Regional Public Transportation Authority

Scottsdale Road/Rural Road Alternatives Analysis Study

Draft Final Report

Prepared for:

RPTA

Prepared by:

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In Association with:
URS Corporation

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Table of Contents

List of Tables

List of Figures

Chapter 1 - Problem Definition

1.1 Introduction

1.1.1 Background

In November of 2004, Maricopa County voters approved Proposition 400, authorizing a twenty-year extension of an existing half-cent sales tax to fund transportation improvements identified in the adopted Regional Transportation Plan (RTP). Approximately one-third of the proceeds are earmarked for rail and bus transit improvements to serve identified regional needs. Among these improvements is the phased implementation of Bus Rapid Transit (BRT) or similar service along several key arterials. The first of these higher-level bus services, known as Mesa Main Street LINK, began service concurrently with the first Valley Metro Rail (METRO) light rail transit (LRT) line in December 2008. The second route, on Arizona Avenue and Country Club Drive in Chandler and Mesa, will begin service in 2011. Scottsdale Road and Rural Road are identified in the RTP as an arterial BRT route. The portion of this route within Scottsdale is programmed and funded in the Transit Life Cycle Program (TLCP).

To better serve this high-travel corridor, the Regional Public Transportation Authority (RPTA) proposes the implementation of a "higher-capacity" transit service on Scottsdale Road/Rural Road that can address short-term transit needs, while laying a foundation for true high-capacity transit service at some future date when the need exists and funding becomes available. "Higher capacity" signifies a type of service that has an intermediate function between local buses—which can be impeded from moving large numbers of people quickly and efficiently—and true high-capacity transit which would operate in its own right-of-way (R/W), such as a fixed guideway system. Previous studies and plans have recommended an enhanced transit corridor along this alignment, as have the Scottsdale and Tempe City Councils. This Alternatives Analysis (AA) constitutes the first step toward implementation of such a corridor.

This chapter documents existing and expected future conditions, in order to establish the purpose of and need for additional transit investments in the corridor. Chapter 2 discusses travel demand in more detail.

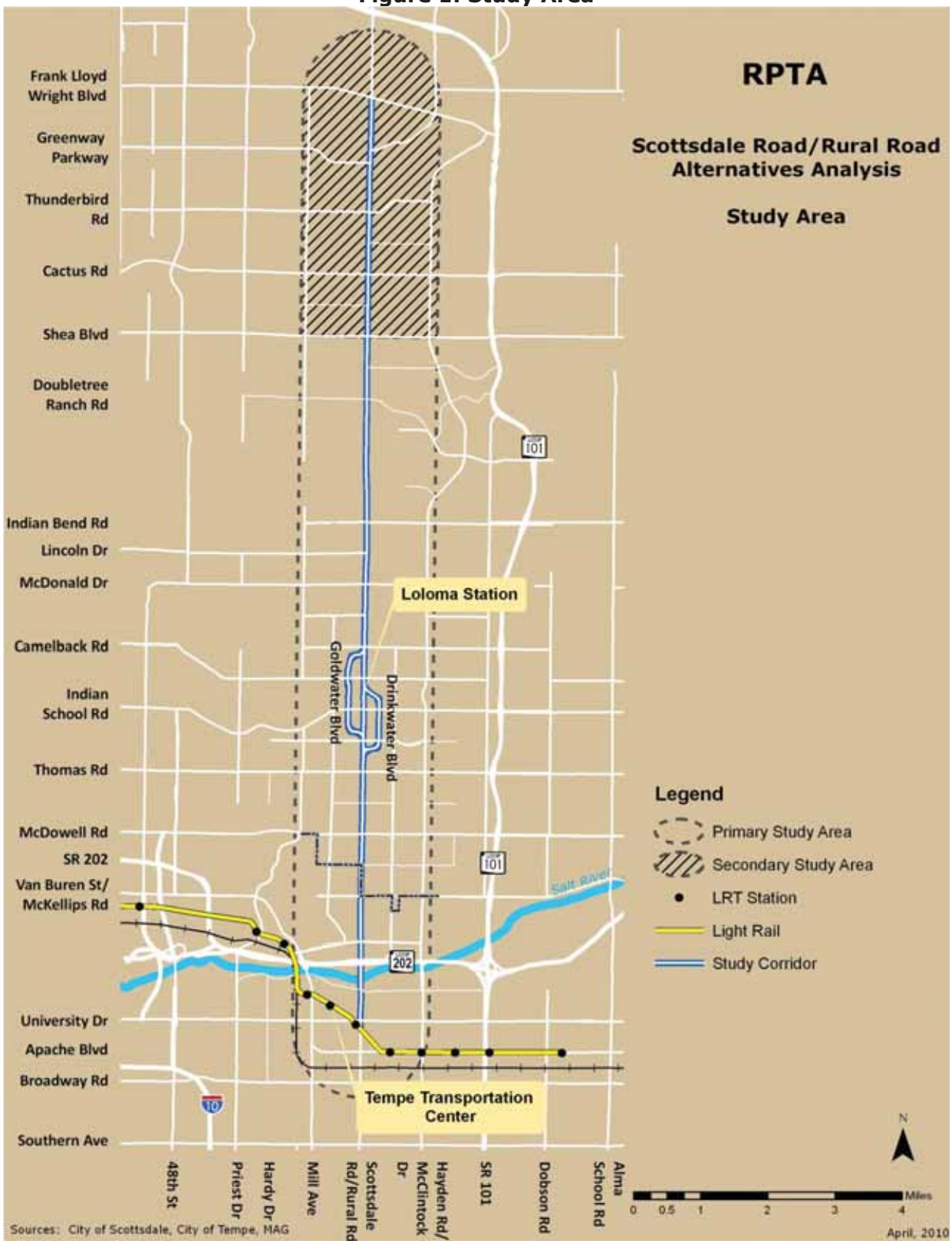
1.1.2 Study Corridor

As Figure 1 illustrates, the Scottsdale Road/Rural Road study corridor begins near the existing METRO LRT line at University Drive in Tempe, extends north on Rural Road across Tempe Town Lake, and continues north on Scottsdale Road through Tempe and Scottsdale to Frank Lloyd Wright Boulevard. The *primary study corridor*, approximately 11.5 miles long, consists of Rural Road and Scottsdale Road from University Drive to Shea Boulevard. (Shea is the northern terminus of the arterial BRT service shown in the Maricopa Association of Governments [MAG] RTP.) It also includes the entire length of Goldwater Boulevard and Drinkwater Boulevard, each of which allows traffic to bypass Scottsdale Road through Downtown Scottsdale. The *secondary study corridor* continues another four miles from Shea Boulevard to Frank Lloyd Wright Boulevard, serving the Scottsdale Airpark employment and commercial center. This AA will focus on specific capital improvements to enhance on-street transit operations within the primary study corridor only.

The broader study area represents the local area of influence that has the strongest transportation and land use interaction with the Scottsdale Road/Rural Road corridor. It is defined as the area within one

mile of Scottsdale Road/Rural Road, from the 64th Street/Kyrene Road alignment on the west to Hayden Road/McClintock Drive on the east.

Figure 1: Study Area



1.1.3 Study Objectives

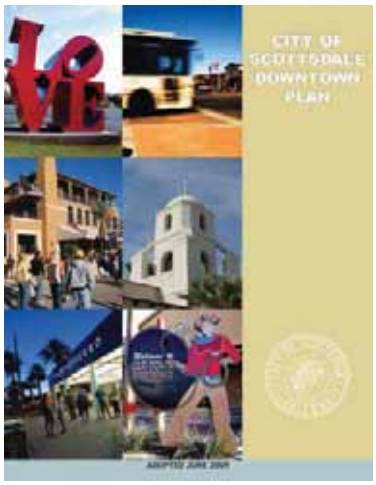
The RPTA's focus is on developing a project that can qualify for Very Small Starts (VSS) funding from the Federal Transit Administration (FTA) in time for a 2016 opening. Therefore, the objectives of this AA are to:

- Establish the purpose of, and need for, higher-capacity transit on Scottsdale Road and Rural Road, to begin justifying the proposed transit investment.
- Identify a Locally Preferred Alternative (LPA) transit investment and operating plan, whose first phase could be implemented by 2016.
- Prepare an implementation and funding plan that can successfully compete for appropriate FTA funding (most likely VSS, based on recently counted ridership in the corridor).
- Coordinate with the recommendations of the Tempe South AA, which studied alternative transit investments in the area just south of the Scottsdale Road/Rural Road study corridor.
- Assess the Scottsdale/Rural corridor's potential as a future high-capacity transit line.

1.2 Previous Planning for the Scottsdale Road/Rural Road Corridor

Previous studies and plans related to this AA include:

- *MAG Fixed Guideway System Study*
- *Scottsdale General Plan, Community Mobility Element*
- *Scottsdale/Tempe North/South Transit Corridor Study*
- *MAG High Capacity Transit Study*
- *RPTA Regional Transit System Study*
- *MAG Regional Transportation Plan (RTP)*
- *Tempe General Plan 2030, Transportation Element*
- *City of Tempe Pedestrian, Bicycle, and Transit Design Criteria*
- *Scottsdale Transportation Master Plan, Transit Element*
- *Tempe Comprehensive Transportation Plan*
- *MAG Commuter Rail Strategic Plan*
- *Scottsdale Road Streetscape Design Guidelines* (City of Scottsdale)
- *Analysis of Arizona State University (ASU) Transit Ridership on the Regional Valley Metro Transit System*
- *RPTA Origin and Destination Study*
- *City of Scottsdale Downtown Plan*
- *Greater Airpark Community Area Plan* (City of Scottsdale)
- *MAG Regional Transit Framework Study*
- *City of Scottsdale Design Standards and Policies Manual: Transportation Chapter*
- *McDowell Corridor/Southern Scottsdale Economic Development Task Force—Recommendations to the Scottsdale City Council*
- *MAG Commuter Rail System Study*
- *Southern Scottsdale Character Area Plan*
- *METRO Tempe South AA/Environmental Impact Statement (EIS)*



Appendix A summarizes these related studies and plans in chronological order. Each summary emphasizes recommendations pertinent to the Scottsdale Road/Rural Road corridor.

Table 1 lists previous milestones in planning for higher-capacity transit in this corridor, north of the METRO LRT starter line. Many of these milestones are drawn from the summaries in Appendix A. Collectively, they reflect strong community support for substantial transit improvements along Scottsdale and Rural Roads north of Downtown Tempe.

Table 1: Previous Milestones in Scottsdale Road/Rural Road Corridor Transit Planning

Study or Plan	Date	Finding, Recommendation or Action
N/A	1990	Scottsdale voters approve 0.2 percent local sales tax for transportation improvements
N/A	September 1996	Tempe voters approve 0.5 percent local sales tax for public transit
MAG Fixed Guideway System Study	January 1999	Scottsdale and Rural Roads constitute a high-demand transit corridor warranting further study for future high-capacity service.
Scottsdale/Tempe North/South Transit Corridor Study	April 2003	Scottsdale City Council recommends Scottsdale Road for some form of higher-capacity transit.
MAG High Capacity Transit Study	June 2003	Recommends future high-capacity transit (HCT) along entire corridor.
Tempe General Plan 2030, Transportation Element	December 2003	Consider implementing final recommendation for Scottsdale/Rural HCT corridor.
MAG Regional Transportation Plan (adopted and funded by voters through Proposition 400)	November 2004	Recommends arterial BRT from Shea Blvd south, beginning in Phase 2 (2011-15); shows the corridor as an unfunded, eligible high-capacity corridor south of the Airpark.
N/A	July 2006	First regional "Supergrid" service (Route 72) begins on Scottsdale and Rural Roads, funded by Prop. 400 sales tax adopted in November 2004.
Scottsdale Transportation Master Plan, Transit Element	January 2008	Recommends enhanced bus service and arterial BRT—using a dedicated or shared guideway--on Scottsdale Road, with potential HCT later.
Tempe Comprehensive Transportation Plan	March 2008	Reaffirms recommendations of Scottsdale/Tempe North/South Transit Corridor Study.
N/A	March 2008	First phase of ASU SkySong opens at former Los Arcos Mall site, Scottsdale Road at McDowell.
Scottsdale Road Streetscape Design Guidelines	May 2008	Design guidelines must not preclude future HCT options along Scottsdale and Rural Roads.
Analysis of ASU Ridership on the Regional Valley Metro Transit System	December 2008	Growth will require ASU to rely increasingly on the regional transit system; Route 72 is among the routes most used by the ASU community.
N/A	December 2008	METRO LRT starter line opens, including station near Rural Road/University Drive. Connecting LINK BRT service begins in Mesa from Sycamore to Superstition Springs Mall.
City of Scottsdale Downtown Plan	June 2009	Scottsdale Road downtown must accommodate all modes of transportation.
Greater Airpark Community Plan (City of Scottsdale)	September 2009	Calls for mixed-use development along the entire Scottsdale Road corridor up to Frank Lloyd Wright Boulevard, specifying highest-scale development with access to multiple transportation modes.
MAG Regional Transit Framework Study	January 2010 (draft)	Three improvement scenarios all envision improvements on Scottsdale/Rural Roads—including BRT investments and possible all-day HCT in the more ambitious scenarios.
Tempe South AA/DEIS	2010	Recommendations include a modern streetcar on Mill Avenue, plus long-term development of BRT on Rural Road from the Downtown Tempe area to Chandler Boulevard.

Sources: Various studies and plans, as described in Appendix A

1.3 Existing Transportation Conditions and Future Changes

1.3.1 Roadway System

Scottsdale Road/Rural Road (the name changes at Tempe Town Lake) is an urban principal arterial that MAG has designated as an Urban Road of Regional Significance, indicating its recognized importance as a multimodal transportation corridor. The roadway generally has six through traffic lanes within the geographic limits of this study, except in Downtown Scottsdale, where it narrows to four lanes with limited on-street parking. Scottsdale/Rural serves as a critical regional access route to ASU Tempe—one of the largest college campuses in the nation—Downtown Tempe, the ASU SkySong Innovation Center approximately three miles north of the Tempe campus, Downtown Scottsdale with its Arizona Canal waterfront and Scottsdale Fashion Square mall, the Resort Corridor (which extends north from Camelback Road to Doubletree Ranch Road), and the Scottsdale Airpark, which contains Scottsdale Airport, one of the busiest single-runway general aviation airports in the country.

In the Downtown Scottsdale area, Goldwater Boulevard to the west and Drinkwater Boulevard to the east serve as twin bypass routes that relieve traffic congestion through the downtown and incidentally could provide flexibility for transit enhancements. Goldwater Boulevard is an important access route to the upscale Scottsdale Fashion Square mall, the waterfront, and the renowned Main Street and Fifth Avenue retail and gallery districts. Drinkwater Boulevard serves not only the Scottsdale Civic Center and related attractions, but also a major hospital (Scottsdale Healthcare-Osborn) and Scottsdale Stadium, where spring training games of the San Francisco Giants can attract several thousand spectators.

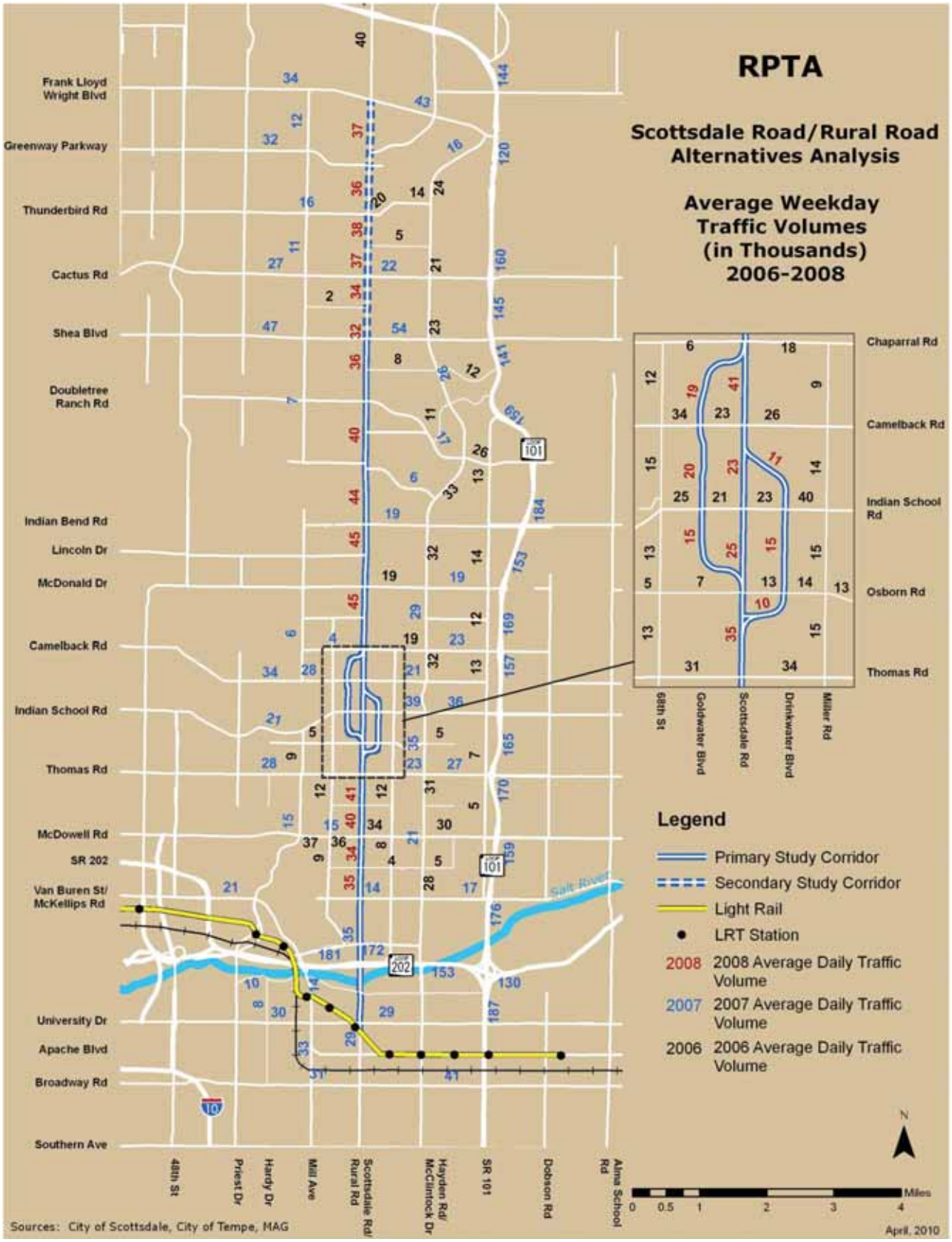
The street system in portions of the study area follows the urban grid pattern, with arterial streets (the multilane carriers of through traffic) spaced one mile apart and collector streets at many of the half-mile intervals. In much of the area, however, the grid is discontinuous and fragmentary due to a combination of topographical and jurisdictional conditions. Such features as Camelback Mountain, Mummy Mountain, and the north-south Crosscut Canal interrupt the grid west of Scottsdale Road. In and near the Resort Corridor, long-established master planned communities and golf courses have led to curvilinear street alignments. The Town of Paradise Valley, which has few through roadways and contains mountainous terrain, adjoins the corridor on the west for several miles. Finally, the Salt River Pima-Maricopa Indian Community, a somewhat insular Native American community that lacks a developed arterial street system, lies only two miles east of Scottsdale Road from the Salt River nearly to Via Linda.

These constraints mean that much of Scottsdale has only two continuous north-south arterials (Scottsdale Road and Hayden Road) and the city is largely disconnected from east-west elements of the regional grid between Camelback Road and Shea Boulevard. Congestion on the State Route (SR) 101 freeway during peak periods makes Scottsdale/Rural and Hayden/McClintock vital alternative routes for longer trips. The nearest continuous, north-south regional transportation corridor to the west is 44th Street/Tatum Boulevard, roughly three miles west. All of this tends to squeeze travel demand into a narrow north-south corridor through southern Scottsdale and northern Tempe. Because little opportunity exists to increase the auto-carrying capacity of Scottsdale Road or parallel routes, many Scottsdale residents and elected officials have come to see the need for a transit solution.

1.3.2 Existing Average Daily Traffic

Figure 2 shows average weekday traffic volumes collected from 2006 through 2008 in and near the study area, and provided by the City of Scottsdale and MAG. Outside Downtown Scottsdale, daily traffic on Scottsdale Road/Rural Road ranges from 29,000 at the south end of the study corridor to 45,000 in the Resort Corridor. The lower volumes through Downtown Scottsdale show that Goldwater and Drinkwater Boulevards are successful in diverting traffic from Scottsdale Road. Shea Boulevard carries the heaviest traffic of the major east-west cross streets.

Figure 2: Average Weekday Traffic Volumes (in Thousands) 2006-2008



1.3.3 Level of Service

Level of service (LOS) is a measure used to determine the performance, from the user's viewpoint, of roadways, intersections, and other transportation facilities. The LOS of a roadway segment is expressed using letters A through F, with A being best and F being worst.

- LOS A represents conditions where traffic flows at the posted speed limit and all motorists have complete mobility between lanes.
- LOS B is slightly more congested, with some impingement of maneuverability; motorists might be forced to drive side by side, limiting lane changes with no impact on speed.
- LOS C has more congestion than B; the ability to pass or change lanes is not always assured.
- LOS D is the level of service of a busy shopping corridor in the middle of a weekday, or a functional urban highway during commuting hours: speeds are somewhat reduced, and motorists are hemmed in by other cars and trucks. **This is the lowest acceptable LOS according to Scottsdale's *Transportation Master Plan*.**
- LOS E is a marginal service state. Flow becomes irregular and speed varies frequently, but rarely reaches the posted limit.
- LOS F is the lowest level of efficiency for the performance of a roadway. Flow is forced; every vehicle moves in lockstep with the vehicle in front of it, with frequent slowing required. This level of service characterizes "stop and go" or "slow and go" traffic.

Figure 3 shows the LOS for the Scottsdale Road/Rural Road corridor—plus Goldwater and Drinkwater Boulevards, SR 101 and SR 202, and major cross streets for a mile on either side--based on 2006, 2007 and 2008 traffic volumes. Level of service was estimated using planning-level LOS criteria for freeways and arterials from Version 5.3 of the Highway Capacity Software. A set of reasonable assumptions about roadway and traffic characteristics, given typical local conditions, was used.

According to Figure 3, Scottsdale Road north of Curry Road has an existing peak period LOS D, which is considered marginally acceptable under urban conditions. Two major cross streets have an LOS E or F on one or both sides of Scottsdale Road. Freeways tend to be more heavily congested because they carry the bulk of regional peak period traffic, and the Pima and Red Mountain (SR 101 and SR 202) are no exception, with LOS F predominating in the area. Both freeways have been or are currently being widened, including the addition of high-occupancy vehicle (HOV) lanes.

1.4 Existing Fixed Transit Routes and Services

Figure 4 illustrates the local transit routes that serve the Scottsdale Road/Rural Road study corridor as of November 2010, following service reductions in July of that year due to shortfalls in local revenue (primarily sales tax) and the state legislature's elimination of the Local Transportation Assistance Fund (LTAF). Table 2 summarizes current service and ridership on the fifteen routes, including METRO LRT and five community circulators, that operate within or across the primary study corridor. Two more local routes serve the secondary corridor, and five additional routes serve the Downtown Tempe Transportation Center (TTC). Some of the routes in Table 2 serve cities other than Scottsdale and Tempe, but the data apply only to the portions in these two cities. Figure 5 illustrates, and Table 3 lists, the four regional express routes that now serve the corridor during weekday peak periods. In these tables and throughout this report, ridership refers to boardings (unlinked trips).

Figure 3: Existing (2006-2008) Peak Period Roadway Level of Service

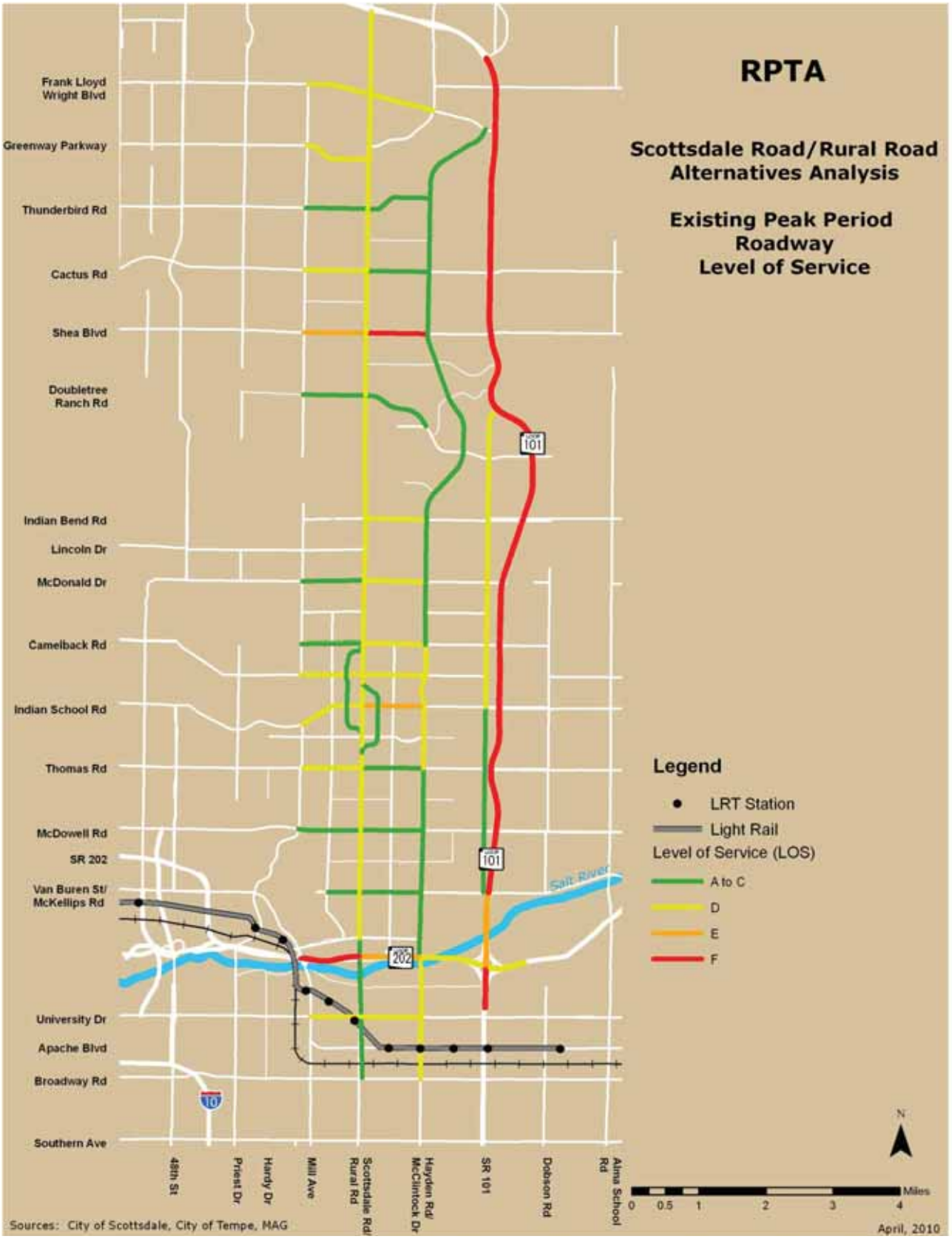


Figure 4: Existing Local Transit Routes


RPTA
Scottsdale Road/Rural Road Alternatives Analysis
Existing Local Transit Routes
Legend
Light Rail
LRT Station
Transit Center
Park-and-Ride
Community Circulator Route
Frank Lloyd Wright Blvd
Greenway Parkway
Thunderbird Rd
Cactus Rd
Shea Blvd
Doubletree Ranch Rd
Indian Bend Rd
Lincoln Dr
McDonald Dr
Camelback Rd
Indian School Rd
Thomas Rd
McDowell Rd
SR 202
Van Buren St/ McKellips Rd
University Dr
Apache Blvd
Broadway Rd
Southern Ave
48th St
Priest Dr
Hardy Dr
Mill Ave
Scottsdale Rd/ Rural Rd
Hayden Rd/ McClintock Dr
SR 101
Dobson Rd
Alma School Rd
Salt River
Miles
0 0.5 1 2 3 4
N
Sources: City of Scottsdale, City of Tempe, RPTA
April, 2010

Figure 5: Existing Express Bus Routes

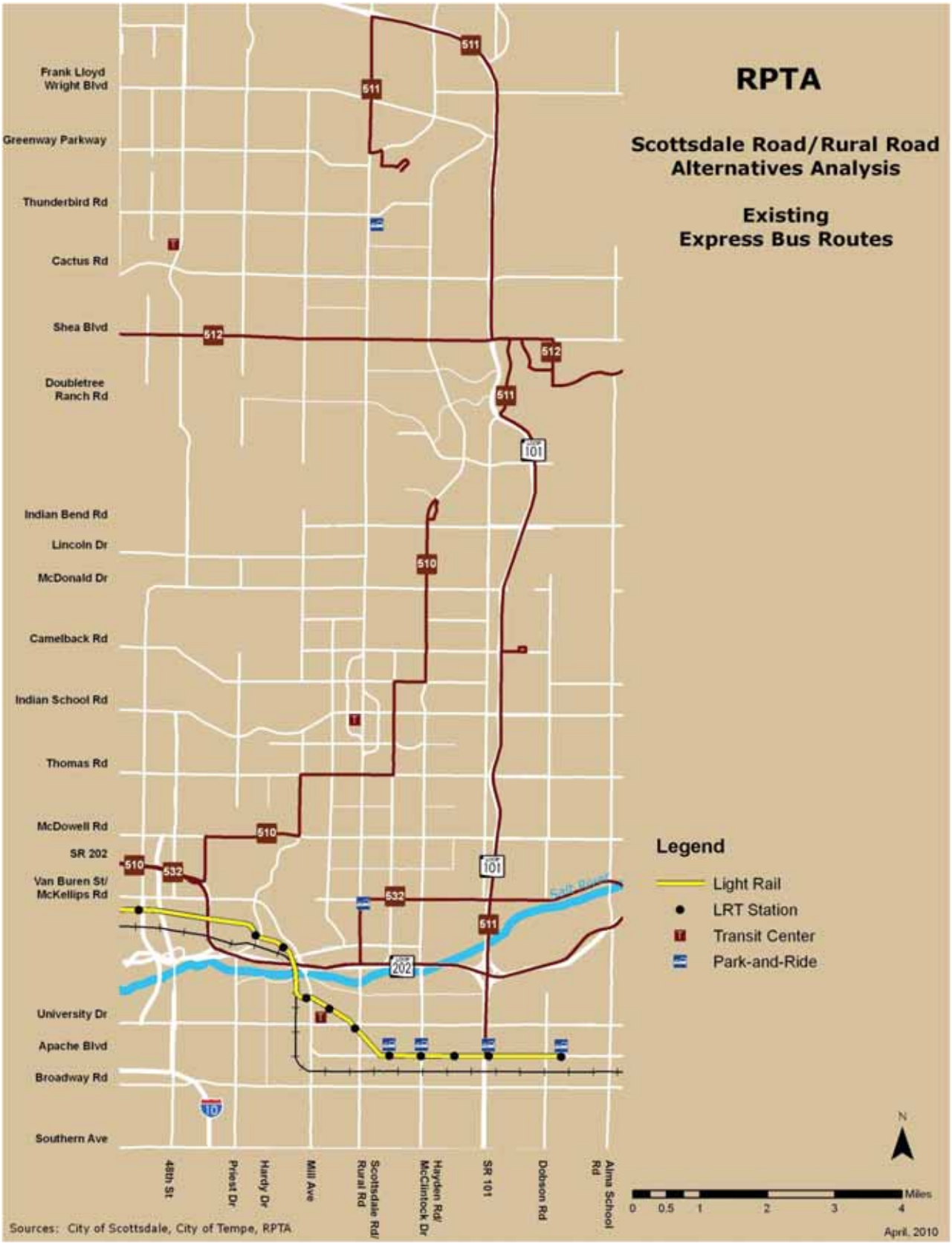

RPTA
Scottsdale Road/Rural Road Alternatives Analysis
Existing Express Bus Routes
Legend
Light Rail
LRT Station
Transit Center
Park-and-Ride
Frank Lloyd Wright Blvd
Greenway Parkway
Thunderbird Rd
Cactus Rd
Shea Blvd
Doubletree Ranch Rd
Indian Bend Rd
Lincoln Dr
McDonald Dr
Camelback Rd
Indian School Rd
Thomas Rd
McDowell Rd
SR 202
Van Buren St/ McKellips Rd
University Dr
Apache Blvd
Broadway Rd
Southern Ave
48th St
Priest Dr
Hardy Dr
Mill Ave
Scottsdale Rd/ Rural Rd
Hayden Rd/ McClintock Dr
SR 101
Dobson Rd
Alma School Rd
Salt River
N
Miles
0 0.5 1 2 3 4
Sources: City of Scottsdale, City of Tempe, RPTA
April, 2010

Table 2: Existing Local Transit Routes, November 2010

Route		City	Service Frequency (Minutes)			Approximate Hours of Service	Average Weekday Ridership (Nov. 2010): Scottsdale and Tempe	
Number	**Name**		**Peak**	**Base**	**Evening & Weekend**		**Total**	**Per Vehicle Revenue Mile**
N/A	METRO LRT	Tempe	12	12	20	0500-0000[1]	12,544	6.5
17	McDowell	Scottsdale	30	30	30	0600-2300[2]	527	2.7
29	Thomas	Scottsdale	20	40	30	0500-2300[2]	939	3.4
30	University	Tempe	30	30	30-60	0500-0100[3]	913	2.0
41	Indian School	Scottsdale	15[4]-30	15[4]-30	30	0500-2300[2]	653	1.9
50	Camelback	Scottsdale	15-30	60	60	0530-2000	467	2.1
62	Hardy/Guadalupe	Tempe	15	30	30	0500-0100[3]	1,726	1.3
72	**Scottsdale/Rural**	**Scottsdale**	**20**	**20**	**30**	**0400-0000[3]**	**1,720**	**1.1**
		Tempe	**20**	**20**	**30**	**0400-0100[3]**	**2,891**	**2.5**
		Both Cities	**20**	**20**	**30**	**0400-0100[3]**	**4,611**	**1.7**
76	Miller	Scottsdale	30	30	60	0500-2300[2]	865	1.1
106	Peoria/Shea	Scottsdale	30	60	60	0500-2100	328	1.1
N/A	Downtown Trolley	Scottsdale	15	15	15	1100-1800[5]	293	1.0
N/A	Neighborhood Trolley	Scottsdale	20	20	20	0630-2100	1,939	6.2
N/A	Orbit Earth	Tempe	15	15	15-30	0600-2230[2]	1,541	1.4
N/A	Orbit Mars	Tempe	15	15	15-30	0600-2230[2]	1,950	2.2
N/A	Orbit Mercury	Tempe	10-15	10-15	15-30	0600-2230[2]	2,849	3.5
Additional Routes Serving Secondary Study Corridor								
154	Greenway	Scottsdale	30	30	60	0500-2230[2]	14	0.3
170	Bell	Scottsdale	30	30	30	0500-2300[2]	119	0.6
Additional Routes Serving Downtown Tempe Transportation Center								
48	48th St/Rio Salado	Tempe	15	30	30	0500-0100[3]	1,067	1.3
65	Mill/Kyrene	Tempe	30	60	60	0500-0100[3]	1,091	1.9
66	Mill/Kyrene	Tempe	30	30	60	0500-0100[3]	976	1.9
N/A	Orbit Jupiter	Tempe	15	15	15-30	0600-2230[2]	1,812	2.3
N/A	Orbit Venus	Tempe	15	15	15-30	0600-2230[2]	1,793	2.6
All Local Transit Routes in Region (including rail and rural routes)							***234,743***	***2.5***

[1]Operates later Friday and Saturday nights
[2]Slightly shorter hours on weekends
[3]Slightly shorter hours Sunday
[4]15-minute frequency west of Loloma Station only
[5]Runs later Thursday for the Scottsdale Art Walk

Sources: RPTA *Transit Book* effective January 25, 2010 through July 25, 2010; *Transit Book Supplement*, July 2010; RPTA Monthly Ridership Report for November 2010

Table 3: Existing Express Bus Routes, November 2010

Number	Name	City	Peak Service Frequency (minutes)	Weekday Revenue Trips	Weekday Ridership (entire route)	
					Total	Per Vehicle Trip
510	Scottsdale	Scottsdale	30-35	4	66	16.5
512	Scottsdale	Scottsdale	20-35	4	65	16.3
532	Mesa	Tempe	15-25	8	134	16.8
Additional Route Serving Secondary Study Corridor						
511	Tempe/Scottsdale Airpark	Scottsdale	60	8	18	2.3
All Regional Express and Rapid Routes					***5,997***	***21.5***

Sources: RPTA *Transit Book* effective January 25, 2010 through July 25, 2010; *Transit Book Supplement*, July 2010; RPTA Monthly Ridership Report for November 2010

Scottsdale, Tempe and other agencies made the following changes to transit service in the study area in July 2010, after this study began:

- The portion of Route 66 north of McKellips Road was discontinued, eliminating service in Scottsdale. (In October 2010, the route was cut back again to the TTC.)
- All trips on Route 72 were extended north to Thompson Peak Parkway, but the frequency was reduced to 20 minutes (from 15) during both peak and off-peak hours on weekdays.
- The south end of Route 76 was restructured to end in a loop at McKellips Road.
- Express routes 536 and 572 were eliminated.
- The southeast end of Route 511 was cut back to Apache Boulevard in Tempe.
- METRO LRT frequencies were reduced to 12 minutes (from 10) during peak periods and 20 minutes at all other times. The length of the daily peak was also reduced.

As is typical of the MAG region, bus stops on Scottsdale Road and Rural Road are generally spaced one-fourth mile apart, with far side stops predominating at major intersections. Some of the more heavily used stops have bus bays or pullouts to prevent stopped buses from impeding other traffic. Both Scottsdale and Tempe have active programs to place public art at many bus stops.

The community circulator routes serve a different function from the numbered local routes. The latter are designed to connect activity centers in a straight line along major corridors, with few if any deviations to serve offline destinations. Community circulators, in contrast, connect community and neighborhood services to each other and to line-haul routes. They are intended to capture as many short trips as possible, using smaller vehicles serving less direct routes along lightly traveled collector and local streets. No fare is charged, in part to stimulate ridership (including impulse trips) and in part to avoid excessive dwell times on the more circuitous alignments. Although the Scottsdale Downtown and Neighborhood Trolleys serve portions of Goldwater and Drinkwater Boulevards, neither leg of the couplet has a continuous north-south transit route across downtown.

Private contractors operate all bus routes in the area for cities or transit agencies. Most routes are funded and contracted by the cities that they serve, especially Phoenix and Tempe. The following routes that serve the study corridor, however, are either funded or contracted by the RPTA:

RPTA-funded routes: 50 (in part), 72, 106 (in part), 510, 511, 512, 532
RPTA-contracted routes: 30, 72, 511, 532

The RPTA receives capital and operating funds for regional bus service from the transit share (approximately one-

third) of a twenty-year, one-half-percent sales tax that Maricopa County voters approved in 2004 as Proposition 400, to implement the MAG RTP. Route 72, Scottsdale/Rural, became the first route in the region to operate as regionally funded "Supergrid" service in July 2006. The Supergrid network, scheduled for phase-in over the lifetime of the RTP, will give the MAG region a network of local bus routes that offer a superior level of service on principal arterials. The concept entails frequent service (every 15 to 30 minutes) seven days a week, throughout the day and evening, with seamless operation across jurisdictional boundaries.

1.5 Transit Passenger Facilities

Two urban transit passenger facilities are located in or near the corridor. Loloma Station, on Marshall Way between 1st and 2nd Streets, is the Downtown Scottsdale transit center. Routes 41 and 72 serve this facility, as do Scottsdale's two original community circulator routes: the Downtown Trolley and the Neighborhood Trolley. According to the *Short Range Transit Program*, 274 buses stop at Loloma Station every weekday—although this number has likely decreased in 2010 because of service cuts. The future of this facility has been under discussion among City of Scottsdale staff and the community.

The downtown TTC is located at the College Avenue LRT station, one-half mile west of Rural Road. This facility accommodates all five Tempe community circulator routes and five other local routes. Here Route 72 makes a longer detour than in Downtown Scottsdale, using University Drive, College Avenue and Veterans Way as a loop connecting the TTC with Rural Road. Route 30, on the other hand, does not deviate to serve the TTC although this would entail a shorter detour than the one made by Route 72. More than 600 transit vehicle trips, including METRO LRT, serve the TTC each weekday, making it the best served transit hub in the region.

Southeast of the TTC, the next LRT station is located one block south of University Drive on the west side of Rural Road. Route 72 and two Orbit circulator routes directly serve this station; Routes 30 and 62 stop nearby on University Drive.

A shopping center at the southeast corner of Scottsdale Road and McKellips Road in Tempe offers free parking to patrons of express route 532, local route 72 and Tempe circulator Orbit Earth. No other shared-use park-and-ride lots currently exist in the study corridor.

1.6 Demand Responsive Transit

The East Valley Dial-a-Ride serves seniors and persons with disabilities in Scottsdale and Tempe, as well as Chandler, Gilbert and Mesa. The fare structure and other service characteristics differ for those who qualify for federally mandated service under the Americans with Disabilities Act. Transfers are available to and from the Phoenix Dial-a-Ride, Paradise Valley Dial-a-Ride and fixed route buses.

1.7 Current and Short-Term Transit Deficiencies

The *MAG Regional Transit Framework Study* identified major transit service deficiencies that characterize much of the region. Many of these deficiencies exist in the Scottsdale Road/Rural Road corridor.

Service area coverage is deficient primarily in the portion of the study corridor north of Camelback Road, where east-west arterial street connections are sparse. The low-density Town of Paradise Valley, which discourages regional through traffic, borders much of the west side of Scottsdale Road between Chaparral Road and Mountain View Road, while the Salt River Pima-Maricopa Indian Community lies just two miles east (and extends south to the Salt River). These jurisdictional constraints, plus the topographic barrier of the Phoenix Mountains farther west, create deficiencies in both roadway and transit coverage. The southern portion of the corridor, between Camelback Road and University Drive, has reasonably good transit service coverage, with line-haul service on north-south and east-west arterials, along with several community circulators to fill the gaps. Except for the METRO LRT at the south end of the corridor, nearly all service consists of local bus routes, operating in a shared curb lane and stopping frequently. The few exceptions are express routes that provide a small number of peak-period weekday trips, and designed to carry commuters to a handful of the largest regional employment destinations.

A second type of deficiency discussed in the *MAG Regional Transit Framework Study* relates to passenger convenience. Focus group participants and others—riders and non-riders—find existing bus service unattractive because it is too slow, runs too infrequently, and has insufficient hours of operation. This type of deficiency applies to the Scottsdale Road/Rural Road corridor, where many local routes operate at a peak period frequency of 30 minutes, and some offer only hourly service off-peak. While some routes run until midnight, others end their service by 8:00 p.m. Because they make the transit system harder to use and understand, these inconsistencies—both between routes and across municipal boundaries—may deter ridership and constitute an important deficiency.

Although regionally funded Supergrid routes like Route 72 may gradually alleviate some of these problems, they share the principal disadvantage of other local bus routes: low travel speed, resulting in travel times that are uncompetitive with the personal auto and unacceptable for many choice riders. The main reasons for this deficiency are:

- Local buses share a lane with mixed traffic and therefore experience the full effects of traffic congestion, especially during peak periods when the roads are most crowded and efficient traffic signal progression is most likely to break down.
- Frequent stops: in the RPTA region, bus stops are typically spaced one-fourth mile apart, and sometimes more closely.
- Long and unpredictable dwell times at stops. Different riders board at different speeds and wheelchair users require more time to board due to the need to deploy a ramp or lift. The problem is exacerbated because (a) the amount of passenger activity tends to be greatest during peak hours, when traffic congestion is at its worst, and (b) each fare must be collected or validated under the supervision of the vehicle operator. The second issue has been mitigated by widespread pre-payment, along with adoption of magnetic strip and "smart card" technologies, which have reduced the number of riders paying with cash at the farebox.
- Related conditions that tend to constrain operation of transit vehicles: e.g., large vehicles are harder to maneuver in traffic; they cannot change lanes freely because of their required availability at bus stops; at some locations they must await gaps to re-enter the traffic stream from on-street bays.
- Especially under off-peak traffic conditions, delays may result from the requirement to observe time points along the route. This exemplifies how one deficiency (in this case, infrequent service) can worsen another; in a system with frequent service on all routes, time points are not necessary because missing a connection does not result in long waits.

Some conceptual solutions to these problems readily suggest themselves: exclusive or semi-exclusive transit lanes, traffic control techniques to give transit vehicles priority over others, less frequent stops at on-line stations, and separating fare control from the boarding process.

Table 4 compares scheduled transit operating times and speeds along Scottsdale Road/Rural Road with conditions on two enhanced transit services implemented at the end of 2008: the METRO LRT starter line, and Mesa LINK (limited-stop bus) from the LRT Sycamore station to Superstition Springs Mall. Separate peak and off-peak data are not shown, because Route 72 travel durations change little throughout the day, according to the Transit Book schedules. The local bus travel speed from the TTC to Frank Lloyd Wright Boulevard is estimated at 16 mph. The scheduled travel speed in the primary study corridor, south of Shea Boulevard, is slightly slower, at 15 mph, but still exceeds the fiscal year (FY) 2008 average for all fixed routes in the region. Both speeds are substantially less than the 19 mph offered by METRO LRT or Mesa LINK, and a trip from Downtown Tempe to Scottsdale Road/Shea Boulevard is (typically) 60 percent faster by private auto than by local bus, because the latter must stop up to four times every mile to receive and discharge passengers. A LINK-type enhanced bus from Downtown Tempe to Scottsdale/Shea might reduce the bus travel time from 50 to 39 minutes.

Table 4: Weekday Modal Travel Times and Speeds

Route	**Scheduled Travel Time** (minutes)	**Resulting Travel Speed** (miles/hour)
Local bus: TTC to Shea Blvd	50	15
Local bus: TTC to Frank Lloyd Wright	62	16
METRO LRT: entire route	65	19
Mesa LINK: entire route	40	19
TTC to Shea Blvd by private auto	30*	24
Hypothetical LINK: TTC to Shea Blvd	39	19
All Fixed Routes in Region—FY 2008	*N/A*	*14***

Estimated Route Lengths: Rural Rd/Scottsdale Rd, TTC to Shea Blvd: 12.2 miles
Scottsdale Rd, Shea Blvd to Frank Lloyd Wright Blvd: 4 miles
METRO LRT (Central Phoenix/East Valley): 20.3 miles
Mesa LINK: 12.5 miles

Sources: RPTA *Transit Book* effective January 25, 2010 through July 25, 2010; *northbound PM peak period trip by private vehicle, Wednesday, October 13, 2010; **RPTA Short Range Transit Program—FY 2009/10–2014/15, Tables 2 through 4

Current and projected revenue shortfalls from the countywide transportation sales tax will also cause deficiencies, in the form of delayed implementation dates for improvements adopted in the MAG RTP. Details appear below under *Planned RTP Transit Improvements.*

1.8 Bicycle and Pedestrian Ways

Both Scottsdale and Tempe have well developed systems of bikeways, trail and multi-use pathways. Existing facilities that lie within or cross the Scottsdale Road/Rural Road corridor include, from south to north:

Primary Study Corridor--Tempe

- Bike lanes on 8th Street from Rural Road to McClintock Drive
- Bike lanes crossing Rural Road on University Drive
- Bike lanes on 6th Street from Rural Road to Veterans Way
- Bike lanes crossing Rural Road on Rio Salado Parkway
- A multi-use path along the south side of Tempe Town Lake
- A multi-use path along the north side of Tempe Town Lake, with a grade-separated crossing of Scottsdale Road
- Bike lanes on Gilbert Drive from Scottsdale Road to College Avenue
- Bike lanes crossing Scottsdale Road on Weber Drive

Primary Study Corridor--Scottsdale

- A bike route crossing Scottsdale Road on Continental Street/Roosevelt Street
- Bike routes crossing Scottsdale Road on Oak Street and Osborn Road
- A bike route on 2nd Street from Scottsdale Road to the civic center
- Bike lanes crossing Scottsdale Road on Indian School Road
- A multi-use path along the Arizona Canal
- Bike routes crossing Scottsdale Road on Jackrabbit Road and Lincoln Drive
- Bike lanes on Scottsdale Road from Indian Bend Road to Doubletree Ranch Road
- Bike lanes on Doubletree Ranch Road from Scottsdale Road west

Secondary Study Corridor

- A bike route crossing Scottsdale Road on Cholla Street
- Bike lanes crossing Scottsdale Road on Sweetwater Avenue
- Bike lanes extending west on Thunderbird Road (in Phoenix) from Scottsdale Road
- A bike route extending west on Greenway Parkway (in Phoenix) from Scottsdale Road

The bikeways along the north bank of Tempe Town Lake, Weber Drive, Roosevelt Street, Oak Street, Osborn Road, and Jackrabbit Trail all connect the corridor to the multi-use paths and recreational activities of Indian Bend Wash, Scottsdale's signature linear park. The RPTA has adopted a policy of accommodating bicycles on its transit vehicles, and a higher-capacity transit investment on Scottsdale/Rural would enhance the ability of cyclists to link bike and transit trips.

1.9 Programmed and Planned Improvements

1.9.1 Current Capital Improvement Programs

Table 5 lists current, transportation-related projects from the Scottsdale Capital Improvement Program (CIP). No projects in the study corridor are currently listed in the City of Tempe CIP.

Table 5: Current Projects from Capital Improvement Program—City of Scottsdale

Location	Current Status	Description
Scottsdale Rd, McKellips Rd to Osborn Rd	Design complete	Add bike lanes, improve transit connections and amenities. To be developed as second phase of Scottsdale Rd Preservation Streetscape Enhancement Bond 2000 project; will include landscaping, shade, site furnishings, pedestrian lighting, and crosswalk treatment.
Scottsdale Rd, Roosevelt St to Earll Dr	Design work complete, Roosevelt St to Earll Dr	Scottsdale Rd Streetscape, Phase 1: Preserve and restore desert lands along Scottsdale Rd; promote its designation as a scenic corridor; enhance streetscape to reflect its importance as the signature roadway of the community. 
Scottsdale Rd/McDowell Rd	Scheduled for construction in 2010	Construct Phase 1 of transit passenger facility (Scottsdale Rd on-street bays) at ASU SkySong.
Scottsdale Rd/McDowell Rd	Timetable will depend on ASU Foundation	Construct Phase 2 of on-site transit center at SkySong.
Thomas Rd, 64th St to Civic Center Plaza (Phase II of three-mile project)	Will follow Phase I, which will be built east of Civic Center Plaza	Add bike lanes; widen sidewalks; add shade, landscaping, site furnishings.
North bank of Arizona Canal, Marshall Way to Scottsdale Rd	Construction expected to begin spring 2010	Build improvements (lighting, landscaping, public amphitheater) on north bank of canal; construct underpass and connecting paths on south bank.
Indian Bend Rd, Scottsdale Rd to Hayden Rd	Construction complete	Improve to four-lane minor arterial with landscaped median, turn lanes, bike lanes, curb & gutter, sidewalk on south side, multi-use path on north side. Additional turn lanes at Scottsdale Rd intersection.

Table 5 (continued)

Location	Current Status	Description
Southeast quadrant of Scottsdale Rd/Thunderbird Rd	Planning complete; Request for Proposals for design issued Feb. 2010	Construct park-and-ride lot.* 

*RTP project in *Short Range Transit Program* for FY 2010 through 2015, using $5.0 million in American Recovery and Reinvestment Act (ARRA) funds

Sources: Scottsdale Capital Improvement Projects, Project Status Reports from www.scottsdaleaz.gov; City of Scottsdale staff

In February 2010, the City of Scottsdale issued a Request for Statements of Qualifications for design of a park-and-ride facility at the southeast corner of Scottsdale Road and Thunderbird Road, in the secondary study corridor. The project, funded in part through the American Recovery and Reinvestment Act (ARRA), will consist of a 5.8-acre site with approximately 150 covered spaces, at least 300 uncovered spaces, landscape/irrigation, a maintenance building, passenger platform, bus bays, covered waiting areas, bicycle racks, incorporation of public art, and related amenities. As the first municipally owned park-and-ride in Scottsdale, the facility will serve Route 511, Route 572, and the future Pima Express between the Scottsdale Airpark area and central Phoenix. Construction is scheduled for 2011.

A transit center is planned at the ASU/Scottsdale Center for New Technology and Innovation, known as SkySong, located at the southeast corner of Scottsdale and McDowell Roads on the site of the former Los Arcos Mall. Phase 1, consisting of on-street bus bays on both sides of Scottsdale Road south of McDowell, has been completed. The bays will serve existing routes 72 and 76. Phase 2 will be an off-street urban transit center on the SkySong campus just east of Scottsdale Road. Scheduling of this phase will depend on the pace of continuing SkySong construction by the ASU Foundation. In addition to routes 72 and 76, this facility may serve Route 17, a rerouted Neighborhood Trolley, an extended Tempe Orbit Earth, and a shuttle service between SkySong and ASU Tempe. The main drive in SkySong was designed to allow future higher-capacity transit to come directly into the development.

Phase 1 of the Scottsdale Road Streetscape, a City of Scottsdale project, is expected to begin construction in 2010. This initial phase will enhance and beautify the 1.75-mile segment from Roosevelt Street to Earll Drive. Appendix A provides additional information on the Scottsdale Road Streetscape Design Guidelines.

1.9.2 MAG Transportation Improvement Program (TIP)

Table 6 lists pertinent projects from the MAG TIP for FY 2011 through 2015. The TIP is the adopted regional program for major short-term transportation improvements in Maricopa County. It includes several Intelligent Transportation Systems (ITS) projects in Scottsdale, a pavement project on Rural Road in Tempe, and the potential higher-capacity transit improvements studied in this AA.

Table 6: Projects from MAG Transportation Improvement Program, FY 2011-2015

Year	City or Agency	Location	Work	Length (miles)
2011	Scottsdale	McDowell Rd: Scottsdale Rd to Pima Rd	Construct smart corridor traffic control system	2.0
2011	Scottsdale	Scottsdale and Hayden Rds: Shea Blvd to McDowell Rd	Install detection equipment, variable message signs and software	2.0
2011	Scottsdale	Earll Dr to Chaparral Rd	Upgrade sidewalks and add bicycle lanes	3.0
2012	Scottsdale	Area enclosing Shea Blvd to Carefree Hwy and 56th St to 136th St	Install dynamic message signs	0.8
2011	Tempe	8th Street: University LRT station to McClintock Dr	Planning study and preliminary design for bicycle and pedestrian improvements	1.0
2012	Fountain Hills	Shea Blvd: Scottsdale Rd to Fountain Hills (Scottsdale local match only)	Construct multi-use path and sidewalk	0.5
2014	Scottsdale	Redfield Rd: Scottsdale Rd to Hayden Rd	Design roadway widening	1.2
2014	Tempe	Rural Rd: Rio Salado Pkwy to Southern Ave	Asphalt mill and overlay	2.5
2015	Scottsdale	Redfield Rd: Scottsdale Rd to Hayden Rd	Construct roadway widening	1.2
2015	Tempe	Creamery Railroad	Construct multi-use path	0.8
2014	RPTA	Scottsdale Rd/Rural Rd corridor	BRT* R/W improvements (phase I)	Not specified
2015	RPTA	Scottsdale Rd/Rural Rd corridor	Scottsdale Rd/Rural Rd BRT* (phase II)	
2011	METRO	Tempe (fixed guideway corridor)	Final Design, Preliminary Engineering, FEIS**	Not specified
2012	METRO		Final Design, Utility Relocation	Not specified
2013	METRO		R/W Acquisition, Construct Transitway	Not specified
2014	METRO		Utility Relocation, Construct Transitway	Not specified
2015	METRO		Utility Relocation, Construct Transitway	Not specified

*Or other form of higher-capacity transit
**Final Environmental Impact Statement

Source: MAG Draft FY 2011-2015 Transportation Improvement Program, July 28, 2010

1.9.3 Planned RTP Transit Improvements

Table 7 summarizes the planned RTP improvements to transit routes and facilities that serve or enter the study corridor. Except for the ARRA-funded park-and-ride lot near Scottsdale Airpark, all have been delayed—many beyond the 2026 sunset date of the current RTP—because of revenue shortfalls from the one-half percent sales tax used as the principal funding source for both transit and roadway projects in the MAG region. Both of the planned express routes might serve the park-and-ride facility at Scottsdale Road and Thunderbird Road. The Supergrid routes would cross Scottsdale Road or Rural Road at various locations. All but one of these local routes currently intersect Scottsdale/Rural, but all would have enhanced frequencies, hours of service and route lengths with Supergrid. If current revenue projections are correct, however, the RPTA will be able to implement only one of the new express routes and three local route upgrades to Supergrid during the lifetime of the current RTP.

Table 7: Planned RTP Facility and Service Improvements

Passenger Facilities	**Location**		**Implementation Dates**	
			Original (2003 RTP)	**2010 Revision[1]**
Expansion & rehabilitation	Downtown Tempe Transportation Center		2016-2020	2037
SkySong Transit Center	Scottsdale Rd/McDowell Rd, southeast corner		2011-2015	2029
Scottsdale Airpark Park-and-Ride	Scottsdale Rd/Thunderbird Rd, southeast corner		2005-2010	2010
New Express Routes				
Regional Express Bus Routes	**Termini**		**Implementation Dates**	
			Original (2003 RTP)	**2010 Estimate[1]**
Pima Express	Scottsdale Airpark	State Capitol	2011-2015	2020
Anthem Express	Scottsdale Airpark	Anthem Park-&-Ride	2016-2020	2034
Supergrid Routes (Improved or New)[2]				
Supergrid Bus Routes	**Termini**		**Implementation Dates**	
			Original (2003 RTP)	**2010 Estimate[1]**
University Dr	South Mountain Community College	Ellsworth Rd	2011-2015	2016
McDowell Rd/McKellips Rd	Litchfield Rd	Red Mtn. Fwy	2011-2015	2026
Thomas Rd	Dysart Rd	Pima Rd	2016-2020	2038
Indian School Rd	Litchfield Rd	Granite Reef Rd	2016-2020	2038
Camelback Rd	Litchfield Rd	Scottsdale Community College	2011-2015	2020
Peoria Ave/Shea Blvd	Thunderbird Blvd/ 103rd Ave	Fountain Hills Blvd	2011-2015	2029
Thunderbird Rd	Litchfield Rd	Scottsdale Airpark	2016-2020	2038
Bell Rd	SR 303	Shea Blvd/Frank Lloyd Wright Blvd	2016-2020	2037

[1]Dates are approximate and may change at any time due to updated revenue projections; dates beyond 2026 assume extension of the half-cent sales tax for transportation improvements in Maricopa County.
[2]Phoenix portions of these routes will be funded by the City of Phoenix.

Sources: MAG Regional Transportation Plan, November 25, 2003; RTP transit brochure Issue 5 (RPTA, METRO and MAG); Short Range Transit Program FY 2009/10-2014/15; memorandum from Paul Hodgins to Scott Miller on FY 2009 Transit Life Cycle Program Update, May 11, 2009

1.9.4 Other Planned and Proposed Improvements

Improvements recommended in other studies and plans, such as the Scottsdale Transportation Master Plan and the Tempe South AA, are described in Appendix A.

1.10 Land Use and Community Development

1.10.1 Existing Land Use Characteristics

Figure 6 is a generalized map of existing land uses in both Scottsdale and Tempe.

Scottsdale
The existing land uses fronting Scottsdale Road are, for the most part, neighborhood and general commercial, as well as residential. Commercial land uses are focused at activity center locations, such as the intersection of Scottsdale Road and McDowell Road, the entire downtown area, Shea Boulevard, and the Scottsdale Airpark area – the largest employment node along the corridor and the second largest in Arizona. South of Shea Boulevard, adjacent residential land uses are primarily medium- to high-density residential, whereas residential land uses between the Scottsdale Airpark and Shea Boulevard typically have lower densities.

