5 Evaluation of Transportation Options in the SWATS Area

5.1 Introduction

This chapter summarizes the options examined for the southwest valley as part of the Southwest Area Transportation Study (SWATS). The chapter first concentrates on highway facilities that were subject to modeling using MAG's regional travel demand forecasting model. That modeling process first considers future (2020 and 2030) distributions of population and employment within the travel forecasting area. Different highway networks were modeled to evaluate future needs for highway improvements in the SWATS area.

This chapter was developed as a Working Paper (WP) and contains data and information that is continuously updated, some of which may have changed or may have been superseded by the final Regional Transportation Plan (RTP). Information was current at the time of initial WP publication.

The chapter presents an analysis of four different highway networks. The chapter briefly summarizes the data used to quantitatively describe and to analyze each network's performance in serving forecast traffic. A comparative analysis of the networks is presented, followed by an analysis of individual major highway improvements included in the modeled networks.

Transit and non-motorized options for the SWATS area are then identified. The analysis of the transit options is somewhat abbreviated because transit options have been more fully presented and analyzed in MAG's High Capacity Transit Study and the Regional Public Transportation Authority's (Valley Metro's) Regional Transit System Study.

This chapter is organized with descriptive information in Sections 5.2 through 5.6. These sections contain little in the way of analysis. Sections 5.7 through 5.12 present additional technical information and provide individual analysis of potential transportation facilities. Many of the projects included in the analytical sections are related to one another. The analysis presented in this chapter sets the stage for a set of conclusions regarding transportation facility needs in the SWATS area. Chapter 6 presents conclusions and recommendations based on information and analysis presented in this chapter and develops a set of transportation facility recommendations with a more complete set of costs.

5.2 Description of Highway Options

This chapter focuses on how well each of four potential future highway networks and the facilities included in each serve the land development, population, and employment expected in the southwest valley in the years 2020 and 2030, based on current land use plans. Potential changes in land use plans could change how well a potential network serves the area. For modeling purposes the networks include only the higher functional classes of roads including freeways, expressways, arterials, and collectors. Local streets and other minor roads are not included in these models because of the higher level focus of the study.

The four potential future highway networks modeled do not represent networks recommended for implementation. They are a means of studying and understanding individual highway facilities and groups of facilities in terms of the extent to which future travel demand is served. By evaluating the affects of individual facilities and groups of facilities a set of recommended highway and transportation improvements can be identified for potential implementation.

The four potential future highway networks modeled represent incremental improvements to the existing highway system. Each of the networks adds a layer of improvements onto the improvements included in the previous networks. The existing highway network ("Current Base" hereafter) represents the first network. This network is shown in Figure 5-1. It should be noted that, due to the technical requirements of the model, the Current Base includes some facilities that are unpaved roads or unimproved dedicated rights-of-way. Such facilities occur west of SR-85 and in southern Goodyear.

The four potential future highway networks are briefly described below in terms of the improvements each represents over the previous network. A more complete comparison of the networks and their forecast traffic characteristics is presented in the subsequent section.

5.2.1 <u>2020 LRTP Based Reference Network ("Future Base")</u>

The second network is the Long Range Transportation Plan Based Reference Network ("Future Base" hereafter), shown in Figure 5-2. This network represents the existing roadway network, improvements whose implementation is already committed, and improvements expected to be implemented before 2022. Those improvements include road and transit projects currently in the region's Long Range Transportation Plan and other projects whose implementation is expected based on existing plans of local governments and private developers. The principal exception is I-17 between Loop 101 and I-10, which is included in the Future Base in its current condition.

New facilities included in this network are shown in Figure 5-3. Among the new facilities in the SWATS area are the South Mountain Freeway, a freeway replacement of SR-85 from the Gila River north, a short southerly extension of Loop 303, numerous arterials, and some additional river crossings.

Widened facilities included in this network are shown in Figure 5-4. As the figure shows, a great many of the existing arterial roadways in the SWATS area are expected to be widened in the coming years. Many of the arterials not expected to be widened are in the northeast corner of the study area and have already reached their ultimate width. SR-85 is widened south of the Gila River.

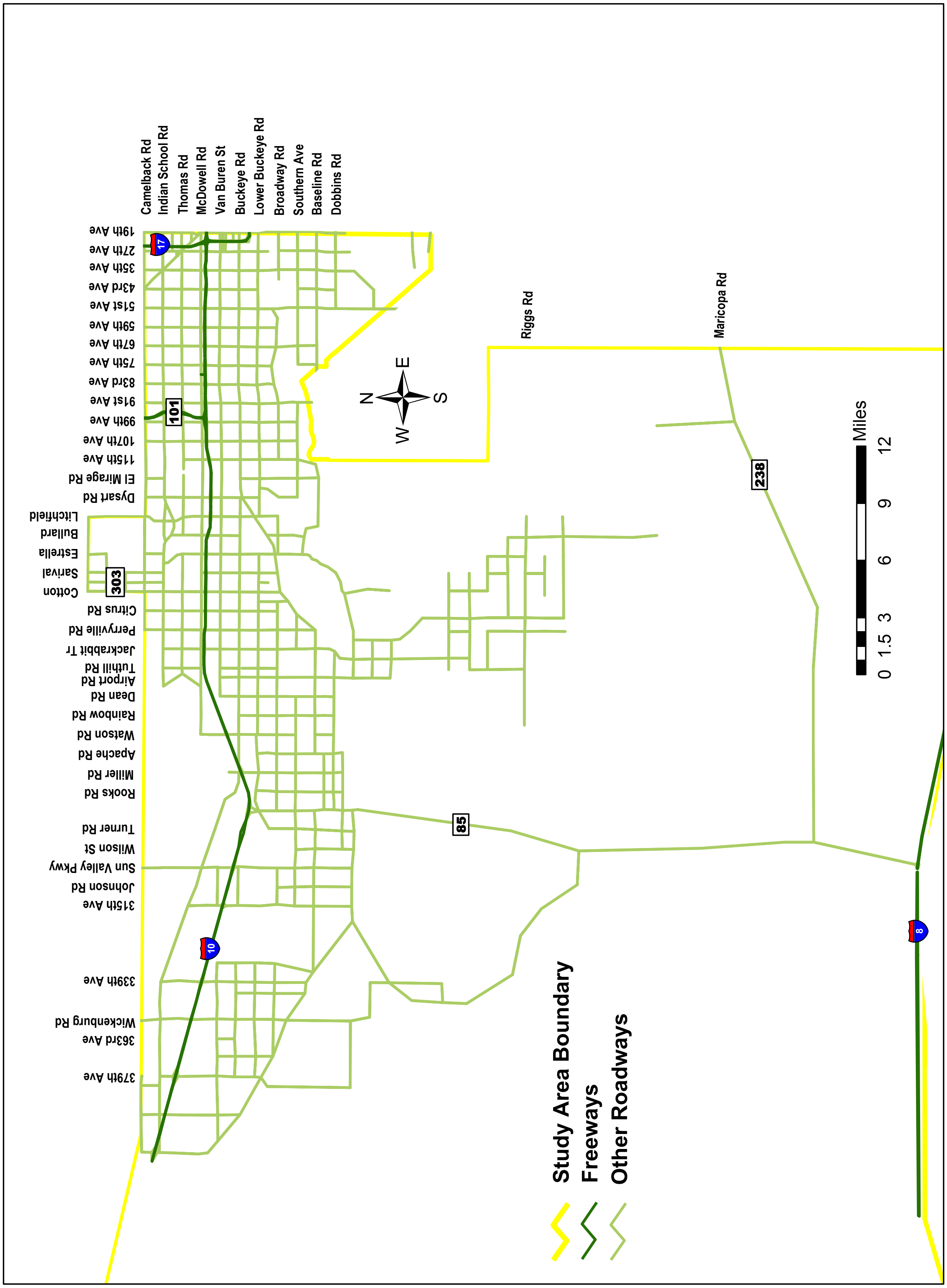

Figure 5-1
Current Base Network

Figure 5-2
Future Base Network

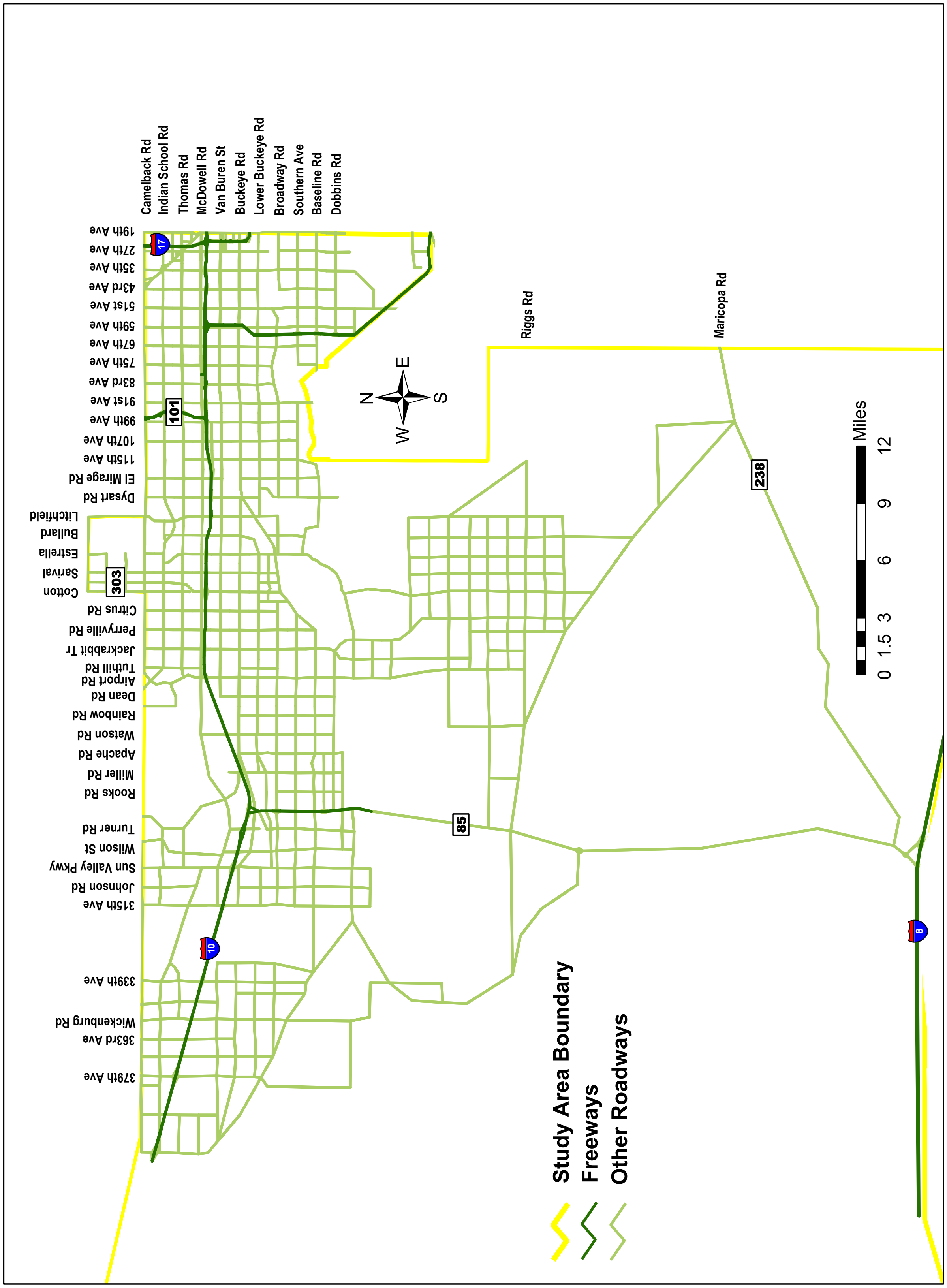

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Figure 5-3
New Facilities in Future Base Network

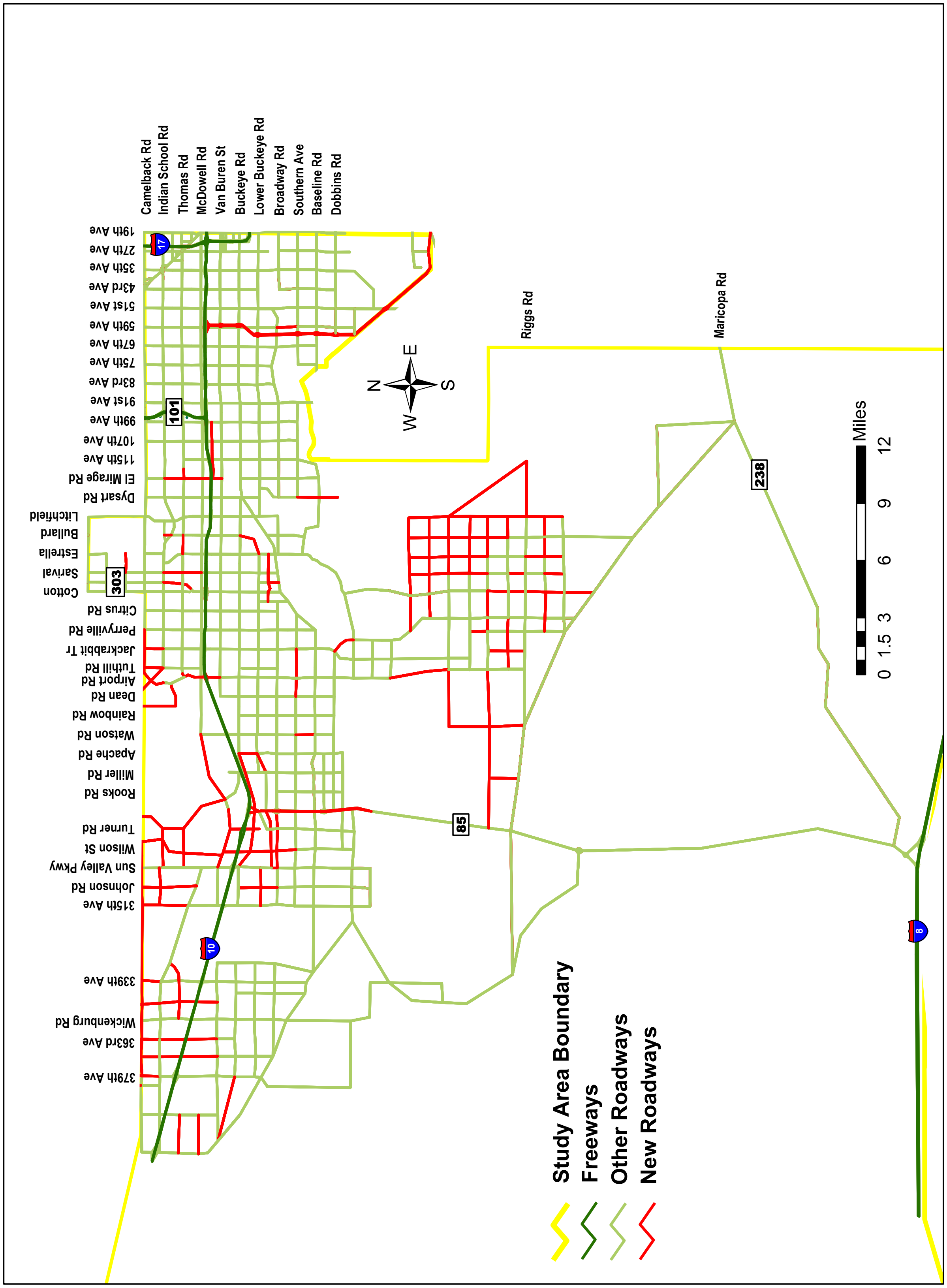
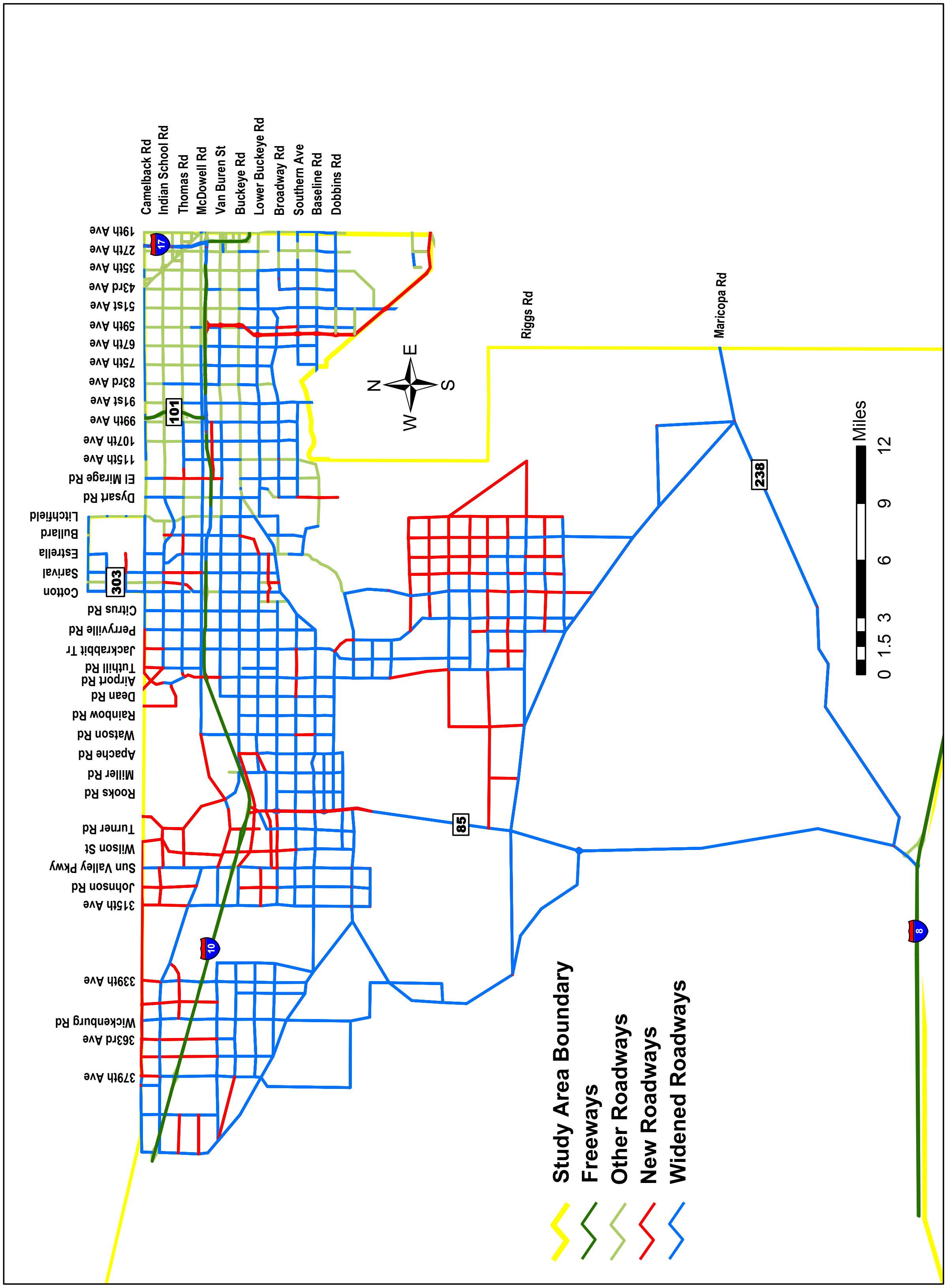


Figure 5-4
New and Widened Facilities in Future Base Network



5.2.2 Enhanced Network

The third network is the Enhanced Network, shown in Figure 5-5. This includes the facilities in the Future Base network plus the new facilities shown in Figure 5-6. Among these facilities are high-occupancy lanes (HOV or carpool lanes) on I-10 west of Loop 101, on I-17 south of I-10, and on Loop 101. Widenings included in this network include I-10 and SR-85 as shown in Figure 5-7.

5.2.3 New Highway Corridors Options A and C

The fourth and fifth networks are the "New Corridors" networks, namely "Option A" and "Option C". These networks, shown in Figure 5-8, include a number of potential new highways in the SWATS area. (There is an "Option B" network, however within the SWATS area it contains no facilities different than those contained in Option A. It provides new facilities in other portions of the metropolitan Phoenix area covered by other studies.) The new highways are shown in the figure and include:

- an I-10 Reliever, a freeway running parallel to and south of I-10 from I-17 near the eastern SWATS area boundary to I-10 west of the Hassayampa River;
- a Loop 101 Extension (5 lanes in each direction) from I-10 to the new I-10 Reliever;
- the Rio Salado Parkway (3 lanes) from downtown Phoenix to the I-10 Reliever at the Loop 101 Extension;
- an extension of Loop 303 south of I-10 to Komatke Road; and
- the Riggs, Komatke, Maricopa Road Expressway (3 lanes) east of SR-85 to the study area boundary, overlapping with Riggs Road and Loop 303 in southern Goodyear.

These networks include widenings of I-17, Rainbow Valley Road, and other limited locations.

The major difference between Option A and Option C is the number of lanes on the I-10 Reliever and on Loop 303 south of the I-10 Reliever. In Option A, the I-10 Reliever is assumed to be 6 lanes in each direction for its entire length. In Option C, the I-10 Reliever has 7 lanes at its eastern end, 4 lanes between Loop 303 and SR-85, and only 3 lanes at its western end. Loop 303 has 5 lanes in Option A for its entire length. In Option C, it has 6 lanes south of the I-10 Reliever to Riggs Road. North of Thomas Road, Loop 303 is widened from the 4 lane expressway included in the Future Base network to a freeway.

Specific alignments for new facilities are not established in this report. If new facilities identified in this report are selected in the Regional Transportation Plan process for funding, then detailed location and design concept studies will be conducted in the future by the Arizona Department of Transportation to provide information on which to base decisions about preferred alignments.

Figure 5-5
Enhanced Network

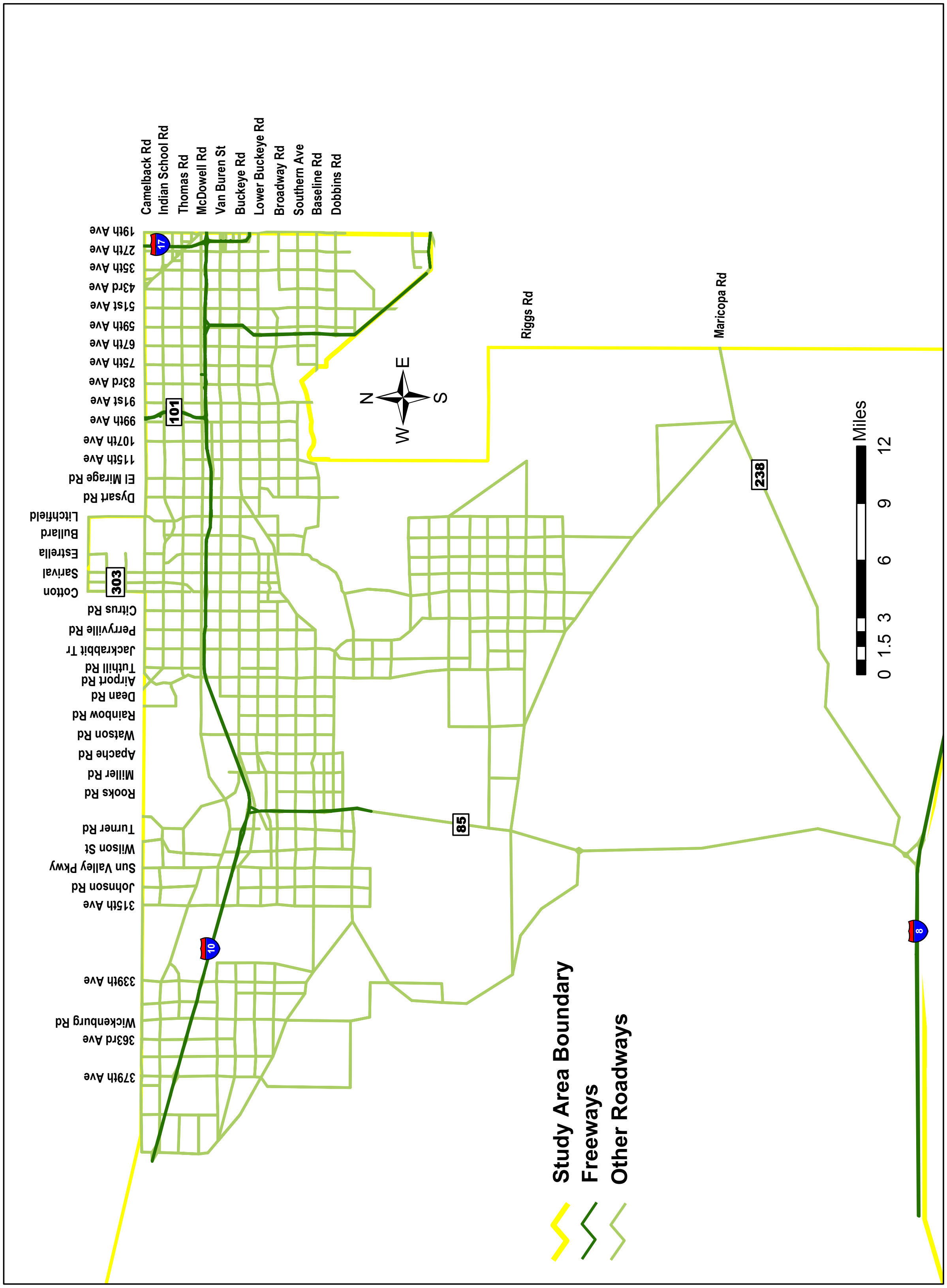


Figure 5-6
New Facilities in Enhanced Network

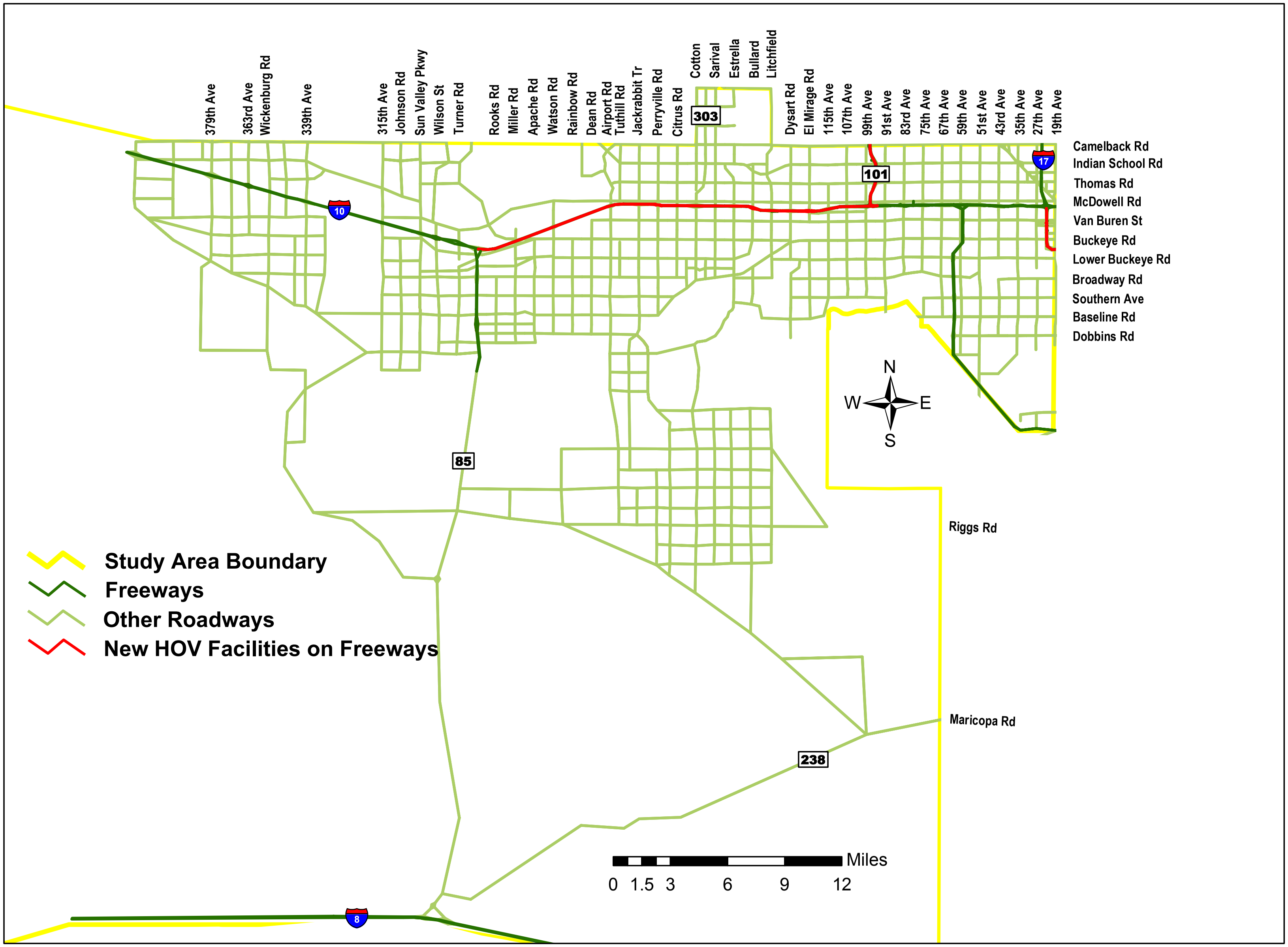


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Figure 5-7
Widened Facilities in Enhanced Network

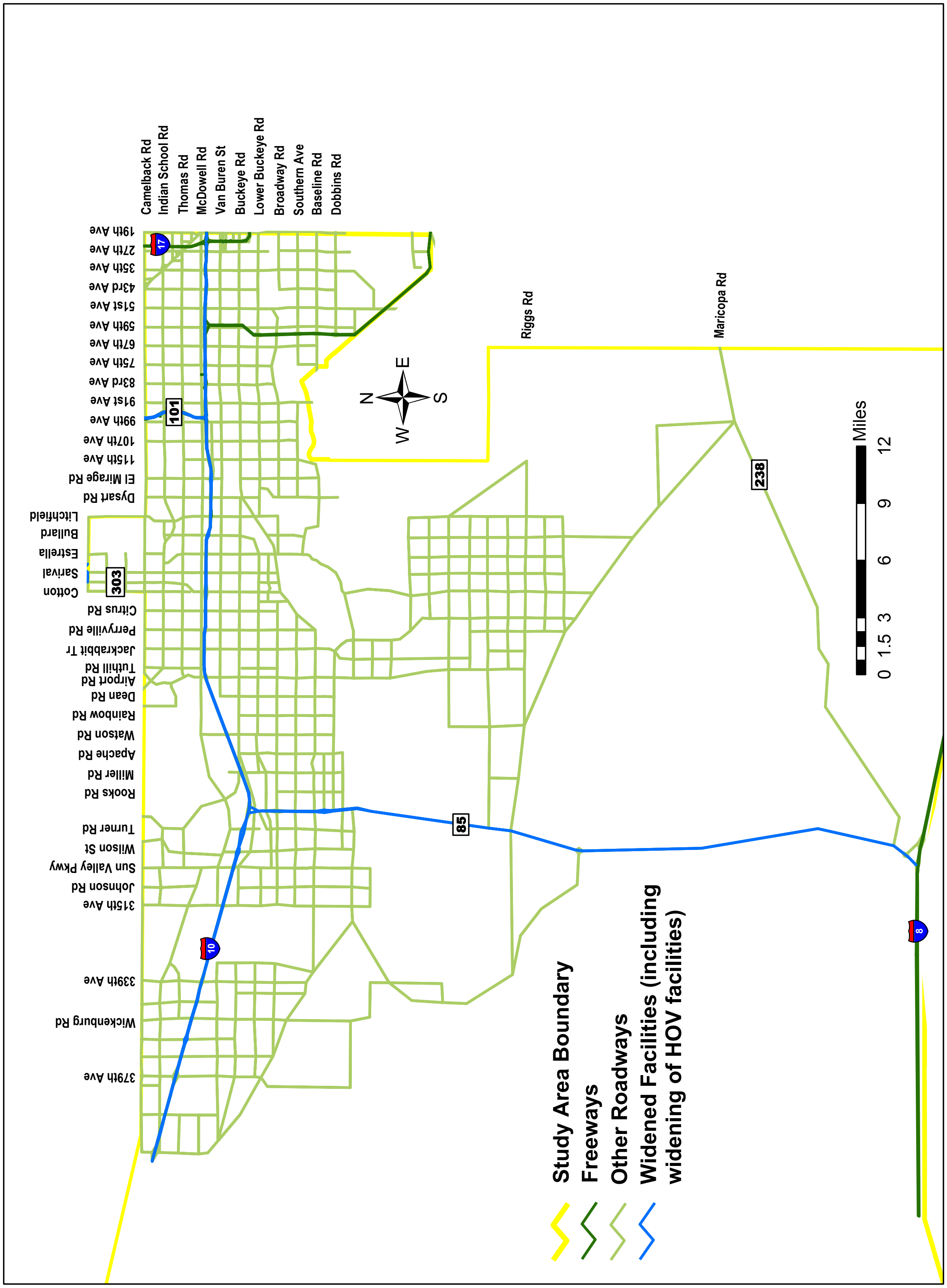
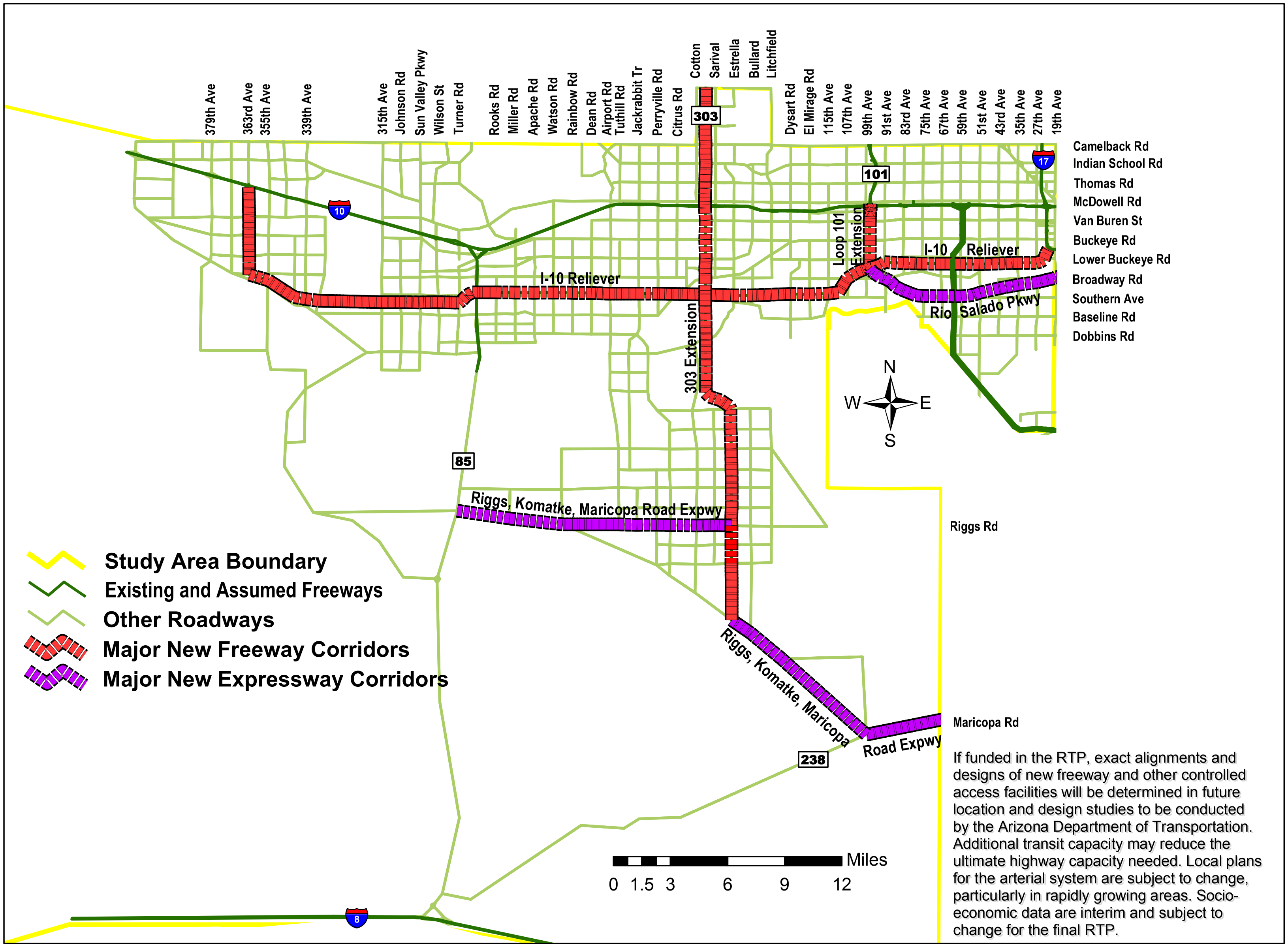


Figure 5-8
Major New Highway Corridors in Option A and Option C Networks



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5.3 Evaluation Method

The following sections (5.4 through 5.6) compare the future highway networks at the system level in terms of roadway as well as forecast performance characteristics. General characteristics compared include centerline miles, lane miles, and capacity miles. Operating and performance characteristics include forecasts of vehicle miles of travel (VMT), truck VMT, peak hour VMT under congested conditions, miles of congested roadway in the peak hour, peak hour intersection congestion, and numbers of motor vehicle accidents.

Subsequently (in Sections 5.7 through 5.10), the new and widened facilities in each of the functional classes of freeways, expressways, and arterials are examined individually. That examination includes bridges across major rivers.

Based on the comparisons of the networks and the individual facilities included in them, a set of conclusions and planning recommendations are developed and presented in Chapter 6.

5.4 General Characteristics of Options

This section provides a comparison of the general characteristics of the networks described above. The centerline miles, lane miles, and capacity miles of each network are summarized and some comparisons made. Some brief information on intelligent transportation systems is included. This section provides descriptive information about the optional highway networks. It does not reach any conclusions.

5.4.1 Centerline Miles and Functional Class

Figure 5-9 (and Table 5A-1 in Appendix V) shows the centerline miles of highways by functional class represented in the Current Base, Future Base, Enhanced, Option A, and Option C models of the highway network in the SWATS area. Figures 5-10 through 5-13 show the functional classes of the highways in each of the networks. Figure 5-9 shows an increase of approximately 300 centerline miles between the Current Base and the Future Base networks. The largest component of this increase is in arterials. By comparison increases in other functional classes are small, including about 20 additional freeway miles and 20 additional expressway miles.

From the Future Base to the Enhanced network, the total centerline miles remain essentially unchanged. However, there is a small increase in expressway miles.

Options A and C are identical in centerline miles. The only difference between these options is the number of lanes on some major new freeways. Arterial mileage is somewhat lower in Options A and C compared to the Enhanced network. About 50 miles of arterials in the Enhanced network are converted to freeways or expressways in Options A and C. Additionally, 90 additional miles of freeways and expressways are added to the highway network under Options A and C.

