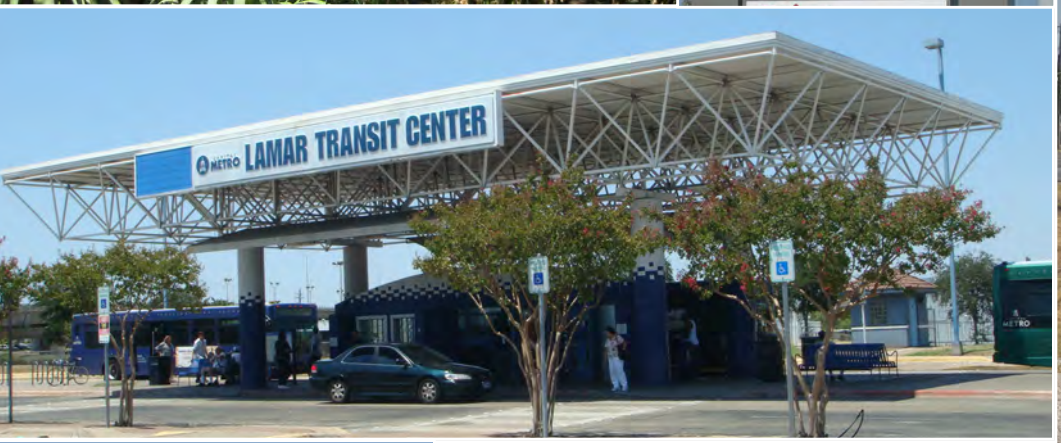
FINAL REPORT

AUSTIN MOBILITY

NORTH LAMAR / BURNET CORRIDOR DEVELOPMENT PROGRAM

DECEMBER 2013



EXECUTIVE SUMMARY

PROGRAM GOALS

The purpose of this corridor development program was to develop a set of recommendations to improve safety, mobility, and quality of life along Burnet Road (from Koenig Lane to MoPac) and North Lamar Boulevard (from US 183 to IH 35). Both Burnet Road and North Lamar Boulevard have unique drainage issues. Their street storm drain systems consist of various combinations of open ditches and some curb and gutter. This results in issues for pedestrian access in most areas, as well as some flooding. A significant portion of residents along Burnet and North Lamar corridors are dependent on transportation modes such walking, biking, and transit. Recommendations were therefore developed with a focus on all road users, including pedestrians, cyclists, and transit users, not just motorists.

PROJECT PURPOSE AND PROCESS

The North Lamar/Burnet Corridor Program was initiated in late June 2011. Data was collected in order to assess current corridor conditions and needs, as well as the outcomes and recommendations identified in some previous studies. The first set of public meetings were held in September 2011 to introduce the project to the public and obtain input on corridor issues and concerns. Stakeholder and Business Open House meetings were then held in October 2011 to obtain input from smaller groups of corridor users and public agencies. Existing conditions analysis and public input were incorporated into the development and evaluation of improvements designed to mitigate identified mobility issues. The second public meeting was held in January 2012 to obtain feedback on proposed recommendations.

For developing the North Lamar/Burnet Corridor Program it is crucial to understand the community and stakeholders within the corridors, review the existing conditions, and propose recommendations for implementation. An evaluation of existing conditions identifies current issues such as safety, mobility, and drainage system, and recommendations that take into account potential future conditions and feasibility, are given to address these issues. This program serves as a framework to guide the next steps in the whole project delivery process. Benefits of improvements and the estimated costs for implementation are given. For the implementation of some improvements in some phases, there will need to be additional efforts for coordination with land owners, local businesses, and local residents along the corridors to realize the recommended improvements.

EXISTING CONDITIONS

The Burnet Road corridor is the 5-mile north-south section from Koenig Lane to Loop 1 (MoPac). The section between Koenig Lane and US 183 is currently maintained by the City of Austin. The section north of US 183 up to MoPac is owned and maintained by TxDOT. Right-of-way (ROW) along this corridor varies from 110 feet to 135 feet. There are a variety of land uses along the corridor including residential, institutional, commercial, and industrial. Major developments include the Northcross Mall on the south end of the corridor, and the Domain and IBM office complex on the north end.

The North Lamar Boulevard corridor is the 6-mile north-south section from US 183 to IH 35. Within the study area, this roadway is owned and maintained in its entirety by the Texas Department of Transportation (TxDOT). Major parallel roadways include IH 35 on the east and Metric Boulevard on the west. ROW along the North Lamar Boulevard corridor generally varies from 95 feet to 120 feet. There are a variety of land uses along the corridor including residential, institutional, commercial, and industrial. Major developments include H-E-B and the Chinatown Shopping Center on the south end of the corridor, and Wal-Mart and Lowe's on the north end.

Traffic

Existing daily traffic volume on Burnet Road ranges from a low of 23,000 vehicles per day (vpd) south of MoPac to a high of 37,000 vpd south of US 183. Daily traffic volume on North Lamar Boulevard ranges from a low of 6,000 vpd south of Howard Lane to a high of 36,000 vpd north of US 183.

Safety

From 2009 to August 2011, there were a total of 404 and 771 crashes along Burnet Road and North Lamar Boulevard, respectively. More than half of the total crashes on both corridors over the 32-month period resulted in some type of injury, with one fatal crash on Burnet Road and two fatalities on North Lamar Boulevard. The 31 crashes involving pedestrians along North Lamar Boulevard are more than double than the 14 pedestrian-related crashes along Burnet Road. The majority of crashes along both corridors were right angle and rear-end crashes due to driver inattentiveness, intoxication, speeding, red light running, and failure to yield right-of-way at stop signs and driveways.

Transit

Burnet Road is served by a number of Capital Metropolitan Transportation Authority (CapMetro) bus routes. However, within the project area, no single route traverses the entire corridor. Transit service along North Lamar Boulevard is more heavily utilized than along Burnet Road. This higher level of transit activity can be attributed to a higher transit-dependent population along the corridor, as well as the fact that, unlike Burnet Road, North Lamar Boulevard has a route that serves the entire corridor.

Pedestrian

A significant number of households along both corridors do not own an automobile, leaving residents dependent on transit, walking, and bicycling for transportation. While the average percentage of households without a car citywide in Austin is 5%, in the project area as many as 13% of households do not have a car. Both Burnet and North Lamar corridors have inadequate facilities for bicyclists and pedestrians. The majority of the existing sidewalk is in good condition, with ADA-compliant curb ramps and accessible signals at intersections. However, some locations have broken sidewalk that cannot be safely navigated by disabled people. Most sections of sidewalk were built before ADA standards were in place, and are too narrow or have excessive cross slope or steep curb ramps. Approximately half of both corridors need sidewalks.

Bicycle

Burnet Road and North Lamar Boulevard are high-speed/high-volume roadways with no bicycle infrastructure. Only the most confident cyclists who have no other alternative route use these corridors for bicycling.

Drainage

Both Burnet Road and North Lamar Boulevard have unique drainage issues. Their street storm drain systems consist of various combinations of open ditches and some curb and gutter. This results in issues for pedestrian access in most areas, as well as some flooding.

PROJECT GOALS AND DESIGN CONSIDERATIONS

A common theme that emerged throughout the public meetings and stockholder discussions along the corridors **was a desire to adequately facilitate the movement of additional automobile traffic, but not design automobile related improvements to such a degree that it would degrade the pedestrian and bicycle level-of-service to such levels as to make those modes unattractive to the average user**.

The Burnet and North Lamar corridors have mobility and safety issues associated with the various transportation modes on the roadways. Existing issues and concerns were identified through the public involvement process as well as a technical evaluation of existing transportation conditions. Primary concerns expressed by members of the public included lack of suitable pedestrian and bicycle infrastructure. Each of the corridors analyzed presented different design considerations, traffic patterns, and existing infrastructure for automobile users, cyclists, and pedestrians.

In determining the appropriate infrastructure revisions for each segment of the corridor, the consultant team utilized various planning level tools that examined the efficiency of the vehicular realm improvements while balancing the needs of the transit patrons, bicyclists, and pedestrians throughout the corridor. Recommendations are classified as short-term or long-term depending on their implementation time frame. Recommendations identified for the Burnet and North Lamar Corridors include corridor-wide improvements as well as improvements specific to the character areas identified along each corridor. Corridor-wide improvements include traffic signal retiming, bus shelters, street lighting, raised medians, bicycle lanes, storm drainage, and shade trees among others.

FUTURE CORRIDOR CHARACTERISTICS AND RECOMMENDATIONS

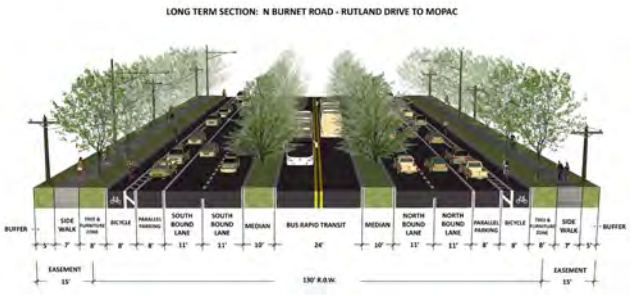
The transportation improvements to Burnet and North Lamar corridors are meant to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders. Recommendations are classified as short-term or long-term depending on their implementation time frame. Short-term recommendations are typically designed for implementation within a 5-year time frame. Funding may not be immediately available for implementation of all short-term improvements and additional prioritization within this category may be necessary. Long-term improvements (10 or more years) require more implementation time with more extensive engineering, acquisition of ROW, negotiation with property owners, funding, and investment from other entities. Cost is a factor in the classification of improvements and as such, roadway reconstruction projects are typically classified as long-term. However, areas of particular need along both the Burnet and North Lamar corridors were identified

for the short term implementation of roadway reconstruction projects. These locations are Koenig Lane to Anderson Lane on Burnet Road, and Rundberg Lane to Braker Lane on North Lamar Boulevard.

Corridorwide Improvements

Short-Term Recommendations

- **Bus Shelters (Locations that meet current CapMetro criteria)**
  - Install additional bus shelters at 16 bus stops on North Lamar
  - Install additional bus shelters at 8 bus stops on Burnet
- **Bicycle Lanes**
  - Implement lane diets where possible to provide bicycle lanes within the existing pavement
- **Signal Timing**
  - Update signal timings
- **Street Lighting**
  - Upgrade street lighting to current safety standards where deficiencies exist
- **Pedestrian Zone**
  - Clear encroachments from the pedestrian zone



Long-Term Recommendations

- **Roadway Reconstruction**
  - Install raised median
  - Install wide sidewalks
  - Install tree & furniture zone
  - Install 8-foot cycle tracks
  - Improve storm drainage
- **Bicycles at Intersections**
  - Add two-stage turn queue boxes or bicycle signal phases
- **Signal Timing**
  - Update signal timings
- **Streetscape Furnishings**
  - Install streetscape furnishings
- **Shade Trees**
  - Plant trees to provide shade along the corridors
- **Bus Pullouts**
  - Install bus pullouts for BRT stops
- **Driveway Consolidation**
  - Explore opportunities to reduce driveway density

Burnet Road

Short-Term Recommendations

- **Crossings with Pedestrian Hybrid Beacons**
  - Install pedestrian hybrid beacons at crosswalks in 7 locations
- **Bus Stop Relocation**
  - Move 4 stops closer to signalized intersections and new crossings with PHB
- **Install Right-Turn Lanes**
  - Burnet Road at Koenig Lane (EB and WB)
  - Burnet Road at Braker Lane (EB)
- **Install Left-Turn Lanes**
  - Burnet Road at Koenig Lane (SB) - increase storage bay to 250'
  - Burnet Road at Braker Lane (EB and WB dual left-turn)
- **Conduct Intersection Reconfiguration and Pocket Park**
  - Burnet Road at Burnet Lane
  - Burnet Road at Cullen Avenue

The estimated total cost for short-term improvements for Burnet Road is $24.7M.

Long-Term Recommendations

- **Install Left-Turn Lanes**
  - Burnet Road at Braker Lane (NB and SB dual left-turn)
  - Burnet Road at Kramer Lane (NB and SB dual left-turn)
- **Conduct Intersection Reconfiguration and Pocket Park**
  - Burnet Road at McNeil Drive

The estimated total cost for long-term improvements for Burnet Road is $52.4M.

North Lamar Boulevard

Short-Term Recommendations

- **Crossings with Pedestrian Hybrid Beacons**
  - Install pedestrian hybrid beacons at the crosswalks in 9 locations
- **Bus Stop Relocation**
  - Move one stop closer to signalized intersection
- **Install Right-Turn lanes**
  - North Lamar Boulevard at Braker Lane (NB, SB and WB)
- **Install Dual Left-Turn lanes**
  - North Lamar Boulevard at Rundberg Lane (EB and WB)
  - North Lamar Boulevard at Braker Lane (EB and WB)
  - North Lamar Boulevard at Parmer Lane (All Approaches)

The estimated total cost for short-term improvements for North Lamar Boulevard is $22.6M.

Long-Term Recommendations

- **Install Right-Turn Lanes**
  - North Lamar Boulevard at Braker Lane (NB and SB)
- **Implement Walnut Creek Bridge Reconstruction**

The estimated total cost for long-term improvements for North Lamar Boulevard is $53.2M.

COST

The total cost for short-term improvements for both corridors is $47.3M, and the total cost for long-term improvements for both corridors is $105.6M.

Project Cost Summary

Corridor	Short Term	Long Term	Ultimate Cost
Burnet Road	24,639,000	52,355,000	76,994,000
North Lamar Boulevard	22,575,000	53,192,000	75,767,000
Total Cost	47,214,000	105,547,000	152,761,000

FUNDING

The improvements recommended by this program could be funded by several funding sources, including Bonds, State Infrastructure Bank, Traffic Impact Fees, the Livable Communities Initiative, and others.

CORRIDOR JURISDICTION

TxDOT currently has jurisdiction of Burnet Road from US 183 to MoPac and the entirety of the North Lamar corridor. The TxDOT Commission adopted rules that includes context sensitive design concepts to be included as part of project development. Significant revisions were made to the Project Development Process Manual (6-09) in order to reflect the department's goal of incorporating local and regional planning and policy goals into the project development process as early as possible. These revisions also aim to create ongoing local partnership feedback mechanisms to achieve sustainable urban contexts around roadways and transportation networks for appropriate corridors or projects.

This corridor development program implemented a multi-disciplinary approach to the project development process that is consistent with the TxDOT Project Development Process Manual. However, the roads that TxDOT owns are subject to the design criteria provided in the TxDOT Roadway Design Manual, 2010. The vision for the Burnet and North Lamar corridors expressed by members of the public and through the neighborhood and master plans that have been developed is generally for these corridors to be complete streets that add to the unique character of the area. TxDOT's highway design standards are focused primarily on maximizing vehicular throughput on the corridors and are not necessarily consistent with the community vision for these two corridors. For example, the design criteria for recommended improvements such as lane widths and sidewalks are consistent with City of Austin standards but are not what TxDOT would permit for highways. The City of Austin should attempt to work with TxDOT to obtain a variance for the context sensitive

designs proposed in this plan. If a design variance is not granted by TxDOT, reconstruction of these two corridors to implement the vision will likely require the City to request that TxDOT transfer jurisdiction of the roads to the City of Austin.

NEXT STEPS

- Coordinate with TxDOT to obtain a variance for the context sensitive designs or request that TxDOT transfer the jurisdiction of the roads.
- Using 2012 bond funding implement the short-term improvements, especially those of pilot projects and/or those related to safety, to make an exemplary case for implementing future projects.
- Look for additional funding sources.
- Implement the long-term improvements when further funding becomes available.

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CHAPTER 1
INTRODUCTION

The purpose of this corridor development program was to develop a set of recommendations to improve safety, mobility, and quality of life along Burnet Road (from Koenig Lane to MoPac) and North Lamar Boulevard (from US 183 to IH 35). Recommendations were developed with a focus on all road users, including pedestrians, cyclists, and transit users, not just motorists. These recommendations have been depicted conceptually in Chapter 6 to illustrate and demonstrate feasibility; prioritized as short-term, or long-term depending on their potential implementation time frame; and evaluated to determine projected benefits and estimated costs for construction.

PROJECT BACKGROUND

On November 2, 2010, Austin voters approved a $90 million bond package to fund a variety of road, bicycle, pedestrian and transit improvements throughout Austin. As part of the Austin Strategic Mobility Plan (ASMP), city staff and the ASMP team worked with community members and groups, partner agencies and a council-appointed Citizens Task Force to develop the 2010 Mobility Bond program which was passed by voters on November 2, 2010. The roadway corridors included in that package were as follows:

- Airport Boulevard (North Lamar Boulevard to US 183)
- East Riverside Drive (IH 35 to US 71)
- FM 969 (US 183 to Webberville)
- North Lamar Boulevard (US 183 to IH 35)
- Burnet Road (Koenig Lane to MoPac)

The five corridor programs are being conducted concurrently by the City of Austin. This report focuses on the Burnet and North Lamar corridors. Of the five corridors, each is unique in terms of existing roadway, development, and demographic conditions, as well as the future vision for the corridor. For example, both Burnet Road and North Lamar Boulevard have unique drainage issues. Their street storm drain systems consist of various combinations of open ditches and some curb and gutter. This results in issues for pedestrian access in most areas, as well as some flooding. Based on 2010 census data, up to 13 percent of households on these corridors do not have access to a vehicle, compared to five percent of Austin households that don't have a vehicle. Therefore, a significant portion of residents along Burnet and North Lamar corridors are dependent on other transportation modes such walking, biking, and transit.

PROJECT PARTNERS

The City of Austin is funding the North Lamar/Burnet Corridor Program and is partnering with other agencies such as the Texas Department of Transportation (TxDOT), Capital Area Metropolitan Planning Organization (CAMPO), Travis County, and Capital Metropolitan Transportation Authority (CapMetro). Another important project partner is the general public.

PROJECT AREA

The Burnet Road corridor is the 6-mile north-south section from Koenig Lane to Loop 1 (MoPac), as shown in **Figure 1-1**. The section between Koenig Lane and US 183 is currently maintained by the City of Austin. The section north of US 183 up to MoPac is owned and maintained by TxDOT. Major signalized cross-streets include Koenig Lane, West Anderson Lane, Steck Avenue, US 183, West Braker Lane, and Kramer Lane. Major parallel roadways include Metric Boulevard on the east and MoPac on the west. Right-of-way (ROW) along this corridor varies from 110 feet to 135 feet. There are a variety of land uses along the corridor including residential, institutional, commercial, and industrial. Major developments include the Northcross Mall on the south end of the corridor, and the Domain and IBM office complex on the north end.

The North Lamar Boulevard corridor is the 6-mile north-south section from US 183 to IH 35, as shown in **Figure 1-1**. Within the study area, this roadway is owned and maintained in its entirety by the Texas Department of Transportation (TxDOT). Major signalized cross-streets include US 183, Payton Gin Road, Rundberg Lane, Kramer Lane, West Braker Lane, and Parmer Lane. Major parallel roadways include IH 35 on the east and Metric Boulevard on the west. ROW along the North Lamar Boulevard corridor generally varies from 95 feet to 120 feet. There are a variety of land uses along the corridor including residential, institutional, commercial, and industrial. Major developments include H-E-B and the Chinatown Shopping Center on the south end of the corridor, and the Wal-Mart and Lowe's on the north end.

BOTH CORRIDORS CURRENTLY HAVE MOBILITY AND SAFETY ISSUES THAT IMPACT MOTORISTS, PEDESTRIANS, BICYCLISTS, AND TRANSIT USERS. AS THE CORRIDORS CONTINUE TO GROW AND DEVELOPMENT INTENSITY INCREASES, MULTIMODAL SOLUTIONS WILL BE NEEDED TO PRESERVE AND IMPROVE QUALITY OF LIFE.

PROJECT PROCESS

The North Lamar/Burnet Corridor Program was initiated in late June 2011, as illustrated in **Figure 1-2**. Data was collected in order to assess current corridor conditions and needs, as well as the outcomes and recommendations identified in some previous studies. The first set of public meetings were held in September 2011 to introduce the project to the public and obtain input on corridor issues and concerns. Stakeholder and Business Open House meetings were then held in October 2011 to obtain input from smaller groups of corridor users and public agencies. Existing conditions analysis and public input were incorporated into the development and evaluation of improvements designed to mitigate identified mobility issues. The second public meeting was held in January 2012 to obtain feedback on proposed recommendations.

Figure 1-1 : Project Area

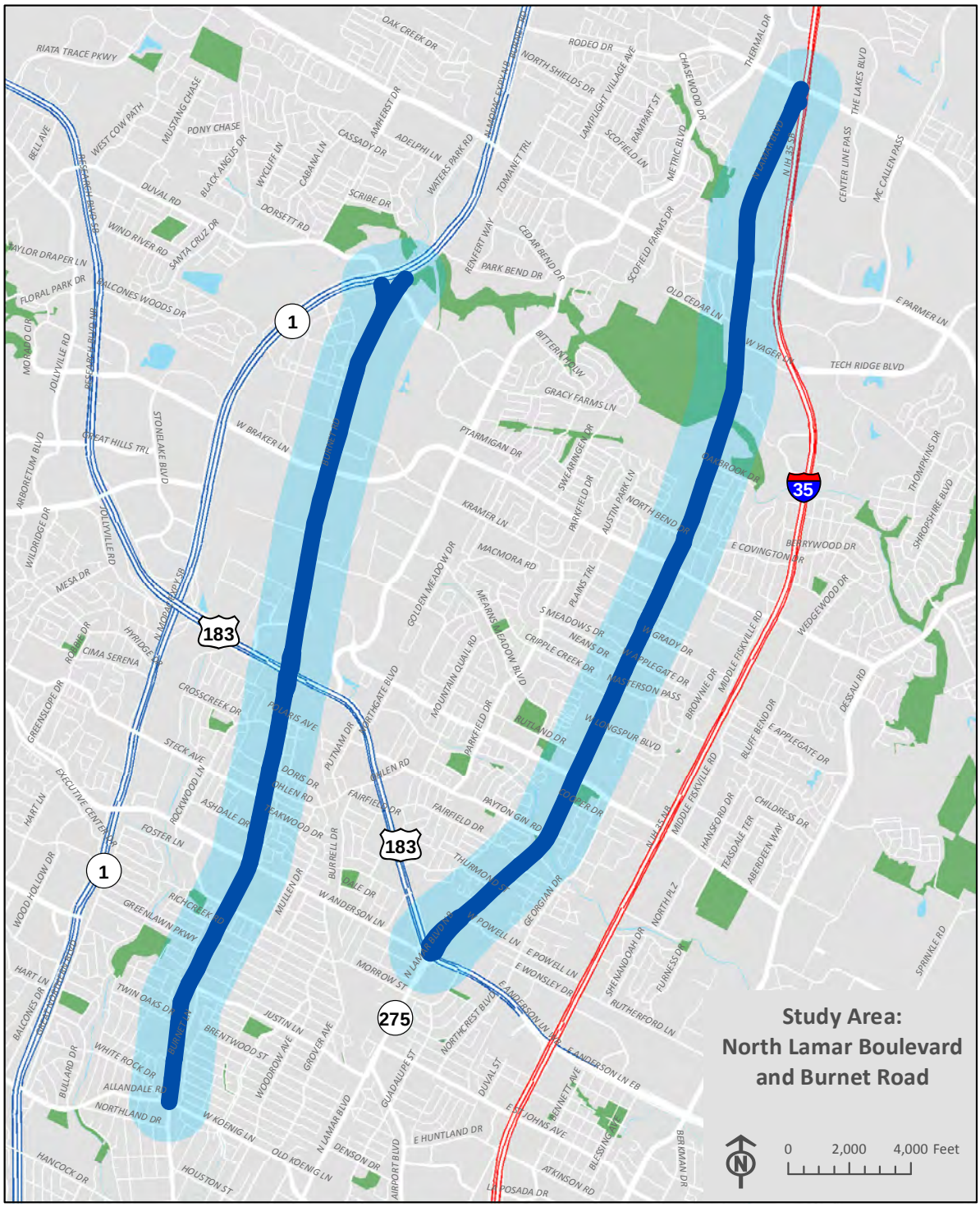
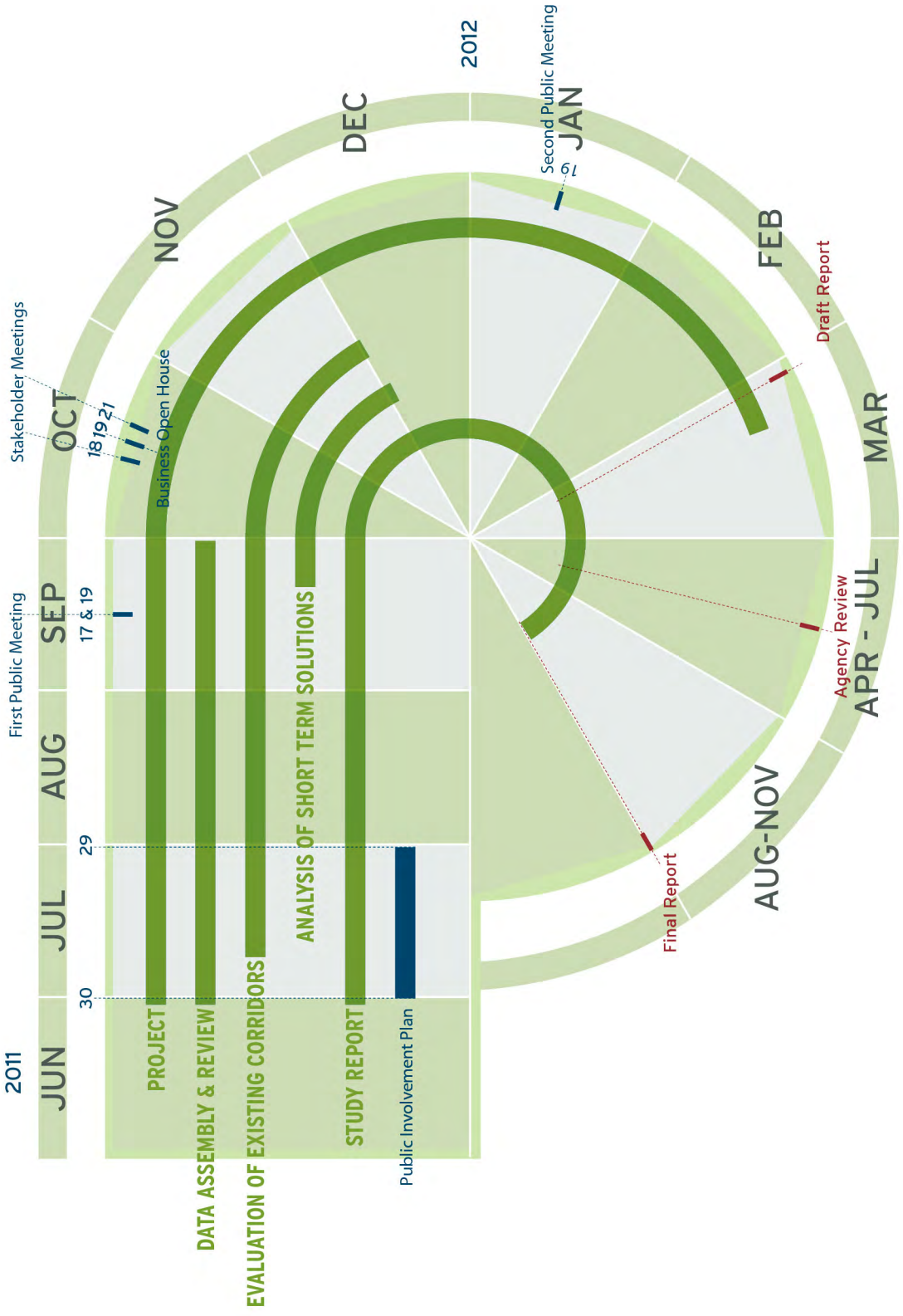


Figure 1-2: Project Schedule



CHAPTER 2
PUBLIC INVOLVEMENT

As part of its commitment to an open, inclusive, proactive and transparent program of public engagement, the City of Austin Transportation Department developed a framework for a Public Involvement Plan (PIP) for the four concurrent corridor development programs along Airport Boulevard, East Riverside Drive, FM 969, and North Lamar/Burnet. This plan formed the basis for a common approach while allowing for specific needs and conditions on each corridor to be addressed through refining the strategies and tactics identified. The goals for community engagement identified in the PIP are as follows:

- **Goal 1:** Provide users, neighbors, property owners, and other direct stakeholders served by each corridor with sufficient opportunity to contribute their input to the City of Austin and its consultants to inform and help shape the results of each Transportation Corridor Development Program.
- **Goal 2:** Ensure that traditionally underrepresented and hard-to-reach populations and groups have sufficient opportunity to engage in the corridor development program process.
- **Goal 3:** Maintain communications and outreach between the City and its consultants and other transportation providers, government agencies, and key public and private partners.
- **Goal 4:** Communicate and enable opportunities for input for interested citizens throughout the City through appropriate engagement and outreach strategies.