Tempe
Existing land uses along Scottsdale Road/Rural Road through Tempe from University Drive to SR 202 include a mix of medium-density residential on the west, commercial on the east, and public recreational/cultural (primarily ASU athletic facilities) on both sides of the roadway. Lands directly adjacent to Tempe Town Lake are largely categorized as vacant. North of SR 202, the Scottsdale/Rural Road corridor is primarily fronted with commercial land uses, interspersed with low-, medium- and high-density residential land uses.

1.10.2 Zoning

Appendix B discusses mixed-use zoning districts designated in Scottsdale and Tempe. These districts are emphasized because of the likelihood that they will become centers of transit ridership and multimodal interaction.

1.10.3 Planned Land Use Characteristics

Figure 7 is a generalized map of planned future land uses in both Scottsdale and Tempe.

Scottsdale
Planned land uses--as defined in the 2001 *City of Scottsdale General Plan*, which looks ahead to 2025--still maintain a focus on commercial and residential land uses along Scottsdale Road, but with greater densities and more mixed uses. The existing commercial hubs at activity center locations are envisioned to become mixed-use neighborhoods, combining multi-family residential, office, employment, and retail space. This category includes the Scottsdale/McDowell SkySong area, Downtown Scottsdale, and the Scottsdale Airpark area. Stretches of strip commercial can be found connecting activity centers in the southern portion of the city. The Scottsdale Road/Shea Boulevard area is expected to remain commercially- and office-focused. Residential land uses adjacent to Scottsdale Road south of Shea Boulevard are primarily categorized as suburban or urban neighborhoods, characterized by medium- to high-density residential. Residential land uses north of Shea Boulevard are characterized as rural neighborhoods, or low-density residential.

Tempe
Planned land uses, as defined in the Tempe *General Plan 2030,* remain the same between University Drive and SR 202, with the exception of the vacant land adjacent to Tempe Town Lake, characterized as mixed-

Figure 6: Scottsdale and Tempe Generalized Existing Land Use

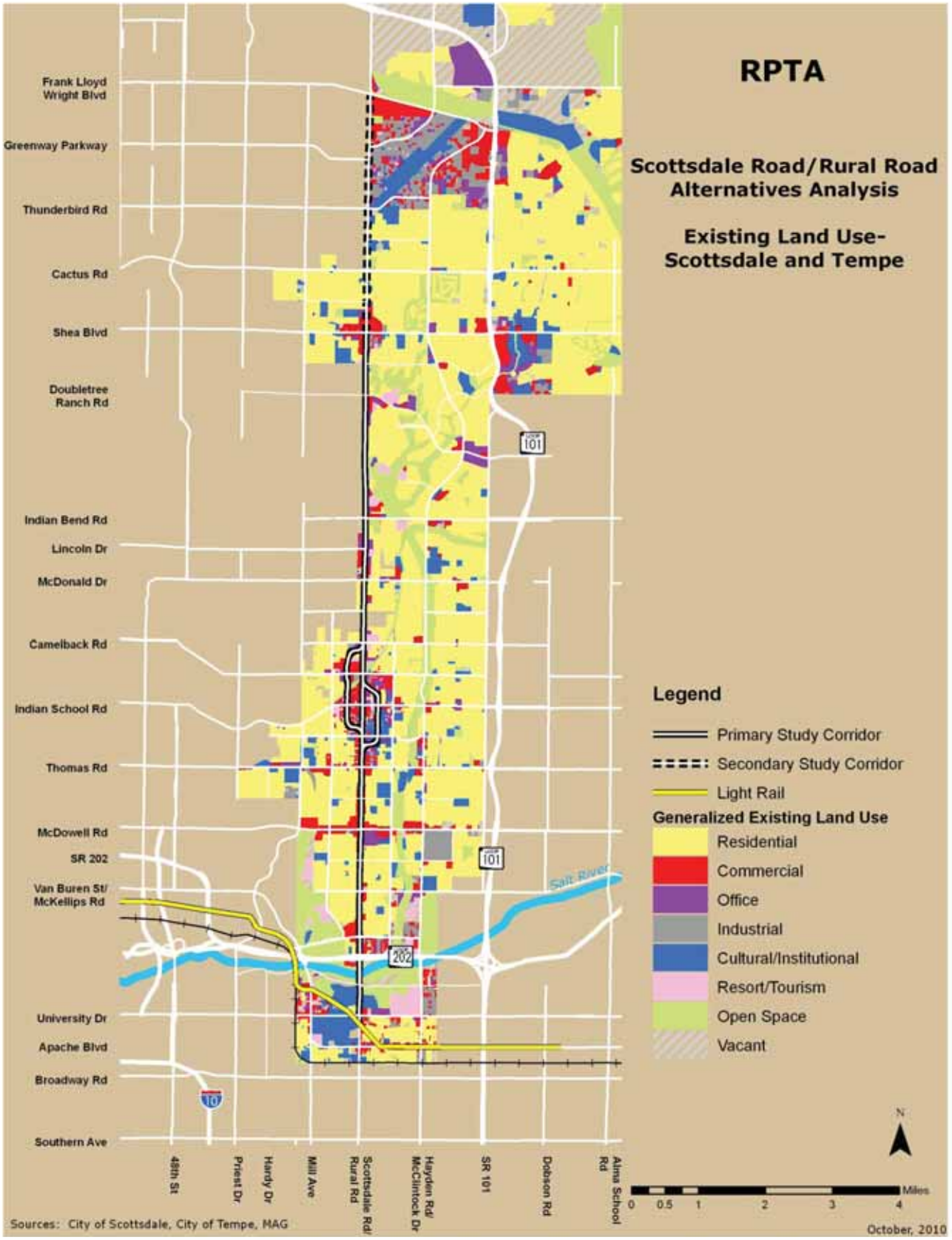
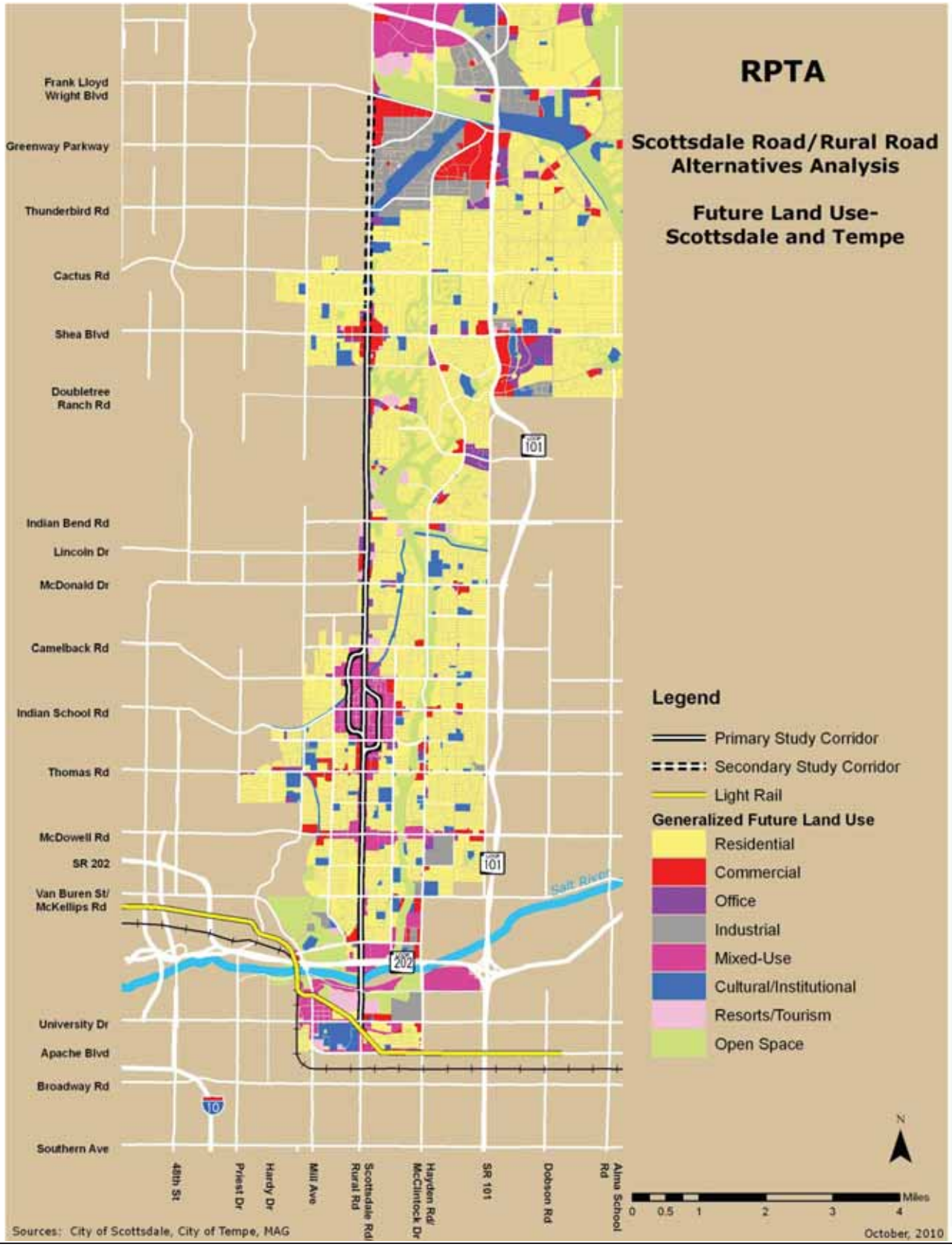


Figure 7: Scottsdale and Tempe Generalized Future Land Use


RPTA
Scottsdale Road/Rural Road Alternatives Analysis
Future Land Use- Scottsdale and Tempe
Frank Lloyd Wright Blvd
Greenway Parkway
Thunderbird Rd
Cactus Rd
Shea Blvd
Doubletree Ranch Rd
Indian Bend Rd
Lincoln Dr
McDonald Dr
Camelback Rd
Indian School Rd
Thomas Rd
McDowell Rd
SR 202
Van Buren St/ McKellips Rd
University Dr
Apache Blvd
Broadway Rd
Southern Ave
48th St
Priest Dr
Hardy Dr
Mill Ave
Scottsdale Rd/ Rural Rd
Hayden Rd/ McClintock Dr
SR 101
Dobson Rd
Alma School Rd
Salt River
Legend
Primary Study Corridor
Secondary Study Corridor
Light Rail
Generalized Future Land Use
Residential
Commercial
Office
Industrial
Mixed-Use
Cultural/Institutional
Resorts/Tourism
Open Space
N
0 0.5 1 2 3 4 Miles
Sources: City of Scottsdale, City of Tempe, MAG
October, 2010

use with high-density residential. North of SR 202, land uses previously characterized as commercial will generally become mixed-use, with medium-density residential. Single-use residential blocks no longer front Scottsdale/Rural Road, but rather back up to the commercial and mixed-use land uses.

1.10.4Transit-Oriented Development Plans and Policies

1.10.4.1 City of Scottsdale

Scottsdale does not have any regulatory form of a transit-oriented development overlay district or policy. The current update of the General Plan seeks to concentrate economic development and residential and commercial density in designated growth areas. All of the preliminarily defined growth areas are centered on Scottsdale Road and envisioned to focus the highest densities and transit-supportive uses along the corridor--in essence, concentrating transit-oriented development in desired locations, but without a regulatory framework.

1.10.4.2 City of Tempe

Tempe's zoning code contains a transportation overlay district (TOD) to encourage appropriate land redevelopment that is consistent with and complementary to the community's focused investment in transit, bicycle, and pedestrian infrastructure in certain areas.

The objectives of the TOD are to:

- Promote and develop livable and sustainable neighborhoods.
- Promote and increase the use of alternative modes of transportation such as walking, bicycling, carpooling, bus and LRT.
- Encourage a mix of uses and balance of densities and intensities in identified activity areas accessible to alternative modes of transportation.
- Provide a quality of urban design that attracts and encourages pedestrian activity.
- Reinforce public and private investments to achieve a compact form of development conducive to walking, bicycling, and transit use.
- Provide facilities that create a safe, accessible, comfortable and pleasant environment, maintain safe access for automobiles and adequate parking, and minimize conflicts between vehicles and pedestrians.
- The TOD modifies the underlying zoning-permitted uses, requiring first floor building uses to create an active pedestrian environment with public amenities, and requiring structured parking to take up no more than 40 percent of the facade length on the ground floor facing the street.
- The district does not alter residential standards.
- Several uses are prohibited in the TOD, including, but not limited to, drive-through businesses, parking lots, and large warehouse/manufacturing facilities.
- Required ground floor uses will confirm to the maximum setbacks, ranging from zero to 20 feet.

Properties adjacent to Rural Road from just south of University Drive to Rio Salado Parkway (except ASU Karsten Golf Course on the east) are within TOD boundaries. A property is considered in the TOD if any portion of the parcel or development is adjacent to a public R/W location within 1,950 feet from the center of an LRT station platform, or within 800 feet of an LRT line. Tempe can modify its TOD to include future high-capacity transit corridors.

1.10.4.3 Conclusion

Among the cities in the MAG region, Tempe is unique in having a large university campus and a vibrant but congested downtown, where parking is scarce and priced accordingly. All this has led Tempe to become very active in transit-oriented development, as demonstrated in the adoption of a transit overlay district. As a landlocked city, Tempe has embraced the challenge of moving from traditional horizontal growth at the fringes to vertical growth at the core. Tempe's interest in high urban densities has helped make it receptive to high-capacity transit investments, including rail.

Scottsdale cherishes its image as a laid-back western town where residents have a range of lifestyle options from rural equestrian to higher-density urban. The city tries to attract visitors and residents through a variety of amenities and attractions woven into an urban fabric that emphasizes convenience (e.g., ample free parking) and low to moderate densities. While Scottsdale encourages the use of transit and non-motorized transportation, it is also committed to preserving quick and easy mobility for the private auto.

1.10.5Activity Centers and Development Proposals

Figure 8 illustrates the principal activity centers in both the Scottsdale and Tempe portions of the study area. The activity centers in Scottsdale have been preliminarily defined as part of the current General Plan update process and therefore are not adopted, but rather proposed as part of an early planning effort. Except for the Resort Corridor, all of the Scottsdale activity centers are included in growth area elements of the Scottsdale General Plan. Tempe defines a series of activity centers/redevelopment areas in its General Plan. Appendix C provides details on these activity centers, related specific plans, and major development proposals.

1.11 Transit Demand Indicators

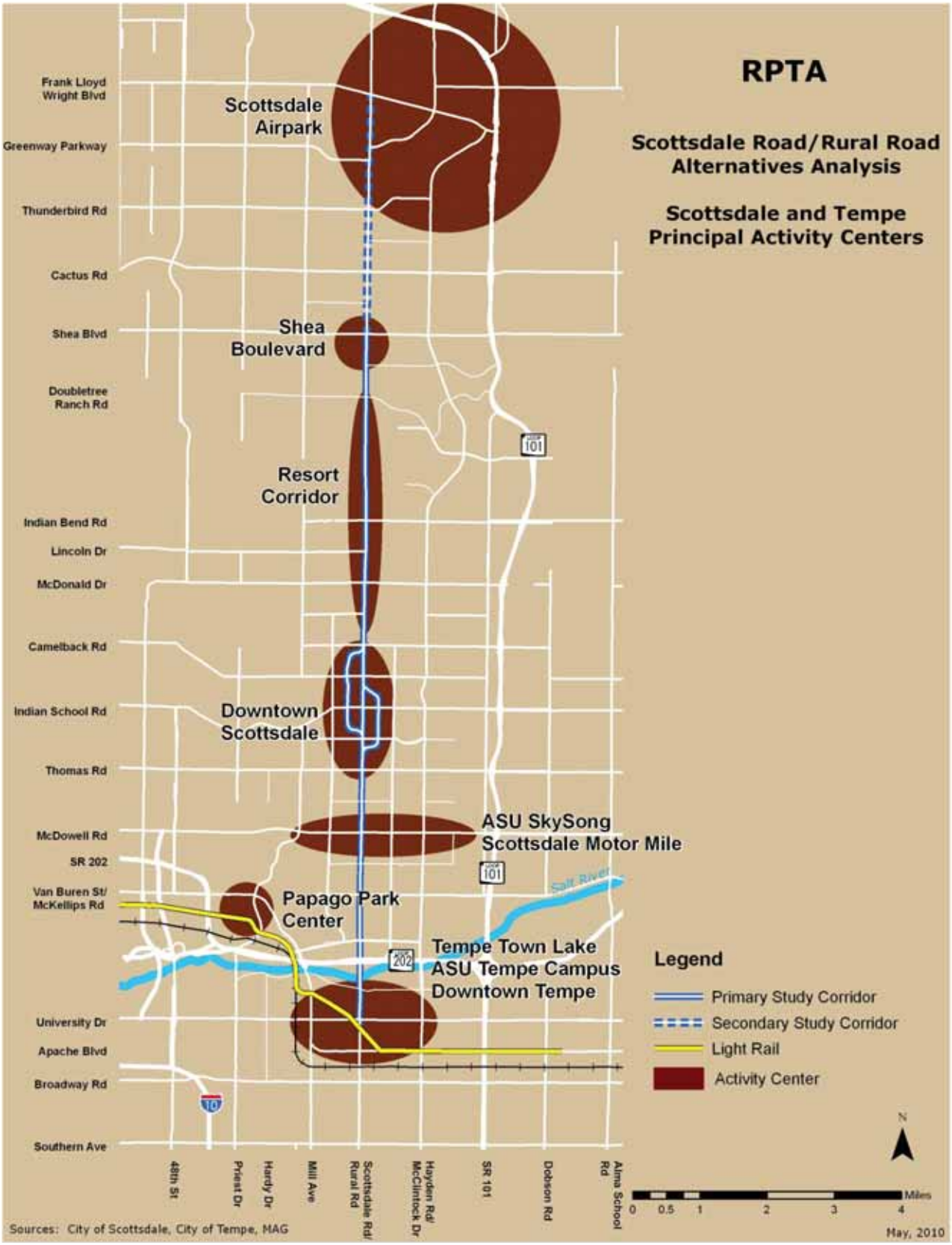
1.11.1Population and Employment

The diverse population along the study corridor shows substantial variation in age distribution and household structure. Residents near ASU Tempe tend to be youthful and transient, as evidenced by the prevalence of rental housing in Tempe. South Scottsdale has a concentration of older residents, who have helped make the Scottsdale Neighborhood Trolley one of the best-performing routes in the RPTA system. North of Downtown Scottsdale, residential lots become larger and households more affluent, with a higher proportion of school-age children.

To analyze population and employment in more detail, the study team obtained MAG 2005 socioeconomic data and 2030 projections for each socioeconomic analysis zone (SAZ) of which at least half lies within one mile of Scottsdale Road or Rural Road, from Apache Boulevard to Frank Lloyd Wright Boulevard. Apache Boulevard was selected as the southern end because the ASU Tempe campus would generate many higher-capacity transit trips in the north-south corridor.

In 2005, the study area contained 26 percent of the combined population of Scottsdale and Tempe, and 37 percent of the employment. By 2030 these proportions are expected to rise slightly for population (to 27 percent), but to fall for employment (to 33 percent). By contrast, the land area of the SAZs near the Scottsdale Road/Rural Road study corridor (approximately 34 square miles) covers only 15 percent of the total area of the Scottsdale and Tempe municipal planning areas.

Figure 8: Scottsdale and Tempe Principal Activity Centers



From 2005 to 2030, the study area for the Scottsdale Road/Rural Road AA is expected to gain more than 25,000 residents (a 25 percent increase) and 30,000 jobs (23 percent growth). This area also has, and

will continue to have, more jobs than residents. In 2005 there were approximately 1.25 jobs for every resident, and this will remain true in 2030. (The MAG region, on the other hand, has less than one job for every two residents.)

In addition, population and employment densities are much higher in the study area than in the two cities as a whole. Table 8 compares these densities in 2005 and 2030. The existing and projected employment density is more than twice as high in the study area as in the combined municipal planning areas (MPAs). The population densities are significantly greater as well.

Table 8: Comparative Population and Employment Densities

Area	Population per Square Mile		Employment per Square Mile	
	2005	2030	2005	2030
Scottsdale and Tempe MPAs	1,779	2,151	1,593	2,168
Scottsdale/Rural AA Study Area	3,013	3,778	3,820	4,711

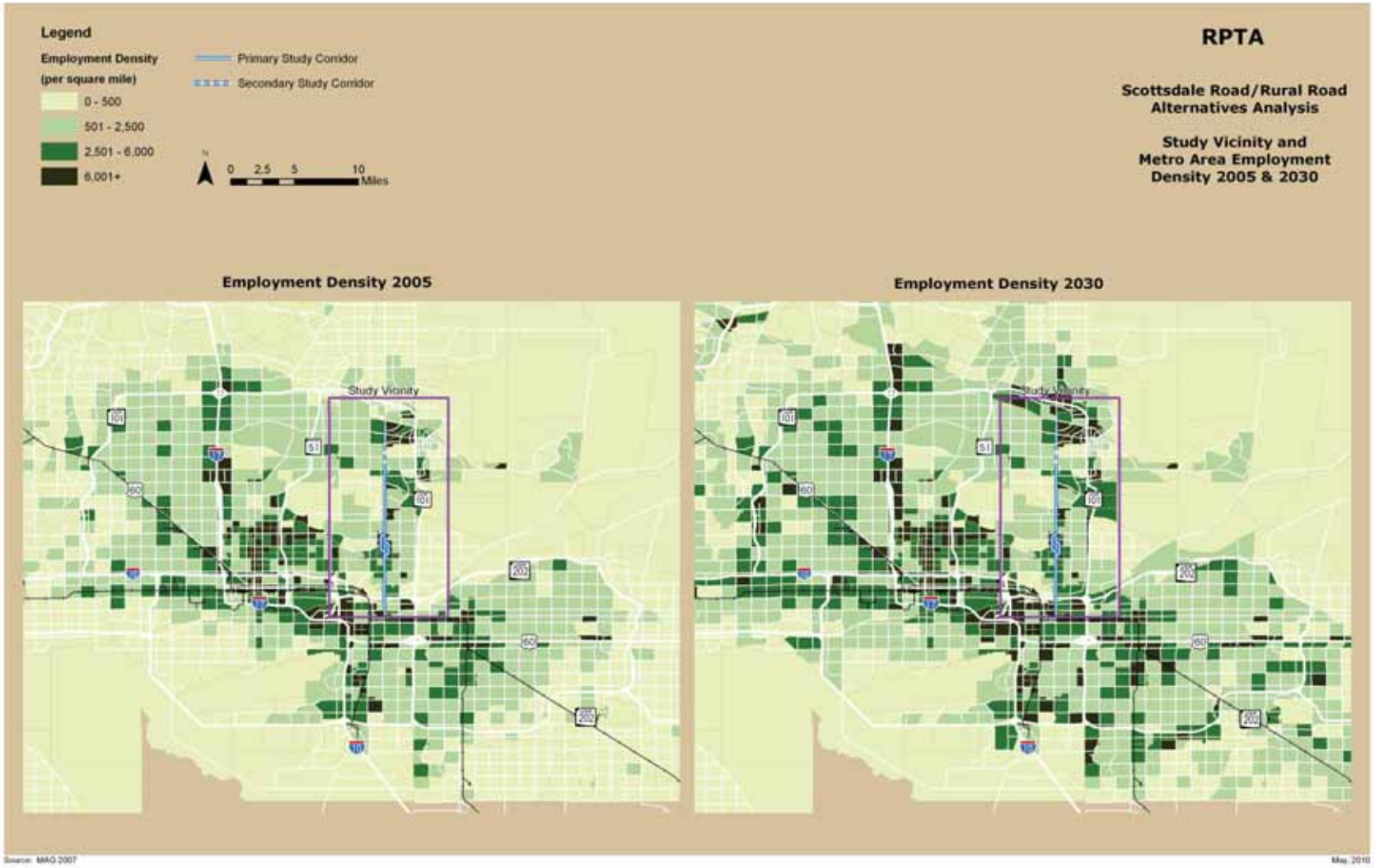
Source: MAG 2007 Socioeconomic Data

Figures 9 and 10 illustrate 2005 and 2030 population and employment densities by SAZ. Existing population densities near the corridor (Figure 9) are especially high between Chaparral Road and Tempe Town Lake. The corresponding densities tend to be somewhat lower north of Shea Boulevard and much lower in the Resort Corridor. This will remain true in 2030. Year 2005 and 2030 employment densities (Figure 10) are highest in Downtown Scottsdale (roughly bounded by 65th Street and Miller, Chaparral and Thomas Roads), at the Scottsdale Airpark north of Thunderbird Road, in the southeast quadrant of the Doubletree Ranch Road intersection, and in the Downtown Tempe/ASU area. Some study area SAZs have lower employment densities, reflecting heavy employment concentrations in relatively compact zones.

In short, the Scottsdale Road/Rural Road study area has more jobs than residents--making it a net importer of daily commuters--high population and employment densities, and healthy growth projections. All of these circumstances make the area a promising one for higher-capacity transit and support the findings of the travel demand analysis. Scottsdale, in particular, tends to have relatively high housing costs, requiring many lower- and middle-income employees to live elsewhere and commute to the city. As the cost of owning and driving a vehicle continues to grow, more and more of these commuters will depend on transit to reach their jobs in the Scottsdale Road/Rural Road corridor.

Figure 9: Study Vicinity and Metropolitan Area Population Density 2005 & 2030

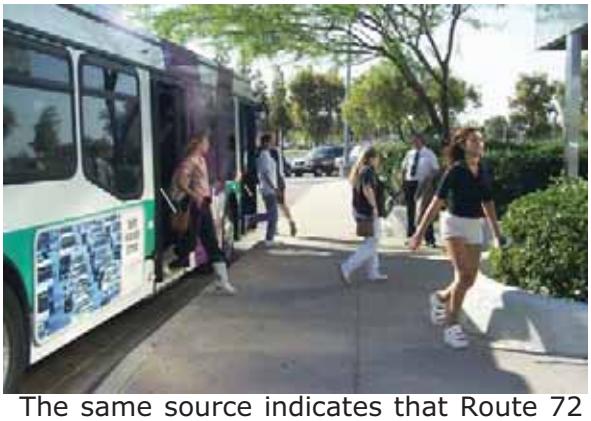
Figure 10: Study Vicinity and Metropolitan Area Employment Density 2005 & 2030



1.11.2Existing Ridership Characteristics and Trends

1.11.2.1 Route 72 (Scottsdale/Rural)

Comparative Analysis Based on Monthly Ridership Report



Route 72 serves Rural Road from Chandler Boulevard (and Chandler Fashion Center mall at SR 101) to Tempe Town Lake, and Scottsdale Road from the lake to Thompson Peak Parkway. Buses make two detours en route: across the ASU campus to the TTC, and one block west of Scottsdale Road to Loloma Station. Approximately 52 percent of the weekday revenue miles operate in Scottsdale, 37 percent in Tempe, and 11 percent in Chandler. According to the RPTA Monthly Ridership Report for November 2010, Route 72 ranked twelfth in weekday boardings among regional bus routes, fifth (after Routes 19, 35, 0 and 16) among north-south routes, and first among routes that do not penetrate Phoenix. The same source indicates that Route 72 accounted for 11 percent of all Tempe bus boardings and 20 percent of Scottsdale boardings, or about 2,700 per weekday in the two cities.

The number of boardings per vehicle revenue mile of service (boardings per mile) is a commonly used performance measure for local bus routes. In November 2010, Route 72 (including the Chandler portion) had 1.7 weekday boardings per mile, ranking thirty-sixth among fifty-seven numbered local RPTA routes and below the systemwide figure of 2.5 for all local routes, including the free community circulators in Scottsdale, Tempe and other cities. One should bear in mind, however, that this is one of the few routes in the system with better than 30-minute service throughout the day, and that such frequent service has existed on Route 72 for less than five years. In contrast, City of Phoenix routes with an equal or better level of service and higher ridership per mile (Routes 0, 3, 17, 19, 29 and 41) have had more time to establish a solid ridership base. Further, many routes that intersect Route 72 operate less frequently and have shorter hours of service. This makes Route 72 less useful than it might be to the many riders who need to transfer.

The study team also reviewed selected month-to-month changes in Route 72 boardings per revenue mile, focusing on the months of January, July and October since the spring of 2007. ASU, the largest trip generator in the corridor, is in session throughout October and during part of January. A reduced student population attends summer sessions in July. Three points stand out:

- As one might expect, ridership tends to rise when school is in session. Although this typifies the entire region, the differences in Tempe boardings between July and October are particularly striking.
- Boardings per mile declined from 2007 to 2010. This may reflect the severe economic recession rather than conditions peculiar to the route. Ridership per mile declined most sharply in Scottsdale, whose hospitality industry has suffered from reduced tourist and business travel. Tempe has a high proportion of student riders, who may form a more stable base.
- Tempe typically experiences more boardings per mile than Scottsdale, although most of Tempe's portion of Route 72 lies outside the study corridor. The pattern continued in November 2010, when Scottsdale had 1.1 weekday boardings per mile and Tempe 2.5 on this route. (Interestingly, the corresponding

systemwide numbers are similar: 1.3 in Scottsdale and 2.4 in Tempe.) By comparison with Scottsdale, Tempe has a larger and more concentrated student population, a higher level of service on many bus routes (although not Route 72), a more elaborate community circulator network, and LRT connections with Phoenix and Mesa.

Table 9 summarizes transit ridership in the City of Scottsdale and on the Scottsdale portion of Route 72 for the last six complete fiscal years. Fixed route transit use in the city grew for three consecutive years, as did boardings on Route 72, from FY 2005 through 2008. During the recession year 2009, ridership along Scottsdale Road fell 11 percent, while it continued to rise citywide as new services were introduced. As the recession continued in FY 2010, ridership declined both citywide and in the Scottsdale Road corridor. The proportion of Scottsdale transit boardings that took place on Route 72 held steady at around three-tenths for several years, but dropped to approximately one-fifth in the last two full fiscal years.

The first two years of Supergrid service on Route 72—FY 2007 and FY 2008—saw particularly healthy ridership increases along Scottsdale Road. Most of the citywide gain in ridership during FY 2009 is attributable to the free Downtown and Neighborhood Trolley routes established in that year. In FY 2010, however, Scottsdale was unable to offer new service, so not only Route 72 but the city as a whole lost transit riders.

Table 9: City of Scottsdale Transit Boardings, Fiscal Years 2005 through 2009

Fiscal Year	All Scottsdale Service		Route 72 (Scottsdale portion)		
	Boardings (000)	Percent Rise from Previous Year	Boardings (000)	Percent Rise from Previous Year	Percent of City Total
2005	1,797	--	544	--	30%
2006	1,891	5%	557	2%	29%
2007	1,995	5%	603	8%	30%
2008	2,267	14%	718	19%	32%
2009	2,878	27%	638	(11%)	22%
2010	2,446	(15%)	499	(22%)	20%

Source: RPTA annual ridership reports, FY 2005-2010

Route 72 Ride Check: November 10, 2010

Although the Monthly Ridership Report is a readily available and commonly used source of ridership data for the entire RPTA system, its information is based on automatically collected farebox data that may sometimes fail to capture all boardings. The RPTA decided in the fall of 2010 to supplement this data with a more accurate manual count, or "ride check," in order to establish VSS funding eligibility, which requires each proposed corridor to meet a threshold of 3,000 current riders on a typical weekday. The simultaneous occurrence of the systemwide, on-board 2010 Origin and Destination Survey provided the RPTA the opportunity to perform a complete ride check of Route 72 on November 10, 2010. The RPTA's survey consultant counted all Route 72 boardings and alightings by stop throughout the day. The entire route was counted—not just the portion making up the Scottsdale Road/Rural Road AA Study corridor.

Table 10 compares actual weekday boardings from the ride check with the volumes recorded by the fareboxes and used in the Monthly Ridership Report. The result justifies the prior belief of the RPTA staff that farebox data tends to undercount actual ridership. Actual one-day boardings on Route 72 were 19 percent higher than the average weekday ridership shown in the Ridership Report for November. These numbers represent boardings in all of Scottsdale and Tempe, not just the study corridor for the Scottsdale Road/Rural Road AA.

Table 10: Weekday Route 72 Ridership Comparison for November, 2010

City	Weekday Ridership		Percent Difference
	Farebox Data (Monthly Ridership Report)	Ride Check Count: 11/10/2010	
Scottsdale	1,720	2,187	27%
Tempe	2,891	3,297	14%
Total	4,611	5,484	19%

Sources: RPTA Monthly Ridership Report for November, 2010 (based on farebox data); Route 72 Ride Check of boardings and alightings on November 10, 2010

1.11.2.2 Interaction between Route 72 and Other Routes

Table 11 shows the number of weekday transfer opportunities available to users of north-south service on Scottsdale and Rural Roads at key locations along existing Route 72, from University Drive to Frank Lloyd Wright Boulevard. Each vehicle trip on an intersecting fixed route—whether LRT, numbered local bus, or community circulator—counts as a transfer opportunity. At some locations, the number of possible transfers is scheduled to increase in the next twenty years because of improvements in the current TLCP.

Scottsdale and Rural Roads offer many possibilities for transfer to and from intersecting routes. These opportunities are most numerous at locations served by rail or community circulators, which may offer high frequencies and extended hours of service. They take on special importance in an urban environment where parking will not be available at many stations, meaning that riders of higher-capacity transit will most often walk or take another transit vehicle to the stop or station. The large number of possible transfers will amplify the benefits of enhanced transit service in the corridor.

Table 11: Existing and Future Weekday Transfer Opportunities from Route 72 to Routes Intersecting Scottsdale/Rural Corridor

Location	Transit Commute Shed	Weekday Transfer Opportunities		
		Existing (2010)	Year 2016[1]	Year 2030[2]
University Dr METRO	Mesa, Tempe, Central & West Phoenix, Glendale	597	675	675
McKellips Rd	South Scottsdale, Tempe	170	170	170
Roosevelt St	S. Scottsdale, N. Tempe	98	98	98
McDowell Rd (SkySong)[3]	Central Phoenix, Maryvale, Avondale	312	312	353
Thomas Rd	Central Phoenix, Maryvale, Avondale	74	74	74
Indian School Rd/Loloma	Central Phoenix, Maryvale, Litchfield Park	262	262	262
Drinkwater Blvd/Indian School Rd[4]		280	280	280
Camelback Rd	Central & West Phoenix, Glendale	108	108	161
Shea Blvd	Phoenix, Glendale, Peoria, Sun Cities, East Scottsdale	55	55	109
Thunderbird Rd[5]	Phoenix, Glendale, Peoria	8	8	18
Greenway Rd		68	68	68
Frank Lloyd Wright Blvd	East Scottsdale, Phoenix, Glendale, Peoria, Sun Cities, Surprise	68	68	68
Total		**2,100**	**2,178**	**2,336**

[1]Assumes initiation of Supergrid service on University Drive in 2016, and that the number of daily runs on future Supergrid routes equals the current 105 daily revenue trips on Route 72 in Scottsdale. Also assumes that METRO LRT will be restored to its FY 2010 service level before 2016.

[2]Assumes initiation of Supergrid service on McDowell Road, Camelback Road and Shea Boulevard by 2030; also initiation of Pima Express to Scottsdale Airpark in 2020, with ten weekday trips.

[3]Assumes rerouting of Scottsdale Neighborhood Trolley and Tempe Orbit Earth to better serve SkySong.

[4]Considers Route 76 (Miller Road) an intersecting route, rather than a north-south route serving the Scottsdale Road corridor.

[5]Consists of service to new park-and-ride lot by all Airpark express routes. Assumed future service does not include restoration of recently eliminated Scottsdale/Surprise express.

Sources: RPTA *Transit Book* and *Transit Book Supplement* (2010); Short Range Transit Program FY 2009/10-2014/15; memorandum from Paul Hodgins to Scott Miller on FY 2009 Transit Life Cycle Program Update, May 11, 2009

1.11.2.3 METRO LRT

The METRO LRT starter line serves the southern end of the study corridor. Daily hours of operation are approximately 5:00 a.m. to midnight, with later service Friday and Saturday nights. Trains operate every 12 minutes weekdays from 7:30 a.m. to 6:30 p.m., and every 20 minutes at other times. In 2010, the second full calendar year of LRT operation, approximately 654,000 weekday boardings, or 2,600 per weekday, occurred at the University Drive/Rural Road station. This was the busiest (most heavily used) of the eight Tempe

LRT stations, the third busiest in the system, and the busiest station without dedicated parking. The nearby Veterans Way/College Avenue station had 27 percent fewer boardings, despite its more plentiful transfer opportunities and its Downtown Tempe location.

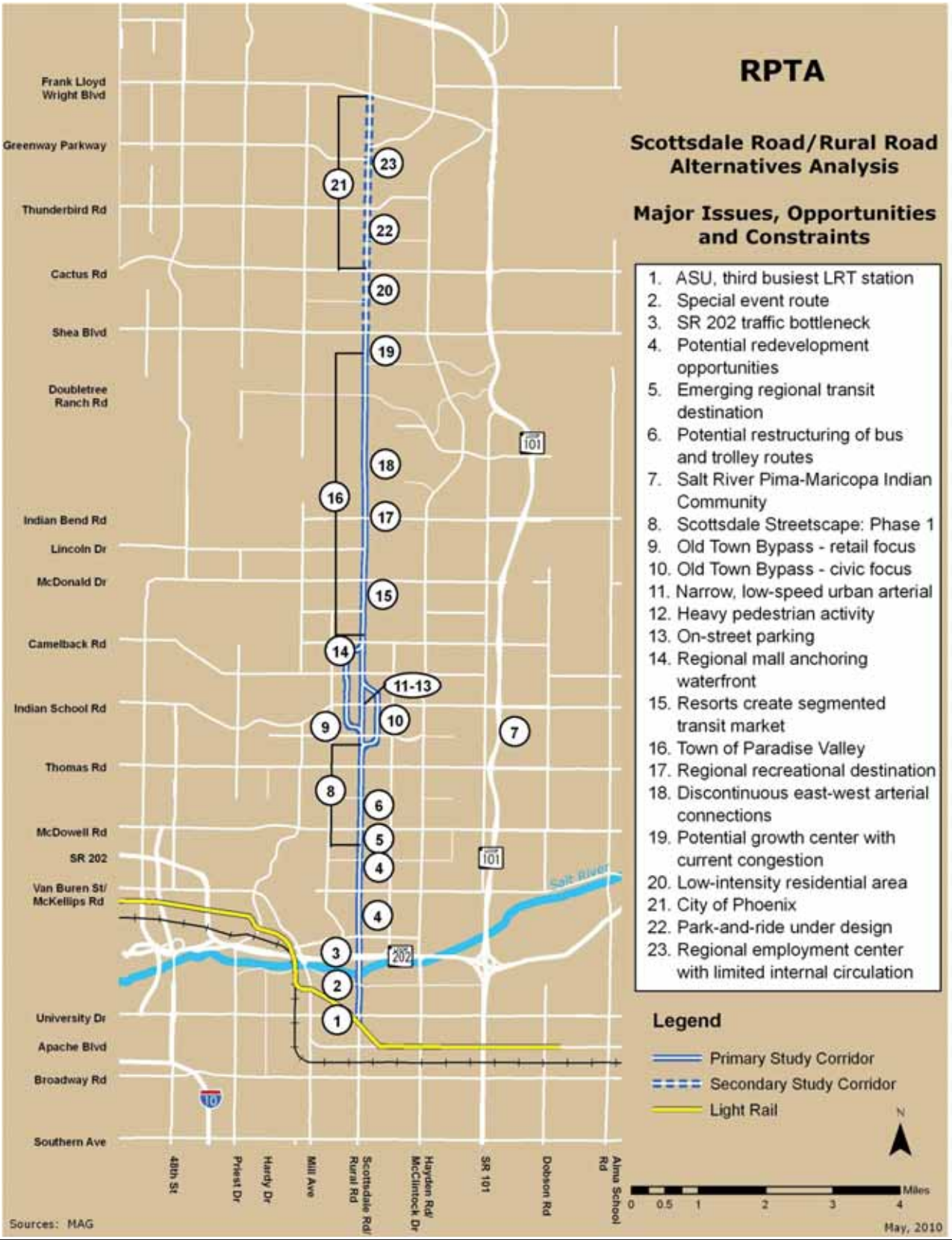
University Drive/Rural Road is the closest LRT station to most ASU classrooms and offices. In 2010, ridership at both this station and Veterans Way/College Avenue declined substantially in the summer months of May through August, before rising in the fall to its highest levels of the year. Weekday rail boardings at the University Drive/Rural Road were more than three times greater in September (at 78,000) than in July (24,000).

The METRO LRT starter line has demonstrated the extraordinary appeal of high-capacity transit in corridors connecting major regional destinations. In November 2010, for example, LRT accounted for close to one-third of transit boardings in Tempe and nearly one out of five in the region, while constituting less than eight percent of combined train and bus vehicle revenue miles. Rail ridership throughout the system has been consistently high throughout the day, rather than peaking sharply during traditional commute hours. This reflects a diverse population of riders who choose rail for many travel purposes.

1.12 Issues, Opportunities and Constraints

Figure 11 shows important issues, opportunities and constraints that are related to the purpose of and need for the proposed transit investment in the Scottsdale Road/Rural Road corridor. Many of the items called out on the map are related to one another; for instance, SkySong and the ASU Tempe campus represent a growing market for convenient and efficient travel service. Many constraints and challenges are also opportunities. One example is the Scottsdale Airpark, whose design makes typical traffic circulation difficult but may lend itself to some form of specialized transit connection with regional service on Scottsdale Road. The relatively low level of congestion in most parts of the corridor, described elsewhere, may offer a favorable environment for transit priority treatments, especially those that involve preferential measures at signalized intersections.

Figure 11: Major Issues, Opportunities and Constraints



Chapter 2 - Travel Demand Characteristics and Forecasts

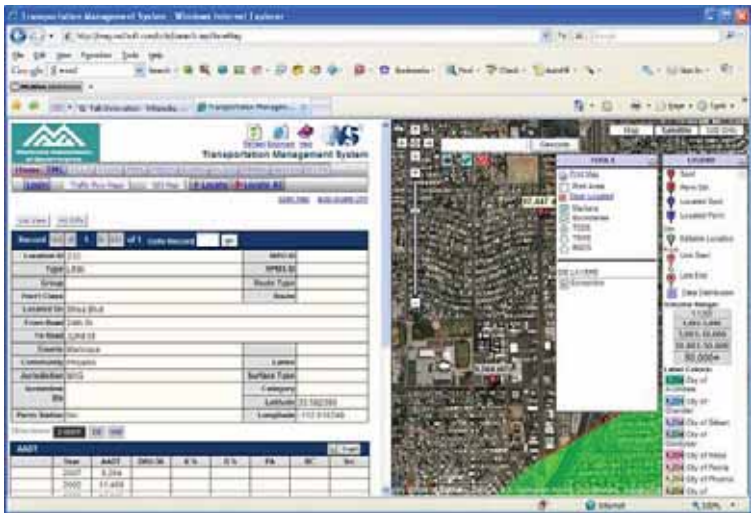
2.1 Introduction

This chapter provides an understanding of the potential future travel demand in the Scottsdale Road/Rural Road study corridor. Analyzing current and future travel demand provides a baseline understanding of demand for transit services and its relationship to the overall project need. This analysis looked at the travel demand based on currently planned transit improvements excluding higher-capacity transit improvements being considered in the study corridor. The MAG 2030 Conformity Regional Travel Demand Model was used for this analysis to forecast travel demand. Travel demand forecasting provides information that helps to characterize potential future ridership, impacts to the transportation system, mode of access, system accessibility, and trip purposes that the project will serve. Route 72, which currently operates along the study corridor, provides insight on existing and future transit demand in the corridor.

This chapter also reviews the base assumptions used for the analysis, including an overview of the No-Build highway and transit networks and a review of the future transit ridership predicted on transit routes serving the Scottsdale/Rural study corridor. It summarizes three regional studies: the *ASU Travel Demand Analysis, the RPTA 2007 Origin-Destination Study* (published in 2009), and the MAG *Regional Transit Framework Study*. The study team reviewed these regional studies to understand how those findings relate to future travel demand in the corridor.

2.2 MAG 2030 Regional Travel Demand Model

The MAG travel demand model was used to test alignment and service scenarios for this project. The 2030 MAG model, certified as being in conformity in 2007, is the version used for the analysis presented in this chapter. As defined by the Federal Highway Administration (FHWA), transportation conformity is a way to target federal funding to transportation activities that are consistent with national air quality goals. It ensures that these transportation activities do not worsen air quality or hinder the attainment of the National Ambient Air Quality Standards (NAAQS). Meeting the NAAQS often requires emissions reductions from mobile sources—especially in a non-attainment area like the MAG region.



At the time of the data preparation for this report, MAG was developing an updated year 2031 model for conformity analysis, using different assumptions for the future highway and transit networks based on the *Draft 2010 RTP Update*. This model was not available for analysis during the development of this study. It is recommended, therefore, that a review of any changes and potential impact to the corridor, based on the updated model, be conducted during the next phase of analysis. *Meanwhile, the No-Build scenario does not take into account any changes to the RTP since adoption of the 2007 update.*

The main inputs to the model are a roadway network, a transit route system, and socioeconomic (population and employment) data. The 2030 information in the model corresponds to the updated 2030 RTP adopted in 2007. The analysis presented in this chapter is based on a No-Build condition. To create a No-Build scenario specific to this proposed project, the only change to the MAG 2030 model was to

remove future BRT service from the Scottsdale/Rural Roads study corridor north of University Drive. The No-Build alternative was used to understand travel conditions without implementation of higher-capacity transit in the corridor. This alternative also provides a benchmark with which Build alternatives can be compared.

2.2.1 2030 No-Build Roadway Network Assumptions

The 2030 analysis is consistent with the RTP and assumes that Scottsdale Road and Rural Road retain their existing configuration of six through traffic lanes (three lanes in each direction) within the geographic limits of the study corridor, except in Downtown Scottsdale, where Scottsdale Road narrows to four lanes (two lanes in each direction) with limited on-street parking. Other major roadways in the study area are also assumed to retain their existing cross-sections. These assumptions are consistent with actual plans of the Cities of Scottsdale and Tempe.

2.2.2 2030 No-Build Roadway Travel Forecasts

The 2030 No-Build roadway traffic forecasts show that Scottsdale Road and Rural Road are expected to carry between 19,000 and 60,000 vehicles per weekday, with most segments carrying 35,000 to 45,000 vehicles. The highest north-south volumes are forecast to occur near Thunderbird Road, near Doubletree Ranch Road, and south of SR 202. The lowest volumes are forecast to occur in Downtown Scottsdale, where the road is narrower (four lanes instead of six) and where parallel roadways (Goldwater and Drinkwater Boulevards) provide alternative routing for through traffic.

2.2.3 2030 No-Build Transit Network Assumptions

The No-Build alternative represents a 2030 scenario without BRT or other enhanced transit service in the study corridor north of University Drive. BRT service is assumed, however, along Rural Road from University Drive to Chandler Boulevard. (This version of the 2030 network does not reflect the draft Locally Preferred Alternative of the *Tempe South Alternatives Analysis,* which recommends a streetcar on Mill Avenue in addition to future BRT on Rural Road. Further, the BRT characteristics that this Scottsdale Road/Rural Road AA assumes south of University Drive come from the 2007 MAG RTP model, and provide less frequent BRT service than recommended for the same segment in the Tempe South AA.) While the assumed 2030 transit services do not exactly match previous recommendations, they provide a reasonable No-Build scenario with which to compare other alternatives.

The No-Build alternative includes existing and planned transit routes that serve the study corridor, other than BRT. Table 12 compares the 2030 transit service assumptions in this version of the model with actual 2010 transit service (after the July, 2010 service cuts) in the Scottsdale Road/Rural Road study corridor. Route 72, the Scottsdale/Rural local, is assumed to have more frequent peak service (every ten minutes) than it does today (every twenty minutes).

Table 12: 2030 No-Build Weekday Local Transit Routes Serving Study Corridor

Route		City	2010 Service Frequency (Minutes)*		2030 Service Frequency (Minutes)		Change from Existing
No.	Name		Peak	Off-Peak	Peak	Off-Peak	
N/A	METRO LRT	Tempe	12	12	10	10	Extended east to Mesa Drive; restored to 2009 frequency
17	McDowell	Scottsdale	30	30	15	30	Improved peak service
29	Thomas	Scottsdale	20	40	10	30	Improved service
30	University	Tempe	30	30	15	30	Improved peak service
41	Indian School	Scottsdale	15-30	15-30	15	30	Service frequency changes
50	Camelback	Scottsdale	15-30	60	15	30	Improved service
62	Hardy/Guadalupe	Tempe	15	30	15	30	--
64	64th St	Scottsdale	--	--	30	30	New route
66	Mill/68th St	Scottsdale, Tempe	No service		30	30	Restored to study area
72	**Scottsdale/Rural**	**Scottsdale, Tempe**	**20**	**20**	**10**	**20**	**Improved peak service**
76	Miller	Scottsdale	30	30	30	30	Does not reflect 2010 route change
106	Peoria/Shea	Scottsdale	30	60	20	20	Improved service
N/A	Downtown Trolley	Scottsdale	15	15	10	10	Improved service
N/A	Neighborhood Trolley	Scottsdale	20	20	--	--	Not in 2030 model
N/A	Orbit Earth	Tempe	15	15	--	--	Not in 2030 model
N/A	Orbit Mars	Tempe	15	15	--	--	Not in 2030 model
N/A	Orbit Mercury	Tempe	10-15	10-15	--	--	Not in 2030 model
Additional Routes Serving Secondary Study Corridor							
154	Greenway	Scottsdale	30	30	30	30	--
170	Bell	Scottsdale	30	30	15	30	Improved peak service
Additional Routes Serving Tempe Transportation Center							
48	48th St/Rio Salado	Tempe	15	30	Not modeled		
65	Mill/Kyrene	Tempe	30	60	30	30	Improved off-peak service
N/A	Orbit Jupiter	Tempe	15	15	--	--	Not in 2030 model
N/A	Orbit Venus	Tempe	15	15	--	--	Not in 2030 model

*In the Scottsdale Road/Rural Road study corridor

Sources: 2010 Transit Book, Transit Book Supplement and MAG Travel Demand Model (2009 Base, 2030 No-Build)

Year 2030 express transit routes that enter the study corridor are similar to those in the existing 2010 network, as shown in Table 13. The Mesa Express (Route 532) has been removed from the 2030 transit network, however. In contrast, Routes 536 and 572, which were discontinued in July 2010, remain in this MAG 2030 network.

Table 13: 2030 No-Build Weekday Express Transit Routes

Route		City	2010 Service Frequency (Minutes)		2030 Service Frequency (Minutes)		Change from Existing
No.	Name		Peak	Off-Peak	Peak	Off-Peak	
510	Scottsdale Express	Scottsdale	30-35	--	30	--	--
512	Scottsdale/Palisades Express	Scottsdale	20-35	--	30	--	--
532	Mesa Express	Tempe	15-25	--	N/A	--	Not in 2030 Model
Additional Routes Serving Secondary Study Corridor							
511	Tempe/Scottsdale Airpark	Scottsdale	60	--	30	--	Improved service
572	Surprise/Scottsdale Express	Scottsdale	No service		30	--	Service restored
Additional Routes Serving Tempe Transportation Center							
536	Northeast Mesa/Tempe/ASU	Tempe	No service		20	--	Service restored

Sources: 2010 Transit Book, Transit Book Supplement and MAG Travel Demand Model (2009 Base, 2030 No-Build)

2.2.4 MAG 2030 No-Build Transit Travel Forecasts

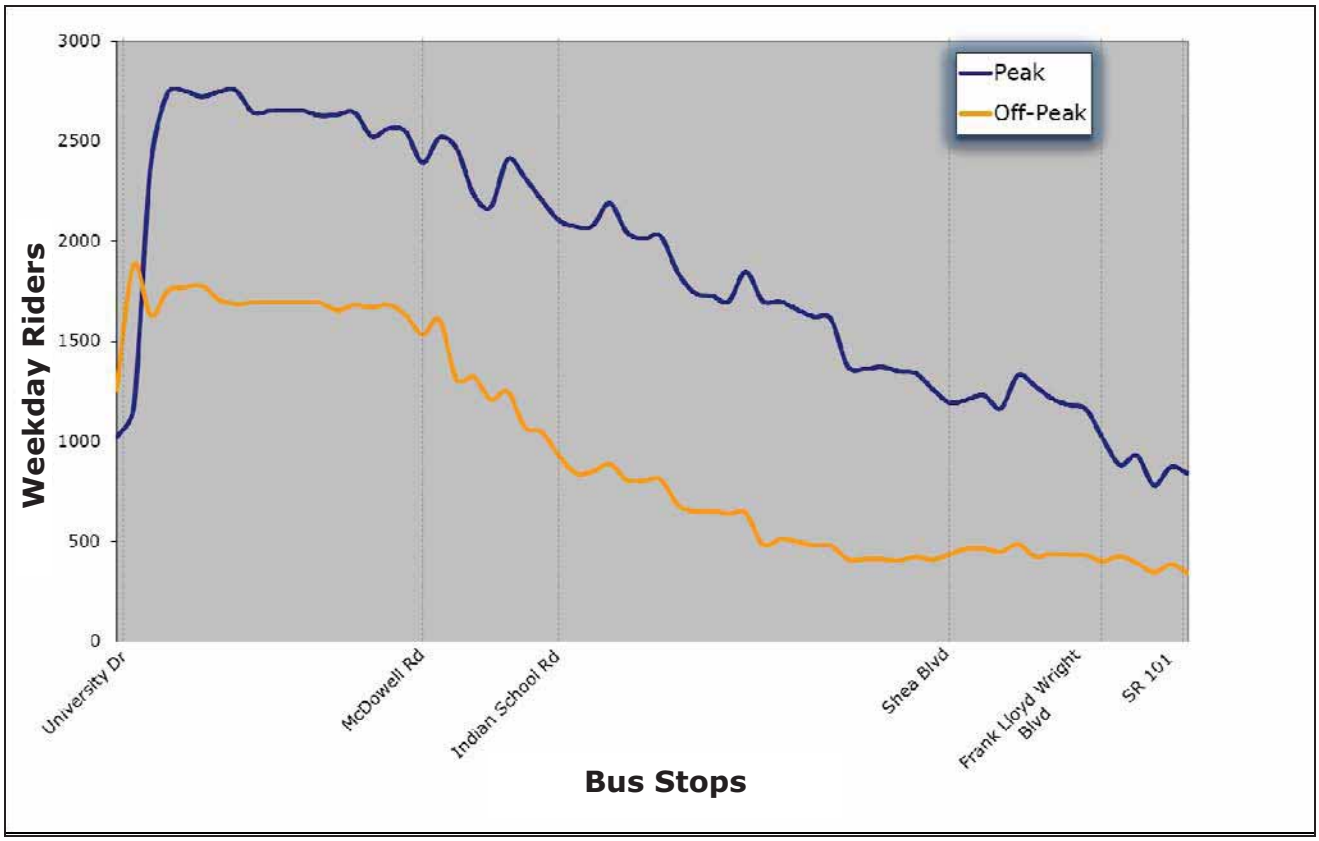
Based on travel forecast estimates from the MAG 2009 validation model and the MAG 2030 forecast model, local routes that serve the study corridor are expected to experience a 69 percent increase in ridership between 2009 and 2030. This growth is somewhat lower than predicted regional ridership growth for local routes (84 percent). Route 72 ridership is expected to grow by about one-third (34 percent) between 2009 and 2030.

2.2.5 MAG 2030 No-Build Route 72 Demand Characteristics

Route 72 ridership is forecast to grow by approximately one-third from 2009 to 2030, based on estimates from the MAG travel demand model. The reasons may include socioeconomic changes, such as growth in population and employment near the study corridor, as well as more frequent peak period service.

Figure 12 shows the predicted 2030 daily transit flows for Route 72 in the study corridor. (The flow past a given a point is defined as the number of transit riders passing that point, whether northbound or southbound.) Ridership on Route 72 peaks at University Drive and drops north of that point. This reflects the many trips in both directions that begin or end at ASU. Proceeding north, ridership rises again and remains fairly consistent to Indian School Road. Ridership declines fairly steadily from Indian School Road north. Near transfer points, there are small spikes that may result from an unusually large number of boardings and alightings at these locations.

Figure 12: Route 72 Daily Ridership Flows, 2030 No-Build



Source: MAG Regional Travel Demand Model (2030 No-Build)

Peak and off-peak transit flows show patterns similar to each other, with the flows highest south of Indian School Road. One would expect the number of daily transit riders to be highest near major trip generators and areas with high transit demand. Two immediate conclusions are that (1) ASU Tempe is a very potent generator of transit trips and (b) demand for north-south transit service is high in the north Tempe/south Scottsdale area, where flows are among the highest in the study corridor. Although some of these riders may be traveling to ASU and Tempe, many are bound for Downtown Scottsdale and other points north. Taken as a whole, Figure 12 implies that the southern portion of the study corridor might see the most benefit from early service, if implementation is phased by segment.

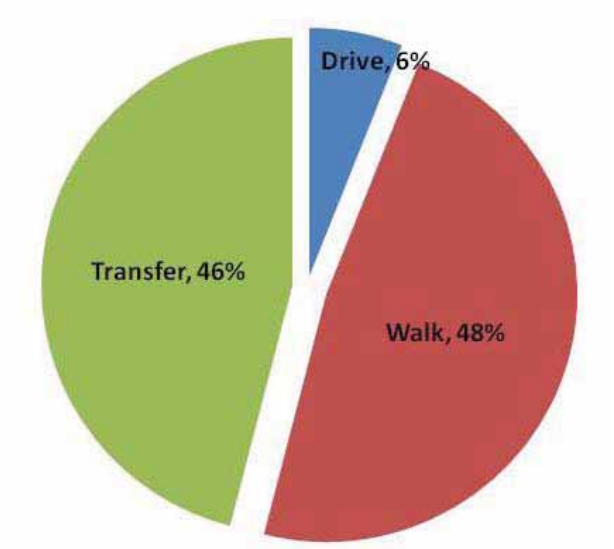
Table 14 and Figure 13 show the forecast Route 72 mode of access in 2030 for peak, off-peak, and daily (weekday) travel. Mode of access is fairly consistent across peak and off-peak hours. Walking and transfers from other transit routes make up the bulk of access to this route.

Table 14: Route 72 Weekday Mode of Access, Year 2030 No-Build

	Peak	Off-Peak	Total Daily
Drive	7%	4%	6%
Walk	49%	45%	48%
Transfer	44%	50%	46%
TOTAL	**100%**	**100%**	**100%**

Source: MAG Regional Travel Demand Model (2030 No-Build)

Figure 13: Route 72 Weekday Mode of Access, Year 2030 No-Build



Source: MAG Regional Travel Demand Model (2030 No-Build)

Route 72 access occurs primarily by walking or by transferring from other routes, while drive access is relatively minor. (Other modes, such as bicycle access, were not modeled.) However, these characteristics do not necessarily predict mode of access to a higher-quality, limited-stop service that may offer dedicated parking at some stations.

