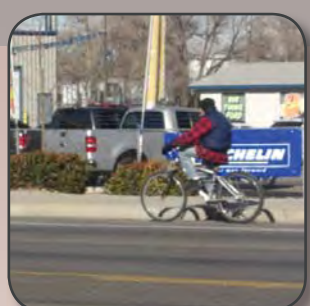
Appendix C

Transportation Assessment



Bridge Boulevard Corridor Redevelopment Plan
Transportation Assessment

March 2012

FEHR & PEERS

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1. INTRODUCTION

THE VISION

To create a more livable South Valley community by transforming Bridge Boulevard into a mixed-use, pedestrian-, bicycle-, and transit-friendly corridor.

Bridge Boulevard is a major travel corridor that carries approximately 30,000 cars per day crossing the Rio Grande. It is one of the few east-west river crossings in the South Valley to connect the rapidly growing Southwest Mesa with the Southeast Heights of Albuquerque and one of only nine river crossings along 20 miles of the Rio Grande in a major metropolitan area of almost a million people. As a result, Bridge Boulevard is the fourth most congested corridor in the Albuquerque metropolitan area.

The emphasis on vehicles and the higher than regional average motor vehicle accident rate along Bridge Boulevard reflect an opportunity and need to evaluate alternative design features. The corridor lacks features such as landscaping, visible crosswalks, continuous sidewalks, and gateways. The large curb radii, free-right turn lanes, and irregular geometry at intersections also contribute to the street's single mode emphasis. While the focus of the corridor is primarily on moving motor vehicle traffic, street design elements could be improved to embrace livability objectives and better interface with the mixed land-uses adjacent to the corridor.

The segment of Bridge Boulevard between Barelas Bridge and Isleta Boulevard is designated for both El Camino Real National Historic Trail and Route 66 National Scenic Byway. It was the first river crossing in the region. The South Valley is one of the oldest communities in Bernalillo County, and many families trace their lineage to the 17th century settlers of Atrisco, Five Points, and Armijo, whose livelihoods were directly tied to agriculture until the early 1940s.

Barriers to redevelopment include lack of appropriate roadway design to support pedestrian and transit modes as well as absence of mixed use zoning. Atrisco residents and other nearby neighborhoods have identified their desire for appropriate development in their goals for Bridge Boulevard via adopted plans. The recent Bridge Boulevard Village Centers and Corridor Plan (2010) intends to promote safety, spur economic development, and celebrate the historic character of the corridor with standards for new development. The Southwest Area Plan (2000) recognized the need for corridor and Village Center planning to include mixed use and higher density development to promote walkability and improved transit service. The Bridge Boulevard Village Center & Corridor Plan identified important first steps to improve livability in the corridor. This includes programming sidewalks outside of village centers and within village center nodes. Additionally new bicycle lanes were identified that would connect to the existing regional bicycle facilities.

STEERING COMMITTEE

Previous planning work provides the framework for this plan. In addition, a Steering Committee comprised of community members ranging from residents and business owners to municipal representatives has been formed for this project. They convened for a transportation specific meeting early in the process. Keypad polling and a facilitated mapping conversation were used to assess the vision and goals of the Steering Committee.

The Steering Committee provided valuable information about the current transportation uses along the corridor and the future vision for Bridge Boulevard transportation during a keypad polling exercise. Most people are using a motorized vehicle to travel in the corridor today, but they would like to see better accommodation for all modes of travel to see a more balanced corridor. Most people currently travel through the corridor to destinations outside the area but would like to have more opportunities to shop and eat locally. Most Steering Committee members think it is very important (79%) or somewhat important (21%) to provide sidewalks and crosswalks on Bridge Boulevard. Most people also think that it is very important (53%) or somewhat important (40%) to provide on-street bike lanes. Also, most committee members think it is very important (69%) or somewhat important (23%) to provide more frequent transit service. 80% of the Steering Committee think that it is important to have a balance between speed and safety for all modes of travel.

Through a group mapping exercise, the Steering Committee provided information about specific locations in the Bridge Boulevard corridor where issues and opportunities exist. Each group identified the Five Point intersection as an area that is currently difficult to navigate and has perceived safety concerns. However, it was also an intersection that was pointed out as an area with great opportunity for redevelopment and improvement. General corridor ideas that were discussed by most of the groups include safety, balancing traffic between commuting needs and retail needs, streetscape/aesthetic improvements, gateway opportunities with arrival across the bridge, and a focus on the people who live in the corridor.

SUMMARY OF FINDINGS

Bridge Boulevard has been a significant corridor for regional and local mobility for over 50 years. The role of this corridor in moving people and creating places is well documented in previous studies and it's is future the focal point of this planning project. The following provides an overview of the findings of this transportation assessment. There are many forecasts for the local and regional changes in the Bridge Boulevard corridor, so this baseline information will be used to determine how future conditions impact, improve, and invigorate Bridge Boulevard's next 50 years.

- There is a need to collect and analyze additional public health data in this corridor. However, the crash data that is available shows that Bridge Boulevard has a similar crash rate to most corridors in the region.
- Bridge Boulevard has lower than the regional average alcohol related crashes in the corridor. The majority of crashes in the corridor are caused by driver inattention and following too close.
- Existing infrastructure for pedestrians and bicycles ranges from substandard to adequate and could be significantly improved to enhance livability.
- Existing transit service in the corridor appears to meet the current demand. However, improvements such as benches, shelters, maps, and schedule information can make transit in the corridor more appealing.
- Existing transit service is oriented to "dependent" riders to connect the majority of destinations with minimal transfers.
- Future high frequency transit investments will be made in corridors that are parallel or intersect with Bridge Boulevard.
- A majority of the traffic on Bridge Boulevard travels through the corridor without stopping at destinations along the route. This pattern is likely to continue because Bridge connects housing west of the river to jobs east of the river crossing.
- The three data sources analyzed indicate that vehicles are traveling through the corridor without stopping at destinations. However, the Bluetooth data shows some variation in how vehicles are traveling through the corridor based on the other data sources.
- MRCOG modeling data shows that the Bridge corridor is serving through trips during all times of the day.
- The Bridge Boulevard corridor connects many destinations in the southwest sector of the city.
- A myriad of tools are available to enhance the physical sustainability of the Bridge Boulevard corridor.

FIGURE 1: BRIDGE BOULEVARD ALIGNMENT

FIGURE 2: 2009 POPULATION

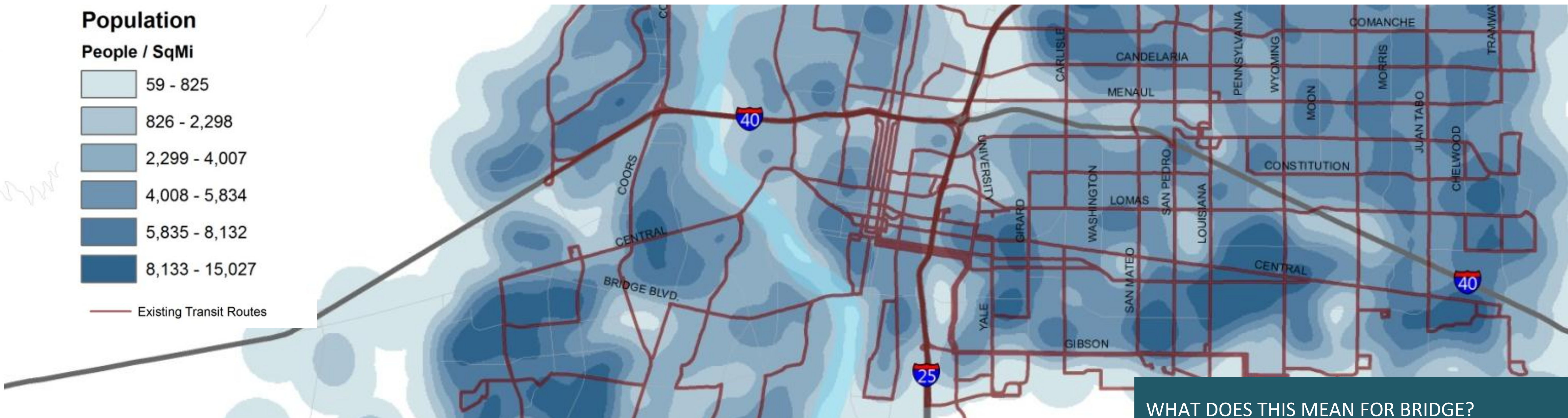


FIGURE 3: 2009 LONGITUDINAL EMPLOYEE DATA

WHAT DOES THIS MEAN FOR BRIDGE?

Population and employment look different in the South Valley. While population ranges in density throughout Albuquerque, jobs are concentrated in several “hot spots” east of the Rio Grande. Bridge Boulevard is one of only a few east-west corridors that provide access to these jobs from households in the west.

Livability Principles

On June 16, 2009, the Environmental Protection Agency (EPA) joined with the U.S. Department of Housing and Urban Development (HUD) and the U. S. Department of Transportation (DOT) to help improve access to affordable housing, more transportation options, and lower transportation costs while protecting the environment in communities nationwide. Through a set of guiding livability principles and a partnership agreement to guide the agencies' efforts, this partnership coordinates federal housing, transportation, and other infrastructure investments to protect the environment, promote equitable development, and help to address the challenges of climate change. Bernalillo County was one of the recipients of a livability grant, which funded this study. The livability principles include:

Provide more transportation choices. Develop safe, reliable, and economical transportation choices to decrease household transportation costs, reduce our nation's dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health.

Promote equitable, affordable housing. Expand location- and energy-efficient housing choices for people of all ages, incomes, races, and ethnicities to increase mobility and lower the combined cost of housing and transportation.

Enhance economic competitiveness. Improve economic competitiveness through reliable and timely access to employment centers, educational opportunities, services and other basic needs by workers, as well as expanded business access to markets.

Support existing communities. Target federal funding toward existing communities—through strategies like transit oriented, mixed-use development, and land recycling—to increase community revitalization and the efficiency of public works investments and safeguard rural landscapes.

Coordinate and leverage federal policies and investment. Align federal policies and funding to remove barriers to collaboration, leverage funding, and increase the accountability and effectiveness of all levels of government to plan for future growth, including making smart energy choices such as locally generated renewable energy

Value communities and neighborhoods. Enhance the unique characteristics of all communities by investing in healthy, safe, and walkable neighborhoods—rural, urban, or suburban.

The Bridge Boulevard Corridor Redevelopment Plan will analyze existing conditions for all modes of travel to identify appropriate improvements to transform Bridge Boulevard into a mixed-use, pedestrian- and transit-friendly corridor that achieves a balance between travel mobility, land use access, and livability.

Recognizing that all of the livability principles are interconnected, this chapter of the document focuses on the transportation components. A variety of transportation elements in the Bridge Boulevard corridor are discussed in the following pages. They include Health and Safety, Roadway Conditions, Pedestrians and Bicycles, Transit Service, Motor Vehicle Traffic, Intersection Capacities, Sustainable Complete Streets, Livability Assessment, and MRCOG Coordination.

2. HEALTH AND SAFETY

TRANSPORTATION AND HEALTH

The way in which a community is designed can have significant impact on the health of its residents. For example, vehicle emissions are related to higher incidences of respiratory disease, cardiovascular disease, and adverse pregnancy outcomes. Additionally, community design such as walking and bicycle accessibility affect physical activity levels and heart health. A variety of strategies are available to make Bridge Boulevard a more healthy transportation corridor.

Enhance Connectivity for Pedestrians and Bicyclists

Land use and development patterns have created environments in which many corridor residents never walk to destinations and have come to depend on motor vehicle travel. It is not surprising when the Steering Committee reports that most of them use a motor vehicle to travel rather than walking or bicycling because destinations are so spread out and routes are not safe or welcoming.

Adopting smaller block sizes, encouraging the appropriate location of key community destinations, and employing land use patterns that make it easier to connect for bicyclists and pedestrians will make active transportation more practical and attractive.

Invest in Infrastructure that Supports Active Transportation

The built environment has an effect on whether people choose to walk or take transit or bicycle rather than drive. In recent years, the Mid-Region Council of Governments (MRCOG) has created transportation policy to investment in infrastructure that makes non-motorized, active transportation easier. These investments include: sidewalks, multi-use trails, bicycle lanes and paths, medians, crosswalks, signs, and street designs that narrow roadways and reduce traffic speed.

Existing programs such as NMDOT Safe Routes to Schools and policy concepts such as Complete Streets support active transportation along with new approaches such as pedestrian- and bicycle-oriented wayfinding and facility design.

Consider the Needs of All Road Users

Transportation policy has historically placed the highest priority on achieving efficiencies for motor vehicles. This emphasis has had negative effects on pedestrian and bicycle safety and, as a result, the amount of active travel that the transportation system can support.

By developing standards for incorporating the needs of pedestrians and bicyclists in all transportation projects, pedestrians and bicyclists will be afforded greater safety. This means adopting new approaches to levels of service, incorporating pedestrian and bicycle experience of the transportation system as a measure of success, and encouraging pedestrian- and bicycle-friendly vehicle designs.

MRCOG has adopted a new project prioritization strategy that ranks projects using a myriad of evaluation criteria to evaluate project impact on quality of life, mobility of people and goods, and economic activity and growth. Bernalillo County also recently completed a Pedestrian and Bicycle Safety Action Plan that emphasizes role of bicycle and pedestrian facilities in the County transportation system.

Make Public Transit Easier to Use

There is a lot of potential in the role that public transit can play in making walking and bicycling trips more convenient. At the same time, high quality bicycle and pedestrian connections between transit desired destinations can go far in solving the “first/last mile” problem that can hinder transit’s usefulness.

Opportunities to make transit easier to use include making transit stops and stations more accessible by walking and bicycling, making room for bicycles on trains and buses, providing route maps and schedule information, and policies to encourage development in and around transit stops and stations.

The Northwest Transit Study has been focusing on ways to make transit more effective in the Albuquerque region. Additional information is provided in the transit section of this chapter.

WHAT DOES THIS MEAN FOR BRIDGE?

There is a need to collect and analyze additional public health data in this corridor. However, the crash data that is available shows that Bridge Boulevard has a similar crash rate to most corridors in the region.

CRASH DATA

Crash data is the most readily available piece of data for assessing safety in the Bridge Boulevard corridor. Analysis of this data is useful in identifying recurring crash trends and high crash locations in order to determine how best to allocate available resources to mitigate the crashes. The crash data used in the analysis of the Bridge Boulevard corridor was compiled by the New Mexico Department of Transportation – Traffic Safety Bureau and the University of New Mexico Division of Government Research based on the uniform crash reports taken by the police officers.

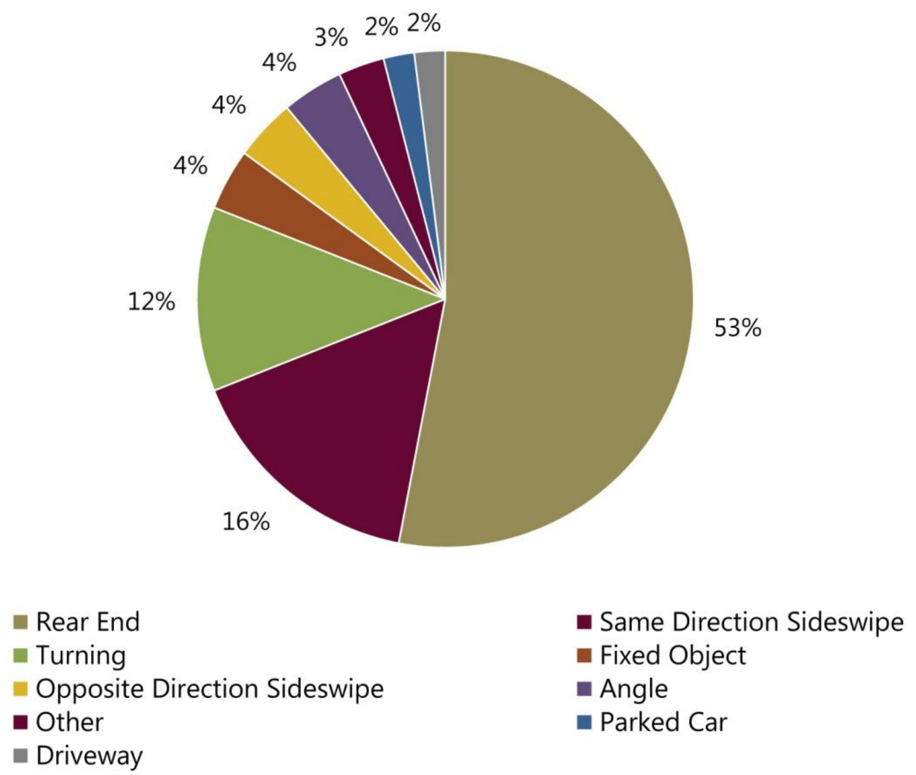
Available reported crash data between 2007 and 2009 were analyzed to develop crash trends along the corridor. Over the three year period there were 354 reported crashes, 4 of which involved bicyclists and 2 that involved pedestrians, with no trends amongst the bicycle and pedestrian crash locations. Of the 4 bicycle crashes, two involved a cyclist running into a stopped vehicle, one involved a head on collision, and one was an angle collision. Both of the pedestrian crashes involved left turning vehicles at separate locations. The pedestrian and bicycle crash locations are identified on Figure 4. As expected the majority of crashes occurred near busier intersections. Isleta Boulevard experienced the most crashes with 94. Goff Boulevard had the second most with 52. La Vega Drive had 48 crashes and Sunset Boulevard/Five Points Road had 47.

There were no fatal crashes, 76 injury crashes, and 278 property damage only crashes. Approximately 53% of all the crashes were rear end crashes while 16% were same direction sideswipe and 12% were turning crashes. A breakdown of the primary crash types are illustrated in Figure 4.

Crashes are classified using the following definitions:

- **Angle** – a vehicle striking another vehicle at a near 90 degree angle or broadside
- **Bicycle** – a cyclist and a motor vehicle (in ‘other’ in Figure 4)
- **Driveway** – a vehicle turning into or out of a driveway
- **Fixed Object** – a motor vehicle striking a fixed object within the public right of way
- **Opposite Direction Sideswipe** – two vehicles traveling in opposite directions making contact on the side of each vehicle
- **Parked Car** – a moving vehicle striking a parked vehicle
- **Pedestrian** – a pedestrian and motor vehicle (in ‘other’ in Figure 4)
- **Rear end** – a vehicle striking another vehicle from behind
- **Same Direction Sideswipe** - two vehicles moving in the same direction making contact on the side of each vehicle
- **Turning** – two vehicles where one vehicle was making a turn

FIGURE 4: CRASH CLASSIFICATIONS



Crash Mitigation Strategies

The Highway Safety Manual was referenced initially in order to develop a list of applicable crash mitigation strategies for intersections and roadway segments along the Bridge Boulevard corridor. However, based on the manual providing a limited number of quantifiable crash mitigation factors for urban roadways, the FHWA's Desktop Reference for Crash Reduction Factors was also used as a reference. The following strategies marked with an asterisk were taken from the FHWA's Desktop Reference and have crash reduction factors associated with them. The strategies intended to improve bicycle and pedestrian safety exclusively were excluded from this list and included within the bicycle and pedestrian safety toolbox in Tables 2 and 3.

Intersection Treatments

- Replace direct left turns with right-turn/u-turn combination
- Provide flashing beacons at stop-controlled intersections
- Provide intersection Illumination
- Increase median width
- Provide turn lane
- Install red light running cameras
- Prohibit left turns/U-turns
- Provide left turn signal phasing
- Install ITE recommended signal clearance intervals*
- Install actuated signals*
- Install advanced dilemma zone detection for high speed approaches*
- Update corridor signal coordination*
- Add 3" yellow retro-reflective sheeting to signal back plates*
- Install additional traffic signal heads to existing mast arms (one centered over each traffic lane)*
- Install signal head back plates*
- Install LED signal heads*
- Install indirect left-turn treatments*
- Install directional median openings to allow left-turns and u-turns*
- Install auxiliary turn lanes*
- Convert intersection to right-in/right-out*
- Convert intersection to a roundabout*
- Improve intersection alignment*
- Improve intersection sight distance*
- Increase pedestrian storage area at intersections*
- Install overhead lane use signs*
- Install stop lines*
- Restrict parking near intersections*

Roadway Segment Treatments

- Road diets
- Provide a raised median
- Install combination horizontal alignment/advisory speed signs
- Install changeable speed warning signs
- Applying traffic calming features
- Prohibit on-street parking
- Implement time-limited on-street parking
- Implement faster response times for winter maintenance
- Install raised median*
- Install appropriate warning/regulatory signs*
- Improve pavement friction*
- Install raised pavement markers*
- Refresh pavement markings*
- Increase speed enforcement*

*from FHWA's Desktop Reference

Approximately 83% of crashes occurred during daily light hours, with approximately 30% occurring during the AM and PM peak periods (7-9 AM and 4-6 PM). A crash density map which illustrates the high crash locations along the corridor is shown in Figure 7.

As part of this analysis, the crash trends found along the Bridge Boulevard corridor were compared to recent crash trends within the Albuquerque Metropolitan Planning Area to see how this corridor compares to the region as a whole. Overall, the region wide crash trends were similar to the Bridge Boulevard corridor with the exception of the top two crash trends. On a regional basis, "driver inattention" is the highest contributing factor representing approximately 30% of all crashes while "following to close" was the highest contributing factor on Bridge Boulevard at 29%. Following too close was the second highest contributing factor on a regional basis at 16.5% while driver inattention was the second highest factor on the Bridge Boulevard corridor at 27%. Based on the relatively high involvement of alcohol in crashes on a regional basis, it is worth noting that alcohol related crashes on Bridge Boulevard corridor were slightly lower than regional percentage. A comparison of contributing crash factors for both the regional and corridor crash data is shown in Figure 5 and Figure 6.

A review of the regional top 20 crash locations by crash totals and crash rate only identified a single location on either list. The Bridge Boulevard and Old Coors Drive intersection was ranked number 13 on the list of high crash locations based on the number of fatalities and crash rate. The crash rate at the following locations along the corridor was up to two times the regional rate of 1.2303 crashes per million vehicles entering:

- Coors Boulevard
- Old Coors Boulevard
- Sunset Road/Five Points Road
- Isleta Boulevard
- Goff Boulevard

It is important to note that the majority of intersections along similar multi-lane arterial corridors within the AMPA planning area had comparable or even higher crash rates. For instance, the New Coors Boulevard corridor has nine intersections with a crash rate greater than two times the regional rate, including seven within the top 20. The Central Avenue corridor has seven intersections with a crash rate greater than two times the regional rate and three in the top 20.

A review of the crash rates for locations involving pedestrian and bicycles only identified one location, the intersection of Bridge Boulevard and Atrisco Drive, where the bicycle involved crash rate was two times the regional average of 0.0321 per million vehicles entering. All the other intersections had crash rates at or below the regional average. Comparing these intersection crash rates to other corridors with similar bicycle and pedestrian infrastructure, shows that Central has more than 12 intersections where the crash rate was two times the regional average and four intersections with crash rates in the top 10 for pedestrian and bicycle crashes.

CONTRIBUTING FACTORS

The primary contributing factors to these crashes included following too close, driver inattention, failure to yield, red light running, excessive speed, and alcohol. A breakdown the corridor contributing factors is shown in Figure 5 as compared with regional contributing factors in Figure 6. The factors and corresponding chart colors are listed below.

- Alcohol Involved
- Driver Inattention
- Excessive Speed
- Failure To Yield
- Following Too Close
- Improper turn
- Other
- Passed Red Light
- Pedestrian Error
- Traveling Too Fast For Condidtions

FIGURE 5: CORRIDOR CONTRIBUTING FACTORS

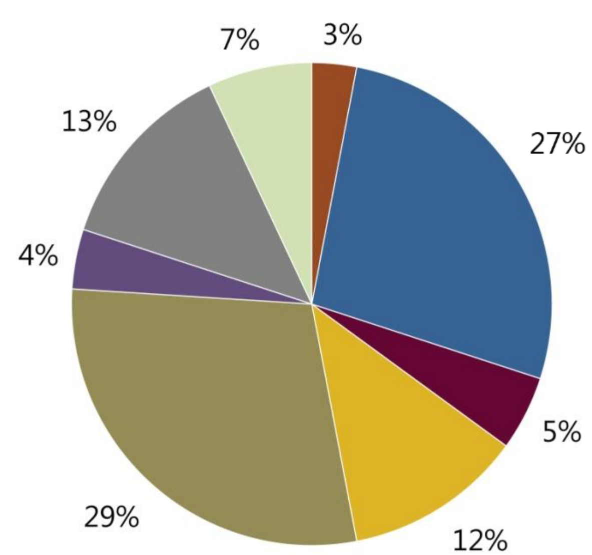
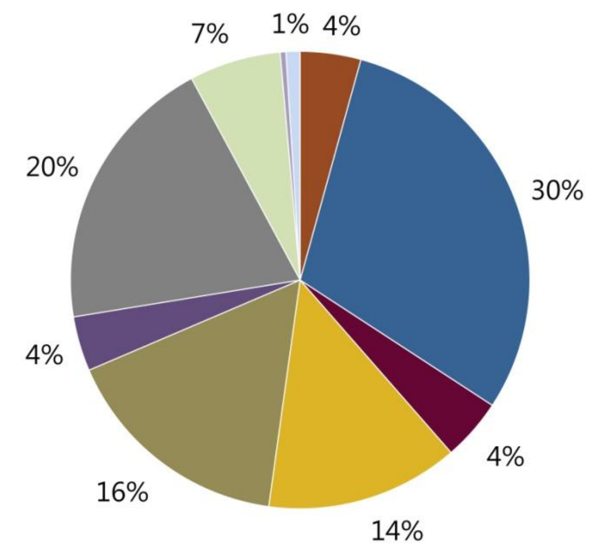


FIGURE 6: REGIONAL CONTRIBUTING FACTORS



INTERSECTION CRASH ANALYSIS AND SAFETY IMPROVEMENTS

A detailed review of the high intersection crash locations along the corridor was performed to identify trends in the crash types and develop potential mitigation strategies using the criteria issued within the Highway Safety Manual. Overall the primary crash trends at these intersections were rear end collisions which are particularly common at signalized intersections.