Figure 5-9
Centerline Miles

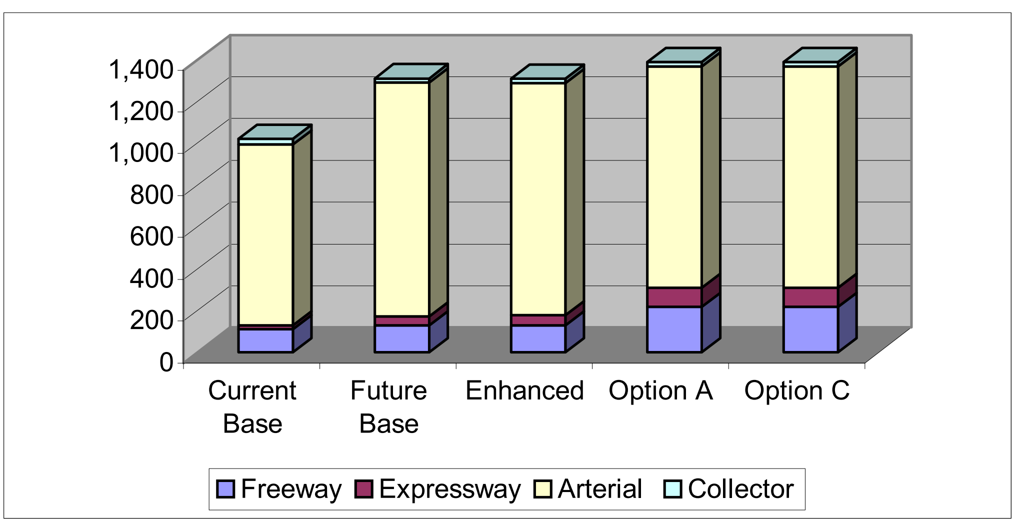


Figure 5-10
Current Base Highway Network Functional Classes

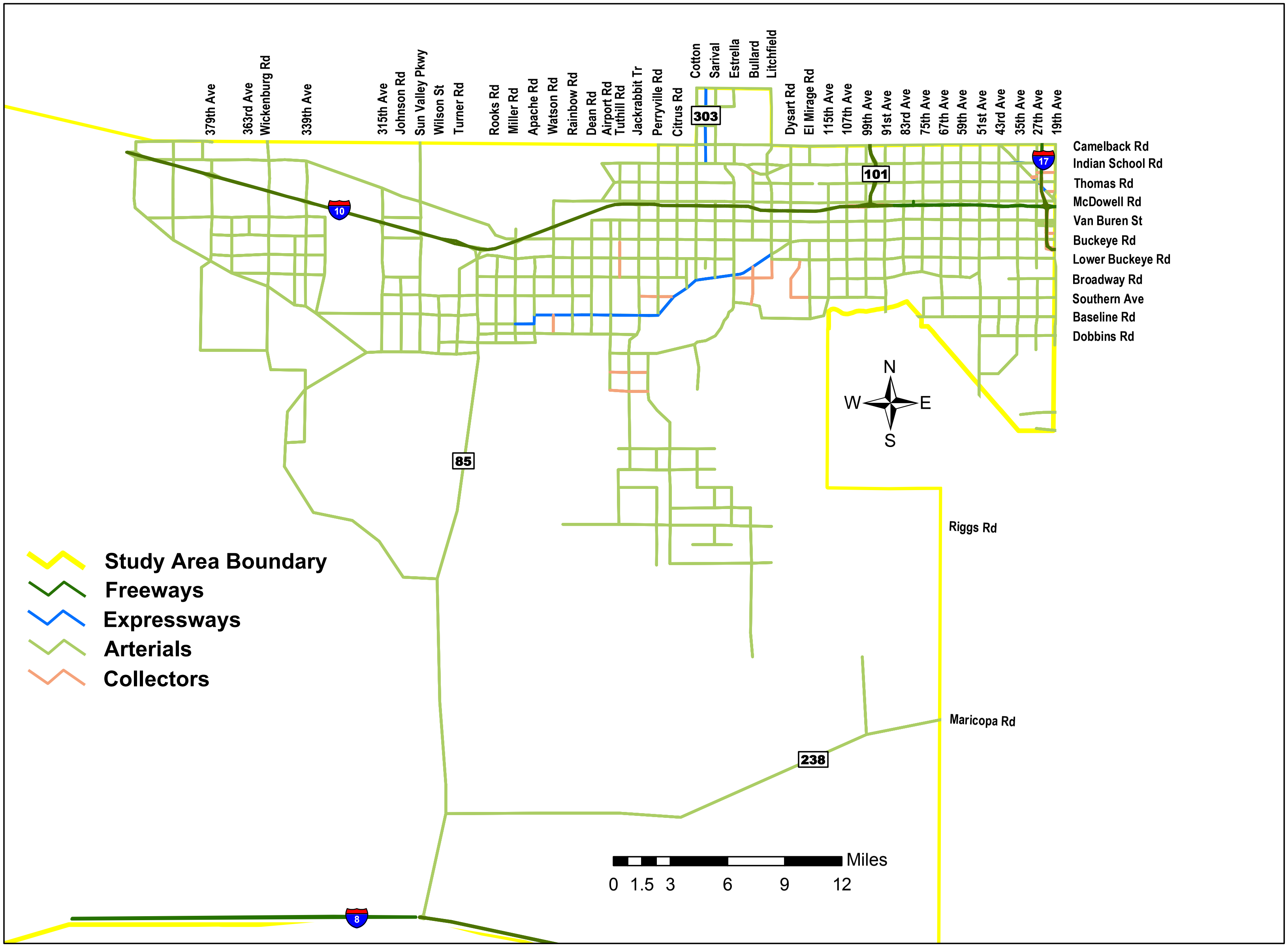


Figure 5-11
Future Base Highway Network Functional Classes

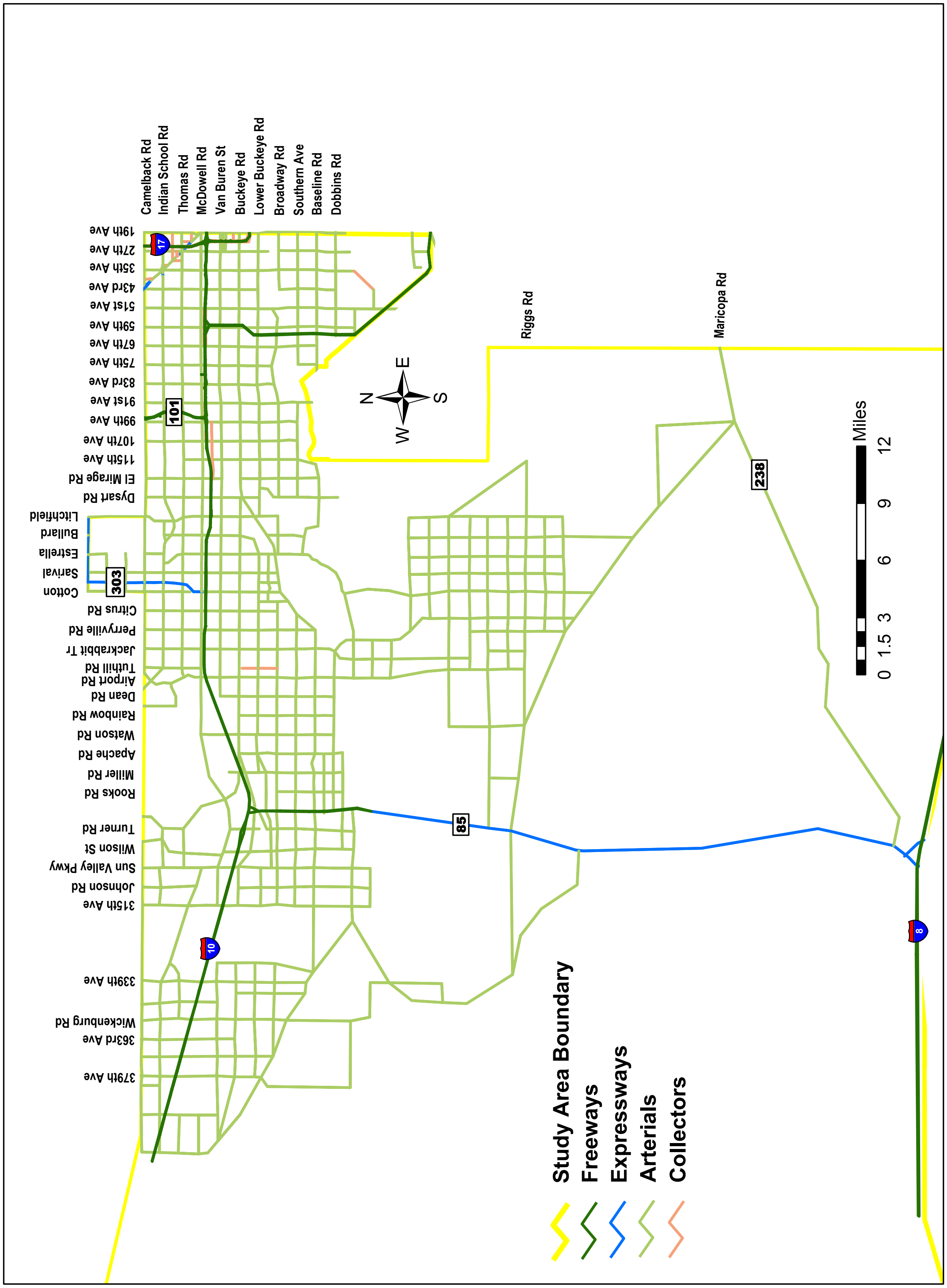


Figure 5-12
Enhanced Highway Network Functional Classes

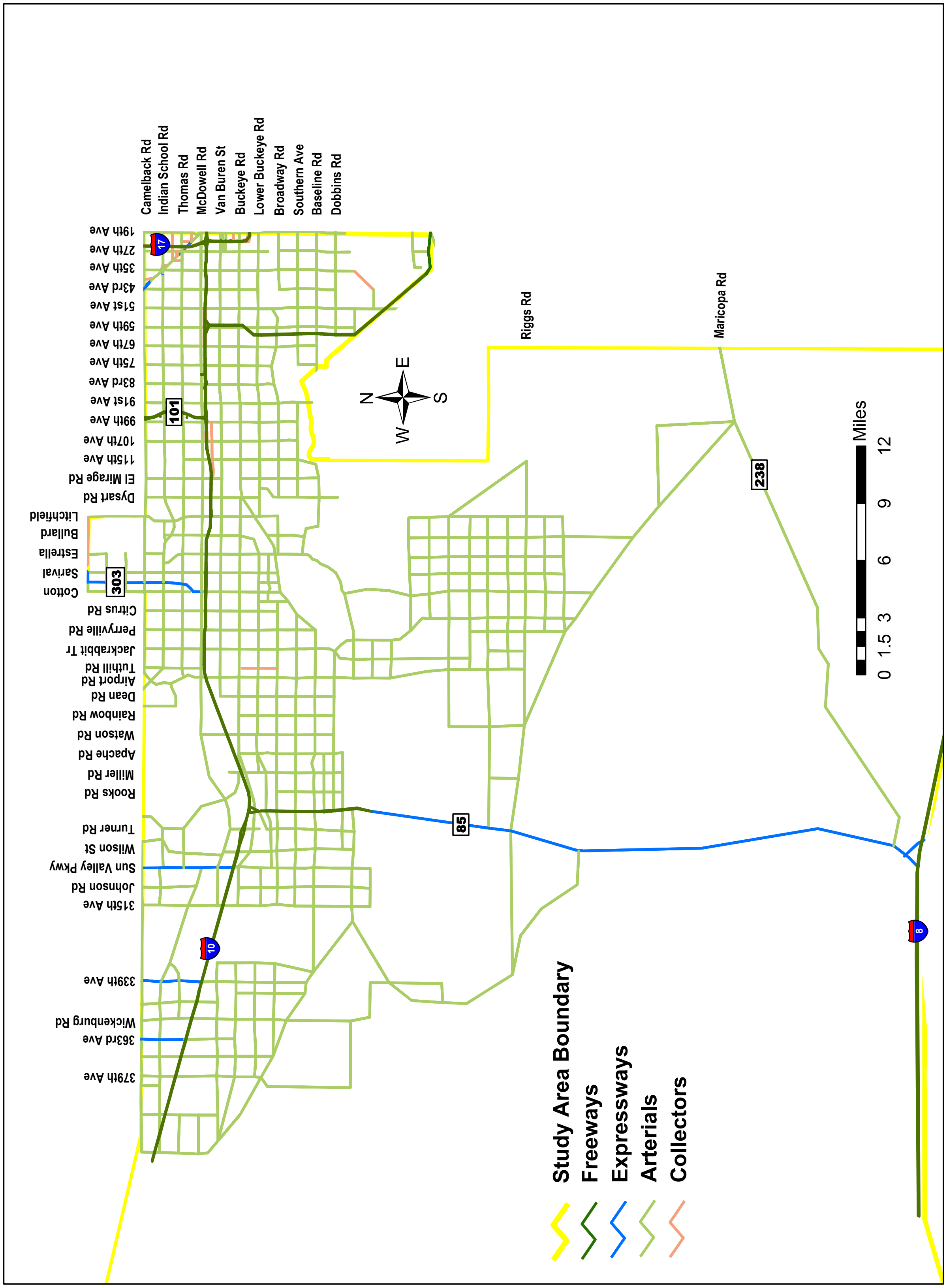
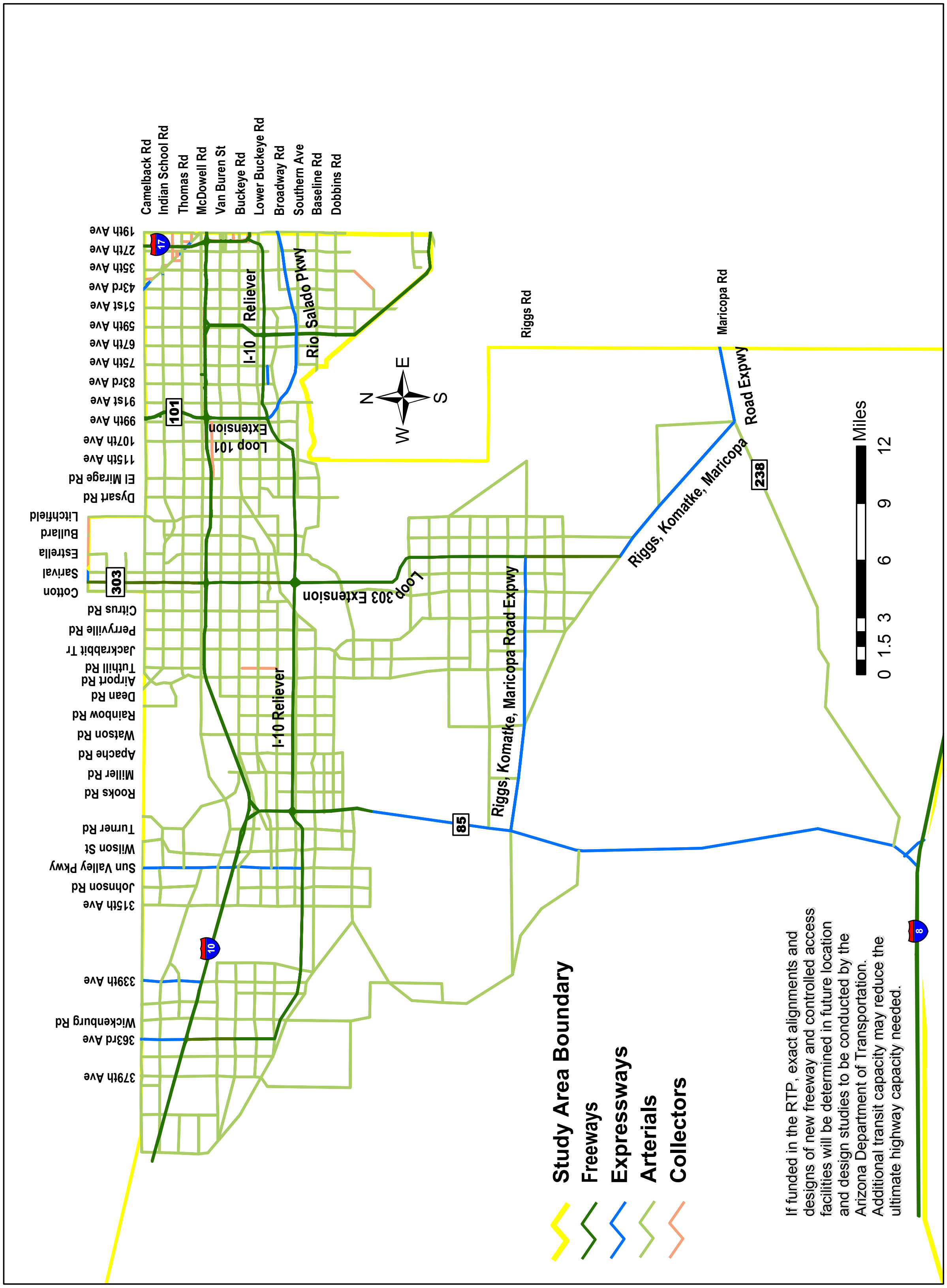


Figure 5-13
Option A and Option C Highway Networks Functional Classes



5.4.2 Lane Miles

Figure 5-14 (and Table 5A-2 in Appendix V) shows the lane miles of highways by functional class represented in the Current Base, Future Base, Enhanced, Option A, and Option C models of the highway network in the SWATS area. Figures 5-15 through 5-19 show the number of lanes on the highways in each of the networks. Figure 5-14 shows that lane miles of highway are doubled in the Future Base network as compared to the Current Base. There are increases in each of the functional classes. The largest increase is in the arterial class with an additional 2,400 lane miles. There are 130 additional lane miles of expressways and 49 additional lane miles of freeways, including both general purpose and HOV lanes.

From the Future Base to the Enhanced network, the total number of lane miles increases by 350. There are nearly 400 additional lane miles of freeway and expressway in the Enhanced network including conversion of about 50 lane miles of arterial to the higher class facilities.

From the Enhanced network to Option A approximately 1,100 lane miles are added. There are over 1,000 additional lane miles of freeway and 250 additional lane miles of expressway. There are about 200 fewer lane miles of arterials, most of which represent conversions to higher class facilities.

Option C is the same as Option A in all categories except freeways. There are 130 fewer lane miles of freeway in Option C. The I-10 reliever east of Loop 303 increases by a lane (from 6 to 7) in each direction. West of Loop 303 to SR-85 it decreases by two lanes (from 6 to 4) in each direction and west of SR-85 it decreases by 3 (from 6 to 3). Loop 303 increases by 1 lane in each direction (from 5 to 6) from the I-10 Reliever south to Riggs Road.

Figure 5-14
Lane Miles

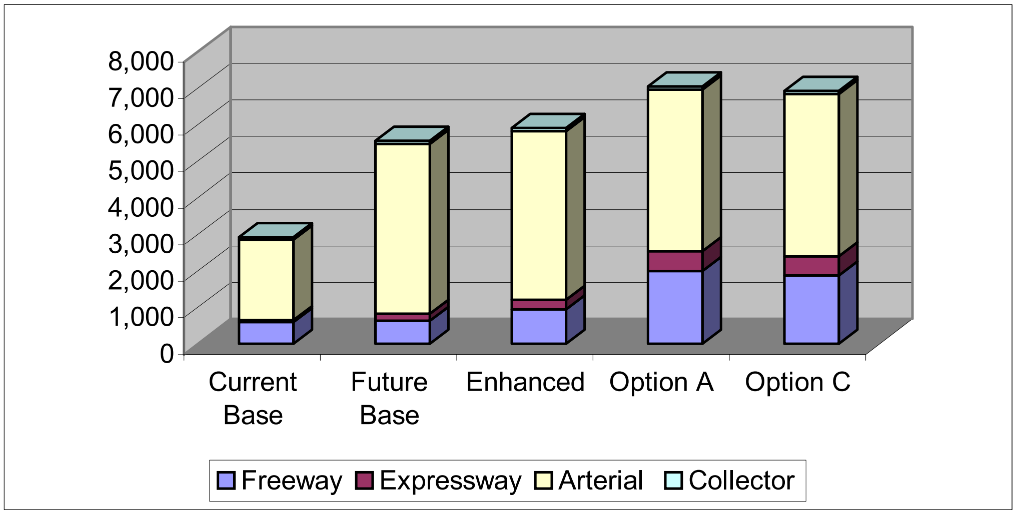


Figure 5-15
Number of Lanes in Current Base Network

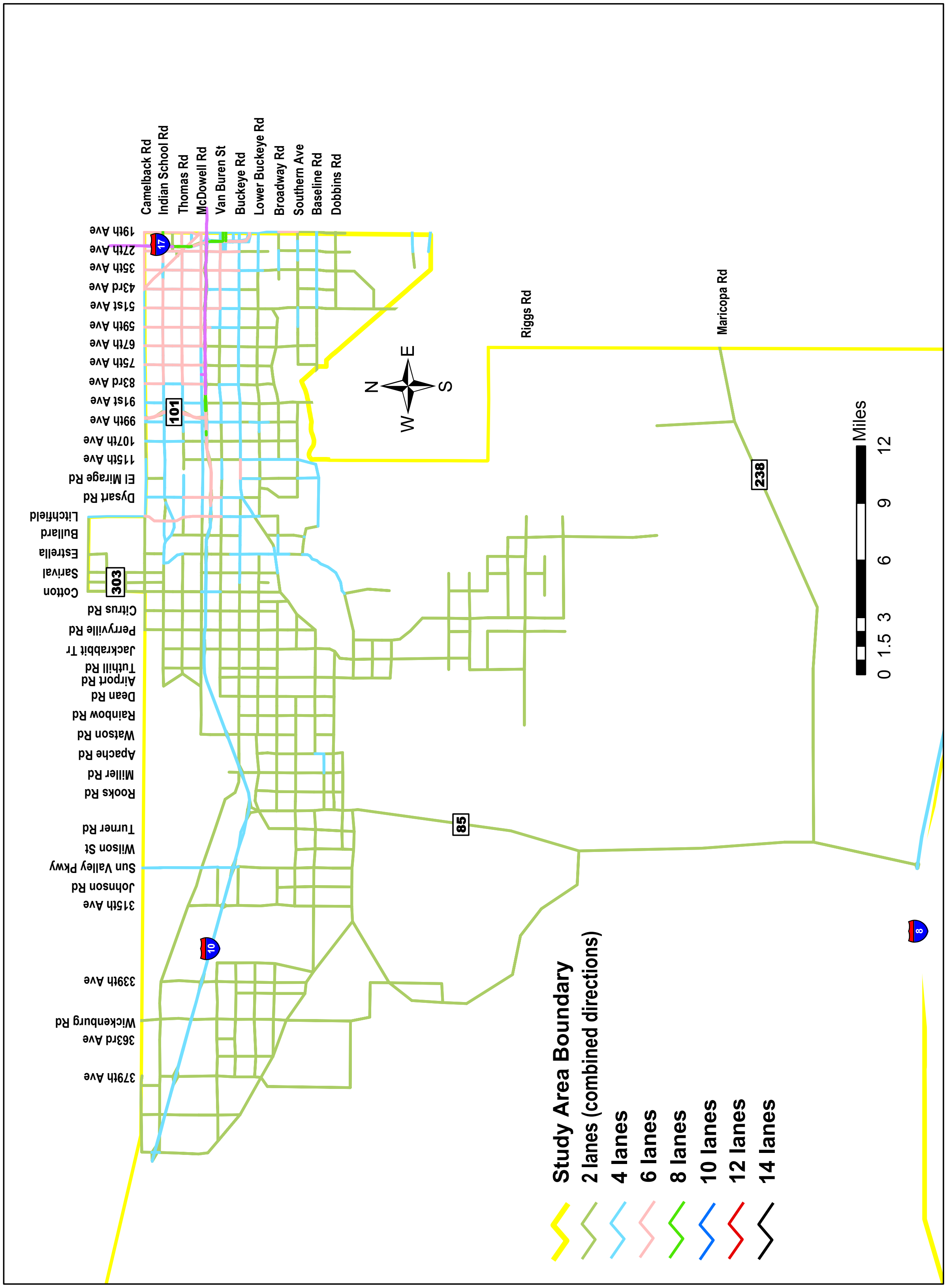


Figure 5-16
Number of Lanes in Future Base Network

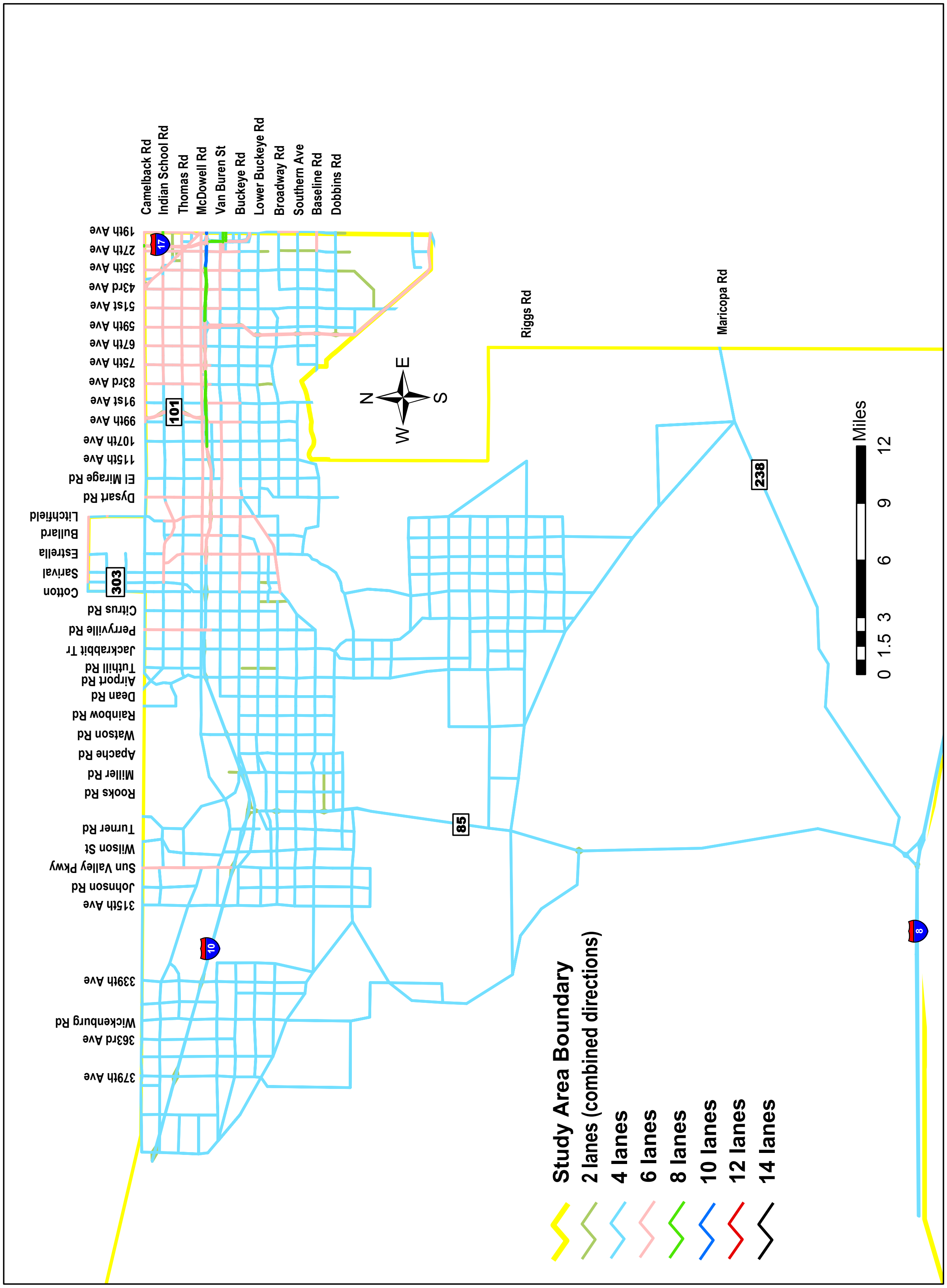


Figure 5-17
Number of Lanes in Enhanced Network

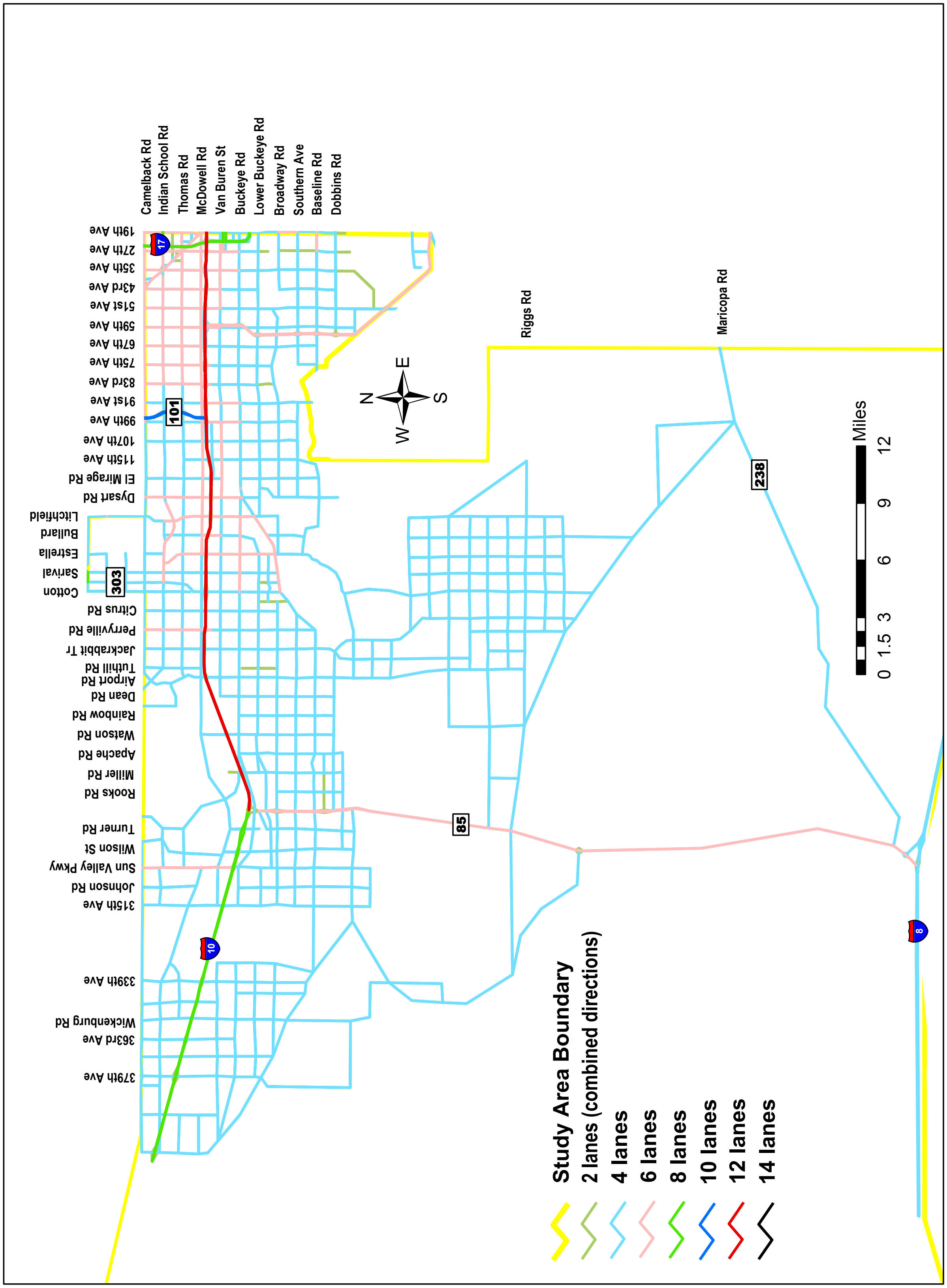


Figure 5-18
Number of Lanes in Option A Network

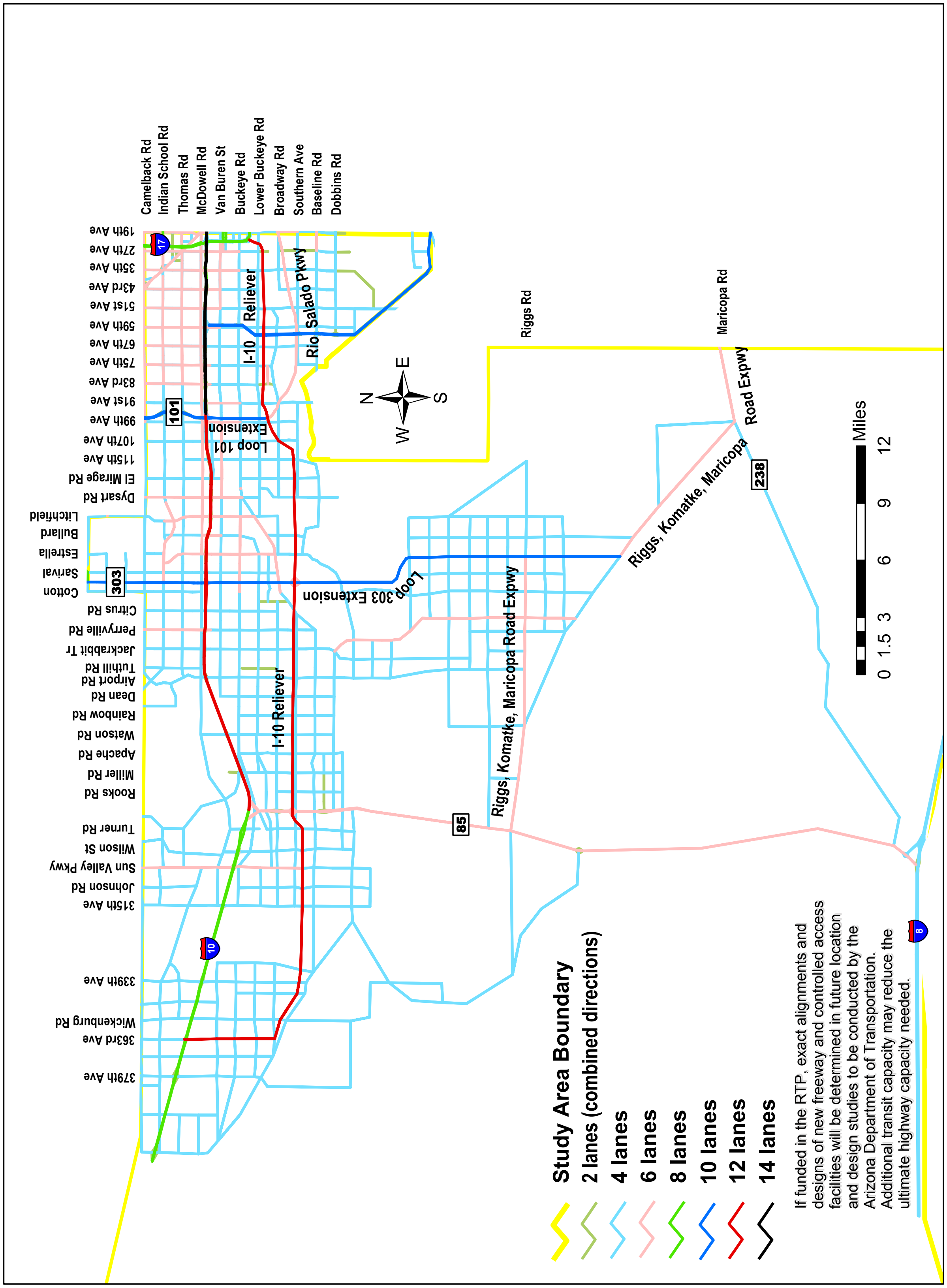
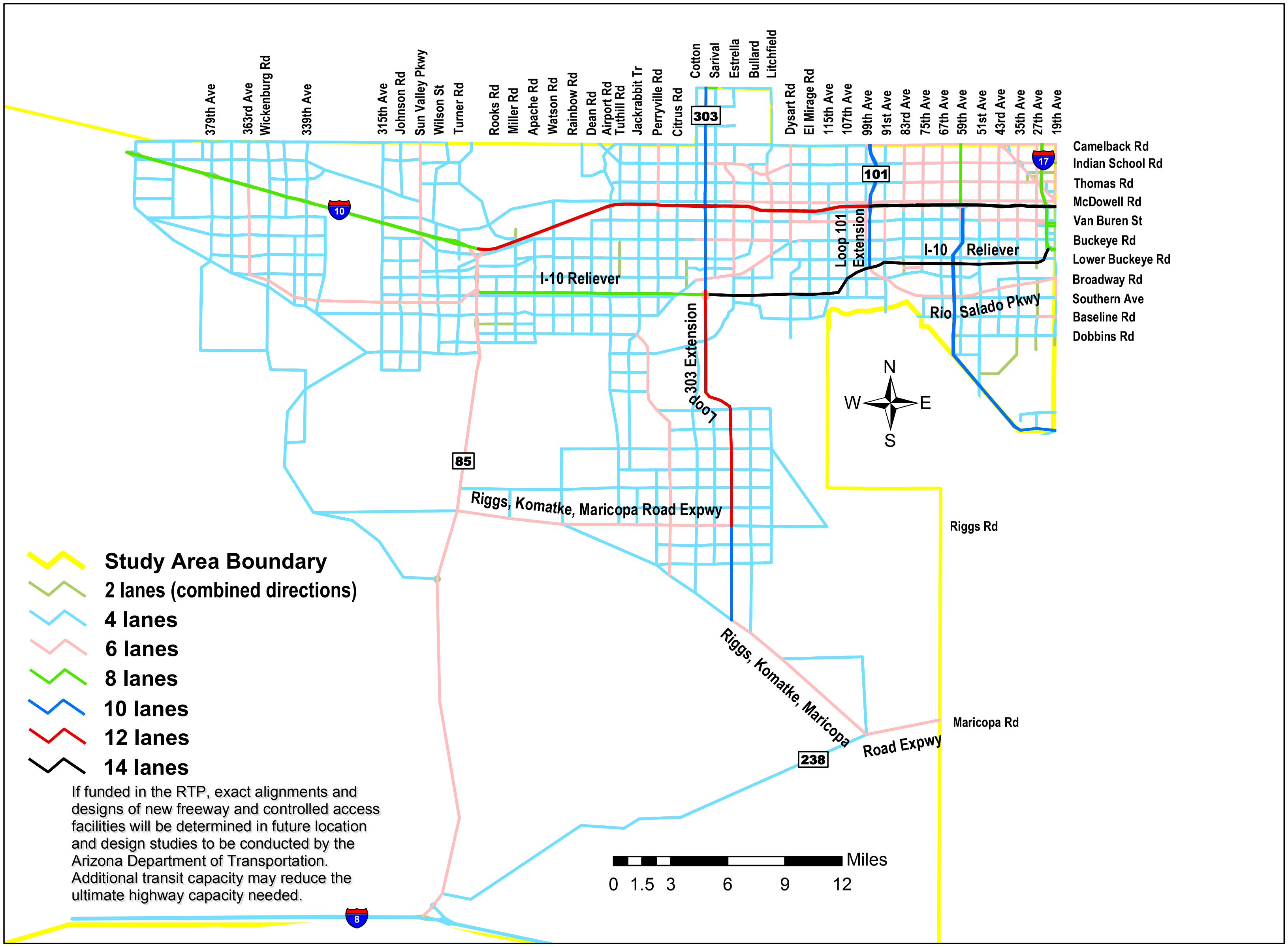


Figure 5-19
Number of Lanes in Option C Network



Study Area Boundary
2 lanes (combined directions)
4 lanes
6 lanes
8 lanes
10 lanes
12 lanes
14 lanes

If funded in the RTP, exact alignments and designs of new freeway and controlled access facilities will be determined in future location and design studies to be conducted by the Arizona Department of Transportation. Additional transit capacity may reduce the ultimate highway capacity needed.

5.4.3 Capacity Miles

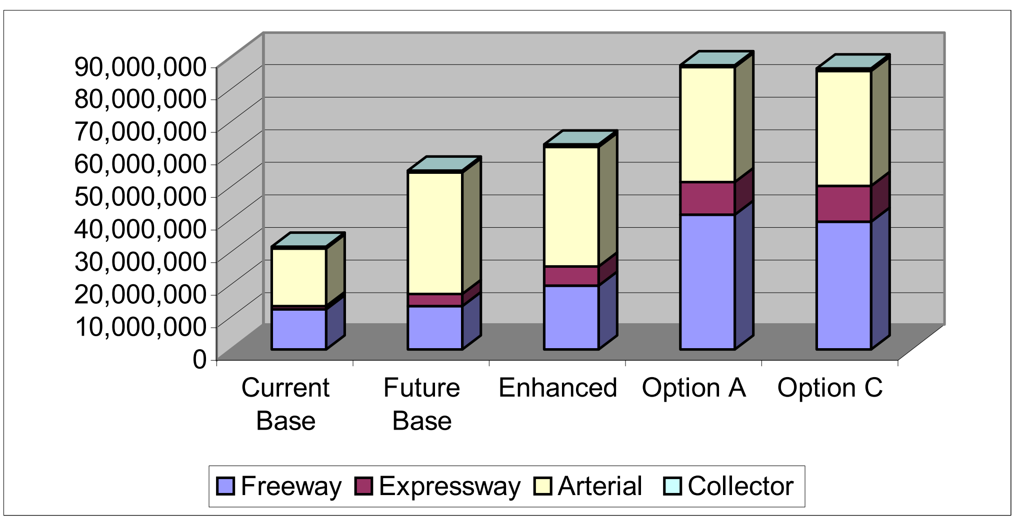
Using a daily capacity of 21,000 vehicles per lane for freeways and expressways and a daily capacity of 8,000 for arterials and collectors, capacity miles in the study area were calculated for each functional class. Capacity miles are a measure of the total amount of daily highway capacity in the study area. Because capacity miles are largely a function of lane miles, a comparison of the networks reveals similar observations to the observations about changes in lane miles themselves.

Figure 5-20 (and Table 5A-3 in Appendix V) presents the capacity miles for the highways represented in the Current Base, Future Base, Enhanced, Option A, and Option C models of the highway network. The figure shows that capacity miles nearly double in the Future Base network as compared to the Current Base. There are increases in each of the functional classes. The largest increase is in the arterial class with an additional 20 million capacity miles. There is an increase of 3.7 million capacity miles of expressways and freeways, including general purpose and HOV lanes.

The Enhanced network adds an additional 8 million capacity miles over the Future Base. Over 6 million capacity miles of freeway capacity are added along with about 2 million of expressway capacity.

Compared to the Enhanced network, Option A more than doubles freeway capacity miles and nearly doubles expressway capacity miles. Option C reduces freeway capacity miles by about 2 million compared to Option A, but increases expressway capacity miles by about 1 million.

Figure 5-20
Capacity Miles



5.5 Operating Characteristics of Options

This section provides some comparisons of the operating characteristics of the networks. Vehicle miles of travel and congestion expected on the networks in the years 2020 and 2030 are presented and compared. This section is restricted to operating characteristics of the SWATS highway system as a whole. Data specific to individual facilities are presented in subsequent Sections 5.7 through 5.10. This section is largely descriptive. Conclusions based on this descriptive information are reached and presented in the following summary section.

5.5.1 Vehicle Miles of Travel

Vehicle miles of travel (VMT) in the SWATS area are expected to nearly triple between 2002 and 2020, from about 14 to 40 million miles every weekday. Figure 5-21 (and Table 5A-4 in Appendix V) shows that VMT under the Future Base and Enhanced networks is similar, with 3 million miles more travel on freeways in the Enhanced network than in the Future Base network (including travel on both general purpose and HOV lanes). This is consistent with the greater presence of freeway lane miles in the Enhanced network as shown in Figure 5-14.

Under Option A and Option C VMT in 2020 is expected to be 15 to 20% greater than under the Future Base and Enhanced networks. Total VMT is about 6-7 million greater under Option A and Option C and freeway VMT is 12-16 million greater. This is largely explained by the substantially greater availability of freeway capacity in Option A and Option C than in the Future Base and Enhanced networks as shown in see Figure 5-20.

By 2030 VMT is expected to quadruple under the Future Base and Enhanced networks, and nearly quintuple under Option A and Option C. Figure 5-22 (and Table 5A-5 in Appendix V) again shows that VMT under the Future Base and Enhanced networks is similar, with 4 million miles more travel on freeways in the Enhanced network than in the Future Base network.

Under Option A and Option C VMT in 2030 is expected to be 20 to 25% greater than under the Future Base and Enhanced networks. As observed above, this is largely explained by the substantially greater availability of freeway capacity in Option A and Option C than in the Future Base and Enhanced networks as shown in Figure 5-20. While VMT is about 12 million greater under Option A and Option C, freeway VMT is about 22 million greater.

Peak hour VMT is expected to follow very similar patterns. Travel in the evening peak hour will triple by 2020 (see Figure 5-23 and Table 5A-6 in Appendix V) and quadruple to quintuple by 2030 (see Figure 5-24 and Table 5A-7 in Appendix V). The figures show that larger amounts of travel are expected under Option A and Option C than under the Future Base and Enhanced networks, consistent with the observations above for daily travel. Similarly, Option A and Option C have substantially larger amounts of travel on freeways than the Future Base and Enhanced networks.

Figure 5-21
Weekday Vehicle Miles of Travel in Year 2020

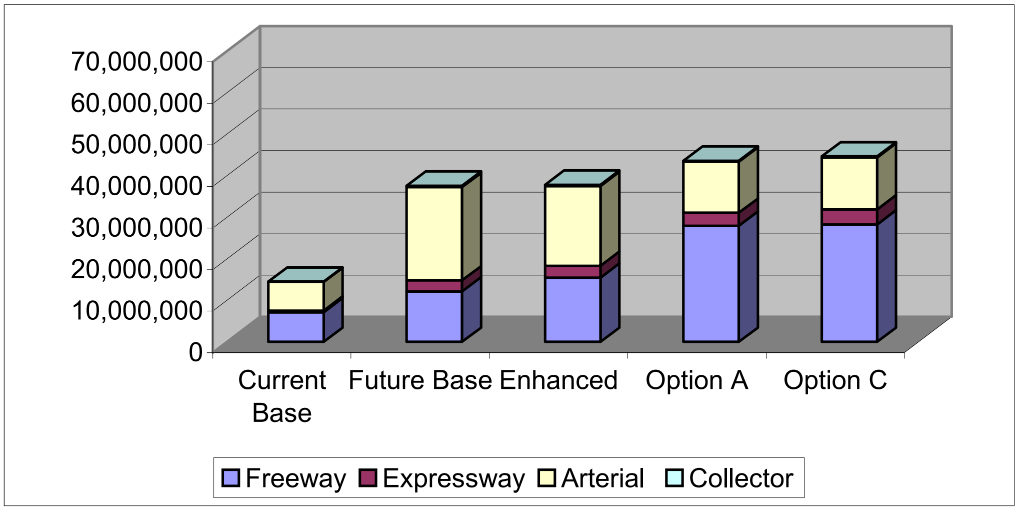


Figure 5-22
Weekday Vehicle Miles of Travel in Year 2030

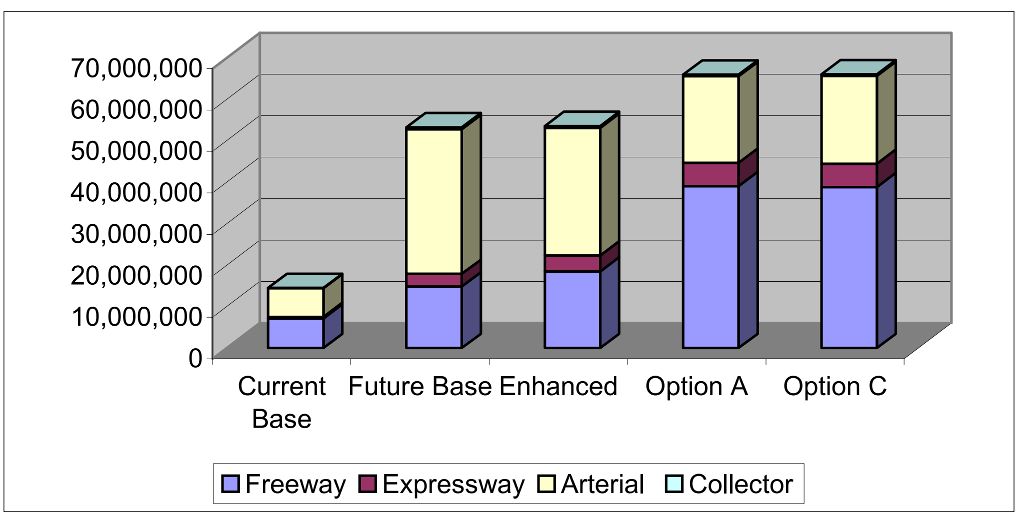


Figure 5-23
Peak Hour Vehicle Miles of Travel in Year 2020

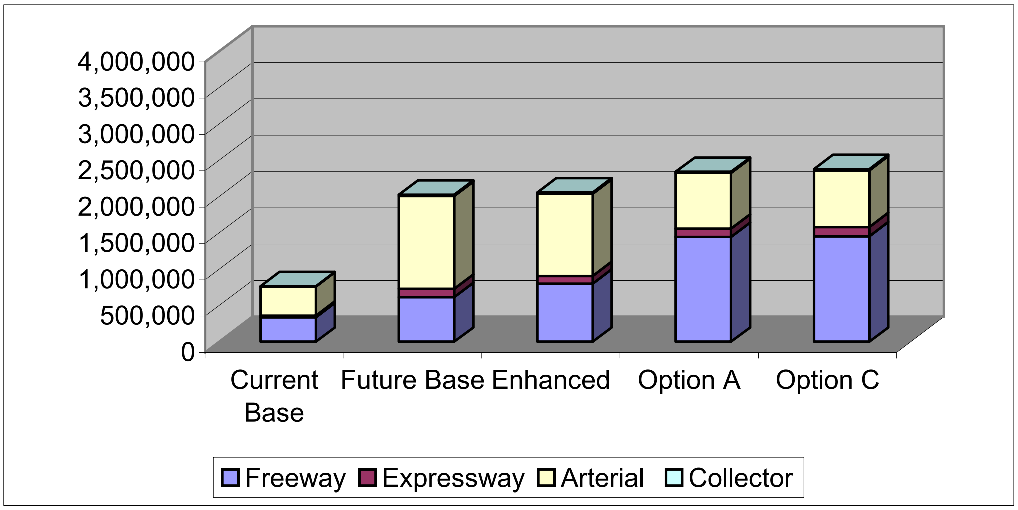
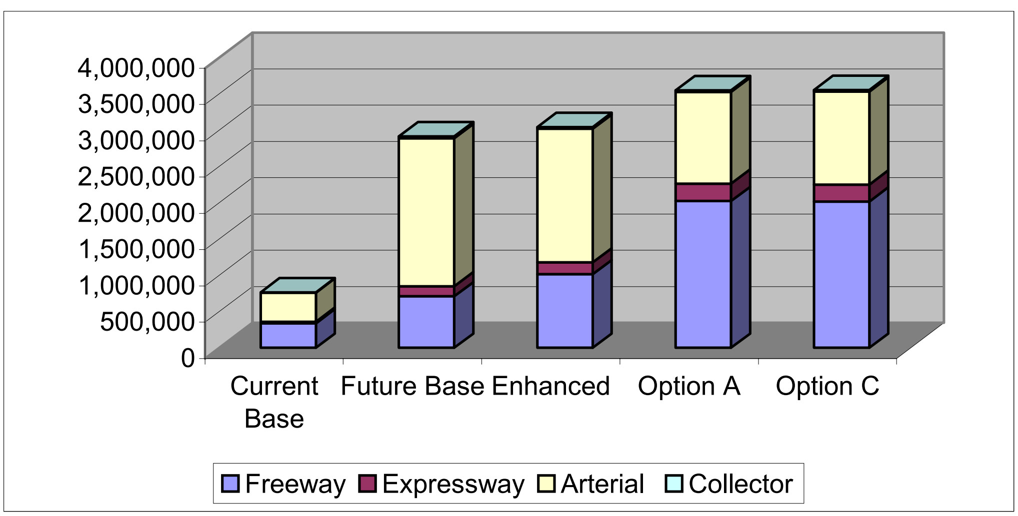


Figure 5-24
Peak Hour Vehicle Miles of Travel in Year 2030



5.5.2 Truck Vehicle Miles of Travel

Goods movement, as measured by truck travel, is expected to increase substantially in the future. Figure 5-25 (and Table 5A-8 in Appendix V) shows that daily truck VMT increases by about 6 million from 2002 to 2020 under the Future Base and Enhanced networks. The arterials in the Future Base and Enhanced networks carry slightly more truck travel than their freeways. With the additional freeways under the Option A and Option C networks (see Figure 5-14), an additional million miles of daily truck travel occurs and there is a substantial shift in that travel to the freeways. Under the Option A and Option C networks, nearly three times as much truck travel occurs on freeways as on arterials.

Figure 5-26 (and Table 5A-9 in Appendix V) shows that daily truck VMT is about 13 million in 2030 under the Future Base and Enhanced networks and 16 million under the Option A and Option C networks. This is 9-12 million more daily truck VMT than currently occurs. As under the 2020 forecasts, the 2030 forecasts for the Future Base and Enhanced networks show more truck travel on the arterial system than on the freeways, but a substantial change in this with the expansion of the freeway system under the Option A and Option C networks.

Figures 5-27 through 5-31 show the daily truck volumes for the Current Base network and the Future Base, Enhanced, Option A, and Option C networks in 2030. The 2020 truck volumes for these networks are shown on Figures 5-32 through 5-35, respectively.