The complete PIP along with objectives associated with these identified goals is included in **Appendix C.**

AS PART OF THE COMMUNITY OUTREACH EFFORT, THE CITY OF AUSTIN HAS MADE INFORMATION RESOURCES AND AERIAL PHOTOS AVAILABLE VIA THE PROJECT WEBSITE -

HTTP://WWW.AUSTIN-MOBILITY.COM/CORRIDOR-DEVELOPMENT-NORTH-LAMAR-BOULEVARD-BURNET-ROAD

STAKEHOLDER MEETINGS

One of the strategies utilized for community outreach was the specific targeting of defined groups of stakeholders. The targeted groups represent people who have an intimate knowledge of the corridor and the issues affecting the area. Stakeholder groups identified for the Burnet and North Lamar corridors included:

- Homeowner/neighborhood associations
- Schools
- Faith-based organizations
- Businesses and chambers of commerce
- Taxi companies
- Utility and cable providers
- Emergency providers
- Bicycle organizations
- State, county, and local agencies

Four stakeholder meetings were held in October 2011 and attracted a total of 38 attendees. Details of the various target groups, meeting dates, and number of attendees at specific meetings are provided in **Table 2-1**.

Table 2-1: Stakeholder Meetings

DATE	LOCATION	TIME	INVITEES	ATTENDANCE
Tuesday, October 18, 2011	North Village Branch Public Library, 2505 Steck Avenue	1:30 p.m. - 3:30 p.m.	• City of Austin Emergency Providers (Emergency Medical Technicians, Fire Department, Police Department, Rapid Response Teams) • TxDOT (Advanced Project Development, Planning) • Car-2-Go • Austin Cab Company • Capital Metropolitan Transportation Authority (Capital Metro) • Travis County Precincts 1&2 (Commissioner, Constable) • CAMPO • City of Austin (Transportation Department) • Yellow Cab • Austin ISD Transportation	14
		4:00 p.m. - 6:00 p.m.	• City of Austin (Austin Water Utility, Public Works, Solid Waste Services, Water Shed Protection) • Time Warner Cable • Grande Communications • AT&T • Austin Energy • Texas Gas Service	6
		6:30 p.m. - 8:30 p.m.	• Austin ISD (Barrington ES, Brentwood ES, Burnet MS, Cook ES, Lanier HS, McBee ES, Pillow ES, Lucy Read Pre-K, Walnut Creek ES, Wooldrige ES) • Pflugerville ISD (Connally HS) • Homeowner/Neighborhood Associations (Allandale, Crestview, North Creek/ Georgian Acres, Gracywoods, Highland, Mockingbird Hill, North Park Estates, North Shoal Creek, Walnut Creek, Wooten, North Austin Civic Association, Sustainable Neighborhoods of Central North Austin) • Charter Schools (Brentwood Christian School, NYOS Charter School) • City of Austin (Neighborhood Planning)	11
Friday, October 21, 2011	North Village Branch Public Library, 2505 Steck Lane	1:00 p.m. - 3:00 p.m.	• City of Austin (Art in Public Places, Parks and Recreation, ADA/Sidewalk Coordinator) • Faith-based Organizations (Austin Area Interreligious Ministries, Churches, Synagogues, Temples) • ADAPT (Disability community) • Austin Bicycle Coalition (and other bicycle entities)	7

BUSINESS OPEN HOUSE

A business open house was held on October 20, 2011 from 10:30 a.m. to 3:00 p.m. The meeting was open to members of the general public but was held during the day to encourage participation by businesses served by the corridor.

GENERAL PUBLIC MEETINGS

Two rounds of public meetings were held as part of the North Lamar/Burnet Corridor Program. The first series of meetings were held in September 2011. The purpose of those meetings was to introduce the project, present an overview of existing corridor conditions, and obtain input from the public on corridor issues and concerns. The input obtained from the public, along with technical analysis was utilized in developing safety and mobility improvements for both corridors. The second meeting was held in January 2012 to present draft recommendations for the corridor and obtain public input and comment.

FIRST PUBLIC MEETINGS

The first round of public meetings was comprised of two meetings conducted in an open house/workshop format. One meeting was conducted for each corridor at a location along or very close to the corridor. The meeting for the Burnet corridor was attended by 64 people; 18 people attended the North Lamar corridor meeting. Participants included local residents, neighborhood groups, and commuters, some of whom attended in multiple capacities. Meeting participants were able to write comments about specific issues and locations using roll plots of aerial exhibits at a 1:50 scale.

During the workshop part of the meeting, attendees were guided through a series of questions designed to more specifically pinpoint problem areas and issues along the corridor, and the priority that members of the public associated with the various types of potential improvements. Meeting participants were given a questionnaire which they could fill out during the workshop or at some other time during the meeting. A total of 37 completed questionnaires were turned in at the Burnet Road meeting; 14 completed questionnaires were received at the North Lamar Boulevard meeting. The majority of issues identified by participants at both meetings pertained to the poor conditions for pedestrians, bicyclists, and transit users along both corridors. Top priorities identified by the public for Burnet were sidewalk improvements, better bicycle connectivity, and improved transit operations. Top priorities for North Lamar included sidewalk improvements, pedestrian street crossing improvements, and improved bicycle connectivity. Public input obtained via the large scale exhibits, questionnaires, and emails were compiled into a public meeting report that is a separate document.

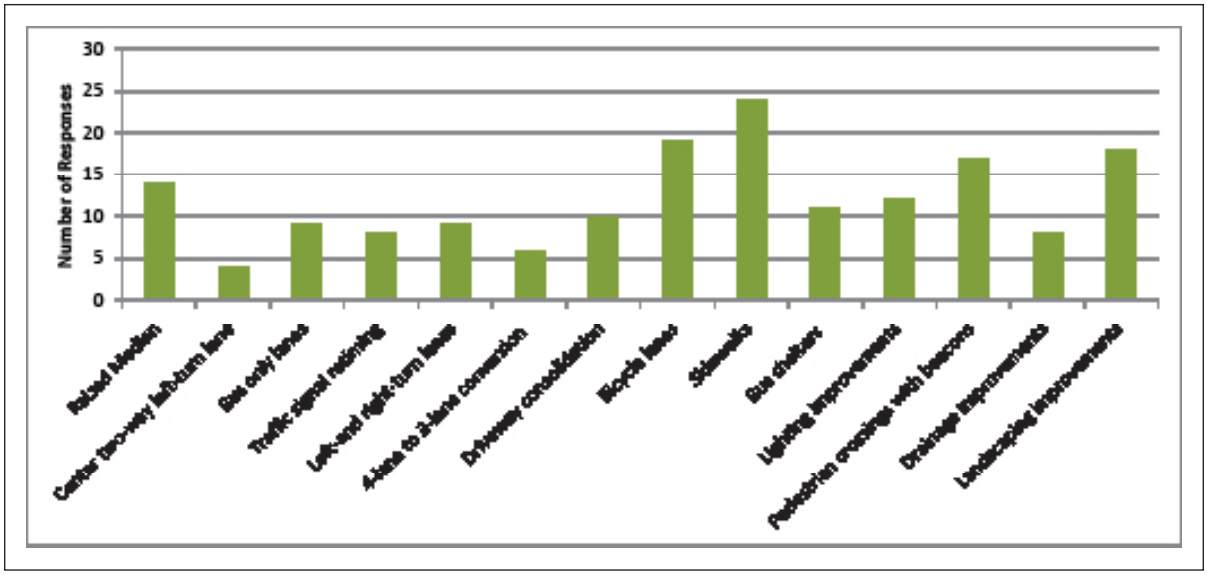
SECOND PUBLIC MEETING

The second public meeting was a joint meeting for both corridors and was attended by 62 people. It was conducted as an Open House from 10 a.m. to 7 p.m. allowing flexibility throughout the day for interested citizens to view exhibits, review proposed improvements, and ask questions of the consultant team. Large aerial maps at 1:100 scale with conceptual representations of short-term and

long-term improvements were available for members of the public to review and comment on. Details of improvements were also summarized on boards mounted on easels. Boards included graphical illustrations of short- and long-term cross-sections, design concepts, and locations for proposed bus shelters and two-stage turn queue boxes for bicycles.

Meeting participants were given questionnaires to solicit written comments on the recommended improvements. A total of 30 completed questionnaires were received. The questionnaires generally expressed support for the set of short-term and long-term improvements presented to the public. **Table 2-1** summarizes the questionnaire responses received at the second public meeting. Of the improvements presented at that meeting, those with the highest support were sidewalks, bicycle lanes, pedestrian crossings with beacons, raised medians and landscaping improvements.

Table 2-1: Summary of Public Response to Improvements

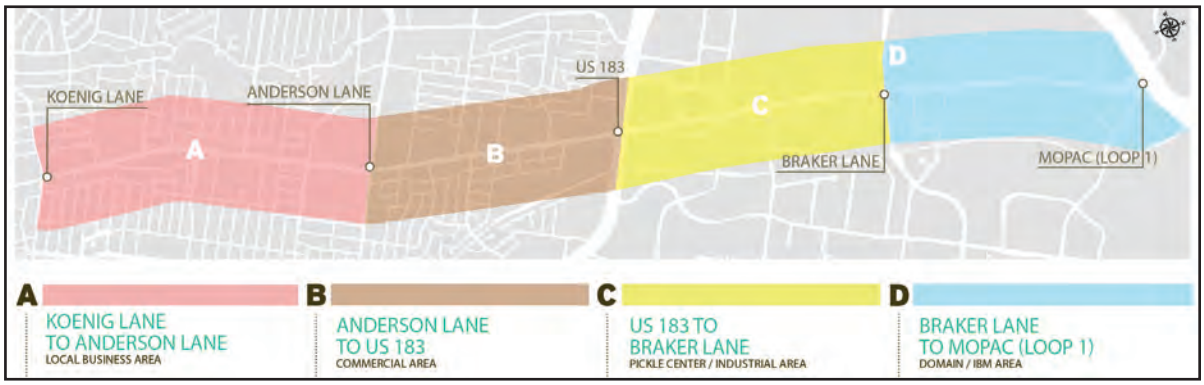


CHAPTER 3
EXISTING CORRIDOR CONDITIONS

This chapter describes existing land use and transportation conditions along the Burnet and North Lamar corridors. This includes an evaluation of each roadway, the nature of the adjacent development, the interaction between the roadway and development, and the resulting traffic operating conditions. An overall evaluation of existing conditions helps identify and quantify deficiencies, constraints, and issues, thereby laying the ground work for the development of appropriate investments to improve mobility, improve safety, and ensure the long-term sustainability of each corridor.

BURNET ROAD

The overall character of Burnet Road has changed over time as Austin has grown northward. It has also been affected by its proximity to MoPac. The east-west arterials and highways that intersect it have acted as northern development boundaries and, over time, created distinct character zones between them.



BURNET ROAD: KOENIG LANE TO ANDERSON LANE - LOCAL BUSINESS AREA

The character of this area is dominated by strip commercial development along the corridor in front of 1960s single-family residential subdivisions. Long-standing, independent local businesses continue to serve the surrounding neighborhoods. The predominant retail use is home furnishings which serves not only these neighborhoods, but also the entire city of Austin. The south anchor is the H-E-B Grocery in the southwest corner of Burnet Road and Koenig Lane.

Entrance to Northcross Mall.

The northern anchor of the area is the newly redeveloped Northcross Mall located west of Burnet on West Anderson

Lane. Along the corridor, one-story strip buildings are placed in a linear arrangement and set back from the road to provide visible parking spaces. While some sites are aggregated into shopping centers, many are afforded individual access points and parking areas. Unique local businesses include The Light Bulb Shop, The Frisco restaurant, and Top Notch Hamburgers. Two auto dealers, Charles Maund Volkswagen and Roger Beasley Mazda, have significant frontage along the corridor.

Neighborhoods abutting this portion of the corridor are Allandale to the west and Brentwood and Crestview to the east. Civic uses include Lamar Middle School, Brentwood Elementary School, and Northwest Metropolitan Park.

BURNET ROAD: ANDERSON LANE TO US 183 (RESEARCH BOULEVARD) - COMMERCIAL AREA

The character of this area is dominated by a continuation of strip commercial development found along the southernmost portion of the corridor. Single-family residential uses are bounded by commercial uses. The predominant retail use is auto-oriented businesses, including a newly redesigned Infiniti dealership. The southern anchor is West Anderson Plaza in the northwest corner of Burnet Road and West Anderson Lane. Northern anchors are The Crossroads shopping center to the west and the Furniture Row shopping center to the east.

Entrance to West Anderson Plaza

Along the corridor one-story strip buildings are placed in a linear arrangement and set back from the road to provide visible parking areas. Some developments are aggregated into shopping centers, but most have individual access points and parking areas.

Neighborhoods abutting this portion of the corridor are North Shoal Creek to the west and Wooten to the east. Civic uses include Burnet Middle School, Pillow Elementary School, and North Village Branch Library.

BURNET ROAD: US 183 (RESEARCH BOULEVARD) TO BRAKER LANE - PICKLE RESEARCH / INDUSTRIAL AREA

The character of Burnet Road changes dramatically north of US 183 into light industrial, research, and business parks. This area is included in the North Burnet Gateway Master Plan and is slated for redevelopment with intensive mixed uses.

The University of Texas J.J. Pickle Research Center is the predominant large parcel land owner with a campus-style development of individual buildings surrounded by green space. Site amenities such as parking, drainage, open areas, signage, and lighting are shared. Other large parcel land owners include the recently developed Waterford Centre business park to the west, with the Coca-Cola / Dr. Pepper distribution center as a major anchor.

J J Pickle Research Center

McNeil Road running at an angle to the east offers access to multiple business / industrial parks. A large tract with an abandoned warehouse offers opportunity for redevelopment.

Civic uses to the east include the new Capital Metro service center with consolidated office functions and Travis County Precinct Two office buildings.

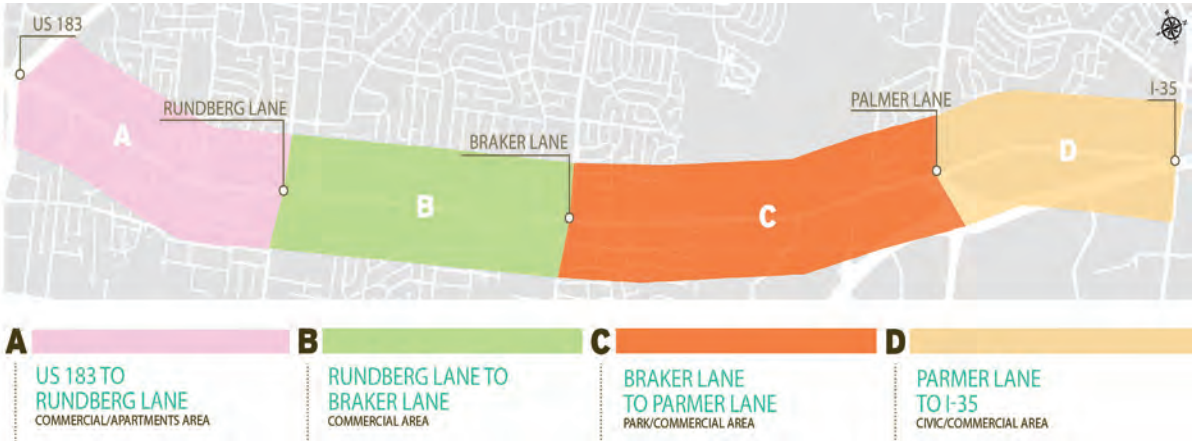
BURNET ROAD: BRAKER LANE TO MOPAC (LOOP 1) - DOMAIN/IBM AREA

The character of Burnet Road changes again north of Braker Lane, with the presence of two large parcel landowners – the new Domain lifestyle center and the 1980s IBM office complex. This area is also included in the North Burnet Gateway Master Plan and is slated for development with intensive mixed-use. This stretch of Burnet Road has a codified set of regulations (Regulating Plan for the North Burnet/Gateway Zoning District) designating required streetscaping and building placement standards for all new development.

The Domain is modeled as a traditional town center that provides a range of uses in a dense pedestrian-oriented setting. Mixed uses include three-story buildings with high-end retail on the ground floor and apartments or offices above. Small family-friendly plazas provide opportunity for public gathering. Undeveloped outparcels and pad sites line the Burnet corridor and are ripe for development. The IBM office complex is a series of six-story office buildings set far back from the road in a campus-like setting with structured parking and recreational facilities. Large parcels of undeveloped land to the east offer opportunity for development.

Civic uses include the Capital Metro Kramer Station on the Red Line to the east on Kramer Lane. Nearby uses include the City of Austin's Watershed Protection service center and Austin Energy service center. According to the master plan, these sites are recommended to be moved to allow mixed-use development near the train station. Residential uses beyond the Domain are limited to three-story apartment complexes at the far north end near MoPac.

Similar to Burnet Road, the overall character of North Lamar Boulevard has followed the growth of Austin northward. Over time, the east-west arterials and highways formed the northern development boundaries and created distinctive character areas between them.



NORTH LAMAR BOULEVARD: US 183 TO RUNDBERG LANE - COMMERCIAL / APARTMENTS AREA

The character of the southernmost area is dominated by a mix of large apartment complexes and strip commercial development. To the west a single-family neighborhood backs up to the apartments. To the east another single-family neighborhood is nested between North Lamar Boulevard and the large scale commercial development along IH 35.

Commercial uses range from rental storage units, multi-tenant strip centers, to independent businesses with individual access points and visible parking. In addition, this southern zone is the home of a large number of automobile-oriented businesses.

Residential uses include the lower portion of the North Austin Civic Association on the west and Georgian Acres on the east. Multifamily units include large tracts of two-story HUD Housing.

Other notable uses include Capital Metro's North Lamar Transit Center and park and ride lot at the northwest corner of North Lamar and US 183, Lanier High School, Barrington Elementary, Fiskville Pocket Park, and Little Walnut Creek Branch Library.

Entrance to Northwend Shopping Center

NORTH LAMAR BOULEVARD: RUNDBERG LANE TO BRAKER LANE - COMMERCIAL AREA

The Chinatown Shopping Center

The character of this area is dominated by strip commercial and individual fast food franchises. To the west a significant area of apartment complexes separates single-family neighborhoods from the commercial corridor on North Lamar Boulevard. To the east, a small single-family neighborhood is nested between apartment complexes.

The commercial strip is anchored on the south by the H-E-B grocery which is located at the northwest corner of Rundberg Lane and North Lamar Boulevard experiences high transit activity at the nearby bus stop. To the north the Chinatown Shopping Center with the expansive My Thanh grocery provides a focal point for Asian-American culture. The center has a large surface parking area surrounded by unique one-story shops and restaurants. The North Austin Events Center is a large under-utilized parcel of land that provides opportunity for redevelopment.

Neighborhoods include the northern portion of the North Austin Civic Association on the west and North Lamar and Mockingbird Hill on the east. Civic uses include Quail Creek Park, Walnut Creek Elementary, McBee Elementary, and the future North Austin Recreation Center.

NORTH LAMAR BOULEVARD: BRAKER LANE TO PARMER LANE - PARK / COMMERCIAL AREA

Walnut Creek Metropolitan Park

North Lamar Boulevard's character north of Braker Lane gradually shifts from strip commercial to the large parcel of the Walnut Creek Metropolitan Park on the west and large undeveloped sites on the east. Two single-family subdivisions abut the corridor with other single-family neighborhoods behind. A new vacant four-story office building at the northern end stands as an apparent victim of the recent economic recession.

Plans call for a continuous Walnut Creek Trail linking the park to other greenbelts to the west and ending north of Burnet Road and MoPac. The city of Austin's Parks Department is seeking to acquire more land to the east so that the trail and park system may be extended under IH 35.

Neighborhoods include North Park Estates and Gracy Woods to the west and Walnut Creek to the east. Civic uses include the Travis County Fire and EMS Station #4, the North Austin Muslim Center, Brentwood Christian School, and the NYOS Charter School.

THE WALNUT CREEK METROPOLITAN PARK PROVIDES A MAJOR AMENITY IN THIS AREA WITH A SERIES OF LOOPED HIKE AND BICYCLE TRAILS

NORTH LAMAR BOULEVARD: PARMER LANE TO IH 35 - CIVIC / COMMERCIAL AREA

Newly developed three-story apartments

The northernmost character area is dominated by large tracts of land of varying uses. North Lamar Boulevard angles to the east and terminates at Howard Lane and the southbound IH 35 frontage road, which creates a smaller area than the other ones along the corridor.

Between IH 35 and Lamar Boulevard are new large one-story commercial centers anchored by Wal-Mart, Lowe's, and CarMax. On the west, the large tract occupied by Connally High School provides a major destination. Large undeveloped parcels are ripe for new construction, while civic uses include the Wells Creek Greenbelt and Scofield Farms Park. On the west, newly developed three-story apartment complexes in front of single-family neighborhoods round out the mix of uses.

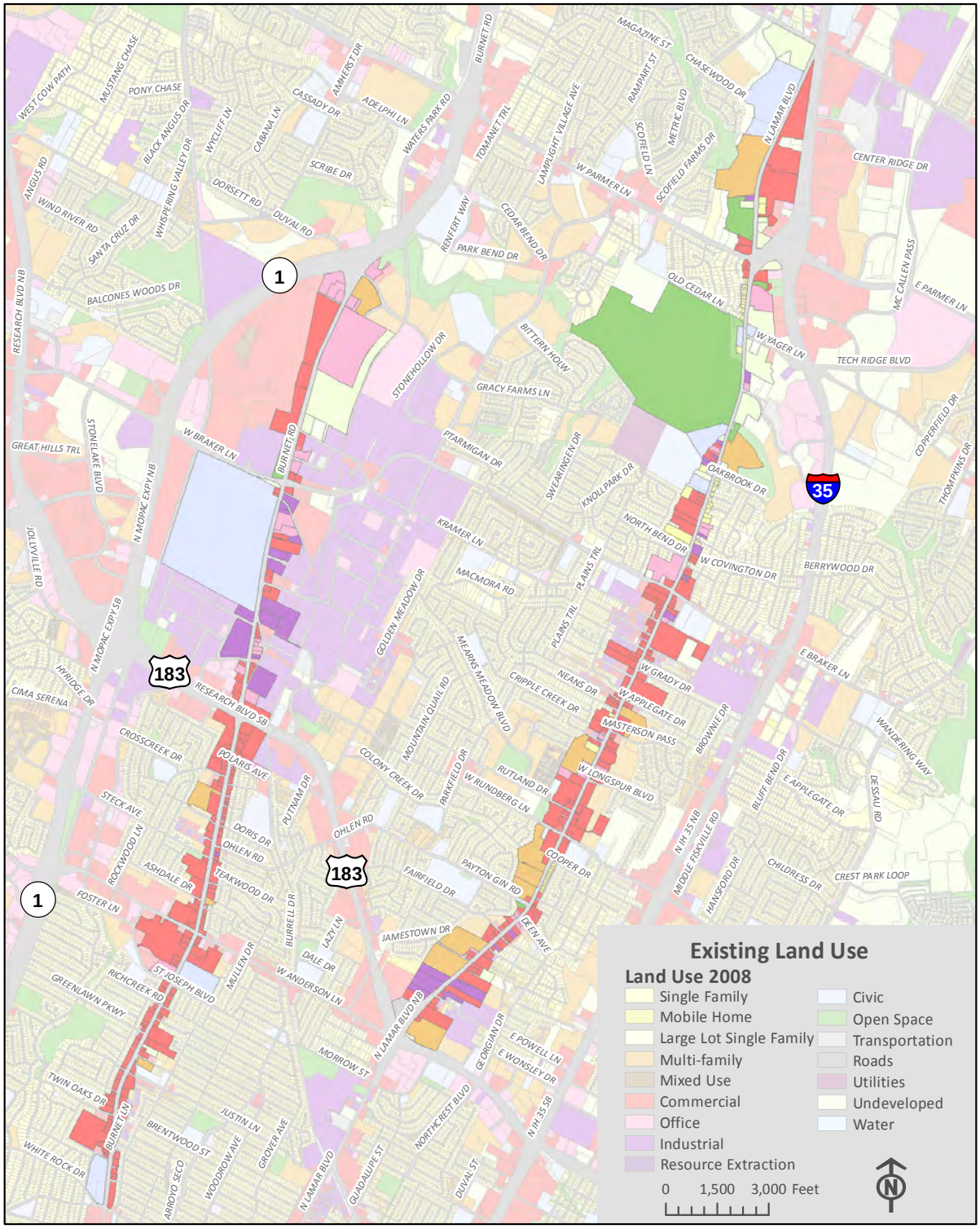
The **Figure 3-1** depicts the existing land use along the study corridors and **Table 3-1** presents the list of major developments along the corridor.

Table 3-1: Major Development

CHARACTER AREA	Burnet Road	
	WEST	EAST
Koenig Lane to Anderson Lane	Northcross Mall and Lamar Middle School	St. Louis Catholic Church, Centennial Center, Northwest Center
Anderson Lane to US 183 (Research Boulevard)	Crossroads, Woodchase, Apartments, The Spectrum, and West Anderson Plaza	Furniture Row North Austin Business Center
US 183 (Research Boulevard) to Braker Lane	JJ Pickle Research Center and Coca Cola Bottling Plant	Travis County Precinct 2 offices Colonade
Braker Lane to MoPac/ Gracy Farms Road	The Domain	Verano Luxury Apartment Homes, IBM, and Austin Commons

CHARACTER AREA	North Lamar Boulevard	
	WEST	EAST
US 183 to Rundberg Lane	North Gate Plaza, The Villas of Quail Creek, Aubry Hills, and Widflower Apartments, Lanier Village, The Malibu Apartments, Thurmond Heights Apartments, and Lamar Transit Center	Santa Maria Village
Rundberg Lane to Braker Lane	Cooper Mill Apartment Homes, North Park Center, and H-E-B	Chinatown Center, Sterling Village Apartments, and Northwest Shopping Center
Braker Lane to Parmer Lane	North Austin Muslim Community Center	On the Green Apartments
Parmer Lane to Howard Lane	Connally High School and The Villages of Sage Creek	Wal-Mart Lowe's

Figure 3-1: Existing Land Use



Source: City of Austin Watershed Protection and Development Review Department, 200905e., WPDR_ADMIN.land_use_2006: City fo Austin Watershed Protection and Development Review Department, Austin TX

ROADWAY CHARACTERISTICS

The name Burnet Road derives from the fact that the road once formed part of a highway between Austin and Burnet. The section of Burnet Road from US 183 to MoPac is currently maintained by TXDOT and was originally known as FM 1325. As of 1995, FM 1325 is officially designated as Urban Road 1325 (UR 1325). The rest of the study area road segment is maintained by City of Austin. The 5-mile corridor development segment has 22 signalized intersections and 18 unsignalized intersections.