ISLETA BOULEVARD

A review of the 94 crashes at the intersection identified a high rear end crash trend on the west, south, and east approaches. There were 38 northbound rear-ends, with the majority involving right turning vehicles. There were 17 eastbound rear-ends and 7 westbound rear ends. All the other crash types had three or less crashes over the three year period. The high frequency of northbound rear-end crashes is likely related to the current geometric design of the northbound right turn lane. The current intersection design features a large sweeping right turn radius which lends itself to drivers traveling at higher rates of speed on the approach to the intersection. This higher travel speed combined with the sudden breaking is likely a primary cause of this trend. Bernalillo County will be reconstructing this intersection in the near future to reduce the curve radius and have the right turn lane intersect Bridge Boulevard at 90 degree angle. The rear-end crash trend on all the approaches could be also be mitigated by reviewing the traffic signal head placement and current traffic signal clearance intervals to minimize vehicles being trapped in the dilemma zone of not knowing whether to break or accelerate to make it through the intersection.

GOFF BOULEVARD

Overall, the intersection experienced 52 crashes with the primary crash trend involving northbound, eastbound, and westbound rear end crashes. There were 10 northbound, 8 westbound, and 7 eastbound rear end crashes. The rear-end crash trends on these approaches could potentially be mitigated by reviewing the traffic signal head placement and current traffic signal clearance intervals to help minimize vehicles being trapped in the dilemma zone. The remaining crash types all experienced three or fewer crashes.

LA VEGA DRIVE

Overall, the intersection experienced 48 crashes with the primary crash trend involving eastbound and westbound rear end crashes. There were 17 eastbound and 14 westbound rear end crashes. The rear-end crash trends on these approaches could potentially be mitigated by reviewing the traffic signal head placement and current traffic signal clearance intervals to minimize vehicles being trapped in the dilemma zone. The remaining crash types all experienced two or fewer crashes.

SUNSET ROAD/5 POINTS ROAD

A review of the 47 crashes at the intersection identified a high rear end crash trend on the west and east approaches. There were 13 eastbound and 10 westbound rear end crashes. The rear-end crash trend on these approaches could potentially be mitigated by reviewing the traffic signal head placement and current traffic signal clearance intervals to minimize vehicles being trapped in the dilemma zone. The remaining crash types all had three or fewer crashes.

ATRISCO DRIVE

Of the 18 reported crashes that occurred, the primary crash trend experienced at the intersection was angle crashes. There were 5 angle crashes involving eastbound through vehicles, 3 of which also involved southbound vehicles and 2 that also involved northbound vehicles. There were 3 angle crashes that involved westbound vehicles, two of which that also involved southbound vehicles. The remaining crash types all had two or fewer crashes. Based on the high angle crash trends at the intersection, potential mitigation strategies include reviewing the traffic signal head placement and current traffic signal clearance intervals to minimize vehicles being trapped in the dilemma zone. Red light running cameras might also be a potential crash mitigation strategy to consider, however studies show that these devices tend to result in an increase in generally less severe rear end crashes.

Old Coors Drive

The review of the 16 crashes at the intersection identified two primary crash trends, westbound sideswipes and westbound rear ends. Both had 4 crashes respectively, while all the other crash types had two or fewer. Overall, these crash totals are very low when considering they were over a three year period. The higher crash totals in the westbound direction are likely related to the crest vertical curve on the east approach the limited signal head visibility it creates. Potential mitigation strategies to reduce the number of westbound rear ends and sideswipes could include investigating an advanced signal detection system to alert westbound drivers when to expect to stop. A review of traffic signal head placement and current traffic signal clearance intervals could also help drivers make better decisions on whether to stop or go when the green signal phase is ending.

(New) Coors Boulevard

Of the 8 reported crashes that occurred, the primary crash trend experienced at the intersection was turning crashes and rear ends. There were 3 turning crashes, all of which were random in nature, and two westbound rear end crashes. Besides two westbound rear end crashes, all the other crashes appeared to be isolated in nature with no crash trends amongst them. Based on the lack of distinguishable crash trends at the intersection, potential mitigation strategies are limited to addressing the isolated incidents which may have marginal benefit based on the associated cost. However, if these mitigation strategies were implemented as part of a corridor wide project, a larger benefit might be realized. Some potential strategies to consider include investigating an advanced signal detection system to alert westbound drivers when to expect to stop. A review of traffic signal head placement and current traffic signal clearance intervals could also help drivers make better decisions on whether to stop or go when the green signal phase is ending.

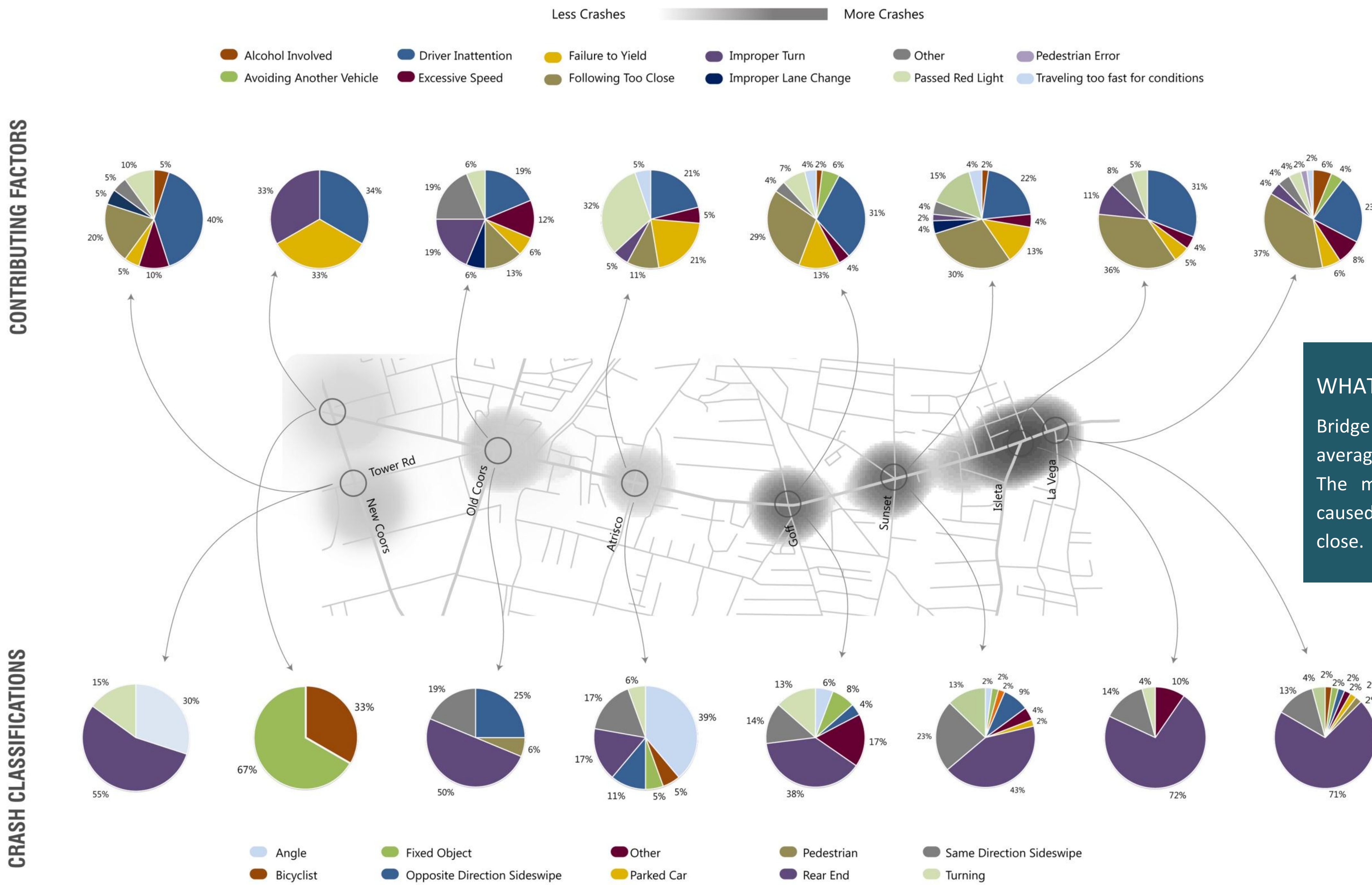
Tower Road

A review of the crash history at the intersection identified 3 reported crashes, with all involving sideswipe collisions. There were two same direction sideswipes, one involving eastbound vehicles and one involving westbound vehicles. There was also one opposite direction sideswipe crash involving an eastbound and westbound vehicle. Based on the sideswipe crash trend, a review of the existing lane alignment, taper rates, and lane widths at the intersection would be appropriate to determine if these all meet applicable design guidelines. Any mitigation strategies considered should account for a future reconfiguration of this intersection as part of a potential shifting of through traffic to the Tower Road corridor.

Tower Road/(New) Coors Boulevard

The review of the 23 crashes at the intersection identified two primary crash trends, rear ends and angle crashes. Of the 11 rear end crashes, five involved northbound vehicles and three involved southbound vehicles. Of the six angle crashes three involved northbound and westbound vehicles and two involved northbound and eastbound vehicles. The remaining crash types all had two or fewer crashes. Based on the high rear end and angle crash trends at the intersection, potential mitigation strategies include reviewing the traffic signal head placement and current traffic signal clearance intervals to minimize vehicles being trapped in the dilemma zone. Red light running cameras might also be a potential crash mitigation strategy to consider, however studies show that these devices tend to result in an increase in generally less severe rear end crashes.

FIGURE 7: HIGH CRASH LOCATION ANALYSIS, 2007-2009



WHAT DOES THIS MEAN FOR BRIDGE?

Bridge Boulevard has lower than the regional average alcohol related crashes in the corridor. The majority of crashes in the corridor are caused by driver inattention and following too close.

FEHR PEERS

March 2012
Source: New Mexico DOT Traffic Safety Bureau

3. Roadway Conditions

HDR prepared this overall assessment of existing roadway conditions in the Bridge Boulevard Corridor to provide an understanding of the immediate deficiencies and issues, to identify immediate opportunities, and to establish a baseline from which to develop transportation alternatives as a part of the overall plan.

As part of this effort, a comprehensive inventory has been completed for numerous characteristics as well as traffic devices and equipment for the Bridge Boulevard corridor. A combination of study of GIS, Google Earth and other mapping was utilized to assemble the inventory. Field reviews were conducted to verify the accuracy of the data being collected.

The corridor is 2.7 miles long and extends from Coors to Barelas Bridge. The roadway generally has a right-of-way of 80 feet between Coors and Old Coors on the Tower alignment; and 80 feet between Old Coors and Isleta, 100 feet between Isleta and Barelas Bridge. There are generally four travel lanes between Old Coors and Barelas Bridge with a center turn lane or medians and two travel lanes between Coors and Old Coors on the Tower alignment. Between Old Coors and Barelas Bridge there are 5 foot sidewalks with curb and gutter and five foot wide bike lanes on each side of the roadway. On the Tower alignment between Coors and Old Coors, there are no sidewalks but there are shoulders. On-street parking is located on both sides of the roadway between Isleta and Barelas Bridge. Seven major intersections are signalized at Coors, Old Coors, Atrisco, Goff, Five Points, Isleta, and La Vega and one major intersection is stop-controlled. All major intersections provide pedestrian crosswalks. Several curb ramps were identified that do not meet ADA standards and some locations have obstructions from fire hydrants, utility poles, or signal equipment. The condition of roadway pavement and sidewalks is generally good with several locations identified for repairs. A number of inactive driveways have been identified that could be closed. Water and sewer lines as well as storm drains run along the majority of the corridor. PNM power lines and a natural gas line extend along the south side of the roadway. Lighting is provided along the length of the corridor on both sides of the roadway.

The following data was compiled for each of the following transportation facility characteristics and is provided in the Appendix.

- Assessment of existing infrastructure and utility conditions
  - Identify width of existing sidewalks
  - Identify existing ROW and roadway widths
  - Identify travel lane and bike lane widths
  - Identify existing pavement and sidewalk condition
  - Identify existing driveway widths
- Inventory of existing traffic signal equipment
  - Pedestrian signal heads and type (traditional or countdown)
  - Pedestrian push buttons (diameter of physical button)
  - Traffic signal head locations and type (i.e. LED or incandescent)
- Identification of Intelligent Transportation Systems (ITS) equipment and projects
- Inventory of on-street parking and also areas where parking is prohibited
  - Identification of posted parking restrictions
  - Identification of estimated on-street parking usage (limited to observations of parking usage, not a formal study)
- Inventory driveways
  - Identification of inactive and active driveways, including driveways that are apparently no longer in use or are redundant, and including driveway locations that are not in compliance with the BC access requirement
  - Identification of locations where sidewalk and pedestrian ramps are not ADA compliant. This includes areas of damaged sidewalk.

Roadway typical sections at select locations across the corridor are shown on Figure 8. Figure 9 shows locations for crashes involving pedestrians and bicyclists. All additional details from the inventory are shown on the Bridge Boulevard Roadway Inventory exhibits located in the appendix. Specific information about existing ITS infrastructure and planned ITS projects is also included in the appendix (Bernalillo County/MRCOG).

Redevelopment alternatives for the Bridge Boulevard Corridor should be prepared with consideration for the following guidance.

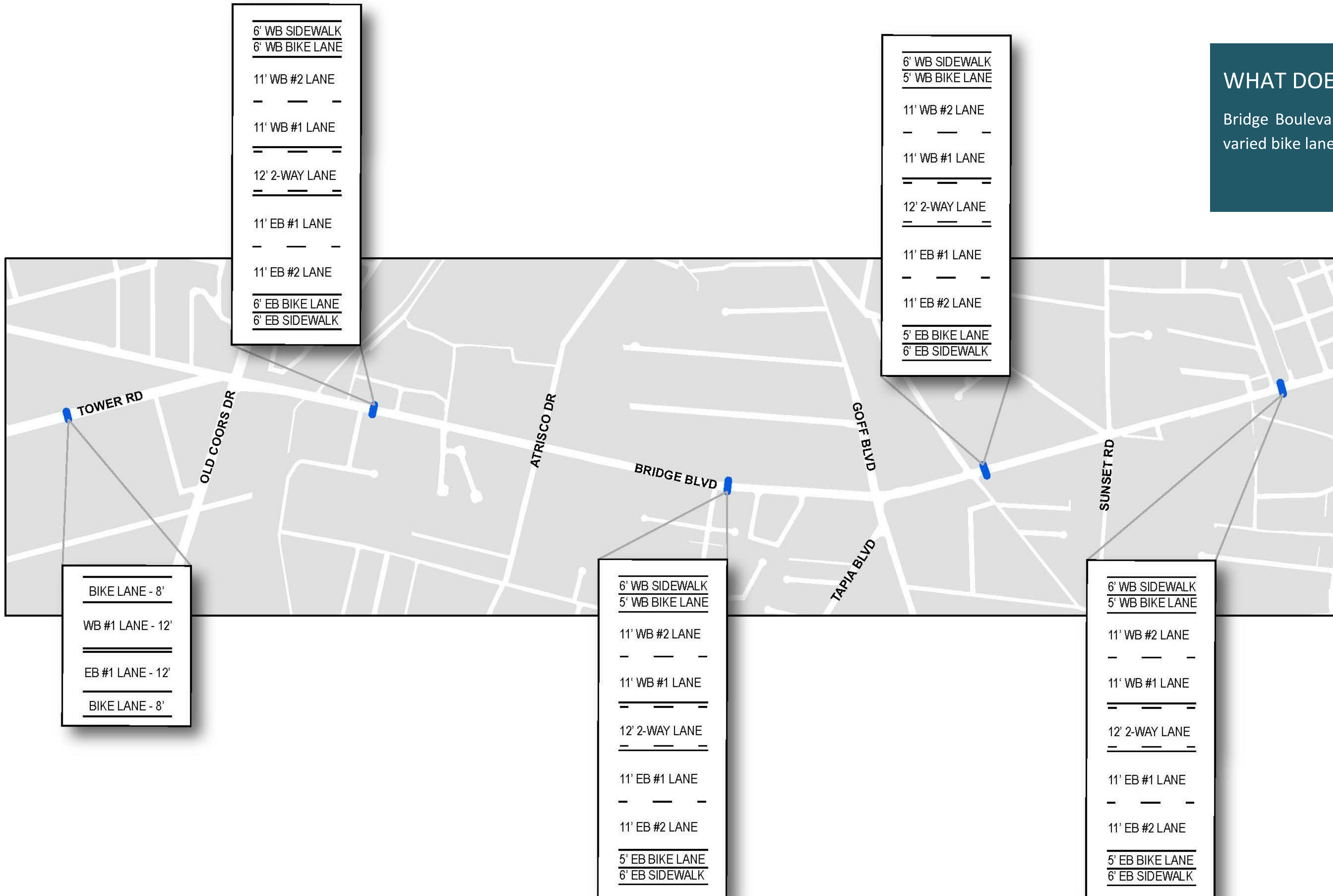
Driveway Access Criteria and Guidance

- For Principal arterials, typically 1 to 2 drives per 300 ft. frontage are allowed depending upon various factors including the general layout for the site.
- Location of driveways: Driveways are to be somewhat evenly spaced where there is more than one driveway. Driveway access points should be carefully managed so that potential conflict points along an arterial roadway are minimized. The following distances should be used as minimums for an intersection. Dimensions are from face of curb of intersecting street to the centerline of the drivepad or access.
  - Principal arterial without median:
    - Approaches:
      - 250 ft. to an arterial intersection
      - 150 ft. to a collector intersection
      - 75 ft. to a local street intersection
    - Following:
      - 100 ft. from an arterial or collector intersection
      - 50 ft. from a local street intersection
  - Principal arterial with median:
    - Drives need to be placed such that the centerline of the drive is approximately centered on the median openings.
    - Where a drive exists on the opposite side of the street, unless they are small developments, or offset by more than 50 ft., the centerline needs to be within 15 ft. of each other.
    - Identify locations where there are opportunities for driveway consolidation or narrowing.

WHAT DOES THIS MEAN FOR BRIDGE?

Most of the Bridge Boulevard corridor has a typical roadway section width of approximately 66.0 feet. The typical roadway section consists of two 11.0-foot thru lanes for each direction, a two-way left turn lane of 11.0 to 12.0-foot width, and bike lanes/shoulders of 5.0 to 6.0-foot width. At intersections, the pavement section of Bridge Boulevard widens to accommodate dedicated left and right turn lanes to access the side streets

FIGURE 8: TYPICAL ROADWAY SECTIONS



WHAT DOES THIS MEAN FOR BRIDGE?

Bridge Boulevard has a consistent travel lane widths through the corridor with varied bike lane widths.

19 March 2012
Source: HDR Inc.

FIGURE 9: BICYCLE & PEDESTRIAN CRASH HISTORY, 2000-2009

WHAT DOES THIS MEAN FOR BRIDGE?

Crash data indicates no specific pattern of crashes as to year, time of day or location. The crashes occurred at random locations, although they generally occurred at or near intersections.

4. PEDESTRIANS AND BICYCLES

Pedestrian and bicycle accommodation in the Bridge Boulevard corridor is very important to achieve the vision of creating "a more livable South Valley community by transforming Bridge Boulevard into a mixed-use, pedestrian-, bicycle-, and transit-friendly corridor." Bridge Boulevard is located Bernalillo County in the South Valley. The South Valley has low walking and bicycling rates compared with Albuquerque and Bernalillo County. Since 2000, bicycle commuting has increased while walk commuting has decreased. The following table is adapted from the Pedestrian and Bicyclist Safety Action Plan that was completed by Bernalillo County Public Work Division in December 2011.

TABLE 1: BERNALILLO BICYCLE AND WALKING COMMUTING PATTERNS

Bernalillo County Commuting Patterns, 2000		
	Bicycle	Walking
Albuquerque	1.1%	2.7%
Bernalillo County	0.9%	2.5%
South Valley	0.0%	1.2%
Bernalillo County Commuting Patterns, 2005-09		
Albuquerque	1.2%	2.1%
Bernalillo County	1.1%	1.9%
South Valley	1.6%	0.5%
Bernalillo County Commuting Patterns, 2010		
Albuquerque	1.4%	1.7%
Bernalillo County	1.6%	1.6%
South Valley	0.5%	1.0%
Source: US Census, American Community Survey, 2035 MTP, MRCOG		

This section evaluates the existing bicycle and pedestrian facilities on Bridge Boulevard and considers way that the corridor can be enhanced to provide safe and comfortable facilities for people who choose to walk and bike.

WHAT DOES THIS MEAN FOR BRIDGE?

Existing infrastructure for pedestrians and bicycles ranges from substandard to adequate and could be significantly improved to enhance livability.

BICYCLE & PEDESTRIAN SAFETY AUDIT

On January 19, 2012, a Bicycle Pedestrian Safety Audit (BPSA) was conducted for a section of Bridge Boulevard. The goal of the audit was to address bicycle and pedestrian safety along the corridor. The audit was intended to evaluate the physical conditions of bicycle and pedestrian facilities in the corridor. A variety of municipal stakeholders were invited to participate in the assessment. Attendees included:

- Caeri Thomas – Transportation Planner, MRCOG
- Julie Luna – Transportation Planner, MRCOG
- Carrie Barkhurst – City of Albuquerque Planner
- Lawrence Kline – City of Albuquerque Transit Planner
- Joe Luehring – Engineer, BC Public Works
- Richard Meadows – Transportation Planner, BC Public Works
- Jessica Griffin (Frost) – NMDOT Safe Routes to School
- Lt. Andie Taylor – County Sheriff SV Commander
- Tim Karpoff – Karpoff & Associates
- Will Gleason – Dekker/Perich/Sabatini
- Dean Bressler – HDR
- Ed Potthoff, HDR
- Molly Veldkamp – Fehr & Peers
- Rick Plenge – Fehr & Peers

Walking along Bridge Boulevard provided an opportunity for firsthand experience of the issue and opportunities related to pedestrian and bicycle safety in the corridor. The walking audit began at the South Valley Economic Development Center (EDC) located on Isleta south of Bridge. Participants began walking north on Isleta, then headed west on Bridge to the 5 Points intersection. Participants traversed the 5-leg intersection and continued east on Bridge back to Isleta and south to the EDC.

Following the walking audit, a debrief session was held to collect all of the observations that were made. The following list provides a summary of observations.

General Corridor Observations

- Generally unpleasant to walk along corridor despite wider sidewalks
- Existing asphalt is loud, smaller aggregate "quiet asphalt" is available to reduce tire noise.
- Vacant lots are a haven for crime
- The corridor is unappealing right now – lacks landscaping
- Sidewalk slopes are generally within accepted tolerances
- Several portions of sidewalk are heaving
- Level path is not maintained across driveways
- A large number of driveways along the corridor – many did not serve any existing use
- Several instances where bollards, utility poles, and bus stop benches encroach into the pedestrian path
- Several locations where previous sign posts were removed from sidewalk leaving a hole in concrete sidewalk
- Faded/outdated signal heads make it difficult to view pedestrian signal indications
- Push buttons are small and don't meet ADA requirements
- The existing pedestrian walk time at signalized intersections appears to be shorter than necessary
- Lack of stop lines on cross streets do little to encourage drivers to stop behind crosswalk
- Lack of crosswalks for pedestrians and bicyclists
- Only one bus shelter along the corridor just west of the bridge, two bus stop benches along the corridor
- The width of the bike lane is generally 5 feet from center of lane line to the outside edge of gutter in some locations it went down to 3.5-4'
- In general the bike lanes were free of debris although there were a few locations where expansion joints created some obstacles for cyclists
- A few traffic signal pull box lids were broken and created a tripping hazard

Specific Location Observations

Several locations were identified by BSPA participants as being particularly difficult for pedestrians and bicyclists. The majority of location-specific issues observed on Bridge Boulevard were focused between Sunset Drive and Isleta Boulevard as that was the extent of the BPSA. However, a few locations were noted as potential crossings at acequias throughout the corridor. Visibility issues were noted at Isleta Boulevard as well as Hartline creating an un-safe pedestrian environment. These locations are shown in Figure 10.