2.3 Regional Transit Framework Study (MAG)

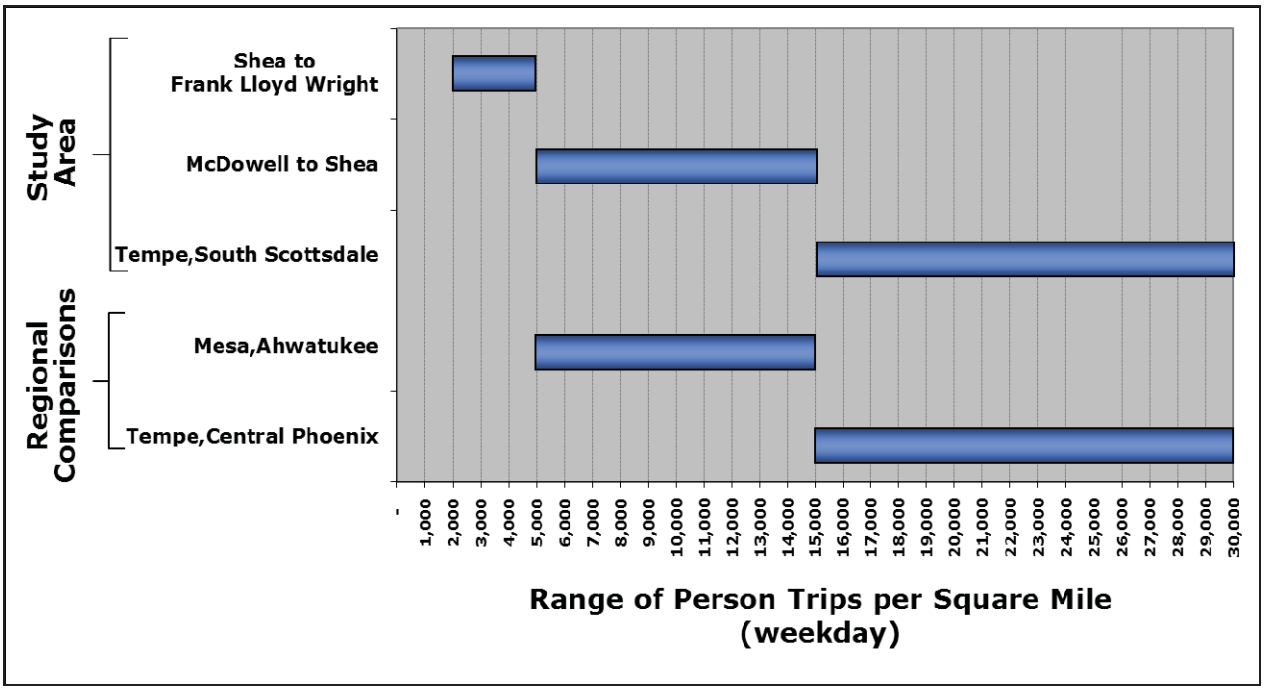
MAG conducted the *Regional Transit Framework Study* (RTFS) to develop an understanding of the region's transit needs and deficiencies, and to formulate a range of improvement scenarios. The study reviewed, at a regional level, the estimated future (2030) travel demand in weekday person trips per square mile. Tempe and the south edge of Scottsdale (south of McDowell Road) were forecast to have high future travel demand for both origins and destinations: 15,000 to 30,000 daily trips per square mile. In the portion of the study area north of McDowell Road, the forecast 2030 travel demand ranges from 5,000 to 15,000 trips per square mile—except in the area between Shea Boulevard and Frank Lloyd Wright Boulevard, where the number of trips per square mile ranges from 2,000 to 5,000.

To put this in a regional context, 15,000 to 30,000 daily trips generated per square mile is similar to the current level of travel demand in the northern half of Tempe and in much of urbanized Phoenix. The

range of 5,000 to 15,000 daily trips characterizes much of Mesa, northeast Phoenix and Ahwatukee. Figure 14 shows how the study area compares to the region in person trips per square mile.

The RTFS also found that Scottsdale and Rural Roads are forecast to have high future (2030) travel demand and strong potential to improve regional mobility. The Scottsdale Road/Rural Road corridor ranked in the highest category for "Overall Potential to Increase Mobility" along with 21 other corridors out of 49 studied.

Figure 14: Person Trips per Square Mile Comparisons (2030)



Source: MAG Regional Travel Demand Model (2030)

The Scottsdale Road/Rural Road corridor is one of seven regional corridors forecast to generate high levels of transit boardings under three distinct investment scenarios for 2030. Scenario I would modestly improve service levels in a few corridors, based on a five-year extension of the current regional sales tax; Scenario II would approximately double existing regional transit funding; and Scenario III would quadruple the existing funding level. All of the scenarios include some level of BRT or higher-capacity transit service on Scottsdale Road/Rural Road. The RTFS clearly identifies the study corridor as a regionally significant transit corridor, with high potential for improving mobility through enhanced transit service.

2.4 ASU Travel Demand Analysis (METRO)

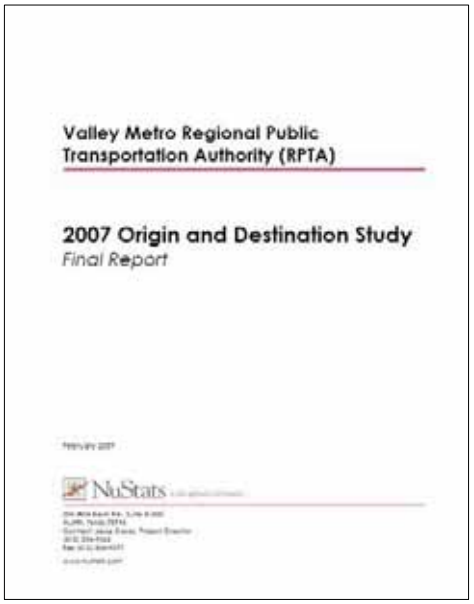
METRO conducted the *ASU Travel Demand Analysis* to better understand the impact of the ASU U-Pass program--which has provided free or discounted unlimited-ride transit passes to students, faculty and staff--on transit ridership. The study reviewed travel demand associated with the main Tempe campus and the three satellite campuses in Phoenix (ASU Downtown and ASU West) and Mesa (ASU Polytechnic).

Route 72 serves the main ASU Tempe campus and is one of six local routes with high U-Pass ridership. In fiscal years 2006 through 2008, Route 72 had the second highest annual ridership for a local bus route serving the campus. The only route with higher ridership was the Red Line, which has since been replaced

by METRO LRT. Some 20 percent of all riders on Route 72 were U-Pass users in September 2008, when classes were in session. The comparable figure for August was 12 percent.

The ASU campus in Tempe is the main destination for U-Pass riders. This study shows that ASU creates a strong demand for transit service throughout the region and draws significant ridership from the vicinity of the Scottsdale Road/Rural Road study corridor.

2.5 RPTA Origin-Destination Studies



In 2007 RPTA administered an Origin-Destination Study of fixed-route bus riders. The findings provide insight into the demographics as well as the travel behavior of transit users in the region. This study identified a number of transit rider characteristics, with key findings including:

- Just over 70 percent of transit riders live in households with income of $35,000 or less.
- Just over half of all transit riders are transit-dependent and do not own a vehicle.
- The majority of trips are to or from home or work.
- Walking is the primary mode of access, accounting for 85 percent of regional transit boardings.
- Almost one-third of the riders indicated that they would not make their trip at all without transit service.

The RPTA Origin-Destination Study also identified two major regional destinations along or near the study corridor: the ASU Tempe campus and the Scottsdale Airpark. ASU is a significant attraction for transit riders originating near the Scottsdale Road/Rural Road study corridor. The majority of transit trips to ASU are made by students, while the majority of trips to the Airpark are work trips.

The Origin-Destination Study divided the RPTA service area into twenty-six districts for analytic purposes. District 17 contains most of Tempe north of US 60, while District 13 encompasses the Scottsdale portion of the study corridor north to about Shea Boulevard. Table 15 shows the contribution of these districts to transit ridership destined for the ASU Tempe campus and the Scottsdale Airpark. While the results differ by time of day, the districts containing the study corridor (mainly 13 and 17) contribute a substantial proportion of transit ridership to both destinations.

Table 15: Percent of Transit Trip Origins by District to ASU and Scottsdale Airpark, 2007

Service Area District	Time of Day			
	AM Peak	Midday	PM Peak	Total
ASU Tempe campus				
Southern Scottsdale (13)	4%	1%	24%	3%
Northern Tempe (17)	38%	70%	4%	58%
Other Scottsdale and Tempe (6, 22)	18%	5%	58%	12%
Scottsdale Airpark				
Southern Scottsdale (13)	17%	6%	0%*	14%
Northern Tempe (17)	15%	5%	0%*	13%
Other Scottsdale and Tempe (6, 22)	2%	6%	0%*	3%

*No transit trips to the Airpark were observed during the PM peak.

Source: RPTA 2007 Origin-Destination Study, Appendix F

2.6 Summary of Findings

The travel demand forecasts for the Scottsdale Road/Rural Road study corridor show increased demand for transit service in 2030. This is consistent with findings from the RTFS, which found strong future ridership demand in the study corridor. Additionally, the travel forecasts confirm the strong influence of the ASU campus, with high transit flows along most of Scottsdale and Rural Roads from Indian School Road to University Drive. This is consistent with the ASU Travel Demand Analysis, which found that in September, 20 percent of existing Route 72 riders are U-Pass users. However, a drop-off in forecast ridership for a short distance just north of ASU Tempe suggests that the north Tempe/south Scottsdale area also has substantial demand for transit service to and from the north. Other findings include:

- Scottsdale Road/Rural Road is expected to carry between 19,000 and 60,000 vehicles per day by 2030, with most of the sections carrying 35,000 to 45,000 vehicles. The highest volumes are forecast near Thunderbird Road, near Doubletree Ranch Road, and south of SR 202. The lowest volumes are forecast in Downtown Scottsdale, where two bypass routes are available.

- Ridership on local routes that serve the study corridor is forecast to increase by 69 percent between 2009 and 2030.

- Ridership on Route 72 along Scottsdale/Rural Road is forecast to grow by one-third (34 percent) between 2009 and 2030.

- Transit ridership on Route 72 is forecast to peak near ASU and is rather consistent as far north as Indian School Road, except for a short stretch between the ASU campus and the residential areas of north Tempe. North of Indian School Road, ridership flows decline fairly steadily. Peak and off-peak transit flows show a similar pattern in this respect.

- Walk trips and transfers from other routes make up the bulk of access to Route 72. However, a new, higher-level transit service with dedicated parking at some stations may have a higher proportion of drive access. Depending on the operational characteristics of Scottsdale Road BRT, its riders may behave more like LRT users than like local bus riders.

Chapter 3 - Purpose and Need

3.1 Statement of Purpose

Heavy travel demand and traffic congestion, especially during peak periods and around special events, exist in the Scottsdale Road/Rural Road study corridor and are forecast to intensify between 2010 and 2030. Efficient public transportation can meet some of this demand and increase mobility options, but current transit service in the corridor is slow and unattractive as an alternative to the automobile. The purpose of a higher-capacity transit investment in the corridor is to:

1. ***Address current and forecast travel demand in the Scottsdale Road/Rural Road study corridor*.** This can be accomplished by offering a higher quality of service through a combination of fewer stops, shorter dwell times, and reduced exposure to traffic delay that exists in shared lane.

2. ***Improve and expand mobility options for north-south travel.*** Travel demand in much of the Scottsdale area and at the north end of Tempe is funneled north-south along two major arterials, of which Scottsdale/Rural is by far the more urbanized. (Hayden/McClintock is the other.) Existing mobility options do not offer reliable travel times along this heavily traveled corridor during times of heavy demand. An efficient, higher-level transit service can help to fill this gap. Such service could vastly improve regional transit mobility through connections with existing east-west bus routes, the Metro LRT and a future higher-capacity transit investment in the Tempe South Corridor.

3. ***Connect large and diverse activity centers.*** Scottsdale Road and the north end of Rural Road connect several major regional activity and employment centers, of which the ASU Tempe campus, Downtown Scottsdale and the Scottsdale Airpark are the largest. An effective transit investment in the corridor would greatly enhance their appeal as transit destinations, especially at locations where parking can be expensive or hard to find.

4. ***Promote planned urban growth and development patterns.*** A successful transit investment in this corridor, with its relatively high densities of both employment and population, would promote the adopted plans of both Scottsdale and Tempe that call for mixed-use and medium- to high-density development with convenient access by multiple transportation modes. Scottsdale has designated its growth areas, and Tempe its transportation overlay district, anticipating the emergence of Scottsdale Road/Rural Road as a strong regional transit corridor.

5. ***Lay the foundation and build demand for future high-capacity transit.*** Previous plans and studies, including the adopted RTP and the recently completed *MAG Regional Transit Framework Study*, have consistently identified Scottsdale Road/Rural Road as a strong candidate for high-capacity transit, such as LRT or BRT in a dedicated guideway. One purpose of the proposed near-term transit investment in the corridor is to demonstrate and build demand for a larger investment in the future.

3.2 Need for the Proposed Project

The proposed transit improvement project and investment on Scottsdale Road and Rural Road is needed for several reasons. Each need represents an opportunity for transit service that can capture untapped markets.

1. ***Few other options exist to mitigate transportation deficiencies.*** For the most part, Scottsdale Road and Rural Road in the study area have been built out to their planned maximum cross-section. Adding traffic lanes is financially and politically infeasible, due to the cost and disruption involved in taking large strips of R/W in heavily urbanized areas with high land values. Even if through lanes could be added, their impact on peak hour congestion would likely be minimal because of traffic diversion from other times of day, other routes and other modes. Local transit frequencies and hours in the corridor are already among the best in the region; simply adding more of the same would not address the need for faster and more reliable service, and might increase congestion by adding buses making frequent stops in the right lane. (In fact, frequent local buses can be an obstacle to building high-capacity transit in corridors with limited R/W.) In view of the obstacles to new large-scale capacity in the corridor—whether on the transit or highway side—a less ambitious investment could attract new riders to transit, while expanding mobility for those who have no vehicle or prefer not to drive.

2. ***Existing transit services are slow and unattractive to choice riders.*** The inconvenience of existing local transit service, due largely to excessive travel times, was identified in the *MAG Regional Transit Framework Study* as a primary deterrent to transit use among those who drive an automobile. An appropriate investment would meet the need for faster and more reliable service in a corridor consistently identified as having a high regional priority for an upgraded level of transit service.

3. ***Strong north-south travel demand has been demonstrated in this corridor.*** Several recent studies, including the *MAG Regional Transit Framework Study*, the most recent RPTA Origin-Destination Study, and the ASU study of transit pass use, have shown high demand generated by the large activity centers along the corridor. Even without an enhanced form of service, the MAG travel model forecasts ridership in the corridor to increase substantially between 2010 and 2030. A faster, more reliable and higher-capacity option can be expected to tap markets for which transit is not currently an attractive choice. Refer to Chapter 2 (following) for more detailed information.

4. ***Local socioeconomic conditions and travel markets are conducive to strong ridership on a higher-capacity transit service.*** In comparison to Scottsdale, Tempe and the region as a whole, the study area has high densities of employment and population. Employment is particularly high and diverse along the Scottsdale Road/Rural Road corridor. The exceptionally high ratio of jobs per resident (approximately 1.25) and the many activity centers—both employment-dominated and mixed-use—make the corridor an unusually promising area for mass transit that can overcome the limitations of standard local bus service. The corridor offers a diverse group of travel markets that could be captured by high-quality transit service, ranging from college students, to resort visitors, to service workers who rely on transit to commute from more affordable housing areas.

Chapter 4 - Development of Transit Investment Alternatives

4.1 Introduction

This chapter describes the process whereby transit alternatives in the Scottsdale Road/Rural Road AA study corridor were developed by the RPTA and its consultant team. The chapter first explores the universe of feasible higher-capacity transit alternatives and their suitability for various segments of the study corridor. Later sections discuss the public and agency outreach events conducted in June and July 2010. Input obtained at these events was used to refine the alternatives. The study team laid out each alternative in sufficient detail to allow an informed comparison using a comprehensive set of evaluation criteria.

This study uses two terms to describe the types of alternatives considered: "high-capacity transit" and "higher-capacity transit." The former consists of public transportation that uses a fixed guideway and/or exclusive or semi-exclusive R/W, combined with large vehicles and high frequencies, to carry large passenger volumes faster and more efficiently than local bus service can. The latter represents an intermediate step up from local bus service in the direction of high-capacity transit. It makes fewer stops than local buses, may operate more frequently, and can carry high passenger volumes between activity centers more efficiently. Higher-capacity transit does not necessarily use a fixed guideway or separate lanes.

4.2 Proposed Corridor Segments

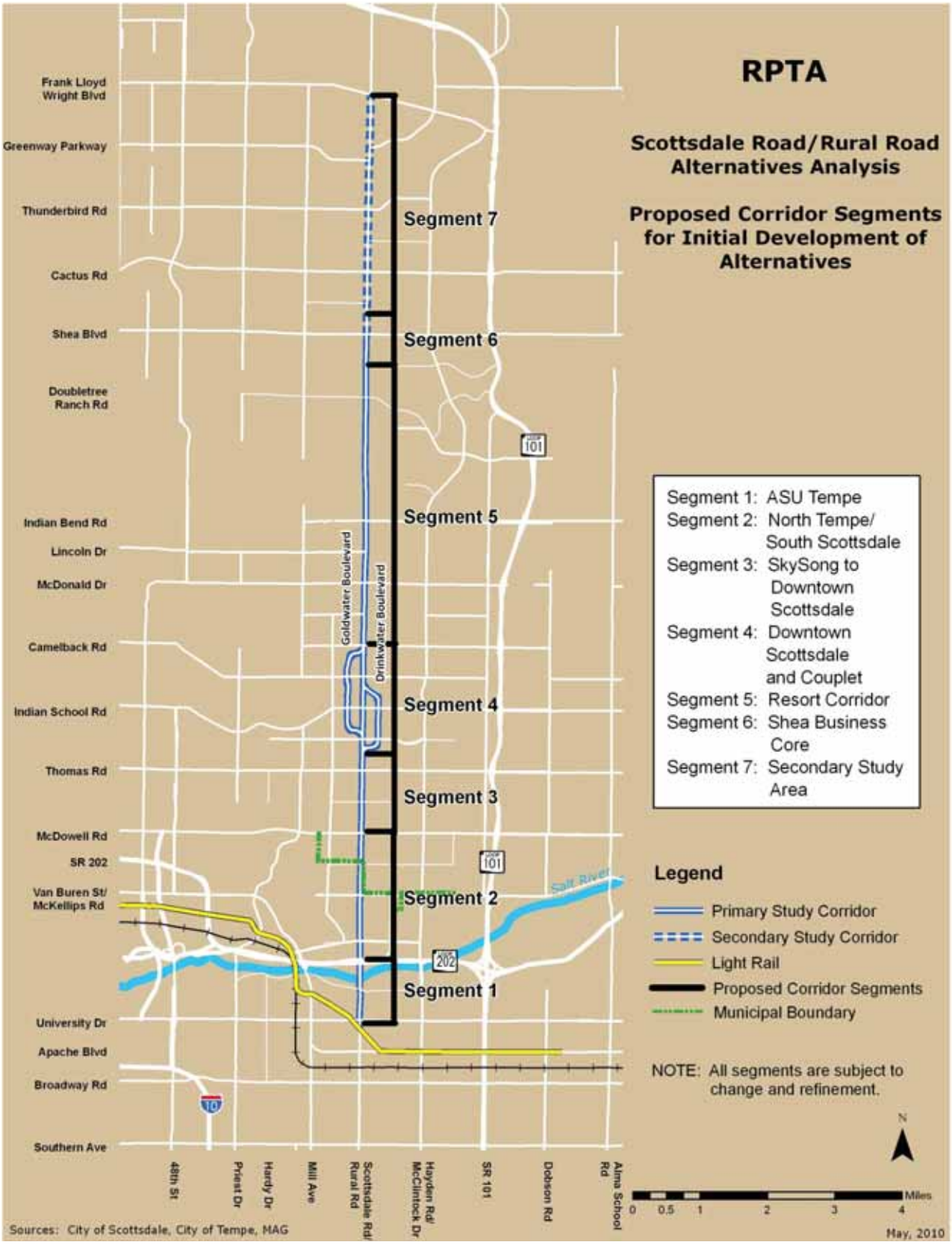
The RPTA initially divided the Scottsdale Road/Rural Road study corridor into the primary corridor extending approximately eleven miles from University Drive in Tempe to Shea Boulevard in Scottsdale, and the secondary corridor extending another four miles from Shea Boulevard to Frank Lloyd Wright Boulevard. The primary corridor includes the Goldwater Boulevard/Drinkwater Boulevard couplet that provides additional north-south capacity through Downtown Scottsdale. The secondary corridor is being studied in less detail than the primary corridor, particularly with respect to capital improvements for transit at intersections and other spot locations.

Because of the length of the route, and in consultation with staff from the Cities of Scottsdale and Tempe, the RPTA further divided the entire study corridor into seven logical segments based on physical characteristics, traffic conditions, and adjacent development characteristics. Segments 1 through 6 are part of the primary study corridor, while Segment 7 constitutes the secondary study corridor.

Figure 15 illustrates the seven segments along the fifteen-mile study corridor. The proposed seven segments are outlined below.

1. *Segment 1--University Drive LRT station to SR 202 (Rural Road along the ASU campus)*
   Segment 1 is characterized by institutional and business land uses, atypical traffic peaking characteristics due to academic schedules and special events, heavy non-motorized cross traffic, and a large number of transit vehicle movements. This short segment has relatively little access from side streets and driveways.

Figure 15: Corridor Segments



2. *Segment 2--SR 202 to McDowell Road (including the ASU SkySong Innovation Center)*.
Segment 2 contains a mixed pattern of small businesses and multi-family residential. As documented in Chapter 1, staff from both Scottsdale and Tempe feels that this segment has strong potential for redevelopment. Segment 2 is also characterized by a heavily used freeway interchange at Scottsdale Road/SR 202 ramp intersection, and by SkySong, an emerging regional business/academic campus at the north end. The Scottsdale/Tempe city limit crosses the study corridor between Roosevelt Street and McKellips Road.

3. *Segment 3--McDowell Road to Earll Drive*
Segment 3, approximately 1.25 miles long, includes areas of mixed businesses with auto-oriented land use and frequent driveway access. The first phase of the Scottsdale Streetscape project (which extends south into Segment 2 as far as Roosevelt Street) includes this segment.

4. *Segment 4--Earll Drive to Chaparral Road (Downtown Scottsdale)*, consisting of the following sub-segments, from south to north:
   A. Drinkwater Boulevard, entire length
   B. Scottsdale Road, Drinkwater south junction to Goldwater south junction
   C. Goldwater Boulevard, entire length
   D. Scottsdale Road, Goldwater south junction to Drinkwater north junction
   E. Scottsdale Road, Drinkwater north junction to Goldwater north junction

Segment 4 bisects Downtown Scottsdale, known for its world-class shopping, restaurants and night life. This is also the Scottsdale Civic Center with a mall plaza that includes museums, an art center, shopping, the city hall, Scottsdale stadium, the public library and a large regional hospital. Pedestrian traffic is extensive and public parking is free as a matter of city policy.

5. *Segment 5--Chaparral Road to Mountain View Road (Resort Corridor)*
Compared with the preceding segment, the Resort Corridor has relatively high travel speeds, lower pedestrian traffic volumes, good signal progression on Scottsdale Road, few intersecting regional arterials, and generally low-density adjacent land uses, except the labor-intensive resorts and the small commercial hubs. Traffic flow is generally smoother because of the fewer access points. The large resorts tend to cluster at certain locations such as Chaparral Road, McDonald Drive/Lincoln Drive, and Doubletree Ranch Road.

6. *Segment 6--Mountain View to Mescal Street (Shea business core)*
Segment 6 contains a sizeable community business (retail/ office) district on both sides of Scottsdale Road, the

intersection of two heavily traveled regional arterials, the first important transit transfer point north of Downtown Scottsdale, and the north end of the primary study area.

7. *Segment 7--Mescal Street to Frank Lloyd Wright Boulevard (secondary study area)*
   Segment 7 is the secondary study area, with a relatively low-density suburban section separating the Shea node from the more densely developed Scottsdale Airpark commercial and employment district farther north. Most of the west side is in Phoenix. The City of Scottsdale is constructing a large park-and-ride lot at the southeast corner of Scottsdale and Thunderbird Roads, which may serve as a logical terminus for the first phase of higher-capacity transit service on Scottsdale Road.

4.2.1 Detailed Corridor Schematics

The study team prepared detailed corridor schematic drawings for the purpose of assessing current conditions along the study corridor. Figure 16 shows a typical example along Segment 4. The schematics provide information on roadway R/W, location of traffic signals, right and left turn lanes, raised medians, two-way median turn lanes, pedestrian crosswalks, business access points, existing bus stop locations and amenities, and average daily traffic volumes at various places along the study corridor. The roadway schematics were used as wall displays during community meetings, focus group sessions and an alternatives workshop; smaller versions were distributed as handouts at technical meetings. All of the schematics are provided in the Technical Appendix.

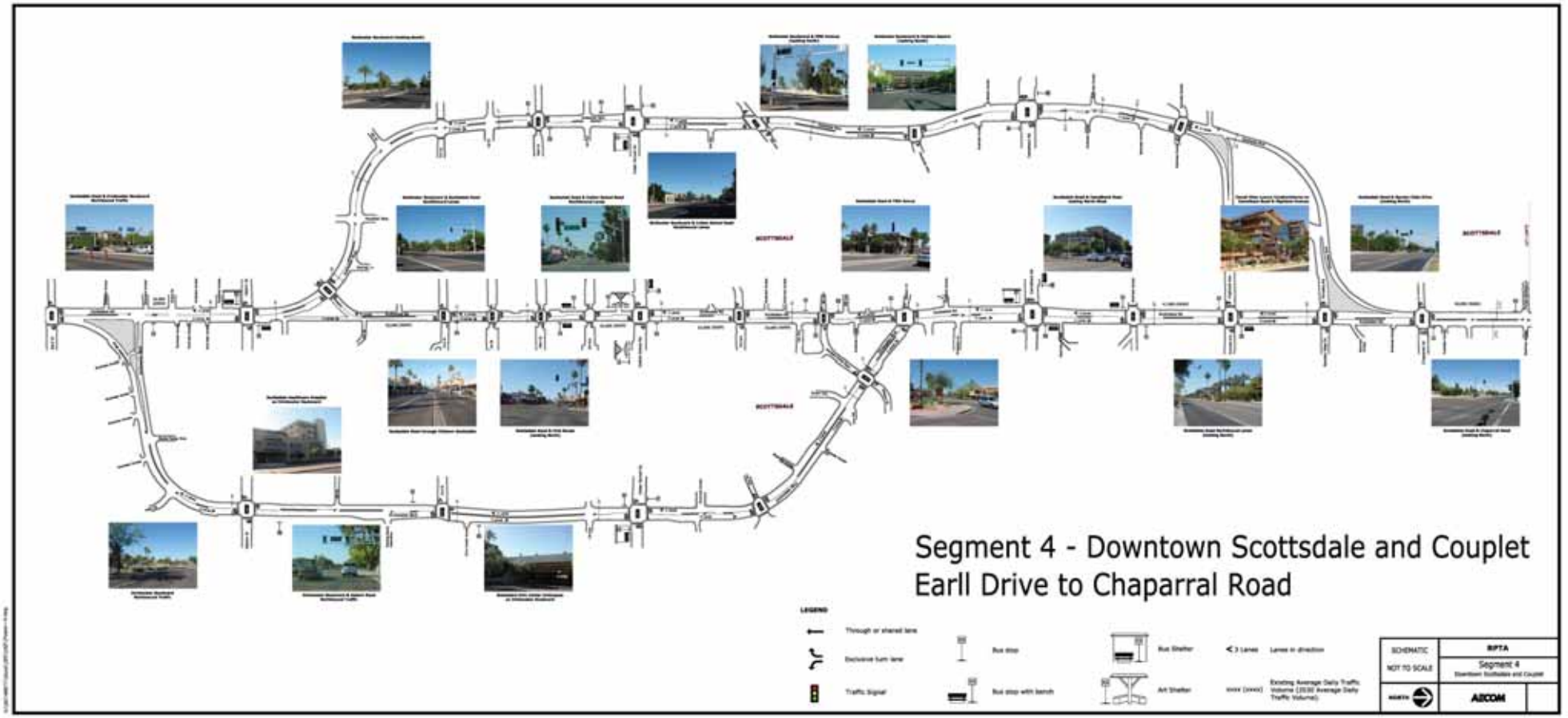
Roadway "as-built" drawings and traffic signal plans, procured from the Cities of Scottsdale and Tempe, were used in conjunction with on-site verification, photographic survey data, and drive-bys for reconstructing the layout of the study corridor. The RPTA provided details on existing bus stops and their locations along the Scottsdale Road/Rural Road study corridor, including the Goldwater/Drinkwater couplet in Downtown Scottsdale.

4.3 Three Dimensions of Potential Transit Investments

Three fundamental questions about potential transit investments in the Scottsdale Road/Rural Road study corridor were defined in preparation for an alternatives workshop held on June 15, 2010 at the Tempe Transportation Center.

A. What mode of transit will the RPTA operate on Scottsdale and Rural Roads?
B. Will transit vehicles share lanes with general traffic, and if so, how?
C. Where on the street will the transit vehicles operate?

Figure 16: Roadway Schematics (Example)



Section 4.3.1 discusses question (A), while 4.3.2 briefly addresses (B) and (C). The answers to these questions partially determine the answers to many questions about physical and operating details of the future system. Of the five transit modes listed below, (1) and (2) constitute modest improvements to existing service; (3) is higher-capacity transit; and (4) and (5), except modern streetcar, lie within the realm of high-capacity transit

4.3.1 Possible Transit Modes

1. *Improved local service*
   This option would merely improve the frequency or extend the service hours of existing Route 72, Scottsdale/Rural. The study Technical Advisory Group (TAG) ruled out this concept because it does not add substantial capacity, and therefore does not meet the purpose and need for the project, as established in Chapter 1.

2. *Limited Stop service*
   This concept is similar to local bus service, except that buses would stop less often. Stops for this type of service are typically located from one-half mile to two miles apart. Buses operating in Limited Stop service generally use the same vehicle fleet and stops as the local service running along the same route. This may be a peak-period-only service.

3. *Basic BRT*
   Basic BRT is the simplest and least expensive form of an arterial BRT system. Buses share the curb lanes with general traffic and local buses, but make limited stops. Unlike the Limited Stop option, Basic BRT typically has enhanced bus stops with special amenities (such as real-time arrival information), and may use special buses that are not mixed with the regular fleet. Riders may benefit from intersection improvements, such as queue jumpers and signal priority, that reduce bus travel times at key locations. The RPTA's Mesa LINK from the Main Street/Sycamore light rail station to Superstition Springs Mall is an example of this type of service, which usually operates during peak and off-peak hours.

4. *Advanced BRT*
   This type of BRT uses large buses (usually articulated) that operate along semi-exclusive R/W, separated from other traffic to raise travel speeds. This type of BRT emulates LRT in speed, frequency and comfort, making limited stops at dedicated platforms. Buses may have doors on both sides to accommodate center platforms, and fare enforcement is based on a proof-of-payment system, allowing rapid boarding through all doors. When installed on an existing street, this system requires major changes to the roadway layout, resulting in higher costs than the basic BRT alternative.

5. *Rail transit (LRT and streetcar)*
   LRT is a frequent high-capacity service that operates on a fixed guideway and usually in an exclusive or semi-exclusive R/W, such as a dedicated roadway median. The speed and schedule reliability of LRT can be maintained by signal priority at intersections, as well as multi-door boarding and a proof-of-payment fare system. METRO LRT in Phoenix, Tempe and Mesa is a good example.

   The modern streetcar is a lighter form of urban rail transit in which smaller, lower-capacity rail cars operate singly, rather than in trains of two or more cars as LRT often does. Streetcars often share lanes with general traffic and may stop frequently at curbside locations like local buses.

Table 16 summarizes the discussed transit modes and their applicability to the Scottsdale/Rural Road corridor.

Table 16: Possible Transit Modes

Mode/Technology		Obvious Fatal Flaws	Description/Comments
Improved Local Service (Route 72 or equivalent)		Does not meet Purpose & Need	Selected operational improvements could supplement the recommended alternative from this study
Limited Stop Service ("Route 72L")		None	Some Route 72 trips would make limited stops in study corridor; possible use of couplet
Basic BRT (example: Mesa Main Street LINK)		None	Makes limited stops, uses shared lanes, has distinctive buses and stops
Advanced BRT (example: Los Angeles Orange Line)		None, unless capital costs are excessive for VSS funding	Largely separates buses from other traffic to significantly raise travel speed
Rail Transit (LRT or modern streetcar)		Capital cost is prohibitive for VSS funding	Tempe South AA has recommended modern streetcar for Mill Avenue from Downtown Tempe to Southern Avenue

Source: RPTA study team, May 2010

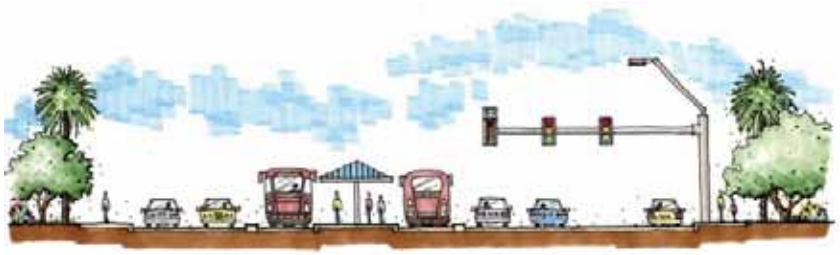
4.3.2 Alternatives for Sharing Lanes and On-Street Placement

Transit operations along existing roadways may involve lane sharing in order to optimize the movement of transit as well as general traffic. The options available with regard to sharing lanes include:

1. *Shared through lanes* - Transit buses fully share a lane with general traffic. Some exceptions may exist, e.g., queue jumpers or queue bypass lanes, where buses are given a separate lane that enables them to bypass vehicles in other travel lanes approaching intersections.

2. *Shared turn lanes* – Transit buses share a lane with restricted traffic movements. For example, curb lanes may be shared with right-turning traffic at all times or at certain times of day (e.g., peak periods). So-called Business Access and Transit (BAT) lanes belong to this category.

3. *Exclusive lanes* – Buses operate in reserved transit lanes. This usually requires one lane in each direction. With appropriate control systems, it may be possible for two-way bus traffic to share a single lane if the frequency of buses is low and if passing lanes are provided at stations.



On-street placement of transit is closely related to the lane-sharing issue. The available options include:

1. *Curb lanes* – Buses operate in the right lane (e.g., local or Mesa LINK buses).

2. *Median lanes* – Buses operate in the middle of the street, usually requiring one lane in each direction. In some cases, buses may use a single median lane for both directions with bus passing movements accommodated at stations (e.g., EmX in Eugene, Oregon).

3. *Operator discretion* – Between designated stops, operators may select a lane for bus operations depending on traffic conditions. This option works best when stops are far apart and allow BRT buses to leapfrog local buses when needed.

Table 17 summarizes a preliminary screening exercise on the feasibility of various combinations of modal, lane sharing, and on-street placement options. The TAG supported these conclusions at its second meeting on May 20, 2010. As a result, the alternatives workshop in June focused only on the concepts deemed "feasible" in Table 17.

Table 17: Preliminary Screening Results

Lane Sharing	On-Street Placement	Technologies/Modes		
		Limited Stop	**Basic BRT**	**Advanced BRT**
Shared Through	Curb	*Feasible*		Infeasible: shared through lanes = basic BRT
	Median	Inferior to curb option, with higher cost, less flexibility, doubtful safety: infeasible		
	Operator Discretion	*Feasible*	*Feasible* but may reduce value of queue jumpers	
Shared Turn	Curb	*Feasible* with effective enforcement		*Feasible* with strong enforcement and modest turn volumes
	Median	Clearly inferior to curb option in safety, efficiency and cost		
	Operator Discretion	*Feasible* but defeats purpose of removing through traffic from lane		
Exclusive Lanes	Curb	Infeasible		Requires special lanes for right-in business access; infeasible in this corridor
	Median	Infeasible		*Feasible*; maintains right turn access
	Operator Discretion	Infeasible—operator discretion inconsistent with exclusive lanes		

Source: RPTA study team, May 2010

4.4 Results of Multi-Agency Alternatives Workshop: June 15, 2010

The alternatives workshop involved TAG members from the RPTA, METRO, MAG, the City of Scottsdale and the City of Tempe, as well as other key staff from the two cities. The goal of the workshop was to enable the study team to assemble "end to end" (corridor-length) modal and alignment alternatives using input received at the workshop. With input from participants, the study team developed a list of feasible alternatives described in section 4.5. Appendix D contains notes from the workshop and a list of attendees.

The half-day workshop was divided into two parts. In the first part, the study team presented the study background and objectives, the purpose and need for the project, and the proposed study corridor segments. The presentation included some initial corridor concepts and their applicability to individual corridor segments. The second part was a facilitated discussion in which each segment was discussed in turn, from south to north, with clearly feasible concepts arising out of the preliminary screening exercise (Table 17).

The following list summarizes the key points on which the workshop participants reached consensus.

1. Due primarily to cost and recent public input on transportation studies in the study corridor, rail modes (modern streetcar and LRT) are not considered feasible alternatives for the near term. The study team should consider the potential for rail or other fixed guideway transit in the future, however, as well as the future convertibility of every BRT option to LRT.

2. The study team should consider a range of BRT options, from basic BRT (similar to Mesa LINK), to advanced BRT (using dedicated lanes in the roadway median). In Segment 5 (the Resort Corridor), however, basic BRT with fully shared curb lanes is the only one that requires consideration, because traffic on Scottsdale Road generally flows well in this segment. There are few major arterial street crossings, numerous right turn deceleration lanes, and extensive access management.

3. If BRT operates in lanes shared with private vehicles, it should use the curb lanes rather than the median. Everyone agreed that running buses in shared median lanes, as opposed to curb lanes, has many operational, safety, and cost disadvantages, and few if any benefits.

4. Participants felt that several alternatives warrant consideration for Segments 1, 2, 3, 6 and 7. The basic BRT options are curb lanes shared with general traffic, Business Access and Transit (BAT) operation in the curb lanes, and median lanes reserved for buses. BAT lanes use signage, striping or pavement color to indicate that they are open to general traffic for right turn movements only. BAT lanes currently exist in several U.S. cities, including Seattle and Tucson. With appropriate signage, they can be open to all vehicles during off-peak hours.

5. Participants recognized that construction of exclusive bus lanes in the middle of Scottsdale Road/Rural Road would reduce the number of lanes available to general traffic from three to two in each direction. Expanding the roadway width is not considered feasible because the R/W acquisition required to add through lanes in many segments of the corridor is not acceptable to the community.

6. The option of operating two-way BRT in a single reserved lane (as implemented for EmX in Eugene, Oregon) might have limited utility at some locations, but did not generate support as a more general solution. Participants noted that even Eugene uses this approach only for a short distance in a physically constrained section of the corridor.

7. If buses remain on Scottsdale Road within Segment 4 (Downtown Scottsdale), the only feasible BRT option consists of curb-lane operation in mixed traffic. Geometrics and traffic patterns on Scottsdale Road rule out other configurations.

8. Several options are feasible using the downtown couplet (Goldwater and Drinkwater Boulevards). However, the group agreed that placing southbound buses on Goldwater and northbound ones on Drinkwater would result in excessive walk times and potential for rider confusion, with northbound and southbound stations up to one-half mile apart. Therefore, either Drinkwater Boulevard or Goldwater Boulevard may be used for BRT, but not both.

9. Placing one direction of service on Scottsdale Road and the other on Goldwater or Drinkwater Boulevard would result in northbound and southbound stations up to one-fourth mile apart. Some participants expressed support for this concept. The walk between Scottsdale Road and Drinkwater Boulevard, in particular, can be a pleasant journey with many shops and points of interest. (The group also discussed operating on Scottsdale Road during off-peak periods and on one of the couplets during peak travel periods.)

10. There seemed to be at least a slight preference among the group for Drinkwater over Goldwater as an alignment through Downtown Scottsdale. Drinkwater Boulevard directly serves the Scottsdale Healthcare campus and related medical offices, which were identified as the largest

employment center in the downtown area and the one generating the most potential transit demand. Scottsdale Stadium and several municipal offices are also located in this area. On Goldwater Boulevard, Scottsdale Fashion Square is an important employment and visitor destination, but perhaps a less critical transit destination than other centers of employment and activity in the vicinity. The Drinkwater Boulevard alignment would also provide direct access to the east side of Scottsdale Fashion Square.

11. In every alternative, appropriate termini at each end of the line need to be considered—both operationally (where can the buses turn around and lay over?) and in terms of travel demand (where are riders going; how can the largest number of travel desires be met most efficiently?). At the north end, this requires analysis of both interim and ultimate terminal locations.

12. Scottsdale staff proposed, and the group agreed, that the study team should consider extending interim or Phase I service north from Shea Boulevard to the new park-and-ride lot under design (as of summer 2010) at Thunderbird Road. Among other issues, the Scottsdale Road/Shea Boulevard intersection lacks opportunities for parking, layovers and quick bus turnaround. Also, consider any redevelopment occurring near Scottsdale Road/Shea Boulevard with respect to opportunities for off-street bus stops and parking.

In summary, workshop participants recommended the following concepts for further analysis, from south to north. They are summarized in Table 18.

Table 18: Screening of BRT Alignment Concepts at Workshop

Segment(s)	Description	Preliminary Screening at Workshop		
		Fully shared curb lanes	**Business Access & Transit (BAT) lanes**	**Exclusive bus lanes in median**
1	University Dr–SR 202 (1 mi)	●	●	*Infeasible* due to traffic conditions, special events
2-3	SR 202-Earll Dr (3.25 mi)	●	●	●
4 (Downtown Scottsdale)	Scottsdale Rd, Earll Dr–Chaparral Rd (1.75 mi)	●	Considered *infeasible* due to geometric, traffic and land use conditions.	
	Goldwater/Drinkwater couplet	●	NB-Drinkwater SB-Goldwater	Considered *unnecessary*.
5 (Resort Corridor)	Chaparral Rd–Mountain View Rd (4.5 mi)	●	Considered *unnecessary* due to favorable traffic conditions	
6 (Shea Area)	Mountain View Rd–Mescal St (0.8 mi)	●	●	If service continues north to Thunderbird
7	Mescal St–Thunderbird Rd or Frank Lloyd Wright Blvd (1.7 – 3.7 mi)	●	●	●

Source: RPTA study team, May 2010

- *University Drive-Earll Drive* (Segments 1 through 3), three concepts: Shared curb lanes, BAT lanes, and (in Segments 2 and 3 only) reserved median lanes.

- *Earll Drive-Chaparral Road* (Segment 4), four concepts: Shared curb lanes on Scottsdale Road, shared (southbound) and BAT (southbound) lanes on Drinkwater, shared (northbound) and BAT (southbound) lanes on Goldwater, and a split alignment between Scottsdale Road and either Drinkwater or Goldwater. Drinkwater Boulevard has two lanes southbound but three northbound, so the northbound curb lane could be converted to a BAT lane. The reverse is true on Goldwater Boulevard, which has two lanes northbound and three southbound—thereby allowing a southbound BAT lane.

- *Chaparral Road-Mountain View Road* (Segment 5), one concept: Shared curb lanes.

- *Mountain View Road-Mescal Street* (Segment 6), three concepts: Shared curb lanes, BAT lanes, and reserved median lanes. If Shea Boulevard is the interim terminus for the service, however, median lanes would not be used in this segment.

- *Mescal Street-Frank Lloyd Wright Boulevard* (Segment 7), three concepts: Shared curb lanes, BAT lanes, and reserved median lanes. Because Segment 6 is short, the two northernmost segments are likely to use the same concept if BRT extends north of Shea Boulevard.

4.5 Proposed Corridor-Length Alternatives for Evaluation

Based on input received at the workshop, as well as an analysis of the types of alternatives considered in similar studies, the RPTA/consultant study team proposed six end-to-end alternatives (in addition to No-Build) for evaluation as potential short-term transit investments in the Scottsdale Road/Rural Road study corridor:

1. A Transportation System Management (TSM) alternative consisting of Limited Stop service on Scottsdale and Rural Roads, operating on the same route as existing local service. Buses would stop approximately every mile, mostly at major intersections and transfer points, although there might be more frequent stops within major activity districts such as Downtown Scottsdale and ASU/Downtown Tempe. It would require no new capital investment other than signage and possibly the purchase of more standard buses (if overall service frequency on Scottsdale/Rural increases). This conforms to the standard definition of TSM as "short-term, low-capital transportation improvements that generally cost less and can be implemented more quickly than system development actions." The service could be offered only during peak periods or throughout the day. Although workshop participants did not discuss this option, the study team sees it as a base for comparing the costs and benefits of similar alternatives (e.g., arterial BRT in shared lanes) that may provide limited additional travel time benefit. However, Limited Stop bus (Alternative 1) most likely would not qualify for VSS funding, and would be at most a short-term solution.

2. Alternative 2, Basic BRT, in which BRT buses would share the curb lanes with general traffic (and local buses) for the entire length of the study corridor. It would operate much like the existing Mesa LINK. Through Downtown Scottsdale, buses would remain on Scottsdale Road, continuing to share the curb lanes (although it is important to consider possible conflicts with diagonal parking in this area). This alignment would place riders near the center of activity downtown, and one-fourth mile or less from destinations on Drinkwater or Goldwater Boulevard. It does not require the addition of traffic lanes to Scottsdale Road or Rural Road, but may involve intersection improvements, including queue jumpers and traffic signal priority measures. Enhanced bus stops would be constructed (on average) about one mile apart, and upscale vehicles such as those used for Mesa LINK would be purchased.

3. Alternative 3, BAT lanes, would operate BRT buses at curbside in Business Access and Transit (BAT) in most of the study corridor. This would allow all traffic to use the transit lanes for turning movements and leave two lanes in each direction for general traffic. An exception would be Segment 5, the Resort Corridor segment, where BRT buses would share the right lanes with general traffic.

In Downtown Scottsdale, this alternative has three variants—3a, 3b and 3c—that differ in their alignment. Alternative 3a, like Alternative 2, would remain on Scottsdale Road and use fully shared lanes rather than BAT lanes along this segment. In Alternative 3b, all buses would operate on Drinkwater Boulevard, taking advantage of its current geometrics--three lanes northbound and two southbound—to offer BAT lane operation northbound, while sharing the southbound curb lane. Alternative 3c would split northbound and southbound buses through Downtown Scottsdale. Southbound BRT buses would share the curb lane on Scottsdale Road, while northbound ones would operate in a BAT lane on Drinkwater Boulevard.

4. Alternative 4, BRT in reserved median lanes, would use the northbound and southbound center lanes for exclusive BRT operations, except in three areas: south of SR 202, through Downtown Scottsdale, and in the Resort Corridor (primarily Segments 1, 4 and 5). Median bus operation would occur at least from the Curry Road area to Earll Drive, and could resume at the north end of the Resort Corridor if BRT service continues north of Shea Boulevard to Thunderbird Road or beyond. This alternative would require a reduction in the number of general traffic lanes on Scottsdale and Rural Roads, as R/W takes for additional lanes are not considered feasible in the study corridor. Therefore, the evaluation of Alternative 4 will assume reduction of the six-lane segments to four general traffic lanes where buses run in the median. Alternative 4

would also require widening at intersections to accommodate bus station platforms in the median, and left turn restrictions similar to those now in effect along the METRO LRT system. Buses might have doors on both sides to accommodate center platform boardings; alternatively, specially designed crossovers could allow buses to switch sides at stations if block signals were installed to prevent conflicts between northbound and southbound vehicles. To take full advantage of the higher speeds allowed by this design, ticket vending machines would be installed at each station to accommodate a proof-of-payment system. Through Downtown Scottsdale, this concept is the only one that would operate on Goldwater Boulevard, with shared-lane operation northbound and a BAT lane southbound.

Table 19 shows details of the six alternatives by segment. Alternatives 1 and 2 would use the same basic alignment—shared curb lanes—throughout the study corridor. Although Alternative 3 emphasizes BAT lanes and Alternative 4 has areas of median running, both alternatives would use shared lanes in Segment 5 and in at least one direction downtown.

Alternative 4 is a special case because it was substantially modified after its initial definition. The study team found that geometric constraints, coupled with a high degree of access management south of the Salt River/Tempe Town Lake, make median running an infeasible option from the Scottsdale Road/SR 202 interchange to Rural Road/University Drive. Impediments to reserved median lanes include the bridge over Tempe Town Lake, frequent reconfiguration of traffic lanes for special events, and the need for buses to leave the median before turning onto University Drive or another Tempe street. This alternative was therefore modified to assume a transition from median running to shared curb lanes north of SR 202 in Tempe. (The transition could be accomplished through a special bus-activated phase at a signalized intersection.) As a result, Alternative 4 would contain reserved median bus lanes only from approximately SR 202 to Earll Drive (roughly three miles) and possibly from the north end of the Resort Corridor to Thunderbird Road or the northern terminus of the route.

These basic alignment concepts were subject to change during the evaluation process described in Chapter 5.

4.5.1 Community Meetings (First Round)

On July 19 and 21, 2010, the RPTA and its consultant team held two public meetings for the community at large: one at the Scottsdale Airport terminal in the northern portion of the study area, and the other at SkySong in the southern portion. The purpose of the meetings was twofold: to familiarize the community with the study and potential transit investments; and to solicit input regarding transit opportunities and needs in the study corridor.

Both meetings followed the same format: they began with a presentation at 6:15 p.m., followed by a question period and then an open house where attendees could talk one-on-one with staff. Thirteen people attended at Scottsdale Airport and twenty-five at SkySong, excluding agency and consultant staff. While a complete record of public input has been provided in Appendix E, some comments related directly to the alternatives under consideration and were considered during the analysis.

1. "Consider Limited Stop bus as a primary option. Can the study team consider this alternative and perhaps extend the service to Bell Road? [Frank Lloyd Wright Boulevard]"
2. The study team considered the option of opening up BAT lanes to all high-occupancy vehicles (HOVs). This was in response to a citizen who asked whether BAT lanes would be open to other drivers when there are no buses.

Table 19: Proposed Transit Investment Alternatives for Scottsdale Rd/Rural Rd Corridor

Alternative	Segment				Notes
	University-Earll: Segments 1-3	Downtown Scottsdale: Segment 4	Resort Corridor: Segment 5	Shea business area and beyond: Segments 6 and 7	
No-Build	N/A				No new service
1: TSM (Limited Stop bus)	Shared curb lanes	Shared curb lanes on Scottsdale Rd	Shared curb lanes	Shared curb lanes	Less frequent stops than local bus
2: Basic BRT	Shared curb lanes	Shared curb lanes on Scottsdale Rd	Shared curb lanes	Shared curb lanes	Adds amenities, queue jumpers, signal priority
3a: Basic BRT with BAT* lanes	BAT* lanes	Shared curb lanes on Scottsdale Rd	Shared curb lanes	BAT* lanes	BAT* restriction could be limited to peak periods
3b: Basic BRT with BAT* lanes	BAT* lanes	Shared curb lane SB, BAT* lane NB on Drinkwater Blvd	Shared curb lanes	BAT* lanes	BAT* restriction could be limited to peak periods
3c: Basic BRT with BAT* lanes	BAT* lanes	Shared curb lane SB on Scottsdale Rd; BAT* NB on Drinkwater Blvd	Shared curb lanes	BAT* lanes	BAT* restriction could be limited to peak periods
4: Exclusive median lanes where appropriate and feasible	Median lanes and center stations north of SR 202; shared curb lanes farther south	Shared curb lane NB, BAT* lane SB on Goldwater Blvd	Shared curb lanes	Depends on northern terminus—could remain in median past Shea Blvd	Service extends north of Shea Blvd to Thunderbird Rd park-and-ride

*BAT (Business Access and Transit) lanes could also be open to other high-occupancy vehicles (HOVs).

Source: RPTA study team, May 2010

3. The study team is currently looking at short-term options, but also needs to think about long-term solutions including LRT. This was in response to a comment that the study team needs to think outside the box.
4. Attendees expressed support for a variety of ideas, with no consensus for a particular alignment or mode of operation. This indicates that the study team needs to proceed with an evaluation of the full range of bus alternatives.

A second round of community meetings was later scheduled for October 27 and 28, 2010, toward the end of the study. Appendix E provides detailed input from both sets of meetings.

4.6 Refinements to Alternatives

4.6.1 Proposed Locations for Bus Stops or Stations

For each of the six alternatives, the study team developed a tentative list of bus stop or station locations. At this point in the AA, the primary purpose of the list is to help provide a set of underlying assumptions for the subsequent evaluation. Specific locations are subject to change both during this AA and after adoption of the LPA.

The proposed locations take into account the following considerations:

- The need to balance travel speed with access to activity centers. Following the example of METRO LRT and Mesa LINK, stops are typically spaced one mile apart. However, buses could stop more frequently in Downtown Scottsdale and less frequently in other areas such as Resort Corridor.
- The relationship between travel speed and the level of bus service. The Limited Stop option (Alternative 1) has more stops than the BRT options (Alternatives 2, 3 and 4). This reflects the likelihood that riders will expect shorter travel times in a system labeled "bus rapid transit," as well as the fact that Limited Stop service requires no new fixed facilities other than signage.
- The location of existing and planned activity centers.
- Connections to intersecting regional transportation corridors, including rail and bus routes. The majority of proposed BRT stops would offer transfers to one or more existing bus routes.
- Thunderbird Road is a logical northern terminus for the first phase primarily because of its parking opportunities. At the south end of the study corridor, METRO LRT provides frequent connections to several park-and-ride lots in Tempe and Mesa. Other possible future parking locations along the study corridor may be identified in the implementation portion of this AA.

Figures 17 through 19 illustrate, and Table 20 lists, the proposed stop or station locations for each of the six alternatives. A few sites are shown as future stations—i.e., station for which R/W would be reserved immediately, but that may not be constructed until after Phase 1 of the service opens.

