State Transportation System Mobility and Regional Circulation Needs Feasibility Study

Draft Working Paper 3
Corridor Needs, Performance and Feasibility
Pima Association of Governments: State Transportation System Mobility and Regional Circulation Needs Feasibility Study (Loop Road Study)

DRAFT

Working Paper 3

Corridor Needs, Performance and Feasibility
# TABLE OF CONTENTS

1. **INTRODUCTION** .................................................................................................................................................. 1  
   1.1 Background Information ............................................................................................................................... 1  
   1.2 Study Purpose .................................................................................................................................................. 2  
   1.3 Corridors Evaluated ......................................................................................................................................... 2  
   1.4 Roadway Facility Types Evaluated for Loop Routes ....................................................................................... 4  

2. **NEEDS AND PERFORMANCE ASSESSMENT FOR LOOP CORRIDORS** .......................................................... 6  
   2.1 Travel Demand Modeling Process .................................................................................................................. 6  
   2.2 Needs Analysis Findings ..................................................................................................................................... 11  
      2.2.1 Revised Loop Corridor Concept Advanced to Feasibility Analysis ......................................................... 14  
   2.3 Regional Traffic Performance .......................................................................................................................... 17  
      2.3.1 Mobility ..................................................................................................................................................... 17  
      2.3.2 Freight Movements ..................................................................................................................................... 18  

3. **CORRIDORS FEASIBILITY ANALYSIS** ............................................................................................................. 22  
   3.1 Feasibility Evaluation Criteria .......................................................................................................................... 22  
   3.2 Physical Constructability Screen ..................................................................................................................... 22  
      3.2.1 Land Use/Land Ownership ............................................................................................................................ 22  
      3.2.2 Utilities/Railroad Infrastructure .................................................................................................................... 25  
      3.2.3 Topography .................................................................................................................................................. 25  
      3.2.4 Drainage ....................................................................................................................................................... 28  
      3.2.5 Central Arizona Project Canal ..................................................................................................................... 30  
      3.2.6 City of Tucson Water Facilities .................................................................................................................. 33  
      3.2.7 Right-of-Way and Access ............................................................................................................................ 36  
      3.2.8 Summary of Physical Constructability Opportunities and Constraints ....................................................... 39  
   3.3 Environmental Screen ....................................................................................................................................... 40  
      3.3.1 Socioeconomic Conditions ........................................................................................................................... 40  
      3.3.2 Biological Corridors and Critical Habitat ..................................................................................................... 41  
      3.3.3 Agricultural Lands-Ranch Lands ................................................................................................................ 42  
      3.3.4 Visual Character .......................................................................................................................................... 46  
      3.3.5 Noxious Weeds .......................................................................................................................................... 46  
      3.3.6 Water Resources ....................................................................................................................................... 47  
      3.3.7 Air Quality Analysis ................................................................................................................................... 47  
      3.3.8 Noise .......................................................................................................................................................... 48  
      3.3.9 Hazardous Materials ................................................................................................................................. 48  
      3.3.10 Section 4(f) Resources ............................................................................................................................... 51  
      3.3.11 Cultural Resources ..................................................................................................................................... 53  
      3.3.12 Summary of Environmental Opportunities and Constraints ................................................................. 55  
   3.4 Land Use and Area Plan Screen ........................................................................................................................ 57  
      3.4.1 Land Use Compatibility ............................................................................................................................... 57  
      3.4.2 Area Plans .................................................................................................................................................. 57  

4. **COST ESTIMATES** .................................................................................................................................................. 65  
   4.1 Planning, Engineering, and Construction Costs ............................................................................................... 65  
      4.1.1 Freeway Costs ............................................................................................................................................. 65  
      4.1.2 Parkway Costs ............................................................................................................................................ 65  
      4.1.3 Right-of-Way Acquisition Costs ................................................................................................................ 67
5. CONCLUSIONS AND RECOMMENDATIONS ................................................................. 68

5.1 Conclusions ................................................................................................................. 68
5.2 Recommendations ........................................................................................................ 70
  5.2.1 Corridor Preservation .............................................................................................. 71
  5.2.2 Funding Sources ...................................................................................................... 71
  5.2.3 Planning, Design, and Construction .......................................................................... 72

List of Figures
Figure 1-1 – Loop System Candidate Corridors ............................................................... 3
Figure 2-1 – Beyond 2030 Base Network ........................................................................ 7
Figure 2-2 – Loop System Candidate Corridor Evaluation Segments ............................... 10
Figure 2-3 – Justified High Capacity Corridors (Based on Demand Analysis Only) ........ 16
Figure 3-1 – Existing Land Ownership ............................................................................. 24
Figure 3-2 – Existing Railroad and Utility Structure ....................................................... 26
Figure 3-3 – Topography .................................................................................................. 27
Figure 3-4 – Major Washes ............................................................................................. 29
Figure 3-5 – 100 Year Floodplains .................................................................................... 31
Figure 3-6 – CAP ............................................................................................................ 32
Figure 3-7 – Tucson Water Recharge Facilities and Land Parcels .................................... 34
Figure 3-8 – Tucson Water’s Potable Distribution System as of 2000 .............................. 35
Figure 3-9 – Biological Corridors and Critical Habitat ...................................................... 43
Figure 3-10 – Riparian Areas ........................................................................................... 44
Figure 3-11 – Ranch Lands .............................................................................................. 45
Figure 3-12 – Hazardous Material Sites .......................................................................... 50
Figure 3-13 – Parks and Historic Districts ....................................................................... 52
Figure 3-14 – Cultural Resources .................................................................................... 54
Figure 3-15 – Existing Land Uses .................................................................................... 59
Figure 3-16 – 2030 Regional Transportation Plan and Loop Corridor System ............... 60

List of Tables
Table 1-1 – Roadway Facility Types .................................................................................. 5
Table 2-1 – Model Inputs .................................................................................................. 6
Table 2-2 – Lanes and Facility Level Assignments by Corridor Segment ......................... 9
Table 2-3 – Needs Analysis Summary .............................................................................. 12
Table 2-4 – Summary of Loop Study Corridors Advanced to Feasibility Analysis .......... 15
Table 2-5 – Overall Mobility Performance ....................................................................... 17
Table 2-6 – Mobility Performance by Functional Class (Urban Roads Only) ................... 18
Table 2-7 – Freight Movements in Arizona by Direction .................................................. 18
Table 3-1 – Major Land Ownership on Loop Corridors .................................................... 22
Table 3-2 – Utility and Railroad Impacts ........................................................................ 25
Table 3-3 – Major Topography Constraints on Loop Corridors ....................................... 28
Table 3-4 – Major Wash Crossings .................................................................................. 30
Table 3-5 – Major Tucson Water Infrastructure Constraints on Loop Corridors .............. 33
Table 3-6 – Right-of-Way Summary ................................................................................. 36
Table 3-7 – Summary of Physical Constructability Opportunities and Constraints .......... 39
Table 3-8 – Summary of Title VI Considerations ............................................................. 41
Table 3-8 – Impacts to Biological Corridors and Riparian Areas ...................................... 41
Table 3-9 – Impacts to Ranch Lands ................................................................................. 46
Table 3-10 – Potential Hazardous Material Impacts by Loop Corridor Route ................. 49
Table 3-11 – Potential Hazardous Material Impacts by Loop Corridor Route ................. 51
Table 3-12 – Potential Cultural Resource Impacts by Loop Corridor Route ........................................ 53
Table 3-13 – Summary of Key Environmental Feasibility Screen ...................................................... 56
Table 3-14 – Existing Land Use Opportunities and Constraints .......................................................... 57
Table 3-15 – Summary of Regional Transportation Plan .................................................................... 58
Table 4-1 – Estimate of Probable Cost ................................................................................................ 66
Table 4-2 – Potential right-of-way costs (in 2004 land values) .............................................................. 67
Table 5-1 – Summary of Feasibility Screens ....................................................................................... 69
1. INTRODUCTION

Working Paper Number 3 is the last of three working papers to be prepared as part of the Pima Association of Governments Transportation System Mobility and Regional Circulation Needs Feasibility Study (referred to as Loop Study). The primary purpose of this working paper is to document the results of a needs, performance, and feasibility assessment of the corridors that make up the Loop Road system. Corridor needs were evaluated using a travel demand assessment for a future regional population of 2.1 million persons. Corridor performance was assessed by evaluating mobility measures such as overall system mobility, mobility performance by urban/rural classification, functional class, and by loop system element. The study also analyzed the potential for the corridors to serve freight movements. Corridor feasibility was evaluated using engineering, environmental, and area plan compatibility screens. This working paper also provides preliminary cost information and recommendations regarding the future development process for the corridors.

1.1 Background Information

In January 1986, the Arizona State Transportation Board (ASTB) passed right-of-way resolutions designating nine roadways and corridors in the Pima Association of Government (PAG) Region as State Routes. The State Route designation is used by the ASTB to designate both existing rights-of-way and corridors for future construction of State Highways; this designation makes the Route eligible for State controlled funds for planning studies including alignment and environmental studies. Construction and maintenance of State Routes are the responsibility of local jurisdictions until such time as they are designated as State Highways by the ASTB.

Four of the nine State Routes were identified by the ASTB as priority corridors and commitments were made to partner with PAG and its member jurisdictions on funding corridor studies. The priority corridors were:

- Tangerine Road (SR 989)
- Golf Links Extension (SR 810)
- Sahuarita Corridor (SR 982)
- Houghton Road (SR 983)

The adopted 1986 PAG Regional Transportation Plan (RTP) included all nine State Routes and relied heavily on the priority corridors to meet the Region’s 20-year transportation needs. The State Routes made up a significant portion of the 80 miles of new controlled access roadways and 22 miles of new arterial roadways that were recommended in the 1986 RTP.

Funding of studies for the priority corridors has resulted in corridor improvement plans and environmental analyses for the Sahuarita Corridor, Tangerine Road, and Houghton Road. Additionally, Golf Links Road, another priority corridor, was extended east to Houghton Road using local funds, and improvements to Tangerine Road were made. However, shortfalls in local and state funding and jurisdictional differences on corridor improvement plans have significantly limited the development of the priority corridors and other State Routes.

In an attempt to facilitate development of the Region’s priority corridors and to address an identified lack of State Highways in the PAG Region, six jurisdictions in the PAG region asked the ASTB to take three corridors into the State Highway System. In a November 2003 letter to the ASTB, the following three corridors were requested for designation as State Highways.
These three corridors, when combined with the transportation system included in the 1986 RTP, make up a majority of the corridors that have been evaluated in this study – the PAG State Transportation Mobility and Regional Circulation Needs Feasibility Study (Loop Road Study). This renewed interest in the development of a loop system along with the passing of House Bill 2507 (the PAG Regional Transportation Authority) has given PAG an opportunity to consider the need for and feasibility of reestablishing a planning framework for the region’s transportation system.

1.2 Study Purpose

The principal purpose of the PAG Loop Road Study is to evaluate the need for, and feasibility of, developing a system of limited, controlled, and reduced access roadways in the PAG region. The successful completion of this study will result in the following regional transportation goals being met:

- A traffic circulation and access framework for future planning efforts in the PAG region;
- Identification of transportation corridors in advance of land use development to meet future mobility and regional bypass needs in future growth areas of the region;
- Preservation of corridors and establishment of land use controls in the emerging and fringe areas of the region;
- Extension of the functional and operational life-cycle of existing arterials, collectors, and local streets in developed areas by providing opportunities for diverting regional traffic to regional routes;
- Inclusion of additional transportation corridors in the PAG travel demand model;
- Inclusion of additional transportation corridors in the PAG 2030 Regional Transportation Plan;
- A basis for prioritizing and programming transportation corridor development; and
- A foundation for a public/private partnership in the funding of transportation infrastructure.

1.3 Corridors Evaluated

Figure 1-1 shows the corridors that were analyzed and evaluated in this study. Based on the results of the needs analysis, these corridors were further refined and evaluated for feasibility. These corridors were developed based on input from the PAG staff and Technical Advisory Committee (TAC) members. The ten (10) corridors that were evaluated individually or as components of a larger system, encompass approximately 215 miles of roadway, and include existing urban and rural arterial facilities. The corridors also include both expansion of existing facilities, as well as new facilities on new right-of-way.
Figure 1-1
Loop System
Candidate Corridors
1.4 Roadway Facility Types Evaluated for Loop Routes

While the loop system will need to provide improved regional connectivity, not all corridors will require the same amount of access restriction, number of lanes, speed limits, and intersection types. In an effort to distinguish future corridor infrastructure, three distinct facility types were identified – limited access control, restricted access control, and full access control facilities. These facility types were evaluated during corridor modeling and are described below.

**Limited access control facilities are urban multi-lane arterial streets with access limitations** intended to increase capacity and travel speeds. Access management strategies that might be implemented to accomplish this include: continuous median barriers, prohibition of left-turn movements, Florida-tee intersections (left turns are prohibited and drivers make a right turn, followed by a u-turn to turn left), driveway consolidation, and possibly frontage roads. Intelligent transportation system technologies include adaptive signal timing and dynamic message signs. Access to individual businesses and residences will be avoided to the extent possible. Six (6) lanes, three in each direction, will be considered the minimum number of lanes for these roadways and typical right-of-way requirements will be 150 feet. An example of a limited access controlled arterial is Kolb Road, in the vicinity of Davis Monthan Air Force Base.

**Restricted access control facilities are urban or suburban multi-lane parkways** with a combination of at-grade intersections, grade-separated intersections, and interchanges. In urbanized areas, these interchanges will be most commonly Single Point Urban Interchanges (SPUI’s), which are interchanges designed similar to a diamond interchange, but with all ramps controlled by a single signalized intersection. Opposing travel directions will be physically separated by either a barrier or a median. Six (6) lanes, three in each direction, is the typical number of lanes for these roadways and right-of-way requirements are anticipated to vary between 150 and 300 feet. An example of this type of facility is the Barraza-Aviation Parkway.

**Full access control facilities are multi-lane freeways** where access is allowed only via ramps at traffic interchanges. Opposing travel directions will be physically separated by either a barrier or a median. Four (4) lanes, two in each direction, will be considered the minimum number of lanes for these roadways and typical right-of-way requirements will be 300 feet.

A summary of the three facility types are provided in Table 1-1.
### Table 1-1 – Roadway Facility Types

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Limited Access Control</th>
<th>Restricted Access Control</th>
<th>Full Access Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway Classification</td>
<td>Arterial with Access Control</td>
<td>Parkway</td>
<td>Freeway</td>
</tr>
<tr>
<td>Jurisdiction</td>
<td>Local, Regional</td>
<td>Regional, State</td>
<td>State</td>
</tr>
<tr>
<td>Design Standard</td>
<td>Local</td>
<td>Local, ADOT</td>
<td>ADOT</td>
</tr>
<tr>
<td>Area Classification</td>
<td>Urban</td>
<td>Urban, Suburban</td>
<td>Urban, Suburban, Rural</td>
</tr>
<tr>
<td>Posted Speed Limit</td>
<td>35-45 mph</td>
<td>40-45 mph</td>
<td>55-75 mph</td>
</tr>
<tr>
<td>Typical Right-of-Way Needs</td>
<td>150 feet</td>
<td>150 - 300 feet</td>
<td>300 feet</td>
</tr>
<tr>
<td>Typical Number of Lanes</td>
<td>6</td>
<td>6</td>
<td>4-8</td>
</tr>
<tr>
<td>Interchange Type</td>
<td>N/A</td>
<td>SPUI*, tight diamond</td>
<td>SPUI*, tight diamond</td>
</tr>
<tr>
<td>Interchange Spacing</td>
<td>N/A</td>
<td>1 mile minimum for interchanges</td>
<td>1-mile minimum, 2-mile preferred</td>
</tr>
<tr>
<td>Frontage Roads</td>
<td>Possible</td>
<td>Possible, but not desirable with SPUIs*</td>
<td>Possible, but not desirable with SPUIs*</td>
</tr>
<tr>
<td>Intersection Type</td>
<td>Signalized, two-way stop</td>
<td>Signalized, two-way stop</td>
<td>N/A</td>
</tr>
<tr>
<td>Minor Street Intersections</td>
<td>Yes, with turning restrictions</td>
<td>Possible, with turning restrictions</td>
<td>No</td>
</tr>
<tr>
<td>Driveways</td>
<td>Consolidated with turning restrictions</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Bus Stops</td>
<td>Yes, with pullouts</td>
<td>Possible, with pullouts</td>
<td>No</td>
</tr>
<tr>
<td>Bicycle Facilities</td>
<td>Yes</td>
<td>Possible</td>
<td>No</td>
</tr>
<tr>
<td>Pedestrian Facilities</td>
<td>Possible</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Future Improvements</td>
<td>N/A</td>
<td>Full Access Control</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* SPUI = Single Point Urban Interchange
2. NEEDS AND PERFORMANCE ASSESSMENT FOR LOOP CORRIDORS

The purpose of the corridor needs analysis is to identify the corridor(s), or portions of the corridors that will:

- Improve regional mobility and continuity.
- Attract sufficient travel demand volume to warrant a major transportation facility.
- Provide congestion relief to other transportation facilities.

Section 2.1 describes the transportation demand model and the modeling process that formed the basis of the needs analysis. Section 2.2 presents the findings and conclusions of the needs analysis. Section 2.3 describes how the loop corridor system affects the regional transportation system performance.

2.1 Travel Demand Modeling Process

In order to determine future travel demands, a transportation model was developed to represent future development of the PAG region. Population growth trends indicate that growth is anticipated to occur in the southeast, Tucson Mountain and Houghton Road areas, as well as “in-fill” of vacant land and redevelopment in Tucson, Marana, Sahuarita and Oro Valley. A transportation model was developed to reflect these trends, which indicate a future regional population of 2.1 million persons. This level of growth is anticipated to occur at some point in the future beyond the year 2030. For this reason, the regional model was termed the “Beyond 2030” model.

The Beyond 2030 model was run for two cases:

1. Base - This model included roadway improvements included in the PAG 2030 model, and the socioeconomic data described below. The model also included recommendations from recent transportation planning studies, described later in this section. This base roadway network is depicted in Figure 2-1.

2. Base + Loop Corridors - This model also included the roadway improvements included in the PAG 2030 model, and included the loop corridors, which are described later in this section.

The travel demand modeling inputs were based on the following regional socioeconomic conditions, shown in Table 2-1:

Table 2-1 – Model Inputs

<table>
<thead>
<tr>
<th>Model Inputs</th>
<th>2030 Model</th>
<th>Beyond 2030 Models</th>
<th>Percent Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>1,500,000</td>
<td>2,100,000</td>
<td>40%</td>
</tr>
<tr>
<td>Employment</td>
<td>700,000</td>
<td>950,000</td>
<td>36%</td>
</tr>
<tr>
<td>Housing Units</td>
<td>600,000</td>
<td>850,000</td>
<td>42%</td>
</tr>
</tbody>
</table>
The travel demand modeling inputs also reflected changing area type characteristics in which urban area travel characteristics were expanded to account for areas that were expected to become infilled, such as Marana, Sahuarita, and the southeast area of Tucson.

The model was also revised to reflect the recommendations of the I-10 Corridor Study Draft Traffic Report (July, 2005) and the I-19 Corridor Study, I-10 to Pima / Santa Cruz County Line (October 2003). In addition, the future roadway system in the southeast area of Tucson was incorporated into the model, based on the findings of the Southeast Area Arterial Study (January, 2005) which provides recommendations for a major streets and routes plan in the southeast portion of Pima County.

The candidate corridors, originally defined in consultation with PAG and the TAC, were assigned a facility type (e.g., arterial, parkway, and freeway) and number of lanes. These were assigned to be consistent with what is needed to support the projected traffic volumes. Table 2-2 shows the facility type and number of lanes assigned to each corridor segment. These original corridors, shown in Figure 2-2, are defined as follows:

- **Houghton/Golf Links/Swan Loop.** This corridor provides connectivity between I-10, the eventual alignment for Sahuarita Corridor as identified in the Southeast Area Arterial Study, Houghton Road, and the existing Golf Links Road. This corridor also provides a connection to the existing Barraza Aviation Highway.

- **Southwest Outer Loop.** This corridor links I-10 in northern Marana with I-10 near the community of Vail via Sandario Road and the eventual Sahuarita Corridor alignment as identified in the Southeast Area Arterial Study.

- **Southwest Inner Loop.** This corridor links I-10 in northern Marana with Houghton Road via Valencia Road.

- **River/Alvernon Corridor.** This corridor links I-10 at the Orange Grove Road interchange with the eventual alignment for the Sahuarita Corridor identified in the Southeast Area Arterial Study via River Road, Alvernon Road, and Swan Road.

- **Kolb/Northern I-10 Loop.** This corridor links I-10 in northern Tucson with the eventual Sahuarita Corridor alignment via Kolb Road. Possible locations for the connection to I-10 include Ina Road, Orange Grove Road, Grant Road interchanges.