Figure 5-25
Weekday Vehicle Miles of Truck Travel in Year 2020

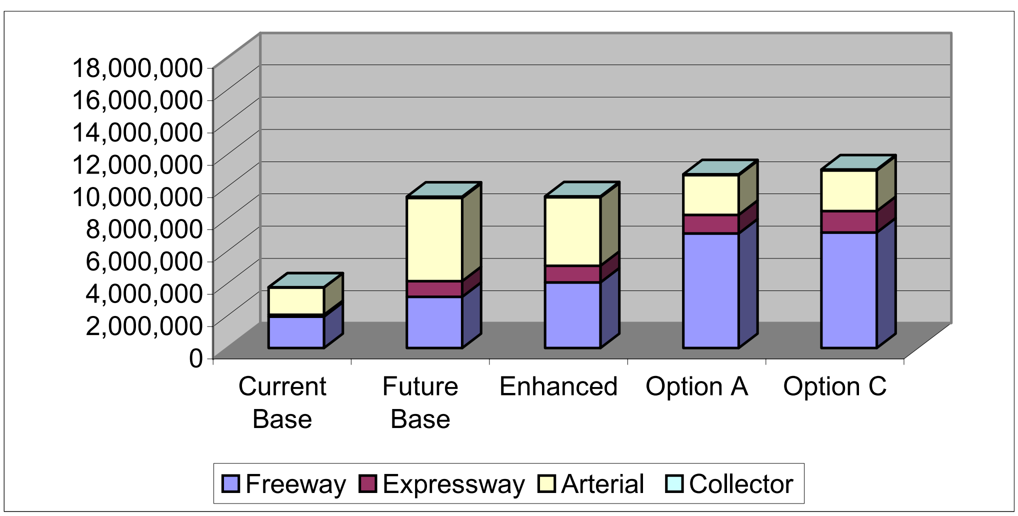


Figure 5-26
Weekday Vehicle Miles of Truck Travel in Year 2030

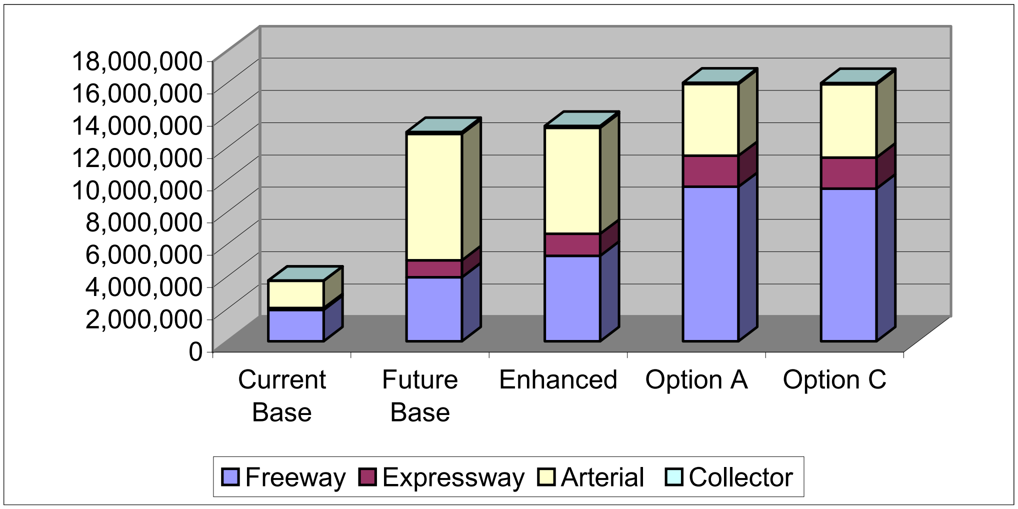


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Figure 5-27
Daily Truck Volumes: Current Base Network 2002

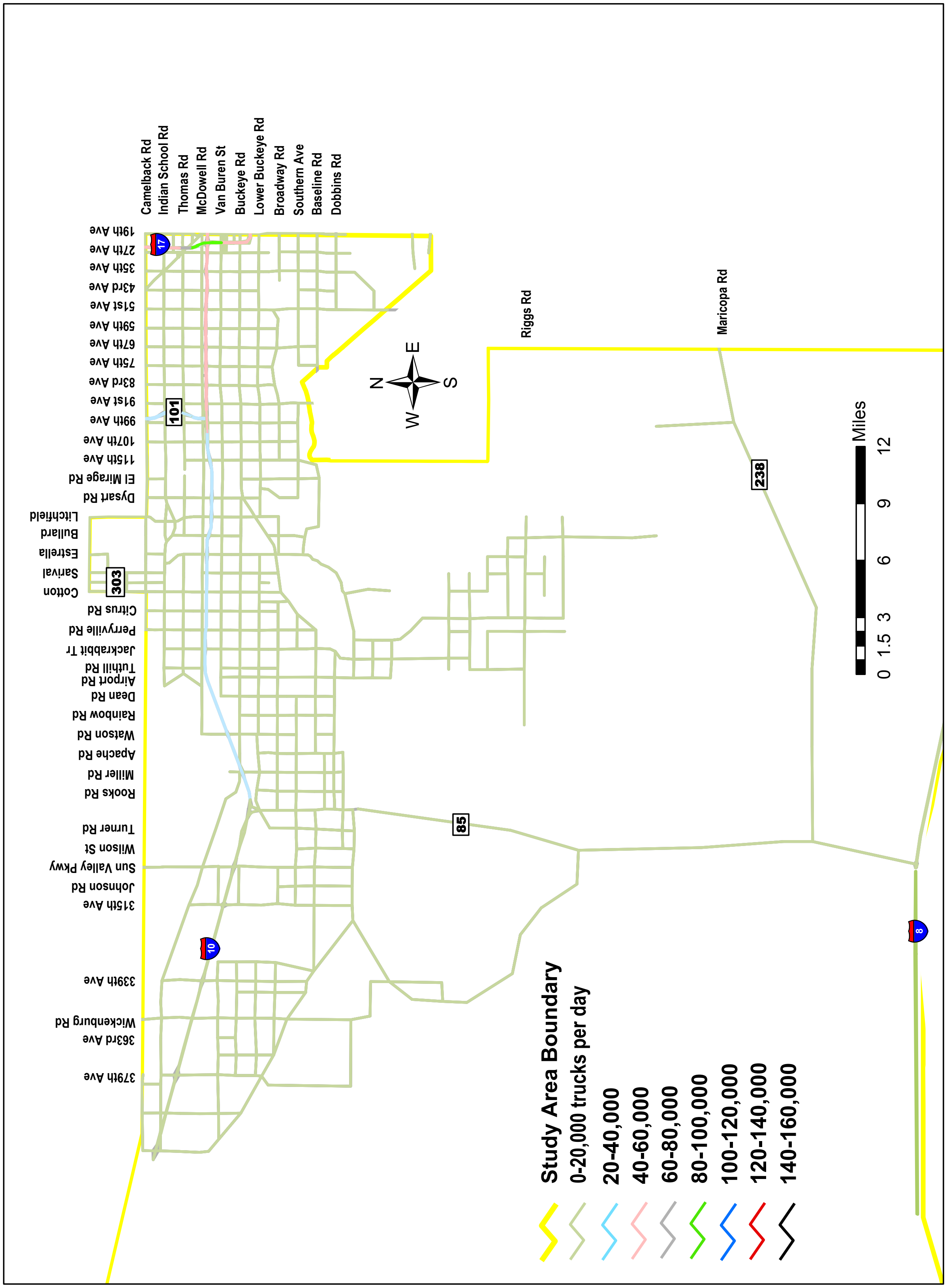

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Figure 5-28
Daily Truck Volumes: LRTP 2030

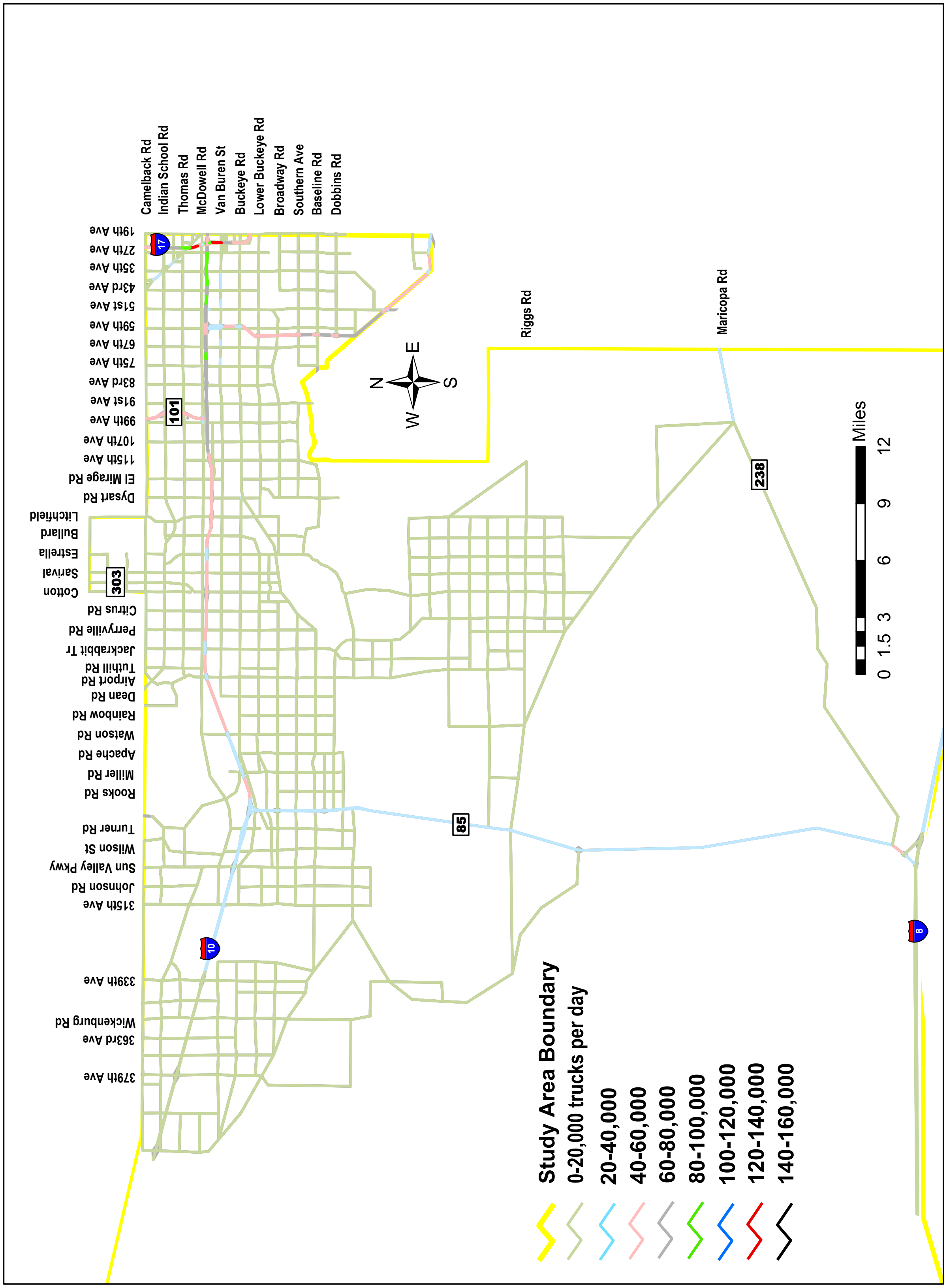

Figure 5-29
Daily Truck Volumes: Enhanced Network 2030

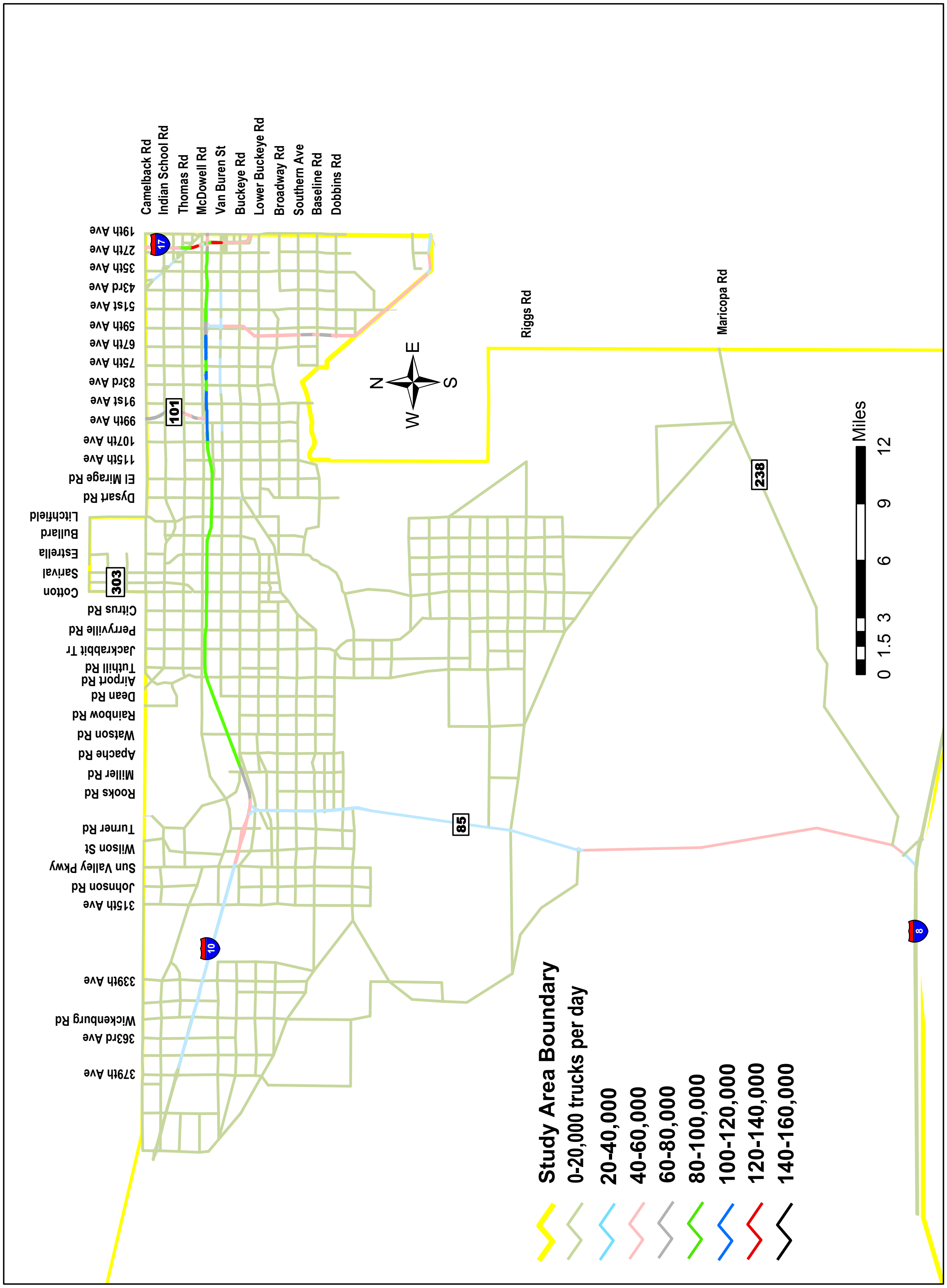

Figure 5-30
Daily Truck Volumes: Option A Network 2030

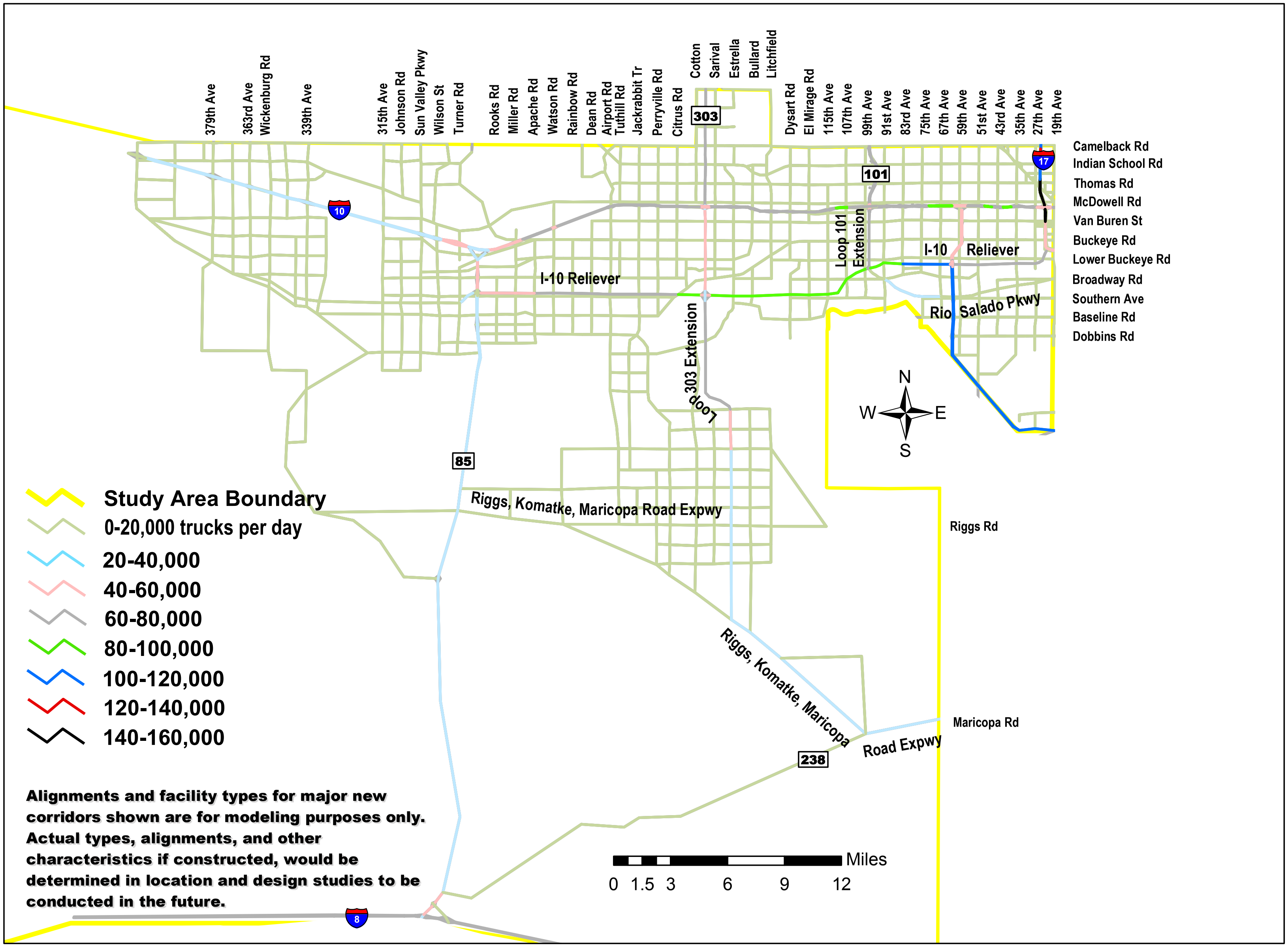

Figure 5-31
Daily Truck Volumes: Option C Network 2030

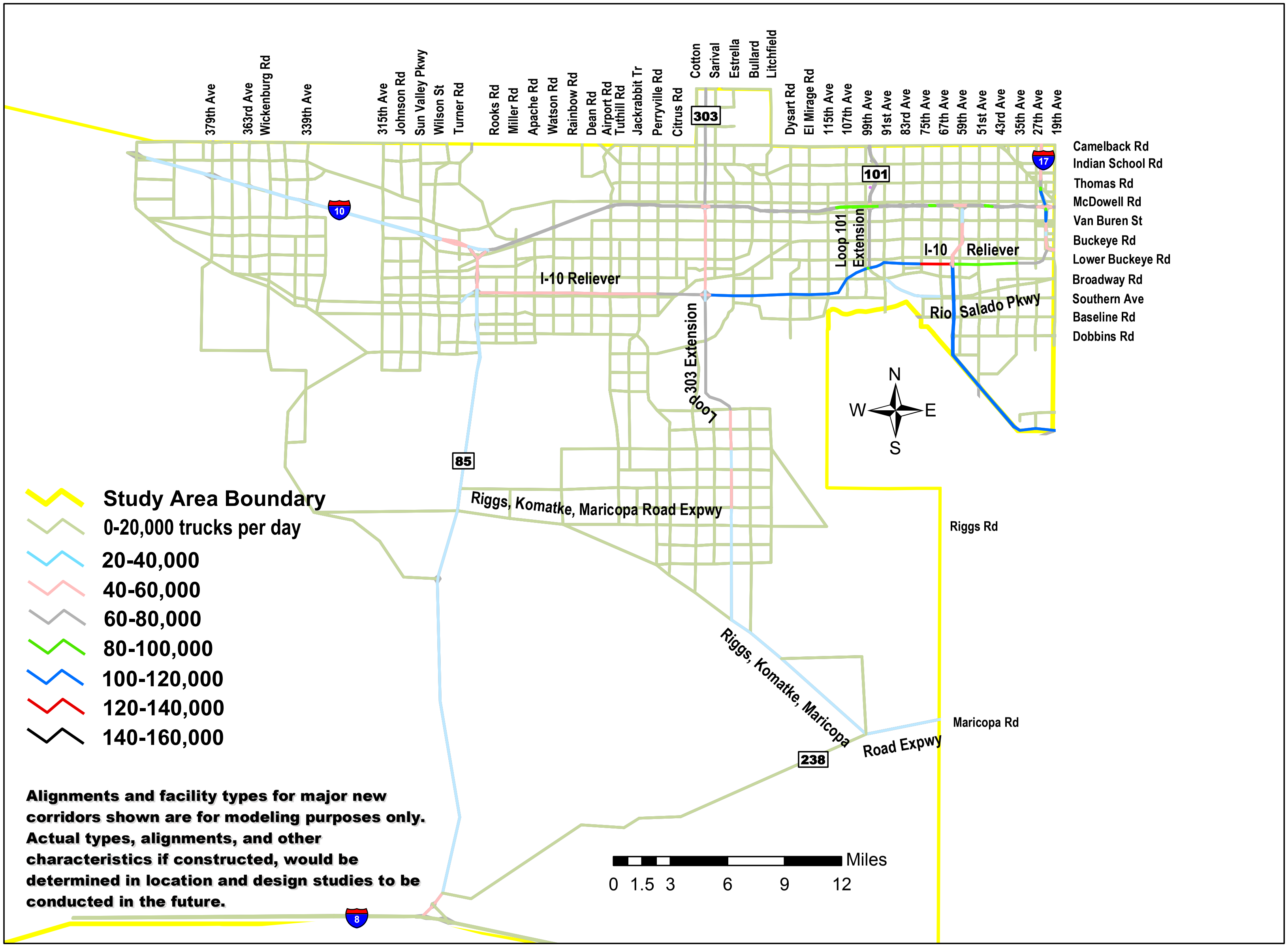

Figure 5-32
Daily Truck Volumes: LRTP 2020

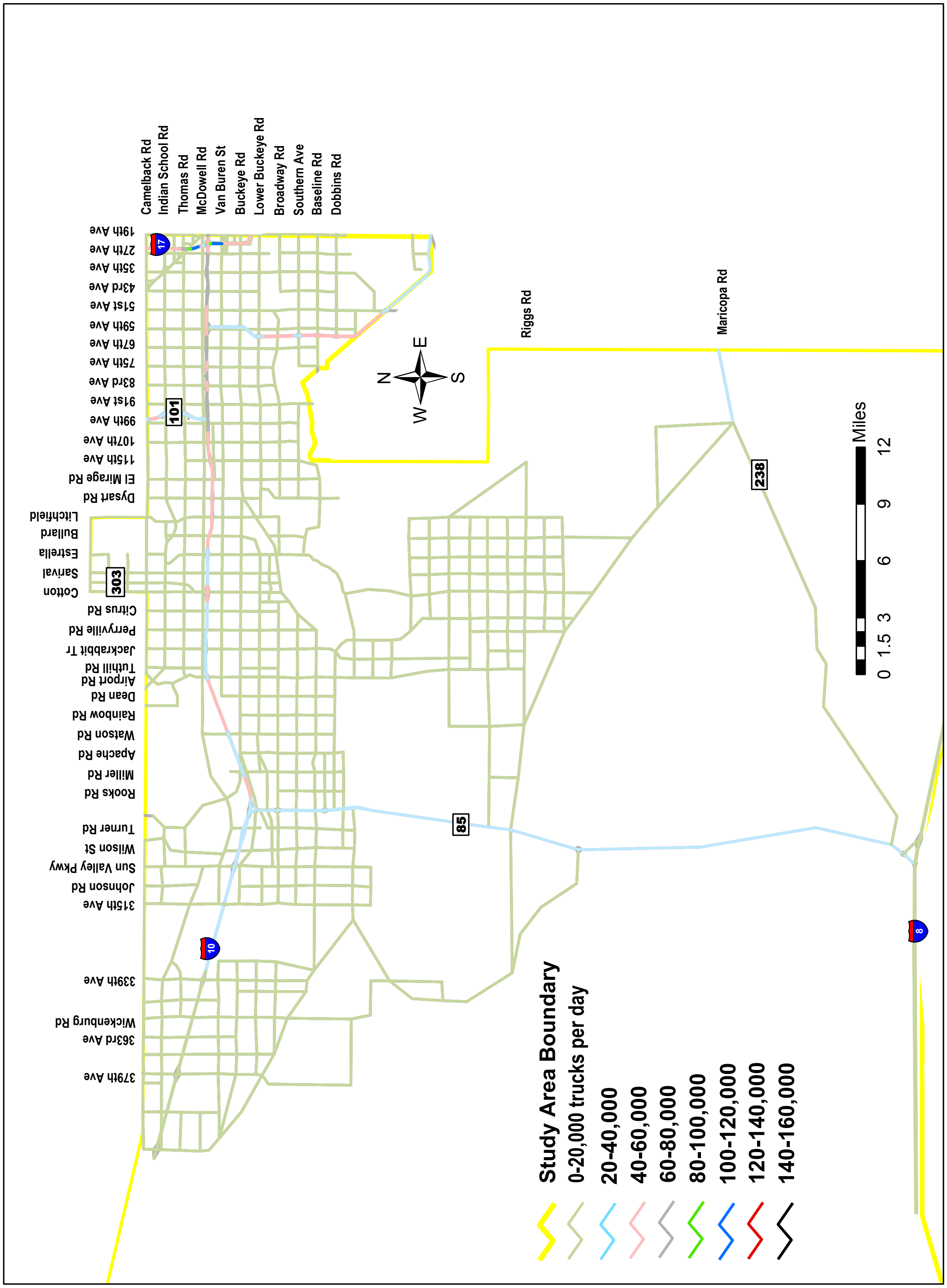

Figure 5-33
Daily Truck Volumes: Enhanced Network 2020

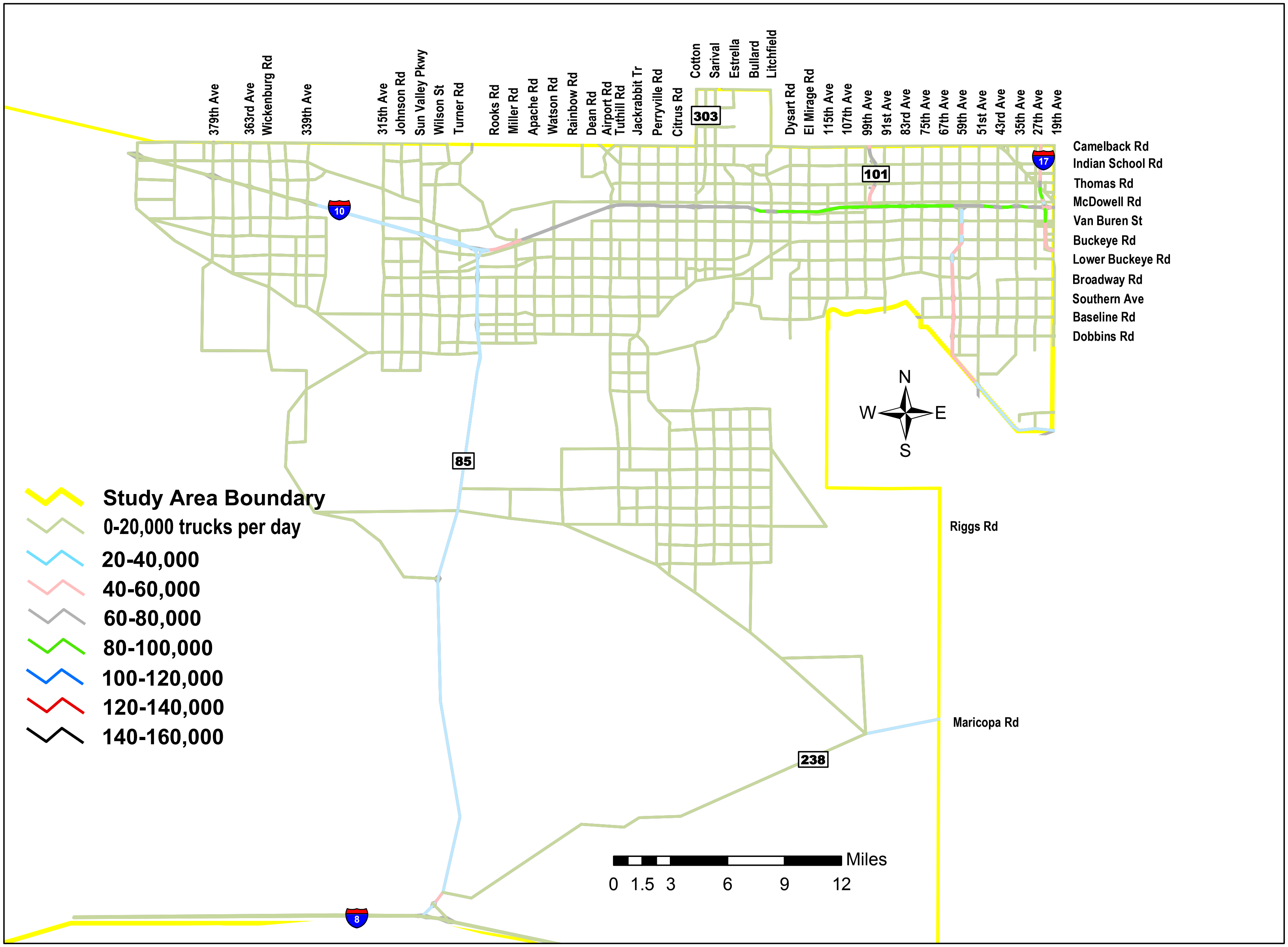

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Figure 5-34
Daily Truck Volumes: Option A Network 2020

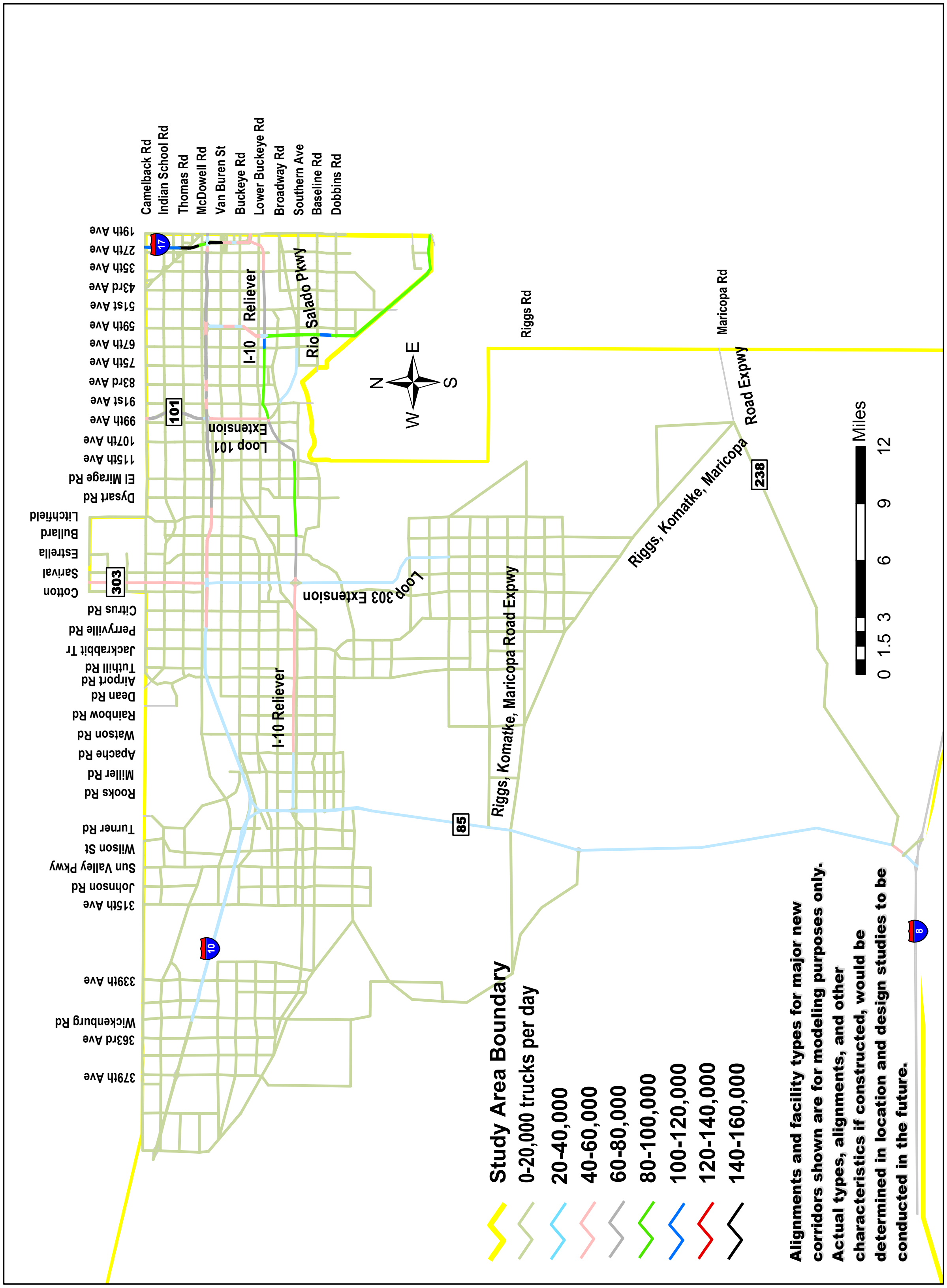
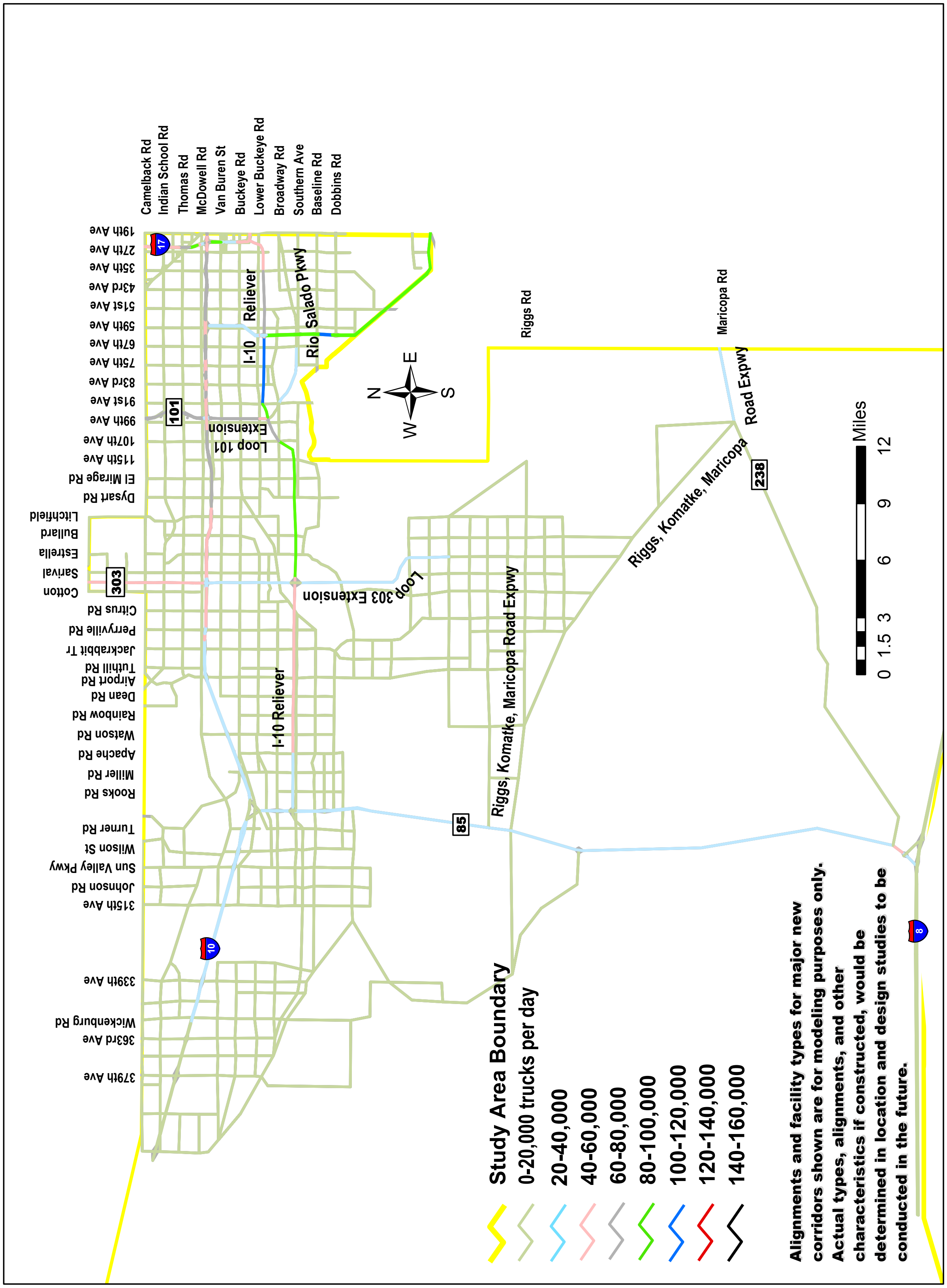


Figure 5-35
Daily Truck Volumes: Option C Network 2030



5.5.3 Congestion and Level-of-Service

Several measures of congestion or level-of-service are available to compare the expected performance of each of the potential future networks. These include the number of miles of roadway expected to be congested during the evening peak hour, the amount of peak hour travel expected to occur on congested roadways, and the number of intersections expected to be congested. To assist in the understanding of these congestion measures, Figures 5-36 through 5-45 show the traffic volumes for the Current Base network and for the Future Base, Enhanced, Option A, and Option C networks in 2030. The 2020 volumes for these networks are shown on Figures 5-46 through 5-53, respectively.

5.5.3.1 Peak Hour VMT under Congested Conditions

The amount of roadway travel in the peak hour under congested conditions is an indicator of the performance of the highway system. Level-of-service (LOS) E and F are indicative of traffic conditions in which there are unacceptable levels of delay due to congestion. Speeds are reduced and may include periods in which motorists are completely stopped or traveling at very slow speeds. In this analysis LOS E and F are defined as forecast traffic volumes in the evening peak hour exceeding 90% of roadway capacity.

Figure 5-54 (and Table 5A-10 in Appendix V) shows that about 90,000 miles of evening peak hour travel in the SWATS area is estimated to currently occur under congested conditions. This is about 12% of peak hour travel in the study area, as shown in Figure 5-55 (and Table 5A-11 in Appendix V).

Under the Future Base network in 2020, 0.56 million miles of evening peak hour travel (28%) is expected to occur under congested conditions in the SWATS area. By 2030 this triples to 1.55 million miles of peak hour travel (53%). (See Figures 5-56 and 5-57 and, in Appendix V, Tables 5A-12 and 5A-13.)

Under the Enhanced network, with its addition of 350 lane miles of highways, 0.33 million miles of 2020 peak hour travel (16%) is forecast to occur under congested conditions. By 2030 this rises to 1.26 million or 41% of all peak hour vehicle miles of travel in the evening peak hour.

Through its addition of over 1000 lane miles of highway in the SWATS area (compared to the Enhanced network), the Option A network reduces the forecast amount of peak hour travel in congestion to under 100,000 vehicle miles, or only 4% of total vehicle miles of travel in 2020. This represents a substantially lower percent of travel under congested conditions than is currently estimated to exist under the Current Base (12%). However, by 2030 the amount of peak hour travel in congestion increases to 0.63 million vehicle miles under Option A, or about 18% of all peak hour travel.

The Option C network (with the reduction of about 100 lane miles compared to the Option A network) is forecast to have 6% of travel under congested conditions in 2020. This increases to 17% in 2030. The slightly lower percent in 2030 for Option C compared to Option A is due to targeting lane miles of freeway under Option C to areas congested under Option A, such as the I-10 Reliever east of Loop 303.

Figure 5-36
Freeway Daily Traffic Volumes: Current Base 2002

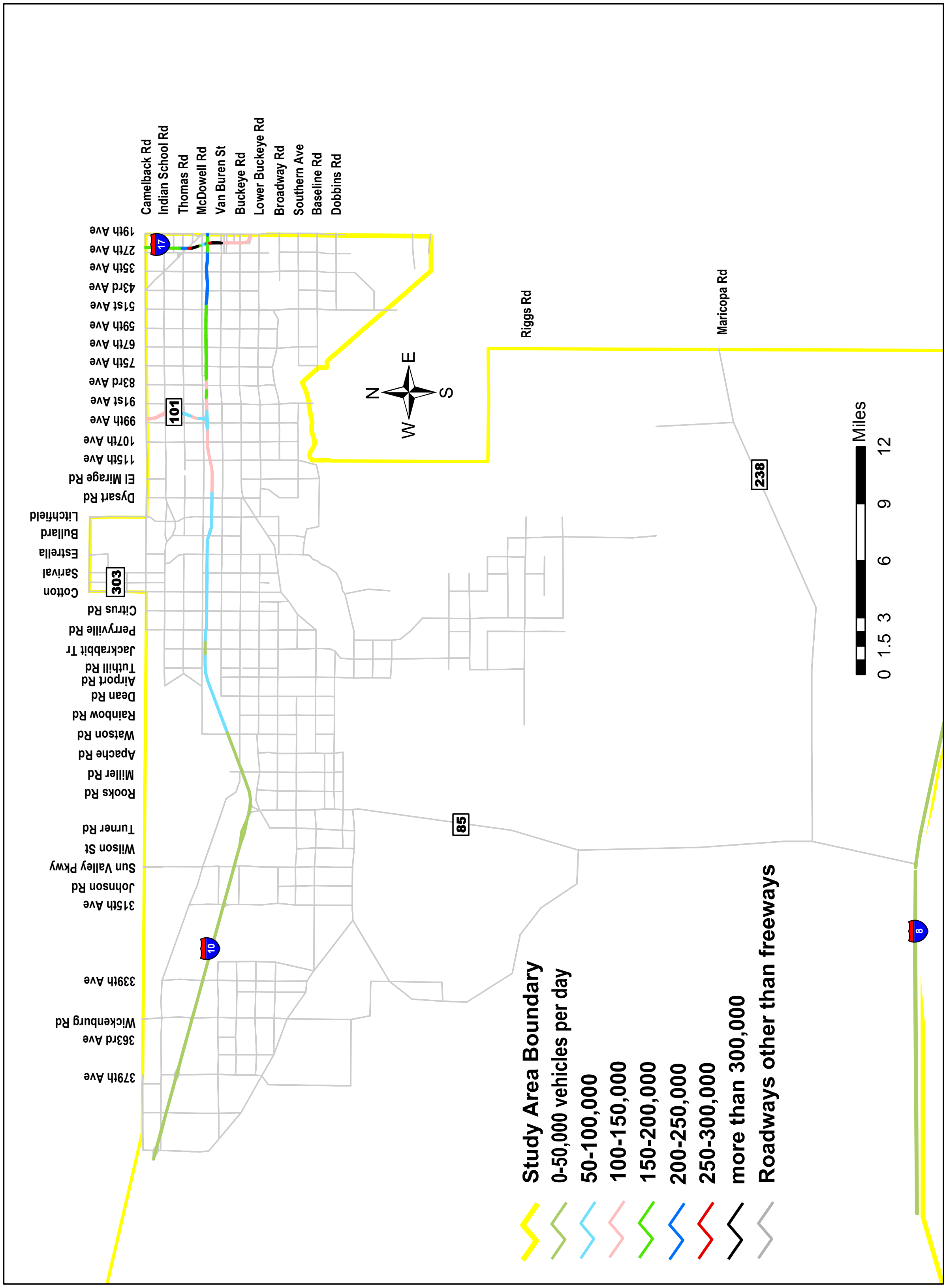


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Figure 5-37
Off-Freeway Daily Traffic Volumes: Current Base 2002

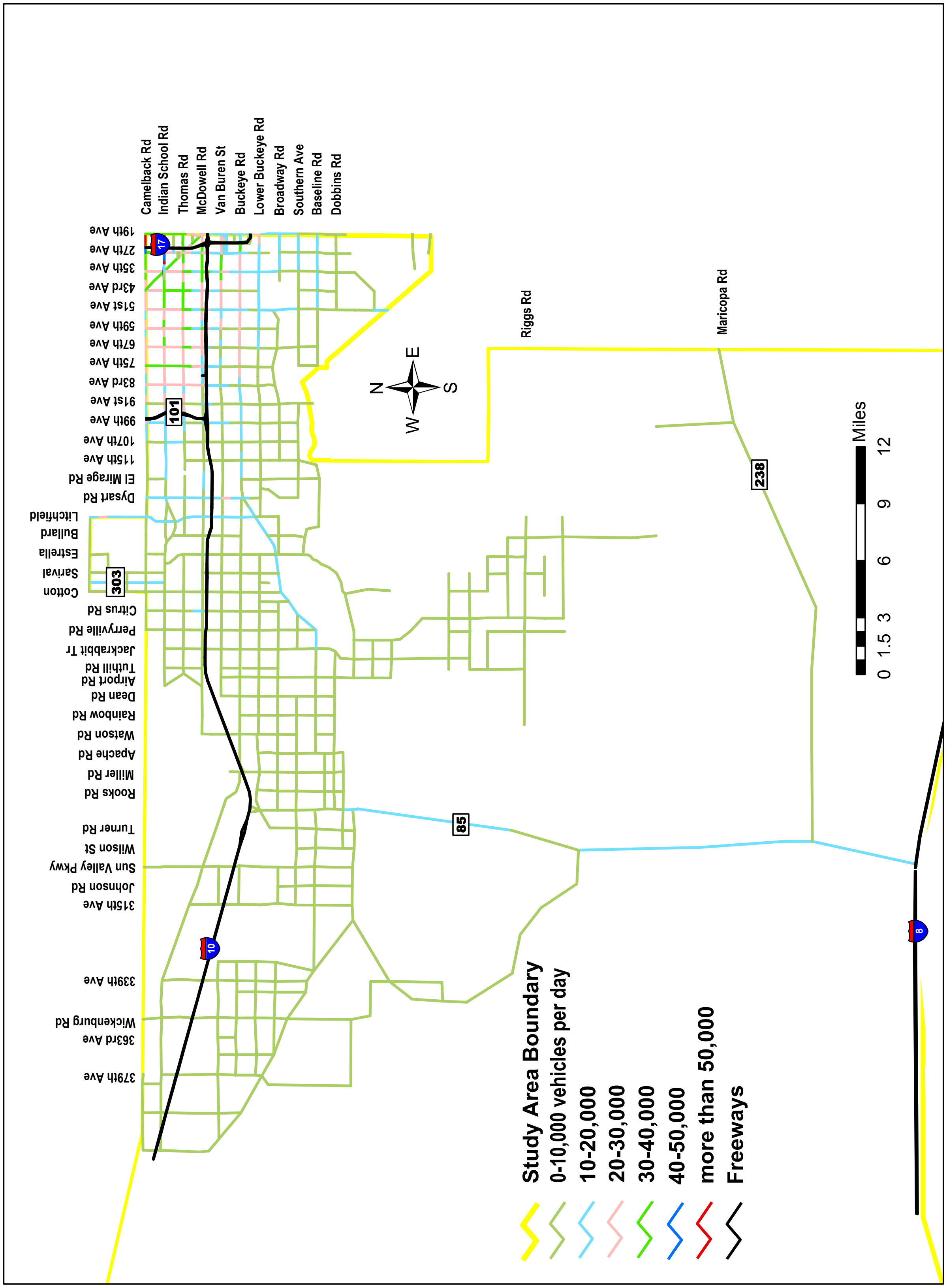

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Figure 5-38
Freeway Daily Traffic Volumes: Future Base 2030