Figure 17: Alternatives 1 and 2--Limited Stop Bus and BRT in Shared Curb Lanes

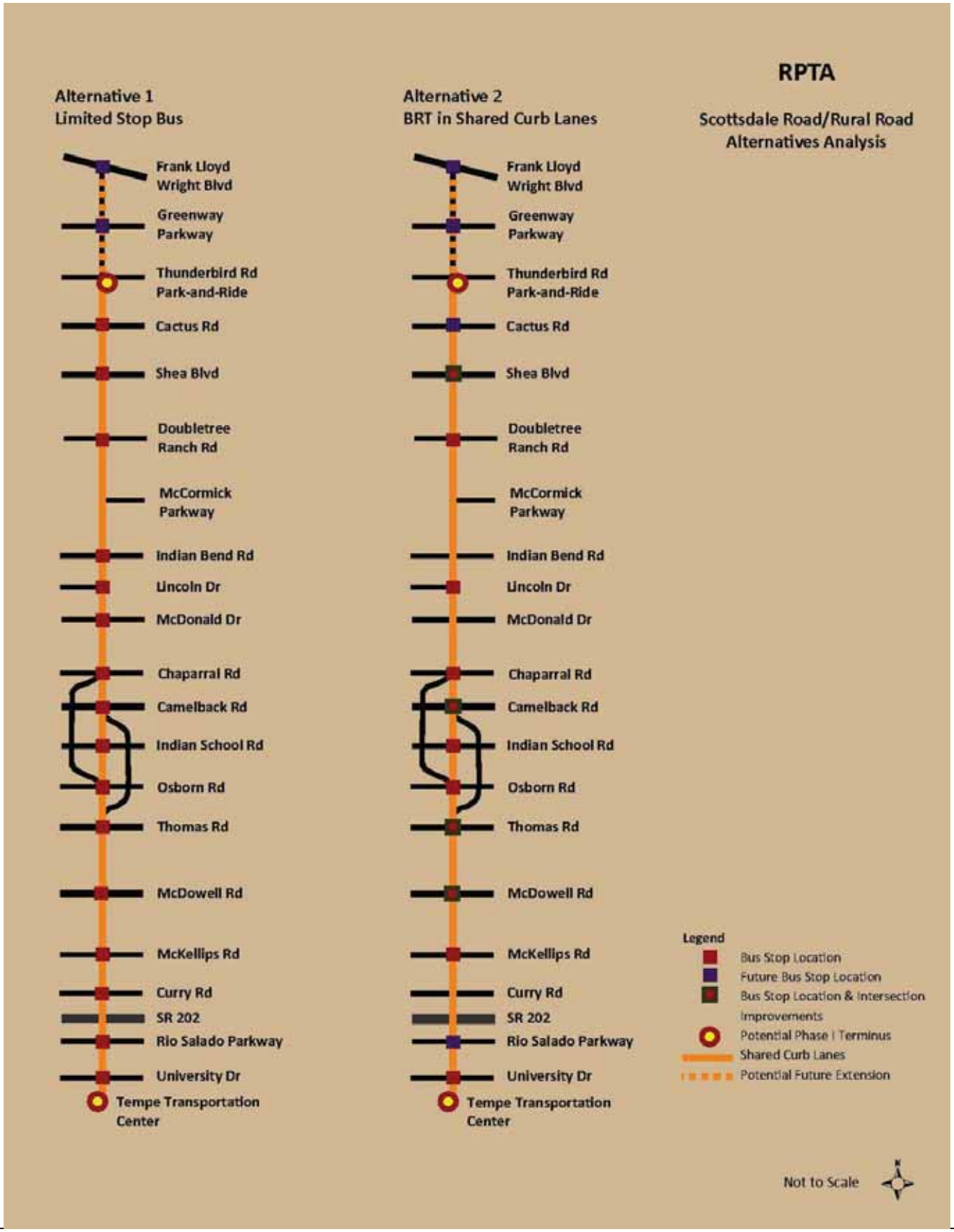


Figure 18: Alternatives 3a and 3b--Enhanced BRT in BAT Lanes

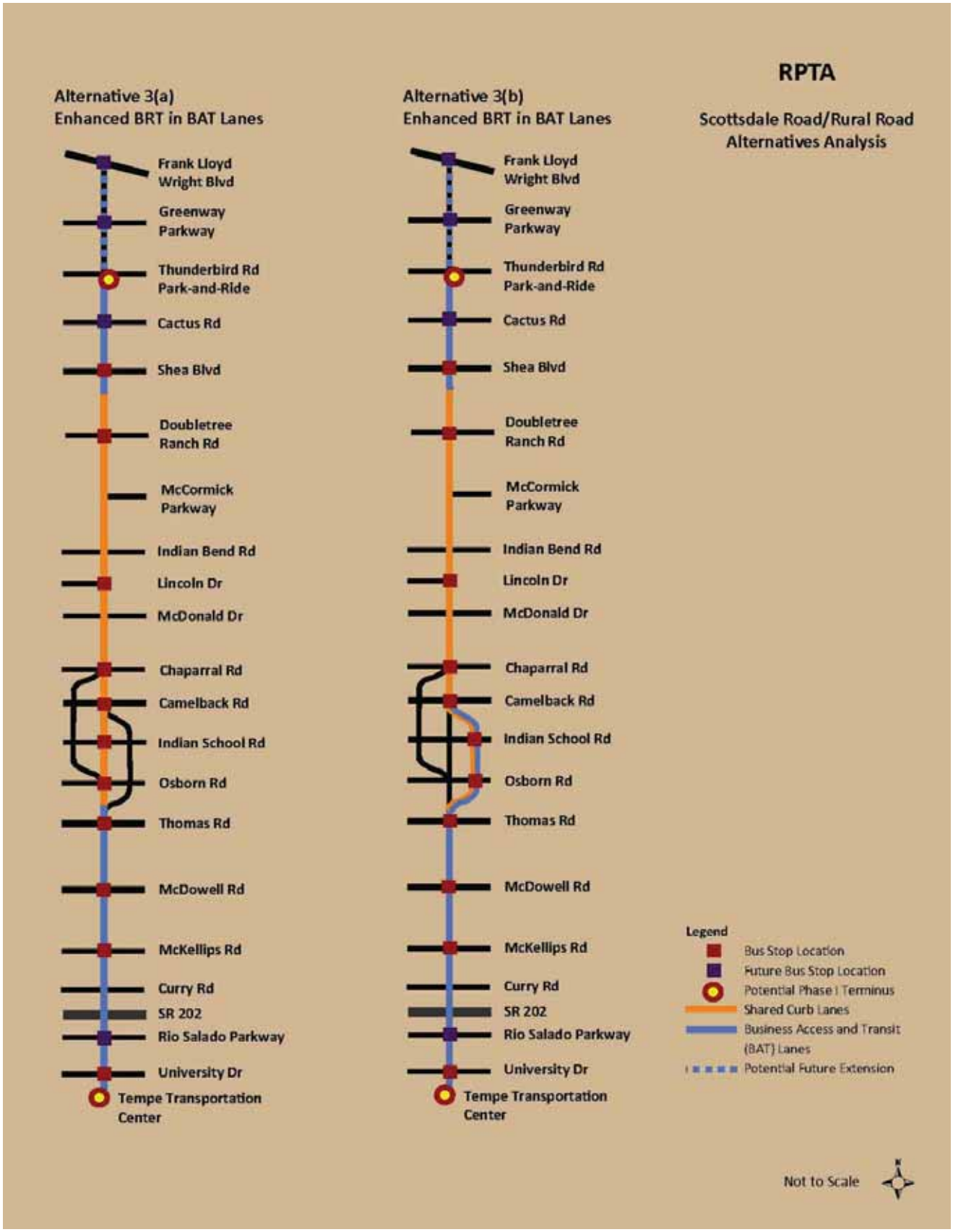


Figure 19: Alternatives 3c--Enhanced BRT in BAT Lanes, and 4--Advanced BRT with Median Lanes

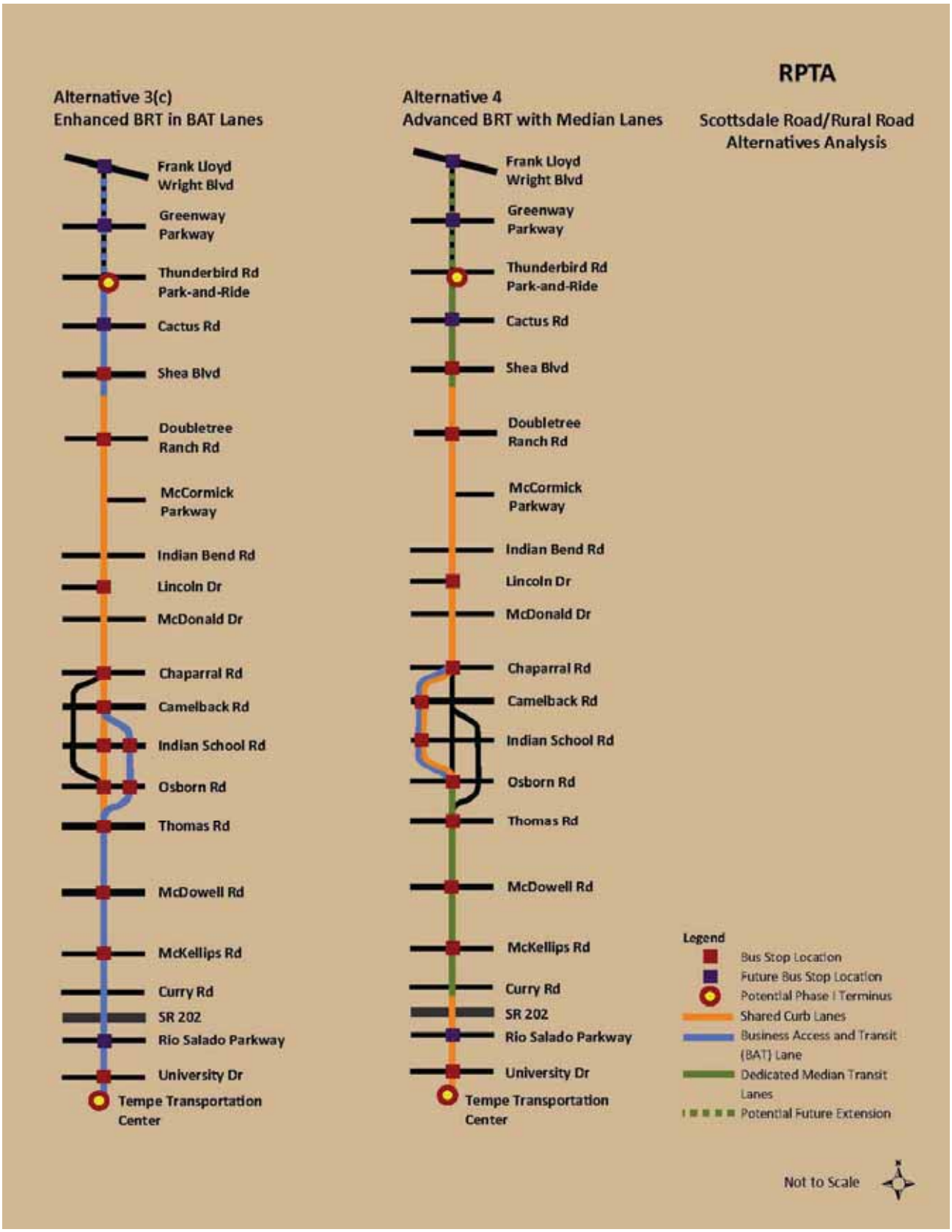


Table 20: Proposed Station/Stop Locations by Alternative

Tempe Stop Locations	**Alternatives**	**Notes**
Tempe Transportation Center	All	Many rail and bus connections in high-demand urban center.
Rural Rd/University Dr	All	Major METRO LRT connection serving ASU campus; bus transfer.
Rural Rd/Rio Salado Pkwy	1	Can be signed immediately as a location for Limited Stop service.
Rural Rd/Rio Salado Pkwy *(future station)*	2, 3a, 3b, 3c, 4	Purchase R/W in Phase 1; construct station in conjunction with connecting local transit service.
Scottsdale Rd/Curry Rd	1	Limited Stop alternative only; no connecting bus service.
Scottsdale Rd/McKellips Rd	All	Connects with local circulators and possible future east-west route. Alt. 4 stop is in median.
Scottsdale Stop Locations	**Alternatives**	**Notes**
Scottsdale Rd/McDowell Rd	All	Serves SkySong and other adjacent development.
Scottsdale Rd/Thomas Rd	All	Intersection with major arterial and east-west bus route.
Scottsdale Rd/Osborn Rd, NB	1,2, 3a, 4	Serves Scottsdale Healthcare and stadium area.
Scottsdale Rd/Osborn Rd, SB	1,2, 3a, 3c, 4	
Drinkwater Blvd/Osborn Rd, NB	3b, 3c	
Drinkwater Blvd/Osborn Rd, SB	3b	
Scottsdale Rd/Indian School Rd, NB	1, 2, 3a	Heart of Downtown Scottsdale; major intersecting bus route.
Scottsdale Rd/Indian School Rd, SB	1, 2, 3a, 3c	
Drinkwater Blvd/Indian School Rd, NB	3b, 3c	
Drinkwater Blvd/Indian School Rd, SB	3b	
Goldwater Blvd/Indian School Rd, NB	4	
Goldwater Blvd/Indian School Rd, SB	4	
Scottsdale Rd/Camelback Rd, NB	1, 2, 3a, 3b, 3c	Scottsdale Fashion Square; major intersecting bus route
Scottsdale Rd/Camelback Rd, SB	1, 2, 3a, 3b, 3c	
Goldwater Blvd/Camelback Rd, NB	4	
Goldwater Blvd/Camelback Rd, SB	4	
Scottsdale Rd/Chaparral Rd	All	North end of Fashion Square; several resorts nearby
Scottsdale Rd/McDonald Dr	1	Limited Stop alternative only; serves modest retail/office
Scottsdale Rd/Lincoln Dr	All	Serves Borgata retail area; several resorts nearby
Scottsdale Rd/Indian Bend Rd	1	Serves one resort and McCormick-Stillman Railroad Park
Scottsdale Rd/Doubletree Ranch Rd	All	Serves two major resorts
Scottsdale Rd/Shea Blvd	All	Major commercial center; intersecting bus route; possible terminus in Phase 1

Table 20 - Continued

Scottsdale Stop Locations	Alternatives	Notes
Scottsdale Rd/Cactus Rd	1	Can be signed immediately as a Limited Stop location
Scottsdale Rd/Cactus Rd *(future station)*	2, 3a, 3b, 3c, 4	Purchase R/W in Phase 1; construct station later as demand warrants
Scottsdale Rd/Thunderbird Rd	All	Potential terminus at new City of Scottsdale park-and-ride facility
Scottsdale Rd/Greenway Pkwy *(future station)*	All	Assumes future service extension north of Thunderbird Rd
Scottsdale Rd/Frank Lloyd Wright Blvd *(future station)*	All	Assumes future service extension north of Thunderbird Rd

Estimated number of stops or stations (opening day; assuming service from TTC to Thunderbird Road):

Alternative 1 (Limited Stop service)	18
Alternatives 2, 3a, 3b, 3c, 4	13

Source: RPTA study team, July 2010

In the five BRT alternatives, the construction and opening dates of the Rio Salado Parkway and Cactus Road stations would depend on travel demand. Alternatively, the Rio Salado Parkway station could be built immediately and used only for special events, if current demand does not warrant a full-time facility.

Each of the five BRT alternatives would have thirteen stations—or slightly less than one per mile—on the opening day of the system. (A northbound/southbound pair in Downtown Scottsdale is counted as one station.) The Limited Stop alternative would begin with eighteen stations, or less than 1.5 per mile.

4.6.2 Candidate Intersections for Queue Jumpers and Signal Prioritization

This section describes some possible candidates for transit queue jumpers and signal prioritization under each alternative. *The diagrams illustrate general concepts, not design recommendations for specific intersections.* Intersection-specific solutions will be developed in the subsequent Design Concept Report.

Figure 20 illustrates a dedicated bus approach lane, or queue bypass lane, where buses can take advantage of a dedicated approach lane to avoid traffic delays at intersections and more quickly reach a far side stop. This strategy also has the advantage of not requiring an advance signal indication for bus priority. Buses simply cross the intersection on green in parallel to general traffic.

This concept has several drawbacks, however. First, it requires a wider roadway cross-section at the intersection. The Scottsdale General Plan deems this undesirable in areas classified as urban (e.g., Downtown Scottsdale and the segment from downtown to Thomas Road), because it increases crossing distances for pedestrians and generally makes the areas less attractive to non-motorized users. Second, the "open" bus bay, which begins at the far side curb of the cross street, may mislead right-turning motorists into using the bay as a through traffic or acceleration lane, thereby endangering transit riders and pedestrians. Third, the far-side stop location requires buses to await a gap in the adjacent traffic stream before pulling back into the shared right lane. This can cause delays that cancel out the benefit of the bus priority lane upstream.

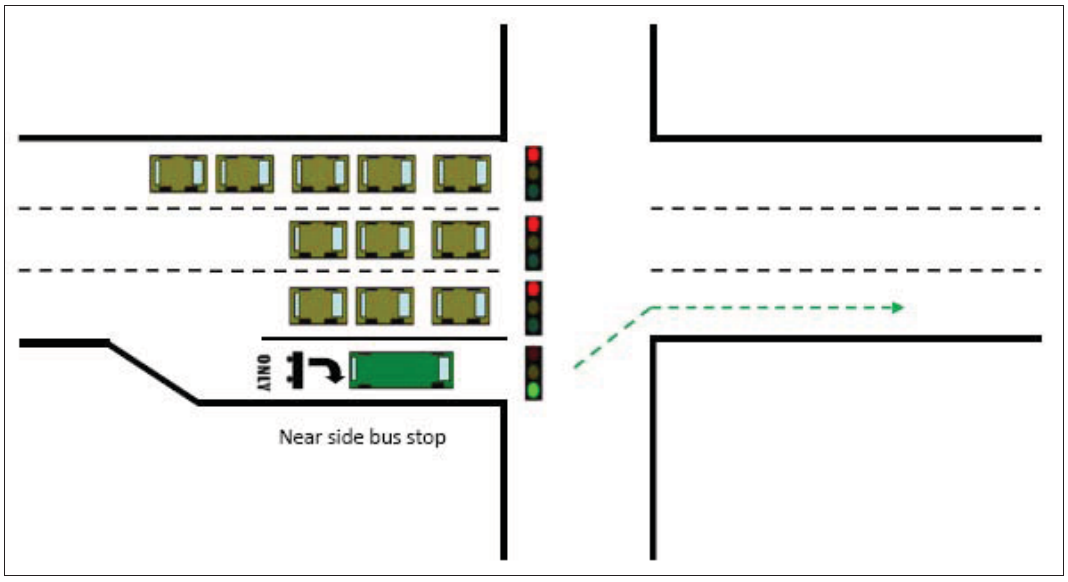
Figure 21 shows a queue jumper in which buses may bypass queued traffic by receiving a green indication in advance of parallel traffic. In this case, the bus shares the dedicated right turn lane and stops on the near side of the intersection to take advantage of the special transit signal priority. This may be a good solution in urban, pedestrian-oriented environments with constrained R/W and low to moderate right-turn volumes. Drawbacks include delays to right-turning vehicles queued behind a stopped bus, and the

difficulty of timing the transit/right-turn phase accurately enough to ensure that buses can take advantage of signal priority, despite variable dwell times. The use of advanced ITS can mitigate these problems.

Wherever buses are given signal priority over traffic in parallel lanes, a distinctive type of signal should be used in order to avoid confusing motorists. The bus-specific signal can be used with a standard green right-turn arrow where appropriate.

Figure 20: Intersection with Bus Priority Lane

Figure 21: Intersection with Transit Queue Jumper and Signal Priority



Alternative 1

This alternative by definition involves no street or traffic signal system improvements, other than signs marking the "limited" bus stops.

Alternative 2

As part of alternative 2, the study team identified a set of intersections where the use of signal priority measures and queue bypass lanes may be beneficial. These include Shea Boulevard, Thomas Road, McDowell Road and Camelback Road in Scottsdale. Intersection improvements similar to these may also be pursued at Rio Salado Parkway in Tempe. Similar improvements are desirable at Camelback Road but may be infeasible because of traffic patterns and R/W constraints.

Shea Boulevard

Scottsdale Road at Shea Boulevard has no dedicated right turn lanes and only single left turn lanes both northbound and southbound. Right-of-way constraints on the south side of Shea Boulevard restrict intersection widening. Commercial properties next to the existing sidewalks limit the option of acquiring land, especially on the southeast corner of Scottsdale Road/Shea Boulevard, where urban-type development abuts the sidewalk.

However, an opportunity may exist to widen the existing 95-foot R/W south of Shea Boulevard, by acquiring land on the southwest corner to allow shifting the existing lanes to the west, creating room for a new right turn/queue jump lane on the east side (south approach). In addition, the 130-foot R/W north of Shea Boulevard provides opportunity for these improvements to roadway geometry. Therefore, Scottsdale Road could be widened to the west to provide right turn lanes both southbound and northbound. Once dedicated right turn lanes are available in each direction, signal prioritization (a dedicated bus/right turn phase) would enable buses to bypass other traffic and merge into general curb lanes on the far side of the intersection.

Thomas Road

Approaching Thomas Road, Scottsdale Road has dedicated right-turn lanes both northbound and southbound, which may be coupled with a dedicated bus/right-turn phase to serve as queue jumpers. Modifications to the far-side curb can provide opportunity for buses to pull through into bus bays, which already exist. Thus, existing bus bays (pullouts) would be converted to a "queue jumper plus pull-through" configuration. Alternatively, and as the City of Scottsdale prefers, buses could stop on the near side and use an advance green phase to move directly into the curb lane across the intersection. Local buses might continue to use the far side bus bay, or the bay could be removed.

McDowell Road

Approaching McDowell Road, Scottsdale Road has a dedicated right-turn lane southbound only. Northbound right-turning traffic shares the curb lane with through traffic. Modifications to the southeast corner of the intersection and widening the roadway to add a right turn lane northbound might enable use of the right turn lane as a bus priority lane/queue jump lane. Signal prioritization would enable northbound and southbound buses to bypass other traffic and merge into a shared curb lane on the far side of the intersection. In general, the options are similar to those available at Thomas Road.

Rio Salado Parkway

The MAG traffic model projects heavy volumes of north-south traffic along Rural Road at Rio Salado Parkway in 2030. Today, heavy use of this part of Rural Road occurs before and after special events in the area, and traffic lanes along Rural Road south of SR 202 are reconfigured when sporting events take place at ASU Sun Devil Stadium. Since no northbound or southbound right turn lane exists at this intersection, providing bus priority would require constructing such lanes. If the City of Tempe installs such lanes in the future, the city should include signal prioritization that can be activated remotely when traffic conditions warrant. The future location and design of bus stops near the Rural Road/Rio Salado Parkway intersection will require due allowance for the existing bridge over Tempe Town Lake.

Alternative 3

Under this alternative, BAT lanes would effectively serve as queue jumpers at many intersections. Locations with the highest turning volumes have existing right turn lanes. This would enable the current right through traffic lane to be restriped as a bus-only lane, again serving as a queue jumper. In addition, BAT lanes can be used effectively in combination with overhead Dynamic Message Signs (DMS) that remind motorists which vehicles and movements are permitted to use each traffic lane. A DMS would allow municipal traffic operations systems to deactivate the BAT (or BAT plus HOV) restrictions during off-peak hours or periods of low traffic.

Alternative 4

On the south end of the corridor, BRT buses will need to operate in shared curb lanes between University Drive and SR 202 in order to accommodate transitions between the median and curb lanes, enabling safe turning movements to University Drive. Median-running buses southbound will need to move over to the curb lane before they can turn right toward the Tempe Transportation Center. Buses will require a significant distance to move from the median lane to the curb lane, given the high volume of traffic on Rural Road between SR 202 and University Drive in Tempe. Additionally, dedicated median transit lanes will limit the reconfiguration of traffic lanes when sporting events take place in Tempe. This need for flexibility to reverse or close traffic lanes may preclude even a median alternative that uses special phasing at a signalized intersection to move transit vehicles across the street—much as METRO LRT does in downtown Phoenix.

North of SR 202, buses will operate in dedicated median lanes until they move back to shared curb lane operations at Earll Drive. North of the Resort Corridor, buses will move from shared curb lanes to dedicated median lane operation south of Shea Boulevard--potentially at Mountain View Road--and terminate at Thunderbird Road at a median station, unless buses leave the median to terminate at the nearby park-and-ride lot at the southeast corner of Thunderbird Road. A single-lane bus underpass may be considered at the intersection of Scottsdale Road and Shea Boulevard to allow unrestricted bus movement. Constraints related to limited R/W on the south side of Shea Boulevard prohibit widening of the roadway. Currently, Scottsdale Road at Shea Boulevard has single left turn lanes in each direction with no dedicated right turn lanes. A single dedicated transit lane may be accommodated with a grade separation at the Shea Boulevard intersection.

4.7 Travel Time Savings Analysis

The study team performed a travel time (running time plus dwell time) analysis for existing local bus Route 72 (as a No-Build alternative), and for Alternatives 1 through 4, to estimate the potential travel time savings of Limited Stop and BRT buses over local bus service. This information will be used in the evaluation of alternatives in Chapter 5.

4.7.1 Baseline Condition

Data on the No-Build alternative, which represents a baseline condition, came from June 2010 weekday boarding counts and the RPTA January-July 2010 Transit Book. The analysis included the stretch from Frank Lloyd Wright Boulevard to the Tempe Transportation Center, divided into five sections based on the timepoints in the Route 72 schedule. Travel times between consecutive timepoints were obtained directly from the schedule. Existing bus stops along the study corridor were classified as major or minor, depending on the daily boardings at each stop. Stops with at least 20 boardings per day were classified as major (5 stops), and those with fewer than 20 as minor (31 stops). Stops with one or two boardings per day were excluded from the analysis. Dwell time at stops was then calculated based on the assumption that each bus stops for 60 seconds at major stops and for 30 seconds at minor ones. Using this information, average running speeds were estimated in the five sections of the study corridor. (Running speed is defined as the distance traveled divided by net time [travel time minus dwell time]).

4.7.2 Alternative 1 – Limited Stop Bus

The Limited Stop bus option includes a total of 18 bus stops over a stretch of 15 miles. It is assumed that buses would stop at each stop for 60 seconds. Since the buses will share the curb lanes with general traffic and local buses, the average running speed will be the same as in the No-Build condition. Travel time savings will occur only because of fewer stops along the route.

4.7.3 Alternative 2 – BRT with Shared Lanes

Like Alternative 1, this alternative assumes that BRT buses will run in shared curb lanes. No queue jumpers or signal priority treatments are assumed, so average running speed would remain the same as in the Limited Stop bus option. BRT buses will stop at each bus stop for 45 seconds, saving time due to both fewer stops and less dwell time per stop. The reduced dwell time at stops is based on typical higher-capacity bus transit systems and the assumption that fare media vending machines at bus stops will reduce the time spent in validating fares during bus boarding.

4.7.4 Alternative 3a, 3b, 3c – BRT with BAT Lanes

These alternatives are based on the assumption that BRT buses will run in BAT lanes over much of the study corridor, sharing their lanes with right turning traffic and potentially with HOVs as well. This will enable the buses to run at a higher speed (75% of posted speed limit) than in the previous alternatives. BRT buses will stop at each bus stop for 45 seconds, saving time due to a combination of faster running speeds, fewer bus stops, and less dwell time per stop.

4.7.5 Alternative 4 – Exclusive Median Transit Lanes

BRT buses will run in exclusive median transit lanes over a portion of the study corridor, providing unrestricted movement of buses (except at signalized intersections) and higher running speeds. In estimating travel time for this alternative, an average running speed of 35 mph was assumed. Since this is an advanced BRT alternative that would likely use articulated buses with boarding through multiple doors and fare vending machines at all stations, the assumed dwell time is only 30 seconds per stop.

4.7.6 Conclusion

Table 21 summarizes the reasons that contribute to travel time savings (over the No-Build) associated with each alternative. Table 22 provides detailed results of the analysis, and Figure 22 summarizes the travel time estimates in a bar chart. Despite greatly reducing the number of potential stops, Alternative 1 only minimally reduces estimated travel time compared with Route 72. A noticeable travel time reduction requires at least BRT in shared lanes (Alternative 2). The next major step up in travel speed occurs with BRT that operates predominantly in BAT/HOV lanes, and uses the couplet (with BAT/HOV lane) in at least one direction through Downtown Scottsdale. Alternative 4, despite the use of median running in part of the study corridor, reduces total travel time by only two minutes. This makes the potential cost look disproportionate to the benefit.

Although further analysis will be needed during the evaluation process, it appears that Limited Stop bus alone would achieve little in travel time savings, and that the construction of dedicated median transit lanes as proposed for a portion of the study corridor may not be worthwhile, because of high construction costs, reduced through vehicle capacity and limited marginal benefit to transit users. If BAT or BAT/HOV lanes are used, they should be retained through Downtown Scottsdale on northbound Drinkwater Boulevard or southbound Goldwater Boulevard, where a lane is readily available for this purpose.

Table 21: Reasons for Transit Travel Time Reduction versus No-Build

Alternative	Reasons for Travel Time Reduction		
	Fewer Stops	Less Dwell Time per Stop	Faster Running Speed
1: Limited Stop Bus			
2: BRT, Shared Lanes			
3: BRT, BAT Lanes			
4: Advanced BRT with Median Running			

Source: RPTA study team, July 2010

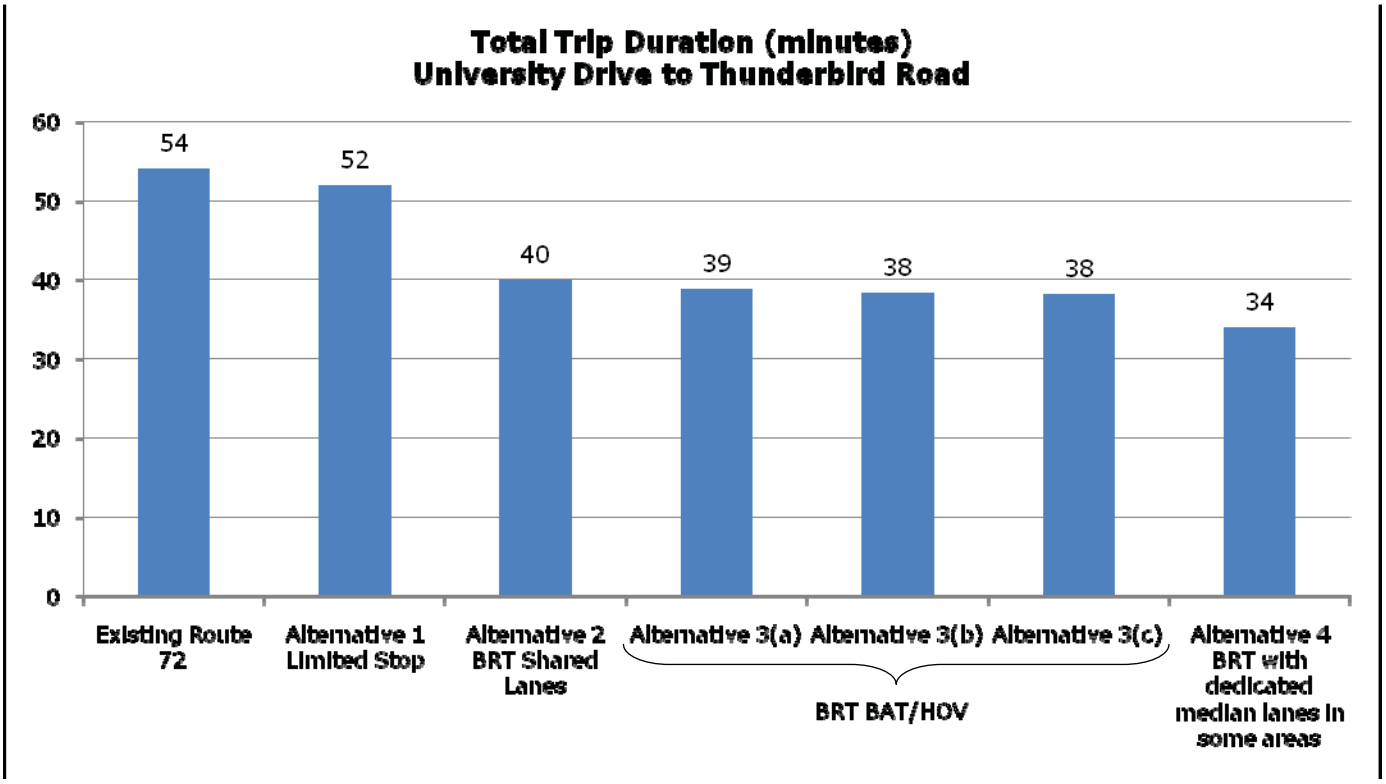
Table 22: Travel Time Comparison for Proposed Alternatives: Tempe Transportation Center to Thunderbird Road

Characteristic	Existing Route 72	TSM (Limited Stop Bus)	BRT with Shared Lanes	BAT Lanes			Exclusive Median Transit Lanes
	No-Build	Scottsdale Rd: Shared Curb Lanes	Scottsdale Rd: Shared Curb Lanes	Scottsdale Rd: Shared Curb Lanes	Drinkwater Blvd: BAT* lane NB; shared curb lane SB	Drinkwater Blvd: BAT* lane NB Scottsdale Rd: Shared curb lane SB	Where appropriate and feasible
		Alternative 1	Alternative 2	Alternative 3a	Alternative 3b	Alternative 3c	Alternative 4
Distance (miles)	14.5	14	14	14	14.3	14.2	14.4
Average Bus Travel Speed (mph)	16	16	21	22	22	22	25
Total Trip Duration (minutes)	54	52	40	39	38	38	34
% Travel Time Savings	N/A	4	26	28	29	29	37

*Or BAT/HOV

Source: RPTA study team, July 2010

Figure 22: Estimated Trip Durations for Proposed Alternatives: Tempe Transportation Center to Thunderbird Road



Source: RPTA study team, July 2010

Chapter 5 - Evaluation of Transit Investment Alternatives

5.1 Introduction

This chapter describes the method that was used to evaluate the potential benefits, costs, impacts and implementation issues of the six alternatives described in Chapter 4. In that chapter, the RPTA/consultant team considered a full range of modal alternatives and narrowed the options to specific bus alternatives. The evaluation process for the remaining alternatives uses both quantitative and non-quantitative measures to describe the characteristics, as well as the advantages and disadvantages, of each alternative. In accordance with FTA policies for potential VSS projects, the evaluation focuses primarily on current (2010) and near-term conditions based on the opening of a transit improvement project by 2016.

This chapter documents the initial (Tier 1) and full (Tier 2) evaluation of the alternatives. Based on the two-tiered evaluation, the document presents conclusions on the effectiveness and impacts of the alternatives, along with a preliminary LPA and related recommendations.

5.1.1 Alternatives

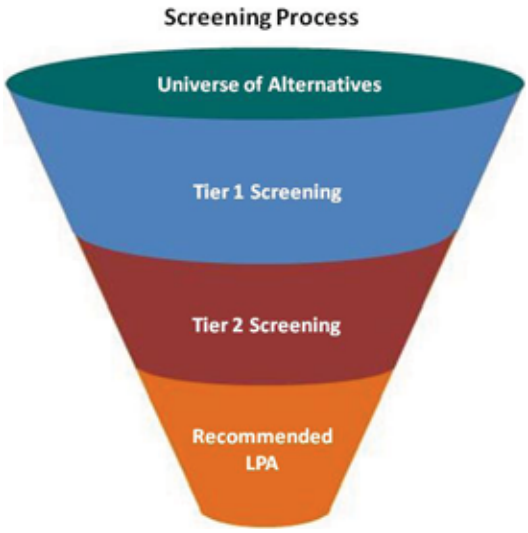
Table 23 summarizes the alternatives developed in Chapter 4.

Table 23: Proposed Transit Alternatives for Scottsdale Rd/Rural Rd Corridor

Alternative	Segment					Notes
	University Dr-SR 202	SR 202-Earll Dr	Downtown Scottsdale	Resort Corridor	Shea Blvd area to Thunderbird Rd	
No-Build	Route 72 only; no new service					No new service
1: Limited Stop bus (TSM)	Shared curb lanes	Shared curb lanes	Shared curb lanes on Scottsdale Rd	Shared curb lanes	Shared curb lanes	Less frequent stops than local bus
2: Basic BRT	Shared curb lanes	Shared curb lanes	Shared curb lanes on Scottsdale Rd	Shared curb lanes	Shared curb lanes	Adds amenities, signal priority, ITS, etc.
3a: BAT/HOV lanes	BAT/HOV lanes	BAT/HOV lanes	Shared curb lanes on Scottsdale Rd	Shared curb lanes	BAT/HOV lanes	Restriction could be limited to peak periods
3b: BAT/HOV lanes	BAT/HOV lanes	BAT/HOV lanes	Shared curb lane SB; BAT/HOV lane NB--both on Drinkwater Blvd	Shared curb lanes	BAT/HOV lanes	Restriction could be limited to peak periods
3c: BAT/HOV lanes	BAT/HOV lanes	BAT/HOV lanes	Shared curb lane SB on Scottsdale Rd; BAT/HOV NB on Drinkwater Blvd	Shared curb lanes	BAT/HOV lanes	Restriction could be limited to peak periods
4: Exclusive median lanes, where appropriate and feasible	Shared curb lanes	Median lanes and center stations north of SR 202	Shared curb lane NB; BAT/HOV SB on Goldwater Blvd	Shared curb lanes	Median lanes and center stations	Roughly five miles of median running.

Source: RPTA study team, June 2010

5.2 Evaluation Methodology



The consultant team performed a two-level screening and evaluation process. Tier 1 consisted of a largely non-quantitative assessment of the six alternatives, using information from Chapter 4 along with community and agency input. Some technical information developed for that chapter, primarily travel time estimates and traffic information, was incorporated in the evaluation. The two-tiered process provided an opportunity to drop some alternatives after Tier 1, if appropriate, and permitted refinements to the alternatives for the Tier 2 evaluation.

The second level of evaluation (Tier 2) was more comprehensive and quantitative, supplemented with additional non-quantitative measures. Together, the two tiers assessed the potential alternatives in terms of mobility benefits, community impacts, cost-effectiveness, land use and economic development benefits, and implementation issues. These categories are consistent with the FTA guidelines for evaluation of VSS projects. Some criteria do not necessarily discriminate well among the alternatives, but can assist in assessing the value of a potential project against the existing (No-Build) condition.

Both phases of the evaluation seek to answer several questions in a manner that allows each alternative to be measured against the others and the No-Build condition. These questions include:

- What are the transit benefits and how will the alternative increase transit ridership?
- How will it affect the street environment (for all modes and users) and access to adjacent properties?
- What will it cost to build and operate? Is it cost-effective?
- Does it have community support and is it consistent with local plans?
- Can it be feasibly funded and implemented in the desired timeframe?
- How does it enhance or diminish future opportunities for a higher level of transit investment in the study corridor?
- How well does it foster economic development and support transit-oriented development in the corridor?

The following sections describe the evaluation process in more detail.

5.2.1 Tier 1 Evaluation Methodology

Table 24 summarizes the Tier 1 evaluation criteria and associated performance measures. The screening of alternatives provides a relative assessment of their estimated performance under current (2010) or opening day (2016) conditions. Travel time estimates, originally developed for Chapter 4 and then adjusted in accordance with comments from the City of Scottsdale, are included as an indicator of the level of improved transit service and as a measure of increased transit capacity. Two criteria gauge the impact of alternatives with exclusive or restricted lanes: relative congestion and traffic impacts (as captured by level of service) due to lane restrictions, and the R/W and property access impacts. The amount of transit service provided and estimated financial feasibility are also included among the Tier 1 criteria. Each alternative, whether Limited Stop (Alternative 1) or BRT (Alternatives 2 through 4), is assumed to operate for 16 hours per weekday, with 6 hours of peak service and 10 hours of reduced off-peak service.

Table 24: Tier 1 Evaluation Criteria and Performance Measures

Criteria	Measures
Transit Service Provided Service frequency (peak/off-peak) Transit capacity	 Frequencies for BRT and local service Relative service and capacity provided
Transit Travel Time	Preliminary estimate of one-way transit travel time and average speed for BRT service; percent reduction compared with existing
Roadway Level of Service	Comparison of impacts on roadway levels of congestion
Right-of-Way and Access Right-of-way impacts Business and other property access	 Relative impacts to adjacent properties Relative impacts on access to businesses
Financial Feasibility Affordability given expected resources	 Likelihood of funding (federal and local)

Source: RPTA study team, August 2010

5.2.2 Tier 2 Evaluation Methodology

The Tier 2 evaluation used a combination of quantitative and non-quantitative criteria. Table 25 summarizes them and their associated performance measures.

The first group of evaluation criteria is largely quantitative. These criteria are designed to describe the transit service and other characteristics of the alternatives, along with their traffic implications for Scottsdale Road and Rural Road. This group includes the measures described below.

- **Transit service amount and capacity** – The amount of transit service for each alternative is described by the assumed peak and off-peak service frequency, the number of seats provided in the peak hour and peak direction, and vehicle revenue miles of service provided.

- **Travel time** – Improvement in transit travel time is an important measure of better transit service that can lead to increased transit use. Reasons for shorter travel times may include, depending on the alternative:
    - Faster running times due to exclusive or BAT/HOV lanes that reduce vehicle conflicts
    - Reduced delays at traffic signals due to transit signal priority, ITS, and queue jump lanes at appropriate locations.
    - Fewer stops for passenger boarding and alighting
    - Reduced dwell time at stops due to (at least partial) off-board fare collection and (in some cases) all-door boarding

Travel time estimates for the alternatives were calculated through a number of adjustments to the current transit travel times. These adjustments considered the number of stops, the reduction in dwell time, and the time benefits of dedicated lanes, signal priority and queue jump lanes. The performance measures are: travel time from Tempe Transportation Center to Thunderbird Road (where the route would have a logical terminus at the new park-and-ride lot), and travel time reduction compared to the No-Build and Alternative 1 (Limited Stop/TSM).

Table 25: Tier 2 Evaluation Criteria and Performance Measures

Criteria	Measures
Transit Service Amount and Capacity	
Service frequency (peak/off-peak)	Frequencies for BRT and local service
Transit capacity	Number of seats in peak hour/peak direction
Vehicle hours and miles	Combined service for BRT and local service
Transit Travel Time	One-way transit travel time; percent reduction compared with No-Build (existing) and TSM (Alternative 1)
Transit Ridership	BRT and total corridor ridership; increase over existing
Access to Transit Service	
Population and employment served	Residents and jobs in SAZs adjacent to Downtown Scottsdale portion of alignment
Service to Downtown Scottsdale activity centers	Number of city-designated downtown activity districts within 1/4 mile of a proposed station
Roadway Traffic Congestion and Level of Service	Number of corridor segments/intersections operating at LOS E or worse in peak hour (current conditions)
Costs	
Capital cost	Estimate of current and year of construction costs, using the FTA format
Operating cost	Based on cost per revenue mile
Total annualized cost	Annualized capital and operating costs
Cost-effectiveness	Annualized cost per rider
Right-of-Way and Access	
Right-of-way impacts	Assessment of properties affected
Business access	Assessment of businesses affected
Community Support	
Consistency with local plans	Qualitative comparison with plans
Consistency with streetscape plans	Identify any significant conflicts
Public support	From public meetings and other outreach
Land Use & Economic Development	
Support for transit-oriented development plans	Project alternatives support city plans; city has appropriate programs or plans
Support for local economic development plans	Project alternatives support city economic development efforts; development plans would be enhanced by project
Financial Feasibility	
Ability to qualify for federal VSS program	Meets minimum requirements
Local funding feasibility	Local fund amount and percent of project
Implementation	
Ease of implementation	Likely implementation timeline and community/traffic disruption
Convertibility to future fixed guideway transit	Will alternatives facilitate or impede future fixed guideway transit?

Source: RPTA study team, August 2010

- **Estimated transit ridership** – For a potential VSS project, the FTA expects that ridership estimates will focus on current and opening day projections. The FTA encourages a simpler (spreadsheet-type) model approach rather than primary use of the traditional, and more complex, travel demand models that would be used for larger New Starts projects. This chapter builds ridership estimates from current (Route 72) ridership by adjusting boarding counts to reflect the improved transit characteristics, such as faster travel time and increased service.

The adjustments considered the changes in travel time, stop locations and service frequency for each alternative. The elasticity of ridership in response to change in each characteristic was based on documented research. In addition, the alternatives were adjusted to account for intangible benefits associated with key BRT features, such as higher quality stops, branding, larger and more comfortable vehicles, and real time schedule information. Transit Cooperative Research Program (TCRP) Report 118, *Bus Rapid Transit Practitioner's Guide*, documents the basis for these adjustments. The final element of the ridership estimate factored the current year estimate to the projected opening year (2016) by adjusting for projected growth in the corridor.

- **Access to transit service** – Transit access to population, employment and activity centers is generally the same for all alternatives, other than Limited Stop bus--except in the Downtown Scottsdale area where alternatives follow different routes. Differences in Downtown Scottsdale were measured partly according to population and employment in SAZs adjacent to each alignment, and partly based on the number of the city's nine downtown area districts at least partially within one-fourth mile of a proposed station. The districts are: Fashion Square, Waterfront, 5th Avenue Shops, Arts District, Old Town, Civic Center Mall, Brown & Stetson Businesses, Entertainment District, and (next to downtown) the Scottsdale Healthcare Osborn area.

- **Roadway traffic congestion and level of service** – To the extent that the introduction of dedicated median lanes, BAT/HOV lanes or queue jump lanes shift general purpose vehicle traffic to other lanes, there may be a increase in congestion or a worsening of traffic LOS. This potential impact was measured by estimating the amount of traffic shifted and the resulting change in LOS. A shift that results in a LOS of E or worse was considered an (adverse) impact.

- **Estimated project capital costs** – Costs for project development and construction were prepared using a simplified version of the standard FTA cost template for Small Starts (which, as the name implies, funds larger projects than Very Small Starts). The cost build-up uses unit costs based on local experience, standard contingencies (allocated to each line item and unallocated), and multipliers for design and project management. Costs are in 2010 dollars. Table 26 shows the unit costs and percentage multipliers.

- **Estimated operating costs for all transit service in the corridor** – Operating costs for each alternative consider the cost of that alternative as well as the cost of continued local bus service in the study corridor. Using the estimate of vehicle revenue miles, the annual cost (in current dollars) was calculated by using the current 2010 average cost per mile of $7.15 provided by the RPTA.

- **Total annualized cost** – This is the sum of annual operating cost and amortized capital cost. Capital costs were amortized over 12 years for vehicles and 25 years for all other capital elements.

- **Cost-effectiveness** – Cost-effectiveness represents the annualized capital and operating cost per transit rider served by the alternative. The study team calculated annualized cost-effectiveness based on guidance from the FTA, which emphasizes new transit riders attracted to the service. Projects that meet the VSS cost and ridership limits are automatically considered "cost-effective" by the FTA under project justification requirements.

Table 26: Proposed Unit Costs and Percentage Multipliers

Item	Percent or Cost	Source
Project Development Costs (% of construction cost)		
Preliminary Engineering	3%	RPTA study team 2010
Final Engineering	8%	RPTA study team 2010
Construction Management	10%	RPTA study team 2010
Start-up	6%	RPTA study team 2010
Total Soft Costs	27%	RPTA study team 2010
Contingencies		
Allocated Contingency (% of Base Unit Cost)	20%	RPTA study team 2010
Unallocated Contingency (% of Total Project Cost)	5%	RPTA study team 2010
Unit Costs (thousands of dollars)		
Base Unit Cost – 60-foot vehicles (w/o contingency)	$725	LINK unit cost adjusted to 2010*
Base Unit Cost – 40-foot vehicles (w/o contingency)	$520	LINK unit cost adjusted to 2010*
Base Unit Cost - stations (w/o contingency)	$284	LINK unit cost adjusted to 2010*
Base Unit Cost – ticket vending machines	$100	RPTA estimate
Base Unit Cost - signal priority/ITS per intersection	$17	LINK unit cost adjusted to 2010*
Base Unit Cost - queue jump lanes each	$200	LINK unit cost (midpoint)
Base Unit Cost - basic BAT/HOV lanes, per mile	$20	RPTA study team 2010
Base Unit Cost - enhanced BAT/HOV lanes, per mile	$225	RPTA study team 2010

*Assumes 5% inflation over 2 years; LINK is the Main Street arterial BRT service in Mesa

The second group of measures addresses broader community impacts and benefits. The measures are generally non-quantitative, but identify specific impacts and issues. They use local agency input on community support and consistency with existing plans and projects. The measures in this group are:

- Business and property impacts, based on the number of properties affected.
- Consistency with local plans, including city general plans, ASU campus plans, and other community plans and policies. Consistency with the Scottsdale Road streetscape planning and design, including identification of any significant conflicts with the current plans, is another important consideration.
- Public and stakeholder support for the alternatives, as identified in community meetings and other outreach activities.
- Degree of consistency with, and support for, city policies for transit-oriented development.
- Degree of consistency with, and support for, city policies and plans for economic development.

The final group of measures assesses implementation issues. The measures in this group are:

- Financial feasibility: both eligibility for VSS and the capacity of local funding sources for the project.
- Estimated timeline for implementation.
- Potential for conversion to future fixed guideway transit.

5.3 Evaluation of Alternatives

This section evaluates the alternatives based on the criteria and measures discussed above, using the two-tiered process. This process was designed to quickly screen out any alternatives with flaws so severe as to make a detailed evaluation unnecessary.

5.3.1 Tier 1 Evaluation

Table 27 presents the Tier 1 evaluation. The results show that the BRT alternatives perform similarly in terms of basic transit benefits, with all providing significantly expanded transit service compared to current levels. Travel time reductions, a good indicator of increases in ridership, are greatest with the alternatives that use BAT/HOV lanes in at least one direction through Downtown Scottsdale (Alternatives 3b and 3c) and with the median lane option (Alternative 4). The Limited Stop service does not offer significant travel time savings.

The initial evaluation suggests that Alternatives 1, 2 and 3 provide transit benefits with reasonable costs and impacts. Only Alternative 4 appears to substantially worsen roadway congestion. This alternative also has a higher capital cost that may be disproportionate to its apparently modest marginal benefit, and it restricts business access in some segments. The time savings for Alternative 4 do not appear great enough to offset the higher costs and other impacts. There are also questions about the financial feasibility of Alternative 4. However, exclusive median lanes, even if constructed in only part of the study corridor, may have other advantages not brought out in Tier 1. In addition, community meetings evinced some public support for this option. Therefore, all six of the alternatives were retained for further evaluation in Tier 2.

5.3.2 Tier 2 Evaluation

The elements of the Tier 2 evaluation are discussed below and summarized in Table 28.

5.3.2.1 Transit Service Provided

An initial component of the evaluation was the development of a proposed service plan and an estimate of the resulting vehicle requirements and service characteristics. A fundamental service assumption was that an underlying local service would be retained in order to serve the stops not served by the Limited Stop or BRT service, and to connect local stops with BRT stops. The local service was designed to provide less service than the current Route 72, but to maintain a minimum 30-minute frequency. BRT service options were designed to meet the FTA VSS guidelines, which require 10-minute frequency in the peak period and 15-minute frequency in the off-peak. This level of service would require additional operating funds beyond those allocated for Scottsdale Road/Rural Road BRT in the TLCP.

The estimated number of transit vehicles was calculated based on the estimated peak travel time and is provided in Appendix F. It was assumed that approximately half of the additional BRT vehicles would be 60-foot articulated coaches, similar to some of those used on the existing Mesa LINK service. The remaining new vehicles would be standard 40-foot BRT buses, like the remaining buses assigned to Mesa LINK. Details of the service plan and other operating characteristics of each alternative are provided in Appendix G and summarized in Table 29. This analysis shows that BRT alternatives 2, 3a, 3b, 3c and 4 will require ten to twelve new vehicles and, in combination with the modified local service, will provide more than twice the vehicle revenue miles currently provided by Route 72.

The capacity of the alternatives was also measured, using seats available in the peak hour and peak direction as the measure of capacity. As a result of the higher capacity of BRT vehicles and the increased level of service, the five BRT alternatives provide more than three times as much transit capacity in the study corridor as current Route 72 (Tables 27 and 28).

Table 27: Tier 1 Screening of Alternatives, University Dr to Thunderbird Rd
Current 2010 Conditions

Criterion/Measure	No-Build	Alt 1 Limited Stop	Alt 2 BRT	Alt 3a BRT	Alt 3b BRT	Alt 3c BRT	Alt 4 BRT
Transit Service Provided							
- Service frequency (minutes, peak/off-peak)							
- BRT/Limited Stop service	--	15/20	10/15	10/15	10/15	10/15	10/15
- Local service	20/20	30/30	30/30	30/30	30/30	30/30	30/30
- Transit capacity (seats in peak hour/peak direction)	105	210	325	325	325	325	325
Transit Travel Time							
- Travel time (TTC to Thunderbird Rd, in minutes)	54	52	40	39	38	38	34
- Average operating speed (mph)	16	16	21	22	22	22	25
- Travel time reduction compared w/ Route 72 (No-Build)	--	4%	26%	28%	30%	29%	37%
Roadway Level of Service (LOS)							
- Percent of corridor operating at LOS E or worse	0	0	0	10%	10%	10%	45%
Right-of-Way and Access							
- Right-of-way and business access impacts	--	None	Minimal	Minimal	Minimal	Minimal	Substantial
Financial Feasibility							
- Affordability given expected resources	--	Good	Good	Fair to good	Fair to good	Fair to good	Poor

Source: RPTA study team, August-December 2010

Table 28: Tier 2 Screening of Alternatives, University Dr to Thunderbird Rd
Current 2010 Conditions

Criterion / Measure	Current Service	Alt 1 Limited Stop	Alt 2 BRT	Alt 3a BRT	Alt 3b BRT	Alt 3c BRT	Alt 4 BRT
Transit Service Provided							
Service frequency (minutes, peak/off-peak)							
BRT or Limited Stop service	--	15/20	10/15	10/15	10/15	10/15	10/15
Local service	20/20	30/30	30/30	30/30	30/30	30/30	30/30
Annual vehicle revenue miles of service	466,000	722,000	995,000	995,000	995,000	1,004,000	1,009,000
Transit capacity (seats in peak hour/peak direction)	105	210	325	325	325	325	325
Transit Travel Time							
Travel time (TTC to Thunderbird Rd, in minutes)	54	52	40	39	38	38	34
Average operating speed (mph)	16	16	21	22	22	22	25
Travel time reduction compared w/ Route 72 No-Build	--	4%	26%	28%	30%	29%	37%
Travel time reduction compared w/ Alt 1 (Limited Stop bus)	--	--	23%	25%	27%	26%	35%
Transit Ridership*							
Estimated daily riders (2016) in corridor	3,713	3,856	4,967	5,006	5,034	5,025	5,229
Increased corridor riders compared w/ Route 72 No-Build	--	4%	34%	35%	36%	35%	41%
Additional passenger boardings (2016) compared w/ No-Build	--	143	1,254	1,293	1,322	1,312	1,516
Increased corridor riders compared w/ Alt 1 (Limited Stop bus)	--	--	29%	30%	31%	30%	36%

Table 28 – Continued

Criterion / Measure	Current Service	Alt 1 Limited Stop	Alt 2 BRT	Alt 3a BRT	Alt 3b BRT	Alt 3c BRT	Alt 4 BRT
Transit Accessibility							
Downtown Scottsdale population and employment served	46,600	46,600	46,600	46,600	44,300	45,500	33,000
Service to Downtown Scottsdale activity centers (number of districts served)	9	9	9	9	8	8.5	5
Roadway Level of Service							
Percent of corridor projected to operate at LOS E or worse	0%	0%	0%	10%	10%	10%	45%
Cost *(thousands of 2010 dollars)*							
Capital cost	--	$1,134	$21,871	$25,736	$26,276	$26,276	$65,462
Annual operating cost	3,332	5,159	7,113	7,113	7,113	7,179	7,213
Total annualized cost	3,332	5,330	9,807	10,211	10,268	10,268	14,345
Additional annualized cost	$0	$1,999	$6,475	$6,879	$6,936	$6,936	$11,014
Cost-effectiveness*							
Operating cost per boarding rider	$2.89	$4.32	$4.62	$4.58	$4.56	$4.61	$4.45
Total annualized cost per boarding	$2.89	4.46	6.37	6.58	6.58	6.59	8.85
Added annualized cost per added rider (vs. No-Build)	--	$45.09	$16.66	$17.16	$16.94	$17.05	$23.44
Right-of-Way and Access							
R/W impacts	--	None	Minimal	Minimal	Minimal	Minimal	Substantial
Business access restrictions	--	None	Minimal	Minimal	Minimal	Minimal	Left turn restrictions

Table 28 – Continued

Criterion / Measure	Current Service	Alt 1 TSM	Alt 2 BRT	Alt 3a BRT	Alt 3b BRT	Alt 3c BRT	Alt 4 BRT
Community Support							
Consistency with local plans	--	Consistent	Generally consistent; some pedestrian issues	Generally consistent; some pedestrian issues	Generally consistent; some pedestrian issues	Generally Consistent; Some pedestrian Issues	Generally consistent
Consistency with streetscape plans	--	Consistent	Generally consistent	Generally consistent	Generally consistent	Generally consistent	Some conflicts
Public support	--	TBD	TBD	TBD	TBD	TBD	TBD
Land Use & Economic Development							
Supports transit-oriented development plans	Limited	Limited	Supports	Supports	Supports	Supports	Supports
Supports local economic development plans	Limited	Limited	Supports	Supports	Supports	Supports	Supports
Financial Feasibility							
Ability to qualify for VSS	No	No	Potentially	Potentially	Potentially	Potentially	Potentially
Local funding feasibility	--	Good	Good	Fair to good	Fair to good	Fair to good	Poor
Implementation							
Meets timeline for implementation	--	Yes	Yes	Yes	Yes	Yes	Unlikely
Level of community disruption	--	None	Minimal	Minimal	Minimal	Minimal	Significant
Convertibility to future fixed guideway transit	--	No constraints	No constraints	May not be able to continue BAT/HOV lanes	May not be able to continue BAT/HOV lanes	May not be able to continue BAT/HOV lanes	No median BRT service during construction

*Based on 2016 (anticipated opening year) ridership forecasts

Source: RPTA study team, August-December 2010

Table 29: Summary of Proposed Operating Characteristics

Alternative (Tempe Transportation Center to Thunderbird Rd)	Peak/Off-Peak Headway (minutes)	Peak Travel Time	Operating Speed (mph)	Revenue Service Vehicles	Total Fleet (with Spares)	Annual Vehicle Revenue Hours	Annual Vehicle Revenue Miles
Current Route 72 service (No-Build)	20/20	54	16	6	8	33,000	466,000
Alt. 1 (TSM) - Limited Stop	15/20	52	16	8	10	27,000	376,000
Alt. 2 BRT Mixed Flow*	10/15	40	21	10	12	40,000	649,000
Alt. 2 with only $725,000 per year^ in operating funds	20/none	40	21	5	6	9,500	155,000
Alt. 3a BAT/HOV*	10/15	39	22	10	12	40,000	649,000
Alt. 3b BAT/HOV*	10/15	38	22	10	12	40,000	649,000
Alt. 3c BAT/HOV*	10/15	38	22	10	12	40,000	658,000
Alt. 4 Median Lanes*	10/15	34	25	9	11	35,000	663,000

*Potentially eligible for FTA Very Small Starts capital funding.
^This is the amount currently allocated from funding available to the RPTA. See the discussion below under Financial Feasibility and in the next chapter.

Source: RPTA study team, August-December 2010

5.3.2.2 Transit Travel Time

The estimated improvements in travel time (from existing conditions) range from 4 percent for Limited Stop service Alternative 1 to 37 percent for BRT Alternative 4. (See Appendix H for details.) Observations on individual alternatives include:

- The travel time benefits of Alternative 1, Limited Stop service, are slight. Some time savings result from the fewer stops compared with local service.
- The additional time savings for Alternative 2, BRT in mixed flow, result not only from fewer stops, but also from transit signal priority (including ITS) and reduced dwell times at the BRT stops.
- Alternative 3a, BRT with some BAT/HOV lanes, queue jump lanes and signal priority, offers additional time savings. However, the savings are limited by the alignment on Scottsdale Road through Downtown Scottsdale, a segment that has no transit priority and would remain relatively slow.
- Alternatives 3b and 3c are slightly faster as a result of a northbound BAT/HOV lane on Drinkwater Boulevard, which is also a higher-speed alternative to Scottsdale Road.
- Alternative 4 provides the greatest travel time savings because of exclusive median transit lanes in some segments, in addition to the features included in Alternatives 3a, 3b and 3c. But the additional travel time reduction is limited because BRT buses would still operate in mixed traffic over most of the route.

5.3.2.3 Transit Ridership

Ridership estimates were developed from current Route 72 ridership through adjustments to reflect the improved transit characteristics, such as faster travel time and increased service. Key base data and other assumptions for the ridership estimates include:

- Current Route 72 weekday ridership is estimated as 3,375 within the project limits of Tempe Transportation Center to Thunderbird Road. This estimate is based on the complete ride check of boardings and alightings conducted on Wednesday, November 10, 2010. In accordance with the FTA guidelines for determining VSS eligibility, this number includes (a) all Route 72 boardings within the corridor in which the new service would be operated, plus (b) trips by riders who boarded outside the study area but remained on the bus after it crossed into that area.

- Current ridership was adjusted to 2016/opening day estimates by applying a ten percent increase to reflect expected growth in the study corridor. Thus, the ridership of Route 72, recently counted at 3,375 in the study area, increases to 3,713.

- It was estimated that 50 percent of the current riders would continue to use local service and 50 percent (1,688) would use new Limited Stop or BRT service. This split was based on a review of riders by stop, which produced a range of approximately 30 to 65 percent, depending on the assumption made for stops within one-fourth mile of a proposed BRT stop. This split is consistent with similar projects such as the MAX BRT line in Las Vegas, Nevada, and follows guidance from TCRP Report 118.

- Adjustments were made to Limited Stop and BRT ridership to reflect increased service frequency and reduced travel times, using standard measures of ridership elasticity. The BRT alternatives (but not Alternative 1) were also adjusted to account for the intangible benefits associated with BRT features, such as higher quality stops/stations, branding, larger and more comfortable vehicles, real-time schedule information, and WiFi. These adjustments, ranging from eight to ten percent based on the features of each alternative, were derived from guidance in TCRP Report 118.

- Ridership for the BRT alternatives was also adjusted to consider the potential benefits of the planned park-and-ride facility at the Thunderbird Road/Scottsdale Road intersection. A two and one-half percent increase was applied for the park-and-ride based on an analysis of the MAG travel model.

- In order to compare ridership with cost, the study team used a factor of 310 to convert total daily (weekday) ridership in the corridor to annual ridership, and to convert annual cost to cost per weekday. The use of 310, rather than 365, reflects a reduced level of transit service on weekends and holidays. These calculations apply both to operating cost and annualized capital cost.

The results of the ridership estimates are shown in Appendix I and summarized in Table 30, along with an estimate of riders per vehicle revenue mile of service. Under any of the BRT alternatives, total ridership in the study corridor (compared with the No-Build scenario) is estimated to increase by thirty-four to forty-one percent. However, the productivity of the service (in riders per vehicle revenue mile) declines from current levels, primarily due to the significant increase in service (with the combination of BRT and local service). The results are similar to the current productivity of other Valley Metro service near the study corridor. For example, the current Mesa LINK service carries approximately 1,300 daily riders; 2,900

when combined with underlying local service (Route 40) in the corridor. The aggregate productivity of the two routes in the Main Street corridor is approximately 1.4 riders per vehicle revenue mile.

These ridership estimates are considered conservative (i.e., likely low rather than high) based on the method that was used. An analysis of the BRT/Route 72 routes from the MAG 2031 travel model run showed an estimated combined ridership of about 7,000 riders per weekday, although MAG assumed higher service frequency for Route 72. A more rigorous estimate of ridership (potentially using the MAG travel demand model) could be conducted as a part of future project development work to better estimate the usage of BRT alternatives. Use of the model might better reflect land use impacts and other socioeconomic factors.

Another measure of performance is daily riders per corridor length (14.3 miles in this case). By this measure, BRT performance ranges from 232 to 250 daily riders per mile. This performance is fairly modest compared to other similar BRT projects nationally. For example, the BRT project on 3500 South in the Salt Lake City area carries over 400 riders per mile and the MAX BRT line in Las Vegas carries over 700 riders per mile.

Table 30: Estimated Ridership and Performance Characteristics (2016)

	Route 72 (20 Min)	Alt 1 Limited Stop	Alt 2 BRT	Alt 3a BRT	Alt 3b BRT	Alt 3c BRT	Alt 4 BRT
Daily Boarding Riders							
Local service	3,713	1,649	1,649	1,649	1,649	1,649	1,649
BRT/Limited Stop service	--	2,207	3,318	3,357	3,385	3,376	3,580
Total corridor riders	3,713	3,856	4,967	5,006	5,034	5,025	5,229
Riders per Vehicle Revenue Mile							
Local service	2.43	1.45	1.45	1.45	1.45	1.45	1.45
BRT/Limited Stop service	--	1.79	1.56	1.58	1.59	1.56	1.65
Total in corridor	2.43	1.63	1.52	1.53	1.54	1.53	1.58
Daily Limited Stop or BRT Riders per Length of Corridor in Miles	--	154	232	235	237	236	250

Source: RPTA study team, August-December 2010

5.3.2.4 Access to Transit Service

This criterion was designed to measure the relative accessibility of transit service in the study corridor and, more specifically, in the Downtown Scottsdale area to evaluate the alignment options there. In the rest of the corridor, there is little difference among the alternatives, since, in combination with the local service, they all fully serve the study corridor population and employment. Alternative 1, however, is proposed to make four more stops than the BRT alternatives, so it would directly serve slightly more population and employment.

In Downtown Scottsdale, two performance measures were used. The first evaluated the projected number of 2030 residents and employees in SAZs adjacent to the alignment in Downtown Scottsdale,

from Earll Drive to Chaparral Road. Where separate northbound and southbound alignments were considered (Alternative 3b), the SAZ totals were averaged.