- **Houghton/Sunrise Corridor.** This corridor links I-10 in northern Tucson with the eventual Sahuarita Corridor alignment as identified in the Southeast Area Arterial Study via Sunrise Road and Houghton Road. Possible locations for an I-10 connection include the Ina Road and Orange Grove Road interchanges.

- **Oracle Junction/La Cholla Corridor.** This corridor connects SR-77 near the Oracle Junction to I-10 in the City of Tucson via the La Cholla Boulevard alignment. Possible locations for an I-10 connection include the Ruthrauff Road interchange or a new interchange between Ruthrauff Road and Prince Road.

- **Barraza Aviation Corridor.** This corridor connects I-10 at the Valencia Road interchange with downtown Tucson via the Barraza Aviation Parkway alignment.

- **Tangerine/Valencia Loop.** This corridor connects Oracle Road (SR-77) with Northern I-10, I-19, and Southern I-10 via Tangerine Road and Valencia Road. Possible connections to I-10 in the Town of Marana include the existing Tangerine Road interchange and the future Twin Peaks Road interchange while the existing Valencia Road interchange will provide connection.
to I-19. The termination of this corridor may be either at the new Alvernon/Swan Road alignment, I-10, or Houghton Road.

Tanque Verde Corridor. This corridor provides connections via the existing Tanque Verde Road alignment. While the range of connection depends on the need for other corridors, the Tanque Verde Corridor could ultimately connect I-10 at the Grant Road interchange with Kolb Road and/or Houghton Road.

Table 2-2 – Lanes and Facility Level Assignments by Corridor Segment

<table>
<thead>
<tr>
<th>Corridor Segment</th>
<th>Segment Description</th>
<th>Initial Model Assumptions for Facility Level and Number of Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Houghton/Golf Links/Swan Loop</td>
<td>Houghton Road: 6-lane parkway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Golf Links Road: 6-lane parkway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Swan Road: 6-lane parkway</td>
</tr>
<tr>
<td>2</td>
<td>Southwest Outer Loop</td>
<td>4-lane freeway</td>
</tr>
<tr>
<td>3</td>
<td>Southwest Inner Loop</td>
<td>6-lane freeway</td>
</tr>
<tr>
<td>4</td>
<td>River/Alvernon Corridor</td>
<td>River Road: 6-lane parkway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alvernon Way: 6-lane parkway</td>
</tr>
<tr>
<td>5</td>
<td>Kolb/Northern I-10 Loop</td>
<td>Kolb: 6-lane parkway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grant Road: 6-lane parkway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Craycroft Road: 6-lane parkway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sunrise Drive: 6-lane parkway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Orange Grove Road: 6-lane parkway</td>
</tr>
<tr>
<td>6</td>
<td>Houghton/Sunrise Corridor</td>
<td>Houghton Road: 6-lane parkway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sunrise: Access controlled 6 lanes</td>
</tr>
<tr>
<td>7</td>
<td>Oracle Junction/La Cholla Corridor</td>
<td>La Cholla Blvd: 6-lane parkway (to Tangerine Rd)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-lane parkway (to SR 77 junction)</td>
</tr>
<tr>
<td>8</td>
<td>Barraza-Aviation Corridor</td>
<td>Barraza-Aviation Extension: 6-lane parkway</td>
</tr>
<tr>
<td>9</td>
<td>Tangerine/Valencia Loop</td>
<td>Tangerine Road: 6-lane arterial</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Valencia Road: 8-lane freeway</td>
</tr>
<tr>
<td>10</td>
<td>Tanque Verde Corridor</td>
<td>6-lane parkway</td>
</tr>
</tbody>
</table>
Figure 2-2
Loop System
Candidate Corridor
Evaluation Segments
2.2 Needs Analysis Findings

The corridors depicted in Figure 2-3 were assessed to determine if there was a need for the corridor. This was accomplished by reviewing the projected travel demand in order to give an assessment based on the following criteria:

- Does the facility improve regional mobility and continuity?
- Does the facility attract sufficient volume for a major transportation facility (Do they ‘load’)?
- Does the corridor provide congestion relief to other transportation facilities and areas?

Table 2-3 is a summary of needs analysis findings for each corridor, and the degree to which future buildout travel on each corridor segment satisfies the required criteria.
<table>
<thead>
<tr>
<th>Segment Name.</th>
<th>Criteria # 1 – Does the facility improve regional mobility and continuity?</th>
<th>Criteria # 2 – Does the facility attract sufficient volume for a major transportation facility (Do they ‘load’)?</th>
<th>Criteria # 3 – Does the corridor provide congestion relief to other transportation facilities and areas?</th>
<th>Needs Analysis Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southwest Outer Loop</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Although a freeway facility is not needed for entire length, reserving ROW for future freeway facility is recommended.</td>
</tr>
<tr>
<td></td>
<td>Provides alternative route to I-10 and I-19.</td>
<td>Freeway volumes between I-10 and Valencia</td>
<td>Relieves congestion on I-19 and I-10.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alternative freight route.</td>
<td>Traffic volumes decrease west of I-19 and east of Kolb (need questionable as freeway).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Links Sahuarita to Marana.</td>
<td>Traffic volumes increase north of SR 86, but not to freeway volumes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Links to I-10 and I-19 to SR 86.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southwest Inner Loop</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Although traffic volumes are not at freeway levels east of Kolb Road, reserving ROW for a future freeway facility is recommended.</td>
</tr>
<tr>
<td></td>
<td>Links the Tucson Airport, Puerto Nuevo to I-19 and I-10.</td>
<td>Freeway volumes east of SR 86</td>
<td>SR 86 to I-10 segment relieves congestion on I-10 but traffic volumes do not warrant freeway.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Links to SR 86.</td>
<td>Traffic volumes decrease east of Kolb (Parkway Kolb to Houghton)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Houghton/ Golf Links/ Swan Road</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>This corridor demonstrates need for a Parkway with GSIs.</td>
</tr>
<tr>
<td></td>
<td>Links southeast area to central Tucson</td>
<td>Parkway with GSIs needed (demand exceeds capacity).</td>
<td>Relieves congestion on 22nd Street.</td>
<td></td>
</tr>
<tr>
<td>River/Alvernon Corridor</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>This corridor demonstrates need for a Parkway with GSIs.</td>
</tr>
<tr>
<td></td>
<td>Connects I-10 to northeast Tucson.</td>
<td>Parkway with GSIs needed (demand exceeds capacity).</td>
<td>Relieves congestion on Ina, Orange Grove and Prince Road.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connects I-10 to Houghton/Golf Links Loop, connects La Cholla Blvd. traffic to east.</td>
<td></td>
<td>Alvernon Road segment relieves congestion on arterial streets in southeast area.</td>
<td></td>
</tr>
<tr>
<td>Kolb/Northern I-10 Loop</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Parkway needed on Orange Grove Road east of La Cholla and on remainder of route. Parkwy with GSIs needed on Kolb Road, Valencia to Grant Rd.</td>
</tr>
<tr>
<td></td>
<td>Connects southeast area to northeast and northwest areas.</td>
<td>Parkway needed on Orange Grove Road east of La Cholla (arterial volumes west of La Cholla). Parkway with GSIs needed on Kolb Road, Valencia to Grant Rd.</td>
<td>Relieves congestion on Ina Road corridor (Ina to remain an arterial).</td>
<td></td>
</tr>
<tr>
<td>Houghton/ Sunrise</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>This corridor demonstrates need</td>
</tr>
<tr>
<td>Segment Name</td>
<td>Criteria #1 – Does the facility improve regional mobility and continuity?</td>
<td>Criteria #2 – Does the facility attract sufficient volume for a major transportation facility (Do they ‘load’?)?</td>
<td>Criteria #3 – Does the corridor provide congestion relief to other transportation facilities and areas?</td>
<td>Needs Analysis Conclusions</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>Corridor</td>
<td>Ø Connects southeast area to northeast and northwest areas.</td>
<td>Ø Parkway with GSIs needed between I-10 and Golf Links Road</td>
<td>Relieves congestion on parallel facilities.</td>
<td>for a parkway with GSIs on Houghton Road between I-10 and Golf Links Road. Arterial facilities are needed elsewhere.</td>
</tr>
<tr>
<td></td>
<td>Ø Connects Houghton to Ina Road/ Orange Grove Road</td>
<td>&quot; No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ø Arterial volumes from Golf Links Road to Sunrise Dr.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&quot; No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ø Arterial volumes on Snyder Road connection.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oracle Junction / La Cholla Corridor</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>This corridor demonstrates need for a parkway. GSIs indicated on La Cholla south of Tangerine Road.</td>
</tr>
<tr>
<td></td>
<td>Ø Connects I-10 at Ruthrauff interchange to SR 77 near Oracle junction.</td>
<td>Ø Parkway with GSIs needed- south of Tangerine Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barraza-Aviation Corridor</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>This corridor demonstrates need for a Parkway.</td>
</tr>
<tr>
<td></td>
<td>Ø Connects I-10 to downtown Tucson</td>
<td>Ø Attracts parkway level traffic volumes</td>
<td>Ø Relieves congestion on I-10.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tangerine/ Valencia Loop</td>
<td>Yes</td>
<td>&quot; No</td>
<td>&quot; No</td>
<td>Tangerine Road does not attract sufficient traffic volume for a freeway or parkway.</td>
</tr>
<tr>
<td></td>
<td>Ø Connects I-10 and SR 77.</td>
<td>Ø Tangerine Road traffic volumes are decreasing beyond 2030, and a portion of the 2030 projected volumes are attracted to other facilities. (see discussion in text on page 14).</td>
<td>Ø Does not relieve congestion significantly on parallel routes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GSI = Grade-separated interchange
Needs were not demonstrated for either freeway or parkway facilities on the following loop system elements:

1. Tangerine Road
2. Houghton Road, north of Golf Links Road
3. Ina Road
4. Orange Grove Road, west of La Cholla Boulevard
5. Snyder Road connection to Houghton Road.

These may be candidates for restricted access arterials but volume ranges do not justify other facility classifications.

One aspect of the modeling work was that Tangerine Road appeared to lose significance as a regional route, and travel demand volumes decreased as compared to previous travel demand volumes. A comparison of these data indicated that other Loop corridor routes are attracting travel demand volumes from this roadway facility. In particular, the La Cholla parkway appears to be drawing traffic from this route.

2.2.1 Revised Loop Corridor Concept Advanced to Feasibility Analysis

Based on the results of the analysis described above, and input from the Technical Advisory Committee and PAG, the original loop study corridors were further refined in order to eliminate corridors or corridor segments that did not serve the evaluation criteria described above. The loop corridors were also revised in order to provide corridors that did not overlap, e.g. provided unique corridor segments.

It should be noted that on the Western Freeway alignment, there is a wide swath shown on Valencia Road. This is to depict that the corridor could be centered on other east-west routes in this general area, such as Drexel Road or Los Reales Road.

The revised Loop Corridors are depicted in Figure 2-3. The Loop Study Corridor Concept that was advanced to the feasibility assessment includes the following facilities, as summarized in Table 2-4:
Table 2-4 – Summary of Loop Study Corridors Advanced to Feasibility Analysis

<table>
<thead>
<tr>
<th>Segment Description</th>
<th>Facility Type, Mileage and Number of Lanes</th>
<th>Other Facility Features</th>
</tr>
</thead>
</table>
| Western Freeway Loop     | - 31.5 miles: 4-lane freeway (I-10 to Valencia Rd)  
- 4.2 miles: 6-lane freeway (Valencia Road, 4.2 miles west of Mark Road to Mark Rd)  
- 13.3 miles: 8-lane freeway (Valencia Rd between Mark Road and Kolb Road) | 4 system interchanges                        |
| Southern Freeway Loop    | - 29.6 miles: 4-lane freeway (Western Freeway to I-19)  
- 9.4 miles: 6-lane freeway (Swan to I-19)  
- 20.6 miles: 8-lane freeway (Kolb Road, Valencia to Swan) | 4 – 5 system interchanges                   |
| Houghton / Golf Links Parkway | - 22 miles: 6-lane parkway                                                                                   | Grade-separated interchanges                |
| River / Alvernon / Swan Parkway | - 32.5 miles: 6-lane parkway                                                                               | Grade-separated interchanges                |
| Kolb/Orange Grove Parkway | - 12 miles: 4-lane parkway  
- 14 miles: 6-lane parkway                                                                                   | Grade-separated interchanges needed on Kolb Road (Valencia Road to Grant Rd) |
| La Cholla Corridor Parkway | - 10 miles: 4-lane parkway (SR 77 to Tangerine Road)  
- 10 miles: 6-lane parkway (Tangerine Road to I-10)                                                            | Grade-separated interchanges needed south of Tangerine Road |
| Barraza- Aviation Parkway | - 4 miles: 6-lane parkway                                                                                   | 1 system interchange                        |
Figure 2-3
Justified High Capacity Corridors (based on demand analysis only)
2.3 Regional Traffic Performance

The methodology for calculating system performance is based on previous work conducted for the Arizona Department of Transportation (ADOT) and other agencies. Previous planning efforts, such as the Arizona Long-Range Transportation Plan (MoveAZ) and ADOT’s Corridor Definition Studies in Pinal County, provide information on potential performance measures for highway systems. Mobility and freight movement performance factors were analyzed and are discussed in the following sections:

2.3.1 Mobility

Overall system mobility was evaluated by analyzing the percentage of the network that is congested (V/C greater than 1) and very congested (V/C greater than 1.5). Table 2-5 presents mobility performance measures for the entire transportation system.

Table 2-5 – Overall Mobility Performance

<table>
<thead>
<tr>
<th>Scenario</th>
<th>VHT</th>
<th>Percent of network congested (V/C &gt; 1)</th>
<th>Percent of Network Very Congested (V/C &gt; 1.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beyond 2030 Base</td>
<td>1,625,119</td>
<td>46.9%</td>
<td>29.2%</td>
</tr>
<tr>
<td>Base + Loop Corridors</td>
<td>1,328,773</td>
<td>37.5%</td>
<td>18.9%</td>
</tr>
<tr>
<td>Deviation from Base</td>
<td>-18.24%</td>
<td>-20.08%</td>
<td>-35.32%</td>
</tr>
</tbody>
</table>

Source: Cambridge Systematics, 2005

Key findings for overall mobility performance are summarized as follows:

- The Loop Corridors are providing alternative routes for overcapacity corridors.
- Vehicle hours of travel decline by 18 percent, despite an 11 percent increase in volumes. This suggests that the loop system provides greater efficiency of travel movements.
- Network congestion declines substantially. Over 45 percent of roads are over capacity in the Beyond 2030 Base, which is reduced by 20 percent with inclusion of the loop corridors. The percent of roads that are very congested (with a v/c ratio greater than 1.5) declines by over 35 percent (from 29 percent to 19 percent).

Examining the mobility measures by functional class identifies the shifting patterns of travel in the PAG region. Table 2-6 presents the performance of the urban roads, by functional class. Some of the key findings from this analysis include:

- The loop corridor system involves the construction of substantial new miles of freeway.
- Most of the remainder of the loop system shifts existing roadways from lower to higher functional class (i.e., major arterial to parkway and minor to major
arterial). This causes an attendant shift in traffic patterns, from lower to higher functional classes.

Table 2-6 – Mobility Performance by Functional Class (Urban Roads Only)

<table>
<thead>
<tr>
<th>Functional Class</th>
<th>Roadway Miles</th>
<th>VMT (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Base</td>
<td>Base + Loop Corridors</td>
</tr>
<tr>
<td>Freeway</td>
<td>157</td>
<td>336</td>
</tr>
<tr>
<td>Parkway</td>
<td>227</td>
<td>274</td>
</tr>
<tr>
<td>Major Arterial</td>
<td>870</td>
<td>972</td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>948</td>
<td>849</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>2202</strong></td>
<td><strong>2431</strong></td>
</tr>
</tbody>
</table>

2.3.2 Freight Movements

Tucson sits at the crossroads of I-10 and I-19. As a result, substantial domestic and international freight passes through the region. This section provides a brief overview of freight movements in Arizona and Pima County and considers the impact that the loop road system could have on the movement of freight.

2.3.2.1 Statewide Freight Context

This section provides summary information related to the movement of goods in Arizona. A summary of the movements of goods in Arizona is presented in Table 2-7.

Table 2-7 – Freight Movements in Arizona by Direction

<table>
<thead>
<tr>
<th>Direction</th>
<th>Millions of Tons</th>
<th>Percent of Total</th>
<th>Millions of Dollars</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outbound</td>
<td>28.9</td>
<td>8%</td>
<td>44,284</td>
<td>6%</td>
</tr>
<tr>
<td>Inbound</td>
<td>52.8</td>
<td>14%</td>
<td>68,641</td>
<td>9%</td>
</tr>
<tr>
<td>Internal</td>
<td>85.8</td>
<td>22%</td>
<td>68,912</td>
<td>9%</td>
</tr>
<tr>
<td>Through</td>
<td>217.3</td>
<td>56%</td>
<td>605,486</td>
<td>77%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>384.8</strong></td>
<td><strong>100%</strong></td>
<td><strong>787,323</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Several key findings are notable:

- Through traffic is by far the largest directional flow in the state with 217 million tons of freight flows and 605 billion dollars worth of shipments. This
far exceeds the flows of outbound, inbound, and internal goods combined. It represents 56 percent of the total tons and 77 percent of the total value shipped in Arizona.

Inbound movements are much greater in Arizona than outbound movements. This reflects Arizona’s status as a consumer, rather than a producer, of goods.

Trucks represent the major mode for freight in Arizona. Over 82 percent of freight with an origin or destination in Arizona moves by truck (137 million tons); over 70 percent of through movements move by truck (152 million tons).

Based on work completed for the I-10 National Freight Corridor Study (Wilbur Smith Associates, May 2003), truck volumes on I-10 are expected to grow at around 3 percent per year, roughly doubling by 2025. The same work suggests that vehicle volumes will grow at a somewhat slower rate, around 2.4 percent per year. Growth in freight truck traffic will depend on a number of external factors, including fuel prices, port demand and capacity.

2.3.2.2 Pima County Freight Flows

Pima County is second to Maricopa County as the number one origin and destination for freight traffic in Arizona with over 34 million tons of domestic freight originating and/or terminating in the County (Table 2-8). The majority of these movements are by truck (32 millions tons). Flows with an origin and destination in Pima County are likely to continue using the existing transportation network. Although in some cases new roads may provide more direct routes for the movements of these goods, most of the economic activity and goods consumption occurs in areas that are best accessed by I-10.

<table>
<thead>
<tr>
<th>Modes</th>
<th>Outbound</th>
<th>Inbound</th>
<th>Internal</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck</td>
<td>12,717</td>
<td>18,079</td>
<td>1,232</td>
<td>32,028</td>
<td>94%</td>
</tr>
<tr>
<td>Rail</td>
<td>54</td>
<td>163</td>
<td>–</td>
<td>217</td>
<td>1%</td>
</tr>
<tr>
<td>Air</td>
<td>1,497</td>
<td>335</td>
<td>–</td>
<td>1,831</td>
<td>5%</td>
</tr>
<tr>
<td>Water</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>14,267</td>
<td>18,577</td>
<td>1,232</td>
<td>34,076</td>
<td>100%</td>
</tr>
<tr>
<td>Percent</td>
<td>42%</td>
<td>55%</td>
<td>4%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

2.3.2.3 International Movement of Goods through Arizona

Table 2-9 presents the total international movement of goods by mode.
Table 2-9 – International Flows by Mode (Millions of Tons)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Truck</th>
<th>Rail</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona-Mexico</td>
<td>2.3</td>
<td>0.5</td>
<td>2.8</td>
<td>20%</td>
</tr>
<tr>
<td>U.S.-Mexico (Through Arizona)</td>
<td>1.9</td>
<td>1.1</td>
<td>3.0</td>
<td>21%</td>
</tr>
<tr>
<td>Mexico-Arizona</td>
<td>2.9</td>
<td>1.1</td>
<td>4.0</td>
<td>28%</td>
</tr>
<tr>
<td>Mexico – U.S. (Through Arizona)</td>
<td>4.1</td>
<td>0.4</td>
<td>4.5</td>
<td>31%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11.2</strong></td>
<td><strong>3.2</strong></td>
<td><strong>14.4</strong></td>
<td><strong>100%</strong></td>
</tr>
<tr>
<td><strong>Percent of Total</strong></td>
<td><strong>78%</strong></td>
<td><strong>22%</strong></td>
<td><strong>100%</strong></td>
<td></td>
</tr>
</tbody>
</table>

Some of the key findings related to international movements include:

- Most goods in Arizona travel to or from Maricopa County. Only 6 percent of goods traveling to or from Mexico originate or terminate in Pima County (about 306,000 tons).
- Much of the freight movement through Arizona ports of entry has destinations or origins outside of Arizona. About 6 million tons have origins or destinations in other states; about 5 million tons originate in or are destined for Arizona.
- Much of the traffic passing through Arizona has origins or destinations in California. Just over half of all imports through Nogales that are not destined for Arizona are shipped to California. A small percentage of these commodities is destined for other western states and somewhat less than half travels east.

