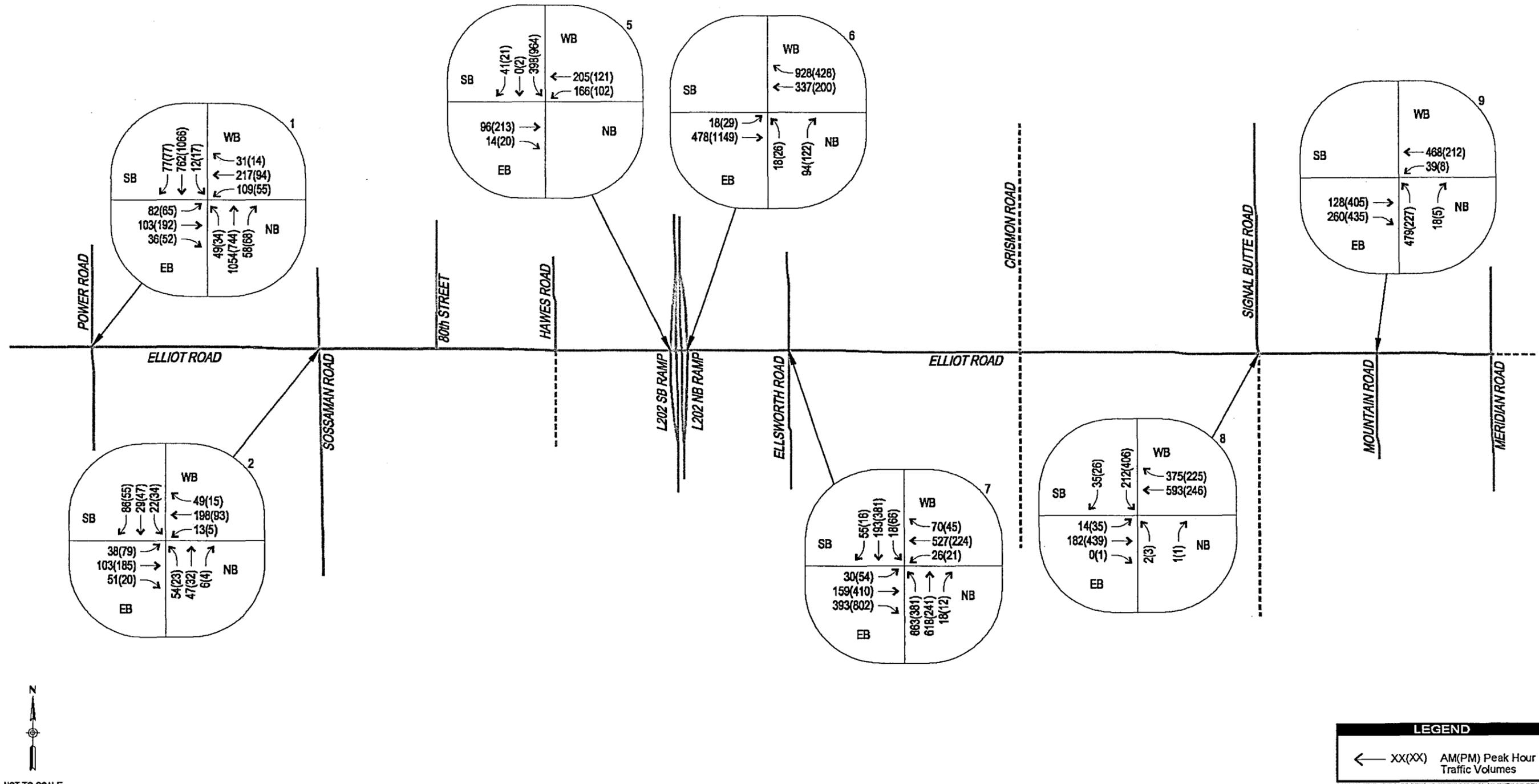
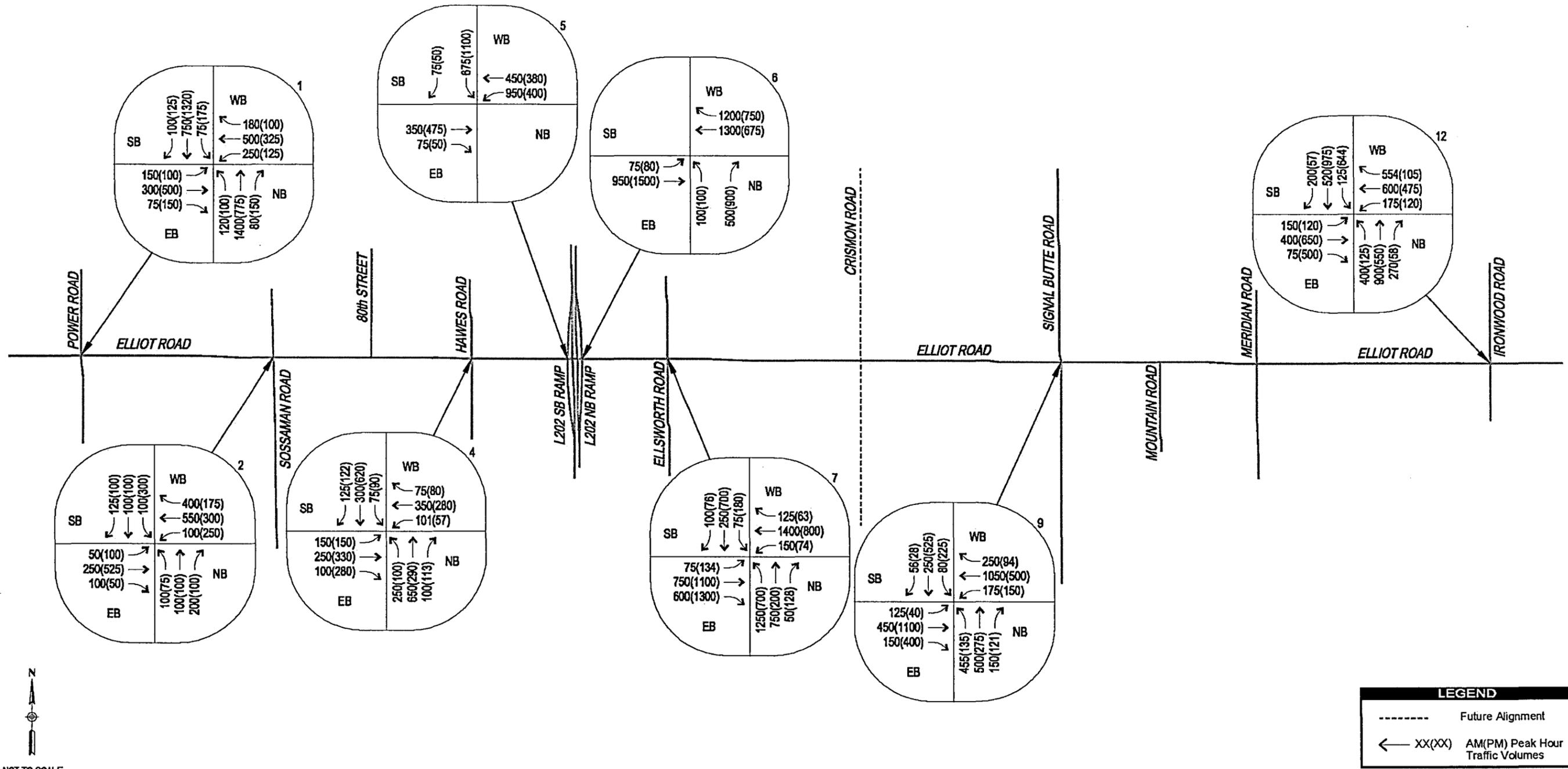


Exhibit 19 – Existing (2007) Peak Hour Traffic Volumes



NOT TO SCALE

Exhibit 20 – Projected 2015 Peak Hour Traffic Volumes



NOT TO SCALE

LEGEND

- Future Alignment
- ← XX(XX) AM(PM) Peak Hour Traffic Volumes

Exhibit 21 – Projected 2030 Peak Hour Traffic Volumes

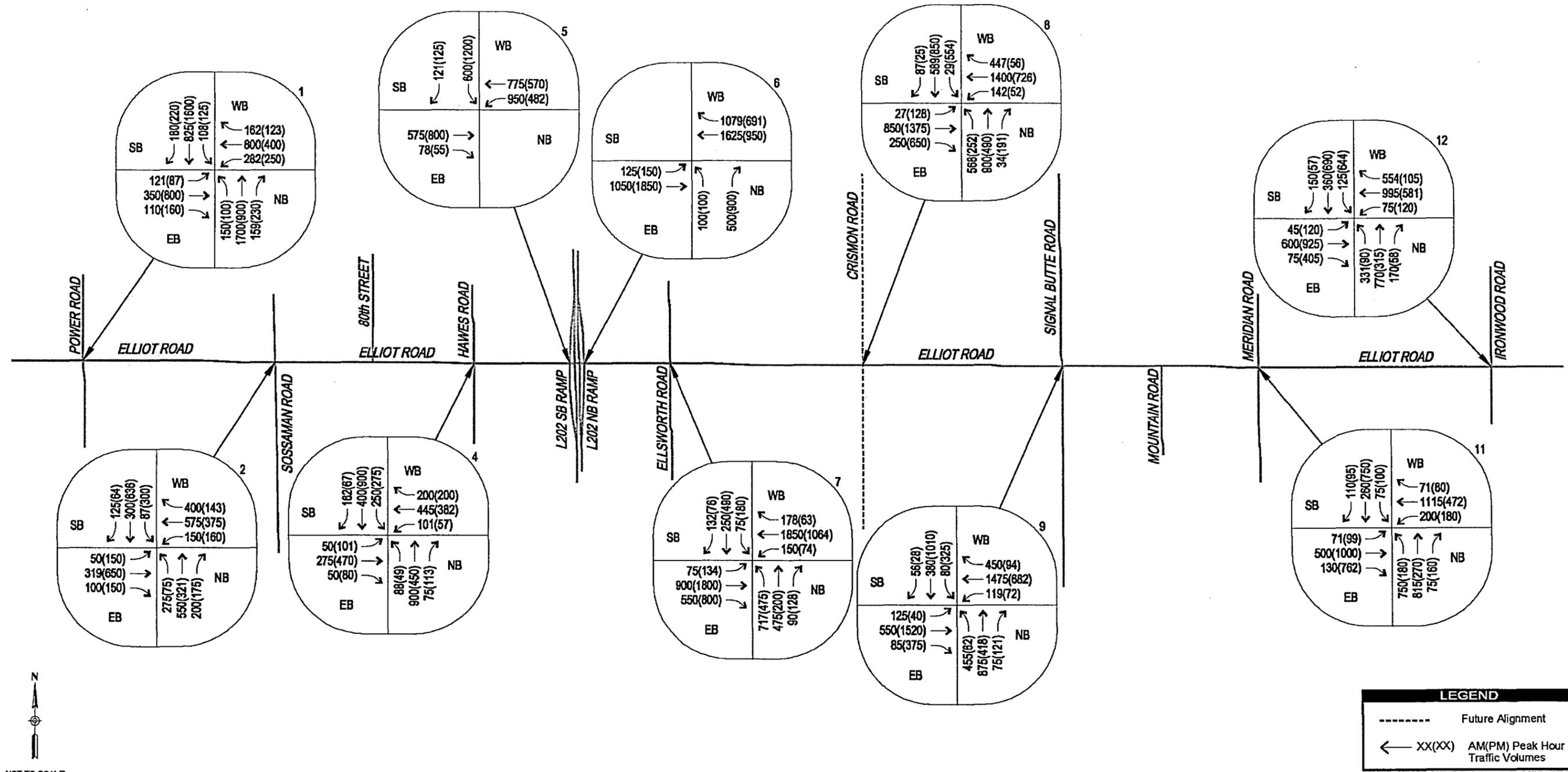
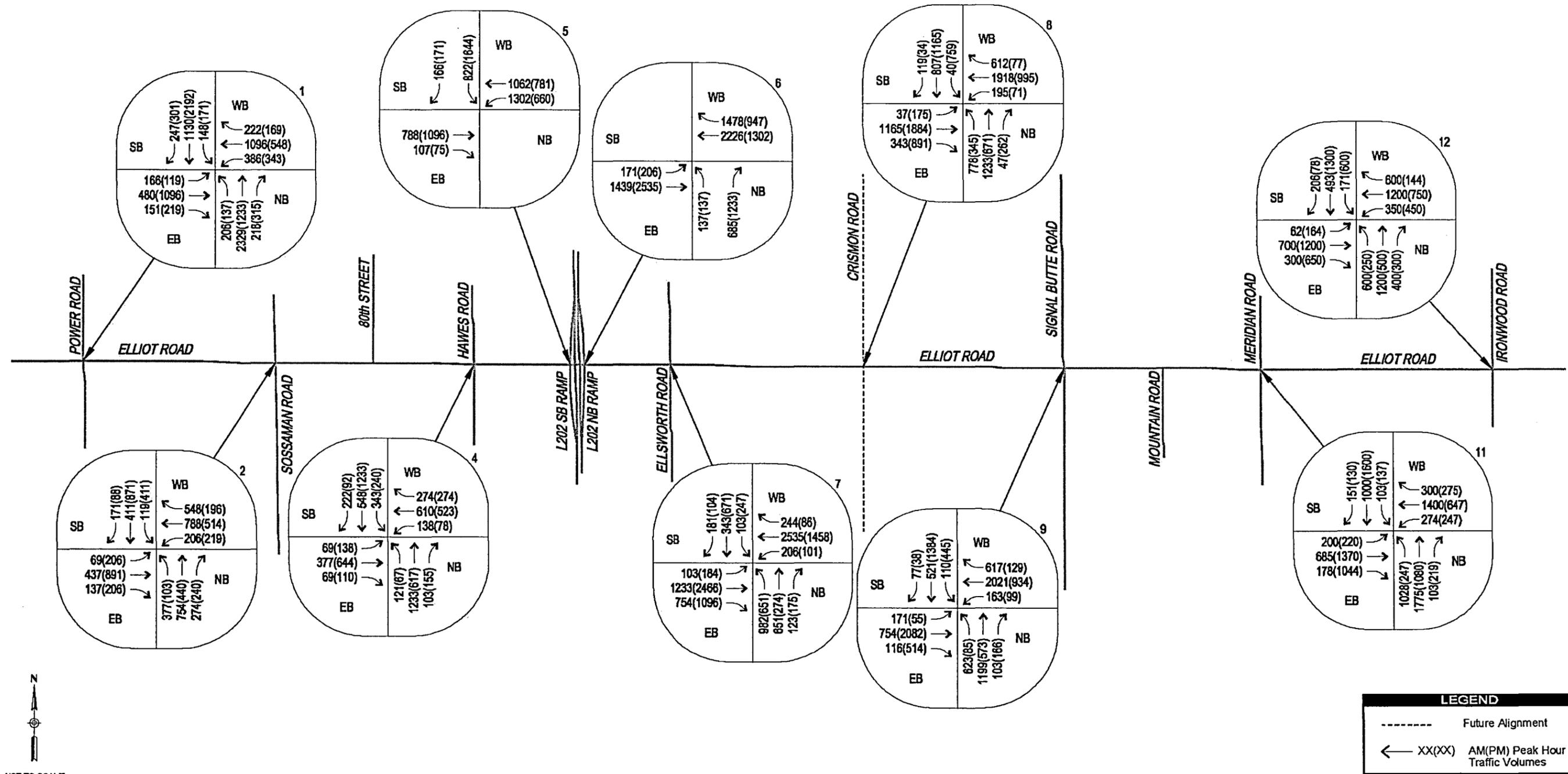


Exhibit 22 – 2030 Sensitivity Peak Hour Traffic Volumes



NOT TO SCALE

2.6 Crash Summary

Crash data for the Elliot Road corridor for the years 2002, 2003 and 2004 were provided by MCDOT. The crash data includes crashes by location, severity, and collision manner. During the three-year analysis period, there were a total of 96 crashes on Elliot Road. The most prevalent crash type on the corridor was a rear-end collision, comprising nearly 35 percent of all crashes. Exhibit 23 summarizes the crash data by crash types.

Exhibit 23 – Crash Types

Crash Type	Number of Crashes	Percentage of Total Crashes
Angle	19	20%
Backing	3	3%
Left Turn	15	16%
Other	1	1%
Rear-End	34	35%
Sideswipe (opposite)	1	1%
Sideswipe (same)	6	6%
Single Vehicle	13	14%
U-Turn	4	4%

Exhibit 24 provides detailed crash data for the three Elliot Road intersections with the highest number of crashes. The following three locations comprised 64 percent of all crashes on the corridor.

- Elliot Road/Power Road;
- Elliot Road/Ellsworth Road; and
- Elliot Road/Signal Butte Road.

The highest number of crashes on Elliot Road occurred at the Power Road/Elliot Road intersection.

Exhibit 24 – Crash Data Summary for Three Locations with the Highest Number of Crashes

Location	Total Crashes	% Crashes by Injury Severity					% Crashes by Collision Manner							
		Fatalities	Incap. Injuries	Non-incap.	Possible Injury	No-Injury	Same dir. side-swipe	Opp. dir side-swipe	Left turns	Rear-end	Angle	Other*	Single Vehicle Only	U-Turn
Elliot Rd./ Power Rd.	32	-	13%	9%	13%	65%	6%	3%	28%	25%	17%	9%	6%	6%
Elliot Rd./ Ellsworth Rd.	18	-	6%	-	17%	77%	17%	-	17%	43%	17%	-	-	6%
Elliot Rd./ Signal Butte Rd.	11	-	9%	18%	18%	55%	-	-	-	45%	45%	-	10%	-

* Includes crashes described as 'backing'

2.7 Existing Access

The purpose of access control and management is to preserve the capacity of the roadway and to maintain safety, while providing appropriate access to adjacent land uses. Access management is achieved through the systematic control of the location, spacing, design, and operations of driveways, median openings, and street connections to the roadway. It also involves the roadway design applications, such as median treatments and auxiliary lanes, and the appropriate spacing of traffic signals (see *Access Management Manual*, produced by the Transportation Research Board in 2003). The appropriate degree of access control varies according to the functions and traffic characteristics of the roadway, abutting land, and long-term planning objectives. In general, the higher the functional classification of the road (i.e., freeways and arterials) the more emphasis placed on traffic mobility as opposed to access to adjoining properties.

Exhibit 25 describes existing access characteristics along the corridor. Generally speaking, there are few driveways that access Elliot Road. The only corridor segment where turning movements are restricted by a raised median is in the vicinity of the Elliot Road/Loop 202 interchange.

The existing degree of access control appears appropriate for the current conditions on Elliot Road. As land adjacent to Elliot Road develops and traffic volumes on Elliot Road increase in the future, additional access restrictions will likely be needed.

Exhibit 25 – Existing Access Characteristics

Roadway Segment	Access-Related Features
Power Road to Sossaman Road	3 driveway access points located on north side of Elliot Road. 3 driveway access points located on south side of Elliot Road.
Sossaman Road to Hawes Road	One-half mile intersection spacing (Sossaman Road, 80 th Street, Hawes Road). 2 driveway access points located on north side of Elliot Road. 10 driveway access points located on south side of Elliot Road.
Hawes Road to Loop 202	There are no driveways or access points between Hawes Road and Loop 202. Raised median exists from approximately 1700' east of Hawes Road to Loop 202. Elliot Road has right-turn deceleration lanes at Loop 202 and a westbound deceleration lane at Loop 202.
Loop 202 to Ellsworth Road	There are no driveways or access points between Loop 202 and Ellsworth Road. Raised median exists through corridor segment.
Ellsworth Road to Signal Butte Road	3 driveway access points located on north side of Elliot Road.
Signal Butte Road to Mountain Road	There are no driveways or access points between Signal Butte Road and Mountain Road. Painted median. Elliot Road has an eastbound right-turn deceleration lane at Mountain Road.
Mountain Road to Meridian Road	There are no driveways or access points between Mountain Road and Meridian Road. Painted median. 320' intersection spacing between Mountain Road and Emery Road. 580' intersection spacing between Emery Road and Oxley Road. 420' intersection spacing between Oxley Road and Clancy Road. 740' intersection spacing between Clancy Road and Payton Road. 580' intersection spacing between Payton Road and Meridian Road.

2.8 Existing Environmental Conditions

This section summarizes the existing environmental conditions along the Elliot Road corridor. Additional information is available in Technical Memorandum No. 4 – Environmental Overview.

2.8.1 Visual Character

The visual character of the study corridor is dominated by open areas of agricultural fields and undeveloped natural desert along the western section of the study area between Power Road and Ellsworth Road; located in the central section of the study corridor is the GM proving grounds and undeveloped natural areas between Ellsworth Road and Signal Butte Road; residential development is observed between Signal Butte Road and Meridian Road; and the eastern section of the study area is undeveloped natural desert from Meridian Road to the CAP Canal. Due to the low topographic relief, views throughout the study area of the surrounding mountains are unimpeded.

The mountain ranges that can be observed from Elliot Road include the Superstition Mountains to the northeast, South Mountain to the west, and the San Tan Mountains to the southwest. Existing residential areas occur mostly in the eastern section of the study area between Signal Butte Road and Meridian Road; however, some scattered residences are located in the western section of the study area on agricultural lands. These buildings have been constructed using a variety of architectural styles, colors and fixtures. Because any future improvements along the existing right-of-way of Elliot Road would consist of materials similar to what currently exists and would occur on essentially the same horizontal and vertical alignment, no changes in the visual character or quality are anticipated along the existing corridor.

The limits of the visual environment in the project study area are defined by geography and the built and natural environments from which the proposed project may be visible. Where additional right-of-way may be acquired for alternatives or where man-made elements may be constructed above grade, visual character impacts will depend on the design, scale and engineering of the new roadway. Visual impacts by travelers would also be minor, except for the use of different construction materials. The horizontal and vertical layout of a new roadway would not differ significantly visually from the existing roads.

2.8.2 Socioeconomic Conditions

The demographic composition of the study area was calculated using the United States Census Bureau, Census 2000 data sets. Census tracts (CT) and block groups (BG) within these tracts are large, relatively permanent statistical subdivisions that do not cross county boundaries. The four block groups within the environmental study area contain a total of 9,889 people (2000 Census). The racial composition of the study area is predominantly White with an average 12.4 percent being Hispanic within the four block groups. Two block groups, CT 3.06 BG2 and CT 4226.01 BG1, within the study area have been identified with race minority populations that exceed the standards set for this socioeconomic analysis; if federal funding is used for roadway improvements, these block groups may require further consideration for disproportionate adverse impacts.

The total populations for elderly, low-income, and disabled individuals within the study area range from lower than, to comparable to, the Pinal County, City of Mesa, and the City of Apache Junction populations; and are slightly higher than the Town of Gilbert populations. The female head-of-household population within the study area is lower than all the comparative municipalities and counties populations. Review of individual census tracts within the study area indicated standards were exceeded for the elderly population; one identified block group may require further consideration for disproportionate adverse impacts (if federal funds are used). This individual block group, CT 3.06 BG 2, displayed substantially higher percentages of elderly populations which are greater than 50 percent of the total population with the block group and exceeds more than double the total percent of the comparative

municipalities and county; therefore, this block group may require further consideration for disproportionate adverse impacts. Individual block groups for low-income, disabled, and female head-of-household populations do not exceed the standards established for this socioeconomic analysis and would not require further consideration for disproportionate adverse impacts.

The percent of Limited English Proficiency (LEP) individuals for the total study area (1.5 percent) is lower than the total percentage for Maricopa County, Pinal County, and the City of Mesa, but comparable to the total percentages for the Town of Gilbert and the City of Apache Junction. One individual block group, CT 4226.12 BG 3, displayed an LEP population within the study area that is double than the LEP percentage for the respective jurisdiction of the Town of Gilbert but is well below the percentage of Maricopa County. LEP services should be considered within the study area, in reference to the identified block group; however, LEP services would not be required based on the overall LEP population percentage.

Calculations for the total study area as a whole do not indicate the potential of disproportionate adverse impacts on minority populations within the study area; however, the three individual block groups identified with minority populations that exceeded standards may require further considerations for disproportionate adverse impacts as improvement plans are developed.

2.8.3 Section 4(f) and Section 6(f) Properties

The study area contains four Section 4(f) properties: three recreational parks located adjacent to Elliot Road on the north side between Ellsworth Road and Signal Butte Road, and one recreational trail located along the west side of the CAP Canal. The three parks and recreational areas are identified as the City of Mesa Basin 114, Basin 115, and Basin 116. These multi-use facilities function as retention basins during periods of increased flooding and function as parks and recreational areas during times of reduced rainfall and water run-off. The recreational trail that runs parallel to and west of the CAP Canal is identified as the CAP National Recreation Trail and it serves as a multi-use and equestrian trail.

No other parks and recreational areas, waterfowl or wildlife refuge areas, or historic sites occur within the Elliot Road study area. If federal funds are used for a transportation project that impacts 4(f) resources in the corridor, a 4(f) evaluation will be required.

According to the 2003 Arizona Statewide Comprehensive Outdoor Recreation Plan (Arizona State Parks 2004), no Section 6(f) funded properties are currently located within the Elliot Road study area; however, if a park that could be directly impacted is constructed within the study area and LWCF funds are used to construct this park, requirements of Section 6(f)(3) could apply. If so, coordination with the Arizona State Parks LWCF Grants Coordinator and the National Park Service would be required, regardless of the construction funding source.

2.8.4 Biotic Community and Wildlife

The study area is located within the Lower Colorado River Subdivision of the Sonoran Desertscrub Biotic Community, the largest and most arid subdivision in Arizona. Species commonly found in this subdivision include: honey mesquite (*Prosopis glandulosa*), ironwood (*Olneya tesota*), blue paloverde (*Cercidium floridum*), desert willow (*Chiopsis linearis*), canyon ragweed (*Ambrosia ambrosioides*), catclaw acacia (*Acacia greggii*), burrobrush (*Hymenoclea salsola*), and desert broom (*Baccharis sarothroides*). Ephemeral washes traversing the study area contain xeroriparian habitat that consists of paloverde and mesquite trees.

The Elliot Road corridor between Power Road and the CAP Canal contains patches of residential development and large sections of agricultural fields, dairy farms, and relatively undisturbed natural desert. The agricultural fields, large sections of undisturbed natural desert, small segments of natural

desert occurring along the residential developments, and the ephemeral drainages provide suitable habitat and potential movement corridors for a wide variety of native wildlife. Native wildlife likely to be present within the study area include a variety of seasonally migrant songbirds, Gambel's quail (*Callipepla gambelii*), mourning dove (*Zenaida macroura*), a variety of raptor species, coyote (*Canis latrans*), an array of small mammals, desert cottontail (*Sylvilagus auduboni*), blacktail jackrabbit (*Lepus californicus*), various rodent species, and a variety of reptile species.

No special status species or critical habitat were documented as occurring within two miles of the study area; however, further field investigation is recommended within the study area during the detailed design process. Field investigations may reveal previously unrecorded resources of special concern in locations where resources are currently undocumented.

2.8.5 Water Resources

There are two canals within the study area identified as waters of the United States, namely the Roosevelt Canal and the CAP Canal. Additionally, there are ephemeral washes within the study area, including one named drainage, the Weekes Wash. No wetlands, sole source aquifers, or unique waters have been identified within the study area. The western portion of the study area is within the 100-year floodplain.

2.8.6 Air Quality and Noise

The entire Elliot Road Corridor study area is within the Phoenix Metropolitan Area 8-Hour Non-Attainment for ozone and PM10, and the Phoenix Metropolitan Area maintenance area for carbon monoxide.

Potential sensitive noise receivers that occur adjacent to Elliot Road within the study area include existing residences between Power Road and Hawes Road, existing residences between Signal Butte Road and Meridian Road, and one existing church located on Signal Butte Road just north of Elliot Road.

2.8.7 Hazardous Materials

A review of available databases revealed only one known leaking underground storage tank – at the Arizona Dairy Company – within the boundaries of the study corridor. No hazardous material incidents or other hazardous material sites or concerns were identified.

2.8.8 Cultural Resources

Based on the results of the records search, previous cultural resource survey investigations have covered approximately 52 percent of the Elliott Road project corridor. The literature review revealed that at least 40 cultural sites have been identified in the review area. Of these 40 sites, 14 have been recommended by their recorders as eligible for inclusion in the National Register of Historic Places (NRHP), though none of these have been “officially” determined eligible by the State Historic Preservation Office (SHPO). An additional 20 sites are of unknown eligibility (9 have not been evaluated and another 11 have no data available on them). Finally, 6 sites appear to be not eligible for the NRHP, though 3 of them have been recommended as not eligible by their recorders, and the remaining 3 are not “considered” eligible by the SHPO, though no “official determination” for these sites has been made by the SHPO.

2.9 Existing Drainage Features

This section summarizes existing drainage conditions, past drainage study recommendations, and drainage concepts associated with improvements to Elliot Road. Additional information is available in Technical Memorandum No. 5 – Conceptual Drainage Report.

Elliot Road is located in an area of old alluvial fans with well-drained, loamy soils. The terrain in the study area is generally flat and slopes to the southwest towards the EMF. Most of the offsite flows are collected and conveyed by three major drainage systems prior to crossing Elliot Road: the EMF, the Santan Freeway channel, and the Elliot Road detention basin and storm drain system. Only parcels immediately adjacent to Elliot Road contribute additional off-site flows to the Elliot Road corridor. The discharges generally flow westerly and are intercepted and conveyed by roadside ditches along the arterials crossing Elliot Road at Sossaman Road and Ellsworth Road.