The second measure addressed service to Downtown Scottsdale activity centers by measuring the number of downtown districts (plus the adjacent Scottsdale Healthcare-Osborn district) located (at least in part) within one-fourth mile of a proposed BRT station. The downtown districts measured were:

Scottsdale Fashion Square	Entertainment District
Southbridge	5th Avenue Shops
Brown & Stetson Businesses	Arts District
Old Town	Civic Center Mall

The analysis shows that, with the exception of Alternative 4 (which is assumed to use Goldwater Boulevard), all the alternatives would provide similar access to downtown population, employment and activity centers. A Goldwater Boulevard alignment, however, would provide worse access to downtown transit markets than a Scottsdale Road or Drinkwater Boulevard routing.

5.3.2.5 Roadway Level of Service

This criterion addresses the potential traffic impacts associated with the introduction of dedicated median lanes, BAT/HOV lanes or queue jump lanes that may shift general purpose vehicle traffic to other lanes. This potential impact was measured by estimating the amount of traffic shifted and the resulting change in LOS by roadway segment. A shift that results in a LOS of E or worse is considered an (adverse) impact. Several assumptions were applied in regard to the shift of traffic and the effective number of travel lanes. For example, it was assumed that a BAT lane (with HOV traffic) would have the equivalent lane capacity of one-half of a general purpose lane. In addition, some modest diversion of auto trips to other routes due to the improved transit service was assumed.

The results of the LOS analysis are provided in Appendix J. In summary, they show that the BAT lanes (if HOV usage is allowed) would have a modest increase in congestion, with seven percent of the study corridor having an increase in LOS from D to E. If HOV use of the BAT lanes was not permitted, the BAT lane segments, constituting 45 percent of the study corridor, would experience LOS F. The analysis also shows that the roadway segments in Alternative 4 with exclusive lanes (lanes dedicated solely to BRT use) would experience LOS F in most cases, with 45 percent of the study corridor deteriorating to LOS E or worse.

5.3.2.6 Cost

Capital Cost

Capital costs for the alternatives were developed using the method discussed in Section 5.2 above and using the multipliers and unit costs from Table 26. Additional elements of the cost estimates include:

- Ten intersections with signal priority (including appropriate ITS) were assumed in Alternatives 2 through 4, pending development of a detailed plan in the Design Concept Report.
- Four queue jump lane locations were assumed in Alternative 2. In Alternatives 3a, 3b, 3c and 4, the BAT/HOV lanes or median lanes would substitute for three of the queue jump lanes. BAT/HOV lanes were assumed to have enhanced features such as overhead message signs.
- For the Alternative 4 exclusive median lanes, a cost range for similar projects (on a per-mile basis) was developed. The base unit construction cost used was $2.5 million per mile, assuming conversion of existing lanes and minimal need to acquire new R/W. Comparison projects included Eugene (Oregon), Las Vegas and Salt Lake City.

- An additional estimated cost of approximately $17 million was included for the proposed single lane undercrossing of Shea Boulevard in Alternative 4.

The capital cost estimates are presented in Table 31. The cost per mile ranges from $1.5 million per mile for Alternative 2 to $4.6 million per mile for Alternative 4, which is consistent with the typical cost range for other BRT projects.

Table 31: Capital Cost Estimates for Alternatives (in thousands of dollars)

Element	Alt 1 TSM	Alt 2 BRT	Alt 3a BRT	Alt 3b BRT	Alt 3c BRT	Alt 4 BRT
Guideway	$0	$960	$3,858	$4,263	$4,263	$34,140
Stations	0	8,179	8,179	8,179	8,179	8,179
Support Facilities	0	0	0	0	0	0
Systems	0	204	204	204	204	204
Construction Subtotal	$0	$9,343	$12,241	$12,646	$12,646	$42,523
Right-of-Way	$0	$0	$0	$0	$0	$0
Vehicles	1,080	8,964	8,964	8,964	8,964	8,340
Professional Services	0	2,523	3,305	3,414	3,414	11,481
Subtotal	$1,080	$20,830	$24,510	$25,025	$25,025	$62,344
Unallocated Contingency	$54	$1,041	$1,226	$1,251	$1,251	$3,117
Total Capital Cost	$1,134	$21,871	$25,736	$26,276	$26,276	$65,462
--Per Mile of Project Length	$79	$1,529	$1,800	$1,837	$1,837	$4,578

Source: RPTA study team, August 2010

Detailed cost estimates for all alternatives are provided in Appendix K.

Operating Cost

Operating costs were estimated on a cost per vehicle revenue mile basis, using the current Valley Metro estimate of $7.15 per vehicle revenue mile. The estimates are shown in Table 32. The combined costs for the BRT and local service are nearly 120% greater than current operating costs for Route 72.

Table 32: Operating Cost Estimates for Alternatives

Alternative (TTC to Thunderbird)	Annual Operating Cost (Per Service)	Annual Operating Cost (All Corridor Transit Services)
Current Route 72 (No-Build)	$3,332,000	$3,332,000
Modified Local Service	2,473,000	N/A
Alt. 1 Limited Stop Bus	2,687,000	5,159,000
Alt. 2 BRT Mixed Flow	4,641,000	7,113,000
Alt. 3a BAT/HOV Lanes	4,641,000	7,113,000
Alt. 3b BAT/HOV Lanes	4,641,000	7,113,000
Alt. 3c BAT/HOV Lanes	4,707,000	7,179,000
Alt. 4 Median Lanes	$4,740,000	$7,213,000

Source: RPTA study team, August 2010

5.3.2.7 Cost-Effectiveness

The study team looked at two cost-effectiveness measures, specifically for the purpose of evaluating the alternatives. (Under the VTA VSS Project Justification Criteria, projects that meet the cost and ridership limits are, by definition, cost-effective.) The first measure was operating cost per boarding rider. For the current Route 72 service in Scottsdale and Tempe, the cost per rider is $3.55 ($7.15 per revenue mile x 2,720 revenue miles ÷ 5,484 boardings). For the six "Build" alternatives, the operating cost per rider (for all service in the corridor, in 2010 dollars) rises to about $4.50 (the range is $4.32 to $4.62), reflecting the higher service levels and operating costs.

A second measure addressed the total incremental cost (capital and operating, on an annualized basis) per additional rider carried. This measure is a variation of the cost-effectiveness measure that the FTA uses for New Starts and Small Starts projects, but does not require for VSS. The FTA's measure addresses both new riders and travel time benefits for existing riders. This approach will require a full travel model run. Therefore, in this chapter the measure addresses only new riders, and, as a result, does not fully capture the potential project benefits.

The total incremental cost was calculated by combining the net additional operating cost with an annualized capital cost. The estimate of annualized cost used the FTA guidance, applying that agency's conservative 10 percent discount rate. The results show a total incremental cost of about $17 per added rider for Alternatives 2, 3a, 3b and 3c, and about $23 for the higher-cost Alternative 4 (Table 28). Alternative 1, Limited Stop Bus, is the least cost-effective of all ($45 per rider), because it attracts far fewer new riders than any of the BRT options.

5.3.2.8 Right-of-Way and Access

This criterion addressed, for each alternative, the potential need for R/W acquisition and the potential impact on business access. This assessment was conducted through a physical review of the study corridor in relation to planned station locations and priority treatments.

Table 33 summarizes the results of this review. They show that Alternatives 1 and 2, which will run in shared curb lanes, will have little or no impact on existing traffic lanes or business access driveways. Alternative 3 will include BAT/HOV lanes in northern and southern parts of the study corridor, which will be dedicated for use by BRT buses and HOV traffic. This treatment includes striping of the lanes but no curb modifications.

Alternative 4 is expected to have significant impacts along the study corridor in the segments where median running BRT is proposed. One general traffic lane in each direction will be dedicated to median running BRT, resulting in fewer general traffic lanes. Median station locations will require modifications to roadway geometry and widening to accommodate the width of the station platforms. Widening may be limited to 10 to 20 feet on either side, extending 100 to 150 feet north or south of the intersection. Intersections where widening may be required include McKellips Road, McDowell Road, Thomas Road, Shea Boulevard and Cactus Road. At Shea Boulevard, widening will be required for a distance extending approximately 1,000 feet north of the intersection. A single median transit lane may need to accommodate bus movements in both directions at Shea Boulevard, due to R/W constraints. A transit underpass could cross Shea Boulevard between Gold Dust Avenue and Mercer Lane.

Alternative 4 will have minimal direct impacts on business access driveways. However, roadway widening at median station locations is expected to impact the first one to two properties on each side of the intersection (see Table 33). In addition, the use of the median for exclusive transit lanes will preclude left turns at locations between signalized intersections. Thus, access to some properties and side streets will require a U-turn movement at a downstream signal. The segments affected extend from Curry Road to Osborn Road and from Shea Boulevard to Thunderbird Road.

Table 33: Impacts on Right-of-Way and Driveways

Cross Street	Impact on Traffic Lanes	Impact on Right-of-Way	Impact on Business Access Driveway	Impact on Properties and Parcels
Alternative 1	No impact on lane configuration	No impact	Existing bus stop locations may be used; driveway impacts are not expected	No impact
Alternative 2	No impact on lane configuration	No impact	Existing bus stop locations may be used; driveway impacts are not expected	No impact
Alternative 3a	Curb lane in each direction will be dedicated to buses and vehicular traffic making right turns	Existing bus stop locations may be used; no driveway impacts are expected	Bus stops may be located on far side in each direction. Driveway impacts are not expected.	No impact
Alternative 3b				
Alternative 3c				

Table 33 – Continued

Cross Street	Impact on Traffic Lanes	Impact on Right-of-Way	Impact on Business Access Driveway	Impact on Properties and Parcels
Alternative 4	One general traffic lane in each direction converted to dedicated median transit lane	Changes to roadway geometry will be required to accommodate curb side median stations on far side in each direction. Widening may be limited to 10 to 20 ft on either side, extending 100 to 150 ft north or south of the intersection. Intersections where widening may be required include McKellips Street, McDowell Road, Thomas Road, Shea Blvd and Cactus Road. At Shea Blvd, Widening will be required approx. 1000 ft north of the intersection.	Minimal direct impact on driveways; restriction on left turn access in segments with median transit lanes (Curry Road to Osborn Road and Shea Boulevard to Thunderbird Road)	Roadway widening is expected to impact the first one to two properties on each side of the intersection. Cactus Rd – 6 parcels Shea Blvd – 2-4 parcels Thomas Rd – 7 parcels McDowell Rd – 4 parcels McKellips Rd – 5-6 parcels

Source: RPTA study team, August 2010

5.3.2.9 Community Support

In terms of compatibility with local plans, the proposed BRT alternatives are consistent with prior regional plans and with local master plans. The *MAG Regional Transit Framework Study* recently identified the Scottsdale Road/Rural Road study corridor as a preferred transit corridor for LRT or dedicated BRT. The MAG RTP programmed Supergrid local service (now operating) along Scottsdale/Rural Road, as well as arterial BRT. The RTP also shows Scottsdale/Rural Road as an unfunded "eligible high-capacity corridor."

The Scottsdale Transportation Master Plan recommends design and implementation of a form of high-capacity transit along Scottsdale Road that connects to METRO LRT and provides "a form of higher-capacity bus service that uses a dedicated or shared guideway to provide Limited Stop service in medium to heavy travel demand corridors."

Scottsdale Road is identified as a conceptual pedestrian corridor in the City of Scottsdale Downtown Plan. In addition, portions of Scottsdale Road, including the segment from McDowell Road to Chaparral Road, are classified in the General Plan as urban arterials, where pedestrian movements are given priority. In these urban segments, there are potential conflicts with elements of the BRT alternatives (such as queue jump lanes) that might require widening of intersections and, as a result, extending pedestrian crossing times.

A second area evaluated was consistency with the Scottsdale streetscape plans. The Scottsdale Road Streetscape Design Guidelines recommend the use of various physical elements that provide a form of visual and character unity to the study corridor. These include a continuous planting strip (8-foot) and sidewalk (8-foot; 10-foot in the Downtown Scottsdale area), green spots at every mile intersection (public gathering areas with shade, benches, and public art), mile markers, benches and art plinths, continuous bike lanes, pedestrian-scale lighting, transit stops, and landscaped or at-grade paved medians. The recommended geometry for Scottsdale Road varies for each segment to minimize impacts to existing curbs, but narrows travel lane and median lane widths as necessary to transfer space to bike lanes. In

Downtown Scottsdale, more reconstruction may need to occur to widen and standardize sidewalk widths, potentially reducing on-street parking.

In general, the proposed BRT alternatives are compatible with the streetscape plans. While there may need to be minor adjustments to accommodate the BRT stations, the stations can complement, and have their design coordinated with, elements of the streetscape plan. One possible conflict area is the far-side, pull-through bus bays (if used with queue jump or BAT/HOV lanes), since they may reduce the sidewalk and landscape areas at some intersections. Another conflict associated with Alternative 4 is the elimination or reduction of opportunities for a landscaped median. However, the streetscape design guidelines state that they should not preclude future high-capacity transit options that can be constructed along the Scottsdale Road/Rural Road study corridor.

The third measure considered under community support was the general level of public support for the alternatives. Initial community meetings and focus groups have shown support for better transit in the study corridor and, in particular, for improved travel times and more frequent service. All of the alternatives address those issues. Other public views on the alternatives, including the trade-offs associated with the proposed transit priority treatments, will be considered through the next round of public meetings. The relatively small groups who attended the first set of meetings showed no consensus for any one alternative.

5.3.2.10 Land Use and Economic Development

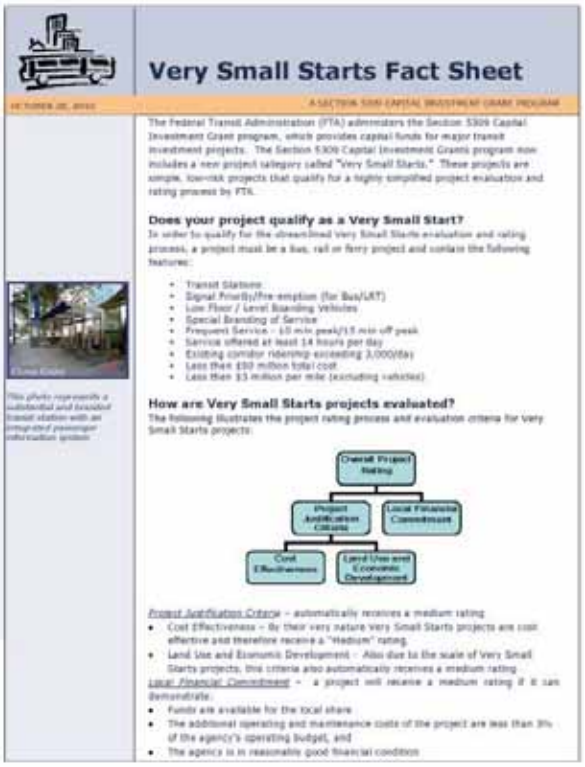
This criterion was designed to measure the degree to which each alternative supports and encourages local policies and plans for transit-oriented development and for economic development in general. This was measured by a qualitative assessment based on research and input from planning staff at the Cities of Scottsdale and Tempe. The BRT alternatives support and encourage transit-oriented development, compared with current transit service and Limited Stop service. For example, the Scottsdale Transportation Master Plan recommends "enhanced bus service" that might support such development along Scottsdale Road. Tempe plans and policies will lay a foundation for it under every alternative. Alternative 4 might offer some additional support for transit-oriented development in segments with semi-exclusive median running.

In terms of economic development, both Tempe and Scottsdale have development plans in the study corridor, with Scottsdale's redevelopment efforts focused south of the downtown. While the BRT alternatives support the development plans, comments from city staff indicate that they see no significant difference in this among the BRT alternatives.

The land use and economic development criterion is not a major differentiator for the BRT alternatives. However, local support for transit-oriented development and economic development with enhanced transit is an important element for securing federal transit funding through the FTA's VSS program. In this regard, local efforts support the BRT alternatives but could be strengthened to improve the likelihood of securing funding. Local policies and programs can be modified as a project is further defined during future development phases.

5.3.2.11 Financial Feasibility

Three aspects to the potential financial feasibility of individual alternatives are: the ability to qualify for and receive federal transit funds, the adequacy of local capital funds, and the availability of sufficient operating funds. The first element relates to the ability to qualify for VSS. These funding programs have specific eligibility requirements for BRT projects, such as corridor ridership, service frequency, and branding. The BRT alternatives are all designed to meet these requirements, and would qualify for funding with an adequate level of peak and off-peak service. Alternative 1 would not meet the FTA guidelines and would not qualify for VSS funds.


Very Small Starts Fact Sheet

Does your project qualify as a Very Small Start?

How are Very Small Starts projects evaluated?

Regarding whether the alternatives would compete well for the limited FTA funds, a key issue is whether the project will qualify specifically for VSS, which is designed for smaller BRT projects like Alternatives 2, 3a, 3b and 3c. Given the cost-effectiveness (only fair) of the proposed BRT alternatives, securing FTA funds through the VSS program appears to be the best funding opportunity. Beyond cost-effectiveness, a number of characteristics should allow the Scottsdale Road/Rural Road corridor to compete well, including a strong corridor (as documented in Chapter 3, Purpose and Need), local support, compatible plans, and good transit connections, including METRO LRT.

In summary, Alternatives 2, 3a, 3b and 3c would be good candidates for the VSS program. Alternative 4 would not qualify for the VSS program, due to the high project cost, and would likely be a fair to poor candidate for Small Starts, because of its relatively low cost-effectiveness.

If a BRT project qualified for FTA funds, it could receive 50 to 80 percent of the project capital cost through the FTA program. For the lower-cost alternatives, the local match would be in the range of $5 million to $13 million. The MAG RTP has identified potential funding for a Scottsdale/Rural Road BRT project of $21.8 million (which includes $17.7 million for infrastructure and $4.1 million for vehicles). Thus, it appears there is sufficient capital funding available for all of the alternatives except 4. If the project does not receive FTA funds, there appears to be sufficient local capital funds for the basic mixed-flow BRT service (Alternative 2), but additional funds may be needed for priority treatments (such as BAT/HOV lanes) that are part of other alternatives.

The RTP allocated $725,000 annually in operating funds for BRT in the Scottsdale/Rural study corridor—about one-fourth of the estimated $3.1 million needed (after adjusting for a 19% fare recovery). The RTP also allocated $4.05 million for all services (local and BRT) in the study corridor, out of an estimated need of $5.84 million. Therefore, additional operating funds (between $1.7 and $2.3 million annually) would need to be allocated to support a reasonably effective BRT service in the study corridor. Currently earmarked regional operating funds may be insufficient to operate more than a limited-stop, peak-period service or a significantly reduced BRT service that would not meet VSS guidelines. Another option, discussed further in Chapter 6, is to reduce service on Route 72 and use some of the savings to operate a higher-quality BRT service on Scottsdale and Rural Roads.

5.3.2.12 Implementation

Three aspects of implementation were addressed. The first is the feasibility of developing and opening the first phase of service by 2016. A typical schedule was developed that fit with the planned start date. Key elements of this schedule include:

2011 to 2012	Project development
2012 to 2013	Environmental clearance and approval of FTA funding
2013 to 2015	Construction of fixed facilities and acquisition of vehicles
Fall 2015	Testing and start up activities
January 2016	Start of operations

All of the alternatives, with the possible exception of Alternative 4, can meet this timeline for implementation.

The second aspect of implementation concerns the potential for community disruption during construction, including traffic delays, pedestrian conflicts and business impacts. Alternative 1 would have no impacts, while those of Alternative 4 are likely to be significant. For the other BRT alternatives, disruption during construction is not expected to be significant in most of the study corridor. There are, however, likely to be temporary localized impacts of short duration associated with station construction and (in Alternative 3) development of BAT/HOV lanes. These impacts are expected to be slightly less with Alternative 2 than with 3a, 3b and 3c.

The final implementation measure addresses the potential for conversion to future fixed guideway transit. For the most part, the alternatives under consideration would neither aid nor constrain the potential for a future fixed guideway system. There are some issues to consider, however. Alternative 4, which provides segments of median transit lanes, would create lanes in a portion of the study corridor that could be converted to fixed guideway if appropriately designed. However, such a conversion would require BRT service to be discontinued or shifted to mixed-flow operation while the guideway was being constructed. Other service alternatives, such as mixed-flow BRT or BAT/HOV lanes, could continue to operate during construction, although the combined traffic impacts of median guideway construction and BAT/HOV lane operation could create pressure for early discontinuance of the latter.

5.4 Conclusions and Recommendations

5.4.1 Conclusions

The evaluation of alternatives addressed two key issues: 1) Does BRT provide sufficient benefits to the Scottsdale Road/Rural Road study corridor, compared to current transit service and a Limited Stop TSM service, to warrant further development and potential funding?, and 2) Which priority elements and route alignments should be further considered? Regarding the first issue, the key questions to be addressed include:

- Do the potential transit improvements provide sufficient benefits to justify the capital and operating costs and other impacts?
- Is the potential project financially feasible?
- Are the potential transit projects consistent with community plans, and do they support growth and development in the study corridor?

The study team's evaluation shows that the BRT alternatives provide a significant increase in transit service in the study corridor, with more frequent service and greater capacity. In addition, BRT provides higher-quality service benefiting both current and new transit users (faster service, improved stations and vehicles, better customer information, and a branded identity).

The performance and cost-effectiveness of the BRT alternatives are below average compared to other national BRT projects, but compare well with similar projects in the region, such as the Mesa LINK service. The high level of BRT service (to meet the FTA VSS requirements and to maintain existing local bus service) requires a substantial increase in operating funds, however.

Alternatives 2, 3a, 3b and 3c are potentially feasible in terms of capital cost, community impacts and capital funds (especially if eligible for the FTA VSS program). Alternative 4 has potentially major community impacts, high cost and poor cost-effectiveness and is unlikely to be financially feasible.

Alternative 2, BRT in mixed traffic, offers most of the benefits of BRT without any potential traffic or community impacts and is slightly more financially feasible. Moreover, the City of Scottsdale, in which most of the project lies, is committed to supporting and enhancing this alternative with sophisticated transit vehicle priority and ITS.

Questions related to the second issue - design of the potential BRT project include:

- What transit priority techniques provide the most benefit in comparison to potential impacts, and are most consistent with local plans and policies?
- What is the best alignment to balance service to the Downtown Scottsdale area with the study corridor's transit needs?

The evaluation estimates that moderate to good travel time savings can be achieved with signal priority and limited stops, as in Alternative 2. Additional savings can be reached with other treatments (e.g. queue jump lanes) where cost-effective and compatible with local plans. The exclusive median lanes in Alternative 4 provide the greatest benefit, but would only be implemented in a relatively small portion of the study corridor, and they have the greatest traffic, community and cost impacts.

Downtown Scottsdale would be best served by a routing on either Scottsdale Road or Drinkwater Boulevard, since those alignments serve the most residents, jobs, retail establishments and other activities. A Scottsdale Road alignment would be slower than Drinkwater Boulevard, but would have maximum visibility to visitors and would offer the most convenient transfers between BRT and local bus service.

5.4.2 Study Recommendations

Based on the technical evaluation and conclusions presented in this chapter, and subject to additional community review, the following study recommendations are proposed:

- Alternative 2, BRT in mixed traffic operation, is recommended for further project development. This alternative provides substantial transit service improvements in the study corridor and attracts a significant number of new riders at a lower cost than the other BRT alternatives and with the least community impact.

- In the further development of Alternative 2, additional opportunities for transit priority treatments should be explored. If feasible and cost-effective, additional transit priority would improve BRT travel time and reliability, and attract riders. The following menu of treatments should be considered, as appropriate to the traffic conditions and physical design of specific locations:

    - Enhanced transit signal priority, integrated with planned ITS features in the study corridor
    - Queue jump lanes that would bypass key areas of congestion while minimizing impacts to auto and pedestrian movement

  - BAT/HOV lanes, if locations exist where they are compatible with business access needs and provide sufficient travel time benefits
  - Fare collection systems that would reduce dwell time at stations

- In Downtown Scottsdale, service on both Scottsdale Road and Drinkwater Boulevard should continue to be explored, since those routes best serve the downtown area. Local service would likely remain on Scottsdale Road, but BRT service could operate on Drinkwater Boulevard, possibly in the peak period only. Operating BRT on Scottsdale Road through Downtown Scottsdale has major advantages, however, including: (a) meeting the expectation of current riders that Scottsdale Road is the north-south transit corridor, and (b) facilitating transfers between BRT and local buses, assuming that the latter remain on Scottsdale Road.

Chapter 6 - Project Finance

This chapter describes potential funding alternatives for BRT on Scottsdale and Rural Roads. The two major cost categories are capital (expenditures on facilities, rolling stock and equipment, plus R/W), and operating, including maintenance. Federal capital assistance programs play a crucial role in most U.S. transit investment projects, although matching local contributions are required. Paying for transit operations is primarily a local and regional responsibility. Since the amount of operating funds that the RPTA will have available for this project is currently unclear, this chapter presents several BRT service scenarios that could be funded at various levels.

6.1 Federal Funding for Capital Costs

6.1.1 FTA Section 5309 VSS Funds

6.1.1.1 Overview

The Small Starts Program is a component of the existing FTA New Starts (49 United States Code Section 5309 Capital Investment Grant) Program. By creating the Small Starts program, Congress and the FTA scaled the New Starts planning and project development analysis to fit the size and complexity of smaller fixed guideway and BRT projects. Within Small Starts, the FTA created the VSS project category as a mechanism whereby simple, low-risk projects can qualify for a highly simplified and expedited project evaluation and rating process.

Eligibility Requirements - In order to qualify for the streamlined VSS process, the FTA requires that projects include the following features:

- Transit stations
- Signal priority/pre-emption
- Low floor/level boarding vehicles
- Special branding of service
- Frequent service – 10-minute peak and 15-minute off-peak
- Service offered at least 14 hours per day
- Existing corridor ridership exceeding 3,000 per weekday
- Less than $50 million total capital cost
- Less than $3 million per mile (excluding vehicles)

Proof of Eligibility - To prove that a proposed project qualifies as a VSS, applicants are required to submit: (1) a detailed definition of the locally preferred alternative; (2) documentation that existing transit riders in the corridor exceed 3,000 per average weekday; and (3) a transit operating plan.

6.1.1.2 VSS Project Evaluation Criteria

The evaluation and rating process for VSS is simple and streamlined compared to both traditional New Starts and (larger) Small Starts projects. The combined Small Starts and VSS funding category receives a total of $200 million per year. (www.fta.dot.gov/planning/newstarts/planning_environment_222.html)

Proposed VSS projects that achieve a "Medium" or better rating for project justification and local financial commitment criteria are eligible to receive funding. The FTA applies the criteria as follows:

Project Justification Criteria - Cost-effectiveness and support of land use and economic development are inherent characteristics of a project that qualifies for the VSS program. Therefore, all VSS projects automatically receive a "Medium" rating for these particular criteria.

Local Financial Commitment - Because project justification criteria are automatically "Medium" for VSS, the overall rating is dependent upon local financial commitment. The FTA will evaluate the financial capability of the project sponsor to construct and operate the proposed investment. A project will receive a "Medium" financial rating if it can demonstrate that:

- Funds are available for the local share;
- The additional operating and maintenance costs of the project are less than 5% of the agency's operating budget; and
- The agency is in reasonably good financial condition.

6.1.1.3 VSS Project Development Process

Simplified AA - VSS projects can use a simplified AA process. Key elements would include the following:

- Description and assessment of the transportation problem or opportunity to improve service.
- Project description, including the scope, list of project elements, costs and expected effect on transit service in the corridor.
- Project effectiveness, including a comparison to current conditions.
- Determination of whether the project sponsor can afford the capital and operating costs of the project.
- Explanation of the choice for the project, including an analysis of the likelihood of achieving the project goals and any uncertainties.
- Plan for implementing and operating the proposed project.

Source: http://www.fta.dot.gov/documents/Very_Small_Starts_Fact_Sheet_Feb_7th.doc

In order to gain approval from the FTA to enter the next phase of the project development process, the project sponsor must (a) complete the AA, with an LPA having been adopted and included in the MPO's long range plan, (b) receive a "Medium" rating or better for the project, and (c) submit a Project Management Plan, including a project budget and schedule.

Project Development (Preliminary Engineering and Final Design) The FTA has combined the preliminary engineering and final design work into a single phase referred to as Project Development.

Project Construction Grant Agreement - Under Section 5309, financial assistance for construction of a VSS project is provided through a Project Construction Grant Agreement that is negotiated during project development. VSS projects are also required to submit a simplified Before-and-After Study following project implementation.

6.1.1.4 VSS Funding

The FTA may recommend a VSS project for funding after it has been approved to enter project development, is "ready" to be implemented, and continues to be rated at least "Medium" for both project justification and local financial commitment. A project that meets these conditions will be eligible to receive Section 5309 Capital Investment Grant funds, subject to funding availability.

6.1.2 Other Federal Transit Funding Programs

FTA Section 5307 and 5340 Funds - The FTA 5307 Urbanized Area Formula Program makes federal resources available to urbanized areas for transit capital and operating assistance in urbanized areas. Funding is apportioned on the basis of legislative formulas. For areas with populations of 200,000 and

more, like the MAG region, the formula is based on a combination of fixed guideway vehicle revenue miles and fixed guideway route miles, as well as population and population density. The Growing States and High Density States Formula Program apportions additional funds to the Section 5307 and Rural Area (Section 5311) formula fund recipients.

Apportionments for the MAG Region in fiscal year 2010 under the Section 5307 and 5340 programs totaled over $20.5 million. (FTA, FY 2010 Available Funding and Apportionments for Grant Programs, www.fta.gov/funding/apportionments/grants_financing_11165.html).

FTA Section 5309 New Starts Funds - The FTA 5309 New Starts Program is the federal government's primary financial resource for supporting locally planned, implemented, and operated major transit capital investments that are too large to fit within the Small Starts or Very Small Starts funding category. New Starts funds are limited and the program is extremely competitive, with the national demand for funding far exceeding the supply of funds available. While this federal program can fund up to 80 percent of the capital cost of a project, the average New Starts project receives about 50 percent of its capital funding from the New Starts program. In fiscal year 2010, the FTA allocated about $1.98 billion in funding for capital investment grants (FTA, FY 2010 Available Funding and Apportionments for Grant Programs, http://www.fta.gov/funding/apportionments/20grants_financing_11165.html).

Congestion Mitigation and Air Quality (CMAQ) Funds - CMAQ funds are available through the FHWA and the FTA for projects that improve air quality in areas that do not meet clean air standards, otherwise known as nonattainment areas. Projects may include a wide variety of highway, transit and alternative mode projects that assist such areas in complying with the National Ambient Air Quality Standards. While these funds are allocated to the state, Arizona's funds have been dedicated entirely to the MAG region, owing to the high congestion levels and major air quality issues in the Phoenix metropolitan area.

6.2 Local Funding for Capital Improvements

The RPTA expects to use a combination of federal and local funds to defray capital and R/W costs associated with the Scottsdale Road/Rural Road BRT projects. Capital costs, as enumerated in Chapter 5, include vehicles (both 60-foot and 40-foot buses), station/stops, fare instrument vending machines (or wiring for future machines), signal priority and ITS equipment, (possibly) queue jumpers or bypass lanes at selected intersections, and related professional services.

The MAG TIP for fiscal years 2011-2015 contains approximately $45 million for capital and R/W expenditures in the study corridor. Table 34 shows the programmed federal/local split for each category. The source of federal funds is listed as Section 5307, but a successful VSS application would allow the 5307 funds to be used elsewhere in the region. The regional funds will come from the portion of Proposition 400 revenue that is dedicated to regional bus system improvements. All expenditures are programmed for FY 2014 and 2015. Pending further project development work, the total amount in Table 34 is adequate for the *capital needs* of the proposed LPA, although it may be necessary to shift R/W funds to other capital needs of the project.

Table 34: Capital and Right-of-Way Funding Summary, 2014 and 2015

Improvement Type	Total Amount Programmed ($000)		
	Federal Funds	Regional Funds	Total
Right-of-way (R/W)	$17,408	$4,908	$22,316
Capital (non-R/W)	11,206	11,206	22,412
Total	$28,614	$16,114	$44,728

Source: MAG Final Transportation Improvement Program for Fiscal Years 2011-2015, adopted July 28, 2010.

6.3 Scenarios for Funding Various Levels of BRT Operation

According to RPTA staff, $725,000 per year (in 2010 dollars) has been allocated to operate BRT on Scottsdale and Rural Roads. The total available for fixed-route bus operation in the corridor, including Route 72, is $4.05 million. The study team used the following assumptions, along with the cost information developed in Chapter 5, to estimate how much funding will be needed for various levels of BRT service:

- The approximate length of the corridor, from the TTC to Thunderbird Road, is 13.775 miles. The length of other Route 72 segments is about 11 miles (TTC to Chandler Fashion Center) and 4 miles (Thunderbird Road to Thompson Peak Parkway). Only the funds used to operate the portion of Route 72 within the study corridor might be available for transfer to BRT or similar service.
- The typical vehicle operating and maintenance cost is $7.15 per vehicle revenue mile. (Source: RPTA, 2010)
- Fare recovery is 19 percent of operating cost. All required funding amounts are exclusive of this assumed fare revenue. (Source: RPTA, 2010)
- There are 255 weekdays per year, excluding major holidays.
- The peak period spans six hours each weekday: roughly 6:00-9:00 a.m. and 3:30-6:30 p.m.
- Although VSS requires a service span of at least 14 hours, a span of 16 hours (5:00 a.m.-9:00 p.m.) is preferred, and recommended as part of the LPA.
- In most cases, 30 minutes is the minimum acceptable frequency of service, for both local and BRT buses. No existing service (e.g., Route 72) will be reduced below this level to support a new service (e.g., BRT).
- Establishing high-quality weekday BRT service is the highest priority. Weekend service is an option if additional funding can be secured.
- The operating funds set aside for BRT would be used throughout the corridor as a seamless whole. In reality, the currently dedicated funds come from Scottsdale's portion of regional transit operating funds. The City of Tempe no longer has money available to operate BRT in its portion, because that city has reallocated its share through the Transit Life Cycle Program review process to the proposed Mill Avenue modern streetcar. During and after the Design Concept Report (DCR) phase, the RPTA would work with Tempe to find sources of funding to operate the approximately three-mile segment from McKellips Road to Downtown Tempe and ASU.

Table 35 presents five scenarios for weekday BRT service in the Scottsdale Road/Rural Road corridor. The independent variable is the amount of regional operating funds available per year.

With the $725,000 currently set aside for BRT in this corridor (Scenario A), only minimal peak-period service could be offered. If the Route 72 frequency were reduced to 30 minutes in the study corridor and the cost savings ($408,000 annually) transferred to BRT, then the latter could operate every 12 to 15 minutes during peak hours only (Scenario B). Alternatively, the same $1.133 million ($725,000 plus $408,000) could be used to provide a 20-minute peak period frequency, along with minimal 60-minute off-peak service. If the RPTA could allocate $2.853 million per year, it would have sufficient funds to deliver the minimum BRT service required for VSS eligibility: 10 minutes during peak periods, 15 minutes off-peak, and 14 hours of operation every weekday (Scenario D).

As indicated in Chapter 5, approximately $3.1 million per year—or more than four times the amount currently budgeted—would be needed to offer 10-minute service for six peak hours and 15-minute service for ten off-peak hours (Scenario E). Even this funding level includes no allocation for weekend service. The estimated annual cost of providing Saturday and Sunday service (every 30 minutes, with a 14-hour span) is approximately $465,000, or 15 percent of weekday Scenario E.

Based simply on mileage, Scottsdale would be responsible for 80 percent of the operating cost of Scottsdale/Rural BRT, and Tempe for the remaining 20 percent. These proportions will change if service is eventually extended north beyond Thunderbird Road.

Table 35: Sample Operating Scenarios for Scottsdale Road/Rural Road BRT Service Based on Annual Funding Level

Scenario	Annual Operating Funds ($000)	Revenue Miles per Weekday	Vehicle Trips per Day		Operating Frequency (minutes)		Span of Service (hours)	
			Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
A	$725*	491	36	0	20	No service	6	None
B	1,133**	767	56	0	12-15	No service	6	None
C	1,133**	767	36	20	20	60	6	10
D	2,853***	1,932	72	68	10	15	6	8-9
E	$3,100****	2,099	72	80	10	15	6	10

*Amount currently set aside annually to fund Scottsdale Road/Rural Road BRT operation. No change to current Route 72 local service.
**Assumes $725,000 annual allocation to BRT (as above), plus $408,000 shifted from Route 72 by reducing its weekday frequency to 30 minutes between Thunderbird Road and the Tempe Transportation Center.
***Assumes $2.445 million annual allocation to BRT, plus $408,000 shifted from Route 72 by reducing its weekday frequency to 30 minutes between Thunderbird Road and the TTC. This is the minimum scenario that meets the FTA's VSS requirements.
****Amount required to operate BRT 16 hours a day with 10-minute frequency at peak times and 15 minutes off-peak. Meets VSS requirements and level of BRT service assumed in Chapter 5 of this report. Would require a regional allocation of $2.692 million annually, plus $408,000 shifted by reducing service on Route 72 within the study corridor.

*Scenarios in **bold italics** meet minimum FTA service requirements for Very Small Starts eligibility.*

Source: RPTA, October 2010.

Chapter 7 - Project Implementation

This chapter addresses several related aspects of implementation of the LPA: the project schedule, routing options for the LPA, and other implementation issues. Many of these will require further study and resolution in the DCR—which the RPTA has postponed, as explained below.

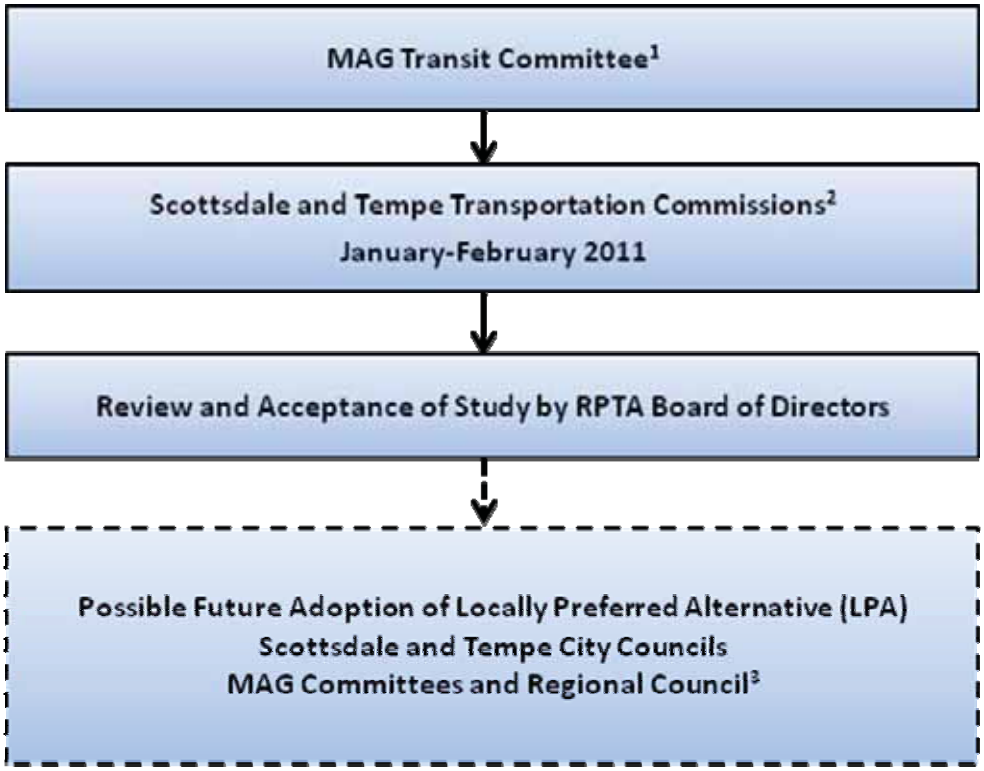
7.1 Implementation Schedule

Following the public involvement process and the development of the Draft Scottsdale Road/Rural Road AA Report, the study findings were presented as information items to the Scottsdale Transportation Commission, the Tempe Transportation Commission, and the MAG Transit Committee. The transportation subcommittee of each City Council has the opportunity for a similar informational presentation. The RPTA Board of Directors will then have an opportunity to review and accept the study. Figure 23 summarizes the study review process that began in December 2010.

At this time (February 2011), RPTA staff have elected not to proceed with the DCR for the Scottsdale Road/Rural Road corridor, and are therefore not recommending formal adoption of the LPA by MAG, the City of Scottsdale or the City of Tempe. The reason is that the current economic recession has caused regional transit revenue to drop substantially lower than previous projections—even recent ones. Until new long-range projections are available in the spring of 2011 for use in reprogramming RTP transit improvements, it is unclear whether or when implementation of the LPA will be feasible. Higher-capacity transit service on Scottsdale and Rural Roads may have to be delayed, scaled back, or both.

When and if sufficient local funding can be secured for the project, the next step will consist of adoption of the LPA into the MAG RTP. The RPTA will then prepare an application to the FTA to request entry into project development. The implementation schedule for the LPA, as illustrated in Figure 24, assumes that the Scottsdale Road/Rural Road BRT project would be funded as a Very Small Start. For VSS projects, both preliminary engineering and final design are included in project development. Implementation of the project would be completed following project development through a recommendation of funding by the FTA and negotiation of a Project Construction Grant Agreement or Capital Grant Award. Public involvement would continue throughout project development and construction. Because of the current funding uncertainties, no specific dates are shown in the chart.

Figure 23: Study Review Process



Sources: RPTA study team, 2010

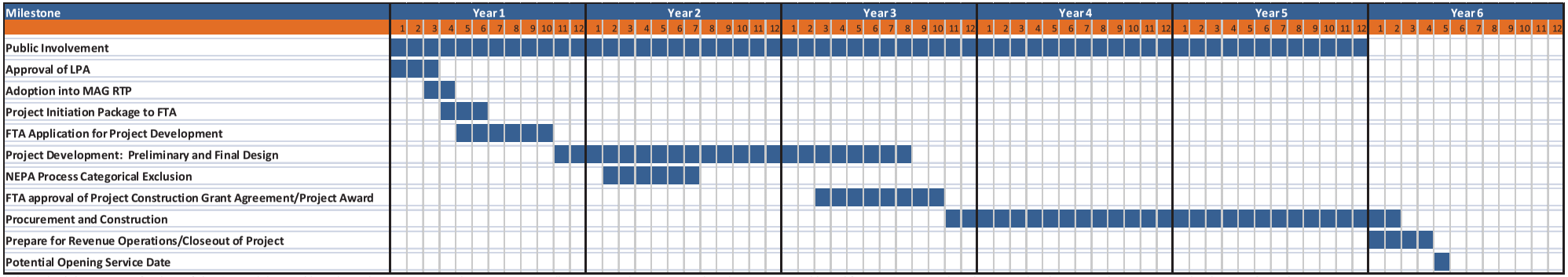
NOTES:

[1] ***MAG Transit Committee***: The MAG Transit Committee reviewed the project LPA as an information item.

[2] ***Scottsdale and Tempe Transportation Commissions***: The Scottsdale and Tempe Transportation Commissions were briefed on the study findings as an information item.

[3] After approval by the Scottsdale and Tempe City Councils, and by the MAG Transportation Policy and Management Committees, the MAG Regional Council would be asked to adopt the LPA into the RTP. This would occur at an unspecified future date after availability of funding has been clarified.

Figure 24: Scottsdale Road/Rural Road Draft Implementation Schedule*



*This schedule assumes funding of the Scottsdale Road/Rural Road BRT Project under FTA Very Small Starts. It also assumes that the project would qualify as a Categorical Exclusion under the National Environmental Policy Act (NEPA).

Source: RPTA study team, 2010

7.1.1 Application for Entry into FTA Project Development

As shown in Table 36, several documents must be prepared for inclusion in the application to enter FTA project development. Each "Reporting Item," as well as the "Required Information," is based on the FTA's *Updated Interim Guidance and Instructions: Small Starts Provision of the Section 5309 Capital Investment Grants Program, July 20, 2007*.

Table 36: Required Application Information for VSS Projects to Enter FTA Project Development

Reporting Item	Required Information
Evidence of Project Readiness	
Alternatives Analysis Report	Final Report
Selection of the LPA and adoption into Constrained Long Range Plan	Proof of local action
Initial information for Before and After Study	Ridership and cost inputs and estimates
NEPA Scoping	Scoping report or memorandum showing evidence of completion
Evidence of sponsor technical capacity	Preliminary Project Management Plan, and/or other materials
Project Background	
Project Description	Project Description template
Make the Case Document	Narrative, data, (to include all basic VSS criteria such as documentation showing over 3,000 daily weekday riders in the project corridor), maps, graphics
Project Maps	
Project site map	Map
Vicinity map	Map
Capital Costs	
Standard Cost Categories, including schedule, inflation, and funding	Standard cost category worksheets
Other Factors (optional)	
Evidence of economic development, congestion pricing, and other project benefits	Narrative, data, maps
Local Financial Commitment	
Financial Plan Summary	Finance template
Evidence of agency financial condition	Audited financial statements
Evidence that project O&M* costs are less than 5% of systemwide O&M costs	O&M Cost Analysis
Supporting financial documentation	Narrative, plans, data, etc.

*O&M = operating and maintenance
Source: FTA, 2007

Once the FTA has approved the project for entry into project development, design and environmental documentation can proceed. For Very Small Starts, project development includes both preliminary and final design.

7.1.2 DCR and Environmental Process

The DCR and environmental process would commence following approval of the Scottsdale Road/Rural Road study corridor into project development by the FTA. The DCR would include a further refinement of the LPA to include Downtown Scottsdale route options, as well as additional detail and analysis of station locations. For purposes of scheduling and the overall environmental process, it is assumed that the project would qualify as a Categorical Exclusion under the National Environmental Policy Act (23 Code of Federal Regulations 771.117).

7.1.3 FTA Funding Recommendations

Based on overall eligibility requirements, the FTA may recommend the project for funding following approval to enter project development. The Scottsdale/Rural project must achieve an overall rating of "medium" and continue to do so throughout the process.

7.1.4 Project Construction Grant Agreement

If the FTA decides to fund the project under Section 5309, a Project Construction Grant Agreement (PCGA) will be negotiated, or the FTA can administer funding as a capital grant. A capital grant can be awarded if the project request is less than $25 million, and if it can be met with a single-year appropriation with existing appropriations. Other FTA requirements associated with Small Starts and VSS may need to be satisfied in order to secure the PCGA.

7.1.5 Before-and-After Study

The Before-and-After Study is a requirement of the FTA for all New and Small Starts Projects, including VSS, to document the impact of the transit investment on overall transit service and ridership. It is also a measure of how the project was predicted to perform versus actual performance. As specified by the FTA, the Before-and-After Study for a VSS project would consist of the following:

1. Comparison of post-construction cost summary (in the FTA standardized cost categories) *with* the cost estimate at the time of entry into project development;
2. A comparison of actual ridership (boardings and alightings) in the study corridor provided in the application to enter project development *with* new counts done two years after opening; and
3. A comparison of transit schedules and frequencies in the study corridor at the time of entry into project development *with* their counterparts two years after opening.

7.2 Routing Options for the Locally Preferred Alternative

7.2.1 Downtown Scottsdale Alignment

As discussed in Chapter 6, both Scottsdale Road and Drinkwater Boulevard should be considered as possible BRT alignments in the DCR. Drinkwater Boulevard may offer shorter travel times and less congestion at certain times of the day. However, there are several reasons to treat Scottsdale Road as the first choice, with Drinkwater Boulevard as the back-up in case Scottsdale Road proves unworkable. Reasons for preferring Scottsdale Road include:

- It is the current and traditional transit corridor through downtown. Residents and visitors expect to see and use buses on Scottsdale Road, which was the original north-south route in the city.
- Except for the stadium and Scottsdale HealthCare, visitor attractions and activities tend to center on Scottsdale Road. BRT will be more visible here to potential riders who might not otherwise know about the service.
- Operating BRT on Scottsdale Road will facilitate transfers to and from local buses (Route 72). Assuming that the latter remain on Scottsdale Road, transfers between them and a Drinkwater Boulevard BRT service will require a walk of at least one-fourth mile in each direction, or frequently operating shuttle services connecting the two streets.
- Resorts will want to see their seasonal shuttles replaced by a route that directly serves the retail, restaurant and entertainment hub of downtown.
- BRT use of Drinkwater Boulevard would present some operational and traffic issues. For example, no traffic signal exists at the intersection of southbound Drinkwater with Scottsdale Road. A new

one would need to be installed midway between existing signals at Osborn Road and Earll Drive. This would slow both Scottsdale Road traffic and southbound BRT.

- The City of Scottsdale could realign its trolley system to feed a BRT station from Scottsdale HealthCare and the city government facilities on Drinkwater.

Although these are strong arguments, the DCR needs to explore the full impacts of operating both BRT and local buses on Scottsdale Road through the downtown. Before local service was reduced in July 2010, there were four buses per hour per direction on Scottsdale Road. With BRT operating on a 10-minute peak headway and Route 72 at a 30-minute frequency, the number would double to eight per hour. Although Central Avenue in Phoenix carried more peak hour local and express buses in the days before LRT, that roadway had three lanes per direction and longer distances between traffic signals, so buses could pass one another fairly easily. The DCR needs to determine whether BRT buses might get stuck behind locals in the Downtown Scottsdale area, and what might be done to avoid this problem. Clearly, careful scheduling is the first line of defense, but other strategies need to be considered.

The short blocks, frequent traffic signals and limited sidewalk space in Downtown Scottsdale create a potential problem for BRT bus stops. If the RPTA decides to have BRT buses use dedicated stops that are separate from local stops, this policy may be difficult to implement downtown, where the opportunities for additional stops (especially ones long enough to accommodate 60-foot buses) may be few. On the other hand, if BRT and local buses are required to share stops in this area, there will be issues if a BRT bus arrives while a local is using the stop. In some cases, BRT stops may have to be located a block or two away from the preferred location at a major cross street intersection with connecting bus routes.

Another issue that may affect BRT operation in Downtown Scottsdale is on-street parking on Scottsdale Road. Both angle and parallel spaces exist, as Table 37 indicates. Along the approximately 0.75-mile segment from 4th Street to Drinkwater Boulevard (north), there are 34 parallel spaces and 15 angle spaces. The main BRT issue with respect to Scottsdale Road parking is whether the increased number of buses would interfere with parking movements. If the DCR revealed that the Downtown Scottsdale BRT stop must be located a substantial distance from Indian School Road, installation might entail the loss of a few spaces.

Table 37: Existing Parking on Scottsdale Road in the Downtown Area

From	To	Parking Spaces	
		Angle	**Parallel**
4th Street	2nd Street	0	11(W)
2nd Street	1st Street	5(E)	0
1st Street	Main Street	7(E)	0
Main Street	1st Avenue	0	3(E), 3(W)
1st Avenue	3rd Ave	0	0
3rd Ave	5th Ave	3(W)	13(E)
5th Ave	Drinkwater Blvd	0	4(E)
Total		***12(E), 3(W)***	***20(E), 14(W)***

E = East side W = West side

Source: RPTA study team, October 22, 2010

7.2.2 Southern Terminus of BRT Route

The DCR should include further analysis and a final recommendation regarding the southern terminus. This Scottsdale Road/Rural Road AA Study recommends that the Scottsdale Road/Rural Road BRT service terminate at the TTC. Extending service from the Rural Road/University Drive METRO LRT station to the TTC maximizes transfer opportunities, but will require some rearrangement of bus berthing assignments

at the TTC to accommodate BRT buses laying over between trips. Although the round trip from Rural Road to the TTC involves a significant detour, there are few good options for a quick turnaround near the Rural/University station (which is an alternative to the TTC as a terminus). The City of Tempe does not own 6th Street, which might otherwise offer a shorter connection to the TTC.

If it serves the TTC, the Scottsdale/Rural BRT need not pull into the Rural/University METRO LRT station as Route 72 does today. Southbound buses could turn right on University Drive, and then proceed to the TTC on University Drive and Veterans Way. They would return to Rural Road the same way. The City of Tempe should work with the RPTA to identify and mitigate potential bottlenecks that might delay service at the southern end of the route. The Rural Road/University Drive intersection has been identified as a point of congestion, especially for vehicles turning left from University Drive to Rural Road. The City of Tempe might examine whether some form of signal priority for buses making this turn is warranted and practical.

If, at some future date, Tempe is able to implement its unfunded recommendation for BRT on Rural Road south of University Drive, consolidation of the two services to form a single Scottsdale Road/Rural Road route, with or without a detour to the TTC, may be considered.

7.3 Other Implementation Issues, Discussion, and Possible Resolution

This section discusses other implementation issues and possible ways to resolve them. In each case, final resolution will occur during the DCR phase.

Issue: What if sufficient operating dollars cannot be found to operate a reasonable level of BRT service on Scottsdale and Rural Roads, even during peak periods only?

Discussion: As Chapter 6 indicates, the expected regional funding level of $725,000 per year for operations would fund only minimal peak-period BRT service in designated Scottsdale Road/Rural Road corridor. At such a low level of service (approximately six hours a day at a 20-minute frequency), policymakers may question whether the proposed capital expenditures on BRT buses and passenger facilities represent an appropriate investment. Other operational strategies exist for improving local bus service during peak periods. Examples include:

- Limited Stop service on selected Route 72 trips—evaluated as Alternative 1 in previous chapters
- Improvement of Route 72 frequency to 10 or 15 minutes during peak hours, with some trips possibly diverted via Drinkwater Boulevard to speed service and better serve Scottsdale HealthCare and the municipal campus.
- Additional trips to serve Scottsdale HealthCare around shift changes. A precedent exists in the form of extra school trips on certain routes. Some extra trips might bypass other downtown stops.
- Other trips that operate nonstop over certain limited segments of the corridor. One possibility is the portion from Chaparral Road to Mountain View Road in Scottsdale. The November 2010 on/off counts along Route 72 would be a useful tool for identifying areas where the fewest riders would be affected. (However, these are also the segments with the least travel time reduction.)
- "A" and "B" skip-stop service. All bus trips would serve the busiest stops at major cross streets and transfer points. Lesser-used stops would be served by "A" or "B" trips, but not both. To travel between an "A" stop and a "B" stop, riders would need to transfer at a major stop served by both "A" and "B" buses. This scheme may be somewhat complicated for customers to understand, especially if it operates only during peak hours.

Any of these strategies could be presented as a temporary expedient, intended to lead up to BRT as soon as the regional funding picture improves.

Issue: Should weekend service be provided?

Discussion: The answer to this question depends on travel demand and of funding. Originally the Mesa LINK BRT offered 60-minute service on weekends, but this was discontinued in July 2010. Because of round-the-clock employers such as Scottsdale HealthCare-Osborn and the resorts, as well as corridor attractions that draw visitors and residents seven days a week, weekend service should be considered in the study corridor if funding can be found. On the other hand, if the funding base appears unstable or insecure, perhaps it would be safer to start with weekday service only. One option would be to offer 30-minute Saturday service but none on Sunday. Another would be to increase the weekend frequency of Route 72 to 20 minutes. The RPTA and the cities should consider whether 60-minute weekend service, even if the best currently affordable, is worth having at all, even as a supplement to local buses. On the other hand, the long-term objective of matching LRT service hours on Scottsdale/Rural and other arterial BRT routes should be considered as well.

Issue: Should BRT operate on a timepoint system, similar to local buses, or should headways be managed in real time instead, with radio and supervisor controls used to maintain the proper interval between trips?

Discussion: Although METRO prints detailed timetables in the Transit Book, in practice train operators are not required to observe timepoints. If Scottsdale Road/Rural Road BRT service operates at 10- and 15-minute frequencies in accordance with the FTA VSS requirements, waiting times will be sufficiently short that riders will not need to rely on timepoints; if they miss a bus that leaves early, the next one will arrive reasonably soon. This is especially pertinent for riders who are not in a hurry and can use either BRT or Route 72. The need to observe timepoints can create problems if BRT shares local bus stops with limited space for buses. Riders—especially those who expect premium service—do not like to wait unnecessarily at stops, even if the reason is that they are theoretically ahead of schedule. On the other hand, if there is an operational need to closely control the spacing of buses, timepoints may be one way to accomplish this; however, this may be more efficiently accomplished from a control center on a real-time basis. This approach has been used effectively in other systems with short headways. Dynamic monitoring and management of the BRT system will be necessary in any case to provide accurate bus information to waiting passengers.

Issue: Should BRT share stops with local buses, or use dedicated stops?

Discussion: BRT systems across the country have answered this question differently. On the Mesa LINK, the RPTA and the city have chosen to share stops with local Route 40. This approach has several advantages. It may be less expensive, because there are fewer stops to maintain, and it may cost less to upgrade a stop than to add a new one. It is convenient for riders, because they can transfer to and from local buses at any BRT stop, and because they can take "whichever bus comes first" if they so choose. It avoids the difficulties of finding and acquiring available land (or securing easements) for new stops. On the other hand, some existing stops may be unable to accommodate two buses at the same time, requiring careful scheduling to avoid conflicts. Even if the stop is long enough or can be lengthened to handle two buses at once, riders with limited mobility may have to move quickly from one location to another if their bus stops at an unexpected point. Another advantage of separate stops is the potential for unique design, branding or even artwork. The RAPID stops in downtown Phoenix offer an example. (VSS requires stations or stops to be "substantial," which usually means a special design, even if they are shared with local service.) The DCR will need to determine which approach is most economical and conducive to efficient system operation. Combined stops may work best in some parts of the study corridor and separate stops in others.

Issue: What should be the characteristics of BRT buses procured for use in this corridor?

Discussion: The BRT buses are expected to have special amenities not found on local buses, such as footrests, overhead racks and Wifi. The RPTA intends to use a mixed fleet of 40- and 60-foot buses to

provide service based on passenger loadings throughout the day. The agency is currently procuring 40-foot buses for the Arizona Avenue LINK route that will interline with the Main Street LINK service, and could also be used in the Scottsdale Road/Rural Road study corridor. This will allow sharing of fleet and use of appropriately sized vehicles based on peak and off-peak demand.

One of the challenges of this project will be to establish the optimal mix of standard and 60-foot (articulated) buses in response to demand fluctuations on the three BRT routes. Because of the unusual number, size and diversity of activity centers along this route, daily fluctuations in demand may be quite different than on Main Street and Arizona Avenue. Peaking during weekday commute hours may be less pronounced, but overall ridership demand may be higher during both peak and off-peak periods, especially if Route 72 service is reduced to a 30-minute frequency. While the Main Street LINK may act largely as a convenient feeder service to METRO LRT, the Scottsdale/Rural BRT can be expected to attract substantial ridership between intermediate points, in addition to serving the ASU Tempe campus and feeding METRO LRT at the south end. This will have implications for both fleet management and bus operations. One reason for providing a superior travel experience to BRT riders is that many transfers from local routes will occur throughout the Scottsdale Road/Rural Road study corridor, including at the north end where Route 72 will serve as a feeder.

The DCR will address the specifics of vehicle procurement, but in recent years the range of available power train options, including those using hybrid fuel technologies, has greatly expanded. As with any new service introduced in the regional system, compatibility with existing and planned fleet elements needs to be taken into account, to take advantage of the efficiencies that come with standardized maintenance procedures and interchangeable parts. Although branding lies beyond the scope of this study, clear marketing advantages can come from a unified regional image using similar buses, a uniform identity and common stationary design elements for all arterial BRT routes in the region. Branding is a required element of a VSS project that will be addressed during the DCR phase.

Issue: How should the RPTA and the cities facilitate efficient fare collection and enforcement?