2.3.2.4 Potential Freight Bypasses

Two of the proposed loop roads stand out as potential freight bypasses:

- The Western Freeway Loop provides a potential bypass for freight movements around the congested I-10 corridor. If used as a freight route, this would reduce truck traffic passing through the congested urban core of Tucson.
- The Southern Freeway Loop provides a southern extension of this potential bypass and also provides a potential I-19 to I-10 east bypass. This latter bypass would provide an alternate route for traffic connecting Mexico with states to the east of Arizona.

**Western Freeway Loop (Bypass of I-10)** - A substantial volume of freight travels along I-10 through Pima County. Between domestic freight traveling between California and other states and international freight passing through Nogales, at least 35 million tons of freight probably moves on I-10 through Tucson each year. By 2030, through freight on I-10 is expect to grow to at least 60 million tons per year and could be higher, depending on a number of external factors. Congestion on I-10, especially during peak hours, could mean a substantial shift of freight
movements to the Western bypass. However, truck movements are often scheduled to avoid peak periods to the best extent possible. Peak delay on I-10 is likely to be much worse than off-peak delay, given the size of the metropolitan area. Because the Western bypass would add several miles to the existing route, most truckers are likely to want to use I-10. Potential policies to help increase the use of the Western Loop could include:

- Setting speed limits to encourage the use of the Western Loop over I-10 for through traffic.
- High-Occupancy Toll (HOT) lanes along I-10 for automobiles only could shift behavior as the capacity of I-10 for trucks was reduced. Demand for these lanes would depend on a number of factors, especially peak period volumes and congestion, cost, and other factors.
- Truck toll lanes on I-10 would provide substantial encouragement to use free lanes elsewhere. However, there would be several problems with this. Unless trucks were required to use the toll lanes on I-10 (which would require legal changes), these lanes might get little use.

**Southern Loop (I-19 to East I-10 Bypass)** - In 2003, 6 million tons of goods were trucked through Arizona on their way to or from Mexico. This total is also likely to grow, but will never compare to the total through movements on I-10. In addition, over half of this traffic either originates in or is destined for California. Even if the total amount of traffic doubled over the next twenty years, only about 6 million tons of freight would be trucked from I-19 to I-10 east. Much of the traffic using I-19 that is headed west on I-10, however, would likely see the Western bypass as a relatively convenient option. Overall, there could be some reduction of truck traffic at the I-10 / I-19 interchange. However, given the volume of truck traffic with origins and destinations in Pima County, this improvement may be hard to notice.
3. **CORRIDORS FEASIBILITY ANALYSIS**

The corridors feasibility analysis includes an assessment of physical constructability, environmental issues, and area plan compatibility. This chapter identifies significant engineering, environmental, or area plan compatibility issues that must be addressed if the roadway projects are advanced for further development.

### 3.1 Feasibility Evaluation Criteria

The feasibility evaluation is comprised of three major components. These are physical constructability screen, environmental screen, and area plan screen. These screens are described below.

- **Physical Constructability Screen** - Physical and engineering features include roadway conditions and structures, right-of-way, topography, geological characteristics, major drainage features, and major utilities within the study area. Physical features that might preclude the construction of the intended improvements will be identified and itemized.

- **Environmental Screen** - The purpose of the social and environmental analysis is to identify and describe existing environmental conditions within the study area. While potential environmental concerns for future corridor development are identified, the analysis is not intended to meet the requirements of the National Environmental Policy Act (NEPA). Environmental features and regulatory requirements that might preclude the construction of the intended improvements will be identified and evaluated.

- **Area Plan Compatibility Screen** - Criteria include compatibility with adopted transportation and land use plans.

### 3.2 Physical Constructability Screen

#### 3.2.1 Land Use /Land Ownership

Current land ownership in the region is summarized in **Figure 3-1**, which includes an overlay of the loop corridors under consideration. A summary of the land ownership that each corridor may impact, as well as potential issues involving land use and ownership, is summarized in **Table 3-1**.

**Table 3-1 – Major Land Ownership on Loop Corridors**

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Major Land Ownership Within Corridor</th>
<th>Land Use Issues / Potential Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>Tohono O’odham Nation</td>
<td>Proximity of route to Tohono O’odham Nation and Pascua Yaqui</td>
</tr>
<tr>
<td></td>
<td>Pascua Yaqui Tribe</td>
<td>Tribal land (both owned and leased land), COT recharge wells, and planned wells, Central Arizona Project,</td>
</tr>
<tr>
<td></td>
<td>Private</td>
<td>and Ironwood Forest National Monument, Saguaro National Park West, Tucson Mountain Park.</td>
</tr>
<tr>
<td></td>
<td>State Trust</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BLM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>City of Tucson</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Central Arizona Project</td>
<td></td>
</tr>
<tr>
<td>Loop Corridor Name</td>
<td>Major Land Ownership Within Corridor</td>
<td>Land Use Issues / Potential Constraints</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>--------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>Tohono O’odham Nation</td>
<td>Potential conflicts with Tohono O’odham San Xavier District land.</td>
</tr>
<tr>
<td></td>
<td>Private</td>
<td></td>
</tr>
<tr>
<td></td>
<td>State Trust</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BLM Land</td>
<td></td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>Private</td>
<td>Conflicts with existing residential and commercial development.</td>
</tr>
<tr>
<td></td>
<td>State Trust</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Davis-Monthan Air Force Base</td>
<td></td>
</tr>
<tr>
<td>River /Alvernon/Swan Parkway</td>
<td>Private Land</td>
<td>Conflicts with existing residential and commercial development.</td>
</tr>
<tr>
<td></td>
<td>State Trust Land</td>
<td></td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>Private</td>
<td>Potential conflicts with existing residential and commercial development.</td>
</tr>
<tr>
<td></td>
<td>State Trust</td>
<td>Kolb Road is already access-controlled through Davis-Monthan Air Force Base</td>
</tr>
<tr>
<td></td>
<td>Davis-Monthan Air Force Base</td>
<td></td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>State Trust *</td>
<td>Potential conflicts with existing residential and commercial development and with planned Tortolita Park expansion. Impacts to the private La Cholla Airpark and residences associated with the Airpark are a concern.</td>
</tr>
<tr>
<td></td>
<td>Private Land</td>
<td></td>
</tr>
<tr>
<td>Barraza- Aviation Parkway Extension</td>
<td>Private</td>
<td>Potential conflicts with existing development and Davis-Monthan Air Force Base.</td>
</tr>
<tr>
<td></td>
<td>Davis-Monthan Air Force Base</td>
<td></td>
</tr>
</tbody>
</table>

*The State Trust Land is planned to be used as part of the Tortolita Mountain Park*

During future development of these alignments, a more detailed study of alignments would be required to determine specific right-of-way and land use impacts.
Figure 3-1
Existing Land Ownership

Legend

Land Owner

BLM
BUREAU OF RECLAMATION
CORONADO N.F.
DAVIS MONTANA A.F.B.
GAME & FISH
MILITARY RESERVATION

PRIVATE
PARKS & RECREATION
PARSICA YAOUI RES.
STATE TRUST
TOHONO O'ODHAM NATION (SHUAK TUAK DISTRICT)
TOHONO O'ODHAM NATION SAN XAVIER DISTRICT

Western Freeway Loop
Southern Freeway Loop
Houghton / Golf Links Parkway
River / Alvernon / Swan Parkway
Kolb / Orange Grove Parkway
La Cholla Parkway
Barraza-Aviation Parkway

Pima County Line
Airport
Freeway
Other Road
3.2.2 Utilities / Railroad Infrastructure

Development patterns and land use within the study area have in large part been influenced, and will continue to be influenced, by existing man-made features and geographic constraints. These man-made features include the Union Pacific Railroad, in which the tracks run parallel and to the east of I-10 and I-19. These and other existing and future man-made features, such as major overhead power lines, are depicted in Figure 3-2, Existing Railroad and Utility Structure. It should be noted that Pima County currently does not have GIS data for water lines or oil/gas lines. Information on City of Tucson water lines and recharge areas is contained in Section 3.3.6.

Table 3-2 summarizes potential utility and railroad crossing constraints. All of the loop corridors will involve utility and railroad crossing constraints.

Table 3-2 – Utility and Railroad Impacts

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Utility and Railroad Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>3 power line crossings</td>
</tr>
<tr>
<td></td>
<td>2 railroad crossings</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>3 power line crossings</td>
</tr>
<tr>
<td></td>
<td>3 railroad crossings</td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>2 power line crossings</td>
</tr>
<tr>
<td></td>
<td>1 railroad crossing</td>
</tr>
<tr>
<td>River /Alvernon/Swan Parkway</td>
<td>3 power line crossings</td>
</tr>
<tr>
<td></td>
<td>2 railroad crossings</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>2 power line crossings</td>
</tr>
<tr>
<td></td>
<td>1 railroad crossings</td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>1 railroad crossing</td>
</tr>
<tr>
<td>Barraza- Aviation Parkway Extension</td>
<td>1 railroad crossing</td>
</tr>
</tbody>
</table>

3.2.3 Topography

Tucson is centrally located within the 1,000 square mile Tucson Basin and has an elevation of approximately 2,500 feet. It is bordered by narrow, rugged mountain ranges. The Tucson Basin’s northeastern boundary is formed by the Santa Catalina and Rincon Mountains, and its western boundary is formed by the Tucson Mountains. The Santa Rita Mountains are to the south, the Sierrita Mountains are located to the southwest and the Tortolita Mountains are located to the north.

Figure 3-3 shows the topography of the Tucson region with an overlay showing the transportation corridors under consideration. Table 3-3 summarizes topographic constraints that may impact development of the corridors.
Figure 3-2
Existing RR and Utility Structure
Figure 3-3
Topography

Legend
- Western Freeway Loop
- Southern Freeway Loop
- Houghton / Golf Links Parkway
- River / Alvernon / Swan Parkway
- Kolb / Orange Grove Parkway
- 20-ft Contour Line
- Freeway
- Other Road
- Pima County Line
- La Cholla Parkway
- Barraza-Aviation Parkway

Figure 3-3 represents the topography of the area, including various roadways and freeways. The map includes a legend indicating different types of roads and contour lines.

Legend:
- Western Freeway Loop
- Southern Freeway Loop
- Houghton / Golf Links Parkway
- River / Alvernon / Swan Parkway
- Kolb / Orange Grove Parkway
- 20-ft Contour Line
- Freeway
- Other Road
- Pima County Line
- La Cholla Parkway
- Barraza-Aviation Parkway
Table 3-3 – Major Topography Constraints on Loop Corridors

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Topography Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>No significant constraints noted.</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>Crosses areas with significant grade changes (west area of loop)</td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>No significant constraints noted.</td>
</tr>
<tr>
<td>River/Alvernon/Swan Parkway</td>
<td>No significant constraints noted.</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>No significant constraints noted.</td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>Tortolita Mountains</td>
</tr>
<tr>
<td>Barraza - Aviation Parkway Extension</td>
<td>No significant constraints noted.</td>
</tr>
</tbody>
</table>

As Table 3-3 indicates, the Southern Freeway Loop and the La Cholla Parkway cross areas with significant grade changes.

3.2.4 Drainage

A significant consideration for roadway development is drainage and the mitigation of storm water run-off. The largest mapped floodplain in the PAG Region is the Brawley Wash, a large tributary of the Santa Cruz River that is located west of the Santa Cruz River. The Santa Cruz River is a major north-south feature that passes through the study area. Other significant floodplains include the Canada del Oro Wash in Oro Valley, Tanque Verde Creek in northeastern Tucson, and the Pantano Wash and Rincon River in the eastern portions of the Region. Major washes (those with recorded flows of over 10,000 cubic feet per second) are shown in Figure 3-4. A summary of impacts of the candidate loop corridors on major wash crossings are summarized in Table 3-4. As can be seen in the table, all of the Loop corridors will have to address major wash crossings, particularly the Western Freeway Loop, which would involve five major wash crossings. Bridges or culverts crossing major washes should be designed to protect the roadway from impacts of scouring or erosion.
Figure 3-4
Major Washes
Table 3-4 – Major Wash Crossings

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Major Washes Within Loop Corridor Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>Black Wash</td>
</tr>
<tr>
<td></td>
<td>Santa Cruz River (2 crossings)</td>
</tr>
<tr>
<td></td>
<td>Brawley Wash (2 crossings)</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>Santa Cruz River</td>
</tr>
<tr>
<td></td>
<td>Black Wash</td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>Pantano Wash (2 crossings)</td>
</tr>
<tr>
<td>River /Alvernon/Swan Parkway</td>
<td>Rillito Creek</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>Confluence of Rillito Creek, Tanque Verde Creek, Pantano Wash</td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>Canada Del Oro</td>
</tr>
<tr>
<td>Barraza- Aviation Parkway Extension</td>
<td>None</td>
</tr>
</tbody>
</table>

Other drainage considerations include impacts on the FEMA 100-year floodplains, which are shown in Figure 3-5. This figure shows the location of the FEMA Zone AE flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance study by detailed methods.

Impacts on existing cross-drainage structures will need to be evaluated as the projects are developed.

3.2.5 Central Arizona Project Canal

The Central Arizona Project canal (CAP) comprises a 336-mile-long system of aqueducts, tunnels, pumping plants, and pipelines. Constructed by the U.S. Bureau of Reclamation, the CAP transports approximately 1.5 million acre-feet of Colorado River water per year to agricultural, urban residents, and Indian Communities in Pima, Pinal, and Maricopa counties. The CAP extends from Lake Havasu to the southern boundary of the San Xavier Indian Reservation located 14 miles southwest of Tucson. The CAP is managed and operated by the Central Arizona Water Conservation District (CAWCD).

As shown in Figure 3-6, the CAP canal, which enters the study area from Pinal County, parallel and east of I-10, then crossing I-10 at approximately Tangerine Road and circling the Tucson metropolitan area to the west to Ajo Way, where it diverges north and south. The CAP location affects the Western Freeway Loop, and potentially the Southern Freeway Loop. Considerations in implementing this alternative may include grade-separated crossings, drainage, and environmental protection. The CAP provides water to the City of Tucson recharge wells and the Tohono O’odham nation in the vicinity of the Western Freeway Loop through the use of pipelines from the CAP.
Figure 3-5
100 Year Floodplains

Legend:
- Western Freeway Loop
- Southern Freeway Loop
- Houghton / Golf Links Parkway
- River / Alvernon / Swan Parkway
- Kolb / Orange Grove Parkway
- La Cholla Parkway
- Barraza-Aviation Parkway
- 100-year Floodplain
- Pima County Line
- Freeway
- Other Road

Figure 3-5 displays the 100 Year Floodplains in the region, with a focus on key roadways such as Ajo (SR 86), Skyline, Manville, Sunrise Rd, Pima Mine Rd, Nogales Hwy, and others. The map highlights various floodplains and the surrounding infrastructure.
Figure 3-6
CAP Line

Legend
- Western Freeway Loop
- Southern Freeway Loop
- Houghton / Golf Links Parkway
- River / Alvernon / Swan Parkway
- Kolb / Orange Grove Parkway
- La Cholla Parkway
- Barraza-Aviation Parkway
- Freeway
- Other Road
- Pima County Line
Because of the CAP’s northwest to southeast orientation, and prior clearance with respect to environmental issues, locating the Western Freeway Loop adjacent to, and directly west of the CAP may be a desirable alternative corridor for the Western Freeway Loop.

### 3.2.6 City of Tucson Water Facilities

The City of Tucson uses its Central Arizona project allocation via recharge facilities at it’s Central Avra Valley Storage and Recovery Project (CAVSARP) facility, located north of the Tohono O’odham Nation Shuk Toak District, and west of the Central Arizona Project. The CAVSARP is a large-scale recharge and recovery facility which consists of 330 acres of recharge basins, 27 recovery wells, a booster station, an 8-million gallon reservoir and approximately 25 miles of pipelines. According to the Tucson Water’s *Water Plan, 2000-2050* (November 2004), this facility uses approximately 45% of the Central Arizona project’s water allocation and makes it available for potable supply. The recharge occurs via pipelines from the CAP to the CAVSARP. An issue is locating the Western Freeway Loop with respect to this facility, and the planned Southern Avra Valley Storage and Recovery Project (SAVSARP), which will become operational in 2007 and will help to achieve the full utilization of the Central Arizona project allocation. This facility, which is under construction, is located on both sides of Sandario Road south of the Tohono O’odham Nation Shuk Toak District.

The City of Tucson also owns numerous land parcels in the west and northwest Tucson region that will be used for water projects in the future. The location of these facilities is shown on Figure 3-7. Location of potable water distribution lines are shown in Figure 3-8. A summary of impacts of the proposed loop corridor routes on City of Tucson Water facilities is summarized in Table 3-5.

### Table 3-5 – Major Tucson Water Infrastructure Constraints on Loop Corridors

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Tucson Water Infrastructure Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>- Potential impacts to Central Avra Valley Storage and Recovery Project (CAVSARP).</td>
</tr>
<tr>
<td></td>
<td>- Potential impacts to Southern Avra Valley Storage and Recovery Project (SAVSARP).</td>
</tr>
<tr>
<td></td>
<td>- Potential impacts to CAP water delivery pipeline.</td>
</tr>
<tr>
<td></td>
<td>- Potential impact to recharge recovery pipelines</td>
</tr>
<tr>
<td></td>
<td>- Potential impact to potable distribution pipeline.</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>- Potential impact to potable production wells and distribution pipelines.</td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>- Potential Impacts to potable distribution pipeline.</td>
</tr>
<tr>
<td>River /Alvernon/Swan Parkway</td>
<td>- Potential Impacts to potable distribution pipeline.</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>- Potential Impacts to potable distribution pipeline.</td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>- Potential Impacts to potable distribution pipeline.</td>
</tr>
<tr>
<td>Barraza- Aviation Parkway Extension</td>
<td>- Potential impacts to potable distribution pipeline.</td>
</tr>
</tbody>
</table>
Figure 3-7
Tucson Water
Recharge Facilities & Land Ownership

Legend
- Western Freeway Loop
- Southern Freeway Loop
- Houghton / Golf Links Parkway
- River / Alvernon / Swan Parkway
- Kolb / Orange Grove Parkway
- La Cholla Parkway
- Barraza-Aviation Parkway
- Pima County Line
- Freeway
- Other Road
- Existing CAVSARP (Central Avra Valley Storage and Recovery Project)
- COT Parcels
- Proposed SAVSARP (Southern Avra Valley Storage and Recovery Project)
- CAP
Figure 3-8
Tucson Water's Potable Distribution System as of 2000
3.2.7 Right-of-Way and Access

The right-of-way required to implement the proposed loop corridors is estimated for planning purposes to be 150 feet for parkway facilities and 300 feet for freeway facilities. These are standards established by ADOT and many jurisdictions for these types of facilities. To assess right-of-way needs, a comparison was made of the existing road segment right-of-way versus loop corridor freeway or parkway requirements. This comparison is shown in Table 3-6. This table also shows whether the road segment would require a resolution of access issues. Examples of ways to resolve access issues could include either purchasing access, providing frontage roads, or accepting less access control. As shown in the table, all of the existing road segments will need to have access concerns addressed.