The EMF is a major flood control channel that is parallel to and east of the RWCD's Roosevelt Canal. The EMF is owned and operated by FCDMC and collects and conveys floodwater away from the area of Mesa east of the Roosevelt Canal and discharges into the Gila River. Between the EMF and Sossaman Road, runoff from the agricultural property north of Elliot Road sheet flows westerly towards the EMF where it flows into an irrigation tailwater culvert along Elliot Road, or sheet flows into the EMF.

Between Sossaman Road and Hawes Road, runoff from mostly desert property north of Elliot Road sheet flows southwesterly toward Elliot Road. Runoff crosses at a double barrel 10-ft x 4-ft box culvert located just east of Sossaman Road and at three dip crossings. Between Hawes Road and the Santan Freeway, some runoff from mostly desert property north of Elliot Road collects in the roadside channel on the east side of Hawes Road and flows southwesterly towards Elliot Road. The runoff collected in the channel discharges into two 30-in corrugated metal pipe (CMP) drainage culverts which cross under Hawes Road at a skew just north of Elliot Road. The culverts discharge into a roadside ditch which discharges to the dip crossings between Sossaman Road and Hawes Road. Runoff crossing Elliot Road at the dip crossings between the EMF and the Santan Freeway ultimately discharge into the EMF south of Elliot Road.

The runoff that does not collect in the channel west of Hawes Road flows over Elliot Road at either the dip crossing east of Hawes Road, or at a 36-in CMP between the dip crossing and Santan Freeway. Pavement drainage from the Santan Freeway is collected in the curb and gutter section of Elliot Road at the Santan Freeway interchange and captured by a 24-in. storm drain. The pavement drainage is detained by on-site retention on the south side of Elliot Road and east of the Santan Freeway.

The Santan Freeway channel is located parallel to the east side of the Santan Freeway (Loop 202). The concrete lined, trapezoidal channel collects off-site drainage flows between Baseline Road and Elliot Road. Runoff in the channel flows towards the south. During the design of the channel, all of the residential and roadway facilities along the east side of the Santan Freeway were planned to connect and drain into the Santan Freeway channel via spillways and storm drain pipes. Storm drains intended to collect pavement drainage from Elliot Road are located between the Santan Freeway and Ellsworth Road. The on-site drainage system discharges runoff into the Santan Freeway channel.

The Elliot Road detention basins and outfall channel are located north of Elliot Road on the east and west sides of Crismon Road. The system was designed based on the ultimate build-out of the contributing watershed, including 100-year, 2-hour on-site retention. The system is comprised of three basins, two on the west side of the Crismon Road alignment, and one on the east side of the Crismon Road alignment. The system also includes inlets and storm drains paralleling the south side of Elliot Road ranging in diameter from 78-in. to 102-in. According to information obtained at the second Elliot Road corridor study public open house from a design engineer involved in the redevelopment of the former GM Proving Grounds, the storm drain system was built using cast-in-place concrete pipe (and not rubber gasket reinforced concrete pipes [RGRCP] as called for in the design plans) that is not traffic-rated. This storm drain system conveys flow from 104th Street to an outfall channel south of the corner of Elliot Road and Ellsworth Road. As part of the detention system, channels were constructed north of Elliot Road along 104th Street and the Crismon Road alignment.

Discharge from the Siphon Draw Wash enters the channel at 104th Street and flows to the inlet structures at the end of the channel adjacent to Elliot Road. According to the *Elliot Road Detention Basin and Outfall Channel*,

Phase 1 design plans (FCDMC, 2000), low flows enter a 24-in. RGRCP and are conveyed across Elliot Road to the storm drain system on the south side of the road. High flows enter an inlet spillway structure and are conveyed to the detention basin east of Elliot Road (Basin A) through a 78-in. pipe.

The channel at the Crismon Road alignment conveys flows from north of Elliot Road to an inlet structure adjacent to Elliot Road. Low flows enter a 90-in. bypass pipe and are conveyed across Elliot Road to the storm drain on the south side of the road. High flows are conveyed to the detention basin adjacent to Crismon Road (Basin B) through an 8-ft x 6-ft box culvert. A basin overflow structure connects Basin B to the detention basin adjacent to it on the west (Basin C). Basin C accepts the overflow from Basin B when necessary. Discharge from the detention basins is conveyed through pipes to the storm drain on the south side of Elliot Road. The storm drain on the south side of Elliot Road ultimately discharges to the Santan Freeway channel, which is located west of Ellsworth Road and south of Elliot Road.

Another 90-in. storm drain was constructed by MCDOT from the northeast corner of Elliot Road and Ellsworth Road to the outfall channel at Ellsworth Road. The MCDOT storm drain crosses Elliot Road on the east side of Ellsworth Road. This storm drain accepts flow from north of Elliot Road, between the Elliot Road detention basins and Ellsworth Road.

Two dip crossings are located between the western and eastern Elliot Road detention basins. A tributary of the Siphon Draw Wash is allowed to bypass the eastern basin and cross Elliot Road at the dip crossings. Low flows are handled by 30-in. RGRCP, and excess runoff is allowed to cross the road before it is intercepted by multi-purpose culverts on the south side of the pavement. The multi-purpose culverts discharge to the main storm drain line that is part of the Elliot Road detention basin and storm drain system.

Siphon Draw Wash begins on the eastern side of the project area between the CAP Canal and Meridian Road, in the Arizona State Lands. The wash flows southwest towards the Elliot Road eastern detention basin. The flow from the wash splits at the bypass channel for the eastern detention basin. Low flows bypass the detention basin and flow directly into the storm drain along Elliot Road in that location. However, during major events, flow from the Siphon Draw Wash will discharge into the eastern detention basin to be released slowly into the Elliot Road storm drain system. Discharge from the detention basins flow along the Elliot Road storm drains to an outfall channel at Ellsworth Road. The outfall channel carries stormwater south of Elliot Road to the Santan Freeway channel, where it ultimately discharges into the EMF south of Elliot Road.

The only apparent off-site flow contribution from the residential developments east of Signal Butte Road is from the basin for the residential community on the north side of Elliot Road. The private detention basin is drained by an 8-in. bleed-off pipe that crosses Elliot Road. The bleed-off pipe discharges into a 24-in. storm drain on the south side of Elliot Road. The 24-in. storm drain conveys to a private detention basin on the south side of Elliot Road west of Mountain Road. Pavement drainage improvements exist along the curb and gutter section of Elliot Road, constructed by the subdivision developers. Runoff from the roadway in this section outlets into the private detention basins on the subdivision properties.

Drainage issues along the roadway corridor appear to be typical of those found along major rural arterial corridors in Maricopa County. Most of the drainage issues related to the cross drainage structures are matching the design flood and discharge with the appropriate size culvert, debris and sediment buildup at the inlets of the culverts, scour at the culvert outlets, and localized flooding and ponding on the upstream side of the roadway. Attempts to minimally impact the structures associated with the Elliot Road detention basins and outfall channel should be made during the design phase. Obtaining additional right-of-way or drainage easements may be necessary to minimize impacts to existing structures.

The EMF and Siphon Draw Wash are located within the Federal Emergency Management Agency (FEMA) designated 100-year floodplains. The floodplain for the EMF is shown as Zone A at Elliot Road on Map Number 04013C2685H. Zone A is described by FEMA as a special flood hazard area subject to inundation by

the one percent annual chance flood with no base flood elevations determined. The eastern portion of the floodplain contained in Pinal County is shown as Zone A on Map Number 0400770125D. The portion west of the county line in Maricopa County has been studied by FCDMC for the Siphon Draw Drainage Improvements project, but not FEMA delineated. This area would be displayed on Map Number 04013C2705F, which is not printed.

The profile of Elliot Road must be established so that the increase in water surface elevations of regulatory floodplains does not exceed regulatory limits. Since the EMF and Siphon Draw Wash are located in floodplains, future discharges from Elliot Road may cause water surface levels in the regulatory floodplains to exceed the regulatory limits. Any future development or discharges from the Elliot Road improvements into the floodplain will need to be addressed during design. A floodway may need to be delineated if the encroachments negatively impact adjacent properties.

The EMF, Santan Channel, and Elliot Road detention basins currently have capacity for the 100-year event or greater, but the FCDMC has indicated that this capacity may soon be utilized by other proposed developments and projects. These existing structures may be able to accept discharges from improvements to Elliot Road, although coordination will be needed with the FCDMC during the design phase to determine if excess capacity is still available.

2.10 Future Drainage Features

A detention basin system to attenuate storm event flows from Siphon Draw Wash is currently being designed by FCDMC. These improvements will be located in the undeveloped area owned by ASLD on the east side of Meridian Road and they are expected to reduce the amount of runoff that enters the Elliot Road study area from the east.

Analysis will be required during final design to determine if runoff from the Elliot Road improvements can be discharged into the EMF, Santan Freeway Channel, Elliot Road detention basins, or Siphon Draw basins, because the FCDMC is concerned about the capacity of these structures. "First flush" requirements must be met prior to discharge into a FCDMC facility.

Per City of Mesa policies, future development along Elliot Road in Mesa will be required to accommodate the half-street drainage onto their developments. Pavement drainage must be retained per City of Mesa requirements.

2.11 Existing and Planned Utility Features

This section summarizes existing and planned utilities along the Elliot Road corridor. Additional information is available in Technical Memorandum No. 6 – Utilities Overview.

2.11.1 Water

Potable water distribution along the Elliot Road corridor is provided by the City of Mesa. The City has three wells located on the north side of the road between Ellsworth Road and Signal Butte Road. Distribution lines exist along Power Road, Ellsworth Road, Signal Butte Road, Mountain Road, Meridian Road and the segment of Elliot Road between Ellsworth Road and Meridian Road.

The Power Road distribution main is a 16" Ductile Iron Pipe (DIP) line located on the east side of the road. This distribution main crosses Elliot Road and has a stub-out to Elliot Road.

Along the eastern side of Ellsworth Road, there is a 16" Asbestos Cement Pipe (ACP) distribution line. A 16" ACP distribution line along the north side of Elliot Road starts at the Ellsworth Road line and continues east to Signal Butte Road where it connects with a 24" Steel Cylinder Pipe (SCP) transmission

main. After the Signal Butte Road intersection, the Elliot Road line switches to the south side of the road and continues to the Mountain Road intersection. At Mountain Road, the Elliot Road line changes to a 24" DIP transmission main with a 16" distribution split to the south and north. To the east of the Mountain Road and Elliot Road intersection, the 24" DIP transmission main has two 8" distribution splits to the north of Elliot that run along the east side of Emery and Clancy, providing connections to the residential areas. The Elliot Road line ends at Meridian Road where it connects to a 12" DIP distribution line that runs north.

2.11.2 Sanitary Sewer

The City of Mesa maintains gravity and force main sewer lines along both sides of Elliot Road from Ellsworth Road to Sossaman Road.

A 42" High Density Polyethylene (HDPE) gravity line flows west along the south side of Elliot Road from the west side of Loop 202 to the east side of the EMF, where the pipe type changes to 48" RGRCP. At the EMF, the line turns south, following the alignment of the EMF channel. A 42" HDPE gravity line flows south along the west side of Ellsworth Road and turns west along the south side of Elliot Road, ending with a plug/cap just east of Loop 202.

A 10" Polyvinyl Chloride (PVC) force main along the east side of Ellsworth Road turns west along the north side of Elliot Road, flowing west under Loop 202 to Sossaman Road. At Sossaman Road, the force main turns north along the west side of the road.

Three force main lines – two 10" DIP and one 16" DIP – flow south along Power Road and turn west along the north side of Elliot Road. A 12" PVC gravity line and a 12" DIP force main line that flow south along the east side of Power Road cross Elliot Road and continue to the south.

2.11.3 Gas

The area north and west of Loop 202 is within the City of Mesa gas service area. The only City of Mesa gas facility currently within the Elliot Road Corridor is a 4" Polyethylene (PE) line along the east side of Power Road. Southwest Gas has PE and Steel Pipe Lines (STL) within the Elliot Road Corridor.

A 4" STL along the west side of Ellsworth Road crosses Elliot Road and continues south. From the intersection of Ellsworth Road and Elliot Road, a 10" STL runs along the south side of Elliot Road to Signal Butte Road, where it turns north along the east side of the road.

There is a 4" PE line along the west side of Signal Butte Road from the north that turns east at Elliot Road, changing to a 6" PE along the south side of Elliot Road at the Mountain Road intersection. East of Mountain Road, the 6" PE switches to the north side of Elliot Road, continuing to a stub-out on the east side of Meridian Road. Service connections to the subdivisions on the north and south of Elliot Road exist at Emery, Oxley, Clancy and Payton. A 6" PE line north of Elliot runs along the west side of Meridian Road.

2.11.4 Power

SRP services this area of the Valley. Overhead power lines run alternatively on the north and south sides of the corridor along sections of the Elliot Road corridor.

A 12kV overhead line runs along the west side of Power Road, switching to the east side just north of the Elliot Road intersection. Another 12kV overhead line runs along Elliot Road from the west, crossing Power Road on the north side of road, switching sides at the Sossaman Road intersection and ending at Hawes Road. 12 kV overhead line crossings of Elliot Road exist along the east side of Sossaman Road,

the west side of 80th Street, the west side of Hawes Road, and midway between 80th Street and Hawes Road.

A 12kV overhead line – 1,400' in length – runs on the south side of Elliot Road, starting 800' to the east of the EMF. Close to its eastern end, this overhead line connects to another 12kV overhead line that is running parallel 250' to the south.

A 12kV overhead line starts east of Loop 202, running along the north side of Elliot Road, switching to the south side at Signal Butte Road and continuing east to end at Mountain Road. A separate overhead line crosses Elliot Road running along the west side of Ellsworth Road.

An underground line (voltage unknown) runs north along the west side of Signal Butte Road starting (but not crossing) at Elliot Road.

A 230kV overhead line runs along the west side of the CAP Canal crossing the Elliot Road section line.

A 230kV overhead line owned and operated by the Western Area Power Administration (WAPA) crosses Elliot Road at Mountain Road. A tower for this line is located just north of the Elliot Road right-of-way on the west side of the Mountain Road alignment. WAPA has specific requirements relating to how close a roadway can be to a WAPA tower.

SRP operates the Browning Receiving Station, which is located on the east side of Signal Butte Road, about one-third of a mile north of Elliot Road. A 230kV overhead transmission line runs parallel to Elliot Road along the mid-section line, one-half mile north of the corridor.

2.11.5 Telecommunications

Qwest and Cox Communications operate telecommunication lines along the corridor. They are typically underbuilt on SRP's power poles, crossing Elliot Road at Power Road, Sossaman Road, 80th Street, Hawes Road and Ellsworth Road. There are underbuilt lines along the segment between Sossaman Road and 80th Street on the south side of Elliot Road.

Buried lines exist along the north side of Elliot Road from Signal Butte Road to Mountain Road, but may extend east toward Meridian Road and west to the flood control basins near the Crismon Road alignment. Qwest's plats do not show the underground lines and Cox did not provide maps.

2.11.6 Irrigation

RWCD operates and maintains the irrigation canal that parallels the EMF along its west side. This canal, known as the Roosevelt Canal, has a concrete lined trapezoidal section, 10' wide at the bottom, with an operational depth of approximately 6' at the Elliot Road single-span bridge crossing. A canal control section with radial gates exists just south of the Elliot Road bridge. There is also a lateral ditch on the south side of Elliot Road between the Roosevelt Canal and Power Road that includes some pipe, the delivery gate to the Roosevelt Canal, a turnout structure, and associated private irrigation tie-ins to the south. RWCD also has a well site near the radial gate south of Elliot Road.

The Central Arizona Water Users District (CAWUD) operates and maintains the CAP Canal located just outside the east end of the study area.

2.11.7 Planned Utilities

Utility lines and telecommunication networks are expected to be continually expanded as a result of new development along the corridor. These improvements typically include local service connections to new developments, as major infrastructure is already in place. The City of Mesa requires new development to

bury any existing overhead telecommunications or 12kV power lines along the roadway. The City of Mesa has developed master plans for water, wastewater, storm drain, and gas that are periodically updated. Any new projects should consult the latest version of these master plans.

The City of Mesa and SRP have short and medium range plans to expand their facilities as described below.

The City of Mesa is currently constructing a new water treatment plant on the northeast corner of the Elliot Road and Signal Butte Road intersection. The plant will include two pump stations and an underground reservoir which will be constructed in phases over the next five years. Raw water will be fed to the plant from the CAP Canal through a 60" pipe line running south along Ironwood Road and west along Elliot Road (paralleling Elliot Road on the north side of the road). New 12", 16", 24" and 30" distribution lines will originate from the plant in all four directions along Elliot Road and Signal Butte Road. Pipe line construction is to be phased during the next 10 years. The City also plans on running 24" or 36" pipelines along Elliot Road west to Power Road at a yet undefined date. Water distribution lines are planned for construction along every major arterial crossing Elliot Road, including the future extension of Crismon Road into what is today the GM Proving Grounds. Additional water wells are also proposed along Elliot Road west of Signal Butte Road and at Mountain Road, and along Signal Butte Road south of Elliot Road.

SRP anticipates having to add transmission lines along Elliot Road and along every major arterial crossing, especially in the area of the existing GM Proving Grounds. Expansion of the power grid into Pinal County is expected. The location of these lines is unknown at this time and will be defined as development occurs. Plans for extension of 69kV overhead lines out of the Browning Receiving Station indicate the new 69kV overhead lines will go along the north side of Elliot Road between Mountain Road and Signal Butte Road and then south along Signal Butte Road across Elliot Road towards the future McPherson Substation near the Mountain Road/Ray Road intersection.

3. TRAFFIC ANALYSIS SUMMARY

This section provides an overview of traffic capacity analyses for the Elliot Road corridor study area for the existing (2007), 2015, and 2030 design years. Additional information is available in Technical Memorandum No. 3 – Traffic Analysis and Technical Memorandum No. 8 – Major Design Features and Access Management Guidelines.

3.1 Traffic Analysis Criteria

Traffic operations analysis as described in the 2000 *Highway Capacity Manual (HCM)* employs a LOS analysis grading system to describe traffic operations. The LOS grading system quantifies operating conditions in terms of quality of traffic flow and the perception of the motorist. Six levels of service are defined ranging from LOS A to LOS F. LOS A represents the best operating conditions and indicates free-flow conditions with little or no delay experienced by motorists. LOS A, B, and C are customarily considered to be acceptable. Moderate delay is noticed by the motorists in LOS D. LOS E and LOS F are generally deemed unacceptable in rural, suburban, and most urban conditions, and represent roadways operating near or over capacity (stop and go conditions). In dense urban conditions, LOS E is often considered acceptable during the peak periods. The MCDOT *Roadway Design Manual* (revised 2004) establishes LOS C as the desired criteria for rural principal arterial roadways and LOS D as the desired criteria for urban principal arterial roadways. The City of Mesa *Transportation Plan* and City of Apache Junction *Small Area Transportation Study* establish LOS D as the desired criteria for principal arterial roadways. Because Elliot Road is transitioning to urban conditions, and is likely to ultimately be a principal arterial under the jurisdiction of the City of Mesa west of Meridian Road, and the City of Apache Junction east of Meridian Road, LOS D was used as the desired LOS for existing and future traffic operations within the corridor.

3.2 Roadway Capacity Analysis

Planning-level LOS values for corridor roadway segments between intersections were estimated for the existing (2007) and 2030 design years using Table 4-1 from the Florida Department of Transportation (FDOT) *Quality/Level of Service Handbook*, published in 2002. This table is based on LOS calculation methodologies described in the *HCM*.

3.2.1 Existing Roadway Segment Level of Service Analysis

Based on the planning level roadway segment level of service values described previously, all of the existing roadway segments on Elliot Road between intersections are estimated to currently operate at acceptable levels of service (at or above LOS D).

3.2.2 2030 Roadway Segment Level of Service Analysis

The Elliot Road corridor currently provides a wide range of cross-sections, from a rural two-lane roadway in the western portion of the study area to a six-lane roadway in the eastern portion. In order to determine the required 2030 cross-section for Elliot Road between intersections, the aforementioned baseline and alternate sensitivity analysis 2030 ADT volumes were compared to the estimated volumes a roadway can accommodate while still providing LOS D or better traffic operations. Exhibit 26 shows the estimated volume thresholds for LOS D for different sizes of roadways and compares these thresholds to the baseline and alternate 2030 ADTs along Elliot Road.

Exhibit 26 – 2030 Roadway Segment Level of Service Analysis Findings

Potential Elliot Road Cross-Section	Estimated Max. ADT for LOS D*	Capacity Constrained Areas (Where Baseline 2030 ADTs Exceed Max. ADT for LOS D)	Capacity Constrained Areas (Where Alternate 2030 ADTs Exceed Max. ADT for LOS D)
Two-lane roadway	14,600	Entire corridor except Elliot Road between 80 th Street and Loop 202 (ADTs of 15,363-47,963)	Entire corridor (ADTs of 16,566-65,709)
Four-lane roadway	31,100	Elliot Road between Loop 202 and Signal Butte Road (ADTs of 32,399-47,963)	Elliot Road between Loop 202 and CAP Canal (ADTs of 32,339-65,709)
Six-lane roadway	46,800	Elliot Road between Loop 202 and Ellsworth Road (ADT of 47,963)	Elliot Road between Loop 202 and Crismon Road (ADTs of 48,425-65,709)

* See Table 4-1 in FDOT's Quality/Level of Service Handbook for more information on the assumptions used to develop these ADT values

In summary, if actual 2030 volumes match the projected “worst-case” alternate volumes, Elliot Road will likely need to have at least four travel lanes west of Loop 202 and at least six travel lanes east of Loop 202 to achieve LOS D. Even with six lanes, the segment of Elliot Road between Loop 202 and Crismon Road could potentially operate at a level of service worse than LOS D during the peak periods.

3.3 Intersection Capacity Analysis

To determine what intersection improvements are expected to be needed along the Elliot Road corridor, a detailed peak-hour capacity analysis was conducted using *Synchro 7* software. To calculate intersection LOS values, the intersection LOS analysis methodology described in the *HCM* was utilized.

3.3.1 Synchro Traffic Parameters

While the default *Synchro* traffic parameters (e.g., peak-hour factor of 0.92) were generally used in the capacity analysis, adjustments were made to the truck percentage factor. For 2007, a truck percentage of six percent was used to reflect existing conditions based on obtained traffic count data. In the future, the rate of passenger vehicle growth is expected to be higher than the rate of growth of truck volumes, reflecting the corridor’s transition from a rural to an urban condition. As such, a truck percentage of four percent was assumed for 2015 and a truck percentage of two percent was assumed for 2030.

Based on the magnitude of projected volumes, it was assumed that all arterial-arterial intersections will be signalized in the future. A 94-second cycle length was assumed at all intersections to match the City of Mesa’s current practice of using a 94-second cycle length to optimize progression between signals at a desirable operating speed.

3.3.2 Analysis Scenarios

A detailed peak-hour capacity analysis was conducted for both the AM and PM peak hours for the following six analysis scenarios:

- Existing (2007) – this scenario represents the existing condition when peak-hour traffic count data was collected in September 2007 and represents the baseline analysis scenario;
- 2015 No-Build – this scenario assumes no intersection improvements are implemented by 2015 except those improvements already constructed since September 2007 or already programmed. The only improvements that meet this criteria are the signalization and widening of the Elliot Road/Signal

Butte Road intersection (completed in early 2008) and the widening of Power Road to the standard City of Mesa six-lane cross-section through the Elliot Road intersection (programmed for construction by 2012). The No-Build scenario also includes minor signal timing improvements (e.g., reallocation of green time between different movements) to accommodate anticipated changes in traffic volumes;

- 2015 with Improvements – this scenario assumes improvements are made as needed so that all study intersections meet the established LOS criteria of “D” or better, with the constraint that improvements along Elliot Road conform to the previously agreed upon design criteria (see **Exhibit 2**). One constraint of note is the arterial roadway maximum approach cross-section at arterial-arterial intersections, which is limited to two left-turn lanes, three through lanes, and one right-turn lane (see *2008 City of Mesa Standard Detail No. M-46.3* for a sample typical intersection layout). The 2015 with Improvements scenario also includes the new roadway segments expected to be built by 2015 according to the MAG 2015 model, which includes extending Elliot Road from Meridian Road to east of the CAP Canal and making Hawes Road a continuous arterial through the Elliot Road study area;
- 2030 No-Build – this scenario assumes no intersection improvements are implemented by 2030 except those improvements already discussed in the 2015 No-Build scenario;
- 2030 with Improvements – this scenario assumes improvements are made as needed so that all study intersections meet the established LOS criteria of “D” or better, with the constraint that improvements along Elliot Road conform to the aforementioned design criteria, including the arterial-arterial intersection maximum approach cross-section of two left-turn lanes, three through lanes, and one right-turn lane. The 2030 with Improvements scenario also includes the new roadway segments that are expected to be built between 2015 and 2030 per the MAG 2030 model, which includes making Crismon Road and Meridian Road continuous arterials through the Elliot Road study area; and
- 2030 Sensitivity – this scenario assumes improvements are made as needed so that study intersections meet the established LOS criteria of “D” or better, if feasible with the aforementioned constraints.

3.3.3 Intersection Level of Service Results

Exhibit 27 shows a summary of the intersection LOS resulting from the *Synchro* capacity analysis for each of the aforementioned six analysis scenarios.

Significant findings from the analysis include:

- All of the intersections in the Existing (2007) scenario provide LOS D or better except the Elliot Road/Signal Butte Road intersection (which has since been improved to now provide an acceptable LOS with the signalization and intersection widening that occurred in early 2008);
- Two-thirds of the intersections in the 2015 No-Build scenario are projected to provide unacceptable LOS in at least one of the peak hours if no improvements are made;
- By 2030, all of the intersections in the 2030 No-Build scenario are projected to provide unacceptable LOS in at least one of the peak hours if no improvements are made;
- LOS D or better is projected to be achievable for all intersections in the 2015 with Improvements scenario except for the Ellsworth Road/Elliot Road intersection, which is expected to provide LOS F in the 2015 PM peak hour, even with the maximum amount of improvements permitted within the aforementioned constraints. This poor LOS is anticipated to occur because of the projected extremely heavy eastbound right-turn volumes, especially in the 2015 PM peak hour, reflecting the fact that for much of the existing and projected development south and east of Loop 202, the shortest route from Loop 202 to that development is to exit Loop 202 at the Elliot Road interchange, travel east along Elliot Road, and then travel south along Ellsworth Road. As would be expected, the reverse movement is projected to be quite heavy in the 2015 AM peak hour, although not quite to the same degree of intensity as the heavy right-turn movement in the PM peak hour. It should be noted,

however, that there is an alternative cross-section outside of the agreed upon standard cross-section that could provide LOS D at this intersection. This alternative cross-section contains both an eastbound exclusive right-turn lane and a shared eastbound through/right-turn lane. Any use of an alternative cross-section would be subject to approval by the governing agency of the intersection, which is expected to be the City of Mesa in 2015. If the alternative cross-section were implemented, no eastbound bike lane should be provided at the Ellsworth Road/Elliot Road intersection because of the increased potential for vehicle-bicycle conflicts from the shared through/right-turn lane. It should also be noted that the projected conditions resulting in the poor LOS in 2015 are expected to actually improve in the next few years after 2015. This improvement in LOS is expected because the volume of traffic making the Loop 202-Elliot-Ellsworth movement is anticipated to actually decrease between 2015 and 2030 because the planned construction of SR 802 (Williams Gateway Freeway) will provide a shorter route from a freeway to developments south and east of Loop 202. While construction of SR 802 is currently scheduled to be completed in 2022, the City of Mesa has indicated it is trying to advance the SR 802 construction timeframe by at least five years;

- LOS D or better is projected to be achievable for all intersections in the 2030 with Improvements scenario; and
- Half of the intersections in the 2030 Sensitivity scenario are projected to provide LOS worse than LOS D in at least one of the peak hours, even with the maximum amount of improvements permitted within the aforementioned constraints. Of particular note is that three of the Elliot Road intersections with unacceptable LOS – Loop 202 South, Loop 202 North, and Ellsworth Road – are within about a one-half mile segment of Elliot Road, which means traffic operations could potentially be even poorer than what was calculated due to queuing from one intersection backing up into adjacent intersections. To achieve LOS D at all intersections in the 2030 Sensitivity scenario, Elliot Road could likely need to be widened to eight through lanes between Ellsworth Road and Loop 202 and triple left-turn lanes and free-flowing right-turn lanes would be needed at both Loop 202 ramp intersections, Ellsworth Road, Crismon Road, and Meridian Road. Alternatively, the governing agency could determine that LOS E or LOS F in peak hours is acceptable in densely developed areas. It should be noted that any modifications to the Loop 202 interchange would require prior approval from ADOT.

