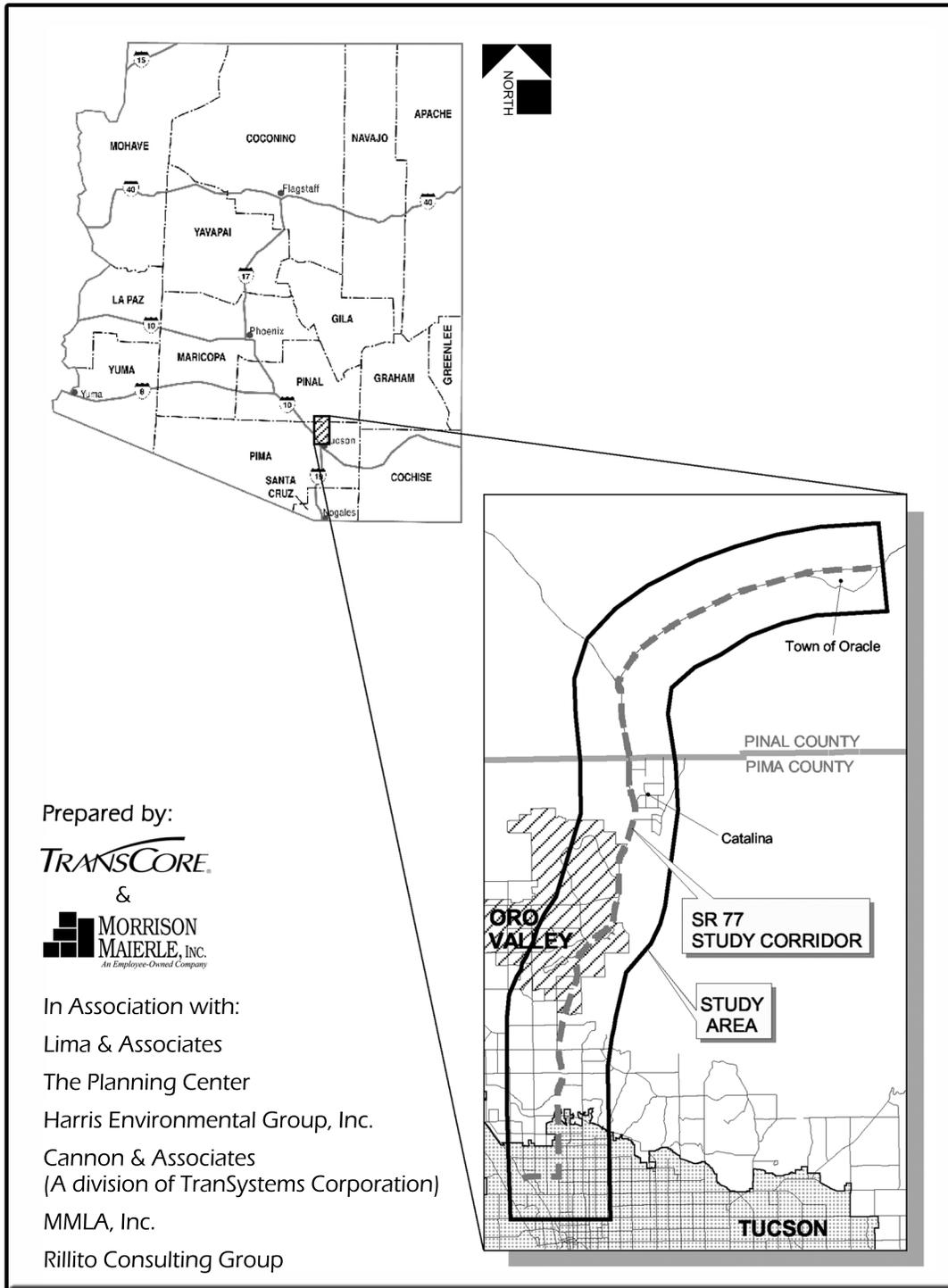


SR 77/Oracle Road Multimodal Corridor Profile Study



May 2007

Executive Summary

SR 77/ORACLE ROAD MULTIMODAL CORRIDOR PROFILE STUDY

EXECUTIVE SUMMARY

Prepared for
Arizona Department of Transportation

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May 2007

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1. INTRODUCTION

PROJECT BACKGROUND

In fulfillment of the planning requirements of the Intermodal Surface Transportation Efficiency Act, the Arizona Department of Transportation (ADOT) 1994 State Transportation Plan identified 33 transportation corridors of statewide significance as a focus of multimodal planning efforts. The corridors of statewide significance are defined as broad geographic areas through which various modes of travel provide connections for the movement of people, goods, and services. Each corridor includes one or more state highways and may include other modes of transportation such as railroads, bus routes, and pipelines.

State Route 77 (SR 77), in Pinal and Pima Counties, serves as a major transportation corridor linking the Tucson metropolitan core, the suburban community of Oro Valley, sections of unincorporated Pima County, and Pinal County. The project corridor is between the I-10 interchange at Miracle Mile (milepost 68.10) and the northeast entrance to the Town of Oracle (milepost 103.32), approximately 35 miles apart. Within the project area, SR 77 is referred to as Miracle Mile between MP 68.10 and MP 69.56 and Oracle Road between MP 69.56 and the Pima County border. Except for the segment of Miracle Mile between I-10 and Oracle Road, SR 77 travels in a north/south direction. Exhibit 1-1 shows the project location.

STUDY PURPOSE, GOALS, AND OBJECTIVES

The corridor profile study is intended to provide information for establishing priorities and identifying additional improvement strategies which should be incorporated into the statewide multimodal plan. The main purposes of this study are to 1) identify issues in the SR 77 relating to established performance criteria, 2) aid the selection of priority projects for the state, as scarce resources are allocated, and 3) assist ADOT in achieving its goal of enhancing the mobility of people, goods, and services.

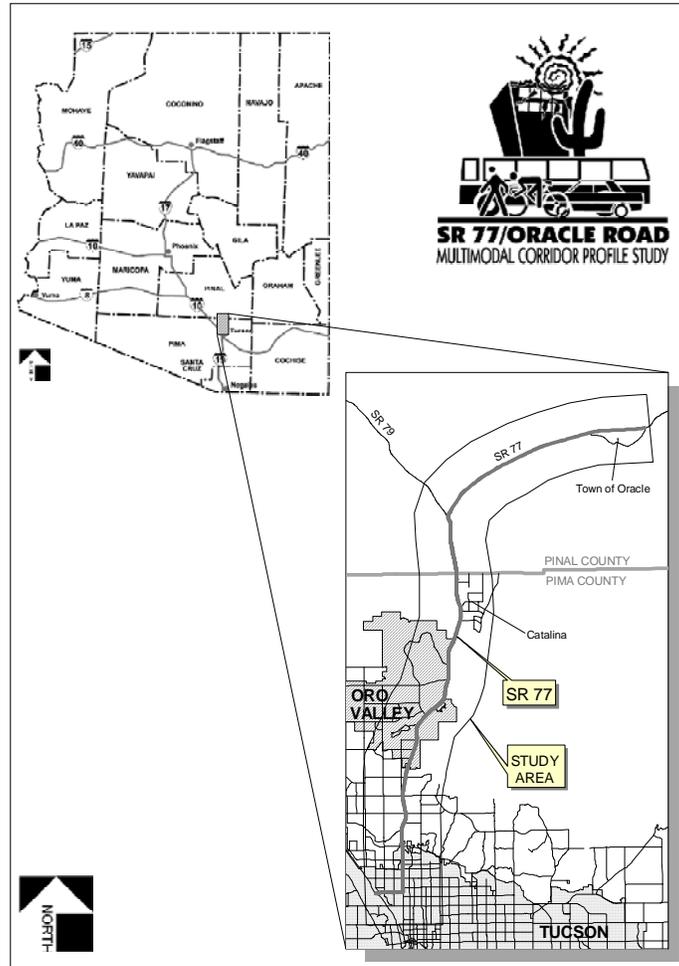
Corridor profile studies fulfill many of ADOT's planning obligations. The following goals and objectives are designed to assist in meeting these obligations.

- To resolve major planning issues prior to initiation of project programming and engineering development plans;
- To identify transportation right-of-way issues and potential right-of-way needs;
- To provide a preliminary identification of potential environmental screening issues;
- To identify potential Title VI issues; and
- To identify candidate projects that can be incorporated into the priority programming process.

The primary objectives of this study are to:

- Analyze, document, and recommend alternative transportation opportunities (including opportunities for roadway improvements, bus transit, light rail transit, bicycle, and pedestrian systems).
- Coordinate the process with state, regional, local, and private interests.

Exhibit 1-1
SR 77/ORACLE ROAD CORRIDOR STUDY AREA



- Provide the opportunity for public involvement at selected points during the planning process.
- Analyze and document environmental issues and concerns.
- Perform analyses of transportation alternatives.
- Analyze and document Environmental Justice issues as they may relate to low income and minority populations.
- Analyze, document, and recommend Intelligent Transportation Systems (ITS) alternatives.
- Identify likely future development that will affect the travel demand within the corridor, assess the effects of that development.
- Identify, evaluate, and prioritize potential actions to preserve and/or improve the corridor's ability to meet the existing and future travel demand.
- Analyze, document, and recommend road and street management actions and investment opportunities.

STUDY PRODUCTS

The study products for this project are the following:

- Working Paper 1: Inventory and Analysis of Existing and Projected Needs and Deficiencies (June, 2003)
- Working Paper 2: Identification and Analysis of Opportunities for Improvements and Feasible Investment Options Under Present and Future Scenarios (February, 2004)
- Working Paper 3: Recommended Projects: Cost Estimates, Environmental Screens, Environmental Justice Considerations and Public Feedback
- Working Paper 4: Draft Final Report
- Final Corridor Profile Report and Executive Summary
- Public Involvement Process

2. EXISTING AND FUTURE CONDITIONS

An inventory and analysis of all existing and planned future socioeconomic conditions, transportation facilities, and services within the SR 77 Corridor study area was completed for this study. The analysis of these conditions, facilities, and services is the basis for identifying existing and future transportation deficiencies within the corridor. A summary of the existing and planned future transportation system conditions is provided below.

EXISTING AND PROJECTED POPULATION

The land within the corridor is divided between rural in the northeastern portion of the corridor and urban in the southern portion, within the urbanized areas of Tucson, Oro Valley, and Catalina. Exhibit 2-1 shows the current population of the counties and communities. The year 2002 total population in the two counties is approximately 1.06 million persons.

**Exhibit 2-1
CURRENT POPULATION STATISTICS FOR COUNTIES
AND COMMUNITIES IN THE SR 77 CORRIDOR**

Geographic Area	Population		Annual Growth Rate
	1990	2002	1990-2002
Pinal County	116,379	190,140	4.3%
Pima County	666,880	890,545	2.4%
Oracle	3,043	3,814	1.9%
Catalina	4,864	7,414	3.6%
Oro Valley	6,670	34,050	14.6%
Tucson	405,390	507,085	1.9%

Source: U.S. Census Bureau and Arizona Department of Economic Security, Population Statistics Unit

Pinal County and Pima County are expected to be among the fastest growing counties in the nation. Exhibit 2-2 shows the Arizona Department of Economic Security population forecasts for select years through the year 2030. Projections for the community of Catalina were not available. The two counties are forecast to have a total population of over 1.6 million persons, an increase of 47 percent over year 2002 estimates. Oracle and Oro Valley are projected to have high growth rates through the year 2030.

Exhibit 2-2
FUTURE POPULATION PROJECTIONS FOR COUNTIES
AND COMMUNITIES IN THE SR 77 CORRIDOR

Geographic Area	Population				Increase	
	2002	2005	2015	2030	2002-2030	Annual
Pinal County	190,140	246,660	486,363	852,463	348.3%	5.5%
Pima County	890,545	957,635	1,175,967	1,442,420	65.7%	1.7%
Oracle	3,814	5,687	7,048	8,596	125.4%	2.9%
Catalina	7,414	N/A	N/A	N/A	N/A	N/A
Oro Valley	34,050	39,400	51,228	68,914	102.4%	2.6%
Tucson	507,085	529,770	565,736	631,889	24.6%	0.2%

Sources: U.S. Census Bureau and Arizona Department of Economic Security, Population Statistics Unit

ROADWAY SYSTEM

Functional Classification

The current roadway functional classification for the study area roadways is provided in Exhibit 2-3. This information was obtained from the Pima County geographic information system database and the 1998 State of Arizona functional classification of the State highway system.

Roadway Geometrics

Throughout the project area, SR 77 varies from a two-lane rural highway to a six-lane divided urban roadway. Exhibit 2-4 provides the existing cross section of SR 77 along the study corridor.

Right-of-Way (ROW)

Existing right-of-way data were obtained from the current Highway Performance Monitoring System data on SR 77. Along SR 77 right-of-way varies throughout the project area from 100 to 260 feet. Exhibit 2-5 shows typical existing right-of-way. Existing right-of-way may be less than the typical values shown in Exhibit 2-5 at specific locations along the corridor.

Posted Speed Limit

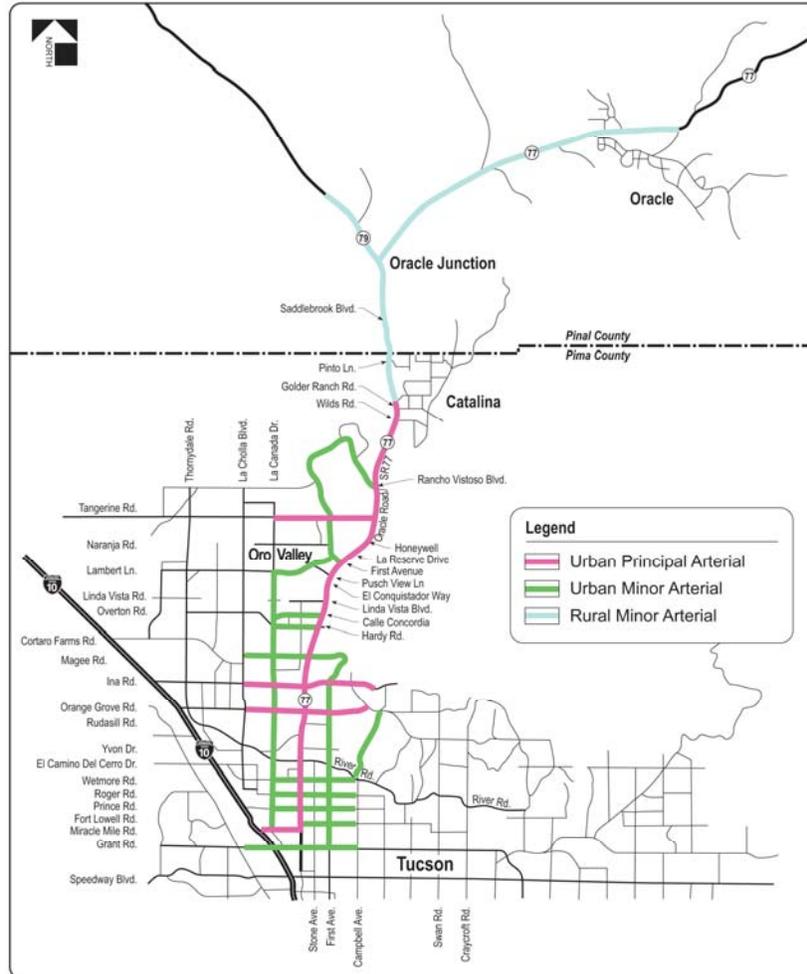
The posted speed limit varies from 40 miles per hour (mph) to 55 mph throughout the project section. Within the Tucson City Limits, the speed limit is 40 mph (I-10 to River Road). From River Road to Ina Road, the speed limit increases to 45 mph. North of Ina Road to Tangerine Road, the speed limit is 50 mph. From Tangerine Road to Lupine Place, the speed limit is 55 mph. North of Lupine Place within the community of Catalina, the speed limit reduces to 45 mph. At the Pima/Pinal County line, the speed limit increases to 55 mph and continues through to the end of the project segment.