Table 3-6 – Right-of-Way Summary

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>ROW Required (in feet)</th>
<th>Road Segment</th>
<th>ROW Available (in feet)</th>
<th>ROW Needs to be Acquired?</th>
<th>Length of Miles to be Acquired</th>
<th>Requires Resolution of Access Issues?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>300</td>
<td>Valencia Road</td>
<td>Ajo to Cardinal</td>
<td>150-210</td>
<td>Yes</td>
<td>6.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cardinal to Midvale Park</td>
<td>150-180</td>
<td>Yes</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Midvale Park to 12th Avenue</td>
<td>110-250</td>
<td>Yes</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12th Avenue to Campbell Avenue</td>
<td>100-150</td>
<td>Yes</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Campbell Avenue to Alvernon Way</td>
<td>140-160</td>
<td>Yes</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alvernon Way to I-10</td>
<td>200-250</td>
<td>Yes</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I-10 to Kolb Road</td>
<td>200</td>
<td>Yes</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trico Road</td>
<td>Avra Valley to Pinal Air Park Road</td>
<td>250</td>
<td>Yes</td>
<td>7.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pinal Air Park to I-10</td>
<td>N/A</td>
<td>Yes, new ROW required</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>New road between Valencia and Trico Road</td>
<td>None</td>
<td>N/A</td>
<td>Yes</td>
<td>22</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>300</td>
<td>New road between proposed Western Loop and Sandario</td>
<td>None</td>
<td>N/A</td>
<td>Yes</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sandario Road</td>
<td>New road (partially along San Xavier District) to I-19</td>
<td>200</td>
<td>Yes</td>
<td>23.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>New road between I-19 to Sahuarita Road</td>
<td>None</td>
<td>N/A</td>
<td>Yes</td>
<td>8.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kolb Rd</td>
<td>Sahuarita Road to Old Vail Connection Rd</td>
<td>150</td>
<td>Yes</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kolb Rd</td>
<td>Old Vail Connection Rd to Valencia Rd</td>
<td>N/A</td>
<td>N/A</td>
<td>4.4</td>
</tr>
<tr>
<td>Loop Corridor Name</td>
<td>ROW Required (in feet)</td>
<td>Road</td>
<td>Road Segment</td>
<td>ROW Available (in feet)</td>
<td>ROW Needs to be Acquired?</td>
<td>Length of Miles to be Acquired</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------------</td>
<td>------</td>
<td>--------------</td>
<td>-------------------------</td>
<td>---------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Andrada Rd</td>
<td></td>
<td></td>
<td>New Kolb Rd to I-10</td>
<td>N/A</td>
<td>N/A</td>
<td>9.3</td>
</tr>
<tr>
<td>Sahuarita to Rita</td>
<td>150-200</td>
<td>Houghton Road</td>
<td>Rita to Poorman</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Poorman to Irvington</td>
<td>175</td>
<td></td>
<td>Irvington to Escalante</td>
<td>150-175</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Escalante to Golf Links</td>
<td>150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alvernon to Swan</td>
<td>160-200</td>
<td>Golf Links Road</td>
<td>Swan to Craycroft</td>
<td>Yes, in some areas</td>
<td>1.1</td>
<td>Yes</td>
</tr>
<tr>
<td>Craycroft to Wilmot</td>
<td>120</td>
<td></td>
<td>Wilmot to Kolb</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>Kolb to Pantano Parkway</td>
<td>150-180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pantano Parkway to Harrison</td>
<td>175-180</td>
<td></td>
<td>Harrison to Houghton</td>
<td>Yes, in some areas</td>
<td>1.0</td>
<td>Yes</td>
</tr>
<tr>
<td>Thornydale to La Cholla</td>
<td>150-550</td>
<td>River Rd</td>
<td>La Cholla to La Canada</td>
<td>175-250</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>La Canada to Oracle</td>
<td>140-220</td>
<td></td>
<td>Oracle Rd to First Ave</td>
<td>140-160</td>
<td>Yes, in some areas</td>
<td>1.0</td>
</tr>
<tr>
<td>First Ave to Campbell</td>
<td>160</td>
<td></td>
<td>Campbell to Alvernon Way</td>
<td>60-130</td>
<td>Yes</td>
<td>2.5</td>
</tr>
<tr>
<td>River Rd to Fort Lowell Rd</td>
<td>85-150</td>
<td>Alvernon Rd</td>
<td></td>
<td>Yes, in some areas</td>
<td>0.7</td>
<td>Yes</td>
</tr>
<tr>
<td>Fort Lowell Rd to Speedway Blvd</td>
<td>90-150</td>
<td></td>
<td></td>
<td>Yes, in some areas</td>
<td>2.0</td>
<td>Yes</td>
</tr>
<tr>
<td>Speedway Blvd to 22nd Street</td>
<td>120-150</td>
<td>Alvernon Rd</td>
<td></td>
<td>Yes, in some areas</td>
<td>2.0</td>
<td>Yes</td>
</tr>
<tr>
<td>Loop Corridor Name</td>
<td>ROW Required (in feet)</td>
<td>Road</td>
<td>Road Segment</td>
<td>ROW Available (in feet)</td>
<td>ROW Needs to be Acquired?</td>
<td>Length of Miles to be Acquired</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------------</td>
<td>------</td>
<td>--------------</td>
<td>-------------------------</td>
<td>---------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Alvernon Rd</td>
<td>150</td>
<td>22nd Street to 29th St</td>
<td>150</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>Alvernon Rd</td>
<td>120-140</td>
<td>29th St to Ajo Way</td>
<td>120-140</td>
<td>Yes</td>
<td>1.7</td>
<td>Yes</td>
</tr>
<tr>
<td>Alvernon Rd</td>
<td>150-275</td>
<td>Ajo Way to Valencia Rd</td>
<td>150-275</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>Orange Grove Rd</td>
<td>140-170</td>
<td>La Cholla to First Ave</td>
<td>140-170</td>
<td>Yes, in some areas</td>
<td>3.0</td>
<td>Yes</td>
</tr>
<tr>
<td>Orange Grove Rd</td>
<td>150</td>
<td>First Ave to Skyline Dr</td>
<td>150</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>Orange Grove Rd</td>
<td>150-180</td>
<td>Orange Grove to Hacienda del Sol</td>
<td>150-180</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>Sunrise Dr</td>
<td>150</td>
<td>Hacienda del Sol to Craycroft Rd</td>
<td>150</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>Craycroft Rd</td>
<td>120</td>
<td>Sunrise Dr to Grant Rd</td>
<td>120</td>
<td>Yes</td>
<td>4.0</td>
<td>Yes</td>
</tr>
<tr>
<td>Grant Rd</td>
<td>120-150</td>
<td>Craycroft to Kolb / Tanque Verde Rd</td>
<td>120-150</td>
<td>Yes, in some areas</td>
<td>1.6</td>
<td>Yes</td>
</tr>
<tr>
<td>Kolb Rd</td>
<td>140</td>
<td>Grant Rd to Speedway Blvd</td>
<td>140</td>
<td>Yes</td>
<td>1.1</td>
<td>Yes</td>
</tr>
<tr>
<td>Kolb Rd</td>
<td>140-150</td>
<td>Speedway Blvd to Broadway Blvd</td>
<td>140-150</td>
<td>Yes, in some areas</td>
<td>1.0</td>
<td>Yes</td>
</tr>
<tr>
<td>Kolb Rd</td>
<td>150</td>
<td>Broadway Blvd to Golf Links Rd</td>
<td>150</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>Kolb Rd</td>
<td>130-150</td>
<td>Golf Links Rd to Escalante Rd</td>
<td>130-150</td>
<td>Yes, in some areas</td>
<td>1.0</td>
<td>Yes</td>
</tr>
<tr>
<td>Kolb Rd</td>
<td>150-200</td>
<td>Escalante Rd to Valencia Rd</td>
<td>150-200</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>Ruthrauff to Orange Grove</td>
<td>90</td>
<td>Yes</td>
<td>2.0</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orange Grove to Ina</td>
<td>200</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ina to Magee</td>
<td>150-160</td>
<td>Magee to Overton</td>
<td>125-200</td>
<td>Yes, in some areas</td>
<td>1.5</td>
<td>Yes</td>
</tr>
<tr>
<td>Magee to Overton</td>
<td>125-200</td>
<td>Overton to Tangerine</td>
<td>50-120</td>
<td>Yes</td>
<td>3.5</td>
<td>Yes</td>
</tr>
<tr>
<td>Overton to Tangerine</td>
<td>120-240</td>
<td>Tangerine to Moore</td>
<td>120-240</td>
<td>Yes, in some areas</td>
<td>1.0</td>
<td>Yes</td>
</tr>
<tr>
<td>Moore Road to SR 77</td>
<td>N/A</td>
<td>Yes, new ROW required</td>
<td>N/A</td>
<td>Yes, new ROW required</td>
<td>9.5</td>
<td>N/A</td>
</tr>
<tr>
<td>N/A (on new alignment)</td>
<td>N/A</td>
<td>Yes, new ROW required</td>
<td>N/A</td>
<td>Yes, new ROW required</td>
<td>4.2</td>
<td>N/A</td>
</tr>
</tbody>
</table>
The results of this analysis indicate that new right of way and right-of-way takes on existing roadways will occur on all of the loop road corridors.

### 3.2.8 Summary of Physical Constructability Opportunities and Constraints

A summary of engineering opportunities and constraints for the definition alternatives is presented in Table 3-7.

#### Table 3-7 – Summary of Physical Constructability Opportunities and Constraints

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Physical Constructability Constraints</th>
<th>Physical Constructability Opportunities</th>
</tr>
</thead>
</table>
| Western Freeway Loop                | - Proximity of route to Tohono O’odham Nation, COT recharge wells, and planned wells, Central Arizona Project, and Ironwood Forest National Monument, Sahuaro National Park West, Tucson Mountain Park CAP Crossing  
- Utility conflicts and 2 railroad crossings  
- Five major wash crossings  
- Tucson Water pipeline and recharge areas  
- Extensive right-of-way requirements and access resolution issues, particularly on Valencia Road. | Location near the CAP may reduce engineering constraints                                         |
| Southern Freeway Loop               | - Potential conflicts with Tohono O’odham San Xavier District land.  
- Utility conflicts and 3 railroad crossings  
- Potential grade issues  
- Two major wash crossings  
- Potential impact to Tucson Water potable production wells and distribution pipelines.  
- Extensive right-of-way requirements and access resolution issues along existing segments.  
- Location of City of Tucson recharge areas |                                                                                |
| Houghton/ Golf Links Parkway        | - Potential conflicts with existing residential and commercial development  
- Utility conflicts and 1 railroad crossing  
- Two crossings of Pantano Wash  
- Potential impact to Tucson Water potable distribution pipelines.  
- Extensive access resolution issues. | Use of existing right-of-way  
Use of existing alignment minimizes topographic constraints                                      |
| River /Alvernon/Swan Parkway        | - Potential conflicts with existing residential and commercial development, including La Cholla Airpark.  
- Utility conflicts and 2 railroad crossings  
- One crossing of Rillito Creek  
- Potential impact to Tucson Water potable distribution pipelines.  
- Extensive access resolution issues. | Use of existing right-of-way  
Use of existing alignment minimizes topographic constraints.                                        |
| Kolb/Orange Grove Road Parkway      | - Potential conflicts with existing residential and commercial development  
- Utility conflicts and 1 railroad crossing  
- Corridor crosses confluence of Rillito Creek, Tanque Verde Creek, Pantano Wash  
- Potential impact to Tucson Water potable distribution pipelines.  
- Extensive access resolution issues. | Use of existing right-of-way  
Kolb Road is already access-controlled through Davis-Monthan Air Force Base  
Use of existing alignment minimizes topographic constraints.                                         |
| La Cholla Parkway                   | - Potential conflicts with existing residential and commercial development, including La Cholla Airpark.  
- Impacts to planned mountain park expansion  
- Utility conflicts and 1 railroad crossing | Use of existing right-of-way on La Cholla.  
Use of existing alignment minimizes topographic constraints.                                          |
### 3.3 Environmental Screen

The purpose of the environmental screen is to describe the existing social and environmental conditions within the proposed Loop Study Area, and identify potential environmental concerns for future development of the Loop Study corridors. Information presented within this environmental analysis is based on the existing data sources from local, county, state, and federal agencies. This analysis is not intended to meet the requirements of the National Environmental Policy Act (NEPA).

Environmental features and regulatory requirements that might preclude the construction of the intended improvements will be identified and itemized in this section.

#### 3.3.1 Socioeconomic Conditions

Projects that utilize federal aid are required to certify nondiscrimination under the requirements of Title VI of the Civil Rights Act of 1964. In 1997, the U.S. Department of Transportation issued *DOT Order to Address Environmental Justice in Minority Populations and Low-Income Populations* to summarize and expand upon the requirements of Executive Order 12898 on Environmental Justice. In accordance with the intent of these federal requirements and recent guidance from PAG, analysis was completed to identify protected populations within the study area.

In this analysis, a protected population was identified when the selected population (as a percentage of the total population) within a specific census block group exceeded the average percentage found in either Pima County or eastern Pima County (the lower of the two thresholds). Based on guidance from PAG, analyses were completed for Hispanic, Asian, African American, American Indian, other race, total minority, population over 65 years of age, and population under poverty guidelines as defined by the Census Bureau’s guidance for low income threshold. Graphics summarizing the Title VI analysis for minority populations, poverty levels, and elderly population are provided in [Appendix A](#). It should be noted that the Title VI analysis is very general in nature and lacks sufficient detail due to the low density of existing population within some areas of the study area and the corresponding large census block structure. Year 2000 census data was used in this analysis. Therefore, for the purpose of this analysis, Table 3-8 summarizes whether each corridor impacts a protected population area or not.

### Table 3-8

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Physical Constructability Constraints</th>
<th>Physical Constructability Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8 Corridor crosses Canada de Oro Wash and Rillito River</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 Potential impact to Tucson Water potable distribution pipelines.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 Right-of-way needs to be acquired in area of extension.</td>
<td></td>
</tr>
<tr>
<td>Barraza- Aviation Parkway Extension</td>
<td>8 Potential impact to Tucson Water potable distribution pipelines.</td>
<td>Level of access resolution required is low.</td>
</tr>
<tr>
<td></td>
<td>8 Extensive right-of-way requirements</td>
<td></td>
</tr>
</tbody>
</table>
Table 3-8 – Summary of Title VI Considerations

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>African American Populations</th>
<th>American Indian Populations</th>
<th>Asian American Population</th>
<th>Hispanic Population</th>
<th>Other Minority Populations</th>
<th>Total Minority Populations</th>
<th>Poverty Populations</th>
<th>Populations over Age 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>River/Alvernon/Swan Parkway</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Barraza- Aviation Parkway Extension</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

The results of this overview indicate that all of the loop study corridors may impact Title VI areas, and the specific impacts would need to be analyzed as further corridor development occurs.

3.3.2 Biological Corridors and Critical Habitat

The inventory of biological corridors and critical habitat of the study area consisted of gathering data and information primarily from the Sonoran Desert Conservation Plan. The two elements that most directly express the biological basis of Pima County, Arizona’s Sonoran Desert Conservation Plan are biological corridors and critical and sensitive habitats. Figure 3-9 shows the location of biological core, multiple use management areas (This term refers to areas with the potential to support three or more priority vulnerable species as identified by the Sonoran Desert Conservation Plan and at least 66.67 percent of the total acreage shall be conserved as undisturbed natural open space), and scientific research areas. Figure 3-10 shows important riparian areas. These areas will support habitat and connecting wildlife corridors that will establish an effective and lasting biological reserve that will promote recovery and improve the status of protected species in the area. A summary of potential impacts in these areas are summarized in Table 3-8.

Table 3-8 – Impacts to Biological Corridors and Riparian Areas

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Impacts to Biological Corridors and Riparian Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>Impacts multiple use or recovery management areas and riparian areas.</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>Impacts multiple use or recovery management areas and riparian areas.</td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>Impacts multiple use or recovery management areas and riparian areas.</td>
</tr>
</tbody>
</table>
Loop Corridor Name | Impacts to Biological Corridors and Riparian Areas
---|---
River /Alvernon/Swan Parkway | Impacts riparian areas.
Kolb/Orange Grove Parkway | Impacts riparian areas.
La Cholla Parkway | Impacts multiple use or recovery management areas and riparian areas.
Barraza-Aviation Parkway Extension | No impacts

3.3.3 Agricultural Lands- Ranch Lands

According to the Sonoran Desert Conservation Plan, the conservation of working ranch lands protects vast areas of open space and preserves the heritage and culture of the Southwest. In eastern Pima County, there are approximately 1.4 million acres, presently dedicated to ranching. Virtually all of the larger ranches manage both privately owned and leased public lands. Ranching has been found to be compatible with the goals of the Sonoran Desert Conservation Plan to preserve the integrity of open space and wildlife habitat. Ranch lands are shown in Figure 3-11.
Figure 3-10
Riparian Areas
Figure 3-9
Pima County Biological Corridors and Critical Habitat Areas
Figure 3-11
Ranch Lands

Legend
- Western Freeway Loop
- Southern Freeway Loop
- Houghton / Golf Links Parkway
- River / Alvernon / Swan Parkway
- Kolb / Orange Grove Parkway
- La Cholla Parkway
- Nogales Highway
- Major Freeway
- Ranch Land
- Other Road
- Pima County Line

Legend
- Western Freeway Loop
- Southern Freeway Loop
- Houghton / Golf Links Parkway
- River / Alvernon / Swan Parkway
- Kolb / Orange Grove Parkway
- La Cholla Parkway
- Nogales Highway
- Major Freeway
- Ranch Land
- Other Road
- Pima County Line

Miles
0 2.5 5
The Sonoran Desert Conservation Plan has identified a number of Priority Ranch Conservation Resources. A summary of potential impacts to these resources is summarized in **Table 3-9** as follows:

### Table 3-9 – Impacts to Ranch Lands

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Potential Impacts to Ranch Conservation Lands?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>Yes - appears to border some individual ranch areas.</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>Yes - Altar Valley Ranch Conservation District and Cienega - Rincon Ranch Conservation District</td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>Yes - Cienega-Rincon Ranch Conservation District</td>
</tr>
<tr>
<td>River /Alvernon/Swan Parkway</td>
<td>Yes - affects various ranch lands in Sahuarita area</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>No</td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>Yes - Tortolita Mountain Park</td>
</tr>
<tr>
<td>Barraza- Aviation Parkway Extension</td>
<td>No</td>
</tr>
</tbody>
</table>

The results of the review indicate that all of the potential loop routes, with the exception of the Barraza-Aviation Extension and the Kolb/Orange Grove Parkway, may potentially impact ranch lands.

**3.3.4 Visual Character**

The visual character of the proposed loop study routes varies greatly due to the location of some routes in rural undeveloped areas and others in urbanized areas. Preserving scenic views for both drivers and adjacent residents is a consideration that will need to be addressed during the further development of these loop corridors.

**3.3.5 Noxious Weeds**

Invasive and noxious weeds are an increasing problem. Invasive and noxious weeds rapidly displace desirable plants that provide habitat for wildlife and food for people and livestock. Invasive and noxious weeds are plants that are not native to Arizona and were introduced accidentally or intentionally. Noxious weeds are listed by state and federal law and are generally considered those that are exotics and negatively impact agriculture, navigation, fish, wildlife, and public health. Under Executive Order 13112, dated February 3, 1999, projects that occur on federal lands or are federally funded must be:

“subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: i) prevent the introduction of invasive species; ii) detect and respond rapidly to, and control, populations of such species in a cost-effective and environmentally sound manner; iii) monitor invasive species populations accurately and reliably; and iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded.”

For any proposed roadway project, a survey will be required by a qualified noxious weed authority to determine if any noxious weeds are present within the project boundaries.
3.3.6 Water Resources

The U.S. Army Corps of Engineers (ACOE) regulates the discharge of dredge and fill material into waters of the U.S. under Section 404 of the Clean Water Act. Any activity that will discharge dredge or fill material into jurisdictional waters, including wetlands, will require a Clean Water Act Section 404 Permit, following the completion of a jurisdictional delineation. A jurisdictional delineation is the process of identifying the characteristics and boundaries of waters of the United States within a given geographic area, and must receive final approval by the ACOE.

If it is anticipated that work will take place within or adjacent to potential waters of the United States, a jurisdictional delineation for the project area should be completed and submitted to the ACOE for concurrence. Following ACOE-approval of the jurisdictional delineation, the project should be reviewed to determine if a Section 404 permit is necessary. Activities that may require a permit include, but are not limited to, construction of new roads, widening of existing roads, construction or expansion of bridges, installation of corrugated-metal pipe and concrete box culverts, installation of riprap, and maintenance activities within a drainage system.

If impacts are expected to be below 0.5 acre for each water of the United States (i.e. each individual wash system), a Nationwide Permit Number 14 would likely be required. If impacts at a single crossing or to any individual drainage system exceed 0.1 acre, pre-construction notification must be provided to the ACOE, and the project must be authorized by the ACOE prior to the start of construction. If impacts at a single crossing or to any individual drainage system do not exceed 0.1 acre, pre-construction notification is generally not required, but may be required if a “may effect” determination is made for a threatened or endangered species and/or the presence of any historic property determined to be eligible, or which may be eligible, for listing on the National Register of Historic Places is identified. If impacts at any single crossing or to any individual drainage system exceed 0.5 acre, a Section 404 Individual Permit would be required. The Individual Permit process requires a more detailed permit application, and the ACOE review period is typically much longer than that of a Nationwide Permit.

Improvements within or near waters of the U.S. require Section 401 Water Quality Certification. In certain cases, projects are Conditionally Certified and it is not necessary to submit an application for certification to the Arizona Department of Environmental Quality; however, the Section 401 conditions listed in the applicable Section 404 permit must be adhered to in order to qualify for Conditionally Certified. Linear transportation projects are generally Conditionally Certified.

The National Pollutant Discharge Elimination System is a national program under Section 402 of the Clean Water Act that regulates discharges of pollutants from point sources into waters of the U.S. Arizona has been delegated authority from the Environmental Protection Agency to implement the permit program within the state. The state program is referred to as the Arizona Pollutant Discharge Elimination System (AZPDES). The AZPDES permit program requires an AZPDES general permit for construction activities that disturb one or more acres of land. A Stormwater Pollution Prevention Plan must be prepared as a part of the permit.

3.3.7 Air Quality Analysis

The Clean Air Act (CAA) Amendments and NEPA require that air quality impacts be addressed in the preparation of environmental documents. The level of effort used to
evaluate these impacts may vary from a simplified description to a detailed analysis depending on factors, such as the type of document to be prepared, the project location and size, the air quality attainment status of the area, and the state air quality standards. Under the CAA, areas are classified for the degree of ambient air pollution existing at the time of the 1990 amendments as to whether they attain the NAAQS or are in nonattainment of the standards as described below. Currently Tucson is classified as in attainment for all pollutants.