Exhibit 27 – Level of Service Summary

Cross Street	Existing (2007)		2015 No-Build		2015 w/ Improvements		2030 No-Build		2030 w/ Improvements		2030 Sensitivity	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Power Road	A	A	C	C	C	C	F	F	C	C	D	D
Sossaman Road	B	A	F	F	A	B	F	F	B	C	C	C
Hawes Road	*	*	*	*	A	A	*	*	B	B	C	C
Loop 202 South	C	C	D	E	C	D	C	E	C	D	E	F
Loop 202 North	C	C	D	D	C	C	C	E	C	D	F	F
Ellsworth Road	C	C	F	F	D	F	F	F	C	C	F	F
Crismon Road	*	*	*	*	*	*	*	*	C	C	D	E
Signal Butte Road	F	F	F	F	C	C	F	F	C	C	D	D
Meridian Road	*	*	*	*	*	*	*	*	C	C	E	F
Ironwood Drive	*	*	*	*	C	C	*	*	C	C	C	D

* Intersection that does not exist or for which traffic volume data was not available.

4. ENVIRONMENTAL SUMMARY

This section summarizes the conclusions from the environmental overview, which documented known environmental resources in the Elliot Road corridor study area and identified potential environmental concerns for future roadway improvements. This overview was not intended to satisfy National Environmental Policy Act (NEPA) requirements for environmental clearance. Future improvements will require further study, analysis, and documentation under applicable environmental statutes. Additional information is available in Technical Memorandum No. 4 – Environmental Overview.

Existing environmental conditions are discussed in Section 2 of this document. The evaluation of the existing socioeconomic environment, physical and natural environmental character, cultural resources, Section 4(f), and Section 6(f) resources conducted for the Elliot Road Corridor Improvement Study indicates that the following additional research, analysis, coordination, and/or permitting would be required (regardless of funding source) prior to proposed roadway improvements within the Elliot Road study area.

- Notification to the Federal Aviation Administration (FAA) Administrator is required if construction operations occur within a 20,000 foot radius of the Phoenix-Mesa (formerly Williams) Gateway Airport and exceed the 100:1 slope equation (see the United States Department of Transportation [USDOT] FAA Advisory Circular AC 70/7460-2K). In the study area, this requirement would apply only if construction operations involve work requiring cranes or the building of an elevated bridge structure whose height exceeds the aforementioned 100:1 slope equation height threshold;
- If construction operations are anticipated to occur within or near a drainage feature or waterway or would impose fill material into a drainage feature or waterway, a Jurisdictional Delineation is required during future project design to determine the jurisdictional boundaries of waters of the U.S. and whether Section 404 Nationwide Permits (NWP), pre-construction notification (PCN), or Individual Permits (IP) are required for project-specific actions such as placement or replacing of culverts, extending culverts, dredging and fill activities (see the Clean Water Act and Army Corps of Engineers standards). In the study area, this requirement would likely apply to crossings within the two identified flood zones and could also apply to some of the culvert crossings;
- If a Section 404 permit is required (NWP or IP), then a Section 401 Water Quality Certification would also be required (see the Clean Water Act, EPA, and Arizona Department of Environmental Quality [ADEQ] regulations). Under the Nationwide Permit Program in the state of Arizona, the Section 401 Water Quality Certification process is typically granted a Conditionally Certified status; therefore, a separate application for Section 401 Water Quality Certification would not be required;
- If construction operations are anticipated to disturb more than one acre of land, an Arizona Pollutant Discharge Elimination System (AZPDES) permit and a Storm Water Pollution Prevention Plan (SW3P) would be required (see Arizona Administrative Code Title 18, Arizona Revised Statutes, Title 49);
- If construction operations are anticipated to occur within the two identified flood zones in the study area that would alter the floodplain ground elevations, coordination with the floodplain manager and FEMA would be required (see the National Flood Insurance Act and Maricopa County Floodplain Regulations);
- If construction operations are anticipated to result in the removal of existing native plant, tree, and/or cactus specimens, a Native Plant Survey should be conducted to determine if any of the impacted plants are protected native plant species. Coordination with the Arizona Department of Agriculture should be conducted if any protected native plants are identified within the study area; impacts to native plants may require a Notice of Intent and/or specific permitting (see Article 11: Arizona Native Plants);
- If construction operations are anticipated to consist of ground-disturbing activities which may result in fugitive dust being emitted into the atmosphere, adherence to local air quality rules, ordinances, and permitting as it may apply is required. The study area is located within air quality non-attainment areas for ozone, and PM₁₀ and the maintenance area for carbon monoxide (see the Clean Air Act, ADEQ requirements, Arizona Revised Statutes

Title 49, Maricopa County Air Pollution Control Regulations, and Pinal County Air Quality Control District Code of Regulations);

- For all construction operations, evaluation, consideration, and adherence to local noise ordinances will need to be followed (see the Noise Ordinance for the City of Mesa);
- For all construction operations anticipated to occur in the vicinity of, or impact, any of the 14 identified sites in the study area that have been recommended by their recorders as eligible for the NRHP, coordination with SHPO should be conducted to determine the eligibility of a ‘recommended eligible’ site within the study area (see the National Historic Preservation Act and the State Historic Preservation Act). None of these 14 sites have been “officially” determined eligible by SHPO; and
- If construction operations are anticipated to occur within or near the identified historic road alignments that cross the study area, then a Pedestrian Survey should be conducted to ascertain the exact location of the historic road alignments and to document any potential disturbance by the current undertaking, and provide eligibility and treatment recommendations (see the National Historic Preservation Act and the State Historic Preservation Act). Areas exist within the study area that have not been previously surveyed for cultural resources and they should be examined prior to the construction of any improvements. Furthermore, any future proposed improvements within the study area should evaluate the area’s potential for containing Traditional Cultural Places (TCP) and other significant cultural landscapes. An assessment for TCPs would include, but not be limited to, literature and/or interviews to identify pre-historical and historical resources, and surveys of historic properties to identify any previously unidentified historic buildings or structures. Construction activities within the study area must also adhere to local historic preservation rules, ordinances, and permitting as they may apply.

Furthermore, based on the given nature of the project area, it is recommended, but not required, that the additional research, investigations, and surveying actions be conducted regardless of the funding source for any improvements within the Elliot Road study area:

- If expansive or large-scale construction operations are anticipated to occur within undeveloped areas in the study area, the Arizona Game and Fish Department (AGFD) highly recommends further field investigations for sensitive species be conducted within the study area. Field investigations may reveal previously unrecorded resources of special concern in locations where resources are currently undocumented (see the AGFD guidelines); and
- If right-of-way is anticipated to be acquired for proposed improvements, a Phase I/II Environmental Site Assessment (ESA) or similar environmental evaluation on proposed right-of-way acquisitions is recommended prior to future project-specific actions (see the Comprehensive Environmental Response, Compensation, and Liability Act guidelines).

Should federal funds be used for the design or construction of proposed enhancements in the Elliot Road study area, then the following additional research or analysis would be required to determine the significance of impacts on the quality of the human and natural environment:

- Consideration and determination of disproportionate adverse impacts for the identified race minority populations, elderly population, and the LEP population (see Executive Order (EO) 12898, EO 13166, and Title VI of the Civil Rights Act of 1964 and related statutes);
- A Section 4(f) evaluation will be required for the four parks and recreational areas identified within the study area: the City of Mesa Basin 114, Basin 115, and Basin 116, and the CAP National Recreation Trail. Additionally, any new Section 4(f) sites that are identified or constructed prior to the construction of proposed enhancements within the study area that could be directly impacted would also require a Section 4(f) evaluation (see the USDOT Act);
- An Invasive Plant Species Survey will need to be conducted prior to future project-specific actions to determine whether noxious weeds exist within the study area and to establish whether decontamination procedures should be put in place prior to any construction activities (see EO 13112 and Arizona Native Plant Law);

- Further coordination with the United States Fish and Wildlife Service (USFWS) on threatened and endangered species is recommended. Major construction activity impacting an area of listed species or critical habitat would require preparation of a Biological Assessment (see the Endangered Species Act and USFWS regulations); and
- An evaluation of the future noise quality against the existing noise data for the study area would be needed. Noise receivers were identified within the study area and include existing and planned residential areas, recreational open space, a church, and undeveloped lands. In addition, local noise ordinances will need to be evaluated in considering future project development (see FHWA 23 Code of Federal Regulations (CFR) 772, the MCDOT Noise Abatement Policy, and the Noise Ordinance for the City of Mesa).

5. DRAINAGE / STRUCTURES SUMMARY

This section provides a description of the operational function of the existing drainage structures in the Elliot Road study area. A review of existing drainage conditions (see Section 2 in this document) was conducted based on information gathered from existing drainage reports, roadway drainage reports, area drainage master plans, field reviews of existing drainage structures, and field observations of drainage patterns along Elliot Road. From the documented existing conditions, improvements to the existing drainage facilities have been recommended based on the proposed roadway cross-section and drainage characteristics in the study area. Additional information is available in Technical Memorandum No. 5 – Conceptual Drainage Report.

5.1 Drainage Design Criteria

As was mentioned in Section 1 of this document, it was agreed upon early in this study that any future roadway improvements (including on-site drainage) for the Elliot Road corridor study area should conform to City of Mesa standards in Maricopa County (west of Meridian Road) and to City of Apache Junction standards in Pinal County (east of Meridian Road). On-site drainage design criteria are described in the City of Mesa's *Engineering & Design Standards, 2007* and the City of Apache Junction's *Engineering Design Guidelines, 2006*. Off-site drainage improvements should conform to FCDMC standards in Maricopa County and to PCFCD standards in Pinal County. Off-site drainage design criteria are described in FCDMC's *Drainage Policies and Standards for Maricopa County, 2007* and in PCFCD's *Drainage Manual, 2004*.

5.2 Hydrology

The hydrology for the watershed upstream of Elliot Road has been studied and documented in several reports. These reports include:

- The FCDMC *East Mesa Area Drainage Master Plans, 1998*;
- The FCDMC *Final Study Report for the East Maricopa Floodway Capacity Assessment, 1999*;
- The FCDMC *Design Documentation Study for the Elliot Road Detention Basins and Outfall Channel Phases I and II, 2000*;
- The MCDOT *Candidate Assessment Report for Elliot Road from Power Road to Ellsworth Road, 2001*;
- The ADOT *Final Drainage Report for the Santan Freeway (202L), Elliot Road to Baseline Road, 2003*;
- The FCDMC *Siphon Draw Drainage Improvements Concept Letter Report, 2006*; and
- The FCDMC *Siphon Draw Drainage Improvements Project Pre-Design Report, 2008*.

The hydrology for Elliot Road from the EMF to the CAP Canal was originally included in the *East Mesa Area Drainage Master Plan (EMADMP)* prepared by the FCDMC in October 1998. The FCDMC subsequently modified the existing conditions hydrology to incorporate the selected design hydrologic criteria and the future condition land use from the MAG 1997 land use maps. The *EMADMP* model was then modified to reflect changes in flow routing from the planned channels, storm drains, and detention basins for the City of Mesa. In May 1999, the hydrology was revised again to model the three detention basins concept (one on the east side of Crismon Road, and two on the west side of Crismon Road). The FCDMC reviewed the revised model and approved it in May 1999. The *EMADMP* model was revised in 2000 to correct several issues identified by an extensive review pertaining to the portion of the model affected by the proposed Elliot Road Detention Basins. This model was agreed upon and established as the baseline model for the design of the Elliot Road detention basins and outfall channel.

Plans and updated hydrology for the Siphon Draw Wash drainage improvements are currently being prepared by the FCDMC. The approved Elliot Road detention basins and outfall channel hydrologic model for the existing condition (100-year, 24-hour) work was updated so that the entire watershed east of Meridian Road

drains to a point at the intersection of Meridian Road and Siphon Draw Wash in the *Siphon Draw Drainage Improvements Concept Letter Report*. In this *Siphon Draw Drainage Improvements* model, it was assumed that a channel will be constructed along Meridian Road from Siphon Draw Wash to approximately 1.5 miles north of the wash as part of the Siphon Draw Wash drainage improvements. The model also reflects land use changes as proposed by ASLD to reflect future conditions. The hydrology model was again updated as part of the *Siphon Draw Wash Drainage Improvements Project Pre-Design Report* to refine the model for the drainage area contributing to the proposed Siphon Draw detention basin facility. The model provided as part of the Pre-Design report is the base hydrologic model for the area east of Meridian Road, while the rest of the hydrology model provided in the Concept Letter Report is the base for the area west of Meridian Road. These models are the basis for the Elliot Road Corridor Improvement Study hydrology.

5.3 Hydraulics

An analysis of culvert hydraulics for the existing culvert crossings of Elliot Road was conducted for this study. The hydrologic information and existing pipe configuration used for the culvert hydraulics analysis was extracted from two sources: the FCDMC *Elliot Road Detention Basins and Outfall Channel Phases I and II* and the *Final Drainage Report for the Santan Freeway (202L), Elliot Road to Baseline Road*. The design flow for this study was the 50-year storm event or the noted design flows provided in the above references. The existing culverts were then hydraulically evaluated to determine current operational capacity.

The existing drainage cross culverts that have an operational capacity to handle off-site flow using the 50-year design flow will need to be extended to span the new roadway cross-sections. The proposed roadway cross-section is expected to be an urban 6-lane divided roadway within 130' of right-of-way west of Meridian Road and within 150' of right-of-way east of Meridian Road. Additional right-of-way or easements may be required for culvert extensions within the Elliot Road study area. Culvert lengths will be required to be at least as long as the width of the roadway pavement, plus additional length to construct the inlet and outlet at ground level. The material used for an extension will remain the same as the existing culvert.

The design flow for new culverts during the design phase should be based on an updated hydrologic analysis to account for land use changes in the upstream basins. A clogging factor was not included in the culvert hydraulics analysis; however sediment and debris should be accounted for in the final design of the culverts for this study. Existing roadside drainage channels and pavement drainage systems were not evaluated for this study. It should be noted that the existing roadside channels and pavement drainage systems will need to be relocated and realigned due to the new roadway widened section. The existing channels and pavement drainage systems may also require upsizing to handle additional pavement runoff. Because some of these channels can be significant in size, additional right-of-way may be needed to accommodate the roadway widening and additional flow.

The portion of Elliot Road between the EMF and CAP Canal has several at-grade (low-flow) crossings. Stormwater flows over the road during storm events. The Elliot Road Corridor Improvement Study has estimated stormwater flows for several of the low-flow crossings using information from the previous drainage reports listed previously. New culverts are recommended at the locations where there is currently an at-grade crossing. Between Meridian Road and the CAP Canal, new culverts are recommended based on the proposed alignment of Elliot Road. When the final design of the proposed roadway improvements is undertaken, the exact locations, types, and sizes of needed drainage facilities will be finalized.

5.4 Discharges for Elliot Road

The design discharges for the Elliot Road Corridor Study were extracted primarily from the FCDMC HEC-1 models for the Siphon Draw Wash drainage improvements project. The subbasin drainage areas and storm event discharges are summarized in **Exhibit 28**, while the storm event discharges at concentration points are

summarized in **Exhibit 29**. The recommended configurations for future drainage features are based on these discharges unless otherwise noted. A schematic diagram of the Siphon Draw Wash HEC-1 Model contributing watershed is provided in **Exhibit 30**. Siphon Draw improvements hydrology reflects future conditions, therefore the subbasins and design discharges in **Exhibit 28** and **Exhibit 29** are considered future conditions.

Existing subbasin areas for the cross culverts and dip crossings from Power Road to the Santan Freeway were determined from aerial photography and information from existing drainage reports. **Exhibit 31** presents the subbasin area delineated. The 50-year and 100-year storm event discharge at each crossing in this area was calculated using the rational method. Culvert recommendations are based on these calculated flows. **Exhibit 32** presents the rational method discharge calculations for each delineated subbasin area. Existing subbasin areas and discharges are expected to remain the same in the future condition for this portion of the study area.

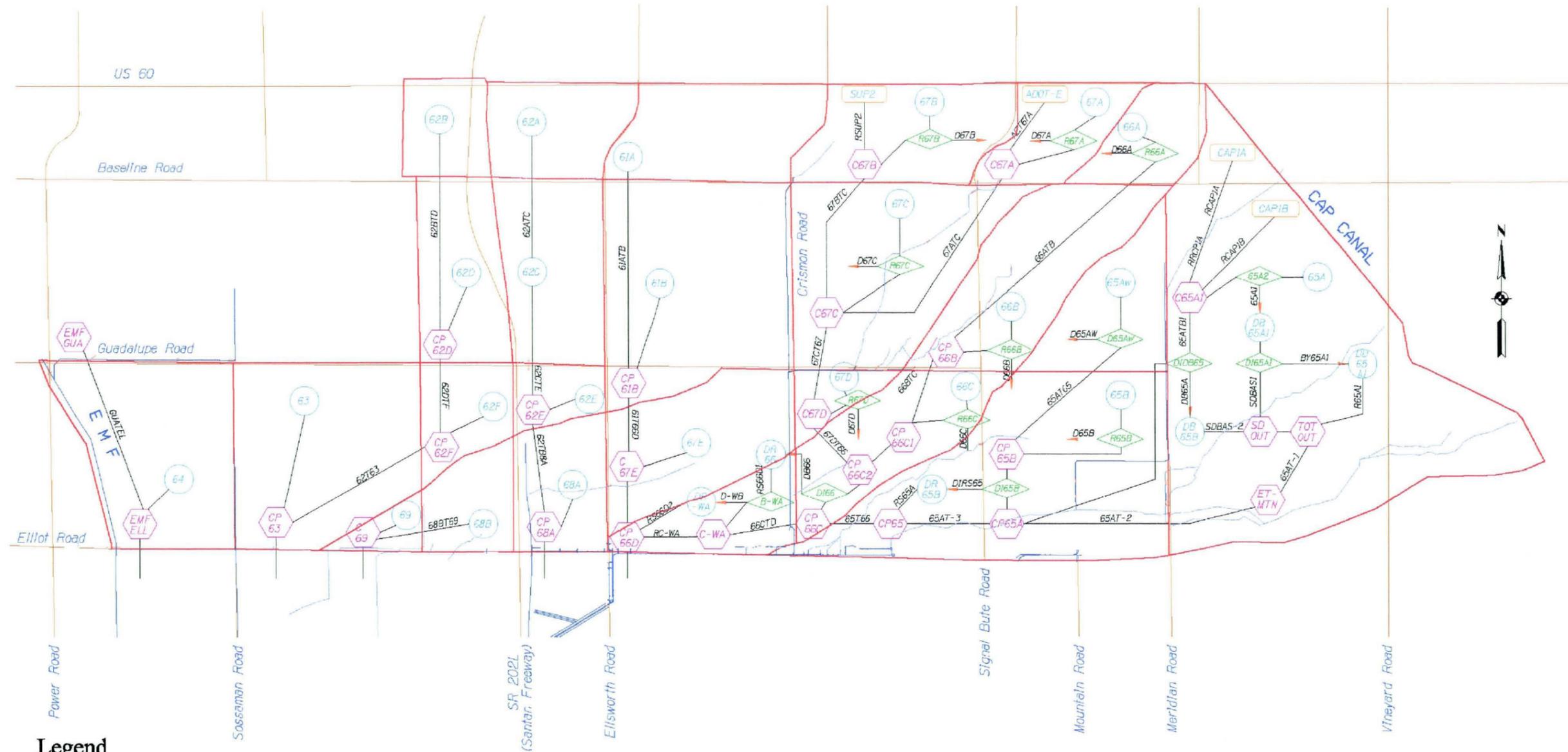
Exhibit 28 – Future Subbasin Area and Discharges for Elliot Road Watershed Subbasins

Subbasin ID	Subbasin Area [acres]	100-year, 24-hour Discharge [cfs]
66A	166	446
67A	192	387
67B	339	714
61A	333	794
62A	243	806
62B	147	544
62D	294	609
62C	352	835
61B	698	1175
67C	595	1019
66B	429	605
65A1	621	655
65A2	346	442
CAP1B	614	710
65Aw	275	555
65B	877	1552
66C	320	707
67D	83	183
67E	371	771
66D	198	651
68A	224	695
62E	96	229
62F	166	421
68B	160	582
69	58	208
63	582	1190
64	518	924

Exhibit 29 – Future Discharges for Elliot Road Watershed Concentration Points

Concentration Point ID	Total Area to Concentration Point [acres]	100-year, 24-hour Discharge [cfs]
CP 66B	595	196
CP 62D	442	452
CP 63	1190	722
CP 62E	691	812
CP 62F	608	360
CP 68A	915	477
CP 61B	1030	330
CP 66C	9594	919
CP 65	7456	519
CP 65B	1152	607
C67A	198	261
C67B	346	495
C67C	1139	678
C67D	1222	680
C67E	1402	249
CP66D	11731	928
C-WA	11731	928
CP66C2	2138	720
CP66C1	915	232
CAP1A	614	710
CCAP1A	1242	1283
CCAP1B	966	1014
C65A12	2202	2227
SDWDBS	2976	72
CP65A	7456	511
C69	217.6	134
EMFGUA	10240	1635
EMFELL	10758	1612

Exhibit 30 – Contributing Watershed



Legend

- | | | | |
|--------|-------------------------|--|--------------------|
| 65B | SUB-BASIN RUNOFF | | SUB-BASIN BOUNDARY |
| 62T63 | ROUTE HYDROGRAPH | | STUDY BOUNDARY |
| CP 68A | COMBINE HYDROGRAPH | | EXISTING WASH |
| CAP1B | OUTFLOW FROM STUDY AREA | | CHANNELS |
| D166 | DIVERSION NODE | | EXISTING BASINS |
| | DIVERSION OUT/IN | | |

Exhibit 31 – Subbasin Drainage Areas (Power Road to Santan Freeway)

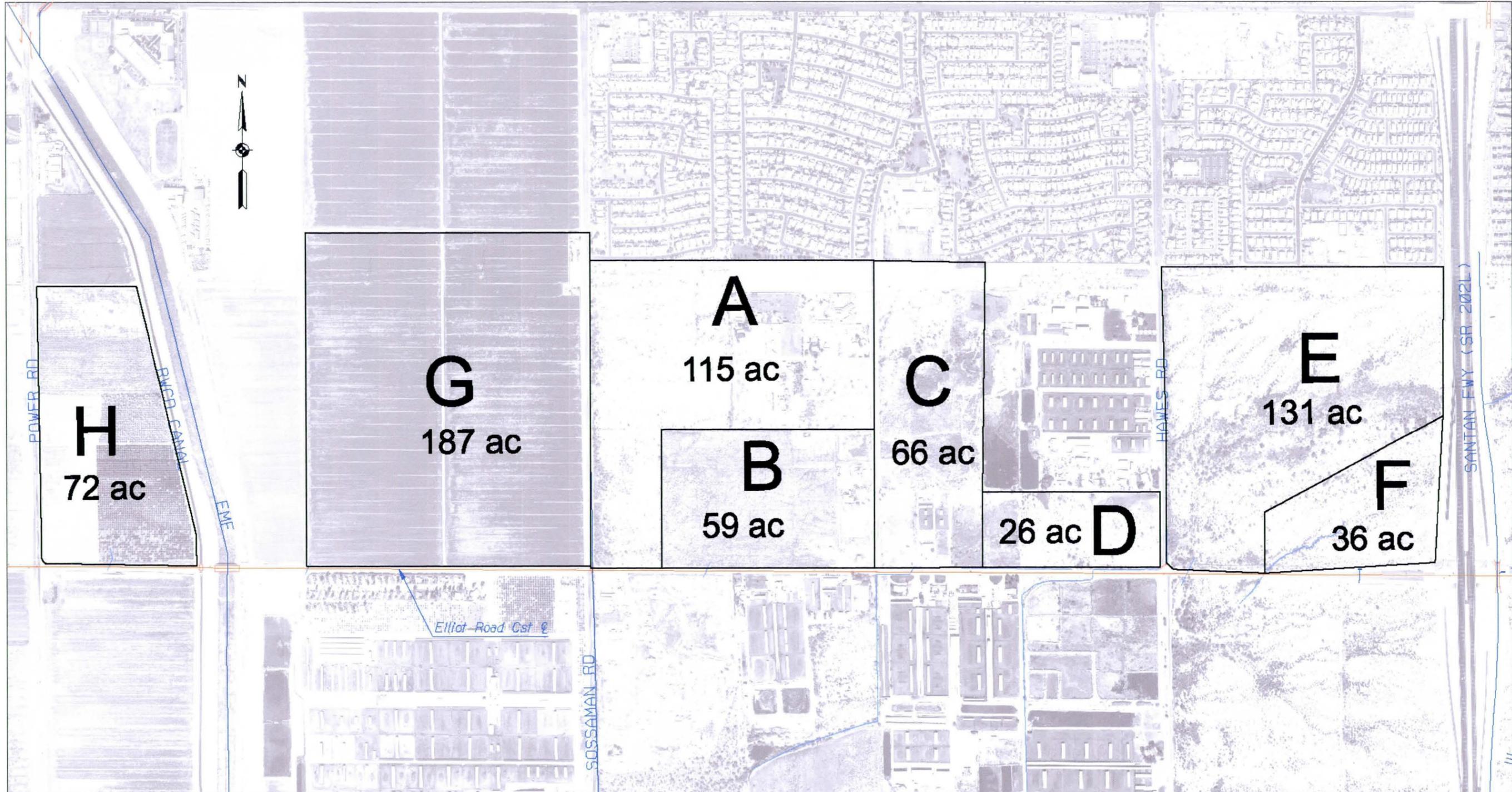


Exhibit 32 – Summary of Calculated Off-Site Peak Flows (Existing Conditions)

Drainage Area ID	Point of Concentration	Inlet?	Unpaved Area (Acre)	Parameters	10yr	25yr	50yr	100yr
A	Culvert	Yes	115	Q (cfs)	45	68	86	105
				C	0.28	0.31	0.34	0.35
				Tc (min)	51.4	46.3	43.2	40.6
				i (in/hr)	1.4	1.9	2.2	2.6
B	Dip	No	59	Q (cfs)	13	19	25	31
				C	0.16	0.18	0.19	0.20
				Tc (min)	52.50	47.20	44.10	41.40
				i (in/hr)	1.4	1.8	2.2	2.6
C	Dip	No	66	Q (cfs)	26	39	52	62
				C	0.28	0.31	0.34	0.35
				Tc (min)	49.4	44.4	41.5	39
				i (in/hr)	1.4	1.9	2.3	2.7
D	Dip	No	26	Q (cfs)	20	27	34	41
				C	0.28	0.31	0.34	0.35
				Tc (min)	19.4	17.8	16.7	15.9
				i (in/hr)	2.7	3.4	3.9	4.5
E	Culvert & Dip	Yes	131	Q (cfs)	55	81	107	128
				C	0.28	0.31	0.34	0.35
				Tc (min)	46.7	42.1	39.4	37
				i (in/hr)	1.5	2.0	2.4	2.8
F	Culvert	Yes	36	Q (cfs)	18	26	33	40
				C	0.28	0.31	0.34	0.35
				Tc (min)	38	34.4	32.2	30.3
				i (in/hr)	1.8	2.3	2.7	3.2
G	Dip	No	187	Q (cfs)	30	47	60	75
				C	0.16	0.18	0.19	0.20
				Tc (min)	74.6	66.6	62	58.1
				i (in/hr)	1.0	1.4	1.7	2.0
H	Dip	No	72	Q (cfs)	10	16	21	26
				C	0.16	0.18	0.19	0.20
				Tc (min)	87.8	78.3	72.6	68.2
				i (in/hr)	0.9	1.2	1.5	1.8

5.5 Cross Drainage Structures Along Elliot Road

Existing cross culvert drainage structures along the Elliot Road Corridor studied in this project were evaluated to accommodate the proposed roadway widening. The cross culverts were analyzed for hydraulic performance under existing conditions and recommendations were made for proposed roadway section conditions.

Existing culvert capacity was determined first for drainage structures along the study corridor. Culverts were modified, if required, by either extending the culvert barrel(s) and/or by replacing culverts with larger barrel(s). If the estimated 50-year flood event discharge was found to be higher than the existing culvert capacity, additional barrels or a larger barrel may be required at that location. If the existing capacity for a culvert was less than the estimated 50-year flood event discharge, the structure was analyzed and sized to convey the estimated 50-year discharge with no overtopping, and convey the 100-year discharge with less than 0.5 feet of existing overtopping. All recommended structures were sized assuming inlet control. One foot of cover at each new culvert location was assumed. The headwater-to-culvert diameter ratio was also checked so that it would not be more than 1.5 at each new culvert location. The Federal Highway Administration (FHWA) Highway Culvert Capacity Charts for inlet controlled reinforced concrete pipes (Chart 1B) and inlet controlled reinforced concrete box culverts (Chart 8B) were used to determine what culvert configuration would meet the conveyance requirements if a new culvert was required. At-grade crossings for the corridor study were also analyzed, and a new culvert configuration was determined if necessary using the same methods. Most storm drains receiving on-site runoff were inventoried, but not analyzed for capacity or recommended improvements. The detention system between Ellsworth Road and Signal Butte Road was inventoried, but not analyzed for recommended improvements since it had been designed in 2004 taking into account the future Siphon Draw drainage improvements and pipes will most likely be relocated.

Exhibits 33, 34, 35, and 36 present the existing drainage inventory for the Elliot Road study area, the results of the capacity analysis for existing cross culverts, and recommended culvert configuration for the proposed Elliot Road improvements. The 100-year flood event discharge information presented in these exhibits for the areas from Power Road to Meridian Road was available in the reports described earlier. The 50-year flood event discharge was calculated as 80 percent of the 100-year flood event discharge, because the 50-year discharge information was not studied in the previous drainage reports.