Past, Present, and Future Forecast Traffic Volume

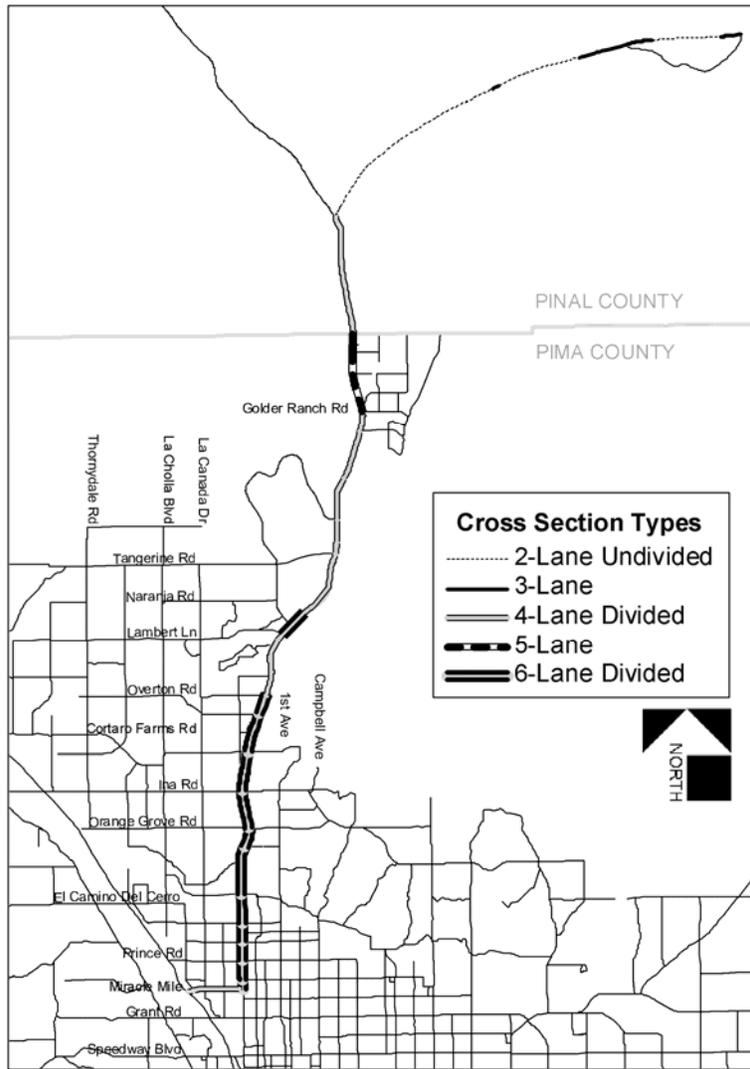
In general, the greatest growth in the traffic volumes along SR 77 has occurred north of Ina Road, particularly in the growing Oro Valley area. For example, traffic volumes on SR 77 north

of Ina Road have at least doubled from 1992 to 2002, which translates into annual growth rates ranging as high as nine percent. Exhibit 2-6 shows counted daily traffic volumes in 1992 and 2002, and provides year 2030 traffic forecasts along SR 77 based on the most current data available at the time this study was completed. Traffic forecasts for year 2030 indicate that traffic volume is expected to continue to increase along SR 77, with the highest growth rates expected north of the Pima County line due to the anticipated population growth in Pinal County.

Exhibit 2-3 ROADWAY FUNCTIONAL CLASSIFICATIONS



**Exhibit 2-4
LOCATION OF CROSS SECTION TYPES ON SR 77**



**Exhibit 2-5
TYPICAL RIGHT-OF-WAY WIDTH ALONG SR 77**

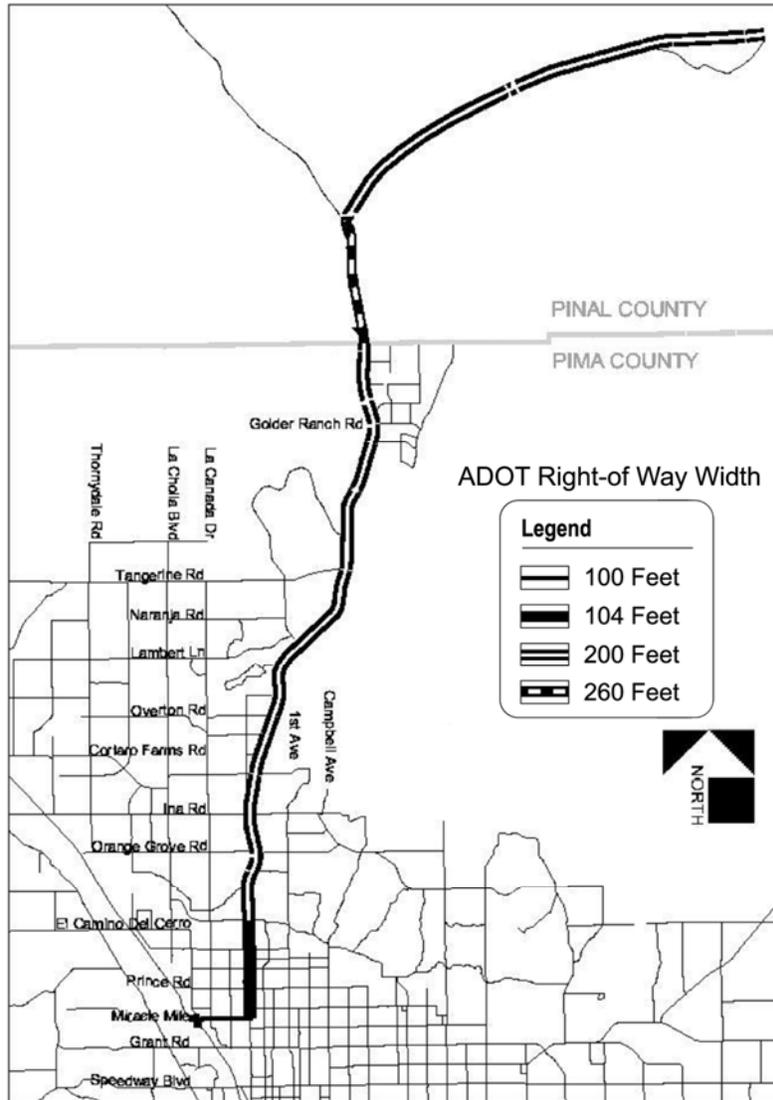
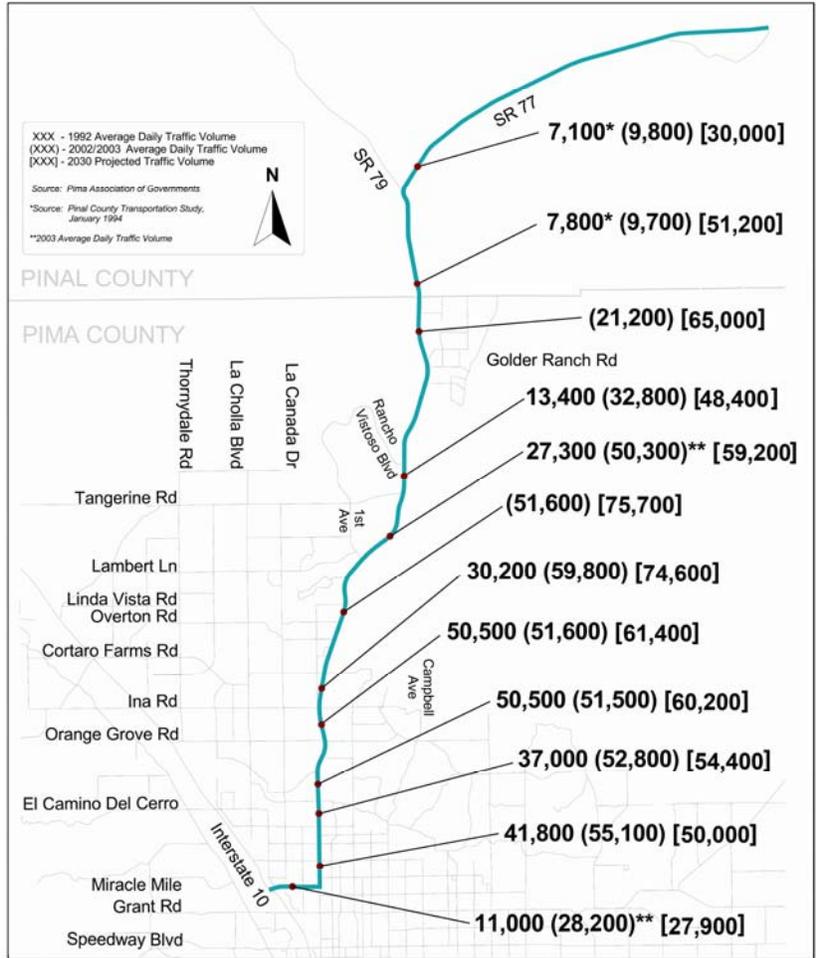


Exhibit 2-6 YEAR 1992, 2002 AND FORECAST YEAR 2030 DAILY TRAFFIC VOLUMES



Traffic Crash Summary

An evaluation of traffic crashes along SR 77 was conducted for the five-year period from December 1997 through November 2002. Exhibit 2-7 provides a summary of the five-year crash data for SR 77.

Exhibit 2-7
TOTAL CRASH CHARACTERISTICS
 (December 1997 through November 2002)

Crash Type	Number of Crashes	Percent of Total Crashes
Fatal Crashes	17	0.3
Injuries Occurred	2,725	54.9
Pedestrians Involved	42	0.8
Bike Involved	65	1.3
Alcohol Related	249	5.0
Angle	501	10.0
Left-Turns	567	11.4
U-Turns	100	2.0
Head-On	11	0.2
Rear Ends	2,621	52.8
Sideswipes	484	9.7
Total Crashes	4,961	

The crash rate for intersections was computed as the number of crashes per million vehicles entering the intersection from all approaches. The crash rate for roadway segments was computed as the number of crashes per million vehicle-miles of travel over the length of the segment. Roadway segments were defined as the roadway between signalized intersections.

There were 29 signalized intersections along SR 77 within the study boundaries at the time this analysis was conducted. Exhibit 2-8 indicates the intersections with the highest crash rate, highest total number of crashes, and the highest increase in crash rate over the five-year analysis period. Exhibit 2-9 summarizes road segment crash characteristics.

Exhibit 2-8
INTERSECTION CRASH SUMMARY

Highest Crash Rates ¹	Highest Number of Crashes ²	Highest Increases in Crash Rate
1. River Road – 1.92	1. River Road – 267	1. Tangerine Road – 650%
2. Flowing Wells Road – 1.42	2. Ina Road – 225	2. Pusch View Lane – 437 %
3. Ina Road – 1.40	3. Prince Road – 161	3. La Reserve Drive – 194%
4. Prince Road – 1.20	4. Orange Grove Road – 136	4. Flowing Wells Road – 123%
5. Wetmore Road – 1.13	5. Wetmore Road – 134	

1. Crashes per million vehicles entering the intersection.
2. Total for 5-year analysis period, December 1997 through November 2002.

**Exhibit 2-9
ROAD SEGMENT CRASH SUMMARY**

Highest Crash Rates ¹	Highest Number of Crashes ²	Highest Increases in Crash Rate
1. Limberlost Drive to Roger Road – 4.76	1. Ina Road to Orange Grove Road - 298	1. First Avenue to Pusch View Lane – 217%
2. Wetmore Road to Limberlost Drive – 4.55	2. Magee Road to Ina Road - 259	2. Pusch View Lane to El Conquistador Way – 106%
3. Orange Grove Road to Rudasill Road – 4.04	3. Rudasill Road to River Road - 238	3. El Conquistador Way to Linda Vista Boulevard – 95%
4. Roger Road to Prince Road – 3.97	4. Orange Grove Road to Rudasill Road - 195	
5. Auto Mall Drive to Wetmore Road – 3.74	5. Hardy Road to Magee Road - 182	

1. Crashes per million vehicle-miles of travel on the segment.
2. Total for 5-year analysis period, December 1997 through November 2002.

Night Versus Day Crash History

An analysis of the nighttime versus daytime crash history was conducted to determine if the lack of roadway lighting could be considered a deficiency at locations along the corridor. Roadside lighting exists along SR 77 within the City of Tucson from Interstate 10 to River Road, a distance of 3.8 miles. There is no roadside lighting north of River Road to the northern terminus of the project, a distance of 31.3 miles. Intersection lighting exists at all signalized intersections.

The analysis computed the nighttime and daytime crash rates for each roadway segment and used these values to compute the ratio of the nighttime to daytime crash rate. Six of the unlighted segments have nighttime crash rates that are 2.2 to 3.5 times higher than the daytime crash rates. The segment from Rancho Vistoso Boulevard to Tangerine Road has the highest night/day crash rate ratio of 3.5. The five segments ranked the highest are in the area from Saddlebrooke Boulevard south to First Avenue, and in order of ranking, are:

1. Tangerine Road to Hanley Boulevard
2. Pinto Lane to Golder Ranch Road
3. Golder Ranch Road to Wilds Road (low number of crashes on this segment does not support a need for lighting)
4. Wilds Road to Rancho Vistoso Boulevard
5. First Avenue to Pusch View Lane

This analysis does not indicate that roadway lighting alone will improve the incidence of nighttime crashes on these segments. It does suggest that lighting should be considered if the already planned capacity improvements do not reduce the incidence of nighttime crashes.

SR 77 Access Points and Crashes

An analysis was conducted evaluating the relationship between the number of driveways and total number of crashes along SR 77 road segments. This analysis was conducted by direction of travel. The analysis related the roadway physical characteristics (segment length, number of

driveways and unsignalized cross streets) and access related crashes (sideswipe, rear end, head on, U-turn, left turn, and angle crashes) along 29 segments of SR 77.