Pedestrian and Bicycle Connectivity

In addition to the bicycle and pedestrian safety assessment, connectivity to and from schools, parks, and village centers was considered. There are currently sidewalks on either side of Bridge Boulevard to Old Coors Drive, providing access to the designated Village Centers. Sidewalks along Isleta Boulevard also provide access from Bridge to schools and parks south of the corridor. Besides these streets, however, sidewalks from the corridor are discontinuous, providing limited access to destinations in proximity of Bridge Boulevard. An existing bike lane on the corridor connects with lanes along Isleta Boulevard, Old Coors Drive, and Coors Boulevard. These lanes provide access to schools south of the corridor. Additional bicycle routes provide connections from Bridge Boulevard to schools and parks north and south of the corridor. Figure 12 shows the bicycle and pedestrian facilities as well as destinations along the corridor

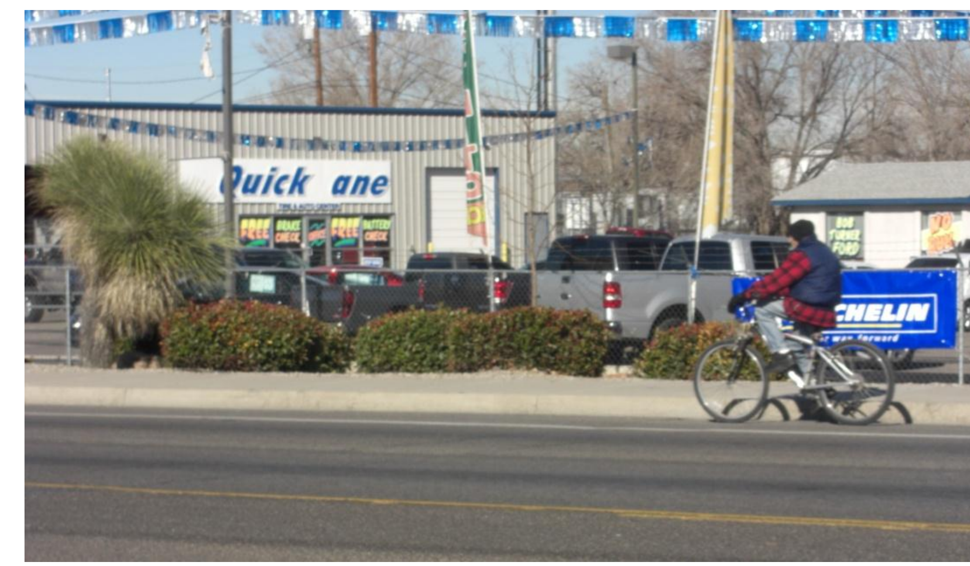


FIGURE 10: LOCATION SPECIFIC OBSERVATION MAP

LOCATION-SPECIFIC OBSERVATIONS

1. Driveways on the southwest corner of Islea and Bridge have low visibility going around the curve - frequent fender benders
2. Visibility issues accessing Bridge from SB Hartline
3. Potential crossing location at acequia
4. Wide curb radii
5. Vacant lots and limited lighting lead to food cart vending and drag racing
6. Lansing to Hartline - street parking blocks bikes, so the bikes use the sidewalk, and the walk is blocked for pedestrians

FIGURE 11: BICYCLE AND PEDESTRIAN COUNTS

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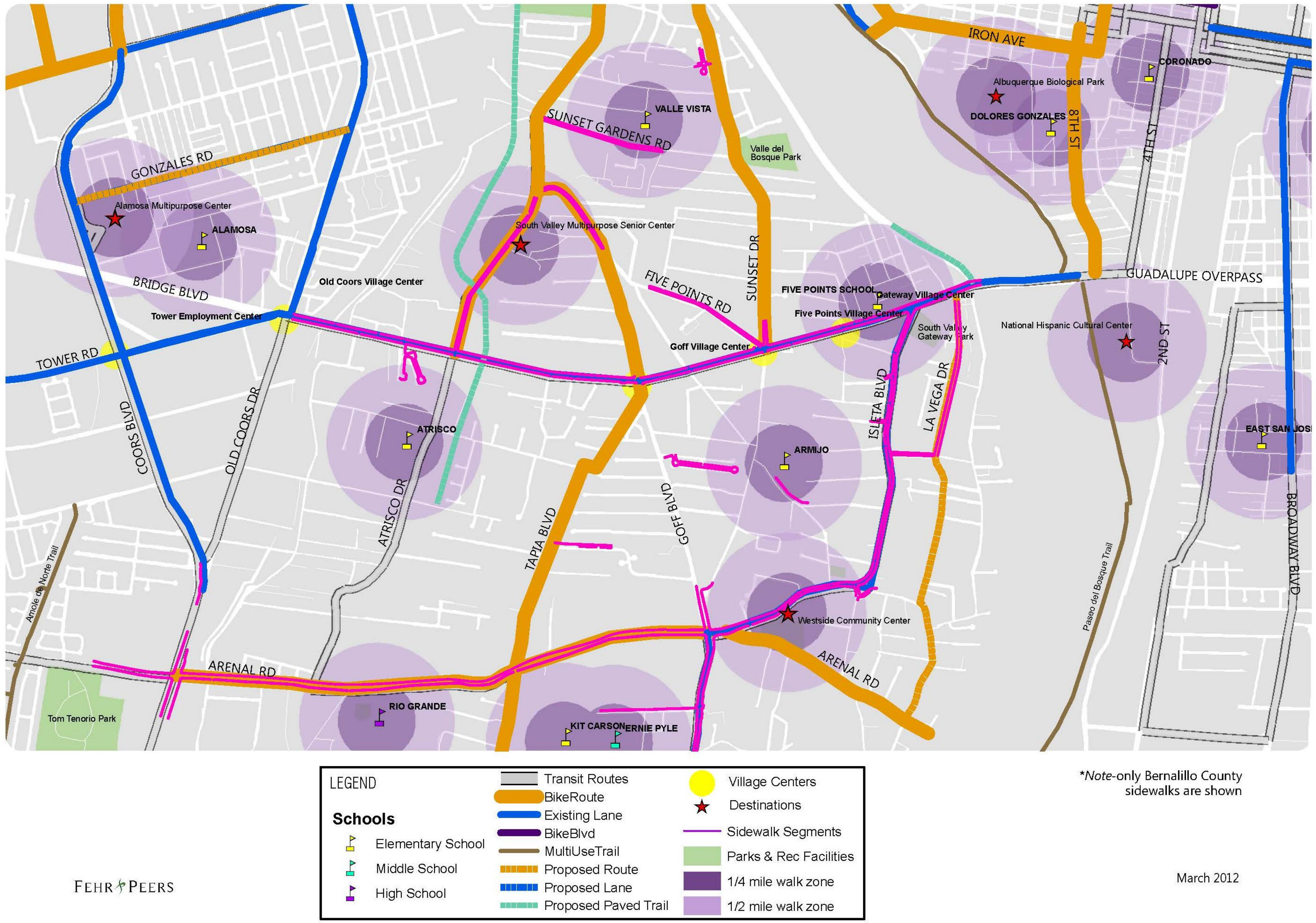
FIGURE 12: BICYCLE AND PEDESTRIAN CONNECTIVITY TO PARKS, SCHOOLS, AND VILLAGE CENTERS



*Note-only Bernalillo County sidewalks are shown

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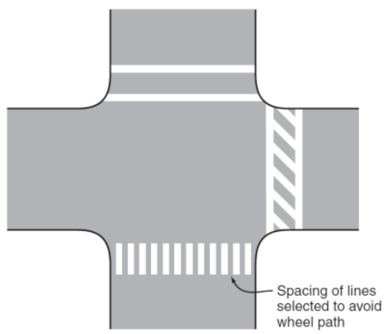
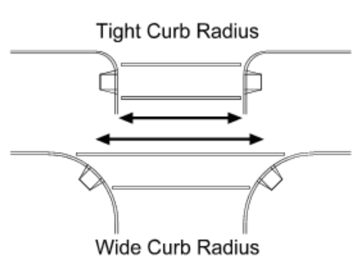
Bicycle and Pedestrian Safety Toolbox

A "toolbox" of bicycle and pedestrian safety enhancements is available for the Bridge Boulevard corridor. Pedestrian, bicycle, signal, and corridor safety tools are described in Tables 2-5.

TABLE 2: PEDESTRIAN SAFETY TOOLS

TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Marked Crosswalk  *Image source: 2009 MUTCD*	Provide designated pedestrian crossings at: • Pedestrian generators • Crossings with significant pedestrian volumes (at least 15 per hour) • Crossings with high vehicle-pedestrian collisions	Signal a clear "channel" for pedestrian pathways to both pedestrians and vehicles	Marked crosswalks alone should not be installed on multi-lane roads with more than about 10,000 vehicles/ day.	$
High-Visibility Signs and Markings  *Image source: http://mutcd.fhwa.dot.gov*	Includes a family of crosswalk striping styles such as the "ladder" and the "continental" High-visibility colored signs are posted at crossings to increase driver awareness of the pedestrian crossing	Increase driver awareness of unexpected condition or location where drivers need to exercise a higher level of caution based on potential conflicts with more vulnerable road users	Beneficial in areas where drivers might not expect a pedestrian crossing or where a higher level of driver attention is required due to potential pedestrian and bicycle conflicts	$
Advanced Yield Lines  *Image source: www.saferoutesinfo.org*	Standard white yield limit lines are placed in advance of marked, uncontrolled crosswalks.	Increases the pedestrian's visibility to motorists Reduces the number of vehicles encroaching on the crosswalk Indicates to drivers where to stop	Useful in areas where pedestrian visibility is low and in areas with aggressive drivers Addresses the multiple-threat collision on multi-lane roads.	$

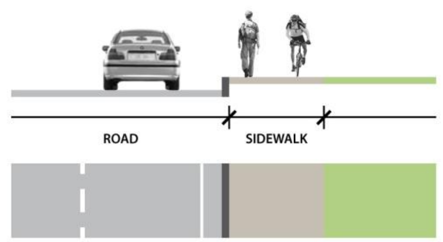
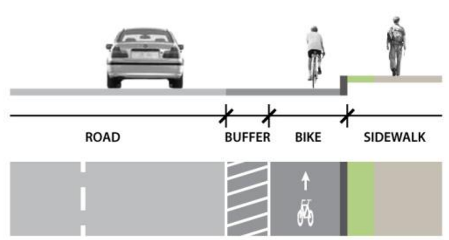
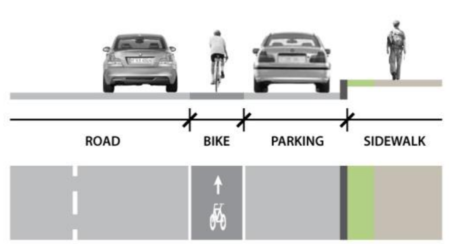
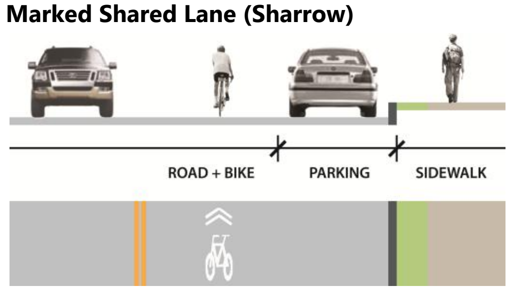
TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
In-Street Pedestrian Crossing Signs  *Image source: http://mutcd.fhwa.dot.gov*	Regulatory pedestrian signage posted on lane edge lines and road centerlines May be used to remind road users of laws regarding right of way at an unsignalized pedestrian crossing	Highly visible to motorists and has a positive impact on pedestrian safety at crosswalks Good driver compliance with yielding to pedestrians though compliance decreases on multi-lane roadways	Mid-block crosswalks Unsignalized intersections Low-speed areas Two-lane roadways May need to be removed in winter in snowy climates	$
Curb Extension/ Bulb Outs 	Traffic-calming measure meant to slow traffic and increase driver awareness Consists of an extension of the curb into the street, making the pedestrian space (sidewalk) wider	Narrows the distance that a pedestrian has to cross and decreases pedestrian exposure time Increases the sidewalk space on the corners Improves pedestrian visibility and improves sight distance for cross street motorists Lowers vehicle turning speeds	Suitable along most roadways and intersections so long as a parking lane shadows the curb extension Need to consider impact on transit service and could provide extended curb extension that extends length of bus stop so long as there is another travel lane to bypass the stopped bus Need to consider larger vehicle turning paths	$$
Reduced Curb Radii  *Image Source: www.ci.austin.tx.us*	The radius of a curb is reduced requiring motorists to make a tighter turn	Narrow the distance pedestrians have to cross Reduce traffic speeds and increase driver awareness (like curb extensions)	Beneficial on streets with high pedestrian activity, on-street parking, and no curb-edge transit service More suitable for wider roadways and roadways with low volumes of heavy truck traffic	$$$

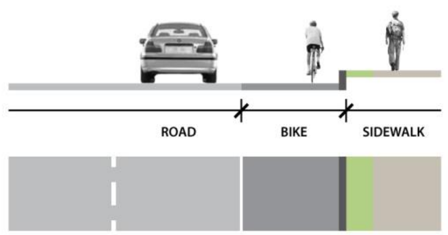
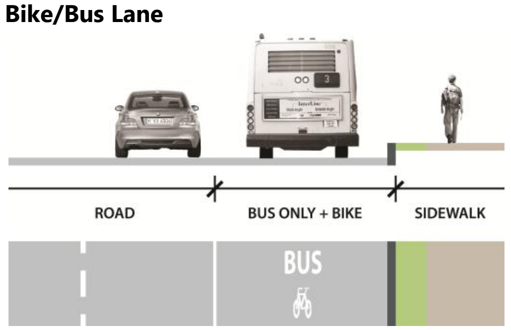
TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Raised Crosswalks 	Marked crosswalks that are raised to act simultaneously as a traffic calming device	Provide superior safety advantage to pedestrians with demonstrated increased yielding by drivers	Appropriate on streets with moderate traffic Particularly effective where heavily used trails cross a road Application may be appropriate on low volume side streets intersecting Bridge Boulevard	$$
Median Pedestrian Island  *Image source: http://thegoodcity.wordpress.com/category/transportation/*	Raised islands are placed in the center of a roadway, separating opposing lanes of traffic with cutouts for accessibility along the pedestrian path, providing a refuge for people crossing	This measure allows pedestrians to focus on each direction of traffic separately, and the refuge provides pedestrians with a better view of oncoming traffic as well as allowing drivers to see pedestrians more easily. It can also split up a multi-lane road and act as a supplement to additional pedestrian tools.	Recommended for multi-lane roads wide enough to accommodate an ADA-accessible median	$$$
Staggered Median Pedestrian Island 	Crosswalks in the roadway are staggered such that a pedestrian crosses half the street and then must walk towards traffic to reach the second half of the crosswalk Must be designed for accessibility by including rails and truncated domes to direct sight-impaired pedestrians along the path of travel.	Increase in the concentration of pedestrians at a crossing and the provision of better traffic views for pedestrians Motorists are better able to see pedestrians as they walk through the staggered refuge.	Best used on multi-lane roads with obstructed pedestrian visibility or with off-set intersections Must be designed for accessibility by including rails and truncated domes to direct sight-impaired pedestrians along the path of travel	$$$

TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
In-Roadway Warning Lights  *Image Source: www.tfhrc.gov/*	Both sides of a crosswalk are lined with pavement markers, often containing an amber LED strobe light Lights may be push-button activated or activated through passive pedestrian detection	Provides a dynamic visual cue Increase effectiveness in low light conditions	Best in locations with low bicycle ridership, as the raised markers present a hazard to bicyclists May not be appropriate in areas with accumulating snow due to decreased visibility of lights Not as effective in locations with bright sunlight Maintenance can be a concern	$$$
Overhead Flashing Beacons  *Image source: tti.tamu.edu*	Flashing amber lights installed on overhead signs in advance of the crosswalk or at the crosswalk	Blinking lights during pedestrian crossing times increase the number of drivers yielding for pedestrians and reduce pedestrian-vehicle conflicts May also improve conditions on multi-lane roadways.	Best used in places where motorists cannot see a traditional sign due to topography or other barriers	$$$
Rapid Flash Beacons  *Image source: mutcd.fhwa.dot.gov*	Replace the traditional slow flashing incandescent lamps with rapid flashing LED lamps The beacons may be push-button activated or activated with pedestrian detection	Very effective as measured by increased driver yielding compliance (65-80% compliance) Solar panels reduce energy costs associated with the device Wireless capabilities reduces installation cost	Appropriate for single and multi-lane roadways Effectiveness decreases as the number of travel lanes increases	$$

TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Pedestrian Hybrid Beacon  *Image Source: www.tfhrc.gov/*	Pedestrian-actuated beacon that is a combination of a beacon flasher and a traffic control signal When actuated, the beacon displays a yellow (warning) indication followed by a solid red light During pedestrian clearance, the driver sees a flashing red "wig-wag" pattern until the clearance interval has ended and the signal goes dark	Reduces pedestrian-vehicle conflicts and increases driver compliance with yielding to pedestrians (80-90% compliance) Reduces vehicle delay when compared to standard pedestrian traffic signal	Useful in areas where it is difficult for pedestrians to find gaps in automobile traffic to cross safely, but where normal signal warrants are not satisfied Based on higher cost, most appropriate for higher speed multi-lane roadways.	$$$$
Pedestrian Countdown Signals  *Image source: www.livablestreets.com*	Pedestrian signal head that displays the amount of time remaining during the pedestrian clearance interval	Reduces pedestrian-vehicle conflicts and slows traffic speeds Studies have shown it reduces pedestrian versus vehicular crashes by 25%	Required by the MUTCD for all signalized intersections With pedestrian signal heads	$$
Pedestrian Overpass/ Underpass  *Image source: omahamidcenturymodern.blogsome.com*	Pedestrian-only overpass or underpass over a roadway Provides complete separation of pedestrians from motor vehicle traffic, normally where no other pedestrian facility is available Connects off-road trails and paths across major barriers	Allow for the uninterrupted flow of pedestrian movement separate from the vehicle traffic	Most feasible and appropriate in extreme cases where pedestrians must cross roadways such as freeways and high-speed, high-volume arterials This measure should be considered only with further study	$$$$$

TABLE 3: BICYCLE SAFETY TOOLS

TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Sidewalk Bikes Permitted  	Designed for bicycle usage to avoid conflicts between single direction motor vehicle traffic	Sidewalks will include additional signage, ground markings, and special curb cuts to facilitate bicycle travel Physical separation between wheeled and non-wheeled users is recommended to minimize potential conflicts between users	Interim solutions that connect two green facilities together Should be used only when there is no immediate solution to resolve a connection between two green facilities	$$$
Buffered or Protected Bike Lane  	Created by painting a flush buffer zone between a bike lane and the adjacent travel lane Buffers may also be provided between bike lanes and parking lanes to demarcate the door zone and discourage bicyclists from riding closely next to parked vehicles	Provides a warning for motorists and bicyclists that the street is multi-purpose Buffered bike lanes increase the riding comfort for bicyclists as they increase separation from vehicular traffic and/or parked vehicles	Should be considered at locations where there is excess pavement width or where increased separation is desired	$$
Bicycle Lane  	Portion of the roadway designated for preferential use by bicyclists One-way facilities that typically carry bicycle traffic in the same direction as adjacent motor vehicle traffic on the right side of the roadway	Provide dedicated space from vehicular traffic Reduce stress caused by acceleration and operating speed differentials between bicyclists and motorists	Desirable on collectors and some arterials where traffic volumes and speeds are higher Typically installed by reallocating existing street space by narrowing existing lanes, removing travel lanes or parking lanes, and/or reconfiguring parking lanes	$$
Marked Shared Lane (Sharrow)  	Marking alerts road users to the lateral position bicyclists are likely to occupy within the traveled way to be most visible to drivers and to help avoid conflicts with parked cars	Provide guidance to bicyclists and motorists in situations where separate bicycle facilities are not provided Encourage safer passing practices (including changing lanes, if necessary)	Installed where there is insufficient space to allocate to a dedicated bicycle facility in the right most through travel lane Generally used on collector streets where a more comfortable bicycle facility cannot be provided due to right-of-way constraints	$

TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Paved Shoulder 	Hybrid bicycle facilities on roadways where there is additional space between the outer travel lanes and the edge of the right of way Paved shoulders are marked with a solid white line	Increase the riding comfort for bicyclists as they increase separation from vehicular traffic Do not have ground markings at the intersections to resolve turning conflicts between bicyclists and motorists	Should be considered at locations where there is excess pavement width or where increased separation is desired Excess width should provide the minimum width as specified by AASHTO Bicycle Facility Guidelines Signage should be installed to warn motorists and bicyclists that the street is multipurpose	$
Bike/Bus Lane 	Marking is intended to alert bicyclists and bus drivers that both uses occupy the traveled way Special ground markings warn motorists of their presence Include special stop designs to allow passing when buses are stopped	Encourage safer passing practices (including changing lanes, if necessary)	Located in arterial corridors where there are bus routes and the need for on-street bicycle connections between destinations	$
Bicycle Detection Loop 	Embedded loop detector in roadway surface detects a bicycle	Decreases delay for cyclists at signalized intersection Encourages cyclists to wait for signal indication	Should be considered in locations where there is a high number of cyclists or low number of vehicles that would activate the signal	$$

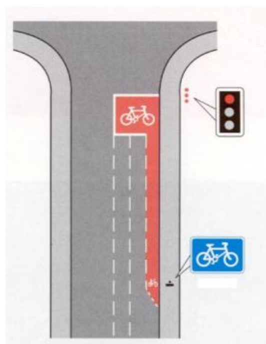
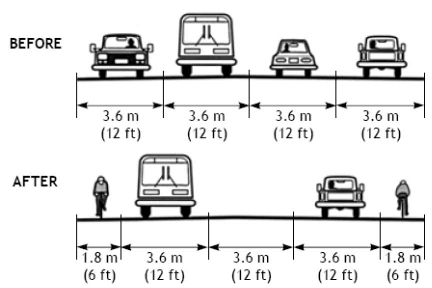
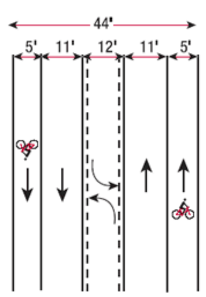
TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Bike Box 	Marked area on the approach to a signalized intersection provides cyclists space to queue during a red signal phase	Reduces potential conflicts between cyclists and turning drivers Enhance visibility of cyclists Helps cyclist get into position to make a left turn during a red signal phase Reduces signal delay for cyclists	Bold markings and education for cyclists and motorists recommended to prevent motor vehicle encroachment into the box. Provides an additional benefit for pedestrians serving as a buffer zone between waiting vehicles and pedestrian crossing	$
Continuous Bike Lane 	Extension of bike lane markings through intersections	Alert drivers to potential presence of cyclists and the need to use caution Designate clear path for cyclist through intersection Pavement markings make cyclists more visible to drivers	Safety benefits of marked lanes through intersections dependent on additional factors including intersection size, number of approaches, and traffic volumes Due to frequent vehicle turning maneuvers, maintenance can be a concern	$
Sharrow/Chevron Markings 	A combination of bike symbol and chevron marking that designate where a cyclist should position themselves within the travel lane	Encourages cyclists to ride away from the parked car door zone Provide guidance to cyclists and motorists in situations where dedicated bicycles facilities are not provided Alerts motorists to the presence of cyclists on the street	Installed centrally where there is insufficient space to allocate to a dedicated bicycle facility Can be used within intersections to define cyclists path through intersection When usable lane width does not provide sufficient space for a vehicle to pass a cyclist, the sharrow symbol should be located in the center of the travel lane	$

TABLE 4: SIGNAL SAFETY TOOLS

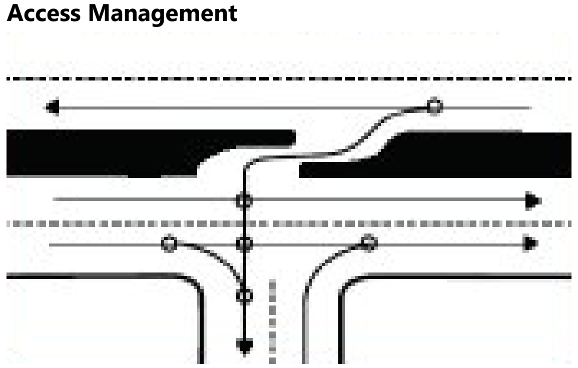
TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Leading Pedestrian Intervals 	Traffic signal timing that provides pedestrians with a few second head start prior to motor vehicles on the parallel roadway being given the green light	Increases pedestrian visibility for turning vehicles and driver yielding compliance for pedestrians Helps reduce conflicts between turning vehicles and pedestrians	Can be applied at most signalized intersections especially where there is a high number of turning vehicles and pedestrians conflicts	$
Protected Left Turn Phasing 	Traffic signal phasing that only allows left turning vehicles to enter the intersection	Eliminates conflicts between left turning vehicles and pedestrians which is one of the most common type of crash involving a pedestrian and vehicle	Used primarily on higher volume roadways where the left turning vehicle must cross multiple approach lanes and there is no left turn storage issues	$$$
No Turn on Red (signs) 	Posting regulatory signs that restrict vehicles from turning on red signal indications	Eliminates potential conflicts between turning vehicles and pedestrians or bicyclists that might be crossing during the conflicting traffic signal phase.	Should be considered in most urban locations where there are a high number of pedestrians Turn restriction can be limited to certain hours when pedestrians are most likely to be present at the intersection	$
Way-finding signs 	Posting a series of pedestrian and bicycle way-finding signs that orient pedestrians to walking and biking destinations along a corridor	Encourages more walking and bike trips by providing people with a reference point to a destination	Applied in locations where there are pedestrian and bicycle destination or attractors Should be located in areas where will not obstruct the pedestrian walkway or create sign clutter Should be scaled to be legible for appropriate user Should not be used to promote private businesses	$

TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Signal Coordination (bicycle progression) 	Developing a traffic signal coordination plan that is based around a slower travel speed usually between 12-18mph	Reduces start and stop delay for cyclists Promotes a more uniform travel speed for all road users Makes for a more comfortable roadway to bike on	Most appropriate on streets where there are high number of bicyclists	$$
Lagging Left Turns 	Changes the sequence of the protected left turn phasing so that the left turn phase occurs after the adjacent through phase is completed instead of before	Reduces delay for pedestrians by providing them the walk phase prior to the left turning phase	Should be considered where there is adequate left turn vehicle storage and will meet driver expectancy.	$
Retiming Clearance Intervals 	Modifying the pedestrian clearance intervals at signalized intersections to provide adequate time for a pedestrian to cross the intersection at a slower walking speed that 3.5 ft/s	Increases the comfort level for all pedestrians and reduces the need to rush to cross the street	Should be considered around schools and senior centers where pedestrians with slower walking speeds are anticipated	$

TABLE 5: CORRIDOR SAFETY TOOLS

TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Pedestrian Safety Blitzes 	Education/enforcement campaign to remind pedestrians and motorists to look out for each other on roadways Local police target drivers who fail to yield to pedestrians in crosswalks	Increase driver compliance with yield to pedestrian laws Raise the awareness of pedestrian safety issues	Blitzes should occur at or near marked intersections and police should cite drivers if a pedestrian has completely entered the crosswalk Initially, warnings should be issued as part of awareness campaign	$$
Road Diet (aka Lane Reduction) 	The number of lanes of travel is reduced by widening sidewalks, adding bicycle and parking lanes, and converting parallel parking to angled or perpendicular parking	Good traffic calming and pedestrian safety tool, particularly in areas that would benefit from curb extensions but have infrastructure in the way Improves pedestrian conditions on multi-lane roadways.	Roadways with surplus roadway capacity Roadways that would benefit from traffic calming measures	$$$
Lane Diets 	Reducing the width of existing wider travel lanes down to 10-11 feet	Encourages slower travel speeds and allows for the installation of medians, bicycle facilities, and other traffic calming elements	Most appropriate on collector/arterial type streets with identified speeding concerns or a desire to provide bicycle facilities	$

TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Sidewalks 	All-weather walking surface outside the travel way	Provides pedestrians a safer and more enjoyable location to walk along a roadway	Should be considered along all corridors	$$
Corridor Lighting 	Roadway and pedestrian sidewalk lighting to improve driver visibility of pedestrians during low light conditions	Improves driver visibility of pedestrians and provides them more time to react to a potential conflict	Should be considered along all corridors	$$$$
Landscape Buffer 	Providing a 5-8' landscaping strip between the edge of roadway and the pedestrian path	Improves pedestrian walking environment by providing buffer between moving traffic and sidewalk Provides area to install street furniture and utilities to help maintain a clear pedestrian walkway Provides a good location to store snow in colder climates	Should be considered on most corridors where right-of-way width permits	$$$

TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Crosswalks 	Provide designated crossing at bus stops-pedestrian generators	Reduce pedestrian conflicts at bus stops by increasing motorist awareness & visibility of pedestrians blocked by buses	Crosswalks are appropriate before bus stops so pedestrians are visible to motorists	$
Shelters 	Bus shelters increase the comfort and usability of the bus/shuttle network	Provide protection from the elements Draw attention to bus stops, making the community more aware of the bus/shuttle network	Bus shelters are appropriate in higher use areas	$$
Benches 	Benches provide seating areas for people waiting for buses.	Benches at bus stops and along bike routes make them easier and more attractive to use Increase motorist visibility and community awareness of bus stops	Site furnishings should coordinate with bus stops to accentuate way-finding	$$
Access Management 	Closing driveways, sharing driveways, or adding narrow medians to ensure safe spacing and use of driveways.	Improves safety by reducing the number of traffic conflicts Improves movement of traffic	Location of driveways should be considered in the context of current and future access needs and intersection operations Consider mobility for pedestrians and bicyclists	$$$$

During the Bicycle Pedestrian Safety Audit, each participant was asked to evaluate the appropriateness of the individual tools along Bridge Boulevard. Participant responses to each of the tools are shown in Figure 13.