Exhibit 37 presents the drainage structures recommended for the proposed Elliot Road alignment from Meridian Road to the CAP Canal. Currently, there are no drainage structures in this area. The 50-year and 100-year discharge for the areas draining to the proposed Elliot Road alignment was calculated using the rational method. The FHWA Highway Culvert Capacity Charts for inlet controlled reinforced concrete pipes (Chart 1B) were used to determine the proposed culvert configuration at the necessary locations along the proposed Elliot Road alignment. Pipe slopes were determined from two-foot topographic data and one foot of cover was assumed at each proposed culvert location. Pipes in the area east of Meridian Road were sized using Pinal County drainage requirements.

**Exhibit 33 – Drainage Features from Power Road to the Santan Freeway
(Off-site runoff discharged into the EMF)**

Structure Station	Subbasin ID	Subbasin Area [acres]	Capacity [cfs]	50-Year Design Discharge [cfs]	100-Year Design Discharge [cfs]	Existing Configuration ³	Recommended Configuration ³
106+70 ¹	H	721	N/A	21	26	Dip Crossing	30-in RGRCP
115+31	Irrigation Canal	N/A	Flows are controlled	N/A	N/A	RWCD 30-ft Long Single Span Bridge	Bridge to be widened ⁶
117+72	EMFELL	10,758	5,100 ⁴	1290 ²	1,612 ⁵	EMF 200-ft Long Six Span Bridge	Bridge to be widened ⁶
125+24 ¹	G	187	Unknown	60	75	Dip Crossing	42-in RGRCP
151+76 ¹	A	115	400	86	105	2-10-ft x 4-ft RCBC	Extension only
162+34 ¹	B	59	Unknown	25	31	Dip Crossing	30-in RGRCP
181+37 ¹	C	66	Unknown	52	62	Dip Crossing	42-in RGRCP
198+25 ¹	D	26	Unknown	99	106	Dip Crossing	48-in RGRCP
205+03 ¹	E	131	66 Excess flows cross road at dip crossing at Station 206+96	107	128	2-30-in CMP	54-in RGRCP (meets 50-year and 100-year criteria to convey flow from Subbasin E)
206+96 ¹	E	131	N/A	42	63	Dip Crossing	
214+20 ¹	F	36	36	33	40	36-in CMP	Extension only
223+00	On-Site Detention	N/A	N/A	N/A	N/A	24-in Storm Drain (on-site)	Relocate if necessary

Notes:

- Subbasin areas at these stations were determined from aerial photography (see Exhibit 6). 50-year and 100-year design discharge was calculated using the Rational Method for the calculated subbasin areas.
- 50-year design discharge calculated as 80 percent of 100-year design discharge.
- CMP = Corrugated Metal Pipe; RGRCP = Rubber Gasket Reinforced Concrete Pipe.
- Discharge value is design flow at that location from East Maricopa Floodway Capacity Assessment (FCDMC, 1999).
- Discharge value from HEC-1 model output for Siphon Draw Drainage Improvements Concept Letter Report (FCDMC, 2006) and the Siphon Draw Drainage Improvements Project Pre-Design Report (FCDMC, 2008). See Exhibits 3 and 4.
- If another pier is added to the bridge in the proposed improvements, more hydraulic analysis on the bridge will need to be conducted to ensure that any change in the floodplain water surface elevation is insignificant.

**Exhibit 34 – Drainage Features from the Santan Freeway to Ellsworth Road
(Off-site runoff discharged into the Santan Freeway Channel)**

Structure Station	Subbasin ID	Subbasin Area [acres]	Capacity [cfs]	50-Year Design Discharge ¹ [cfs]	100-Year Design Discharge [cfs]	Existing Configuration ³	Recommended Configuration
235+80	CP68A	915	1,468	382	477 ³	3-8-ft x 7-ft 221-ft CBC	Extension only
235+91 to 238+38	68A	224	140	556	695 ³	2-36-in x 252-ft Storm Drain (Excess off-site flow from 68A sheet flows to Santan Freeway Channel)	Relocate if necessary
235+93 to 256+41	Pavement Drainage	N/A	N/A	N/A	N/A	24-in Storm Drain	Undetermined
243+81	Pavement Drainage	N/A	N/A	N/A	N/A	18-in x 34-ft Storm Drain	Undetermined
243+85	Pavement Drainage	N/A	N/A	N/A	N/A	18-in x 61-ft Storm Drain	Undetermined
248+62	Pavement Drainage	N/A	N/A	N/A	N/A	18-in x 35-ft Storm Drain	Undetermined
248+64	Pavement Drainage	N/A	N/A	N/A	N/A	18-in x 60-ft Storm Drain	Undetermined
256+41	Pavement Drainage	N/A	N/A	N/A	N/A	18-in x 38-ft Storm Drain	Undetermined
256+42	Pavement Drainage	N/A	N/A	N/A	N/A	18-in x 66-ft Storm Drain	Undetermined
257+74	Pavement Drainage	N/A	N/A	N/A	N/A	30-in x 181-ft Storm Drain	Undetermined
257+74 to 258+73	Pavement Drainage	N/A	N/A	N/A	N/A	30-in x 94-ft Storm Drain	Undetermined
260+31 Rt 55ft	Pavement Drainage	N/A	N/A	N/A	N/A	18-in x 20-ft Storm Drain	Undetermined
260+31 Lt 48ft	Pavement Drainage	N/A	N/A	N/A	N/A	18-in x 102-ft Storm Drain	Undetermined
263+85 Lt 49ft	Pavement Drainage	N/A	N/A	N/A	N/A	18-in x 102-ft Storm Drain	Undetermined
263+85 Rt 52ft	Pavement Drainage	N/A	N/A	N/A	N/A	18-in x 19-ft Storm Drain	Undetermined

Notes:

- 50-year design discharge calculated as 80 percent of 100-year design discharge.
- CBC = Concrete Box Culvert.
- Design flow obtained from Final Drainage Report Santan Freeway (ADOT, 2003).

Exhibit 35 – Drainage Features from Ellsworth Road to Signal Butte Road

Structure Station	Subbasin ID	Subbasin Area [acres]	Capacity [cfs]	50-Year Design Discharge ¹ [cfs]	100-Year Design Discharge [cfs]	Existing Configuration ²
258+71	66D	198.4	350	521	651	90-in x 299-ft Storm Drain
296+74	Basin WB	N/A	28	N/A	N/A	18-in x 170-ft RGRCP
305+23	Basin WA	N/A	22	N/A	N/A	18-in x 185-ft RGRCP
309+21	Crismon Rd. Bypass CP66C	9,594	410	735	919	90-in x 760-ft RGRCP
312+93	65B	877	250	1242	1552	Dip Crossing 2-48-in x 52-ft
314+26	65B	877	37	1242	1552	30-in x 130-ft RGRCP
317+68	65B	877	250	1242	1552	Dip Crossing 3-42-in x 46-ft
319+62	65B	877	37	1242	1552	30-in x 130-ft RGRCP
323+40	65B	877	244	1242	1552	60-in RGRCP
324+83	Basin EA	N/A	10	N/A	N/A	18-in x 254-ft HDPE
338+05	65B	877	30	1242	1552	24-in RGRCP

Notes:

¹ 50-year design discharge calculated as 80 percent of 100-year design discharge.

² RGRCP = Rubber Gasket Reinforced Concrete Box Culvert; HDPE = High Density Polyethylene

Exhibit 36 – Drainage Features from Signal Butte Road to Meridian Road (Pavement Drainage Only)

Structure Station	Subbasin ID	Existing Configuration
390+29	Private Detention	8-in x 110-ft Bleed-off Storm Drain
390+29 Rt 22ft to 379+51 Rt 43ft	Drainage Subdivision	24-in Storm Drain
390+61 Lt 47ft	Pavement Drainage	24-in x 40-ft Storm Drain

Note:

Information obtained from Residential Dev. Infrastructure Plans (Nora Vista, 2006; Mountain Ranch, 2000; Meridian Point, 1999)

Exhibit 37 – Proposed Drainage Features from Meridian Road to the CAP Canal

Structure Station	Subbasin Area [acres]	50-Year Design Discharge [cfs]	100-Year Design Discharge [cfs]	Proposed Configuration	Ditches 3:1 side slopes, 2 ft deep [approximate stations]
430+50	2	4	5	1-18-in RGRCP	440+00 to culvert
455+00	18	32	39	1-30-in RGRCP	463+00 to culvert
464+00	4	10	12	1-18-in RGRCP	473+00 to culvert
473+00	3	8	9	1-18-in RGRCP	478+00 to culvert
481+70	8	124	155	2-42-in RGRCP	488+00 to culvert
490+00	90	59	72	1-42-in RGRCP	494+00 to culvert
495+00	11	19	24	1-24-in RGRCP	none
502+10	46	85	103	1-48-in RGRCP	514+00 to culvert
516+40	4	9	11	1-18-in RGRCP	none
518+70	17	35	43	1-30-in RGRCP	534+00 to culvert

5.6 Pavement Drainage Systems

The proposed six-lane roadway typical cross-sections include curb and gutter. In order to drain the roadway pavement, each developer will be required to provide storage on their property for the on-site requirements as well as the half-street drainage. A drainage system using curb and gutter, catch basins, and storm pipe may be considered to collect and convey pavement drainage to an on-site storage location.

5.7 Drainage Analysis Conclusions and Recommendations

Existing structures should be maintained where appropriate during the design and construction phases of Elliot Road improvements. Existing cross culverts with sufficient capacity to convey the 50-year flood event discharge should remain and be extended to the limits of the improved roadway. If existing cross culverts do not have sufficient capacity to convey the 50-year flood event discharge, culverts should be replaced with larger barrels, or additional barrels should be placed in that location. Off-site drainage criteria are per Maricopa County standards in Maricopa County, and per Pinal County standards in Pinal County. New cross culverts are recommended along the proposed Elliot Road alignment east of Meridian Road.

Pavement drainage systems will be required to drain runoff from Elliot Road. Developers of property along Elliot Road will be required to accommodate the half-street drainage along the frontage of the property per the applicable jurisdictional standards. Storage for the half-street drainage should be provided by developers on the frontage property.

Several other constraints should be considered during the design phase. They include the following.

- If the bridge at Elliot Road and the EMF is widened, floodplain encroachment at that location is possible. A floodplain use permit and right-of-way permit may be required from the FCDMC to construct the bridge improvements. Drainage for the improved decks should be collected via a storm drain system and treated for water quality. Deck drains are not recommended due to the water quality problems that could arise from directly discharging into the EMF;
- Elliot Road improvements should be designed to minimally impact the Elliot Road detention basin system. According to the *Elliot Road Detention Basins and Outfall Channel, Phase 1* design plans, the storm drain

system that parallels Elliot Road to the south lies outside of the future right-of-way. The location of the storm drain system should be verified during the design phase. This storm drain is made of cast-in-place concrete pipe and is not traffic rated. Additional right-of-way or drainage easements should be obtained if necessary;

- The 90-in. storm drain at the northeast corner of Elliot and Ellsworth Road is not anticipated to be impacted by future improvements to Elliot Road but its existence should be noted in case plans for future improvements change. Additional right-of-way or drainage easements should be obtained if necessary; and
- Floodplain encroachment into Siphon Draw Wash is possible if Elliot Road is extended to the CAP Canal in the area east of Meridian Road. A detailed floodway delineation may be necessary where encroachment occurs.

6. UTILITIES SUMMARY

This section provides an overview of utilities and utility owners within the study area that may impact or be impacted by future improvements. Additional information is available in Technical Memorandum No. 6 – Utilities Overview.

6.1 Utility Owners

Through field research and Blue Stake reporting, the companies and agencies shown in **Exhibit 38** were identified as having utilities along or crossing the Elliot Road Corridor.

Exhibit 38 – Utility Companies with Utility Lines in Elliot Road Corridor

Company	Facility
Qwest Communications	Telecommunications
WAPA	Power
SRP	Power
Cox Communications	Telecommunications
Southwest Gas	Gas
City of Mesa	Water, Sewer
RWCD	Irrigation (Roosevelt Canal)
CAWUD	Irrigation (CAP Canal)

Utility lines along the corridor exist within easements that alternate inside and outside of the roadway right-of-way. The City of Mesa and SRP have plans to expand their facilities in the near future. These existing and planned utility lines were described in more detail previously in Section 2 of this document.

6.2 Constraints and Recommendations

The feasibility and cost of utility relocations are always relevant factors that influence the selection of improvement alternatives for a roadway project. Within the study limits, Elliot Road is paralleled primarily by power, telecommunications and gas utility lines. Avoidance or relocation of utility line segments may be alternatively required along the corridor, depending on factors that include, but are not limited to, right-of-way availability, access for maintenance, connectivity, setbacks and clearances.

Based on the utility features identified, the following represent potential constraints that should be accounted for when considering future improvement alternatives:

- RWCD canal radial gates, well site, and lateral ditch located just south of the existing bridge that crosses the Roosevelt Canal and the EMF;
- WAPA overhead 230kV power line tower situated just north of the edge of the existing roadway right-of-way;
- Overhead 12kV power lines along many segments of the roadway just outside the existing roadway right-of-way; and
- Proposed 69kV power lines along the north side of Elliot Road between Mountain Road and Signal Butte Road and along Signal Butte Road across Elliot Road.

Close coordination with cities, developers, and utility companies is important during the development process. Utility infrastructure improvements installed in advance of roadway improvements need to be designed for compatibility with the ultimate future Elliot Road improvements to minimize future reconstruction costs.

Although identification of prior rights is not in the scope of this study, it should be noted that design and construction of utility lines with verified prior rights would need to be funded by roadway improvement projects if relocations are required.

7. ALTERNATIVES DEVELOPMENT AND EVALUATION

This section documents the evaluation of improvement alternatives considered for the Elliot Road Corridor Improvement Study. The development and evaluation of alternatives were based upon information collected and documented in other Technical Memoranda, jurisdiction design guidelines and criteria, input received from the Elliot Road TAC and SAC, and input received during public open houses. The alternatives evaluation was conducted to the extent necessary to provide a meaningful comparative analysis of feasible improvement alternatives, leading to the selection of a preferred alternative. The preferred alternative has been refined further as described in Section 8 of this document. Additional information on the alternatives evaluation is available in Technical Memorandum No. 7 – Corridor Alternatives and Evaluation.

7.1 Lead-up to Development of Candidate Alternatives

Based upon data collected and input received previously in this study from the TAC, SAC, and public, it was determined that Elliot Road should be planned as a future six-lane principal arterial throughout the corridor study area, which extends from Power Road to the CAP Canal. As proposed early on in the study and agreed upon by the TAC and SAC, the cross-section for Elliot Road should match the City of Mesa standard principal arterial cross-section (see Exhibit 39) between Power Road and Meridian Road and the City of Apache Junction standard principal arterial cross-section (see Exhibit 40) between Meridian Road and the CAP Canal.

Various conceptual improvement alternative alignments for Elliot Road were considered and evaluated for feasibility. Taking into account the existing roadway alignment (between Power Road and Meridian Road), the existence of the Loop 202/Elliot Road interchange, the location of existing and proposed developments, and input received from the TAC, SAC, and public, it was determined that significant shifts in the alignment of Elliot Road were not feasible or necessary. Minor alignment shifts were considered to be feasible improvement alternative candidates and as such were subjected to a more detailed evaluation.

Exhibit 39 – Typical Roadway Cross-Section: Power Road to Meridian Road

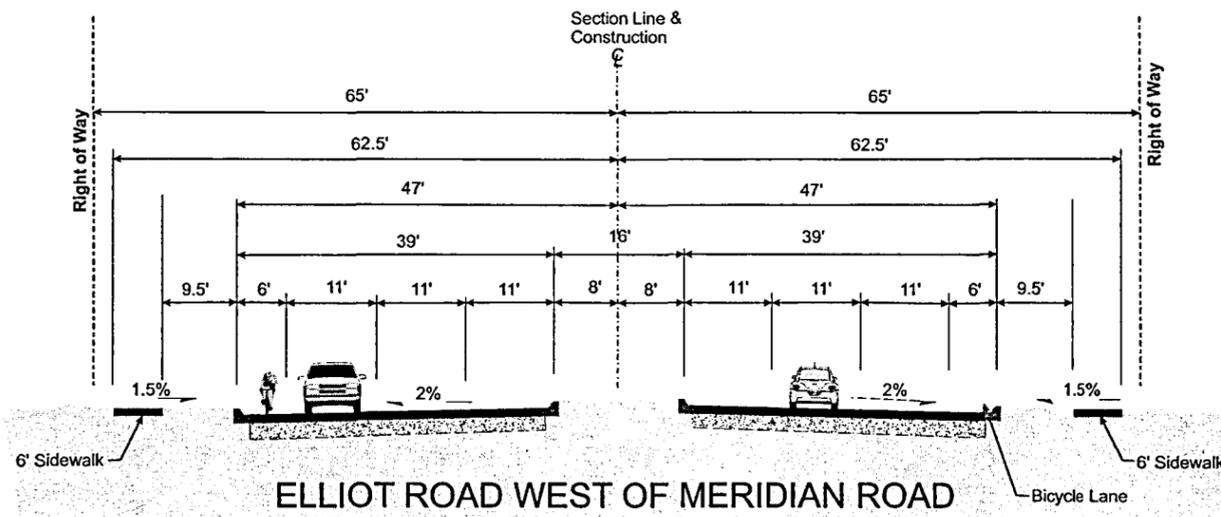
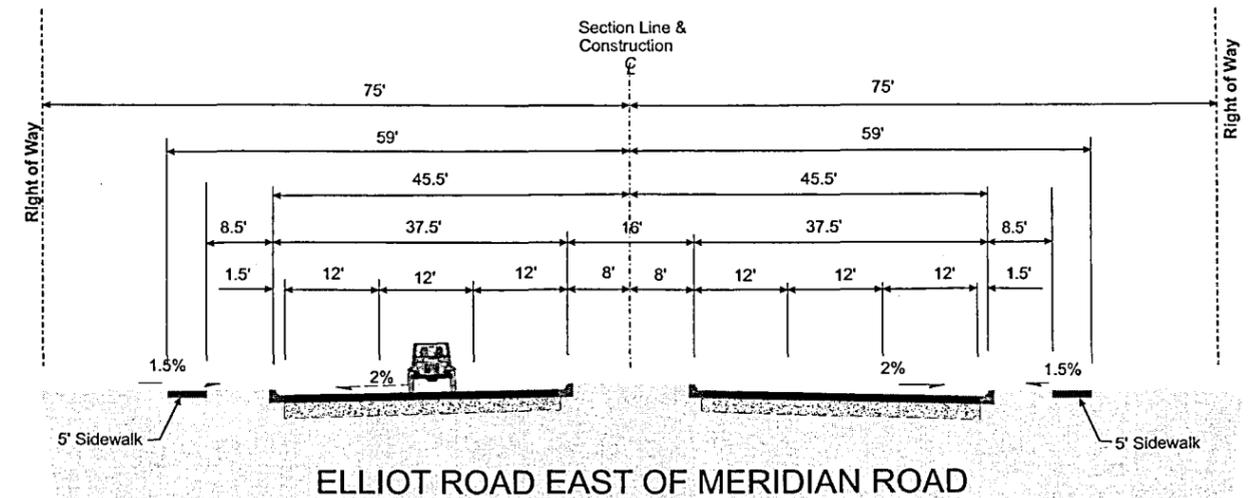


Exhibit 40 – Typical Roadway Cross-Section: Meridian Road to CAP Canal



7.2 Existing Right-of-way Conditions

Existing right-of-way between Power Road and Meridian Road does not consistently accommodate the 130-foot typical right-of-way requirement for the desired six-lane principal arterial cross-section. Existing right-of-way conditions can generally be characterized as follows:

- *Power Road to Loop 202* – The existing right-of-way through this segment is primarily 33 feet on either side of the section line (which typically has the same alignment as the centerline of Elliot Road) for a total of 66 feet;
- *Loop 202 to Mountain Road* – The existing right-of-way through this segment is primarily 40 feet north of the section line and 65 feet south of the section line for a total of 105 feet; and
- *Mountain Road to Meridian Road* – The existing right-of-way through this segment is 65 feet north of the section line and 65 feet south of the section line for a total of 130 feet.

Between Meridian Road and the CAP Canal, no existing roadway exists along the Elliot Road alignment. New right-of-way will be required to accommodate the new six-lane principal arterial. The recommended cross-section for Elliot Road between Meridian Road and the CAP Canal requires 150 feet of right-of-way.

7.3 Candidate Alignment Alternatives

Three candidate alignment alternatives were evaluated for the existing segment of Elliot Road between Power Road and Meridian Road:

- *Alternative A: Symmetrical right-of-way acquisition* – This alternative places the right-of-way centerline for the new typical cross-section on the existing roadway centerline (which aligns with the section line). New right-of-way acquisition would be required on both the north side and south side of Elliot Road for this alternative;
- *Alternative B: North-side right-of-way acquisition* – This alternative places the south-side right-of-way line for the new typical cross-section on the existing south-side right-of-way line. All new right-of-way acquisition would be limited to the north side of Elliot Road for this alternative; and

- Alternative C: South-side right-of-way acquisition – This alternative places the north-side right-of-way line for the new typical cross-section on the existing north-side right-of-way line. All new right-of-way acquisition would be limited to the south side of Elliot Road for this alternative.

For each alternative, the amount of required new right-of-way was determined. No new right-of-way was assumed to be needed for the existing segments of Elliot Road that are already built in accordance with the recommended principal arterial cross-section (e.g., between Mountain Road and Meridian Road).

7.4 Reverse Curve Alternatives

If Elliot Road is constructed so as to be centered on the existing section lines, there would be an offset in Elliot Road at Meridian Road of more than 300 feet because the section lines do not line up across the Maricopa/Pinal county border. A reverse curve on Elliot Road connecting the two section line alignments just east of Meridian Road was proposed – and accepted by stakeholders – as an appropriate solution to avoid creating an offset in Elliot Road at Meridian Road.

Two reverse curve alternatives were evaluated for the proposed segment of Elliot Road with a reverse curve east of Meridian Road:

- 10,000-foot radius reverse curve – This alternative provides a 10,000-foot radius reverse curve and would allow for the use of a normal crown roadway cross-section through the curves (per *A Policy on Geometric Design of Highways and Streets*, AASHTO, 2004); and
- 2,000-foot radius reverse curve – This alternative provides a 2,000-foot radius reverse curve and would require superelevating the roadway cross-section by approximately 3.5 percent through the curves (per *A Policy on Geometric Design of Highways and Streets*).

7.5 Evaluation of Candidate Alignment Alternatives

The previously described Symmetrical, North-side, and South-side right-of-way acquisition alignment alternatives were evaluated using the following criteria:

- Number of affected parcels;
- Total additional right-of-way required (measured in square feet/acres of new right-of-way);
- Estimated right-of-way acquisition cost (measured in millions of dollars based on a unit cost of \$12 per square foot);
- Number of buildings/structures affected;
- Constructability issues (measured using a qualitative scale of minimal, modest, or significant impact/issues);
- Environmental issues (measured using a qualitative scale of minimal, modest, or significant impact/issues);
- Potential conflicts with existing utilities (measured using a qualitative scale of minimal, modest, or significant impact/issues); and
- Public acceptability (measured using a qualitative scale of minimal, modest, or significant impact/issues).

A preliminary evaluation matrix was developed that summarized the evaluation criteria and the findings of the evaluation for each of the three candidate alignment alternatives. The three alternatives and the preliminary matrix were then presented to the TAC and SAC at a joint meeting held November 29, 2007, and at a public informational open house conducted on January 14, 2008. Exhibit 41 shows the alignment alternatives evaluation matrix.

Exhibit 41 – Alignment Alternatives Evaluation Matrix

Right-of-Way Acquisition Alternative	Affected Parcels	Additional Right-of-Way Required (sf/acre)	Estimated Right-of-Way Cost (\$ Millions)	Buildings/Structures Affected	Constructability Issues	Environmental Issues	Potential Utility Conflicts	Public Acceptability
Alternative A: Widen Symmetrically	89	3,390,400/ 77.9	\$46.1M	27	●	○	●	○
Alternative B: Widen to North	81	3,397,560/ 78.0	\$42.8M	10	●	○	●	●
Alternative C: Widen to South	65	3,430,800/ 78.8	\$47.2M	30	●	○	●	●

○ Minimal Impact/Issues ● Modest Impact/Issues ● Significant Impact/Issues

The Symmetrical alternative affects more parcels than the other alternatives, but the overall right-of-way impact is less, as evidenced by the fact that this alternative requires less right-of-way area than the North-side and South-side alternatives. The estimated right-of-way cost is highest for the South-side alternative because more buildings (mostly mobile homes) and shade structures will be impacted by the South-side alternative than the other alternatives. All three alternatives are anticipated to have a similar amount of constructability issues related to traffic control and maintenance of through traffic during construction. Minimal environmental issues are anticipated with all three alternatives. Utility relocations of the irrigation gate structure at the Roosevelt Canal, storm drainage inlet structure west of Signal Butte Road, and overhead power lines at multiple locations are expected to be required with all three alternatives. The South-side alternative would also likely require the relocation of the large storm drain pipe on the south side of Elliot Road between the aforementioned storm drainage inlet structure and Ellsworth Road.

Input received on the alternatives from TAC/SAC members and the public was generally in favor of the Symmetrical alignment alternative (Alternative A) because it results in more equitable right-of-way takings from property owners on both sides of Elliot Road rather than taking large amounts of right-of-way from property owners on one side of Elliot Road and no right-of-way from property owners on the other side of Elliot Road. In addition, significant portions of Elliot Road have already been constructed with the recommended principal arterial cross-section centered on the section line (which aligns with the Symmetrical alignment alternative), including the eastbound side of Elliot Road from Loop 202 to Ellsworth Road and from Signal Butte Road to Meridian Road.

7.6 Evaluation of Reverse Curve Alternatives

The two previously described reverse curve alternatives were presented to the TAC and SAC at a joint meeting held November 29, 2007, and at a public informational open house conducted on January 14, 2008. Input received on the reverse curve alternatives from TAC/SAC members and the public was generally in favor of the 10,000-foot radius reverse curve because it would not require superelevation, would avoid crossing a drainage

wash that the 2,000-foot radius reverse curve would cross, and would match better with the planned Lost Dutchman Heights development roadway network and the Siphon Draw Wash drainage basin.

7.7 Preferred Alignment Alternative

Based on a review of the evaluation matrix and input received from the TAC, SAC, and public, along with the recognition that existing development has already set the Elliot Road alignment about the section line at several locations along the corridor, the Symmetrical alignment alternative (Alternative A) is recommended as the preferred alternative for Elliot Road between Power Road and Meridian Road. The preferred alignment alternative is shown in **Exhibit 42a** and **Exhibit 42b**.

While the Symmetrical alternative affects more parcels than the other alternatives, the overall right-of-way impact is less and results in more equitable right-of-way takings from property owners on both sides of Elliot Road rather than taking large amounts of right-of-way from property owners on one side and no right-of-way from property owners on the other side.

The Symmetrical alternative will eliminate the need to relocate the large storm drain pipe on the south side of Elliot Road between the aforementioned storm drainage inlet structure and Ellsworth Road that would likely be required if the South-side alternative were implemented.

Input received on the alignment alternatives from TAC/SAC members and the public was generally in favor of the Symmetrical alignment alternative (Alternative A) because of the aforementioned balanced right-of-way impacts and the fact that significant portions of Elliot Road have already been constructed with the recommended principal arterial cross-section centered on the section line (which aligns with the Symmetrical alignment alternative).

7.8 Preferred Reverse Curve Alternative

Based on input received from the TAC, SAC, and public, the 10,000-foot radius reverse curve alternative is recommended as the preferred alternative for avoiding an offset in Elliot Road between Meridian Road and the CAP Canal. The preferred reverse curve alternative is shown in the previously referenced **Exhibit 42a** and **Exhibit 42b**.

Input received on the reverse curve alternatives from TAC/SAC members and the public was generally in favor of the 10,000-foot radius reverse curve because it will eliminate the need for superelevation and avoid crossing a drainage wash that would likely have to be crossed if the 2,000-foot radius reverse curve alternative were implemented. In addition, the 10,000-foot radius reverse curve will match with the planned Lost Dutchman Heights development roadway network and the Siphon Draw Wash drainage basin.