Comparing the number of access points per mile to access related crashes and total crashes, north and south bound, several trends appear.

- Access related crashes account for more than 50 percent of total crashes along the road segments. This trend holds for 90 percent of the road segments in both directions.
- In general, as the number of access points per mile increases, the number of total crashes and access related crashes increase. This trend is visible in both directions of travel.
- The majority of access related crashes occur between Magee Road and Rudasill Road, and between Prince Road and Roger Road.
- Regression analysis indicated that approximately 59 percent of the variation in the segment crash rate is explained by the variation in access points per mile, suggesting a fairly strong correlation between the number of driveways and crash rate for the corridor.

TRANSIT SYSTEM AND SERVICE

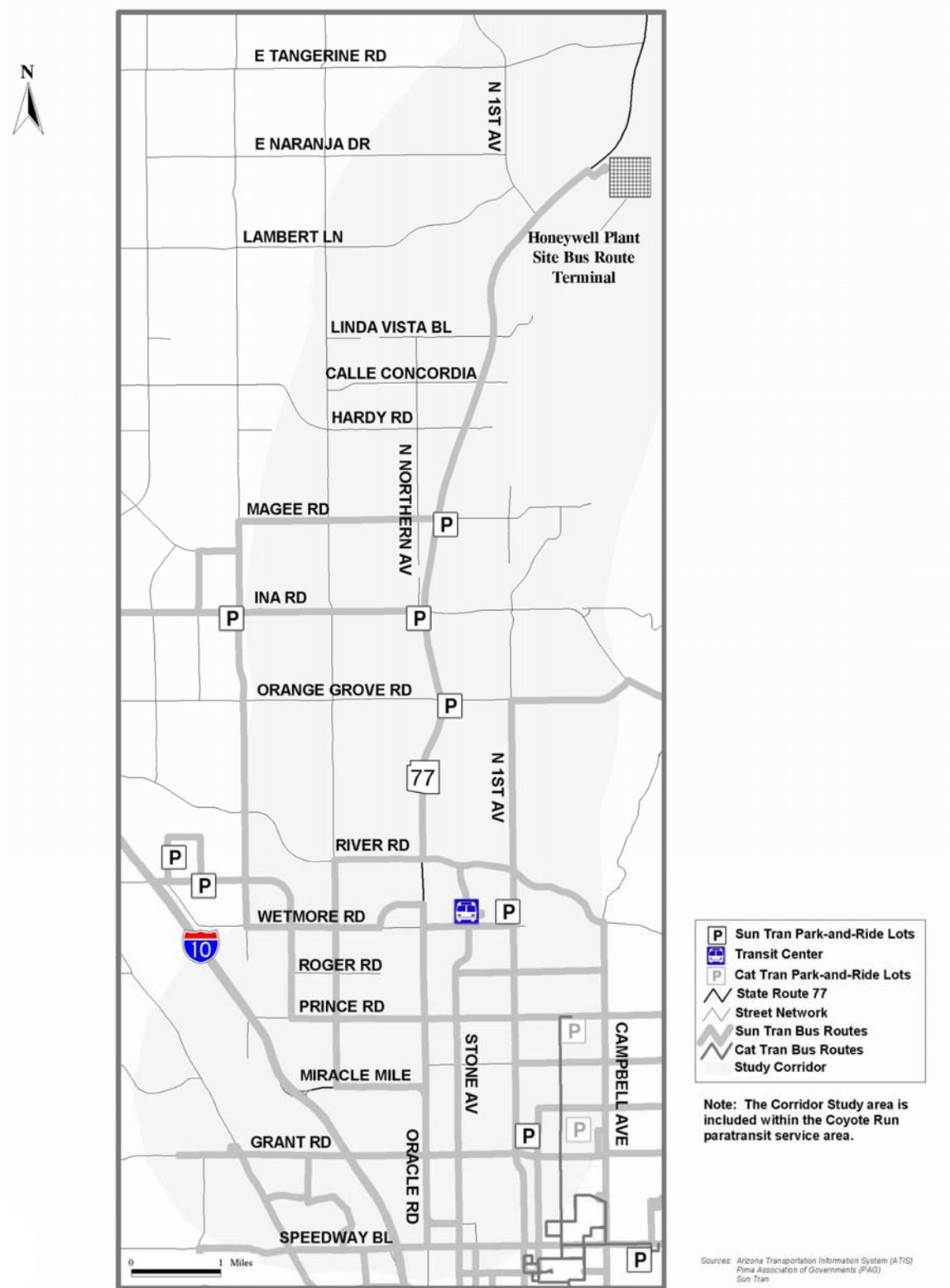
Sun Tran Transit System

Sun Tran, the transit system provided by the City of Tucson, operates fixed-route services in the study area. Special needs services are operated by VanTran, Sun Tran's affiliate dial-a-ride system, and by Coyote Run, which targets seniors in the Oro Valley area but will make trips as far south as St. Mary's Hospital in Tucson.

Sun Tran operates 26 local fixed routes and 11 express routes in the greater Tucson area. Of these, eight of the local routes and five of the express routes operate wholly or partially within the corridor. These include local Route 16, which travels over Oracle Road as far north as Ina Road before heading west on Ina Road. Express routes 103, the "Oldfather Express" and 162, the "Oro Valley express," operate several trips each way during the morning and evening peak periods only. The "Oro Valley Express" also functions as a reverse commute, carrying Honeywell employees from Tucson out to the aerospace firm's Oro Valley facility.

Sun Tran's Tohono Tadaí transfer center, located on the northeast corner of Stone Avenue and Wetmore Road, serves as a hub for the fixed route services in the area. Sun Tran also advertises three park-and-ride lots along SR 77. Corridor transit routes and facilities are shown in Exhibit 2-10.

Exhibit 2-10 EXISTING TRANSIT FACILITIES IN THE CORRIDOR



Paratransit Services

Two operators provide Paratransit services within the SR 77 Corridor study, Van Tran, operated by the City of Tucson, and Coyote Run, operated by the Town of Oro Valley.

As required by the Americans with Disabilities Act (ADA), the City of Tucson operates Van Tran, a complimentary paratransit service within the extents of the Sun Tran service area and within three-quarter mile of each Sun Tran fixed route. Van Tran provides service to persons holding an ADA eligibility card.

The Town of Oro Valley implemented Coyote Run in October of 1996 to serve residents who are 62 years of age or older or are eligible under the ADA. Service is provided within Oro Valley and from Oro Valley to destinations such as medical facilities and social service agencies throughout much of the Tucson area.

BICYCLE FACILITIES

The ADOT Map of Suitable Bicycle Routes on the State Highway System identifies the project section of SR 77 as a “More Suitable” Bicycle Route. This designation is based on criteria associated with shoulder width, pavement condition, and widening feasibility.

The City of Tucson Bike Map identifies the following segments of SR 77 as:

- SR 77 (Miracle Mile) from Flowing Wells Road to Fairview Avenue, and SR 77 (Oracle Road) from Miracle Mile to Roger Road: Bike Route with Striped Shoulder.
- SR 77 (Oracle Road) from Ina Road to North of Mainsail Boulevard (just south of the Pinal County Line): Paved Shoulder – On street, with painted edge line, speed limits 30 mph or more.
- SR 77 (Oracle Road) from Wilds Road to Mainsail Boulevard: Shared-use Path – Paved facility, separated from street.

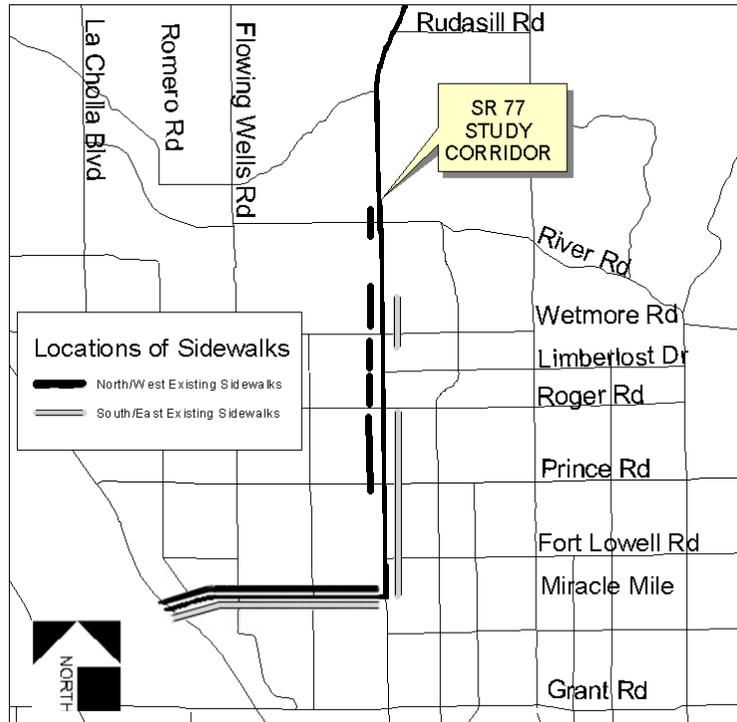
SR 77 from River Road to Ina Road was recently rebuilt by ADOT to have wider shoulders that accommodate bike travel.

There are currently no programmed or planned projects to improve bicycle facilities on SR 77 between I-10 to Flowing Wells Road, Fairview Avenue to Oracle Road, or Roger Road to River Road. Sections of major parallel routes within the corridor are identified on the Tucson Bike Map as bicycle facilities. These include Flowing Wells Road/La Canada Boulevard, La Cholla Boulevard, Fairview Avenue, Stone Avenue First Avenue, Mountain Avenue and Campbell Avenue.

PEDESTRIAN FACILITIES

An inventory of existing sidewalks was conducted for this project. In general, the project area within the City of Tucson has the most standard sidewalks, although there are several locations of discontinuity. Exhibit 2-11 shows the location of sidewalks on SR 77.

Exhibit 2-11
LOCATIONS OF SIDEWALKS ON SR 77



INTELLIGENT TRANSPORTATION SYSTEM (ITS) FACILITIES

Traffic Signal System

On SR 77/Oracle Road, there are 32 existing traffic signals within the project limits as described in Exhibit 2-12. An additional signal is planned at Ram’s Field Pass (between Honeywell Entrance and Tangerine Road). In addition to the SR 77/Oracle Road signals, there are an additional 84 signals within the four-mile width of the corridor study area.

All of the traffic signals within the corridor are coordinated by the City of Tucson, or ADOT from the I-10/Miracle Mile interchange through to Rancho Vistoso Boulevard in Catalina. ADOT recently coordinated all signals from Rudasill Road to Rancho Vistoso Boulevard. All of the signals within the corridor except for SR 77/Saddlebrooke Boulevard are connected to the City of Tucson Traffic Management Center.

Other Existing ITS Facilities

Currently there are no other ITS facilities on SR 77 within the project limits. The document, *Intelligent Transportation Systems: ADOT Statewide Plan – Intelligent Transportation Infrastructure*, (ADOT Intermodal Transportation Division Technology Group, December 2002) identifies a future/proposed Variable Message Sign to be located on SR 77 at MP 92. This document also identifies a future/proposed Road Weather Information System (RWIS) on SR 77

north of Tucson. The purposes of the (RWIS) are in part to provide real time weather conditions, provide data for predicting weather conditions, and to determine surface and subsurface temperatures.

Exhibit 2-12
EXISTING TRAFFIC SIGNALS ALONG SR 77
Signals on SR 77

- I-10 West
- I-10 East
- Flowing Wells Road
- Fairview Avenue
- Miracle Mile
- Fort Lowell Road
- Prince Road
- King Road (Fire Department Signal)
- Roger Road
- Limberlost Road
- Wetmore Road
- Auto Mall Drive
- River Road
- Rudasill Road
- Orange Grove Road
- Ina Road
- Suffolk Drive (new 2005)
- Magee Road
- Hardy Road
- Calle Concordia
- Linda Vista Road
- El Conquistador Way
- Pusch View Lane
- First Avenue
- La Reserve Drive
- Honeywell Entrance
- Tangerine Road
- Rancho Vistoso Boulevard
- Wilds Road
- Golder Ranch Road
- Pinto Lane
- Saddlebrooke Boulevard

PLANNED AND PROGRAMMED IMPROVEMENTS

Corridor Roadway Projects

The current planned or programmed projects were taken from the *PAG 2007-2011 Transportation Improvement Program*, the Central Arizona Association of Governments *2003-2008 Transportation Improvement Program*, the *PAG 2030 Regional Transportation Plan Amendment*, the PAG Regional Transportation Authority (RTA) list of projects to be funded by the May 2006 voter approved regional transportation sales tax. A summary of the planned and programmed capacity projects within the corridor is provided in Exhibit 2-13.

Alternate Mode and Other Non-Capacity Projects

Numerous non-capacity and alternative mode improvements are also planned and programmed for the corridor. These projects are summarized in Exhibit 2-14. These projects include pedestrian, bicycle, and transit service improvements. In general, the pedestrian and bicycle system improvements are included in the roadway widening projects planned for the corridor.