Discussion: The generalized cost estimate in Appendix K assumes that no money will be budgeted initially for fare (pass) vending machines at BRT stations, although the necessary infrastructure to support future installation of such machines should be included. At system opening in 2016, no fare vending machines are expected to exist other than the ones at LRT stations. However, all BRT stations along Scottsdale Road and Rural Road should be constructed to facilitate future boarding through all doorways, on both 40-foot and 60-foot buses. The RPTA's objective is to move eventually to a proof-of-payment system similar to the one used on METRO LRT. This will further reduce travel time by increasing boarding speed and removing the operator from the fare collection process.

Issue: How can BRT travel times be minimized and operational efficiency be maximized by ITS?

Discussion: Either as part of the DCR or in a parallel process, the Cities of Scottsdale and Tempe should develop a coordinated ITS plan designed to implement effective bus prioritization at signalized intersections throughout the corridor. We suggest that the plan include:

- A statement of objectives, developed by the Cities of Scottsdale and Tempe and reviewed by the RPTA.
- An inventory of existing systems and resources.
- Description of preferred additional hardware or software elements needed to make the system work effectively.
- Analysis of transit and traffic flow using traffic simulation software.
- Analysis of what actions are necessary to make the two cities' systems compatible in the study corridor as a whole—where such compatibility can reasonably be achieved.

- Discussion of how the ITS will interact with existing and planned geometric elements, including bus stop locations and physical priority measures such as bus/right turn bypass lanes or queue jumpers.
- Identification of any significant impacts of ITS-aided signal priority for transit on general traffic flows (on Scottsdale/Rural Road or cross streets).
- A phased implementation plan, with funding identified where possible. The first phase should be ready for implementation when the first phase of service begins.

Issue: How should the system accommodate pedestrians and bicycles?

Discussion: The new BRT, like the rest of the Valley Metro system, should accommodate bicycles on the vehicles. The City of Scottsdale should provide bicycle parking or storage facilities at the new Thunderbird Road park-and-ride.

As indicated earlier, portions of Scottsdale and Rural Roads in both Scottsdale and Tempe have been designated as a conceptual pedestrian/bicycle corridor. Numerous examples across the country have demonstrated that buses and bicycles can share the road safely, especially if well-designed bike lanes are provided as envisioned for this corridor. The Scottsdale Road Streetscape Design, whose first phase from Roosevelt Street to Earll Drive is now under construction, will make the corridor a more pleasant place for non-motorized users. At a minimum, all BRT stations in Scottsdale must be designed and built in a manner consistent with these guidelines.

The DCR phase as well as detailed station design will require close cooperation between city staff, local residents, the business community and the RPTA to ensure that BRT stations will seamlessly fit into the approved streetscape (whether existing or planned) and show sensitivity to the surrounding urban context. A citizens' committee could voice community concerns about the aesthetic impacts of the project and serve as a sounding board for station design concepts. Along the first two arterial BRT routes in Chandler and Mesa, most station shelters were standardized, but some flexibility was allowed for local creativity. Both Chandler and Mesa have commissioned artists for their portions of the two LINK routes.

Issue: How should the BRT operation handle special events, especially large ones such as sporting events at Sun Devil Stadium?

Discussion: The City of Tempe frequently adjusts lane usage and alters traffic flow for special events held in Downtown Tempe and at ASU Sun Devil Stadium. One of the advantages of the LPA is the ability of buses to adapt to whatever traffic restrictions and lane arrangements are in effect. Ways should be found not only to minimize the impact of these events on BRT travel times, but to encourage Scottsdale residents and visitors to use BRT as their mode of choice for these events. One approach would involve routing BRT with general traffic, but finding ways to give BRT additional priority. Another would allow BRT buses to use routes that are closed to general traffic. The TTC terminus lies within easy walking distance of both ASU Sun Devil Stadium and Downtown Tempe.

Chapter 8 - Assessment of the Corridor as a Future High-Capacity Transit Investment

8.1 High-Capacity Transit Modes

The *MAG Regional Transit Framework Study* defines six modes of fixed-route transit service, each serving a different purpose in the regional transportation system. "High-Capacity Transit (HCT) All Day" is bus or rail service that operates solely in a semi-exclusive guideway, providing frequent service throughout the day. "Semi-exclusive" means that general traffic may cross the guideway at grade under signal control. Proposed regional standards call for HCT All Day to operate seven days a week, twenty hours a day, at a minimum frequency of ten minutes during peak periods and fifteen minutes at other times. METRO LRT, the only current example of HCT All Day in the MAG region, does not currently meet these standards because of funding shortfalls.

While "high capacity" is a somewhat subjective concept, HCT systems typically take advantage of:

- Vehicles that can accommodate more riders (seated and total) than the standard 40-foot transit bus. They include 60-foot articulated buses, "double articulated" buses, and most rail vehicles.
- In the case of rail modes, the ability to train vehicles. METRO LRT generally operates two- or three-car trains. This characteristic gives rail unique flexibility in responding to surges in demand, such as those that occur around special events.
- Project design elements that increase travel speed and thereby raise the capacity of the system to deliver mobility. They include the dedicated transit guideway, signal priority measures, proof-of-payment fare collection, multiple-door entry, and low floors to allow level platform boarding.

Although METRO LRT is the first true HCT in this region, BRT in dedicated lanes can also play this role, provided that service is sufficiently frequent and large buses are available to meet peak period demand. This type of BRT functions virtually as a rubber-tired, trackless form of LRT. One advantage over LRT is the ability of buses to leave the guideway at an off-line station or activity center (perhaps temporarily, pending guideway completion). In high-demand corridors, however, the operating cost of rail can be less per passenger mile of service provided.

Since its 2001 debut in Portland, Oregon the modern streetcar has attracted widespread interest as a technology that has lower capital cost than LRT, but may provide some of the same economic development and revitalization benefits. A streetcar has less capacity than an LRT vehicle but considerably more than a standard bus. Unlike LRT, vehicles usually operate singly. In many cases, the modern streetcar operates in mixed traffic—often in the curb lane and with frequent stops. Mixed-traffic operation, along with front-only boarding and on-board collection on some systems, places the streetcar farther from HCT and somewhat closer to a local bus in its speed and capacity. As noted elsewhere in this report, the recent Tempe South AA/DEIS recommends modern streetcar as a high-priority HCT transit investment on Mill Avenue.

Table 38 provides basic data on vehicular capacities of LRT, the modern streetcar and BRT. A two-car light rail train provides roughly the same passenger capacity as six standard buses or four articulated (60-foot) buses. Although the capacity of a 40-foot or even a 60-foot bus seems modest by comparison with a two-car train, arterial BRT such as the LPA proposed for Scottsdale and Rural Roads can play an essential role in building and demonstrating demand for future LRT or other HCT. It presents an opportunity to strengthen the transit market and develop a transit culture.

Table 38: Typical Vehicle Capacities of LRT, Modern Streetcar and BRT (Bus)

Mode	Length (feet)	No. of Doors (both sides)	No. of Seats	Seated plus Standing Capacity
LRT Vehicle	93	8	68	164
Modern Streetcar	66	6	35	127
BRT: 40-foot bus	40	2-5*	35-44	50-60
BRT: 60-foot bus	60	4-7*	31-65	80-90
BRT: 80-foot bus	80	7-9*	40-70	110-130

*Number of "door channels"

Sources: Tucson Department of Transportation, "Comparison of Modern Streetcar vs. Light Rail Transit"; Samuel L. Zimmerman and Herbert Levinson, "Vehicle Selection for BRT: Issues and Options," *Journal of Public Transportation*, Vol. 7, No. 1, 2004

8.2 Planning Future High-Capacity Transit in the Scottsdale Road/Rural Road Study Corridor

This section briefly discusses elements of the planning process that would be required for implementation of HCT in this corridor at some future date.

Show a clear consensus in the community supporting HCT. Community support for HCT, including a willingness to bear a portion of the costs and impacts, will be a prerequisite for any further planning.

Obtain regional and local designation as a high-priority corridor for HCT, develop local capital and operating funding sources, place the corridor on the RTP (or its successor), and program, in the RTP, design and construction of the project. The current RTP and the half-cent sales tax that funds it will expire in 2026. Any major transit investments after that date will require a new funding source, and probably the same series of regional actions and approvals that major investments must receive today. This and other new HCT corridors may have to compete with a backlog of programmed but unfunded projects from the 2006 to 2026 period.

Understand and follow the federal planning and environmental processes. It seems unlikely that the region or the cities will be able to afford true HCT in this corridor without federal funding. Implementation of HCT may be decades in the future, but federal funding will still be highly competitive, and will probably be governed by something similar to the existing New Starts and NEPA requirements. The process may begin with a new Alternatives Analysis to establish the most appropriate mode of HCT and develop a Locally Preferred Alternative.

Build the case for transit demand in the corridor, and support it with forecasts as well as ridership data from the project implemented as a result of this study. Ridership demand will most likely remain an important criterion for federal funding, both directly and as an element of cost-effectiveness. The latter currently weighs heavily in the FTA evaluation of proposed New Starts projects, such as LRT. Strong ridership in the study corridor over a period of years, on both local and BRT service, will help justify a higher level of investment.

Forecast, and if necessary find ways to mitigate, the permanent traffic impacts of high-capacity transit in this corridor. At least in many portions of the corridor, building true HCT will require reducing the number of traffic lanes. (Modern streetcar may be a partial exception.) Although HCT may accommodate much of the existing automobile travel demand, the scarcity of alternative north-south routes will require careful analysis of traffic forecasts and thorough planning to mitigate any resulting congestion. The mitigations may include R/W takes to preserve traffic lanes in some areas—for example, at major intersections.

Plan for connections to the regional HCT system. One of the key questions to be answered will be how to connect Scottsdale/Rural HCT with METRO LRT in Tempe. If rail is the selected technology, then a

physical track interline, enabling one-seat rides from Scottsdale to Mesa and Phoenix, may be possible. On the other hand, if demand for such trips is relatively low, a convenient transfer between trains may be sufficient, at a considerably lower capital cost. Neither arrangement would be easy in the congested area near the Rural/University station where the two lines would meet. Another option, which was considered in the *Scottsdale/Tempe North/South Corridor Study*, might be to turn the rail route westward to meet the existing line north of Tempe Town Lake. Regional HCT connections may be influenced by changes in fuel and powertrain technologies in the coming years. Fuel cell or battery-powered rail vehicles may eliminate the need for overhead wires, which could in turn reduce opposition to some alignments and avoid relocation of underground utilities.

If BRT were chosen as the HCT technology in the Scottsdale Road/Rural Road study corridor, all LRT riders would need to transfer in order to use the new service, but the engineering issues involved in connections between two rail lines would be greatly simplified. The ultimate choice between technologies should consider this advantage of BRT versus the greater operating efficiency and possible ridership attraction of LRT. A modern streetcar may be able to share tracks with LRT, at least for a short distance.

Another connection that will require consideration involves the higher-capacity service that may be operating on Rural Road south of University Drive, if funding can be found in the future. If BRT were implemented on South Rural Road as recommended by the Tempe City Council, a median-operating, high-capacity BRT system to the north could change to mixed-use or BAT/HOV lanes farther south; or the center guideway could be extended south on Rural Road as funding permits. If LRT or modern streetcar someday came to the Scottsdale/Rural study corridor, then transfers to the South Rural Road BRT would occur at the Rural/University METRO LRT station or elsewhere.

Provide additional capital facilities that are necessary to ensure the success of HCT in the corridor. Chief among these is parking. METRO LRT and other light rail systems typically provide park-and-ride lots at selected stations, especially endpoints of the route, but not at the most densely developed or urbanized locations, where parking is an economically inefficient use of land and most HCT access is expected to occur on foot, by bicycle or on buses. METRO has dedicated parking at eight of twenty-eight stations; many of the lots are heavily used. Park-and-ride sites along a future Scottsdale/Rural HCT route are most likely to be available in the portion of Scottsdale and Tempe south of McDowell Road and north of the ASU Tempe campus. The Cities of Scottsdale and Tempe should consider ways in which redevelopment may create opportunities for dedicated parking, perhaps through public/private partnerships or development stipulations, near possible future HCT stations. The future selection of a northern terminus for HCT on Scottsdale Road should consider the availability of land for parking. An expanded park-and-ride lot at Thunderbird Road could serve motorists using SR 101 to access the regional HCT system.

Establish an enhanced network of feeder bus routes to serve HCT stations in the corridor. HCT cannot meet its potential without an adequate network of connecting bus routes for passenger collection and distribution in the catchment area of each station. For the METRO LRT starter line, this need is largely met through the pre-existing grid system of bus routes, although some routing adjustments occurred when the LRT opened. As noted in Chapter 1, however, this grid is missing or undeveloped in much of the area that a Scottsdale Road/Rural Road HCT would serve—especially north of Downtown Scottsdale. This is due partly to the low density of some surrounding neighborhoods, partly to the nature of the roadway network, and partly to local funding limitations and service priorities. If HCT is someday extended north of the Scottsdale central business district, the RPTA and the city should consider new neighborhood circulators or other ways to bring residents and nearby employees to stations, especially in the Resort Corridor. Phoenix and Scottsdale should also extend Thunderbird Road bus service east to the Scottsdale Airpark, improve service on Greenway and Bell Roads, and add community circulator routes in the Airpark/Kierland area.

Study Downtown Scottsdale routing options. Planning for HCT will require a new study of how to thread high-capacity transit, whether LRT or BRT, through Downtown Scottsdale. Feasible options include:

- Turn Scottsdale Road into a transit street, with use restricted to buses (and/or rail) and local deliveries. This seems a radical solution and a remote possibility given the key role of Scottsdale Road as a traffic artery and in providing business access.
- Split the alignment between Scottsdale Road and one of the couplet legs—either Drinkwater Boulevard or Goldwater Boulevard. The obvious precedent is the Central Avenue/1st Avenue and Washington Street/Jefferson Street split in Phoenix. However, the latter couplets are closer together than the one-fourth mile separation between Scottsdale Road and Drinkwater or Goldwater Boulevard.
- Locate both the northbound and southbound guideway on Drinkwater or Goldwater Boulevard.
- (Modern streetcar): Operate two-way service in mixed traffic on Scottsdale Road; remove on-street parking; divert remaining local buses to Drinkwater or Goldwater Boulevard.
- (BRT only): Revert to mixed-traffic operation through Downtown Scottsdale only.

Any of these options except the last would involve major changes to business access downtown. There would also be substantial traffic impacts during construction and some reduction in north-south capacity once the HCT line opened.

Prepare to mitigate construction impacts, and work out a smooth transition from BRT in mixed traffic to true HCT. Future construction of LRT, modern streetcar or median-running BRT in the Scottsdale Road/Rural Road study corridor would cause temporary disruption to traffic flow and to local business access, as the recent example of METRO LRT construction shows. Access to adjacent properties would be maintained throughout the construction period, however. Construction of a median BRT guideway would be less disruptive than installing rail, because less utility work would be needed and no new infrastructure would be embedded in the street. Either way, traffic movement in the study corridor would be restricted at times to one or two lanes per direction.

As noted in Chapter 5, one advantage of the recommended alternative is that BRT could continue to operate in the curb lanes during fixed guideway construction. This would not constitute business as usual, because at times the BRT service would suffer from substantial delays, along with general traffic. There might be times when signal priority measures in construction zones might need to be inactivated owing to their temporary ineffectiveness. If guideway construction ever occurs on Scottsdale Road through Downtown Scottsdale, BRT vehicles might be diverted to Drinkwater Boulevard or Goldwater Boulevard. More generally, if METRO and its partners anticipate the impacts of guideway construction to be so great as to jeopardize the "higher-capacity" functioning of BRT, they might consider ending service on a positive note, before major construction affects its quality.

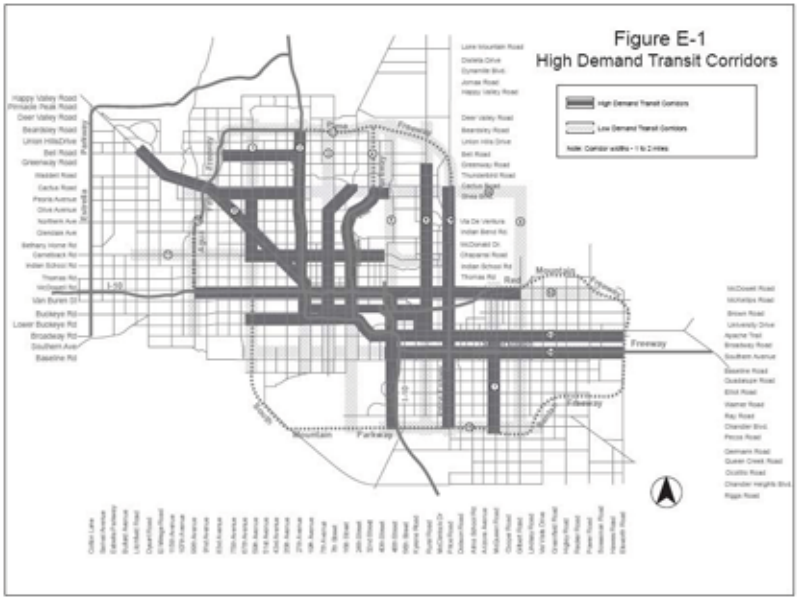
Once the fixed guideway transit route opens, the curb-lane BRT will most likely be discontinued, or cut back to the guideway terminus. The Mesa LINK service constitutes a local example. Once METRO LRT is extended east to Mesa Drive--as currently scheduled for 2016--LINK will be truncated to end in downtown Mesa. One plan under consideration calls for buses to make a terminal loop using downtown streets, with the westernmost stop on Centennial Way near Main. Transferring riders will have a short walk between this stop and the rail station at Main and Center streets. Existing local bus routes will stop in the same area. A similar scheme could be implemented if a future fixed guideway is built in a portion of the Scottsdale Road/Rural Road study corridor, perhaps as far north as SkySong or Downtown Scottsdale.

Appendix A - Summaries of Related Studies and Plans

MAG Fixed Guideway System Study

Date Completed: January 1999
Lead Agency: MAG, in cooperation with Glendale, Mesa, Phoenix, Scottsdale and Tempe
Study Area: Phoenix Metropolitan Area

Purpose: The purpose of this study was to analyze fixed guideway system options for the Phoenix Metropolitan area, including evaluation of alternative corridors and transit technologies, to identify the corridors and technologies best able to meet travel demand efficiently in the growing MAG region.



Recommendations Relevant to Scottsdale/Rural Corridor: The study recommended a fixed guideway and express bus concept with improved local bus service for further study. LRT is recommended to provide capacity and improve the quality of transit service in central, high-demand corridors. The final report also identified approximately fifteen high-demand corridors, one to two miles in width, including one centered on Scottsdale Road and Rural Road from Apache Boulevard to the Scottsdale Airpark.

Scottsdale General Plan, Community Mobility Element

Date Completed: 2001 (updated 2010-2011)
Lead Agency: City of Scottsdale
Study Area: City of Scottsdale and its municipal planning area

Purpose: The purpose of the Community Mobility Element is to set forth policies that will provide safe, efficient and accessible choices for the movement of people, goods and information.

Recommendations Relevant to Scottsdale/Rural Corridor: This document was largely superseded by the 2011 General Plan Update, of which a draft was issued for public review in November 2010. The new Community Mobility chapter calls for developing an effective and connected multimodal transportation system. See also the Scottsdale Transportation Master Plan, Transit Element.

Scottsdale/Tempe North/South Transit Corridor Study

Date Completed: April 2003
Lead Agencies: City of Scottsdale, City of Tempe, RPTA, MAG
Study Area: Bounded generally by 64th Street on the east and SR 101 on the west. The primary study area extended from Indian Bend Road to Apache Boulevard; the secondary study area, studied at a more general level, continued north to Frank Lloyd Wright Boulevard and south to Elliot Road.

Purpose: The purpose of this study was to determine the feasibility of a high-capacity transit system connecting Scottsdale and Tempe, to select a locally preferred alignment and technology, and to explore how the system might connect to the METRO LRT starter line.

Recommendations Relevant to Scottsdale/Rural Corridor: The study recommended LRT on Scottsdale Road/Rural Road from Indian Bend Road to Curry Road, with a direct interline to the METRO LRT starter line north of Downtown Tempe. The Scottsdale City Council approved Scottsdale Road as the recommended corridor, but did not endorse LRT in this corridor. Instead, it recommended evaluation of BRT, LRT and modern streetcar in future studies.

High Capacity Transit Study

Date Completed: June 2003
Lead Agency: MAG
Study Area: Maricopa County

Purpose: The purpose of the study was to recommend an integrated system of high-capacity transit corridors providing efficient and convenient travel throughout the MAG region. This long-range study considered projected travel demand in the MAG region to 2040, when the population was expected to exceed seven million residents. The study focused on the three most prevalent existing and emerging forms of high-capacity transit in North America: commuter rail, BRT, and LRT. An important objective was to ensure connections between the corridors to facilitate seamless mobility across the region, regardless of the transit technology selected.

Recommendations Relevant to Scottsdale/Rural Corridor: This study recommended LRT or dedicated BRT--with a final modal decision to be made in future studies--along Scottsdale Road/Rural Road from Bell Road on the north to Elliot Road on the south, with transit stations located approximately every mile. Specific recommendations for the high-capacity transit corridor included connections to a Camelback Road LRT or dedicated BRT corridor and a Union Pacific Railroad (UP) commuter rail corridor, as well as the METRO LRT starter line. Short-term (in the next fifteen years) the study recommended LRT or BRT in dedicated lanes on Scottsdale/Rural between Camelback and Broadway Roads, with further extensions in the next thirty years.

Regional Transit System Study

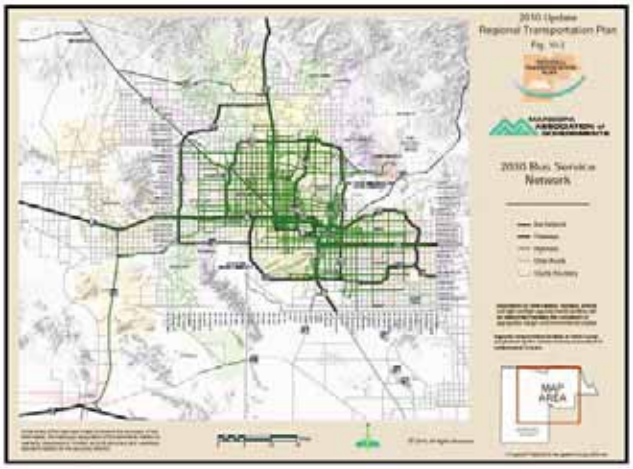
Date Completed: July 2003
Lead Agency: RPTA
Study Area: Maricopa County and the northern portion of Pinal County

Purpose: The purpose of the study was to develop a fiscally constrained regional multimodal transit plan for Maricopa County that could be implemented through 2030. The study evaluated all modes of public transit except fixed-guideway/high-capacity, to determine how best to meet current and future transportation needs.

Recommendations Relevant to Scottsdale/Rural Corridor: This study recommended the following transit network options on or near Scottsdale Road/Rural Road:

- Local fixed-route transit with a park-and-ride located at SR 101 and transit centers located at SR 101, Indian School Road, McDowell Road, and Apache Boulevard.
- Arterial regional connection route between SR 202 and SR 101, with major stops at important activity centers.
- A park-and-ride at Scottsdale Airpark (Scottsdale Road and SR 101).
- The planned transit center in Downtown Tempe.
- Transit center at Scottsdale Airpark (near Scottsdale Road and Bell Road).

Regional Transportation Plan (RTP)



Date Completed: November 2003 (with frequent updates since then)
Lead Agency: MAG
Study Area: Maricopa County

Purpose: The purpose of this document was to provide a comprehensive, multimodal regional plan through 2026, creating a blueprint for future transportation investments. Since the plan's adoption by Maricopa County voters in November 2004, with funding through a half-cent sales tax, MAG has updated it several times to accommodate cost and revenue changes.

Recommendations Relevant to Scottsdale/Rural Corridor: The RTP recommended Supergrid local service (now operating) along Scottsdale/Rural, and arterial BRT from Shea Boulevard to Chandler Boulevard, with planned or existing transit centers at Indian School Road (existing Loloma Transit Center) and McDowell Road (planned SkySong Transit Center). The RTP also shows Scottsdale/Rural as an unfunded "eligible high-capacity corridor" from the Scottsdale Airpark to the METRO LRT starter line, and from Southern Avenue to Chandler Boulevard.

Tempe General Plan 2030, Transportation Element

Date Completed: December 2003
Lead Agency: City of Tempe
Study Area: City of Tempe

Purpose: The transportation element is one chapter of the City of Tempe's *General Plan*, and is based on strategies identified in the council-adopted *Comprehensive Transportation Plan*. The purpose of this chapter was to guide further development of a citywide multimodal transportation system, integrated with the city's land use plans.

Recommendations Relevant to Scottsdale/Rural Corridor: Transit improvement options in Tempe include increased peak-period service and extended hours on all routes. A new downtown transit center can become a hub for integration of future BRT, LRT, and commuter rail. One strategy to meet the city's transit objectives is to implement final recommendations for the Scottsdale/Tempe high-capacity corridor.

City of Tempe Pedestrian, Bicycle, and Transit Design Criteria

Date Completed: August 2006
Lead Agency: City of Tempe
Study Area: City of Tempe

Purpose: The *Pedestrian, Bicycle, and Transit Design Criteria* is part of the larger *Engineering Design Criteria* for the City of Tempe, outlining general requirements and guidelines for improvements.

Recommendations Relevant to Scottsdale/Rural Corridor: Design criteria for developments adjacent to transit stations or corridors include the following:

- Building frontages and locations of main buildings should be oriented toward arterial streets or streets with planned transit service.
- Bus stops should be integrated into the overall pedestrian plan of any project; pedestrian walkways should directly connect main building entrances with transit stops.
- Pedestrian and transit user access to buildings is encouraged by locating buildings at the minimum setback along corridors with planned or provided transit.
- Bus stops should be located between 60 feet and 110 feet from point of tangency of the intersection curb return.
- Furniture installed at bus stops should be located to provide the minimum 36-inch clearance for access and maintenance between components and switch boxes, mailboxes, and utility boxes. All bus stops shall meet current Americans with Disabilities Act requirements.
- Bus stops should be provided with convenient and safe pedestrian access between building entrances and streets. It is recommended that driveways not be located within a bus stop and/or pullout area.
- Landscape plans should incorporate shade trees for bus stops, located so as not to obstruct the shelter canopy or visibility of the bus stop.
- Mixed-use development is encouraged, allowing people to work and play near home.

Scottsdale Transportation Master Plan, Transit Element

Date Completed: January 2008
Lead Agency: City of Scottsdale
Study Area: City of Scottsdale
Purpose: The transit element is one chapter of the City of Scottsdale's *Transportation Master Plan*. The purpose of this chapter was to develop detailed information so that citizens, elected officials, city staff, and others could determine the appropriate level of transit investment for Scottsdale. The recommendations of this comprehensive study were used to update the city's *Transit Plan* (February 2003), refining and updating the previous recommendations.

Recommendations Relevant to Scottsdale/Rural Corridor: Transit improvement options are recommended in three time frames: short-term (five-year) to focus on improving the level of bus service in Scottsdale to match that of its neighboring jurisdictions, mid-term (ten-year) to focus on improving the overall level of fixed-route bus service in Scottsdale, and long-term (twenty-year) to

complete the transit network in Scottsdale so that it meets or exceeds the regional standard of service. The city's overarching vision for Scottsdale Road is:

> *"Design and implement a form of HCT [high-capacity transit] along Scottsdale Road that connects to the [METRO LRT starter] system," and provide "a form of higher-capacity bus service that uses a dedicated or shared guideway to provide limited stop service in medium to heavy travel demand corridors."*

Table A-1 lists recommendations for the Scottsdale Road corridor in the City of Scottsdale.

Table A-1: Related Recommendations of Scottsdale Transportation Master Plan

Timeframe	Service Type/Facility	Location	Description
Short-Term (5 years)	Fixed Route Bus	Scottsdale Road (Route 72)	Increase service frequencies to 15 minutes in off-peak; extend to Thompson Peak Parkway *(has been implemented)*
	Neighborhood Circulator (Trolley)	Central Scottsdale	Extend to future SkySong Transit Center
	Transit Center	SkySong Transit Center at McDowell Road	New transit hub for transfers between fixed-route buses and the Neighborhood Trolley
Mid-Term (10 years)	Enhanced Bus	SkySong Transit Center to SR 101; potential extension south to Chandler	New service, including limited stops, 10-minute peak-hour frequency, enhanced shelters with real-time passenger information, unique branding, and transit signal priority
	Arterial BRT	Scottsdale Road	Funding included in Regional Transportation Plan; design and implementation part of future study
	Neighborhood Circulator	Scottsdale Airpark	Potential new service
	Transit Center	SR 101/Scottsdale Road	Potential new facility (now being implemented as a park-and-ride at Thunderbird Road)
Long-Term (20 years)	High-Capacity Transit	Scottsdale Road, Downtown Scottsdale to ASU	Potential HCT (BRT, LRT, modern streetcar) connecting Downtown Scottsdale to ASU

Tempe Comprehensive Transportation Plan

Date Completed: March 2008
Lead Agency: City of Tempe
Study Area: City of Tempe

Purpose: The purpose of this report was to guide further development of a citywide multimodal transportation system, integrated with the city's land use plans. It is an update of the recommendations previously made in the *Tempe General Plan* (2003) and focuses on the ability to move people rather than just vehicles.

Recommendations Relevant to Scottsdale/Rural Corridor: Transit improvement options relative to the Scottsdale/Rural corridor in Tempe include completing construction of the Tempe Transportation Center and implementation of recommendations from the *Scottsdale/Tempe North/South Transit Corridor Study* on a Scottsdale/Tempe high-capacity corridor.

Commuter Rail Strategic Plan

Date Completed: March 2008
Lead Agency: MAG
Study Area: Maricopa County and portions of Northern Pinal County

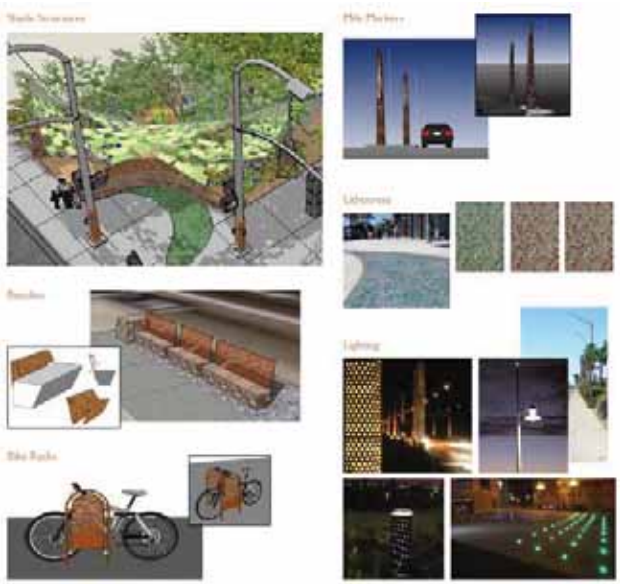
Purpose: The purpose of the MAG Commuter Rail Strategic Plan was to define the requirements and steps that will need to be followed to plan and potentially implement commuter rail service. The study area was separated into five subareas that focus on and around existing rail lines. These areas are experiencing substantial population growth, and a large amount of employment growth is also occurring in the Phoenix Central Business District, resulting in the need for improved access for commuters. The Strategic Plan also examines how commuter rail can serve these growing communities by operating on existing freight railroad lines and future extensions.

Recommendations Relevant to Scottsdale/Rural Corridor: This study analyzed a regional commuter rail system in the study area built on the premise that commuter rail could most easily be implemented on an existing rail line. It recommended the development of a regional implementation plan and corridor development plans to further analyze commuter rail feasibility in five corridors. Three of the five corridors—including the Tempe Industrial Lead approximately one mile west of Rural Road--are located in the East Valley and are branches of the UP Phoenix Subdivision, which crosses Rural Road south of Apache Boulevard in Tempe.

Scottsdale Road Streetscape Design Guidelines

Date Completed: June 2008
Lead Agency: City of Scottsdale
Study Area: Scottsdale Road corridor

Purpose: The Scottsdale Road Design Guidelines provide streetscape design direction for the entire 24-mile length of the Scottsdale Road corridor. The design guidelines provide general principles for the streetscape overall, as well as more specific recommendations for each of the six corridor segments, four of which fall within the Scottsdale Road/Rural Road AA study area. The intent of the guidelines is to establish a strong identity and visual character for Scottsdale Road, representing the quality of the community and developing a sense of place throughout the city.



Recommendations Relevant to Scottsdale/Rural Corridor: The following physical elements will be used throughout the corridor as a form of visual and character unity: continuous thread of a planting strip (8-foot) and sidewalk (8-foot; 10-foot in downtown area), green spots at every mile intersection (public gathering areas with

shade, benches, and public art), mile markers where appropriate, benches and art plinths, continuous bike lanes, pedestrian-scale lighting, transit stops, and landscaped or at-grade paved medians. Larger green spots are located approximately every mile, with secondary green spots at some half-mile intersections. Areas of public art include the following intersections: McDowell Road/ASU SkySong, Oak Street, Earll Drive, Camelback Road, Goldwater Boulevard, Jackrabbit Road, McCormick Parkway, Shea Boulevard, Cactus Road, Greenway Parkway, and Frank Lloyd Wright Boulevard. Trails are proposed east of Scottsdale Road along Mountain View Road and Shea Boulevard, with an equestrian trail to span Scottsdale Road at Cactus Road.

The recommended geometry for Scottsdale Road varies for each segment, striving to minimize impacts to existing curbs, but narrowing travel lane and median lane widths to transfer space to bike lanes. In Downtown Scottsdale, more reconstruction may need to occur to widen and standardize sidewalk widths, potentially reducing current on-street parking.

Regardless of the streetscape recommendations, the plan states that the design guidelines must not preclude future high-capacity transit options that can be constructed along the Scottsdale/Rural corridor.

Analysis of Arizona State University Transit Ridership on the Regional Valley Metro Transit System

Date Completed: December 2008
Lead Agency: ASU
Study Area: Four ASU campuses

Purpose: This report was conducted to better understand the impact of the ASU U-Pass program on regional bus transit ridership. Regionally, ASU consists of four academic campuses: a main campus in Tempe, and three satellite campuses (West in northwest Phoenix, Polytechnic in east Mesa, and Downtown in downtown Phoenix). Transit service is provided through campus shuttles, METRO LRT, and fixed route bus and paratransit service. Since its inauguration in FY 2006, the U-Pass has enabled students to ride transit at no charge; the university reimburses the RPTA for each trip taken. The program was offered to faculty and staff at no charge until FY 2009, when ASU began charging $260 per year. (Although not noted in the report, students must pay a nominal charge beginning in the 2009-10 school year.)

In September 2008, U-Pass holders accounted for three percent of Valley Metro ridership. From FY 2006 through 2008, Route 72 (Scottsdale/Rural) consistently had the highest ridership of the six bus routes that experienced the highest U-Pass usage—except the Red Line, which LRT has since replaced. U-Pass holders made up 20 percent of riders on Route 72 and 21 percent on Route 81 (Hayden/McClintock) in September 2008.

Recommendations Relevant to Scottsdale/Rural Corridor: While this report does not make any recommendations on specific additional transit services, it does note the future challenges of serving the widespread ASU population with public transportation, including that the current shuttle system operated by ASU will not be adequate to serve an increased enrollment and employment base, causing the university to rely on the regional transit system to meet the long-term needs of the campuses. The U-Pass risks becoming a victim of its own success, because it is funded from ASU parking revenue.

Origin and Destination Study

Date Completed: February 2009
Lead Agency: RPTA

Study Area: RPTA transit service area

Purpose: The RPTA administered an Origin and Destination survey of riders of fixed-route bus services (Local, Circulator, Rural, Express, and RAPID bus), to accomplish four objectives: (1) to collect data on transit ridership as required for the LRT starter line by the FTA Final Rule on Major Capital Investment Projects; (2) to update travel pattern data for calibrating computer modeling to reflect the current transit system; (3) to collect data to reflect target transit markets that may have been under-represented in previous surveys; and (4) to improve the quality of the data collected for valid origin and destination trip pairs.

Recommendations Relevant to Scottsdale/Rural Corridor: This report presents snapshots of the total origin/destination database to illustrate peak transit flows. For example:

- The ASU campus area, in Tempe zip code 85281, experiences the highest percentage of origin/destination flows all day long.
- Route 72 along Scottsdale and Rural Roads has an average weekday ridership of 5,223, falling within the top 25 percent of local routes with the highest ridership.
- The majority of transit trips to ASU, as a designated activity center, is for the purpose of college/university (student only), followed by ASU as a place of work and as a place of residence.
- The majority of trips to Scottsdale Airpark, as a designated activity center, are for the purpose of work, followed by shopping and medical appointments.

General findings about transit riders that the study presented included:

- Transit riders are more likely than the general population to be from low-income households. Almost three in four riders belong to households earning less than $35,000. Many college students belong to this category.
- About half of all transit riders are transit-dependent, i.e., they belong to households that do not own any vehicles.
- Two out of every three riders are employed.
- Riders are primarily in the 25 to 54 years of age; young riders in the age range of 18-24 form the second largest group.
- The majority of transit trips begin or end at home or work; 44 percent of riders make home-based work trips using transit, while 40 percent make home-based non-work trips.
- Walking is the dominant access and egress mode, used by more than three-fourths of riders for access and egress.
- Nearly two-third of riders transfer at least once to complete their one-way trip.
- In the absence of transit service, almost one-third of the riders report that they would not make the trip.

<u>City of Scottsdale Downtown Plan</u>

Date Completed: June 2009
Lead Agency: City of Scottsdale
Study Area: Zigzagging boundary between Chaparral Road on the north, Earll Drive on the south, Miller Road on the east, and 68th Street on the west; more focused downtown core identified between 5th Avenue, 2nd Street, Brown Avenue and Goldwater Boulevard.

Purpose: This plan is intended to guide growth and development decisions for Downtown Scottsdale for the

next 20 years.

Recommendations Relevant to Scottsdale/Rural Corridor: Scottsdale Road is identified as a conceptual pedestrian corridor, which would provide safe access and connections to adjacent development. In the core of downtown, Scottsdale Road is classified as a downtown area access roadway--facilitating the circulation and access of all visitors downtown and accommodating all modes of transportation, with a special emphasis on meeting pedestrian needs. The rest of Scottsdale Road, paired with Goldwater and Drinkwater Boulevards, is a designated regional access corridor in which the couplet accommodates pass-through traffic around downtown. Although not location-specific, the Downtown Plan encourages planning for a mixture of land uses and densities near major transit routes and facilities to promote public and private investment in the downtown area, emphasizing high-frequency transit service and expanded service hours. The Arizona Canal waterfront, just south of Camelback Road from Scottsdale Road to Goldwater Boulevard, has recently become the focus of this kind of mixed-use development.

Greater Airpark Community Area Plan

Date Completed: September 2009 (approved by City Council October 2010)
Lead Agency: City of Scottsdale
Study Area: Bounded on the north by Thompson Peak Parkway and Grayhawk Master Planned Community; on the east by 90th Street and Loop 101/Pima Freeway; on the south by Sutton Drive, Thunderbird Road, and residential neighborhoods; and on the west by Scottsdale Road.

Purpose: This plan is intended to be a policy document to guide growth and development decisions for the greater Scottsdale Airpark area over the next 20 years, outlining the vision and necessary implementation programs to achieve it. It identified east-west access across the airport property as a significant issue.

Recommendations Relevant to Scottsdale/Rural Corridor: The plan calls for mixed-use development along the entire Scottsdale Road corridor, up to Frank Lloyd Wright Boulevard, specifying highest-scale development with access to multiple modes of transportation, including mid-block connections to provide easier pedestrian, bicycle, and vehicular access. Important pedestrian linkages along Scottsdale Road are noted at Butherus Drive and Frank Lloyd Wright Boulevard. Scottsdale Road is an existing transit corridor, with a potential transit center located at Thunderbird and Scottsdale Roads. It is also a conceptual pedestrian/bicycle corridor. The implementation section recommends many specific projects to improve transit, vehicular traffic mobility and parking. Circulation would be enhanced by widening major streets, improving intersections, and providing better access to and from SR 101.

MAG Regional Transit Framework Study (RTFS)

Date Completed: January 2010 (draft of final report)
Lead Agency: Maricopa Association of Governments (MAG)
Study Area: Maricopa County

Purpose: The purpose of this study was to understand the region's transit needs and deficiencies, with the goal of identifying high-leverage transit investments that could attract a significant number of new passengers, while improving transit service for existing patrons. Six transit service types were identified as potential investment options: regional connectors, Supergrid (regionally funded) local bus service, arterial BRT (similar to Mesa LINK), express bus, "HCT peak period," and "HCT all day" (similar to METRO LRT). MAG developed three regional transit system improvement scenarios based on alternative assumptions about additional funding beyond the current RTP: these are known as Basic Mobility, Enhanced Mobility, and Transit Choice. Of the three, Basic Mobility would require the least additional

funding and Transit Choice the most. The modeling performed for the RTFS assumes one-mile spacing between stations for arterial BRT and one-half-mile to one-mile spacing for HCT all day.

Recommendations Relevant to Scottsdale/Rural Corridor: Major elements (facilities and services) were recommended for each scenario from travel demand forecasting, focus groups of riders and non-riders, and the experience of peer cities. Each scenario built on the previous one in the series: i.e., Enhanced Mobility incorporates all the elements of Basic Mobility, and Transit Choice includes all the services and facilities in the Enhanced Mobility scenario.

Table A-2 summarizes recommendations of each scenario for the Scottsdale/Rural corridor. MAG also developed regional service standards for each mode, including service frequencies of 10 minutes peak/15 off-peak for both arterial BRT and HCT all day.

Table A-2 Recommendations of MAG Regional Transit Framework Study

Scenario	Service Type	Corridor	Description
Basic Mobility	Arterial BRT	Scottsdale/Rural, Chandler Fashion Center to Scottsdale Airpark	Service level increase; infrastructure investments
Enhanced Mobility	Supergrid	Scottsdale/Rural	Increased service
	Arterial BRT	Scottsdale/Rural, Chandler Fashion Center to Elliot Road and Scottsdale Fashion Square to Scottsdale Airpark	Service level increase and extension; infrastructure investments
	HCT All Day	Scottsdale/Rural, Camelback Road to University Drive	Corridor extension; infrastructure investments
Transit Choice	Supergrid	Scottsdale/Rural	Increased service
	HCT All Day	Scottsdale/Rural, SR 101 to Chandler Boulevard	Route extension; infrastructure investments

Source: MAG Regional Transit Framework Study, January 2010

City of Scottsdale Design Standards and Policies Manual: Transportation Chapter

Date Completed: January 2010
Lead Agency: City of Scottsdale
Study Area: City of Scottsdale

Purpose: The transportation chapter of the *Design Standards and Policies Manual* provides minimum design criteria for modifying and constructing transportation facilities in Scottsdale.

Recommendations Relevant to Scottsdale/Rural Corridor: While any new construction or reconstruction along Scottsdale Road will be required to comply with other subsections, such as R/W impacts, signal design, signs and markings, bikeways, and pedestrian facilities, the most relevant subsection of this chapter is related to transit, including:

- Criteria for bus stop locations
  - Minimum standard for bus stop locations is at quarter-mile intervals for residential areas, eighth-mile intervals for activity centers.
  - Bus stops should be located as close to intersections as possible, with far side stops preferred.

  - The location of a transit stop is generally 85 feet (plus or minus 25 feet) from the curb of an unsignalized intersection, and 105 feet (plus or minus 25 feet) from a signalized intersection.
- Transit amenities
  - At all bus stop locations, the following should be provided: benches, shelter, trash receptacle, at least two bike loops.
  - Bus bays should be at or near transfer points when average peak period dwell time exceeds 30 seconds per bus.
- Landscaping
  - Landscaping should be provided where possible to provide shade from the afternoon sun; all landscaping should be compatible with frontage landscaping.
- Signage
  - Standard signs should be posted to serve as a reference for passengers and bus operators, and as a point of identity for the transit system
- Bus stop maintenance
  - Bus stops should be well maintained to honor the image of the transit system.

All bus bays, bus stops, shelter sites, major transfer centers, and park-and-ride lots must be delineated on all site plans or preliminary plats submitted to the city.

McDowell Corridor/Southern Scottsdale Economic Development Task Force—Recommendations to the Scottsdale City Council

Date Completed: February 9, 2010
Lead Agency: McDowell Corridor Task Force
Study Area: Bounded by Osborn Road to the north, Tempe to the south, Phoenix to the west, and the Salt River Pima-Maricopa Indian Community to the east

Purpose: The Task Force was charged with studying the McDowell corridor/southern Scottsdale area and determining how it should be marketed as a place to live and work. Its recommendations may also serve as a tool to market the area to those considering it as a place to locate businesses or developments.

Recommendations Relevant to Scottsdale/Rural Corridor: The many recommendations included: continue evaluating existing and future infrastructure to ensure sufficient capacity to support revitalization; develop the strongest possible transportation corridor between Downtown Tempe and Downtown Scottsdale, with a major stop at SkySong; increase floor area ratio by right from 0.8 to 2.0; increase density in Multi-Family and Focal Core Areas from 23 units to 30 units per acre; reduce parking requirements for developments within 250 feet of the Scottsdale Road Opportunity and Transit Corridor; and establish pedestrian-friendly neighborhood and greenbelt connections as a key focal point for revitalization.

Commuter Rail System Study

Date Completed: March 2010 (Draft)
Lead Agency: MAG
Study Area: Maricopa County and portions of Northern Pinal County

Purpose: The MAG Commuter Rail System Study is an overall evaluation of a system of commuter rail corridors that would extend from downtown Phoenix to the northwest, west, and south/southeast. This study aims to address increasing travel demand and to help provide options for faster and more reliable travel between downtown Phoenix, other activity centers and suburbs. The purpose of the study is to

define a network of corridors and the necessary elements to implement commuter rail service in the MAG region and northern Pinal County. The Commuter Rail System Study evaluates potential commuter rail links to the East and West Valley, and offers recommendations for an optimized commuter rail system within the region.

Recommendations Relevant to Scottsdale/Rural Corridor: The System Study assumes that limited financial resources will be available for full buildout of each corridor concurrently, and therefore recommends a phased approach to implementation. The analysis gave the Southeast Corridor (through Tempe, Mesa, Gilbert and Queen Creek) the highest ranking due to its high forecast boardings per revenue mile, travel time savings and low capital costs compared with the other corridors. This study recommended that the Southeast Corridor be the first commuter rail corridor implemented in the MAG region. This corridor crosses Rural Road south of Apache Boulevard in Tempe. When developed, the corridor may provide a transfer opportunity to LRT west of the existing 3rd Street/Mill Avenue METRO station.

Southern Scottsdale Character Area Plan

Date Completed: Adopted October 26, 2010
Lead Agency: City of Scottsdale
Study Area: The portion of Scottsdale between the city's western boundary, Pima Road, Indian Bend Road and McKellips Road, except the area covered by the City of Scottsdale Downtown Plan.

Purpose: To establish goals and objectives for the area, and to define its desired character in terms of specific community elements.

Recommendations Relevant to Scottsdale/Rural Corridor: Support Scottsdale Road as the city's designated high-capacity corridor between Tempe and Downtown Scottsdale. Continue to use innovative transportation technologies to reduce congestion and pollution. Increase the effectiveness and efficiency of transit routes throughout the area.

Tempe South AA/Environmental Impact Statement (EIS) Interim Documents (Purpose and Need, Tier 1 and 2 Evaluation Reports)

Date Completed: Final EIS expected by 2011
Lead Agency: METRO
Study Area: Bounded by Kyrene Branch of the UP on the west, SR 101 (Price Freeway) on the east, SR 202 (Red Mountain Freeway) on the north; and SR 202 (Santan Freeway) to the south

Purpose: The purpose of the AA/EIS is to evaluate high-capacity transit alignments and technologies in Tempe and Chandler, and to recommend an LPA for further design and implementation. This process has gone through a tiered evaluation process to narrow down the alternatives and determine a LPA.

Recommendations Relevant to Scottsdale/Rural Corridor: The Tier 1 analysis included sixteen potential choices for high-capacity transit, made up of four corridor and four technology options. The evaluation process narrowed the sixteen down to six, for further evaluation in the Tier 2 analysis. Of the six alternatives moved forward to Tier 2, two included recommendations along Rural Road: BRT in one alternative, and LRT or modern streetcar in the other.

A more detailed analysis and evaluation was conducted on the six Tier 2 alternatives, resulting in two final options for Tier 3 analysis and the ultimate recommendation of a LPA. The first option is BRT along Rural Road from the Tempe Transportation Center to Chandler Boulevard, where the corridor would split and

travel east to the Chandler Fashion Center and west/south to a transit center at Kyrene Road/SR 202. This concept would have BRT using BAT/HOV lanes as far south as Baseline Road. The second option is a modern streetcar along Mill Avenue from Downtown Tempe initially to Southern Avenue, with future phases possibly extending east to Rural Road and north from Downtown Tempe into Scottsdale. The Tempe City Council has adopted the Mill Avenue modern streetcar as the LPA for short-term funding and implementation in the Tempe South study area. BRT on Rural Road south of University Drive will be retained as a currently unfunded option for future consideration beyond the 2026 expiration of the RTP.

Appendix B - Current Zoning

Scottsdale

The City of Scottsdale has numerous zoning districts related to mixed-use development. Where these districts are adjacent to or traverse the Scottsdale Road corridor, mixed-use development in response to future higher-capacity transit is allowed, as stipulated below.

- The planned community development (PCD) is intended to enable and encourage the development of large tracts that are under unified ownership or control, to achieve land development patterns which will maintain and enhance the physical, social, and economic values of an area. To achieve this goal, PCD districts may include a combination of land uses with a variety of residential, commercial, industrial, public, and semi-public areas, arranged so as to be properly related to each other, the surrounding community, the planned transportation system, and other public facilities; e.g., water and sewer systems, parks, schools, and utilities. PCD districts have a minimum gross parcel size of 10 acres in a designated redevelopment area, and a minimum gross area of 160 acres outside a designated redevelopment area. Many of the mixed-use designations within the Downtown and Scottsdale Airpark activity centers are PCD designations.

- The purpose of the planned commerce park (PCP) district is to promote, encourage, and accommodate innovatively designed and master-planned major developments around an office employment core, in an open space framework of expansive streetscapes, functional pedestrian spaces, enhanced view corridors, and other public environmental amenities. The planned commerce park district can accommodate mixed-use commerce and employment centers in large-scale, campus-style developments. A PCP occupies at least 15 contiguous acres. While these districts will not likely abut Scottsdale Road, they may be found in large employment areas, like the Scottsdale Airpark.

- The planned unit development (PUD) district promotes the goals of the general plan, area plans, and design guidelines in areas that the general plan designates for a combination of land uses in a mixed-use development pattern of either horizontal or vertical design. This zoning district recognizes that adherence to a traditional pattern of development standards, (e.g., height, setback, lot coverage, space, bulk and use specifications) would preclude the application of the more flexible PUD concept. Commercial, employment, hospitality, multi-family residential, and townhouse residential uses are encouraged, with intensities and densities that promote a mix of daytime and nighttime activities. Overall residential densities can vary and will be established by the development plan. The gross site area of any PUD development shall be between one-half acre and 15 acres, except where a larger site is appropriate to achieve a fully integrated mixed-use development. A PUD could be found anywhere along the Scottsdale Road corridor.

- The planned regional center (PRC) district is intended to provide for a variety of general merchandise/retail and services (e.g., professional, education, government, medical), which may include office and residential uses carefully integrated to assure complimentary uses in the mixed-use complex. Designations of this district are concentrated along the freeway, including at the intersection of Scottsdale Road and SR 101, just north of the study area boundary.

- The central business district (Downtown Scottsdale) is intended to permit all neighborhood commercial uses, as well as commercial activities designed to serve the community as a whole. Mixed-use buildings are allowed, where dwelling units physically integrated with commercial establishments do not exceed one dwelling unit per establishment.

- The downtown district overlay allows greater flexibility for mixed-use developments, where one objective of the downtown district, among others, is to provide opportunities and incentives for residential projects and mixed-use developments. Residential/commercial mixed uses are allowed throughout the downtown sub-districts, which include retail/specialty, office/commercial, regional commercial office, residential/hotel, medical (with a major hospital in the downtown area), civic center, and residential high density.

Tempe

The City of Tempe's *Zoning and Development Code* includes seven mixed-use districts. Where these districts adjoin or traverse the Scottsdale Road/Rural Road corridor, mixed-use development in response to future higher-capacity transit is allowed, as stipulated below.

- The city center (CC) district fosters employment and livability in Tempe's city center by providing retail, offices, moderate- and high-density residential uses, entertainment, civic uses, and cultural exchange in a mixed-use environment that supports public investment in transit and other facilities and services. This district may also be considered mixed-use when the design provides a mix of uses for the purpose of implementing the General Plan Land Use. CC and MU-4 (see below) are the most prevalent types of existing mixed-use development adjoining the study corridor.

- The mixed-use commercial and residential districts require the integration of commercial and residential uses (a) to support pedestrian circulation and transit as alternatives to driving, and (b) to provide employment and housing options. Mixed-use districts allow development intensities and uses including, but not limited to: personal and professional services, institutional and civic uses, retail, multi-family dwellings, attached single-family dwellings, and mixed-use buildings and building sites. All mixed-use districts require a planned area development (PAD) overlay for processing. The purpose of the PAD is to accommodate, encourage, and promote innovatively designed developments involving residential and/or non-residential land uses, which form a harmonious unit of the community. Such a planned development may be designed as a large-scale separate entity, able to function as an individual community, neighborhood, or mixed-use development; as a small-scale project that requires flexibility because of unique circumstances or design characteristics; or as a transitional area between dissimilar land uses. All land uses and densities in a PAD shall comply with the underlying zoning district.

- The mixed-use, low-medium density (MU-1) district allows low- to medium-density housing (up to 10 dwelling units per acre) to be combined with commercial, office, and public uses that serve the neighborhood.
    - The mixed-use, medium density (MU-2) district allows medium-density housing (up to 15 dwelling units per acre) to be combined with commercial, office, and public uses that serve the neighborhood.
    - The mixed-use, medium-high density (MU-3) district allows medium- to high-density housing (up to 25 dwelling units per acre) to be combined with commercial, office, and public uses that serve the neighborhood or community.
    - The mixed-use, high density (MU-4) district allows unlimited housing density in a mixed-use setting with commercial, office, and public uses. Development intensity must be consistent with the General Plan and the city's ability to provide public facilities.
    - The mixed-use educational (MU-Ed) district can be used only for properties owned by a public university.

- The residential/office (R/O) district allows professional and administrative services, live-work, and limited retail uses on small parcels located between higher-intensity commercial (or multi-use) zones and residential zones.

Appendix C - Activity Centers and Development Proposals

Scottsdale

The City of Scottsdale has preliminarily designated a series of activity centers along the Scottsdale Road corridor as part of the General Plan update process. Major activity centers are located at ASU SkySong, the Downtown Scottsdale area centered two miles north of SkySong, the intersection of Scottsdale Road with Shea Boulevard, and the Scottsdale Airpark area from Thunderbird Road to SR 101. These activity centers are envisioned to become hubs of focused economic development with the highest densities and building verticality in the city, as well as concentrated transit service. Each activity center is planned for a "park once" situation, where visitors can park their car once and travel throughout the activity center either on foot or on internal shuttle systems, similar to the trolley in Downtown Scottsdale. A transportation management association, which could enact minimal parking fees (e.g., weekends or evenings only) or minimal shuttle fares, is a mechanism that the city might consider to help fund future transit circulation within activity centers. The following paragraphs summarize plans and proposals for development and expansion of the activity centers.

ASU SkySong

SkySong is a mixed-use project of ASU (through the ASU Foundation) and the City of Scottsdale. Located at the southeast corner of Scottsdale and McDowell Roads (on the former Los Arcos Mall site), it consists of an entitled 1.2 million square feet of office, research, and retail space, plus a hotel/conference center at full build-out. In addition to the commercial space, SkySong will include multi-family residential units. Development will occur in several phases, adding 150,000 square feet of development every three years through 2028. Phase 1, consisting of two large office buildings containing 300,000 square feet of office space, was recently constructed. Phase 2, currently under construction, consists of a large multi-family housing element, with ground floor retail and commercial uses.

Timing of the remaining phases will depend on ASU resources and on market conditions. When built out with its full complement of offices, laboratories and classrooms, SkySong will serve as an integral part of five-campus ASU system, along with Tempe, Downtown Phoenix, Polytechnic and West. SkySong's proximity to the main ASU campus will result in substantial interaction between the two centers, yet SkySong and Tempe are too far apart for an extension of the existing FLASH circulator to connect them efficiently. Using strategies such as the discounted UPass and parking management, the university is encouraging its population to take full advantage of the regional transit system.

Currently, SkySong serves as a business park for business incubation and start-ups employing a small number of students. SkySong supports new technology start-ups with office space, access to business services, and continued training geared toward local innovators and global firms seeking to start operations in the United States.

A large parcel of land is available just east of SkySong, for which the city has received several development proposals, including a 6,000-seat multi-purpose event center, a hotel complex, and a mixed-use office/retail/multi-family residential complex. The city has not committed itself to any proposal at this time.

Just northwest of SkySong, the Scottsdale Motor Mile is the stretch of McDowell Road from 68th Street to Scottsdale Road. This corridor, previously composed of high-end car dealerships, is experiencing more vacancies as dealerships move elsewhere. Future growth of this prime redevelopment area will be tied to SkySong. The city would like to see this area become an urban village, with everyday amenities such as a grocery store and dry cleaner, affordable multi-family housing with ground floor retail space, and at least one major employer. The scale of development in this activity center would include buildings no higher than five stories. The tallest and most intense growth is planned to occur along Scottsdale Road.

The city is in the process of creating a Community Area Plan for southern Scottsdale. The Southern Scottsdale Community Area encompasses approximately 14 square miles of the southernmost portion of the city, bordered by Phoenix and Paradise Valley to the west, Tempe to the south, the Salt River Pima-Maricopa Indian Community to the east, and Indian Bend Road to the north. The goal of the plan is to complete an area-specific policy document that can be incorporated in the City's *General Plan 2011* update, as well as to begin implementation of the community's goals for the area.

Downtown Scottsdale

Scottsdale completed its *Downtown Plan* in June 2009 to guide downtown growth and development decisions for the next 20 years. The area included as part of the *Downtown Plan* has a zigzagging boundary generally between Chaparral Road on the north, Thomas Road on the south, Miller Road on the east, and 68th Street on the west; with a core between 5th Avenue, 2nd Street, Brown Avenue and Goldwater Boulevard. This area includes the historic Old Town as well as Scottsdale Fashion Square, a major high-end regional shopping destination located immediately south of Downtown Scottsdale.

Recommendations in the *Downtown Plan* for the Scottsdale Road corridor include:

- Scottsdale Road is identified as a conceptual pedestrian corridor: a safe and walkable pedestrian-way to provide access and connections to adjacent developments.
- In the core of the downtown, Scottsdale Road is classified as a downtown area access roadway--facilitating the circulation and access of all downtown visitors and accommodating all modes of transportation, with a special emphasis on meeting pedestrian needs. Through traffic could use alternative routes to avoid lower speeds through the heart of downtown.
- Goldwater Boulevard and Drinkwater Boulevard are designated as regional access corridors to accommodate pass-through traffic around downtown.

The *Downtown Plan* encourages planning for a mixture of land uses and densities near major transit routes and facilities to promote public and private investment, emphasizing high-frequency transit service and expanded service hours. Downtown Scottsdale is envisioned to maintain a pedestrian-friendly and compact "Main Street" feel, while increasing the verticality (up to nine or ten stories) and building densities of development. High-density residential buildings are expected to have ground floor retail and commercial uses to maintain a 24-hour "eyes on the street" environment. This area would become more residential and less tourism-oriented, with a series of urban neighborhoods focused on Main Street, the medical campus, the civic center, the waterfront, and possibly other nodes such as the 8,500-seat

Scottsdale Stadium, the baseball spring training facility for the San Francisco Giants that generates event trips during the season in March.