FIGURE 13: SAFETY ENHANCEMENT TOOL PREFERENCES

5. Transit Service

Transit is a critical mode of transportation in the Bridge Boulevard corridor for residents without a vehicle or living with disproportional housing + transportation costs (H+T). The current service frequencies and route structures are oriented to transit "dependent" riders housing and destinations. The services provide a general coverage of major destinations. The services are not designed for "choice" riders as a time competitive choice to personal automobile travel. This is a primary function of the current land development patterns and densities that are presented in the Bridge Boulevard travel market. The following provides an overview of the current services and demographics in the transit travel market.

WHAT DOES THIS MEAN FOR BRIDGE?

Existing transit service in the corridor appears to meet the current demand. However, improvements such as benches, shelters, maps, and schedule information can make transit in the corridor more appealing.

Bridge Boulevard is primarily served by Route 54. This route operates east and west from Old Coors across the Rio Grande to 4th Street. While the current route configuration provides transit service through several neighborhoods, it does not provide direct east-west access west of Old Coors Boulevard. Route 53, which is primarily a north-south route, runs along the corridor for a shorter segment, from Isleta Boulevard to 8th Street. Figure 19 and Figure 20 show transit along Bridge Boulevard.

FIGURE 14: BRIDGE BOULEVARD TRANSIT RIDERSHIP

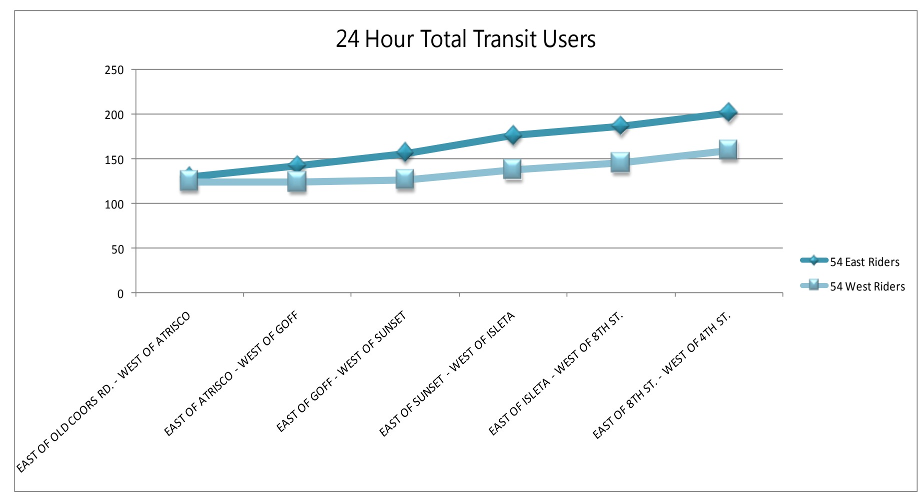


Figure 14 shows that ridership along route 54 increases from Old Coors Boulevard to 4th Street. This indicates that more route 54 westbound riders are boarding along this corridor than exiting, most likely to access downtown. Route 54 eastbound ridership reflects the opposite pattern as riders decrease from 4th Street to Old Coors Boulevard. Based on the transfer opportunities between routes 53 and 54, the Isleta location was the busiest transit stop with 38 boardings and 31 alightings. The Sunset Drive location was the second busiest with 31 boardings and 24 alightings.

While transit currently makes up a small percentage of mode-share along the Bridge Boulevard corridor, routes 51 and 155 provide key north-south connections from or across Bridge to Central Avenue - ABQ Ride's most heavily traveled route with 40-45% of the system-wide ridership. Coors Boulevard is also designated as a Premium Quality Corridor by the *Westside Long Range Transit Plan*, reflecting a "Transit First" policy with the goal of providing linkages among transit centers. Thus, developing transit routes along Bridge that connects with more frequent, heavily-utilized routes, such as 155 along Coors, will be key in developing a convenient transit network. Physical considerations such as stop locations, as well as operational factors such as frequency and scheduling, must be considered in relation to these routes.

According to the *Westside Transit Improvement Study*, Bridge Boulevard from Coors Boulevard to 8th Street is considered a Major Quality Corridor. Although this designation does not assume a "Transit First" priority, some priorities for transit operation along this corridor will make routes along Bridge Boulevard more convenient. Effective connections to premium quality corridors such as Coors are critical to developing a quality transit system overall.

Major Quality Corridors include the following elements:

- Transit priority- some intersections with traffic signal priority
- Pedestrian linkages- convenient, well designed paths should be available in all directions from each stop to adjacent neighborhoods and activities
- Average route speed- medium, generally equivalent to street traffic
- Station/stops- shelters at each stop
- Intelligent transportation systems technology- real-time bus status shown on a sign/monitor at park-ride facilities
- Transit service types- commuter/express & line haul

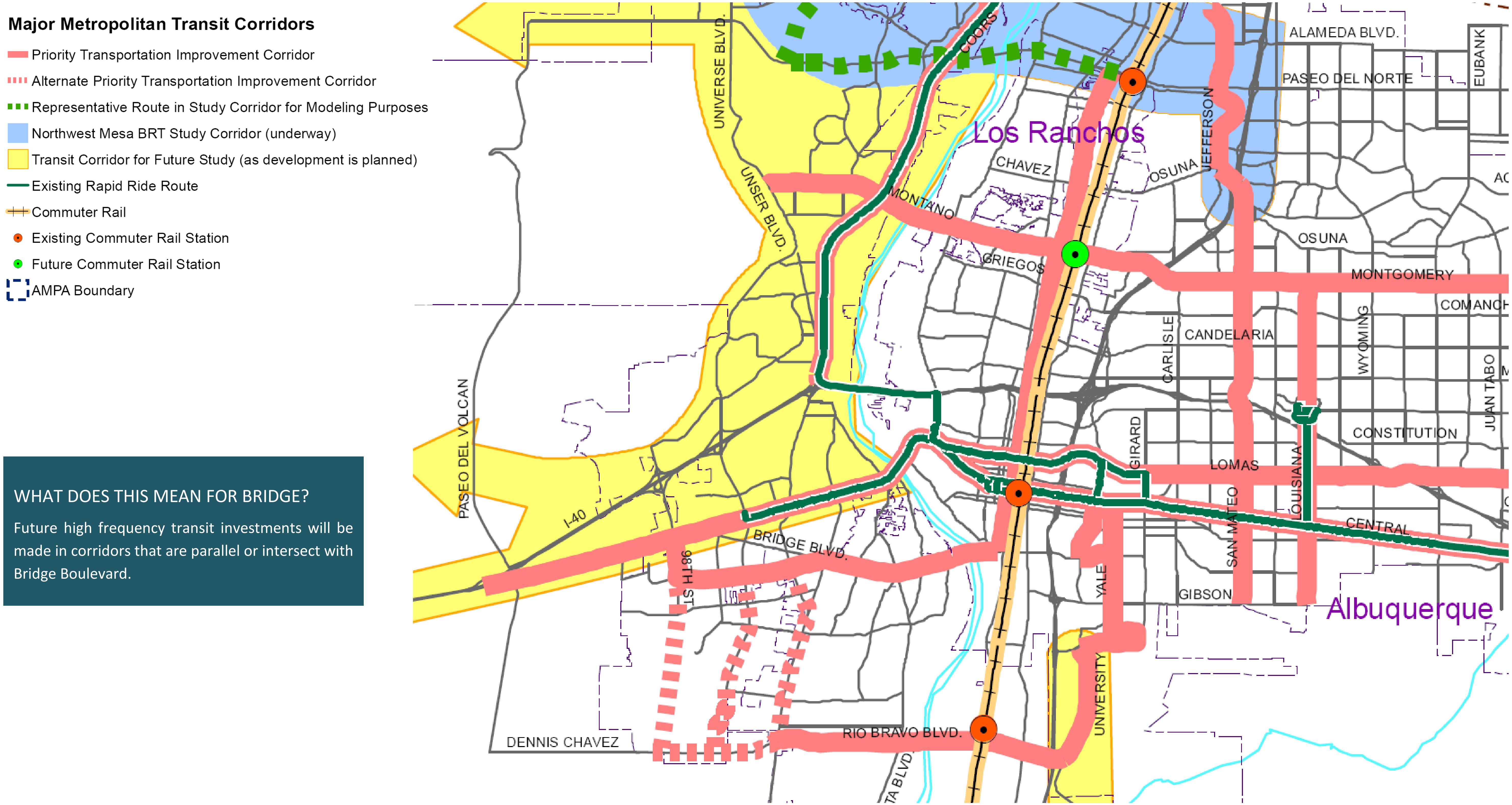
The Westside Transit Improvement Study also includes several improvement alternatives for routes along or connecting with Bridge Boulevard.

Service Improvement Alternatives for Short Range Implementation:

- 51- Atrisco/Rio Bravo- frequency improvements "Rationalize" service with 60-minute service headways
- 53- Isleta- improve frequency of service from 45 min to 30 min. explore possibility of 30-min service
- 54- Bridge/Westgate- Change west terminal to Rio Bravo and Coors Boulevards (re-route south from intersection of Unser and Coors Boulevards) explore possibility of 30 min. service
- 155- Coors- connect both Westside transit centers; improve productivity

The recommendation for route 54 to relocate the Delgado terminal to the future transit center located at Coors Boulevard and Rio Bravo may change route choices for Westside residents. This change would make route 54 a more convenient option for residents south of Bridge to access downtown via route 54 rather than taking routes 51 or 155 to connect with routes along Central Ave. This may result in higher transit mode-share along Bridge Boulevard.

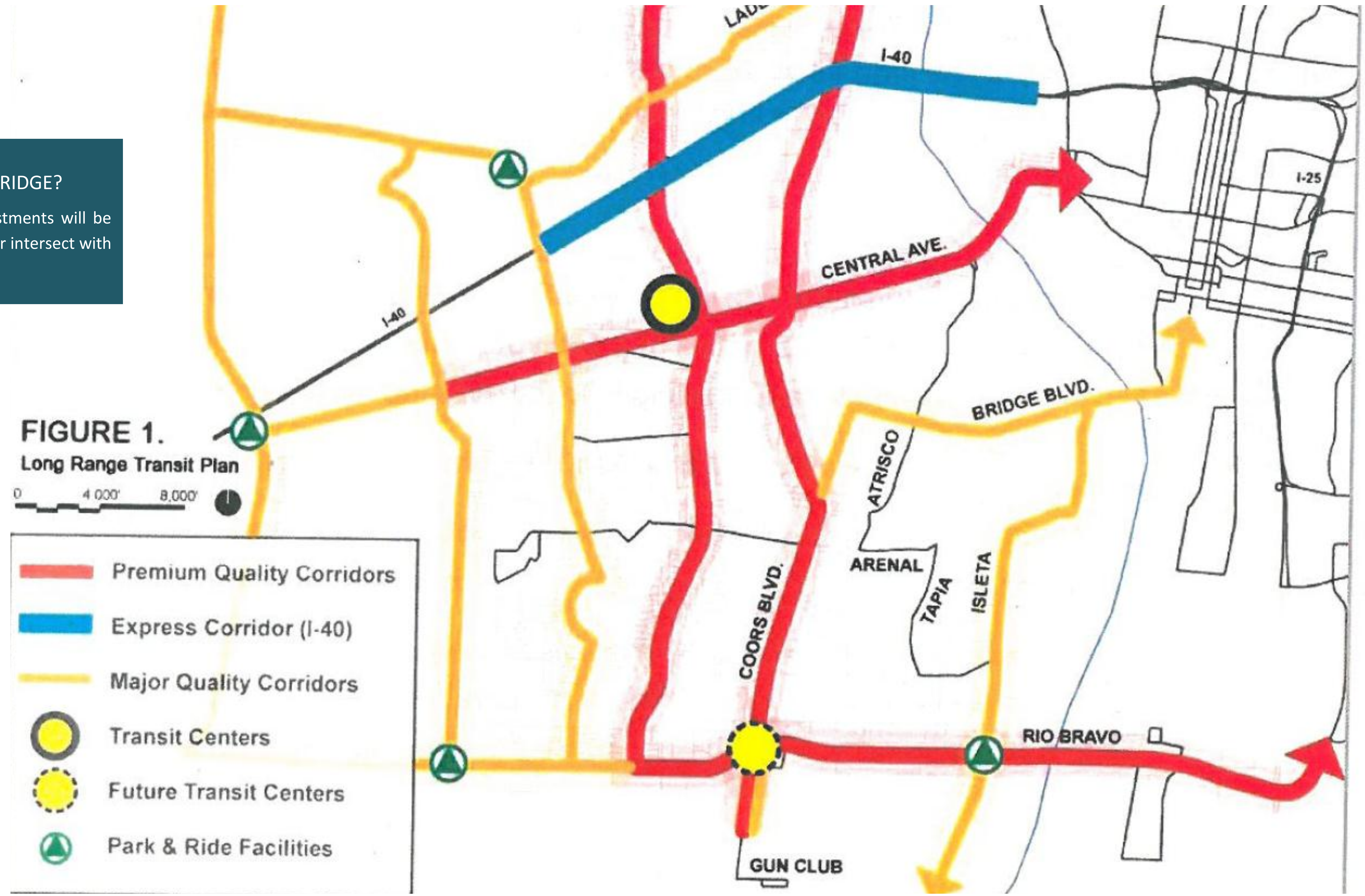
FIGURE 15: MRCOG 2035 REGIONAL TRANSPORTATION PLAN



WHAT DOES THIS MEAN FOR BRIDGE?

Future high frequency transit investments will be made in corridors that are parallel or intersect with Bridge Boulevard.

FIGURE 16: ABQ RIDE WESTSIDE TRANSIT IMPROVEMENT STUDY



WHAT DOES THIS MEAN FOR BRIDGE?

Future high frequency transit investments will be made in corridors that are parallel or intersect with Bridge Boulevard.

FIGURE 17: 2006-2010 AMERICAN COMMUNITY SURVEY – WORKERS WITHOUT ACCESS TO A VEHICLE

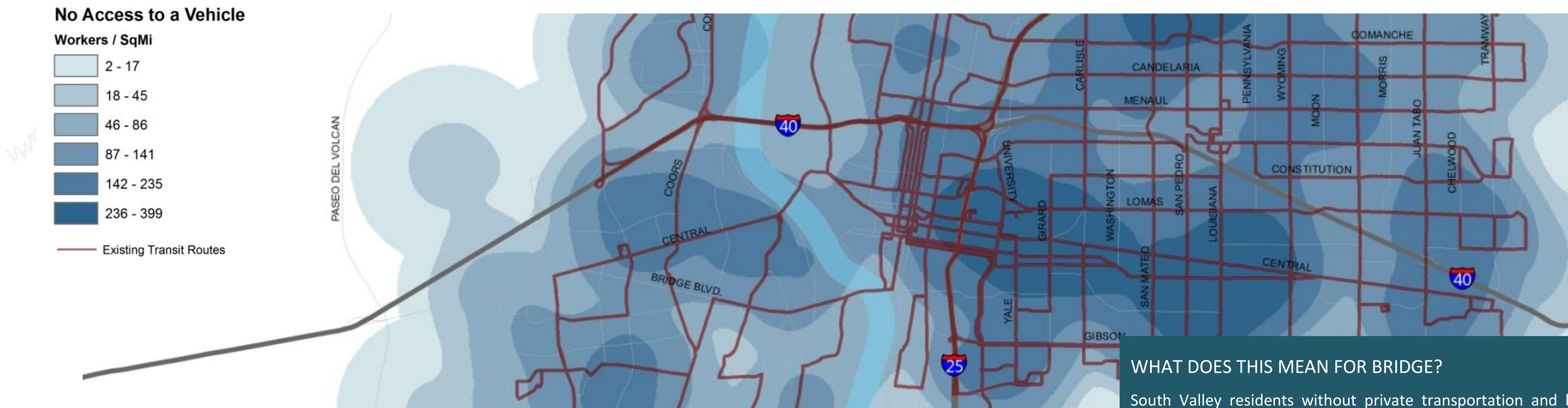
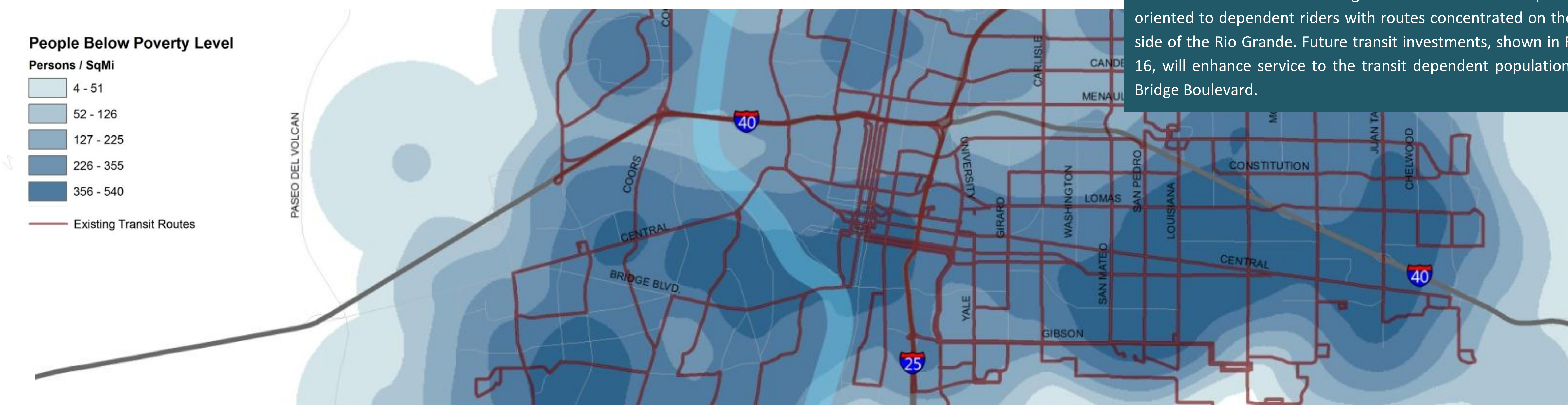


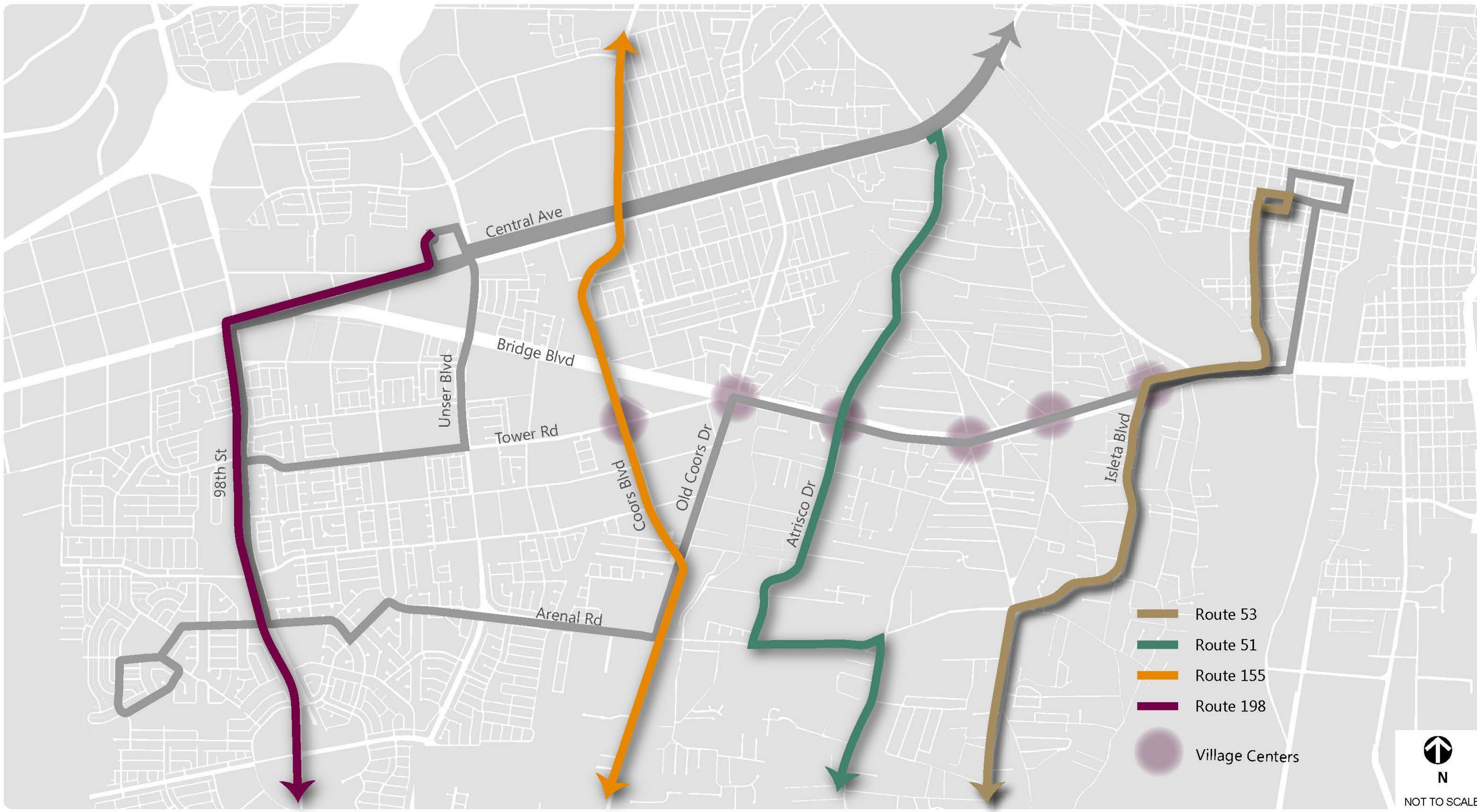
FIGURE 18: 2012 U.S. CENSUS – PEOPLE BELOW POVERTY LEVEL



WHAT DOES THIS MEAN FOR BRIDGE?

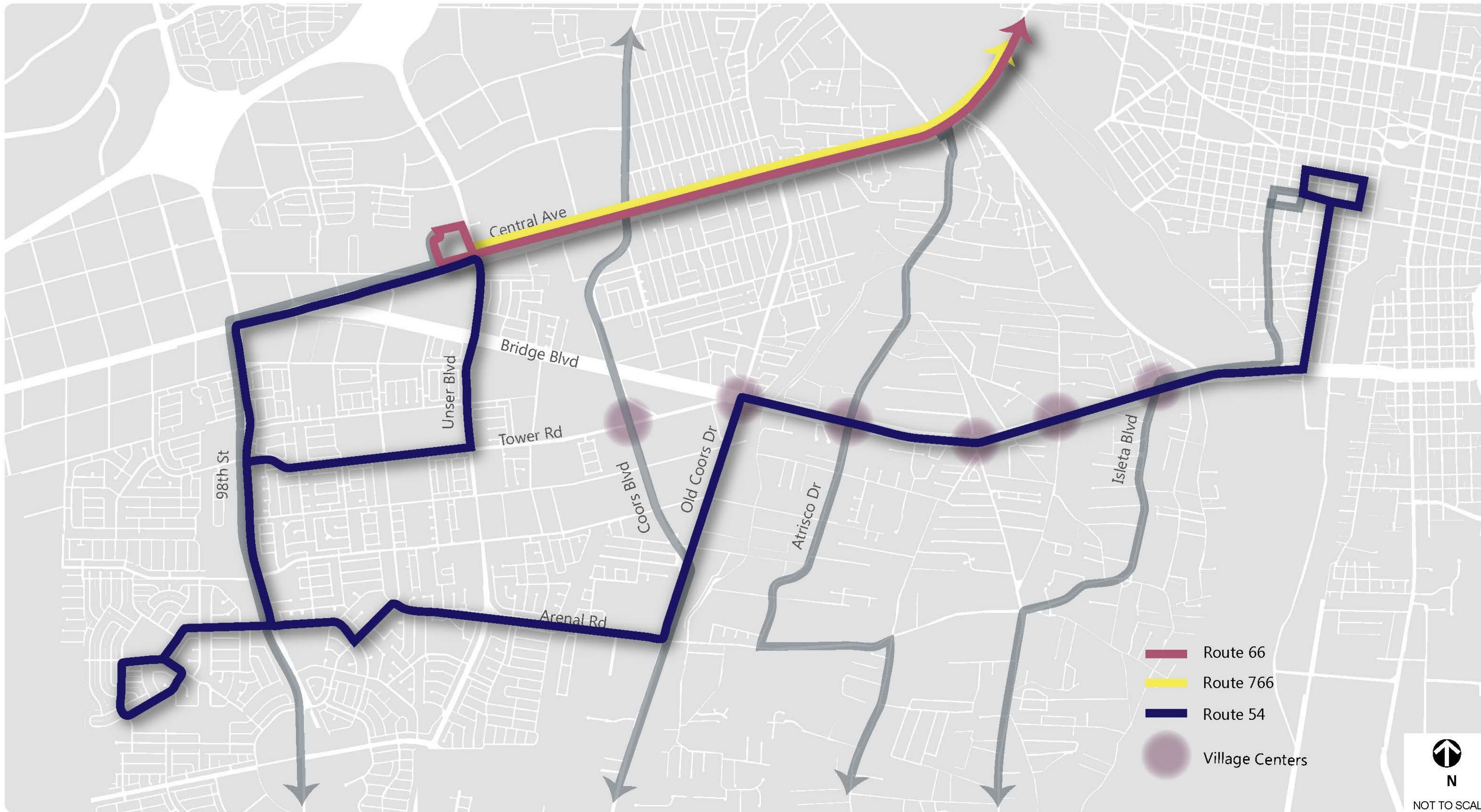
South Valley residents without private transportation and below poverty level are considered transit dependent by the Federal Transit Administration. Existing transit service in Albuquerque is oriented to dependent riders with routes concentrated on the east side of the Rio Grande. Future transit investments, shown in Figure 16, will enhance service to the transit dependent population near Bridge Boulevard.