The segment of North Lamar Boulevard in the project area is currently owned and maintained by TxDOT and it is also known as Loop 275. The 6-mile segment starts at the interchange of US 183 and proceeds north passing FM 734 and terminating at the south bound frontage road of IH 35, just south of Howard Lane. The corridor development segment has 17 signalized intersections and 27 unsignalized intersections.

BURNET ROAD AND NORTH LAMAR BOULEVARD ARE TWO VERY IMPORTANT NORTH/SOUTH ARTERIALS ON THE NORTH SIDE OF AUSTIN. WITHIN THE PROJECT AREA THE BURNET CORRIDOR IS 5.3 MILES LONG, AND THE NORTH LAMAR CORRIDOR IS 5.9 MILES LONG.

Table 3-2 summarizes the roadway characteristics of these two corridors.

Table 3-2 Roadway Characteristics

Burnet ROAD	LENGTH (MI)	LANES	SPEED LIMIT	RIGHT-OF-WAY
Koenig Lane to Anderson Lane	1.6	5	40 mph	120 ft to 135 ft
Anderson Lane to US 183 (Research Boulevard)	1.2	5	40 mph – 45 mph	120 ft to 135 ft
US 183 (Research Boulevard) to Braker Lane	1.3	5	45 mph	120 ft to 130 ft
Braker Lane to MoPac	1.2	5	45 mph	110 ft to 130 ft
NORTH LAMAR BOULEVARD	**LENGTH (MI)**	**LANES**	**SPEED LIMIT**	**RIGHT-OF-WAY**
US 183 (Research Boulevard) to Rundberg Lane	1.4	5	45 mph	100 ft to 130 ft
Rundberg Lane to Braker Lane	1.4	5	45 mph – 50 mph	95 ft to 110 ft
Braker Lane to Parmer Lane	1.9	5	50 mph	95 ft to 135 ft
Parmer Lane to Howard Lane	1.2	4	50 mph	100 ft to 125 ft

BURNET ROAD

Burnet Road is served by a number of Capital Metropolitan Transportation Authority (CapMetro) bus routes. However, within the project area, no single route traverses the entire corridor. The busiest transit stop along the corridor is located on the northbound side of Burnet Road at the northern property line of St. Louis Catholic church, across the street from Panda Express. This bus stop is served by Routes 3, 5, 19, 323 and 325. **Table 3-3** and **Figure 3-2** summarize the transit characteristics of Burnet Road.

Table 3-3: Burnet Road Transit Characteristics

AREA	ROUTES	SOUTHBOUND BUS STOPS	NORTHBOUND BUS STOPS
Koenig Lane to Anderson Lane	3 5, 19, 323,325 (Anderson Ln to Northcross Dr) 151	6 stops	7 stops
		(1 without a bench; 5 with unsheltered bench)	(1 without a bench; 2 with unsheltered bench; 4 with sheltered bench)
Anderson Lane to US 183	3 325 (Ohlen Rd to Anderson Ln)	5 stops	6 stops
		(1 without a bench; 2 with unsheltered bench; 2 with sheltered bench)	(1 without a bench; 4 with unsheltered bench; 1 with sheltered bench)
US 183 to Braker Lane	3 240 (Braker Ln to Rutland Dr) 466 (Braker Ln to Read Granberry)	5 stops	4 stops
		(3 without a bench; 1 with unsheltered bench; 1 with sheltered bench)	(All without a bench)
Braker Lane to MoPac	240 392 (Kramer Ln to Braker Ln) 466	2 stops	3 stops
		(All without a bench)	(All without a bench)

Figure 3-2: Burnet Road Transit Characteristics

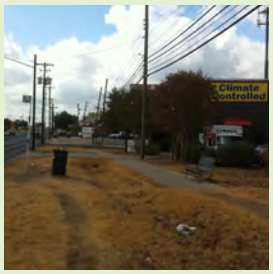
Without a Bench

Northbound at Kramer

Northbound south of Rutland Dr

With an Unsheltered Bench

Southbound at Crossroads Plaza

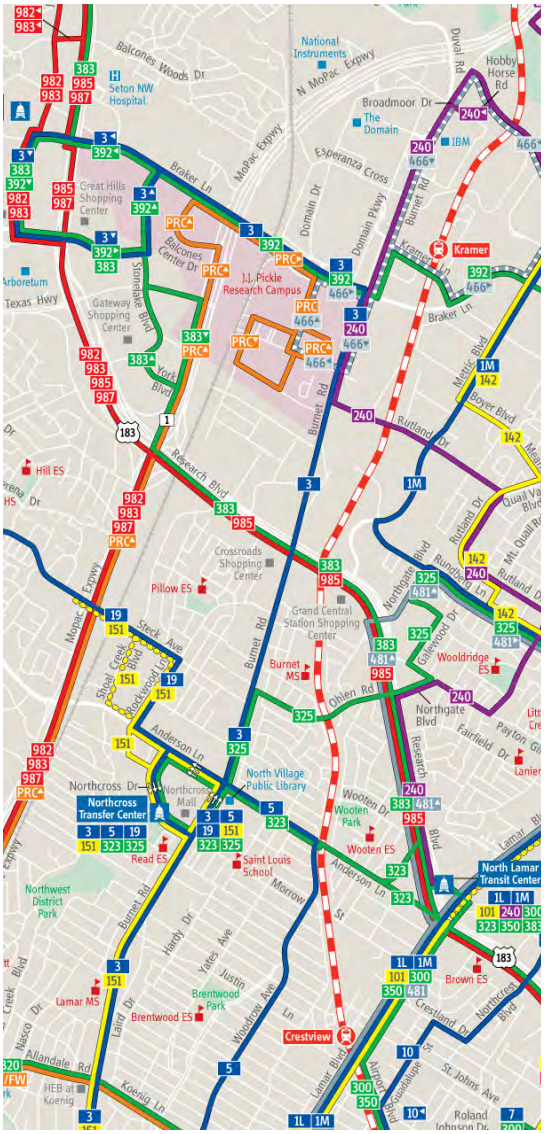


Southbound north of Justin Ln

With a Sheltered Bench

Northbound north of Romeria

Northbound at St. Louis Church



NORTH LAMAR BOULEVARD

Transit service along North Lamar Boulevard is more heavily utilized than along Burnet Road. This higher level of transit activity can be attributed to a higher transit-dependent population along the corridor, as well as the fact that, unlike Burnet Road, North Lamar Boulevard has a route that serves the entire corridor. Other than the North Lamar Transfer Center, the busiest transit stops along the corridor are the ones located at Rundberg Lane. These stops are served by Routes 1L and 101. **Table 3-4** and **Figure 3-3** summarizes the transit characteristics of North Lamar Boulevard.

Table 3-4: North Lamar Boulevard Transit Characteristics

AREA	ROUTES	SOUTHBOUND BUS STOPS	NORTHBOUND BUS STOPS
US 183 to Rundberg Lane	1L 1M 101 485 240,300,323,350,383 (At North Lamar Transit Center)	7 stops	8 stops
		(1 without a bench; 6 with sheltered bench)	(4 without a bench; 1 with unsheltered bench; 3 with sheltered bench)
Rundberg Lane to Braker Lane	1L 101 485	5 stops	6 stops
		(4 with unsheltered bench; 1 with sheltered bench)	(All without a bench)
Braker Lane to Parmer Lane	1L 101	6 stops	5 stops
		(4 without a bench; 2 with unsheltered bench)	(4 without a bench; 1 with an unsheltered bench)
Parmer Lane to Howard Lane	1L 101	2 stops	0 stops
		(All without a bench)	

Figure 3-3: North Lamar Boulevard Transit Characteristics

Without a Bench

Northbound
South of Meadowlark St

Southbound south
of Walnut Creek Park
entrance

With an Unsheltered Bench

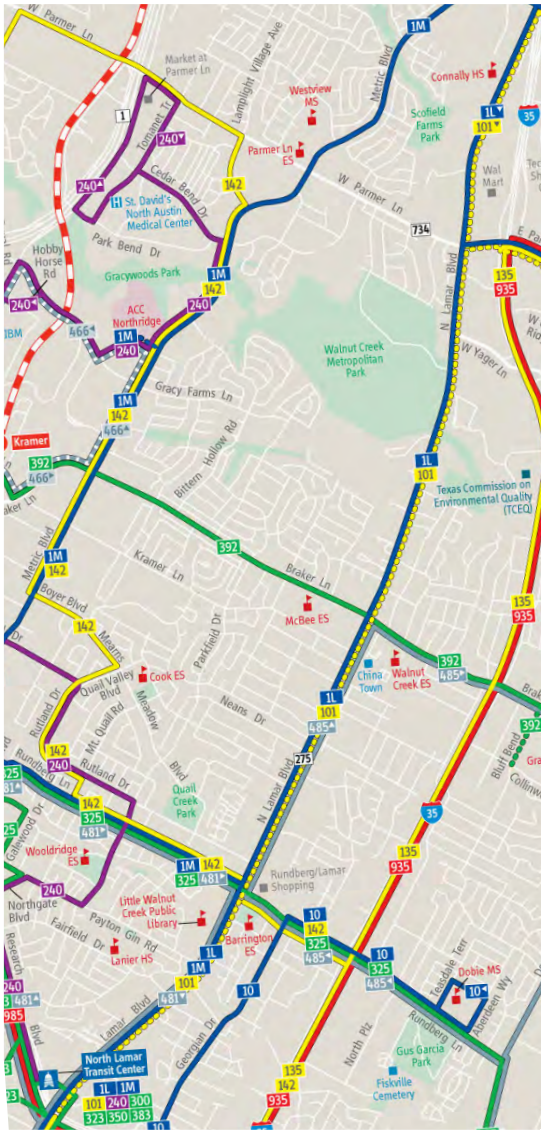
Northbound
south of Indian Mound

Southbound
north of Indian Mound

With a Sheltered Bench

Southbound
at North Gate Plaza

Southbound
at H-E-B



PEDESTRIAN CONDITIONS

A significant number of households along both corridors do not own an automobile, leaving residents dependent on transit, walking, and bicycling for transportation. While the average percentage of households without a car citywide in Austin is 5%, in the project area as many as 13% of households do not have a car. Both Burnet and North Lamar corridors have inadequate facilities for bicyclists and pedestrians. The conditions described in the following sections are common to both corridors. The majority of the existing sidewalk is in good condition, with ADA-compliant curb ramps and accessible signals at intersections. However, some locations have broken sidewalk that cannot be safely navigated by disabled people. Most sections of sidewalk were built before ADA standards were in place, and are too narrow or have excessive cross slope or steep curb ramps. Approximately half of both corridors need sidewalks. **Tables 3-5** and **3-6** summarize pedestrian facilities located on each side of the road.

Table 3-5: Burnet Road Existing Pedestrian Traveled Way By Direction

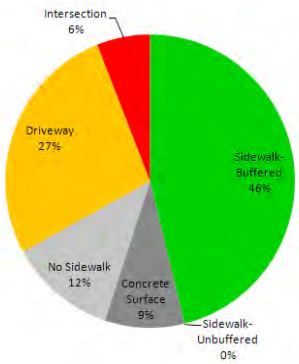
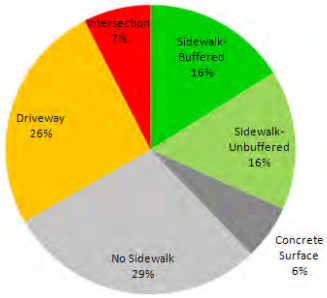
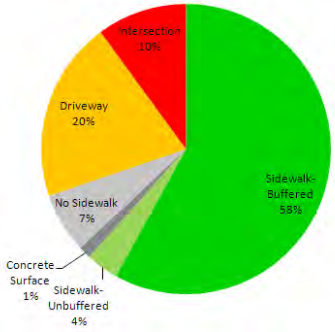
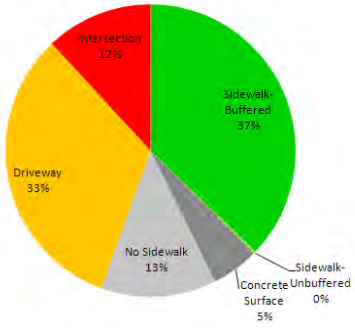
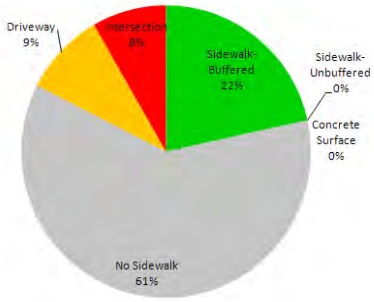
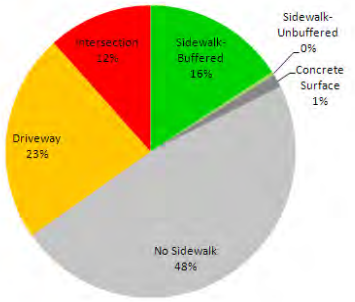
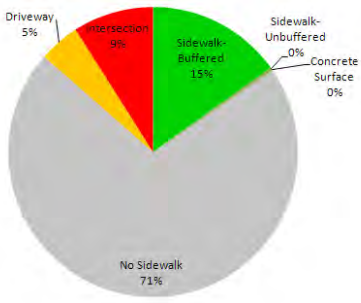
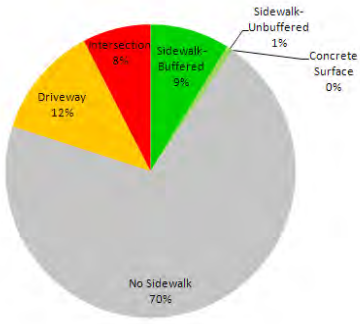
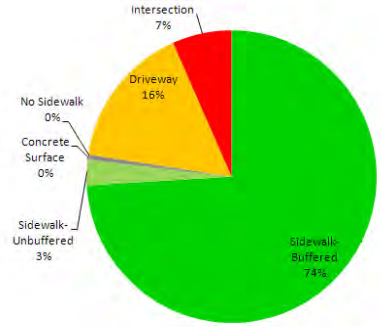
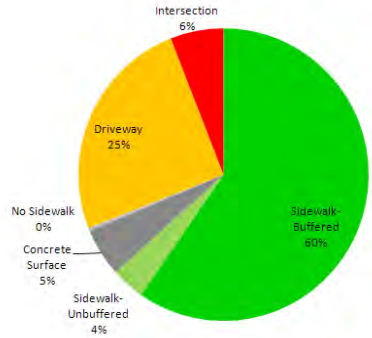
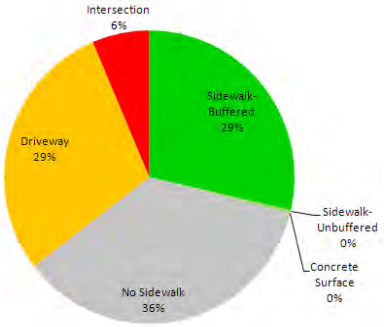
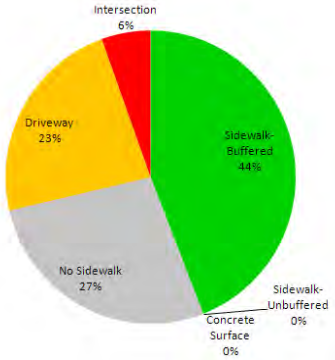
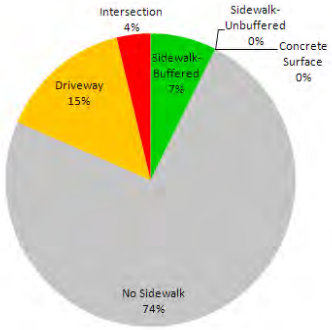
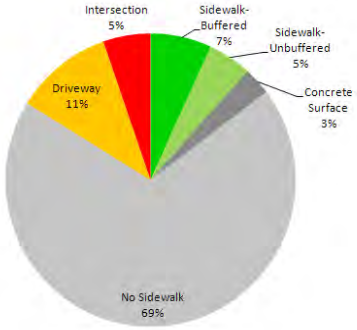
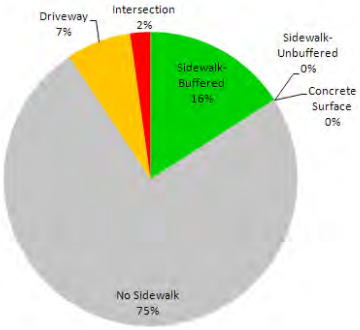
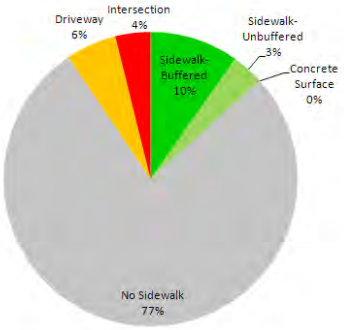
Segment	Southbound (Percent Linear Feet)	Northbound (Percent Linear Feet)
Koenig Lane to Anderson Lane		
Anderson Lane to US 183		
US 183 to Braker Lane		
Braker Lane to MoPac		

Table 3-6: North Lamar Boulevard Existing Pedestrian Traveled Way By Direction

Segment	Southbound (Percent Linear Feet)	Northbound (Percent Linear Feet)
US 183 to Rundberg Lane		
Rundberg Lane to Braker Lane		
Braker Lane to Parmer Lane		
Parmer Lane to Howard Lane		

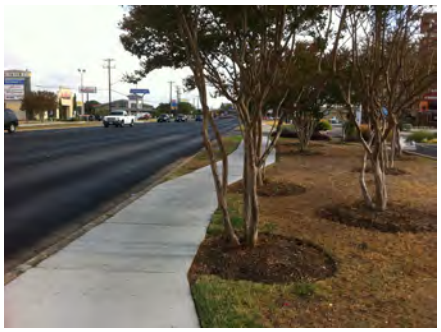
Missing Sidewalks: Both corridors have significant sections of missing sidewalks, ranging from a few feet to over a quarter-mile long. Many locations with missing sidewalk show evidence of demand with visible worn paths or "desire lines" along the side of the road.

Missing Sidewalk

Ditches: In many sections of both corridors, sidewalks cannot currently be built due to drainage ditches adjacent to the roadway. Desire lines indicate that people are walking in these locations anyway, with paths worn along the sides and sometimes even down in the ditch. Some of these ditches are over four feet deep, placing pedestrians at risk of tripping or falling. In one location on Burnet Road, a ditch stands between the bus stop adjacent to the roadway and the pedestrian path at the edge of the right of way, forcing people to walk through the ditch to reach the bus stop.

Ditches

Numerous and Hazardous Driveways: Perhaps due to relaxed development and land use standards in place during the times these two corridors were built out, many commercial sections have numerous driveways of which most are wide, creating conflict points and uncomfortable conditions for a person attempting to walk down the sidewalk. Several properties have more than one driveway ingress/egress, and many have sight distance issues with exiting motorists unable to see a person on the sidewalk due to landscaping, signs and other obstacles.



Sidewalks

According to one Pedestrian Level-of-Service performance measure from Transportation Research Record 1538, there should be no more than 22 driveways or side streets per mile. As shown in **Tables 3-7** and **3-8**, most of both corridors have a higher driveway density.

Driveways present a major conflict point between vehicles and pedestrians. There are high volume pedestrian areas where motorists exiting a business block the sidewalk while waiting to enter traffic, or simply dash across the sidewalk without stopping at all. This creates hazardous conditions for pedestrians. The higher the driveway density, the more hazardous conditions are for pedestrians.

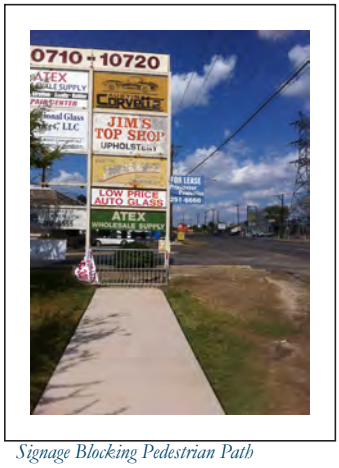
Table 3-7: Burnet Road Driveway Density

		Southbound		Northbound	
SEGMENT	LENGTH	DRIVEWAYS	DRIVEWAY/MI	DRIVEWAYS	DRIVEWAY/MI
Koenig Lane to Anderson Lane	1.6	65	40.6	61	38.1
Anderson Lane to US 183	1.2	33	27.5	64	53.3
US 183 to Braker Lane	1.3	14	10.8	30	23.1
Braker Lane to MoPac	1.2	3	2.5	12	10.0

Table 3-8: North Lamar Boulevard Driveway Density

		Southbound		Northbound	
SEGMENT	LENGTH	DRIVEWAYS	DRIVEWAY/MI	DRIVEWAYS	DRIVEWAY/MI
US 183 to Rundberg Lane	1.4	34	24.3	55	39.3
Rundberg Lane to Braker Lane	1.4	53	37.9	37	26.4
Braker Lane to Parmer Lane	1.9	37	19.5	21	11.1
Parmer Lane to Howard Lane	1.2	10	8.3	6	5.0

Encroachments into Pedestrian Area: There are many locations along both corridors where sidewalk encroachments such as signage, landscaping and parked cars block the pedestrian pathway. Several automotive businesses have customer cars parked in the sidewalk area, or encroach into the area by not providing wheel stops for head-in parking spaces. A strip center on Burnet Road constructed its sign directly on top of the sidewalk area, resulting in the area sidewalk appearing to lead a pedestrian into collision with the sign. There is a need for enforcement efforts to tackle these encroachment issues.



Signage Blocking Pedestrian Path


Parked Cars Blocking Pedestrian Path


Landscaping Blocking Pedestrian Path

Distance Between Signalized Intersections: Although both Burnet Road and North Lamar Boulevard are high-volume, multi-lane arterial corridors, some segments of both roads effectively function as local streets, with nearby residents walking along them to access businesses and transit. Therefore, pedestrians along these corridors need to cross at frequent intervals to reach transit stops, grocery stores, medical facilities, and their homes. According to best pedestrian design practices, 500 feet is considered to be the maximum distance that a pedestrian will divert their direct path to reach a signalized crossing. Along both corridors, most signalized intersections are located from 1,000 feet apart to over one half-mile. Currently the only protected pedestrian crossing opportunities are provided at signalized intersections. Due to these conditions there is a high incidence of pedestrians crossing the road at random areas along the corridors. **Tables 3-9** and **3-10** summarize the distance between signalized intersections along the two corridors.

Unprotected Pedestrian Crossing the Road

Unprotected Pedestrians Crossing the Road

Two particular sections of North Lamar have had long-standing acute safety concerns and a preponderance of unprotected pedestrian crossings. These two sections, from Thurmond to Fairfield and from Rundberg to Longspur, were the subject of a detailed study in 2009 led by the Texas Department of Transportation and the Texas Transportation Institute. The 2009 TTI study data and field observation point to the dire need for multiple pedestrian safety measures and access improvements including sidewalks, mid-block crossings, median refuge islands, intersection safety mitigation measures, bus shelters, driveway reduction and safety treatments, and others.

Table 3-9: Burnet Road Distance between Intersections

Area	Distance Between Signalized Intersection
Koenig Lane to Anderson Lane	800 feet to 2,600 feet
Anderson Lane to US 183	400 feet to 2,200 feet
US 183 to Braker Lane	1,000 feet to 2,900 feet
Braker Lane to MoPac	1,100 feet to 1,600 feet

Table 3-10: North Lamar Boulevard Distance between Intersections

Area	Distance Between Signalized Intersection
US 183 to Rundberg Lane	2,200 feet to 3,000 feet
Rundberg Lane to Braker Lane	800 feet to 2,200 feet
Braker Lane to Parmer Lane	1,000 feet to 6,600 feet
Parmer Lane to Howard Lane	6,500 feet

Vehicle Speeds: Relatively high vehicle speeds greatly decrease the comfort of pedestrians and can be a major deterrent to pedestrian trips. Based on research, speeds over 35 mph have been found to greatly decrease the comfort of pedestrians and negatively impact pedestrian level-of-service[1]. The effect of high speeds is exacerbated if there is no tree strip or other buffer between the sidewalk and travel lanes. Several segments along the Burnet and North Lamar corridors have posted speed limits that exceed 35 mph, most notably North Lamar between Braker Lane and Parmer Lane near Walnut Creek Metropolitan Park. The speed limits for both corridors were presented in **Table 3-2**.

Turning Conflicts at Intersections: Intersections with high volumes of turning vehicles provide increased opportunities for potential pedestrian-vehicular conflict, which increases the level of discomfort for pedestrians. An example of this condition is at the intersection of North Lamar and Rundberg, which has high level of pedestrian activity, and high turning traffic volumes.

Lack of Shade and Shelter: In the same way a motorist enjoys protection from cold, rain, heat, and humidity in their vehicle, pedestrians also desire shade and shelter. Trees and structures that offer shade to pedestrians make walking for transportation more manageable and provide greater equity. Many parts of both the Burnet and North Lamar corridors have no shade trees, and three-quarters of Capital Metro bus stops lack shelters and benches.

Lack of Shelter at Bus Stop

1 *Bicycle and Pedestrian Level of Service Measures and Standards for Congestion Management Systems,* Transportation Research Record 1538, Transportation Research Board, 1996

BICYCLING CONDITIONS

Burnet Road and North Lamar Boulevard are high-speed/high-volume roadways with no bicycle infrastructure. Only the most confident cyclists who have no other alternative route use these corridors for bicycling. The vision of the current Austin Bicycle Master Plan is to transform the city into a world-class bicycling city. The Plan targets improving bicycle facilities, promoting bicycle use, improving the safety of cyclists, and ensuring the funding for the implementation of tasks. To contribute to Austin's citywide bicycle mode share goals and to make Burnet and North Lamar accessible to cyclists, cohesive, safe and comfortable bicycle facilities must be provided. Through providing designated right-of-ways to bike, bicycle facilities not only give cyclists more confidence in choosing to bike but also make cyclists more visible and their movements more predictable to vehicle drivers.

While the current Austin Bicycle Master Plan references the Federal Highway Administration's Guide for the Development of Bicycle Facilities in support of many of its recommendations, several new and more advanced designs have been developed by the industry in the three years since the master plan was adopted. These designs, such as separated cycle tracks, specialized intersection markings and signalization have been successful in increasing bicycle ridership in many European and North American cities.

For example, research conducted by Portland State University, the Portland Bureau of Transportation and others led to the categorization of bicyclist comfort levels currently used in the City of Portland (Oregon) Bicycle Master Plan. According to that criteria, the general population is divided into four categories based on their propensity to use a bicycle as a mode of transportation. Those categories are:

- Strong and Fearless -- less than 1% of people
- Enthused and Confident -- 7% of people
- Interested but Concerned -- 60% of people
- No Way No How -- 32% of people

Based on these criteria and current conditions along Burnet Road and North Lamar Boulevard, less than 1% of users (Strong and Fearless) would ride a bicycle. To capture the largest potential group (Interested but Concerned), bicycle facilities with physical separation will be necessary.

LANDSCAPING

There is little landscaping along the Burnet and North Lamar corridors. The abutting public and private property is largely lined with grass and intermittent large trees. **Tables 3-11** and **3-12** present a summary of the landscaping features along each corridor.