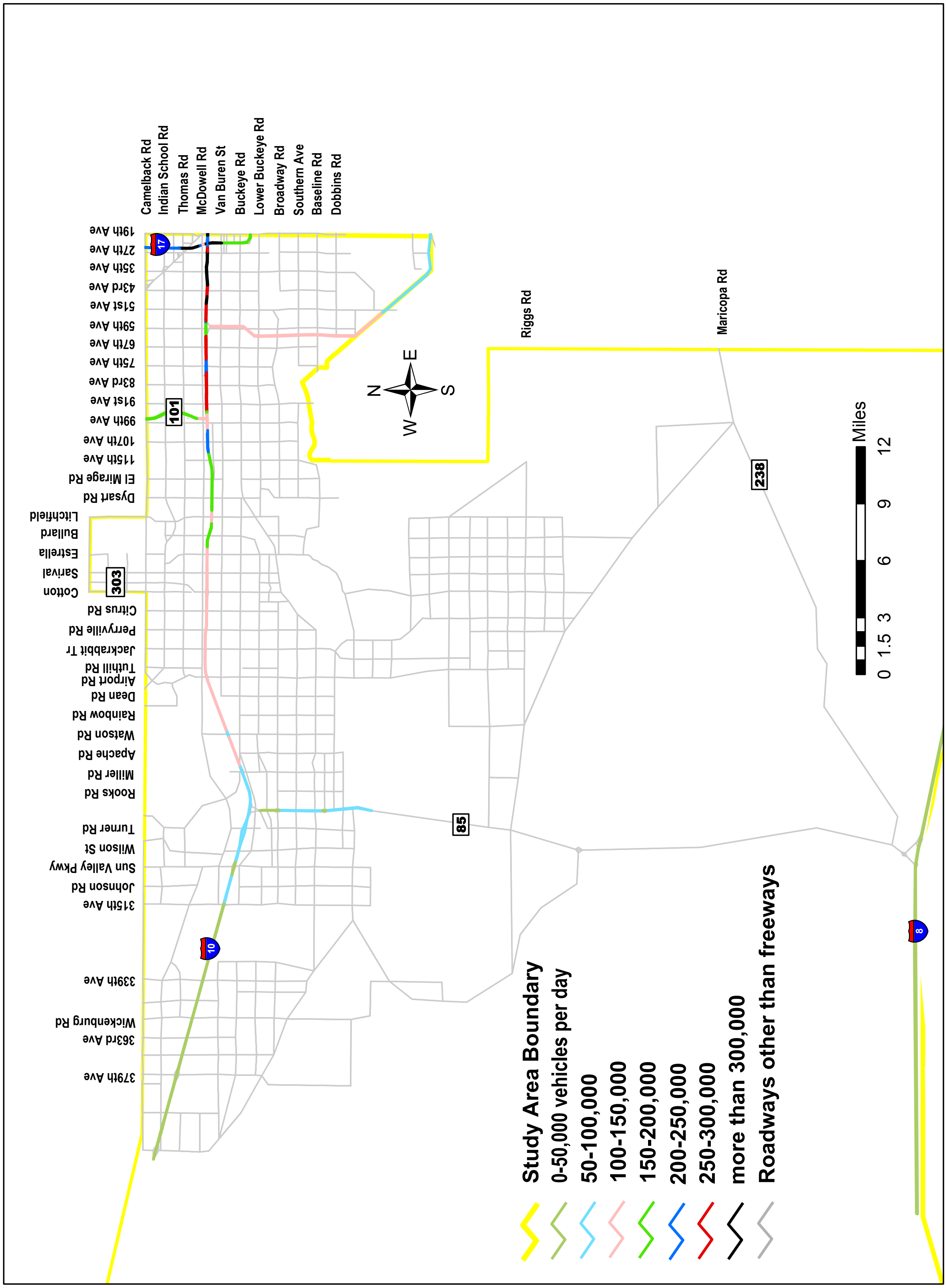

Figure 5-39
Off-Freeway Daily Traffic Volumes: Future Base 2030

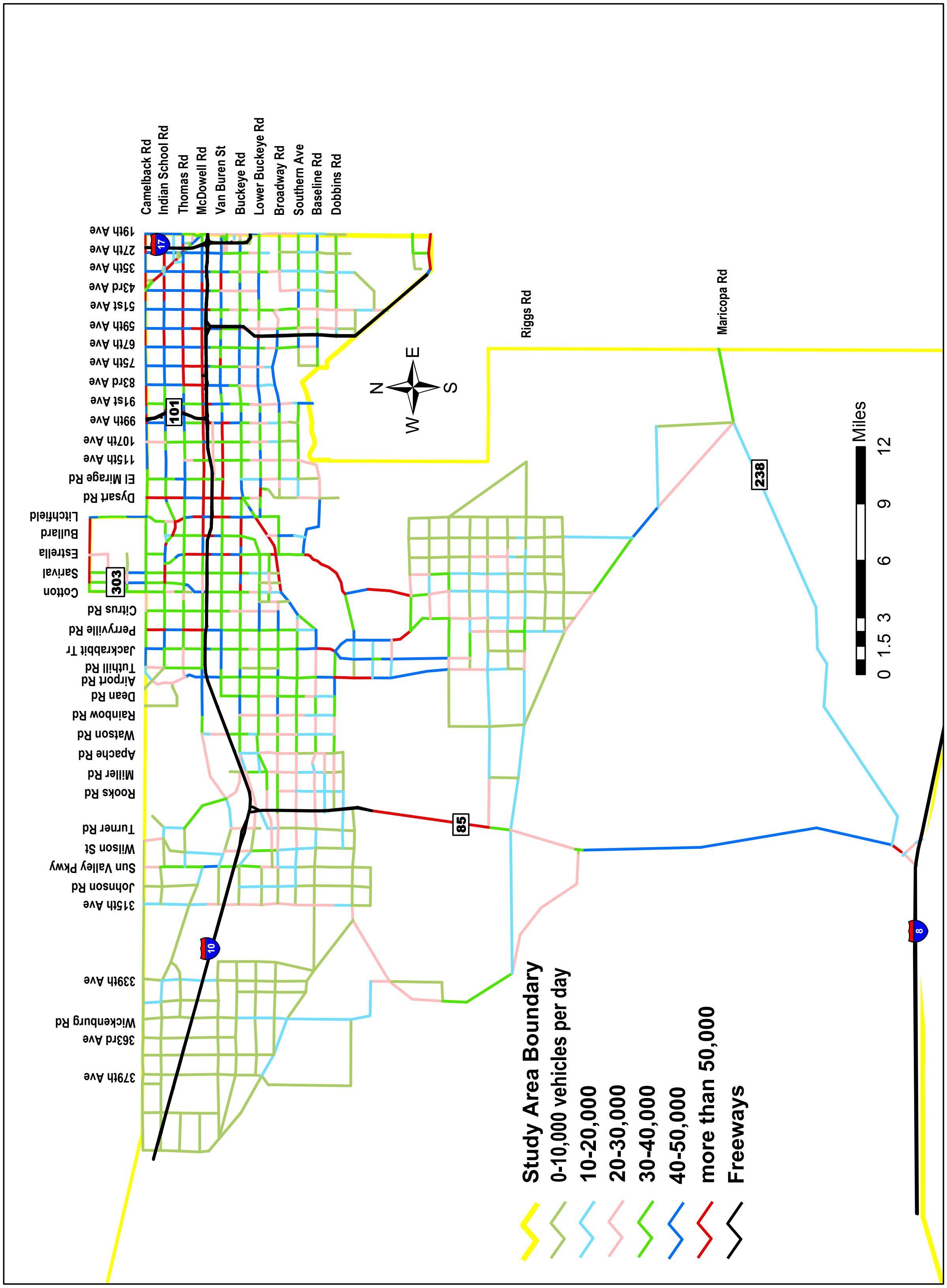

Figure 5-40
Freeway Daily Traffic Volumes: Enhanced 2030

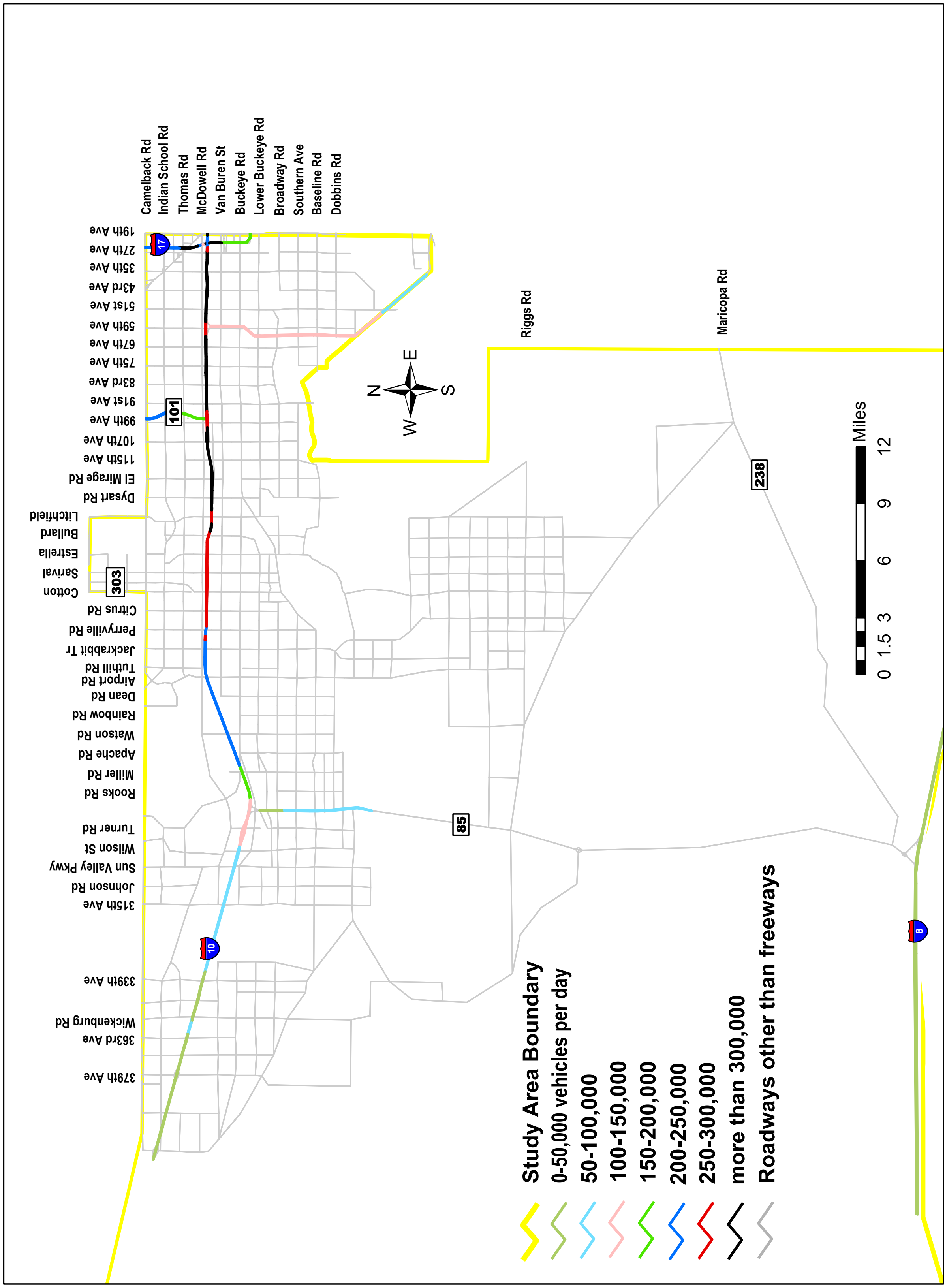

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Figure 5-41
Off-Freeway Daily Traffic Volumes: Enhanced 2030

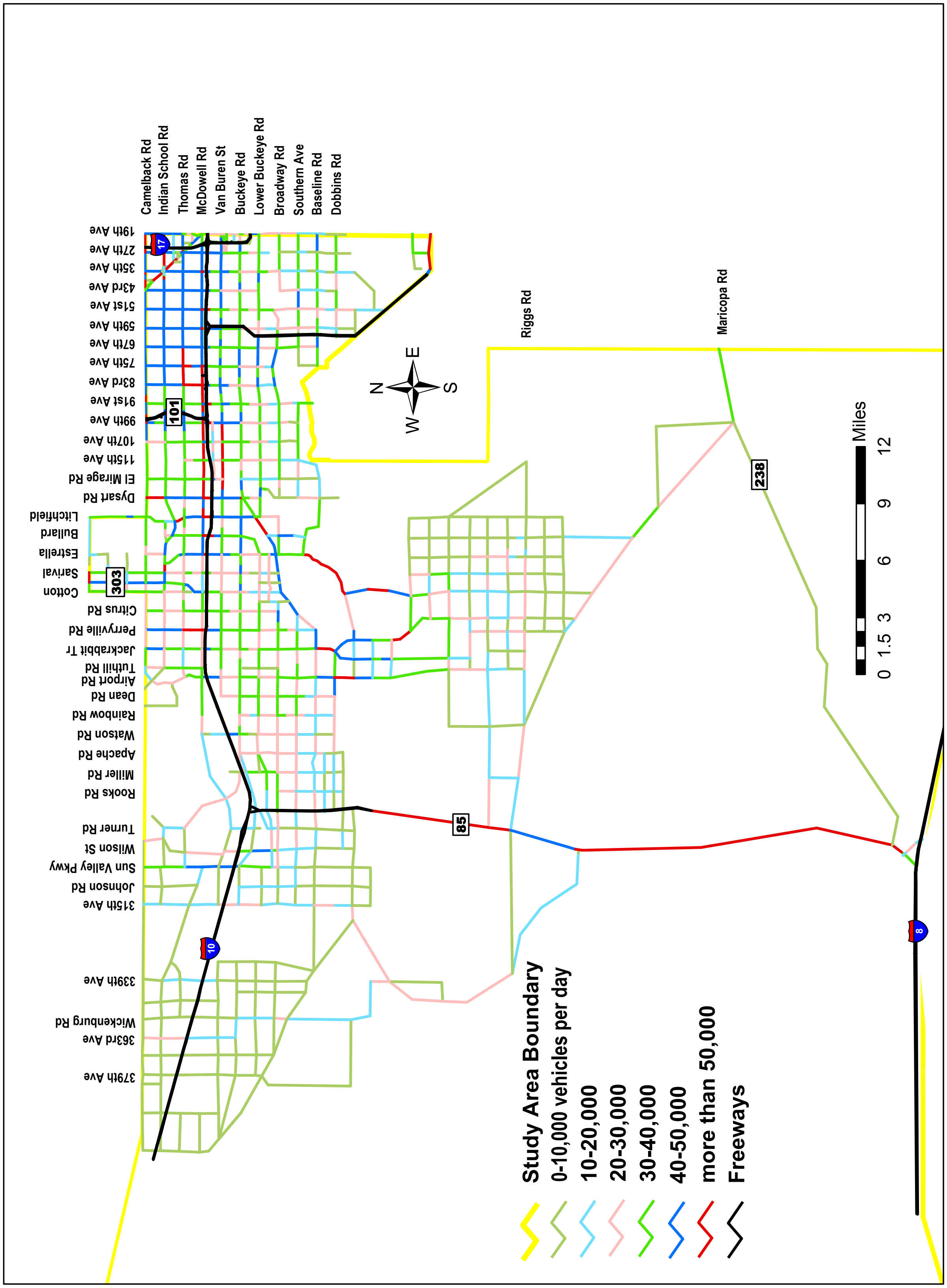

Figure 5-42
Freeway Daily Traffic Volumes: Option A 2030

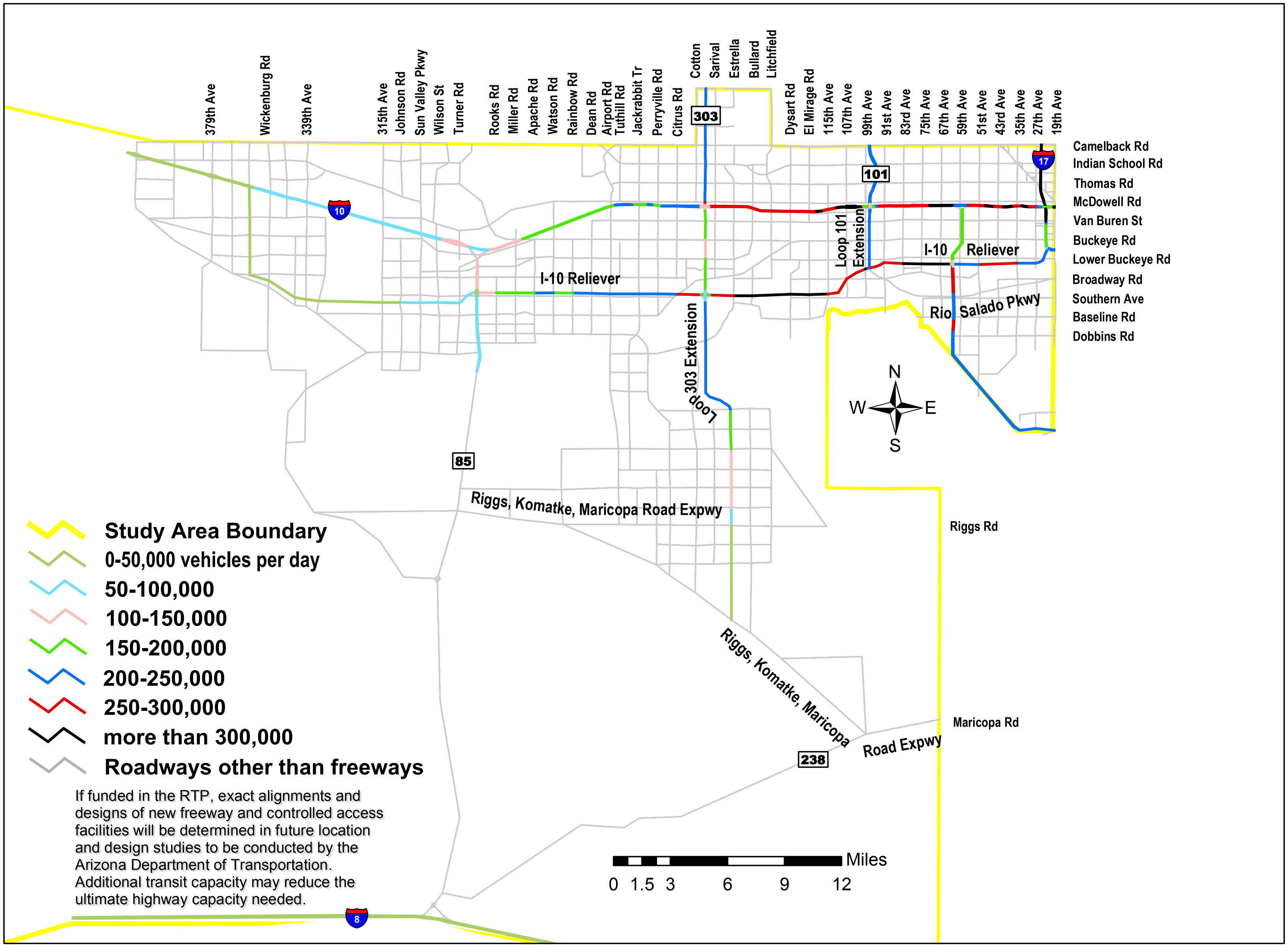

Figure 5-43
Off-Freeway Daily Traffic Volumes: Option A 2030

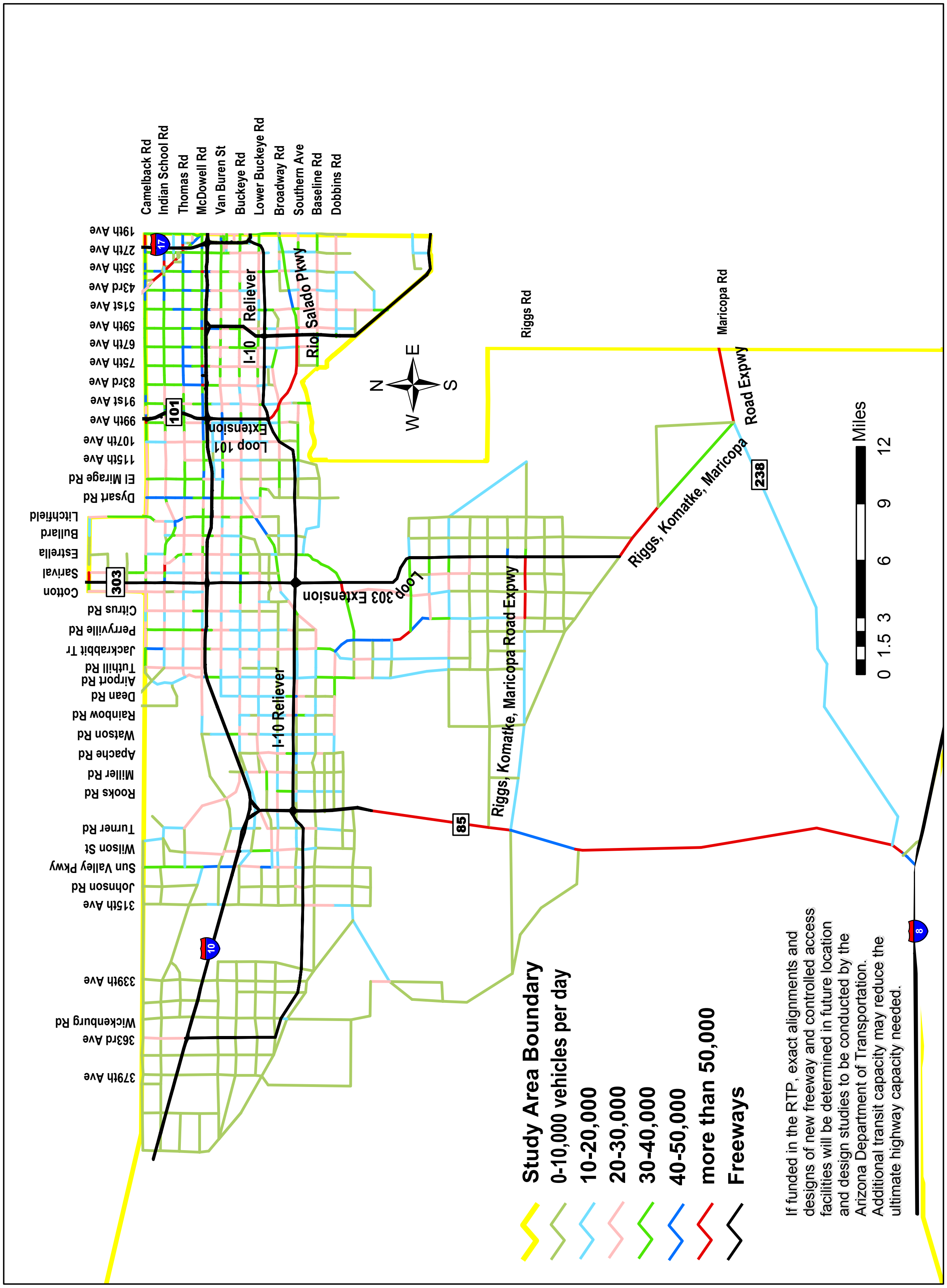

Figure 5-44
Freeway Daily Traffic Volumes: Option C 2030

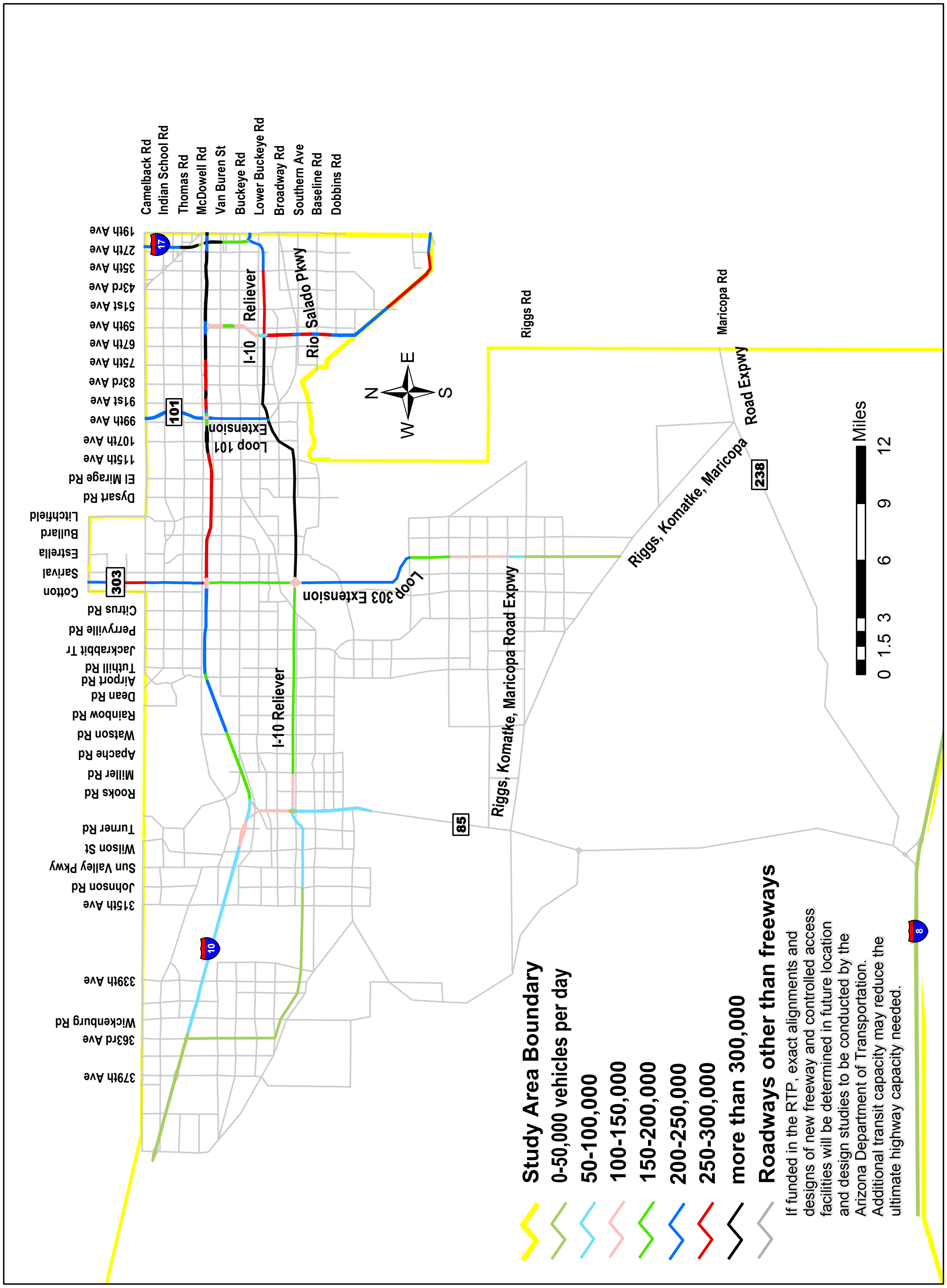

Figure 5-45
Off-Freeway Daily Traffic Volumes: Option C 2030

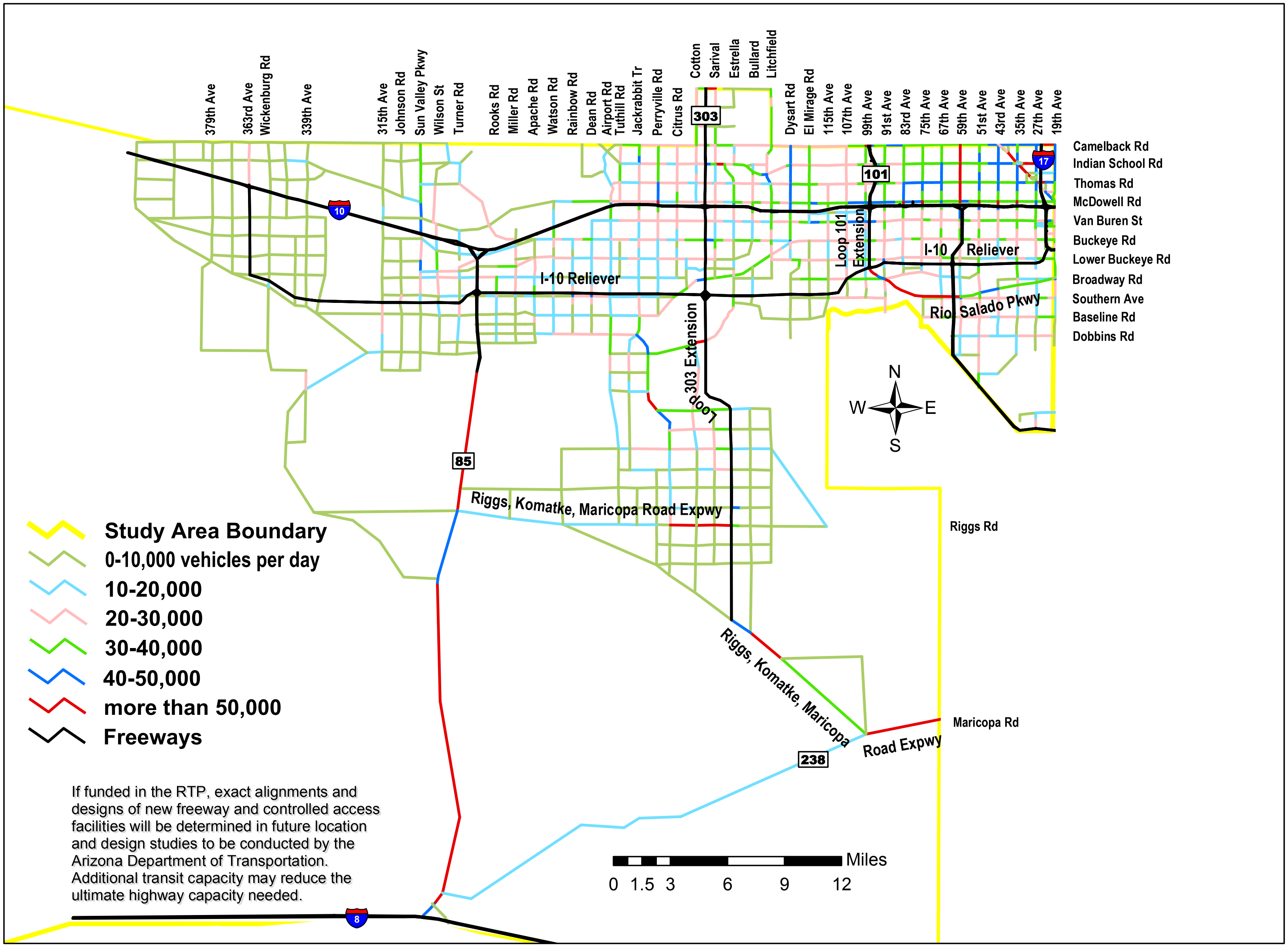

Figure 5-46
Freeway Daily Traffic Volumes: Future Base 2020

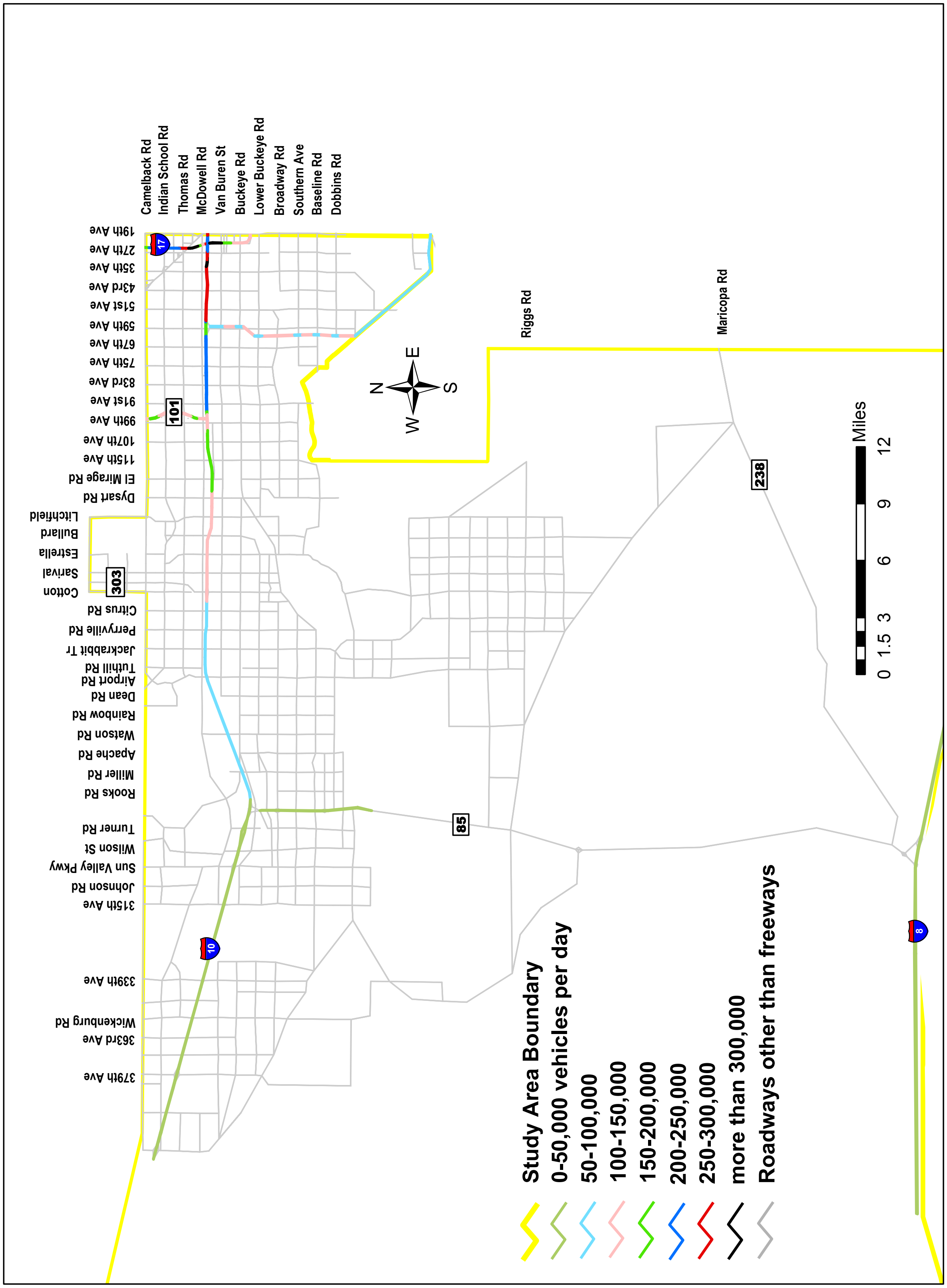

Figure 5-47
Off-Freeway Daily Traffic Volumes: Future Base 2020

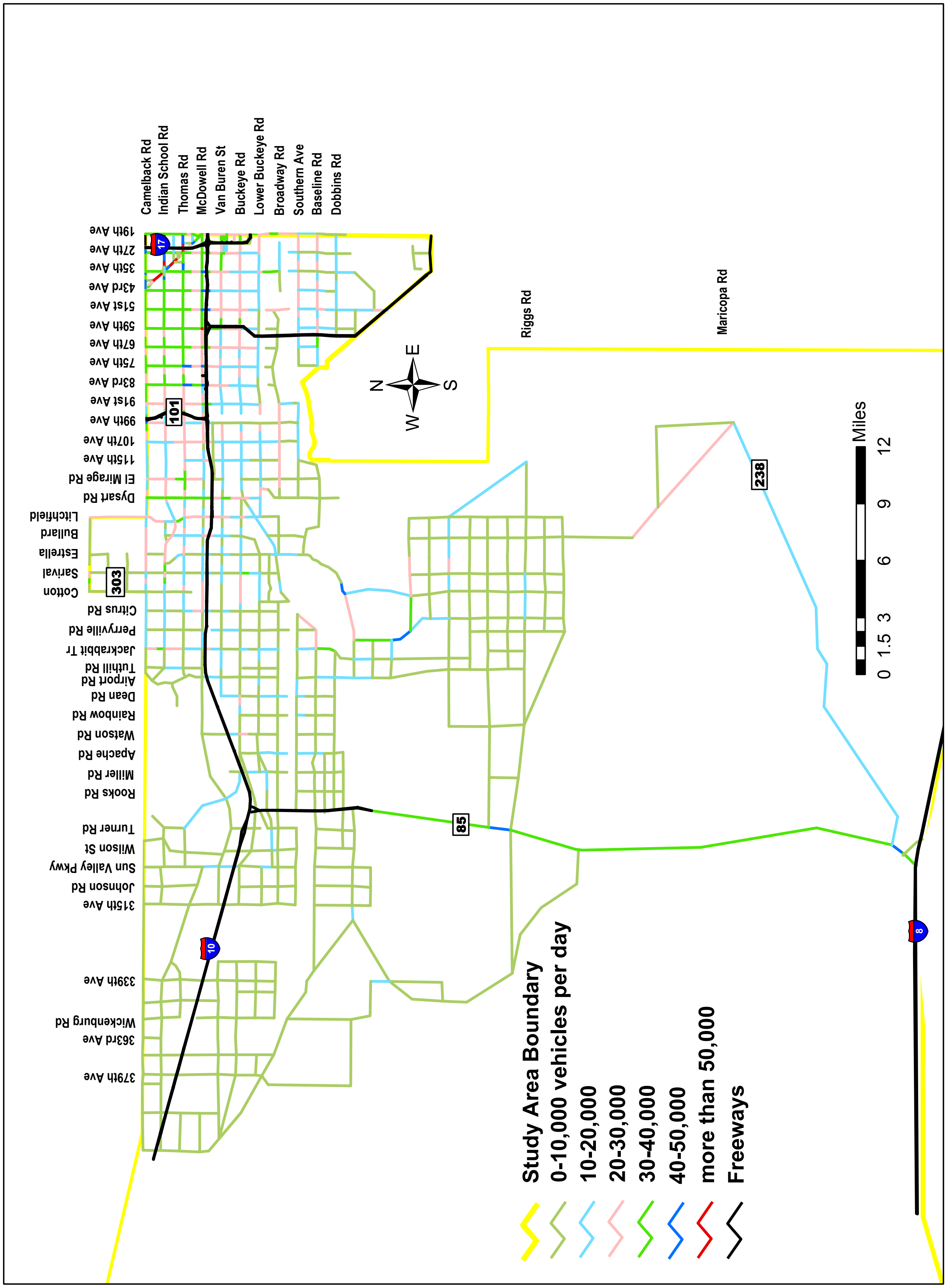

Figure 5-48
Freeway Daily Traffic Volumes: Enhanced 2020

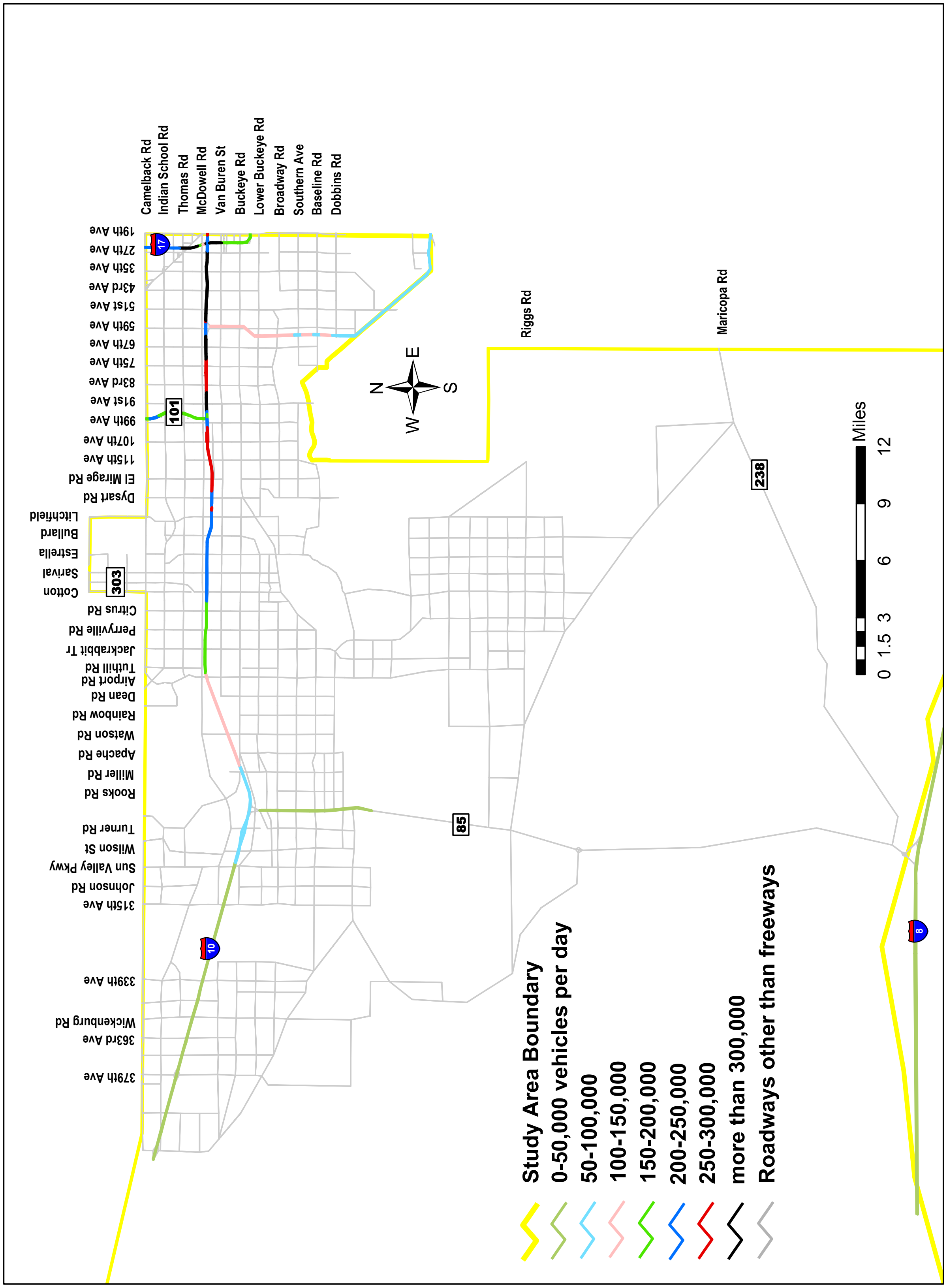

Figure 5-49
Off-Freeway Daily Traffic Volumes: Enhanced 2020

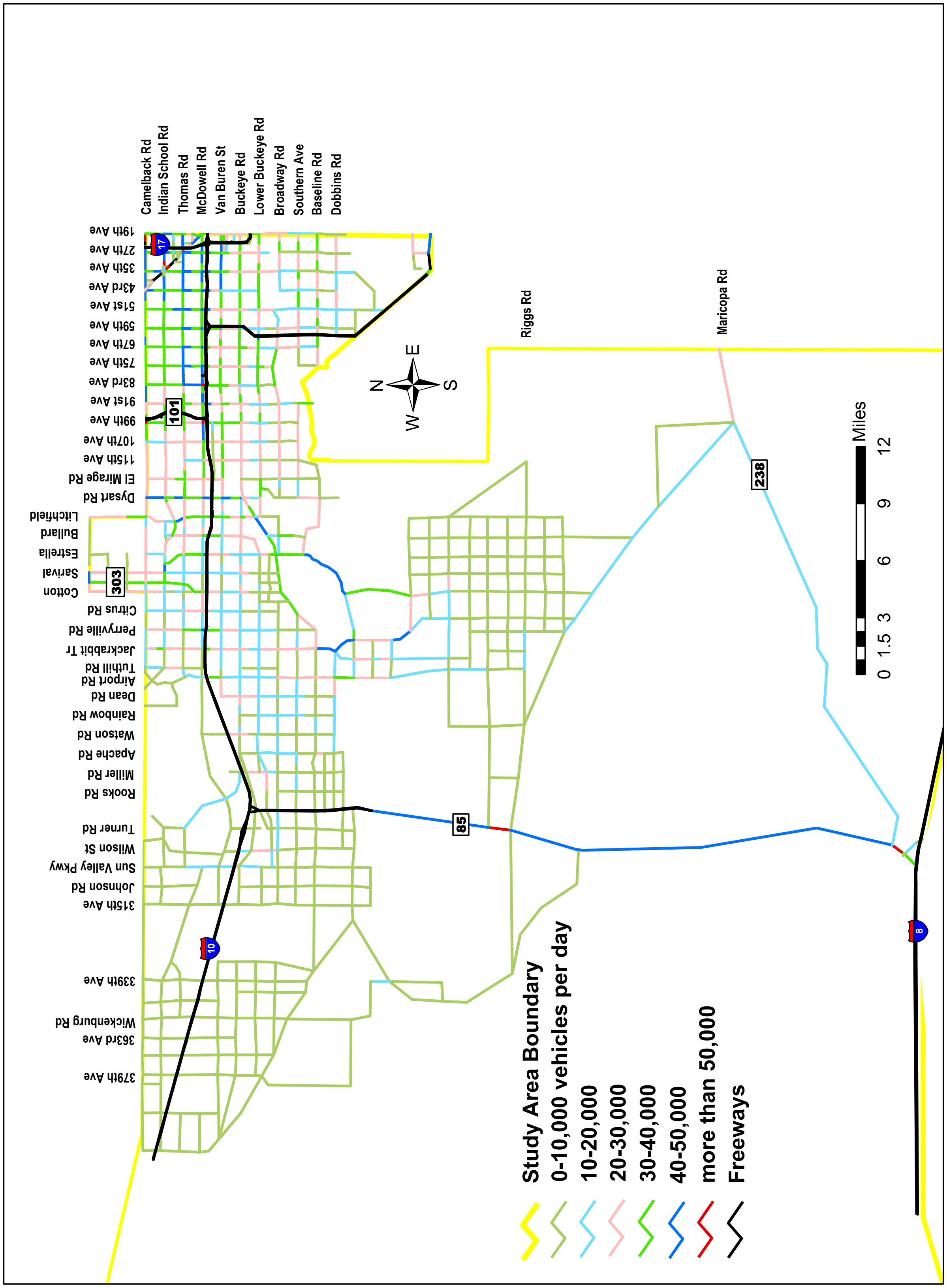

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Figure 5-50
Freeway Daily Traffic Volumes: Option A 2020