FIGURE 19: NORTH SOUTH TRANSIT ROUTES



NORTH-SOUTH TRANSIT ROUTES

FIGURE 20: EAST WEST TRANSIT ROUTES



EAST-WEST TRANSIT ROUTES

6. Motor Vehicle Traffic

A large amount of data were collected to help understand motor vehicle traffic patterns along the Bridge Boulevard corridor. In general, this chapter will refer to the data but focus more on the results of the analysis and what they mean for the corridor.

Potential redevelopment in the area may influence travel behavior around the Bridge Boulevard corridor. It is Important that the existing conditions are adequately analyzed and documented for comparison and forecasting purposes.

Data Collection

The following data was collected to create a baseline understanding of motor vehicle travel patterns in the Bridge Boulevard corridor.

Traffic Counts: Bernalillo County provided year 2010 eight-hour turning movement counts at study area intersections. Intersection turning movement counts provide valuable insights on demand at intersections and hence enable Transportation Engineers/Planners to evaluate measures that improve the overall traffic operations and safety at the study intersection and corridor. Fehr & Peers also collected 24-hour bi-directional traffic counts for three days at eight locations in the vicinity of the Bridge Boulevard corridor. 24-Hour traffic counts assist Transportation Engineers/Planners in identifying trends in traffic at various points of time in a day.

Bluetooth Data: Fehr & Peers employed Bluetooth technology to understand some of the characteristics of the corridor that could not be established using traffic counts. As part of this effort, Bluetooth readers were placed at eight strategic locations around the Bridge Boulevard corridor. These locations included:

- 98th Street, South of Sage Road
- 98th Street, South of Central Avenue
- Bridge Boulevard, West of Unser Boulevard
- Bridge Boulevard, East of Old Coors Drive
- Bridge Boulevard, East of Atrisco Drive
- Bridge Boulevard, West of Sunset Road
- Bridge Boulevard, West of 8th Street
- Central Avenue, West of Tingley Drive

Bluetooth technology is an emerging trend in traffic data collection and enables Transportation Engineers/Planners to collect various forms of traffic data including origin-destination (O-D) and travel times. Bluetooth data was compared to tube counts to arrive at the percentage of total traffic detected by Bluetooth sensors.

Figure 21 shows locations where turning movement counts, 24-hour approach counts and Bluetooth data was obtained/collected as part of this study.

Field Review: Fehr & Peers performed field reviews along the corridor to qualitatively understand the character of the corridor. This included making observations on roadway geometry, land use compositions, access point evaluation and a pedestrian walk-audit.

Mid-Region Council of Governments' (MRCOG) Travel Demand Model: Fehr & Peers obtained MRCOG's regional travel demand mode in order to simulate the region's travel patterns and generate various outputs such as transit ridership and roadway volumes. Travel demand models are extensively used to test future scenarios and develop estimates of future transit ridership and traffic volumes.

Findings

The collected data was used to perform analysis to identify and understand traffic patterns in the vicinity of Bridge Boulevard.

Sample Size: Due to the prohibitive costs associated with collecting a sample size that equals the population in a study, certain statistical tests have been developed to estimate the sample size that will adequately represent the population. For travel time and origin-destination studies, the sample size is based on average daily traffic on the study corridor. In general, for the Bridge Boulevard corridor which serves between 22,000 vehicles per day (vpd) and 39,000 vpd, the sample size required is approximately 380 at a 95% confidence level with a 5% margin of error. The sample size collected during all periods of the day (AM peak, PM Peak, and Off-Peak) were observed to meet a confidence level of 95% with the margin of error varying between 5% and 6% except for the westbound direction in the AM peak period during which the margin of error was 12%. However, the westbound direction in the AM peak period is not used for further analysis so the higher margin of error is inconsequential.

Origin-Destination: The Bluetooth data was processed to obtain O-D distributions which are useful in identifying whether a given corridor services local traffic or through traffic. Fehr & Peers used year 2010 turning movement volumes and the MRCOG model's *Select Link Analysis* tool to supplement and validate the results of the Bluetooth O-D data. The MRCOG model's select link analysis allows users to select segments of a roadway and track the travel routes of traffic using that roadway segment. The results of these analyses are summarized in Table 6. Eastbound and westbound entering volumes shown in the table are based on traffic counts to allow for a percentage comparison between Model, Turning Movement Counts (TMCs) and Bluetooth results. Bluetooth data shows lower through traffic estimates for eastbound movements as compared with model outputs and turning movement counts. Thus, the Bluetooth data represents the lower end of the range for the through volume estimate. For example, based on the Bluetooth data, during a 24 hour period, a minimum of 4,294 vehicles out of the 10,858 vehicles, entering the Bridge Boulevard corridor just east of Old Coors Drive travel across the river crossing on Bridge Boulevard (eastbound direction).

Figure 22 shows through traffic estimates calculated using three different methods, Bluetooth data, turning movement volumes, and select link analysis for the 24-hour, 3-Hour AM and 3-Hour PM peak periods. It should be noted that these through volume estimates are limited to volumes entering the network just east of Old Coors Drive and just west of 8th Street and do not include through volumes entering via Atrisco Drive, Goff Boulevard, Sunset Drive, and/or Isleta Boulevard. Based on these findings, it is safe to conclude that Bridge Boulevard primarily services through traffic with a small proportion of local trips, i.e. trips beginning and ending along Bridge Boulevard between Old Coors Drive and Isleta Boulevard.

Travel Market: Origins and destinations from the MRCOG model's Select-Link Analysis tool were mapped using ESRI's Geographic Information Systems (GIS) to reflect the general daily travel market served by the Bridge Boulevard River Crossing. Figure 24 displays varying daily trip intensities for both origins and destinations in a 24 hour period. While Bridge Boulevard is currently serving several destinations in Albuquerque, it is primarily used for travel to and from residential areas, particularly in the southwest sector of the City.

WHAT DOES THIS MEAN FOR BRIDGE?

A majority of the traffic on Bridge Boulevard travels through the corridor without stopping at destinations along the route. This pattern is likely to continue because Bridge connects housing west of the river to jobs east of the river crossing.

TABLE 6: BRIDGE BOULEVARD THROUGH TRAFFIC ESTIMATES

Method	Time Period	Eastbound			Westbound		
		Entering Volume	Thru Volume	Percent Thru	Entering Volume	Thru Volume	Percent Thru
Model	AM Peak	2,849	2,041	72%	2,956	931	31%
TMCs	AM Peak	2,849	2,027	71%	2,956	1,378	47%
Bluetooth	AM Peak	2,849	1,569	55%	2,956	1,290	44%
Model	Off-Peak	5,838	3,632	62%	6,172	2,503	41%
TMCs	Off-Peak	5,838	3,203	55%	6,172	2,768	45%
Bluetooth	Off-Peak	5,839	2,139	37%	6,172	3,386	55%
Model	PM Peak	2,171	1,256	58%	2,093	898	43%
TMCs	PM Peak	2,171	1,141	53%	2,093	1,182	56%
Bluetooth	PM Peak	2,171	586	27%	2,093	1,127	54%
Model	24-Hour	10,858	6,925	64%	11,221	4,510	40%
TMCs	24-Hour*	10,858	6,524	60%	11,221	5,648	50%
Bluetooth	24-Hour	10,858	4,294	40%	11,221	5,804	52%

*Estimated using 8-hour TMCs

Select Link Analysis: The Select Link Analysis tools in the MRCOG travel demand model was used to determine travel patterns along Bridge Boulevard. Figure 23 summarizes the results of this analysis and shows travel patterns for the 3-hour AM Peak, 3-Hour PM Peak and 24-hour model volumes. Figure 24 shows an intensity map highlighting areas of trip generation and attraction for trips using the river crossing on Bridge Boulevard.

Travel Time: The Bluetooth data also yielded travel time estimates. Travel time data is often used in transportation studies as a performance measure to evaluate roadway corridors and networks. The travel time data for Bridge Boulevard is provided in Table 7 which also contains snapshots of real time travel times reported on Bing maps. Bluetooth travel times are averages for the AM Peak, Off-Peak, PM Peak, and 24-Hour time periods. Motorists are more likely to stop at locations along Bridge during off-peak hours as opposed to peak hour travelers on their way to and from work. Thus, off-peak travel times are higher than peak travel times as those longer trips are included in the Bluetooth average.

TABLE 7: BRIDGE BOULEVARD TRAVEL TIMES

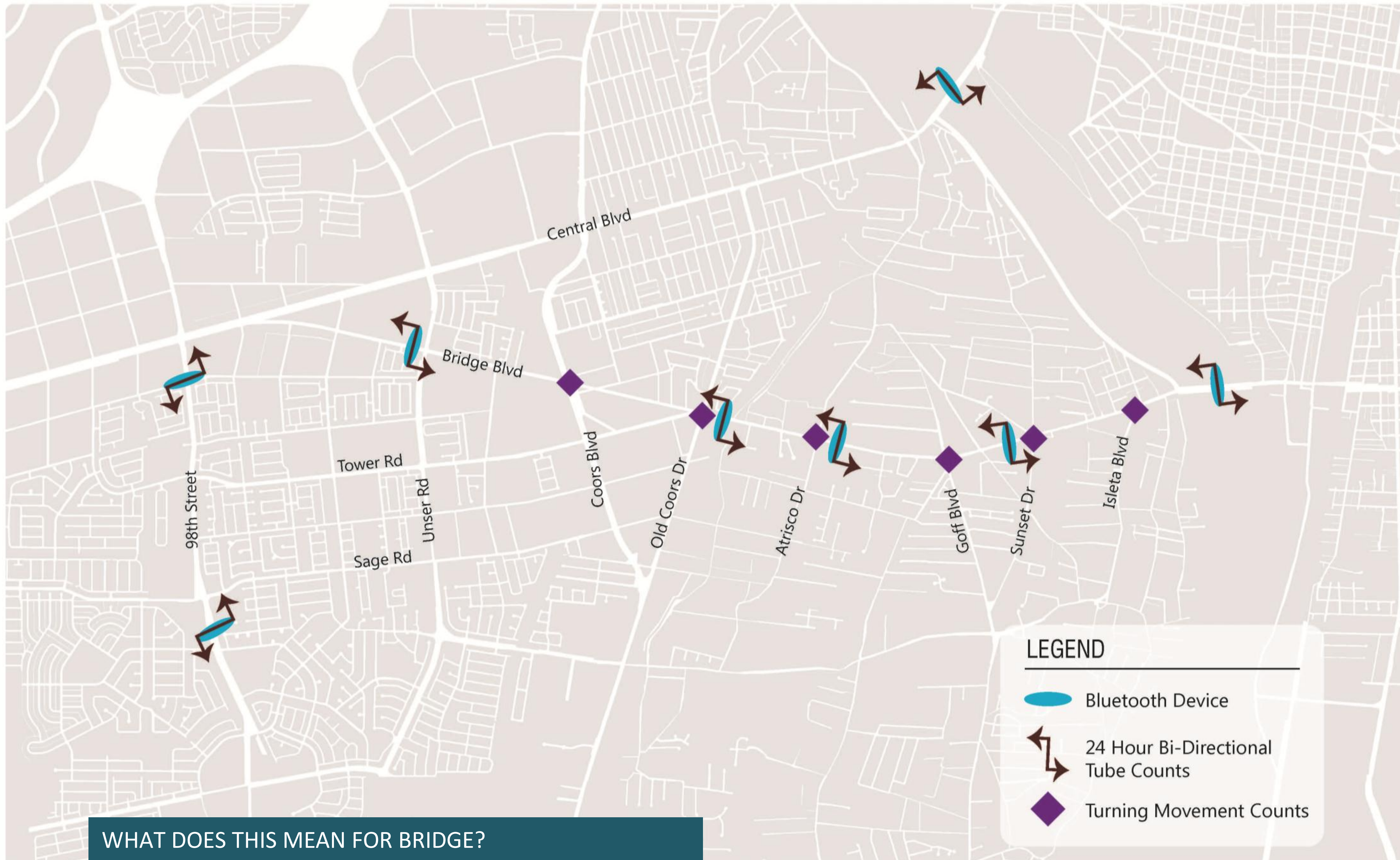
Direction	AM Peak		Off-Peak		PM Peak		24-Hour	
	Blue-tooth	Bing Map	Blue-tooth	Bing Map	Blue-tooth	Bing Map	Blue-tooth	Bing Map
Eastbound (E of Old Coors Dr to W of 8th St)	6m41s	7m	8m07s	7	7m32s	7	7m19s	7m
Westbound (W of 8th St to E of Old Coors Dr)	6m12s	7m	7m56s	7	7m20s	7	7m16s	7m

Average Daily Traffic: Existing average daily traffic (ADT) volumes on the Bridge Boulevard corridor range from approximately 5,000 vehicles west of Unser Boulevard to 36,000 vehicles east of Isleta Boulevard. The ADT volumes for each major segment of Bridge Boulevard are shown in Figure 25. As is shown in Figure 25, Old Coors Drive represents the break point in traffic volumes, where volumes to the west drop off dramatically and begin to rise to the east. Logically, this coincides with the transition of Bridge Boulevard from a 4 lane roadway to a 2 lane roadway. Directional distributions provide more detail of travel patterns along Bridge Boulevard by separating out the direction of travel by time of day. The directional distributions reflect a primary eastbound movement in the AM peak hour and a westbound orientation in the PM peak hour. This indicates that motorists are likely crossing the river to go to work in the mornings (westbound), and crossing the river in the opposite direction (eastbound) on their return trip home in the evenings. Due to the variability in directional volumes, the Bridge Boulevard river crossing would be an ideal location to display travel times from Bluetooth devices using Dynamic Message Signs (DMS).

Turning Movement Counts: The 2010 AM and PM peak hour turning movement count data for Bridge Boulevard are summarized in Figure 25. The peak hour data follows a similar trend to the ADT data which shows traffic volumes generally increasing the closer you get to the Rio Grande River and a large eastbound directional trend in the AM followed by a westbound directional pattern in the PM peak hour. Figure 25 also illustrates the primary intersections where vehicles are turning onto and off the Bridge Boulevard corridor.

Forecast Traffic: Forecast traffic volumes for the 2035 horizon year were taken from the MRCOG travel demand model. Figure 25 illustrates the increases in traffic projections between existing daily traffic volumes and the 2035 horizon year.

FIGURE 21: DATA COLLECTION LOCATION MAP



WHAT DOES THIS MEAN FOR BRIDGE?

Bluetooth data was collected to provide additional information about travel patterns within the study area.

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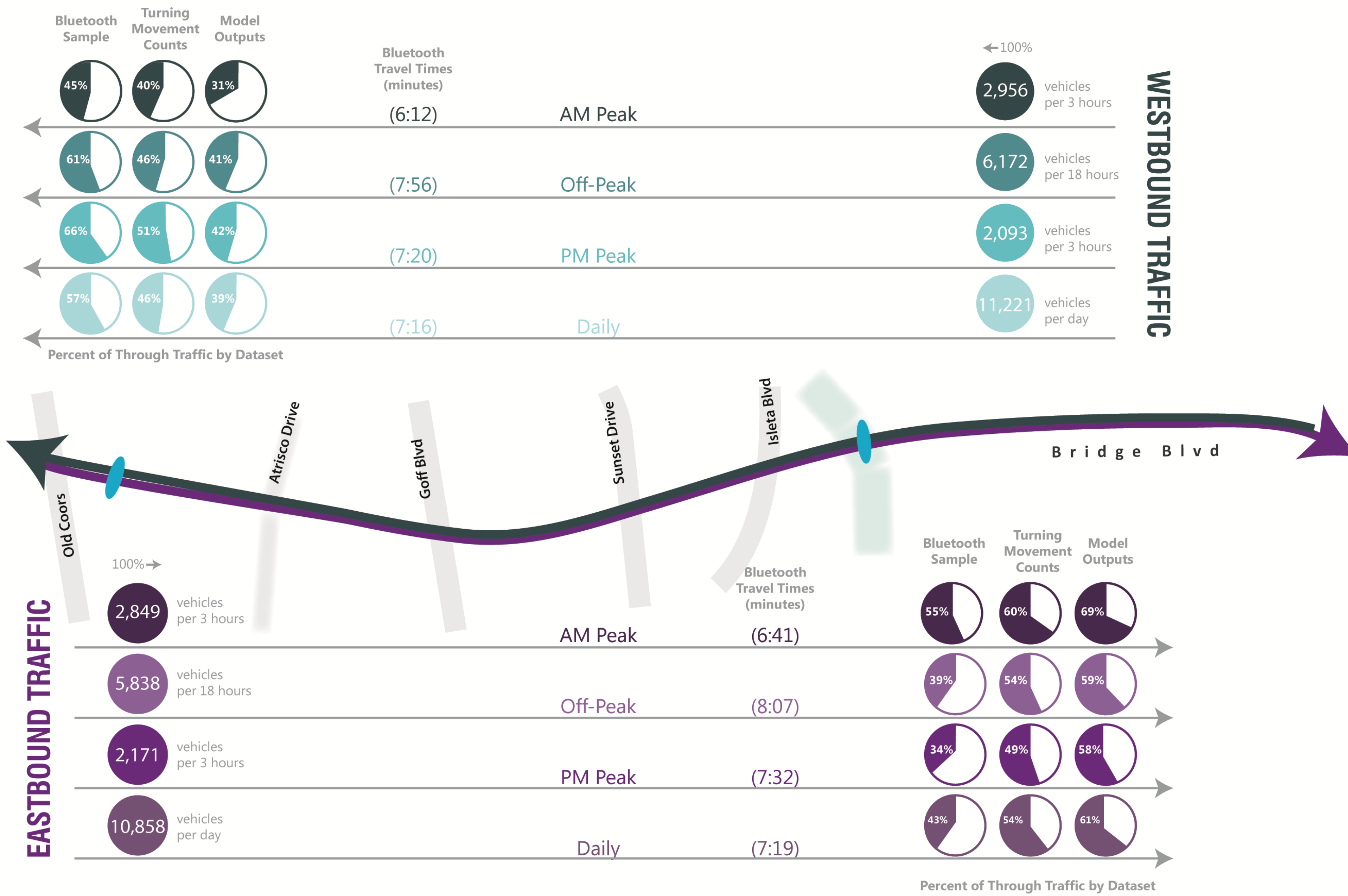
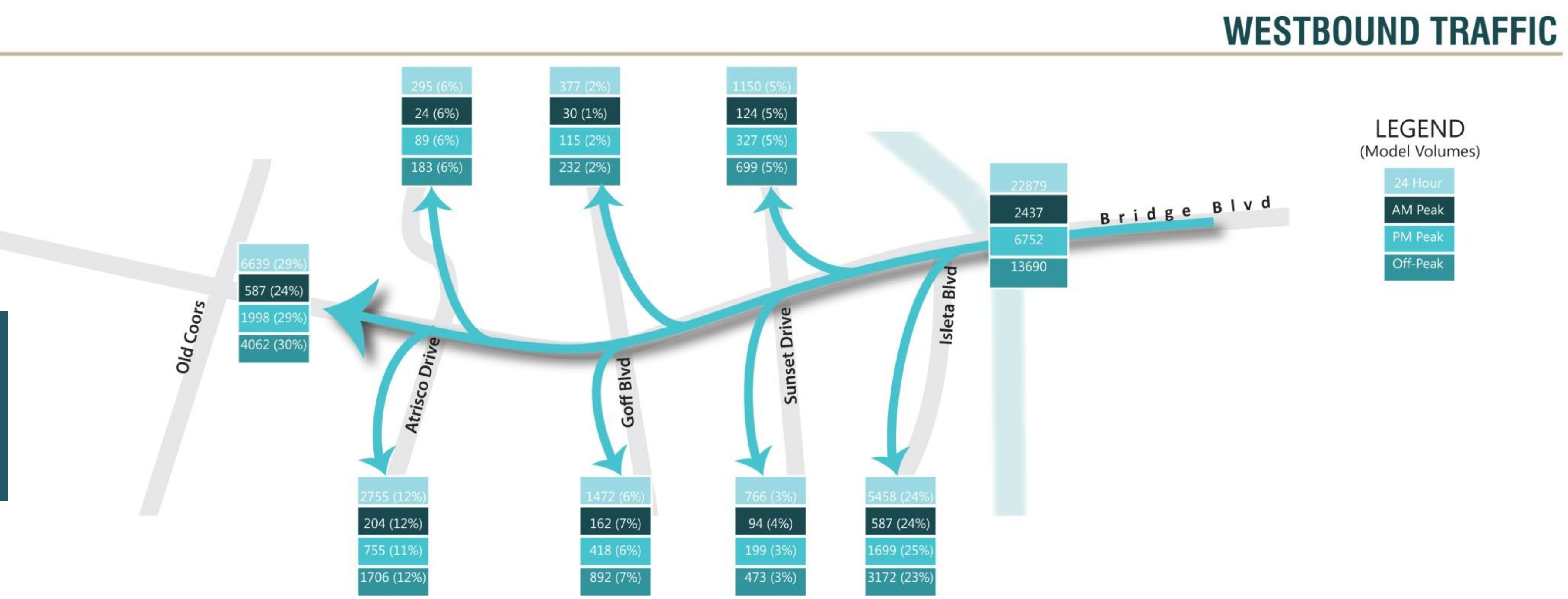
FIGURE 22: THROUGH TRAFFIC AND TRAVEL TIME ESTIMATES



WHAT DOES THIS MEAN FOR BRIDGE?

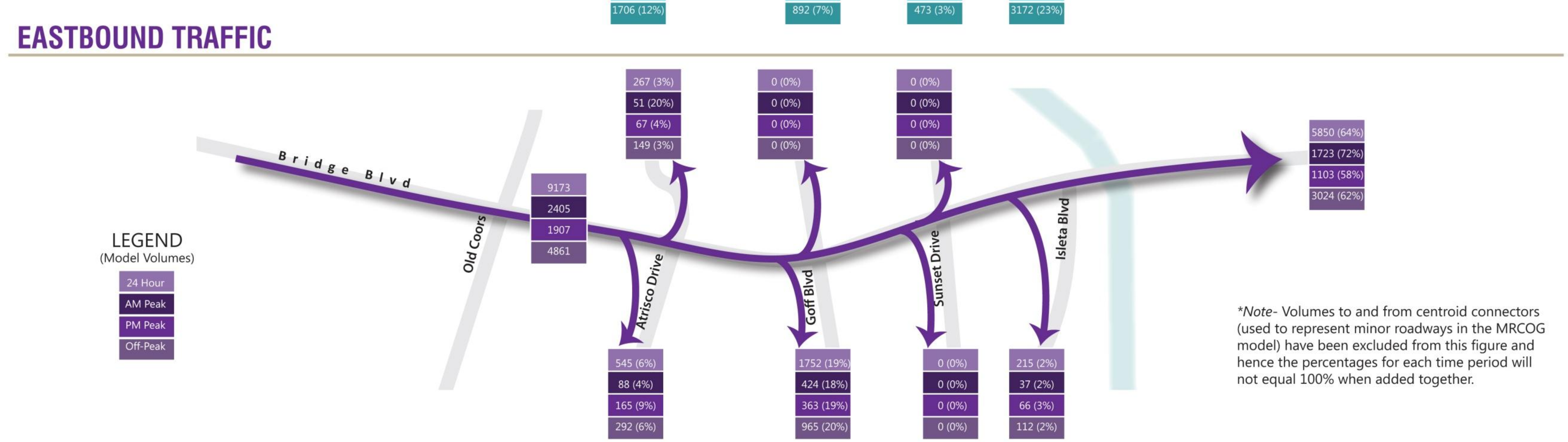
The three data sources analyzed indicate that vehicles are traveling through the corridor without stopping at destinations. However, the Bluetooth data shows some variation in how vehicles are traveling through the corridor based on the other data sources.

FIGURE 23: MRCOG TRAVEL MODEL RESULTS (2008)



WHAT DOES THIS MEAN FOR BRIDGE?

MRCOG modeling data shows that the Bridge corridor is serving through trips during all times of the day.



**Note*- Volumes to and from centroid connectors (used to represent minor roadways in the MRCOG model) have been excluded from this figure and hence the percentages for each time period will not equal 100% when added together.