Table 3-11: Burnet Road Landscape Characteristics

BURNET ROAD

AREA	SOUTHBOUND		NORTHBOUND	
	PRIVATE/PUBLIC PROPERTY	RIGHT OF WAY	PRIVATE/PUBLIC PROPERTY	RIGHT OF WAY
Koenig Lane to Anderson Lane	Grass w/intermittent trees	Grass only	Grass only	Grass w/ large trees adjacent to shopping centers/church. Predominantly grass w/ intermittent trees/shrubs
Anderson Lane to US 183	Grass w/ intermittent large trees	Grass only	Grass only	Grass w/ large trees adjacent to shopping centers. Predominantly grass w/ intermittent trees/shrubs
US 183 to Braker Lane	Grass w/intermittent large trees	Open grass channel	Open grass channel	Grass w/intermittent large trees
Braker Lane to MoPac	Row of large trees Braker to Kramer	Open grass channel	Open grass channel	Grass w/ large trees @ IBM

Table 3-12: North Lamar Boulevard Landscaping Characteristics

AREA	SOUTHBOUND		NORTHBOUND	
	PRIVATE/PUBLIC PROPERTY	RIGHT OF WAY	PRIVATE/PUBLIC PROPERTY	RIGHT OF WAY
US 183 to Rundberg Lane	Trees adjacent to Transit Center parking lot Grass w/ intermittent trees /shrubs Pocket park @ Payton Gin Rd.	Grass only	Grass only	Grass w/intermittent trees and shrubs Creek with native trees and shrubs
Rundberg Lane to Braker Lane	Grass w/ intermittent trees shrubs	Grass only Rutland to Braker– open grass channel	Rundberg to Rutland - open concrete channel Rutland to Braker– open grass channel Median on Longspur – grass Median on Masterson Pass – trees/grass	Grass w/intermittent trees and shrubs Events Center – Grass w/ shrubs adj. to parking lot Chinatown Center– Grass/trees/shrubs adjacent to parking lot
Braker Lane to Parmer Lane	Grass w/ intermittent large trees and shrubs	Grass only Large trees @ Walnut Creek Park	Grass only Large trees @ Walnut Creek Park	Grass w/ intermittent large trees and shrubs
Parmer Lane to Howard Lane	Grass w/intermittent trees	Open grass channel	Open grass channel	Grass w/ intermittent trees

The City of Austin Drainage Criteria Manual (DCM) contains the hydrologic and hydraulic criteria for the assessments and designs of street storm drainage systems. To analyze the existing drainage condition, drainage areas contributing runoff to the roadway rights-of-ways and contributing runoff directly onto the pavements along the roadways were delineated. Drainage area delineations were based upon the City of Austin's effective HEC-HMS model basin delineations, the City's GIS topographic mapping, and drainage boundary area investigations. Due to the conceptual nature of this corridor development program, the capacities of the existing street storm drainage system ditches, within the rights-of-ways, were compared to peak 25-year and 100-year flows at full ditch flow depths. Detailed hydrologic and hydraulic analyses should be performed of the existing street storm drainage systems in subsequent design phase of recommended improvements, taking into account allowable street flooding in the 100-year flood event. The following is a summary of the existing drainage conditions and issues along the Burnet and North Lamar corridors. Details are provided in **Appendix D**.

BURNET ROAD

Approximately 180 acres of drainage area contribute runoff directly to the pavement and another 720 acres of drainage area contribute runoff to existing storm drain systems within the roadway right-of-way. Shoal Creek, Little Walnut Creek, and Walnut Creek are the watersheds along Burnet Road. The street storm drain systems along Burnet Road consist of various combinations of open shoulder ditches ("bar ditches"), curb & gutter, and storm drain conduits with scattered curb inlets that discharge into the storm drain conduits.

Approximately 26 percent of the Burnet corridor (7,185 feet) has an open ditch on at least one side. In general, the existing shoulder ditches appear to have adequate capacity up to the 100-year storm runoff event. However the capacities of the ditches could be reduced by the driveway culverts. There are storm drain conduits parallel to the roadway, but these are mostly not continuous. Storm drain conduits are concentrated south of US 183 to Koenig Lane and immediately north of US 183 to McNeil Road.

There are no stormwater detention structures or stormwater quality treatment structures within the Burnet Road right-of-way. The City owns scattered regional stormwater detention and stormwater water quality structures within the watersheds to which some of the Burnet Road storm drain systems discharge. The detention and water quality treatment capacities of the existing regional structures to treat Burnet Road runoff are currently unknown. A total replacement of existing storm drain conduits is needed in order to connect to storm drain collector conduits that will replace the existing open shoulder ditches and isolated storm drain conduits. The new drainage system is also needed to convey off-site storm drain flows that will combine with roadway drainage flows.

NORTH LAMAR BOULEVARD

Approximately 215 acres of drainage area contribute runoff directly to the pavement along the corridor study area. Little Walnut Creek and Walnut Creek are the watersheds along North Lamar Boulevard. As is the case on Burnet Road, the street storm drain systems along North Lamar Boulevard consist of various combinations of open shoulder ditches, curb & gutter, and storm drain conduits with scattered curb inlets that discharge into the storm drain conduits.

Approximately 52 percent of the North Lamar corridor (16,100 feet) has an open ditch on at least one side. In general, the existing shoulder ditches have adequate capacity up to the 100-year storm runoff event. However, as is the case along the Burnet corridor, the capacities of the ditches could be reduced by the driveway culverts. Based on the drainage analysis of existing conditions, Walnut Creek would have a flood elevation, during the 100-year storm event, that would cross a portion of the Lamar Bridge at Walnut Creek. During the 25-year and 100-year storm events, Little Walnut Creek would overflow the Lamar Bridge at Little Walnut Creek. There are storm drain conduits running parallel to the roadway, but in most sections they are not continuous. The only continuous storm drain pipe system along North Lamar Boulevard, mapped on the City GIS database, is from Cooper Drive to Little Walnut Creek. All other curbed sections of Lamar Boulevard convey drainage along via curb & gutters to scattered storm drain curb inlets. A total replacement of existing storm drain conduits is needed in order to connect to storm drain collector segments that will replace the existing open shoulder ditches and storm drain conduits.

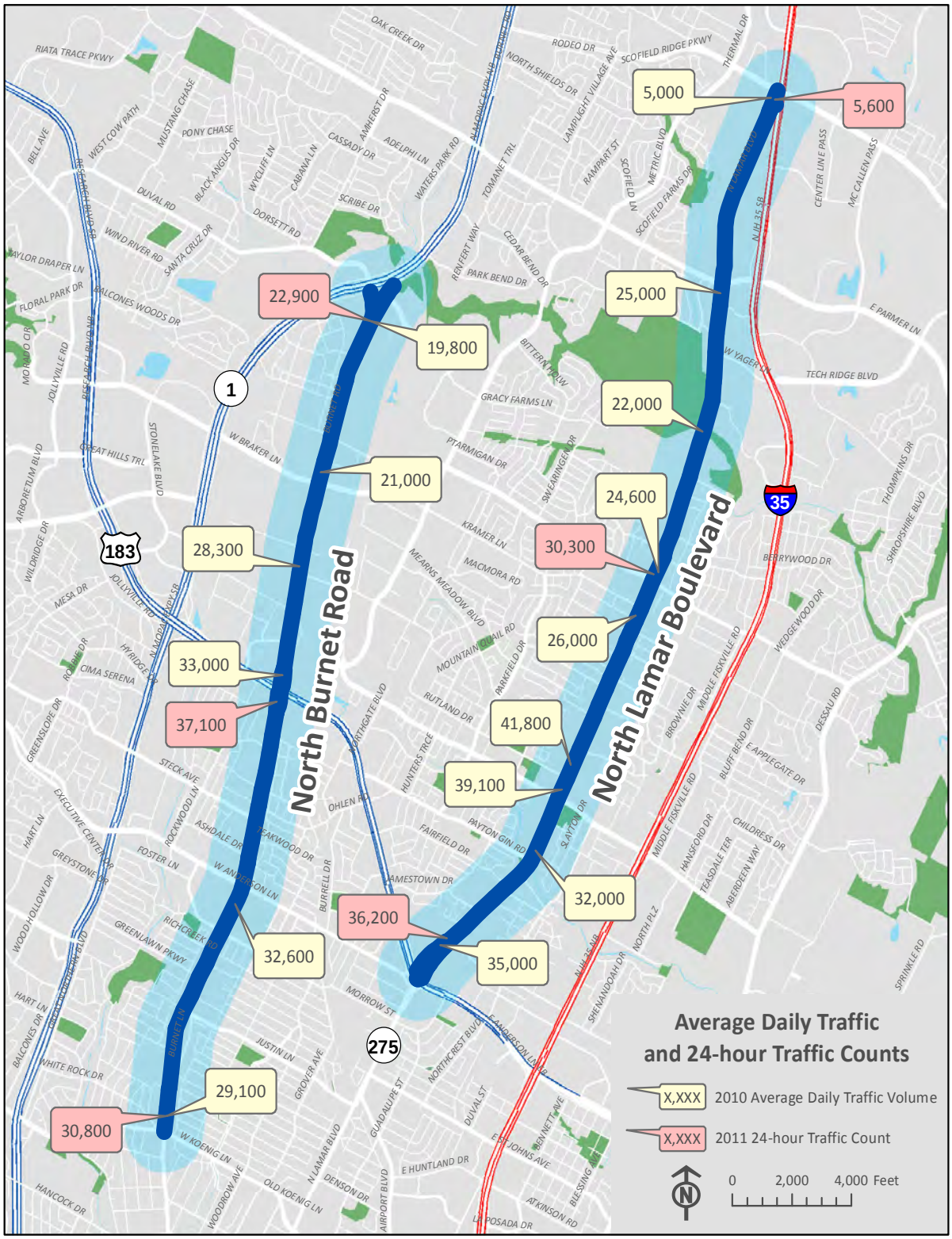
There are no stormwater detention structures or stormwater quality treatment structures within the North Lamar Boulevard right-of-way. The City owns scattered regional stormwater detention and stormwater water quality structures within the watersheds to which some of the North Lamar Boulevard storm drain systems discharge. The detention and water quality treatment capacities of the existing regional structures to treat Lamar Boulevard runoff are currently unknown.

TRAFFIC OPERATIONS ANALYSIS

TRAFFIC VOLUME

Traffic volumes along Burnet Road and North Lamar Boulevard were obtained from the Texas Department of Transportation's Transportation Planning and Programming division. Daily traffic volume and peak hour intersection turning movement counts were conducted along Burnet Road and North Lamar Boulevard in October 2011 as part of this project. Detailed traffic count data is provided in **Appendix E**. Daily traffic volume on Burnet Road ranged from a low of 23,000 vehicles per day (vpd) south of MoPac to a high of 37,000 vpd south of US 183. Daily traffic volume on North Lamar Boulevard ranges from a low of 6,000 vpd south of Howard Lane to a high of 36,000 vpd north of US 183. Vehicle classification traffic counts were also conducted along both corridors. Heavy trucks comprise eleven percent of daily traffic volumes along Burnet Road, and ten percent along North Lamar Boulevard. **Figure 3-4** summarizes both 2010 AADT and 2011 traffic counts at various locations along the two corridors.

Figure 3-4: Daily Traffic Volume



Source: CDM Smith and Texas Department of Transportation, 2011

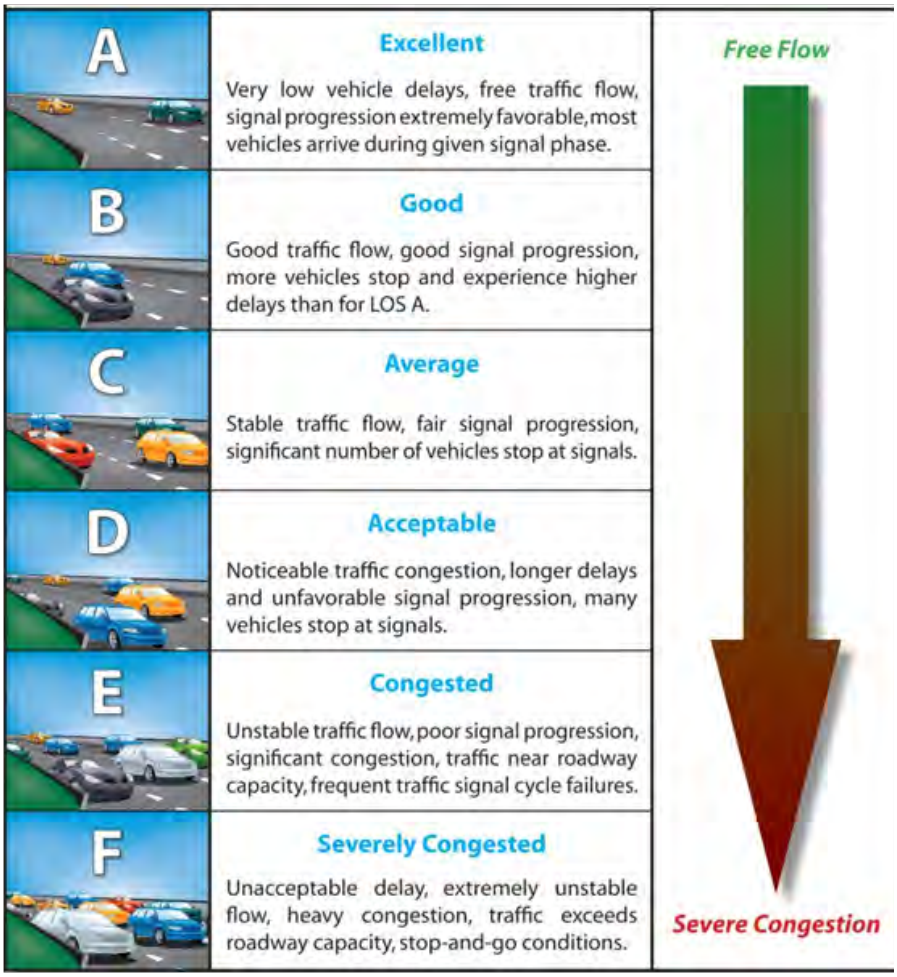
INTERSECTION LEVEL-OF-SERVICE

Level-Of-Service (LOS) is a qualitative measure of operating conditions based on control delay for intersections. LOS is given a letter designation from A to F, where LOS A represents free-flow conditions and LOS F represents heavy congestion. LOS D represents the limit of acceptable operating conditions in urban areas. In rural area, LOS C is generally regarded as the limit of acceptable operating conditions. Control delay is defined as delay associated with vehicles slowing in advance of an intersection, the time spent stopped on an intersection approach, the time spent as vehicles move up in the queue, and the time needed for vehicles to accelerate to their desired speed. Control delay criteria for the various LOS classifications are summarized in **Table 3-13**. These LOS classifications are also illustrated in **Figure 3-5**.

Table 3-13: Level-Of-Service Classifications

LEVEL OF SERVICE (LOS)	SIGNALIZED INTERSECTIONS AVERAGE CONTROL DELAY (SEC/VEH)	DESCRIPTION
A	0 - 10	Very low vehicle delays, free traffic flow, signal progression extremely favorable, most vehicles arrive during given signal phase.
B	> 10 - 20	Good traffic flow, good signal progression, more vehicles stop and experience higher delays than for LOS A.
C	> 20 - 35	Stable traffic flow, fair signal progression, significant number of vehicles stop at signals.
D	>35 - 55	Noticeable traffic congestion, longer delays and unfavorable signal progression, many vehicles stop at signals.
E	> 55 - 80	Unstable traffic flow, poor signal progression, significant congestion, traffic near roadway capacity, frequent traffic signal cycle failures.
F	> 80	Unacceptable delay, extremely unstable flow, heavy congestion, traffic exceeds roadway capacity, stop-and-go conditions.

Figure 3-5 Level-Of-Service Illustration



A traffic operations model using Synchro, a traffic analysis software tool, was developed for Burnet Road and North Lamar Boulevard to assist in the evaluation of the impacts of identified transportation improvements. Model inputs included vehicle speed profiles, vehicle types and characteristics, traffic composition, lane geometries, traffic volumes, and signal control timing plans.

Existing LOS is summarized in **Tables 3-14** and **3-15** for the signalized intersections along Burnet Road and North Lamar Boulevard. Along Burnet Road, the intersections with the worst LOS are Koenig Lane, US 183, Braker Lane, and Kramer Lane, which operate at LOS E and F during one or both peak hours. Along North Lamar Boulevard, Rundberg Lane, Braker Lane, Parmer Lane and IH 35 operate at LOS E and F during one or both peak hours.

Table 3-14: Burnet Road Existing Intersection Level-Of-Service

INTERSECTION	AM INTERSECTION LOS	PM INTERSECTION LOS
Burnet Road at Allandale Rd/Koenig Ln	E	E
Burnet Road at Romeria Dr	A	A
Burnet Road at White Horse Trail	A	A
Burnet Road at Justin Ln/Pegram Ave	A	B
Burnet Road at Greenlawn Pkwy	A	C
Burnet Road at Richcreek Rd	A	A
Burnet Road at Northcross Dr/St. Joseph Boulevard	B	B
Burnet Road at W. Anderson Ln	D	D
Burnet Road at Steck Ave	B	C
Burnet Road at Buell Ave/Ohlen Rd	B	B
Burnet Road at Rockwood Ln	A	B
Burnet Road at US 183 EB Frtg Rd	F	F
Burnet Road at US 183 WB Frtg Rd	D	F
Burnet Road at Waterford Centre Boulevard	A	A
Burnet Road at Longhorn Boulevard	A	B
Burnet Road at Rutland Dr	B	C
Burnet Road at Braker Ln	F	E
Burnet Road at Kramer Ln/Alterra Pkwy	C	F
Burnet Road at Esperanza Crossing	A	A
Burnet Road at IBM Dwy/Palm Way	A	A
Burnet Road at Gault Ln	A	C

Table 3-15: North Lamar Boulevard Existing Intersection Level-Of-Service

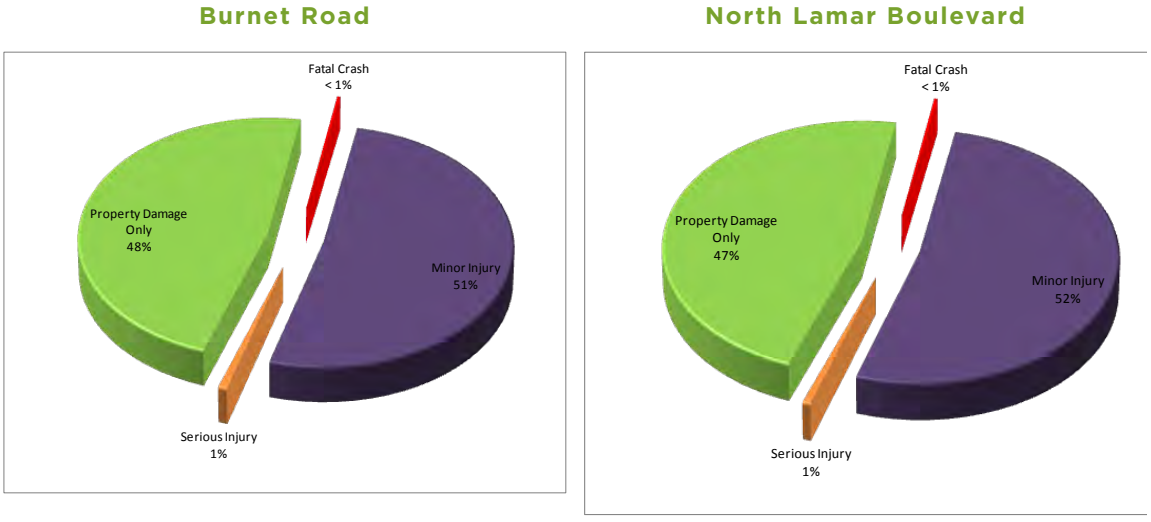
INTERSECTION	AM INTERSECTION LOS	PM INTERSECTION LOS
North Lamar Boulevard (SB) at US 183 EB Frtg Rd	D	B
North Lamar Boulevard (NB) at US 183 EB Frtg Rd	B	C
North Lamar Boulevard (NB) at US 183 WB Frtg Rd	B	B
North Lamar Boulevard (SB) at US 183 WB Frtg Rd	B	B
North Lamar Boulevard at Thurmond St	A	A
North Lamar Boulevard at Payton Gin Rd	C	B
North Lamar Boulevard at Rundberg Ln	D	F
North Lamar Boulevard at Rutland Dr	C	C
North Lamar Boulevard at W. Longspur Boulevard	B	B
North Lamar Boulevard at Masterson Pass	C	B
North Lamar Boulevard at Meadows Dr	A	A
North Lamar Boulevard at Kramer Ln	B	C
North Lamar Boulevard at Braker Ln	E	E
North Lamar Boulevard at Bend Dr	A	A
North Lamar Boulevard at Yager Ln	B	C
North Lamar Boulevard at Parmer Ln	E	F
Howard Ln at IH 35 SB Frtg Rd	F	E
Howard Ln at IH 35 NB Frtg Rd	E	E

The main purpose of a crash analysis is to identify crash patterns in order to develop suitable countermeasures to mitigate them. This analysis was based on annual crash data provided by the City of Austin along Burnet Road and North Lamar Boulevard for the 32-month period from January 2009 to August 2011. During this period, there were a total of 404 and 771 crashes along Burnet Road and North Lamar Boulevard, respectively. More than half of the total crashes on both corridors over the 32-month period resulted in some type of injury, with one fatal crash on Burnet Road and two fatalities on North Lamar Boulevard. The 31 crashes involving pedestrians along North Lamar Boulevard are more than double than the 14 pedestrian-related crashes along Burnet Road.

Crash Severity

The severity of crashes along both corridors from January 2009 to August 2011 is summarized in **Figure 3-6.** On both corridors more than half of the crashes resulted in some type of injury or death.

Figure 3-6: Crash Severity



High Frequency Crash Locations

The locations with the highest number of crashes are summarized in **Tables 3-16** and **3-17**. Along Burnet Road, Anderson Lane had 32 crashes in the 32-month analysis period. There were four locations with more than 20 crashes but less than 30 crashes. These include Northcross Street, Koenig Lane, Braker Lane and US 183. Along North Lamar Boulevard, Parmer Lane had 74 crashes, Rundberg Lane had 69 crashes, and US 183 had 57 crashes in the 32-month period. Rutland Drive had 39 crashes and Peyton Gin Road had 37 crashes. The majority of crashes along both corridors at these high crash locations were right-angle and rear-end crashes due to driver inattentiveness, intoxication, speeding, red light running, and failure to yield right-of-way at stop signs and driveways.

Based on corridor conditions, potential countermeasures for the red light running problem include traffic signal synchronization, removal of signal sight obstructions, and placement of signal ahead signs. Speeding can be mitigated by traffic-calming measures such as lane narrowing, raised medians,

and pavers. Potential countermeasures for failure to yield right-of-way at stop signs include removal of sign sight obstructions and flashing beacons where appropriate. Overall police enforcement also needs to be increased to minimize these occurrences.

Table 3-16 : Burnet Road High Crash Locations

Intersection	Pedestrian	Bicycle	Rear-End	Fixed Object	Sideswipe	Angle	Total
Burnet Road at Anderson Lane	1		7	2	1	21	32
Burnet Road at Northcross Street		1	8			15	24
Burnet Road at Koenig Lane	1		7		2	12	22
Burnet Road at Braker Lane		1	5	2	1	12	21
Burnet Road at US 183			4	1		16	21
Burnet Road at Richcreek	2		6		1	7	16
Total	4		37	5	5	83	136

Table 3-17 : North Lamar Boulevard High Crash Locations

Intersection	Pedestrian	Bicycle	Rear-End	Fixed Object	Sideswipe	Angle	Total
North Lamar Boulevard at Parmer Lane	2		22	6	4	40	74
North Lamar Boulevard at Rundberg Lane	4		27	3	4	27	65
North Lamar Boulevard at Rutland Drive	3		16	2	1	17	39
North Lamar Boulevard at Payton Gin Road	3		14	3	3	14	37
North Lamar Boulevard at US 183			2	1		54	57
North Lamar Boulevard at Braker Lane	1		8		1	11	21
North Lamar Boulevard at Kramer Lane			6		0	13	19
North Lamar Boulevard at Thurmond Street		1	6	1	2	4	14
North Lamar Boulevard at Powell Lane		1	1		2	12	16
Total	13	2	102	16	17	192	342

Crash Rates

The number of crashes along a given segment of roadway is not in and of itself indicative of a crash problem. Rather, the number of crashes per the amount of travel along a roadway, (i.e., the crash rate) provides a better means to compare the safety of various roadway segments. Crash rates are influenced by number of factors including roadway type, weather conditions and driver behavior. Crash rates were calculated for the study corridor based on the number of crashes per 100 million vehicle miles traveled (100 MVMT) and compared to statewide averages of 4-lane divided urban roadways. As the section of North Lamar Boulevard from Parmer Lane to Howard Lane is a 4-lane undivided roadway, this section was compared to the statewide averages of 4-lane divided urban roadways. **Table 3-18** summarizes the corridor-wide crash rates by character area. Typically, a roadway is considered to have a significant crash problem when the crash rate is more than double the statewide average for that particular roadway type.

Based on the crash data analyzed, in most areas of Burnet Road, crash rates are lower than the statewide average. Between Braker Lane and MoPac, the overall three-year crash rate is 46% higher than the statewide average. However, three out of the four character areas along North Lamar Boulevard have a significant crash problem. The area between Parmer Lane and Howard Lane has a crash rate that is more than four times the statewide average. The areas between US 183 and Rundberg Lane, and from Rundberg Lane to Braker Lane have a crash rate that is more than double the statewide average.

Table 3-18: Crash Rates [2]

Year	Corridor	Character Sector	Length	Number of Crashes	Daily Traffic Volume	Crash Rate (100 MVMT)	Statewide Crash Rate	Percent Difference
2009	Burnet Road	W Koenig Lane to W Anderson Lane	1.59	64	36,000	306.3	224.75	36%
		W Anderson Lane to US 183	1.20	41	36,000	260.0	224.75	16%
		US 183 to W Braker Lane	1.27	29	36,000	173.8	224.75	-23%
		W Braker Lane to MoPac	1.21	35	19,400	408.5	224.75	82%
	North Lamar Boulevard	US 183 to W Rundberg Lane	1.44	133	35,000	723.0	224.75	222%
		W Rundberg Lane to W Braker Lane	1.44	84	28,000	570.8	224.75	154%
		W Braker Lane to Parmer Lane	1.87	38	25,000	222.7	224.75	-1%
		Parmer Lane to Howard Lane	1.24	26	4,700	1,222.3	207.51	444%
2010	Burnet Road	W Koenig Lane to W Anderson Lane	1.59	67	32,630	353.8	224.75	71%
		W Anderson Lane to US 183	1.20	37	32,630	258.9	224.75	15%
		US 183 to W Braker Lane	1.27	27	33,000	176.5	224.75	-21%
		W Braker Lane to MoPac	1.21	18	19,800	205.8	224.75	-8%
	North Lamar Boulevard	US 183 to W Rundberg Lane	1.44	132	35,000	717.5	224.75	219%
		W Rundberg Lane to W Braker Lane	1.44	102	26,000	746.4	224.75	232%
		W Braker Lane to Parmer Lane	1.87	38	25,000	222.7	224.75	-1%
		Parmer Lane to Howard Lane	1.24	35	5,000	1,546.6	207.51	588%
2011	Burnet Road	W Koenig Lane to W Anderson Lane	1.59	29	36,000	208.5	224.75	-7%
		W Anderson Lane to US 183	1.20	18	36,000	171.5	224.75	-24%
		US 183 to W Braker Lane	1.27	18	36,000	162.0	224.75	-28%
		W Braker Lane to MoPac	1.21	21	19,400	368.2	224.75	64%
	North Lamar Boulevard	US 183 to W Rundberg Lane	1.44	80	35,000	653.2	224.75	191%
		W Rundberg Lane to W Braker Lane	1.44	50	28,000	510.3	224.75	127%
		W Braker Lane to Parmer Lane	1.87	31	25,000	272.9	224.75	21%
		Parmer Lane to Howard Lane	1.24	22	5,000	1,460.2	207.51	550%
2009 - 2011	Burnet Road	W Koenig Lane to W Anderson Lane	1.59	160	34,877	289.5	224.75	32%
		W Anderson Lane to US 183	1.20	96	34,877	230.1	224.75	2%
		US 183 to W Braker Lane	1.27	74	35,000	170.8	224.75	-24%
		W Braker Lane to MoPac	1.21	74	19,533	327.5	224.75	46%
	North Lamar Boulevard	US 183 to W Rundberg Lane	1.44	345	35,000	697.9	224.75	211%
		W Rundberg Lane to W Braker Lane	1.44	236	27,333	609.2	224.75	171%
		W Braker Lane to Parmer Lane	1.87	107	25,000	239.4	224.75	7%
		Parmer Lane to Howard Lane	1.24	83	4,900	1,409.7	207.51	527%

2 http://ftp.dot.state.tx.us/pub/txdot-info/trf/crash_statistics/2010/02_2010.pdf , http://ftp.dot.state.tx.us/pub/txdot-info/trf/crash_statistics/2009/02_2009r.pdf, Accessed December 2011

CHAPTER 4
FUTURE CHARACTERISTICS

This chapter discusses the future characteristics for the study area. Items discussed include planned / programmed multi modal projects, future travel demand, and planned development activities. Future conditions and plans previously developed by the City and area neighborhoods were utilized in identifying improvement recommendations.