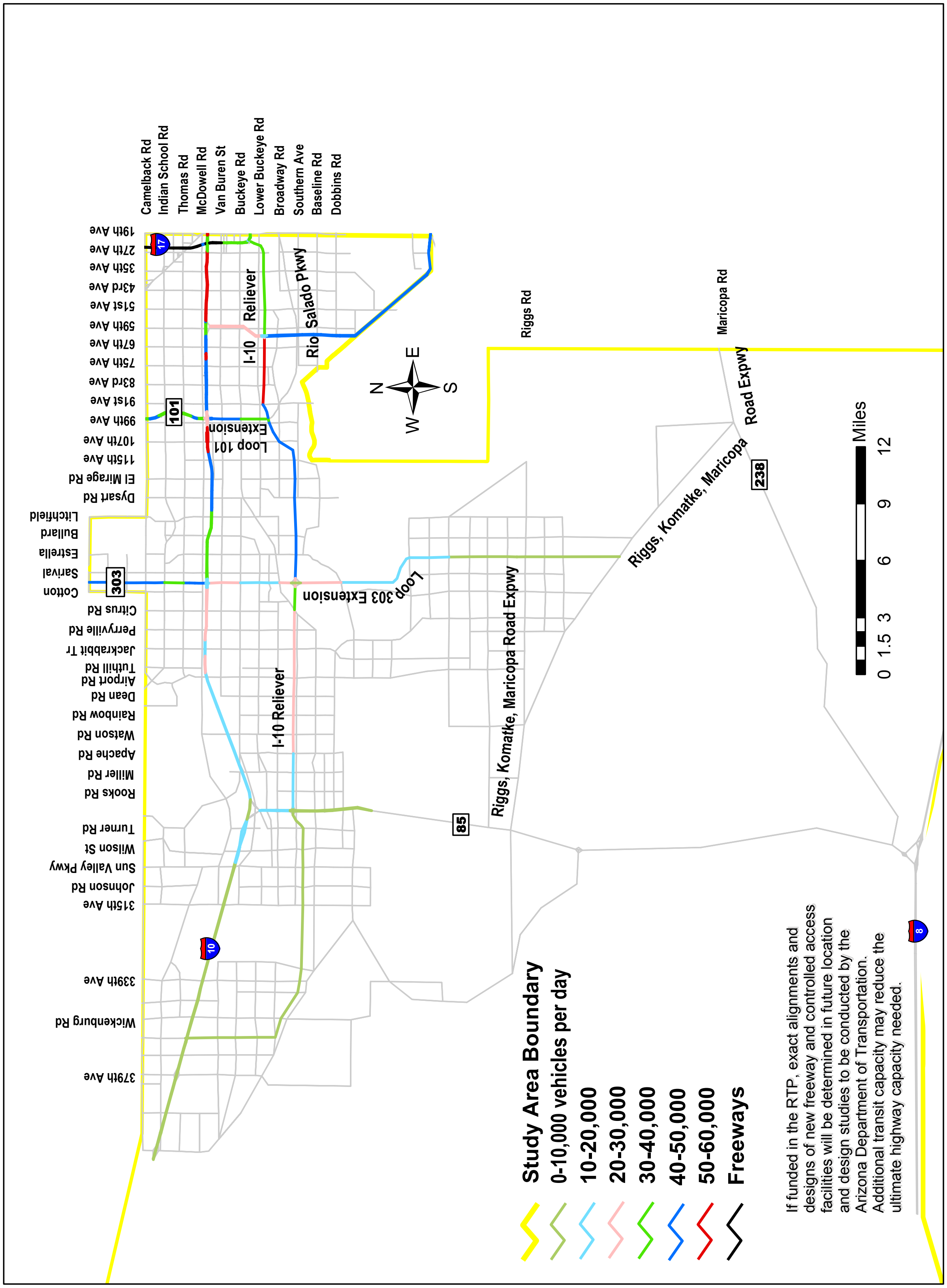


Figure 5-51
Off-Freeway Daily Traffic Volumes: Option A 2020

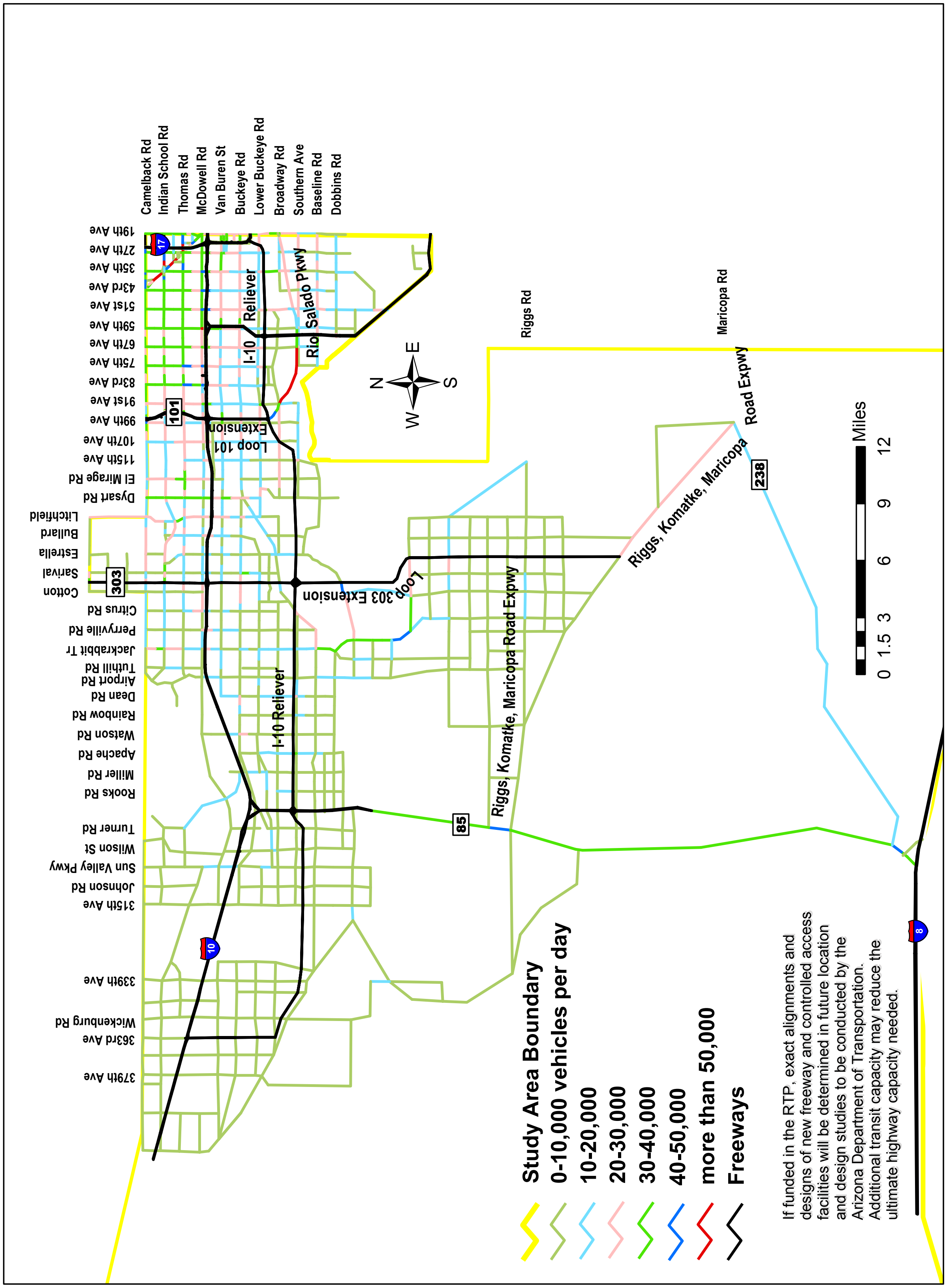


Figure 5-52
Freeway Daily Traffic Volumes: Option C 2020

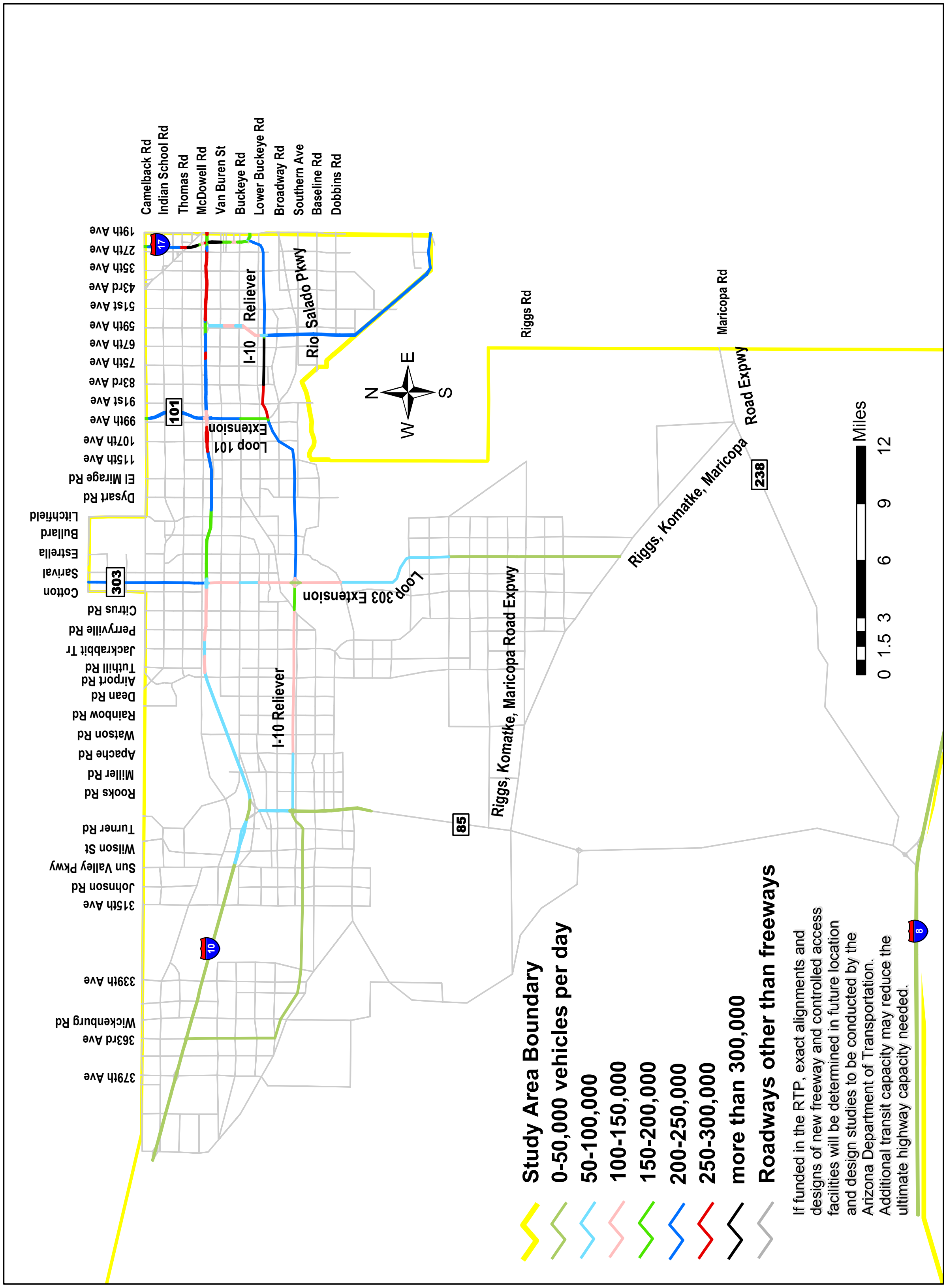


Figure 5-53
Off-Freeway Daily Traffic Volumes: Option C 2020

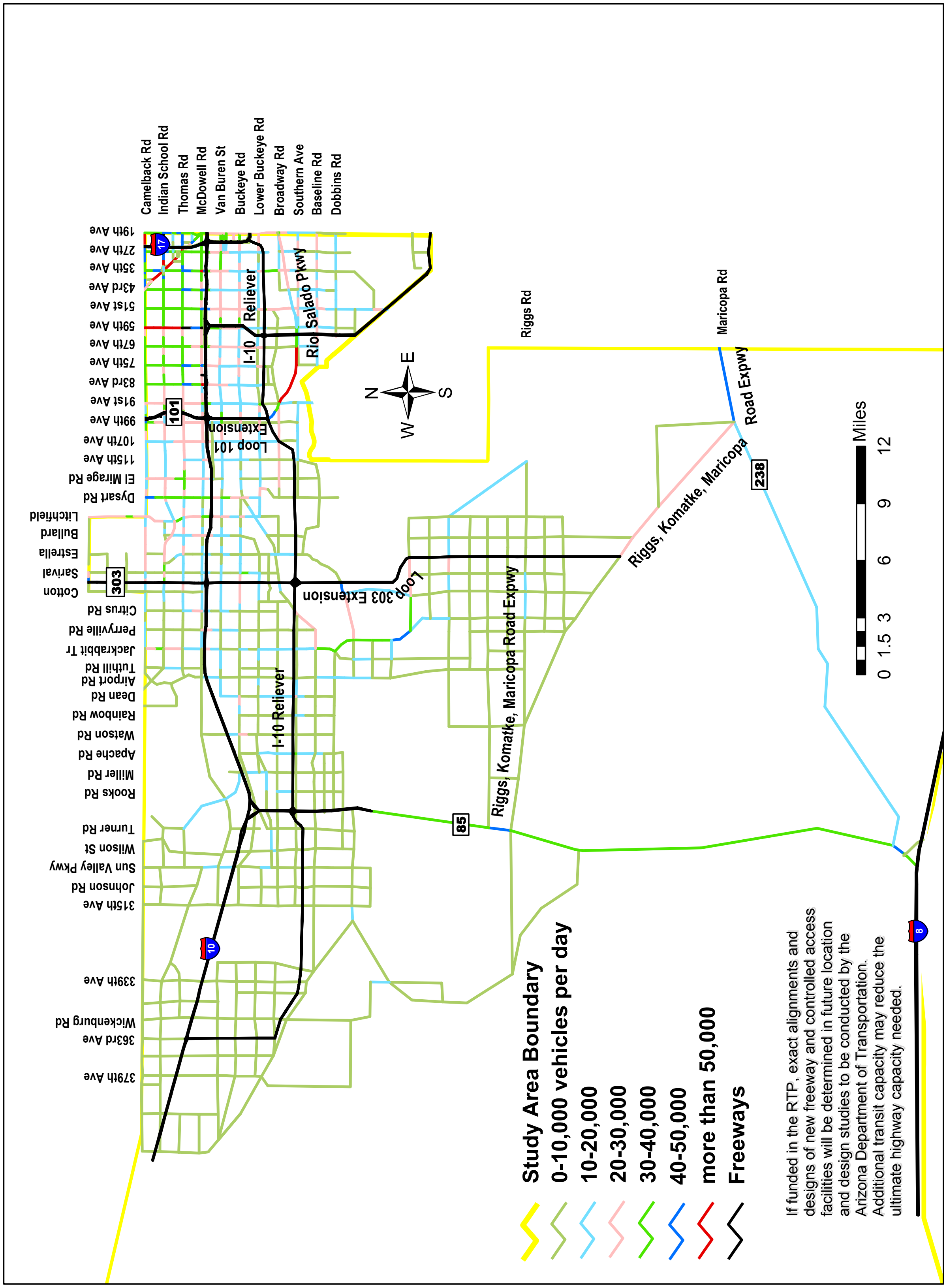


Figure 5-54
Peak Hour Vehicle Miles of Travel at LOS E or F in Year 2020

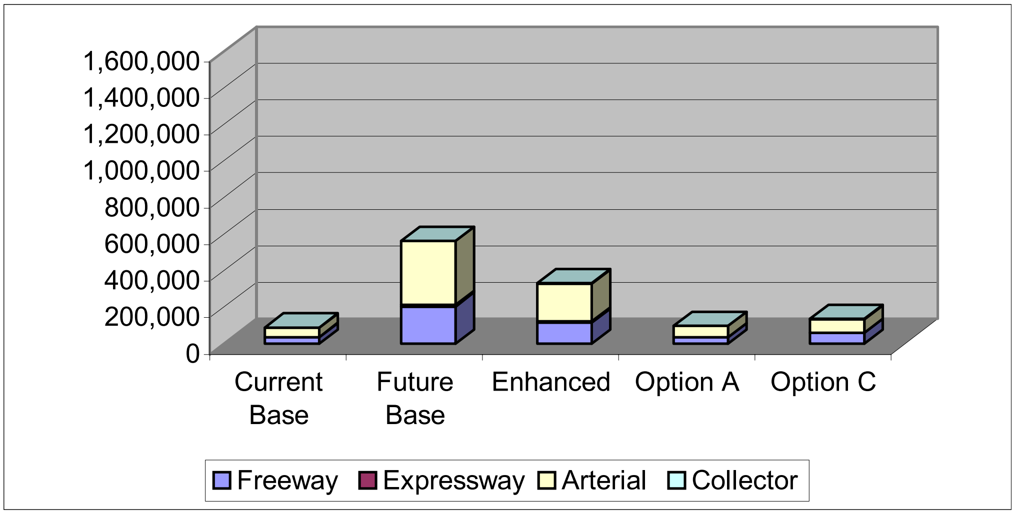


Figure 5-55
Percent of Peak Hour Vehicle Miles of Travel at LOS E or F in Year 2020

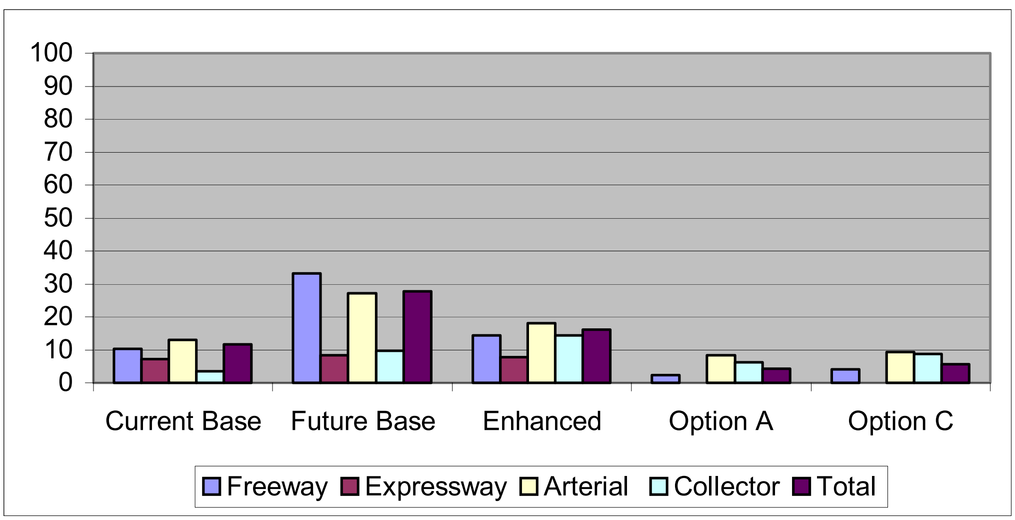


Figure 5-56
Peak Hour Vehicle Miles of Travel at LOS E or F in Year 2030

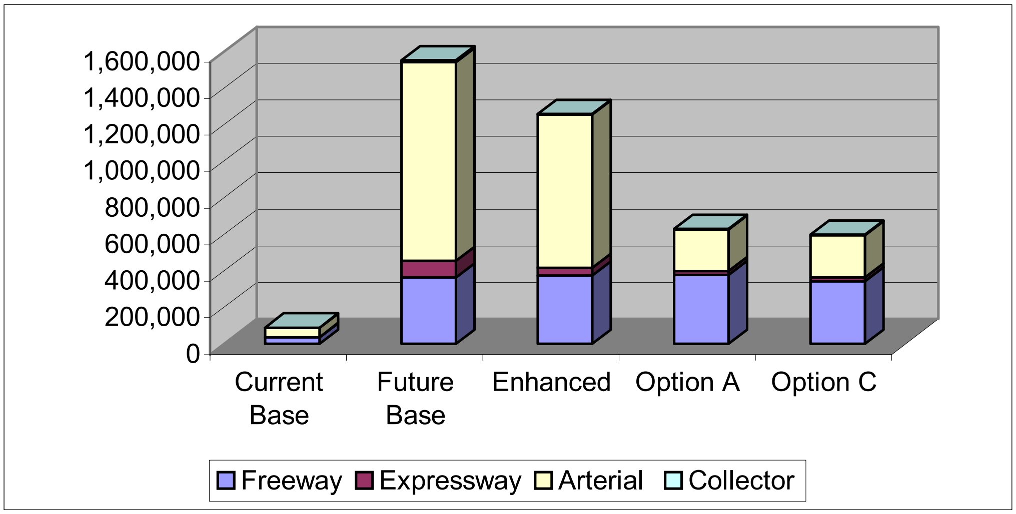
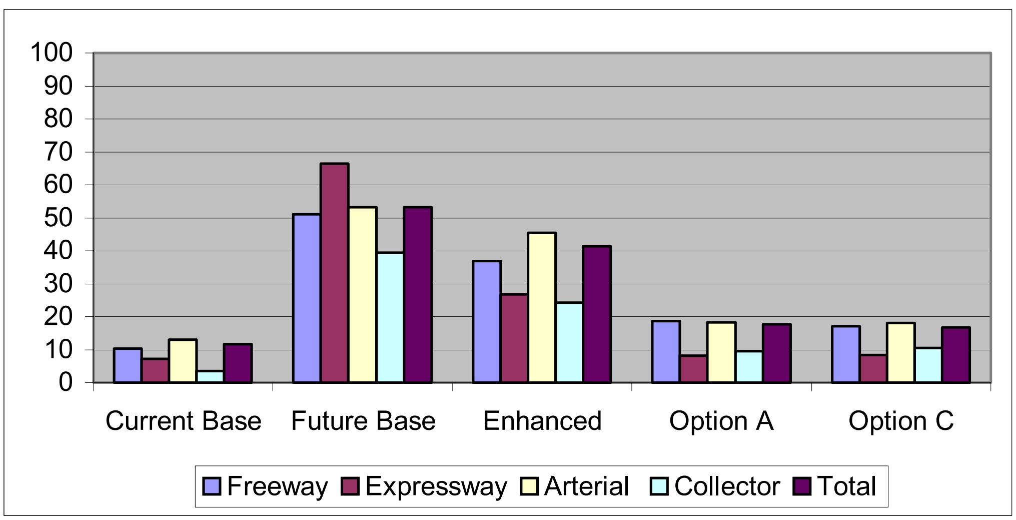


Figure 5-57
Percent of Peak Hour Vehicle Miles of Travel at LOS E or F in Year 2030



5.5.3.2 Miles of Congested Roadways in the Peak Hour

The number of miles of roadway expected to operate under congested conditions is another indicator of roadway performance. Figure 5-58 (and Table 5A-14 in Appendix V) presents the number of directional miles of roadway expected to operate at level-of-service (LOS) E or F during the evening peak hour in 2020 in the SWATS area under each of the modeled highway networks. Because evening peak hour traffic tends to be heavier in one direction than the other, each direction of travel on a roadway is treated independently in this analysis. A directional mile of roadway includes all lanes on a single roadway traveling in the same direction. Thus a six lane highway one mile in length with three lanes in each direction is two directional roadway miles in length.

Figure 5-58 indicates that there are 75 directional miles of roadway in the Current Base network operating under congested conditions in the evening peak hour. Figure 5-59 (and Table 5A-15 in Appendix V) shows that this is approximately 4% of all the directional miles of roadway included in the Current Base network. In 2020 under the Future Base network, 255 directional miles (or 10% all directional miles) are forecast to operate under congested conditions in the evening peak hour. Nearly 20% of freeway mileage is expected to be congested.

This situation improves remarkably under the Enhanced network. The number of directional miles of roadway operating under congested conditions in the evening peak hour in 2020 drops to 145 (6% of total roadway mileage). This is largely attributable to the addition of 70 lane miles of HOV lanes and 200 miles of general purpose freeway lanes. (See Figure 5-14.) The number of congested directional miles of arterials drops substantially, despite little change in the number of arterial lane miles. Travel is clearly being diverted from the congested arterials in response to the addition of freeway lane mileage. Nonetheless, the percentage of total directional miles operating under congested conditions still exceeds the Current Base.

Under Option A and Option C the number of directional miles of congested roadways in the evening peak hour in 2020 drops by about 100 compared to the Enhanced network. The percentage of congested roadway miles drops to 2%, below that of the Current Base. The number of congested directional miles of arterials shows the most dramatic improvement in response to the additional 1000 lane miles of roadway included in Option A and Option C compared to the Enhanced network.

The increases in traffic expected by 2030 result in a substantial increase in the number of directional miles of roadway forecast to operate under congested conditions in the evening peak hour. A comparison of Figures 5-58 and 5-60 (and Tables 5A-14 and 5A-16 in Appendix V) shows that from 2020 to 2030 the directional miles in the Future Base network operating under congested conditions in the evening peak hour triples to 749 miles. This is 29% of the directional mileage included in the Future Base network, as shown in Figure 5-61 (and Table 5A-17 in Appendix V).

The additional 350 lanes miles of roadway added to the Future Base network in the Enhanced network reduces the number of congested directional miles in 2030 to 582 or 22% of network mileage. This is a fourfold increase over the number of congested directional miles in 2020 on the same network. The subsequent addition of 1000 more lanes miles of roadway under the Option A and Option C networks leaves 200 miles of directional roadway mileage in these networks operating under congested conditions in the evening peak hour. The number of congested directional miles of roadway under the Option A and Option C networks in 2030 is about 4 times the number forecast for the year 2020. The percent of directional miles in the Option A and Option C networks forecast to operate under congested conditions in the evening peak hour is 7%, compared to the 4% in the

Current Base.

Figures 5-62 through 5-70 show levels of service for the Current Base, 2020, and 2030 forecasts for the Future Base, Enhanced, Option A, and Option C networks. These figures demonstrate that there are fewer locations of LOS E and F under the Option A and Option C networks than under the Future Base and Enhanced networks.

Figure 5-58
Directional Miles of Highway at LOS E or F in the Peak Hour - Year 2020

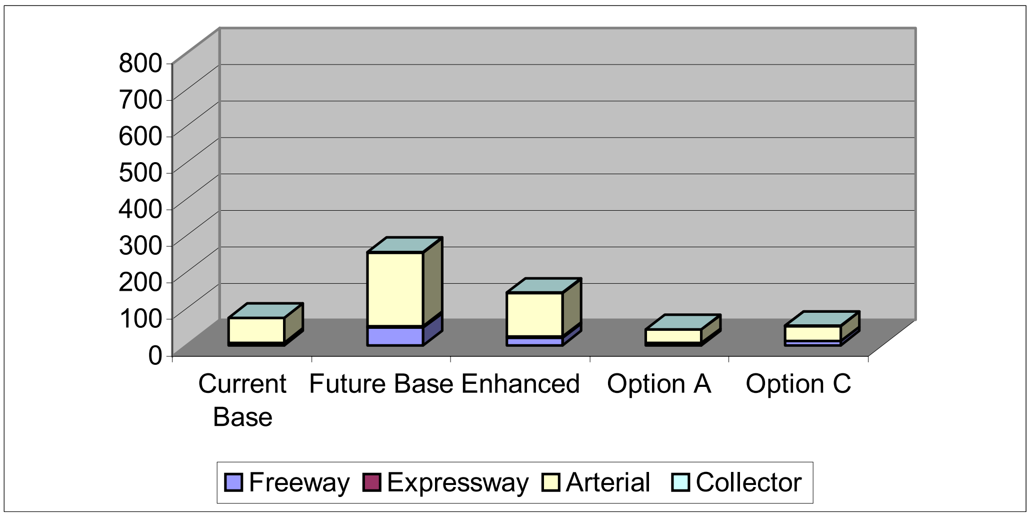


Figure 5-59
Percent of Directional Miles of Highway at LOS E or F in the Peak Hour - Year 2020

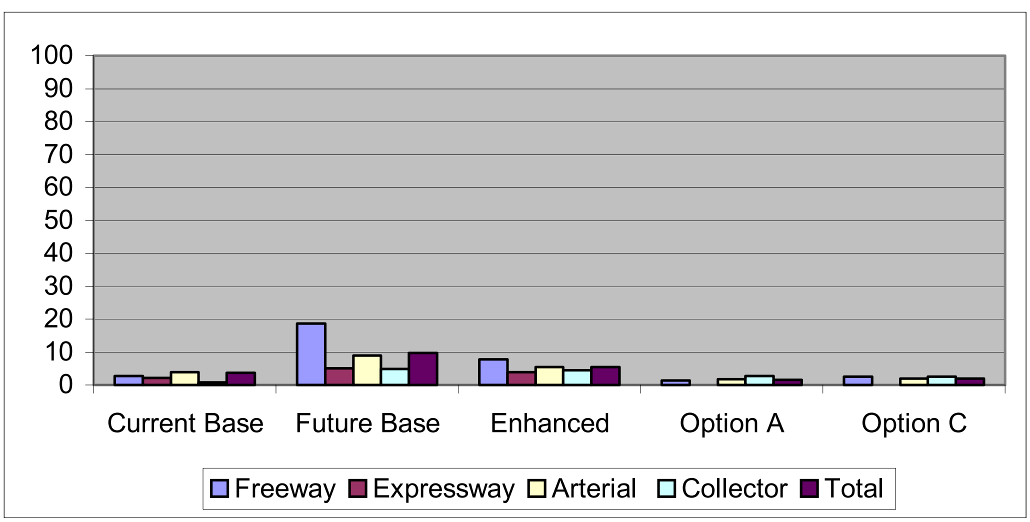


Figure 5-60
Directional Miles of Roadway at LOS E or F in the Peak Hour - Year 2030

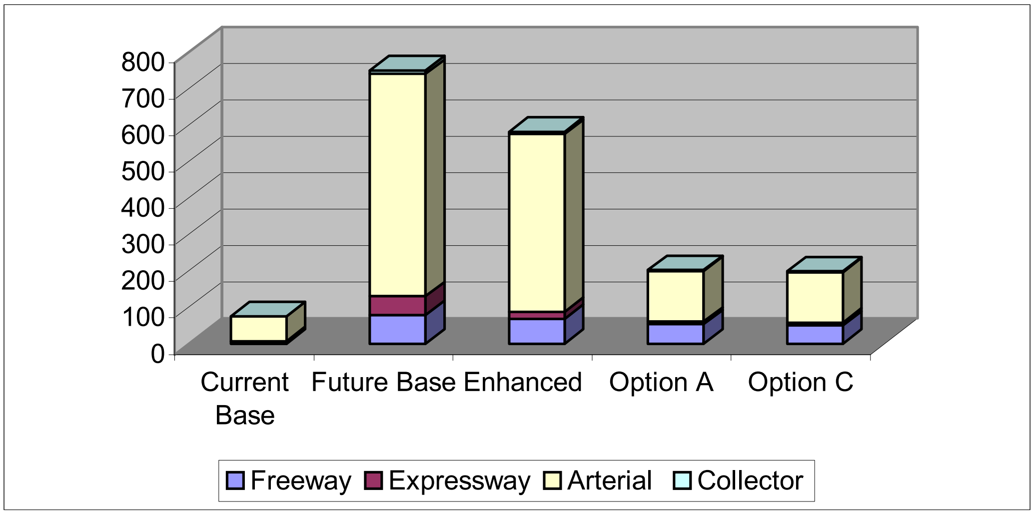


Figure 5-61
Percent of Directional Miles of Roadway at LOS E or F in the Peak Hour - Year 2030

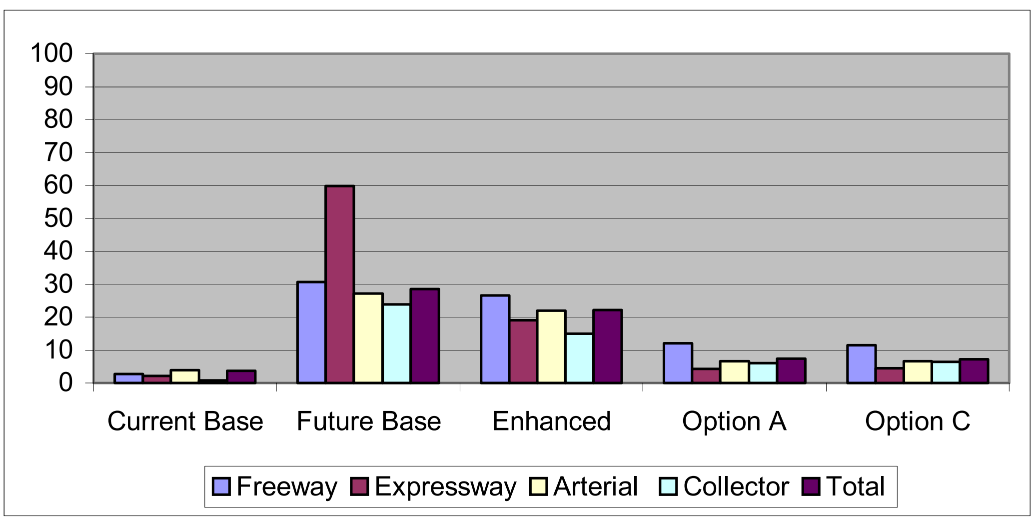


Figure 5-62
Roadway Level-of-Service: Current Base 2002

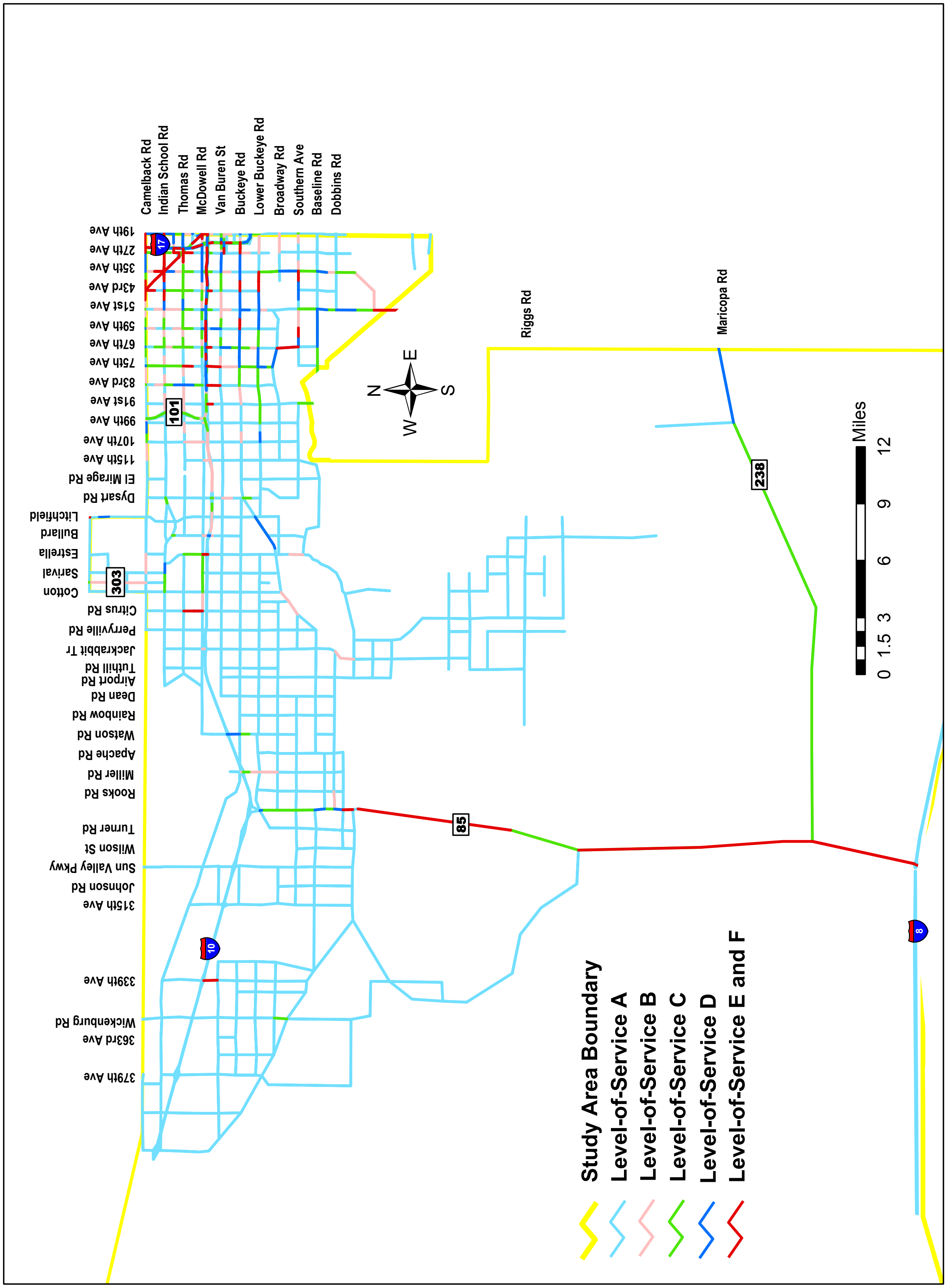
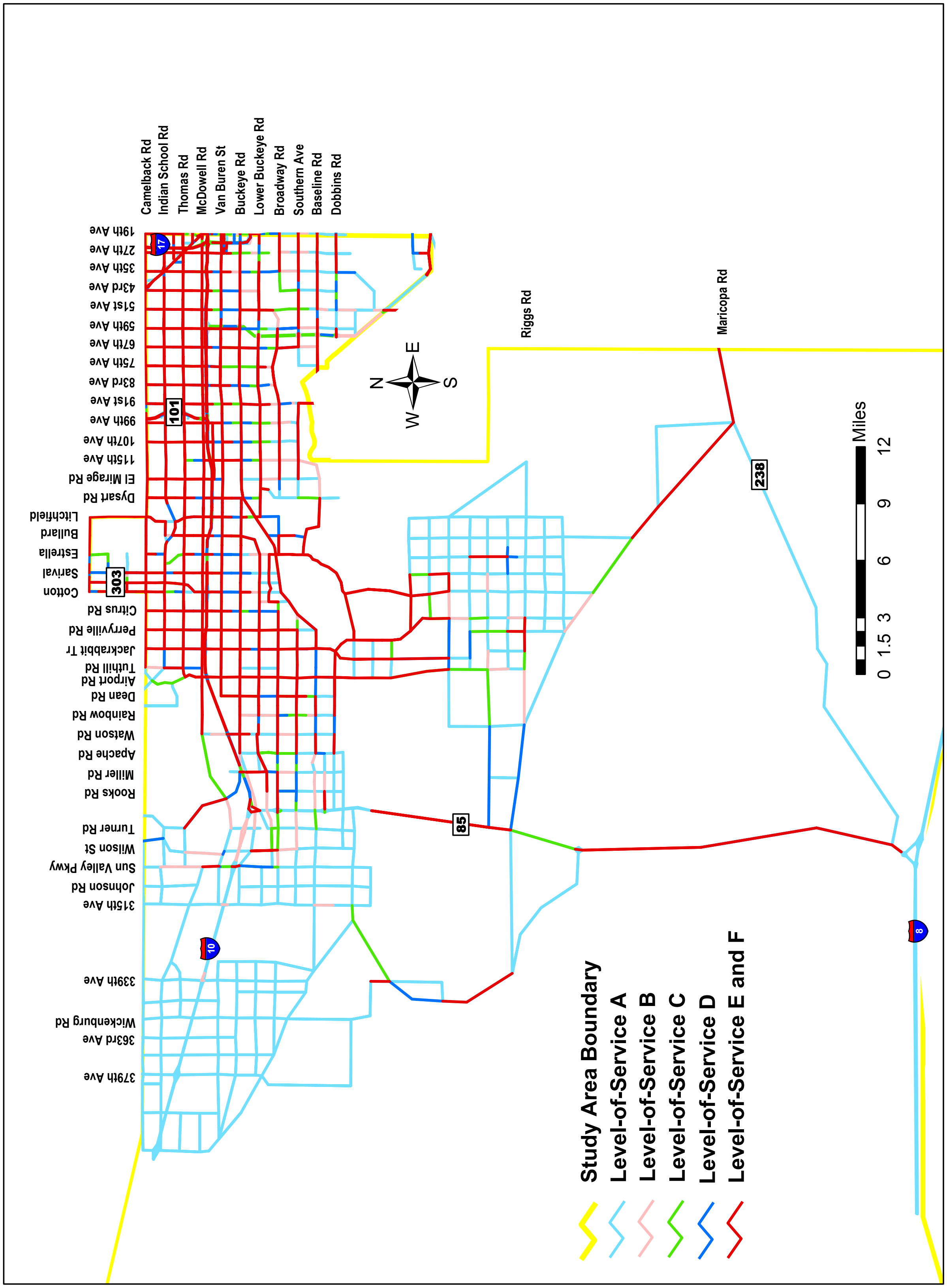


Figure 5-63
Roadway Level-of-Service: Future Base 2030



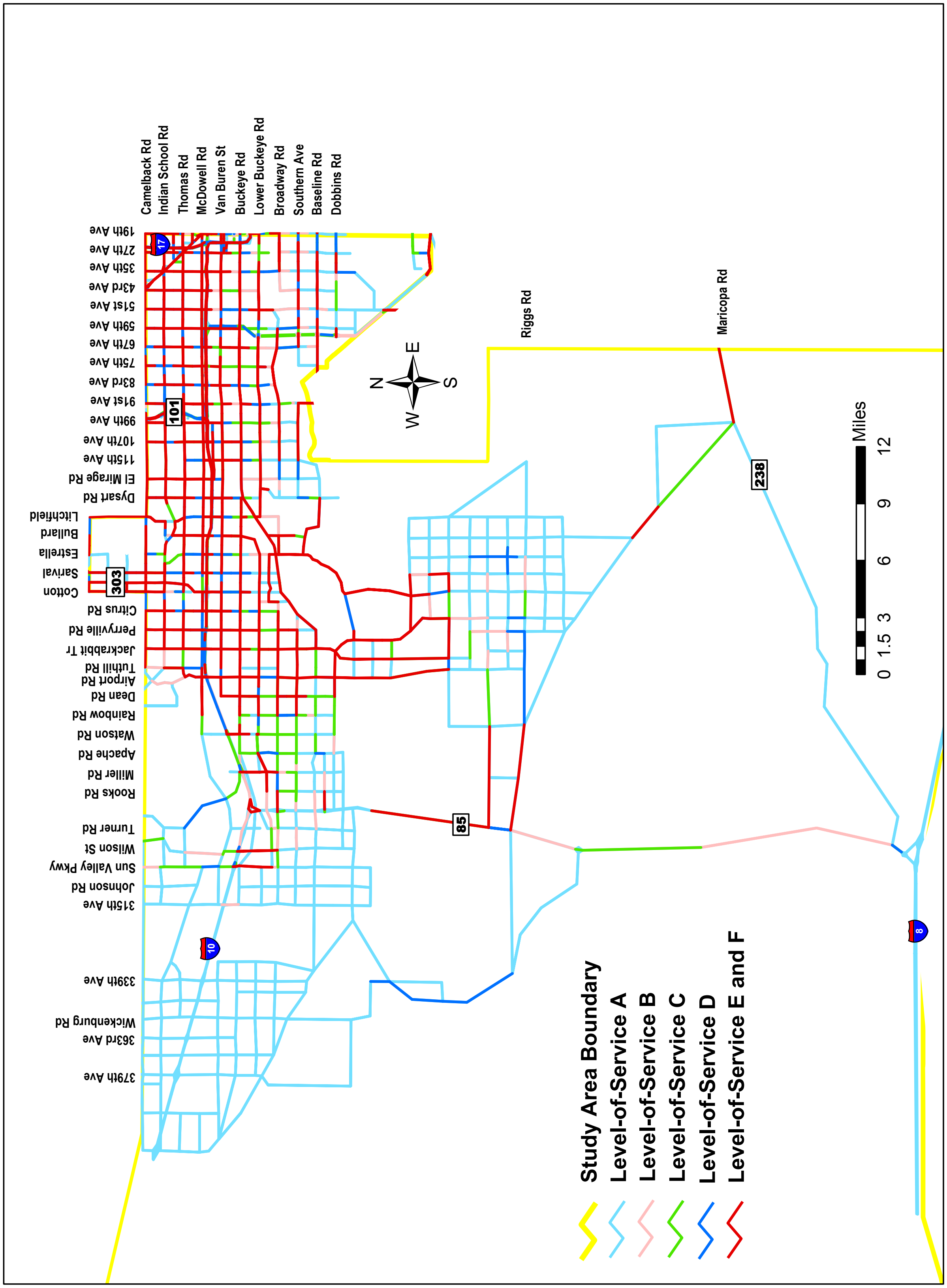


Figure 5-64
Roadway Level-of-Service: Enhanced 2030

Figure 5-65
Roadway Level-of-Service: Option A 2030

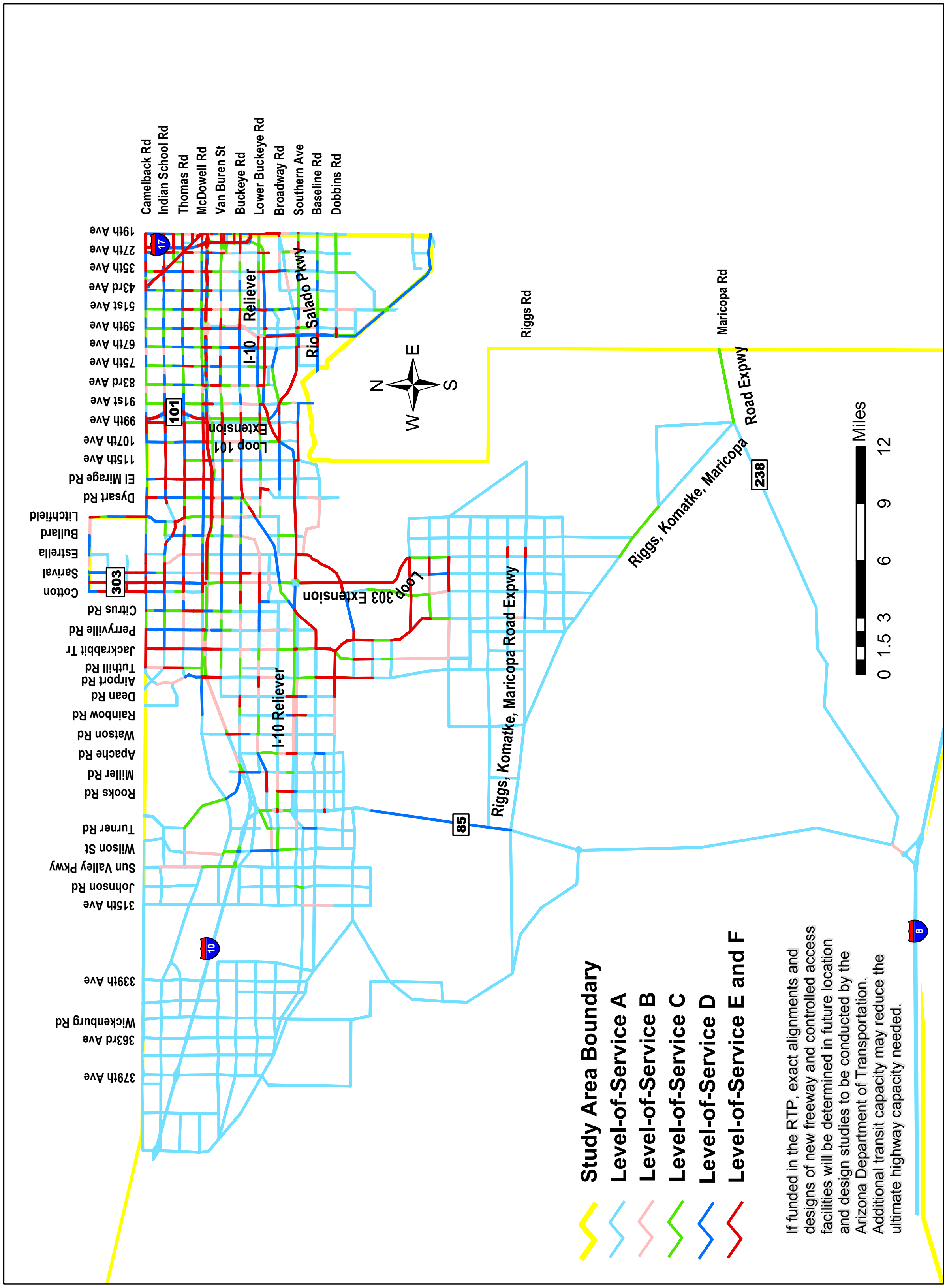


Figure 5-66
Roadway Level-of-Service: Option C 2030

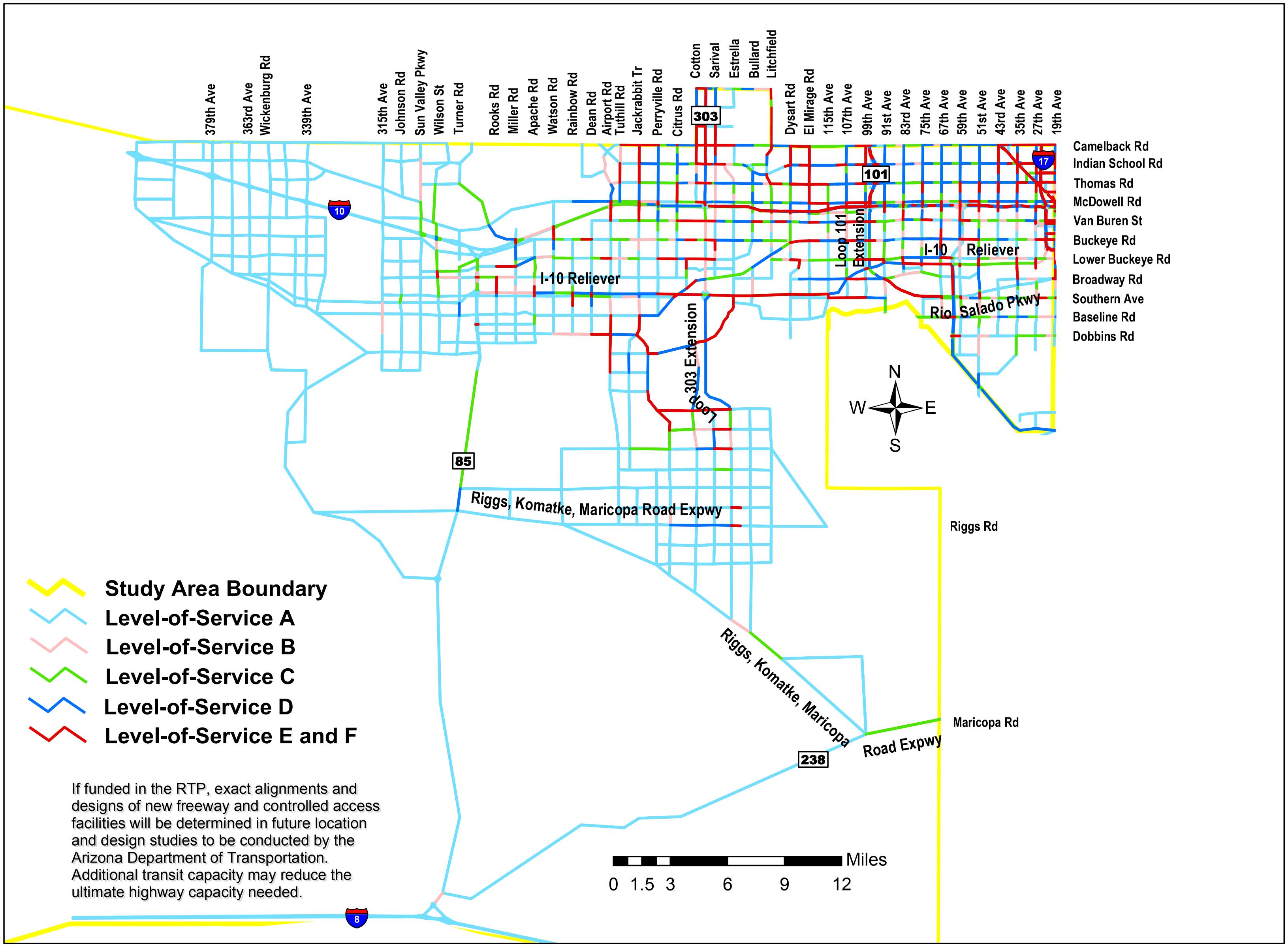


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Figure 5-67
Roadway Level-of-Service: Future Base 2020