Exhibit 2-13 PLANNED AND PROGRAMMED CAPACITY PROJECTS

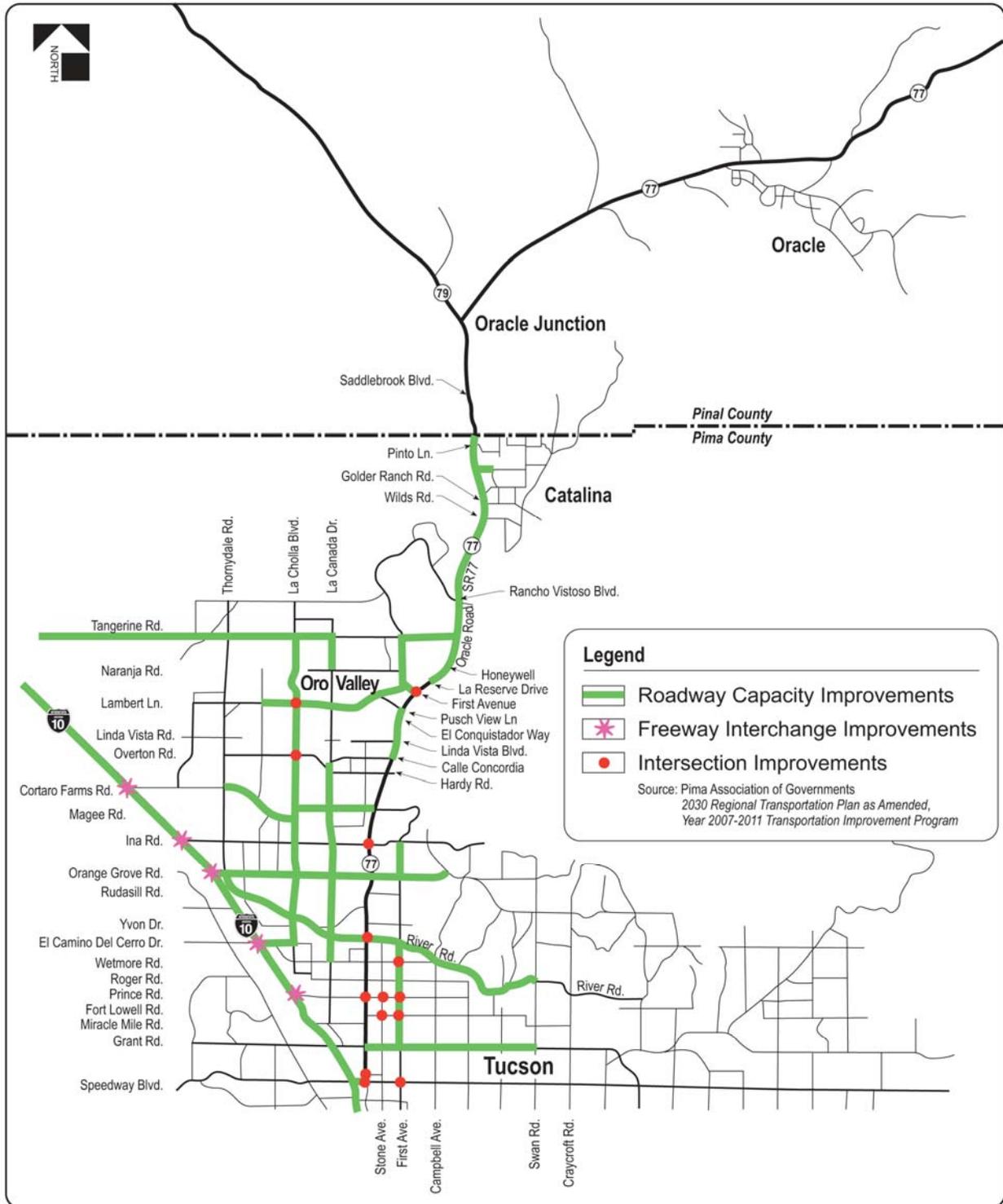
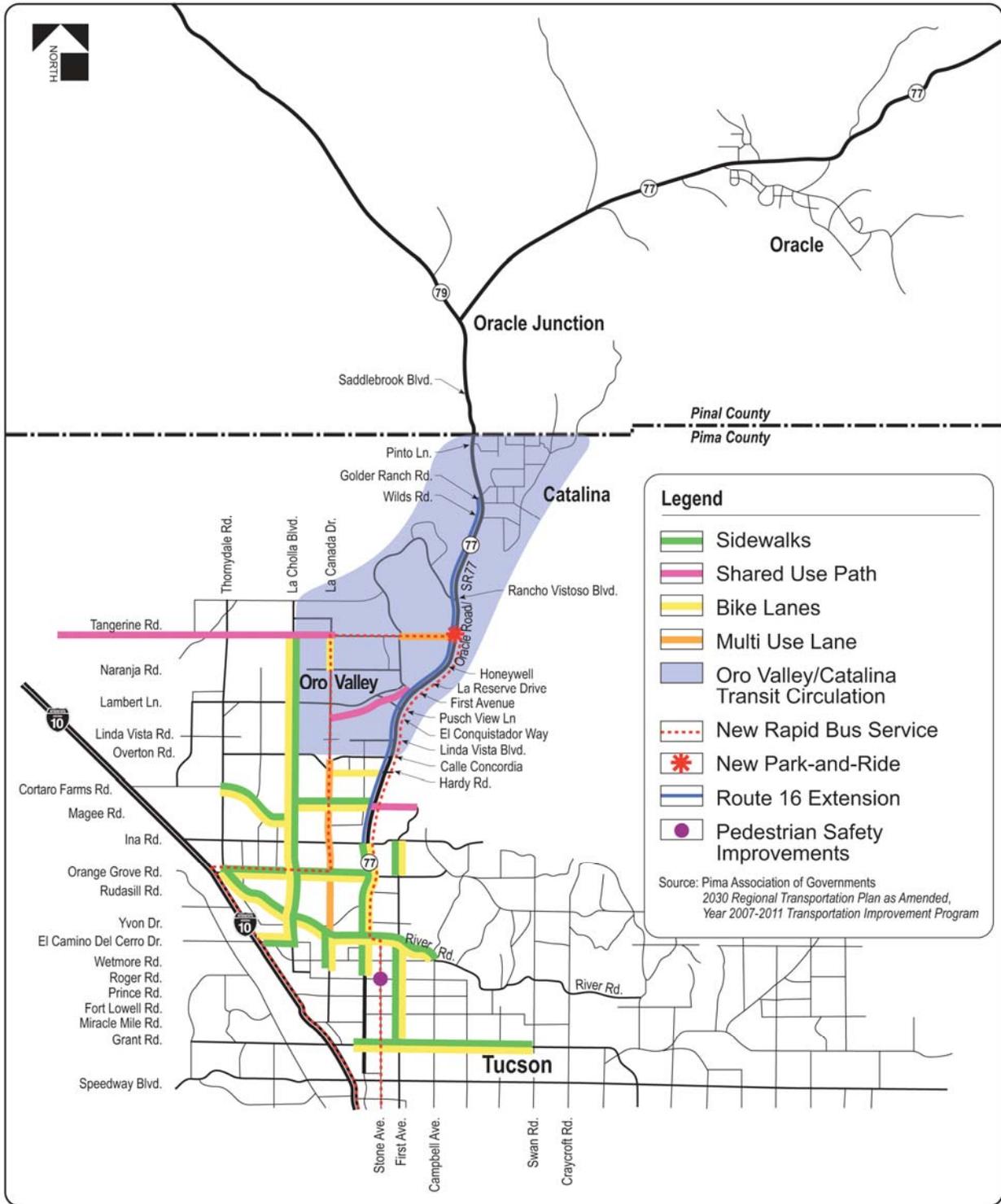


Exhibit 2-14 PLANNED AND PROGRAMMED ALTERNATIVE MODE IMPROVEMENTS



3. EXISTING AND PROJECTED NEEDS AND DEFICIENCIES

A technical analysis of the existing and future needs and deficiencies of the transportation facilities and services within the SR 77 Corridor was conducted as part of this study. Other information on needs and deficiencies was also gathered as part of a series of public open houses held early in the project, a series of two transit workshops, discussions with corridor stakeholders, and a corridor field trip held with project Technical Advisory Committee (TAC) members.

ROADWAY SYSTEM

Congestion

Level of congestion information for the existing conditions was provided by the Pima Association of Governments (PAG). PAG uses estimates of roadway segment volume to capacity ratio (V/C) to establish the segment level of congestion. Four congestion levels are estimated, but only heavy congestion (V/C between 0.76 and 1.0), and severe congestion (V/C greater than 1.0) are generally considered to represent capacity deficiencies. The levels of congestion for the year 2002 traffic are provided in Exhibit 3-1. For comparison, the forecast levels of congestion for year 2030 are provided in Exhibit 3-2. **The year 2030 congestion levels are based on a roadway system that includes the all of the planned and programmed improvements described in Chapter 2 of this Executive Summary.**

The congestion analysis indicates that even with six lanes on SR 77 to the Pima/Pinal County line, the roadway will be approaching or experiencing unacceptable levels of heavy or severe congestion by year 2030.

There are no significant improvements along SR 77 to address the identified future year 2030 congestion related deficiencies. In addition, potential new development north of Oro Valley and in southern Pinal County, which may not be entirely accounted for in the PAG regional traffic forecast, could significantly exacerbate congestion along SR 77.

Safety

The crash analysis indicated that there are several intersections and roadway segments along the corridor where improvements could reduce the number and rate of crashes. In addition, a few roadway segments were identified having a disproportionate night to day crash history. Roadway lighting might improve the crash characteristics on these segments, but the planned and programmed capacity improvements should be implemented first to determine if the redesigned roadway will address the nighttime safety concerns. A strong correlation was also found to link crash history on the corridor with the location of driveways, median openings and cross streets. The locations of the roadway segments and intersections with safety deficiencies are provided in Exhibit 3-3.