PLANNED MULTIMODAL IMPROVEMENTS

Planned transportation improvements in the Burnet and North Lamar project areas include bicycle lanes, bus rapid transit, and a trail system.

BICYCLE LANES

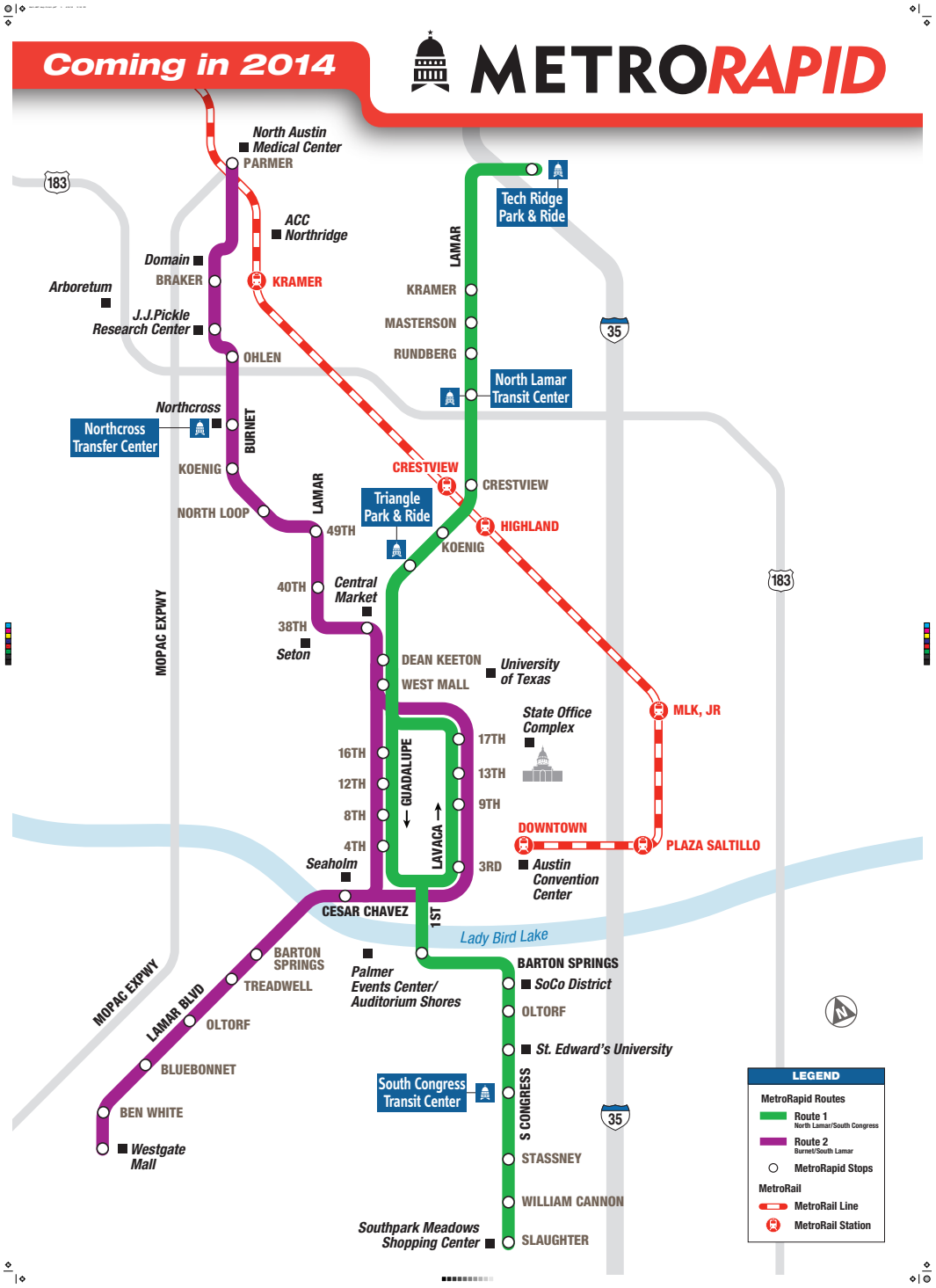
As part of the bicycle program, the City of Austin has implemented a lane diet along Burnet Road from Burnet Lane to US 183 in order to provide bike lanes. The four travel lanes and the two-way left-turn lane were reduced from 12 feet to 10 feet. Two 5-foot bike lanes were striped using the pavement space gained as a result of the lane reductions.

BUS RAPID TRANSIT

MetroRapid is a new Bus Rapid Transit (BRT) service that is expected to result in faster, more convenient service for the community. BRT service will have limited stops, boarding from all doors, unique and upgraded stops with real-time bus arrival information. Buses equipped with signal priority technology will provide improved service along Burnet Road and North Lamar Boulevard. BRT will feature approximately six stops on each roadway within the project area. The bus stops will be in close proximity to local bus routes and Metro Rail stations for easy connections.

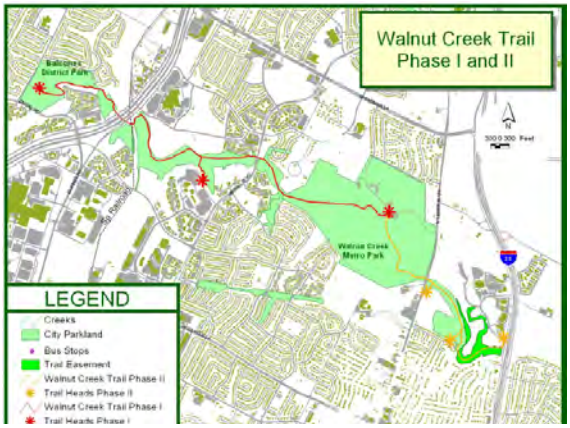
The signal priority technology aboard the buses will communicate with traffic lights to either extend green lights for a few seconds to allow the bus to make it through the light, or make red lights turn green a few seconds earlier. This will help buses move faster through the corridor. The current plan is to operate BRT at a 10-minute frequency during peak periods and 15-minute frequency during the off-peak. Compared to current buses, BRT buses will have twice the capacity for wheel chairs and bikes. **Figure 4-1** illustrates the proposed BRT stops along the two corridors.

Figure 4-1: Proposed BRT Stop Location[3]



3 *http://allsystemsgo.capmetro.org/capital-metrorapid.shtml, accessed on May, 2012"*

WALNUT CREEK TRAIL



The Walnut Creek Trail project is an initiative to develop an extensive trail system along this major Austin creek. The trail will ultimately be a 16-mile concrete trail from Balcones District Park in NW Austin to Govalle Park in East Austin. The project includes construction of a new 10-foot wide concrete trail with two-foot wide grass shoulders, trail heads, modifications to existing parking lots, new parking lots, low-water crossings, and pedestrian bridges. Phase 2 of the proposed project will be executed in the study area connecting the Walnut Creek Park to TCEQ and Girl Scout buildings at IH 35, with a total cost is $1.9M

RECENT AND PLANNED DEVELOPMENTS

The last few years have seen a few new developments along the Burnet and North Lamar corridors. These include:

- Central Health, a new community health care clinic along Braker Lane close to North Lamar Boulevard.
- Capital Metro Transit center in the northwest corner of the North Lamar Boulevard at US 183 intersection. This transit center is being considered for a potential relocation.
- Domain – A mixed-use high density development located at the north end of Burnet Road.

Lamar Transit center

Planned development along the two corridors include the following:

- North Austin Community Recreation Center, a new recreation center to be located on Rundberg Lane near North Lamar Boulevard.
- Asian-American Senior Apartments, proposed to be located east of the Chinatown Shopping Center.
- Precinct Two Constable Office Expansion on Burnet Road.
- Expansion of the JJ Pickle Research Center.

The Domain

AUSTIN METROPOLITAN AREA TRANSPORTATION PLAN

The 2025 Austin Metropolitan Area Transportation Plan (AMATP) serves as the planning document for future transportation in Austin. In that document, North Lamar Boulevard is planned to be a 4-lane divided roadway. Burnet Road is to be a 4-lane divided roadway from Koenig Lane to US 183 and a 6-lane divided roadway from US 183 to MoPac. The City of Austin is currently updating the entire planning document as part of the Austin Strategic Mobility Plan.

NEIGHBORHOOD PLANS

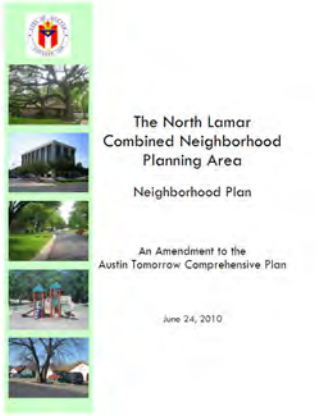
In Austin, neighborhood planning provides an opportunity for citizens to take a proactive role in the planning process and decide how their neighborhoods will move into the future. The neighborhood planning process addresses land use, zoning, transportation, and urban design issues. The goal of neighborhood planning is for diverse interests to come together and develop a shared vision for their community. A neighborhood plan:

- Represents the views of all the stakeholders that make up a community
- Identifies neighborhood strengths and assets
- Identifies neighborhood needs and concerns
- Establishes goals for improving the neighborhood
- Recommends specific recommendations to reach those goals

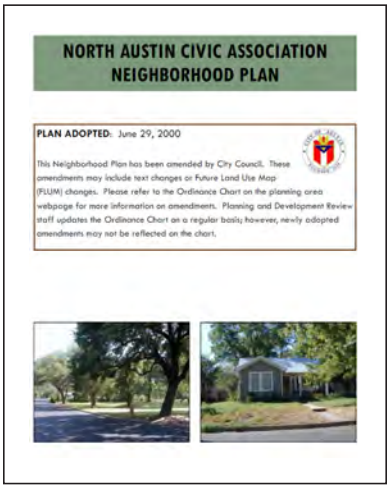
Neighborhood plans for the North Lamar and Burnet project area are summarized in this section.

The North Lamar Combined Neighborhood Planning Area (NLCNPA): This plan is developed for the Georgian Acres and North Lamar planning areas. The boundaries for the combined planning area are Braker Lane on the north, IH 35 on the east, Anderson Lane on the south, and North Lamar Boulevard on the west. The North Lamar Combined Neighborhood Plan was adopted on June 24, 2010, and was amended on August 26, 2010, by the Austin City Council. The following are the stated goals for the future transportation needs for this planning area:

- The pedestrian and bicycle transportation networks should be improved.
- The safety of both pedestrians and motorists needs to be upheld and ensured.
- North Lamar Boulevard should be a safe route for both pedestrians and bicyclists.
- Traffic flow along North Lamar Boulevard should be improved.



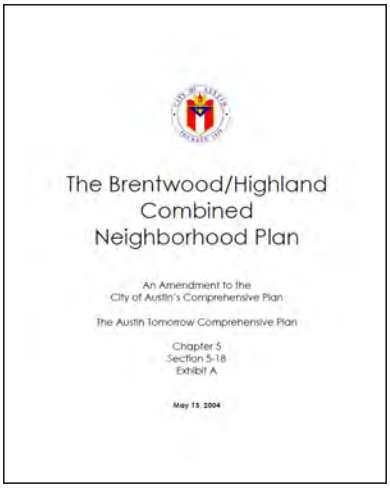
- Travel within the neighborhoods should be efficient and free of physical barriers.
- Travel within the neighborhoods should be safe and free of psychological barriers
- Transit options should be readily accessible to everybody in the NLCNPA.



North Austin Civic Association (NACA) Neighborhood Planning Area: The boundaries for the planning area are Kramer Lane on the north, Lamar Boulevard on the east, U.S. Highway 183 on the south, and Metric Boulevard on the west. The Austin City Council adopted the NACA Neighborhood Plan on June 29, 2000. The City Council approved the Neighborhood Plan Combining District (NPCD) to implement the NACA plan's land use recommendations on May 24, 2001. The overall vision of the NACA neighborhood is that it continues to mature gracefully. To accomplish this goal, a balance of preservation activities, infrastructure improvements, and vibrant in-fill developments are necessary. The goal of the Neighborhood Plan is to guide future development, protect existing residential areas and provide opportunities to improve the quality of life for everyone in the neighborhood through the following:

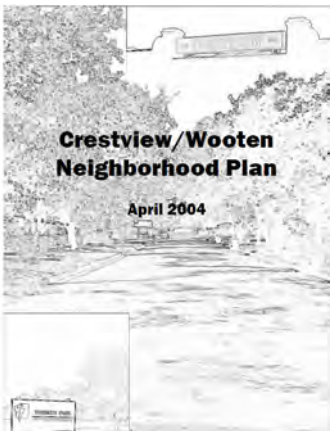
- Establish land use and zoning for future development that will improve the quality of life for neighborhood residents and businesses.
- Create a more pedestrian and cyclist friendly neighborhood by adding sidewalks and improving access to major centers of neighborhood activity.
- Protect residential areas from impacts of through traffic and improve traffic flow in the neighborhood.
- Improve the safety, comfort, and efficiency of Capital Metro services in the neighborhood.
- Transform North Lamar Boulevard into a "Great Street" incorporating mixed-use buildings along the sidewalk edge and landscaped sidewalks and medians.
- Create a "Gateway' at Rundberg and North Lamar.

The Brentwood / Highland Combined Neighborhood Planning Area: The boundaries of the Brentwood Planning Area are Burnet Road on the West, North Lamar Boulevard on the east, Justin Lane on the north, and 45th Street on the south. The boundaries of the Highland Planning Area are North Lamar Boulevard on the west, Middle Fiskville on the east, Anderson Lane on the north, and Koenig Lane on the south. The plan was adopted on May 13, 2004. Their goals pertaining to transportation are as follows:



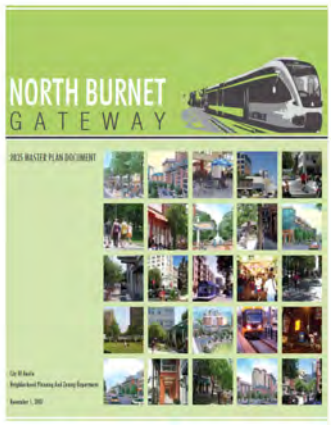
- Maintain a traffic pattern that provides easy access to destinations, while keeping through traffic off interior streets by creating safe and efficient corridors and arterials.
- Create a bicycle and pedestrian network that is safe and accessible for people of all ages and mobility levels, by improving routes and facilities for walkers and cyclists.
- Provide public transit options and accessibility.

The Crestview - Wooten Neighborhood Combined Planning Area: The boundaries of the Crestview Neighborhood Planning Area are Anderson Lane to the north, North Lamar Boulevard on the west, Justin Lane on the south, and Burnet Road to the east. The boundaries of the Wooten Neighborhood Planning Area are US Highway 183 on the north and west, Anderson Lane on the south and Burnet Road on the east. The plan was adopted on April 1, 2004. Their goals pertaining to transportation are as follows:



- Increase alternatives to driving by improving routes and facilities, access for pedestrians, bicycles, and public transportation.
- Maintain a transportation network that allows all residents to travel safely throughout the neighborhood by improving safety on major corridors and preserving and enhancing neighborhood friendly streets.
- Provide safe accessible routes for residents of all mobility levels.
- Encourage the use of major corridors by all traffic generated outside the neighborhood, and discourage that traffic from using interior streets.
- Provide better connection between corridors to reduce neighborhood cut through traffic.
- Maintain each neighborhood's and each individual's freedom to choose or oppose rapid transit, but plan for the possibility.

The North Burnet/Gateway Planning Area: The boundaries for the planning area are Walnut Creek on the north, Metric Boulevard on the east, US 183 (Research Boulevard) on the south and southwest, Braker Lane on the northwest, and MoPac (Loop 1) on the west. The Austin City Council adopted the North Burnet/Gateway Master Plan on November 1, 2007 as an amendment to the Austin Tomorrow Comprehensive Plan. The North Burnet/Gateway Master Plan presents a long-term vision for a 2,300-acre area along MoPac, north of US 183, to redevelop the existing low density, auto-oriented and industrial uses into a higher density mixed-use neighborhood that is more pedestrian-friendly and takes advantage of the links to commuter rail transit and the area's key position within Austin's Urban Core. The North Burnet Gateway Master Plan has an accompanying codified Regulating Plan that sets the regulatory framework for the area included in the North Burnet Gateway boundary. The North Burnet Gateway Regulating Plan regulates sidewalk standards, site development standards, land use, density, and more to help realize the vision laid out in the North Burnet Gateway Master Plan. The plan introduces a model for a more sustainable, compact form of development in a region that is challenged by explosive growth.



Travel demand model data from the Capital Area Metropolitan Planning Organization (CAMPO) were obtained to review the future travel demand needs for the corridor. Base 2010 and projected 2035 traffic volumes along Burnet Road and North Lamar Boulevard from the CAMPO travel demand model are summarized in **Figures 4-2** and **4-3**. In year 2035 Burnet Road is projected to carry between 32,000 and 52,000 vehicles per day (vpd). North Lamar Boulevard is projected to carry between 19,000 and 43,500 vpd. **The travel demand model projects a 38 percent growth in traffic volume by 2035 for Burnet Road and 33 percent growth for North Lamar Boulevard**.

Based on a review of the projected travel demands, it was found that the travel demand model assigned relatively higher traffic volumes at two locations along Burnet Road; one south of Braker Lane near the JJ Pickle Research Center with projected travel demand of 52,500 vpd, and the other south of MoPac near the Domain with a projected travel demand of 43,500 vpd. In addition to the roadway network, travel demand models include centroid connectors. Centroid connectors are used in travel demand models to represent local access to various land uses in the model. Centroid connectors in the model do not have any capacity constraints and allow unrestricted flow of traffic from/to adjacent roadways. In a regional travel demand model, these access representations are not always accurately coded causing unreasonable loading of traffic on the adjacent roadway network. Therefore the relatively high volumes at these two locations in the model are not representative of the actual traffic volumes.

Area near the JJ Pickle Research Center

The main access to the JJ Pickle Research Center is along Braker Lane, however the centroid connectors coded in the CAMPO model assigned more travel demand to the connector from Burnet (20,600 vpd) than Braker Lane (6,500 vpd). The primary reason for this discrepancy appears to be the relative representation of roadways and centroid connectors. Making appropriate adjustments yields a projected travel demand of 42,200 vpd along Burnet Road in this area, which is consistent with the volumes north of Braker Lane and north of US 183.

Area near the Domain

The connector that represents access from MoPac expressway frontage road into the Domain is coded incorrectly in the CAMPO model. As a result, traffic from MoPac is diverted to the frontage road and is dumped into a centroid connector to Burnet Road. Making appropriate adjustments yields a projected travel demand of approximately 36,300 vpd, consistent with the travel volume distribution along the rest of the corridor.

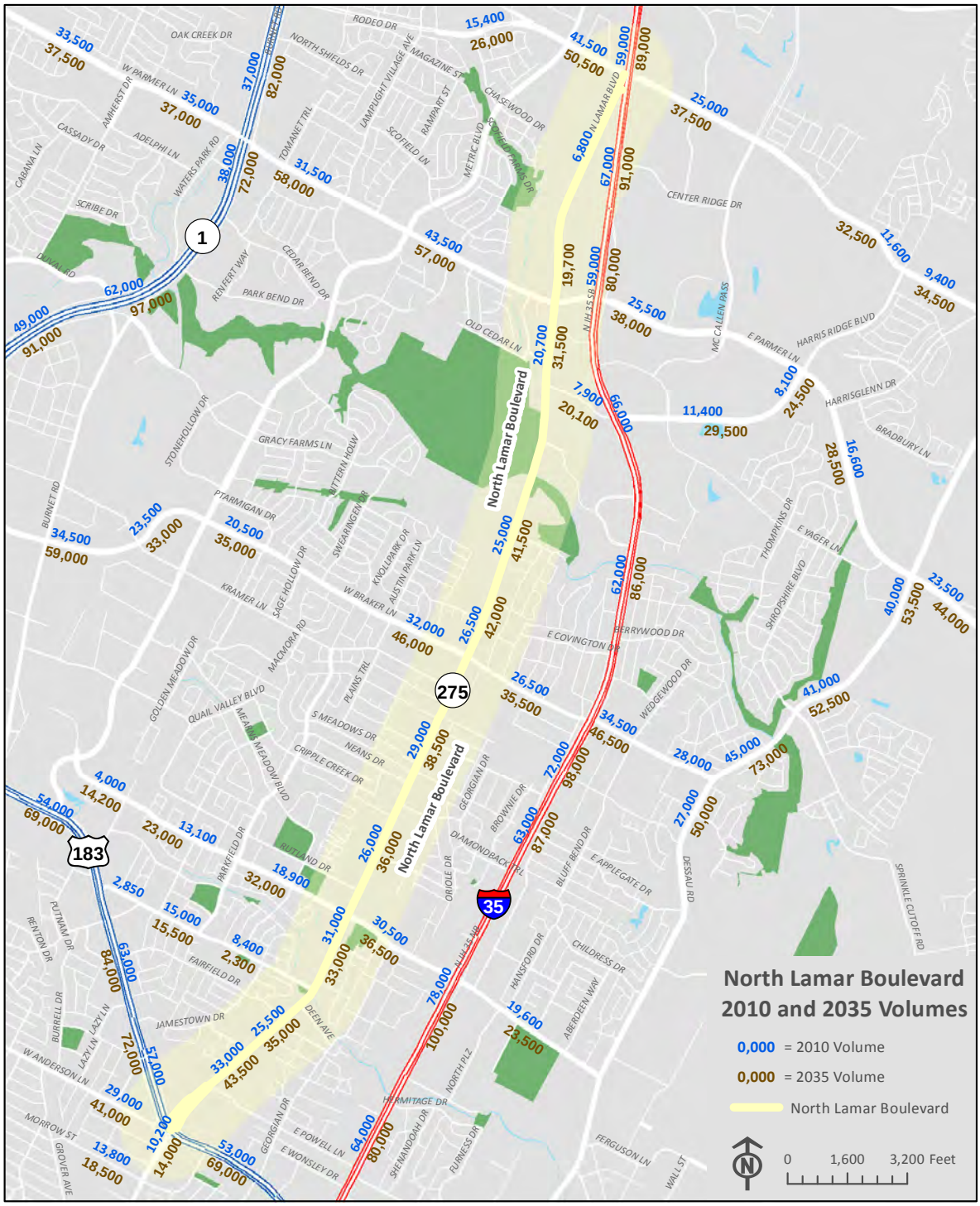
Accommodating Future Travel Demand

As mentioned earlier, the CAMPO travel demand model projects future traffic growth of 33-38 percent for the project corridors. This projected growth does not account for changes in development trends or growth policies and should be seen not as an absolute but rather as the potential demand assuming nothing changes. The vision for the Burnet and North Lamar corridors includes complete streets that balance the safety and mobility needs for all road users, not just automobiles. **A 20 percent traffic growth in future automobile traffic is more consistent with what should be the goal for development policy along the corridor**.

Figure 4-2 : Burnet Road Projected Annual Average Daily Traffic

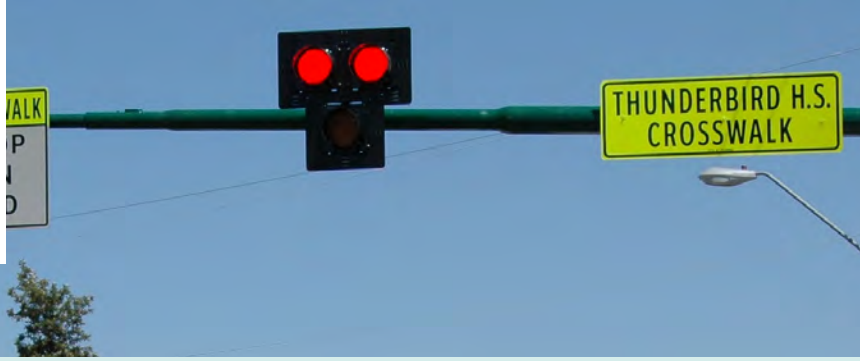
Source: CAMPO Regional Travel Demand Model, December, 2012

Figure 4-3 : North Lamar Boulevard Projected Annual Average Daily Traffic



Source: CAMPO Regional Travel Demand Model, December, 2012

CHAPTER 5
IMPROVEMENT TOOLS

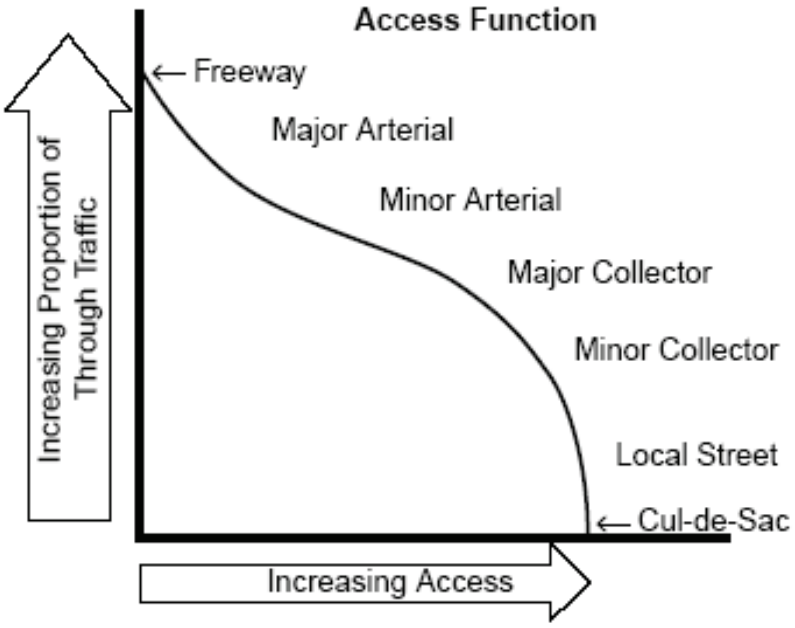


As discussed in Chapter 3, the Burnet and North Lamar corridors have mobility and safety issues associated with the various transportation modes on the roadways. Due to the capacity constraints, high volumes, and high speeds, these undesirable conditions will worsen in the future if not mitigated. The purpose of this section is to discuss the available toolbox of improvements ranging from relatively low cost options to more capital-intensive measures.

ROADWAY HIERARCHY

Roadways provide mobility and access to varying degrees depending on their place within the roadway hierarchy. Mobility refers to ability and ease with which traffic moves along the roadway whereas access refers to the ability and ease for traffic to get to a destination. Roadway functional hierarchy is illustrated in **Figure 5-1** and demonstrates how various roadway types accommodate mobility and access. Freeways are on one end of the spectrum and primarily provide mobility with no direct access for residential, commercial, or other developments. One step below are Arterials (such as Burnet Road and North Lamar Boulevard) which are designed to primarily provide mobility but also have some access to abutting development. Local Streets are at the other end of the spectrum and exist primarily to provide access to development.

Figure 5- 1: Roadway Functional Hierarchy[4]



4 *Access Management Manual, Transportation Research Board, 2003, p4*

There are a variety of tools that can be used as part of a corridor improvement plan, access management plans, two-way left-turn lanes, exclusive turn lanes, raised medians, signal modifications, bicycle facilities, pedestrian crosswalks, sidewalks, and many others.