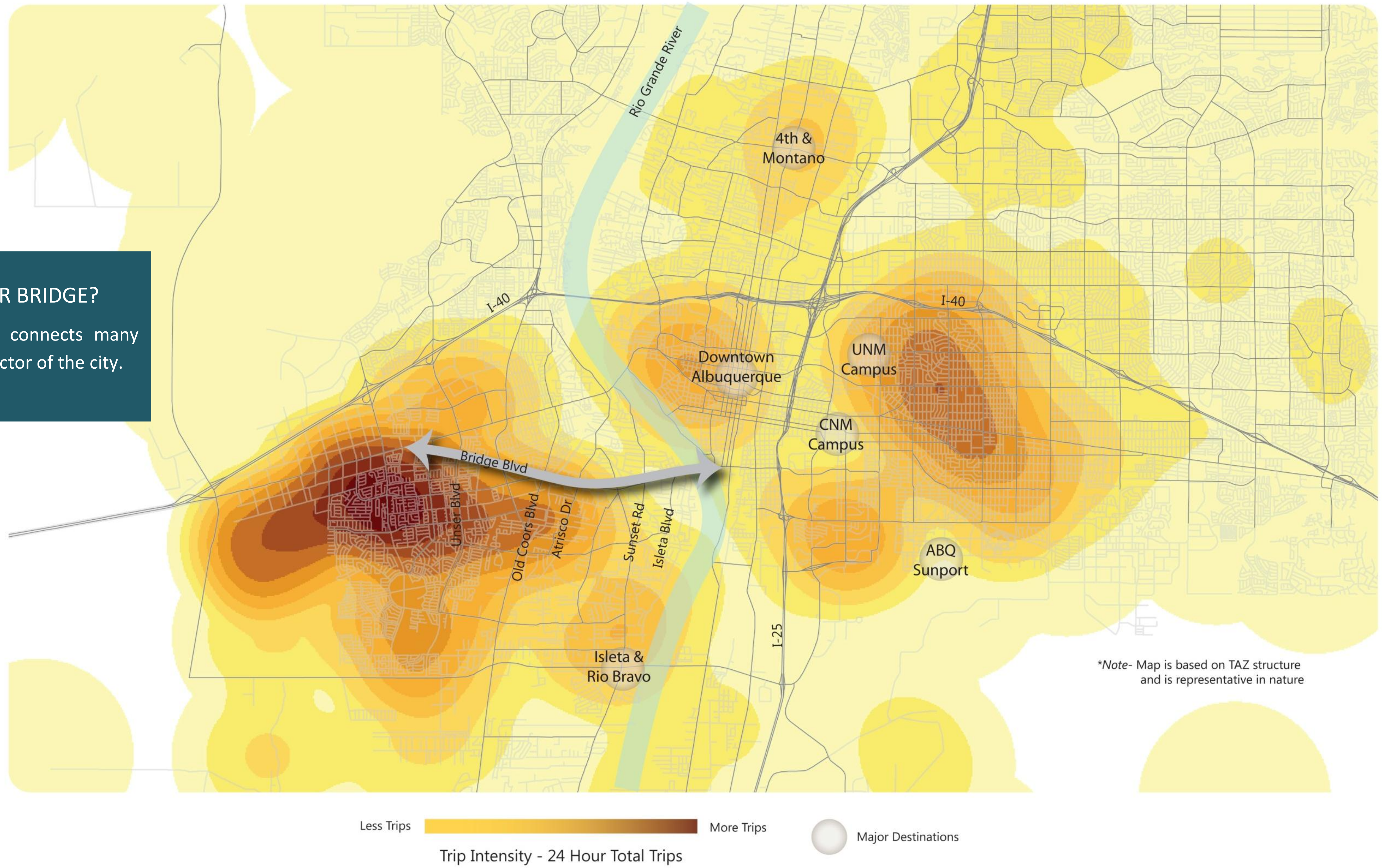
FEHR PEERS

March 2012
Source: MRCOG Model Volumes

FIGURE 24: MRCOG HOMEBASED TRIP INTENSITY MODELING (2008)

WHAT DOES THIS MEAN FOR BRIDGE?

The Bridge Boulevard corridor connects many destinations in the southwest sector of the city.



March 2012
Source: MRCOG Model

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7. Motor Vehicle Intersection Capacities

Fehr & Peers performed intersection capacity analysis to document existing levels of service at all signalized intersections within the Bridge Boulevard study corridor. A brief description of the capacity analysis process follows:

Data Collection

The following data were collected to perform capacity analysis at study area intersections:

Turning Movement Counts (TMC): Fehr & Peers obtained year 2012 TMC for the intersection of Coors Boulevard and Bridge Boulevard from Bernalillo County. In the absence of year 2012 TMC for rest of the intersections, Fehr & Peers obtained year 2010 TMC for these intersections. Based on historical average daily traffic (ADT) counts obtained from Mid-Region Council of Governments (MRCOG) and year 2011 counts collected by Fehr & Peers, this corridor has experienced an annual average growth of approximately 0.5% per year with various roadway segments also exhibiting negative growth. Therefore, year 2010 volumes were deemed to provide a reasonable estimate of year 2012 traffic volumes and were used for the analysis without applying a growth factor.

Signal Timings: Fehr & Peers obtained most recent signal timings from the City of Albuquerque and Bernalillo County. These timings were used to develop existing conditions models using the Synchro 7.0 traffic analysis software.

Lane Geometry: Fehr & Peers used aerial photographs as a basis for determining existing lane geometry used in the development of the existing conditions models.

Intersection Capacity Analysis

The FHWA (Federal Highway Administration) defines capacity as the maximum rate at which vehicles can pass through a given point in an hour under prevailing conditions. Capacity impacts the experience motorists have while driving through an intersection. This experience is defined using six levels of services (LOS) as recommended in the 2000 Highway Capacity Manual. Table 8 presents a description of these six levels of services that vary based on delay experienced by vehicles crossing study intersections due to traffic control measures like signals, stop signs, etc.

TABLE 8: 2000 HCM LEVEL OF SERVICE (LOS) CRITERIA

LOS	Control Delay Per Vehicle (in seconds)	
	Signalized Intersections	Unsignalized Intersections
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

The capacity analysis for the study area intersections was performed using the Highway Capacity Manual methodologies utilized within the Synchro 7.0 software. Table 9 shows the overall intersection LOS and the LOS for worst approach at each intersection. Based on the capacity analysis performed, all intersections operate at an acceptable LOS (D or better) except the unsignalized intersection of Bridge Boulevard and Towers Road which operates at LOS E during the PM Peak period.

TABLE 9: LEVEL OF SERVICE

Intersection	Intersection LOS		Worst Movement (LOS)	
	AM Peak	PM Peak	AM Peak	PM Peak
Bridge Blvd at Coors Blvd	C	B	EBT (D)	WBT (D)
Towers Rd at Coors Blvd	C	C	WBT (C)	WBT (D)
Bridge Blvd at Towers Rd*	C	E	NBL/NBR (C)	NBL/NBR (E)
Bridge Blvd at Old Coors Dr	C	D	WBL (E)	WBL (E)
Bridge Blvd at Atrisco Dr	C	B	NBT (E)	SBT (D)
Bridge Blvd at Goff Blvd	B	B	NBT (D)	NBL (E)
Bridge Blvd at Sunset Rd	D	C	NBT (E)	SBT (E)
Bridge Blvd at Isleta Blvd	C	C	WBL (E)	WBL (D)
Bridge Blvd at La Vega Dr	C	A	NB (D)	NB (D)

* Stop-Controlled Intersection

The capacity analysis also yielded queue lengths at study area intersections. Table 10 shows the 95th percentile queues expected at the study area intersections during the AM and PM peak periods. Based on the analysis, the eastbound through (EBT) movements experience the longest queues during the AM peak at most of the study intersections except at Isleta Boulevard. During the PM peak period, the westbound (WB) movements experience the longest expected queues with the longest occurring at the westbound left (WBL) lane at Isleta Boulevard.

TABLE 10: 95TH PERCENTILE QUEUE LENGTH

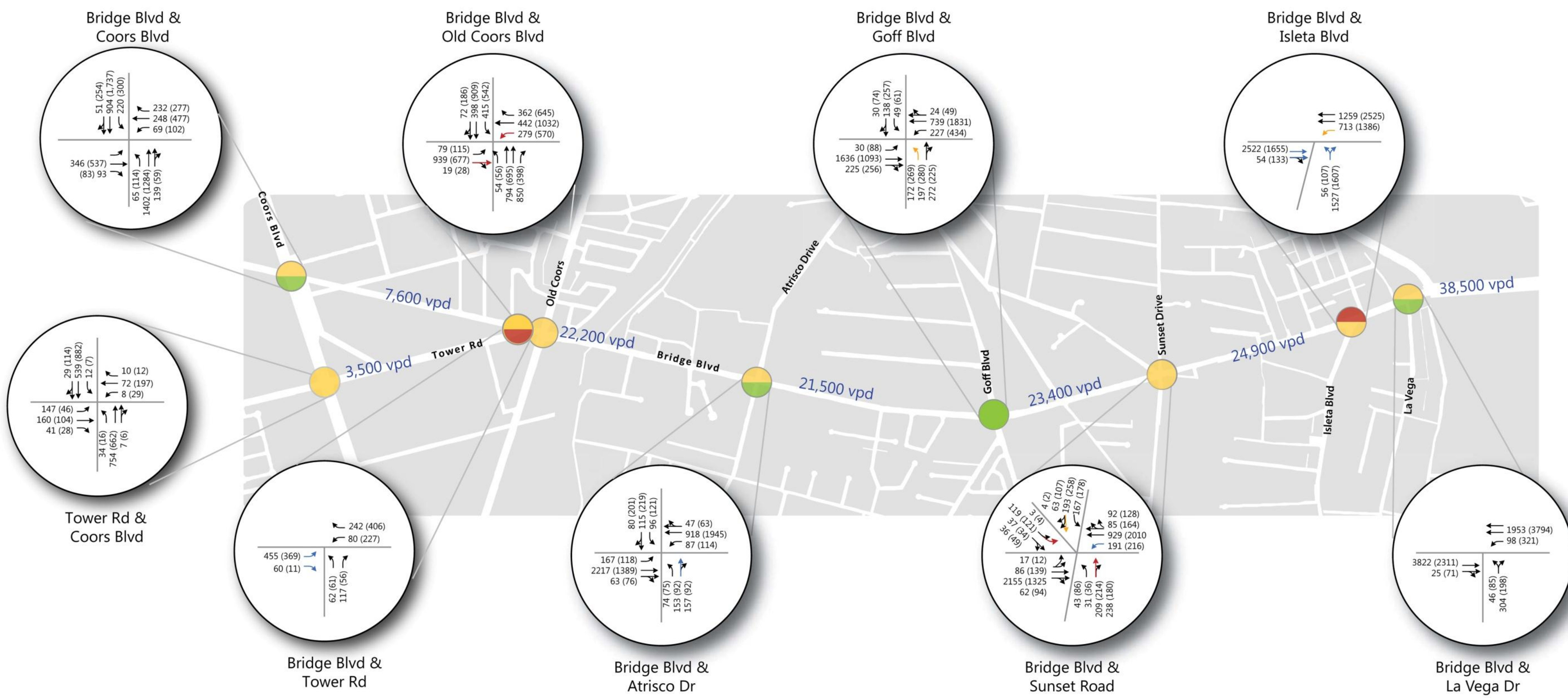
Intersection	Controlling Queues	
	AM Peak	PM Peak
Bridge Blvd at Coors Blvd	314' (EBT)	269' (SBT)
Towers Rd at Coors Blvd	288' (NBT)	352' (SBT)
Bridge Blvd at Towers Rd*	25'(NBL/NBR)	87'(NBL/NBR)
Bridge Blvd at Old Coors Dr	609' (EBT)	550' (WBT)
Bridge Blvd at Atrisco Dr	576' (EBT)	200' (SBT)
Bridge Blvd at Goff Blvd	255' (EBT)	256' (NBT)
Bridge Blvd at Sunset Rd	718' (EBT)	538' (WBT)
Bridge Blvd at Isleta Blvd	816' (EBT)	707' (WBL)
Bridge Blvd at La Vega Dr	1132' (EBT)	413' (WBT)

* Stop-Controlled Intersection

Signal Operations Strategies

As shown in Table 10 above, the section of Bridge Boulevard east of Sunset Road experiences the longest queues within the study area. Fehr & Peers will continue to evaluate this corridor in further detail and develop a list of potential capacity enhancements for the study area intersections with special emphasis on improving traffic operations along Bridge Boulevard between Sunset Road and La Vegas Drive . Bandwidth is the duration of green time along a travel corridor within which vehicles progress through multiple intersections without stopping. A review of the most recent signal timings indicates that the east-west progression bandwidth along Bridge Boulevard is 21 seconds (eastbound) and 40 seconds (westbound) during the AM peak period, and 0 seconds (eastbound) and 3 seconds (westbound) during the PM peak period. Analysis conducted by Fehr & Peers indicates that there may be opportunities to improve the corresponding bandwidths, especially for the PM peak period and hence reduce stops and travel times along the Bridge Boulevard corridor.

FIGURE 25: EXISTING CONDITIONS AND CAPACITY ANALYSIS RESULTS



LEGEND

	Lane Configuration
AM (PM)	Peak Hour Traffic Volume
xxxx vpd	2011 ADT
	AM Peak LOS PM Peak LOS

LEVEL OF SERVICE
Control Delay per Vehicle (sec./veh.)
(Highway Capacity Manual 2000)

- LOS A <10, LOS B 10-20
- LOS C 20-35, LOS D 35-55
- LOS E 55-80, LOS F >80

- LOS E or F During AM & PM Peak
- LOS E or F During AM Peak Only
- LOS E or F During PM Peak Only

Note- Turning movement counts represent two hour AM and PM peak periods.

WHAT DOES THIS MEAN FOR BRIDGE?

All intersections, except Isleta Boulevard at Bridge Boulevard are currently operating at an acceptable level of service.

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March 2012
Source: Turning movement counts obtained from Bernalillo County

8. Sustainable Complete Streets

The sustainable complete streets (SCS) idea revolves around the planning and designing of the public right of way to minimize the environmental impact and provide facilities that are safe and enjoyable for all users. A primary goal of developing sustainable streets is applying best management practices to address stormwater runoff quantity and quality. This goal can be achieved in a variety of ways including:

- using narrower roadway cross sections to minimize the amount of impervious service
- providing permeable roadway and sidewalk surfaces to reduce and filter runoff
- using bio swales and infiltration planters to absorb and treat runoff

Other goals of sustainable complete streets include improving air quality, reducing light pollution, integrating recycled materials, reducing energy and maintenance costs, encouraging multi-modal transportation options, reducing solar heat gain and air temperatures, improving the health of vegetation, and improving the safety and comfort of right of way users. Many of these goals are consistent with the principles and design strategies issued in the Bridge Boulevard Village Center and Corridor Plan and the Great Streets Facility Plan developed for the City of Albuquerque. The items included in the Table 11 all serve to achieve these goals in a variety of ways and are applicable to the Bridge Boulevard corridor.

WHAT DOES THIS MEAN FOR BRIDGE?

A myriad of tools are available to enhance the physical sustainability of the Bridge Boulevard corridor.

TABLE 11: SUSTAINABLE COMPLETE STREETS TOOLS

TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Recycled Concrete and Aspahlt 	Existing roadway pavement materials can be reused as aggregate in new pavement. Can also be used as mixture in roadway subbase material.	Reduces transportation costs associated with hauling existing material off-site. Reduces disposal cost and can improve structural integrity of pavement and sub base materials. Reduces need to supply new aggregate material.	Need to confirm mix design based on quality of reused material and installation temperature.	$
Recycled Rubber Tires 	Recycled rubber tires can be mixed with asphalt concrete to resurface roadway and bike and pedestrian paths.	Reuses rubber tires and keeps them out of landfills. Reduces tire noise from vehicles. Provides higher skid resistance and is less susceptible to cracking than normal asphalt.	Can be formed into pavers or cast in place. Limitations on ground temperature for installation	$$
High Albedo Pavement Material 	High albedo (light color) materials used in place of asphalt.	Concrete materials reflect more sunlight than asphalt. Asphalt absorbs more light and thus contributes to the urban heat island effect.	Resin pavement materials have similar reflectivity performance to that of concrete.	$$

TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Permeable Pavement 	Porous concrete, asphalt, or pavers allow stormwater to percolate through to the ground water system.	Reduces amount of storm water runoff and improves quality of storm water by filtering runoff. Improves water infiltration into the soil for trees.	Confirm sub-base is a well-drained. Some materials require cleaning with vacuums to prevent pores from being blocked from debris. Some pavers provide a rough travel surface for bicyclists and people with mobility aids.	$$
Bioswales/Infiltration Planters 	Bioswales are linear rain gardens planted with native vegetation. They are designed to receive and absorb stormwater runoff from impervious surfaces.	Reduces the need for offsite storm water retention ponds. Improves quality and lowers temperature of storm water runoff. Can improve aesthetic properties of street.	Requires maintenance and trash removal. Depending on soil type, can pond water which can lead to concentration of mosquitos.	$$
Dark Sky Light Fixtures 	Light fixtures that reduce upwards light emission.	Limits the amount of light pollution.	Confirm approved vendor list with International Dark Sky Association	$
LED Lighting 	Installing high efficient light fixtures	Reduced energy cost, longer life span, ability to dim lights based on time of day, reduced light pollution, less attractive to nocturnal insects, instant on-off, and more accurate color rendering.	Upfront capital cost is significantly higher than conventional lighting but the difference is decreasing.	$$
Shade Trees 	Trees placed along parkway between sidewalk and roadway	Reduce solar heat gain. Reduce air temperature. Remove carbon dioxide from atmosphere. Create more inviting walking environment. Increase property values.	Depending on proximity to roadway and snow maintenance practices, should consider salt tolerant species. Also confirm species is native or drought tolerant to reduce required maintenance. To help tree reach mature height, use larger tree pits and silva cells.	$

TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Drought Tolerant Plants 	Native plant materials that require little or no irrigation.	Reduce maintenance costs and capital costs associated with irrigating landscaping.	Depending on proximity to roadway and snow maintenance practices, should consider salt tolerant species.	$
Construction Techniques 	Utilizing construction techniques to reduce vehicle emissions' both on site and in the transportation of resources to the site. Developing a material recycling protocol. Tracking the amount of water used on the construction site.	Reduce vehicle emissions and transportation costs by using local subcontractors and utility suppliers. Reduce water usage on site.	May need to consider incentive program or establishing contractor performance standards and protocol to have contractor comply.	$
Narrow Roadways 	Reducing the pavement width by using narrower or fewer travel lanes.	Reduce construction and maintenance costs. Reduce travel speeds and improve safety. Reduces storm water run-off. Improves livability of street.	Need to consider the context of the roadway and existing and projected traffic volumes and appropriate design vehicles.	$
Bicycle/Pedestrian Infracture 	Including bike and pedestrian facilities that provide roadway users with alternatives to using a personal automobile.	Reduce vehicle emissions, improved air quality, reduce health care costs, improved health, increase safety of bike and pedestrians, reduced vehicle congestion, slower traffic speeds and reduced crash rates.	Need to consider the context of the roadway to determine the appropriate type of pedestrian and bicycle facility and treatments.	$
Transit Infracture 	Providing enhanced transit infrastructure to encourage more users to consider using the bus service.	Reduce vehicle emissions, improved air quality, reduce health care costs, reduced vehicle congestion.	Need to make sure infrastructure improves reliability, competitive with personal automobile travel times, provides accessible access for all users.	$$

TOOL	DESCRIPTION	BENEFITS	APPLICATION/CONSIDERATIONS	COST
Intelligent Transportation Systems (ITS) 	May include a wide variety of field devices and communication systems. • Closed Circuit Television (CCTV) Cameras • Dynamic Message Signs (CMS) • Ramp Metering Systems (RMS) • Traffic Monitoring Station (TMS) • Highway Advisory Radio (HAR) • Advanced Traffic Controller • Wireless Communication Systems • Bridge Crossing Traffic Monitoring	ITS improves transportation safety and mobility and enhances American productivity through the integration of advanced communications technologies into the transportation infrastructure and in vehicles. Intelligent transportation systems (ITS) encompass a broad range of wireless and wire line communications-based information and electronics technologies.	Travelers will also benefit from real-time, multimodal information that will lead to more efficient and eco-friendly choices regarding travel routes and modal choices. For instance, informed travelers may decide to avoid congestion by taking alternate modes such as walking, biking, or public transit; by rescheduling their trip; or by taking alternate routes.	VARIES
Context Sensitive Solutions (CSS) 	Design guidance to ensure roadway improvement projects are consistent with their physical settings. Guidelines may be applied to the following: o Lane width o Medians o Bicycle Lanes o On-Street Parking Configuration and Width o Transition Design o Midblock Crossings o Pedestrian Refuge Islands o Midblock Bus Stops	Context Sensitive Solutions is an approach that considers the total context within which a transportation improvement project will exist. CSS helps to develop transportation facilities that fits their physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility	CSS focuses on applying the principles in transportation planning and in the design of roadway improvement projects in places where community objectives support walkable communities-compact development, mixed land uses and support for pedestrians and bicyclists, whether it already exists or is a goal for the future	VARIES
Travel Demand Management (TDM) 	Set of strategies aimed at maximizing traveler choices • Travel management • Lane management • Dynamic information pricing • Incident management • Flow management • Supply management • Access management	Managing both the "growth of" and periodic "shifts in" traffic demand are necessary elements of managing traffic congestion. Managing traffic demand today is about providing travelers, regardless of whether they drive alone, with travel choices, such as work location, route, time, and mode.	Demand-oriented approaches are needed to address the transportation issues created by growth and the variability in demand for use of the systems.	VARIES

CONGESTION MANAGEMENT PROCESS

Congestion management improves transportation system performance and reliability based on local needs. The Congestion Management Process (CMP) is a federally mandated process that helps planners identify congested travel corridors and recommends strategies to increase transportation efficiency and provide additional options for the travelling public. The CMP is a systematic process that provides safe and effective integrated management and operation of the multimodal transportation system.

Because traffic congestion issues are unique to different metropolitan areas, data is gathered on a network of corridors in the Albuquerque Metro Planning Area. This data helps identify the sources and types of congestion experienced, as well as the locations which experience the greatest travel delays in the region. The CMP addresses congestion by prioritizing investments in the Albuquerque Metro Planning Area. Priorities defined by the CMP for Bridge Boulevard are shown in Table 12. High priority strategies for Bridge Boulevard include:

- Traffic signal timing and coordination
- Traffic signal equipment and modernization
- Traveler information devices
- Communications networks and roadway surveillance coverage
- New fixed guideway transit travelways and dedicated transit lanes
- Transit service expansion
- Transit intersection queue-jump lanes and signal priority
- Park & ride facilities
- On-street bicycle treatments
- Incident management plans (regional and site specific)
- Incident response and Courtesy Patrol
- Roundabout intersections

Benefits of this program may include improved travel times for commuters, improved incident management, enhanced public safety and security, reduced traveler delays, improved traveler information, and in general, a more efficient transportation system. The CMP is an on-going process, that evolves over time as goals and objectives change, new congestion issues arise, new information sources become available, and new strategies are identified and evaluated.

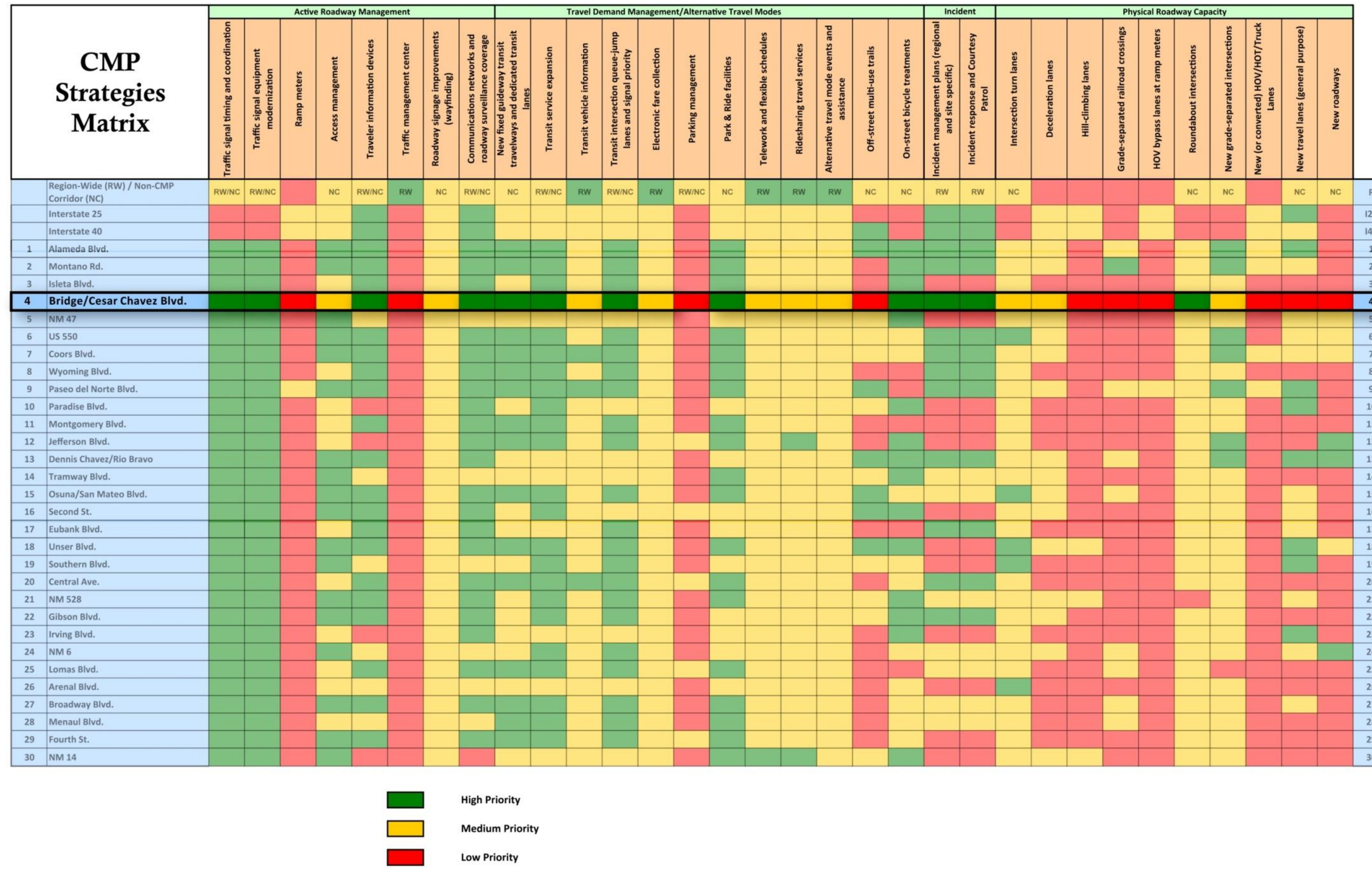

TABLE 12: CMP STRATEGIES MATRIX

APPENDIX

BRIDGE BOULEVARD ROADWAY INVENTORY EXHIBITS

ITS INFRASTRUCTURE AND PLANNED ITS PROJECT EXHIBITS

Bridge Boulevard Roadway Inventory

HDR Engineering
29 March 2012

0 100 200 Feet

LEGEND

Sidewalk
Roadway X-Section
Parking Restrictions

Parking Usage
Low
Medium
High

Driveways
Active Driveway
Redundant Driveway

Inventory Points
Manhole or Inlet not in conformance
Traffic signal head
Pedestrian push buttons
Pedestrian signal heads
Pedestrian ramp not ADA compliant
Sidewalk not ADA compliant
Sidewalk width obstruction
Sidewalk damaged
Light poles

Roadway Conditions Inventory

Page 1 of 9

Roadway inventory was conducted in March 2012. These data were the results from desktop analysis with ~~two~~ days of field inventory. Desktop analysis was based on 2010 MRCOG Aerial Imagery.