Exhibit 42a – Preferred Alternative: Symmetrical Right-of-Way Acquisition

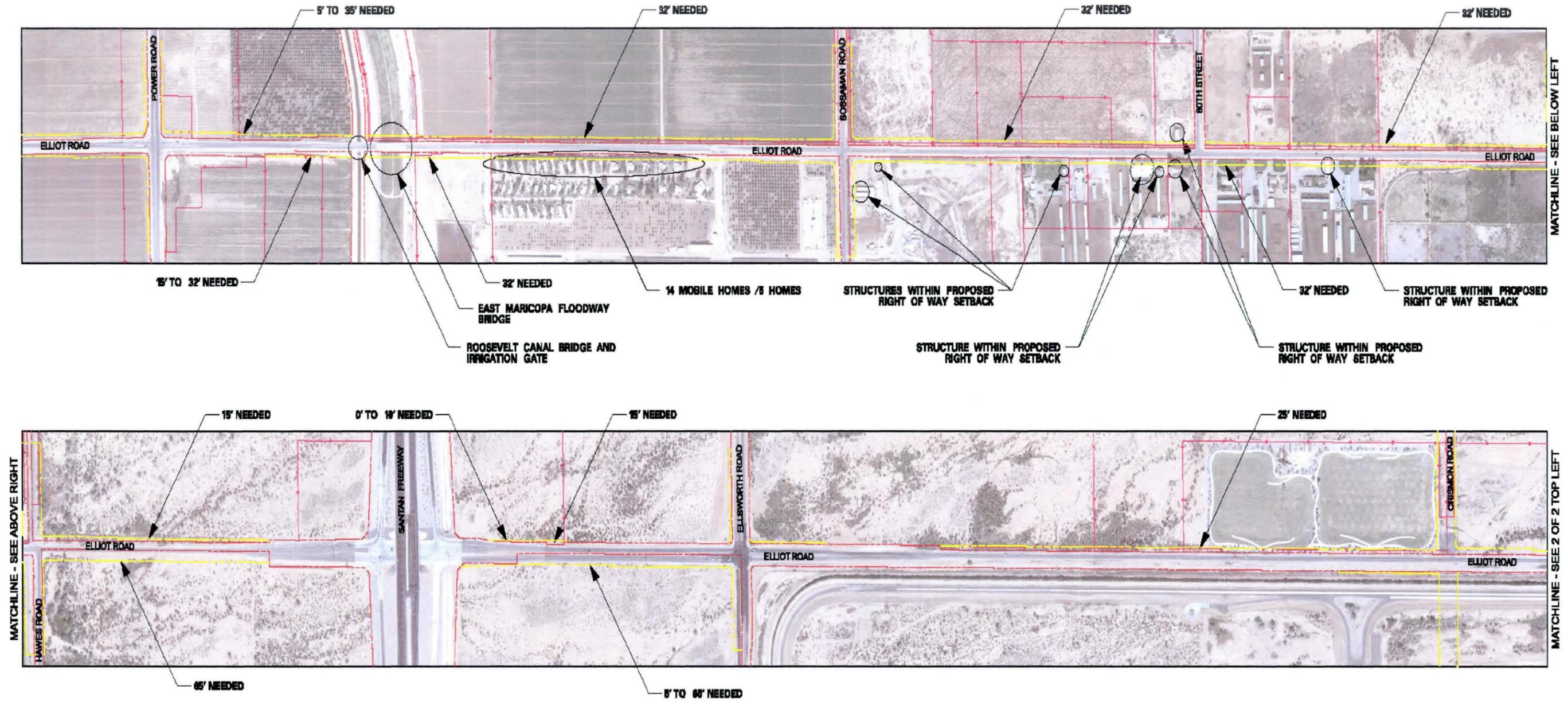
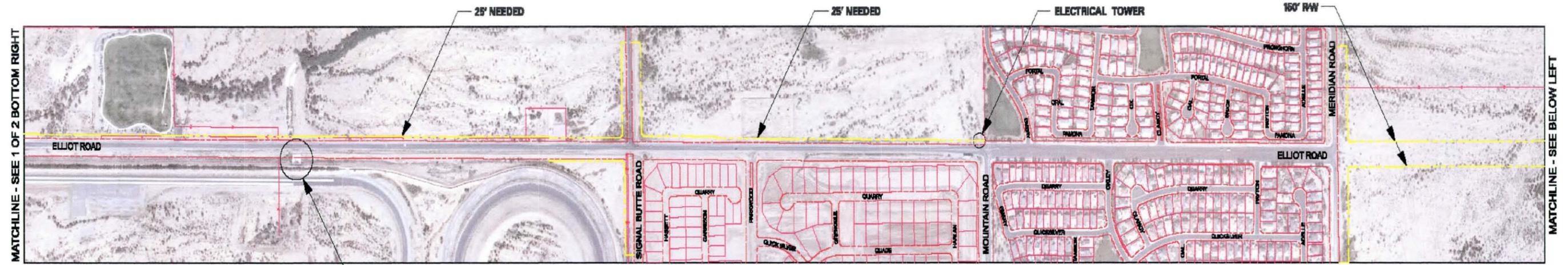
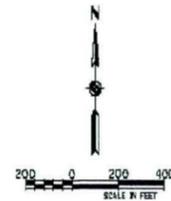
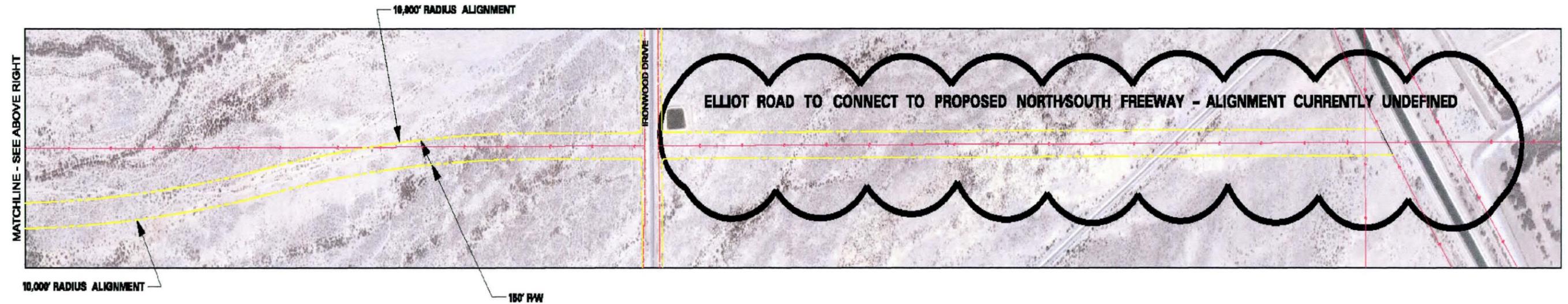


Exhibit 42b – Preferred Alternative: Symmetrical Right-of-Way Acquisition



DRAINAGE STRUCTURE



LEGEND

- EXISTING RIGHT-OF-WAY
- EXISTING PARCEL LINE
- PROPOSED RIGHT-OF-WAY

8. MAJOR DESIGN FEATURES FOR THE PREFERRED ALTERNATIVE

This section establishes the design criteria and access management guidelines recommended for use in the implementation of the preferred alternative recommended in Section 7 of this document. The establishment of design criteria will allow the Elliot Road corridor to be improved in a manner that is consistent with the vision and goals developed and accepted by the stakeholders of the Elliot Road corridor study. Additional information on the major design features and access management guidelines is available in Technical Memorandum No. 8 – Major Design Features and Access Management Guidelines. It should be noted that individual jurisdictions are ultimately responsible for defining and implementing improvements within their respective jurisdictions.

8.1 Review of Preferred Alternative

As discussed in Section 7 of this document, the analysis of alternatives resulted in the following recommendations for the preferred alternative:

- The recommended cross-section for Elliot Road between Power Road and Meridian Road is a six-lane arterial on 130 feet of right-of-way. This cross-section, shown previously in **Exhibit 39**, is consistent with the *2008 City of Mesa Standard Detail No. M-19.1* for an arterial street with a face-of-curb to face-of-curb width of 94 feet. Symmetrical acquisition of right-of-way was selected as the preferred alternative for areas where new right-of-way is required; and
- The recommended cross-section for Elliot Road between Meridian Road and the CAP Canal is a six-lane arterial constructed on 150 feet of right-of-way. This typical cross-section, shown previously in **Exhibit 40**, is consistent with the *2006 City of Apache Junction Standard Detail No. AJ-20.4* for a principal arterial street with a back-of-curb to back-of-curb width of 92 feet. The recommended alignment of this new segment of roadway is to be centered on the offset Maricopa County and Pinal County section lines, with a 10,000-foot radius reverse curve connecting the offset section lines east of Meridian Road.

The transition from one cross-section to the other should occur at least 500' east of the Elliot Road/Meridian Road intersection. The new east leg of the Elliot Road/Meridian Road intersection should then be built to match the west leg of the intersection, which is already built per the recommended cross-section for Elliot Road west of Meridian Road.

At arterial-arterial intersections under the jurisdiction of the City of Mesa, an additional ten feet of right-of-way is required on the inbound approaches to accommodate a right-turn lane per the *2008 City of Mesa Standard Detail No. M-46.3*.

8.2 Recommended Design Criteria

Exhibit 43 documents design criteria that were used in the detailed development of the preferred alternative. Based on discussions with the TAC and SAC, and the anticipated eventual annexation of Elliot Road into the City of Mesa west of Meridian Road and into the City of Apache Junction east of Meridian Road, it is recommended that any roadway improvements proposed for Elliot Road conform to City of Mesa standards west of Meridian Road and to City of Apache Junction standards east of Meridian Road. Off-site drainage improvements should conform to FCDMC standards in Maricopa County (west of Meridian Road) and to PCFCD standards in Pinal County (east of Meridian Road). Any design criteria not addressed by the aforementioned standards should conform to the design criteria presented in Maricopa County's *Roadway Design Manual*. The design criteria utilized in the Elliot Road corridor study are drawn from the following references:

- City of Apache Junction, *Engineering Design Guidelines*, 2006 (AJEDG);
- City of Apache Junction, *Standard Details*, 2006 (AJSD);

- City of Mesa, *Standard Details and Specifications*, 2008 (MSDS);
- City of Mesa, *Engineering & Design Standards*, 2007 (MEDS);
- City of Mesa, *Transportation Plan*, 2002 (MTP);
- Maricopa County Department of Transportation, *Roadway Design Manual*, 2004 (MCRDM);
- Flood Control District of Maricopa County, *Drainage Policies and Standards for Maricopa County*, 2007 (DPSMC); and
- Pinal County Flood Control District, *Drainage Manual*, 2004 (PCDM).

Exhibit 43 – Recommended Design Criteria

Design Criteria	Elliot Road – Power Road to Meridian Road	Source	Elliot Road – Meridian Road to CAP Canal	Source
Design Year	2030	MCRDM, Ch. 2	2030	MCRDM, Ch. 2
Design Vehicle	WB-50	MCRDM, Ch. 4	WB-50	MCRDM, Ch. 4
Design Speed	50 mph	MEDS, Ch. 2	55 mph	AJEDG, Ch. 3
Standard Typical Section	see Exhibit 39	MSDS M-19.1 MSDS M-46.3	see Exhibit 40	AJSD AJ-20.4
Maximum Vertical Gradient	5%	MCRDM, Ch. 5	6%	MCRDM, Ch. 5
Maximum Curvature	Minimum radius of 930'	MCRDM, Ch. 5	Minimum radius of 1190'	MCRDM, Ch. 5
Maximum Superelevation	4%	MEDS, Ch. 2	4%	MCRDM, Ch. 5
Minimum Lateral Clearances	1.5' (with curb)	MCRDM, Ch. 5	1.5' (with curb)	MCRDM, Ch. 5
Minimum Left-Turn Storage Lengths	250	MSDS M-46.3	200	AJEDG, Ch. 3
Minimum Right-Turn Storage Lengths	250	MSDS M-46.3	150	AJEDG, Ch. 3
Minimum Median Opening Spacing	1/6 mile – full access 1/8 mile – partial access from signalized int.	MEDS, Ch. 2	1/6 mile – full access 1/8 mile – partial access from signalized int.	AJEDG, Ch. 3
Minimum Driveway Spacing	100' from intersection 60' from other driveways	MEDS, Ch. 2	100' from arterial int. 50' from non-arterial int.	AJEDG, Ch. 3
Minimum Intersection Level of Service (LOS)	LOS D	MTP, Ch. 4	LOS D	MCRDM, Ch. 2
On-Site Drainage	10-year event	MEDS, Ch. 8	10-year event	AJEDG, Ch. 4
Off-Site Drainage	50-year event w/ no overtopping	DPSMC, Ch. 6	50-year event w/ no overtopping	PCDM, Ch. 3

8.3 Proposed Roadway and Traffic Signal Improvements

8.3.1 Near-Term Improvement Recommendations

Based on the traffic analysis results and the projected development patterns, the following improvements are anticipated to be needed in the near-term (by 2015), although the timing of many of these improvements will be dependent on what, where, and when development occurs:

- The Sossaman Road/Elliot Road intersection will likely need to be signalized by 2015. In the short-term, this could be a two-phase signal with one left-turn lane, two through lanes, and one right-turn lane on each approach;
- The Hawes Road/Elliot Road intersection will likely need to be signalized by 2015. In the short-term, this could be a two-phase signal with one left-turn lane, two through lanes, and one right-turn lane on each approach;
- Elliot Road (and its associated cross-streets) will likely need to be widened to the full six-lane cross-section between Loop 202 and Meridian Road by 2015; and
- According to the MAG model, by 2015 Elliot Road is expected to be extended east of Meridian Road to Ironwood Road and perhaps beyond, depending on the to-be-determined North-South freeway alignment. While only a four-lane road is likely needed initially from a capacity standpoint, a six-lane road should be built so the road does not have to be rebuilt later. The existing waterline easement that the City of Mesa has identified will likely need to be modified to run parallel to, and on the north side of, the reverse curve alignment recommended previously in this document.

Exhibit 44 shows what the intersection geometry will look like in 2015 if all of the near-term improvements are implemented.

8.3.2 Mid-Term Improvement Recommendations

Based on the development patterns projected by MAG, the following improvement is anticipated to occur in the mid-term (2015-2025), although the timing of this improvement will be dependent on what, where, and when development occurs:

- The Crismon Road/Elliot Road intersection will likely be constructed during this time period.

While the Crismon Road/Elliot Road intersection is assumed to be a principal arterial-principal arterial intersection in this study based on available adopted agency plans, preliminary plans from DMB, the developer of the Mesa Proving Grounds, indicate that Crismon Road may be a collector rather than a principal arterial south of Elliot Road, with only two through lanes northbound and southbound through the intersection. The DMB preliminary plans also indicate Crismon Road may be constructed prior to 2015.

While not an improvement directly on Elliot Road, the MAG model projects that the gaps that currently exist in Meridian Road will be filled during the mid-term timeframe, resulting in a continuous arterial with freeway access through a future interchange with US 60. These improvements are anticipated to significantly alter traffic volumes on Meridian Road and some of the adjacent parallel arterials, such as Ironwood Road, as well as on Elliot Road between Ellsworth Road and Ironwood Road. It is during this timeframe when the Meridian Road/Elliot Road intersection is expected to be striped and operated as a full principal arterial-principal arterial intersection, although the actual pavement width at the intersection is expected to be constructed as part of the aforementioned near-term extension of Elliot Road east of Meridian Road to Ironwood Road. As has previously been mentioned, the new east leg of the Meridian Road/Elliot Road intersection should be built to align with the existing west leg of the intersection. When the north and south legs are improved, they should be built to City of Mesa standards on the west side

(southbound direction) of Meridian Road and to City of Apache Junction standards on the east side (northbound direction) of Meridian Road. Using City of Apache Junction standards on the east side of Meridian Road will result in acquiring 75' of right-of-way to the east of the section line. Recognizing that FCDMC had assumed only 65' of right-of-way east of the section line would ultimately be needed for Meridian Road, it should be noted that acquiring 75' of right-of-way could impact the Siphon Draw detention basins currently under design. Coordination with FCDMC is recommended to determine if the proposed 75' right-of-way taking will significantly impact the Siphon Draw basins.

8.3.3 Long-Term Improvement Recommendations

Based on the traffic analysis results and the projected development patterns, the following improvement is anticipated to occur in the long-term (beyond 2025), although the timing of this improvement will be dependent on what, where, and when development occurs:

- Elliot Road (and its associated cross-streets) will likely be widened to the full six-lane cross-section between Power Road and Loop 202. The only exception to the six-lane cross-section is the cross-street of Sossaman Road, which is classified as a four-lane arterial in the City of Mesa's *Transportation Plan*.

8.3.4 Sensitivity Analysis Recommendations

As was mentioned previously, if traffic volumes in 2030 are similar to those assumed for the 2030 Sensitivity scenario instead of the 2030 with Improvements scenario, much of the Elliot Road corridor will still function relatively well with the standard principal arterial cross-section assumed in the 2030 with Improvements scenario. To better promote safety and efficient traffic operations under the Sensitivity scenario, dual left-turn lanes with protected left-turn signal phasing are proposed to be added at all of the arterial-arterial intersections that previously had only single left-turn lanes with protected/permitted left-turn phasing.

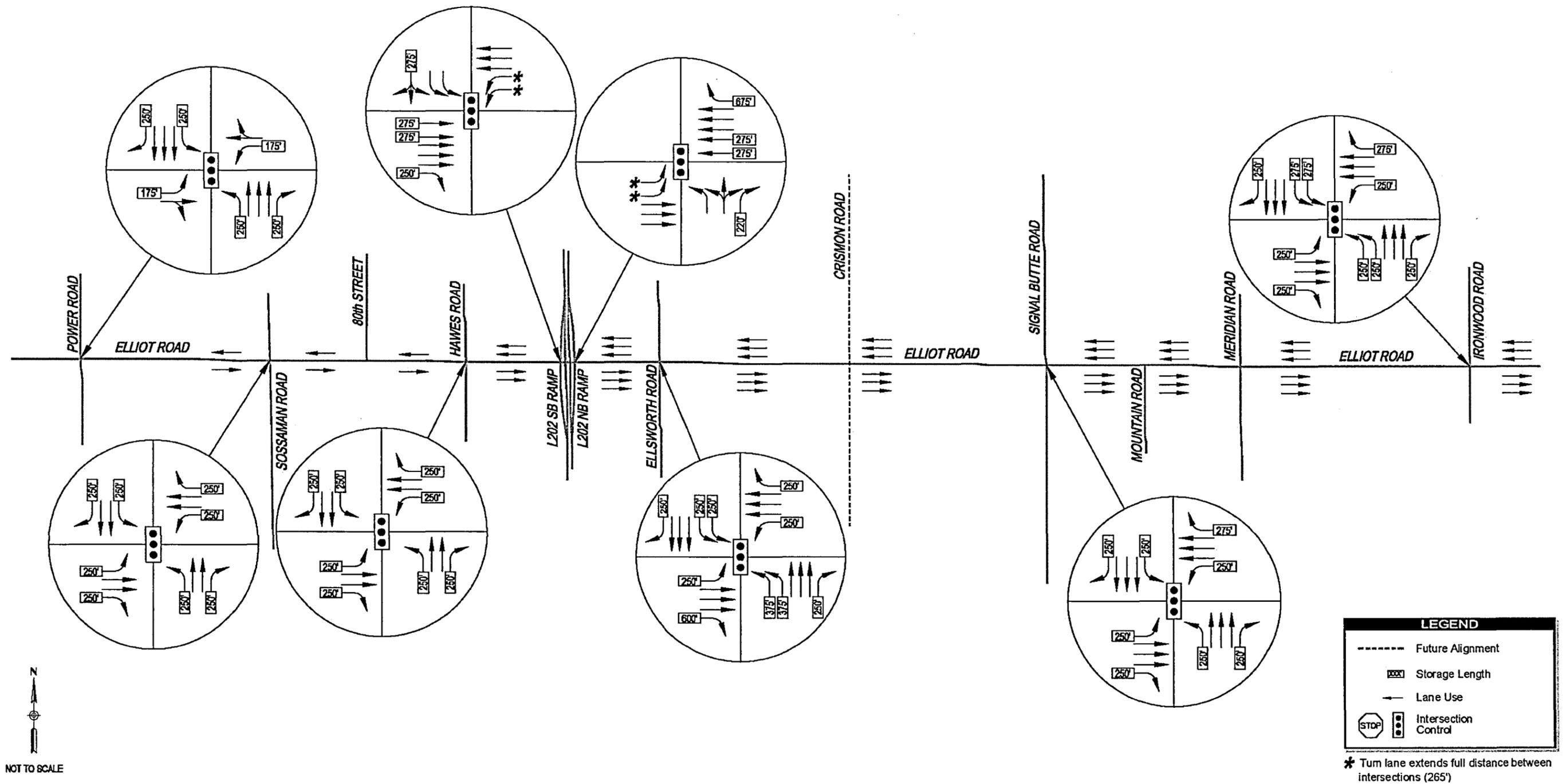
If LOS D is desired, additional major improvements would likely be needed at the Loop 202/Elliot Road interchange and on the segment of Elliot Road between Loop 202 and Ellsworth Road (like interchange reconstruction or providing eight through lanes on Elliot Road), along with some spot improvements at the Crismon Road and Meridian Road intersections.

Recognizing the uncertainty of what the magnitude of traffic volumes in 2030 will be, but also recognizing the potential that additional major improvements may be needed on Elliot Road between Loop 202 and Ellsworth Road, it is recommended that obtaining an easement at least ten feet wide next to each side of the standard right-of-way width be considered. Sidewalks and landscaping could be relocated to the easement area to make room for additional improvements within the standard right-of-way. Utilities would not be allowed in this easement unless they could easily be relocated (and at the cost of the utility provider). This establishment of a "clear zone" adjacent to the right-of-way will provide flexibility to accommodate future potentially needed improvements while also allowing the property owner to still utilize the land in the meantime for landscaping, retention, or other appropriate uses.

Alternate solutions are to consider utilizing a modified cross-section with narrower lanes that allows for eight through lanes or other appropriate improvements; or, the respective jurisdiction could determine that LOS E or LOS F in peak hours is acceptable in densely developed areas and not require additional improvements.

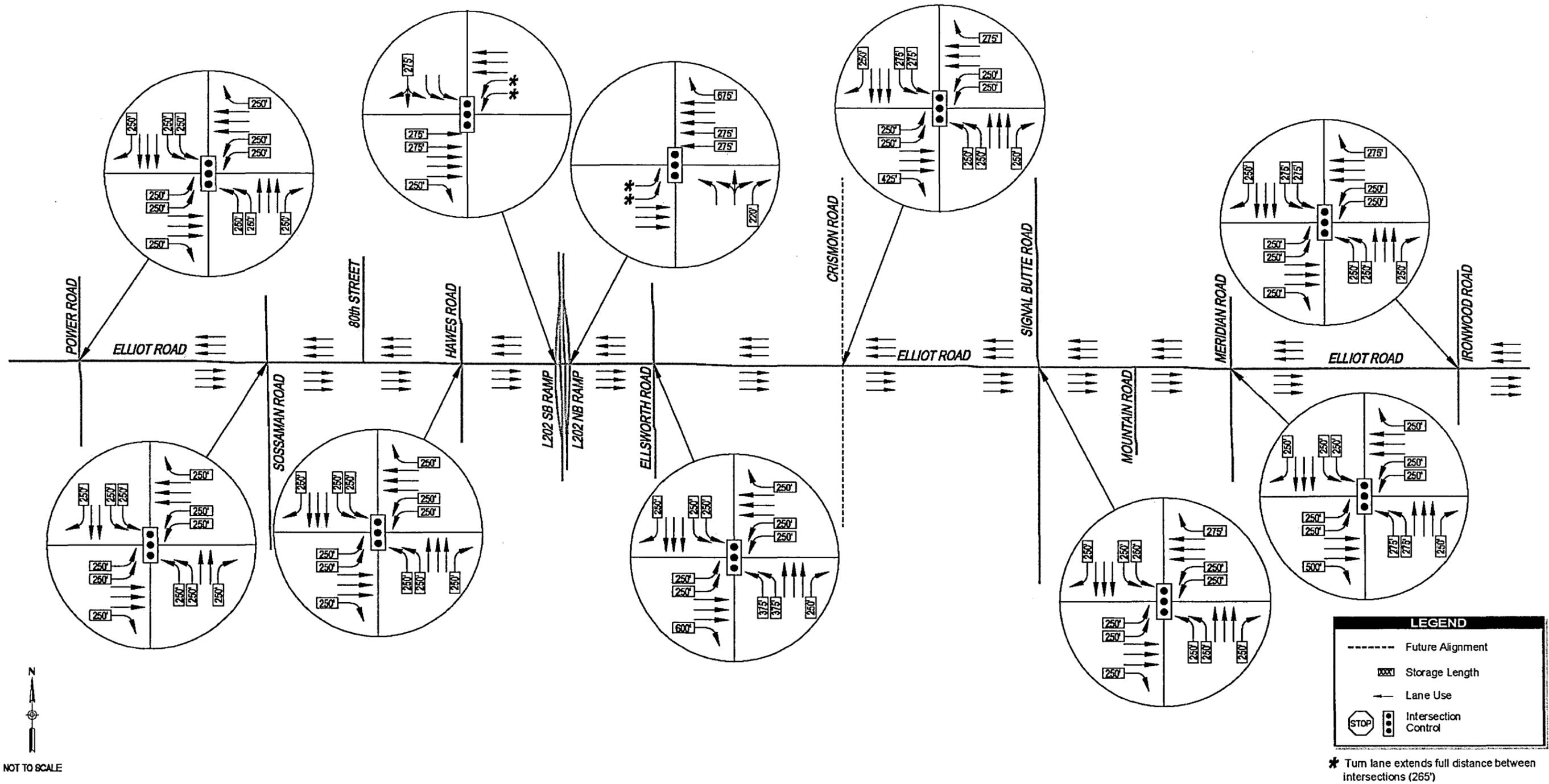
Exhibit 45 shows what the intersection geometry will look like if all of the mid-term and long-term improvements are implemented by 2030 (per the 2030 with Improvements scenario) plus the addition of dual left-turn lanes at all of the arterial-arterial intersections.

Exhibit 44 – Recommended 2015 Conditions



NOT TO SCALE

Exhibit 45 – Recommended 2030 Conditions



8.4 Proposed Drainage Improvements

Roadway improvements will need to incorporate improvements to drainage features. Most of the offsite flows for Elliot Road are collected and conveyed by three major drainage systems prior to crossing the road: the East Maricopa Floodway, the Santan Freeway (Loop 202) channel, and the Elliot Road detention basin and storm drain system. A fourth system, the Siphon Draw Drainage Project, is currently being designed and could potentially add another discharge point between Meridian Road and the CAP Canal. Only parcels immediately adjacent to Elliot Road contribute additional off-site flows to the Elliot Road corridor. The discharges generally flow westerly and are intercepted and conveyed by roadside ditches along the arterials crossing Elliot Road at Sossaman Drive and Ellsworth Drive.

The existing drainage cross culverts that have an operational capacity to handle off-site flow using the 50-year design flow will need to be extended to span the new roadway cross sections. Additional right-of-way or easements may be required for culvert extensions within the Elliot Road corridor. Culvert lengths will be required to be at least as long as the width of the roadway pavement, plus additional length to construct the inlet and outlet at ground level. If an existing culvert cannot convey the 50-year flow, an upsized or additional culvert is recommended in the location of the inadequate culvert.

The design flow for new culverts should be based on an updated hydrologic analysis to account for land use changes in the upstream basins. Sediment and debris should be accounted for in the final design of the culverts. Existing roadside channels and pavement drainage systems will need to be relocated and realigned due to the new roadway cross-section. The existing channels and pavement drainage systems may also require upsizing to handle additional pavement runoff. Because some of these channels can be significant in size, additional right-of-way may be needed to accommodate the roadway widening and additional flow. Final design of improvements related to additional roadside drainage channels and pavement drainage systems, if needed, will likely be the responsibility of future developers along Elliot Road.

Analysis will be required during final design to determine if runoff from the Elliot Road improvements can be discharged into the EMF, Santan Freeway Channel, Elliot Road detention basins, or Siphon Draw basins, because the FCDMC is concerned about the capacity of these structures. "First flush" requirements must be met prior to discharge into a FCDMC facility. Future developers desiring to discharge on-site drainage to a FCDMC facility are required to meet FCDMC detention/retention requirements prior to discharging to a FCDMC facility.

The dip crossings on Elliot Road between Power Road and Loop 202 are recommended to be replaced with rubber gasket reinforced concrete pipe. Existing culverts in this area are recommended to be modified by either extending the culvert barrel(s) and/or by replacing culverts with larger barrel(s), depending on whether the existing culverts meet the capacity requirements of Maricopa County. The EMF Bridge will need to be widened to accommodate the new roadway cross-section.

The drainage features along Elliot Road between Loop 202 and Ellsworth Road are to convey pavement drainage. Developers of the properties adjacent to Elliot Road will be required to accommodate the half-street and on-site drainage along the frontage of their property. Most off-site runoff in this section of the roadway currently discharges into the Santan Freeway channel.

The roadway corridor drainage features along Elliot Road between Ellsworth Road and Signal Butte Road are associated with the Elliot Road Detention Basin System. Elliot Road improvements should be designed to minimally impact the detention basin system. Additional right-of-way or drainage easements should be obtained if necessary for the detention basin system. Two dip crossings are currently located between the west and east Elliot Road detention basins. The multi-purpose culverts on the south side of the road will be extended to the north to intercept flows and eliminate the need for the dip crossings. The concrete drop inlet structure

located approximately one-half mile west of Signal Butte Road on the south side of the road may need to be relocated due to the proposed widening of Elliot Road in that area.

Drainage features along Elliot Road between Signal Butte Road and Meridian Road currently exist to accommodate drainage from private detention basins for the residential communities on both sides of the road. The pipes in that area associated with the detention basins should be minimally impacted by improvements on Elliot Road.

Cross culverts are recommended for the Elliot Road alignment from Meridian Road to the CAP Canal. Currently, there are no drainage structures in the area. Cross culvert pipes ranging from 18" diameter to 48" diameter are recommended in this segment.