3.3.8 Noise

Noise, defined as unwanted or excessive sound, is an undesirable by-product of our modern way of life. While noise emanates from many different sources, transportation noise is perhaps the most pervasive and difficult source to avoid in society today. The Federal-Aid Highway Act of 1970 mandates the FHWA to develop noise standards for mitigating highway traffic noise. The FHWA regulations for mitigation of highway traffic noise in the planning and design of federally aided highways are contained in Title 23 of the United States Code of Federal Regulations Part 772. The regulations require the following during the planning and design of a highway project: 1) identification of traffic noise impacts; examination of potential mitigation measures; 2) the incorporation of reasonable and feasible noise mitigation measures into the highway project; and 3) coordination with local officials to provide helpful information on compatible land use planning and control. The regulations contain noise abatement criteria, which represent the upper limit of acceptable highway traffic noise for different types of land uses and human activities. The regulations do not require that the abatement criteria be met in every instance. Rather, they require that every reasonable and feasible effort be made to provide noise mitigation when the criteria are approached or exceeded. Specific requirements for noise mitigation will need to be guided by the requirement of the jurisdiction that the alignment is located in.

Highway construction noise is often viewed by the public as being short term and a necessary price for growth and improvement. Highway construction noise should generally be addressed in a qualitative, rather than quantitative, manner commensurate with the scope of the highway project. If potential construction noise impacts are identified, a common sense approach should be utilized to incorporate appropriate abatement measures into the highway project.

3.3.9 Hazardous Materials

Pima County’s geographic information system contains information on the locations of areas where hazardous materials were stored, used, disposed of, transported, or had experienced discharges. Pima County’s GIS database includes several areas of concern, including Superfund Amendments and Reauthorization Act (SARA) Title III sites, landfills (existing and proposed), unlawful open wildcat dumps, and other sites of known contamination. Information is graphically represented in Exhibit 3-12.

The area in the vicinity of the Tucson International Airport (near the far northwestern portion of the study area) is highly populated with businesses that have some involvement with hazardous materials. This is not surprising considering the industrial nature of the land uses in the area. The Tucson Airport Remediation Project (TARP) treatment facility, which removes trichloroethylene (TCE) from contaminated groundwater, is one of the industrial sources.

Other areas of concern are the several large wildcat dumps and a volatile organic compound area located south of Escalante Road and west of Houghton Road. Several superfund sites
and a large volatile organic compound waste area are also present in areas east of I-10 near Ruthrauff Road and La Cholla Boulevard. This is likely related to the high intensity of warehousing and manufacturing in that area.

If a roadway alignment were selected through these areas, additional investigation during the preliminary design stages of the roadway network would be required. It is anticipated that most of these areas could be successfully remediated; however, this remediation effort would probably negatively impact roadway development budgets and schedules. A summary of hazardous material potential impacts are summarized in Table 3-10.

Table 3-10 – Potential Hazardous Material Impacts by Loop Corridor Route

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Potential Hazardous Material Impacts?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>Yes - Trichlorethylene (TCE) plumes, superfund site (between Tucson Blvd. and Park Ave.)</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>Yes- Sahuarita Bombing Range</td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>Yes, there is one Superfund site near Golf Links Road and two Superfund sites near Houghton Road.</td>
</tr>
<tr>
<td>River /Alvernon/Swan Parkway</td>
<td>Yes- Proposed landfills in Sahuarita areas, Sahuarita Bombing Range. Project is in the vicinity of City / County landfill and volatile organic compounds. Superfund sites are located near the west end of the project, and near the River Road /</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>Yes, near Kolb Road there are two superfund sites and an area of volatile organic compounds.</td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>Yes, superfund sites are located near the south end of the corridor.</td>
</tr>
<tr>
<td>Barraza- Aviation Parkway Extension</td>
<td>Yes, a superfund site is located near in the vicinity of the extension</td>
</tr>
</tbody>
</table>

The results of the preliminary review indicated that there is potential hazardous material concerns associated with all the loop corridor routes.
Figure 3-12
Hazardous Materials

Legend
- Western Freeway Loop
- Southern Freeway Loop
- Houghton / Golf Links Parkway
- River / Alvernon / Swan Parkway
- Kolb / Orange Grove Parkway
- La Cholla Parkway
- Barrera-Aviation Parkway
- Superfund Sites
- Sahuanta Bombing Range
- City/County Landfills
- Wildcat Dumps
- Proposed Landfills
- Other Landfills
- TCE (Trichlorethylene)
- Volatile Organic Compounds
- Pima County Line
- Freeway Line
- Other Road

Contaminant Plumes
- TCE (Trichlorethylene)
- Volatile Organic Compounds
- Pima County Line
- Freeway Line
- Other Road
### 3.3.10 Section 4(f) Resources

Section 4(f) of the Department of Transportation Act of 1966 stipulates that Federal Highway Administration may not approve the use of land from a significant publicly owned park, recreation area, or wildlife and waterfowl refuge, or any significant historic site that is either listed, or eligible for listing on the Register under the following Criterion stated in 49 U.S.C., Section 303:

(a) “It is the policy of the United States Government that special effort be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites.

(b) The Secretary of Transportation shall cooperate and consult with the Secretaries of the Interior, Housing and Urban Development, and Agricultural, and with the States, in developing transportation plans and programs that include measures to maintain or enhance the natural beauty of lands crossed by transportation activities or facilities.

(c) The Secretary may approve a transportation program or project requiring the use of publicly owned land or a public park, recreation area, or wildlife and waterfowl refuge, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, recreation area, refuge, or site) only if-

1) There is no prudent and feasible alternative to using that land; and

2) The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.”

**Figure 3-13** shows the location of parks, historic districts that are current, eligible, or pending approval, and federally designated wilderness areas. A summary of potential impact to these areas is summarized in **Table 3-11**.

**Table 3-11 – Potential Hazardous Material Impacts by Loop Corridor Route**

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Potential Section 4(f) Impacts?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>No anticipated impacts- loop will avoid West Saguaro National Monument</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>No anticipated impacts</td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>Yes, Houghton Road Golf Course and Golf Links Sports Complex, Southeast Regional Park.</td>
</tr>
<tr>
<td>River /Alvernon/Swan Parkway</td>
<td>Yes-Tucson Botanical Gardens, Randolph Park, El Montevideo historic district, San Clemente historic district (pending)</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>Yes, Ft. Lowell Multiple Resource Historic District</td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>Yes, possible impact to Rillito River Park, and planned expansion of Tortolita Mountain Park</td>
</tr>
<tr>
<td>Barraza- Aviation Parkway Extension</td>
<td>No anticipated impacts</td>
</tr>
</tbody>
</table>

All loop routes with the exception of the Western Freeway Loop, the Southern Freeway Loop and the Barraza- Aviation Parkway extension are anticipated to have Section 4(f) impacts.
Figure 3-13
Parks and Historic Districts

Legend
- Western Freeway Loop
- Southern Freeway Loop
- Houghton / Golf Links Parkway
- River / Alvernon / Swan Parkway
- Kolb / Orange Grove Parkway
- La Cholla Parkway
- Barraza-Aviation Parkway
- Historic District
- Pima County Line
- Freeway
- Other Road
- Wilderness
- Park

Legend
Western Freeway Loop
Southern Freeway Loop
Houghton / Golf Links Parkway
River / Alvernon / Swan Parkway
Kolb / Orange Grove Parkway
La Cholla Parkway
Barraza-Aviation Parkway
Historic District
Pima County Line
Freeway
Other Road
Wilderness
Park
3.3.11 Cultural Resources

Certain areas of the PAG region contain historic cultural backgrounds and archeological sites that would require extensive investigation before any proposed roadway corridor be constructed. Three Indian reservations are present within the PAG region: the Pascua Yaqui Indian Reservation, the San Xavier Indian Reservation, and the Tohono O’odham Indian Reservation. These Nations generally extend along significant areas of the Brawley Wash and Santa Cruz River. Any proposed project will be required to consult with and involve these Nations in preliminary investigations to ensure that tribal concerns are thoroughly understood and addressed. The extent of each Indian Reservation is shown in Figure 3-14. Pima County is currently making cultural resource information vague to protect the resources from potential scavenging. Figure 3-14 includes GIS-based information related to Pima County’s archaeologically sensitive areas. This information shows areas of highly sensitivity archaeological zones, moderately sensitivity zones, and low priority areas. Sensitive cultural areas tend to follow watercourses. Typically, the larger the water source (the Santa Cruz River), the larger the area of concern. A summary of potential cultural resource impacts is listed in Table 3-12.

Table 3-12 – Potential Cultural Resource Impacts by Loop Corridor Route

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Potential Cultural Resource Impacts?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>Yes - impacts large area of high archaeological sensitivity, impacts Tohono Indian Reservation, impacts areas of historic agricultural land.</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>Yes- Potential impacts to three areas of high archaeological sensitivity and one area of moderate archaeological sensitivity, two areas of historic agricultural land, and the San Xavier Indian Reservation</td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>Yes, impacts areas of high and moderate archaeological sensitivity</td>
</tr>
<tr>
<td>River /Alvernon/Swan Parkway</td>
<td>Yes, impacts areas of high and moderate archaeological sensitivity, and may have impacts to historic agricultural land on River Road.</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>Yes, impacts areas of high and moderate archaeological sensitivity.</td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>Yes, impacts large area of high archaeological sensitivity, and possibly historic agricultural land near River Road/ Craycroft Road.</td>
</tr>
<tr>
<td>Barraza- Aviation Parkway Extension</td>
<td>No</td>
</tr>
</tbody>
</table>

To ensure compliance with the National Historic Preservation Act and to prevent the disturbance of historic and/or cultural resources within the study area, 100 percent coverage field surveys and records searches will be required for environmental clearance of proposed roadway construction projects. If cultural resources eligible for listing on the National Register of Historic Places are found in a proposed roadway corridor, additional testing of sites may be required.
Figure 3-14
Sensitive Cultural Areas

Legend
- Western Freeway Loop
- Southern Freeway Loop
- Houghton / Golf Links Parkway
- River / Alvernon / Swan Parkway
- Kolb / Orange Grove Parkway
- La Cholla Parkway
- Barraza-Aviation Parkway

Indian Reservations
- Pascua Yaqui Indian Reservation
- Tohono O’Odham Nation (San Xavier District)
- Tohono O’Odham Nation (Shuck Tuak District)
- Cemetery
- Historic Agricultural Land

Archaeologically Sensitive Zones
- High
- Moderate
- Pima County Line
- Freeway
- Other Road

Legend
- Western Freeway Loop
- Southern Freeway Loop
- Houghton / Golf Links Parkway
- River / Alvernon / Swan Parkway
- Kolb / Orange Grove Parkway
- La Cholla Parkway
- Barraza-Aviation Parkway

Indian Reservations
- Pascua Yaqui Indian Reservation
- Tohono O’Odham Nation (San Xavier District)
- Tohono O’Odham Nation (Shuck Tuak District)
- Cemetery
- Historic Agricultural Land

Archaeologically Sensitive Zones
- High
- Moderate
- Pima County Line
- Freeway
- Other Road
Testing will provide the information necessary to fully define and mitigate disturbance to these sites. Consultation with the State Historic Preservation Officer will occur prior to testing and after the testing program is completed to determine if any additional mitigation measures are necessary. It is anticipated that most of these areas could be successfully mitigated; however, testing and mitigation of cultural sites would probably negatively impact roadway development budgets and schedules.

3.3.12 Summary of Environmental Opportunities and Constraints

This section contains a summary of the social and environmental issues that should be considered during future corridor development. A summary of environmental opportunities and constraints is presented in Table 3-13. In a number of areas, further environmental investigations would need to be conducted once a more detailed alignment is chosen. A summary of environmental tasks is listed below:

- During the Design Concept Report or Final Design, scoping letters should be submitted to the AGFD and USFWS and a biological evaluation should be completed to determine the potential affects to threatened and endangered species.
- A jurisdictional delineation would need to be conducted to determine waters of the United States.
- A Section 404 Permit would be required if the project impacts waters of the United States.
- A noise analysis would be required if the proposed roadway is located near noise receptors.
- If new right-of-way is to be acquired for future construction, a Phase I Environmental Site Assessment should be conducted to determine specific potential hazmat concerns are Recognized Environmental Conditions.
- During the Design Concept Report or Final Design, the demographic composition and Title VI/Environmental Justice should be reevaluated and block groups be included in this reevaluation.
- Cultural resource evaluations will be required for all of the corridors. A Section 4(f) evaluation will be required.
- The CAP right-of-way has already been cleared of cultural resources.
Table 3-13 – Summary of Key Environmental Feasibility Screen

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Environmental Feasibility Constraints</th>
<th>Environmental Feasibility Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>§ Title VI potential impacts § Impacts multiple use management and riparian areas § May impact individual ranch areas § Potential hazardous material impacts § Potential cultural resource impacts.</td>
<td>§ Corridor would provide better transportation facilities to minority population groups. § Corridor would provide better access to parks and recreational facilities.</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>§ Title VI potential impacts § Impacts multiple use or recovery management and riparian areas § Potential impacts to ranch conservation districts § Potential hazardous material impacts § Potential cultural resource impacts.</td>
<td>§ Corridor would provide better transportation facilities to minority population groups. § Corridor would provide better access to parks and recreational facilities.</td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>§ Title VI potential impacts § Impacts multiple use or recovery management and riparian areas § Potential impacts to ranch conservation districts § Potential hazardous material impacts § Potential Section 4(f) impacts § Potential cultural resource impacts.</td>
<td>§ Corridor would provide better transportation facilities to minority population groups. § Corridor would provide better access to parks and recreational facilities.</td>
</tr>
<tr>
<td>River/Alvernon/Swan Parkway</td>
<td>§ Title VI potential impacts § Impacts riparian areas § May impact individual ranch areas § Potential hazardous material impacts § Potential Section 4(f) impacts § Potential cultural resource impacts.</td>
<td>§ Corridor would provide better transportation facilities to minority population groups. § Corridor would provide better access to parks and recreational facilities.</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>§ Title VI potential impacts § Impacts riparian areas § Potential hazardous material impacts § Potential cultural resource impacts.</td>
<td>§ Corridor would provide better transportation facilities to minority population groups. § Corridor would provide better access to parks and recreational facilities.</td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>§ Title VI potential impacts § Impacts multiple use or recovery management and riparian areas § May impact Tortolita Mountain Park ranch area § Potential hazardous material impacts (south end) § Potential Section 4(f) impacts § Potential cultural resource impacts.</td>
<td>§ Corridor would provide better transportation facilities to minority population groups. § Corridor would provide better access to parks and recreational facilities.</td>
</tr>
<tr>
<td>Barraza- Aviation Parkway Extension</td>
<td>§ Title VI potential impacts § Potential hazardous material impacts</td>
<td>§ Corridor would provide better transportation facilities to minority population groups. § Corridor would provide better access to parks and recreational facilities.</td>
</tr>
</tbody>
</table>
3.4 Land Use and Area Plan Screen

The area plan /community compatibility screen involved two elements: reviewing existing land use to determine what land uses the loop system will affect and assessing whether programmed and planned transportation projects include elements of the loop corridor system, or include transportation projects that support the need–based findings. It should be noted that planned projects may or may not be ultimately constructed.

3.4.1 Land Use Compatibility

Figure 3-15 shows GIS-based land use categories that were overlaid with the loop study routes. A summary of the land use constraints and opportunities summarized in Table 3-14.

Table 3-14 – Existing Land Use Opportunities and Constraints

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Land Use Opportunities</th>
<th>Land Use Constraints/Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>§ There are vacant land areas in the west area of Tucson, some of which are State Trust Lands.</td>
<td>§ Potential impacts to residential land use on Valencia Road and scattered areas of residential development. § Potential impacts to agricultural land use at the north end of corridor.</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>§ The west and east segments of the corridor have large areas of vacant land, much of this is State Trust Land.</td>
<td>§ Impacts to agricultural and residential land.</td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>§ The land use at the south end of the corridor on Houghton Road is vacant.</td>
<td>§ Impacts to residential and commercial land, Davis-Monthan Air Force Base along Golf Links Road.</td>
</tr>
<tr>
<td>River /Alvernon/Swan Parkway</td>
<td>§ The corridor traverses vacant land on the south end the corridor, much of which is State Trust Land.</td>
<td>§ Impacts to residential and commercial land uses. § South of Valencia Road, there are impacts to agricultural lands.</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>§ Access to Davis–Monthan Air Force Base is already controlled, and would be compatible with a parkway.</td>
<td>§ Impacts to residential land uses and commercial land uses within the metropolitan area.</td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>§ The State Trust Land at the north end of the project is undeveloped, and the road would serve this land. § Potential to enhance access to commercial developments.</td>
<td>§ Impacts to developed residential and commercial areas throughout the much of the corridor, including La Cholla Airpark. § Impacts to vacant State Trust Land planned to be used for addition to Tortolita Mountain Park.</td>
</tr>
<tr>
<td>Barraza- Aviation Parkway Extension</td>
<td>§ Vacant land offers opportunities for roadway construction.</td>
<td>§ Proximity to Davis-Monthan Air Force Base.</td>
</tr>
</tbody>
</table>

3.4.2 Area Plans

2030 Regional Transportation Plan (Adopted June 2005) - This regional plan addresses transportation facilities and services in eastern Pima County, which includes unincorporated Pima County, the City of Tucson, the City of South Tucson, the Town of Marana, the Town of Oro Valley, the Town of Sahuarita, the Pasqua Yaqui Tribe and the San Xavier District of
the Tohono O’odham Nation. The roadway element of the RTP is shown overlaid with the Loop Study corridors in Figure 3-16. As the exhibit demonstrates, the loop system coordinates well with a number of elements of the Regional Transportation Plan.

A tabular summary of how the 2030 Regional Transportation Plan supports the need for the loop corridors is provided in Table 3-15.

### Table 3-15 – Summary of Regional Transportation Plan

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Projects Included in the Adopted 2030 Regional Transportation Plan that Support the Need for the Loop Study Corridors</th>
</tr>
</thead>
</table>
| Western Freeway Loop        | § SR 989 (Sandario Loop), ROW purchase.  
§ SR 910 (north of Ajo Way to I-19), ROW purchase  
§ Tangerine Road extension (Avra Valley Road to I-10), ROW purchase and construction of two lane roadway.  
§ Valencia Road (Houghton Road to SR 86), parkway improvements, RTP includes 4 and 6-lane widening. |
| Southern Freeway Loop       | § SR 989 (Sandario Loop), ROW purchase.  
§ SR 982 (Southeast Area), ROW preservation  
§ Kolb Road (I-10 to Old Vail Connection), parkway widening to 4-lanes  
§ Kolb Road (Old Vail Connection to Wilmot Road), ROW purchase. |
| Houghton/ Golf Links Parkway| § Houghton Road (Snyder Road to Sahuarita Road), parkway widening to 6-lanes from Golf Links to UPRR.  4-lane widening elsewhere. RTP includes new railroad grade separation.  
§ Golf Links Road, intersection improvements planned at Swan Road, Wilmot Road, Kolb Road. |
| River /Alvernon/Swan Parkway| § River Road, 6-lane arterial widening Orange Grove to Campbell Ave., 4-lane arterial widening Campbell Ave. to Sabino Canyon Road  
§ Alvernon Way, River to Ft. Lowell, arterial widening to 4-lanes  
§ Alvernon Way, Ft. Lowell to Grant, arterial widening to 6-lanes  
Alvernon Way, intersection improvements at Fort Lowell, Grant Road, 5th Street, Broadway. |
| Kolb/Orange Grove Parkway   | § Orange Grove Road (Thornydale to Corona), arterial widening to 6-lanes  
§ Orange Grove Road (Corona to Oracle Road), arterial widening to 4-lanes.  
§ Orange Grove Road (Oracle Road to Skyline Drive), arterial widening to 4-lanes.  
§ Craycroft Road, River to Sunrise, arterial widening to 4-lanes  
§ Kolb Road, intersection improvement at Golf Links Road  
§ Valencia Road, Kolb to Houghton, parkway widening to 6-lanes |
| La Cholla Parkway           | § La Cholla Blvd, Tangerine Road to I-10, parkway widening to 6-lanes and interchange connection to I-10. |
| Barraza- Aviation Parkway Extension | § Barraza-Aviation Parkway 6-lane extension (Golf Links to I-10 / Valencia Road).  
§ New system interchange at I-10/Valencia/Barraza-Aviation extension. |

Several presentations were made during the development of the loop study corridors to the Technical Advisory Committee for the Study. The TAC was comprised of representatives from the following agencies and jurisdictions:

- City of Tucson
- Arizona State Land Department
- Pima County Department of Transportation
- Arizona Department of Transportation
- Pasqua Yaqui Tribe
- Town of Sahuarita
- City of Marana
- Town of Oro Valley
- City of South Tucson
- Tucson Airport Authority
- San Xavier District of Tohono O’odham Nation

TAC meeting summaries are provided in Appendix B.
Figure 3-15
Existing Land Use
Figure 3-16
Proposed Plan Improvements

Legend
- New/Rebuilt RR Grade Separations
- New/Rebuilt Interchange
- Intersection Improvements
- Freeway Improvements
- Parkway Improvements
- Arterial Road Improvements
- Collector Road Improvements
- Right of Way Preservation

0 10 20 Miles
**Pima County 2001 Comprehensive Plan** - The Land Conservation Element of the Plan describes environmental areas (Important Riparian Areas, Biological Core Management Areas, Multiple Use Areas, wildlife Corridors) that are constraints to the development of certain loop corridors. These are described in the environmental screen section of the report. The Circulation Element of the Pima County Comprehensive Plan describes the general requirements for transportation improvements within Pima County. Specific roadway projects are not included.