Bridge Boulevard Roadway Inventory

HDR Engineering
29 March 2012

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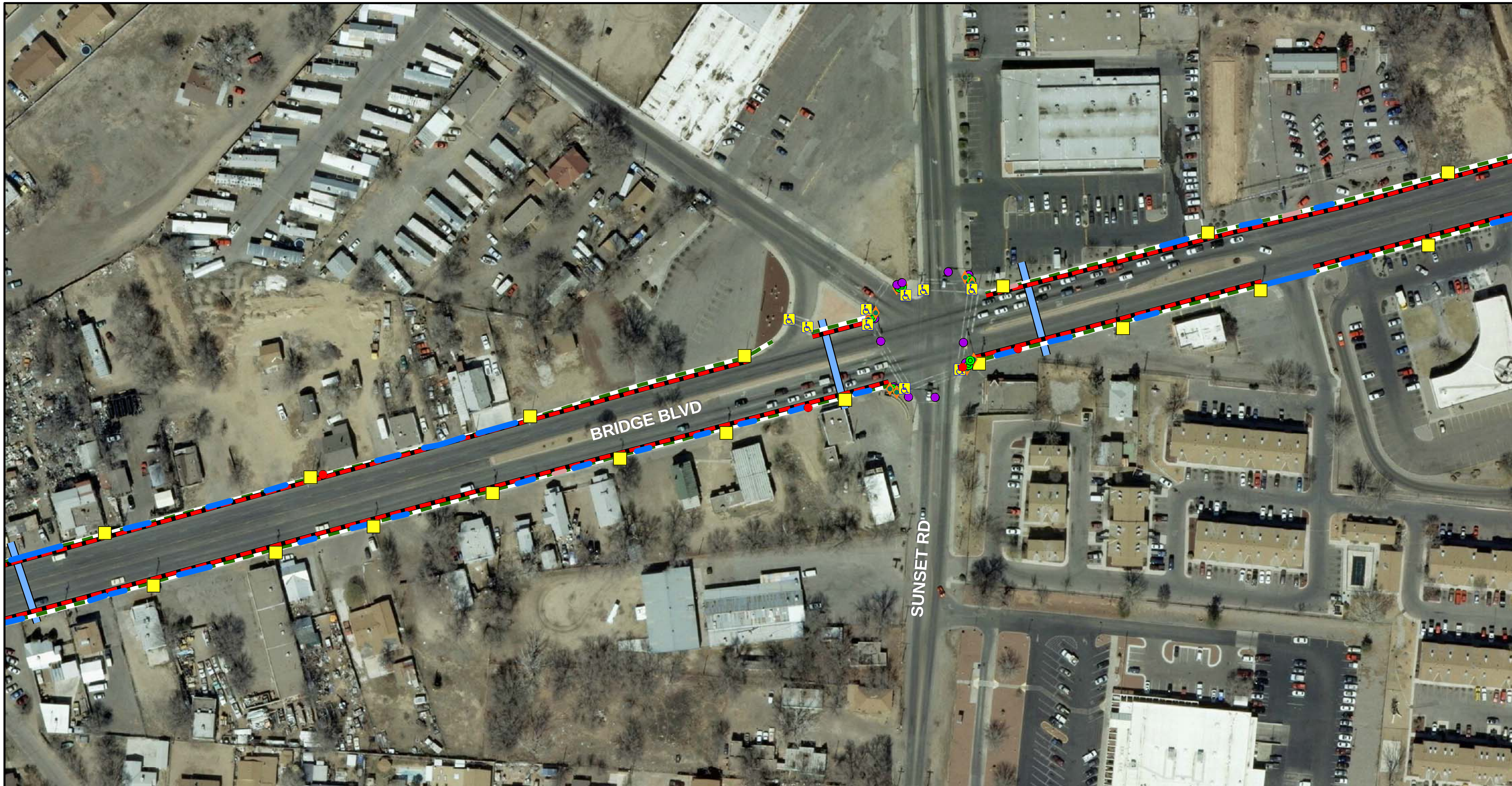

HDR Engineering
29 March 2012

0 100 200
Feet

LEGEND

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Roadway X-Section
Parking Restrictions

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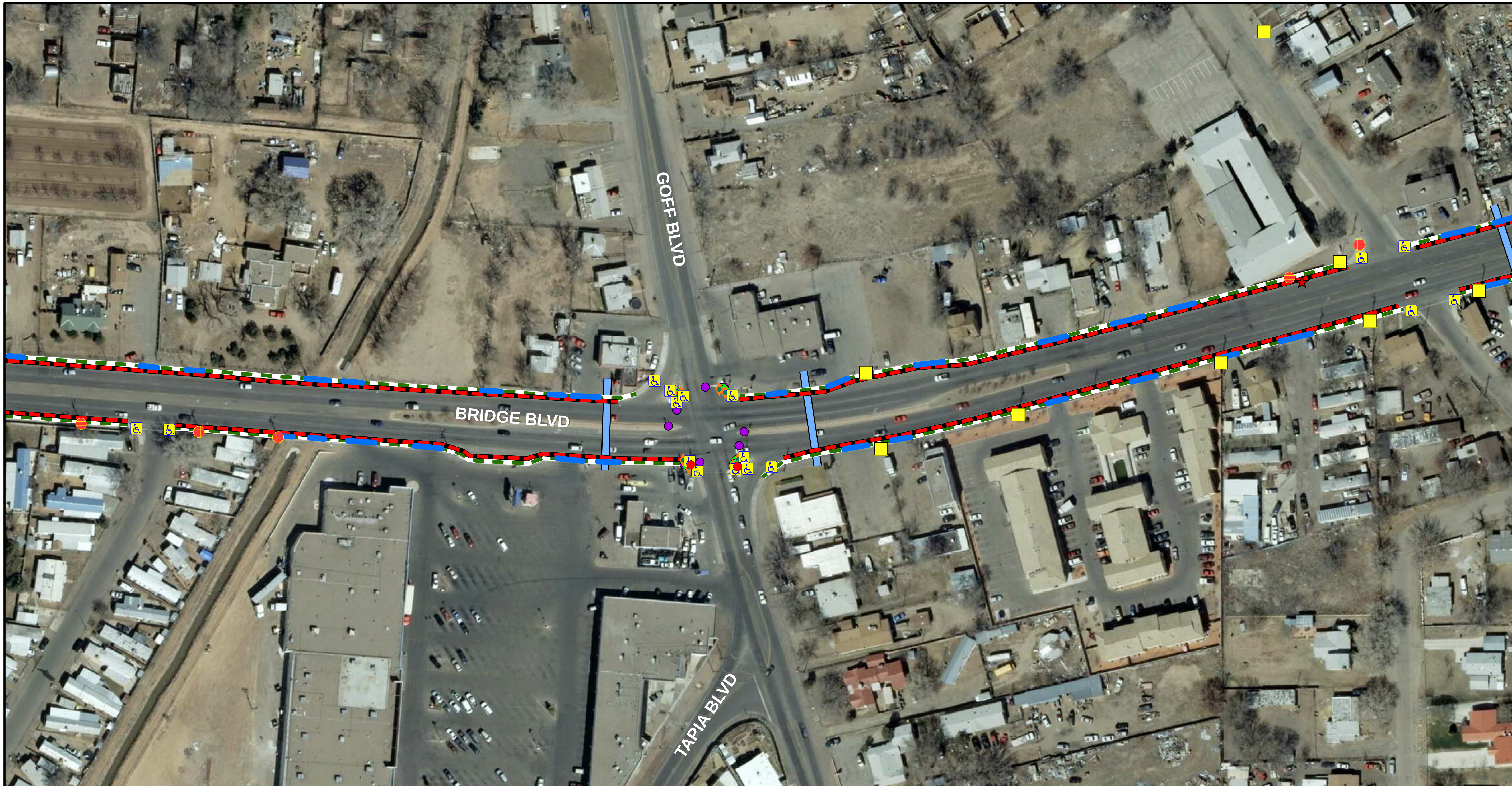

HDR Engineering
29 March 2012

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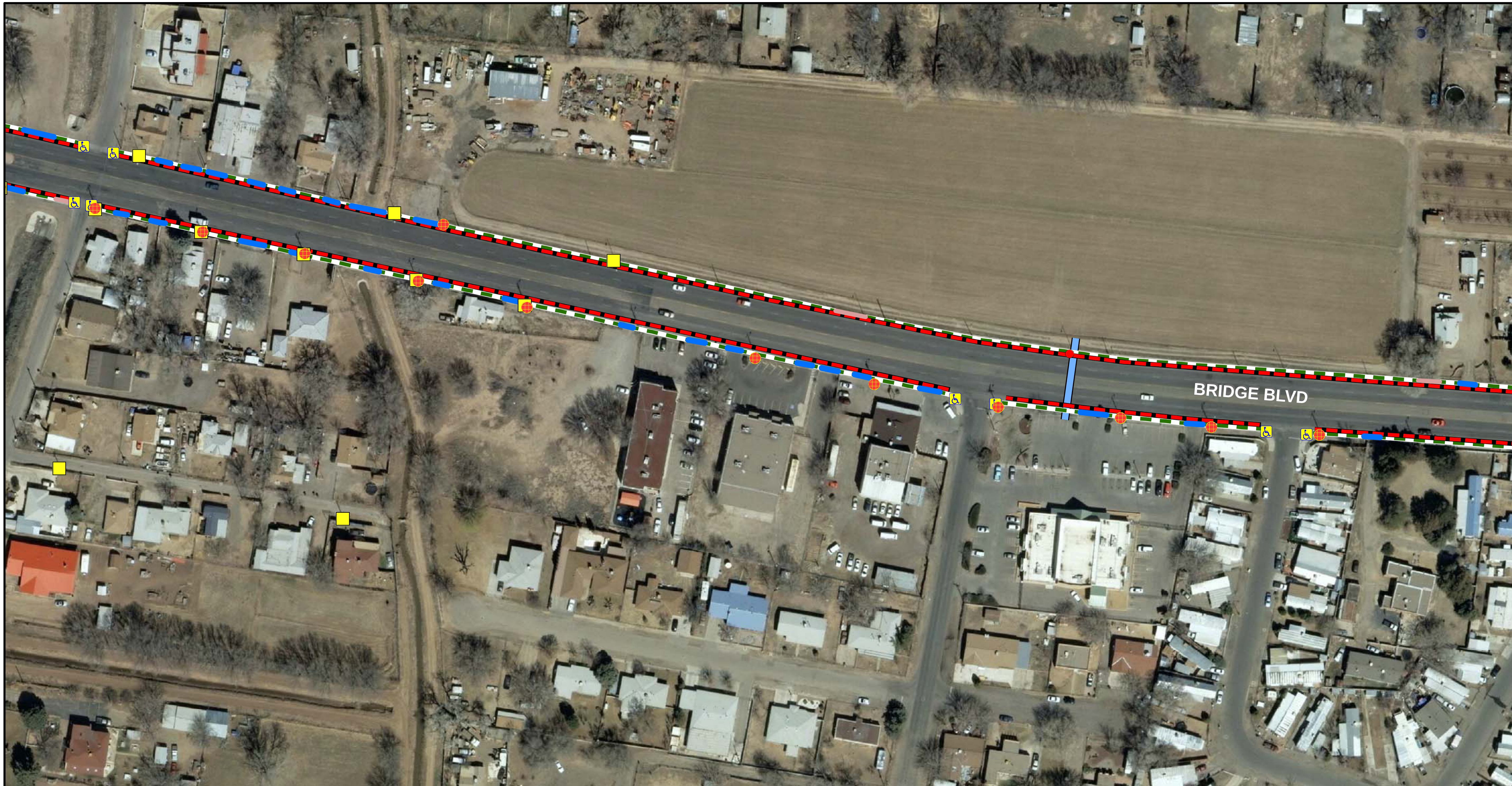

HDR Engineering
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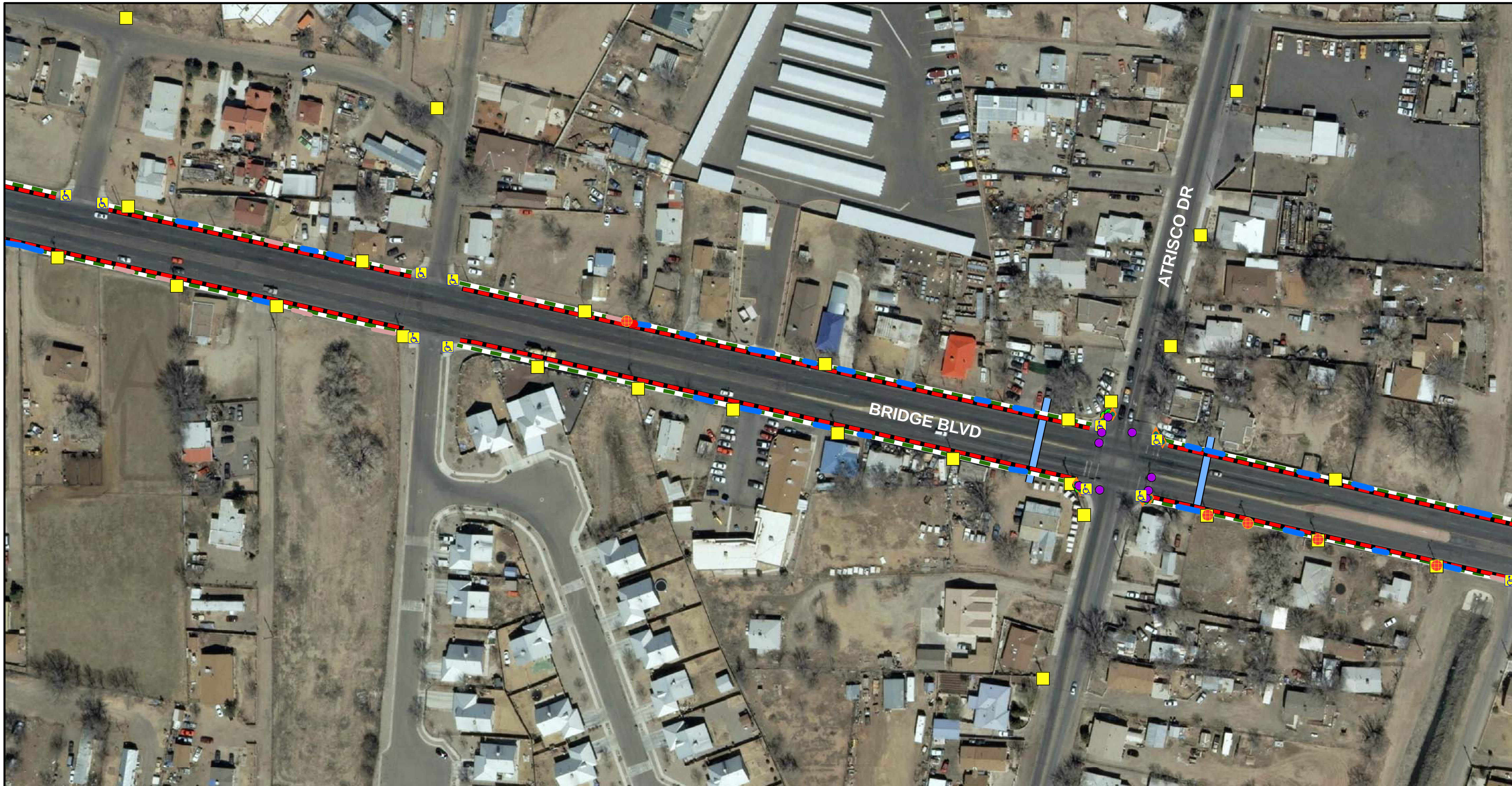

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29 March 2012

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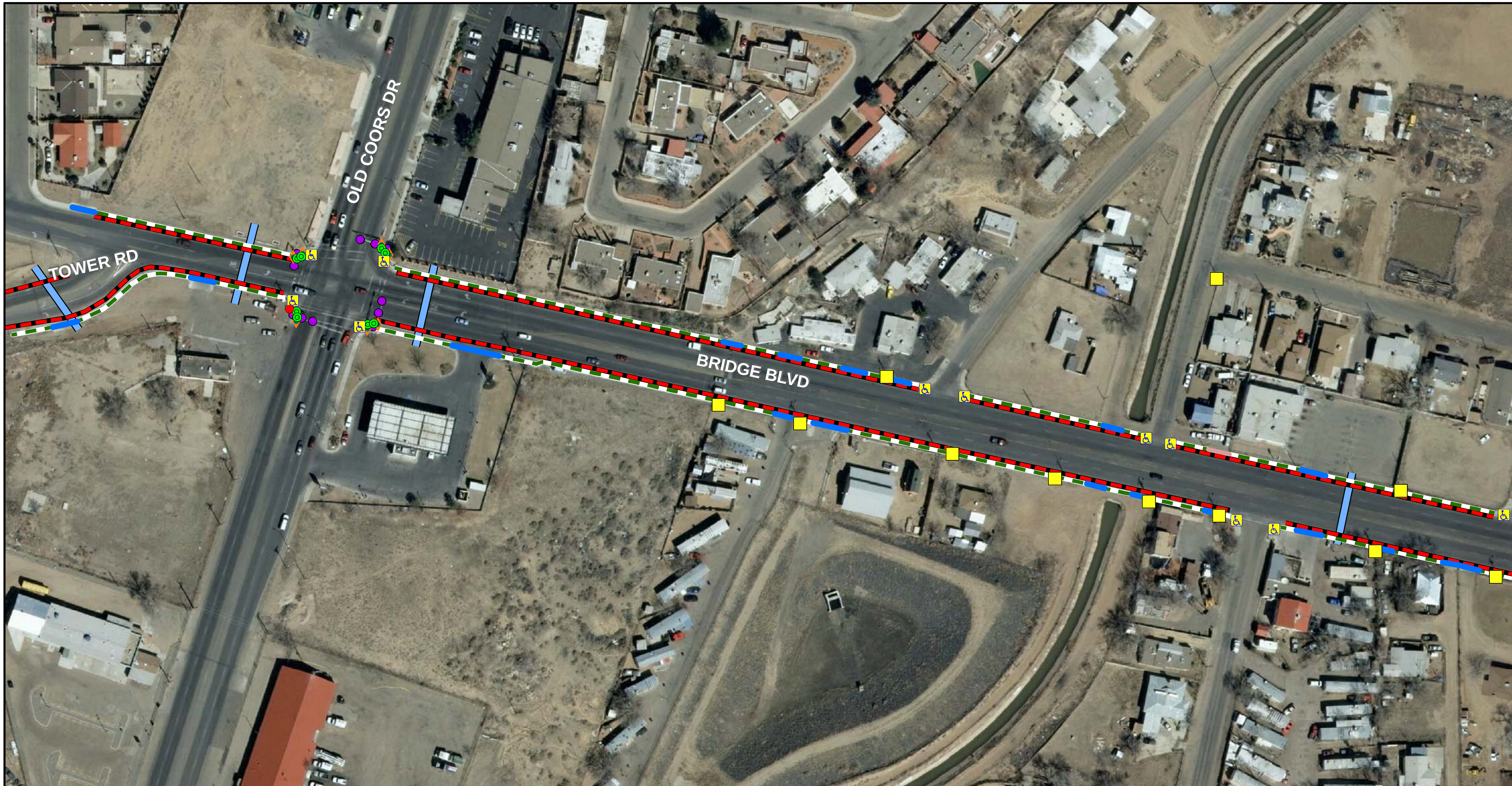

HDR Engineering
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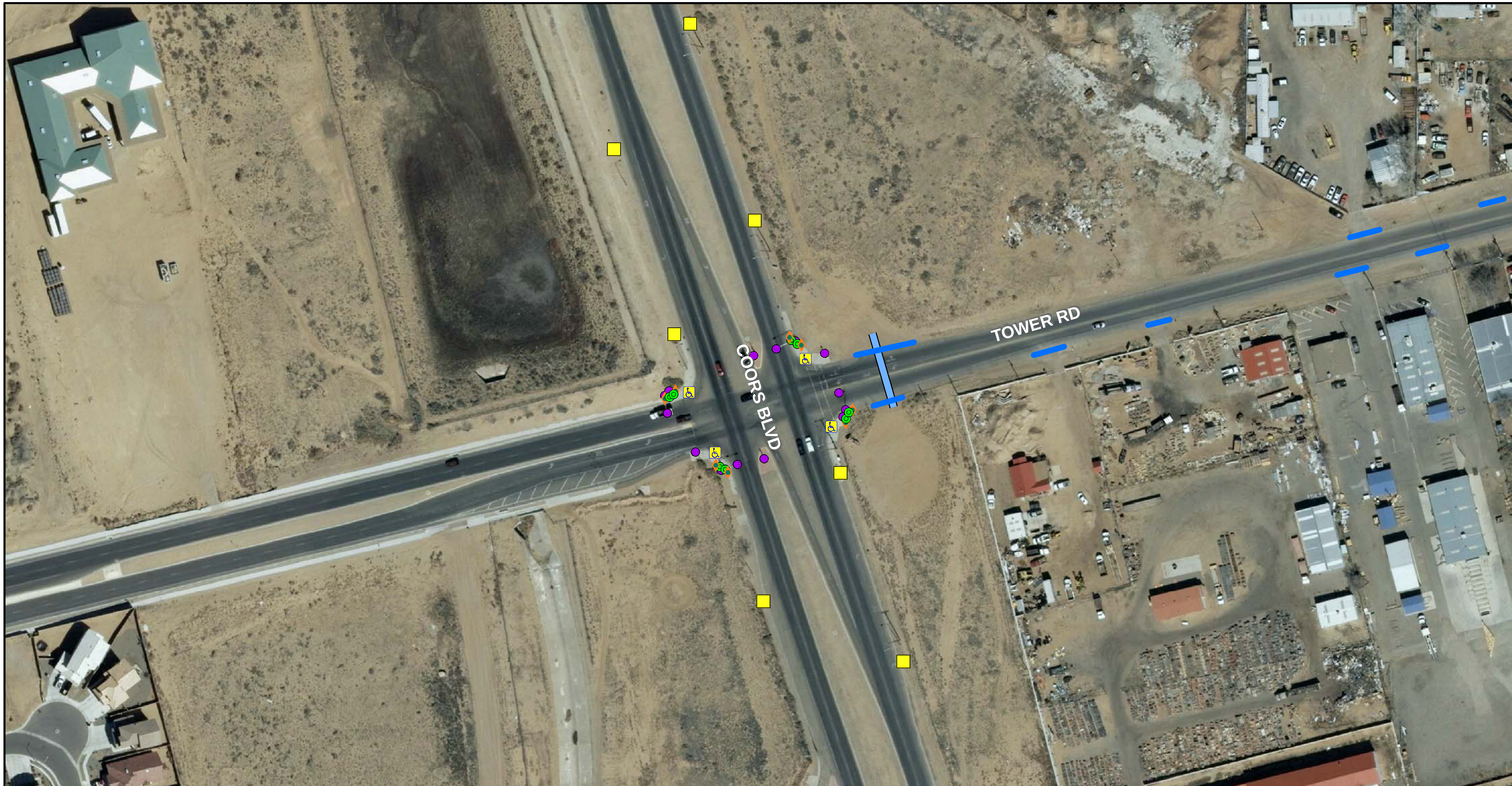

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Roadway Conditions Inventory

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-ITS Deployment Summary Assessment–

ITS Corridor Profile: Bridge Blvd ***CMP Ranking: 4***

Notable Projects: Bridge Blvd Corridor Project (TIGER Grant), CoA ATMS Ph 13, Complete Streets Concepts, Transit; Associated Economic Development

Intersections:

1. ***System Type-*** *Siemens i2 in City; Aries (soon to be Centracs) in Bernalillo County*
2. ***Controllers-*** *Econolite ASC2, ASC3*
3. ***Preemption-*** *Opticom as noted*
4. ***Detection Type-*** *Video and Loops*
5. ***Signal Timing Plans-*** *City Manages Entire Corridor per informal agreement with BC; AM/PM/OP Average (2010), various stages of implementation*
6. ***CCTVs-*** *Included in COA's ATMS Phase 13; locations as noted on Corridor Profile Map*

Improvement Potential: *Projects in place for Telemetry, CCTVs, VDS, etc; ATMS Ph 13, Bridge Blvd Reconstruction. Expanded signal timing plans needed, shared operational management*

Telemetry (w to e): *Twisted Pair, Old Coors to La Vega*

Improvement Potential: *Continuous fiber programmed with Bridge Blvd Reconstruction, coordinated with CoA Phase 13 Event Center ITS*

MOUs:

1. Bern Co and CoA ***(Informal)*** *- Signal Coordination*
2. NMDOT and CoA – Fiber, DMS with operational capacity
3. NMDOT and Bern Co – Fiber

Improvement Potential: *Formalization of MOU between City of Albuquerque and Bernalillo County may be required; should include equipment sharing; details to be determined by respective parties and desired operational outcomes.*

DMS:

1. *Potential as part of Bridge Corridor work; projects identified above.*

Improvement Potential: *Travel Time Data Collection and DMS Dissemination is currently under consideration by Bern Co and COA.*

Mid Block Sensors/Traffic and Speed Control:

1. Bridge w/4th - CoA's ATMS Ph 13
2. Avenida Cesar Chavez e/Edith Blvd - CoA's ATMS Ph 13
3. Avenida Cesar Chavez e/I-25 - CoA's ATMS Ph 13
4. Avenida Cesar Chavez e/Buena Vista - CoA's ATMS Ph 13

Improvement Potential: *Develop remote access to counters; tie data collection to DMS, install speed detectors to support DMS (see above) and counting activities*

Transit:

Corridor is currently served with the following routes and connections to the ATC, Rapid Ride and Rail Runner Commuter Train Service:

51 Atrisco/Rio Bravo	Weekday	Saturday	
53 Isleta	Weekday	Saturday	Park & Ride
54 Bridge/Westgate	Weekday	Saturday	Park & Ride
155 Coors	Weekday	Saturday & Sunday	Park & Ride

Improvement Potential: *Bridge Blvd Reconstruction, and Bridge Blvd Gateway Enhancement projects include evaluation and development of transit enhancements along corridor including BRT type/enhanced transit, queue jumpers, etc. (MPO ID 872, 872.2, FY14 and FY15). The Bridge Blvd river crossing is part of MTB (R-10-16) and RTD (R-11-1) River Crossing Mode Share Goals of 10% and 20% in 2025 and 2035, respectively, and allocation of 25% of federal funding including 2016 and beyond to achieve these goals; ITS strategies will likely play a major part.*

Bridge Blvd ITS Corridor Profile, 10/11

Appendix C

Sensitivity Analysis

FEHR PEERS

MEMORANDUM

Date: August 10, 2012

To: Joe Luehring, P.E. – Bernalillo County
Richard Meadows, AICP – Bernalillo County
Dean Bressler – HDR
Ed Pottoff, P.E. - HDR

From: Rick Plenge, P.E., PTOE
Carlos Hernandez, AICP

Subject: Task 7: Bridge Boulevard Intersection and Roadway Traffic Analysis

Introduction

A preliminary analysis of intersection traffic operations was performed for the Isleta, Five Points Road, and Old Coors intersections and roadway options identified during the Bridge Boulevard Charrette (charrette) in May 2012. This includes a motor vehicle level of service analysis and a multimodal accommodations analysis for the options identified for the corridor during the charrette. An assessment of the multimodal compatibility of the intersection and roadway segments was also completed. This will be used later in the process with the livability criteria to determine a preferred option, before moving into preliminary design.