**Exhibit 3-1
CORRIDOR CONGESTION DEFICIENCIES YEAR 2002**

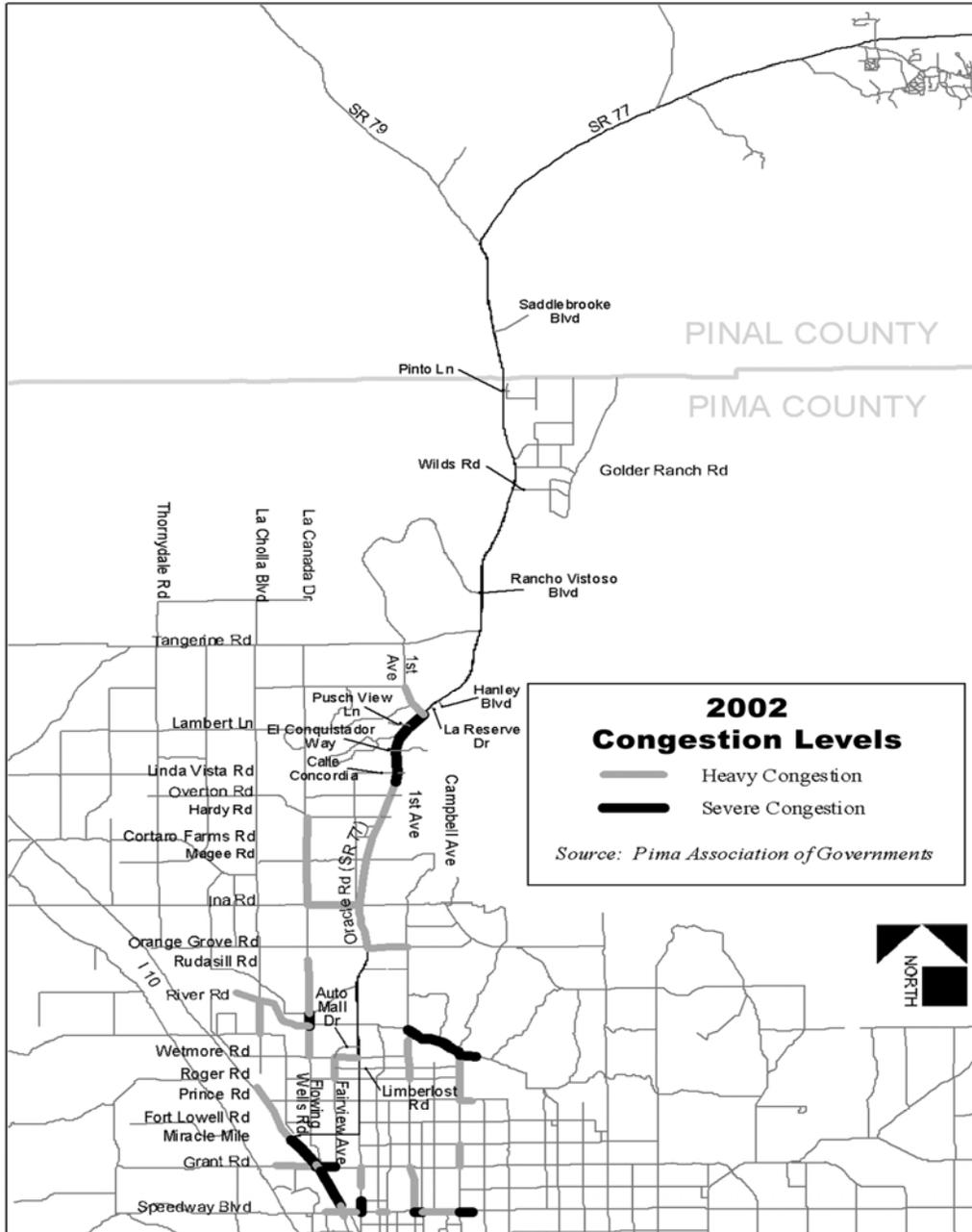


Exhibit 3-2 CORRIDOR CONGESTION DEFICIENCIES YEAR 2030

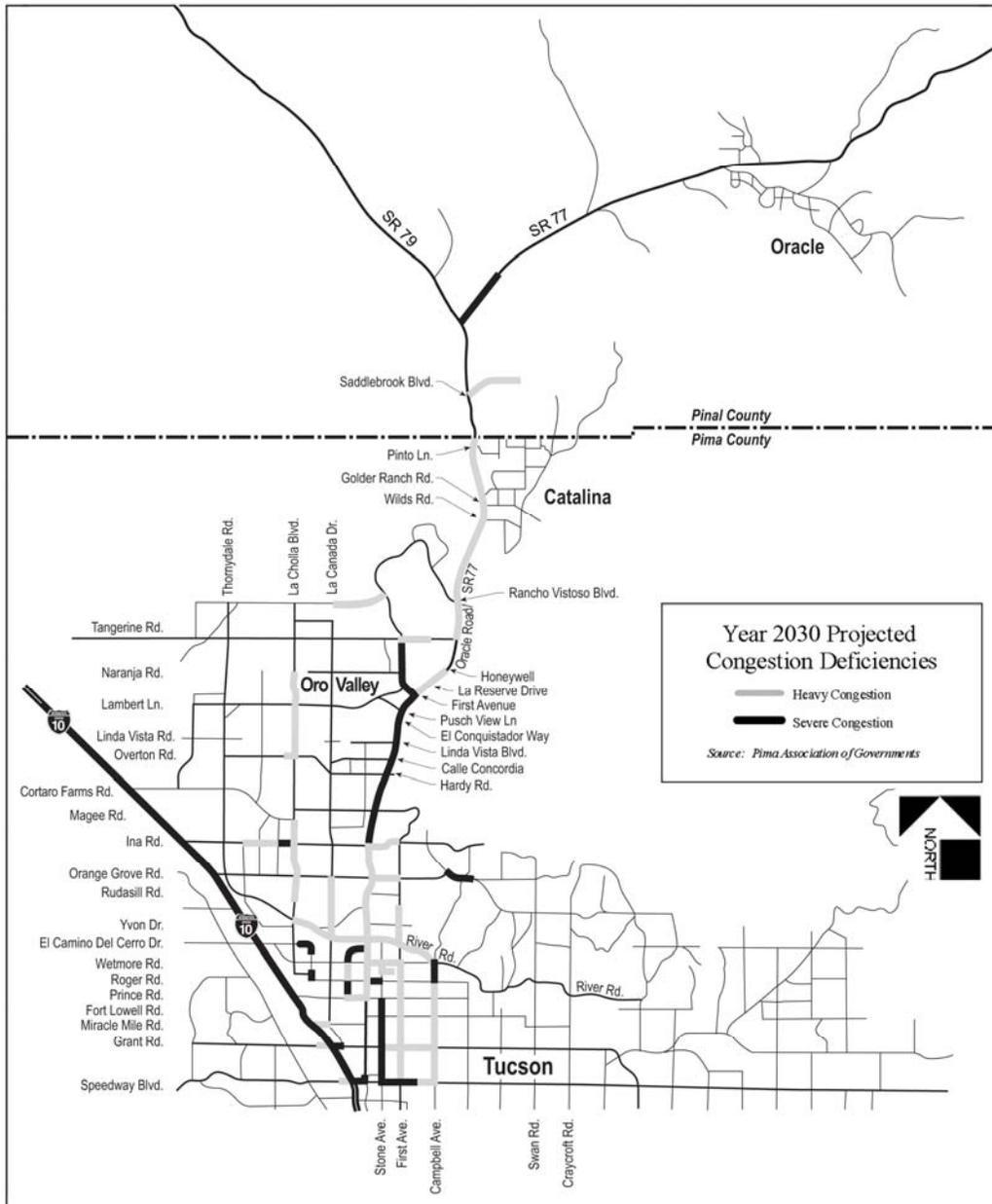
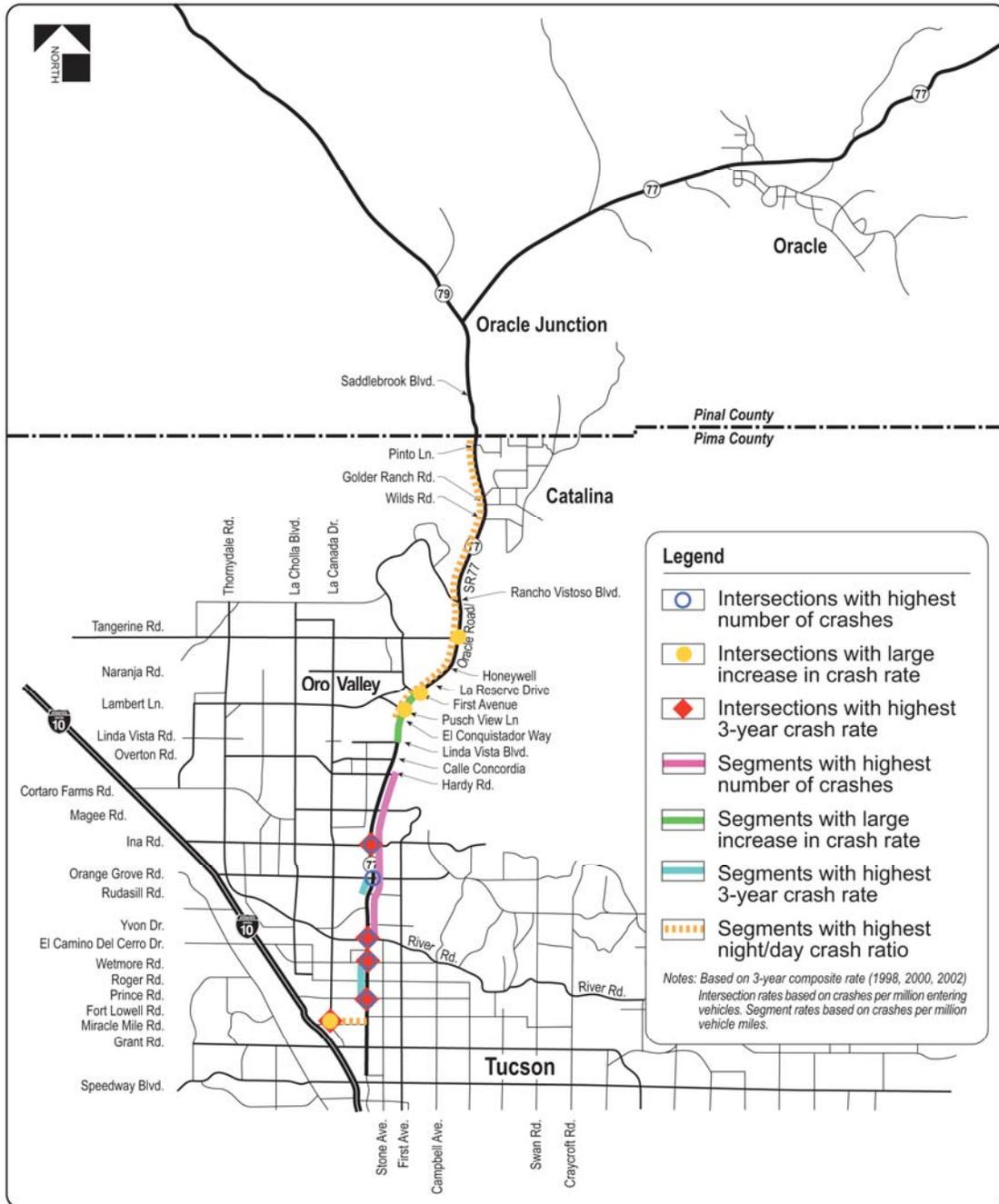


Exhibit 3-3 CORRIDOR SAFETY DEFICIENCIES



Access

The need for consolidating driveways along SR 77 was identified through an analysis of driveway density and crash types that can be related to access. Roadway segments along SR 77 were inventoried to identify need to consolidate driveways based on driveway density and crash rates over a three-year history. The segments were divided into three levels of need to consolidate the number of driveways and provide improved access management to reduce crashes. The levels of need were based on the number of access points per mile and the segment crash rate. Level 1 represents the highest need and Level 3 the lowest.

Exhibit 3-4 shows the segments along SR 77 that fall within each level of need. It is recommended that these segments be studied in detail to develop specific access management design concepts for each segment.

Exhibit 3-4

SR 77 SEGMENTS WITHIN LEVELS OF NEED FOR DRIVEWAY CONSOLIDATION AND ACCESS MANAGEMENT

Level of Need for Driveway Consolidation	Segment
Level 1	<ul style="list-style-type: none">I-10 to Oracle RoadMiracle Mile to River Road
Level 2	<ul style="list-style-type: none">River Road to Hardy RoadPinto Lane to Golder Ranch Road
Level 3	<ul style="list-style-type: none">Hardy Road to end of corridor (except for the segment of Pinto Lane to Golder Ranch Road)

Note: Level 1 indicates the highest need for driveway consolidation and Level 3 indicates the lowest level

PUBLIC TRANSPORTATION

The needs and deficiencies of the public transit system in the corridor were identified through several sources of information, which included:

- Two community transit workshops conducted by the study.
- A Technical Advisory Committee field review
- Deficiencies identified in other plans and studies.
- Public open houses conducted by the project.

The needs and deficiencies identified in other plans and studies are summarized in Exhibit 3-5. Other public transportation needs and deficiencies included the following:

- A perceived need for additional service in the northern portion of the corridor.
- Provision of ADA compliant transit stops along the corridor from River Road to the northern termini of the existing transit service.
- Lack of bus pullouts and shaded benches for bus passengers.

- Additional traffic lanes for bus use only at major bus stops. Can be used for bus or buses/bikes.
- More frequent transit service.
- Trolley/light rail along more developed areas.

**Exhibit 3-5
MATRIX OF EXISTING TRANSIT NEEDS
AND DEFICIENCIES IN CORRIDOR**

Issue	Transit Element – 2025 PAG RTP	PAG Intermediate Range RTP	Town of Oro Valley General Plan	Oro Valley Transit Development Plan
Level of Service	Need more service outside Tucson city limits	Insufficient transit service in some areas	Insufficient to capture significant share of travel market	Need neighborhood shuttle
Service Coordination	Lack of coordination among systems regarding schedules and information sharing	Lack of coordination among services		
Facilities		Lack of bus shelters, transit centers, and other transit facilities	Need better, less cramped passenger facilities	Need park and ride lots and bus shelters
Operating Issues	Sun Tran demand has declined	Overlapping transit service provision		
Funding Issues	Lack of dedicated funding limits planning, implementation	Multiple and competitive funding sources	Funding is limited for all transportation projects	Need dedicated source of funding
Planning Issues	Lack of planning coordination	Loosely coordinated transit system planning	Plan for transit facilities when widening roads	Phase improvements over 10-year period
Regional and Commuter Service	Lack of direct regional connections, express service, sufficient park and ride lots	Limited regional service		Need to extend Express Route 162
Paratransit	Some persons denied requests for service on busy days by Van Tran		Need improved productivity (Coyote Run)	Need expanded paratransit service
Pedestrian Facilities			Need to facilitate walking	
Bicycle Facilities			Need to facilitate bicycling	

BICYCLE FACILITIES

Bicycle facility needs and deficiencies were identified through a review of current plans and studies, and through public meetings and meetings with other stakeholders. The identified needs and deficiencies included the following (also see Exhibit 3-6 below):

- There are currently no plans to widen SR 77 from Roger Road to River Road to include a bike route.

- There are gaps shown on the Tucson Bike Map on Miracle Mile where there are no bicycle routes between I-10 and Flowing Wells Road, and again from Fairview Road to Oracle Road.
- A need to provide periodic sweeping of the shoulders in the vicinity of Oro Valley, where dirt and gravel accumulate creating hazardous conditions for bicyclists on the shoulder of SR 77.
- Stakeholders identified safety concerns for bicyclists on SR 77 in the vicinity of Pusch View Lane and La Reserve Drive in Oro Valley because of the continuous right turn lane on southbound SR 77.
- North of the SR 77/SR 79 junction, a recent restriping project reduced the shoulder area on SR 77 to almost no shoulder.
- Need to replace rumble strips on SR 77 north of Catalina with more bicycle-compatible rumble strips;
- Need to widen the bike lane/paved shoulder through the Town of Catalina to provide a minimum 5.5-foot shoulder for bicyclists.
- Add six-foot paved shoulders on SR 77 for a two-mile section approaching the Town of Oracle.
- No exit from Rillito Park bike path on east side of Oracle Road.

PEDESTRIAN FACILITIES

The existence of sidewalks along SR 77 is primarily limited to locations south of River Road. Even the existing sidewalks are discontinuous, as illustrated in Exhibit 3-6. The inventory of sidewalk conditions indicated that over 32 miles of the 35-mile corridor has no sidewalks. In some locations non-maintained pedestrian paths have been worn by pedestrian traffic, but these paths may have limited accessibility for the ambulatory and are not considered accessible for those in wheelchairs. Where sidewalks do exist, ramps are provided at intersections. In some cases where there are sidewalks there may also be obstructions (e.g., utility poles, sidewalk discontinuities, fire hydrants, etc.) that limit accessibility. Sun Tran bus stops located north of River Road are not accessible via a sidewalk.

BRIDGES AND DRAINAGE STRUCTURES

Bridges with an ADOT sufficiency ratings at or below 80 percent are classified as structurally deficient structures and are eligible for rehabilitation. Bridges with sufficiency ratings below 50 percent may need replacement. Exhibit 3-7 provides a list of the structurally deficient structures on SR 77. None of the bridges have sufficiency ratings less than 50 percent, so none are identified as being eligible for replacement based on the sufficiency rating.

Exhibit 3-6 PEDESTRIAN/BIKE ISSUES

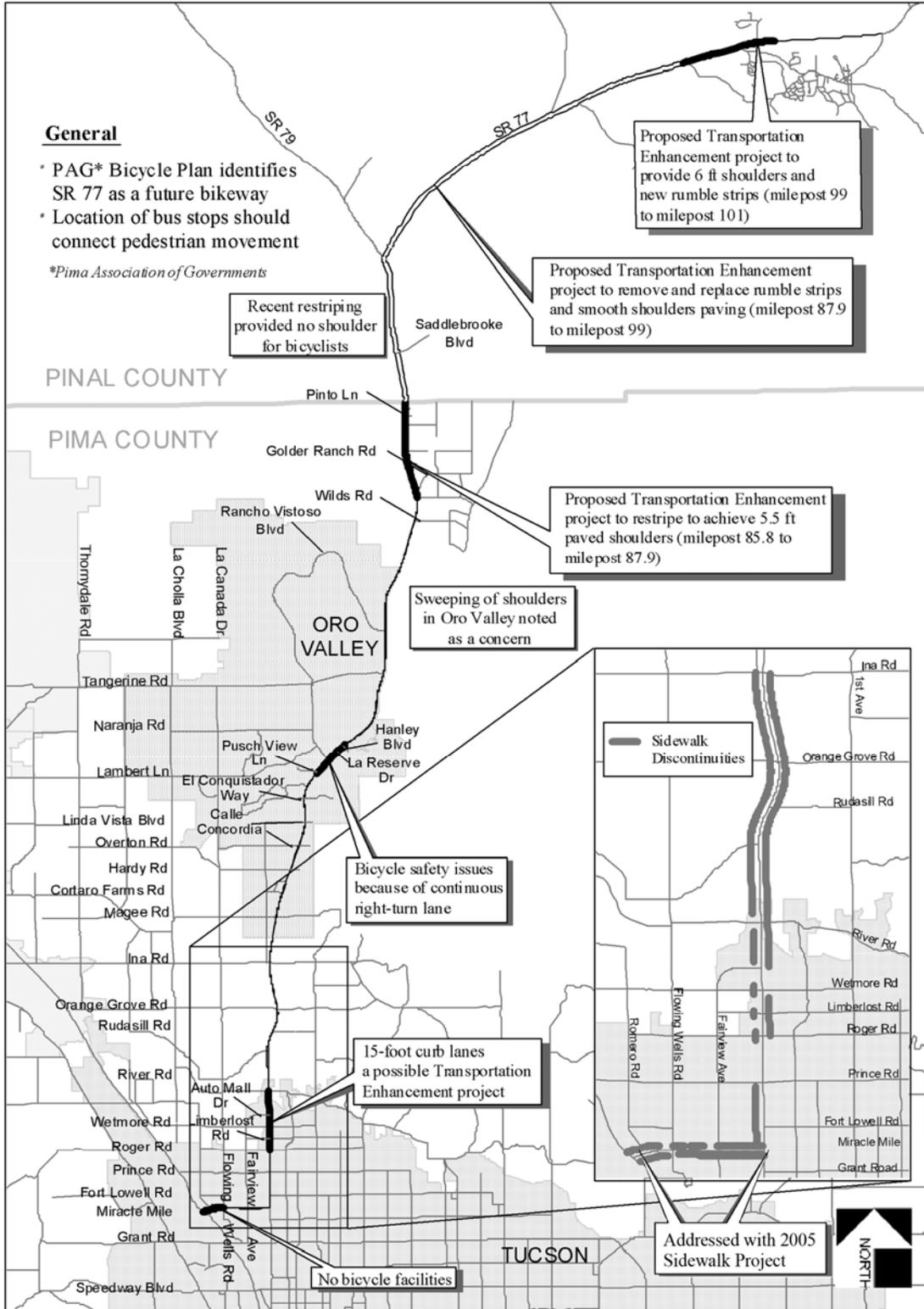


Exhibit 3-7
BRIDGES WITH SUFFICIENCY RATINGS
AT OR LESS THAN 80 PERCENT

Structure Number	Structure Name	Mile Marker	Sufficiency Rating
2006	Cañada Del Oro Bridge	80.78	80.00
4733	Twenty-Seven Wash RCB Culvert	85.99	80.00
1550	Rillito Creek Bridge	71.79	78.22
4730	Pima Wash RCB Culvert	72.46	70.00
6754	RCB Culvert	75.71	70.00
7115	CMP Culvert	76.41	70.00
4731	RCB Culvert	76.68	70.00
6755	RCB Culvert	77.13	70.00
6756	RCB Culvert	78.37	70.00
6757	RCB Culvert	78.80	70.00
4732	RCB Culvert	78.90	70.00
6812	RCB Culvert	79.82	65.00

Note: RCB = Reinforced Concrete Box
 CMP = Corrugated Metal Pipe

According to the document, *Final Project Assessment, SR 77, Junction Miracle Mile to Ina Road, Project 77 PM 69 H5256 01C, Roadway Predesign Section, June 2000*, the ADOT Bridge Management Section's Bridge Evaluation report dated May 27, 1999, for Structure #4728, RCB (MP 69.73) and Structure #4729 RCB (MP 69.92) indicates that although the existing bridge barriers are geometrically deficient, they are structurally adequate. The Bridge Management Section did not recommend any revision to these existing bridge barriers.