**Pima County Sonoran Desert Conservation Plan** - This report details six elements of a Sonoran Desert Conservation Plan for Pima County: Historic Conservation, Ranch Conservation, Riparian Restoration, Mountain Parks, Biological Corridors, and Critical Habitat. The purpose of this plan is to preserve and protect those lands in Pima County that are of environmental, cultural, or historic importance. If fully implemented, the proposed plan will dramatically effect regional urban form, arrest urban sprawl, and protect those lands that contain the highest quantity and quality of regional resources. The plan provides guidance as to where environmental resources are located. Roadways impacting these areas are considered environmentally sensitive and a special procedure should be followed to preserve and enhance resources and minimize impacts.

**City of Tucson General Plan** - The City of Tucson General Plan guides overall land use decisions and sets policies related to growth for the City of Tucson. Efforts to minimize the duration of traffic congestion and traffic accident rates are encouraged. The Loop Study corridors will assist in reducing congestion in the metropolitan area of Tucson.

**Town of Sahuarita General Plan** - The Town of Sahuarita General Plan is the guiding tool for the future development of the Town of Sahuarita. The General Plan identifies three growth areas within the PAG Region – Duval Mine Road and I-19, Pima Mine Road and I-19, and Sahuarita Road and I-19. The Loop Study corridors will help to support these growth areas.

**Houghton Road Corridor Study** - This study identifies right-of-way requirements, and provides roadway improvement and access control recommendations on Houghton Road from Tanque Verde Road to Sahuarita Road. The following are recommendations made in the study:

- **Houghton Road, from Tanque Verde Road to Golf Links Road:** recommended as a 6-lane arterial, with 150-foot ROW, intersecting roads spaced one-half mile apart, and signals spaced one mile apart. This supports the loop corridor recommendation that this segment of Houghton Road remain an arterial with access control.

- **Houghton Road, from Golf Links Road to I-10:** recommended as a 6-lane parkway, with 150-foot ROW, intersecting roads spaced one mile apart with GSI, system interchange at Valencia and I-10. This recommendation supports the Loop Study finding of Houghton Road as a 6-lane parkway with GSI’s between Golf Links Road and Sahuarita Road.

- **Houghton Road, I-10 to Sahuarita Road:** recommended as a 6-lane parkway, with 150-foot ROW, intersecting roads spaced one mile apart with GSI. This recommendation supports the Loop Study finding of Houghton Road as a 6-lane parkway with GSI’s between Golf Links Road and Sahuarita Road.

- **Golf Links Road/Alvernon Way, from Houghton Road to I-10:** recommended as a 6-lane arterial, intersecting roads spaced one-half mile apart with GSI, signals and signals spaced one mile apart. This recommendation supports the Loop Study finding of Golf Links Road as a 6-lane arterial with GSI’s between Houghton Road and I-10.
apart with GSI, signals spaced one mile apart, system interchange at Golf Links Road/Alvernon Way and Aviation Parkway. This recommendation supports the Loop Study finding of Golf Links Road as a 6-lane parkway with GSI’s between Golf Links Road and Sahuarita Road.

*2001-2025 Marana Transportation Plan Update* - The following are major recommendations from the study for improvements to be made by the year 2025:

- **Widen Tangerine Road to 4 lanes from Sandario Road to west of I-10, and 6 lanes from east of I-10 to Hartman Road-** the Southern freeway loop corridor would link this connection to a freeway on southern Sandario Road. Therefore this project is consistent with the Loop study corridors.
- **Widen Ina Road to 6 lanes from I-10 to Thornydale-** This supports the Loop Study finding that the Kolb /Orange Grove parkway loop would place the more access controlled facility on Orange Grove Road. Ina Road, which has more commercial development, would have less access control.
- **Widen Avra Valley Road from Sanders Road to east of Silverbell Road-** This supports the Loop Study Western Freeway Loop because it can interchange with Avra Valley Road.
- **Widen Camino de Manana to 4 lanes from I-10 to Tangerine Road-** This supports the Loop Study Western Freeway Loop. Camino de Manana widening will facilitate travel to Twin Peaks Road, which connects to Avra Valley Road and the proposed Western Freeway Loop.
- **Planned bicycle facilities along Tangerine Road and Camino de Manana-** This supports the Loop Study recommendation that Tangerine Road not be a freeway or parkway facility.
- **Planned commuter transit along I-10, Ina Road, and Orange Grove Road-** This supports the Loop Study recommendation on the Kolb/Orange Grove Parkway Loop.
- **Continued investigation of express commuter transit service from Marana to downtown Tucson and Tucson International Airport employment areas-** This supports the Loop Study Western Freeway Loop which may increase demand for this service, especially as development occurs in northwest Marana.

*Oro Valley General Plan Update* - The purpose of this study was to update the Town of Oro Valley’s 1996 General Plan. Although this plan was adopted by the Town Council on June 15, 2005, it will not go into effect until ratified by Oro Valley voters in an election.

- **The town shall continue to ensure that Oro Valley’s roadway network is developed with the proper amount of capacity to serve traffic generated by the land uses depicted on the General Plan Land Use Map. Strive to maintain at least a level of service “D” on all streets within Oro Valley.**
- **With respect to the Loop Study corridor routes, the General Plan states that La Cholla Blvd. is planned for eventual connection to I-10. This supports the Loop Study La Cholla Parkway. With respect to Tangerine Road, the General Plan states that Tangerine Road connects to I-10, and that several safety and capacity improvements are scheduled.**
The 2005-2009 PAG Transportation Improvement Program (TIP) - The Transportation Improvement Program is a five-year schedule and budget of proposed transportation improvements within the PAG Region. Proposed federal, state, and local highways, as well as transit, aviation, ride sharing, bicycle and pedestrian facilities are projects that are addressed by the TIP. The TIP makes optimum use of available funds and resources to address the transportation needs of the region. The following are projects that are proposed within the next five years and are consistent with and support the need for the Loop Study corridors:

- Widen Tangerine Road to 4 lanes from First Avenue to Oracle Road (construction in 2005) - This supports the Loop Study finding that Tangerine Road remain an arterial facility.
- Widen Ina Road to 6 lanes from I-10 to the Camino de Manana Wash (design in 2007, construction in 2008) - This is supports the Loop Study finding that Ina Road remain an arterial facility.
- Widen La Cholla Boulevard to 4 lanes from Overton Road to Tangerine Road (design in 2008, begin construction in 2009) – this project supports the need for La Cholla Blvd- this supports the Loop Study finding that La Cholla Blvd. become a parkway facility in the future.
- Widen Tangerine Road to 4 lanes from Shannon Road to La Canada (design in 2007) - this supports the Loop Study finding that Tangerine Road remain an arterial facility.
- Widen Alvernon Way to 4 lanes from Fort Lowell Road to River Road (design in 2005, construction from 2006-2008)- This supports the Loop Study finding that the River /Alvernon/Swan loop route should be a future parkway facility.
- Widen Craycroft Road to 4 lanes from River Road to Sunrise Drive (design in 2005, construction from 2006-2009) - this supports the Loop Study finding that Craycroft Road become a parkway facility in the future.
- Widen La Cholla Boulevard to 6 lanes from Omar Drive to River Road (construction from 2005-2006). This supports the Loop Study La Cholla Blvd extension.
- Widen River Road to 4 lanes from Campbell Avenue to Alvernon Way (construction from 2005-2009). This supports the Loop Study River/ Alvernon/Swan Parkway.
- Widen Valencia Road to 4 lanes from Mark Road to Camino de la Tierra (design from 2005-2006, begin construction in 2008). This supports the Loop Study Western Freeway Loop.

Southeast Area Arterial Study- The Major Streets and Routes Plan that is recommended in the study consists of approximately 190 centerline miles of roadway, of which 20 are planned to be fully access-controlled roadways, 48 are planned to be limited-access controlled roadways, and 122 miles are arterial roadways. The Major Streets and Routes Plan provides the following recommendations for roadways of interest in the Loop Study:

- Valencia Road from I-19 to I-10 – Limited access control, 6-lane parkway. This supports the Loop Study Western Freeway Loop.
- Alvernon Way/Swan Road from Valencia Road to Camino Aurelia – Limited access control, planning alignment shifts from Alvernon Way to
Swan Road near Los Reales Road. This supports the Loop Study River/Alvernon/Swan Parkway.

- Houghton Road from I-10 to the recommended extension of Andrada Road – Limited access control (consistent with the ADOT Houghton Road Corridor Study). This supports the Loop Study Houghton / Golf Links Parkway.

In summary, elements of area plans generally support the loop corridor system. Primary exceptions are that with respect to the Southern Freeway Loop, The Town of Sahuarita objected to the east-west roadway connection to I-19, using the El Toro Road alignment. The Town formally asked that PAG evaluate the feasibility of using the Pima Mine Road alignment as an alternative to the El Toro alignment for the east-west connection to I-19. Three alignments and associated I-19 interchange alternatives were developed on or near the Pima Mine Road. While all of the alternatives were found to be possible from a design and construction perspective, no single alternative was endorsed by representatives of both the Town of Sahuarita and the San Xavier District. As a result, additional studies will be required to resolve issues associated with the recommendation for a 300-foot (right-of-way) corridor connecting I-10 to I-19 in the Southeast Area. Further, if it is decided by the State Transportation Board that a corridor connecting I-19 to I-10 in the Southeast Area should be developed as a state highway, additional studies will be required to evaluate alternative corridor alignments, to identify and develop mitigation strategies for environmental impacts, and to obtain environmental clearance in accordance with National Environmental Policy Act (NEPA) policies and procedures. If such a study is conducted, corridors along the El Toro and Pima Mine Road alignments should be considered and evaluated along with other corridor alternatives.

With respect to the La Cholla Parkway, Pima County objects to this alignment which impacts the planned expansion of the Tortolita Mountain Park. Another consideration in corridor development is that the potential northern termination point for the La Cholla Parkway is in Pinal County. Coordination with Pinal County staff to include this project in the development of long and short range plans would be needed.

Concerns have been expressed by the Tohono O’odham nation regarding the proximity of the loop corridors to the Nation’s borders.
4. **Cost Estimates**

Loop Study planning-level cost estimates have been developed based on unit cost estimates from a number of sources, including unit costs recently developed for the Regional Transportation Authority (RTA) *Project Cost Estimation Report* (October, 2005), as well as freeway costs estimated from a recent Arizona Department of Transportation 2005 audit of freeway costs in Maricopa County.

Cost estimates reflect the total highway development including the costs of planning and engineering studies, design, roadway construction, and right-of-way acquisition. The cost estimates provide an approximation that is suitable for use in programming the next steps of highway development.

4.1 **Planning, Engineering, and Construction Costs**

Planning and engineering cost are based on per mile unit costs for constructing limited access roadway sections. The per mile construction costs include provisions for typical drainage improvements, structures, environmental mitigation, and other related infrastructure.

4.1.1 **Freeway Costs**

A recent report, *Performance Audit of Arizona Department of Transportation: Review of the Oversight and Management of the Maricopa County Regional Freeway System, June 2005*, provides average construction cost averages for freeway construction in the Phoenix Metropolitan area. The report states that capital construction costs for a selected number of segments in the MAG Regional Freeway System varied between $2.38 and $3.78 million per lane mile. For a 6-lane freeway, this is approximately $14 to $22 million per centerline mile. This figure does not include right-of-way, design, and landscaping costs. The audit report states that these costs are comparable with the construction cost standards adopted by the California Department of Transportation (CalTrans), where the actual costs per lane mile should be within the $5 million range. Because of rising construction costs, it was decided to use the higher per lane mile construction cost estimate of $3.78 million per lane mile.

4.1.2 **Parkway Costs**

Parkway unit construction costs were estimated by reviewing the costs of parkway facilities estimated in the Regional Transportation Authority (RTA) *Project Cost Estimation Report* (October, 2005). Based on similar type facilities, the construction cost per mile was estimated to be $14 million per mile for a six-lane parkway facility and $6 million per mile for a 4-lane parkway facility.

An estimate of construction cost for the Loop Study corridors is presented in **Table 4-1**. The table includes the following elements:

- Construction cost per mile
- Construction contingency (estimated to be 20% of the construction cost)
- Construction Administration Cost (estimated to be 15% of the construction cost)
- Pre-Design studies (estimated to be 5% of the construction cost)
- Design Costs (estimated to be 10% of the construction cost)

The estimated cost of the entire loop system is $6.622 billion dollars in 2005 construction dollars. This cost does not include the cost of right-of-way, which is discussed in the following section.
Table 4-1 – Estimate of Probable Cost

<table>
<thead>
<tr>
<th>Classification</th>
<th>Length in Miles</th>
<th>Construction Cost per Mile (or per interchange)</th>
<th>Construction Cost (Million$)</th>
<th>Construction Contingency (20% of construction cost)(Million$)</th>
<th>Construction Administration (15% of construction cost)(Million$)</th>
<th>Pre-Design Studies (5% of construction cost)(Million$)</th>
<th>Design Costs (10% of construction cost)(Million$)</th>
<th>Total Estimated Cost (Million$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western/Southern Inner Freeway Loop</td>
<td>Freeway</td>
<td>49</td>
<td>4-lanes 31.5</td>
<td>15.1</td>
<td>476.3</td>
<td>95.3</td>
<td>71.4</td>
<td>23.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6-lanes 4.2</td>
<td>22.7</td>
<td>95.3</td>
<td>19.1</td>
<td>14.3</td>
<td>4.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8-lanes 13.3</td>
<td>30.2</td>
<td>402.2</td>
<td>80.4</td>
<td>60.3</td>
<td>20.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Service Interchange 6</td>
<td>15.0</td>
<td>90.0</td>
<td>18.0</td>
<td>13.5</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>System Interchange 3</td>
<td>100.0</td>
<td>300.0</td>
<td>60.0</td>
<td>45.0</td>
<td>15.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong> 2,045.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>Freeway</td>
<td>60</td>
<td>4-lanes 29.6</td>
<td>15.1</td>
<td>447.6</td>
<td>89.5</td>
<td>67.1</td>
<td>22.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6-lanes 9.4</td>
<td>22.7</td>
<td>213.2</td>
<td>42.6</td>
<td>32.0</td>
<td>10.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8-lanes 20.6</td>
<td>30.2</td>
<td>622.9</td>
<td>124.6</td>
<td>93.4</td>
<td>31.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Service Interchange 9</td>
<td>15.0</td>
<td>135.0</td>
<td>27.0</td>
<td>20.3</td>
<td>6.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>System Interchange 3</td>
<td>100.0</td>
<td>300.0</td>
<td>60.0</td>
<td>45.0</td>
<td>15.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong> 2,576.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Houghton/Golf Links Pkwy (all 6-lanes)</td>
<td>Parkway</td>
<td>22</td>
<td>14.0</td>
<td>14.0</td>
<td>308.0</td>
<td>61.6</td>
<td>46.2</td>
<td>15.4</td>
</tr>
<tr>
<td>River/Alvernon/Swan (all 6-lanes)</td>
<td>Parkway</td>
<td>32.5</td>
<td>14.0</td>
<td>455.0</td>
<td>91.0</td>
<td>68.3</td>
<td>22.8</td>
<td>45.5</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>Parkway</td>
<td>26</td>
<td>4-lanes 12.4</td>
<td>6.0</td>
<td>74.4</td>
<td>14.9</td>
<td>11.2</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6-lanes 14</td>
<td>14.0</td>
<td>196.0</td>
<td>39.2</td>
<td>29.4</td>
<td>9.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong> 405.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>La Cholla</td>
<td>Parkway</td>
<td>20</td>
<td>4-lanes 10.25</td>
<td>6.0</td>
<td>61.5</td>
<td>12.3</td>
<td>9.2</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6-lanes 9.9</td>
<td>14.0</td>
<td>136.6</td>
<td>27.7</td>
<td>20.8</td>
<td>6.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong> 300.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barraza-Aviation(new segment) (all 6-lanes)</td>
<td>Parkway</td>
<td>4</td>
<td>NA</td>
<td>99.0</td>
<td>19.8</td>
<td>14.9</td>
<td>5.0</td>
<td>9.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>TOTAL COST</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.1.3 Right-of-Way Acquisition Costs

As land continues to appreciate each year within the study area, right-of-way costs will inevitably increase. It is not an unreasonable assumption that right-of-way costs could exceed construction costs. Right-of-way costs for future corridors are nearly impossible to estimate with any degree of certainty. Furthermore, some of the land being considered for the corridor development is within the jurisdiction of Arizona State Land Department which typically auctions land to the highest bidder. Right–of-way costs were estimated by using GIS data on the full assessed property value from the Pima County Assessor’s Office, for parcels along existing corridor segments. These values were averaged, by segment. To be conservative, the highest segment full assessed property value was then used to determine right-of-way costs. In the case of the Western Freeway Loop and the Barraza Aviation Parkway, which are in rural areas, average assessed values were very low, and so higher average right-of-way costs from nearby corridors were used. The assessed values were then divided by a ratio of total assessed value to estimated actual total value of (0.13), which was based on information from the City of Tucson for the last 10 fiscal years (Source: City of Tucson Comprehensive Annual Financial Report, Fiscal Year July 1, 2004-June 30, 2005).

An estimate of probable cost for required right-of-way is presented in Table 4-2. This estimate does not include right-of-way required for system and service interchanges. This cost does not include relocation costs, which may be a significant expense. Depending on the type of property, relocation costs can potentially be as much as right-of-way costs.

<table>
<thead>
<tr>
<th>Loop Corridor Name</th>
<th>Total Acres of Right-of-Way Estimated To Be Acquired</th>
<th>Unit Cost / Acre ($)</th>
<th>Total Right-of-Way Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>1210</td>
<td>223,000</td>
<td>$269,830,000</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>1353</td>
<td>223,000</td>
<td>$301,719,000</td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>8</td>
<td>346,000</td>
<td>$2,768,000</td>
</tr>
<tr>
<td>River /Alvernon/Swan Parkway</td>
<td>39</td>
<td>885,000</td>
<td>$34,515,000</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>21</td>
<td>962,000</td>
<td>$20,202,000</td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>576</td>
<td>615,000</td>
<td>$354,240,000</td>
</tr>
<tr>
<td>Barraza- Aviation Parkway Extension</td>
<td>245</td>
<td>346,000</td>
<td>$84,770,000</td>
</tr>
</tbody>
</table>
5. **CONCLUSIONS AND RECOMMENDATIONS**

This section discusses the findings of this study and recommends steps and activities that will be required to develop the recommended corridors.

5.1 **Conclusions**

The following conclusions can be drawn from the information provided in this Working Paper:

**Corridor Needs Analysis:**

As a result of the needs assessment, the following Loop Study corridors demonstrated a need for a freeway facility:

- Western Freeway Loop
- Southern Freeway Loop

The following facilities demonstrated needs for parkway facilities:

- Houghton/Golf Links Parkway
- River/Alvernon/Swan Parkway
- Kolb/Orange Grove Parkway
- La Cholla Corridor Parkway
- Barraza- Aviation Parkway

Needs were not demonstrated for either freeway or parkway facilities on the following loop system elements (they could, however, be considered as restricted access arterials, however, their loadings suggest they will function as arterials):

- Tangerine Road
- Houghton Road, north of Golf Links Road
- Ina Road
- Orange Grove Road, west of La Cholla Boulevard
- Snyder Road connection to Houghton Road.

**Corridor Feasibility Analysis**

Three feasibility screens were performed for the freeway and parkway corridor: a physical constructability screen, an environmental screen, and a land use / area plan compatibility screen.