8.5 Proposed Improvements to Bridge Structures

The aforementioned proposed roadway improvements will need to incorporate widening the two bridges on Elliot Road between Power Road and Sossaman Road if Elliot Road is to accommodate the proposed six-lane roadway. The two bridges are the RWCD Canal Bridge and the EMF Bridge. These bridges were built by MCDOT and FCDMC. ADOT currently conducts bridge maintenance and inspection activities on these two structures. The Roosevelt Canal Bridge is assigned a structure number 9827 and the EMF Bridge is assigned a structure number 9828 for inspection purposes.

A review of the record drawings and the inspection reports of the two bridges indicates that the Roosevelt Canal Bridge is a single span (29'-0") bridge. The overall out-to-out width of the canal bridge is 64'-0". There is 52'-0" roadway width between the barrier faces with a 32" barrier on the north side and a 42" barrier on the south side. There is an 8'-2" sidewalk and parapet on the northern edge of the bridge beyond the 32" barrier. The superstructure is comprised of 1'-3" deep voided prestressed concrete slabs. The substructure consists of cast-in-place concrete abutments with 12" diameter pipe pile foundations. The Roosevelt Canal Bridge has a 15'-0" long approach slab at either end.

The EMF Bridge is a six-span structure (total span = 200'-2"). The overall out-to-out width of this structure is 62'-0" with 50'-0" clear for the roadway, two 32" barriers on both sides and an 8'-0" wide sidewalk on the south side. The superstructure is comprised of a reinforced concrete deck slab that is 2'-0" deep. The pier and abutment caps are integral with the superstructure with flares at the pier locations. Each pier is comprised of five circular columns that are pinned at the superstructure and are founded on a mat foundation. The abutment is founded on belled drilled shafts. The EMF Bridge has a 15'-0" long approach slab at either end.

A review of the inspection reports/ratings on the existing bridge superstructures suggests a functional condition and compliance with typical ADOT criteria for structural sufficiency at the time of the inspections. The reports available are based on inspections performed in 2006 for the two bridges. Another inspection is scheduled for the two bridges in late 2008. More information on the current condition of the bridges will be available once this scheduled inspection is completed by ADOT.

According to the inspection reports, repairs are required on these bridges that have not been completed. Replacement of these bridges and/or possible retrofit measures for the superstructures (such as deck/girder replacement) and substructures may have to be evaluated at the time when the widening of these structures actually takes place.

The width of the bridges will have to be a total of 108'-0" to accommodate the 106'-0" wide approach roadway and two 1'-0" parapets on either side. The typical section at the bridge will consist of a 6' raised sidewalk, 6' shoulder and three 11' lanes placed symmetrically about a 16' wide median.

This ultimate roadway width would require an asymmetrical widening (because the existing bridge is not centered on the section line) of the Roosevelt Canal Bridge of 26'-5" on the north side and 17'-7" on the south

side. Along with the existing 64'-0" structure, this gives a total new widened bridge width of 108'-0". The existing parapet and barriers will have to be removed and the reinforcing cut to the deck elevation prior to the widening.

At the EMF Bridge, the widening will be 27'-5" on the north side and 18'-7" on the south side. Along with the existing 62'-0" structure, this gives a total new widened bridge width of 108'-0". The existing parapet and barriers will have to be removed and the reinforcing cut to the deck elevation prior to the widening. If Elliot Road is only widened to accommodate a four-lane, rather than a six-lane, roadway, the amount of needed bridge widening would correspondingly decrease.

During final conceptualization and design, the roadway centerline alignment at the two bridges should be evaluated to determine if shifting the roadway centerline alignment could potentially reduce the cost or extent of the future bridge improvements. Clearances over the Roosevelt Canal and EMF will also need to be evaluated with any future bridge widening.

Both bridges will likely be widened in kind to maintain the existing superstructure and substructure characteristics. It is proposed that the widened Roosevelt Canal Bridge superstructure consist of 1'-3" deep voided precast prestressed slabs set on a cast-in-place abutment founded on small diameter drilled shafts or piles. At the EMF Bridge, the widened superstructure is proposed to consist of cast-in-place reinforced concrete slabs placed on circular columns and pinned at the piers. The foundations at the piers are proposed to be spread or mat footings as currently exist. The abutment should be integral with the superstructure and should be pinned with a cap that is founded on drilled shaft foundations. During final conceptualization and design, other types of superstructures and substructures can be evaluated in more detail.

8.6 Access Management Guidelines

This section discusses access management guidelines that can be implemented by governing jurisdictions to provide appropriate access to adjacent land while also promoting safety and efficient traffic operations.

The aforementioned recommended design criteria already contain some access management features, namely a raised median along Elliot Road and minimum spacing requirements for driveways and for full and partial median openings.

The following recommendations provide additional guidance as a target to work towards related to managing access on Elliot Road:

- When widening Elliot Road to the proposed six-lane section, install the minimum number of median openings needed to adequately serve traffic and adjacent land. Additional median openings should then be added later only if their anticipated benefits outweigh their anticipated adverse impacts on traffic operations and safety;
- When improving Elliot Road, initially install new traffic signals at a minimum spacing of 2640 feet (1/2 mile). If additional signals are later needed, they could be added when warranted as long as they are spaced per the City of Mesa and City of Apache Junction standards so as to not disrupt the progression of through-traffic along Elliot Road;
- Avoid direct access to Elliot Road where feasible alternate access points exist. Access to new corner developments should occur on north-south cross-streets rather than directly on Elliot Road if the cross-streets have a lower functional classification than Elliot Road;
- If direct access to Elliot Road is needed, limit each property to one access point on Elliot Road;
- New developments should share access points on Elliot Road where feasible and should provide interconnectivity between their parking lots and those of adjacent properties;
- Improve existing business access points by installing curb/gutter and consolidating driveways;

- Prohibit left-turn movements from driveways when feasible;
- Encourage shared parking for adjacent businesses;
- Encourage or require new developments to provide pedestrian and bicycle linkages between their developments and public thoroughfares;
- Driveways should be located at least 600 feet from adjacent driveways if possible;
- Driveway openings on Elliot Road should be located at least 400 feet from an intersection with another major arterial street if possible;
- In the vicinity of Loop 202, prohibit driveways within 1,000 feet of the interchange ramps if possible; and
- Discourage the subdividing of lots that would make it impossible to meet the desired access point spacing along Elliot Road.

While it is recognized that these proposed guidelines may not be feasible in all situations, efforts should be made to meet the guidelines to promote adequate access control. Doing so will require significant collaboration with stakeholders, business owners, and the public. Individual jurisdictions are ultimately responsible for implementation of access management within their respective jurisdictions.

8.7 Corridor Traffic Management / Intelligent Transportation Systems

As traffic volumes and congestion increase along the Elliot Road corridor, it will become increasingly important for the responsible agencies/jurisdictions to manage traffic operations in an efficient manner. Traffic congestion, road closures, and traffic-related incidents can often be better managed through application of intelligent transportation systems (ITS). ITS tools such as cameras, traffic detectors, dynamic message signs and traffic signals interconnected by fiber-optic cables or wireless radios all help to provide real-time travel information for both travelers and traffic managers.

As the Elliot Road corridor continues to develop, consideration should be given to deploying ITS. While there are currently no known local or regional plans to deploy ITS devices on Elliot Road, any deployment of ITS devices in the future should be integrated with future local or regional ITS plans. The deployment of ITS devices should follow applicable City of Mesa or City of Apache Junction ITS-related standards.

It is recommended that the following ITS elements be considered for design and implementation:

- Centrally-controlled signal system management plan for the corridor;
- Traffic detection and counting capabilities to achieve efficient real-time signal operations;
- Pertinent infrastructure for wireless interconnection between traffic signals or conduit and pull box infrastructure to facilitate installation of fiber-optic interconnect cable;
- Instrumentation of the corridor for appropriate video camera-based real-time traffic monitoring by agency operators;
- Traveler information system elements (e.g., dynamic message signs); and
- Non-intrusive video detection at traffic signals that will enable traffic managers to instantly view real-time conditions along the corridor.

8.8 Implementation Phasing and Staging of Improvements

Exhibit 46 presents the proposed implementation phasing and staging of corridor improvements. Improvements are prioritized considering need and when development of adjacent land and construction of other roadways in the area are anticipated to occur. Actual phasing may vary depending on the timing and location of adjacent development and proposed improvements to other roadways in the vicinity of Elliot Road (e.g., Crismon Road may be constructed before 2015 per preliminary DMB plans). Many of these

improvements will likely be financed by developers as part of their development agreements with the respective jurisdiction. Exhibit 46 also includes an estimate of probable construction costs.

Exhibit 46 – Proposed Implementation Phasing and Estimate of Construction Cost

Improvements	Proposed Phasing	Estimate of Probable Construction Cost
Signalize and Widen Sossaman Road Intersection	Near-term (by 2015)	\$930,000
Signalize and Widen Hawes Road Intersection	Near-term (by 2015)	\$930,000
Elliot Road: Meridian Road to Ironwood Road (construct with 6 lanes)	Near-term (by 2015)	\$6,390,000
Elliot Road: Loop 202 to Mountain Road (widen to 6 lanes)	Near-term (by 2015)	\$14,270,000
Construct Crismon Road Intersection	Mid-term (by 2025)	\$1,310,000
Elliot Road: Power Road to Loop 202 (widen to 6 lanes)	Long-term (after 2025)	\$15,320,000
Total Construction Cost		\$39,150,000

A detailed estimate of probable total cost, that includes costs for construction, design, construction management, right-of-way, utility relocation, and administration, is shown in Exhibit 47. The costs listed include right-of-way dedications and work performed by developers that are not typically reimbursed by the respective jurisdiction.

Funding is also needed for maintenance of the segments of Elliot Road that are already constructed. Pavement conditions are poor on Elliot Road between Power Road and Loop 202 and between Ellsworth Road and Signal Butte Road and pavement restoration will likely be needed soon.

When Elliot Road is extended to the east across the CAP Canal, funding responsibilities will need to be established to construct the bridge structure over the CAP Canal. The amount of funding needed will depend heavily on the location of the North-South freeway and whether or not the crossing of the CAP Canal can be incorporated into the bridge structures needed for the proposed freeway interchange at Elliot Road. In addition, a bridge structure may be needed to cross the Powerline Flood Retarding Structure that is located just east of the CAP Canal. While it is beyond the scope of this study to determine the locations and types of bridge structures needed to cross the CAP Canal, the agencies with jurisdiction where Elliot Road crosses the CAP Canal should recognize that a significant amount of funding—likely in the range of \$10 million to \$20 million—will be needed.

The jurisdictions involved in this study should continue to work together to develop some type of formalized agreement related to the aforementioned proposed standards and implementation of the proposed improvements for Elliot Road.

Exhibit 47 – Total Cost Estimate for Elliot Road Improvements

	Elliot Road Segment				
	Power Road to Meridian Road	Meridian to CAP Canal	Entire Corridor		
2008 SUMMARY COST ESTIMATES (Current Dollars)					
<i>Term of Construction</i>	<i>Near (by 2015)</i>	<i>Mid (by 2025)</i>	<i>Long (after 2025)</i>	<i>Near (by 2015)</i>	<i>Total</i>
Construction	\$16,130,000	\$1,310,000	\$15,320,000	\$6,390,000	\$39,150,000
Design (12%)	\$1,935,600	\$157,200	\$1,838,400	\$766,800	\$4,698,000
Construction Management (15%)	\$2,419,500	\$196,500	\$2,298,000	\$958,500	\$5,872,500
Right-of-Way	\$12,600,000	\$1,000,000	\$11,500,000	\$22,000,000	\$47,100,000
Utility Relocation	\$300,000	\$0	\$0	\$0	\$300,000
Administration (10%)	\$1,613,000	\$131,000	\$1,532,000	\$639,000	\$3,915,000
Total Cost	\$34,998,100	\$2,794,700	\$32,488,400	\$30,754,300	\$101,035,500
PRELIMINARY SUMMARY COST ESTIMATES (Adjusted for Inflation)					
<i>Term of Construction</i>	<i>Near (by 2015)</i>	<i>Mid (by 2025)</i>	<i>Long (after 2025)</i>	<i>Near (by 2015)</i>	<i>Total</i>
Assumed Annual Inflation Rate	2.90%	2.90%	2.90%	2.90%	-
Assumed Number of Years	7	17	22	7	-
Adjusted Construction	\$19,703,437	\$2,129,770	\$28,734,061	\$7,805,639	\$58,372,907
Design (12%)	\$2,364,412	\$255,572	\$3,448,087	\$936,677	\$7,004,748
Construction Management (15%)	\$2,955,516	\$319,465	\$4,310,109	\$1,170,846	\$8,755,936
Right-of-Way	\$15,391,402	\$1,625,778	\$21,569,302	\$26,873,876	\$65,460,358
Utility Relocation	\$366,462	\$0	\$0	\$0	\$366,462
Administration (10%)	\$1,970,344	\$212,977	\$2,873,406	\$780,564	\$5,837,291
Adjusted Total Cost	\$42,751,572	\$4,543,563	\$60,934,965	\$37,567,602	\$145,797,702

8.9 Potential Cost-Saving Solutions

The proposed improvements are based on the agreed upon design criteria. There are a few instances, however, where design exceptions may be warranted because there are alternate solutions that could significantly reduce the cost of the improvements with minimal impacts on traffic operations. Potential cost-saving solutions, such as the following, should be considered as the proposed improvements enter the design phase:

- Provide a shared eastbound through/right-turn lane rather than an exclusive right-turn lane at the Elliot Road/Loop 202 Southbound Ramps intersection because the projected eastbound right-turn volumes are quite low, even in the 2030 sensitivity analysis scenario. This alternate solution could be implemented using the pavement that already exists and would not require any reconstruction except for some minor signing and pavement marking modifications. As has previously been mentioned, any modifications to the Loop 202 ramp intersections would require prior approval from ADOT;
- Provide two through lanes in each direction rather than three through lanes in each direction on Elliot Road between Power Road and Loop 202. This alternate solution would still provide LOS C or better, even in the 2030 sensitivity analysis scenario, at the Sossaman Road/Elliot Road and Hawes Road/Elliot Road intersections, and would reduce the amount of additional pavement required and the amount of utility relocation required; and
- Related to the previous alternate solution, restripe Elliot Road across the Roosevelt Canal Bridge and EMF Bridge to provide two 10.5' lanes and a 5' shoulder in each direction and no median rather than widening the two bridges to accommodate the full six-lane principal arterial cross-section. This proposed cross-section would require an additional 2' of roadway width on the EMF Bridge beyond what currently exists. This could be accomplished by moving the concrete barrier at the edge of the south side of the road 2' farther south (effectively reducing the existing sidewalk width from 8' to 6'). This alternate solution would eliminate or postpone the need to widen the bridges and relocate the gate structure on the Roosevelt Canal south of Elliot Road.

8.10 Preliminary Design Drawings of the Recommended Future Geometry

Preliminary design drawings for the plan view of the recommended future roadway geometry (per Exhibit 45, which shows the 2030 with Improvements scenario plus the addition of dual left-turn lanes at all of the arterial-arterial intersections) superimposed on aerial photography are presented in the Appendix. Profile drawings are presented for areas where no roadway currently exists. The schematic drawings show stationing, centerline, edge of pavement, pavement markings, auxiliary lanes, curbed median, cross-streets, drainage features, existing right-of-way and parcel boundaries, and proposed right-of-way lines.

9. AGENCY, STAKEHOLDER, AND PUBLIC INVOLVEMENT

This section documents the results of the interaction with affected agencies, stakeholders, and the general public during the Elliot Road Corridor Improvement Study. Additional information on agency, stakeholder, and public participation is available in Technical Memorandum No. 9 – Public and Stakeholder Participation.

9.1 Technical Advisory Committee

The TAC was established by MCDOT to provide technical oversight and guidance throughout the study duration. The TAC consisted of representatives of the following agencies and organizations:

- ADOT;
- ASLD;
- CAAG;
- City of Apache Junction;
- City of Mesa;
- FCDMC;
- MAG
- MCDOT;
- Pinal County; and
- Town of Gilbert.

The role and responsibility of the TAC was to meet at key decision and milestone points during the study to receive information on study progress, to offer advice on study issues, to review technical memoranda, and to inform management from their respective agencies on study progress. The TAC met five times during the study.

9.2 Stakeholder Advisory Committee

The SAC was established by MCDOT to obtain input from a broader range of participants in advance of public open houses. The SAC consisted of many of the same participants included on the TAC, and after holding the first round of TAC and SAC meetings, both committees were combined for joint meetings for the duration of the project. In addition to the TAC membership, the SAC included representatives from the following agencies and organizations:

- CAP;
- DMB;
- East Valley Partnership;
- Maricopa County Planning;
- RWCD; and
- SRP.

The role and responsibility of the SAC was to review information to be presented at scheduled public open houses and offer advice on the quality and completeness of information. Four SAC meetings were held during the study.

9.3 Public Open Houses

Through the course of the study, the MCDOT RightRoads Program conducted three open houses to discuss and gather public comment on project scoping, proposed alignment alternatives, access control measures, and design features of the preferred alignment alternative. Participants staffing the open houses included:

- Roberta Crowe, MCDOT Community Relations;
- Tim Oliver, MCDOT Planning;
- Bryan Patterson, KHA;
- Michael Grandy, KHA;
- Bruce Beenken, KHA;
- Andy Smith, Pinal County;
- Marc Ahlstrom, City of Mesa;
- Mark Venti, City of Mesa;
- Glenn Gorke, City of Mesa; and
- Fred Rustam, City of Mesa.

Gaining consensus among partnering agencies and the public has and will continue to be critical to the success of this study and future implementation of its recommendations to provide a safe, consistent, and efficient roadway.

With this in mind, one public meeting was held during each of the three progressive phases of the study. The first “Public Scoping” meeting, held on August 29, 2007, provided area residents and other study stakeholders an opportunity to comment on the study’s goals and objectives as well as to inform the project team about local transportation needs and study area issues.

The second “Alternatives Analysis” public meeting was held on January 14, 2008 to present preliminary analysis findings and three roadway alignment alternatives for public review and comment.

The final public information meeting was held on April 14, 2008 to present final study findings, recommended roadway type and alignment, access management strategies, and opinions of probable cost for the proposed improvements.

All public meetings were conducted in an “open house” format to provide a free, open, and accurate exchange of information between the project team and area residents with specific issues and questions.

9.3.1 Outreach Methods

The following outreach methods were used to inform and notify the general public and impacted residents about the study, public input meeting dates and locations, and additional means for input:

- Media releases;
- Newspaper articles;
- Display advertisements in local and regional publications;
- MCDOT website;
- Partner agency mediums; and
- Direct mail flyers to adjacent property owners and previous meeting attendees.

9.3.2 Public Comment

Approximately 55 people attended the three public input meetings conducted over the course of the study. Presentation materials, study fact sheets, and comment sheets were distributed to all those in attendance. Comments were received from the public at each of the public input meetings.

1. Scoping Phase Public Meeting

August 29, 2007

Gilbert High School Cafeteria

1101 East Gilbert Road, Gilbert

Attendance: 22

The following are the comments received from the public during the scoping phase public meeting:

- Great job. Please continue to keep public informed and up-to-date. Elliot to Ironwood provides second means of access to Meridian Point development, which is good;
- Accommodate local and regional trail systems;
- Address drainage issues;
- Minimize disruption during future construction;
- Improve arterial network connectivity to Elliot;
- Extend Elliot to Ironwood as soon as possible;
- Maintain access during construction;
- Provide additional access from Meridian Pt./Mtn. Ranch;
- Don't segment improvements. Construct uniformly as a single project;
- Construct continuously;
- General contractor really needed for urban art;
- Eliminate jog at Meridian;
- Provide waterline easement with future roadway;
- Make improvements as soon as possible;
- Address drainage/flooding issues; and
- Design access points to accommodate future development.

2. Alternatives Analysis Phase Public Meeting

January 14, 2008

Highland High School Cafeteria

4301 East Guadalupe Road, Gilbert

Attendance: 25

The following are the comments received from the public during the alternatives analysis phase public meeting:

- Widen Elliot Road to three lanes in each direction from Ironwood Road all the way through to Ellsworth and the 202. This will be absolutely necessary to handle the massive increase of traffic that will result from Queen Creek traffic taking the new 'quick route' to the 202 via Ironwood and Elliot;

- Make considerations to combat potential speeding problem on Elliot Road between Ironwood Road and Mountain Road due to the long stretch of road that will exist without any development;
- The existing Elliot Road storm drain pipe that was actually bid and installed between Ellsworth and Signal Butte was cast-in-place pipe and it is not traffic rated. Therefore, it would have to be replaced in the south shift alternative. Obviously this would be a huge cost that should be taken into account;
- Support Alternative A – widening alternative;
- Extend Meridian to the north;
- Need more viable alternative routes for east end of the project area;
- Opposition to location of new and proposed SRP lines (sight issues);
- Alt. A “makes sense”;
- Alt. A or B ok;
- Coordinate water line alignment (City of Mesa) easement with roadway alignment thru State Lands on Meridian;
- Understand necessity for ultimate 6 lane improvement; and
- Construction – Build half-road sections first, to extend, then other half of roadway.

3. Findings and Recommendations Phase Public Meeting

April 14, 2008

Highland High School Cafeteria

4301 East Guadalupe Road, Gilbert

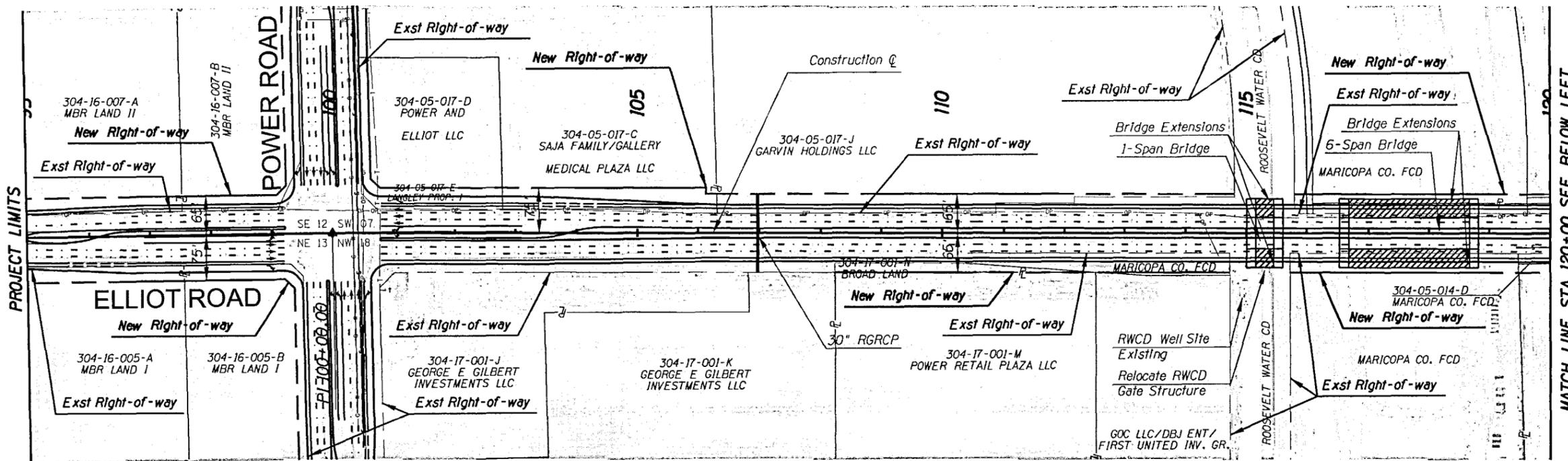
Attendance: 6

The following are the comments received from the public during the findings and recommendations phase public meeting:

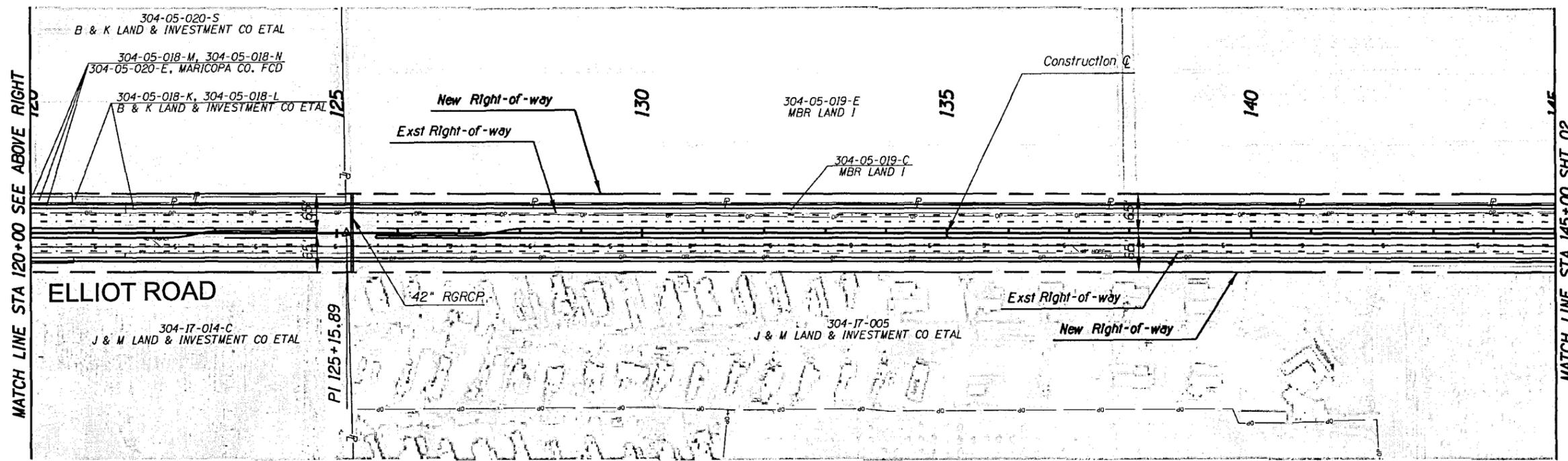
- Concern/desire expressed for landscaping and median/shoulder aesthetics;
- Consider impacts and costs associated w/ RWCD facilities for future roadway improvements;
- General acceptance of recommended symmetrical widening alternative;
- Establishment of a defined construction schedule for improvements is desired;
- Identification of project funding sources is needed; and
- Coordinate Elliot Road and Power Road widening/improvements with development community.