Scottsdale/Shea Boulevard

Scottsdale has just initiated a Community Area Plan for the Scottsdale Road/Shea Boulevard activity center, scheduled for completion by 2012, to set out a long-range vision, anticipated land uses, and applicable policies and implementation steps. The last area plan for this vicinity was conducted in 1993. The goal is to transform this area into an urban village, with more multi-family residential development, better transit connections, higher-density development along Scottsdale Road, and at least one major employer.

Scottsdale Airpark

The Scottsdale Airpark area is the second largest employment center in the state. South of Frank Lloyd Wright Boulevard it contains a mix of residential and commercial land uses, with further development anticipated in both categories. Industrial uses and corporate headquarters are planned to locate around the airport property. The highest intensity of buildings and uses is planned along the Scottsdale Road corridor, which is envisioned as a major multimodal spine, with other transportation modes intersecting and dispersing travel throughout the activity center.

The *Greater Airpark Community Area Plan* was completed in 2009. It is a policy document to guide growth and development decisions for the greater Scottsdale Airpark area over the next 20 years, outlining the vision and necessary implementation programs to achieve it.

The plan specifies mixed-use development along the entire Scottsdale Road corridor up to Frank Lloyd Wright Boulevard, specifying highest-scale development with access to multiple modes of transportation, including mid-block connections to provide easier pedestrian, bicycle, and vehicular access. Important pedestrian linkages along Scottsdale Road are noted at Butherus Drive and Frank Lloyd Wright Boulevard. Scottsdale Road is an existing transit route corridor, with a potential transit center located at Thunderbird and Scottsdale Roads. (As mentioned elsewhere in this paper, the city is developing a park-and-ride lot at the southeast corner of this intersection.) It is also shown as a conceptual pedestrian/bicycle corridor.

Scottsdale Resort Corridor

The portion of Scottsdale Road between Camelback and Doubletree Ranch Roads is known as the Resort Corridor. Interspersed with commercial and office development, and generally surrounded by residential development, the Resort Corridor contains hotels, retail/restaurant uses, and golf courses. This area peaks in Arizona's more comfortable fall through spring seasons, attracting visitors for many outdoor activities, including hiking, golfing, and baseball spring training. The lodging/resort industry in this area is highly labor-intensive, and employs hundreds of service workers who often earn relatively low wages. Many of these workers live outside the area and rely on transit to get to and from work. The Resort Corridor is not expected to grow or change much in the future, except for some new commercial or mixed-use nodal development that might generate additional transit ridership.

Tempe

ASU Tempe Campus/Tempe Town Lake

The ASU Tempe campus currently has an annual enrollment of 55,000 students, both undergraduates and graduate students. University leadership does not foresee increasing the enrollment, although the focus of the campus is changing to a greater research orientation--tripling research capacity by 2012--which may cause a long-term reduction in undergraduates and an increase in candidates for advanced degrees.

The university has a series of development initiatives underway that may affect transit demand and ridership in the Scottsdale Road/Rural Road corridor. The first is a 13-acre parcel at the northwest corner of University Drive and Rural Road, where ASU has plans for a 3,000-bed student housing facility, a 200- to 300-bed hotel, and 250,000 square feet of retail space. This land is partially owned by a university developer and a private property development group. The City of Tempe is currently processing the subdivision plat for this mixed-use development. The student residence hall has the highest priority, with an expected opening in time for the fall 2010 semester.

ASU is also conducting an internal analysis to look at the redevelopment potential of the 165-acre Karsten Golf Course, located at the southeast corner of Rio Salado Parkway and Rural Road, for future conversion into a multi-use commercial development, including the potential for a research park, multi-family housing, and retail.

At a location not directly on the Scottsdale Road/Rural Road corridor, but with high potential for transit ridership, ASU is exploring the potential to construct university-based retirement housing near Tempe Town Lake, recognizing proximity of the baby boomer generation to retirement age and the widespread desire for a connection to lifelong learning. Such housing could accommodate current faculty and staff, retired faculty and staff, alumni, and others.

While parking lots on campus are generally seen as placeholders for future development, very few plans exist for parking lot conversion in the near future. Lot 59, located on the north side of Rio Salado Parkway and spanning both sides of Rural Road, is a potential location for future waterfront development, although nothing is currently programmed.

Construction is underway on Lot 44, located on the southeast corner of Terrace Road and McAllister Avenue, for conversion from a parking lot to a new high-technology research laboratory and office space (Interdisciplinary Science and Technology Building 4). This approximately 300,000-square-foot building will house the School of Earth and Space Exploration, Fulton School of Engineering research programs, and research units from the College of Liberal Arts and Sciences. Construction is scheduled to be complete in spring 2012.

Downtown Tempe

Many of the development proposals for Downtown Tempe have been put on hold because of the downturn in the current economic cycle. Plans were in place for a new hotel, conference center, high-density residential development, and additional mixed-use student housing. Most areas along the Scottsdale/Rural Road corridor are controlled by ASU, with the exception of the northeast corner of University and Rural Roads. Development exists on the site today, but with considerable vacant space and poorly situated site plan. The city envisions higher-density mixed-use development at this site.

Papago Park Center

Papago Park Center, a 522-acre employment campus containing the headquarters of the Salt River Project, lies on the north side of Tempe Town Lake. Although not on Scottsdale Road or Rural Road, it is located roughly one mile west and connected to the corridor by LRT. Currently a large employment center, it is envisioned to build on the assets of the nearby Desert Botanical Garden and Phoenix Zoo (in Phoenix) to become a major cultural/museum/park center with future resort development.

Miscellaneous Redevelopment Opportunities in Tempe

Parts of Tempe along Scottsdale Road, north of Tempe Town Lake, could see some future redevelopment. The city envisions higher-density, mixed-use development. Recent construction has emphasized multi-family housing (condominiums and apartments) east of Scottsdale Road and north of Town Lake, complementing the development of high-density, premium housing on the south side of the lake.

A county island exists east of Scottsdale Road between Curry Road and SR 202. This area could see some redevelopment with higher densities. The rest of the Scottsdale Road corridor within Tempe is already built out with multi-family residential and commercial development. The opportunity may exist, however, for redevelopment of some parcels to higher-density residential or mixed-use.

Appendix D - Notes from Alternatives Development Workshop: June 15, 2010, Tempe Transportation Center

Scottsdale Rd/Rural Rd Alternatives Analysis (AA) Study
Alternatives Development Workshop
June 15, 2010: 8:00-11:30 a.m., Tempe Transportation Center

Attendance

Stuart Boggs, RPTA
Brad Carr, City of Scottsdale
Dawn M. Coomer, City of Tempe
Ross Cromarty, City of Scottsdale
Wulf Grote, METRO
Kammy Horne, URS
Teresa Huish, City of Scottsdale
Greg Jordan, City of Tempe
Diana Kaminski, City of Tempe
Michael Kies, AECOM
Jim Lightbody, AECOM
Jim Mathien, METRO
John McNamara, AECOM
Dave Meinhart, City of Scottsdale
Jackie Pfeiffer, AECOM
Joe Racosky, URS
Vijayant Rajvanshi, AECOM
Ethan Rauch, AECOM
Carolyn Reid, City of Tempe
Janet Strauss, RPTA
Mary Vandevord, City of Scottsdale
Kevin Wallace, MAG

Mike Kies began the meeting with a PowerPoint presentation, explaining that the purpose of the workshop is to develop six feasible, end-to-end alternatives for further development and evaluation. His presentation included a review of transit modes ranging from local bus to commuter rail. The study team proposes to remove local bus as an improvement alternative because it does not meet the Purpose and Need for the project. On the other hand, LRT modes are too costly in the short term and not feasible to implement by the target date of 2016. It was also noted that commuter rail options would not be evaluated for this corridor, due to the lack of an existing freight rail corridor.

Possible Transit Modes

-We still need some level of local bus service operating on Scottsdale Road/Rural Road along with our improvement—much as Route 40 does with the Main Street LINK (Wulf Grote).

-Emphasize that we want transit improvement in operation by 2016, in order to justify removing LRT from set of alternatives.

-LRT may be the best long-term solution, however (Dave Meinhart).

-Fade out infeasible modes on the PowerPoint slides instead of using a red X (Stuart Boggs).

-We should always keep in mind the bigger picture, so that the short-term solution does not preclude a different long-term solution.

-Dawn asked whether there's funding for full BRT. Wulf responded that we will need federal money even to implement "BRT light."

-We should be mindful of the federal New Starts (Very Small Starts) process—we will need to chase federal funds. The FTA has specific steps to calculate ridership: does our corridor meet the threshold? The study team needs to find out whether VSS is a realistic alternative for this corridor in the near term (Wulf).

-Dave: Also consider corridor planning without VSS funding.

-We need to understand the resources available and whether that affects solutions/outcomes. This may include phasing of improvements to match funding availability.

Corridor Segments and Land Use

-Dave observed that the City of Scottsdale is developing a park-and-ride lot at Scottsdale/Thunderbird, so the study team should consider dividing Segment 7 in two. Scottsdale would like to retain opportunity to connect BRT into the lot—it's a good terminus/turnaround location. Scottsdale is about to lose an express route to the facility, and would like to bring more service there. Mary added that our long-range thinking should consider extension beyond Frank Lloyd Wright to SR 101L.

-Be mindful of future development that will influence locations and future ridership: SkySong, canal area/downtown, Airpark. SkySong is currently one-fourth built out (Stuart).

-The Resort Corridor will not change character much, but there are major activity centers on both ends. The Shea area won't change much either, but the Airpark will see densification (Dave).

-In Segment 3, the Southern Scottsdale Character Area Plan recommends mixed-use, high-density development fronting Scottsdale Road. This area will see many opportunities for redevelopment and associated transportation improvements. Refer to the Scottsdale Streetscape Plan. The timeline for redevelopment is ten to twenty years, according to Ross.

-Ross: This area has many long and shallow lots mixed with short and deep ones. This makes land assembly a challenge.

-There has been discussion in the past of removing two lanes from Scottsdale Road.

-Given the FTA emphasis on ridership, what development intensity is imminent?

-Jim Lightbody stressed that we need to look at opening day conditions. Mike replied that we'll be getting pertinent forecasts from MAG.

-Ross: The first Southern Scottsdale Character Area Plan is suggesting revisiting parking requirements for southern Scottsdale. The Southern CAP supports exploring public/private partnerships for joint parking structures and lots to accommodate small lot development.

The Scottsdale City Council agreed to begin reducing parking requirements for planned unit developments.

Transit Concepts

Shared through lanes (right/curb)

-Like Mesa LINK.

-We can include pull-through lanes at intersections—they extend the right-turn lane through the intersection for buses. Buses can then exit the pull-through bay when the signal stops traffic on the next cycle. Pull-through lanes work well with queue jumpers (Stuart).

-We can establish more elaborate bus stops (common to all BRT options).

-On the LINK system, buses receive signal priority only if running late (Stuart).

Business Access and Transit (BAT) lanes

-The right lane is reserved for buses and right turns.

-This is not truly taking an entire lane of traffic—accommodates natural slowing and deceleration for right turns.

-Wulf: The Tempe South AA proposes full BRT on Rural Road BAT lanes from University Drive to Baseline Road. This would be frequent, all-day service. It is not funded, however.

-BAT could be difficult in this corridor because of the high level of tourists—it's easier for local commuting traffic to change behavior.

-With enough BRT and local buses using the lane, it could almost be self-enforcing; through vehicles won't want to be stuck behind buses and right turning vehicles.

Shared through lanes (left/median lanes)

-This concept creates issues with the way left turns are managed in Scottsdale and Tempe. Lagging left versus leading left.

-Buses can stop in the lane or in a pullout.

-There should be pullouts at station/stop locations.

-This concept violates drivers' expectations. There are few existing examples. Jim Lightbody: Only Eugene and Cleveland have left door boarding, but the buses also have right doors and operate in exclusive median lanes.

-Because of left turn bays, it may be difficult to put stations near intersections. This makes connections to intersecting east-west bus routes difficult.

-If LRT eventually becomes the long-range solution, it will run in the median, meaning that the cities must take out the entire bus infrastructure and reroute service during construction.

-Is this a feasible option?
- -"Very little gain for the pain" (Dave). High cost for little benefit.
- -Poor convertibility to LRT.
- -Poor transfer connections.
- -Works against maximizing people-carrying capacity in the corridor
- -No, we will not consider it further.

Exclusive bus lanes (median)

-Operates like LRT without rail.

-Median stations can accommodate right-door buses if the platform is tapered to allow crossing movement of buses approaching the station. This would require some form of block control to avoid conflicts at crossover points at either end of the platform.

-No left turns except at (signalized) intersections.

-Many businesses traditionally are not supportive. This would be a flashpoint. Ross sees no current support in the community.
-Central Avenue businesses protested but (mostly) survived.

-Could support economic development by access to businesses in different ways.

-Southern Scottsdale may not support it.

-Does this type of investment require certain ridership levels?
-In other parts of the country, this type of service increased speed and ridership 30-40%. One can sometimes get more ridership by offering a premium service.
-It probably would elevate our project from Very Small Starts to Small Starts (Wulf).

-Dave said that this is the first alternative that really enhances service. If rail does not become a long-term option, it provides good transit access and service for a much lower cost than rail. Make the service attractive enough to lure choice riders out of their cars.

-Dave added, however, that it will be impossible to find or buy the R/W to do this without taking traffic lanes. But do we really need six through lanes today along Scottsdale Road? Perhaps four lanes plus dedicated transit lanes will work indefinitely.

-If we offer right-lane service first to assess demand for a possible move to the median, we may never capture some of the choice riders who would use median service.

-The Eugene, Oregon system uses creative traffic management techniques to move buses from median to curb and back. They involve a combination of signals and queue jumpers.

Exclusive single lane (median)

-This is used for about a mile in Eugene (EmX).

-Jim said that there can also be one-sided stations.

-Salt Lake City uses a single bus lane through intersections. This saves space and preserves left turn lanes.

-Conclusion: This might work for short stretches, but Wulf added that it won't work at all with high bus frequencies.

Segment 1: University Drive to SR 202 (ASU Area)

-If the proposed BAT lanes are provided on Rural south of University at some future date, there will need to be a transition if a different configuration is selected to the north.

-Tempe does not want to give up traffic lanes. Dawn likes the idea of the BAT lane, which can accommodate both transit and cyclists. It also matches the Tempe South recommendation south of University Drive.

-This segment has high traffic and congestion, and many bicyclists.

-Wulf: The proposed Tempe South BRT would go to the Tempe Transportation Center (TTC). Should ours do the same? Look at the 2030 travel demand chart from Tempe South.

-The Tempe South study found that riders went north or south to and from Downtown Tempe/ASU; not through the ASU/downtown area. This may help us decide whether it's important to carry the same transit type/configuration through Tempe.

-On the other hand, given a better service, would through trips increase? Dave argued that through ridership between Scottsdale and Chandler/South Tempe may be low because the travel time is excessive. Jim Mathien replied that a district-to-district analysis of all travel demand, not just transit demand, will tell us what we need to know.

-Options for terminus (Wulf):
- -All trips terminate at Rural/University LRT station
- -All terminate at Tempe Transportation Center
- -Hybrid
- -Future vision, with BRT on Rural South, could feature through buses, Scottsdale to Chandler, or route split at TTC, or some of both

-The BAT lane is a strong alternative.

-How do we get buses to the TTC from Rural Road? We could use 6th Street or Rio Salado/Packard. Or do we want to stop on University Drive? On the other hand, University Drive, and the University/Rural intersection in particular, are congested, which could slow BRT operations.

-Diana suggested expanding the study area to Baseline to ensure eligibility for Very Small Starts funding.

-We need to understand the ridership numbers.

-Segment 1 is a major corridor for special events, during which traffic is heavily rerouted. A median system may not be flexible enough to accommodate these events. It might be worthwhile to talk with METRO about its experience with special event congestion around Sun Devil Stadium and Mill Avenue.

-There will be more density along Rio Salado in the future.

-Few left turns occur here because of the river and the freeway. Median running might work well, but a transition would be needed for buses to reach the terminus/LRT station.

-BAT is preferred, but don't eliminate a one-lane median as an option.

-Different termini (points of view):
- -We need to make sure we're taking people where they want to go—the center of campus on University, or the TTC? (However, many riders are students, who are highly mobile on foot or by bicycle.)
- -Review boardings by stop.
- -There's no reason to go downtown if the ultimate vision is to take service through to Chandler.

Segment 2: SR 202 to McDowell Road (North Tempe/South Scottsdale)

-The Scottsdale streetscape improvements, which are going to construction soon north of Roosevelt Street, will add a few pieces of raised median. Tempe has no plans for medians.

-The Tempe portion has little bike/pedestrian activity because of limited shade and heavy traffic. It is not pedestrian-friendly. Residents have expressed interest in wider sidewalks. Businesses want more street activity.

-This segment has the most left-turn business access. Businesses do not want fewer left turn lanes. Dave noted, however, that median lanes are best for the transit user.

-From a transit user's perspective, median running is most efficient because it limits conflicts with driveway access movements, but BAT may be most feasible—look at both.

-Stuart suggested looking at crash data because of the large number of turns to and from driveways along a curbside alignment.

-New on-street bus stops at SkySong, with bays and shelters on Scottsdale Road, will be constructed later this year. The long-term vision (with no date attached) calls for a passenger station integral to a SkySong building, adjacent to the sidewalk. The transit center won't be a stand-alone structure. SkySong won't have a park-and-ride.

-SkySong was approved with reduced parking to take advantage of multiple transit opportunities. (However, the transit availability assumptions of the original SkySong project are no longer valid, due to the impact of the economy on local transit budgets and the 20-year transit program in the RTP. This may result in the development of more parking at SkySong than originally envisioned.) Scottsdale is narrowing lanes to eleven feet; it will add bike lanes per the streetscape plan.

-According to Diana, there may not be enough density to support a station at Curry Road. No plans exist for new development there. Nothing is expected to happen in the adjacent county island. *(Jackie Pfeiffer of AECOM later confirmed this with county staff.)*

-Offer a BAT alternative, median running with double lanes, and shared curb lanes.

Segment 3: McDowell Road to Earll Drive (SkySong to Downtown)

-Shared lanes, BAT and dedicated median lanes are all options for this segment.

-Right-lane running may be much easier (than median running) if the route shifts to Drinkwater in Segment 4.

-Otherwise Segment 3 is similar to Segment 2.

Segment 4: Earll Drive to Chaparral Road (Downtown Scottsdale)

-Some parallel and diagonal parking exists along Scottsdale Road.

-Are there activity centers on Scottsdale Road that would help gain riders? Conversely, would we gain riders on the couplet due to different activity centers and higher speeds?

-The couplet is typically on the edges of the greatest activity attractions downtown. Stuart added that with BRT on both legs of the couplet, a circulator service connecting with Scottsdale Road would be necessary.

-We need to pick one element of the couplet: not both. They are too far apart (up to half a mile) for riders to walk between them.

-Drinkwater is probably more efficient than Goldwater, but would probably require a new signal at its southern intersection with Scottsdale Road.

-Fully shared right lanes are the only option for Scottsdale Road in this segment. Dave: The public and City Council opposed rail on this alignment, but not necessarily bus.

-If the destinations are downtown, stay on Scottsdale Road. If the hospital is the main attractor, use Drinkwater. Wulf: We need to understand the origins and destinations.

-Two major attractors: The hospital (Scottsdale Healthcare) and Fashion Square. With multiple destinations, Scottsdale Road may be the best route. Dave added that HDR did some O-D analysis in the Transportation Master Plan. They found that the hospital and Fashion Square are the main destinations.

-There are currently no bike lanes on the couplet.

-Removing Loloma Station is part of the long-term vision.

-Consider alternating service. Run one bus on Scottsdale Road and the next on the couplet, with 10-minute intervals overall or 20 minutes on each road. This may be feasible only with higher frequencies. It may also cause rider confusion. Alternating service might make sense during the peak hours, with all off-peak service using Scottsdale Road. Possibly split service between Scottsdale Road and Drinkwater? The walk between these two streets is interesting, with multiple destinations and activities. There's more vacant land between Scottsdale Road and Goldwater.

-Median running offers little benefit in this area, as the couplet is available for excess traffic. Scottsdale Road has no room for a median.

-Teresa said that if we use Drinkwater, we need to consider the shift schedules at the hospital, which is planning to double the size of its campus over time. Late night and early morning operation would be required to serve 24-hour hospital shifts.

Segment 5: Chaparral Road to Mountain View Road (Resort Corridor)

-This segment has the most traffic but the least congestion in the corridor.

-It may not make sense to take away any lanes, since the buses can operate at competitive speeds.

-Attractive landscaped medians give Scottsdale Road an appealing character. Access is well managed so there's no need for median-running buses.

-The draft Southern Scottsdale Character Area Plan is encouraging redevelopment, but wants to keep the predominantly resort use.

-Key activity center for future transit-oriented development and possible BRT stations include Gainey Village and the Borgata/Lincoln Village.

-Conclusion: Share the right lane with through traffic. Wulf suggested adding queue jumpers, although there are few busy cross streets. Some intersections experience queuing traffic. Provide signal priority where the opportunity exists.

-This is a good area to save travel time. It may have fewer stops than other segments. Resort shuttles could feed BRT stations. Many resorts are interested in transit. They are major employers of service workers, so we should be mindful of stop locations to ensure access to job sites.

Segment 6: Mountain View Road to Mescal Street (Shea Business Area)

-This segment has the most apparent congestion.

-The city wants to make it more pedestrian- and transit-friendly.

-The Mescal/74th/70th Street couplet provides good auto capacity; it is not well designed for transit.

-Transfers between the Shea and Scottsdale Road bus routes generate some pedestrian activity.

-With through movements congested on Scottsdale Road, BAT lanes may impede through traffic.

-Consider both a BAT lane and a shared right lane alternative.

-Median-running option: Probably not—but it depends on how buses operate farther north. Stuart observed that single-lane median running (for a short distance) with a bus-only underpass at Shea should be evaluated, so that transit could bypass peak-period backups. A single-lane underpass would limit lane taking while improving through movement of buses on Scottsdale Road. Adding queue jumpers and pull-through bays at this intersection would be difficult due to the proximity of existing commercial development in the southeast quadrant—possibly requiring the city to totally reconstruct the intersection and shift it to the west.

-Queue jumpers and signal priority will be needed to enhance bus service.

-Shea could be the interim or near-term terminus. How to turn buses around? Is the end point on Scottsdale Road at Shea? The couplet could be used to turn buses around.

-With the park-and-ride two miles north, how much should be invested at this location?

-The land near the Scottsdale Road/Shea Blvd intersection is valuable; don't want to use too much of it for parked cars. Consider as a possible location for a public/private partnership to develop structured parking that would serve transit riders and local businesses (Stuart).

-Fragmented ownership on southeast corner. It is the only corner with truly urban development facing the street—but behind the buildings lies a sea of parking.

-It may be easier for buses to stop and turn around on the northeast corner.

-Suggestion: Keep the stations on Scottsdale Road. This presents a marketing opportunity and makes transfers to/from other routes easier.

-But there's limited space for bus stops at Scottsdale/Shea.

Segment 7: Mescal Street to Frank Lloyd Wright Blvd. (Secondary Corridor)

-Consider shared curb lanes as well as BAT lanes.

-Consider how circulation around the airport could be addressed (i.e., circulator buses providing connections to employment centers east and west of the airport).

Segment Alternatives Summary

1. BAT, median (possibly single), shared curb lanes. Multiple options for southern terminus.
2. BAT, shared curb lanes, median (dual lanes).
3. Same as (2).
4. Shared curb lanes on Scottsdale Road; shared or BAT on couplet; split service (with the two directions no more than one-fourth mile apart); multiple routes during peak periods.
5. Shared curb lanes.
6. BAT, shared curb lanes, median (if not terminus). This is an urban corridor where transit needs the highest priority. Multiple options for northern terminus (may be interim terminus at Shea).

Summary: Key Points of Agreement Reached at the Workshop

1. Due primarily to cost and recent public input on transportation studies in this corridor, rail modes are not feasible alternatives for the near term. The study team should consider the potential for rail or other fixed guideway transit in the future, however.

2. The team should consider a range of BRT options, from "BRT light" (similar to Mesa LINK), to "full BRT" (using dedicated lanes in the roadway median). In Segment 5, however, BRT light with fully shared curb lanes is the only one that requires consideration, because traffic on Scottsdale Road generally flows well and there are few major arterial street crossings.

3. If BRT operates in lanes shared with private vehicles, it should use the curb lanes rather than the median. There was a consensus that running buses in shared median lanes, as opposed to curb lanes, has many operational, safety, and cost disadvantages, and few if any benefits.

4. Participants felt that several alternatives warrant consideration for Segments 1, 2, 3, 6 and 7. The basic BRT options are curb lanes shared with general traffic, Business Access and Transit (BAT) operation in the curb lanes, and median lanes reserved for buses. BAT lanes use signage, striping and pavement color to indicate that they are open to general traffic for right turn movements only.

5. Participants recognized that construction of exclusive bus lanes in the middle of Scottsdale Road/Rural Road would reduce the number of lanes available to general traffic from three to two in each direction. The massive and disruptive R/W acquisition required to add through lanes in long segments of the corridor is not viewed as acceptable.

6. The option of operating two-way BRT in a single reserved lane (as implemented for EmX in Eugene, Oregon) might have limited utility at some locations, but did not generate support as a more general solution. Participants noted that even Eugene uses this approach only for a short distance in a physically constrained section of the corridor.

7. If buses remain on Scottsdale Road within Segment 4 (Downtown Scottsdale), the only feasible BRT option consists of curb-lane operation in mixed traffic. Geometrics, traffic patterns, and existing diagonal parking on Scottsdale Road rule out other configurations.

8. Several options are feasible using the couplet (Goldwater and Drinkwater Boulevards). However, the group agreed that placing southbound buses on Goldwater and northbound ones on Drinkwater would result in excessive walk times and potential for rider confusion, with northbound and southbound stations up to one-half mile apart. Therefore, either Drinkwater or Goldwater may be used for BRT, but not both.

9. Placing one direction of service on Scottsdale Road and the other on Goldwater or Drinkwater would result in northbound and southbound stations up to one-fourth mile apart. Some participants expressed support for this concept. The walk between Scottsdale Road and Drinkwater Boulevard, in particular, can be a pleasant journey with many shops and points of interest. (The group also discussed operating on Scottsdale Road during off-peak periods and on one of the couplets during peak travel periods.)

10. There seemed to be at least a slight preference among the group for Drinkwater over Goldwater as an alignment through downtown. Drinkwater Boulevard directly serves Scottsdale Healthcare, which was identified as the largest employment center in the downtown area and the one generating the most transit demand. It also serves the east side of Scottsdale Fashion Square. Several municipal offices are also located in this area. On Goldwater Boulevard, the west side of Scottsdale Fashion Square is an important employment and visitor destination, but perhaps a less critical transit destination than other centers of employment and activity in the vicinity.

11. In every alternative, appropriate termini at each end of the line need to be considered—both operationally (where can the buses turn around and lay over?) and in terms of travel demand (where are riders going; how can the largest number of travel desires be met most efficiently?). At the north end, this requires analysis of both interim and ultimate terminus locations.

Scottsdale staff proposed, and the group agreed, that the study team should consider extending interim or Phase I service north from Shea Boulevard to the planned park-and-ride lot at Thunderbird Road. Also, the team should consider any redevelopment occurring near Scottsdale Road/Shea Boulevard with respect to opportunities for off-street bus stops and parking.

Appendix E - Public Meeting Input and Attendance

Community Meeting—Notes by Project Team
July 19, 2010 – 6:00 pm – Scottsdale Airport

Question: What service is being considered for Scottsdale Road?

Ethan: Bus--not LRT. LRT is not currently feasible in this corridor due to limitations on financial resources to build, operate, and maintain.

Question: Are areas for park-and-rides being considered?

Ethan: Yes, we will look at general locations for opportunities. However, if the project extends north of Shea Boulevard, there is an opportunity to connect with the Thunderbird Road park-and-ride, which is scheduled to break ground soon.

Question: Could limited stop bus be considered as a primary option? Could we consider limited stop and perhaps extend the service to Bell Road?

Ethan: Yes, that is a possibility, especially with continued growth in the corridor.

Question: Could you consider a private service rather than public? Discuss possibility of a private shuttle. Discuss possibility of yellow cab or Super Shuttle.

Ethan and others: This study would not consider this and public transit agencies are focused on providing services for everyone. Having a private service could hurt overall feasibility for a well planned and operated public transportation option. Paratransit services are currently available for people who need more localized and personal service. Private shuttle service could create confusion to riders, since it would not be a part of the regional schedules and would require separate fares.

Question: Will the fares be collected on- or off-board?

Stuart: There will be an opportunity for either. Mesa LINK has options to pay on- or off-board. Typically people are encouraged to purchase tickets before boarding. Bus fares are validated when boarding the bus at the front door. If the alternative allows boarding at the rear door, some sort of fare enforcement will be required.

Community Meeting—Notes by Project Team
July 21, 2010 – 6:00 pm – SkySong Innovation Center

Question: Will the service run at peak hours or all day?

Ethan: Could be either and we will look at a combination of peak and off-peak service in this AA.

Question: (in reference to BAT lane concept) If the lane was exclusive, could you drive on it when there were no buses?

Ethan: No--not if the lane was restricted. However, we can consider an option to open the BAT lanes to HOVs.

Question: Why not use downtown Scottsdale for buses only and not allow cars? Downtown Scottsdale could be converted to a bus mall.

Ethan: Scottsdale Road is a regional arterial roadway which provides connectivity between North Scottsdale and Tempe/Chandler. It is important to maintain the connectivity. Also, it is not in the city's plan to close it to general traffic, and the road is meant to serve retailers in downtown Scottsdale. It may be challenging to suggest restricting vehicular traffic through downtown Scottsdale.

Follow up comment/question: You should consider other options now and think outside the box.

Ethan: We are currently looking at short-term implementation solutions, but future high-capacity transit could include other options such as LRT.

Question: Scottsdale just approved funding for the Scottsdale Road streetscape and a new transit center at SkySong. What purpose will they serve?

Ethan/Teresa Huish: The study must pay attention to the Scottsdale Road streetscape guidelines. The transit center at SkySong is in its design phase. In the first phase of construction, only bus bays and shelters will be installed; these will serve this study's recommendations for 2014. The second phase will include a transit center on-site. This facility at SkySong could be used by service implemented through this project as well as Route 72.

Question/follow-up: What about Papago Plaza?

Teresa: There will be bus bays on both sides of Scottsdale Road.

Question: If city of Scottsdale removes the "Transportation Corridor" designation from Scottsdale Road, would it affect the access to federal funds of other corridors in the region?

Ethan/Stuart: Scottsdale Road would still be designated for public transportation regionally; removing a local designation would not change that. "Transportation Corridor" is a regional designation through Proposition 400; the Scottsdale/Rural Road corridor provides regional connectivity. There are no similar north-south routes in the vicinity.

Question: Is this study assuming future growth in this area? What is the projected population for Scottsdale?

Ethan/Annie DeChance: This information is being put together by the study team. Preliminary information is provided on the display boards.

Ethan: Population and employment in the study area (within one mile of the study corridor) is projected to grow by approximately 25% from 2005 to 2030. Since the study area is already highly urbanized, this represents significant growth.

Question: This is a north-south route that would be implemented with few east-west transit connections--doesn't that limit options for connectivity?

Ethan: Yes, we recognize that better east-west transit connections are needed, but this study focuses on the north-south corridor of Scottsdale and Rural Roads. This is an issue, especially with limited funding for local Supergrid service on arterials.

Question: Who will ride the bus then? How will we move across town? There will be long walks if you are only planning for north-south transportation.

Ethan: There is still a strong market for bus transit in this corridor. Parking will be provided at Thunderbird Road and possibly elsewhere. Access to METRO light rail at the south end of the corridor may attract a wider spectrum of riders to more regional destinations.

Question: What about a jitney type of service or a neighborhood trolley like Orbit? What fuel would these buses use?

Ethan: Orbit and the Scottsdale circulators serve the same purpose as Jitneys. The idea is to have a bus system with multiple options for multiple purposes.

Question: What is the time projection from here to Shea Boulevard?

Ethan/Stuart: I do not have the specific information, but it would not be as fast as a car because a car is traveling from point to point without stops.

Question: Have you considered economic growth? BRT/bus has not demonstrated its benefit to economic development. Buses can too easily change alignment. LRT makes sense in the long run; make sure that the current option allows for it.

Ethan: (1) We need a system that allows efficient conversion (from one mode to the other). (2) One reason for the limited impact of BRT to economic development may be that this mode has not existed long enough to ascertain its long-term economic benefits.

In response to a question, Wulf Grote addressed pending service cuts for METRO light rail.

Community Meetings—Comment Cards
July 19, 2010 – 6:00 pm – Scottsdale Airport
July 21, 2010 – 6:00 pm – SkySong Innovation Center, ASU

1. Please describe how you or your family uses public transit.
   - I have ridden the bus since 2001 and used it when I was down at ASU.
   - To work, meetings, shopping, etc.
   - Do not use – too slow, too few.
   - Light rail – fairly regularly; local bus – moderately.
   - Work, special events, some shopping.
   - We never have in USA.
   - Daily commute.
   - Use the light rail to go to sporting events.
   - Limited – for events (downtown Tempe) and work as an alternative.
2. Do the existing bus frequency, routing, and connections to other routes fully meet the need for public transportation on Scottsdale and Rural Roads?
   - The 15-minute service was great; too bad it is going away (20 min). Definitely need to speed up service between Camelback Rd and University Dr.
   - No.
   - Not yet. Combined express bus and jitneys (electric) would make more sense.
   - I question the adequacy of frequency. It is my understanding that Route 72 has standing room only on most portions of the route at all times of the day.
   - No. Can't talk about Scottsdale Road without including discussion of east-west routes.
3. If you commented that service is not adequate, please refer to the map on the back and specify segments or locations where you think improvements could be made.
   - Segments 1-4 (segments 5-7 are really fast).
   - All segments.
   - Segments 1-4.
   - Segments 1, 3, 4 and 6.
   - Frequency! And extend/restore service hours.
   - Speed of route.
4. Among the alternatives shown tonight, which do you like or dislike, and why?
   - I like alternative 2. I suggest naming this route "Scottsdale/Rural LINK."
   - None – Support fixed guideway option. The best shown tonight is #4 – Exclusive median transit lane. I dislike all the rest.
   - Curb lane as mixed bus and car lane. Cars will avoid it to not be slowed by following a bus. Right turn cars – OK.
   - I like option 3. It is as close to LRT we may get in Scottsdale and that's a shame. Has Scottsdale asked for a license plate survey at LRT park-and-ride lots? It would be interesting to see whether and how many Scottsdale residents are riding the LRT. My family has owned a home in Scottsdale for 40 years. When evaluating this system, please consider the input of the under-50 age group. We will be the riders for the long-term.
   - Prefer BRT – flexibility in scheduling; cost in tax dollars to community.
   - No build – please apply funding to existing routes/grid, instead of cutting back on service.
   - The exclusive median bus lanes – do it right the first time.

- Like the center dedicated bus lanes – benefits the rider and could drive up ridership. Limit cars – people will choose public transportation.
- Dedicated bus right lane (maybe including HOVs to use).

5. What issues were not sufficiently covered in today's discussion?
   - Route 511 trips could be moved over to Scottsdale Road to jump start service in January 2011 as I explained.
   - Use of light rail.
   - Cost of running large "clean diesel" buses versus electric jitneys.
   - What would the bus service on Scottsdale Road look like? Would LINK operate along with Route 72?
   - Routing BRT along the Goldwater/Drinkwater couplet.
   - Any Scottsdale park-and–rides planned? Connecting city trolley routes to Route 72 if Loloma Station is closed.
6. What can we do to improve the next set of community meetings?
   - Questions at the end, that's all. Keep the cookies!
   - Discuss where the $$ comes from, limits, and who controls decision.
   - Shorten the presentation. It was way too long and had too much technical information.
   - This was well done.
   - I arrived late because the bus had a rack for only two bikes. Fortunately the next bus (20 minutes later) had free racks. Then trying to find the "Convergence Room" on southeast corner. Three people I asked had no idea. Cleaning lady directed me to the North building.
   - Time projections for alternatives, cost projections per option (express bus versus regular bus).
   - Good pacing, presentation materials like tonight.
7. How did you learn of tonight's meeting?
   - Valleymetro.org and Scottsdale Republic.
   - Newspaper.
   - Arizona Republic (two people).
   - Valley Metro.
   - Was invited to focus groups in June but illness kept me away. Sit on General Plan Update Group and Housing Board for City of Scottsdale.
   - Scottsdale website.
   - Through work.
   - Web news article on Phoenix Business Journal.

Community Meetings—Attendance List
July 19, 2010 – 6:00 pm – Scottsdale Airport
July 21, 2010 – 6:00 pm – SkySong Innovation Center, ASU

Patty Badenoch
D. Billingsley
Dawn Coomer (City of Tempe)
Nancy Cantor
Frankie Connell
Annie DeChance (City of Scottsdale)
Mary A. Gayle
Wulf Grote (METRO)
Kammy Horne (consultant team)
Teresa Huish (City of Scottsdale)
Greg Jordan (City of Tempe)
Sonnie Kirtley
Bart Lamer
Paul Leitman
M. Larson
Sam Malekooti
Jim Mathien (METRO)
Dan McParland
Carol O'Hearn
John Packham
Jackie Pfeiffer (consultant team)
Ethan Rauch (consultant team)
Jay Smyth
Janet Strauss (study team/RPTA)
Harvey Turner
Ron Barnes
Stuart Boggs (study team/RPTA)
Tony Cabrera
Susan Colter
Dawn Coomer (City of Tempe)
Shana Ellis
Richard Gayle
Terry Gruver
Charles Huelmantel
Mark Hunsberger
Carol Ketcherside (RPTA)
Gregor Kramer
Jane Larson (*Arizona Republic*)
Leyna
Sam Luis (?)
Ross Maniaci
Catherine Mayorga
Susan Meil (?)
Ned O'Hearn
Darlene L. Petersen
Vijayant Rajvanshi (consultant team)
Stephanie Shipp
Jodi Sorrell
Susan Tierney (RPTA)
Ed Weinstein

Community Meeting—Notes by Project Team
October 27, 2010—5:00 pm—Scottsdale Stadium Team Shop

Question: What does ASU charge for parking? Is it a feasible park-and-ride location?

Response: There will be a park-and-ride at the north end of the route (Thunderbird Road), but not at ASU.

Question: What is the timeline for the draft final report, and for taking it to the councils?

Response: The draft final report will be submitted in November and the final in December. The study will most likely be taken to the councils for approval early next year.

Question: Did the study consider relieving congestion and pollution, or was the objective just to move the people as fast as possible?

Response: The study did consider the impacts on future congestion, which are minimal. Impacts on pollution would be hard to measure for a project at this scale, although this project like all others must be included in the regional conformity process. The primary purpose of the project is to provide additional mobility and travel options.

Question: What happens when businesses ask for additional [BRT] stop locations?

Response: Those requests would be considered case by case. RPTA and the cities must strike a balance between speed and local access. BRT stops are typically meant to serve a multi-business activity center rather than a single establishment.

Question: In Alternative 2 [the study team's recommended Locally Preferred Alternative], is it possible for a bus driver to gain more control over traffic signals?

Response: The cities and RPTA are looking into ways to give buses priority at signalized intersections. They would not necessarily require action by the driver.

Question: Have you consulted with emergency responders about installing medians?

Response: The type of service under consideration will not result in installation of new medians, and will not affect emergency response.

Question: In alternatives with a downtown [Scottsdale] split, was a connection with the [downtown Scottsdale] trolley service considered?

Response: Connections with existing transit services were considered in the evaluation of alternative alignments through downtown. One of the drawbacks of a split is that it complicates connections with other routes. If a split alignment is chosen, the existing downtown trolley service may need to be rerouted and enhanced.

Community Meeting—Notes by Project Team
October 28, 2010—5:00 pm—Scottsdale Airport Terminal

Question: Is it relatively easy to build on Alternative 2 and provide a more advanced system, should there be a future demand? What about moving from Alternative 2 (BRT in general traffic lanes) to Alternative 3 (BRT in Business Access and Transit lanes)?

Answer: Turning general purpose lanes into BAT lanes is relatively straightforward. Moreover, service under Alternative 2 could be maintained while a true high-capacity transit guideway is constructed in the roadway median.

Community Meetings—Comment Cards
October 27, 2010—5:00 pm—Scottsdale Stadium Team Shop
October 28, 2010—5:00 pm—Scottsdale Airport Terminal

1. Do you have any questions about the information presented?
    - Questions were answered.

2. Do you believe that the proposed alternative will benefit you or your business?
    - Not really.
    - Only if bus stops have real time arrival information.
    - Yes—attract employees and increase spending in Scottsdale.

3. Which route, if any, do you prefer through downtown Scottsdale: Drinkwater Boulevard, Goldwater Boulevard, or Scottsdale Road? Why?
    - Goldwater.
    - Drinkwater is a much better choice in my opinion. It's faster and less congested. Goldwater is good also.
    - Scottsdale Road—center of city—no substantial commute time.

4. As this is a preliminary recommendation to begin building ridership, what are your thoughts about future high-capacity transit on Scottsdale and Rural Roads?
    - Transit (High Capacity) is not needed. Smaller buses with greater frequency are what is needed.
    - With the elimination of Tempe bus routes, Scottsdale/Rural buses in south Scottsdale and Tempe are very crowded. A meaningful improvement is needed.
    - In favor of it—light rail as #1 option.

5. Are the proposed stop locations appropriate? If not, where should they be and why?
    - Not sure.

Community Meetings—Attendance List
October 27, 2010—5:00 pm—Scottsdale Stadium Team Shop
October 28, 2010—5:00 pm—Scottsdale Airport Terminal

Jenny Bixby
Stuart Boggs (RPTA/study team)
Tanya Chavez (City of Tempe)
Annie DeChance (City of Scottsdale)
Michael Fernandez
Casey Griffin (City of Tempe)
Wulf Grote (METRO)
Kammy Horne (consultant team)
Teresa Huish (City of Scottsdale)
Bryan Jungwirth (RPTA)
Carol Ketcherside (RPTA)
Brennan Kidd
Paul Leitman
Ofelia Madrid (*Arizona Republic*)
Jim Mathien (METRO)
Jyme Sue McLaren
Jaclyn Pfeiffer (consultant team)
Vijayant Rajvanshi (consultant team)
Ethan Rauch (consultant team)
Janet Strauss (RPTA/study team)
Jami Thompson
Ted Werner
Robert Yabes (City of Tempe)

Appendix F - Vehicle Requirements

Alternative (TTC to Thunderbird)	Current Service				Vehicles Required	
	Peak Travel Time	Layover Time (on Rd. Trip)	Total Round Trip Time (min.)	Trips per Hour (Each Dir.)	Revenue Service Vehicles	Total BRT Fleet (with Spares)
Current Route 72 Service	54.0	15	123.0	3	6	8
Modified Local Service	54.0	15	123.0	2	4	5
Alt. 1 Limited Stop	51.9	15	118.8	4	8	10
Alt. 2 BRT Mixed Flow	40.0	15	95.0	6	10	12
Alt. 3a BAT/HOV (via Scottsdale Rd.)	38.8	15	92.6	6	10	12
Alt. 3b BAT/HOV (via Drinkwater)	38.4	15	91.8	6	10	12
Alt. 3c BAT/HOV (split in Downtown Scottsdale)	38.2	15	91.4	6	10	12
Alt. 4 Median Lanes	33.8	15	82.7	6	9	11

Appendix G - Corridor Performance

	Rte. 72 (20-Min. Service)	Alt 1 Limited Stop	Alt 2 BRT	Alt 3a BRT	Alt 3b BRT	Alt 3c BRT	Alt 4 BRT
Project & Service Characteristics							
Length of project (miles)	14.0	14.0	14.0	14.0	14.0	14.2	14.3
Annual Veh. Revenue Mi. – local	466,000	345,800	345,800	345,800	345,800	345,800	345,800
Annual Veh. Revenue Mi. – BRT		375,800	649,000	649,000	649,000	658,300	662,900
Vehicles (incl. spares) – local	8	5	5	5	5	5	5
Vehicles (incl. spares) - BRT or Limited Stop service		10	12	12	12	12	11
Annual Miles per Vehicle – local	58,300	69,200	69,200	69,200	69,200	69.200	69,200
Annual Miles per Vehicle – BRT or Limited Stop service		37,600	54,100	54,100	54,100	54,900	60,300
Daily Boarding Riders (2016)							
Local service	3,713	1,649	1,649	1,649	1,649	1,649	1,649
BRT or Limited Stop service		2,207	3,318	3,357	3,385	3,376	3,580
Total corridor riders	3,713	3,856	4,967	5,006	5,034	5,025	5,229
Daily Vehicle Revenue Miles							
Local service	1,528	1,134	1,134	1,134	1,134	1,134	1,134
BRT or Limited Stop service		1,232	2,128	2,128	2,128	2,158	2,174
Total corridor vehicle miles	1,528	2,366	3,262	3,262	3,262	3,292	3,307
Riders per Vehicle Revenue Mile							
Local service	2.43	1.45	1.45	1.45	1.45	1.45	1.45
BRT or Limited Stop service		1.79	1.56	1.58	1.59	1.56	1.65
Total corridor riders per mile	2.43	1.63	1.52	1.53	1.54	1.53	1.58
Daily Operating Cost							
Local service	$10,924	$8,106	$8,106	$8,106	$8,106	$8,106	$8,106
BRT or Limited Stop service	N/A	$8,809	$15,215	$15,215	$15,215	$15,433	$15,541
Total daily operating cost	$10,924	$16,915	$23,322	$23,322	$23,322	$23,539	$23,648
Operating Cost per Boarding							
Local service	$2.94	$4.92	$4.92	$4.92	$4.92	$4.92	$4.92
BRT or Limited Stop service		$3.99	$4.59	$4.53	$4.49	$4.57	$4.34
Total corridor cost per rider	$2.94	$4.39	$4.70	$4.66	$4.63	$4.68	$4.52

Appendix H - Travel Time Analysis

Valley Metro Local Bus Time-Table Sections		Existing Route 72	TSM (Limited Stop Bus)	BRT with Shared Lanes	BAT Lanes			Exclusive Median Transit Lanes
		No-Build	Scottsdale Rd: Shared Curb Lanes	Scottsdale Rd: Shared Curb Lanes	Scottsdale Rd: Shared Curb Lanes	Drinkwater Blvd: BAT lane NB; shared curb lane SB	Drinkwater: BAT lane NB Scottsdale Rd: Shared curb lane SB	Where appropriate and feasible
			Alternative 1	Alternative 2	Alternative 3(a)	Alternative 3(b)	Alternative 3(c)	Alternative 4
A. Tempe Transportation Center - McDowell Rd	Distance (miles)	3.9	3.9	3.9	3.9	3.9	3.9	3.9
	Number of Stops	18	6	4	4	4	4	4
	Number of Major Stops (60 seconds)	3						
	Number of Minor Stops (30 seconds)	10						
	Total Travel Time (minutes)	16.00	14.00	9.96	9.50	9.50	9.50	8.69
	Total Dwell Time (minutes)	8.00	6.00	3.00	3.00	3.00	3.00	2.00
	Travel Time (minutes)	8.00	8.00	6.96	6.50	6.50	6.50	6.69
	Average Running Speed (mph)	29.25	29.3	33.6	36.0	36.0	36.0	35.0
B. McDowell Rd - Earll Drive	Distance (miles)	1.9	1.2	1.2	1.2	1.2	1.2	1.2
	Number of Stops	14	1	1	1	1	1	1
	Number of Major Stops (60 seconds)	1						
	Number of Minor Stops (30 seconds)	7						
	Total Travel Time (minutes)	9.00	3.84	3.22	2.75	2.75	2.75	2.56
	Total Dwell Time (minutes)	4.50	1.00	0.75	0.75	0.75	0.75	0.50
	Travel Time (minutes)	4.50	2.84	2.47	2.00	2.00	2.00	2.06
	Average Running Speed (mph)	25.33	25.3	29.1	36.0	36.0	36.0	35.0
C. Earll Drive - Chaparral Road	Distance (miles)	6.5	1.7	1.7	1.7	2	1.9	2.1
	Number of Stops	20	4	4	4	4	4	4
	Number of Major Stops (60 seconds)	1						
	Number of Minor Stops (30 seconds)	8						
	Total Travel Time (minutes)	23.00	8.71	7.09	7.09	6.69	6.51	6.29
	Total Dwell Time (minutes)	5.00	4.00	3.00	3.00	3.00	3.00	2.00
	Travel Time (minutes)	18.00	4.71	4.09	4.09	3.69	3.51	4.29
	Average Running Speed (mph)	21.67	21.7	24.9	24.9	32.5	32.5	29.4
C. Chaparral Road - Shea Blvd	Distance (miles)	6.5	5	5	5	5	5	5
	Number of Stops	20	5	3	3	3	3	3
	Number of Major Stops (60 seconds)	1						
	Number of Minor Stops (30 seconds)	8						
	Total Travel Time (minutes)	23.00	18.85	14.29	14.29	14.29	14.29	11.72
	Total Dwell Time (minutes)	5.00	5.00	2.25	2.25	2.25	2.25	1.50
	Travel Time (minutes)	18.00	13.85	12.04	12.04	12.04	12.04	10.22
	Average Running Speed (mph)	21.67	21.67	24.92	24.92	24.92	24.92	29.35
D. Shea Blvd - Thunderbird Rd	Distance (miles)	2.2	2.2	2.2	2.2	2.2	2.2	2.2
	Number of Stops	7	2	2	2	2	2	2
	Number of Major Stops (60 seconds)	0						
	Number of Minor Stops (30 seconds)	3						
	Total Travel Time (minutes)	6.00	6.50	5.41	5.17	5.17	5.17	4.77
	Total Dwell Time (minutes)	1.50	2.00	1.50	1.50	1.50	1.50	1.00
	Travel Time (minutes)	4.50	4.50	3.91	3.67	3.67	3.67	3.77
	Average Running Speed (mph)	29.3	29.3	33.7	36.0	36.0	36.0	35.0
Total Trip Duration		**54.00**	**52**	**40**	**39**	**38**	**38**	**34**
% Travel Time Savings			**3.90**	**25.97**	**28.15**	**28.89**	**29.23**	**36.98**
Total Number of Stops		59	14	10	10	10	10	10
Average Running Speed (mph)		21.12	21.12	24.28	26.58	26.58	26.58	26.87
Distance (miles)		14.5	14	14	14	14.3	14.2	14.4
Average Bus Speed		16.1	16.2	21.0	21.6	22.3	22.3	25.4

Assumptions:

1. One minute dwell time at bus stops under the TSM alternative.
2. 45 second dwell time at bus stops under the shared curb lane and BAT alternatives.
3. 30 second dwell time at bus stops under the dedicated median transit lane alternative.
4. Running time on BAT lanes are based on 60% of existing speed limit.
5. A 15% increase in average running speed in each segment (Alternative 2) due to signal priority/ITS

Appendix I - Ridership Estimates

	Rte 72 (20-Min. Service)	Revised Local Service	Alt 1 Limited Stop	Alt 2 BRT	Alt 3a BRT	Alt 3b BRT	Alt 3c BRT	Alt 4 BRT
Current Service								
Current daily ridership	3,375							
Distribution by stop type		50%	50%	50%	50%	50%	50%	50%
Allocation of current riders		1,688	1,688	1,688	1,688	1,688	1,688	1,688
Adjusted Service Frequency								
Current peak headway (min)	20	20	20	20	20	20	20	20
Proposed peak headway		30	15	10	10	10	10	10
Service elasticity		0.4	0.4	0.4	0.4	0.4	0.4	0.4
Estimated ridership due to adjusted service level		1,463	1,913	2,363	2,363	2,363	2,363	2,363
Adjusted Travel Times								
Current peak travel time	54							
Estimated peak travel time		54	52	40	39	38	38	34
Travel time elasticity		0.6	0.6	0.6	0.6	0.6	0.6	0.6
Ridership augmented by reduced travel time		1,463	1,957	2,730	2,762	2,785	2,777	2,893
Adjusted for Thunderbird Park-and-Ride								
Benefit to ridership of park-and-ride		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Estimated ridership with park-and-ride		1,499	2,006	2,798	2,831	2,855	2,847	2,965
Adjusted for BRT Features								
Benefit to ridership of BRT features		0%	0%	8%	8%	8%	8%	10%
Estimated ridership augmented by BRT features		1,499	2,006	3,017	3,051	3,078	3,069	3,254
Adjusted for Opening Year								
Population growth in corridor (2010 to 2016)	10%	10%	10%	10%	10%	10%	10%	10%
Estimated daily ridership augmented by corridor growth	3,713	1,649	2,207	3,318	3,357	3,385	3,376	3,580

Appendix J - Level of Service Analysis

Level of Service Analysis for Scottsdale Rd/Rural Rd Transit Alternatives
Based on 2008 Traffic Volumes

Segment		Alternative 1			Alternative 2			Alternative 3(a)			Alternative 3(a)			Alternative 3(b)			Alternative 3(c)			Alternative 4		
From	To	No Build/TSM			Shared Curb Lanes			BAT Lanes (w/o HOV)			BAT Lanes (with HOV)			BAT Lanes (with HOV)			BAT Lanes (with HOV)			Exclusive Median Lanes		
		Volume	# Lanes	LOS	Volume	# Lanes	LOS	Volume	# Lanes	LOS	Volume	# Lanes	LOS	Volume	# Lanes	LOS	Volume	# Lanes	LOS	Volume	# Lanes	LOS
Greenway Parkway	Frank Lloyd Wright Blvd	37,000	6	D	36630	6	D	36260	4	F	36260	5	D	36,260	5	D	36,260	5	D	35520	4	F
Thunderbird Rd	Greenway Parkway	36,000	6	D	35640	6	D	35280	4	F	35280	5	D	35,280	5	D	35,280	5	D	34560	4	F
Sweetwater Ave	Thunderbird Rd	38,000	6	D	37620	6	D	37240	4	F	37240	5	D	37,240	5	D	37,240	5	D	36480	4	F
Cactus Rd	Sweetwater Ave	37,000	6	D	36630	6	D	36260	4	F	36260	5	D	36,260	5	D	36,260	5	D	35520	4	F
Cholla St	Cactus Rd	34,000	6	D	33660	6	D	33320	4	F	33320	5	D	33,320	5	D	33,320	5	D	32640	4	E
Shea Blvd	Cholla St	32,000	6	D	31680	6	D	31360	6	D	31360	6	D	31,360	6	D	31,360	6	D	30720	4	D
Doubletree Ranch Rd	Shea Blvd	36,000	6	D	35640	6	D	35280	6	D	35280	6	D	35,280	6	D	35,280	6	D	34560	6	D
McCormick Parkway	Doubletree Ranch Rd	40,000	6	D	39600	6	D	39200	6	D	39200	6	D	39,200	6	D	39,200	6	D	38400	6	D
Indian Bend Rd	McCormick Parkway	44,000	6	D	43560	6	D	43120	6	D	43120	6	D	43,120	6	D	43,120	6	D	42240	6	D
Lincoln Dr	Indian Bend Rd	45,000	6	D	44550	6	D	44100	6	D	44100	6	D	44,100	6	D	44,100	6	D	43200	6	D
McDonald Dr	Lincoln Dr	45,000	6	D	44550	6	D	44100	6	D	44100	6	D	44,100	6	D	44,100	6	D	43200	6	D
Chaparral Rd	McDonald Dr	45,000	6	D	44550	6	D	44100	6	D	44100	6	D	44,100	6	D	44,100	6	D	43200	6	D
Camelback Rd	Chaparral Rd	41,000	6	D	40590	6	D	40180	6	D	40180	6	D	40,180	6	D	40,180	6	D	18240	5	C
Indian School Rd	Camelback Rd	23,000	6	C	22770	6	C	22540	6	C	22540	6	C	10,780	5	C	10,780	5	C	19200	5	C
Osborn Rd	Indian School Rd	25,000	6	C	24750	6	C	24500	6	C	24500	6	C	14,700	5	C	14,700	5	C	14400	5	C
Thomas Rd	Osborn Rd	35,000	6	D	34650	6	D	34300	6	D	34300	6	D	34,300	5	D	34,300	5	D	33600	4	F
Oak St	Thomas Rd	41,000	6	D	40590	6	D	40180	4	F	40180	5	E	40,180	5	E	40,180	5	E	39360	4	F
McDowell Rd	Oak St	40,000	6	D	39600	6	D	39200	4	F	39200	5	E	39,200	5	E	39,200	5	E	38400	4	F
Roosevelt St	McDowell Rd	34,000	6	D	33660	6	D	33320	4	F	33320	5	D	33,320	5	D	33,320	5	D	32640	4	E
McKellips Rd	Roosevelt St	35,000	6	D	34650	6	D	34300	4	F	34300	5	D	34,300	5	D	34,300	5	D	33600	4	F
SR 202	McKellips Rd	35,000	6	D	34650	6	D	34300	4	F	34300	5	D	34,300	5	D	34,300	5	D	33600	4	F
University Drive	SR 202	29,000	6	D	28710	6	C	28420	4	D	28420	5	D	28,420	5	D	28,420	5	D	27840	6	D

Assumptions:

1. 1% of vehicular traffic will be diverted to transit under Alternative 2
2. 2% of vehicular traffic will be diverted to transit under Alternatives 3(a) to 3(c)
3. 4% of vehicular traffic will be diverted to transit under Alternatives 4
4. Alternative 3 is based on traffic volumes along Drinkwater Boulevard in downtown Scottsdale
5. Alternative 4 is based on traffic volumes along Goldwater Boulevard in downtown Scottsdale
6. For simplicity we have assumed a BAT lane with HOV has the equivalent capacity as ½ of a general purpose

Appendix K - Capital Cost Estimates

Alternative 1

Element	Quantity	Base Unit Cost $000	Allocated Contingency	Total Cost $000	% of Constr. Cost	% of Total Cost
Guideway				**$0**		0%
Exclusive/BAT lanes (per mile)			20%	$0		
Exclusive median lanes (per mile)			20%	$0		
Queue jump lanes (each)		$200	20%	$0		
Stations				**$0**		0%
New station platform		$284	20%	$0		
Support Facilities				**$0**		
Sitework				**$0**		
Landscape improvements			20%			
Pedestrian improvements			20%			
Systems				**$0**		
Transit signal priority and ITS (per intersection)		$17	20%	$0		
Ticket vending machines		$100	20%	$0		
Construction Subtotal				**$0**		0%
Right-of-Way			20%	**$0**		0%
Vehicles	2			**$1,080**		95%
60' articulated BRT vehicles	0	$725	20%	$0		
40' standard BRT vehicles	0	$520	20%	$0		
40' standard buses	2	$450	20%	$1,080		
Professional Services				**$0**	27%	0%
Subtotal				**$1,080**		95%
Unallocated Contingency				**$54**		5%
Total Project Cost				**$1,134**		100%

Alternative 2

Element	Quantity	Base Unit Cost $000	Allocated Contingency	Total Cost $000	% of Constr. Cost	% of Total Cost
Guideway				**$960**	10%	4%
Exclusive/BAT lanes (per mile)			20%	$0		
Exclusive median lanes (per mile)			20%	$0		
Queue jump lanes (each)	4	$200	20%	$960		
Stations				**$8,179**	88%	37%
New station platform	24	$284	20%	$8,179		
Support Facilities						
Sitework				**$0**	0%	
Landscape improvements			20%			
Pedestrian improvements			20%			
Systems				**$204**	2%	
Transit signal priority and ITS (per intersection)	10	$17	20%	$204		
Ticket vending machines	0	$100	20%	$0		
Construction Subtotal				**$9,343**	100%	43%
Right-of-Way			20%			0%
Vehicles	12			**$8,964**		41%
60' articulated BRT vehicles	6	$725	20%	$5,220		
40' standard BRT vehicles	6	$520	20%	$3,744		
40' standard buses		$450	20%	$0		
Professional Services				**$2,523**	27%	12%
Subtotal				**$11,487**		52%
Unallocated Contingency				**$1,041**		5%
Total Project Cost				**$21,871**		100%

Alternative 3a

Element	Quantity	Base Unit Cost $000	Allocated Contingency	Total Cost $000	% of Constr. Cost	% of Total Cost
Guideway				**$3,858**	32%	15%
Exclusive/BAT lanes (per mile)	13.4	$225	20%	$3,618		
Exclusive median lanes (per mile)			20%	$0		
Queue jump lanes (each)	1	$200	20%	$240		
Stations				**$8,179**	67%	32%
New station platform	24	$284	20%	$8,179		
Support Facilities						
Sitework				**$0**	0%	
Landscape improvements			20%			
Pedestrian improvements			20%			
Systems				**$204**	2%	
Transit signal priority and ITS (per intersection)	10	$17	20%	$204		
Ticket vending machines	0	$100	20%	$0		
Construction Subtotal				**$12,241**	100%	48%
Right-of-Way			20%			0%
Vehicles	12			**$8,964**		35%
60' Articulated BRT vehicles	6	$725	20%	$5,220		
40' standard BRT vehicles	6	$520	20%	$3,744		
40' standard buses		$450	20%	$0		
Professional Services				**$3,305**	27%	13%
Subtotal				**$12,269**		47%
Unallocated Contingency				**$1,226**		5%
Total Project Cost				**$25,736**		100%

Alternative 3b

Element	Quantity	Base Unit Cost $000	Allocated Contingency	Total Cost $000	% of Constr. Cost	% of Total Cost
Guideway				**$4,263**	34%	16%
Exclusive/BAT lanes (per mile)	14.9	$225	20%	$4,023		
Exclusive median lanes (per mile)			20%	$0		
Queue jump lanes (each)	1	$200	20%	$240		
Stations				**$8,179**	65%	31%
New station platform	24	$284	20%	$8,179		
Support Facilities						
Sitework				**$0**	0%	
Landscape improvements			20%			
Pedestrian improvements			20%			
Systems				**$204**	2%	
Transit signal priority and ITS (per intersection)	10	$17	20%	$204		
Ticket vending machines	0	$100	20%	$0		
Construction Subtotal				**$12,646**	100%	48%
Right-of-Way			20%			0%
Vehicles	12			**$8,964**		34%
60' articulated BRT vehicles	6	$725	20%	$5,220		
40' standard BRT vehicles	6	$520	20%	$3,744		
40' standard buses		$450	20%	$0		
Professional Services				**$3,414**	27%	13%
Subtotal				**$12,378**		47%
Unallocated Contingency				**$1,251**		5%
Total Project Cost				**$26,276**		100%

Alternative 3c

Element	Quantity	Base Unit Cost $000	Allocated Contingency	Total Cost $000	% of Constr. Cost	% of Total Cost
Guideway				**$4,263**	34%	16%
Exclusive/BAT lanes (per mile)	14.9	$225	20%	$4,023		
Exclusive median lanes (per mile)			20%	$0		
Queue jump lanes (each)	1	$200	20%	$240		
Stations				**$8,179**	65%	31%
New station platform	24	$284	20%	$8,179		
Support Facilities						
Sitework				**$0**	0%	
Landscape improvements			20%			
Pedestrian improvements			20%			
Systems				**$204**	2%	
Transit signal priority and ITS (per intersection)	10	$17	20%	$204		
Ticket vending machines	0	$100	20%	$0		
Construction Subtotal				**$12,646**	100%	48%
Right-of-Way			20%			0%
Vehicles	12			**$8,964**		34%
60' articulated BRT vehicles	6	$725	20%	$5,220		
40' standard BRT vehicles	6	$520	20%	$3,744		
40' standard buses		$450	20%	$0		
Professional Services				**$3,414**	27%	13%
Subtotal				**$12,378**		47%
Unallocated Contingency				**$1,251**		5%
Total Project Cost				**$26,276**		100%

Alternative 4

Element	Quantity	Base Unit Cost $000	Allocated Contingency	Total Cost $000	% of Constr. Cost	% of Total Cost
Guideway				**$34,140**	80%	52%
Exclusive/BAT lanes (per mile)			20%	$0		
Exclusive median lanes (per mile)	5.5	$2,500	20%	$16,500		
Exclusive single median lane (per mile)	0.4	$2,500	20%	$1,200		
Queue jump lanes (each)	1	$200	20%	$240		
Shea Undercrossing				$16,200		
Stations				**$8,179**	19%	12%
New station platform - side	24	$284	20%	$8,179		
New station platform - median	0	$426	20%	$0		
Support Facilities				**$0**		
Sitework				**$0**	0%	
Landscape improvements			20%			
Pedestrian improvements			20%			
Systems				**$204**	0%	
Transit signal priority and ITS (per intersection)	10	$17	20%	$204		
Ticket vending machines	0	$100	20%	$0		
Construction Subtotal				**$42,523**	100%	65%
Right-of-Way			20%	**$0**		0%
Vehicles	11			**$8,340**		13%
60' articulated BRT vehicles	6	$725	20%	$5,220		
40' standard BRT vehicles	5	$520	20%	$3,120		
40' standard buses		$450	20%	$0		
Professional Services				**$11,481**	27%	18%
Subtotal				**$19,821**		30%
Unallocated Contingency				**$3,117**		5%
Total Project Cost				**$65,462**		100%

Appendix L - Community and Business Focus Groups

SCOTTSDALE ROAD/RURAL ROAD ALTERNATIVES ANALYSIS (AA)
South Scottsdale/North Tempe Residents Focus Group—*Notes by Project Team*
June 9, 2010 – 6:00 pm – Tempe Transportation Center

General Comments

- Community members use routes 17, 29, 35, 40, 41, 50, 65, 66, 70, 72, 76, 81, 106, 170, Orbit and Light Rail, mostly for non-work trips.
- Some felt that the sense/perception of safety is compromised on the current transit system.
- Increase of people/street activity creates a perception of improved safety, and can help reduce crime.
- Difficult for buses to turn around at University Drive LRT station. More logical terminus may be Apache Boulevard.
- Best practices from historic transit systems should be reviewed to identify lessons learned.