The results of these screens showed that all of the corridors have constraints that will need to be addressed in future planning efforts. Those alignments that traverse developed areas will need to address concerns relating to access and right-of-way impacts, particularly on those segments where grade-separated interchanges may be warranted. Table 5-1 summarizes potential impacts regarding feasibility, on a scale from low to high, with “Low” indicating that there appears to be low or minimal potential impact, which must be reconfirmed through detailed studies, “Medium” indicating that there is likelihood of impacts; further study is needed to determine specific impacts and “High” indicating there is a high likelihood of impacts.
Table 5-1 – Summary of Feasibility Screens

<table>
<thead>
<tr>
<th></th>
<th>Land Use</th>
<th>Utility/Railroad Impacts</th>
<th>Topography</th>
<th>Major Wash Crossings</th>
<th>CAP</th>
<th>Tucson Water Facilities</th>
<th>RDW and Access</th>
<th>Socioeconomic Impacts</th>
<th>Biological Corridors/Critical Habitat/Riparian Habitat</th>
<th>Agricultural Lands/Ranch Lands</th>
<th>Hazardous Materials</th>
<th>Section 4(f)</th>
<th>Cultural Resources</th>
<th>Land Use/Area Plan Compatibility</th>
<th>Ability of Route to Serve as an Alternate Route to Interstate 10 or I-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Yes</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Yes</td>
</tr>
<tr>
<td>Houghton Golf Links Parkway</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Yes</td>
</tr>
<tr>
<td>River/Alvernon/Swan Parkway</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Yes</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Yes</td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Yes</td>
</tr>
<tr>
<td>Barranca - Aviation Parkway Extension</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Yes</td>
</tr>
</tbody>
</table>

High = there is a high likelihood of impacts  
Medium = there is likelihood of impacts, further study is needed to determine specific impacts  
Low = there appears to be low or minimal potential impact, this must be reconfirmed through detailed studies.
All of the corridors will have environmental impacts that will need to be investigated in greater detail as the projects are developed in more detail. On the corridors that traverse undeveloped areas, environmental impacts relating to impacts to wildlife corridors, ranch lands, and critical habitats are key concerns. The western area of Tucson also has extensive Tucson Water recharge facilities and vacant parcels that are planned for future water resource development.

The location of the Central Arizona Project presents both a constraint and an opportunity to develop the Western Freeway Loop. A location near the CAP presents opportunities to locate the roadway near an area that has been cleared environmentally. However, there are a number of major water lines that divert the CAP water to recharge areas and to the Tohono O’odham Nation for irrigation purposes that must be bridged or otherwise avoided.

With respect to area plan compatibility, concerns have been expressed regarding the location of the La Cholla Parkway connection because it impacts the planned expansion of the Tortolita Mountain Park. The La Cholla Parkway also terminates to the north in Pinal County.

Concerns have been expressed by the Tohono O’odham nation regarding the proximity of the loop corridors to the Nation’s borders.

**Project Costs**

Project costs (in 2005 dollars) were estimated for the corridors as follows:

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Construction Cost (Million $)</th>
<th>ROW Cost (Million $)</th>
<th>Total Cost (Million $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Freeway Loop</td>
<td>2,045.6</td>
<td>$269.8</td>
<td>2,315.4</td>
</tr>
<tr>
<td>Southern Freeway Loop</td>
<td>2,578.0</td>
<td>$301.7</td>
<td>2,879.7</td>
</tr>
<tr>
<td>Houghton/ Golf Links Parkway</td>
<td>462.0</td>
<td>$2.8</td>
<td>464.8</td>
</tr>
<tr>
<td>River /Alvernon/Swan Parkway</td>
<td>682.5</td>
<td>$34.5</td>
<td>717.0</td>
</tr>
<tr>
<td>Kolb/Orange Grove Parkway</td>
<td>405.6</td>
<td>$20.2</td>
<td>425.8</td>
</tr>
<tr>
<td>La Cholla Parkway</td>
<td>300.2</td>
<td>$354.2</td>
<td>654.4</td>
</tr>
<tr>
<td>Barraza- Aviation Parkway Extension</td>
<td>148.5</td>
<td>$84.8</td>
<td>233.3</td>
</tr>
<tr>
<td><strong>Total Costs</strong></td>
<td><strong>6,622.4</strong></td>
<td><strong>1068.0</strong></td>
<td><strong>7690.4</strong></td>
</tr>
</tbody>
</table>

**5.2 Recommendations**

The recommended Loop Study Corridors are conceptual in nature and will remain conceptual without implementation and involvement from PAG member jurisdictions, PAG and the Regional Transportation Authority. Some of the higher capacity, limited access roadways shown on the network may be candidates for state or federal highways (described in Working Paper 2 of this study) and necessitate the involvement of the Arizona Department of Transportation and the Federal Highway Administration as well. A decision by the Arizona State Transportation Board as to the status as state route or highway may affect the development and funding of the facilities.

The successful implementation of the Loop Study corridors will require (1) advanced corridor preservation to gain governmental stewardship over the corridors, (2) earmarking funds for right-of-way acquisition and construction, and (3) detailed planning, design, and construction of each corridor. Based on the results of the study, the following recommendations are presented:
5.2.1 Corridor Preservation

Merely identifying future roadway corridors in a technical study is insufficient to secure the necessary right-of-way and preserve it for future acquisition and construction. Local governments have established tools to preserve corridors such as “major streets and routes” plans, “functional classification” maps, circulation maps, zoning codes, and development restrictions. These regulatory tools need to be updated expeditiously to include the new corridors and additional work needs to proceed to determine the precise location and width of the corridors.

The primary tool for corridor preservation is a Major Streets and Routes Plan (MSR). Pima County and the City of Tucson have already adopted MSRs which are updated periodically. The City of Tucson routinely follows the intent of the Pima County MSR as they annex unincorporated areas. The Town of Marana has a Major Route Right of Way Plan. Corridors that follow a section line can be added into existing transportation plans of the local jurisdictions or adopted formally, and placed on an existing MSR plan. For those corridors not on a section line, additional planning and location studies are needed to help create a legal description of the corridor. This can occur prior to inclusion on the MSR, but also can happen afterwards. The benefit of early inclusion is the public notice of intent to obtain right-of-way; the disadvantage is the precise location is unknown, which complicates land development and investment decisions. It should be noted that more right-of-way is typically needed at major intersections to accommodate turn lanes, and in some locations, grade separation structures.

It is recommended that all of the recommended Loop Study corridors be included on existing MSR of the City of Tucson and Pima County, the Major Route Right-of-Way Plan in Marana, and that other PAG member jurisdictions consider adopting a MSR plan. In all cases, where future alignment studies are needed, such studies should be immediately programmed in the appropriate jurisdictions’ transportation improvement program for completion within the next five years. All MSRs should be coordinated and compatible and should include regional transportation considerations. In addition, major land development should not occur in the study area prior to improvement of the arterial corridor(s) serving the development. This recommendation is consistent with sound public policy, access management, and state statutes dealing with “smart growth.” A concurrency policy should be included in the MSR along with development fee benefit areas and intergovernmental agreements (IGAs) for the area.

5.2.2 Funding Sources

There are several funding sources potentially available to help implement the proposed Loop Study corridors. At the federal level, funds are provided to ADOT and PAG for planning and construction of facilities on the National Highway System and the Surface Transportation Program. The facilities must be identified on the Regional Transportation Plan to be eligible for these funds, which are administered by PAG and ADOT. Federal discretionary funds and direct appropriations are sometimes available for projects of special interest.

State funds are available for arterials that are designated State Routes. This does not necessarily mean the facility would be accepted into the State Highway System, but this requires approval of the State Transportation Board. The Board adopted policies regarding the State Highway System that emphasize through routes and discourages routes that serve urban development from being placed on the system. As discussed in Working Paper 2 of
Local funds are likely to be the primary source of revenues for implementing the study corridors. These funds include local Highway Users Revenue Fund (HURF) for all jurisdictions, development impact fees for Pima County, City of Tucson, Town of Marana, Town of Oro Valley and construction sales taxes in the Town of Sahuarita.

Total construction costs of the proposed Loop Corridors are expected to be about $6.76 billion, in 2005 dollars. It is recommended that a special study be implemented by the affected jurisdictions to consider increasing the impact fee in the area and establishing a multi-jurisdictional benefit area to accumulate funds for future improvements through an intergovernmental agreement. This also requires that those PAG jurisdictions that do not have a development impact fee establish a fee pursuant to ARS 9-463.05 for the proposed benefit area. Assuming that construction is funded with non-HURF revenues, the ongoing maintenance of the roadways should be possible from the increased local HURF generated by the new residents.

Private funds include contributions and exactions from landowners and developers. Developers are often required to dedicate right-of-way and build offsite roadway improvements as conditions of development approval. However, the Arizona State Land Department (ASLD), is prohibited from dedicating right-of-way at no-cost in advance of selling the land to a developer. ASLD would sell right-of-way or consider interim road easements, but this matter needs to be resolved with ASLD or the State Legislature.

5.2.3 Planning, Design, and Construction

Due to the regional nature of these roadway corridors, the planning, design, and construction of these projects will likely require input and/or management from either the Pima Association of Governments or the Regional Transportation Authority.

PAG is currently responsible for regional transportation planning within metropolitan Pima County. Major transportation investments within PAG’s member jurisdictions are identified in the Regional Transportation Plan which has a 20-year minimum horizon and is updated approximately every three years. The RTP is implemented through the Transportation Improvement Program, which has a 5-year horizon and is updated annually. The PAG RTP for 2030 has been adopted. Several of the corridors identified under this study could be implemented at least partially prior to 2030. Further, all right-of-way for the corridors should be defined within the next five years. Accordingly, it is recommended that the future updates of the PAG RTP include all of the Loop Study corridors as either being constructed, planned, defined, or preserved. In addition, the Regional Transportation Authority (RTA) was reauthorized by the State Legislature in 2004. The RTA will define a multi-modal transportation plan to be funded with a proposed ½-cent sales tax earmarked for transportation.
APPENDIX A

TITLE VI SUMMARIES
Asian American Populations

Legend
- Western / Southern Inner Freeway Loop
- Southern Freeway Loop
- Houghton / Golf Links Parkway
- River / Alvernon / Swan Parkway
- Valencia / Kolb / Grant / Craycroft / Sunrise Parkway
- La Cholla Parkway
- Barranca-Aviation Parkway

Population is below 2.0%
Population is 2.0% or Greater
Pima County Line
Freeway
Other Road
Populations Over Age 65

Legend
- Western / Southern Inner Freeway Loop
- Southern Freeway Loop
- Houghton / Golf Links Parkway
- River / Alvernon / Swan Parkway
- Valencia / Kolb / Grant / Craycroft / Sunrise Parkway
- La Cholla Parkway
- Barranca Aviation Parkway

Population is below 15.5%
Population is 15.5% or Greater
Pima County Line
Freeway
Other Road

Legend
Western / Southern Inner Freeway Loop
Southern Freeway Loop
Houghton / Golf Links Parkway
River / Alvernon / Swan Parkway
Valencia / Kolb / Grant / Craycroft / Sunrise Parkway
La Cholla Parkway
Barranca Aviation Parkway

Population is below 15.5%
Population is 15.5% or Greater
Pima County Line
Freeway
Other Road
APPENDIX B

TAC MEETING SUMMARIES
The first meeting of the Loop Study Technical Advisory Committee (TAC) was held on October 7, 2003 at the Pima Association of Governments (PAG) Fourth Floor Conference Room located at 177 North Church Avenue, Tucson, Arizona 85701. The meeting began at 1:30 PM and ended at 3:00 PM. TAC members and other agency representatives who attended the meeting are attached to the Meeting Summary. The Meeting Summary follows the agenda (attached) for the meeting.

1. OPENING REMARKS AND INTRODUCTIONS

Don Freeman, the PAG Project Manager for the Loop Study, opened the meeting with self-introductions, described the events leading to the initiation of the study, and described the consultant selection process.

Dave Perkins provided an overview of the study purpose and indicated that the successful completion of this study would require that the following key questions be addressed:

- Are the “special focus” corridors needed, justified for inclusion on the State Highway System, and feasible for development in the context of the 2030 RTP Update?
- Based on a travel demand model assessment of 2030 system performance, is there a need and justification for a Loop Road System in the 2030 RTP Update?
- Based on a sketch-planning analysis of “beyond” 2030 system performance, is there a need and justification for a Loop Road System in the PAG Region?
- If need and feasibility is demonstrated, what is the cost and implementation schedule for system implementation?

2. ROLE AND RESPONSIBILITY OF THE TAC

Mr. Freeman and Mr. Perkins presented the roles and responsibilities of the TAC as follows:

- Attend Scheduled TAC Meetings
- Present Perspectives and Unique Understandings
- Review and Comment on Information Presented During TAC Meetings
- Communicate Study Progress to Others
- Assist in Identifying and Resolving Study Issues
- Be an Active Participant in the Study
The TAC was encouraged to “think regionally” as it will require team work to create a transportation system that extends multiple jurisdictions.

3. SCOPE OF SERVICES AND STUDY PRODUCTS

Mr. Perkins summarized the approach to the study in terms of work tasks and products. Following are the major work tasks included in the study:

1. Project management and agency coordination
2. Work plan/public involvement plan
3. Corridor features inventory
4. Needs assessment
5. Feasibility assessment
6. Preliminary findings on feasibility
7. Cost estimates
8. Performance evaluation
9. Ultimate findings on feasibility
10. Corridor schematics
11. Public involvement

Study milestones and products included the following.

- Up to 12 TAC meetings (although it is likely that it will be less)
- Three Working Papers
- Draft Final Report (Working Paper No. 4)
- Final Report and Executive Summary
- Two rounds of Open Houses

A 12-month schedule was presented that defined the timing of each task, milestone, and product of the Study.

5. WORKING DEFINITION OF ROADWAY TYPES

Mr. Perkins provided an overview of the working definitions of roadway types the study will consider:

- Limited access roads (an expressway or freeway)
- Controlled access roads (a parkway)
- Reduced access roads (less controlled than controlled access)

Based on TAC input a fourth type was identified – limited access with multi-modal accommodations.
6. KEY STUDY ISSUES AND EXPECTATIONS

Mr. Perkins asked the TAC to provide comments on key issues that should be addressed during study. The following issues were recorded.

- By October 15, 2004 comments on the scope (if any) must be provided.
- The super street concept in Las Vegas was based on the “judicious omission of intersections”.
- The definitions should not be limited by 6 lanes.
- In Northwest Marana the standard right-of-way is 300 feet.
- Oro Valley has 400 feet of right-of-way along Tangerine.
- Three Global Issues this study will need to consider:
  - Limited access with multi-modal reservations (rail)
  - Legal consideration
    - State Policies
    - State Land Trust
    - City’s ability to satisfy requirement that they provide a 100 year water supply (regional growth limitations)
  - Three County Planning Process is developing into a “strip megalopolis along I-10”
- Southeast Area Arterial Study and Loop Study need to be in sync
- State lands has concerns about limited access roadway as they can limit the usefulness of land
- Clearance of the Davis-Monthan paddles may afford some opportunities (and constraints)
- Economic energy as it relates to intersections is an important issue
- State land trust is losing out as a result of the DMAFB Paddle
- Where do roads make sense from a land use perspective (this needs to be asked)?
- Flood control in the southwest area of the PAG region is a significant concern (Catalina Mountains)
- This study needs to reflect other ongoing Master Planning Studies
- Remove Sahuarita Corridor from the study
- La Cholla by-pass needs additional information to substantiate
- Significant new developments are planned in Pinal and Cochise County
- Their needs to be coordination between this study and the ongoing SR77 Corridor Profile study
- Wilmot Road does not go north-south of the base (as shown on mapping)
- It would be helpful to see the original 1965 RTP Plan (for comparative purposes)
- Upgrading Houghton/Golf Links/Alvernon (inner ring) should be a priority

7. TAC COMMENTS ON ANY ASPECT OF THE STUDY

Included in Item 6.

8. ADJOURNMENT

TAC meeting material will be distributed to TAC members who did not attend the meeting. Agency representatives who attended the meeting were placed on the project mailing list for future TAC meeting mailings.
Southeast Area Arterial Study

Technical Advisory Committee Meeting No. 1

Date: October 7, 2004 (Thursday)
Time: 1:30 PM
Location: PAG Fourth Floor Conference Room
177 North Church Avenue, Suite 405
Tucson, Arizona 85701

Tentative Agenda

1. Opening Remarks and Introductions (Don Freeman)
2. Role and Responsibility of the TAC (Don Freeman)
3. Scope of Services and Study Products (Dave Perkins)
4. Working Definitions:
   - Corridor Evaluation Segments (Dave Perkins)
   - Limited, Controlled, and Reduced Access Roads (Dave Perkins)
5. Key Study Issues and Expectations (TAC)
6. Committee Comments on Any Aspect of the Study (TAC)
7. Adjournment

For More Information Contact Don Freeman, PAG (520) 792-1093 or Dave Perkins, Kimley-Horn (520) 615-9191
MEETING SUMMARY

1. Welcome and Introductions

A Technical Advisory Committee Meeting of the State Transportation System Mobility and Regional Circulation Needs Feasibility Study (Loop Study) was held on October 14, 2005 at the Pima Association of Governments 5th Floor Conference Room. The meeting began at 1:30 p.m. and adjourned at approximately 2:45 p.m.

Don Freeman opened the meeting and the attendees introduced themselves.

2. Southeast Area Arterial Study Update

Don Freeman summarized the status of the Southeast Area Arterial Study. He stated that the findings of the Southeast Area Arterial Study were presented to the PAG Regional Council in early 2005. The Regional Council requested that study
recommendations be presented to affected jurisdictions and stakeholders. Presentations were made to the following jurisdictions and stakeholders.

- Town of Sahuarita (February 14 and April 25, 2005)
- San Xavier District Planning and Housing Committee (March 2, 2005)
- Arizona State Transportation Board (March 8, 2005)
- San Xavier District Tribal Council (March 15, 2005)
- City of Tucson (March 15, 2005)
- Arizona Department of Transportation, Tucson District (March 21, 2005)
- Arizona State Land Department (March 31, 2005)
- Town of Sahuarita (Public Hearing, April 25, 2005)

Presentations were offered to Pima County and the Tucson Airport Authority and the offer was declined.

Don Freeman reported that PAG received several letters and verbal expressions of support for the study recommendations including from Pima County and the Tucson Airport Authority. The Town of Sahuarita however objected to the east-west roadway connection to I-19, using the El Toro Road alignment. The Town asked PAG to evaluate the feasibility of using the Pima Mine Road alignment as an alternative east-west connection to I-19. Don Freeman reported that Kimley-Horn has developed three concepts using this alignment, and they are currently being evaluated in consultation with Town staff, Tribal representatives, and ADOT District staff.

Gary Oaks asked if there was an end date for the project. Dave Perkins said that after agency meetings, the alternatives and the evaluation would be documented and reported to PAG who would decide on the next steps.

3. Summary of Working Paper 1, Data Collection and Existing Conditions

Dave Perkins provided an overview of the Loop Study progress. He said that at the last TAC meeting in December 2004, the intention was to launch into an assessment of focus area routes to determine if they meet criteria for designation as state highways. In February 2005, it was determined that Kimley-Horn would do the modeling for the project. In the time period between February and July, a change order was approved and an operational travel demand model was developed.

Dave Perkins then provided an overview of Working Paper 1, which reviewed access features along the loop corridors, inventoried roadway and environmental features, and defined facility types. He described the three types of facilities being evaluated-full access control (freeways), restricted access control (parkways) and limited access control (arterials with access management).

Don Freeman requested that all TAC comments on Draft Working Paper 1 be submitted in writing to Don Freeman by October 28, 2005.
4. **Summary of Working Paper 2, Assessment of Selected Loop Routes for Designation as State Highways**

Dave Perkins described the contents of Working Paper 2, in which focus routes on the loop system were reviewed to determine if they met criteria for designation as state highways. Criteria were developed from the Arizona Revised Statutes, State Transportation Board Policies, and the ADOT Level of Development Study. Dave Perkins reviewed the criteria and the summary table that was prepared assessing the loop routes.

Bill Jansen asked about the through traffic criteria. On Tangerine Road, was through traffic considered to be vehicles traveling from Oracle Road to I-10? Dave Perkins said yes, but intermediary points were considered for very long routes to assess through trips.

Larry Maucher said that the 1986 resolutions designating roads as state routes also adopted them as freeway/expressway facilities. Dave Perkins said that Kimley-Horn would review the resolutions and amend the draft summary table.

Dave Perkins said that the recommendation for a state highway is made from the ADOT Director to the State Transportation Board. He discussed an example, the Pinal Corridors Study, which used the same criteria developed in this study to assess route feasibility to be designated as a state highway. Larry Maucher mentioned that to be designated as a state highway, a road has to first be designated as a state route.

5. **Preliminary Modeling Results for Loop Segments Beyond 2030**

Dave Perkins explained that the next phase of the study involved looking beyond 2030 to determine which facilities were feasible for development as freeways, parkways, and super-arterials. He explained that Kimley-Horn staff had completed initial model runs on individual loop routes, and the next step will be to model combinations of alternatives.

Larry Maucher mentioned that 5 to 7 years ago, there was study of SR 286 to Sandario Road, to connect to a similar alignment to the Southwest Inner Loop alignment. He mentioned that San Joaquin Road went through two sections that the BLM had set aside. Kurt Weinrich asked if the loop route south of Tangerine Road was using Picture Rocks Road. Dave Perkins responded that it was using the alignment for the Twin Peaks Road interchange.

Dave Perkins described the modeling parameters for the “beyond 2030” scenarios. He said that the projected population was 2.1 million persons, as compared to 1.5 million persons in the 2030 travel demand model. He said that the model assumes that all of the southeast area would be developed, as well as the Tucson Mountain area and the Houghton Road corridor.
Gary Oaks asked if the model assumed growth in Pinal or Cochise counties. Dave Perkins responded that it does only to the extent that the 2030 travel demand model includes it.