APPENDIX – PRELIMINARY DESIGN DRAWINGS OF RECOMMENDED IMPROVEMENTS

ELLIOT ROAD TO TRANSITION TO FIVE-LANE SECTION WEST OF PROJECT LIMITS

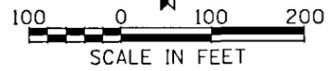


MATCH LINE STA 120+00 SEE BELOW LEFT



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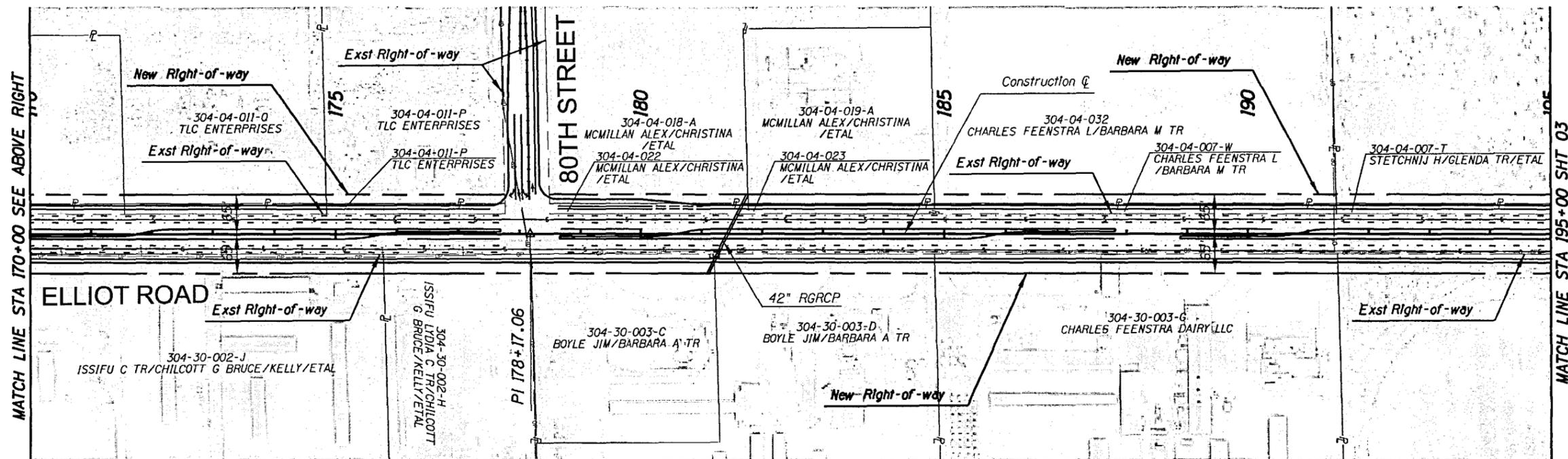
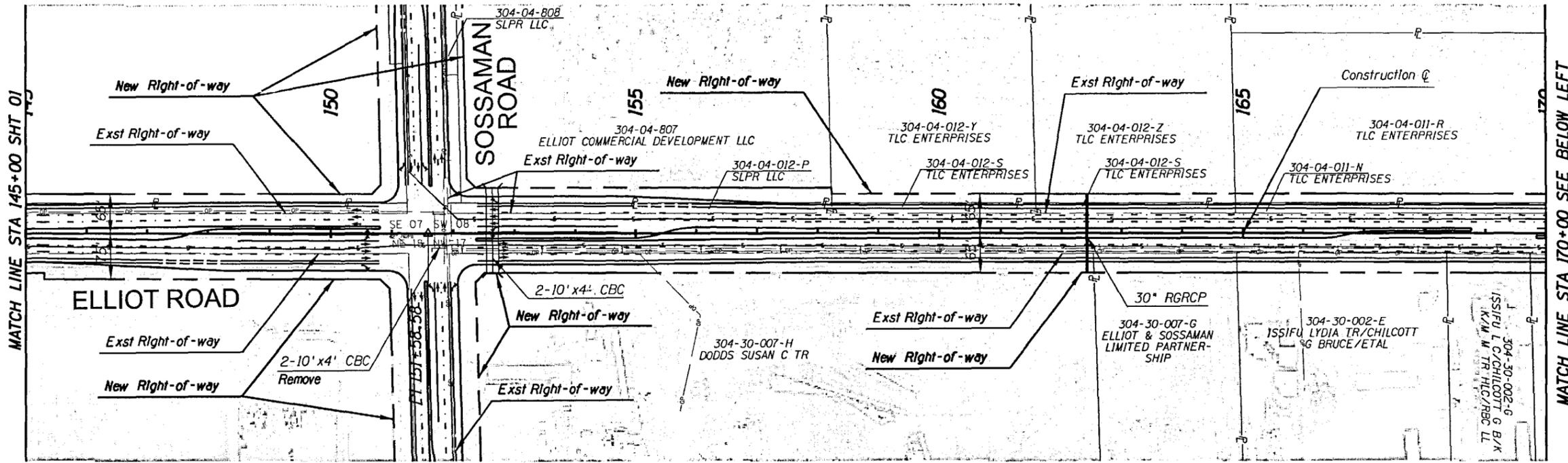


MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

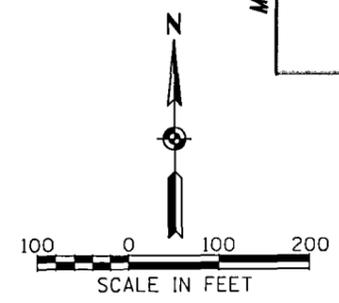
ELLIOT ROAD
CORRIDOR IMPROVEMENT STUDY
POWER ROAD TO CENTRAL ARIZONA PROJECT CANAL

RECOMMENDED FUTURE
ROADWAY GEOMETRY
SHEET 01 OF 12





6/12/2008 \$TIME\$ K:\Rdwy\9091337101_Elliot Rd Corr\ldor\CADD\SH091337101R002.dgn



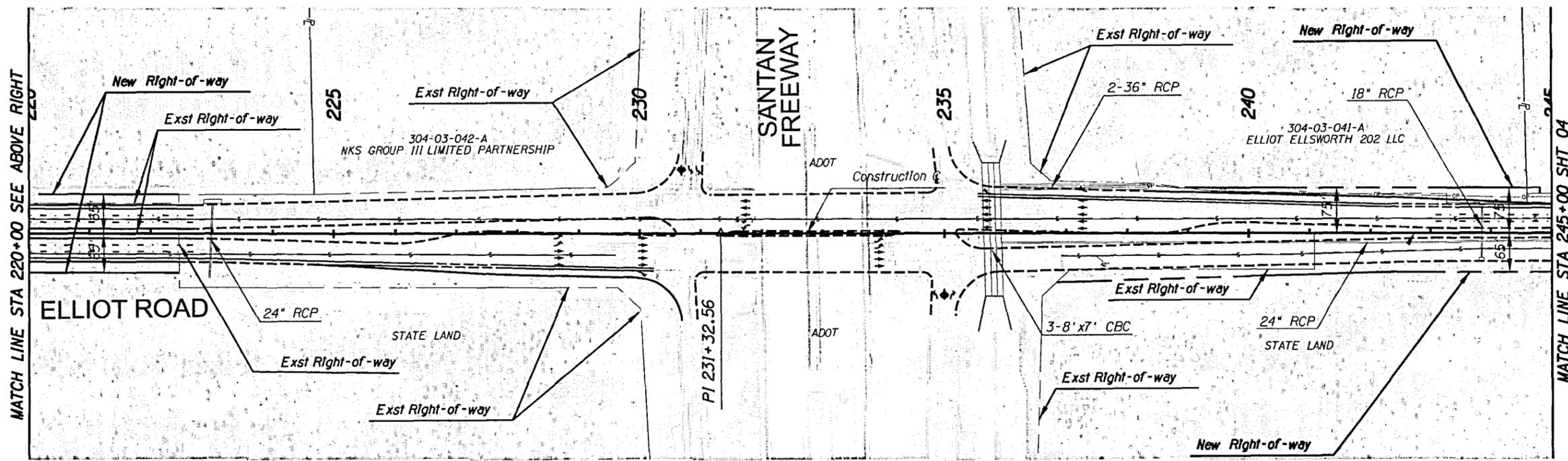
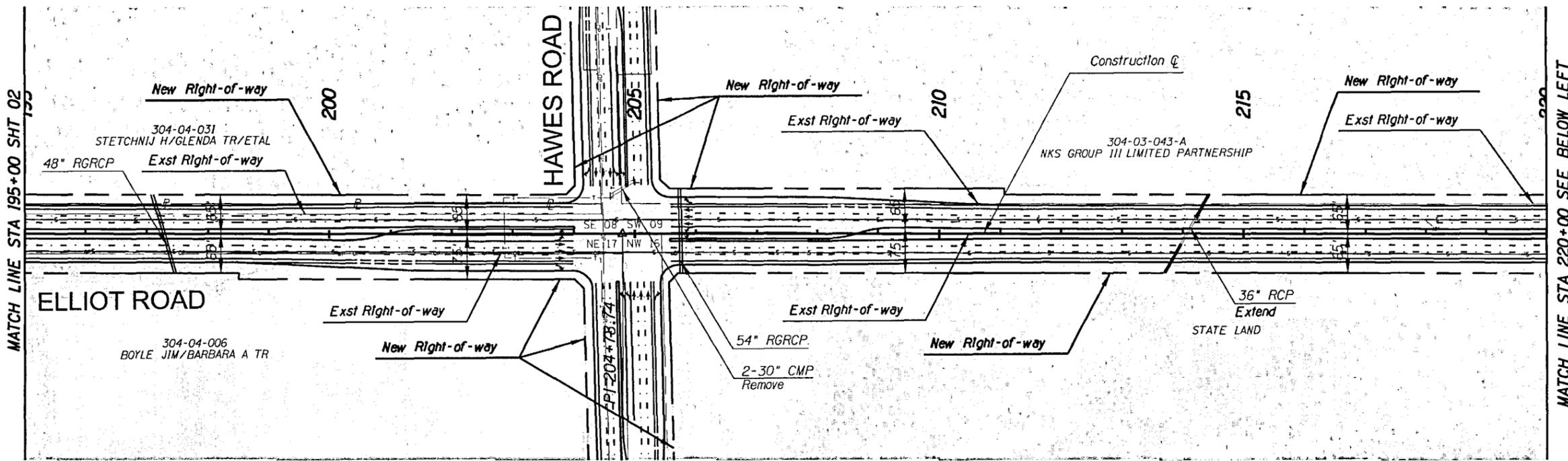
MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

ELLIOT ROAD
CORRIDOR IMPROVEMENT STUDY
POWER ROAD TO CENTRAL ARIZONA PROJECT CANAL

RECOMMENDED FUTURE
ROADWAY GEOMETRY
SHEET 02 OF 12



English



6/12/2008 \$TIMES K:\rwy\091337101_Elliot Rd Corridor\CADD\SHT091337101R003.dgn



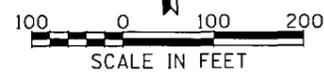
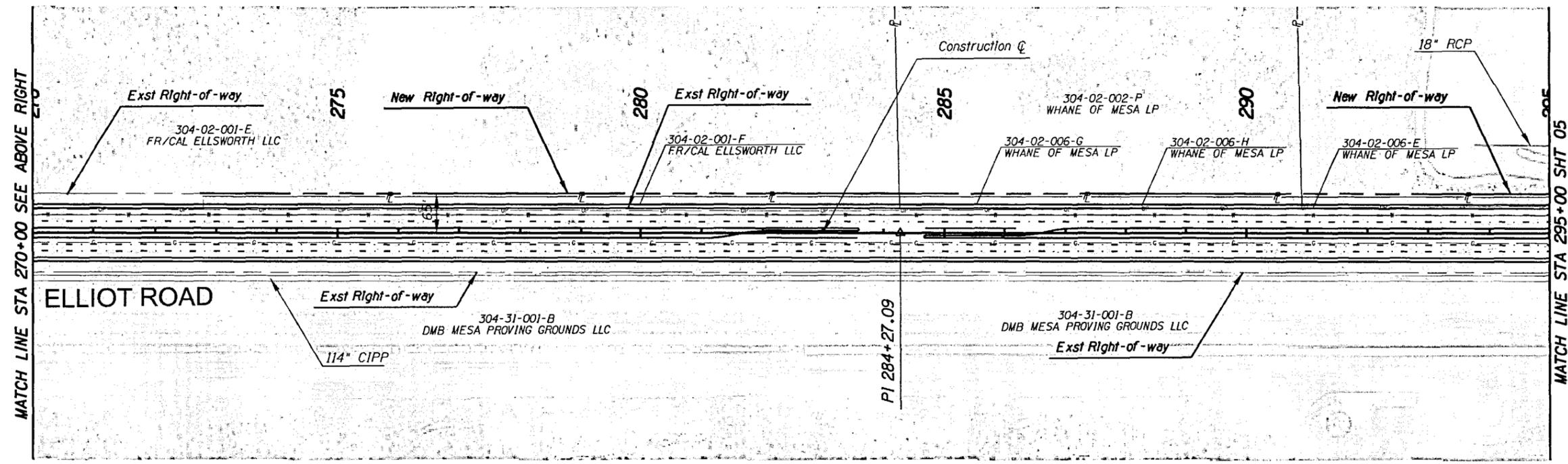
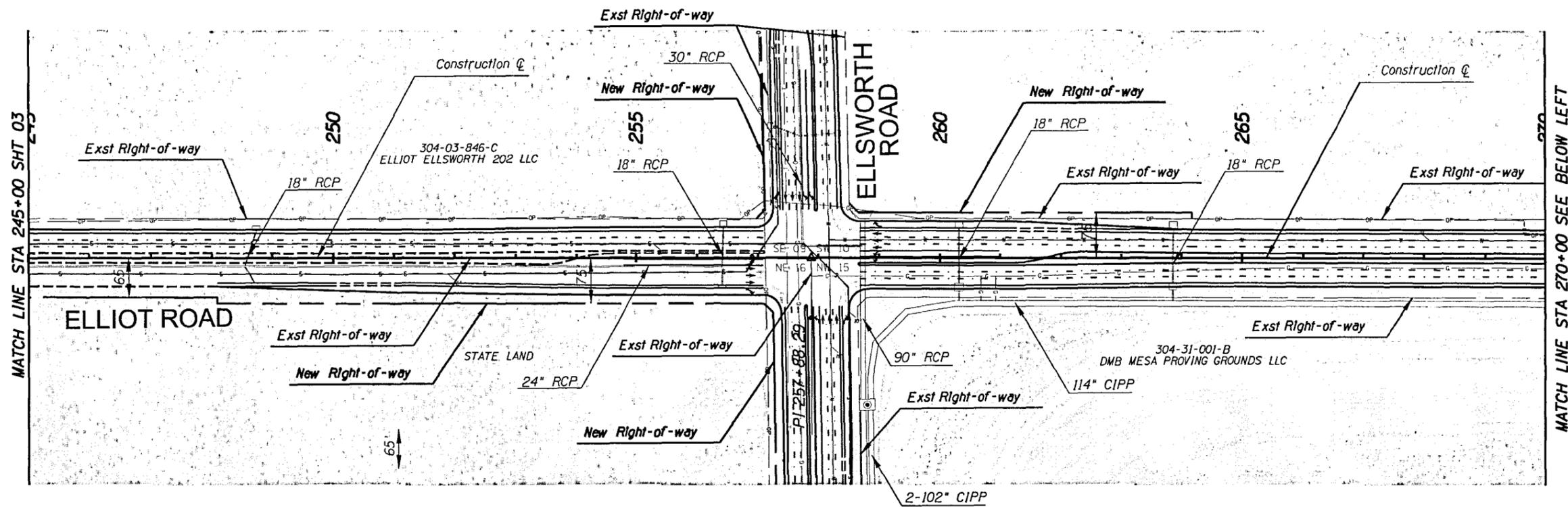
MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

ELLIOT ROAD
CORRIDOR IMPROVEMENT STUDY
POWER ROAD TO CENTRAL ARIZONA PROJECT CANAL

RECOMMENDED FUTURE
ROADWAY GEOMETRY
SHEET 03 OF 12



English



6/12/2008 8:11 AM K:\RD\091337101_ Elliot Rd Corridor\CADD\SH091337101RD04.dgn



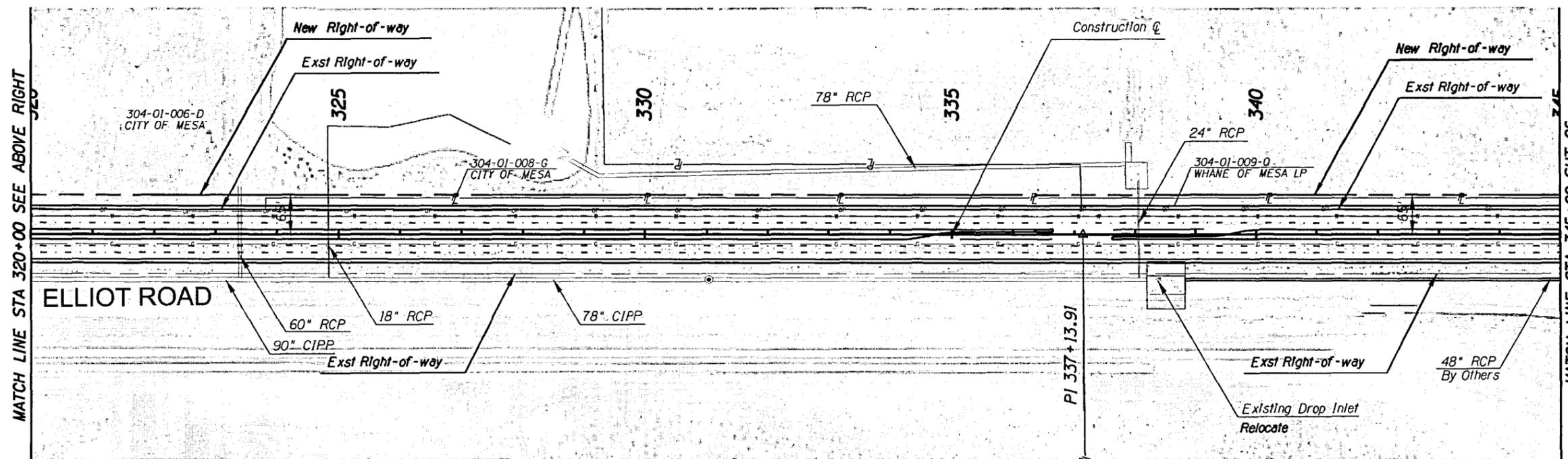
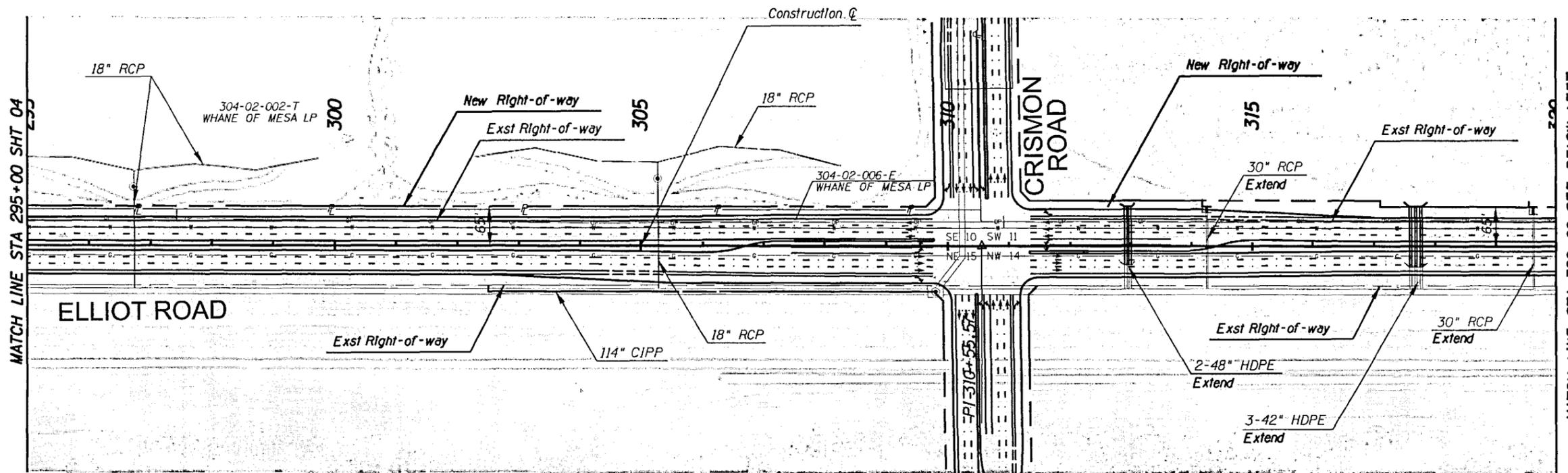
MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

ELLIOT ROAD
CORRIDOR IMPROVEMENT STUDY
POWER ROAD TO CENTRAL ARIZONA PROJECT CANAL

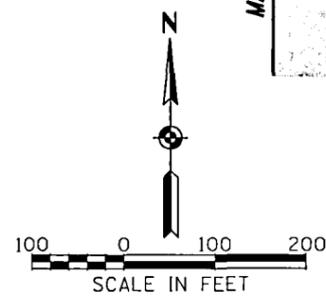
RECOMMENDED FUTURE
ROADWAY GEOMETRY
SHEET 04 OF 12



English



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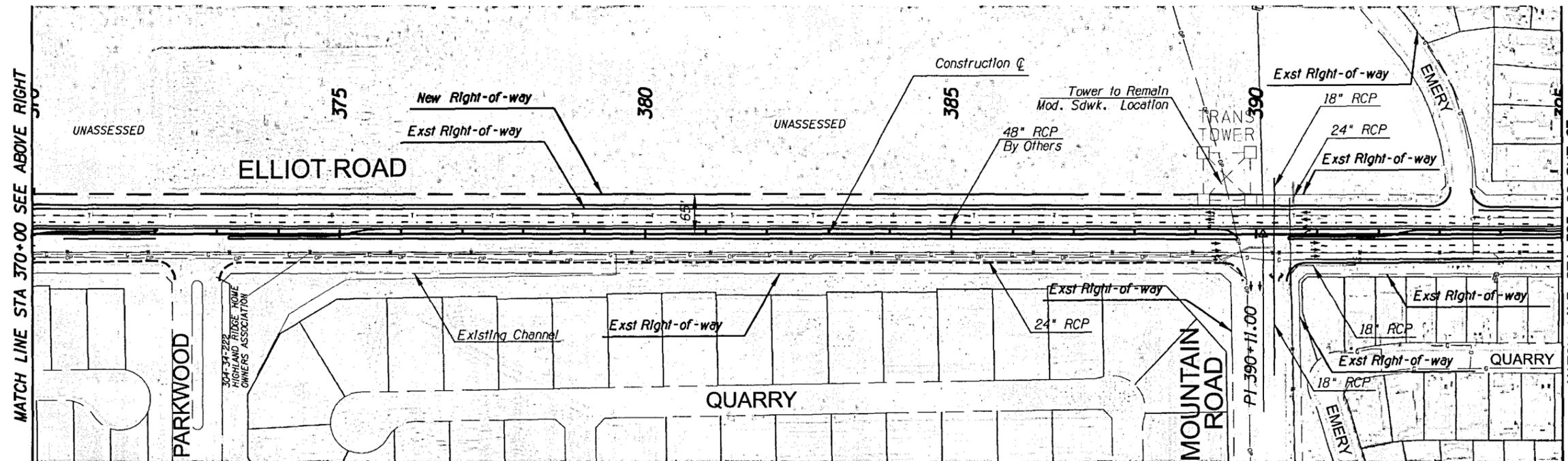
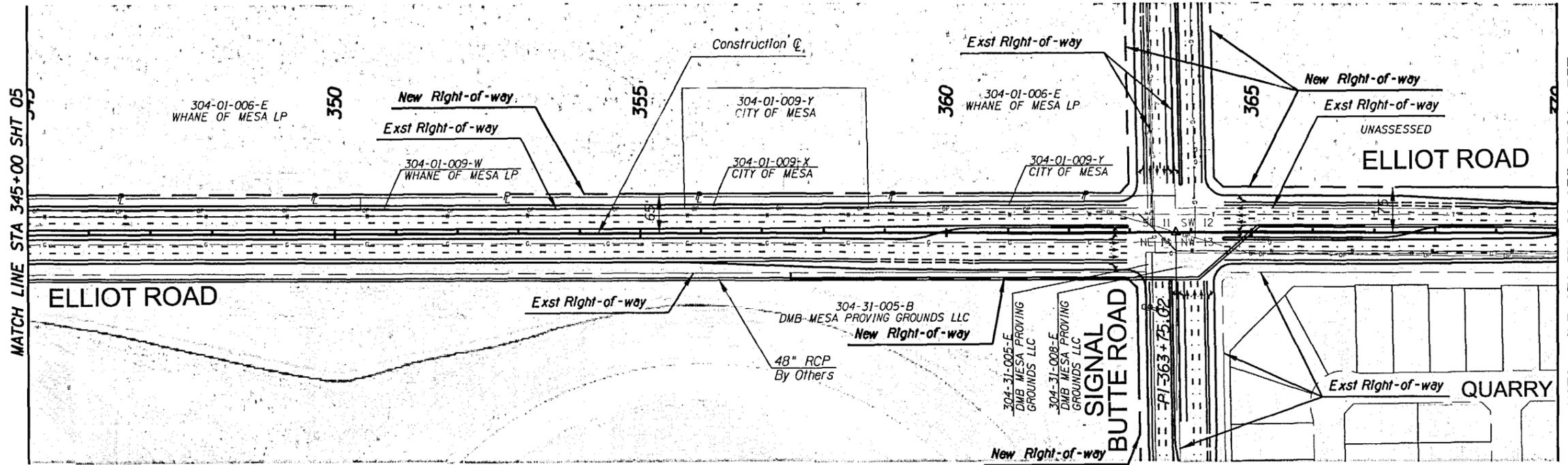
MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

ELLIOT ROAD
CORRIDOR IMPROVEMENT STUDY
POWER ROAD TO CENTRAL ARIZONA PROJECT CANAL

RECOMMENDED FUTURE
ROADWAY GEOMETRY
SHEET 05 OF 12



English

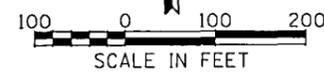


MATCH LINE STA 345+00 SHT 05

MATCH LINE STA 370+00 SEE BELOW LEFT

MATCH LINE STA 370+00 SEE ABOVE RIGHT

MATCH LINE STA 395+00 SHT 07



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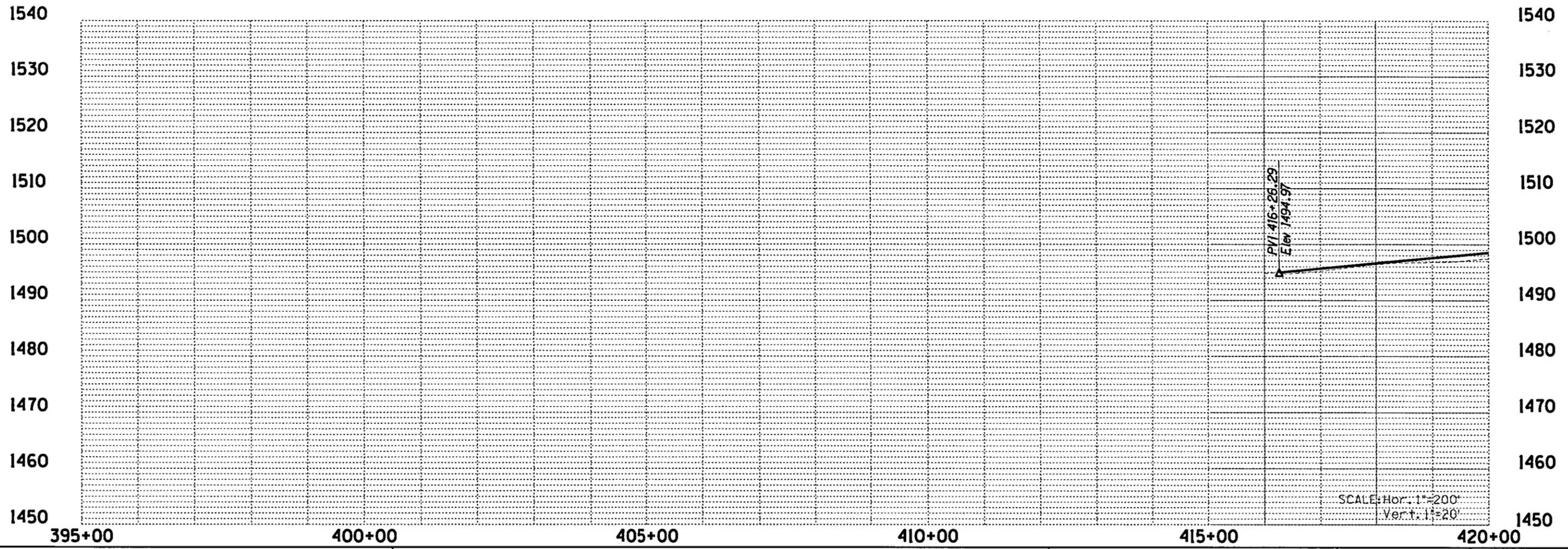
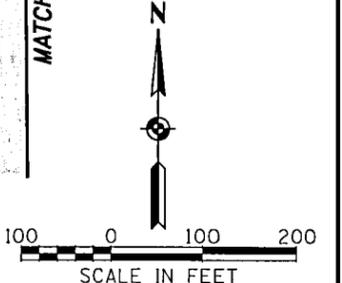
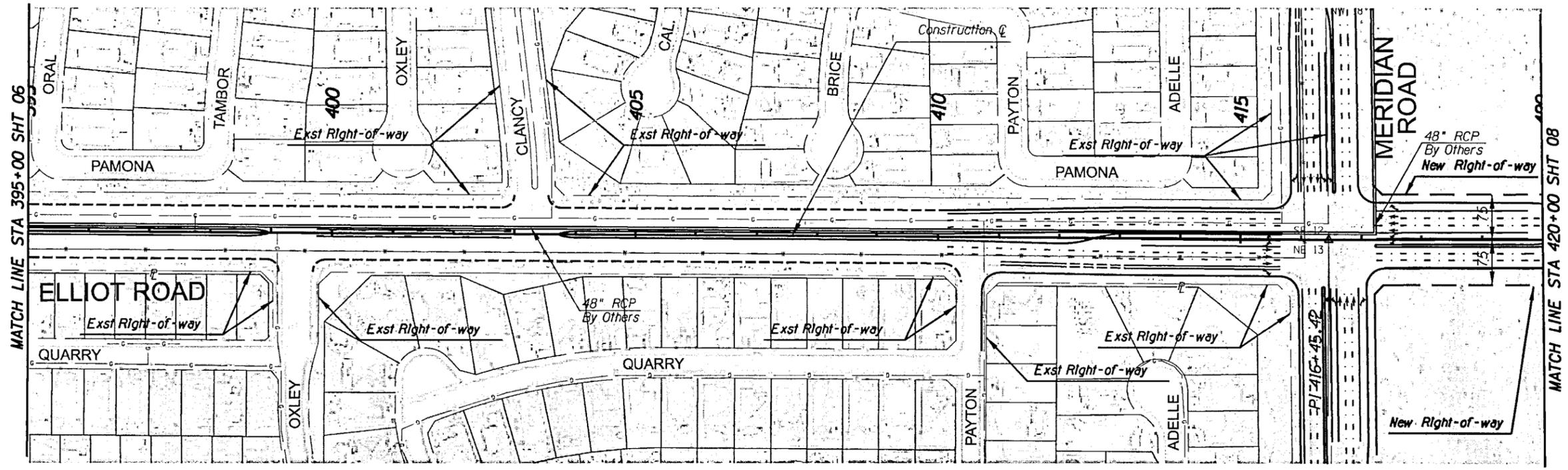
MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