Background

The project team proposed, studied, and tested several intersection options at the charrette. This included a series of roadway designs that would improve mobility for all modes of travel, address livability, and focus on safety improvements. The options that gained the most support from staff, the project team and the public were a 5-lane roadway section with a center median that had "gateway" roundabouts at the Isleta, Five Points, Old Coors intersections.

Based on this input, an operations analysis was conducted on the Bridge Boulevard/Isleta Boulevard, Bridge Boulevard/Sunset Road/Five Points Road, Bridge Boulevard/Old Coors Boulevard/Tower Road intersections. This included existing conditions analysis of both intersections using traffic counts (2010) and the projected future conditions at both intersections using growth rates from the MRCOG travel demand model. A critical factor in this analysis is that the Bridge Boulevard/Isleta Boulevard, Bridge Boulevard/Sunset Road/Five Points Road, and Bridge Boulevard/Old Coors Boulevard/Tower Road intersections are projected to have a 1.91%, 1.52%, and 2.7% annual growth, respectively. Based on the outcome of the charrette, some of this travel demand will be accounted for with roadway improvements for motor vehicles, improving access to ABQ Ride's proposed High Capacity Transit corridors, improved bicycle facilities, new pedestrian safety measures, and some will reallocate to other corridors with bridge crossings. Tables 1 and 2 summarize the 2010 traffic counts and projected

2035 volumes using the projected growth rates for each intersection under their current configurations.

FEHR & PEERS

Table 1 – Bridge Boulevard and Isleta Boulevard Peak Hour Traffic Counts (current intersection configurations)

	Bridge Blvd Westbound		Isleta Blvd Northbound		Bridge Blvd Eastbound	
Start Time	Left	Thru	Left	Right	Thru	Right
2010 AM	385	676	30	827	1398	30
2035 AM	618	1085	48	1327	2244	48
2010 PM	700	1298	62	554	824	66
2035 PM	1123	2083	99	889	1322	106

Table 2 – Bridge Boulevard and Sunset Road/Five Points Road Peak Hour Traffic Counts (current intersection configurations)

	Sunset Rd Southbound				Bridge Blvd Westbound				Sunset Rd Northbound				Bridge Blvd Eastbound				Five Points Rd Southeastbound			
Start Time	Left	Thru	Right	Hard Right	Left	Thru	Bear Right	Right	Left	Bear Left	Thru	Right	Hard Left	Left	Thru	Right	Hard Left	Bear Left	Bear Right	Hard Right
2010 AM	80	110	28	2	111	482	42	37	23	23	113	146	10	51	1209	28	2	71	25	19
2035 AM	117	160	41	3	162	703	61	54	34	34	165	213	15	74	1763	41	3	104	36	28
2010 PM	91	112	59	1	117	999	83	73	54	20	108	105	5	73	642	46	2	55	19	23
2035 PM	133	163	86	1	171	1457	121	106	79	29	157	153	7	106	936	67	3	80	28	34

Table 3 – Bridge Boulevard and Sunset Road/Five Points Road Peak Hour Traffic Counts (current intersection configurations)

	Old Coors Dr Southbound			Bridge Blvd Westbound			Old Coors Dr Northbound			Bridge Blvd Eastbound		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
2010 AM	248	217	40	140	259	203	28	443	470	37	503	9
2035 AM	483	422	78	273	504	395	55	862	915	72	979	18
2010 PM	300	485	100	271	558	331	29	350	201	59	334	10
2035 PM	584	944	195	528	1086	644	56	681	391	115	650	19

FEHR & PEERS

Intersection Concepts

At the charrette three intersection treatments were identified for their ability to manage some of the future travel demand for motor vehicles, while improving accommodations for multimodal travel. The three alternatives are:

1. Jug Handle Lefts (Signalized)
2. Traditional Signalized Intersections
3. Multi-lane Roundabouts (with pedestrian signalization if warranted)

The multilane roundabout option was identified by the public and staff at the charrette as the preferred intersection treatment to further evaluate. The following analysis provides detail on how a multilane roundabout performs against those objectives. Included in this memorandum is a planning-level review of other intersection options considered during the charrette and discussed with the community (see the Compatibility Matrix attached to this memorandum).

Preliminary Analysis

The motor vehicle travel analysis was performed using the Sidra roundabout software program and based on the MRCOG forecasted growth projections. The analysis was done for the scenarios outlined below:

- Sunset Road/Five Points Road (2018 opening year)
- Old Coors Boulevard/Tower Road (2018 opening year)
- Isleta Boulevard (2023 opening year)
- MRCOG bulidout year (2035)

The Highway Capacity Manual automobile LOS "E" threshold was used as failing. Tables 3, 4, 5 summarize the intersection capacity analysis assuming a two-lane roundabout configuration at both intersections with pedestrian and bicycle accommodations.

Sunset Road/Five Points Road intersection

- The capacity analysis shows that this intersection will function at a **LOS B** during its 2018 opening year and **LOS F** during 2035 AM peak hour.

Bridge Boulevard and Isleta Boulevard Intersection

- The capacity analysis shows that this intersection will function at a **LOS F** during its 2023 opening year in the PM peak hour and **LOS F** during 2035.
    - This intersection will operate at LOS E by 2019 and fail before the roundabout is constructed in 2023. This is largely due to the 1,100 westbound left turning

vehicles competing against 1,300 eastbound through vehicles during the PM peak hour based on MRCOG growth forecasts.

Old Coors Boulevard/Tower Road

- The capacity analysis shows that this intersection will function at a **LOS F** during its 2018 opening year.
    - This intersection will operate at LOS E in the PM peak hour by 2014 and fail before the roundabout is constructed in 2018. This is largely due to the large southbound left turn volumes.

Table 3 – Bridge Boulevard and Sunset Road/Five Points Road Intersection Capacity Analysis (two-lane roundabout)

	Sunset Rd Southbound	Bridge Blvd Westbound	Sunset Rd Northbound	Bridge Blvd Eastbound	Five Pts Rd SEbound	Overall	Comments
2018 AM	A	A	C	B	B	B	
2035 AM	B	A	E	F	B	F	
2018 PM	C	B	B	A	B	B	
2035 PM	D	E	B	B	C	D	

Table 4 – Bridge Boulevard and Isleta Boulevard Intersection Capacity Analysis (two-lane roundabout)

	Bridge Blvd Westbound	Isleta Blvd Northbound	Bridge Blvd Eastbound	Overall	Comments
2023 AM	F	A	F	E	Traffic volumes represents a 26% increase in 2010 volumes
2035 AM	F	A	F	F	
2023 PM	C	A	F	F	Intersection will operate at a LOS E beginning in 2019
2035 PM	F	A	F	F	

Table 5 – Bridge Boulevard and Old Coors Boulevard/Tower Road (two-lane roundabout)

	Bridge Blvd Westbound	Old Coors Dr Northbound	Bridge Blvd Eastbound	Old Coors Dr Southbound	Overall	Comments
2018 AM	A	C	B	A	B	Traffic volume represents a 26% increase in 2010 volume
2018 PM	D	A	A	F	F	Traffic volume represents a 26% increase in 2010 volume.
2035 AM	B	F	F	C	F	Traffic volume represents a 95% increase in 2010 volume
2035 PM	F	F	E	F	F	Traffic volume represents a 95% increase in 2010 volume

For comparison purposes, each intersection was also analyzed under traditional signal control for opening year and 2035 conditions. This analysis shows that the signalized intersections will experience similar operational problems as with the intersections under roundabout control and in the case of the Sunset Road/Five Points Road and Old Coors Boulevard/Tower Road intersections will actually operate at a worse level of service.

Sunset Road/Five Points Road intersection

- The capacity analysis shows that this intersection will function at a **LOS E** during its 2018 opening year and **LOS F** during 2035 AM peak hour.
    - During the PM peak hour, the intersection is projected to operate at a LOS D during the 2018 opening year and LOS F in 2035.

Isleta Boulevard Intersection

- The capacity analysis shows that this intersection will function at a **LOS E** during its 2018 opening year in the AM peak hour and **LOS F** by 2020 assuming double westbound left turn lanes along Bridge Boulevard.
    - During the PM peak hour, the intersection is projected to operate at a LOS C during the 2018 opening year and LOS D in 2035.

Old Coors Boulevard/Tower Road Intersection

- The capacity analysis shows that this intersection will function at a **LOS D** during its 2018 opening year assuming double southbound left turn lanes along Old Coors Boulevard.
    - The intersection is projected to operate at a LOS F during the 2035 PM peak hour and LOS D during the 2035 AM peak hour.

Roundabouts Design Considerations (Assuming that the MRCOG forecasted volumes are realized)

Sunset Road/Five Points Road Intersection:

- if **additional lanes** are added to the roundabout **LOS C** conditions will exist during the peak hour in 2035:
    - assumes an additional westbound to northbound right turn slip lane
    - assumes an additional eastbound (3 total lanes) approach lane

- if **peak hour managed lanes** are introduced to the roundabout (3 total) **LOS C** conditions will exist during the peak hour in 2035:
    - assumes an outside travel lane on Bridge Boulevard in each direction is managed during the peak hours
    - assuming a combined 30% mode shift to high occupant vehicles, ABQ Ride, bicycling, and walking

Isleta Boulevard Intersection:

- if **additional lanes** are added to the roundabout (3 total lanes) **LOS F** conditions will still exist during the peak hour in 2035:
    - assumes an additional eastbound to southbound right turn slip lane
    - assumes an additional eastbound and westbound (3 total lanes) approach lane
- if **peak hour managed lanes** are introduced to the roundabout (3 total) **LOS F** conditions would still exist during the peak hour in 2035:
    - assumes an outside travel lane on Bridge Boulevard in each direction is managed during the peak hours
    - assuming a combined 40 to 50% mode shift to high occupant vehicles, ABQ Ride, bicycling, and walking
- Consider a **continuous flow intersection**
    - assumes that bicycle and pedestrian accommodations are provided through the intersection
    - assumes appropriate access can be provided for proposed land uses adjacent to intersection

Old Coors Boulevard/Tower Road Intersection:

- if **additional lanes** are added to the roundabout (3 total lanes) **LOS F** conditions will still exist during the PM peak hour in 2035:
    - assumes three lanes on all approaches
    - assumes right turn slip lanes on all but the southwest quadrant

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Tables 6, 7, 8 summarize the 2035 traffic operations at each intersection with identified geometric improvements.

Table 6 – Bridge Boulevard and Isleta Boulevard Intersection Capacity Analysis (w/improvements)

	Bridge Blvd Westbound	Isleta Blvd Northbound	Bridge Blvd Eastbound	Overall	Geometric Configuration
2035 AM	A	A	A	A	Add EB to SB right turn slip lane and third EB and WB thru lane
2035 AM*	A	A	B	A	Add EB to SB right turn slip lane and third EB and WB thru lane
2035 PM	F	A	F	F	Add EB to SB right turn slip lane and third EB and WB thru lane
2035 PM*	F	A	F	F	Add EB to SB right turn slip lane and third EB and WB thru lane

*EB/WB outside thru lane would be restricted to HOV during peak hour

Table 7 – Bridge Boulevard and Sunset Road/Five Points Road Intersection Capacity Analysis (two-lane roundabout)

	Sunset Rd Southbound	Bridge Blvd Westbound	Sunset Rd Northbound	Bridge Blvd Eastbound	Five Pts Rd SEbound	Overall	Geometric Configuration
2035 AM	B	A	E	F	B	A	Two lane entry and exit on all approaches, add 3rd EB thru and NB thru, and WB right slip results in LOS A
2035 AM*	B	A	C	D	B	C	Two lane entry and exit on all approaches, add 3rd EB thru and NB thru, and WB right slip results in LOS A
2035 PM	D	E	B	B	C	C	Two lane entry and exit on all approaches, add WB right slip ramp results in LOS A
2035 PM*	E	C	A	A	C	C	Two lane entry and exit on all approaches, add WB right slip ramp results in LOS A

*EB/WB outside thru lane would be restricted to HOV during peak hour

Table 8 – Bridge Boulevard and Old Coors Boulevard/Tower Road Intersection Capacity Analysis (three-lane roundabout)

	Bridge Blvd Westbound	Old Coors Dr Northbound	Bridge Blvd Eastbound	Old Coors Dr Southbound	Overall	Geometric Configuration
2035 AM	A	D	A	A	B	Three approach lanes with right turn slip ramps on the northbound, westbound, and southbound approaches.
2035 PM	D	A	C	F	F	

Bridge Boulevard Future Transit Analysis

If MRCOG growth projections are realized and Bridge Boulevard is constrained to its current lane configuration, transit investment will play a key role in mitigating this demand along the corridor. The corridor population is currently home to many households with 1 or fewer automobiles. These households are typically classified as transit dependent, meaning that members of the household are dependent on transit for their daily travel needs. In addition, as fuel prices and congestion continue to increase, choice ridership on transit is also expected to increase. Choice riders are those who choose to use transit even though they might have other options for fulfilling their travel needs. When people choose to use transit rather than drive their vehicle alone, vehicle miles traveled can decrease and start to positively impact the amount of greenhouse gas emissions in the region. Finally, to create a corridor that will accommodate future travel needs for all modes of travel, a high percentage of travel will need to take place in forms other than automobiles being driven by a single person.

One of the goals of the Bridge Boulevard corridor plan is to enhance the livability in the corridor. To achieve this livability, redevelopment in the corridor is planned to front the street in a pedestrian-oriented manner rather than the strip mall style development currently found in the corridor. Even if the corridor is completely redeveloped with this type of development, but the roadway is built to accommodate only vehicles, few of the corridor goals will be achieved. One of the ways to reduce the need to build additional roadway capacity is to encourage transit use in the corridor. Investment in transit service can relieve future traffic congestion and reduce the amount of roadway lane miles that needs to be constructed. This can help to create a narrower roadway with less turn lanes, which creates a safer place to walk, ride a bike, and use transit.

Table 9 below shows a cursory future transit analysis demonstrating how future transit investments could affect the potential for ridership in the corridor. The analysis was conducted for the future year 2035, using the same growth rates and numbers as the traffic analysis. The table shows 5 levels of future transit investment. Existing transit assumes the same level of transit service in the corridor as currently exists. Enhanced transit service assumes the current bus type but increases the transit service frequency from 30 minutes to 15 minutes. Basic Bus Rapid Transit (BRT) maintains the 15 minutes service but provides benefits such as off-board fare payment, real-time bus arrival and travel times at bus stops, transit signal priority, and higher capacity buses. Enhanced BRT provides the benefits described above and increases service levels to 7.5 minute frequency. Premium BRT provides all of the service as Enhanced BRT but uses the highest capacity buses.

Each of the transit scenarios assumes that in the future, all peak hour capacity is used and that the ridership equals capacity. The ridership is then taken as a percent of peak hour vehicle traffic to determine the transit mode share in the corridor. As transit service increases, transit ridership increases, and in turn, transit mode share increases. Of course, increasing transit frequency and quality also comes with a cost. As frequency increases, additional buses will need to be purchase and additional operation funds will also be required.

Table 9 – 2035 Bridge Boulevard Transit Investment Summary

Transit Service Accommodations	Frequency (min.)	Capacity (persons/bus)	Ridership^	Mode Share^^
Existing Transit*	30	160	160	4%
Enhanced Transit*	15	320	320	9%
Basic Bus Rapid Transit (BRT)**	15	520	520	14%
Enhanced BRT**	7.5	1040	1040	29%
Premium BRT***	7.5	1280	1280	36%

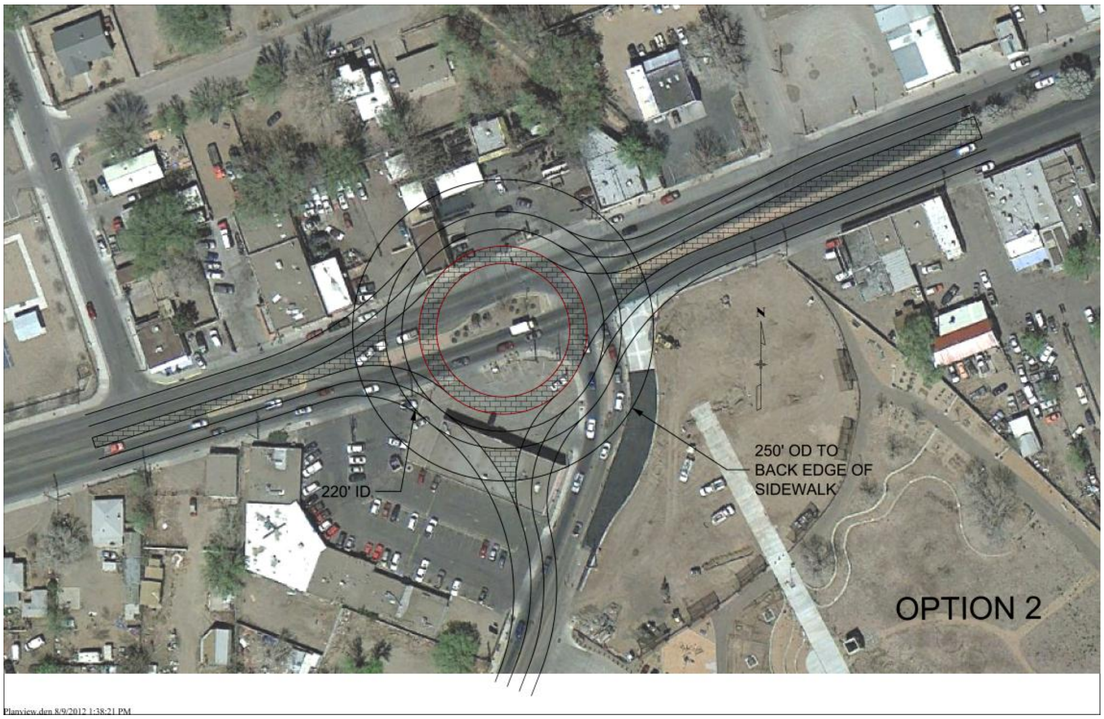
*Assumes New Flyer Bus with 40 person capacity
**Assumes New Flyer BRT Bus with 65 person capacity
***Assumes New Flyer BRT Bus with 80 person capacity
^Future ridership assumes full usage of capacity during peak hour
^^Mode share is based on 3,600 peak hour vehicles

The traffic analysis in the corridor found that in order to accommodate two lane roundabouts, approximately 50% of travel would need to take place in modes other than single occupant vehicles. Even if the existing transit service during the peak hour was used to its capacity, the transit mode share would only be 4%, doing little to impact projected congestion. If the highest level of transit investment were made in the Bridge Boulevard corridor, approximately 36% of trips could be accommodated on transit. The necessary mode shift to reach the 50% goal for non-single occupancy vehicle travel on the corridor could be achieved through a number of other means including increasing bicycle/walking trips and car-pooling. Bicycle and walking trips have typically accounted for approximately 2% of commuting trips within Albuquerque while approximately 12% of the Albuquerque population routinely car pools. A significant investment will need to be made to increase the bicycle and walking trips along the corridor including facilities that increase the physical separation between those users and moving traffic. Other urban areas have experienced a doubling of bicyclists when these enhanced facilities have been provided.

Roundabout Positioning with Respect to Land Use Opportunities

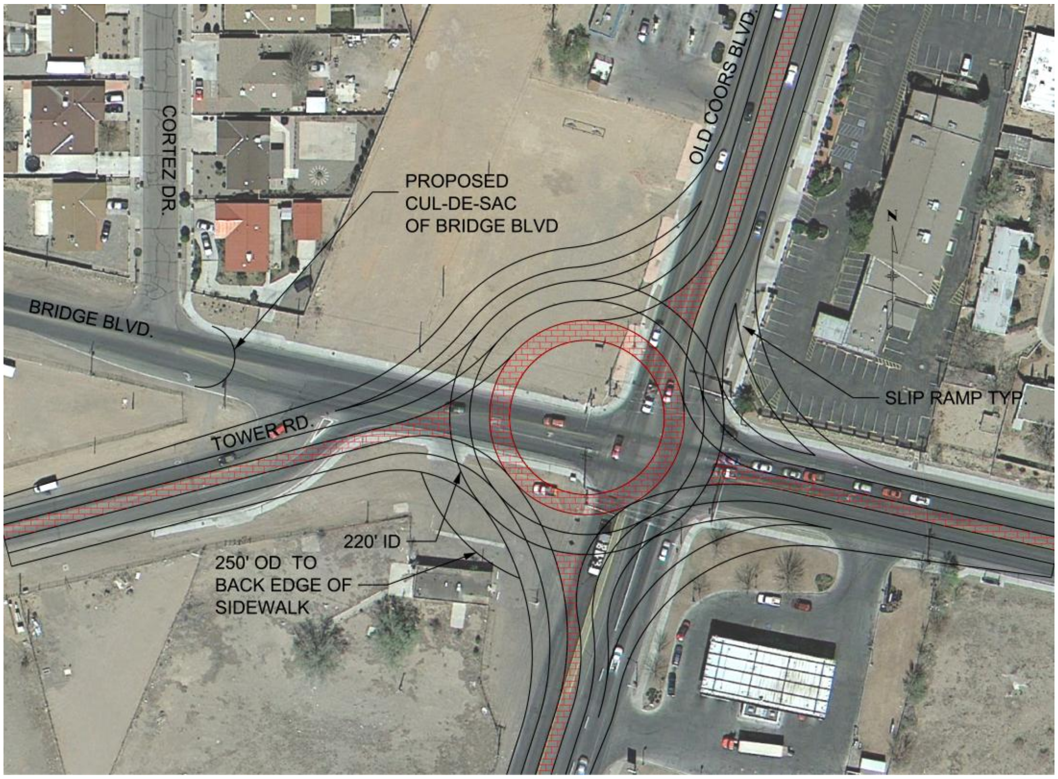
A preliminary assessment of roundabout positioning within the Isleta Boulevard, Sunset Drive/Five Points Road, and Old Coors Boulevard/Tower Road intersections were performed to identify which roundabout orientation maximized redevelopment potential within the vicinity of the intersection. At each intersection a 250-foot diameter circle was drawn which assumed a 220-foot diameter roundabout and a 30 additional landscaping and pedestrian area. A larger 220-foot diameter circle was used based on its added versatility of accommodating both a two-lane roundabout layout and also a three lane roundabout if future traffic projections are realized.

Based on a review of the transportation design/analysis and land use/redevelopment potential for each intersection, the following options were identified as the preferred roundabout orientations at both intersections.



Bridge Boulevard and Isleta Boulevard Recommended Roundabout Orientation

Bridge Boulevard and Sunset Drive/Five Points Road Recommended Roundabout Orientation



Bridge Boulevard and Old Coors Boulevard/Tower Road Recommended Roundabout Orientation

Intersection and Roadway Segment Compatibility Assessment

A separate compatibility assessment of the preferred roadway segments and intersection options was performed to identify various design considerations and provide a screening tool for evaluating the segment and intersection options.

The attached screening matrix summarizes the identified design considerations for each option and provides a preliminary screening of the combined segment and intersection options based on how compatible the options were. The screening matrix was color coded based on compatibility, with green representing the option with the greatest compatibility and orange representing those that had significant operational and constructability challenges that would be difficult to overcome. Included at the bottom of the compatibility matrix is a summary of the general operational and design considerations for various travel modes for each intersection type.

The matrix identified that the Main Street option with all general purpose lanes and either traffic signal or a 2-lane roundabout intersection configuration had the greatest compatibility.

Final Considerations

Traffic Analysis

The traffic analysis shows that if MRCOG 2035 projected traffic volumes are realized along the Bridge Boulevard corridor, the roundabout intersections, most notably at the Isleta Boulevard intersection will begin to break down and continue to operate poorly despite additional capacity being provided. This will likely be the case for all the preferred intersection treatment alternatives identified during the charrette. More elaborate intersection alternatives such as metering select roundabout approaches and Continuous Flow Intersections would need to be considered at the Isleta Boulevard intersection to mitigate future demands.