Kurt Weinrich asked what assumptions were made with regards to freight traffic. Dave responded that the PAG model does not specifically deal with freight movements. Dave Perkins explained the legend on the graphics for each loop route and described the initial modeling results for each corridor. Regarding the Loop 1 corridor (Houghton Road/ Golf Links Road / Swan Road), he said that in the southeast area, the model is loading with high traffic volumes.

Brooks Keenan asked how many lanes were assumed on the corridor. Dave responded that it was assumed to be a 6-lane parkway. Larry Maucher commented that the Barraza- Aviation Parkway carried 80,000 vpd with access control.

Dave Perkins described the modeling results for the Loop 2 corridor (Southwest Outer Loop). He said it was not heavily used north of Ajo Way. Walker Smith asked if there was development west of the Tucson Mountains? Dave Perkins said yes, there was development in Avra Valley. Gary Oaks commented that the freeway was constrained in the model. Dave Perkins agreed and said that the capacity thresholds on the higher facilities are typically exceeded in the model.

On the Loop 3 corridor (Southwest Inner Loop), Dave Perkins commented that Valencia Road is loading up with high projected travel volumes. He said that the travel demand modeling results suggest that the RTA is on the right track in serving this area. Loop 4 (River/Alvernon corridor), Loop 5 (Kolb Road/ Northern I-10), and Loop 6 (Houghton Road/ Sunrise Drive corridor) are showing heavy loading. He stated that the corridors may not all be feasible, but the preliminary modeling is showing that multiple concentric corridors may be needed. Loop 7 (Oracle Junction /La Cholla corridor) relieved the Oracle Road corridor somewhat.

Bill Jansen commented that Interstate 10 is a choke-point, and the capacity of I-10 has to be considered. La Cholla Boulevard may be more heavily used if I-10 planned and ultimate capacities are taken into account. He mentioned that there are huge planned developments in Pinal County. Bill Jansen said that the capacity analysis and timing (e.g. phasing) are important. Dave Perkins commented that Bill Jansen was saying that there is a need for looking beyond the technical analysis, similar to the approach taken by ADOT in the Pinal County Corridors Definition Studies.

Larry Maucher commented that five lanes with auxiliary lanes in each direction is the maximum laneage on I-10 unless frontage road areas are converted to mainline lanes. Curt Lueck commented that there may be technical advances in Intelligent Transportation Systems (ITS) by that time.

Gary Oaks commented that we should err on the side of preserving right-of-way for future corridors. Larry Maucher said that on the Sahuarita and Tangerine corridors, it was important to preserve right-of-way. Walker Smith asked how Loop 10 (Tanque
Verde) was related to the River/Alvernon alternative. Dave Perkins responded that in the next stage of the project we will show combinations of corridors and Cambridge Systematics will look at regional performance measures.

6. Committee Comments on Any Aspect of the Study

Larry Maucher said that that in the original Aviation Parkway Study the volumes were within 2-3% of the forecasted traffic volumes. I-10 traffic volumes were in reality only 10% higher than predicted. Walker Smith said that only 15 years ago I-10 was carrying 85,000 vehicles per day. Now there are 167,000 vehicles per day on I-10 at Congress Street. Dave Perkins said that the I-10 widening was originally designed for a design year of 2010 or 2015, so it was approaching that time frame. Larry Maucher commented that this study was exciting, and the traffic projections for the combinations will likely be accurate.

Bill Jansen commented that this was really good information. Don Freeman commented that the preliminary results are showing that the corridors are needed, more than we thought. Walker Smith commented about the relatively small amount of funding proposed in the RTA.

7. Next Steps

Dave Perkins commented that the TAC will be meeting on this study two more times this year.

Don Freeman said that Draft Working Paper 2 will be finished shortly and sent to the TAC members for review.
STATE TRANSPORTATION SYSTEM MOBILITY AND REGIONAL CIRCULATION NEEDS FEASIBILITY STUDY (LOOP ROAD STUDY)

TECHNICAL ADVISORY COMMITTEE MEETING

November 29, 2005
Pima Association of Governments
177 North Church Avenue
5th Floor Conference Room
Tucson, Arizona
9:00 a.m.

ATTENDANCE

Artemio Hoyos, Pasqua Yaqui Tribe
Bill Jansen, Town of Oro Valley
Brooks Keenan, City of Tucson
Mark Pugh, San Xavier District of Tohono O'Odham Nation
Kurt Weinrich, Pima County Department of Transportation
Aichong Sun, Pima Association of Governments

Sandra Gilbert, Arizona Department of Transportation
Cherie Campbell, PAG
Don Freeman, PAG Project Manager
Mike Carlson, Tucson Airport Authority
Catherine Balzano, Arizona State Land Department

Consultant Staff in Attendance

Dave Perkins, Kimley-Horn & Assoc.
Mary Rodin, Kimley-Horn & Assoc.

Curtis Lueck, Curtis Lueck & Associates

MEETING SUMMARY

1. Welcome and Introductions

A Technical Advisory Committee Meeting of the State Transportation System Mobility and Regional Circulation Needs Feasibility Study (Loop Study) was held on November 29, 2005 at the Pima Association of Governments 5th Floor Conference Room. The meeting began at 9:00 a.m. and adjourned at approximately 11:00 a.m.

Don Freeman opened the meeting and the attendees introduced themselves.

2. Summary of Working Paper 2, Assessment of Selected Loop Routes for Designation as State Highways

Dave Perkins described the contents of Working Paper 2, in which focus routes on the loop system were reviewed to determine if they met criteria for designation as state highways. He said the report was revised to include information from Larry Maucher.
regarding 1986 State Transportation Board resolutions designating roads as state routes. Dave Perkins asked that the TAC send written comments on the draft report to Don Freeman by December 7th, 2005. Kimley-Horn will incorporate these comments into the final report for the project.

3. Preliminary Needs Analysis Results for Loop Segments Beyond 2030

Dave Perkins explained the process for evaluating the loop system elements and he described the modeling parameters for the “beyond 2030” scenario. The model input includes a projected population of 2.1 million persons, as compared to 1.5 million persons in the 2030 travel demand model. He said that the model assumes that all of the southeast area would be developed, as well as the Tucson Mountain area and the Houghton Road corridor.

Bill Jansen asked what the boundary for the corridor was, and if it assumed growth in Pinal or Cochise counties. Dave Perkins responded that the study includes the PAG planning region and the model includes external growth only to the extent that the 2030 travel demand model includes it. Don Freeman asked if the model included the external stations included in the PAG 2030 model. Dave Perkins responded that it did. It was noted that this may underestimate the impacts of growth in the areas immediately adjacent to the PAG boundary.

Dave Perkins described the needs assessment process and the initial freeway and parkway system that was the result of the modeling efforts. He described how the modeled loop systems affected regional mobility measures. On a systemwide basis, regional vehicles miles of travel will increase from 79.5 million miles of travel to 92.7 million miles of travel, while vehicle hours of travel will decrease from 2.86 million vehicle hours of travel to 2.37 million vehicle miles of travel. Curt Lueck commented that average travel speed will increase from 22 to 43 mph.

Dave Perkins described each of the corridors and requested comments from the TAC. A summary of discussion on the corridors are summarized as follows:

Freeway Corridors

- Bill Jansen commented that the southwest outer loop freeway system will attract through trips, and is an alternative route. He asked if the model assumed freight flows from the CANAMEX corridor. Dave Perkins responded that PAG model does not account for freight travel, as a separate element. He said that previous studies had shown that of freight trips to/from the US/Mexico border on I-19, approximately 1/3 travel east and 2/3 travel west. It was discussed that CANAMEX corridor is a route designated by Congress, so the outer loop freeway would not replace it without congressional redefinition, but could potentially be a reliever route.
- Brooks Keenan asked about designating lower-volume segments of the outer loop system as a parkway. Dave Perkins responded that designating the loop as a freeway in the model better reflects the higher travel speeds and travel times that would occur. Bill Jansen commented that parkways can lose access control.
- Brooks Keenan commented that he has trouble envisioning Valencia Road as a freeway. Dave Perkins said that in the feasibility assessment phase of the study,
Valencia Road may not be feasible and the freeway facility may need to be relocated to a different alignment.

- Kurt Weinrich commented that it would be good to identify opportunities and constraints for each corridor. Dave Perkins explained about the possibility of locating the outer loop on the CAP alignment, to minimize impacts.
- Catherine Balzano asked about the Three Points area and whether the outer loop freeway would facilitate travel to that area, and to SR 286. Dave Perkins said yes.
- Ms. Balzano also asked about old Nogales Highway, and whether this would be a potential route. Dave Perkins said KHA was asked to analyze specific routes. However, the PAG Southeast Area Arterial Study did recommend Old Nogales Highway as a parkway.
- Curt Lueck said that the Southwest Loop provided an opportunity to realign the UPRR railroad. Kurt Weinrich said that in Reno, it was cheaper to move the railroad underground than to build a new freeway. Bill Jansen said that there will be a need to re-rail the track at some point.

**Parkway Corridors**

- Brooks Keenan asked Kurt Weinrich whether the County planned to widen River Road in the vicinity of Swan Road and Craycroft Road.
- Kurt Weinrich commented that the Snyder Road Bridge and Pantano Creek were geographic barriers. He said that a regional flood control plan is being developed by Pima County that will include regional detention basins in a number of locations (e.g. Brawley Wash, Black Wash). These should be included in the constraints analysis.
- Bill Jansen commented that Pinal County plans all have major connections to Florence. A La Cholla Road connection should provide access to the system in Pinal County. Dave Perkins commented that SR 79 was recommended to be preserved for a 4-lane route in the future.
- Brooks Keenan asked where the northern limit of the Houghton Road Parkway was. Dave Perkins responded that it was at Golf Links Road.
- Bill Jansen asked if anything was at odds with the RTA plan. It was requested that the loop systems be compared to other study recommendations for consistency, in the feasibility analysis.
- Don Freeman commented that there were a lot of GSIs being shown, and generally the community dislikes GSIs. Dave Perkins explained that both the parkways and the future arterial system will mature, typically using GSIs.
- Curt Lueck commented that the biggest feasibility constraint is right-of-way availability. There was a further discussion of constraints, including community acceptance and potential for access control. Tangerine Road was mentioned as an example of a facility where the local jurisdictions have a lot of control.

**Other Comments**

- Bill Jansen asked if the final report will go to the TPC and the PAG Regional Council. Don Freeman said that it is reasonable to assume that it will go to the Board after the RTA vote. There were comments that this is a significant study, and that if the RTA is approved, it may lend enthusiasm to this study’s recommendations.
Mike Carlson commented that if the Valencia Road corridor is not feasible, an alternative corridor will be important to the Tucson Airport Authority.

There was a brief discussion of what would happen if the corridors are not shown to be feasible. Dave Perkins said we will show the impacts of not having the loop systems.

4. Next Steps

Dave Perkins commented that the next TAC meeting will be in January. Kimley-Horn is planning to complete the study early next year.
MEETING SUMMARY

1. Welcome and Introductions

A Technical Advisory Committee Meeting of the State Transportation System Mobility and Regional Circulation Needs Feasibility Study (Loop Study) was held on June 1, 2006 at the Pima Association of Governments 5th Floor Conference Room. The meeting began at 9:00 a.m. and adjourned at approximately 11:00 a.m. Don Freeman opened the meeting and the attendees introduced themselves.


Dave Perkins described the contents of Working Paper 3, which documents the results of the needs, performance, and feasibility assessment of the Loop Road system. Dave said that Working Paper 3 will include comments from this meeting and will be distributed to the TAC for review and comment.

Dave Perkins explained the process for evaluating the loop system elements. He described the socioeconomic parameters for the “beyond 2030” modeling scenario which
assumed a projected population of 2.1 million persons, as compared to 1.5 million persons in the 2030 travel demand model. He summarized the mobility results and the feasibility assessment.

A summary of discussion on the freeway and parkway corridors are summarized as follows:

Freeway Corridors

- Jim DeGrood mentioned that he brought a map showing development planned in the Red Rock area.

- Gary Oaks asked what the mileage comparison was for I-10 versus the proposed Western Freeway loop. Dave Perkins responded that I-10 was approximately 35 miles versus 49 miles on the Western Freeway Loop.

- There was a discussion regarding Valencia Road, part of the Western Freeway Loop. It was pointed out that this corridor could potentially be located on Los Reales Road or a nearby parallel facility. Martin Roush asked that a disclaimer be put on report maps to clarify that the lines shown are not exact locations.

- Don Freeman questioned if the Valencia Road connection near I-10 could physically work with its proximity to the Barraza – Aviation Parkway. Dave Perkins responded that Kimley-Horn has done a conceptual layout for a system interchange at that location as part of the work for the I-10 Corridor Study.

- Dave Perkins said that the Southern Freeway Loop will require further study. Parts of the route are not supported by the Town of Sahuarita and the Tohono O’odham Nation does not want the road close to their boundary. Mike Carlson asked what the need for the Southern Freeway Loop is. Dave Perkins responded that the proposed freeway would off-load traffic from I-19 and I-10.

- Kurt Weinrich commented that the Puerto Nuevo project team was putting together a plan by the end of June.

- Martin Roush suggested color-coding segments of the corridors with respect to time frames and impacts. Dave Perkins said we may do this in the priority phase of the project. Don Freeman asked him if he was suggesting that the Southern Freeway Loop be divided into two segments at I-19. Martin Roush responded “yes”.

- Mark Pugh said that with respect to the southern loop freeway location, if it is located farther south of Pima Mine Road, then it is of less concern to the San Xavier District. However, the Pima Mine Road location is seriously opposed by the District and the Tohono O’odham Nation.
Parkway Corridors
• Dave Perkins said that in developed areas, the highest level of roadway studied was a parkway. It was assumed that parkways would initially start with at-grade intersections and as volumes grew congested intersections would be reconstructed to grade-separated interchanges (GSIs).
• There was a discussion that as more north-south facilities were included in the model, travel demand tended to decrease on east-west facilities such as Ina Road and westerly segments of Orange Grove Road. Kurt Weinrich commented that when Skyline Drive was widened, traffic volumes on River Road decreased.
• Craig Civilier commented that there was extensive development planned in southern Pinal County. Tom Cooney commented that the model showed substantial development in the Saddlebrook area. Kurt Weinrich commented that the Pinal County Board of Supervisors is looking at a comprehensive plan with regards to employment in Pinal County. Sharon Bronson is planning to set up a summit meeting for the two counties to discuss employment opportunities and plans.
• There was a discussion of the Tangerine Road corridor, which appeared to decrease in significance beyond 2030. Jim DeGrood cautioned that if Tangerine Road is not part of the ultimate loop system, then it “takes the wind out of the sails” to acquire a wide right-of-way in the corridor. Dave Perkins commented that the 2030 roadway priorities should not change. Craig Civilier said that it is a question of rezoning-do we ask for 150 feet or 300 feet on these facilities. Dave Perkins responded that the land use in a corridor could change 2-3 times over the course of the time period for the “beyond 2030” model.
• Kurt Weinrich commented that the study could provide an impetus for access management policies on arterial streets. He suggested that the study look at access management from a regional or state policy level. Curt Lueck said that there may be a study on the Overall Work Program regarding access management policies. Priscilla Cornelio said that the report should emphasize that 2030 is the adopted plan, and show the 2030 plan first in the document, then talk about the “beyond 2030” scenario.
• Mike Carlson commented that it looked odd having the River Road and Orange Grove Road corridors so close. Dave Perkins responded that these corridors were included to be studied in the study definition.
• Jim DeGrood said that depicting all State Land in the north for the Tortolita Mountain park expansion may not be a good assumption.
• Don Freeman commented that there is a southern Pinal study on the horizon that will analyze development and transportation issues near the county line.
• Kurt Weinrich commented that Tucson Water has long term commitments in Avra Valley which may impact the Avra Valley bypass.

Workshop
A workshop was conducted in which the TAC members commented on a number of issues. Each issue is listed with comments from the TAC on the issue. Dave Perkins facilitated the discussion.

Future Freeway Traffic Volumes
• Dave Perkins stated that in some areas the planned loop freeways facilities are not loading but are provided to provide continuity with the rest of the system. Jim De
Grood agreed with this statement. Martin Roush agreed with this statement. He said “if you build it, they will come”. He used the roadway to Kitt Peak is an example. He said the projected volumes could be used as a priority tool.

**Transition of Major Arterials to Parkways**
- Jim De Grood commented that we could selectively look at hot spots, or areas with redevelopment opportunities. We need to develop parkway standards now.
- Kurt Weinrich suggested documenting before and after “lessons learned” regarding transitions from major arterials to parkways.
- Martin Roush said it is easier to get access management implemented on a new facility than on an old one.
- Dave Perkins asked if there was any value to jurisdictions to have a regionally defined system with an access management process. Jim DeGrood said the region could benefit from access management guidelines. Kurt Weinrich said they could be developed through discussions with the RTA. Martin Roush commented that it was hard to reach a consensus. He commented that the City of Tucson had a model plan- another layer could be added for parkway facilities. He didn’t think a regional policy would happen - let jurisdictions develop access management policies first.

**Parkway Transition to GSIs**
- Dave Perkins asked for comments as whether it was reasonable to expect the next steps in parkway development, which is constructing GSIs.
- Martin Roush asked what the benefit would be of a sweeping policy. Don Freeman said that GSIs would not be constructed until it was feasible. He asked the group if they want to accept GSIs as a step in the roadway development process. Priscilla Cornelio commented that triggers could be documented in the report, e.g. 70,000 to 100,000 vehicles per day entering intersection volume.
- Jim DeGrood commented that most opposition from the business community has come with respect to parkway standards. Craig Civalier commented that if the standards are not in place, developers can’t plan for it.
- Martin Roush commented that the first steps should be getting Avra Valley right-of-way purchased as soon as possible.
- Kurt Weinrich said that an alternative to GSIs is a classic parkway where the street does not intersect with every part of the grid (grade separated but not connected). Martin Roush mentioned the super-arterial concept.
- There was a consensus among the group that parkway enhancements should be a recommendation.

**Tangerine Road Corridor**
- Jim De Grood suggested calling it a parkway “lite”. He said don’t throw out the RTA plan.
- Martin Roush said show the RTA plan in the report.
- Kurt Weinrich commented that there is a strongly held feeling in Tucson that we should be preserving scenic values. Dave Perkins said this might be a value-added recommendation- that arterials could be converted to scenic parkways when needed.
La Cholla Boulevard Corridor
• Craig Civalier commented that we should include La Cholla Boulevard in the plan, but we need to consider alternatives to La Cholla Boulevard. He also commented that the alignment needs an arc to the west.
• Dave Perkins said that if La Cholla Boulevard is not supported, then a major rethinking of alternatives with respect to Oracle Road is needed, involving coordination with Pinal County, Arizona State Land Department and ADOT.

El Toro Road
Martin Roush commented that the region has to explore this option. He suggested bringing this corridor forward, but with a disclaimer on any mapping.

Valencia Road
• Priscilla Cornelio asked that the report call this corridor Los Reales/Valencia, particularly west of the airport. She said show a wider line depicting the corridor. Another person commented that it could be called the Los Reales/Drexel/Valencia corridor.
• Mike Carlson said there are advantages to routing the corridor north of Valencia Road. He said there is flexibility in locating the route between Valencia Road and Ajo Way.
• Mark Pugh commented that any future Los Reales alignment heading west through the San Xavier District would be seriously opposed by the District and the Tohono O'odham Nation, since it would split the San Xavier Cooperative Farms in half, and impact housing as well. In addition, the Pascua Yaqui Nation should be consulted for their thoughts on this matter as well due to their proximity to Los Reales Rd.

Implementation
• Martin Roush commented that making jurisdictional commitments are not the purview of the TAC. Jurisdictional commitments are the purview of the TPC.
• Kurt Weinrich said that the comprehensive land use plan is the implementation plan.
• There were comments about how “growing smarter” legislation should be incorporated into the planning process.
• Martin Roush commented that jurisdictions could update their Specific Plans or General Plans with the results of this study. Jurisdictions could also update their Major Streets and Routes plan, as applicable.
• Craig Civalier commented that jurisdictions could review their zoning codes, e.g., the overlay district that exists on Tangerine Road. He would like to pass an overlay district for La Cholla Boulevard.
• As state land is purchased, assure that access management and coordinated transportation and land use planning occur.
• Martin Roush suggested that there is a need for funding and regional funds should be used to preserve corridors. Priscilla Cornelio said there is a need to perform studies to preserve corridors.
• Someone commented that the report will say that some of these corridors can serve a state function. There is an implication that this may be a funding source.
• Priscilla Cornelio asked if PAG should be the responsible agency to do the next studies. It was suggested that this be a cooperative effort, particularly in urban areas and for arterials, perhaps led by PAG.
3. Next Steps

Dave Perkins commented that the next steps are to finalize Working Paper 3 and to conduct an open house. Kurt Weinrich commented that it is important to distinguish this report from the RTA plan. He suggested coordinating with the community development section. He suggested calling it the “2030 plus” plan.