ELLIOT ROAD
CORRIDOR IMPROVEMENT STUDY
POWER ROAD TO CENTRAL ARIZONA PROJECT CANAL

RECOMMENDED FUTURE
ROADWAY GEOMETRY
SHEET 06 OF 12



English



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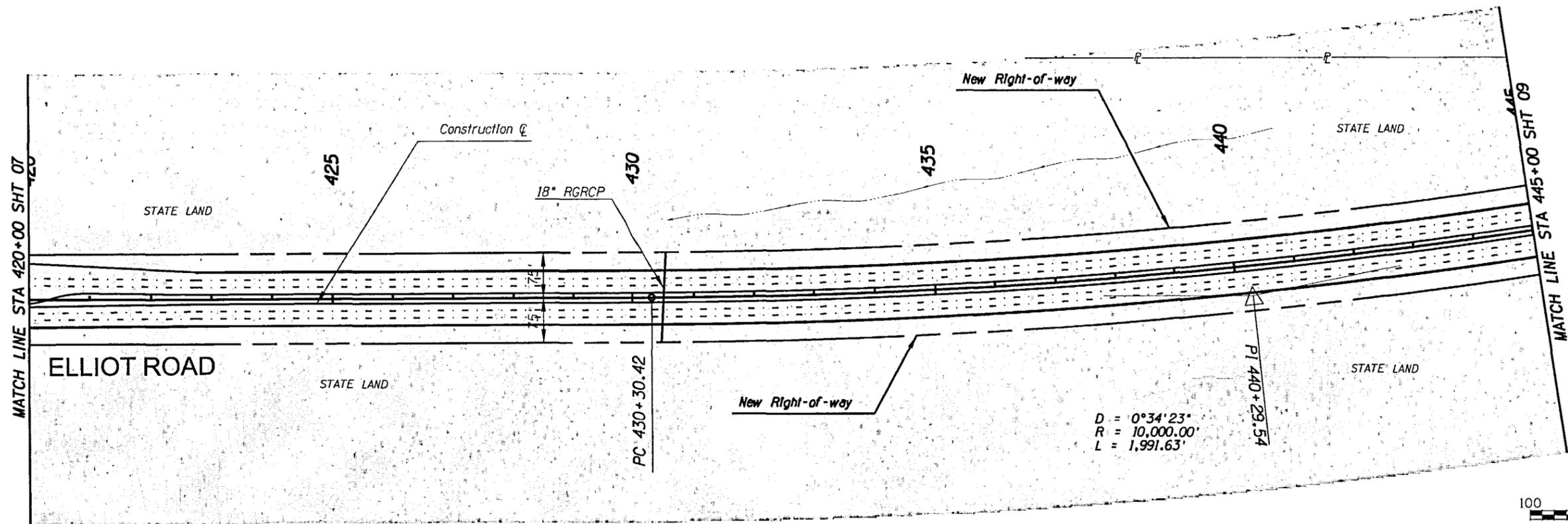
MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ELLIOT ROAD
CORRIDOR IMPROVEMENT STUDY
POWER ROAD TO CENTRAL ARIZONA PROJECT CANAL

RECOMMENDED FUTURE
ROADWAY GEOMETRY
SHEET 07 OF 12

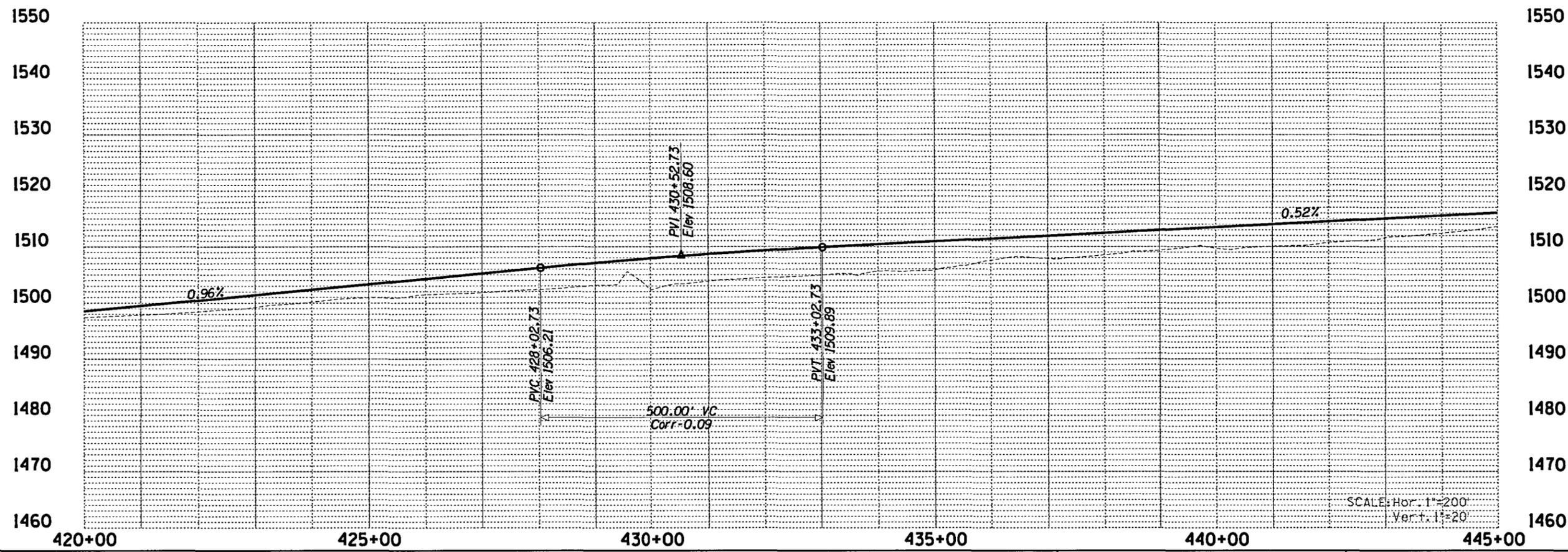
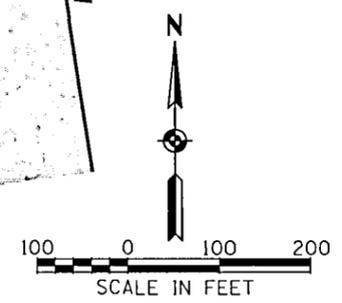


English



$D = 0^{\circ}34'23''$
 $R = 10,000.00'$
 $L = 1,991.63'$

$PI\ 440+29.54$



SCALE: Hor. 1"=200'
 Vert. 1"=20'

6/12/2008 8:11 AM \$ K:\MRGWY\091337\01_Elliot_Rd_Corr\Iddr\CADD\SHT091337\101RD08.dgn



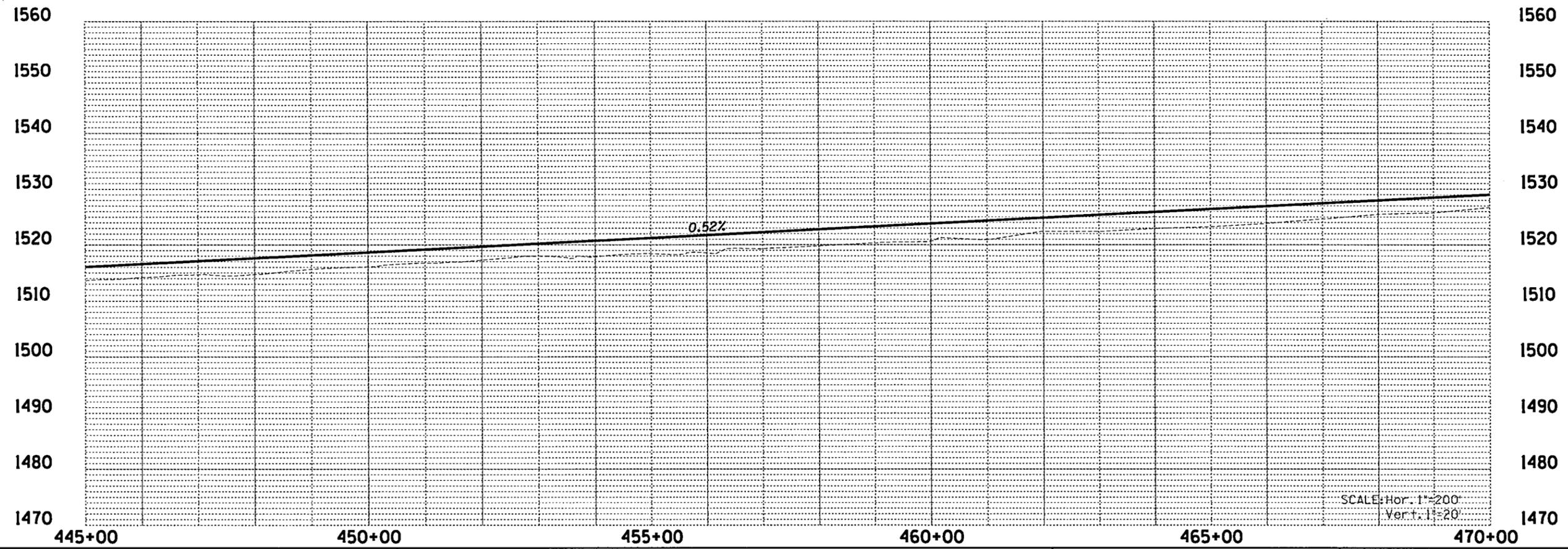
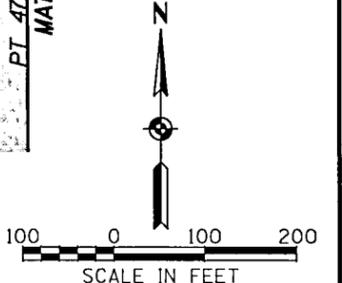
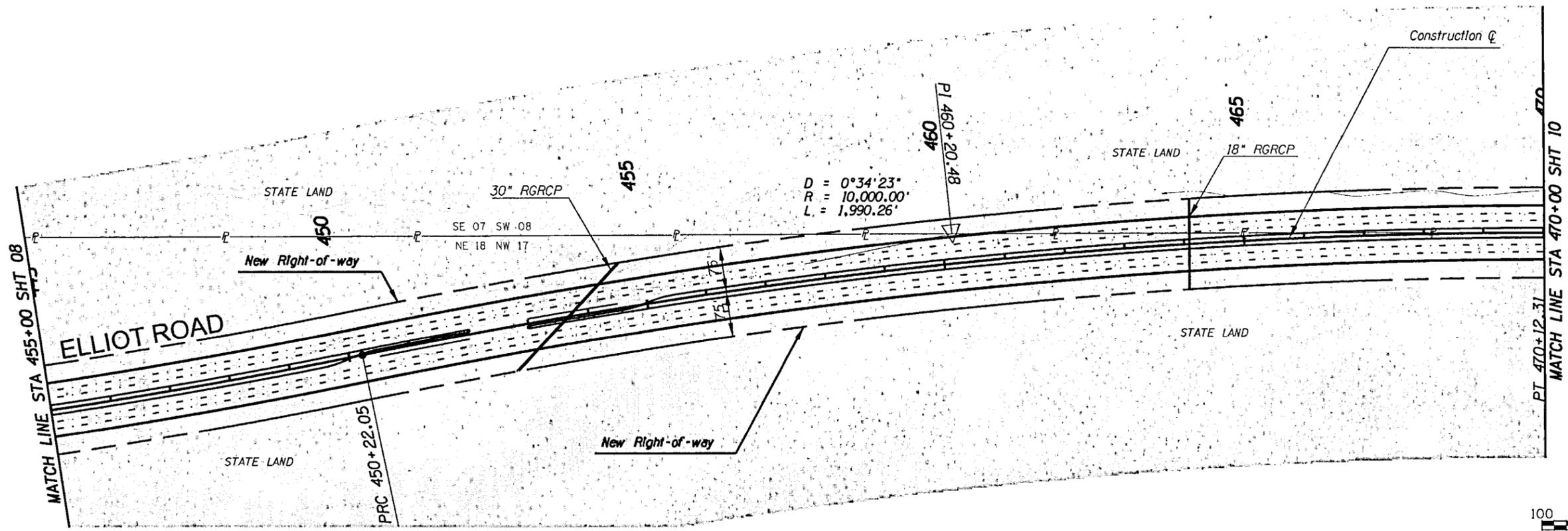
MARICOPA COUNTY
 DEPARTMENT OF TRANSPORTATION
 ENGINEERING DIVISION

ELLIOT ROAD
 CORRIDOR IMPROVEMENT STUDY
 POWER ROAD TO CENTRAL ARIZONA PROJECT CANAL

RECOMMENDED FUTURE
 ROADWAY GEOMETRY
 SHEET 08 OF 12



usj0108



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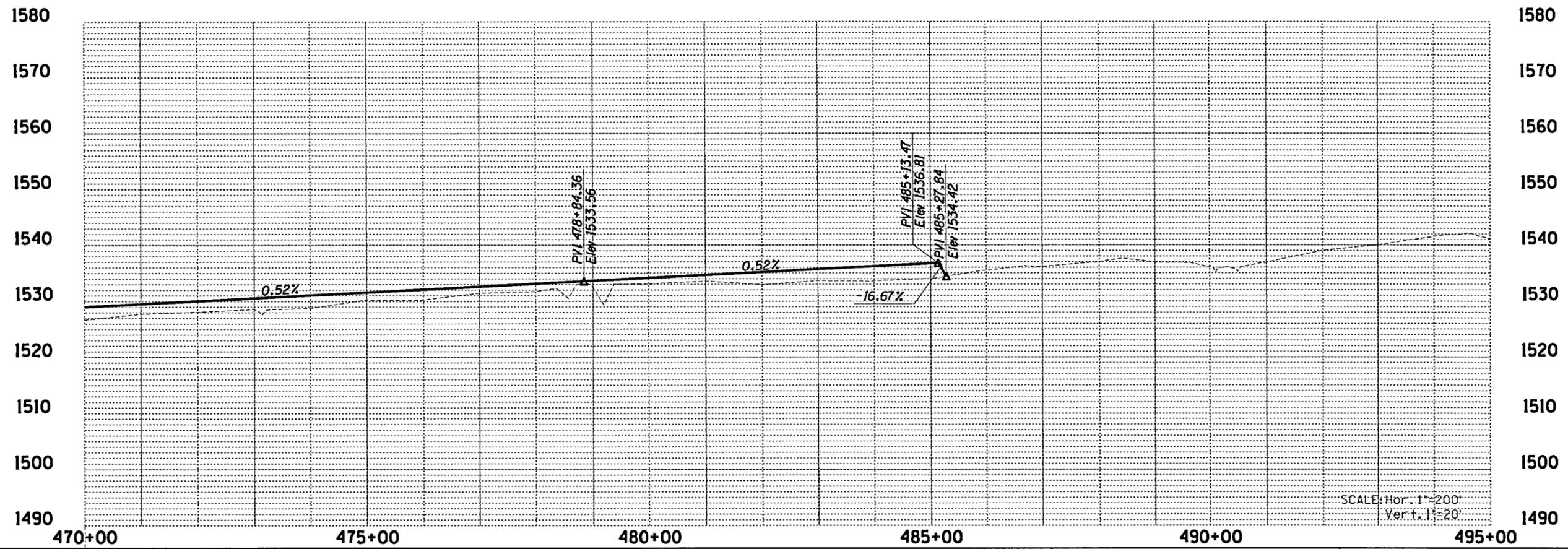
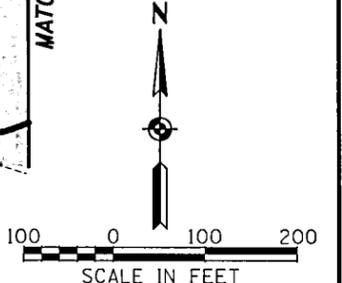
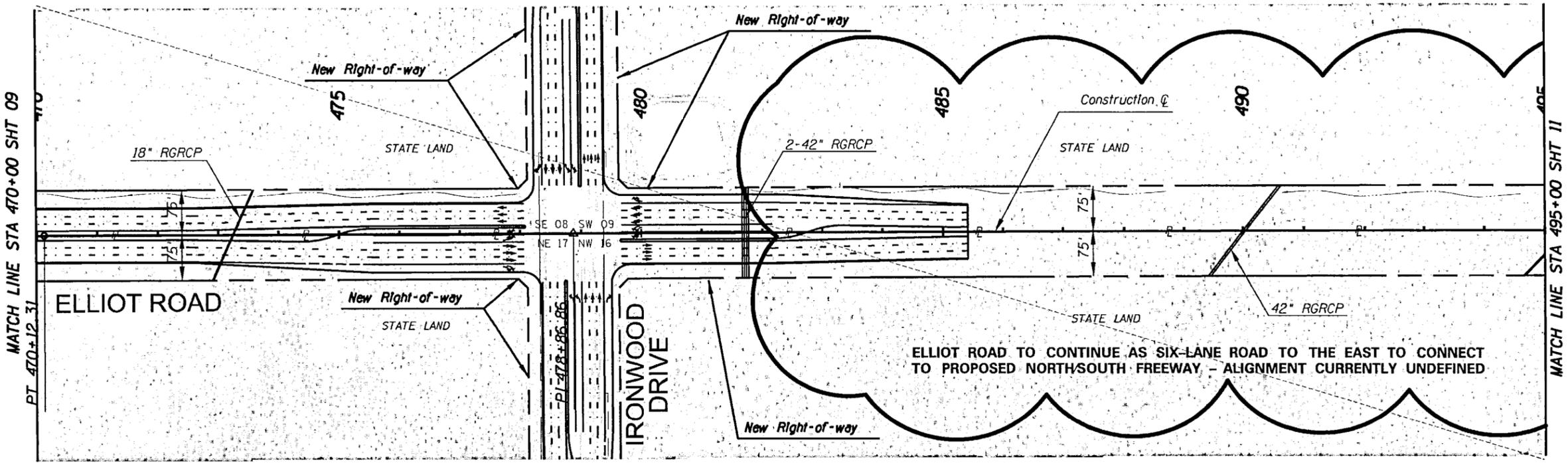
MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
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ELLIOT ROAD
CORRIDOR IMPROVEMENT STUDY
POWER ROAD TO CENTRAL ARIZONA PROJECT CANAL

RECOMMENDED FUTURE
ROADWAY GEOMETRY
SHEET 09 OF 12



English



6/12/2008 \$TIME\$ K:\R0wy\091337101_Elliot Rd Corridor\CADD\SHT091337101.RD10.dgn



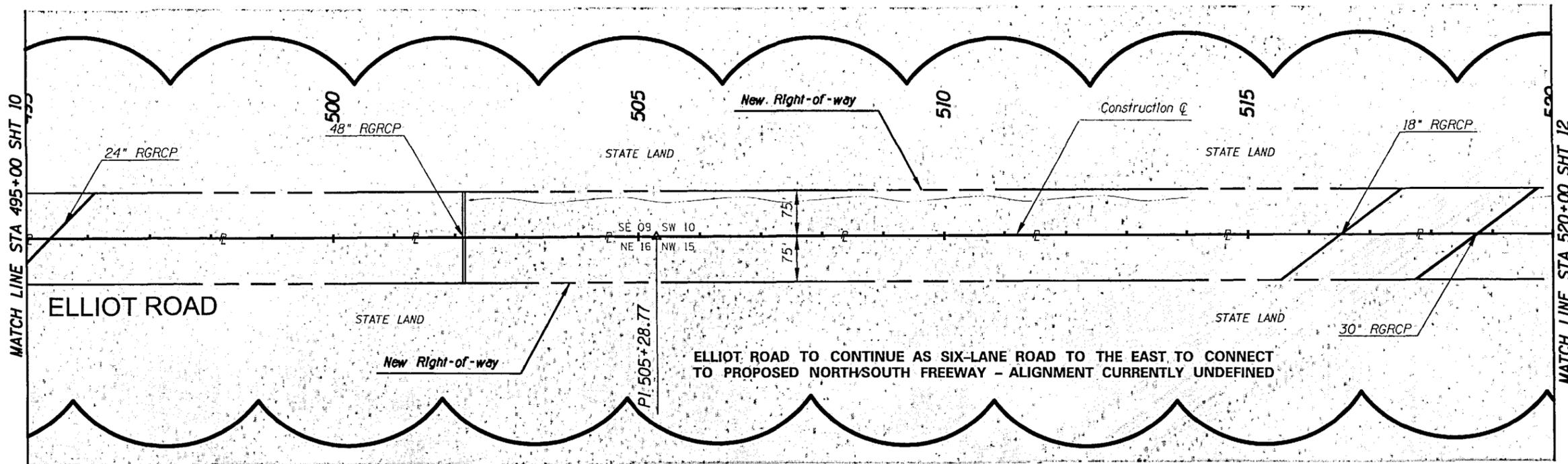
MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ELLIOT ROAD
CORRIDOR IMPROVEMENT STUDY
POWER ROAD TO CENTRAL ARIZONA PROJECT CANAL

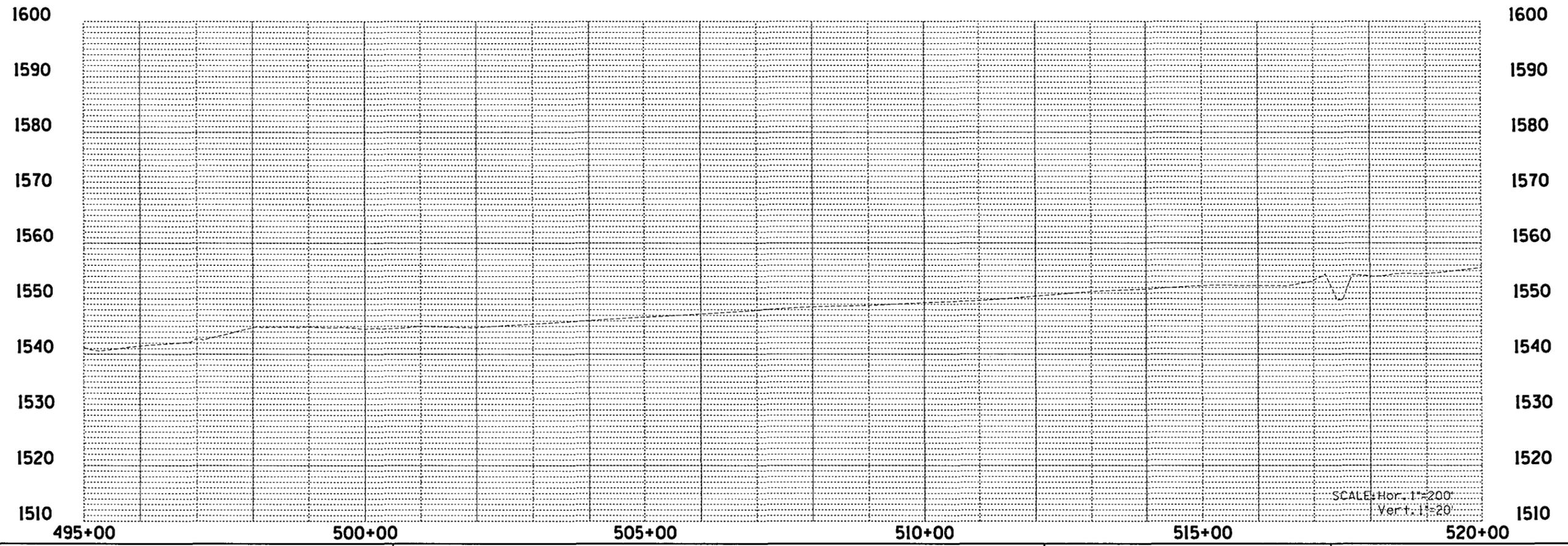
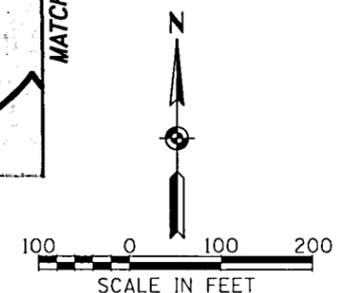
RECOMMENDED FUTURE
ROADWAY GEOMETRY
SHEET 10 OF 12



English



ELLIOT ROAD TO CONTINUE AS SIX-LANE ROAD TO THE EAST TO CONNECT TO PROPOSED NORTHSOUTH FREEWAY - ALIGNMENT CURRENTLY UNDEFINED



6/12/2008 \$TIME\$ K:\R091337101-Elliot Rd Corridor\CADD\SHT091337101RD11.dgn



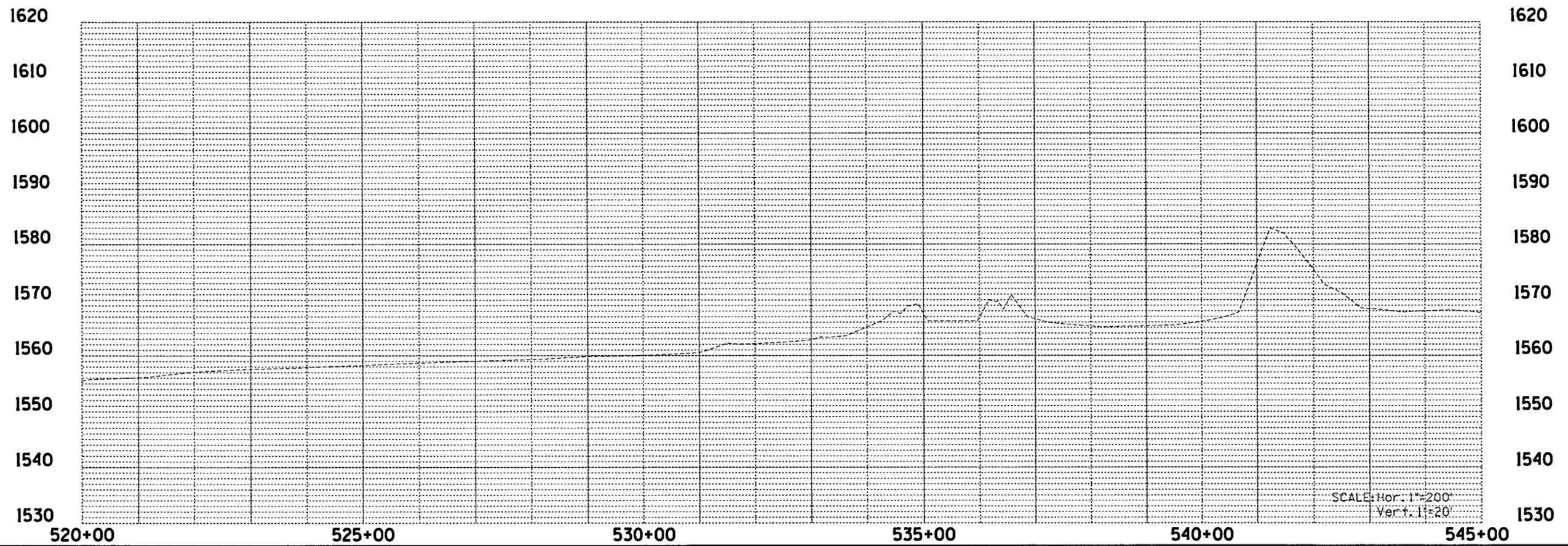
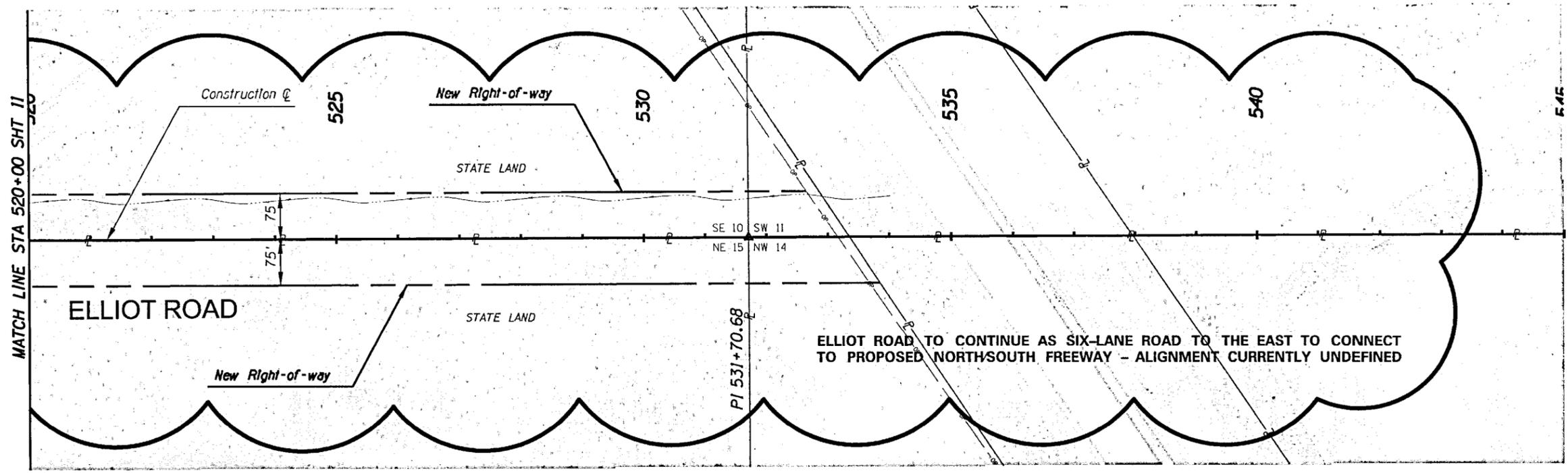
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ENGINEERING DIVISION

ELLIOT ROAD
CORRIDOR IMPROVEMENT STUDY
POWER ROAD TO CENTRAL ARIZONA PROJECT CANAL

RECOMMENDED FUTURE
ROADWAY GEOMETRY
SHEET 11 OF 12



English



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CORRIDOR IMPROVEMENT STUDY
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RECOMMENDED FUTURE
ROADWAY GEOMETRY
SHEET 12 OF 12



Kimley-Horn
and Associates, Inc.

English