ACCESS MANAGEMENT PLAN

Access management techniques help increase the mobility and safety of a particular corridor by consolidating driveways and controlling access to adjacent land uses by influencing access location, design, spacing and operation. Access management techniques provide a cost effective means of extending the useful life of a roadway. The purpose of an access management plan is to provide access to corridor development in a manner that maintains the safety and mobility of the existing transportation system. In undeveloped areas, access management plans and policies can be implemented to guide development. In areas that are already developed, these measures can be retrofitted within the right-of-way controlled by the owning public agency. Measures such as driveway density and modification (width, throat length, etc) can be implemented as redevelopment occurs.

TWO-WAY LEFT-TURN LANES

The section of North Lamar Boulevard north of Parmer Lane has two travel lanes with a double yellow line in the middle and no physical separation between opposing traffic. While this is adequate on low-volume roadways, as traffic volumes and left-turn maneuvers increase, this type of roadway cross-section has limitations in safely accommodating vehicles, pedestrians, and bicyclists. Two-way left-turn lanes allow turns in both directions and can increase capacity on an undivided roadway by as much as 30 percent[5]. In addition to improving mobility, they also improve safety. Studies have shown that roadways with two-way left-turn lanes have crash rates as much as 35 percent lower than undivided roadways without a median[6]. Two-way left-turn lanes are typically used where there are 10-20 driveways per mile and traffic volumes are in excess of 3,000 vpd for 2-lane roadways, and 6,000 vpd for 4-lane roadways. The upper threshold for using two-way left-turn lanes is typically 20,000 vpd.

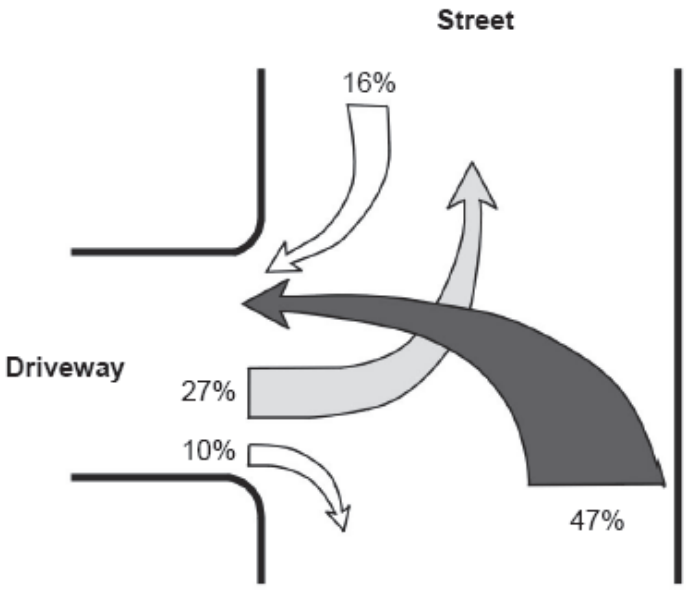
RAISED MEDIAN TREATMENTS

The typical roadway cross-section for the Burnet and North Lamar corridors includes a flush two-way left-turn lane which allows for left-turn ingress and egress along the entire length of the roadway. While this is convenient for access to and from adjacent development, high traffic volumes and speed make this an unsafe situation. Existing daily traffic volumes are as high as approximately 37,100 vpd along Burnet Road, and 41,800 vpd along North Lamar Boulevard. Raised medians are typically considered when daily traffic volumes exceed 20,000 vpd . Raised medians offer the opportunity for improvements in safety, traffic operations, and aesthetics, and they are considered long-term improvements for most of Burnet Road and the entire length of the North Lamar Boulevard corridor.

Safety - The increase in adjacent development has a direct correlation to increased traffic volume. A two-way left-turn lane allows unfettered access to all driveways and as traffic volumes and access density increase, so does the crash risk. Studies have shown that more than 70 percent of crashes at driveways involve left turns as shown in **Figure 5-2**.

5 *Access Management Manual, Transportation Research Board, 2003, p19*
6 *Access Management Manual, Transportation Research Board, 2003, p200*

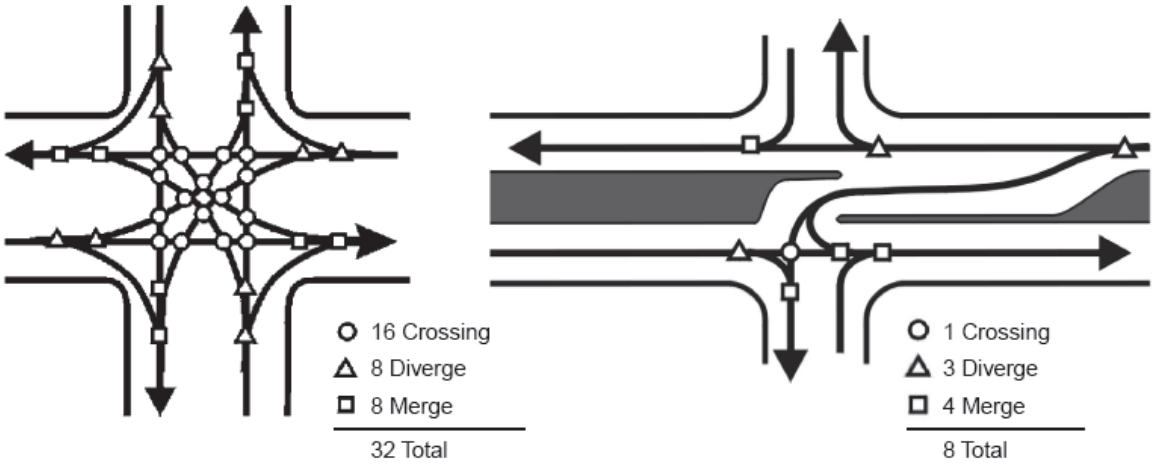
Figure 5- 2: Percentage of Driveway Crashes by Movement[7]



The implementation of a raised median significantly reduces the number of conflict points. A conflict point represents an area of the roadway at an intersection where vehicle paths cross. Increasing the number of conflict points increases driving complexity and subsequently increases crash risk. As shown in **Figure 5-3**, an intersection with no access control has a total of 32 conflict points. With the installation of a directional median the number of conflict points is reduced to 8. Studies have shown that replacing a two-way left-turn lane on a 4-lane roadway with a raised median can reduce crashes by as much as 15-57 percent. A median also provides an additional refuge area for both pedestrians and bicyclists. Implementation of raised medians results in more u-turn maneuvers due to the reduction in direct left-turn access. Studies have shown that right turns followed by u-turns are safer than direct left-turns[8].

7 *Access Management Manual, Transportation Research Board, 2003, p10*
8 *Access Management Manual, Transportation Research Board, 2003, p8*

Figure 5- 3: Conflicts points: Typical 4-Way Intersection versus Directional Median Opening[9]



Traffic Operation: Studies have shown that implementation of a raised median can reduce delay by up to 30 percent and increase capacity of the roadway by up to 30 percent[10]. A raised median therefore offers a roadway system that is operationally more efficient.

Aesthetics: The installation of a raised median offers opportunities to enhance the aesthetics of a corridor through landscaping or other improvements, thereby increasing the corridor's appeal and potentially attracting additional economic development.

EXCLUSIVE TURN LANES

Exclusive left-turn and right-turn lanes allow turning vehicles to move out of through travel lanes with less disruption to following traffic. This minimizes the speed differentials along a facility and improves traffic flow and safety. Studies have shown that right-turn lanes can reduce crashes by up to 20 percent and left-turn lanes can reduce total crashes at unsignalized locations by up to 75 percent [11]. Exclusive turn lanes are recommended for the majority of signalized intersections along the corridors.

TRAFFIC SIGNAL OPERATIONS

Traffic signal optimization and synchronization promotes optimal traffic flow. Closely spaced intersections such as Rundberg Lane and Rutland Drive operate better when interconnected and coordinated. Properly spacing signals is crucial for efficient traffic operation at local intersections as well as along the corridor. Studies have shown that one half-mile is the optimum spacing for traffic signals along a corridor. In urban settings it is not always possible to allow a half-mile between traffic signals. However, signals should not be placed less than one quarter-mile apart.

Adjustments to signal timing can also be made at individual traffic signals to improve traffic flow. This includes adjustments to green time and actuation parameters. At actuated signal locations, in-pavement loop detectors or video detectors are used to place calls for service for intersection approaches. A call is placed when a vehicle arrives at the intersection during the red signal indication. However, the recall feature of the traffic signal controller can be modified so that calls for side street service aren't placed

9 *Access Management Manual, Transportation Research Board, 2003, p18*
10 *Access Management Manual, Transportation Research Board, 2003, p19*
11 *Access Management Manual, Transportation Research Board, 2003, p19*

after vehicles have turned right on red and are no longer waiting for the green indication on that approach. This program recommends that timings be updated along with the implementation of short-term improvements.

ROAD DIET

This program recommends that a road diet be implemented along North Lamar Boulevard between Parmer Lane and Howard Lane. A road diet, also called a lane reduction, occurs when the number of travel lanes and/or effective width on a road is reduced in order to achieve overall transportation improvements. Road diets are typically done on roadways with low daily traffic volumes. A road diet is typically designed to improve safety and provide accommodation for non-motorized road users. It is commonly implemented on streets with four travel lanes. The road diet reduces the cross-section to one travel lane in each direction. The rest of the roadway cross-section may then be used to provide some of the following features:

- Wider footpaths/sidewalks
- Bicycle lanes on one or both sides of the road
- A two-way left-turn lane

Road diets can offer benefits to both drivers and pedestrians. On a 4-lane street, speeds can vary between lanes, and drivers must slow or change lanes due to slower or turning vehicles. In contrast, on streets with two through lanes plus a center turn lane, drivers' speeds are limited by the speed of the lead vehicle in the through lanes, and through vehicles are separated from left-turning vehicles. Thus, road diets may reduce vehicle speeds and vehicle interactions, which could potentially reduce the number and severity of vehicle-to-vehicle crashes. Road diets can also help pedestrians by creating fewer lanes of traffic to cross and by reducing vehicle speeds[12].

ROUNDABOUT

A roundabout is a type of circular intersection at which traffic flows in one direction around a central island. In a roundabout, entering traffic must yield to circulating traffic. Roundabouts have unique features and characteristics, including safety, environmental factors, operation and maintenance costs, traffic calming, aesthetics, and access management. They are designed with splitter islands for pedestrian access, and have entry deflections which slow cars at the intersection. After analyzing the feasibility of installing roundabouts at various intersections, a roundabout is recommended at the intersection of North Lamar Boulevard and Howard Lane. Primary advantages of roundabouts are summarized as follows[13] :

- **Safety/Traffic Calming**
  - Reduced crash severity for all users, safer merges into circulating traffic, and more time for all users to detect and correct for the mistakes of others due to lower vehicle speeds.
  - Fewer overall conflict points and no left-turn conflicts.
  - Beneficial in transition areas by reinforcing the notion of a significant change in the driving environment.
- **Operations and Maintenance**
  - May have lower delays and queues than other forms of intersection control.
  - Can reduce lane requirements between intersections.

12 *http://www.fhwa.dot.gov/publications/research/safety/10053/index.cfm, accessed July 2012*
13 *Roundabouts: An Informational Guide, NCHRP Report 672 (2nd Edition).*

- No signal hardware or equipment maintenance.
- **Non-Motorized Users**
  - Pedestrians must consider only one direction of conflicting traffic at a time.
  - Bicyclists have options for negotiating roundabout, depending on their skill & comfort level.
- **Access Management**
  - Facilitate u-turns that can substitute for more difficult mid-block left-turns.
- **Space**
  - Often require less queue storage space on intersection approaches.
  - More easily accommodates parking, wider sidewalks, planter strips, etc.
- **Environmental Factors**
  - Noise, air quality impacts and fuel consumption may be reduced.
  - Little stopping during off-peak periods.

Primary disadvantages of roundabouts are summarized as follows[14] :

- **Safety**
  - Increase in single-vehicle and fixed-object crashes compared to other intersection treatments.
  - Multilane roundabouts present more difficulties for individuals with blindness or low vision due to challenges in detecting gaps and determining that vehicles have yielded at crosswalks.
- **Operations and Maintenance**
  - Equal priority for all approaches can reduce the progression for high volume approaches.
  - Cannot provide explicit priority to specific users (e.g., emergency vehicles, transit, pedestrians) unless supplemental traffic control devices are provided
- **Non-Motorized Users**
  - Pedestrians with vision impairments may have trouble finding crosswalks and determining when/if vehicles have yielded at crosswalks.
  - Bicycle ramps at roundabouts have the potential to be confused with pedestrian ramps.
- **Access Management**
  - May reduce the number of available gaps for midblock unsignalized intersections and driveways
- **Space**
  - Often requires more space at the intersection itself than other intersection treatments.
- **Environmental Factors**
  - Possible impacts to natural and cultural resources due to greater spatial requirements at intersections.

MULTIMODAL IMPROVEMENTS

Establishment or improvement of multimodal alternatives along a corridor has the potential to reduce auto demand and the reduced traffic volume results in improvements in traffic flow and safety. Accommodation of modes such as transit and bicycles, and improvements in conditions for pedestrian traffic, enhance a corridor's appeal, traffic operation, and safety. Multimodal improvements include a safe, secure area for patrons at transit stops, sidewalks of sufficient width and in good condition on both sides of the roadway, and bicycle facilities. This program recommends multiple

14 *Roundabouts: An Informational Guide, NCHRP Report 672 (2nd Edition).*

multimodal improvements such as providing additional bus stop shelters, upgrading street lighting where necessary, and clearing pedestrian zones.

DRIVEWAY MODIFICATIONS

Like typical intersections, driveways have numerous conflict points. Right-turn and left-turn lanes can allow turning vehicles to get out of through lanes prior to the execution of the turn maneuver. However, the design of the driveway is also important in maintaining good traffic flow. Small curb radii cause drivers turning right into a driveway to do so more slowly, and result in a greater negative impact to drivers who are following them. There is also an increase in the potential for drivers to turn into the path of exiting traffic. Conversely large curb radii may increase vehicular speeds and negatively impact pedestrians. Larger curb radii also increase pedestrian exposure time across driveways. It is therefore important that driveway curb radii, throat length and width are appropriately sized to provide efficient mobility and safety for pedestrians and vehicles.

INCREASED INTERSECTION/DRIVEWAY SPACING

Access density is directly correlated to crash risk. Crash risk increases as access density increases. For example, studies have shown that increasing access density from 10 access points per mile to 20 access points per mile can increase crash rates by an estimated 30 percent[15]. Therefore access spacing should be given careful consideration when reviewing permit applications for new driveways. Driveway consolidation requires agreement between the property owner and the responsible agency and can therefore be problematic. However, where possible, consideration should be given to consolidating existing driveways to reduce conflicts and improve traffic operation. Driveway consolidation is recommended for several sections along the corridors.

SIDEWALKS

Safe, continuous sidewalks with crosswalk curb ramps are important for pedestrians and are a crucial part of a Complete Street. Wider sidewalks in commercial areas with adequate buffering from the roadway facilitate a mix of uses. The addition of streetscape improvements such as shade trees can also promote pedestrian use. Sidewalks with sufficient width and shade trees are recommended for all sections of both corridors. Also, enforcing clear pedestrian zones is recommended for both short-term and long-term corridor-wide improvements.

CROSSWALKS

A crosswalk is a designated location at which pavement striping is utilized to assist pedestrians in crossing the street. They are designed to keep pedestrians together where they can be seen by motorists, and where they can cross safely. Crosswalks are often found at intersections, but may also be located at mid-block locations on busy roads that would otherwise be too unsafe to cross without assistance due to vehicle volumes, speed or road widths. They are also commonly installed where large numbers of pedestrians may seek to cross the street.

PEDESTRIAN HYBRID BEACONS

Pedestrian hybrid beacons (PHB) are traffic signals used to stop vehicular traffic and allow pedestrians to cross safely. The PHB is the most effective mid-block crossing treatment and is in use by the City

15 *Access Management Manual, Transportation Research Board, 2003, p16*

of Austin in multiple locations. For most of the Burnet and North Lamar corridors, the separation between signalized intersections (which typically have pedestrian crosswalks) is greater than the distance that most pedestrians would walk to utilize crosswalks.. For example, in the Northcross Mall area of the Burnet corridor near Fairfield Drive, signalized crossings are almost one half-mile apart. In general, 500 feet is considered a reasonable distance for a pedestrian to walk to a signalized crossing. Pedestrian crossings with pedestrian hybrid beacons are recommended at multiple locations along the corridors.

BICYCLE FACILITIES

Bicycle facilities are a form of cycling infrastructure consisting of marked lanes, tracks, shoulders and paths designated for use by bicyclists and from which motorized traffic is generally separated. The term includes bicycle lanes, cycle tracks, separated bicycle lanes, road shoulders and side paths located within a road right-of-way.

Bicycle Lanes

Bicycle lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. The bicycle lane is located adjacent to motor vehicle travel lanes and flows in the same direction as motor vehicle traffic. These lanes are typically on the right side of the street, between adjacent travel lane and curb, road edge, or parking lane. Bicycle lanes enable bicyclists to ride at their preferred speed without interference from prevailing traffic conditions. Bicycle lanes facilitate predictable behavior and movements for both bicyclists and motorists. A separated or buffered bicycle lane increases comfort level for bicyclists by increasing the distance between the motor vehicle lanes and the usable space for bicyclists.

Cycle Tracks

A cycle track is an exclusive bicycle facility that combines the user experience of a separated path with the on-street infrastructure of a striped bicycle lane. These bicycle facilities are physically separated from vehicular traffic and separate from the sidewalk area. Because of the wider total width and separation from vehicular traffic, cycle tracks have been shown to attract more people to bicycling for transportation, accommodate a wider range of bicyclist skill level and reduce crashes. As discussed in Chapter 3, separated cycle tracks are becoming the preferred facility for attracting the largest potential number of new cyclists, the "Interested but Concerned" who comprise roughly 60% of the population, according to research from the Portland Department of Transportation.

There are two types of cycle tracks - separated in-street cycle tracks and raised cycle tracks. The first type is placed at street level as a conventional bicycle lane, but is physically separated from vehicular travel lanes by a 2-foot or 3-foot raised median buffer. Bollards or raised pavement markers are also added on the street side to enhance the physical separation. The National Organization of City Transportation Officials (NACTO) Urban Bikeway Design Guide recommends a minimum of eight feet for cycle tracks comprised of a 5-foot or 6-foot operational area and a 2-foot or 3-foot buffer or barrier curb. The City of Austin's bicycle program recommends that the minimum operational area should be 7-foot or 8-foot with the 2-foot or 3-foot raised barrier curbs to provide adequate separation for cyclists and visibility to motorists. This is due to some difficulties with passing, riding side by side, and maintaining street-sweeping equipment where raised curbs or barriers are installed for lanes less than seven feet. An in-street cycle track with raised median buffer is illustrated in **Figure 5-4**.

Figure 5-4: In-Street Cycle Tract with Raised Median Separation[16]

The second option, a raised cycle track, is physically separated from vehicular traffic by a vertical curb. This curb can be half the curb height or 3" to the bikeway and another 3" to the sidewalk. Alternatively, a full-height curb may be installed so that the cycle track and sidewalk are at the same level. In that case, however, care must be taken to provide a clear separation between bicycle and pedestrian traffic to prevent conflicts and to maintain smooth vertical transitions across driveways. The City of Austin's bicycle program also recommends that raised cycle tracks have an operational area of seven feet or eight feet for reasons previously noted. The program also recommends that where space is available that the in-street type of cycle track should be used as they provide horizontal separation from vehicular traffic and offer a higher level of comfort for cyclists. **Figure 5-5** illustrates a raised cycle track.

Figure 5-5: Raised Cycle Track[17]

16 *http://nacto.org/cities-for-cycling/design-guide/cycle-tracks/protected-cycle-track, accessed July 2012*
17 *http://overthebarsinmilwaukee.files.wordpress.com/2010/07/raised-lane-in-amsterdam.jpg?w=640&h=480, accessed December 2013*

Bicycle Operations at Intersections

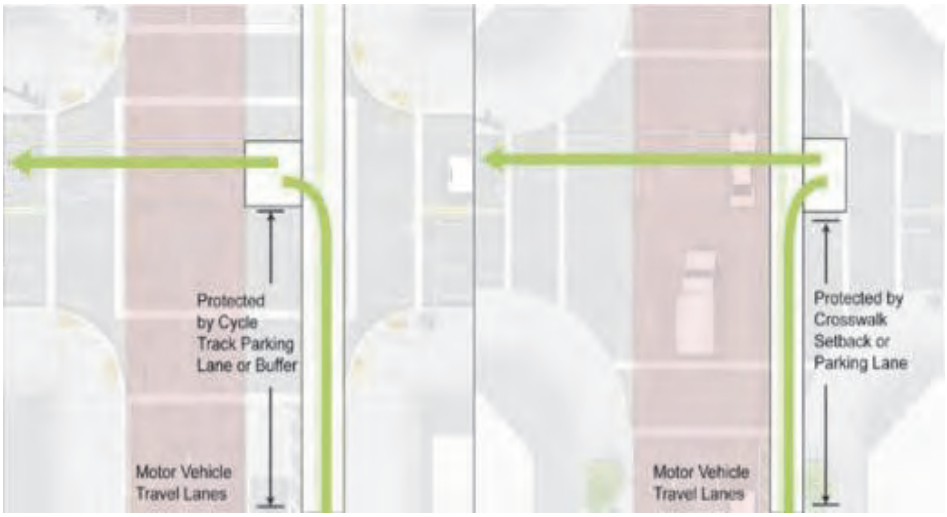
Bicycle mobility and connectivity is challenged at high-volume, multi-lane intersections as these conditions can make it difficult for many cyclists to make left turns from the corridor. Two possible solutions to consider for left turns are:

- Bicycle signal heads and phases
- Two-stage turn queue box

A bicycle signal allows a bicyclist wishing to turn left and who cannot get a gap in oncoming car traffic to proceed to the corner and activate the signal with either a well-placed button or an in-pavement sensor. When vehicular traffic stops on red, a bicycle green light with a leading interval would allow the cyclist to move into the left lane in front of the cars and make the turn. This is most effective when used with a green bicycle box or advanced stop bar that designates space for the bicyclist to wait in front of stopped cars.

The two-stage turn queue box is a new design described in the NACTO Urban Bicycle Design Guide (UBDG) , and illustrated in **Figure 5-6**. These markings facilitate left turns at multi-lane signalized intersections from the bicycle lane or cycle track on the right side of the roadway. A queue box, typically painted green and including a bicycle symbol is placed in front of the crosswalk in the right-side leg of the intersection. When through traffic gets the green, the bicyclist proceeds to the box, pivots to the left and waits for the green in this new direction. This works best when the queue box is placed in front of a through traffic lane or when rights turns on red are prohibited.

Figure 5-6: Two-Stage Turn Queue Box[18]



18 *http://nacto.org/cities-for-cycling/design-guide/intersection-treatments/two-stage-left-turn-queue-boxes, accessed February 2012*

CROSS-STREET WIDENING/ IMPROVED SUPPORTING STREET NETWORK

Widening cross-streets that intersect a major roadway can improve traffic flow along the corridor by making it easier for drivers to turn into the roadway as well as providing better access via the cross-street and reducing dependence on the major street. A supporting street network is crucial to the mobility and safety of a community. Alternative routes reduce the burden on other facilities. A roadway network that incorporates roadway hierarchy provides better traffic operation and safety.

REGIONAL AND LOCAL POLICIES

Policy frameworks can be established on a regional or local level to provide standards that enforce access management principles. Such policies should be an integral part of the development and permitting review process. Having such policies not only helps maintain optimum levels of traffic operation and safety, but also provides developers a clear understanding of expectations. Further discussion of such policies is included in Chapter 8.

CHAPTER 6
RECOMMENDATIONS

Existing issues and concerns were identified through the public involvement process as well as a technical evaluation of existing transportation conditions. Primary concerns expressed by members of the public included lack of suitable pedestrian and bicycle infrastructure. Although mobility and safety concerns were cited by members of the public for the entirety of both corridors, particular areas of concern included North Lamar Boulevard at Powell, North Lamar Boulevard from Thrumond to Long Spur and Burnet Road at Anderson Road. This section identifies the improvements developed to address these and other concerns.

PRIORITIZATION OF IMPROVEMENTS

Each of the corridors analyzed presented different design considerations, traffic patterns, and existing infrastructure for automobile users, cyclists, and pedestrians. **A common theme that emerged throughout the public meetings and stakeholder discussions was a desire to adequately facilitate the movement of additional automobile traffic, but not design automobile related improvements to such a degree that it would degrade the pedestrian and bicycle level-of-service to such levels as to make those modes unattractive to the average user.** Recognizing this common theme, the City of Austin and the consultant team determined a threshold of additional traffic that would be the design volume for which to develop infrastructure. In general, that design volume anticipates a 20% increase in traffic volumes over the current traffic levels. This consideration allowed for growth to occur within each of the corridors, but balanced that need with the desire expressed by the community for multiple modes of travel within each corridor.

In determining the appropriate infrastructure revisions for each segment of the corridor, the consultant team utilized various planning level tools that examined the efficiency of the vehicular realm improvements while balancing the needs of the transit patrons, bicyclists, and pedestrians throughout the corridor. Various software platforms including the proposed Highway Capacity Manual's Multi-Modal Level of Service were utilized in determining the trade-offs in each infrastructure decision. However, the currently available version of the analysis tools do not differentiate between types of bicycle facilities. They also do not recognize the intrinsic value of consistent facilities throughout an entire corridor, as they examine intersections and segments between intersections, rather than focusing on the actual user experience associated with the proposed facilities. As such, there was not a final calculation that documents the Multi-Modal Level of Service across the corridors. Rather these corridors can be described as Context Sensitive Corridors that balance the needs of all users in developing an ultimate vision for the future of the corridor.

Recommendations are classified as short-term or long-term depending on their implementation time frame. Short-term recommendations are typically designed for implementation within a five-year time frame. They are generally, though not always, confined to the existing right-of-way and include projects which can be constructed relatively quickly. In some instances however right-of-way corner clips may be required to implement short-term recommendations. Right-of-way corner clips are usually obtained in order to allow room for the roadway turning radius, sidewalk, ADA

ramps and utilities. Funding may not be immediately available for implementation of all short-range improvements and additional prioritization within this category may be necessary.

Long-term improvements (10 or more years) require more implementation time with more extensive engineering, acquisition of right-of-way, negotiation with property owners, funding, and investment from other entities. Cost is a factor in the classification of improvements and as such, roadway reconstruction projects are typically classified as long-term. However, areas of particular need along both the Burnet and North Lamar corridors were identified for the short-term implementation of roadway reconstruction projects. These locations are Koenig Lane to Anderson Lane on Burnet Road, and Rundberg Lane to Braker Lane on North Lamar Boulevard. Recommendations identified for the Burnet and North Lamar Corridors include corridor-wide improvements as well as improvements specific to the character areas identified along each corridor. Corridor-wide improvements include traffic signal retiming, bus shelters, street lighting, raised medians, bicycle lanes, storm drainage, and shade trees among others. In the following sections, the discussion of corridor-wide improvements will precede the discussion of character area-specific improvements.

SHORT-TERM CORRIDOR-WIDE IMPROVEMENTS

TRAFFIC SIGNAL ENHANCEMENTS

Various enhancements are recommended for improved traffic signal operation to facilitate both vehicular and pedestrian flow.