In addition to structurally deficient structures, there are functionally obsolete structures. Functionally obsolete structures include bridges with horizontal and vertical clearances or other functional limitations which met AASHTO clearance standards when originally constructed, but which may not meet updated standards. None of the structures on SR 77 were identified as functionally obsolete in the bridge record.

Based on input from the Central Arizona Association of Governments a box culvert at Oracle Junction (approximately MP 91) is recommended to be extended in order to move the existing culvert headwalls out of the clear zone.

PAVEMENT

The Pavement Serviceability Rating (PSR) of each segment of SR 77 was identified from the current Highway Performance Monitoring System data on SR 77 as part of the project inventory. Most of the segments on SR 77 have a PSR rating over 3.0, representing pavements that exhibit few, if any, visible signs of surface deterioration. The segments between MP 69.80 and MP 71.30 have PSR ratings slightly under 3.0; however, these segments were part of a recently completed pavement overlay project, which is not reflected in the pavement ratings.

Most of the traveled way on SR 77 is asphaltic concrete (AC). This type of pavement has a design life of approximately 10 years. After that time, the AC pavement is generally in need of milling and replacement. Based on the design life of pavement surfaces, it is expected that all pavement surfaces on SR 77 within the project limits will need to be rehabilitated within the next 20 years.

AASHTO DESIGN STANDARDS

The horizontal and vertical geometric deficiencies are defined in terms of the most recent standards or criteria set forth by the American Association of State Highway and Transportation Officials (AASHTO). To identify project deficiencies in the SR 77 corridor, project assessment reports prepared for segments in the corridor were reviewed. Several project assessments required an AASHTO Controlling Design Criteria Report, which gives a description of each design deficiency. Deficiencies identified in the corridor are summarized in Exhibit 3-8.

Exhibit 3-8 EXISTING AASHTO DESIGN DEFICIENCIES FROM PROJECT ASSESSMENT REPORTS

Project Assessment	Begin MP	End MP	Horizontal Curves Have Excessive or Insufficient Superelevation for Design Speed	Vertical Curves Exceed Criteria for Maximum Grade	Vertical Curves Have Insufficient Stopping Sight Distance for Design Speed
Junction Miracle Mile to Ina Road	69.50	74.84	3		
Calle Concordia to Tangerine Road	77.50	82.0	1*		
First Avenue to Tangerine Road	79.20	82.20			1
Willow Springs to Oracle Road	95.80	103.87		2	

* Excessive but not deficient superelevation.

INTELLIGENT TRANSPORTATION SYSTEM (ITS)

The document, *Intelligent Transportation Systems: ADOT Statewide Plan – Intelligent Transportation Infrastructure*, (ADOT Intermodal Transportation Division Technology Group, December 2002) identifies a future/proposed variable message sign to be located on SR 77 at MP 92. This document also identifies a future/proposed Road Weather Information System (RWIS) on SR 77 north of Tucson. The purposes of the RWIS are in part to provide real time weather conditions, provide data for predicting weather conditions, and to determine surface and subsurface temperatures.

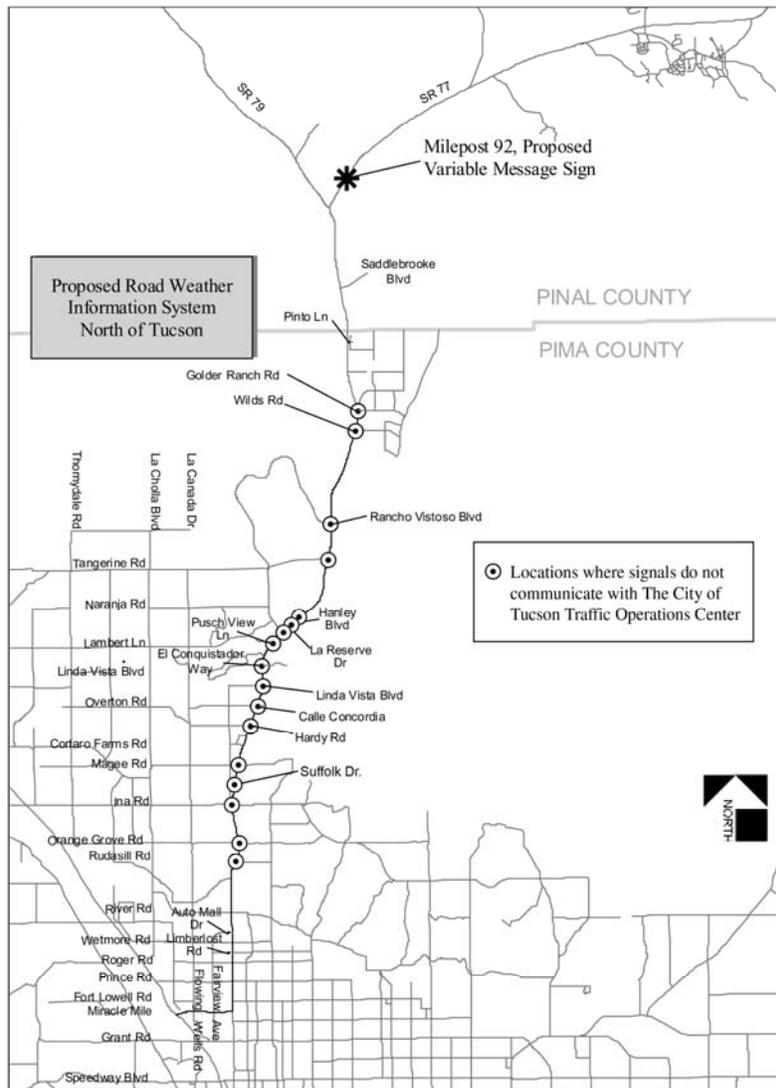
With the exception of Pinto Lane, none of the ADOT traffic signals on SR 77 north of River Road communicate with the City of Tucson’s Traffic Operations Center (TOC). Exhibit 3-9 shows signalized intersection locations on SR 77 where there is no communication to the TOC, as indicated by TOC staff.

OTHER NEEDS AND DEFICIENCIES

The following needs were identified through public comments and comments provided by other stakeholders:

- A need exists for a grade-separated wildlife crossing to recognize an existing wildlife corridor connecting Cañada del Oro and Big Wash.
- Also needed are a multi-use path and grade separated equestrian passage.

Exhibit 3-9 ITS DEFICIENCIES



4. INVESTMENT OPTIONS

SUMMARY OF INVESTMENT OPTIONS TO ADDRESS CAPACITY DEFICIENCIES

The roadway deficiencies were examined on a segment-by-segment basis and roadway improvement options were developed to address these deficiencies. These improvement options were then compared along the entire corridor to provide coordinated and comprehensive alternatives for consideration. Further analysis was then conducted through traffic simulation modeling to refine feasible capacity alternatives and determine the effects of the grade-separated interchange (GSI) alternatives as compared to an eight-lane widening alternative. An analysis of the potential right-of-way impacts of widening portions of the corridor to eight traffic lanes was also conducted to evaluate the potential right-of-way cost of this option and impacts to adjacent properties.

A summary of the capacity improvement alternatives developed for consideration is provided below. It must be noted that the major improvements described would not necessarily be implemented together, but rather these concepts are presented as alternative ways of maintaining or improving traffic operations and safety along SR 77. It should also be noted that it is assumed that these improvements are in addition to those improvements that are already planned or programmed and included in the *PAG 2030 Regional Transportation Plan*.

Development of an Alternative High-Capacity Corridor

One option is to develop a parallel high-capacity controlled access corridor to divert traffic from SR 77. The concept is to provide sufficient capacity and travel speed on a parallel route such that enough traffic would be diverted away from SR 77 to reduce the need for other major capacity improvements (e.g., widening to eight lanes or constructing grade-separated intersections). This could be accomplished through the use of series of GSIs along a parallel route (e.g., La Cholla Boulevard) or through the development of a fully access controlled freeway corridor to the west of SR 77.

The alternative corridor concept is illustrated in Exhibit 4-1. The corridor could extend as far north as the SR 77/SR 79 junction, thus providing an alternative route for traffic to and from the anticipated development north of the Pima County/Pinal County line. It would connect to Tangerine Road, already planned as a high-capacity corridor connecting to I-10 on the west. This new corridor would extend south, potentially connecting to one or more high-capacity corridors extending east across the core of the urban area.

In order to enhance the effectiveness of this new north/south limited access facility to divert traffic from SR 77 it should connect on the southern end with one or more east/west high capacity facilities. The east/west facilities should extend across the City of Tucson to provide an alternative route for the dominant traffic pattern within the region, which is north/south in the SR 77 corridor and then east/west across the valley. This concept of an alternative north/south corridor connecting to one or more improved east/west corridors could provide the levels of traffic diversion needed to reduce forecast traffic demand along SR 77. **This concept should be evaluated in more detail to determine whether it could provide sufficient congestion relief for SR 77.**

Summary of Other Capacity Improvement Options Along SR 77

Several other options are proposed to increase capacity and reduce congestion along SR 77. These are summarized in Exhibit 4-2 and described below.

- Widen SR 77 to four lanes from the SR 79 junction east through the town of Oracle. This is the recommendation of the *Southern Pinal County Regional Transportation Plan* (April 2003) and it is consistent with the findings of this study.
- Widen SR 77 to eight general-use lanes from Auto Mall Drive north to Golder Ranch Road. This option is presented as a way to directly address the existing and future congestion levels along SR 77. Signalized intersection improvements to provide the turn lane capacity needed to meet future demand would also be implemented with this widening.
- Add a diamond lane for bus transit and right turns on Oracle Road/SR 77 from Drachman Boulevard (south of Grant Road) north to Saddlebrooke Boulevard, with the exception of the roadway segment between Wetmore Road and Auto Mall Drive. SR 77 would be an eight-lane facility, but the additional lane would be reserved for transit vehicles and traffic making right turns at intersections or driveways. This differs from the eight-lane widening alternative, which addresses congestion problems exclusively.
- Add grade-separated intersections at high volume intersections from Ina Road to the south. These would be implemented instead of widening SR 77 to eight lanes south of Ina Road. This could be combined with a comprehensive access control plan south of River Road and the possible use of a diamond lane from Drachman Boulevard to Wetmore Road. Locations with the highest potential benefit from GSI application include Ina Road, Orange Grove Road, and River Road. The Ina Road application would require simultaneous capacity improvements north from Ina Road through Magee Road in order for the GSI to achieve its full potential. The Orange Grove Road application potential is reduced by right-of-way constraints at this location. North of Ina Road, the eight-lane widening alternative appears to be a better alternative to the use of additional grade separated intersections.
- **The final decision to implement either GSIs, widen to an eight-lane cross section, or develop a high capacity alternative corridor requires additional study at the design concept level of analysis.**
- Add right-turn lanes at all arterial road intersections that do not currently have them and have immediate capacity needs. This would be an interim improvement only and is not intended as a long-term congestion mitigation measure. These intersections are:
 - Limberlost Road
 - Roger Road
 - Prince Road
 - Fort Lowell Road (northbound only)
- Provide additional left-turn lanes at locations with high left-turn volumes and left-turn delays. Candidates for this type of improvement are northbound SR 77 at Rancho Vistoso Boulevard and southbound SR 77 at Auto Mall Drive. These are considered necessary interim improvements that address immediate roadway capacity needs. However, these improvements will not solve the long-term congestion problems along the corridor.