Network and Efficiency

- Current bus system is too slow. Number of connections and frequency of bus operations should be increased to reduce waiting times. (2 comments)
- Existing LRT has too many stops to operate efficiently.
- Frequency of operation is the biggest choice factor between bus and LRT.
- Participants feel that it will be difficult to implement high-capacity transit today in mixed traffic.
- When service ends at early hours, transit users still need connections to get to their destinations (alternative options). Service hours of other service connections need to be coordinated.
- Bus stops away from the street corner, on far side of intersection, add to walking time and distance.
- Allow buses to pick up riders upon flagging.
- Frequency of bus operations should be about 10 to 15 minutes.
- Ideal to have overlapping and coordinated transit service. Concurrent local and express routes should be planned.
- This corridor may not be well served by mile stops. Stops can be located in areas with high residential and employment activity.
- Highest transit use is expected between Segments 1 and 4, from downtown Tempe through downtown Scottsdale.
- Need real time bus arrival information at stops.
- Bus service using the couplet in downtown Scottsdale may help in reducing congestion.
- Scottsdale Stadium could be served via bus route running along Drinkwater Boulevard.
- Electric powered transit should be considered.
- Park-and-ride facilities are needed to accommodate high-capacity transit.

Transit Stop Amenities

- Summer heat prohibits people from waiting for transit and walking more than a quarter mile to transit stops.
- Greater consideration should be given to station locations/stops. Bus stops should facilitate comfort in this hot climate (i.e. shade).
- Need to commit to shade early on – allows more comfortable, longer waits.

- Bus stop shelters should be designed using functional art to provide adequate shade and identity. Many cultural opportunities exist throughout the corridor to implement such bus stop shelters.
- Station/stop amenities such as toilets and drinking water are necessary.

Connectivity/Impact on Community

- This route needs regional connectivity (e.g. Shea Blvd or Bell Rd corridor). We need a coordinated system of high-capacity transit routes.
- Transit services should serve major economic destinations and employment centers.
- Transit should serve destinations to generate revenues in cities.
- Concern regarding project-related construction impact on local businesses along corridor.
- Concern regarding changes to community character with growth.
- More stops facilitate more growth. It is important to consider stop locations as they become catalysts for growth.
- Transit investment can raise property values.
- Interface with Downtown Tempe and Tempe Transportation Center to facilitate other transit connections.

Vision for the Future

- Residents in Scottsdale are opposed to light rail along Scottsdale Road.
- Mass transit (streetcar) use declined due to traffic congestion and reduced efficiencies.
- High-capacity transit in dedicated transit lane.
- Bus stop outside travel lane (pull-out) – facilitates safety and efficiency/speeds of through auto traffic.
- Coordinate local bus service and express service in same corridor to serve different travel needs.
- Bus service with coordinated connections, part of a regional transit system.

SCOTTSDALE ROAD/RURAL ROAD ALTERNATIVES ANALYSIS (AA)

South Scottsdale/Tempe Residents Focus Group

June 9, 2010 – 6:00 pm – Tempe Transportation Center

Name	Address	Phone Number	Email
Carole Poyton CHARLES POYTON	8570 S BONITA DR	480 945 8297 SCOTT 85258	
PATTY Badenoch	5027 N 71 Pl	480.949.9549 SCOTTSDALE	guardbadenoch@cox.net
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Ted Lehman	118 E Encanto Dr Tempe 85281	4802225709	temple118@gmail.com
David Carey			

SCOTTSDALE ROAD/RURAL ROAD ALTERNATIVES ANALYSIS (AA)

South Scottsdale/Tempe Residents Focus Group

June 9, 2010 – 6:00 pm – Tempe Transportation Center

Name	Address	Phone Number	Email
Darlene Justus	315 E. Courtland Tempe 85281	480-529-3584	d_justus@cox.net
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SCOTTSDALE ROAD/RURAL ROAD ALTERNATIVES ANALYSIS (AA)
North Scottsdale Residents Focus Group—*Notes by Project Team*
June 16, 2010 – 5:30 pm – Mustang Library

General Comments

- Commuters will take advantage of reliable transit service, where available.
- Need to have higher densities and mixed uses along transit.
- There is a perception that fare payment is not being enforced adequately on the LRT.
- Issue of encroachment on existing right-of-way.
- Concern regarding implementation of light rail on Scottsdale Road.
- We need to familiarize ourselves with every city's general plan. Use it as an "all-encompassing guide."
- Scottsdale conducted a survey for its general plan update that's available online; it includes public opinion regarding multimodal transportation, urban form, economic vitality, etc.
- Scottsdale is a mosaic of areas working together. Residents are looking not so much for transit-oriented development (TOD) as for utility and character.
- Consider TOD with lower levels of density in specific areas.
    - TOD does not always mean high density and high intensity development, but at its most basic is about creating walkable communities (Stuart Boggs).
- Consider variable pricing for transit services during different time periods/seasons/events.
- There may be public objection to fixed guideway transit. Rubber tires allow flexibility in transit service and routing.
- It is important to understand who are we moving. What purpose is this corridor going to serve?
- The speed of transit service may dictate the level of service provided.
- Understanding of ridership and rider origins and destinations can help determine service and equipment type.

Network and Efficiency

- Provide ample parking at park-and-rides.
- Frequency of transit service should be responsive to special events (e.g. higher frequencies during major events).
- Need for transit connecting to Phoenix Sky Harbor Airport – needs to have relatively competitive routing and timing over vehicular traffic.
- During the tourist season, there is severe congestion between SR 101 and Thunderbird Road.
    - Disadvantage for travelers from the north to Thunderbird park-and-ride/transit.
- Need to smooth out flow of traffic through downtown Scottsdale.
    - Use of Intelligent Transportation Systems.
    - Bus bays as enhancements to traffic efficiency and transit reliability.
- Transit should support employer goals for Maricopa county trip reduction program requirements.
- Convenience and availability are high priorities for local shuttle service.

Transit Stop Amenities

- Station amenities are necessary to provide comfortable shelters to riders while waiting for transit.
- Amenities include more shade along Scottsdale Road, water resources, seating.
- Restrooms are a needed amenity.

Connectivity/Impact on Community

- Transit improvements must support employment areas/activity areas, but also respect existing character and quality of life.
- It is important to preserve the ambience of downtown Scottsdale.
- Should consider shift timings for employees at Scottsdale Healthcare Center and the resorts--all types of transit needs.
- Need coordinated transit network connecting major mobility spines through the Valley.
- Currently there is limited opportunity to use transit for access to other activity centers (e.g. Westworld)
    - Plan for east-west transit connections from Scottsdale Road.
    - Understand ridership needs in surrounding corridor areas.
- Need mobility options for tourists and residents to improve quality of life and economic vitality.
    - Offer multiple mode options.
- Must consider bigger picture of regional connectivity.

Vision for the Future

- Ultimate vision should be modern streetcar; interim solution is bus.
- May want more stops in certain areas (e.g. South Scottsdale live/work).
    - May want to facilitate getting off bus in economic activity centers.
    - Continue to run underlying local bus service.
- Special signing/branding for bus rapid transit (BRT).
- Restrooms are a needed amenity.
- Timing problem over congestion issue.
- Use non-polluting vehicles.

SCOTTSDALE ROAD/RURAL ROAD ALTERNATIVES ANALYSIS (AA)

Northern Scottsdale Residents Focus Group

June 16, 2010 – 5:30 pm – Mustang Library

Name	Address	Phone Number	Email
Mike Kelly	8993 N. 84th Way	480 998 4975	
Jane Strauss	802 N 1st Ave	602-534-7988	jst rauss@gmail.com
Andrea Michaels	33012 N 68th Way	480 488 8450	mxdcap_thinkther@yahoo.com
STUART BOGGS	302 N. 1ST AVE, SUITE 700 PHOENIX, AZ		SBOGGS@VALLEYMETRO.ORG
ERIC LARSON	8420 E. QUARTER HORSE SCOTTSDALE 85258	(602)499-1346	ENLARSON1@COX.NET
Mark Ortega	10011 E Sheena Dr Scottsdale 85260	602-803-0444	mgoppe@q.com
Laura Baker	10011 E Sheena Dr Scottsdale AZ	602.856.0850	lbaker@q.com

SCOTTSDALE ROAD/RURAL ROAD ALTERNATIVES ANALYSIS (AA)
Business/Property Owners Focus Group—*Notes by Project Team*
June 18, 2010 – 7:30 am – Scottsdale Stadium Team Shop

Q & A

- Does the study include consideration of advanced technologies such as monorail, personal rapid transit, etc.?
- Will operating costs for this route compromise funding for local or feeder routes? Stuart Boggs said no. This money is regional, while the city of Scottsdale pays for local routes.

General Comments

- Recommendations from this study will go through a vetting process to ensure local support.
- Transit service along a dedicated guideway will be problematic along Scottsdale Road because of limited right-of-way.
- The study will follow federal guidelines to achieve Very Small Starts funding. With current levels of available funding, the study will likely look at some form of BRT.
- Transit aesthetics are important in creating a desirable public transit system.
- Some participants expressed concern about subsidizing transit for other users.
    - Possible user fee (those who use must help subsidize).
    - Difficult to separate cost for bus, which runs on public streets.
- Although much of the capital cost for transit projects is covered by federal funds, operational costs are paid locally.
- Federal funding does come from a tax source – locally paid in some capacity.
- ASU subsidizes transit fares for students.
- ASU does not manage parking at SkySong, and therefore is not permitted to run a shuttle to the Tempe campus. Students use Route 72 to commute between the Tempe campus and SkySong Center.
- ASU gives preference to use of local transit by students, where available.
- ASU staff does not choose to use local bus service because of reliability and timing issues.
- In the recession, areas with greater amenities did not lose as much property value as areas without amenities. Reasons include:
    - Proximity to jobs
    - Lower transportation costs
- TOD can occur at different scales, and primarily implies greater walkability within communities.
- The study should address safety concerns related to public transit:
    - There are many pedestrians along Scottsdale Road; what is the safest mode?
    - There are few safety issues at ASU Tempe, which has multiple modes and lots of people.
- Light rail draws a wide range of riders, which helps enhance safety – more "eyes on the street."
    - Crime flourishes in areas without a lot of people/pedestrian traffic.
    - Need Aggressive graffiti control.
- Express or Rapid buses tend to attract a different group of riders – commuters, business people.
    - BRT will be looking to attract choice riders.
- "Drive until you qualify" played a role in sprawl in the 2000's.
- Scottsdale is service-oriented.

Network and Efficiency

- Current local service is not fast enough (travel times are too long with stopping) for efficient commuting.
- Recommendations should consider transit improvements on SR 101.
- Transit is being considered to address travel demand along Scottsdale/Rural Roads, which are built out in terms of available right-of-way.
- Need to accommodate parking needs along the corridor.
    - May consider extending initial study corridor to take advantage of planned park-and-ride at Thunderbird Road south of the airport.
- Ensure viability of long-term solution in construction of short-term solution.
- The long-term (as well as short-term) solution should connect to light rail corridor.
- Scottsdale transportation plan recommends reducing lanes on Drinkwater and Goldwater (Teresa Huish).
    - The extra space can be used for bike lanes, transit etc.
- Need coordinated transit service throughout the region to actually allow people to travel without the need for a car.
- Scottsdale ranked 40th out of 40 for local transportation among popular convention destinations in the U.S. People want to ride not local buses, but LRT or resort trolleys.
- We should dedicate lane(s) to public transit.
- Prefer to use transit, if frequency, travel times and reliability acceptable.
- Need to invest in regional transit network.

Transit Stop Amenities

- Can overcome the issue of heat by providing amenities like shade and drinking water at bus stop locations.

Connectivity/Impact on Community

- Transit helps reduce air pollution.
- Need extra commuting options for Scottsdale Healthcare hospital.
- Bringing in tourists, shoppers, and employees requires parking facilities.
- Transit allows reduced parking; can use valuable land for other purposes.
- Scottsdale Road is an ideal corridor for high-capacity transit because of linear placement of activity centers/destinations.
- Airpark (Segment 7) is a priority because of levels of employment.
    - Local circulation/shuttle can help internal circulation.
- Transit connection from Sky Harbor Airport through the region is important.
- The study should take a long-term view of Pima Road. The Salt River Pima-Maricopa Indian Community is planning for 50,000-60,000 jobs in the long term.
- Investment (in transit) can help improve the quality of development along Scottsdale Rd/Rural Rd.
- Most Airpark employees may not look along the corridor. Priority should be connecting Tempe and Scottsdale downtowns first.

Vision for the Future

- The long-term solution should accommodate future generations of transit users.
    - Current opposition to light rail in Scottsdale may exist, but we should set the tone now for the (more distant) future.
    - Transit will become an important transportation option as more employees commute to this area, and with increasing student population.

- The long term solution should include dedicated lanes.
    - Would likely use couplets through downtown Scottsdale because of limited right-of-way.

SCOTTSDALE ROAD/RURAL ROAD ALTERNATIVES ANALYSIS (AA)

Property Owner/Business Community Focus Group

June 18, 2010 – 7:30 am – Scottsdale Stadium Team Shop

Name	Address	Phone Number	Email
John PACKHAM	4221 N. SCOTTSDALE RD	480-945-2651	JOHN@SHARKLINE.COM
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VIRGINIA KARTE	8222 E. GAIL RD SCOTTS. 85260	480-602-228-9818	VLKARTE@MSN.COM
MATT RHORER	704-590 E. Camelback Scotts 85251		
TOM MASON	6164 CAMEL	480-990-7267	TOMMYMASON@Hotmail.com
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DON CONVILLION	13211 N. 76TH PL SCOTTSDALE	480-965-5945	DON.CONVILLION@ASU.COM
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RPTA Scottsdale Rd/Rural Rd Alternatives Analysis Study
North Scottsdale Focus Group—second session
September 30, 2010, 5:30-7:00 p.m., Mustang Library

Participants: Patty Badenoch, Sonnie Kirtley, Mark Ortega, Ted Werner
RPTA/Consultant Team: Stuart Boggs, Tanya Chavez, Dawn M. Coomer, Kammy Horne, Teresa Huish, Jackie Pfeiffer, Ethan Rauch, Susan Tierney

These notes record comments made and questions asked, during and after a PowerPoint presentation on the study and its proposed recommendation of Bus Rapid Transit in mixed traffic lanes.

Question: What are the criteria to qualify for federal transit funding?
Kammy: The ability to attract riders is most important; others include financial feasibility and capacity as well as land use. She showed the slides listing evaluation criteria.

Q: Regarding the display boards, how big are the bus stops represented by the pasted-on squares?
Answer: They would be much like today's stops, but with additional amenities. Much can be done within the existing right-of-way (R/W). RPTA is trying to minimize the purchase of new R/W. Stuart added that the Design Concept Report (DCR), which is the next phase after this study, will consider many more details. DCR initiation is scheduled for the spring of next year, after this Alternatives Analysis study is approved by various committees and the two city councils. Kammy mentioned that the federally mandated environmental process will also begin in the next phase.

A participant expressed concern about preserving existing artist-designed bus stops, such as at the intersection of Scottsdale Road with Indian School Road.

One person is concerned about neighborhood security, such as loiterers, and also about neighborhood access. She feels that transit improvements will impact her neighborhood. She wants to preserve her current lifestyle.

Q: Can a BRT vehicle pass a local bus? Stuart answered yes: either in another lane or at a local stop.

In response to a question from the study team, a participant said that both directions of the BRT service should run on Scottsdale Road. A trolley could link the service to Drinkwater Boulevard. Drinkwater is not a convenient route for tourists. The number of people that might use BRT on Drinkwater to and from the stadium is relatively small. Splitting the alignment between Scottsdale Road and Drinkwater would be confusing. In addition, Scottsdale Road is closer than Drinkwater to Loloma Station. In response to a question, Teresa said that moving Loloma is still under discussion, but would be coordinated with this (Scottsdale Road BRT) project. There was a comment about the large number of boardings on Scottsdale Road in the downtown area. There was another comment that current transit facilities at the Scottsdale Road/Drinkwater Boulevard intersection are "rinky dink." No one opposed running the transit service on Scottsdale Road through downtown.

Stuart mentioned that if BRT were placed on Drinkwater Boulevard, a transit connector with Scottsdale Road would need to operate frequently. A participant added that extending the current operating hours of the Downtown Trolley could also be a budget issue.

Another participant said that our Alternative 4 (buses running in semi-exclusive median lanes) looks like the setup for LRT. Stuart replied that this type of BRT actually makes future rail less likely because of the transit service disruption involved in conversion from bus to rail.

Kammy noted that the corridor is already built out and congestion is not the issue, at least in the near future. Our travel forecasting model doesn't forecast a lot of additional congestion in this corridor.

Q: Does Tempe have ITS on its portion of the corridor? Kammy replied that we haven't talked with Tempe staff about it yet.

Q: Does this study affect the Scottsdale Road Streetscape Guidelines? Answer: no.

Stuart noted that one question we have to consider is whether the BRT buses will stop at the same stops as local buses. There are pros and cons. On Mesa LINK, they do.

Appendix M - TAG Member Comment/Resolution Matrix

Source	Document/Location	Comment	Disposition
Stuart Boggs	Chapter 1	Include service cuts proposed with LTAF/LTAF II sweep.	Updated existing transit service to July 31, 2010.
Janet Strauss	Chapter 1, general	Can any more graphics be added to the chapter? The only graphic elements are the maps. There is a lot of dense text which may inhibit readability.	Added illustrations to break up the text.
	Chapter 1, Background	Is it better to call this the METRO LRT? The CP/EV LRT is an older term.	Changed terminology.
Stuart Boggs	Chapter 1, Figure 1	Increase font size on map to make it more readable. Shade the primary and secondary study areas differently rather than using a dashed and solid line on Scottsdale/Rural Rds. Show the end points of the study corridor as a half dome rather than as a straight line.	Complied.
	Chapter 1, Figure 2	Map might be clearer using line widths to show different traffic volumes	Difficult to clearly show requisite width differences on 8.5 x 11 map. No change.
	Chapter 1, Roadway System	Should mention that spring training facility is located on Drinkwater south of municipal complex. This is a significant source of event traffic during spring training season.	Noted in text.
		You may want to include a level of service map for Scottsdale/Rural and the major cross streets.	See Figure 3.
Janet Strauss	Chapter 1, Table 2	Tables on existing local transit routes and possible service reductions should act as placeholders and be updated after the July [2010] service cuts.	Tables and text have been updated.
Stuart Boggs	Chapter 1, Figure 4	Street names on map need to be in a larger font.	Complied.
Janet Strauss		Didn't you mention a shared use park-and-ride? Is it not on the map?	All current park-and-ride lots are now shown.
	Chapter 1, Transit Passenger Facilities	Please note that Loloma Station will most likely be closed July 26th [2010].	Loloma Station remains open for now. No change.
Stuart Boggs	Chapter 1, Transit Deficiencies	Off-vehicle fare collection and the adoption of magnetic strip and "smart card" technologies have reduced boarding time by reducing the number of riders paying with cash at the farebox.	Noted in text.
		[Buses are slower than cars] because the bus stops every quarter mile to pick up or drop off passengers whereas the private auto does not.	

Source	Document/Location	Comment	Disposition
	Chapter 1, 1.10.3	Plan focus in this area [Downtown Scottsdale] seems to be on circulation, not on accommodating through trips.	Noted; no change.
	Chapter 1, 1.11.1	Would also be useful to have some discussion of age along the study corridor. South Scottsdale shows a concentration of older residents, Tempe is dominated by the transient university population, north Scottsdale is a mix of families with school age children and older residents.	Mentioned in text.
	Chapter 1, Figure 7	Move these maps up to section 5.1.	Complied.
	Chapter 1, 1.11.2	Should be noted that Route 72 has the highest service frequency of the four routes.	Paragraph deleted.
	Chapter 1, 1.11.2.3	Note that rail ridership is fairly consistent throughout the day, not just high during peak commute periods.	Complied.
Janet Strauss		Service is decreasing in July [2010] to 12-minute peak.	Text changed accordingly.
Stuart Boggs	Chapter 1, density maps (Figs. 9 and 10)	You might want to display the 2005 and 2030 maps side by side on a bi-fold sheet of 11 x 17 paper. Would make it easier for the reader to identify changes between the maps.	Complied.
	Chapter 1, Figure 11; and Chapter 3, Purpose and Need	Increase font sizes on map. Should also note that Scottsdale abuts Salt River Pima-Maricopa Indian Community which limits north-south circulation opportunities east of SR 101 due to the lack of a developed arterial street system—also that SRPMIC includes several employment opportunities including retain notes adjacent to Loop 101 and two casinos. Limited east-west and north-south regional road connections in Paradise Valley also contribute to strong north-south travel demand in Scottsdale.	
Janet Strauss	Chapter 1, Figures 9 and 10	The color gradations on these population and employment density maps are very hard to read on a printout. Change the colors, adding more variation.	
	Chapter 1, Figure 11	Is a map the best way to conclude this chapter? Is text more appropriate, with the map right beforehand?	Added text so document ends less abruptly.
	Chapter 3, Need for the Project	This [the need for the project, in that few options exist to mitigate transportation deficiencies] represents a major obstacle to building high capacity transit here.	Added.
Teresa Huish, City of Scottsdale (COS)	Chapter 1	I'm not sure that the chapter discusses the net importation of jobs to this corridor as well as you explained it last night [at the focus group].	Clarified and strengthened.

Source	Document/Location	Comment	Disposition
Madeline Clemann, COS	Chapter 1, several places	Consultant failed to explain the very important relationship of Route 72 to the rest of the region in terms of activity, employment and housing centers. Document should state that Scottsdale is a net importer of employees to fill lower and middle range wage jobs due to high housing costs in Scottsdale. Our case to the FTA needs to be made in words, not just statistics. Table 11 lists transfer opportunities, but each one should describe the population that this route brings into Scottsdale.	
	Chapter 1	Also, they didn't explain the roadway character of the Valley that makes quick transit difficult. We have freeways running east-west at the edges; only in the middle of the Valley do we have north-south freeways. The rest is all surface streets and long corridors, so the potential to travel by bus east and west makes for long, long trips and reducing headways is expensive to overcome that.	No change.
	Chapter 1, 1.11.3	Third bullet down does not say why Route 72 is expected to grow. What is predicted to happen in Scottsdale that increases ridership? Talk a bit about the airpark growth as the second largest Valley employer, etc. It might be good to include the Framework map…could lop off the very west area.	Clarified in Chapter 2.
Madeline Clemann and Teresa Huish	Chapter 1, Table 2	Update the table and four bullet points (Routes 76, 66, 72 and 81 changes). Also update the text now that the decisions are made on route changes. It should be noted that all the changes have been made since the TMP was passed. The narrative is on the attached slides [that explain the July 2010 transit cuts and their history]. They could even use the new map.	Updated all tables and text to July 31, 2010, after the effective date of the service cuts. However, detailed discussion of the cuts and their background is beyond the scope.
Teresa Huish	Chapter 1, 1.1.2 and Figure 1	In our first TAG meeting, we [Scottsdale] recommended that it just be a primary study area up to Frank Lloyd Wright or even SR 101. Has that suggestion been discarded?	As the study evolved, Phase 1 focused on bringing BRT north as far as the new Thunderbird Road park-and-ride.
	Chapter 1, 1.2	List of related studies would be more helpful with dates. (Similar comment from Tempe.)	Dates added in Appendix A.
	Chapter 1, 1.2 and Appendix A	Add Scottsdale General Plan, Community Mobility Element (2001), and McDowell Task Force Report (2010).	Added.

Source	Document/Location	Comment	Disposition
Dave Meinhart, COS	Chapter 1, Figure 4	Remove Route 66 in Scottsdale.	Removed.
Teresa Huish	Chapter 1, 1.3.3	LOS D is standard in Scottsdale's TMP.	Noted in text.
Dave Meinhart		Who calculated the segment LOS? How was it calculated? Worse than Rural near ASU?	Segment LOS was calculated using threshold values from the *Highway Capacity Manual* and traffic counts from 2006-2008.
Teresa Huish	Chapter 1, Figure 3	If we are showing 2+ miles to the east probably should include more west of corridor too.	SR 101 is a unique facility in this area. There are no similar facilities to the west.
	Chapter 1, 1.7	More clearly separate solutions from deficiencies.	Attempted to clarify.
	Chapter 1, Table 4	Should someone actually drive this [TTC to Shea]?	Done; text updated.
	Chapter 1, Figure 6	I think SkySong should be shown as office.	Changed.
	Chapter 1, Figure 7	This corridor is mixed use (McDowell from 64th to 84th and Scottsdale Road from McDowell to Thomas).	
	Chapter 1, 1.10	Various comments regarding Scottsdale planning.	Integrated comments in text.
	Chapter 1, Figure 8	All areas shown as Activity Centers, except Resort Corridor, are included in Growth Areas Element of Scottsdale General Plan.	Noted in text.
	Chapter 1, 1.11.2	If as a *system* METRO rail ridership is high throughout the day, how is this attributable to ASU?	Deleted reference to ASU.
	Chapter 1, 1.12.2	Point #5 doesn't really describe the need for HCT.	Deleted this point.
Dawn Coomer, City of Tempe	Chapter 1, 1.1	There is no operations or capital funding in the TLCP for Rural BRT in Tempe and Chandler. Please change first paragraph.	Corrected and clarified.
		It is important in this level of analysis to identify an appropriate project based on technical need rather than constrain by funding prematurely. It would seem appropriate to scale recommendations to available funding later in the project.	Funding, especially from FTA, has been an important consideration for RPTA from the outset, along with need for the project.
	Chapter 1, 1.2	Scottsdale Road has been identified as a transit corridor since Valtrans…the history is long!	No change.
	Chapter 1	The main drive in SkySong was designed to allow future HCT to come directly into the development	Noted in text.
	Chapter 1, 3.3	Please define TTC before abbreviating; is TTC the busiest hub or the best served?	Clarified.

Source	Document/Location	Comment	Disposition
	Chapter 1	Please add some discussion of Orbit.	Orbit is included.
	Chapter 1, general	Discuss the importance of Scottsdale/Rural as one of the few north/south routes of its length in the region (importance for all modes. Due to topography, the next closest route would be 44th Street in Phoenix.	Noted in text.
	Chapter 1	Travel speed is lower in peak periods due to congestion.	No change.
		Since we don't have tons of bus service and operate based on schedule adherence, bus travel speeds are slowed as operators stop and wait to maintain schedules. If we have more coverage and frequency, we could start buses and just run them to the end of the line (as LRT is operated). This type of operation might be appropriate for the BRT service.	Discussed in Chapter 7.
	Chapter 1, 1.8, Bicycle and Pedestrian Ways	Both Scottsdale and Tempe have Scottsdale Road identified with bike lanes and enhanced pedestrian facilities.	The next subsection identifies programmed and planned improvements.
	Chapter 1, 1.9.2 and Table 6	Add the funding for the Tempe South AA project and bike/ped projects to this list.	Table updated to reflect MAG TIP for 2011-15.
	Chapter 1, 1.10.4	We can modify our TOD to include future HCT corridors.	Noted in text.
		Note that all development in Tempe is redevelopment.	Complied.
	Chapter 1	The month-to-month changes highlighted…are true for all routes in the region.	Clarified.
		Boardings per mile in Tempe have declined also due to high service levels there.	Noted in text.
		Please discuss load factors. In the Tempe South AA, we did some analysis showing that Scottsdale/Rural transitions in Downtown Tempe. The load factors show two corridors: one north of downtown Tempe/ASU and one to the south. This is important for both planning and operations.	Did not receive additional information requested from Greg Jordan of Tempe.
	Chapter 1, 1.11.2	LRT has high all-day ridership also due to lunch trips and recreation trips. There is a rider survey that documents the reasons for the load distribution that could be referenced here.	Details on LRT ridership are outside the scope of this study.

Source	Document/Location	Comment	Disposition
Stuart Boggs	Chapter 2, 2.2.3	How does the assumption [of BRT service along Rural Road from University Drive to Chandler Boulevard] jibe with the Tempe South AA draft LPA which calls for streetcar on Mill Avenue rather than BRT on Rural Road?	The study recommends both streetcar on Mill and BRT on Rural, but the latter is unfunded.
	Chapter 2, Figure 12	Might want to show this as a line graph rather than a bar graph. Might look less busy.	Complied.
	Chapter 2, 2.3	Might be helpful to show this [future daily trips generated per square mile] with a bar chart.	Figure 14.
Teresa Huish	Chapter 2, Table 15	Can we explain 0% share for transit trips to airpark in PM peak?	Clarified existing footnote.
Dawn Coomer	Chapter 2, general	What assumptions are being made for the Tempe South HCT investment?	The current assumption in the MAG model is BRT on Rural south of University Drive.
		METRO conducted a rider survey approximately one year ago and that information should be reflected in the report.	Complied.
		Depending on the operational characteristics of Scottsdale Road BRT, its riders may behave more like LRT riders than [local bus] riders.	Noted in text.
	Chapter 2	Note that the MAG travel demand model doesn't accurately forecast existing transit ridership for the LRT starter line…this has also been true in some other corridors. It is a regional model and as smaller geographic areas are considered it becomes less accurate.	Acknowledged.
		What assumptions are made for BRT on Rural Road in Tempe and Chandler? BRT in those cities has been postponed beyond 2026—but is it assumed to operate in 2030?	See discussion of the No-Build network in Chapter 2. Assumption is RTP level of BRT south of University Drive.
		If BRT on Rural Road is operating in Tempe and Chandler in 2030, do the operating characteristics match those in the Tempe South Corridor Study?	See Chapter 2 discussion of the No-Build network. BRT operations south of University Drive are based on the RTP and are less intense than those analyzed in the Tempe South AA.
Stuart Boggs	Chapter 4, 4.2	I'd suggest including a representative streetscape picture with each segment description.	Complied.
	Chapter 4, Table 16	I suggest getting a picture of the LA Orange Line showing bus, R/W and station.	

Source	Document/Location	Comment	Disposition
	Chapter 4	Operator discretion also allows BRT bus to leapfrog local bus when needed.	Noted in text.
	Chapter 4, 4.4	Workshop participants concluded that the study team should consider the future convertibility of BRT to LRT.	
	Chapter 4, 4.5	BRT operation in mixed traffic on Scottsdale Road through Downtown Scottsdale may conflict with diagonal parking in the area.	Chapter 7.
		BRT buses operating in the roadway median would not necessarily require left-side doors as stated in the text. Buses could transition to other side of platform if the ends of the station were tapered. Would require a block signal to prevent conflicts between northbound and southbound buses at the crossover points.	Changed text appropriately.
	Chapter 4	Convert bus bay to bus pull through [at Thomas Road].	Addressed as appropriate.
		I'd still include signal prioritization at [Rio Salado Parkway] that can be remotely controlled by the Tempe TOC to respond to changing traffic conditions. I'd also suggest a bus specific signal at all locations that have signal priority to avoid confusion for other motorists.	
		May also want to look at incorporating the BAT lane into a dynamically managed lane with overhead DMS that reminds motorists that the lane is for right turns only and bus through movements. DMS would allow for deactivating BAT lane during low traffic periods.	Details are moot since this alternative was not selected for implementation.
		[In Alternative 4] may want to look at how METRO Rail handles side to side alignment transitions at 1st Avenue in downtown Phoenix. Handling the transition through a signalized intersection can allow for a faster transition over a shorter distance.	
	Chapter 4, Table 22	I'd also suggest showing the trip times graphically (i.e., a bar chart) to allow for easy comparison of travel time savings for each alternative.	Complied.
Teresa Huish	Chapter 4	Various detailed comments in e-mail dated 8/20/2010.	

Source	Document/Location	Comment	Disposition
Dawn Coomer	Post-workshop (6/22/10) memorandum proposing six end-to-end alternatives	Would it be appropriate to consider exclusive curb lanes as we consider exclusive median lanes? I know we have the BAT lanes but it seems odd to me to evaluate dedicated median lanes and not dedicated curb lanes. I'm sure the impacts between the two would be similar for a rubber-tired operation.	Explained (to Dawn) the difficulty of providing business access with a dedicated curb lane.
Robert Yabes, City of Tempe	Chapter 4	The [proposed] location of the bus stop NB at Rio Salado [and Rural] would require modifying the bridge.	Text changed.
Scottsdale staff	Chapter 4	We believe that we could get just as much benefit to transit travel time through a combination of basic BRT and ITS technology driven signal prioritization—instead of the queue jumpers and/or BAT lanes discussed in the chapter. Scottsdale will provide RPTA and the consultant the needed information on system capabilities and needs.	Text changed accordingly in Chapter 4 and elsewhere.
		Scottsdale Road is designated as an arterial with an urban character which emphasizes pedestrian activity—installation of the queue jumpers (first diagram Figure 6) increases crossing time and would most likely de-emphasize pedestrian activity, making the roadway more suburban in character.	
		Consider an Alternative 2A which is BRT with shared lanes AND signal priority and possible queue jumpers in some locations where the technology is feasible and is the best optimization strategy.	
		One location discussed in the report that we would not recommend for a queue jumper is on the southbound trip south of Camelback Road. The area has changed since the field evaluation—the city has recently installed curb and sidewalk in this location, the queue jumper could not be accommodated any longer.	
		The bus stops do not need to be on the far side of the intersection to make the queue jumpers effective. We recommend [a near side location with the bus stopping in the exclusive right turn lane, then using an advance green to leapfrog through traffic in parallel lanes]. This plan works well with placement of a signal actuator and does not require the bus bay to be continued on the far side of the intersection, which interferes with pedestrian circulation.	

Source	Document/Location	Comment	Disposition
Stuart Boggs	Chapter 5	I thought the Tier 1 analysis included LRT and streetcar.	Tier 1 analysis does not include rail modes. These were eliminated earlier.
		Define "BAT" lane.	Defined in Chapter 4.
	Chapter 5, 5.1.1	Should we also include a question dealing with the potential of an option to foster economic development along the corridor?	Added to the list of questions and evaluated in Tier 2.
	Chapter 5, Table 25	Should access [of an alternative] to transit service be measured partly according to the number of downtown Scottsdale activity districts within one-half mile, rather than one-fourth mile, of a proposed station?	We think one-fourth mile is a reasonable distance that better discriminates among alternatives.
	Chapter 5	Should address how median bus lanes could create issues for future conversion of the corridor to LRT.	See Table 25, Convertibility to future fixed guideway transit.
	Chapter 5, 5.3.2.3	Other amenities could include WiFi which will be available on both the Main Street and Arizona Avenue LINK routes.	Noted.
	Chapter 5, 5.3.2.11	How about CMAQ funds? [Regarding discussion of eligibility for Small Starts or Very Small Starts.]	Discussed CMAQ and other sources in Chapter 6.
		How about reducing funding for Route 72 and using savings to increase service frequencies on BRT as was done on Main Street in Mesa?	Mentioned as an option here, and discussed in Chapter 6.
	Chapter 5, 5.3.2.12	Need to also take into account delays resulting from land acquisitions for site and intersection improvements.	Chapter 7.
Jim Mathien, METRO	Chapter 5	I did note…your discussion of "cost effectiveness." If this project becomes a VSS, it will not need to address that particular criterion nor will it need any travel forecasts. You may find the attached table of interest. It compares what is required for New Starts, Small Starts, Very Small Starts and Exempt projects.	Cost-effectiveness is likely to matter to local decision-makers, so we retained it as a Tier 2 criterion.
Marc Pearsall, MAG	Chapter 5	Please add a glossary of terms.	Made sure technical terms are defined as necessary, but the report is written mainly for a technical audience.
		Please add a general map showing alignment.	Chapter 1.
		Add emphasis on mode connectivity (local, circulator, express, LRT)	In earlier chapters.

Source	Document/Location	Comment	Disposition
		Title VI population (how many benefit from this project).	The benefits are described in general terms, but detailed Title VI analysis is beyond the scope of this study.
		Revisit the total number of 60-foot vehicles required based on projected ridership (especially with such low projected productivity).	[From S. Boggs] We would use a mixed fleet of 40- and 60-foot vehicles based on passenger loadings throughout the day. RPTA is procuring 40-foot buses for the Ariz. Ave. LINK route that will interline with the Main Street LINK service. This will allow sharing of fleet and use of appropriately sized vehicles throughout the day based on peak and off-peak demand.
	Chapter5, 5.2	Does not specify total load, only seated load.	Seated load is useful as a surrogate measure at this level of analysis.
	Chapter 5, 5.2	Calls out reduced dwell time at stop due to off-board fare collection and all-door boarding; will there be no on-board fare collection?	Clarified; in the first phase some off-board collection is assumed.
	Chapter 5, 5.3.1	Need to note that this level of funding (10-minute peak, 15 off-peak) would require additional funds to operate.	Noted in text.
	Chapter 5, Tables 27 and 28	Break Financial Feasibility into two categories: capital and operating. There is concern whether there is adequate funding in the RTP to operate the service at the levels shown.	The distinction appears in Chapters 5 and 6.
	Chapter 5, Table 27	Should contain additional row stating if it does or doesn't meet the criteria for VSS.	Table 6 contains such a row.
		Include span of service; operating hours aren't clear. (Also from Teresa Huish.)	Added.
		Make transit capacity clear; does SS/VSS require 3,000+ riders in the corridor or on the new mode?	Clarified in text.
		For Alt. 1, it's hard to believe that there's only a 5% increase in average speed from the No-Build scenario.	Simply skipping lightly used stops may have little impact.
	Chapter 5, Table 28	Shows local service at peak and off-peak as 20/20, when it should be 20/20/30 (table has 20/30).	Corrected.

Source	Document/Location	Comment	Disposition
		Expand on "added annualized cost per added rider"? Also the added operating costs exceed TLCP allocation.	(1) Explained under Cost-Effectiveness. (2) See Chapter 6.
		542 additional boardings for Alt. 2 is not much of an increase in ridership from the current Route 72, given the estimated $27 million to build and operate for the first year for Alt. 2 BRT.	Noted in the text. This estimate applies to the opening year under conservative assumptions.
	Chapter 5, Travel Time (e.g., Table 29)	Shows *TTC = Tempe Transportation Center; don't see where it's referenced from.	Included in list of abbreviations and spelled when first used.
		Under transit travel time, can reduced dwell time also apply to Alt. 1? This would allow for a reduced travel time, making "travel time reduction" on p. 10 greater than 5% and maybe (Alt. 1) a better alternative.	This alternative would not necessarily reduce dwell time. Some buses might make fewer stops, but more boardings per stopped bus may counterbalance.
		Use of "smaller" and "fewer" stops--need to be consistent throughout the document	Complied.
	Chapter 5, Table 30	Call out "daily revenue miles per rider"; also, is this productivity (passengers/mile) or load (passenger miles)?	Riders per revenue mile is a measure of productivity.
		Some numbers don't match; 2,080 riders in corridor, then an increase to 3,622 which makes it a difference of 822; however, Table 28 has a difference of 542.	The number shown is 3,080, not 2,080; the calculations in Table 30 are correct.
	Chapter 5, 5.3.2.3	What is the purpose of this recommendation? Forecasts from a regional level traffic model are not required for Small Starts.	Changed "should" to "could." Use of the travel model might better reflect future land use impacts and other socioeconomic factors, potentially resulting in higher estimated ridership.
		"Performance is relatively low." Based on the information presented, it would be more accurate to note that the performance is significantly low.	Disagree; no change.
	Chapter 5, Table 32	Was fare recovery estimated here (number of full and reduced fare passengers)?	No, but 19 percent farebox recovery was assumed.
	Chapter 5, 5.3.2.9	"MAG High Capacity Transit Study" should instead read "MAG Regional Transit Framework Study."	Corrected.
		Document does not spell out much about the community itself; it relates to adopted plans but not a summary of outreach findings or future outreach.	Community input has been limited, with no clear favorite alternative. Input is documented elsewhere in the report.

Source	Document/Location	Comment	Disposition
	Chapter 5, 5.3.2.11	Calls out corridor ridership as 3,000—is the corridor or the mode the one that needs 3,000+ average daily riders to be eligible for FTA VSS? This is why this would be useful in Table 28.	The 3,000 threshold applies to existing transit service in the corridor; clarified in text.
		What is the alternative plan if the additional operating funds are not identified?	Discussed in Chapter 6.
	Chapter 5, 5.4.1 Conclusions	"Somewhat below average" appears to be an understatement, given that the BRT line is projected to carry 179-178 riders per mile, and the sample projects cited on page 15 are in the 400-700 riders per mile range. Change to "substantially below average."	Dispensed with any further modifier of "below average."
		If we want to move forward, need to delineate a plan of attack, maybe extending the alignment to connect to the farthest point of express routes, consider eliminating/shortening an express route, and transferring the passengers and funding from one mode to the other.	BRT would connect with express routes at Thunderbird park-and-ride. The two modes serve different purposes and one would not replace the other.
	Chapter 5, 5.4.2 Preliminary Recommendations	The recommendation to advance Alt. 2 should be made in concert with the identification of additional operating funds to implement the alternative. Another option would be to move two alternatives forward: Alt. 2 and an alt. that can operate with the funds available (capital and $750K per year for operating).	Chapter 6.
Teresa Huish	Chapter 5, 5.3.2.7	Over what period of time are the costs amortized?	Clarified in text.
		What is source of $4.30 operating cost per rider on Route 72?	Clarified in text. Calculated using current ridership and the operating cost of $7.15 per vehicle revenue mile.
	Chapter 5, 5.2.1 and 5.3.2.2	Was travel time with technology benefits of Alt. 2 calculated in this section?	The travel time analysis was used for both Tiers 1 and 2. The assumptions included time savings for transit signal priority in Alt. 2 consistent with the technology discussed. Benefits would be further identified in the next project development phase.

Source	Document/Location	Comment	Disposition
	Chapter 5, Table 28	Percent increase in corridor ridership—good, bad or normal? What's the makeup of ridership? How much and how many additional riders?	At this level of modeling and analysis, the composition of ridership is unknown. Text discusses the other questions.
		Added annualized cost per added rider—what is this based on?	Defined in the text.
		Costing to include ITS enhancements—add a line ITS costs and then add text re use of ITS technology in future options.	The ITS elements are included in the unit cost for signal priority. Changed cost category to Signal Priority/ITS.
	Chapter 5, 5.3.2.5	Need broader discussion of LOS impacts. Clarify average for corridor intersections or segments.	Not much to add at this level of analysis.
	Chapter 5, Table 32	In light of TLCP numbers, where did annual operating cost of $7.113 million for all corridor bus service come from?	Clarified, but this number is based on the amount required to operate the specified level of local and BRT service, not the amount available in the TLCP. The amount was provided by Stuart and should reflect the latest discussion between agencies.
TAG members	Chapter 5, 5.3.2.1 and Table 29	Show how many buses are needed fo minimal service with only $725,000 of annual operating funds.	Complied.
Stuart Boggs	Chapter 6	Note that Main St. LINK and Rt. 40 combined ridership exceeds 3,000 per weekday. Since corridor links to METRO Rail you could make the case that access to LRT has driven ridership in this corridor. A similar case could be made for BRT and Rt. 72…since this line will also provide a direct connection to and from METRO.	Ridership in the Mesa portion (served by LINK as well as Route 40) was only 2,744 in Oct. 2010 and 2,732 in September.
Jim Mathien, Kevin Wallace et al	Chapter 6, Table 35	Highlight the scenarios that meet the FTA requirements for VSS eligibility. Rework the scenarios so that Rte. 72 service would be reduced only in the portions of the corridor in which BRT service is added.	Complied.
Jim Mathien	Chapter 6, Table 35	Can we link the operating/funding scenarios with recommended levels of capital investment?	See Table 29 with respect to vehicle requirements. Linkage to fixed facilities should be pursued in DCR.

Source	Document/Location	Comment	Disposition
Kevin Wallace, MAG	Chapter 6, etc.	Can this study recommend an LPA without enough committed funding to implement it?	Report indicates that federal VS eligibility will require additional operating funds and prior agreement among Scottsdale, Tempe and MAG on committed funding levels, especially for operations.
Teresa Huish	Chapter 6, 6.1.1	Should we say we think this is a VSS project, since most of this discussion is VSS?	Yes—clarified.
		"The evaluation requirements for Small Starts are shown in Table 37…" but the table shows VSS. "Small Starts has similar requirements…" similar to what?	Clarified in text.
Teresa Huish	Chapter 6, Table 35	Add the scenario label to each row.	Complied.
Teresa Huish	Chapter 6, 6.1.2	Third paragraph: Are Sec. 5309 discretionary grants available for capital costs associated with New Starts only for commuter rail projects?	No; corrected.
TAG members	Chapter 7	Mention, as a lower-cost option, an A/B operation where some bus trips would skip certain stops.	Mentioned in Chapter 7.
Stuart Boggs	Chapter 7	Should matching LRT service hours be considered?	
		There is flexibility for some local variation in BRT station design, although most shelters have been standardized. Chandler and Mesa have commissioned artists for their portions of the first two arterial BRT routes.	
		Explain why BRT routing on Scottsdale Road through Downtown Scottsdale may not be feasible.	Complied.
Teresa Huish	Chapter 7	BRT stations in Scottsdale must be compatible with Scottsdale Road Streetscape Guidelines.	Noted in text.
	Chapter 7, 7.1.2	Third paragraph, beginning "As discussed…" Make it clear what we're recommending here—New Starts or Small Starts.	Complied.
	Chapter 7, 7.1.3	Discussion of first issue—increasing the weekend frequency of Route 72 to 20 minutes assumes we are reducing frequency for VSS.	Not necessarily. The current lower (30-minute) frequency is not contingent on reduced weekday frequency due to BRT.

Source	Document/Location	Comment	Disposition
Jim Mathien	Chapter 7, Figure 23	The schedule for "Project Development: Preliminary and Final Design" and for "Procurement and Construction" appears extremely generous. Given that R/W acquisition may be minimal and no major civil design must be accomplished, does the schedule provide too much time for these tasks?	Schedule revised.
Jim Mathien	Chapter 7, 7.2.1, "Downtown Scottsdale Alignment," second bullet point	Add the words "and hospital" after the fourth word "stadium."	Complied.
Jim Mathien	Chapter 8	Note that strong BRT can help build demand and a transit-friendly corridor for future LRT or other HCT. It's an opportunity to develop a transit population and transit culture.	Complied.
Teresa Huish	Chapter 8, 8.1	Why would we not include modern streetcar in our assumptions about future HCT, especially since that's what's recommended for Mill Ave? We will likely have LRT, MSC and BRT in the region by the time HCT is implemented in this corridor.	Added modern streetcar.
Teresa Huish	Appendix A	Draft 2011 General Plan is on-line now—recommendations are likely the same or similar to 2001.	Mentioned in text.
		We didn't discuss anything from the HCT section of the Transit Element (of the Transportation Master Plan).	See Table A-1.
		Add the Southern Scottsdale Area Plan, Oct. 2010	Added.
Stuart Boggs	Chapter 8	Regional HCT connections could be influenced by changes in HCT technologies in the coming years. Fuel cell or battery powered LRT vehicles could eliminate the need for overhead wires, which could reduce opposition to some alignments and reduce the need for relocation of underground utilities.	Added to text.
	Appendix A	You might want to consider including a representative graphic from some of these studies and reports. Would break up the text and provide a visual reference to some of the concepts described (such as building setback/orientation or bus stop components).	Complied.
		Should include some discussion of the findings of the study [ASU 2008 Transit Ridership Analysis] as it applies to ASU generated ridership in our study corridor.	

Source	Document/Location	Comment	Disposition
	Appendix A, Origin & Destination Study	Maybe call it the O and D Survey, without the 2007 distinction. It was completed in 2009, so it could be considered confusing.	
		[The fact that] almost ¾ of transit riders belong to households earning under $35,000 a year may be misleading as many of them are college students.	Mentioned in report, although the figure is systemwide.
	Appendix A, Scottsdale Downtown Plan	Should include some reference to the recent mixed use development around the [Arizona Canal].	Complied.
	Appendix A, Greater Airpark Community Area Plan	I think the plan also identified east-west access across the airport property as a significant issue. The city was studying construction of a vehicular tunnel under the runway but this idea has since been dropped due to cost.	Noted in text.
		Designation of this part of Scottsdale Road as a conceptual pedestrian/bicycle corridor may create safety issues for cyclists with a curb-running BRT alignment.	Chapter 7.
Janet Strauss		What is the "powerline corridor"? If it is a corridor, why is it not capitalized?	Deleted reference.
	Appendix A, MAG Regional Transit Framework Study	"Each scenario built logically on the previous ones." Maybe explain a little further.	Clarified and explained.
Stuart Boggs		I think the study included assumptions for station spacing for BRT and HCT. If it does, you may want to mention it here.	Study mentioned typical distances, but no assumptions or guidelines. No change.
	Appendix A, Scottsdale Road Streetscape Design Guidelines	May have implications for curb running alignment options as well as station design. Potential conflict between trying to visually reinforce a transit "brand" and a local desire to design stations to be context sensitive.	Chapter 7.
	Appendix A, MAG Commuter Rail System Study	When developed, this commuter rail corridor may include a transfer opportunity to LRT west of the existing Mill Ave. METRO station.	Noted in text.
	Appendix A, Tempe South AA/EIS	I'd confirm [the outcome of the study] with Dawn or Wulf. My understanding is the LPA would be the Mill Ave. streetcar and the BRT on Rural would be retained as a future option.	Confirmed and changed as appropriate.
	Appendix B	Does the Scottsdale PCD designation address pedestrian circulation and accessibility?	Not specifically. No change.

Source	Document/Location	Comment	Disposition
Janet Strauss	Appendix C	I believe Papago Park Center extends to the border of Phoenix [as well as lying within Scottsdale and Tempe]. The Desert Botanical Garden and Phoenix Zoo are both in Phoenix.	Center is in Tempe, but nearby attractions are not. Clarified.
Stuart Boggs	Appendix C	Need some discussion of Scottsdale Fashion Mall, a regional shopping destination located immediately north of downtown Scottsdale.	Complied.
		Refer to the planned park-and-ride at Scottsdale Road/Thunderbird Road.	
		Need some discussion of the relationship of the ASU Tempe campus to ASU SkySong.	Added.
		Note that dealerships along the Scottsdale Motor Mile have moved to other cities as well as other parts of Scottsdale.	Complied.
		Under Miscellaneous Redevelopment Opportunities in Tempe, include some mention of the recent condo and apartment construction east of Scottsdale Road and north of Town Lake.	
	Appendix D	Need to determine how high a [BRT] frequency can be supported using single bi-directional travel lane.	Consultant team performed an analysis before Alt. 4 fell out in Tier 2.
		Both median and curb running alternatives would be impacted by special events. Might be worthwhile to talk to Rail about their experience with special event congestion around Sun Devil Stadium and at Mill Ave.	Special events would affect all service on Rural Road, but curb running alts. are inherently more flexible.
		A lot of students take their bikes on transit to allow them to make the connection to class from their transit stop. Providing a direct connection to the center of campus is not necessarily vital when you consider the demographic (i.e. students who walk, bike and skateboard to class).	Noted, but ASU is a key activity center for many who are less mobile as well. Originally proposed LRT routing would have stopped at a more central campus location.
		Transit availability assumptions of original SkySong project are no longer valid due to the impact the economy on the 20-year transit program in the RTP. This may translate in more parking being developed than originally envisioned.	Noted in text.
		Should check with the County just to make sure there are no development plans for island [near Curry Road].	Confirmed with county planners. Island lies within Tempe MPA.
		Since resorts are heavy employers of service staff, we should be mindful of where we locate stops to ensure access to job sites. (Similar comment on Chapter 1)	Noted. Consultant team identified resort locations.

Source	Document/Location	Comment	Disposition
		Single lane median running with bus only underpass at Shea Blvd. should be evaluated. Heavy east-west and north-south traffic movements here result in peak travel period backups. A single lane underpass would limit lane taking while improving through movement of buses on Scottsdale Road. Adding queue jumpers and pull-through bays at this intersection would be difficult due to the proximity of existing commercial development in the southeast quadrant. To accommodate these lanes you would need to shift the whole R/W to the west, increasing land taking on the west side of the corridor and necessitating total reconstruction of the intersection. The underpass option would allow us to maintain the existing R/W.	Included in planning-level cost estimate for Alternative 4 (Chap. 5). Could be studied further if high-capacity, median-running BRT is reconsidered in the future.
		May need to look at phased improvements in the corridor to match funding availability.	Added to text.
		Effective BRT service on Drinkwater would also require late night and early morning running to address multiple hospital shifts.	
	Appendices H and J	Display on 11 x 17 paper to make it easier to read.	Complied.

Appendix N - List of Abbreviations

AA	Alternatives Analysis
ARRA	American Reinvestment and Recovery Act
ASU	Arizona State University
BAT	Business Access and Transit
BRT	Bus Rapid Transit
CIP	Capital Improvement Program
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FY	Fiscal Year
HCT	High-Capacity Transit
HOV	High-Occupancy Vehicle
ITS	Intelligent Transportation Systems
LOS	Level of Service
LPA	Locally Preferred Alternative
LRT	Light Rail Transit
LTAF	Local Transportation Assistance Fund
MAG	Maricopa Association of Governments
METRO	Valley Metro Rail
MPA	Municipal Planning Area
NAAQS	National Ambient Air Quality Standards
NB	Northbound
NEPA	National Environmental Policy Act
O&M	Operating and Maintenance
PCGA	Project Construction Grant Agreement
RPTA	Regional Public Transportation Authority
RTFS	Regional Transit Framework Study
RTP	Regional Transportation Plan
R/W	Right-of-Way
SAZ	Socioeconomic Analysis Zone
SB	Southbound
SR	State Route
TAG	Technical Advisory Group
TCRP	Transit Cooperative Research Program
TIP	Transportation Improvement Program
TLCP	Transit Life Cycle Program
TOD	Transportation Overlay District
TSM	Transportation System Management
TTC	Tempe Transportation Center
UP	Union Pacific Railroad
VSS	Very Small Starts

Technical Appendix – Existing Roadway Schematics

See file: **2010 10 26 Corridor Schematics.pdf**