Vehicular Timing Parameters

This program recommends that in the short term, traffic signals along both Burnet Road and North Lamar Boulevard be retimed to provide better vehicular traffic coordination and flow. For example, public input was received about the section of North Lamar Boulevard from Rundberg Lane to Rutland Drive where drivers experience numerous stops due to poor signal coordination. Retiming these signals would improve traffic flow. Traffic signals that are in close proximity to each other benefit from being interconnected so they work together as a coordinated system. Traffic signals such as those along North Lamar Boulevard at Rundberg Lane and Rutland Drive could be interconnected to better facilitate optimized follow of traffic. Based on the analysis conducted for these corridors using Synchro, optimized signal timing without any other improvements could reduce intersection delay by up to 27 percent on Burnet Road during the PM peak hour and up to 11 percent during the AM peak hour. On North Lamar, improvements could be as much as 49 percent during the PM peak hour and 48 percent during the AM peak hour.

Traffic signal timing parameters are dependent on factors such as traffic volume and speed. As traffic volumes change along Burnet Road and North Lamar Boulevard due to traffic growth and redistribution, it will be necessary to retime traffic signals regularly to maintain optimum traffic flow and operation. The Austin Transportation Department optimizes the signal timings on an ongoing basis and this program recommends the timings to be updated along with the implementation of short-term improvements.

Pedestrians

Based on the input from public outreach, in the short term it is recommended that pedestrian crossing signal phases along both corridors be evaluated to determine if there is sufficient crossing time, particularly for the aging and disabled members of the public. The feasibility of implementing leading pedestrian signal intervals and exclusive pedestrian phases should also be evaluated as part of the project implementation phase. These enhancements would improve safety for pedestrians by allowing increased visibility and reducing conflicts with right-turning vehicles. Although exclusive pedestrian phases reduce conflicts for pedestrians, they lead to longer signal cycle lengths and increased delay for all users. Therefore during the design phase of implementation, locations for such improvements should be carefully selected and evaluated. Consideration should also be given to installing pedestrian countdown signals. These signals have the advantage of reducing the number of pedestrians stranded in the intersection and improving pedestrian safety.

TRANSIT FACILITIES

Bus stop amenities vary depending on the number of boardings and alightings. These range from a simple bus stop sign with no furniture, to a bus stop with benches and a shelter. As mentioned previously, 34 percent of bus stops along Burnet Road and 54 percent of bus stops along North Lamar Boulevard have neither a bench nor shelter.

Boarding and alighting data were reviewed for the bus stops along the two study corridors. According to CapMetro's service guidelines, bus stops generating at least 50 daily boardings qualify for a shelter. Bus stops which currently meet CapMetro's boarding/alighting criteria for shelters but do not have one were identified and are summarized in **Table 6-1**. The program recommends City of Austin to coordinate with CapMetro on installing bus stop shelters at the following locations.

Table 6-1: Recommended Bus Stop Shelters

Corridor	On Street	At Street	Direction
Burnet Road	Burnet	Braker	NB
	Burnet	Mahone	NB
	Burnet	Kramer	NB
	Burnet	Teakwood	NB
	Burnet	Braker	SB
	Burnet	Steck	SB
	Burnet	Mc Hale	NB
	Burnet	Ohlen	NB

Corridor	On Street	At Street	Direction
North Lamar Boulevard	North Lamar	Masterson	SB
	North Lamar	Masterson	NB
	North Lamar	Carpenter	NB
	North Lamar	Braker	NB
	North Lamar	Braker	SB
	North Lamar	Longspur	SB
	North Lamar	Rutland	NB
	North Lamar	Kramer	NB
	North Lamar	Cooper	NB
	North Lamar	Kramer	SB
	North Lamar	Howard	SB
	North Lamar	Parmer	SB
	North Lamar	Longspur	NB
	North Lamar	Meadows	SB
	North Lamar	Indian Mound	NB
	North Lamar	Applegate	NB

CLEAR PEDESTRIAN ZONE

Auto-oriented businesses such as repair and collision shops, and car sales lots are common along the Burnet and North Lamar corridors. Many of these businesses have vehicles parked on the sidewalk, or due to poorly placed wheel stops have the fronts and backs of vehicles suspended over the sidewalk area, blocking the pedestrian pathway. In the short term the City should work with business owners to remove these encroachments in priority locations. Other encroachments such as signage and landscaping should also be removed. In the long term, the City should develop standards to regulate the placement of parking space wheel stops. This would minimize or eliminate the incidence of parked cars protruding over sidewalks and blocking the pedestrian pathway.

STREET LIGHTING

Concerns were raised by members of the public about poor lighting along various sections of both Burnet Road and North Lamar Boulevard. Neighborhood plans in the North Lamar Boulevard area identify the fear that pedestrians have of being out when it gets dark. Poor lighting and the associated incidence of crime contributes to the safety concerns of residents along these corridors. This condition particularly affects non-motorized transportation users in a negative way. Pedestrians and bicyclists feel less safe traveling the corridor, and transit users feel less safe walking to and from bus stops, as well as waiting at those bus stops. It is recommended that in the short term, street lighting for the entirety of both corridors be evaluated in detail and upgraded to current safety standards where deficiencies exist.

BICYCLE LANES

From the public responses, bicycle lane is one of the improvements that received strong support. A more connected bicycle network could also make transit users feel more confident riding bicycles to transit stops, and therefore could increase the catchment areas and ridership. The 2009 Austin

Bicycle Master Plan specifies 5-foot bicycle lanes for the prevailing conditions on Burnet Road and North Lamar Boulevard. Based on the "high" volumes (over 10,000 ADT) and posted speeds, a 5-foot bicycle lane, separated by a lane stripe and measured to the face of curb is the minimum facility recommended by the Federal Highway Administration. In the short term bicycle lanes are recommended along most of the two corridors where sufficient existing pavement width exists and where roadway reconstruction (with exclusive bicycle facilities) is not being recommended. If enough additional space is available, buffered bicycle lanes could be installed in the short term to improve the level of comfort for cyclists.

LONG-TERM CORRIDOR-WIDE IMPROVEMENTS

ROADWAY RECONSTRUCTION

One improvement that is common to both Burnet Road and North Lamar Boulevard in the long term is roadway reconstruction to **provide a consistent curbed roadway with appropriate storm drainage and better facilities for pedestrians and bicyclists**. For both Burnet Road and North Lamar Boulevard, the proposed **roadway pavement would typically comprise four vehicular travel lanes, a raised median with shade trees, and a cycle track**. Along Burnet Road from US 183 to MoPac, there would also be two exclusive BRT lanes in the middle of the corridor, and on-street parking.

RAISED MEDIANS

For most of Burnet Road and the entire length of the North Lamar Boulevard corridor, the existing two-way left-turn lane should be replaced with a raised median. Full median openings will be limited to signalized intersections and most public streets. Directional openings allowing left-turns but not cross-traffic are recommended at various locations along both corridors. Left-turn bays (with raised curb) are recommended where left-turn lanes are currently striped. Installation of a raised median will require some drivers to execute u-turn maneuvers for access and egress. U-turns will be accommodated at most median openings. Due to constrained rights-of-way, it may be necessary during final design to identify locations where u-turns cannot be accommodated due to right-of-way constraints.

BICYCLE FACILITIES

Recommendations for bicycle improvements along Burnet Road and North Lamar Boulevard include cycle tracks, bicycle signal heads, and two-stage turn queue boxes.

Cycle Tracks

In the long term, a minimum of 8-foot cycle tracks are recommended for the entire length of both Burnet Road and North Lamar Boulevard. Cycle tracks may be either at-grade (and separated by pavement striping, raised pavement markers, bollards, or other physical barriers) or they may be grade-separated. The configuration of cycle tracks will be determined during the design of recommended improvements. There are a variety of conditions that will inform the design choice including available right-of-way, drainage operations, driveway conflicts, and others. Cost is also a factor, especially in determining priorities for location of cycle tracks along these corridors, which are between five and six miles in length.

In determining the nature of bicycle facilities on Burnet Road and North Lamar Boulevard , the goal is provide the widest possible facility, 7-foot or 8-foot operational space and 2-foot to 3-foot buffer, preferably a raised median. If this ultimate facility is not possible, a cycle track with a minimum 8-foot total width and either raised with mountable curb or at-grade with a striped buffer are the next choices. The guiding principle is to make these corridors as safe, comfortable and inviting to potential bicyclists as possible.

Conflict Areas

Pavement striping at conflict points between vehicles and bicycles is important in order to reduce the potential for crashes. Such conflict areas include intersections and ramp diverge areas, particularly those with high vehicular volumes. Of particular note are Anderson Lane, US 183, and Braker Lane along Burnet Road; and Rundberg Lane, Braker Lane, Kramer Lane, and Parmer Lane along North Lamar Boulevard. Rather than terminating bicycle lane striping upstream of an intersection, it is recommended that bicycle lane striping be carried through the intersection.

Intersections

Consideration should be given to providing either bicycle signal phases or two-stage turn queue boxes along the Burnet and North Lamar corridors to facilitate left-turn maneuvers for cyclists. Although exclusive bicycle phases reduce conflicts for cyclists, they lead to longer signal cycle lengths and increased delay for all users. Therefore during the design phase of implementation, their use should be further analyzed and evaluated, and locations for such improvements carefully selected.

BUS PULLOUTS

A bus pullout is a designated space that allows buses to pick up and drop off passengers without blocking through traffic. One of the problems associated with bus pullouts is the difficulty that bus drivers may have in rejoining the traffic flow after a stop. This problem is associated primarily with nearside bus stops. Locating bus stops on the far side of the intersection eliminates this problem and allows buses to join the traffic stream when through traffic stops on red. It is recommended that bus pullouts be utilized along the Burnet and North Lamar corridors for BRT stops and that those stops be located on the far side of signalized intersections. **Figure 6-1** is a conceptual representation of a bus pullout.

Figure 6-1: Potential Bus Pullout Concept

STORM DRAINAGE

Poor drainage is currently a problem for most of the Burnet and North Lamar corridors. Storm drain pipes sized based on the long-term need for these two corridors have been identified and vary from 18 inches to 60 inches in diameter. Details of the conceptual storm water drain improvements are provided in **Appendix D**.

STREETSCAPE FURNISHINGS

The use of vehicular and pedestrian pavers is recommended along the Burnet and North Lamar corridors. These may be used at intersections and driveways and are discussed more in the section of this chapter dealing with specific improvements for identified character areas. In addition to adding to the character of an area, pavers can raise driver awareness through increased noise and vibration[19]. New techniques have been developed to improve installation so as not to negatively impact pedestrians who walk or use wheelchairs.

Appropriate considerations for design, installation, and maintenance of pavers should be identified in the design phase of implementation. Although pavers have several advantages, they must be regularly maintained to ensure that they are in good condition to provide intended functions. City of Austin has to take special care to the streetscape furnishings to maintain them in good condition. Also, depending on paver type, they might be more expensive to install than traditional asphalt/concrete surfaces. Streetscape furnishings recommended for the two corridors are associated with CapMetro bus stops. Other furnishings include bicycle racks, bollards, and banner poles.

Bicycle Parking

Standard bicycle racks are the Inverted-U shape designated by the City of Austin in their standard details. These might be placed adjacent to bus stops in the street tree/ furniture zone based on Capital Metro's data on boardings and alighting. The City of Austin requires new development to provide sufficient bicycle parking. The quantity of bicycle racks required depends on development size and density.

Bicycle Racks

Bollards

Bollards can be useful for protection of streetscape improvements from adjacent private property construction. They may also be needed to protect nearby utility poles. Bollards need to be durable and able to withstand being hit by trucks, repair, and delivery vehicles. The style of the bollards needs to fit within the design vocabulary of the streetscape. Placement of bollards should be based on the 7-foot pedestrian clear zone requirements recommended in this program.

19 *http://safety.fhwa.dot.gov/ped_bicycle/univcourse/pdf/swless15.pdf, accessed February 2012*

Banner Poles

Two types of banner poles are recommended for the corridors: poles for horizontal banners and poles for vertical banners. At the heart of each corridor, horizontal banner poles are recommended at the major intersections for festival banners strung across the roadway. Horizontal poles could be installed at gateway intersections and vertical poles for various sections to promote the diversity of unique character of surrounding neighborhoods. Spacing for poles and their incorporation into a design theme that includes pedestrian lighting should be determined during the design phase for recommended corridor improvements.

Banner

SHADE TREES

Shade is a vital part of the walking environment, and is of particular importance due to the hot and humid conditions in Austin. In the same way that motorists are protected from the sun, heat, rain and wind, people without access to vehicles need as much protection from the elements as possible. It is recommended that shade trees be planted along the Burnet and North Lamar corridors with special attention to areas with high volume pedestrian activity.

Because water and other natural resources are scarce, it it crucial to plant trees in a more environmentally friendly way. The concept of sustainable landscaping is that it should include an attractive environment that is in balance with the local climate and requires minimal resource inputs, such as fertilizer, pesticides, gasoline, time, and water[20].

Therefore, the types of shade trees must be considered to be compatible with Austin's climate, so that they would require less resources to maintain and be less prone to pest infection. Drought tolerant trees should be used so that less water is required. The application of nutrients and watering work should be carefully managed so that energy would be saved and plants would be better maintained.

ROUNDABOUTS

As a part of the proposed recommended improvements, roundabouts were considered for installation along Burnet Road and North Lamar Boulevard at various intersections. These locations were selected due to conditions such as closely spaced intersections, intersections with angled approaches, and heavy turning traffic volumes. A planning level screening was performed to determine the feasibility of installing roundabouts at the following intersections:

- Burnet Road at Buell and Ohlen Street
- Burnet Road at Burnet Lane and Cullen Boulevard
- North Lamar Boulevard at Rundberg Lane
- North Lamar Boulevard at Payton Gin Road
- North Lamar Boulevard at Howard Lane

20 *Klett, J.E. and Cummins, A., Sustainable Landscaping, Colorado State University Extension, 2011, http://www.ext.colostate.edu/pubs/garden/07243.pdf, accessed December 2013*

Selection and design of a roundabout, as with any intersection treatment, requires the balancing of competing objectives. These range from transportation-oriented objectives like safety, operational performance, and accessibility for all users to other factors such as economics, land use, aesthetics, and environmental aspects.

A basic question that needs to be answered at the planning level is how many lanes are required in a roundabout to serve the traffic demand. The number of lanes not only affects the capacity of the roundabout but also its size. NCHRP Report 672 – Roundabouts, An Informational Guide (2nd edition) provides planning-level considerations for the purpose of the initial screening of roundabout feasibility. It is estimated that a single-lane roundabout operates acceptably with approximately 17,000 vehicles per day, with a capacity of approximately 26,000 vehicles per day. Similarly, a double-lane roundabout operates acceptably with approximately 31,000 vehicles per day, and has a capacity of approximately 46,000 vehicles per day. Based on traffic counts conducted for this program, and provided in **Appendix E**, Burnet Road and North Lamar Boulevard have between 32,000 and 42,000 vpd at the locations evaluated for roundabouts, with the exception of North Lamar Boulevard at Howard Lane. Such volumes indicate that a double-lane roundabout would be more appropriate than a single-lane roundabout.

An initial estimate of the space (footprint) required for a roundabout is a consideration for a given location. A roundabout on a corridor such as Burnet Road or North Lamar Boulevard would need to accommodate large trucks (such as WB-50 or WB-67 tractor-trailer combinations). The key indicator of the required space is the inscribed circle diameter. The inscribed circle diameter is the sum of the central island diameter and twice the circulatory roadway width. Generally, the inscribed circle diameter of a double-lane roundabout ranges from 150 to 250 ft. With the exception of the North Lamar Boulevard at Howard Lane location, there isn't sufficient right-of-way to construct a double-lane roundabout without acquiring private property, including some parking spaces at intersections.

Therefore, based on planning level feasibility, the location found to be most feasible for a roundabout is the intersection of North Lamar Boulevard at Howard Lane. A roundabout at this location would provide for a connection in both directions between North Lamar Boulevard, IH 35, and Howard Lane. Additional details for this potential roundabout are provided later in this chapter.

CONCEPTUAL LAYOUTS AND CROSS-SECTIONS

Conceptual layouts of short- and long-term improvements and detailed exhibits illustrating the relationship between recommended roadway cross-sections and existing roadway cross-sections (obtained through field survey at select points along the Burnet and North Lamar corridors) are provided in **Appendix A.**

BURNET CHARACTER AREA IMPROVEMENTS

As mentioned previously in the report, the intensity and the physical character of development vary along Burnet Road. Four character areas were identified as a way to divide the corridor into segments within which the nature and character of development is similar. This approach facilitates the development of improvements that are context sensitive and account for the unique variation in character along each corridor. The preceding section discussed improvements that were common to the both corridors as a whole. Details of prioritized improvements for each Burnet corridor character area are described in the following sections.

BURNET ROAD: KOENIG LANE TO ANDERSON LANE

This character area has a relatively high amount of pedestrian traffic, due to the unique mix of residential land uses and traffic generators such as the Lamar Middle School, H-E-B, and Northcross Mall. Roadway reconstruction is not typically a short-term recommendation. However, given the unique safety and mobility issues in this area, this is recommended for this character area. Total roadway reconstruction would allow for better accommodation for bicycles and pedestrians, improved vehicular mobility, and a new storm drain trunk line approximately 18 to 42 inches in diameter on one side of the roadway.

Roadway Cross-Section

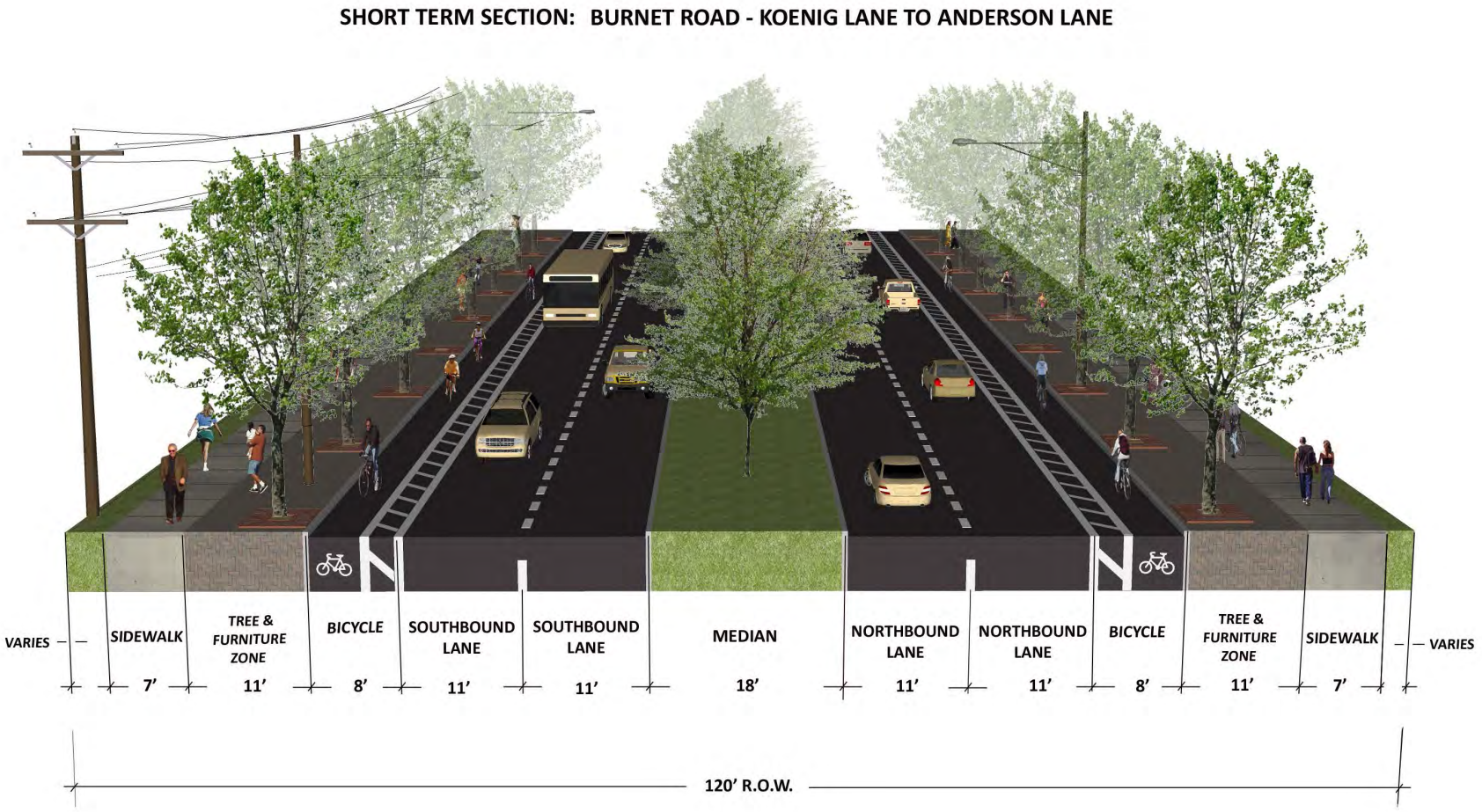
The roadway pavement would include four 11-foot lanes for vehicular travel, one 8-foot cycle track in each direction, and an 18-foot median with shade trees. The 11-foot wide street tree/furniture zone would include shade trees in tree grates within a pedestrian paver strip. It is recommended that the 7-foot wide sidewalk have a slightly textured "picture frame" finish, with a troweled frame and broom finish field. The recommended cross-section would fit within the existing right-of-way, with minimal impacts to existing overhead utilities. **Figure 6-2** illustrates the proposed cross-section for this area.

The Koenig Lane and Anderson Lane intersections are considered gateways to this character area and it is recommended that vehicular pavers be used for crosswalks and pedestrian paver landings be installed at the corners. Other intersections in the character area would only have vehicular pavers at crosswalks. Vehicular pavers are also recommended for driveway crossings.

Pedestrian Crossings

Pedestrian crossings with pedestrian hybrid beacons are proposed for two locations in this character area. The first is at the intersection of Twin Oaks Drive, and the second at the Northcross Mall South Entrance. It is proposed that these pedestrian crossings also have vehicular paver crosswalks, pedestrian paver landings, and landscape enhancements. **Figure 6-3** illustrates the potential pedestrian crossing treatment.

Figure 6-2: Koenig Lane to Anderson Lane



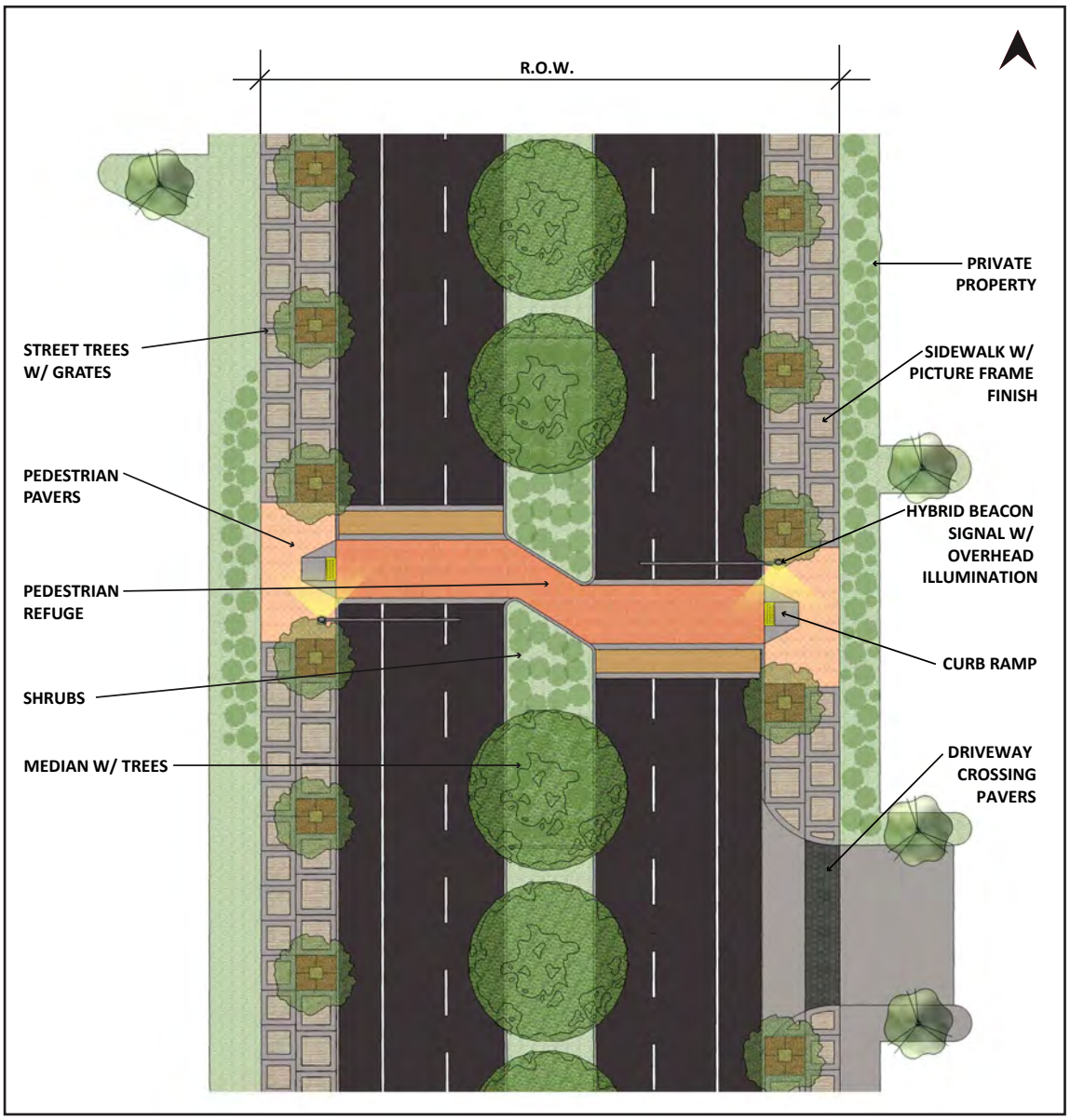
Bus Stop Relocation

This program recommends the relocation of the Burnet/Romeria bus stop closer to the proposed crossing with pedestrian hybrid beacon at Twin Oaks Drive. Relocating the bus stop to this location would improve safety and convenience for pedestrians.

Driveway Consolidation

The driveway density for this character area is approximately 41 driveways per mile in the southbound direction and 38 per mile in the northbound direction. It is recommended that opportunities be explored during the design phase to reduce driveway density to a maximum of 22 driveways per mile. This lower density is considered optimal for vehicular, pedestrian, and bicycle mobility.

Figure 6-3: Potential Pedestrian Crossing Treatment



Koenig Lane and Anderson Lane Intersection Improvements

Turn bays

Additional turn bays are recommended for the intersection of Burnet Road at Koenig Lane to improve the flow of traffic. Right-turn bays are recommended for the eastbound and westbound intersection approaches. It is also recommended that the existing southbound left-turn storage be increased to 250'.