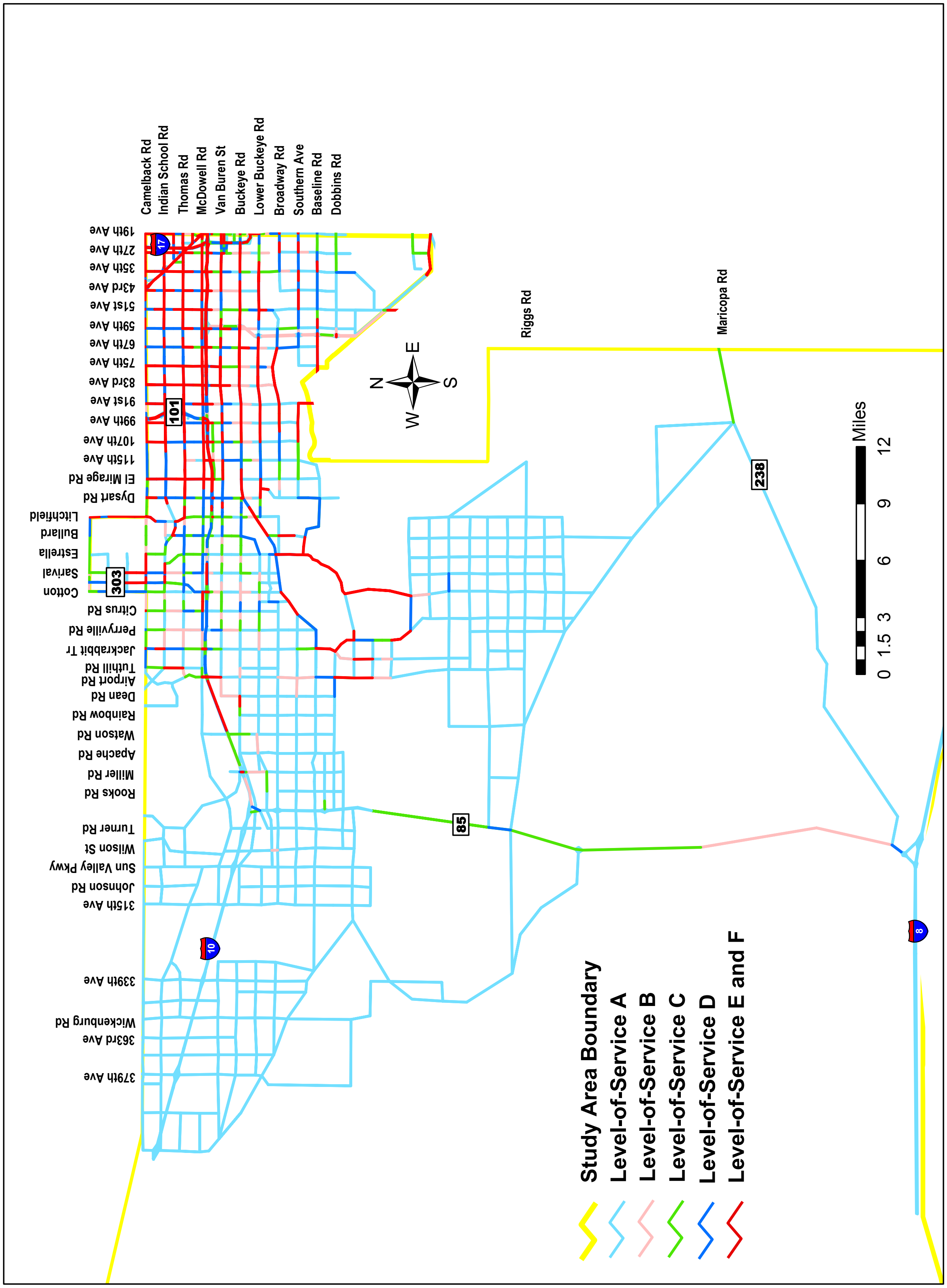

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Figure 5-68
Roadway Level-of-Service: Enhanced 2020

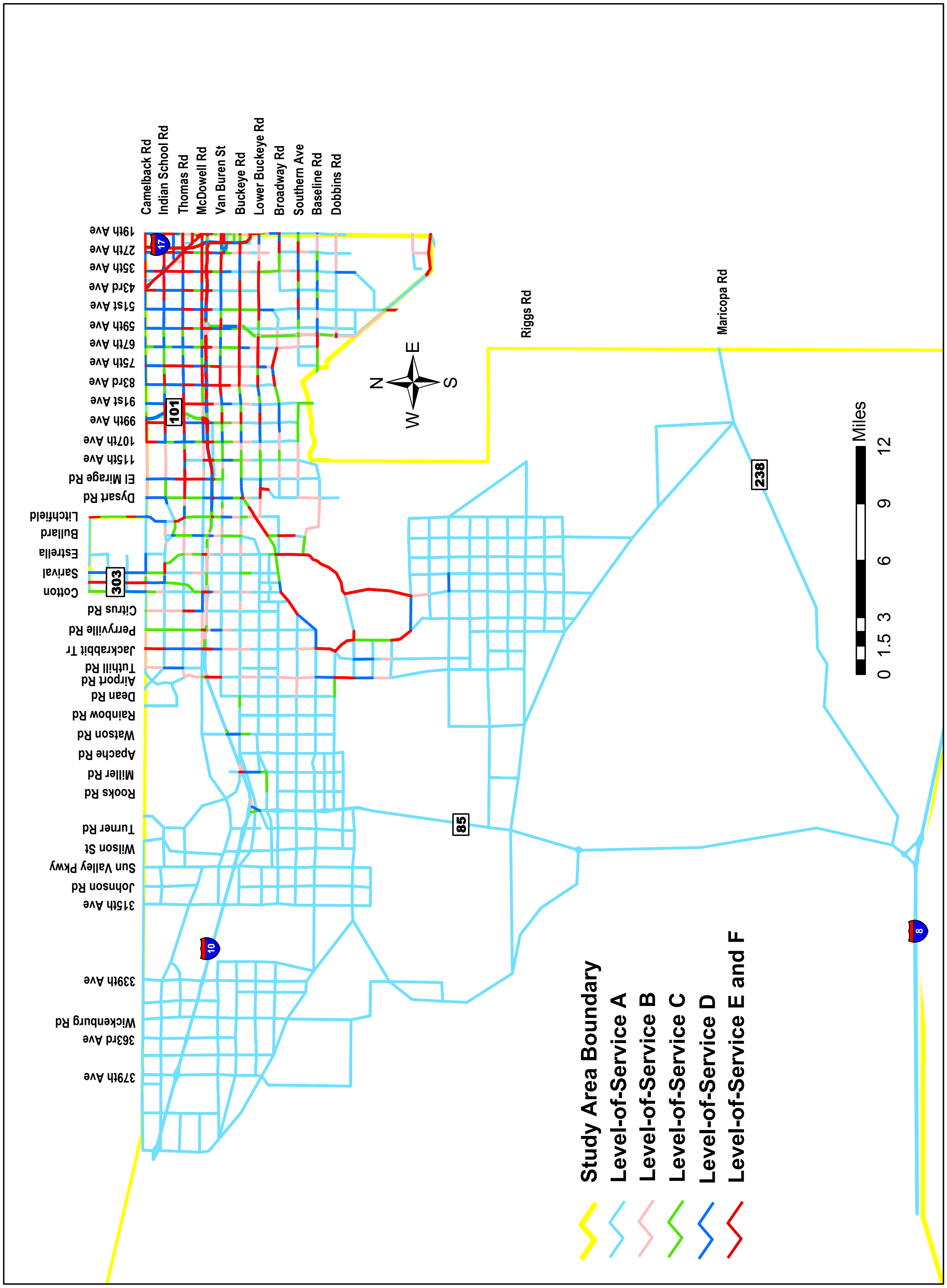

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Figure 5-69
Roadway Level-of-Service: Option A 2020

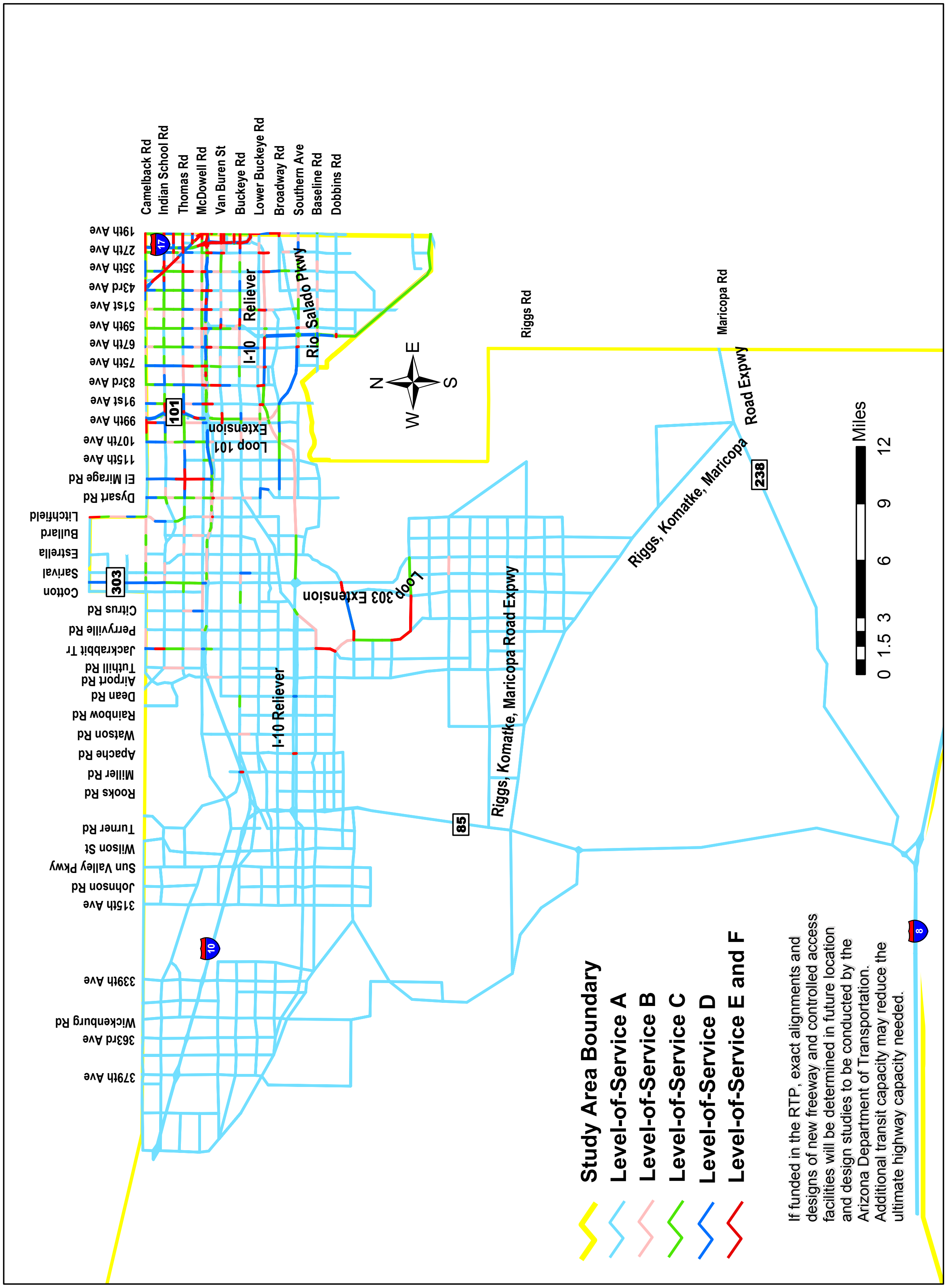

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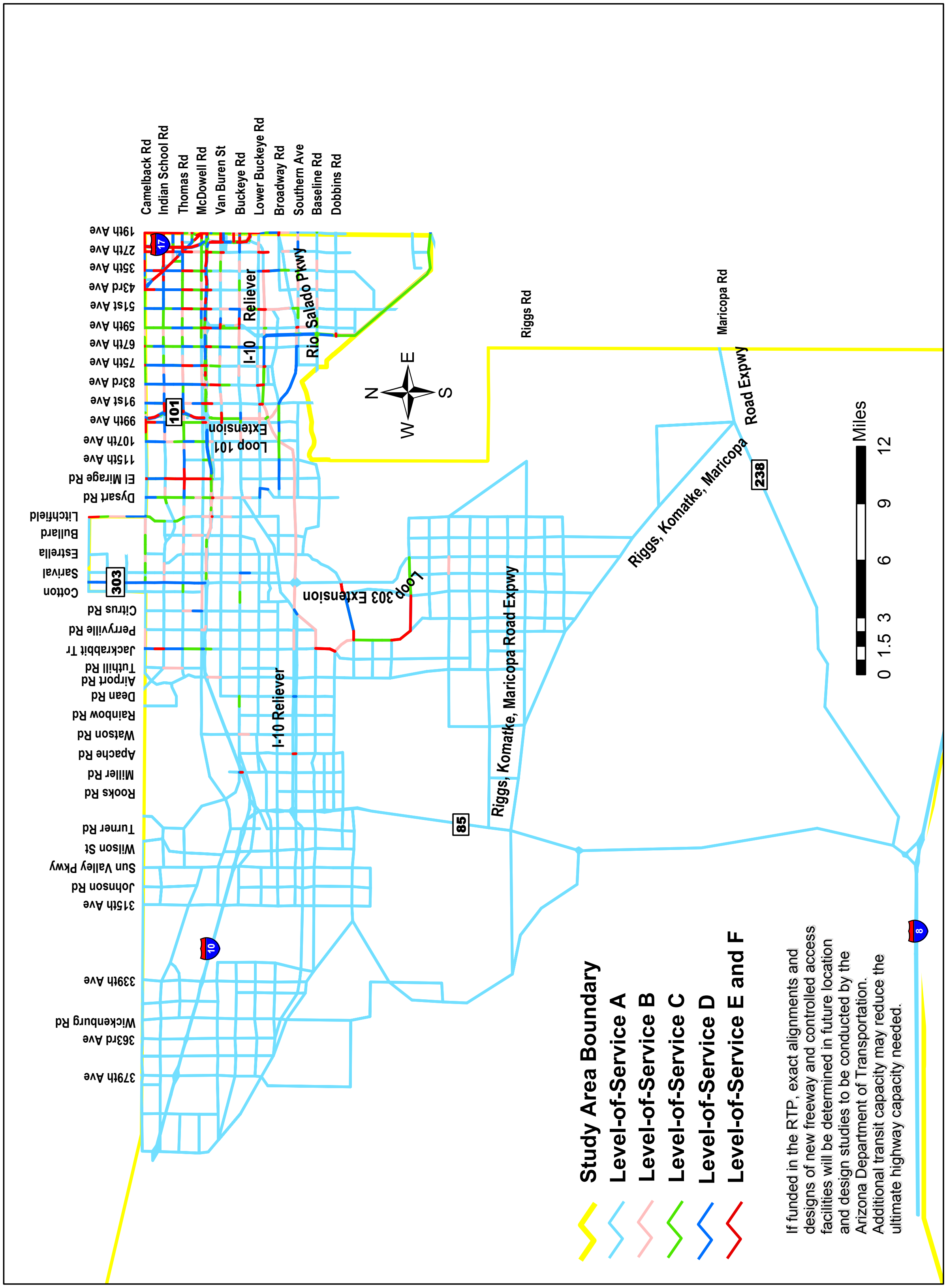
Figure 5-70
Roadway Level-of-Service: Option C 2020



5.5.3.3 Intersection Congestion

For streets other than freeways, the ability to move traffic in urbanized areas is generally limited by the capacity of intersections. Traffic conflicts result from vehicles traveling in different directions. These conflicts are most pernicious at intersections. Thus, traffic is most heavily controlled at intersections with consequential reductions in roadway capacity at intersections.

The level-of-service (LOS) was evaluated at a number of intersections in each of the highway networks modeled for the SWATS. The level-of-service is based on an estimate of the delay that the average vehicle entering the intersection will encounter, if the entering vehicle is on an approach subject to traffic control such as a traffic signal or stop sign. LOS E and F are considered to have unacceptable amounts of delay. Under LOS E average delay is between 55 and 80 seconds. Under LOS F average delay exceeds 80 seconds. For the SWATS, intersection levels-of-service E and F are considered unacceptable.

The study area was divided into four subareas for this analysis. The east subarea is the portion of the study area east of the Agua Fria River, where existing development and development pressure is the most intense. The central subarea is west of the Agua Fria River and represents the area primed for the most intense development after the east area approaches build out. The west subarea (west of SR-85) and the south subarea (west of the Agua Fria River and south of the Gila River) represent the subareas where intense levels of development pressure can be expected in the longer term as the central subarea approaches build out.

Figure 5-71 (and Table 5A-18 in Appendix V) shows that most of the intersections expected to experience unacceptable amounts of delay in 2020 occur in the east subarea, with a few in the central subarea. Hardly any occur in the west and south subareas. Figure 5-72 (and Table 5A-19 in Appendix V) shows that the percent of intersections expected to operate with unacceptable amounts of delay in 2020 is over 40% under the Future Base network, slightly below 40% under the Enhanced network and about 20% under the Option A and Option C networks. The Option A and Option C networks have higher amounts of travel taking place on freeways where there are no intersections.

Figures 5-73 and 5-74 (and Tables 5A-20 and 5A-21 in Appendix V) show the intersection data forecast for 2030. While there are a few in the south and west subareas, the bulk of the intersections forecast for unacceptable levels of delay are still located in the east and central subareas. Figure 5-74 shows that nearly 70% of the intersections in the east and central subareas are forecast to experience unacceptable levels of delay in the Future Base network. These percentages are somewhat improved under the Enhanced network, but the Option A and Option C networks enjoy substantial improvement, with only about 40% of the intersections in the east subarea and 20% in the central subarea experiencing unacceptable levels of delay.

Figures 5-75 through 5-79 show the level-of-service at intersections under the Current Base network in 2002 and under the Future Base, Enhanced, Option A, and Option C networks in 2030. The 2020 levels-of-service for these networks are shown on Figures 5-80 through 5-83, respectively. The figures demonstrate the higher preponderance of intersections with poor traffic service in the eastern and central subareas.

Figure 5-71
Number of Intersections Operating at Level-of-Service E or F in the Peak Hour in Year 2020

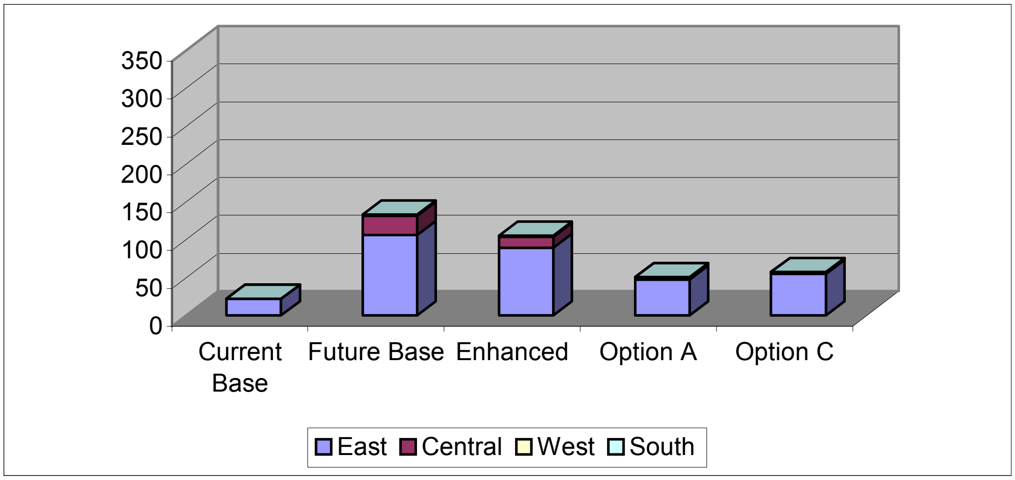


Figure 5-72
Percent of Intersections Analyzed Operating at Level-of-Service E or F in the Peak Hour in Year 2020

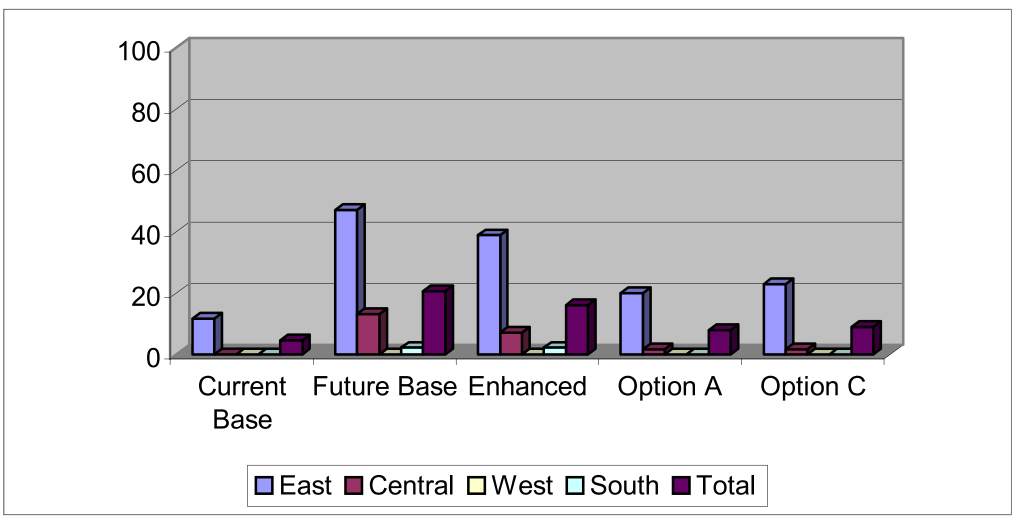


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Figure 5-73
Number of Intersections Operating at Level-of-Service E or F in the Peak Hour in Year 2030

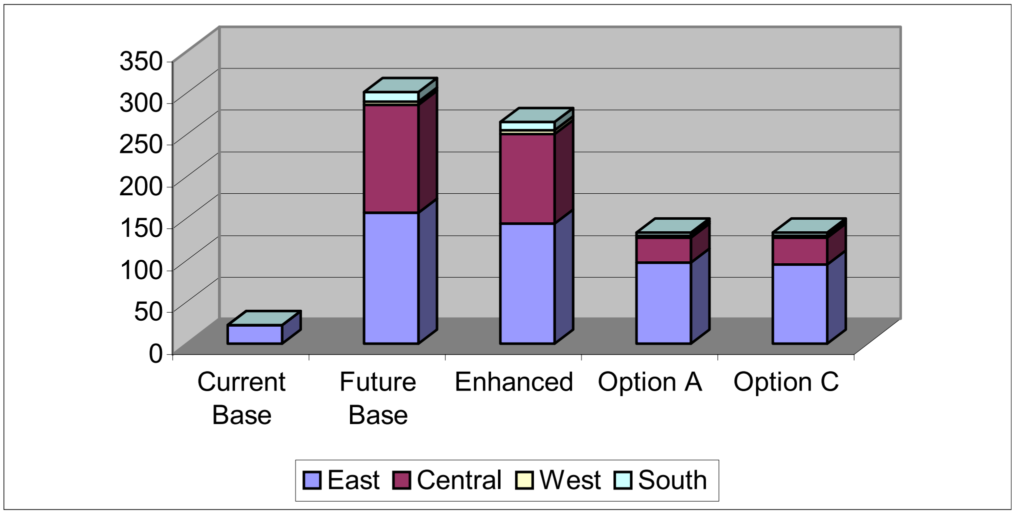

Figure 5-74
Percent of Intersections Analyzed Operating at Level-of-Service E or F in the Peak Hour in Year 2030

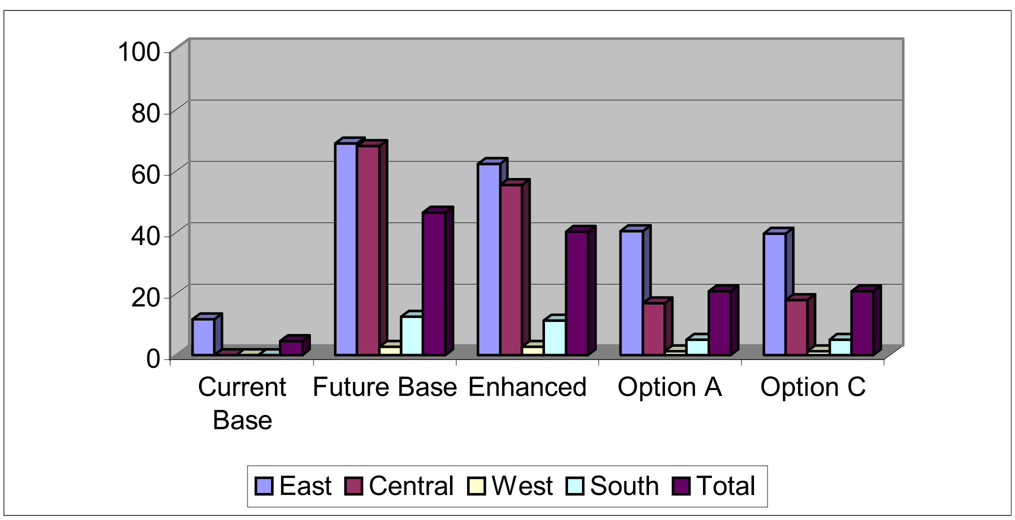

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Figure 5-75
Intersection Level-of-Service: Current Base 2002

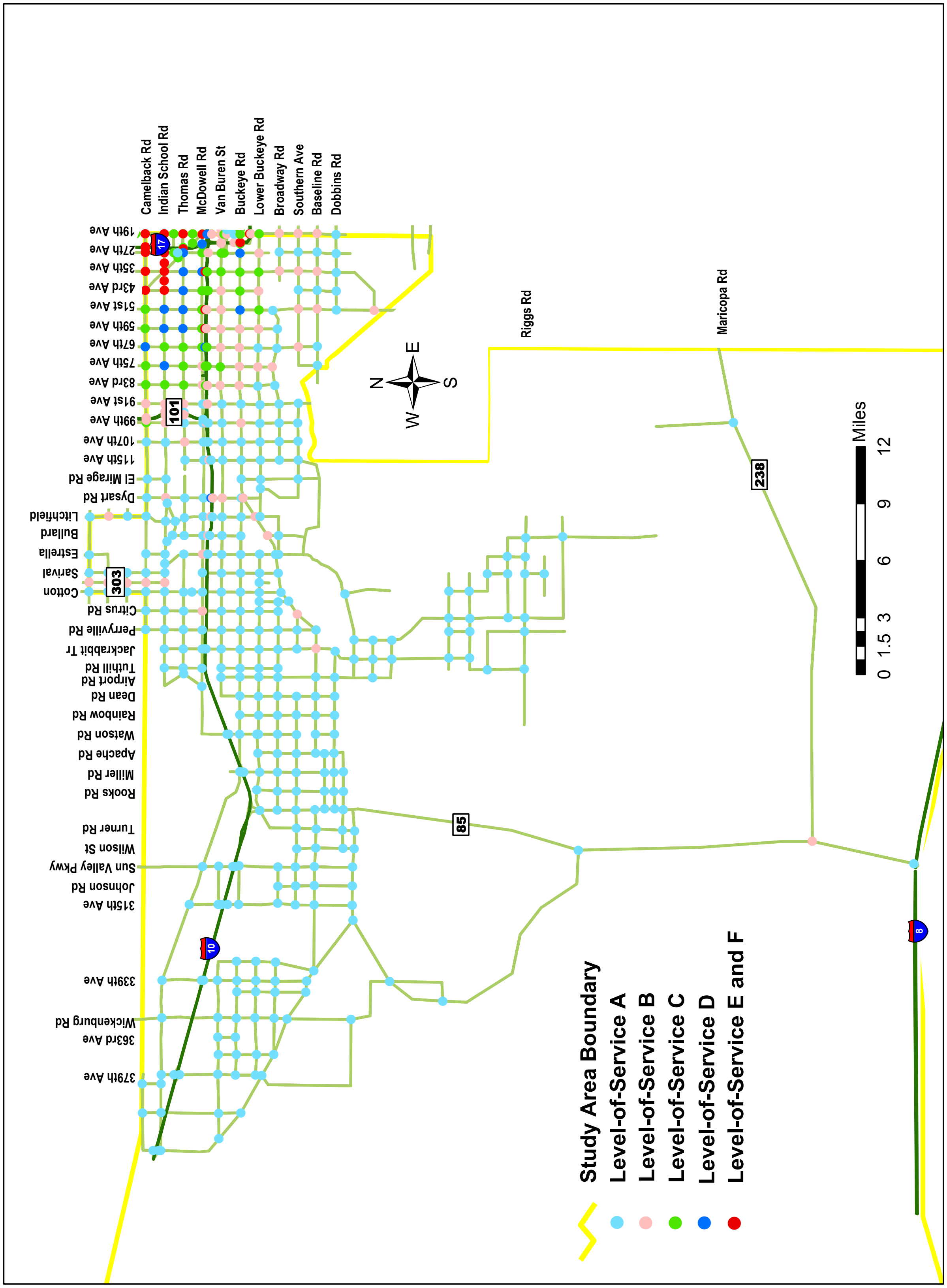

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Figure 5-76
Intersection Level-of-Service: Future Base 2030

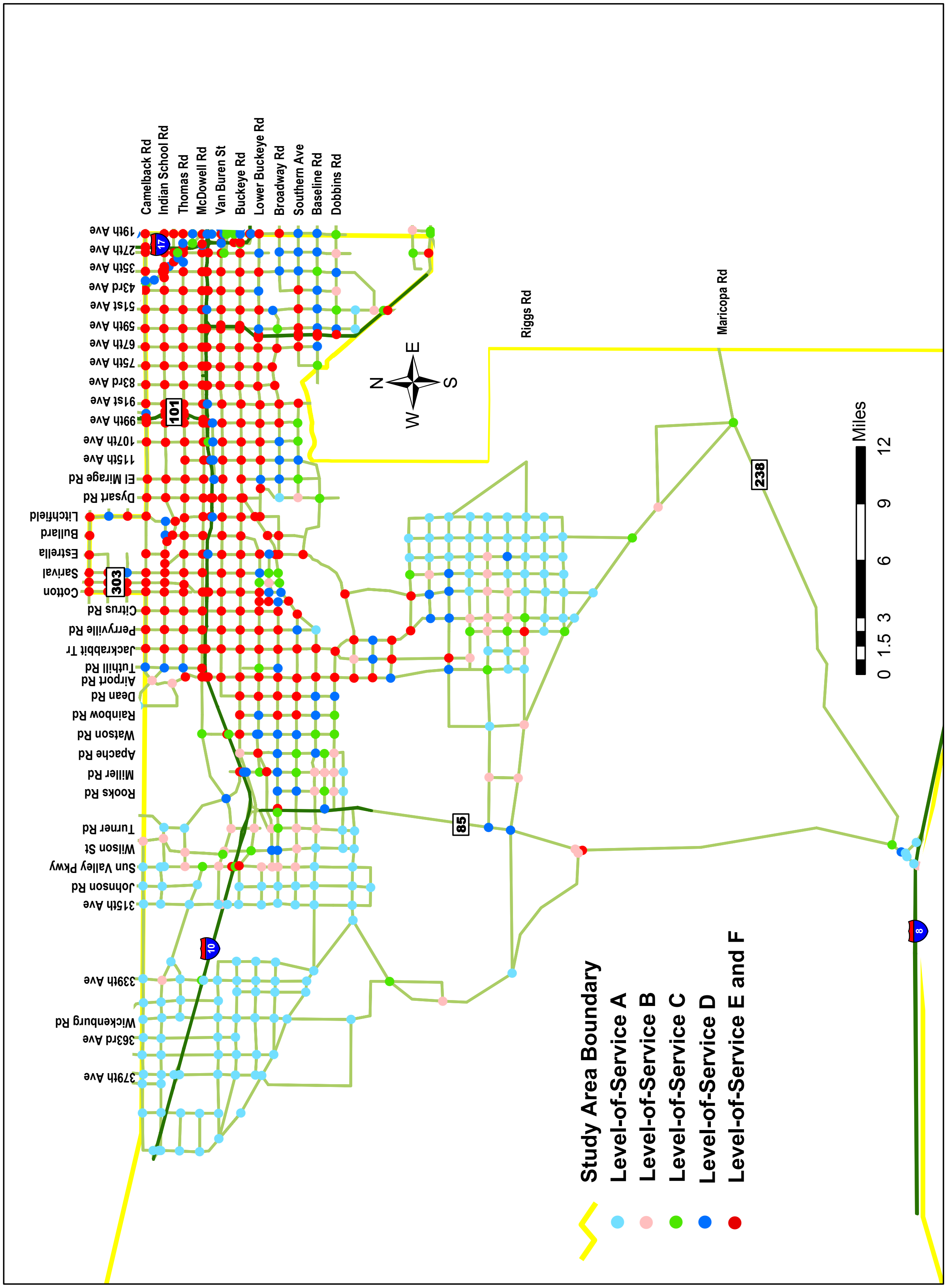

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Figure 5-77
Intersection Level-of-Service: Enhanced 2030