Exhibit 4-1 POTENTIAL HIGH-CAPACITY ALTERNATE CORRIDOR

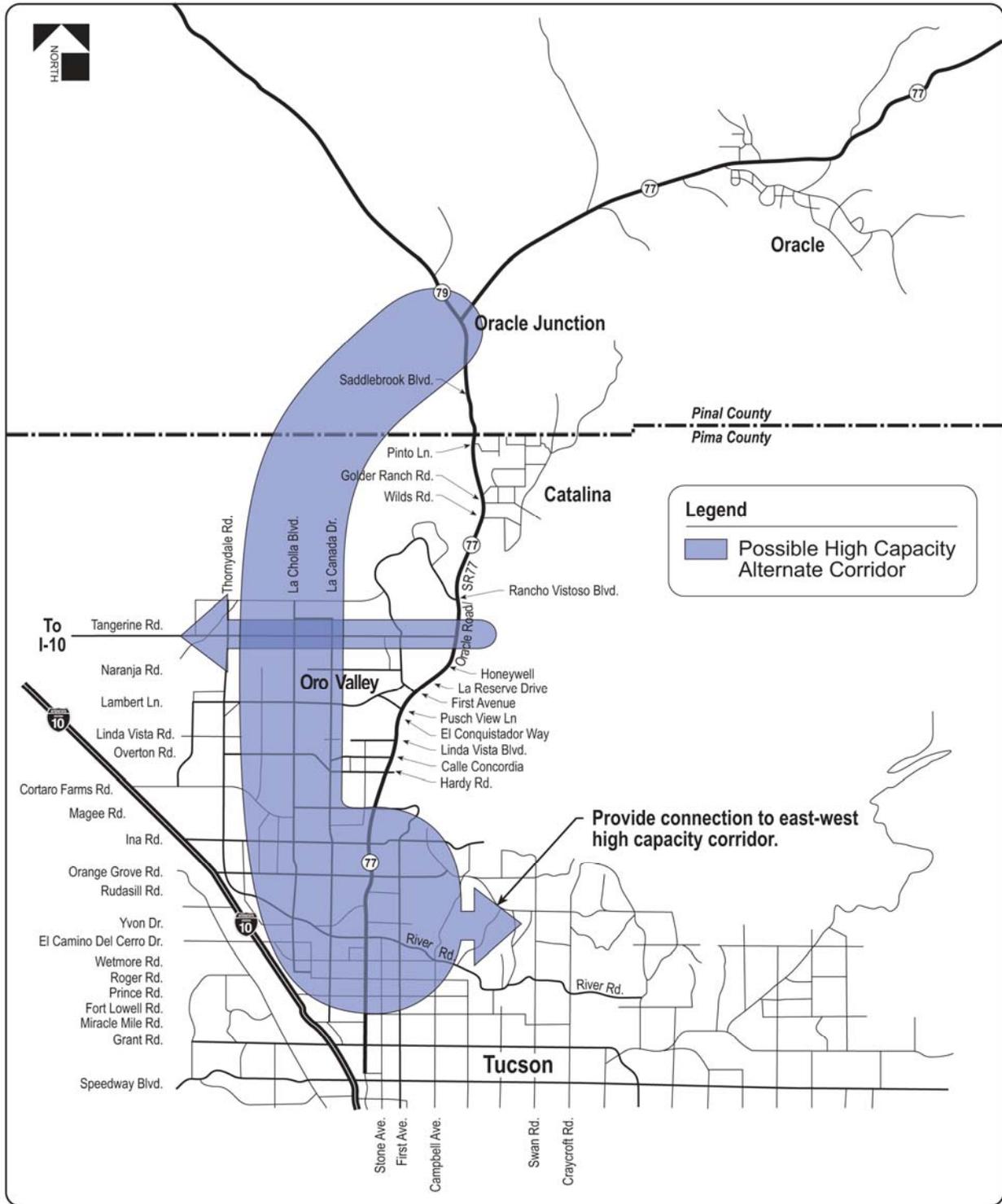
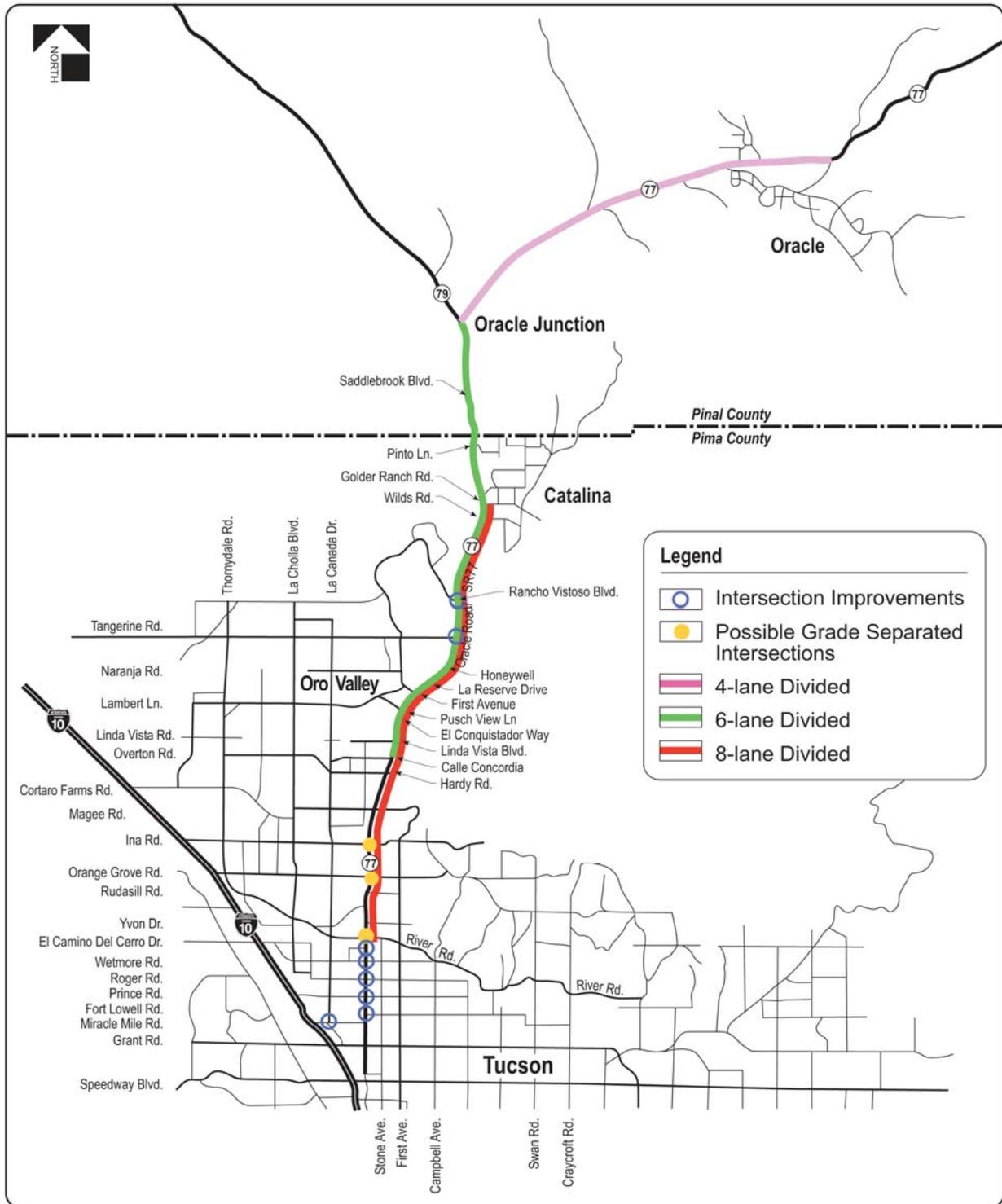


Exhibit 4-2
SUMMARY OF ROADWAY CAPACITY IMPROVEMENT OPTIONS ON SR 77



SUMMARY OF INVESTMENT OPTIONS TO ADDRESS NON-CAPACITY DEFICIENCIES

Roadway Lighting Investment Options

The results of the analysis of the night versus day crash history indicates that the SR 77 corridor segment from Pinto Lane to Pusch View Lane (west) could benefit from roadway lighting. One area of this segment, from Rancho Vistoso Boulevard to Tangerine Road, was ranked somewhat lower than the other segments (ranked seventh, instead of in the top five segments), however, this segment was included to provide a continuous road segment. This lighting may only be required if the reconstruction of the roadway to a six-lane divided facility with improved access management does not improve the nighttime crash condition. The segment of SR 77 from I-10 to Oracle Road was found to have non-standard lighting, which is recommended to be upgraded to current standards.

Pedestrian Investment Options

Pedestrian facility improvement recommendations for consideration are (also see Exhibit 4-3):

- In the interim, provide ADA compatible bus stops within the SR 77 corridor area.
- As roadway improvements are implemented, provide sidewalks in areas defined as activity areas in the *PAG Regional Pedestrian Plan* (July, 2000).
- Implement the already planned sidewalk improvements from I-10 to Prince Road.
- Provide continuous sidewalks on both sides of SR 77 from Prince Road to River Road by filling in the sidewalk discontinuities.
- Provide continuous pedestrian facilities in conjunction with the improvement alternative to widen SR 77 to an eight-lane facility from River Road to Golder Ranch Road. North of River Road to Ina Road this would mean providing continuous sidewalks in conjunction with widening SR 77 as an urban roadway section. North of Ina Road to Golder Ranch Road, this would mean developing a continuous shared use path on both sides of the roadway for use by pedestrians and bicyclists.

Bicycle Facility Investment Options

The proposed recommendations for bicycle facilities would ultimately provide continuous facilities from I-10 to the Town of Oracle. Although ADOT does not specifically build bicycle lanes on state routes, cyclists can and do use the shoulders provided on state routes. Bicycle facility improvement recommendations for consideration are (also see Exhibit 4-3):

- In the interim, it is recommended to fund improvements to replace non-compatible rumble strips with more bicycle-compatible rumble strips in the northern area of the corridor, and widen shoulders in the Catalina area to a minimum of 5.5 feet for use by bicyclists.
- The diamond lanes that are proposed as a long-range transit option in the segment from of SR 77 from Saddlebrooke Boulevard to Drachman Road would also provide a multi-use facility for bicyclists.
- Under the improvement alternative to widen SR 77 to an eight-lane facility from south of River Road to Golder Ranch Road, cyclists could use either the wide shoulder, or use the proposed shared-use path north of Ina Road to Golder Ranch Road. **The development of**

shared-use paths north of Ina Road may be constrained by the existing number of roadside access points (commercial driveways and cross streets) in this area. An investigation of the safety and traffic control implications of a share-use path under the existing access conditions should be conducted to determine whether the application is appropriate.

- Provide a connection from the east side of SR 77 to the Rillito Park Bike Path just south of River Road.

Transit Investment Options

The consensus of the transit analysis and the results of the transit workshops was that significant improvements or additions to the transit component of the corridor need to be planned for and implemented over time, with a system in place by the 2030 horizon year that recognizes the northward advance of urbanization along the corridor to the Pinal County line and beyond.

The draft concept recommendations were evaluated and consolidated into two maps, Exhibits 4-4 and 4-5, depicting the north and south halves of the corridor. Concepts for transit improvements or additions presented on the maps are separated into three phases: near-term, mid-term, and long-term. Generally, more modest recommendations are shown as "near-term," with more significant transit improvements envisioned as occurring in the mid- or long-term time frames as warranted. For example, a dashed line along Oracle Road north of River Road depicts peak-hour express bus service in the mid-term and all-day limited-stop service in the long term.

A key concern is the need to make bus stops and service accessible and to provide adequate sidewalks, crosswalks, shelters, and benches. "Far side" bus pullouts, located downstream from major intersections, were also recommended unless pre-empted by the use of curb-side diamond bus and carpool lanes such as those used, for example, along east Broadway Boulevard in Tucson. Neighborhood and commercial area circulators are recommended as a means of improving mobility in the Flowing Wells area, near the Tucson Mall, and at key intersections where commercial development is occurring farther north. Exhibits 4-4 and 4-5 also identify the suggested general locations for additional park-and-ride lots.

High capacity transit may be needed between the vicinity of the Tohono Tadaí Transit Center/Tucson Mall area and the University of Arizona and the Tucson Central Business District. Taking into consideration the significant amount of growth projected for Marana and new communities in Pinal County on the I-10 corridor, the need may also arise for a high capacity connection between the Tucson Mall area and the I-10 corridor. Determination of the appropriate high capacity mode, or combination of modes, will require further study, and would be the subject of a future study effort.

Bridge and Drainage Structures Investment Options

None of the bridge or drainage structures were identified as being eligible for replacement based on structural sufficiency ratings. However, these structures should be reviewed and possibly upgraded during planned widening projects, or through road widening projects recommended by this study. A summary of the structures with sufficiency ratings of 80 or less and whether they are included in planned or programmed projects is shown Exhibit 4-6. The structures shown in

Exhibit 4-3 PEDESTRIAN AND BICYCLE FACILITY IMPROVEMENT RECOMMENDATIONS

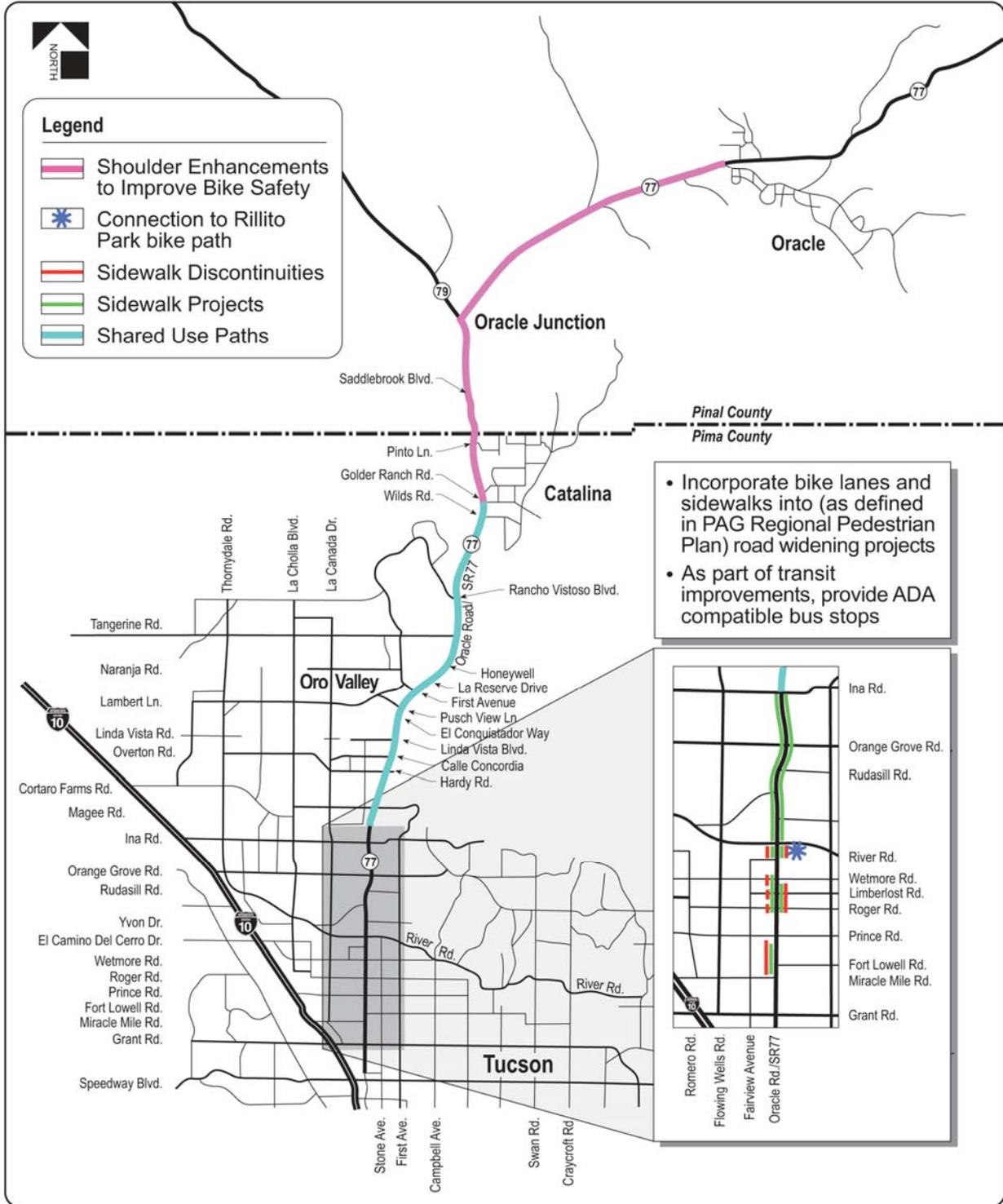


Exhibit 4-6 that are not included in the planned or programmed projects should be reviewed as part of the design process if the road widening option is selected for these areas of the corridor.

Additionally, the Central Arizona Association of Governments recommends that ADOT program a culvert upgrade at Oracle Junction to move culvert headwalls out of the clear zone. Two other structures were noted as being geometrically deficient, although structurally adequate. These were:

Structure Number	Structure Name	Mile Marker	Location
4728	Reinforced Concrete Box	69.73	Fort Lowell Road to Miracle Mile
5729	Reinforced Concrete Box	69.92	Prince Road to Fort Lowell Road

In these areas, diamond lanes are an option, and these structures should be reviewed in more detail if the diamond lane option is recommended.