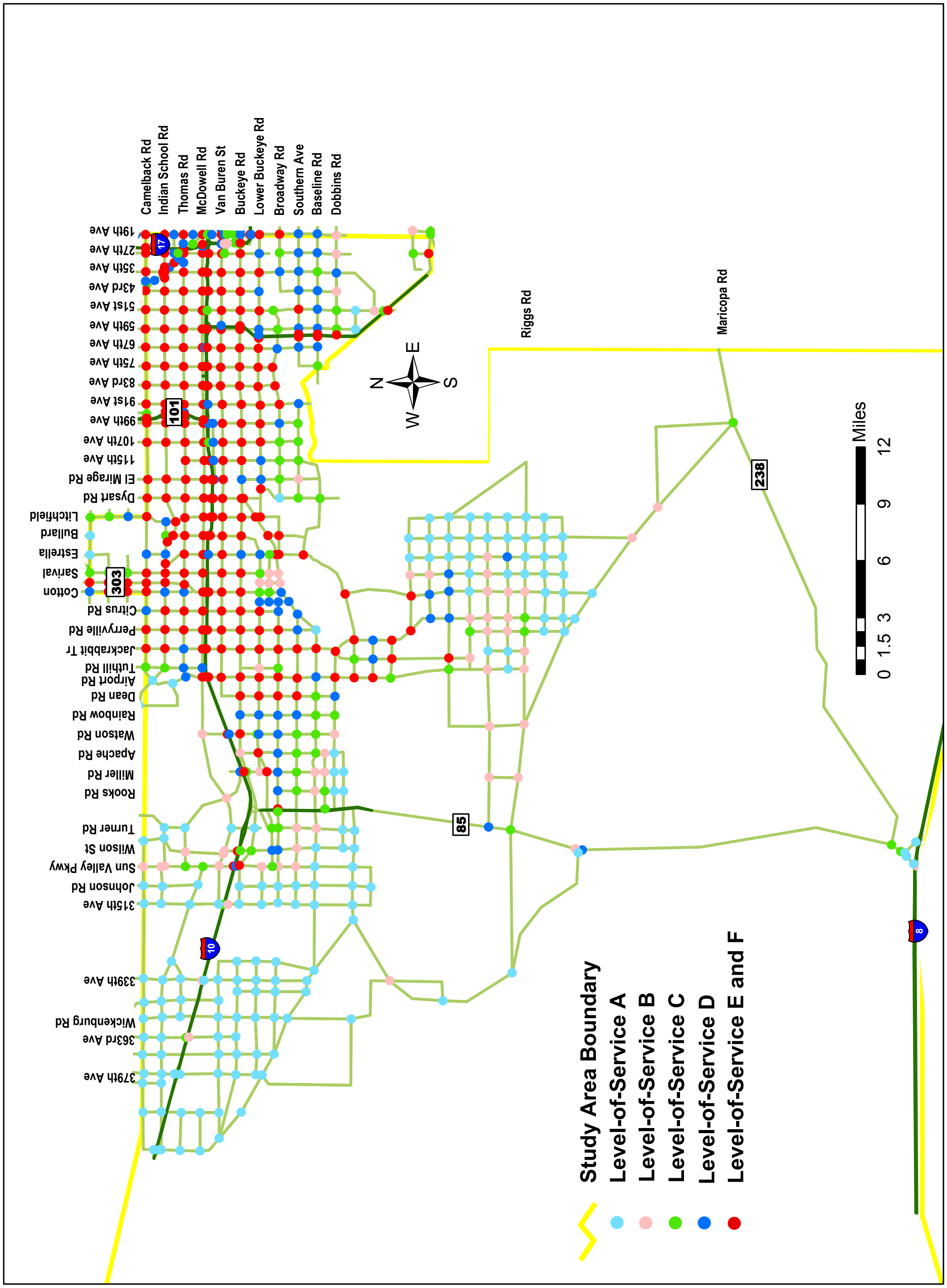


Figure 7-78
Intersection Level-of-Service: Option A 2030

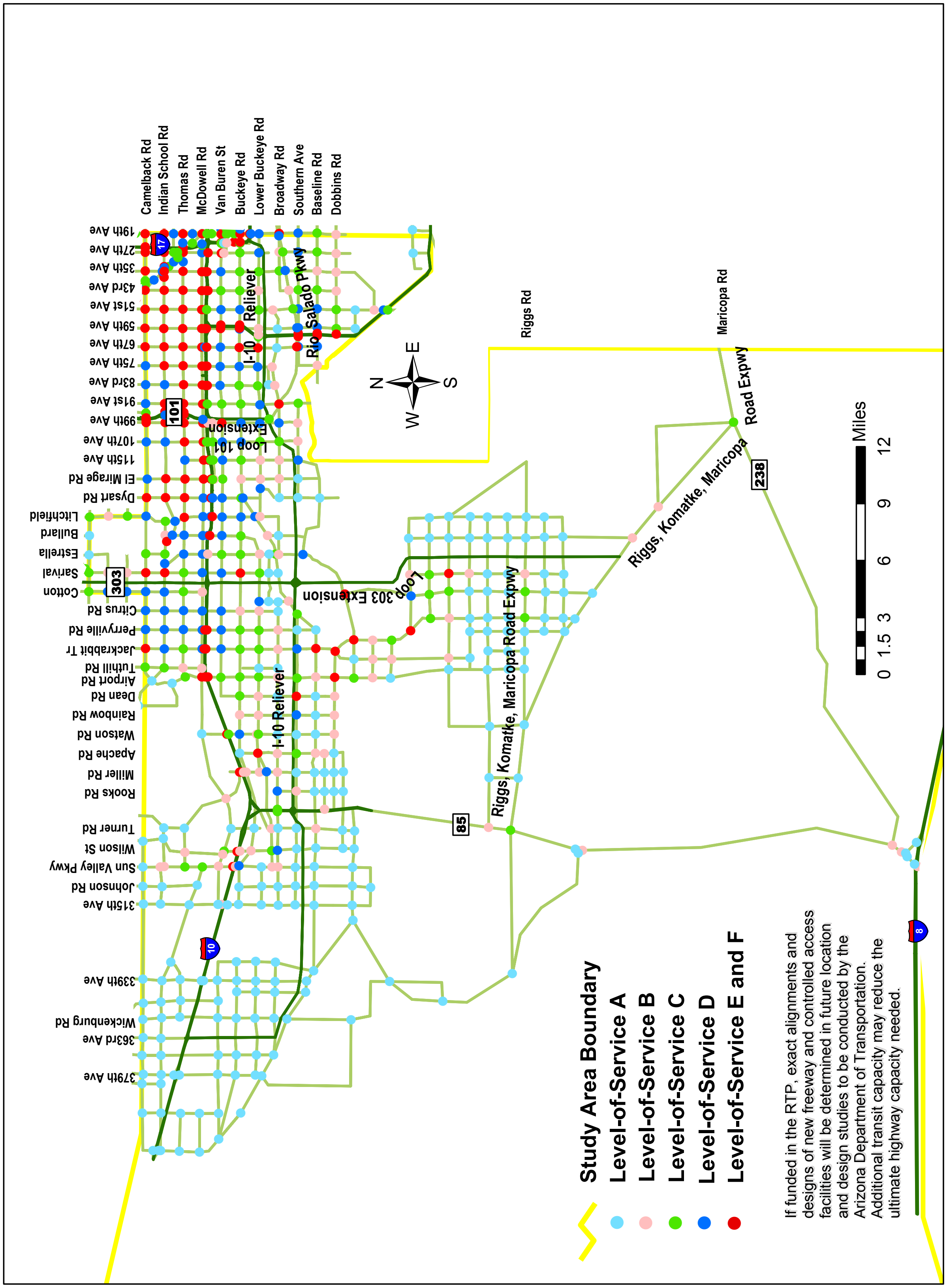


Figure 7-79
Intersection Level-of-Service: Option C 2030

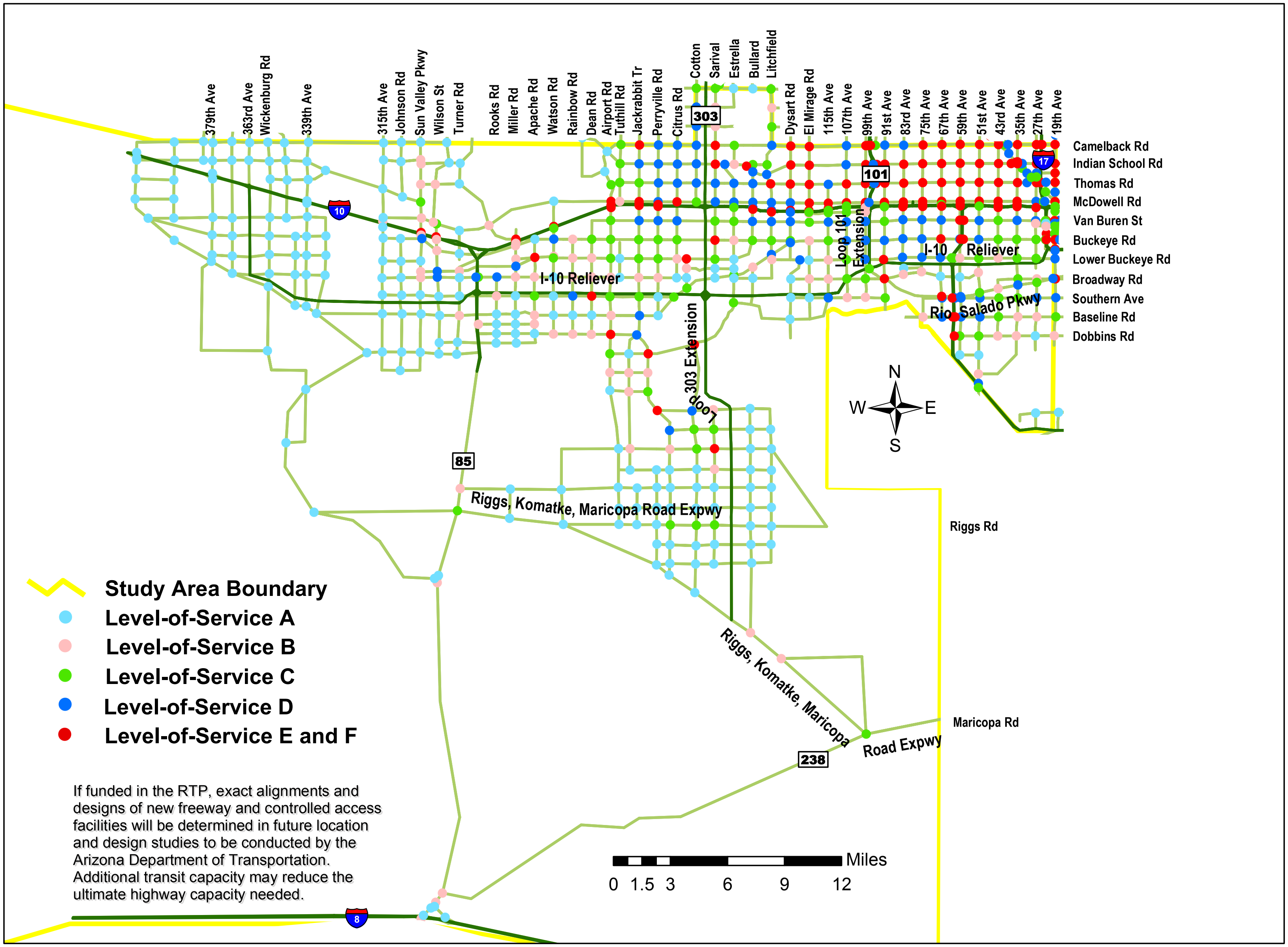


Figure 5-80
Intersection Level-of-Service: Future Base 2020

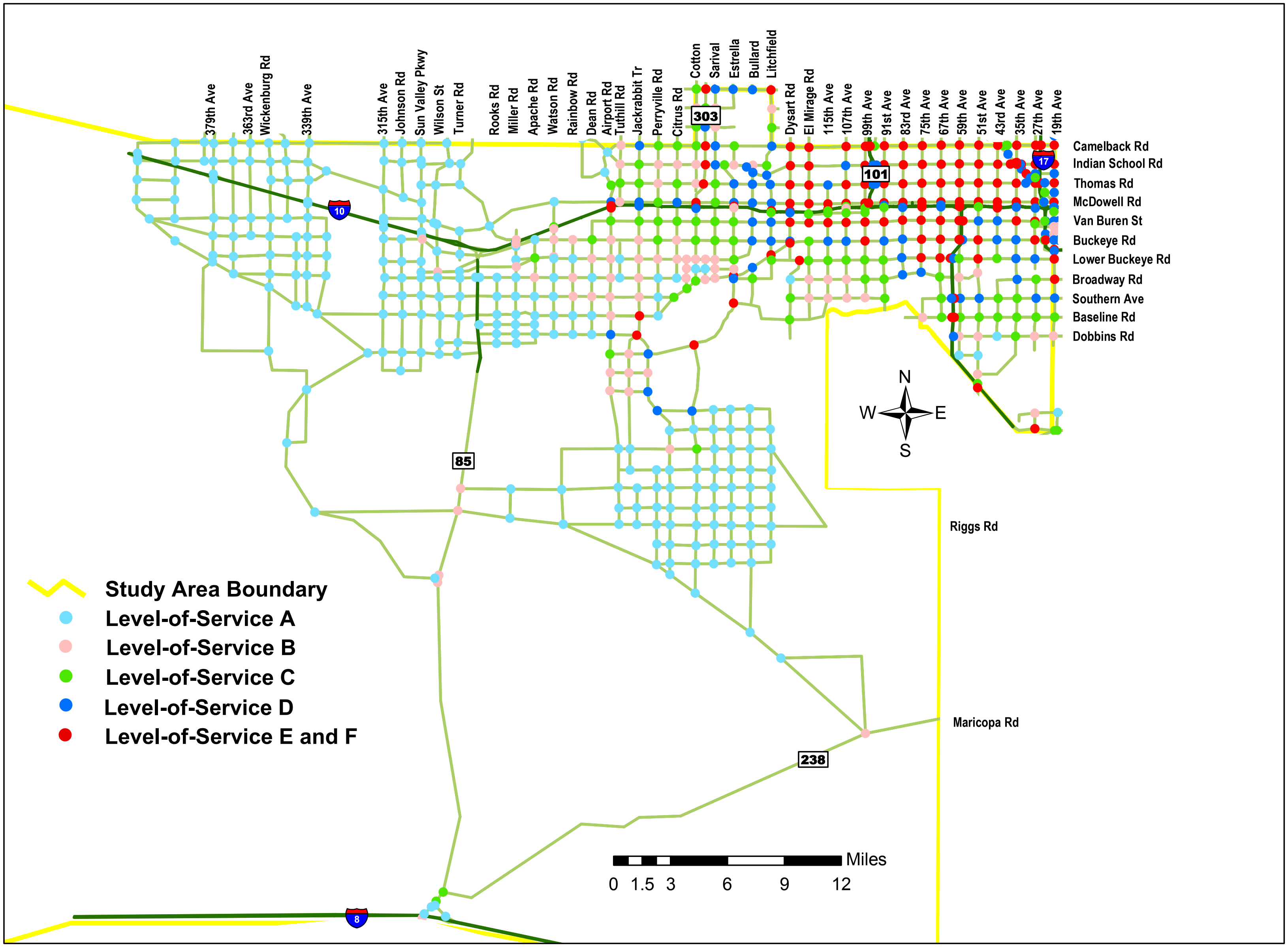


Figure 5-81
Intersection Level-of-Service: Enhanced 2020

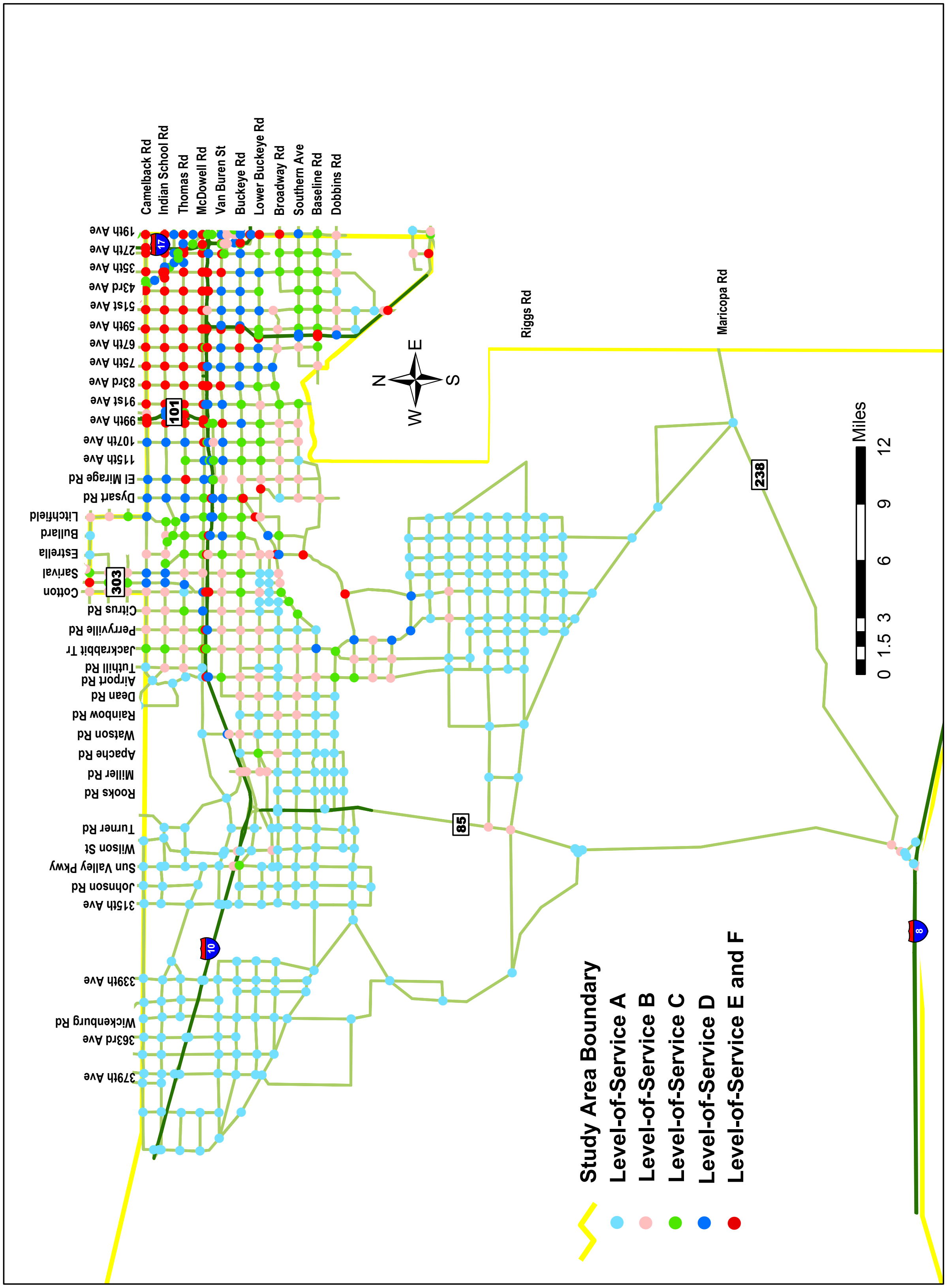


Figure 5-82
Intersection Level-of-Service: Option A 2020

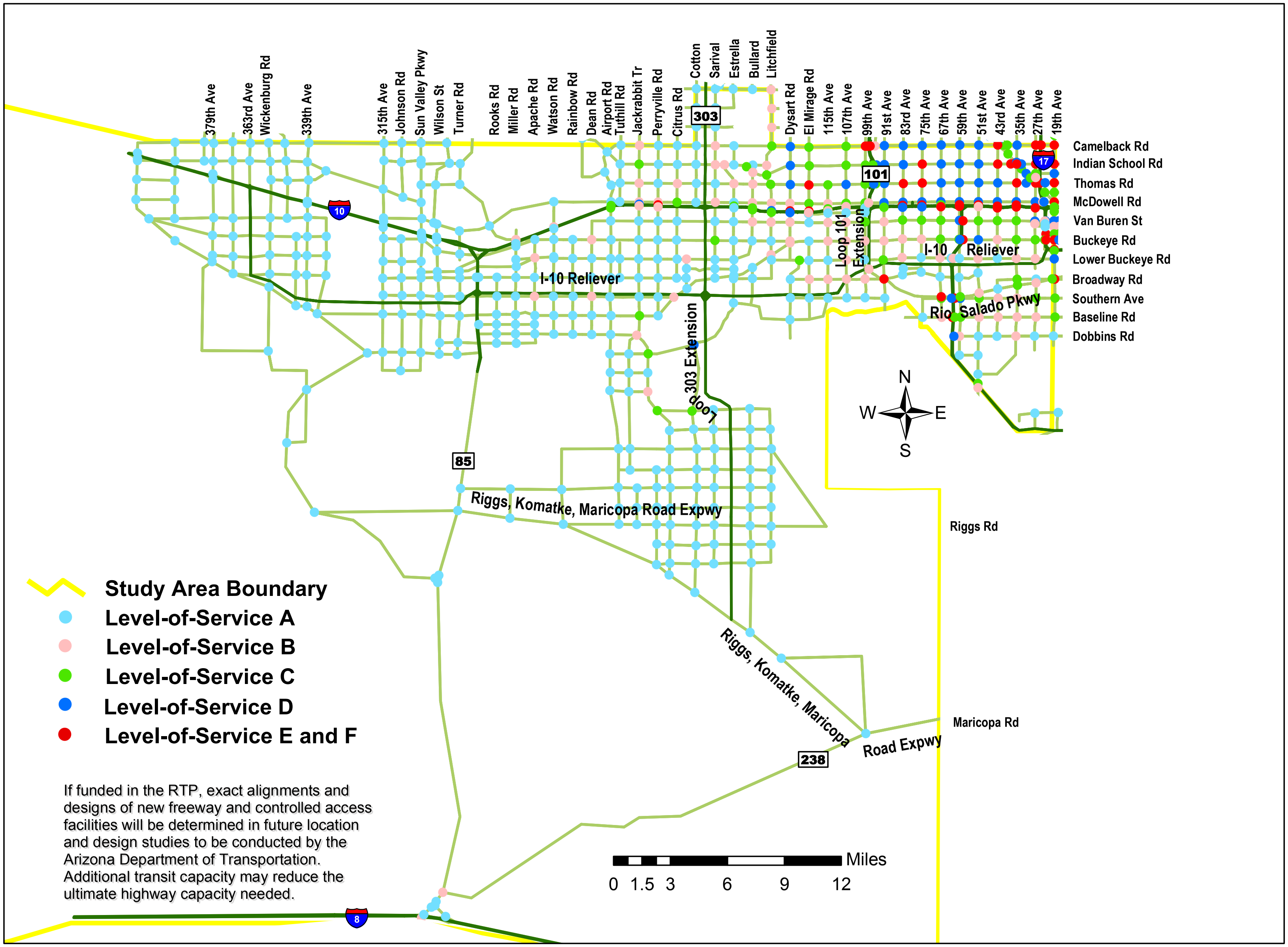
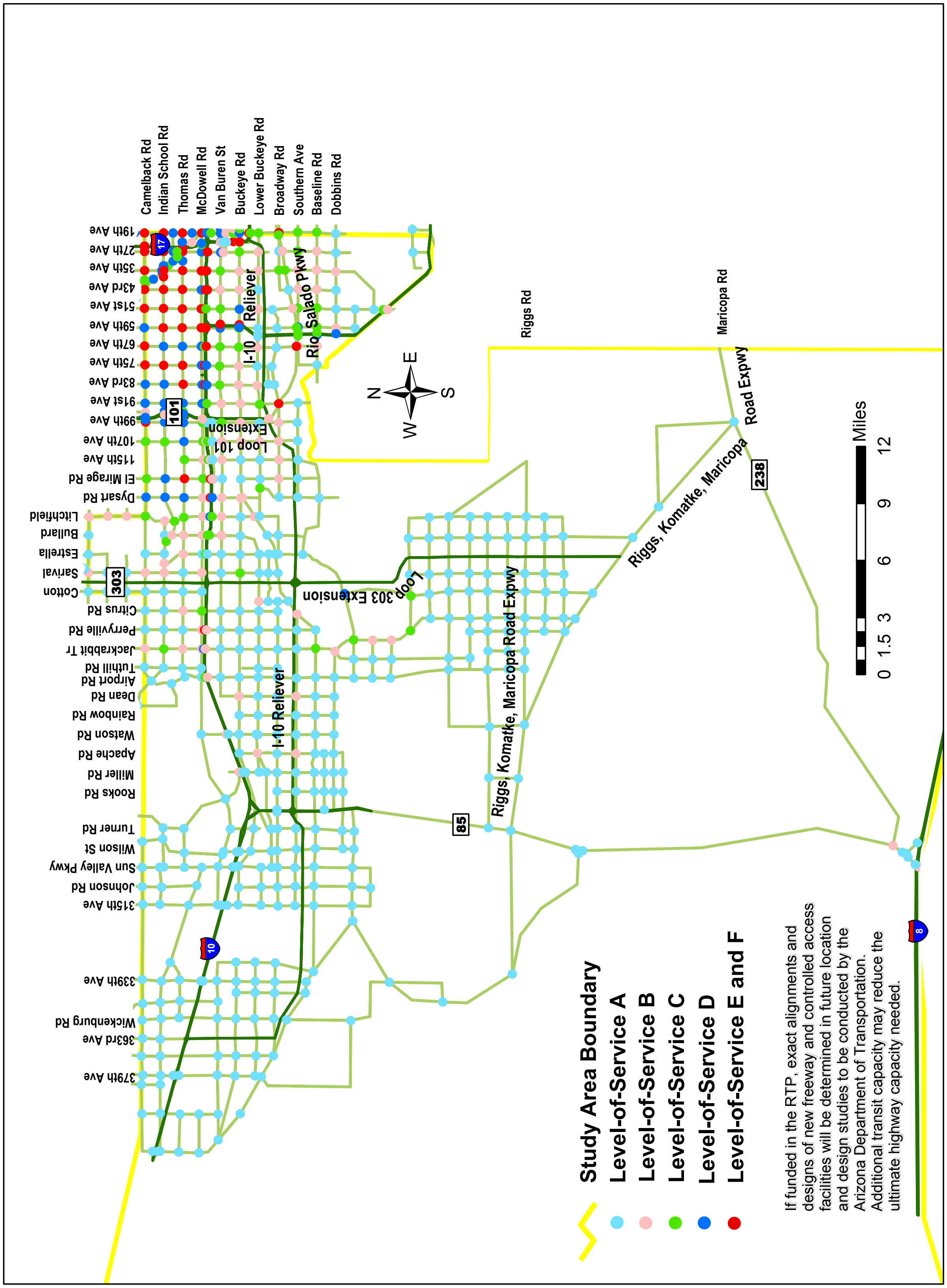


Figure 5-83
Intersection Level-of-Service: Option C 2020



5.5.4 Safety

Over the years, traffic count data and crash data have clearly indicated that the number of motor vehicle crashes increase proportionately with increasing vehicle miles of travel (VMT). Although, the relationship between the number of crashes and the amount of travel of exposure is not exactly linear, for a planning level safety assessment involving a comparison of the relative safety between planning options, a linear relationship is assumed to be adequate.

This method utilizes, traffic crash rates, computed either as the number of crashes per 100 million VMT (on continuous highway segments) or crashes per 100 million entering vehicles (at intersections), to estimate the total number of crashes that we may expect occur in a future year based on a forecast for the amount of travel in that year. This analysis can be further refined by utilizing particular crash rates generated for different crash severities such as fatal, personal injury, and property-damage-only (PDO) accidents, and also for different types of highway facilities and intersections. Freeway and arterial crash rates used in this assessment to generate future expected crashes were obtained from published literature for other similar urban regions, since similar statistics for the MAG region are not available at the current time.

Figures 5-84 and 5-85 (and Tables 5A-22 and 5A-23 in Appendix V) show the estimated number of crashes and their severity distribution for each of the networks in 2020 and 2030, respectively. The Current Base is an estimate based on the same crash rates used to estimate future year crashes and does not reflect the actual current crashes in the MAG region. Estimates for the Current Base are only for comparative purposes. The percent change (shown in the tables) for each network is the percent change compared to the Current Base.

A comparison of the Future Base, Enhanced, Option A and Option C networks against the Current Base shows different impacts on roadway safety due to different improvements to the roadway system assumed for each network. As expected, there are substantial increases in the total number crashes and the number within each crash category (i.e., fatal, injury, PDO) due to increased VMT on the highway system. For example, for the Current Base and Future Base networks the total number of freeway crashes is expected to increase from 4,920 in 2002 to 8,761 in 2030, an increase of 78%. For the 2030 Future Base network the number of crashes is estimated to increase 122% over the Current Base.

An examination of Enhanced, Option A, and Option C networks clearly shows that each of these scenarios will produce an improvement in overall road safety in comparison to the Future Base. Most of these improvements are due to more travel occurring on the freeway system as opposed to the arterial system. Although the total number of crashes on freeways appear to have increased, significant reduction in crashes are affected on arterials and at intersections. This leads to the conclusion that, systemwide, the Future Base network leads to the worst crash scenario among all networks compared.

As measured by total crashes, systemwide safety improves as additional freeway and expressway capacity are included in the Enhanced, Option A, and Option C networks. The Enhanced network includes more arterial travel than the Option A and Option C networks. As reflected by the crash numbers this leads to more fatal, injury and PDO crashes on the arterial system as compared to Option A and Option C. In conclusion, a comparison of both total and fatal plus injury crashes for the Option A and Option C networks indicates that these two networks are the best options from a safety viewpoint.

Figure 5-84
Motor Vehicle Accidents Forecast for 2020

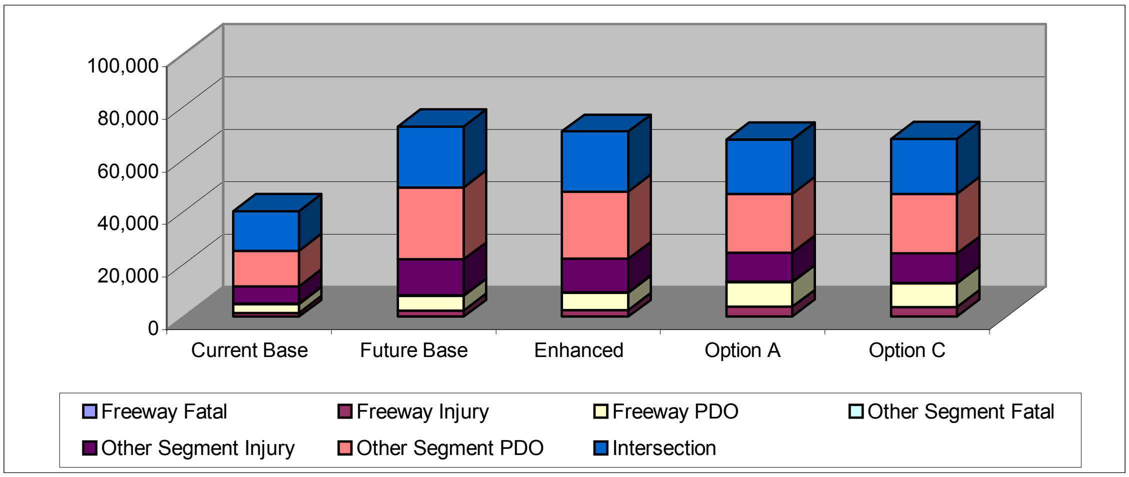
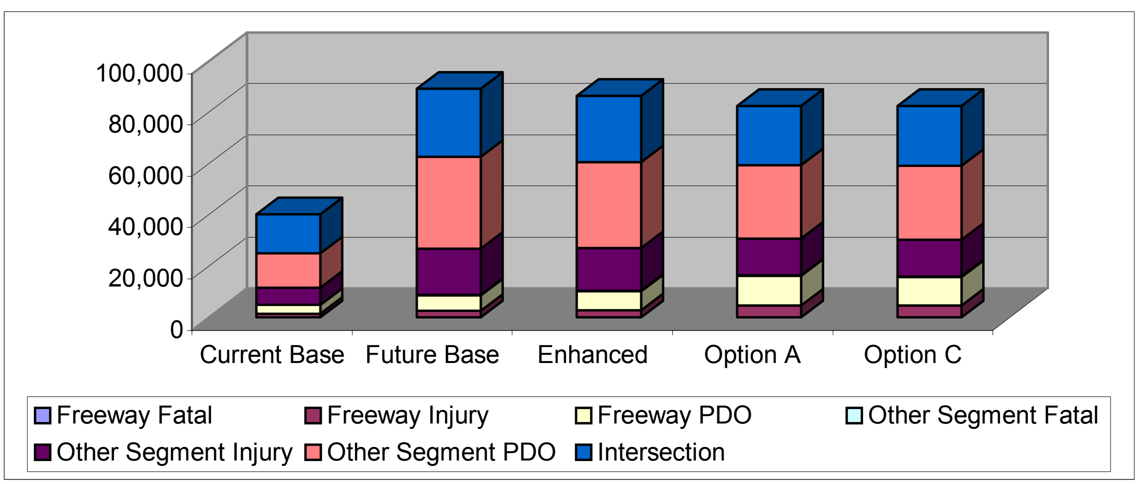


Figure 5-85
Motor Vehicle Accidents Forecast for 2030



5.6 System Summary and Conclusion

Table 5-1 presents, on a single table, much of the data described above. The physical data (centerline, lane, and capacity miles) on each network show that the major differences between the networks are the extent of the freeway system which is much more extensive under the Option A and Option C networks than under Future Base and Enhanced networks. The expressway system is also more extensive under Option A and Option C.

Operationally, the table shows that there is considerably more travel under Option A and Option C than under the Future Base and Enhanced networks both at the daily and peak hour level and for trucks. Because of the greater extensiveness of the freeway and expressway systems under Option A and Option C, there is much more travel on these systems under Option A and Option C and less on the arterial system.

In terms of congestion, there are many fewer miles of highway congested in the peak hour under Option A and Option C than under the Future Base and Enhanced networks. The number of intersections forecast to experience congestion is also smaller under the Option A and Option C networks than under the Future Base and Enhanced networks. The amount of travel in the peak hour expected to occur under congested conditions is greater under Option A and Option C than under the Future Base and Enhanced networks. However, this is in part due to the fact that there is substantially more travel overall under the Option A and Option C networks than under the other two. In percentage terms, there is a much smaller portion of total peak hour travel in congested conditions under the Option A and Option C networks than under the Future Base and Enhanced networks.

The number of motor vehicle accidents expected under the Option A and Option C networks is about 5% lower than under the Future Base and Enhanced networks. Freeway travel is generally safer than travel on lower class facilities with intersections, driveways, and other conflict zones.

Overall, the substantial increase in the number of freeway and expressway facilities in the Option A and Option C networks makes these networks generally more desirable in terms of congestion and safety. It is therefore concluded that a network is needed which includes substantial additions of freeway and expressway improvements.

After a brief review and comparison of arterial roadways and bridges under the four optional future highway networks, information on the individual new freeway and expressway facilities included in the networks is presented and analyzed. Following that presentation and analysis, transit and non-motorized transportation options are presented.

Table 5-1
Network Performance Comparisons*

	Network								
Year	2002	2020				2030			
Network	Current Base	Future Base	Enhanced	New Corridor Option A	New Corridor Option C	Future Base	Enhanced	New Corridor Option A	New Corridor Option C
Centerline Miles									
Freeway	108	128	128	218	218	128	128	218	218
Expressway	21	43	50	90	90	43	50	90	90
Arterial	865	1,119	1,109	1,057	1,057	1,119	1,109	1,057	1,057
Collector	27	20	22	22	22	20	22	22	22
Total	1,021	1,310	1,309	1,387	1,387	1,310	1,309	1,387	1,387
Lane Miles									
Freeway	585	634	935	1,999	1,869	634	935	1,999	1,869
Expressway	54	184	276	526	526	184	276	526	526
Arterial	2,204	4,658	4,608	4,423	4,432	4,658	4,608	4,423	4,432
Collector	69	74	84	84	84	74	84	84	84
Total	2,913	5,550	5,903	7,032	6,912	5,550	5,903	7,032	6,912
Capacity Miles**									
Freeway	12,293,610	13,307,910	13,307,910	19,717,530	19,626,390	13,307,910	13,307,910	19,717,530	19,626,390
Expressway	1,129,800	3,854,760	3,854,760	5,794,320	5,794,320	3,854,760	3,854,760	5,794,320	5,794,320
Arterial	17,632,320	37,265,600	37,265,600	36,864,480	36,864,480	37,265,600	37,265,600	36,864,480	36,864,480
Collector	554,880	592,800	592,800	672,800	672,800	592,800	592,800	672,800	672,800
Total	31,610,610	55,021,070	55,021,070	63,049,130	62,957,990	55,021,070	55,021,070	63,049,130	62,957,990
Daily Vehicle Miles of Travel									
Freeway	6,958,146	11,586,434	14,420,107	27,269,662	27,484,309	14,188,130	18,446,314	37,820,996	37,545,683
Expressway	388,532	2,663,287	2,854,555	3,106,447	3,598,702	3,038,593	3,890,479	5,646,793	5,603,736
Arterial	6,870,346	22,435,342	19,190,450	12,290,813	12,520,980	34,870,689	30,748,799	20,910,225	21,245,244
Collector	86,303	350,646	302,706	224,848	256,971	452,913	458,313	337,952	359,209
Total	14,303,326	37,035,709	36,767,818	42,891,770	43,860,963	52,550,326	53,543,906	64,715,966	64,753,872
Daily Truck Vehicle Miles of Travel									
Freeway	1,951,141	3,182,836	4,065,007	7,107,940	7,160,477	3,974,190	5,299,251	9,572,807	9,462,723
Expressway	102,628	961,038	1,038,715	1,152,828	1,328,326	1,041,947	1,361,063	1,925,822	1,924,482
Arterial	1,692,490	5,160,140	4,234,261	2,461,570	2,530,692	7,849,686	6,581,317	4,454,160	4,541,169
Collector	17,810	81,358	71,873	47,606	54,609	112,593	112,542	79,408	83,001
Total	3,764,070	9,385,372	9,409,857	10,769,944	11,074,104	12,978,416	13,354,174	16,032,197	16,011,375
Evening Peak Hour Vehicle Miles of Travel									
Freeway	337,282	616,052	798,620	1,441,343	1,450,840	708,938	1,013,414	2,022,321	2,014,484
Expressway	22,013	113,879	106,401	114,382	127,615	140,093	162,693	240,572	236,049
Arterial	400,007	1,276,556	1,131,467	768,189	781,498	2,039,333	1,841,064	1,264,034	1,279,598
Collector	6,106	19,024	17,366	15,100	15,075	25,425	24,876	20,980	21,376
Total	765,409	2,025,510	2,053,855	2,339,014	2,375,027	2,913,789	3,042,047	3,547,906	3,551,506
Evening Peak Hour Average Vehicle Speeds									
Freeway	53	42	50	54	54	35	41	46	44
Expressway	42	39	43	44	44	27	36	42	42
Arterial	30	27	29	30	30	22	24	27	27
Collector	25	22	22	23	23	18	20	22	22
Directional Highway Miles under Congested Conditions (Level-of-Service E or F†) in the Evening Peak Hour									
Freeway	6	48	20	6	11	79	68	53	50
Expressway	1	4	4	0	0	52	19	8	8
Arterial	68	201	119	37	41	609	488	139	138
Collector	0	2	2	1	1	9	7	3	3
Total	75	255	145	44	53	749	582	202	199
Percent of Directional Highway Miles under Congested Conditions (Level-of-Service E or F†) in the Evening Peak Hour									
Freeway	3	19	8	1	3	31	27	12	11
Expressway	2	5	4	0	0	60	19	4	4
Arterial	4	9	5	2	2	27	22	7	7
Collector	1	5	4	3	2	24	15	6	6
Total	4	10	6	2	2	29	22	7	7
Evening Peak Hour Vehicle Miles of Travel under Congested Conditions (Level-of-Service E or F†)									
Freeway	34,943	204,265	114,791	33,226	59,715	708,938	1,013,414	2,022,321	2,014,484
Expressway	1,598	9,568	8,268	0	0	140,093	162,693	240,572	236,049
Arterial	52,198	347,440	204,723	63,617	73,395	2,039,333	1,841,064	1,264,034	1,279,598
Collector	212	1,829	2,511	941	1,325	25,425	24,876	20,980	21,376
Total	88,951	563,103	330,293	97,784	134,436	2,913,789	3,042,047	3,547,906	3,551,506
Percent of Evening Peak Hour Vehicle Miles of Travel under Congested Conditions (Level-of-Service E or F†)									
Freeway	10	33	14	2	4	51	37	19	17
Expressway	7	8	8	0	0	66	27	8	8
Arterial	13	27	18	8	9	53	45	18	18
Collector	3	10	14	6	9	39	24	10	10
Total	12	28	16	4	6	53	41	18	17
Evening Peak Hour Intersections under Congested Conditions (Level-of-Service E or F†)									
East Subarea***	22	107	90	48	55	227	231	239	239
Central Subarea***	0	25	14	3	3	189	193	177	177
West Subarea***	0	0	0	0	0	142	146	142	142
South Subarea***	0	2	2	0	0	88	88	79	79
Percent of Intersections under Congested Conditions (Level-of-Service E or F†) in Evening Peak Hour									
East Subarea***	12	47	39	20	23	69	62	41	40
Central Subarea***	0	13	7	2	2	68	55	17	18
West Subarea***	0	0	0	0	0	3	3	1	1
South Subarea***	0	2	2	0	0	13	11	5	5
Motor Vehicle Accidents - Annual									
Freeway Fatal	22	33	38	53	51	36	42	63	62
Freeway Injury	1,418	2,298	2,644	3,781	3,649	2,516	2,949	4,670	4,562
Freeway PDO****	3,480	5,668	6,521	9,340	9,012	6,209	7,277	11,559	11,292
Freeway Subtotal	4,920	7,999	9,203	13,174	12,712	8,761	10,268	16,292	15,916
Other Segment Fatal	74	148	142	121	123	192	184	155	156
Other Segment Injury	6,699	13,717	12,756	11,149	11,295	17,972	16,709	14,299	14,380
Other Segment PDO****	13,361	27,406	25,534	22,328	22,639	35,892	33,478	28,712	28,901
Other Segment Subtotal	20,134	41,271	38,432	33,598	34,057	54,056	50,371	43,166	43,437
Intersection	15,219	23,083	22,869	20,737	20,838	26,411	25,878	23,054	23,228
Total	40,273	72,353	70,504	67,509	67,607	89,228	86,517	82,512	82,581

*Results are preliminary given the interim nature of the underlying socioeconomic data and are subject to change in the RTP process.
**Capacity Miles: lane miles multiplied by daily vehicle capacity per lane of: 21,000 for freeways and expressways; 8,000 all other types
***Subareas: East is east of the Agua Fria River; central is west of the Agua Fria River, east of SR-85, and north of the Gila River; south is south of the Gila River and west of the Agua Fria River; west is west of SR-85.
****PDO: Property Damage Only
†Level-of-Service E and F are highly congested or jammed conditions. Level A is freeflow. Levels B to D are progressively deteriorating traffic service.

5.7 New Arterials

As shown in Figures 5-9, 5-14, and 5-20, there are more centerline mile, lane miles, and capacity miles of arterial roads than of all the other classes of roads in each network put together. This section focuses on the expansion of the arterial network. It provides information and analysis. Conclusions are presented in Section 5.13 following a thorough presentation of information and analysis for all of the networks and their potential new facilities.

The increases in lanes miles of arterials from the Current Base to the Future Base network includes 287 miles of new 4 lane arterial and 5 miles of new 6 lane arterial, as shown in Table 5-2. New facilities in the Future Base network are shown on Figure 5-3. Additionally, there are 600 miles of existing arterials that are widened in the Future Base network. Widened facilities in the Future Base network are shown on Figure 5-4. Nearly all of the arterial widenings in the Future Base are a single lane in each direction, with a very small number of widenings of two lanes in each direction.

Table 5-2
Centerline Miles of New and Widened Arterials

	Network		
	Future Base	Enhanced	Options A and C
New 4 Lane	287	3	0
New 6 Lane	5	1	0
Widen by 2 Lanes	594	0	13
Widen by 4 Lanes	18	0	0

Review of level-of-service information shown in Figures 5-63 to 5-66 shows that level-of-service on arterials in the western and southern portions of the study area are generally expected to be very good in 2030. In southern Goodyear south of the Gila River there are a very limited number of facilities operating near capacity. Similarly, west of SR-85 level-of-service the figures show that volume-to-capacity ratios are generally less than 0.60. East of the Agua Fria River volume-to-capacity ratios are generally higher, with some facilities operating at LOS E and F, indicating volume-to-capacity ratios in excess of 0.90. Under Option A and Option C, there are sufficient facilities operating at better levels of service to provide motorists with uncongested alternative routes.

The relative lack of congestion in the southern and western portions of the study area may be in part due to the land development conditions not approaching build out in 2030. In subsequent years as build out is approached, volume-to-capacity ratios can be expected to rise and approach those predicted for the central portion of the study area. In the portion of the study area bounded by Camelback Road, 19th Avenue, Lower Buckeye Road, and Airport Road on the west, build-out is likely to be much closer in 2030. In that area the depicted network provides about 30% of the arterial network in 6 lane facilities and the remainder in 4 lane facilities.

Table 5-3 shows the costs of the new and widened arterials in each of model networks. The costs assume that there are no right-of-way acquisition costs for new construction or widening of existing arterials, since most of the arterial right-of-way acquisition will take place through dedication. (Chapter 6 includes a more refined cost estimate for recommended facilities that includes an estimate of arterial right-of-way acquisition costs.) The table shows that over $3 billion of arterial improvements are included in the Future Base network. Improvements included in the Enhanced network are estimated to cost an additional $10 million and improvements in the Option A and Option C networks an additional $47 million. Much of the arterial network will be built by the private sector as part of the land development process.

Table 5-3
Arterial Costs in Millions of 2003 Constant Dollars

		Network		
	Cost per Mile	**Future Base**	**Enhanced**	**Options A and C**
New 4 Lane	3.0	860	8	0
New 6 Lane	4.0	18	2	0
Widen by 2 Lanes	3.5	2,079	0	47
Widen by 4 Lanes	4.5	80	0	0
TOTAL		$3,038	$10	$47

5.8 New Arterial River Crossings

Four major rivers, the Salt, the Agua Fria, the Hassayampa, and the Gila, flow through the more populated northerly section of the study area. Rivers are a natural impediment to travel. Overcoming this impediment opens up new lands for development, but requires substantial bridge investment.

The Future Base network shows six additional river crossings on the arterial network compared to the existing river crossings. These river crossings are assumed to be bridges. (Chapter 6 provides a more complete examination of arterial river crossings, including low-lying options subject to flooding during storm events.) These new bridges are located at:

- 59th Avenue over the Salt River;
- Dysart Road over the Gila River;
- Rainbow Valley Road over the Gila River;
- Camelback Road over the Hassayampa River;
- Thomas Road over the Agua Fria River; and
- El Mirage Road over the Agua Fria River.

All of these bridges have four travel lanes in the Future Base network. No additional arterial bridges are included in the Enhanced, Option A, or Option C networks. The estimated cost of these six bridges is $144 million as shown on Table 5-4. Almost half of this total cost is bridging Camelback Road over the Hassyampa River. Due to the river's width, a very long bridge would be required. A bridge at this location may be funded by nearby land developers.

Table 5-4
Estimated New Arterial River Bridge Costs in 2003 Constant Dollars

Bridge	Lanes	Width in Feet	Length in Feet	Cost per Square Foot	Cost
59th Avenue over the Salt River	4	78	1000	120	$ 9,360,000
Dysart Road over the Gila River	4	78	2000	120	$ 18,720,000
Rainbow Valley Road over the Gila River	4	78	2000	120	$ 18,720,000
Camelback Road over the Hassayampa River	4	78	5200	120	$ 48,672,000
Thomas Road over the Agua Fria River	4	78	1000	120	$ 9,360,000
El Mirage Road over the Agua Fria River	4	78	1000	120	$ 9,360,000
Total					**$ 114,192,000**

Table 5-5 shows the peak hour volume-to-capacity ratios for the peak direction on these six bridges under each of the networks modeled for 2030. Under the Future Base and Enhanced networks the 59th Avenue bridge over the Salt River has peak hour volume-to-capacity ratios in excess of 0.80. With the addition of 4 lanes to the adjacent South Mountain Freeway bridge under the Option A and Option C networks, these ratios fall substantially to less than 0.20. The overall volume-to-capacity ratio for Salt River bridges from 19th Avenue west is about 0.75 under Option A and Option C.

Table 5-5
Peak Hour Volume-to-Capacity Ratios on Major New Arterial River Crossings in 2020 and 2030

Bridge	Network: Future Base	Network: Enhanced	Network: Option A	Network: Option C
	2020			
59th Avenue over the Salt River	0.74	0.59	0.03	0.03
Dysart Road over the Gila River	0.82	0.65	0.14	0.14
Rainbow Valley Road over the Gila River	1.17	1.13	0.63	0.64
Camelback Road over the Hassayampa River	0.01	0.01	0.01	0.01
Thomas Road over the Agua Fria River	1.10	1.01	0.95	0.96
El Mirage Road over the Agua Fria River	0.94	0.91	0.94	0.95
	2030			
59 Avenue over the Salt River	0.85	0.83	0.12	0.17
Dysart Road over the Gila River	0.80	0.83	0.62	0.53
Rainbow Valley Road over the Gila River	1.49	1.52	1.03	0.94
Camelback Road over the Hassayampa River	0.07	0.07	0.07	0.07
Thomas Road over the Agua Fria River	1.39	1.37	1.22	1.15
El Mirage Road over the Agua Fria River	1.09	1.04	0.94	1.00

The Dysart Road bridge over the Gila River has a 2030 forecast peak hour volume-to-capacity ratio in the peak direction under the Future Base network of 0.80. Under the Option A and Option C networks this falls to 0.62 and 0.53, respectively, with the nearby bridges at 115th Avenue, El Mirage Road, and Bullard Avenue all forecast to operate at LOS A, as shown in Figures 5-65 and 5-66. Under the Enhanced network these nearby bridges will operate at LOS A, except for the Bullard Avenue bridge which will operate at LOS C, as shown in Figure 5-64. Under the Future Base 2030 forecast, the Bullard Avenue bridge operates at LOS D, the El Mirage Road bridge at LOS C, and the 115th Avenue bridge at LOS B, as shown in Figure 5-63.

The Rainbow Valley Road bridge over the Gila River shows 2030 forecast volume-to-capacity ratios in excess of 0.90 under all of the networks. The lowest value occurs under Option C under which the Loop 303 Extension bridge over the Gila River is the widest. Collectively, the Rainbow Valley Road bridge and the two nearby river crossings at Tuthill Road and Airport Road show peak hour volume-to-capacity ratios which greatly exceed capacity under the Future Base and Enhanced networks, but which match capacity under the Option A and Option C networks. The inclusion of the I-10 Reliever freeway just to the north of these bridges in the Option A and Option C networks increases the amount of travel across the bridges.

The Camelback Road bridge over the Hassayampa River has peak hour peak direction volume-to-capacity ratios of less than 0.10 under all of the networks. To its south, the Tonopah-Salome Highway also has a volume-to-capacity ratio of less than 0.10 under all of the networks.

The two new arterial bridges over the Agua Fria River show peak hour peak direction volumes which exceed 0.90 under all networks. There is an existing housing development on the grid alignment of El Mirage Road south of Thomas Road to the Agua Fria River.

5.9 New Freeways and Freeway Widenings

Freeways provide the means for high speed automobile and truck travel. The data associated with Figure 5-9 (presented in Table 5A-1 in Appendix V) show that between 10 and 16% of highway centerline miles in the SWATS area are freeways. The data associated with Figures 5-21 and 5-22 show that 26 to 63% of vehicle miles of travel in 2020 and 2030 are expected to be on the freeway system.

The increase in centerline miles of freeways from the Current Base to the Future Base network includes the 14 mile South Mountain Freeway with 6 lanes, about 3 miles of new HOV lanes on I-17 and I-10, about 6 miles of 4 lane freeway replacing the northernmost portion of SR-85, and about 5 miles of I-10 widening by 2 lanes. These data are shown on Table 5-6.

Table 5-6
Centerline Miles of New and Widened Freeways

	Network			
	Future Base	Enhanced	Option A	Option C
New HOV lanes	3	28		
New 6 lane - South Mountain Bypass	14			
New 4 lane - Northerly Section SR-85	6			
New 12 lane - I-10 Reliever: entire length			48	
New 14 lane - I-10 Reliever: east of Loop 303 Ext				19
New 8 lane - I-10 Reliever: Loop 303 Ext to SR-85				12
New 6 lane - I-10 Reliever: West of SR-85				17
New 10 lane - Loop 101 Extension: south of Riggs Rd			4	4
New 10 lane - Loop 303 Extension: north of Riggs Rd			27	
New 12 lane - Loop 303 Extension: north of I-10 Reliever				13
New 10 lane - Loop 303 Extension: Riggs Rd to I-10 Relvr				14
Widen 2 lane	5	14		
Widen 4 lane		26	14	14
Widen 6 lane		18	4	4

Freeway mileage increases from the Future Base to the Enhanced network with new HOV lanes on I-17 south of I-10, on Loop 101, and on I-10 west of Loop 101 to SR-85, as well as an increase from 2 to 4 HOV lanes on I-10 east of Loop 101. The entire length of I-10 in the study area is widened by up to 6 lanes and the northerly section of SR-85 is widened from 4 to 6 lanes. Six new interchanges are added along I-10 in the Enhanced network.

Option A and Option C provide dramatic increases in the amount of freeway serving the study area. Figure 5-8 shows the major new freeway corridors included in these networks. The number of centerline miles under these options is the same (see Table 5A-1 in Appendix V), but differing freeway widths yield somewhat different amounts of freeway lane mileage (see Table 5A-2 in

Appendix V). Major new freeways are listed above in section *5.2.3 New Highway Corridors Options A and C.* In addition to major new freeways in the study area, the South Mountain Freeway is widened from 6 to 10 lanes under Option A and Option C. The estimated costs of the freeway improvements are shown on Table 5-7 by the network in which each improvement is included in the networks.

Table 5-7
Freeway Costs in Millions of 2003 Constant Dollars

		Network			
	Cost per Mile	Future Base	Enhanced	Option A	Option C
New HOV lanes	6	18	168	-	-
New 6 lane - South Mountain Bypass	40	560	-	-	-
New 4 lane - Northerly Section SR-85	25	150	-	-	-
New 12 lane - I-10 Reliever: entire length	55	-	-	2,640	-
New 14 lane - I-10 Reliever: east of Loop 303 Ext	60	-	-	-	1,140
New 8 lane - I-10 Reliever: Loop 303 Ext to SR-85	45	-	-	-	540
New 6 lane - I-10 Reliever: West of SR-85	40	-	-	-	680
New 10 lane - Loop 101 Extension: south of Riggs Rd	50	-	-	200	200
New 10 lane - Loop 303 Extension: north of Riggs Rd	50	-	-	1,350	-
New 12 lane - Loop 303 Extension: north of I-10 Reliever	55	-	-	-	715
New 10 lane - Loop 303 Extension: Riggs Rd to I-10 Relvr	50	-	-	-	700
Widen 2 lane	8	40	112	-	-
Widen 4 lane	16	-	416	224	224
Widen 6 lane	24	-	432	96	96
Total		**$768**	**$1,128**	**$4,510**	**$4,295**

New freeway facilities included in the Future Base network will cost $768 million, most of which is for construction of the South Mountain Freeway. New HOV lanes and freeway widenings account for the $1.1 billion needed to provide the additional freeway facilities included in the Enhanced network. Option A and Option C require an additional $4.3 to 4.5 billion, depending upon the number of lanes included on sections of the I-10 Reliever and the Loop 303 Extension. The level of potential investment required for future freeways is quite large. Each new freeway facility is described below with a brief description of forecast traffic and other characteristics.

Some of the major new freeways include major river crossings. The costs of these major bridges are shown in Table 5-8. These costs are in addition to those noted above for each of the networks. With the exception of the South Mountain Freeway bridge which is included in the Future Base network, all of the new bridges are developed under the Option A and Option C networks. The South Mountain Freeway bridge cost estimate includes the full 10 lane facility included in the Option C and Option A networks. The Loop 303 Extension and I-10 Reliever cost estimates over the Gila and Agua Fria Rivers, respectively, include the wider facilities included in the Option C network. The I-10 Reliever cost estimate for the Hassayampa River bridge is for the Option C network facility.

Table 5-8
Estimated New Freeway and Expressway River Bridge Costs in 2003 Constant Dollars

Bridge	Lanes	Width in Feet	Length in Feet	Cost per Square Foot	Cost
South Mountain Bypass over the Salt River	10	156	1000	120	$ 18,720,000
I-10 Reliever over the Agua Fria River	14	204	1000	120	$ 24,480,000
Loop 303 Extension over the Gila River	12	180	2000	120	$ 43,200,000
I-10 Reliever over the Hassayampa River	6	108	5200	120	$ 67,392,000
Rio Salado Expressway over the Salt River	6	102	2000	120	$ 24,480,000
Total					**$ 178,272,000**

Each potential new freeway facility is described below with a brief description of forecast traffic and other characteristics. The facilities are shown in Figure 5-86. The information presented is used in the subsequent section to draw conclusions concerning each facility. Several of the facilities are closely interrelated, so a complete review of the information is necessary before conclusions can be drawn. This includes information on widening of I-10. Widening of Loop 101 and I-17, as noted above, are at the edge of the SWATS area and are covered under the Northwest Area Transportation Study.

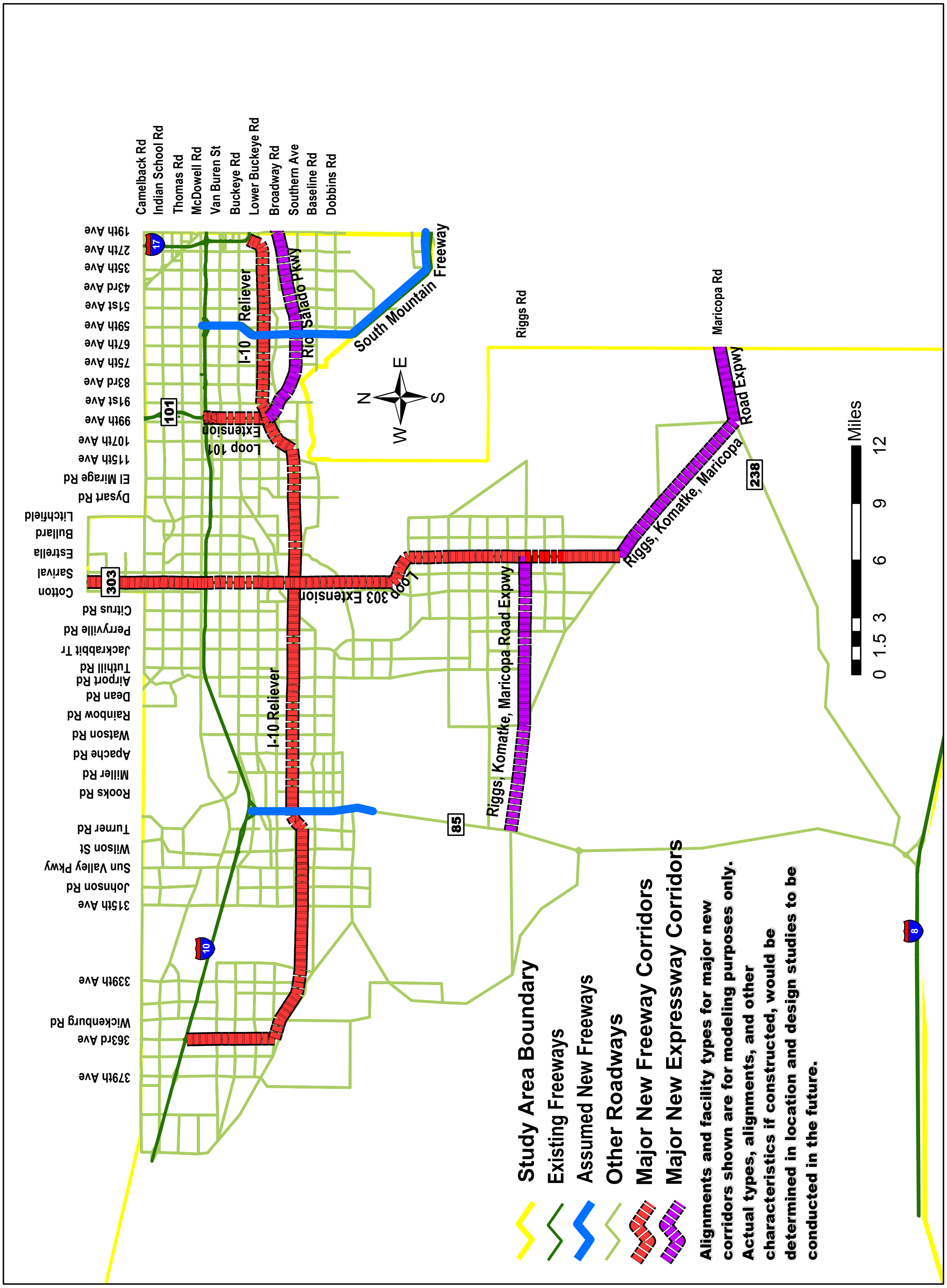
Under the Future Base network I-10 is widened by one general purpose lane (from 4 to 5) in each direction west of I-17 to 35th Avenue and the existing HOV lane is extended through the Loop 101 interchange. An additional general purpose lane is added west of Dysart Road to Estrella Parkway, providing 3 lanes in each direction. Figure 5-63 shows that I-10 is expected to operate under congested conditions of LOS E or F east of Miller Road in 2030.

Under the Enhanced, Option A, and Option C networks I-10 is widened to 7 lanes (5 general purpose and 2 HOV) east of Loop 101, 6 lanes (5 general purpose and 1 HOV) west of Loop 101 to SR-85, and 4 general purpose lanes west of SR-85. Under the Enhanced network I-10 is expected to operate with congested conditions of LOS E or F east of Airport Road to downtown Phoenix in 2030, as shown in Figure 5-64. West of Airport Road volume-to-capacity ratios remain over 0.80, but drop to about 0.69 west of Watson Road. West of SR-85 volume-to-capacity ratios fall to 0.66 and west of Sun Valley Parkway to 0.36.

Figures 5-65 and 5-66 show that under Option A and Option C congested conditions along I-10 improve. There are some locations with congested conditions expected in 2030, particularly in the section between Loop 101 and Loop 303. East of Loop 101 to downtown Phoenix there are some short sections expected to experience LOS E or F congested conditions in 2030.

West of Loop 303 there are no sections expected to operate under LOS E or F conditions under Option A and Option C. Volume-to-capacity ratios are slightly higher under Option C than under Option A west of Loop 303 and drop to 0.70 west of Jackrabbit Trail and to 0.57 west of Watson Road. West of SR-85 volume-to-capacity ratios are 0.57 and 0.31 west of Sun Valley Parkway. (Volumes are shown on Figures 5-36 through 5-45 and volume-to-capacity ratios on Figures 5-62 through 5-66.)

Figure 5-86
Potential New Freeways and Expressways



5.9.1 South Mountain Freeway

The South Mountain Freeway included in the Future Base highway network model runs from I-10 near 59th Avenue to the western terminus of the Santan Freeway. The portion of the facility in the SWATS study area is about 14 miles. The facility is modeled with 6 lanes (3 in each direction) in the Future Base and Enhanced and with 10 lanes in the Option A and Option C networks. For simplicity, HOV lanes were not included in the modeling of any of the new freeways included in the Option A and Option C networks. Regional policy is to include HOV lanes on the freeway system.

The South Mountain Freeway is currently undergoing environmental study to determine its location, width, and other potential characteristics. The facility is intended in part to provide a bypass for traffic currently using I-10 and I-17 to move between areas south and east of downtown Phoenix and areas to its north and west. This facility includes a bridge over the Salt River.

Forecast daily traffic volumes for this facility are in the 125-150,000 range in 2030 in the Future Base network with peak hour volume-to-capacity ratios in the 0.70 to 0.80 range. Volumes are similar under the Enhanced network. Under Option A and Option C volumes are substantially higher south of the I-10 Reliever at about 250,000, with volume-to-capacity ratios in the 0.80 to 0.90 range. North of the I-10 Reliever, volumes are on the order of 160,000 vehicles per day and volume-to-capacity ratios substantially lower in the 0.50 to 0.60 range.

5.9.2 SR-85

In the Future Base network SR-85 south of I-10 for 6.5 miles is upgraded to a 4 lane freeway. This facility is currently planned for upgrading from the existing 2 lane rural arterial in order to accommodate increasing traffic volumes.

Traffic volumes forecast for 2030 on the Future Base network are on the order of 50,000 vehicles per day with volume-to-capacity ratios on the order of 0.60. Under the Enhanced network this section is widened from 4 to 6 lanes. Volumes increase to about 70,000 vehicles per day with peak hour volume-to-capacity ratios still on the order of 0.60. Under Option A and Option C volumes south of the I-10 Reliever remain about 70,000 vehicles per day with volume-to-capacity ratios under 0.60. However, north of the I-10 Reliever to I-10 volumes increase to 120,000 and volume-to-capacity ratios are forecast in the 0.70 to 0.80 range.

5.9.3 I-10 Reliever

The I-10 Reliever is included in the Option A and Option C networks. It is 48 miles long and parallels I-10 between I-10 and the Salt and Gila Rivers. It starts at I-17 near 19th Avenue and proceeds west across the Hassayampa River where it turns north ending at I-10. The purpose of this facility is to provide for high speed travel in the east/west direction and to relieve forecast congestion on I-10. HOV lanes were not included in the modeling of this facility, but they would be included in its construction.

Under the Option A network the I-10 Reliever is 12 lanes for its entire length. East of the South Mountain Freeway forecast daily traffic volumes in 2030 are in the 240-250,000 range with peak hour volume-to-capacity ratios on the order of 0.80. West of the South Mountain Freeway to the Loop 303 Extension volumes are somewhat higher in the 280-335,000 range with volume-to-capacity ratios generally exceeding 0.90 and sometimes exceeding 1.00. From the Loop 303 Extension west to SR-85 forecast daily volumes fall from about 240,000 near the Loop 303 Extension to 150,000 at SR-85. Volume-to-capacity ratios in this section are in the 0.50 to 0.80

range. West of SR-85 forecast volumes fall off quickly from 100,000 vehicles per day (with peak hour volume-to-capacity ratios near 0.30) just west of SR-85 to less than 15,000 daily vehicles (with volume-to-capacity ratios less than 0.10) across the Hassayampa River and to its west.

Under the Option C network the I-10 Reliever has 14 lanes east of the Loop 303 Extension, 8 lanes from there to SR-85, and 6 lanes west of SR-85. East of the South Mountain Freeway forecast daily traffic volumes in 2030 are about 275,000 with peak hour volume-to-capacity ratios on the order of 0.80. West of the South Mountain Freeway to the Loop 303 Extension volumes are somewhat higher in the 310-360,000 range with volume-to-capacity ratios generally exceeding 0.90 and sometimes exceeding 1.00. From the Loop 303 Extension west to SR-85 forecast daily volumes fall from about 200,000 near the Loop 303 Extension to 135,000 at SR-85. Volume-to-capacity ratios in this section are in the 0.60 to 0.95 range. West of SR-85 forecast volumes fall off quickly from 100,000 vehicles per day (with peak hour volume-to-capacity ratios near 0.60) just west of SR-85 to less than 15,000 daily vehicles (with volume-to-capacity ratios less than 0.10) across the Hassayampa River and to its west.

5.9.4 Loop 101 Extension

The Loop 101 Extension from I-10 south to the I-10 Reliever provides freeway service on 10 lanes into the developing areas south of I-10. It connects to the Rio Salado Parkway which continues easterly along the Salt River toward downtown Phoenix. Under Option A the Loop 101 Extension is forecast in 2030 to carry about 215,000 vehicles per day with volume-to-capacity ratios between 0.70 and 0.80. Under Option C the facility is forecast to handle 220,000 vehicles per day with volume-to-capacity ratios between 0.75 and 0.85.

HOV lanes were not included in the modeling of this facility, but they would be included in its construction.

5.9.5 Loop 303 Extension

The Loop 303 Extension provides freeway service between the outer suburbs expected to develop in the northwestern and southwestern sections of the valley. Portions of this facility already exist from US 60 south to a point a mile north of I-10. The current facility is not built to the freeway standard included in the Option A and Option C networks. In the SWATS study area the Loop 303 Extension covers 31 miles from Northern Avenue to Komatke Road in southern Goodyear.

Under Option A the entire facility provides 10 lanes. North of I-10 traffic forecast for the year 2030 is in the 240-250,000 range with peak hour volume-to-capacity ratios from 0.85 to 0.95. Between I-10 and the I-10 Reliever, daily forecast volumes range from 160-190,000 with peak hour volume-to-capacity ratios in the 0.65 to 0.75 range. Immediately south of the I-10 Reliever and across the Salt River volumes in the 220-240,000 range are forecast with peak hour volume-to-capacity ratios in excess of 0.90. Within the developed section of southern Goodyear forecast volumes fall rapidly as one progresses south. In the northernmost sections a daily volume of 180,000 (with a peak hour volume-to-capacity ratio under 0.80) is forecast for 2030, 90,000 (volume-to-capacity ratio 0.35) just north of Riggs Road and 45,000 (volume-to-capacity ratio less than 0.20) at the southern terminus of the Loop 303 Extension at Komatke Road.

Under Option C the facility's 10 lanes are expanded to 12 lanes between the I-10 Reliever and Riggs Road. North of the I-10 Reliever traffic forecasts vary little from the traffic forecast under Option A for the year 2030. Immediately south of the I-10 Reliever and across the Salt River volumes of 230-

250,000 are forecast with peak hour volume-to-capacity ratios between 0.80 and 0.90. Within the developed section of southern Goodyear forecast volumes fall rapidly as one progresses south. In the northernmost sections a daily volume of 190,000 (with a peak hour volume-to-capacity ratio of 0.70) is forecast for 2030, 90,000 (volume-to-capacity ratio 0.30) just north of Riggs Road, and 45,000 (volume-to-capacity ratio less than 0.20) at the southern terminus of the Loop 303 Extension at Komatke Road.

5.10 New Expressways

Expressways provide the means for somewhat higher speed automobile and truck travel than provided by arterials roads, but somewhat slower speed travel than found on freeways. Expressways have some at-grade intersections but restricted access from abutting properties.

Table 5A-1 (in Appendix V) reveals that there are only 21 existing centerline miles of expressway in the SWATS area and that number increases to 90 under the Option A and Option C networks. The existing expressways are MC-85 west of Litchfield Road to Miller Road in Buckeye and Loop 303. Under the Future Base network MC-85 is downgraded to an arterial. However, SR-85 from Gila Bend north to a point just south of the Gila River is upgraded to an expressway facility. Under the Enhanced network Sun Valley Parkway, 339th Avenue, and 355th Avenue north of I-10 are upgraded to expressway facilities and SR-85 is modeled with 6 lanes. The Option A and Option C networks add the Rio Salado Parkway and the Riggs-Komatke Road Expressway. These are major new potential expressway corridors and are shown in Figure 5-86. The expressway improvements in each network are shown in Table 5-9.

Table 5-9
Centerline Miles of New and Widened Expressways

	Network		
	Future Base	Enhanced	Options A and C
SR-85 - 4 lanes	31		
SR-85 - 6 lanes		31	
US 60 - 6 lanes	2		
Sun Valley Parkway - 6 lane		5	
339th Avenue - 4 lanes		3	
363rd Avenue - 4 lanes		2	
Rio Salado Expressway - 6 lanes			10
Rigg, Komatke, Maricopa Roads Expressway - 6 lanes			31

Table 5-10 shows the estimated costs associated with the expressways in each of the model networks. SR-85 is shown in both the Future Base and Enhanced networks. The costs are not cumulative, but assume each project upgrades the existing facility.

5.10.1 SR-85

The SR-85 conversion from a 2 lane rural highway to an expressway is one of the two most expensive expressway projects because of its comparatively long length. Under the Future Base network with a 4 lane expressway, volumes forecast for 2030 exceed 50,000 vehicles per day and peak hour volume-to-capacity ratios are greater than 0.90. Under the Enhanced network with 6 lanes, volumes of 60,000 and volume-to-capacity ratios of 0.70 are found south of Komatke Road. North of Komatke Road volumes exceed 70,000 and volume-to-capacity ratios exceed 1.00. Under the Option A and Option C networks volumes are generally below 60,000 with volume-to-capacity ratios over 0.80 north of Komatke Road, while volume-to-capacity ratios less than 0.55 are found south of Komatke Road. (Volumes are shown on Figures 5-36 through 5-45 and volume-to-capacity ratios on Figures 5-62 through 5-66.)

Table 5-10
Expressway Costs in Millions of 2003 Constant Dollars

		Network		
	Cost per Mile	Future Base	Enhanced	Options A and C
SR-85 - 4 lanes	4	124	-	-
SR-85 - 6 lanes	5	-	155	-
US 60 - 6 lanes	5	10	-	-
Sun Valley Parkway - 6 lane	3	-	15	-
339th Avenue - 4 lanes	4	-	12	-
363rd Avenue - 4 lanes	4	-	8	-
Rio Salado Expressway - 6 lanes	6	-	-	60
Rigg, Komatke, Maricopa Roads Expressway - 6 lanes	5	-	-	155
Total		**$134**	**$190**	**$215**

5.10.2 Sun Valley Parkway

In the Future Base network Sun Valley Parkway is widened from a 4 to a 6 lane arterial. In the Enhanced network it is further upgraded to a 6 lane expressway. On the 4 lane road in the Future Base network, traffic volumes are highest north of the Tonopah-Salome Highway where daily volumes in 2030 are forecast at about 45,000 with peak hour volume-to-capacity ratios near 0.90. These volumes fall to less than 30,000 with volume-to-capacity ratios under 0.60 south of Camelback Road. Under the 6 lane Enhanced, Option A, and Option C networks the heaviest volumes on the facility increase to 50,000 with volume-to-capacity ratios of about 0.80.

5.10.3 339th Avenue and 355th Avenue

In the Enhanced network these two facilities are upgraded to 4 lane expressways. In the Future Base they are 4 lane arterials. In the Future Base network 339th Avenue has an interchange with I-10 but 355th Avenue does not. It should be noted that 355th Avenue in the SWATS area is to become a portion of the CANAMEX highway, connecting to Wickenburg Road north of the study area. Volumes forecast for 2030 on 339th Avenue are about 20,000 with peak hour volume-to-capacity ratios of 0.50, while 355th Avenue has even lower values. Under the Enhanced, Option A, and Option C networks 339th Avenue has an interchanges with I-10. Under the Enhanced, Option A, and Option C networks, daily volumes on 339th Avenue drop to 10,000 (volume-to-capacity ratios of 0.25), while volumes on 355th Avenue are extremely minor on the order of 2,000.

5.10.4 Rio Salado Parkway

The potential 6 lane Rio Salado Parkway enters the study area from downtown Phoenix and parallels the Salt River to the river's south as far west as 75th Avenue where it crosses the river and turns north ending at the interchange of the Loop 101 Extension and the I-10 Reliever. This new facility is included in the Option A and Option C networks. It includes a major bridge over the Salt River whose cost is shown in Table 5-8. In 2030 under both networks the facility is forecast to carry about 65,000 vehicles per day west of 59th Avenue and about 40,000 east of 59th Avenue, with peak hour volume-to-capacity ratios of 0.95 and 0.65, respectively.

5.10.5 Riggs, Komatke, and Maricopa Roads

A potential expressway was included in the Option A and Option C highway networks. The expressway would start at SR-85 and continue east along Komatke Road to Riggs Road, which it then follows to the Loop 303 Extension in southern Goodyear. The potential expressway overlaps the Loop 303 Extension south and rejoins Komatke Road and Maricopa Road east into Pinal County. In the Future Base network and Enhanced networks these facilities are 4 lane arterials.

Under the Future Base and Enhanced networks daily volumes forecast for 2030 east of SR-85 to the Loop 303 Extension are in the 20-30,000 range with peak hour volume-to-capacity ratios of 0.85 to more than 1.00. Volumes are about 10,000 in the north/south section of the facility overlapping the Loop 303 Extension with volume-to-capacity ratios of 0.50. On the southerly section along Komatke and Maricopa Roads volumes are 40,000 with volume-to-capacity ratios of 0.95 and higher.

Under the Option A and Option C networks volumes drop west of Rainbow Valley Road to 11,000 vehicles per day forecast for 2030 with peak hour volume-to-capacity ratios of 0.40. Further east between Rainbow Valley Road and the Loop 303 Extension volumes are 50,000 with volume-to-capacity ratios of 0.75 to 0.85. The section of overlap with the Loop 303 Extension has volumes of 45,000 and volume-to-capacity ratios less than 0.20. South of the Loop 303 Extension volumes are in the 50-60,000 range with volume-to-capacity ratios of 0.80.

5.11 Transit

Potential future transit improvements in the SWATS area have been identified through the MAG High Capacity Transit Study and the RPTA Regional Transit Systems Study (RTS). Those studies are the basis for the information included in this section.

5.11.1 High Capacity Transit Study

The MAG High Capacity Transit Study (HCTS) investigates the potential for transit with higher capacities than traditional transit buses and includes consideration of light rail transit (LRT), bus-rapid-transit (BRT), and commuter rail. LRT, also commonly referred to as a trolley, is currently under advancement in Phoenix and Tempe. Two types of BRT are included in the HCTS. Dedicated BRT would generally operate on separate rights-of-way but could operate on streets in mixed traffic. Express BRT would operate along freeways in HOV lanes and be similar to express bus service. Commuter rail service is operated on traditional railroad tracks with equipment similar to Amtrak passenger cars.

The draft HCTS report recommends a number of corridors in the SWATS area where high capacity transit should be given further consideration in response to growing highway congestion and the need for alternative modes of transportation.

The draft HCTS recommends a set of corridors in which services should be further investigated. Corridors are identified based on the nearby roadways. That identification does not indicate a specific alignment, but rather a general location in which high capacity transit may be needed.

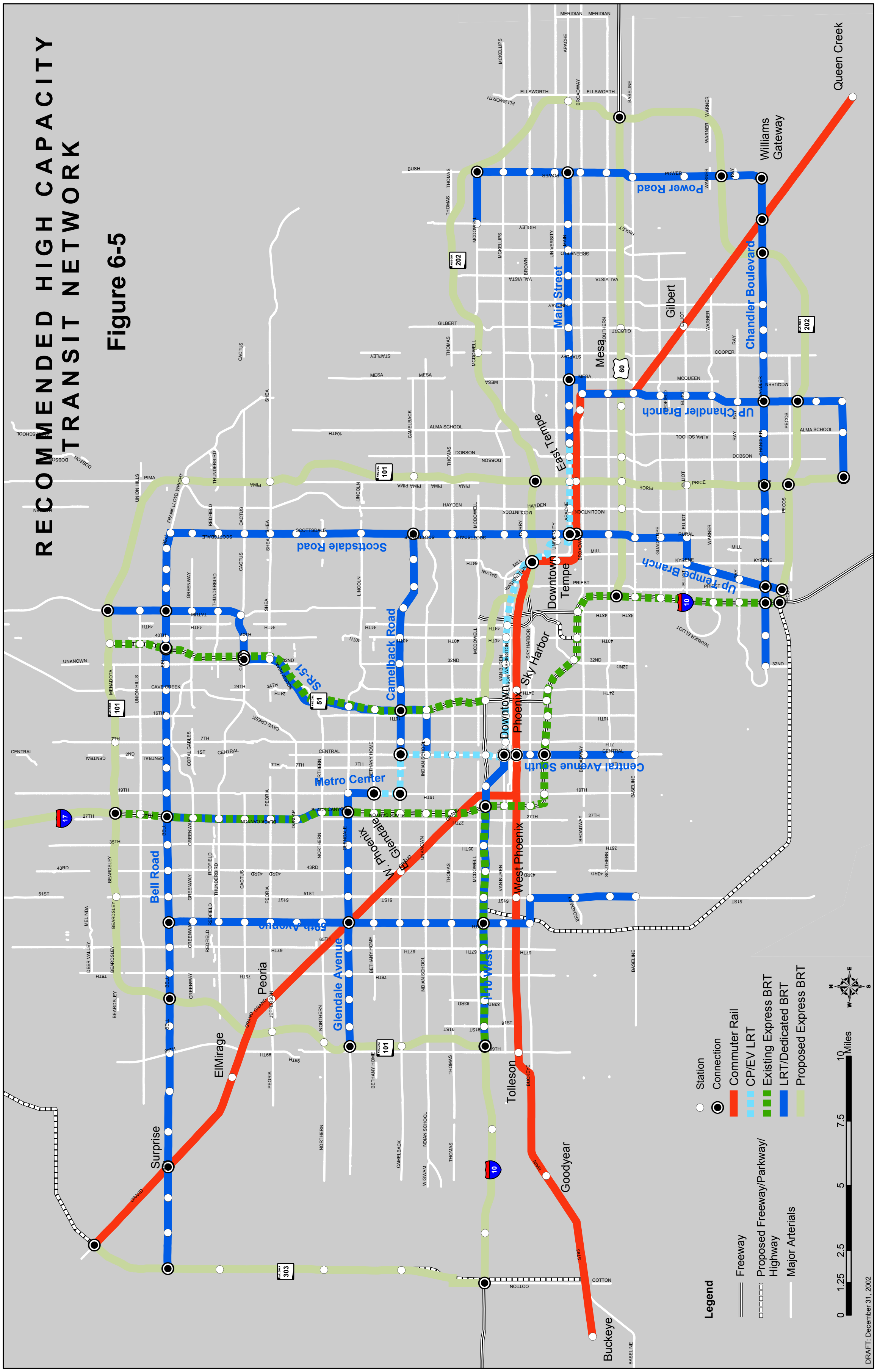
The draft HCTS recommends the following corridors in the SWATS area for further consideration:

- LRT or Dedicated BRT in the I-10 corridor from downtown Phoenix to Loop 101;
- Express BRT in the I-10 corridor to from Loop 101 to Loop 303;
- Express BRT in the Loop 101 corridor north of I-10;
- Express BRT in the Loop 303 corridor north of I-10;
- LRT or Dedicated BRT in the 51st/59th Avenue corridor north of Baseline Road; and
- Commuter rail along the Union Pacific corridor from downtown Phoenix to Buckeye.

Figure 5-87 presents the location of these potential transit facilities in the SWATS area.

5.11.2 Regular Fixed Route and Demand Responsive Bus Transit

The RPTA Regional Transit Systems Study (RTS) shows a substantial increase in the service area of regular route and demand responsive transit services in the SWATS area. Figure 5-88 shows the service area for fixed route and demand responsive transit recommended in the RTS Final Report for the SWATS area. The figure shows the transit service area expanding west of the White Tank Mountains and south of the Gila River into southern Goodyear. The current transit service area does not extend west of 83rd Avenue except for limited service to Tolleson, Avondale, and Litchfield provided by the 560, 561, and 131 START routes.


RECOMMENDED HIGH CAPACITY TRANSIT NETWORK
Figure 6-5
* Source: MAG High Capacity Transit Plan, 2003
Legend
Station
Connection
Commuter Rail
CP/EV LRT
Existing Express BRT
LRT/Dedicated BRT
Proposed Express BRT
Freeway
Proposed Freeway/Parkway/Highway
Major Arterials
0 1.25 2.5 5 7.5 10 Miles
DRAFT: December 31, 2002
Bell Road
Scottsdale Road
Camelback Road
Glendale Avenue
59th Avenue
I-10 West
Central Avenue South
Main Street
Power Road
Chandler Boulevard
UP Chandler Branch
UP Tempe Branch
SR-51
Metro Center
Surprise
ElMirage
Peoria
Glendale
W. Phoenix
West Phoenix
Downtown Phoenix
Sky Harbor
Downtown Tempe
East Tempe
Mesa
Gilbert
Williams Gateway
Queen Creek
Tolleson
Goodyear
Buckeye

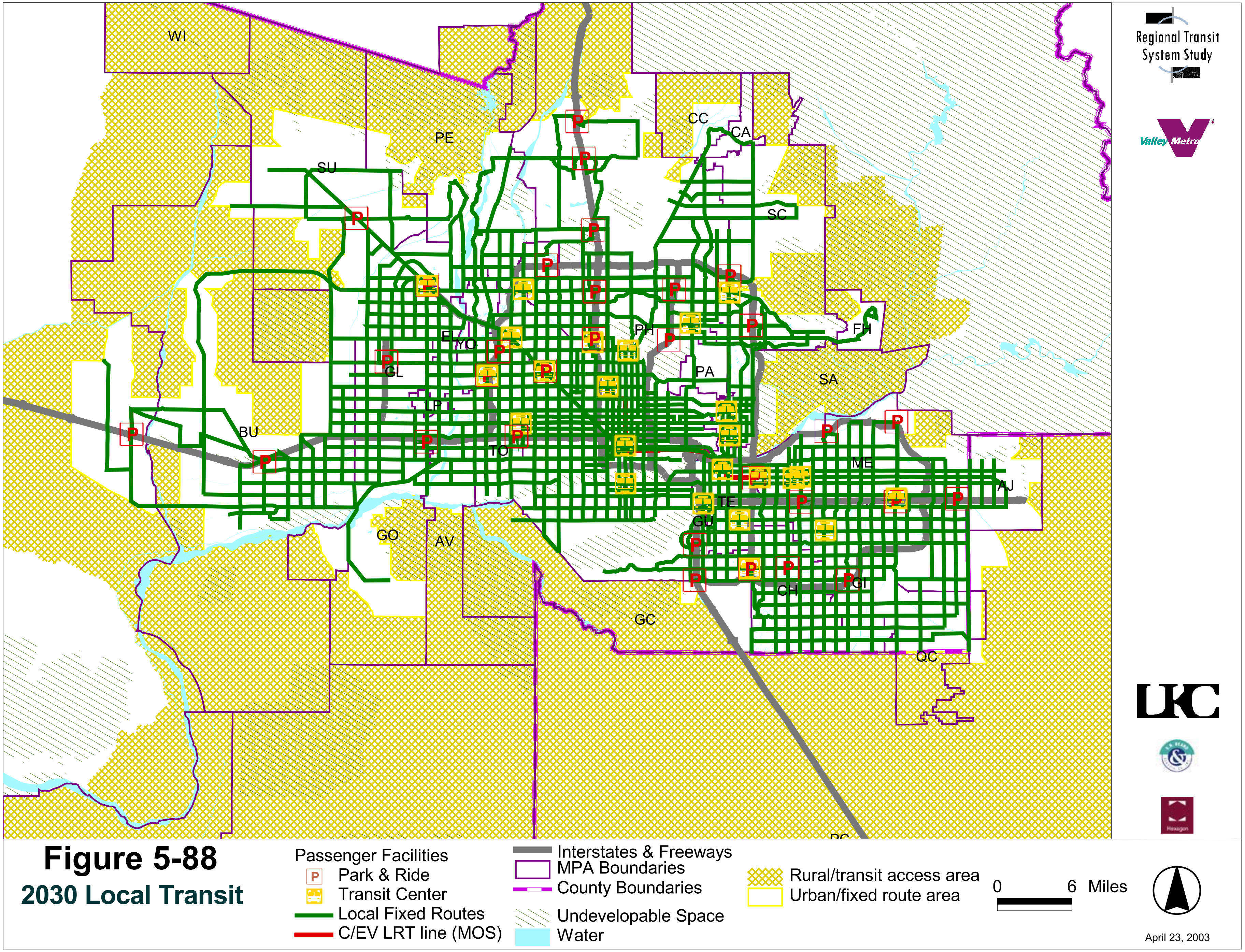


Figure 5-88
2030 Local Transit

In general future fixed route services would follow the arterial grid (as shown on Figure 5-88), consistent with the current practice, and the demand responsive service would serve the same area as served by the fixed route service.

The draft RTS identifies a set of Regional Transit Routes designed to replace existing express and bus-rapid-transit services. These routes would operate on a limited number of freeways and arterials and provide longer distance, higher speed services with limited stops. Figure 5-89 shows the routes recommended in the draft RTS in the SWATS area.

The draft RTS estimates the amount of service needed in each jurisdiction. Table 5-11 shows the number of revenue miles of service needed every day in each of the jurisdictions in the SWATS area in 2000 and in 2030. The estimate includes each jurisdiction in its entirety, including portions outside of the SWATS area. The estimate shows that transit service needs will grow substantially between 2000 and 2030.

The RTS proposes two new park-and-ride facilities in the SWATS area in addition to the one already planned along I-10 near Litchfield Road. The additional park-and-ride facilities are to be located along I-10 near Miller Road and 339th Avenue, as shown in Figure 5-88. The only existing formal park-and-ride facility in the study area is located along I-10 at 79th Avenue.

Table 5-11
Vehicle Revenue Miles of Transit Service Needed in 2030
(source Draft RTS)

	2000	2030			
Jurisdiction	**Total**	**Total**	**Fixed Route**	**Circulator**	**Other**
Avondale	1,052.0	4,367.0	3,930.0	257.0	180.0
Buckeye	564.0	16,510.0	15,625.0	-	1,929.0
Gila Bend	81.0	763.0	-	-	763.0
Goodyear	778.0	12,371.0	6,515.0	2,400.0	3,456.0
Litchfield Park	103.0	376.0	444.0	-	-
Phoenix	50,844.0	82,271.0	71,916.0	8,986.0	1,369.0
Tolleson	485.0	1,075.0	1,176.0	-	-
Maricopa County - unincorporated portions	2,876.0	5,356.0	4,290.0	-	1,811.0

Note: Includes complete jurisdictions, including portions outside the SWATS area.

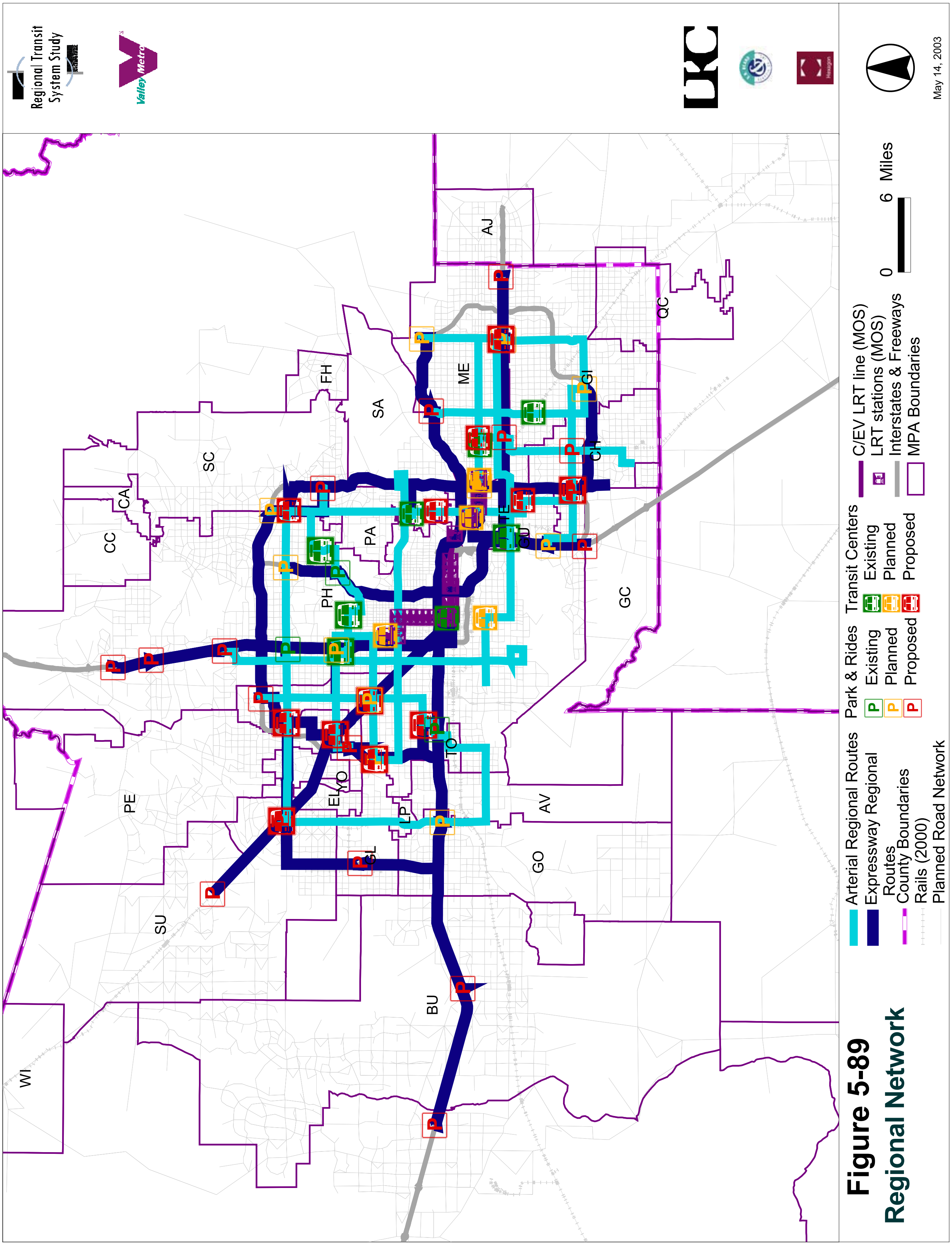


Figure 5-89
Regional Network
Regional Transit System Study
Valley Metro
Arterial Regional Routes
Expressway Regional Routes
County Boundaries
Rails (2000)
Planned Road Network
Park & Rides
Existing
Planned
Proposed
Transit Centers
Existing
Planned
Proposed
C/EV LRT line (MOS)
LRT stations (MOS)
Interstates & Freeways
MPA Boundaries
0
6
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May 14, 2003
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5.11.3 Transit Capital Costs

Table 5-12 summarizes the capital costs of the projects noted above from both the HCTS and RTS. The costs for the projects included in the table are estimates derived from the HCTS and RTS. The HCTS recommends LRT or BRT in the I-10 corridor west of downtown Phoenix. Since the HCTS provides no BRT cost estimate for this corridor, an estimate of half of the LRT capital cost is shown on the table consistent with a similar relationship in other corridors.

Figure 5-87 shows that the rail facilities whose costs are included in Table 5-12 extend beyond the boundaries of the SWATS area. The table includes costs for entire projects, not just portions within the SWATS area.

The principal capital costs associated with regular fixed route, demand responsive, and express BRT services are the costs of the buses themselves and their maintenance facilities. The RTS estimates the total capital funding needed for buses over the period 2002 to 2030 at $1.4 billion. The total local transit revenue miles needed for the SWATS area jurisdictions shown in Table 5-11 is 51% of the total required for the Phoenix metropolitan area. Thus an investment of $700 million in buses is needed over the next 30 years. It should be noted that much of that investment will serve areas outside of the SWATS area, since Table 5-11 includes major portions of Buckeye, Goodyear, and Phoenix that are outside the SWATS area.

Table 5-12
Transit Capital Costs
(in millions of 2002 constant dollars)

Project	Cost	BRT
LRT: I-10 from downtown Phoenix to Loop 101	$400	$200
LRT: $51^{st}/59^{th}$ Avenue corridor north of Baseline Road	730	360
Commuter rail: downtown Phoenix to Buckeye	450	
Park-and-ride - 3 facilities	9	
Buses	700	

Notes: Except for the park-and-ride facilities, all projects include portions outside the SWATS area.
The first two projects are under consideration as either LRT or BRT.

5.12 Non-Motorized

Existing non-motorized facilities are shown on Figures 5-90 and 5-91. Few of the off-road facilities are paved and many are informal. Figure 5-92 shows the draft Regional Off-Street System Plan. The plan shows a variety of facilities in the SWATS area, dominated by potential facilities along river banks, canals, power lines, and railroads. MAG's West Valley Rivers Master Plan recommends multi-use facilities along the Agua Fria River.

Policies that would encourage an orderly expansion of the non-motorized system of facilities include:

- inclusion of bicycle lanes (either on or off-road) in conjunction with construction or widening of arterials where feasible and where part of a regional bike plan;
- identification and adoption of a backbone of regional off-road multi-purpose paved facilities to which local and on-road facilities could be connected to form a complete system of continuous non-motorized facilities serving the SWATS area; and
- provision of bicycle facilities at all transit centers and on all transit vehicles.

Figure 5-90
Existing Off-Road Non-Motorized Facilities

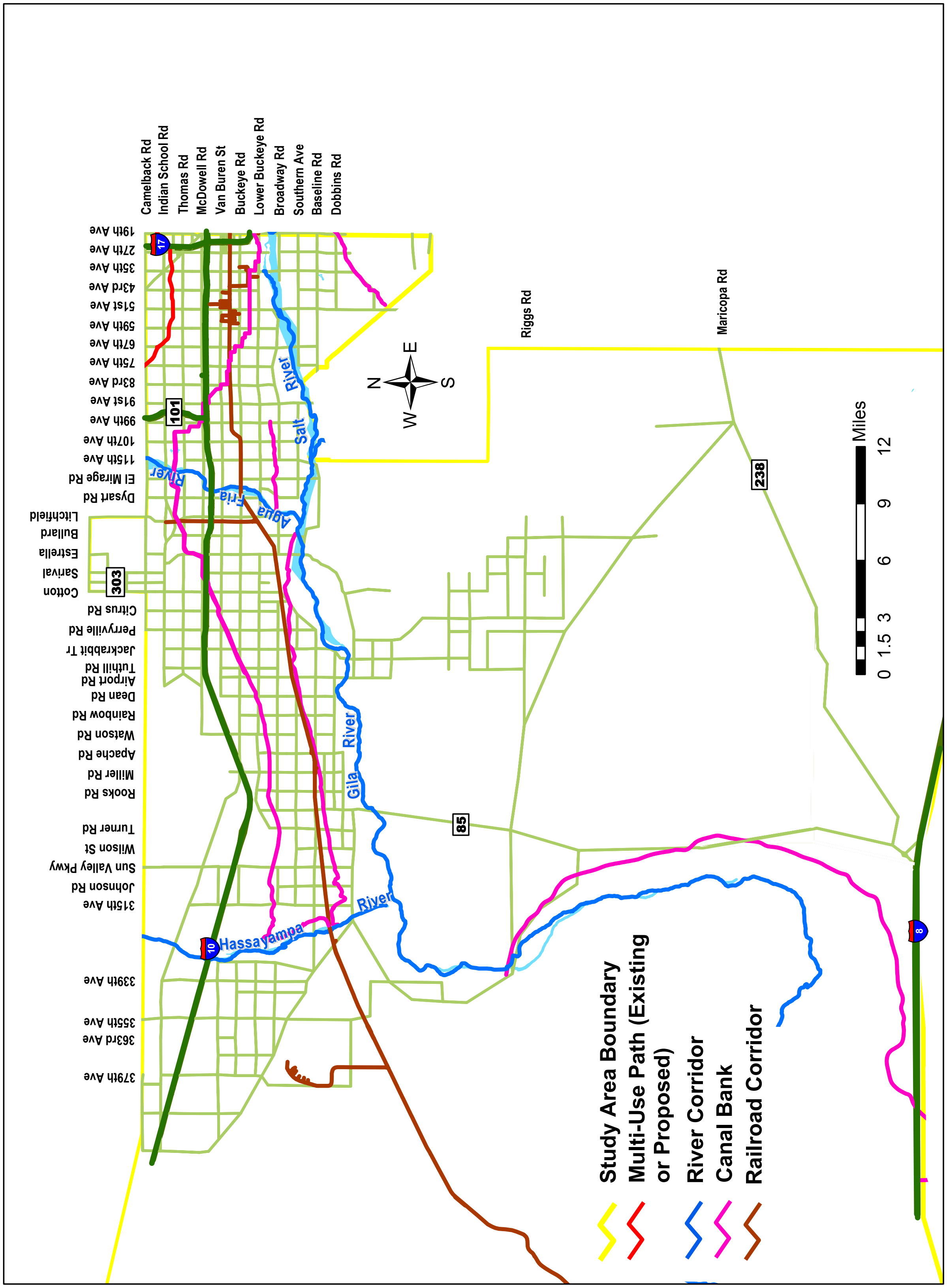
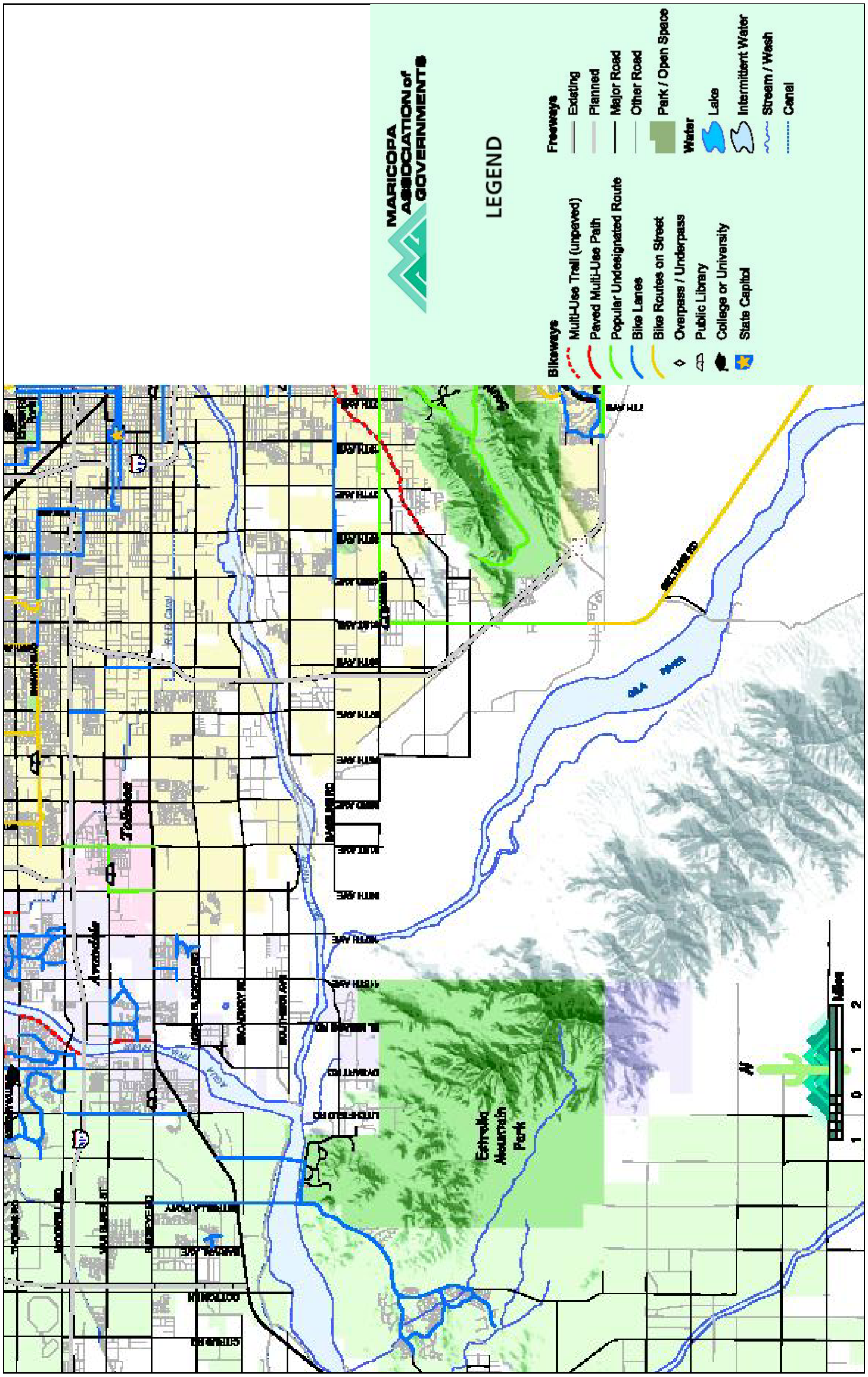


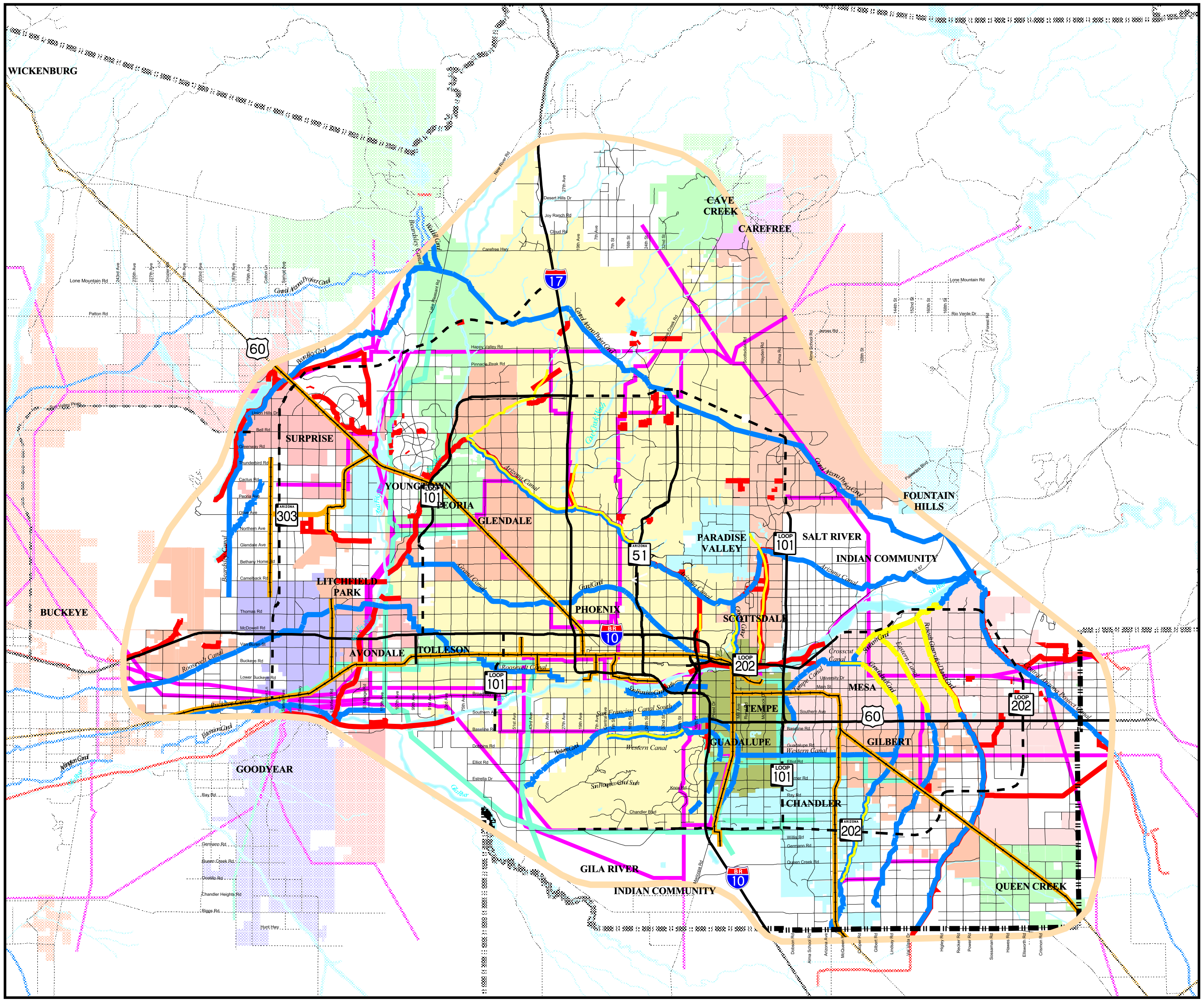
Figure 5-91
Bikeways and Other Non-Motorized Facilities



* Source: MAG Bikeways Map, 2003

Regional Off-Street System Plan

Potential Corridors



- Study Area Boundary
- Canals
- Flood Control Projects
- Gas Lines
- High Voltage Power Lines
- Railroads
- Rivers, Streams, and Desert Washes
- Existing paved routes within corridors
- County Boundary
- City Boundaries
- Existing Freeways
- Planned Freeways
- Arterial Roads

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20000 0 20000 Feet

June 20, 2000

MARICOPA ASSOCIATION of GOVERNMENTS

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