Intelligent Transportation System (ITS) Investment Options

ITS deficiencies that were noted within the corridor include 17 signalized intersection locations where there is no communications to the City of Tucson’s Traffic Operations Center (TOC). It is recommended that communications alternatives be investigated and that the most cost-effective method of communications be established so that these signals can be linked to the Tucson TOC. In addition, ADOT and the local agencies should work together to develop a suitable uniform application of traffic signal preemption equipment along the corridor. Other alternatives include programming the planned Road Weather Information System north of Tucson system in the northern area of the corridor, and a Proposed Variable Message Sign at MP 92. The ITS improvements for the corridor are summarized in Exhibit 4-7.

Investment Options to Address AASHTO Design Deficiencies

AASHTO design deficiencies were identified in project assessments. These included four horizontal curve deficiencies and three vertical curve deficiencies in the corridor. Two of these deficiencies will be addressed in the already planned projects, as indicated below:

- Calle Concordia to Tangerine Road: Widen to 6 lanes.
- First Avenue to Tangerine Road: Widen to 6 lanes.

The deficiencies in the area from Willow Springs to Oracle would be addressed in the option proposed by this study to widen this section to four lanes. The deficiencies in the section from Miracle Mile to Ina Road could be addressed either through the proposed option to widen to eight lanes from Auto Mall Drive north, or the proposed option to construct an additional traffic lane (possibly a diamond lane) through this entire section.

**Exhibit 4-5
TRANSIT INVESTMENT OPTIONS
(SOUTH HALF OF CORRIDOR)**

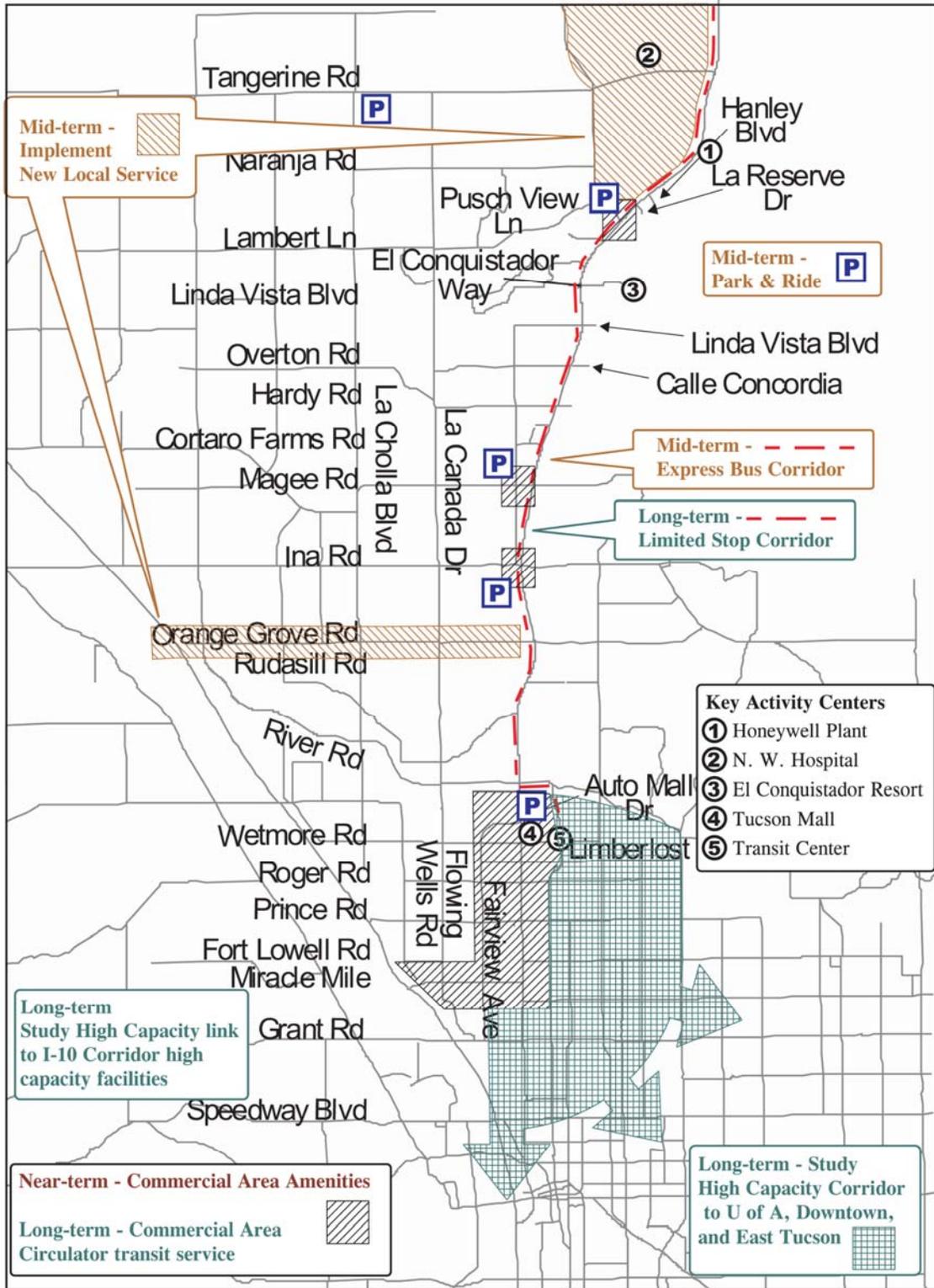


Exhibit 4-6
BRIDGES WITH SUFFICIENCY RATINGS AT OR LESS THAN 80 PERCENT
AND WHETHER THEY ARE INCLUDED IN PLANNED OR PROGRAMMED PROJECTS

Structure No.	Structure Name	Mile Marker	Road Segment Location	Sufficiency Rating	Are these addressed in Planned or Programmed Projects?
2006	Cañada Del Oro Bridge	80.78	Tangerine Road to Hanley Boulevard	80.00	Yes, in six-lane widening
4733	Twenty-Seven Wash RCB Culvert	85.99	Pinto Lane to Golder Ranch Road	80.00	Yes, drainage improvement project is planned
1550	Rillito Creek Bridge	71.79	River Road to Auto Mall Drive	78.22	
4730	Pima Wash RCB Culvert	72.46	Rudasill Road to River Road	70.00	Yes, in culvert/shoulder project.
6754	RCB Culvert	75.71	Hardy Road to Magee Road	70.00	
7115	CMP Culvert	76.41	Hardy Road to Magee Road	70.00	
4731	RCB Culvert	76.68	Calle Concordia to Hardy Road	70.00	
6755	RCB Culvert	77.13	Calle Concordia to Hardy Road	70.00	
6756	RCB Culvert	78.37	El Conquistador Way to Linda Vista Boulevard	70.00	Yes, in six-lane widening.
6757	RCB Culvert	78.80	Pusch View Lane to El Conquistador Way	70.00	Yes, in six-lane widening.
4732	RCB Culvert	78.90	Pusch View Lane to El Conquistador Way	70.00	Yes, in six-lane widening.
6812	RCB Culvert	79.82	Hanley Boulevard to La Reserve Drive	65.00	Yes, in six-lane widening.

Access Control Investment Options

The procedure to develop an access management concept for the SR 77 corridor, involved dividing the roadway into urban, suburban, and rural segments based on the level of access control compatible with existing and future adjacent land uses. Exhibit 4-8 presents the current and proposed access conditions. Characteristics include the type of section (urban, suburban, and rural), adjacent land use, signal spacing, an access management strategy for the roadway segment, and driveway density. Access management strategies have been categorized into a “comprehensive strategy” and “retrofit strategies”.

A comprehensive access management strategy blends land use and high level access management techniques to minimize the impacts of adjacent property on traffic operations and safety on SR 77. The characteristics of this strategy include:

- A multi-lane divided highway with a median.
- Long uniform signal spacing or grade-separated interchanges.
- Median openings between traffic signals or interchanges.
- Low driveway density.

Retrofit access strategies are techniques that are applied to existing roadway sections and retrofit techniques can be applied to mitigate the adverse effects of unregulated access. A key retrofit strategy is consolidation of driveways.

Exhibit 4-9 shows the locations of the Level 1 and Level 2 access management segments along the corridor. Other segments were included in a given level to form a consistent larger segment. It is recommended that these segments be studied in detail to develop specific access management design concepts for each segment based on the proposed access characteristics provided in Exhibit 4-8.

Wildlife Corridor Improvements

Based on input during the Technical Advisory Committee field review and other information, a need exists for a grade-separated wildlife crossing to recognize an existing wildlife corridor connecting Cañada del Oro and Big Wash. Suggestions have been made for this crossing to be located approximately 1-1/2 miles north of the Catalina State Park entrance, near the Cañada del Oro Wash crossing, and other locations using State Trust land. During road improvements in this general area, a wildlife crossing should be implemented.

Exhibit 4-7 ITS IMPROVEMENTS

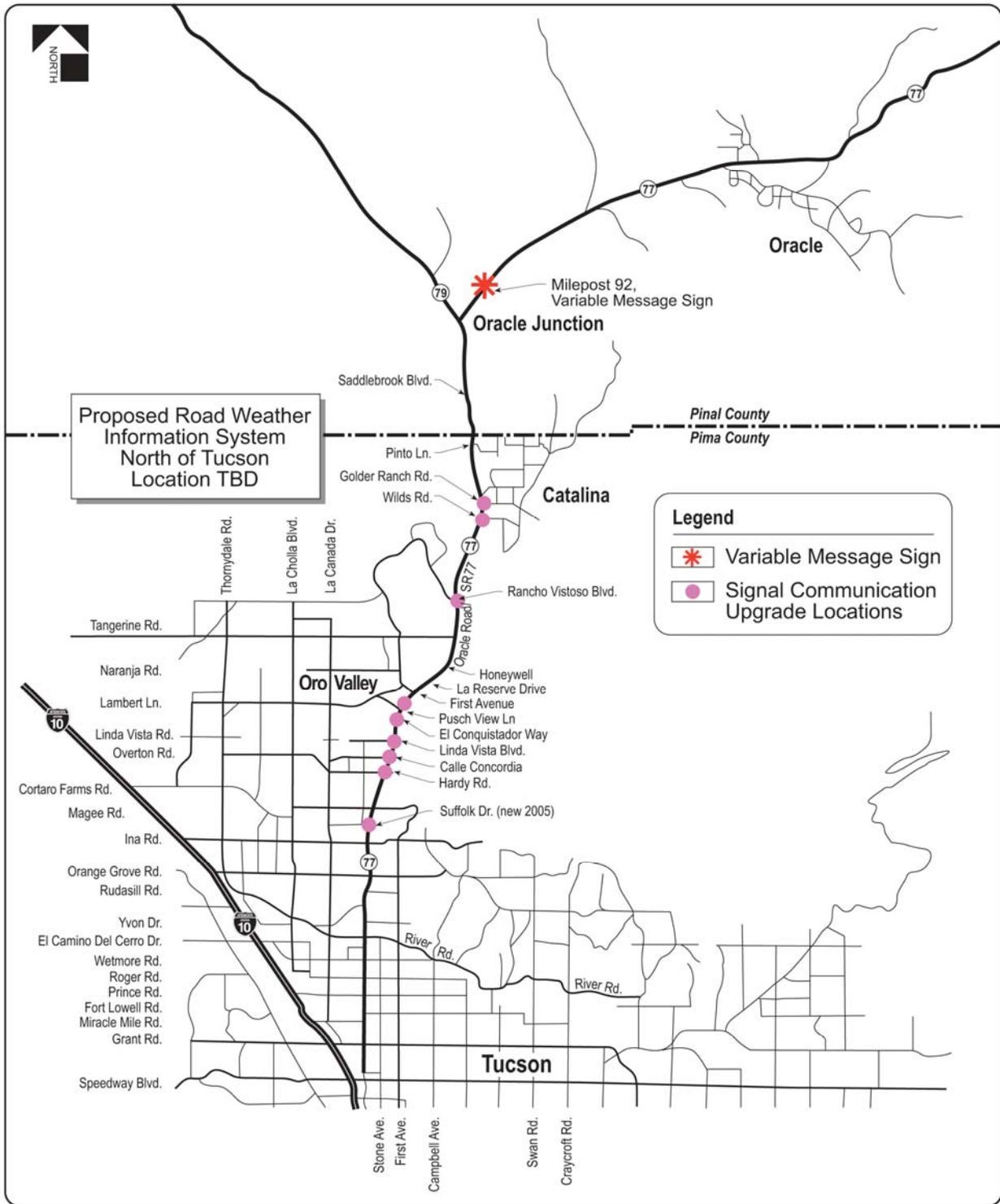


Exhibit 4-8
PROPOSED CORRIDOR ACCESS MANAGEMENT CONCEPT
SR 77 – I-10 TO ORACLE

Segment	Length (miles)	Current Access Conditions			Proposed Access Characteristics				
		Land Use	Driveway Density	Signals per Mile	A. Type of Segment	Future Land Use	Access Management Strategy	Driveway Density ⁽¹⁾	Signal Spacing
I-10 to Oracle Road	1.4	Urban Mixed Commercial/Industrial/Hotel	High	3.6 (>1/4 mile)	Urban	In-fill Redevelop Mixed Use	Retrofit	Moderate	1/4 mile
Miracle Mile to River Road	1.8	Commercial	High	3.9 (1/4 mile)	Urban	Commercial	Retrofit Comprehensive	Moderate	1/4 mile
River Road to Ina Road	4.6	Commercial	Moderate	1.6 (>1/2 mile)	Suburban	Commercial	Retrofit Comprehensive	Low to Moderate	1.5 mile GSI @ River, Orange Grove & Ina
Ina Road to El Conquistador Way	2.6	Commercial/Multifamily	Low	1.9 (1/2 mile)	Suburban	Redevelopment on southern end. Planned Developments on northern end	Comprehensive	Low	1/2 mile
El Conquistador Way to Golder Ranch Drive	7.3	Residential	Very Low	1.0 (1 mile)	Suburban	Large developments	Comprehensive	Low	1 mile
Golder Ranch Drive to Pinto Lane	1.9	Low Density Residential	Moderate	0.5 (2 mile)	Urban	In-fill Commercial	Retrofit	Low to Moderate	1 mile
Pinto Lane to Saddlebrook Boulevard	1.2	Very Low Density Residential	Low to Very Low	0.8 (1 mile)	Urban	Mixed Use New Development	Comprehensive	Low	1 mile
Saddlebrook Boulevard to End of Corridor	14.5	Very Low Density Residential	Very Low	N.A.	Rural	New Residential Development	Comprehensive	Low	2.0 miles – Redesign SR 79/SR 77 Intersection

1. Driveway densities: Very low – less than 10 access points per mile; Low – greater than 10 and less than 20 access points per mile; Moderate – greater than 20 and less than 40 access points per mile; High – greater than 40 access points per mile

Exhibit 4-9
LOCATION OF LEVEL 1 AND LEVEL 2 ACCESS MANAGEMENT SEGMENTS