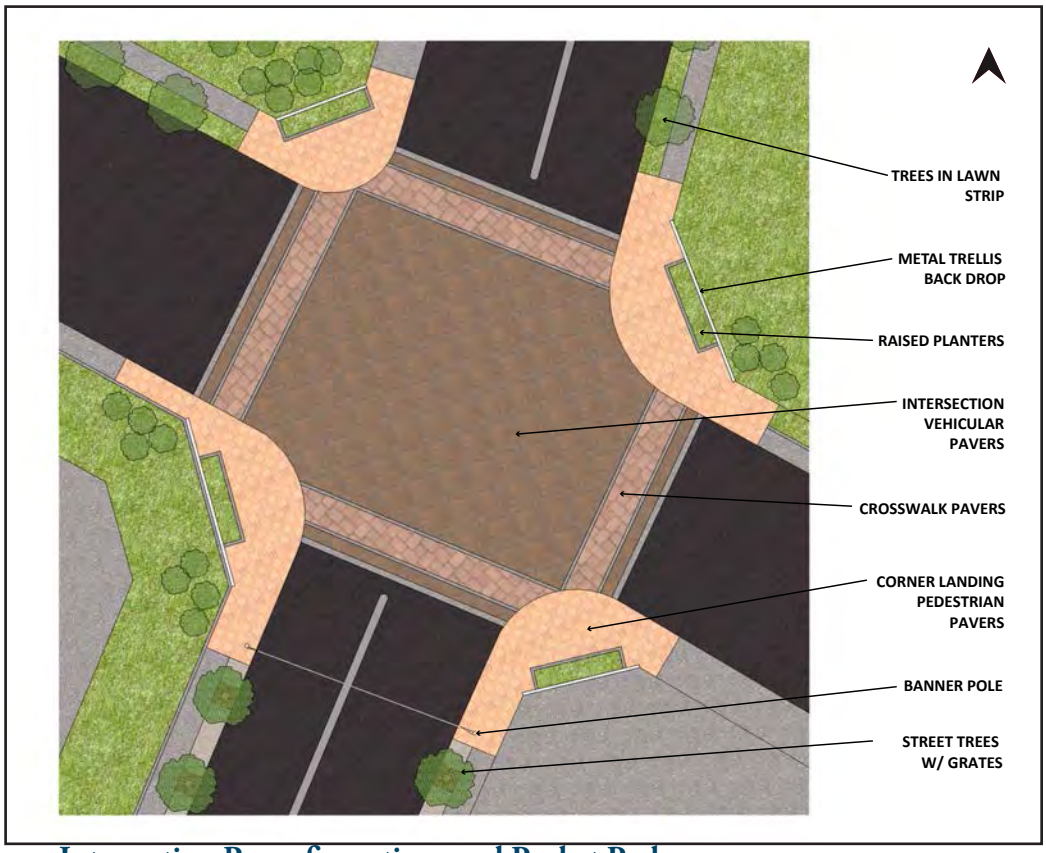
Pedestrian Signal Enhancements

As mentioned in the previous section on corridor-wide improvements, it is recommended that pedestrian signal timing parameters be re-evaluated during project implementation to ensure adequate time for pedestrians, particularly the aged and those in wheelchairs. Also, the feasibility of implementing leading pedestrian signal intervals and exclusive pedestrian phases should be evaluated at that time.

Gateway Treatments

The intersection of Burnet Road at Anderson Lane has been identified in neighborhood plans as the "Gateway to Burnet". Proposed urban design improvements, illustrated in **Figure 6-4**, to achieve this goal include patterned vehicular paver crosswalks, paver field in the intersection, and pedestrian paver landings at the corners. At each corner, gateway elements of metal trellis backdrops and raised planters would bring consistency to divergent treatments on the adjacent private properties. The gateway treatment might also include some public art. Banner poles are proposed on either side of the street to support a horizontal banner for business/neighborhood events such as a "Sustainable Neighborhoods Festival". These banner poles would be located on the south side of the Anderson intersection. The Burnet Road at Koenig Lane intersection is the "gateway" on the southern end of this character area and would therefore have a similar treatment as the Anderson Lane intersection, with pavers, raised planters, trellis backdrops, and banner poles. At this intersection, the banner poles would be located on the north side of the intersection. In this way, the horizontal banners at the two gateways would "book end" a festival event. Implementation of the mobility and urban design enhancements will require acquisition of right-of-way corner clips. Other considerations for the detailed design phase of project implementation include the possible relocation of utility poles and wires, traffic control boxes, and utility boxes and reconstruction of existing retaining walls.

Figure 6-4: Potential Gateway Concept for Anderson Road



Intersection Reconfigurations and Pocket Parks

This program recommends that two intersections along Burnet Road (at Burnet Lane and at Cullen Avenue) be reconfigured to eliminate the existing skewed approaches, as illustrated in **Appendix A (**Burnet Road Sheet 2 of 12). The southern Burnet Lane approach would be realigned so that it is perpendicular to Burnet Road. The northern Burnet Lane approach would be terminated and vehicular access to Burnet Road eliminated. At Cullen Avenue, Burnet Lane is proposed to be terminated by a pocket park allowing bicycle and pedestrian access, but no automobile access.

These roadway reconfigurations would provide opportunities for three pocket parks. These pocket parks could have raised planters, pedestrian pavers, and ornamental fencing buffers at the line between the right-of-way and private property. The pocket parks might also be good locations for public art. Pocket parks often require turf and landscape plantings to promote enough shade and include amenities such as benches, lighting, and trash bins. Although these parks would increase maintenance labor of the Austin Parks and Maintenance Department, the installation of pocket parks creates a better sense of place and recreational utility for the local residents.

In the long term, the Burnet Lane section between the pocket parks could become a pedestrian/bicycle friendly street lined with boutique shops and outdoor cafes. Automobiles would continue to have access, but pedestrians and bicycles would be the dominant transportation mode.

BURNET ROAD: ANDERSON LANE TO US 183

Short-Term Improvements

Short-term improvements between Anderson Lane and US 183 include bicycle lanes, sidewalk improvements, and bus stop relocation.

Bicycle Lanes

The City of Austin is planning to restripe Burnet Road to provide two 5-foot bicycle lanes, four 10-foot travel lanes, and a 10-foot two-way left turn lane. That project is funded and is to be implemented in the spring of 2012.

Pedestrian Facilities

Short-term improvements identified as part of this corridor development program include 7-foot sidewalks along both sides of the road in sections where there are no existing sidewalks. There are some sections that currently have sidewalks, typically four feet on the either side of the road. While these do not conform to the new standard 7-foot width, the short-term priority is to install missing sidewalk segments and upgrade existing sidewalks as part of a later phase. Crosswalks at existing signalized intersections should be restriped. Pedestrian crossings with pedestrian hybrid beacons and painted crosswalks are proposed at Ashdale Drive, Shamrock Avenue and between Polaris Avenue and US 183.

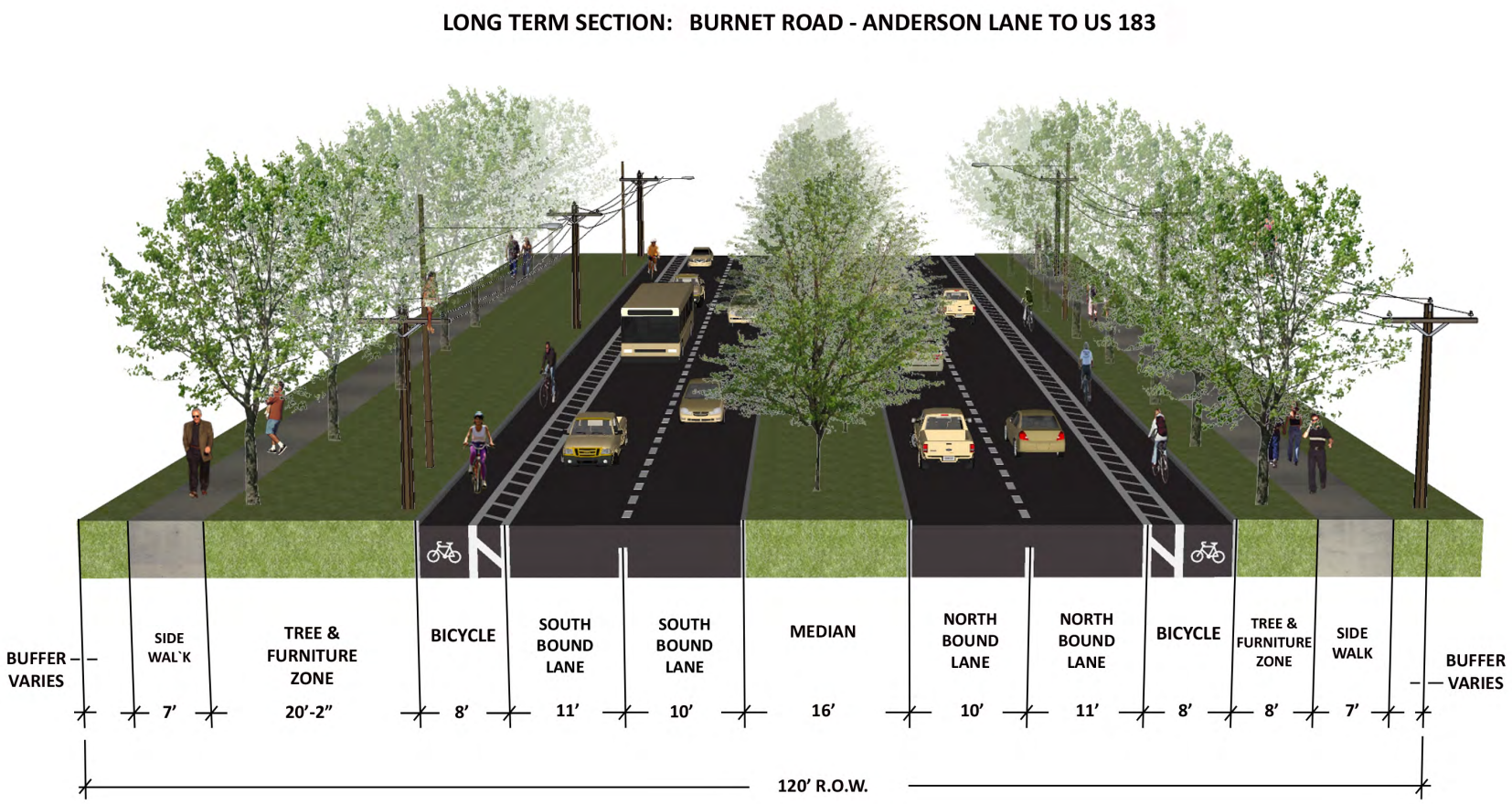
Bus Stop Relocation

This program recommends the relocation of the Burnet/Teakwood bus stop closer to the proposed crossing with pedestrian hybrid beacon at Ashdale Drive. Relocating the bus stop to this location would improve safety and convenience for pedestrians.

Long-Term Improvements

Long-term recommendations for this section of Burnet Road from Anderson Lane to US 183 include the total reconstruction of the roadway, providing a 74-foot pavement. The roadway pavement would include one 8-foot cycle track in each direction, two 11-foot outside travel lanes and two 10-foot inside travel lanes. Reconstruction would also include a 16-foot raised median with shade trees. A new storm drain trunk line approximately 36-60 inches in diameter is required on one side of the roadway. A minimum 8-foot street/tree furniture zone would be installed on both sides with shade trees in a lawn strip. The intersection of Burnet Road at US 183 would have patterned vehicular paver crosswalks, a paver field in the intersection, and pedestrian paver landings at the corners. Minor intersection crossings would only have vehicular pavers at the crosswalks. All driveway crossings would have vehicular pavers. When the roadway is reconstructed, pedestrian crossings (with pedestrian hybrid beacons) should be constructed with pavers and landscape enhancements as shown in Figure 6-3. The driveway density for this character area is approximately 28 driveways per mile on the southbound side of the roadway and 53 per mile on the northbound side. It is recommended that opportunities be explored during the design phase to reduce driveway density to no more than 22 driveways per mile. This lower density is considered optimal for vehicular, pedestrian, and bicycle mobility. **Figure 6-5** illustrates the proposed long-term section for this character area.

Figure 6-5: Anderson Lane to US 183



Short-Term Improvements

Short-term improvements between US 183 and Braker Lane include bicycle lanes, side walk improvements, bus stop relocation, and turn lane improvements.

Bicycle Lanes

It is recommended that in the short term, the existing pavement, where there is adequate width, be restriped to accommodate bicycle lanes. Existing travel lanes would be striped to provide 10-foot travel lanes and a minimum of 12 feet for the two-way left-turn lane. Between US 183 and Longhorn Boulevard, there is sufficient existing pavement width to accommodate 5-foot bicycle lanes. However, between Longhorn Boulevard and Braker Lane, the bicycle lanes would need to be reduced to four feet in order to fit. This reduced bicycle lane width is for sections with shoulders and is not to be used in curb-and-gutter sections as the pavement width would not be sufficient.

Pedestrian Facilities

New 7-foot sidewalks are recommended for both sides of the roadway at locations where there are currently no sidewalks. Where possible, these sidewalks are to be constructed consistent with where they would be located when the roadway is reconstructed in the long term. As such, where they are currently missing, sidewalks would be constructed outside the existing right-of-way. As stated in the North Burnet Gateway Regulation Plan (section 3.2.B. Sidewalks) the sidewalks shall be located along both sides of the roadway. The minimum width requirement shall apply regardless of the available ROW. Where required, the sidewalk shall extend onto private property to fulfill the minimum requirement, with a sidewalk easement provided.

Any obstructions on sidewalks at these locations would need to be removed. Additionally, negotiations would be needed for easements or agreements in order for these streetscape elements to be constructed on what is currently private property. A mid-block crossing with a pedestrian hybrid beacon and painted crosswalk is proposed between Mc Hale Court and Braker Lane.

Bus Stop Relocation

This program recommends the relocation of the Burnet/Braker bus stop closer to the Burnet Lane intersection. Relocating the bus stop to this location would improve safety and convenience for pedestrians.

Intersection Improvements

Dual left-turn lanes are recommended for the eastbound and westbound Braker Lane approaches at Burnet Road. Also, a right-turn bay is recommended for the eastbound approach. These turn lane improvements would improve traffic operations for vehicles at this intersection. Crosswalks at all signalized intersections should be restriped.

Long-Term Improvements

A vision for the long-term roadway cross-section for this area was developed as part of the North Burnet Gateway Master Plan. That vision includes exclusive Bus Rapid Transit (BRT) lanes, on-street parking, and bicycle lanes. The essence of that vision served as a building block for the long-term recommendations for this section of Burnet Road from US 183 to Braker Lane.

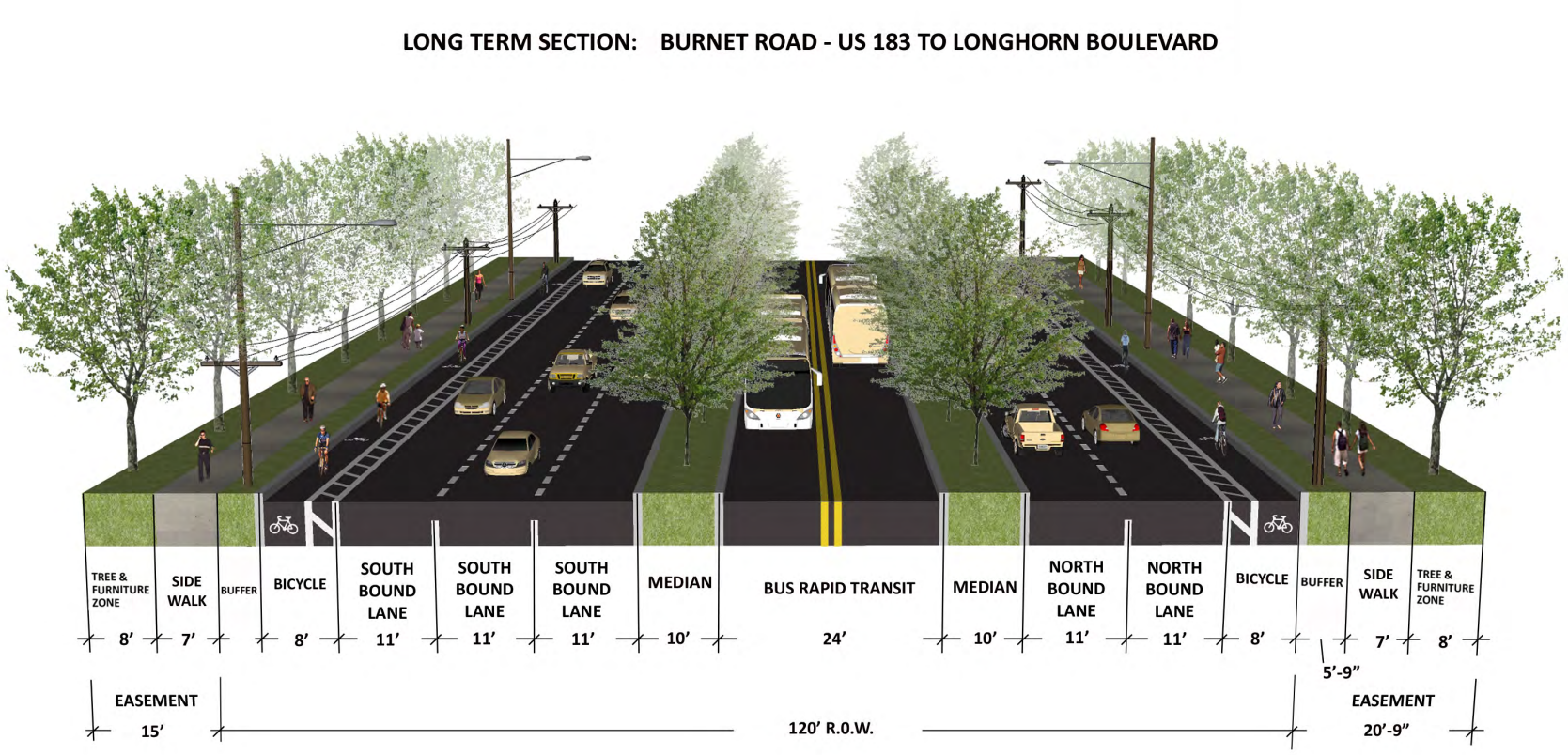
Roadway Cross-Section

In the long term, consistent with the North Burnet Gateway Master Plan and Regulating Plan for the North Burnet/Gateway Zoning District, it is recommended that this section of Burnet Road be reconstructed to provide additional pavement and sidewalks. The long-term pavement cross-section would comprise two 12-foot exclusive BRT lanes, four 11-foot travel lanes, raised medians with shade trees, and an 8-foot cycle track in each direction. The section of roadway between US 183 and Longhorn Boulevard currently has three southbound lanes, which should be maintained in the future. Portland Cement Concrete (PCC) pavement is recommended for consideration as an alternative for the future BRT lanes. On-street parking is recommended for the section between Longhorn Boulevard and Braker Lane, but not between US 183 and Longhorn Boulevard due to insufficient ROW. A new storm drain trunk line approximately 24-54 inches in diameter is proposed along one side of the roadway.

An 8-foot street tree/furniture zone is recommended for both sides of the roadway in the long term, along with 7-foot sidewalks. The standard configuration is for the street tree/furniture zone to be located between the roadway pavement and the sidewalk. Due to existing overhead utility conflicts in the area between US 183 and Longhorn Boulevard, it is recommended that this configuration be reversed for this area. As with previous character areas, major signalized intersections such as Braker Lane would have patterned vehicular paver crosswalks, a paver field in the intersection, and pedestrian paver landings at the corners. Also, as with other character areas, minor intersection crossings would only have vehicular pavers at the crosswalks and driveway crossings would have vehicular pavers. The mid-block crossing would also have pavers and landscape enhancements. In order to accommodate the increased roadway pavement width, the required streetscape, and overhead utilities, additional right-of-way would need to be acquired.

Figure 6-6 illustrates the proposed long-term section for this character area. It should be noted that **Figure 6-6** shows three southbound travel lanes, consistent with the existing cross-section between US 183 and Longhorn Boulevard which was surveyed as part of this project. The recommended cross-section between Longhorn Boulevard and Braker Lane is similar, with the exception of the two southbound lanes and on-street parking.

Figure 6-6: US 183 to Longhorn Boulevard



Driveway Consolidation

The driveway density for this character area is approximately 10 driveways per mile on the southbound side of the roadway and 23 per mile on the northbound side. No driveway consolidation is recommended for this character area. However, consideration should be given during the approval of future driveway permits to maintaining a maximum density of 22 driveways per mile.

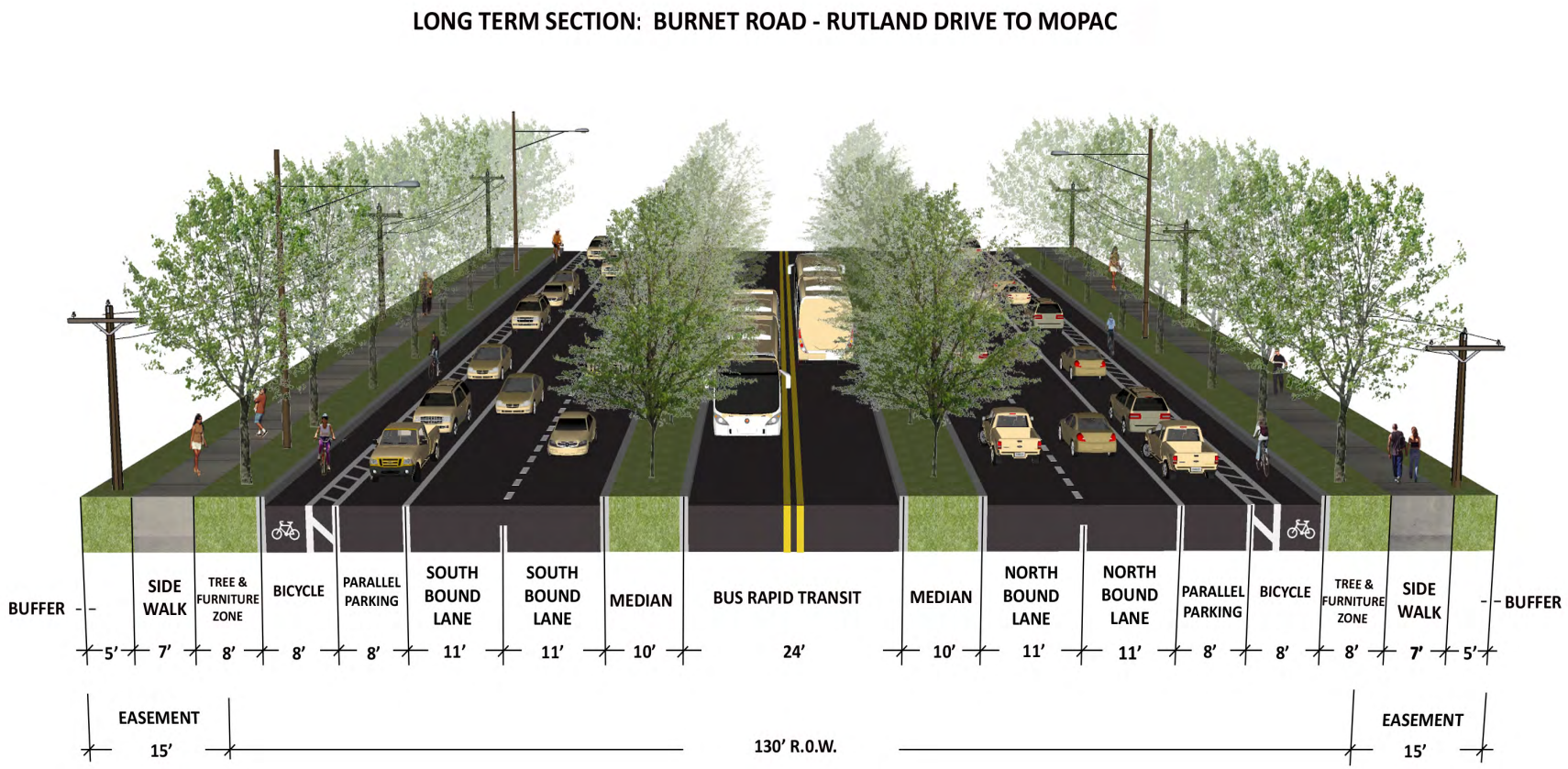
Intersection Improvements

Dual left-turn lanes are recommended for the northbound and southbound Burnet Road approaches at Braker Lane and Burnet Road at Kramer Lane. These turn lane improvements would improve traffic operations for vehicles at this intersection. Crosswalks at all signalized intersections should be restriped.

Intersection Reconfigurations and Pocket Parks

It is recommended that the McNeil Road approach at Burnet Road be reconfigured to eliminate the existing skew, as illustrated in **Appendix A** (Burnet Road Sheets 7 and 8 of 12). This roadway reconfiguration would provide opportunities for three pocket parks with raised planters, pedestrian pavers, and ornamental fencing buffers. As with the other pocket parks identified previously, public art may be displayed here.

Figure 6-7: Rutland Drive to MoPac



BURNET ROAD: BRAKER LANE TO MOPAC

Short-Term Improvements

Unlike other sections of Burnet Road, the existing roadway pavement is not wide enough to restripe to accommodate bicycle lanes in the short term. Short-term improvements in this section include the restriping of signalized intersection crosswalks and 7-foot sidewalks on both sides of the roadway where there are currently no sidewalks. Where possible, new sidewalks should be located consistent with where they would be in the long term after the roadway is reconstructed. This would require some right-of-way acquisition and the removal of obstructions where sidewalks would be located.

Long-Term Improvements

Consistent with the vision for this area identified in the North Burnet Gateway Master Plan, the long-term cross-section for Burnet Road between Braker Lane and MoPac includes raised medians with shade trees, exclusive BRT lanes, on-street parking, and bicycle lanes. However the regulating plan states that on-street parallel parking is not permitted along Burnet Road. The portion of Burnet Road in the North Burnet/Gateway planning area is part of the State Highway System (FM1325) and thus under TxDOT jurisdiction. The North Burnet/Gateway Master Plan recommends the City of Austin take ownership of the roadway, and redesign the roadway as an urban transit boulevard. At such time as the City takes over ownership, consideration should be given to permitting parallel parking on Burnet Road.

Major intersections such as Braker Lane, Kramer Lane, and Esperanza Crossing would have patterned vehicular paver crosswalks, a paver field in the intersection, and pedestrian paver landings at the corners. Minor intersection crossings would only have vehicular pavers at the crosswalks and driveway crossings would have vehicular pavers. A new storm drain trunk line approximately 24-42 inches in diameter is required along one side of the roadway.

The driveway density for this character area is approximately three driveways per mile on both sides. No driveway consolidation is recommended for this character area. However, consideration should be given during the approval of future driveway permits to maintaining a maximum density of 22 driveways per mile. The long-term recommendations would require acquisition of additional right-of-way. **Figure 6-7** illustrates the proposed long-term section for this character area. It should be noted that **Figure 6-7** illustrates the section between Rutland Drive and MoPac which was surveyed as part of this project. The recommended cross-section for the rest of the corridor is similar to this with the exception of some variations in right-of-way and utility pole locations.

The four character areas identified along North Lamar Boulevard are US 183 to Rundberg Lane, Rundberg Lane to Braker Lane, Braker Lane to Parmer Lane, and Parmer Lane to Howard Lane (IH 35). Details of prioritized improvements for each character area are described in the following sections

NORTH LAMAR BOULEVARD: US 183 TO RUNDBERG LANE

Short-Term Improvements

Short-term improvements between US 183 and Rundberg Lane include a raised median, lane reconfiguration, and bicycle and pedestrian infrastructure.

Raised Median

It is recommended that the existing 14-foot raised median on North Lamar Boulevard between US 183 and Powell Lane be extended to Meadowlark Street to address the safety concerns due the numerous conflicting movements in that area.

Intersection Improvements

It is recommended that the lane configuration for the eastbound US 183 approach at North Lamar Boulevard be changed to one through, one through/right, and one right-turn lane to provide better traffic operations. The existing lane configuration is one right-turn lane and two through lanes.

It is also recommended that a 10-foot multi-use path be cantilevered off the US 183 bridge structure to provide a much needed connection for pedestrians and bicyclists across US 183.

Bicycle Lanes

This plan recommends that in the short term, the existing pavement width (where there is adequate width) be restriped to accommodate 5-foot bicycle lanes between Thurmond Street and Rundberg Lane. Existing travel lanes would be reduced to 10 feet and the two-way left-turn lane would be a minimum of 12 feet wide.

Pedestrian Facilities

Short-term improvements in this section include the restriping of signalized intersection crosswalks and 7-foot sidewalks on both sides of the roadway where there are currently no sidewalks. Where possible, new sidewalks should be located consistent with where they would be in the long term after the roadway is reconstructed. This would require some right-of-way acquisition and the removal of obstructions where sidewalks would be located. Pedestrian crossings with hybrid beacon signals and painted crosswalks are proposed at Fairfield Drive, Deen Avenue and Cooper Drive.

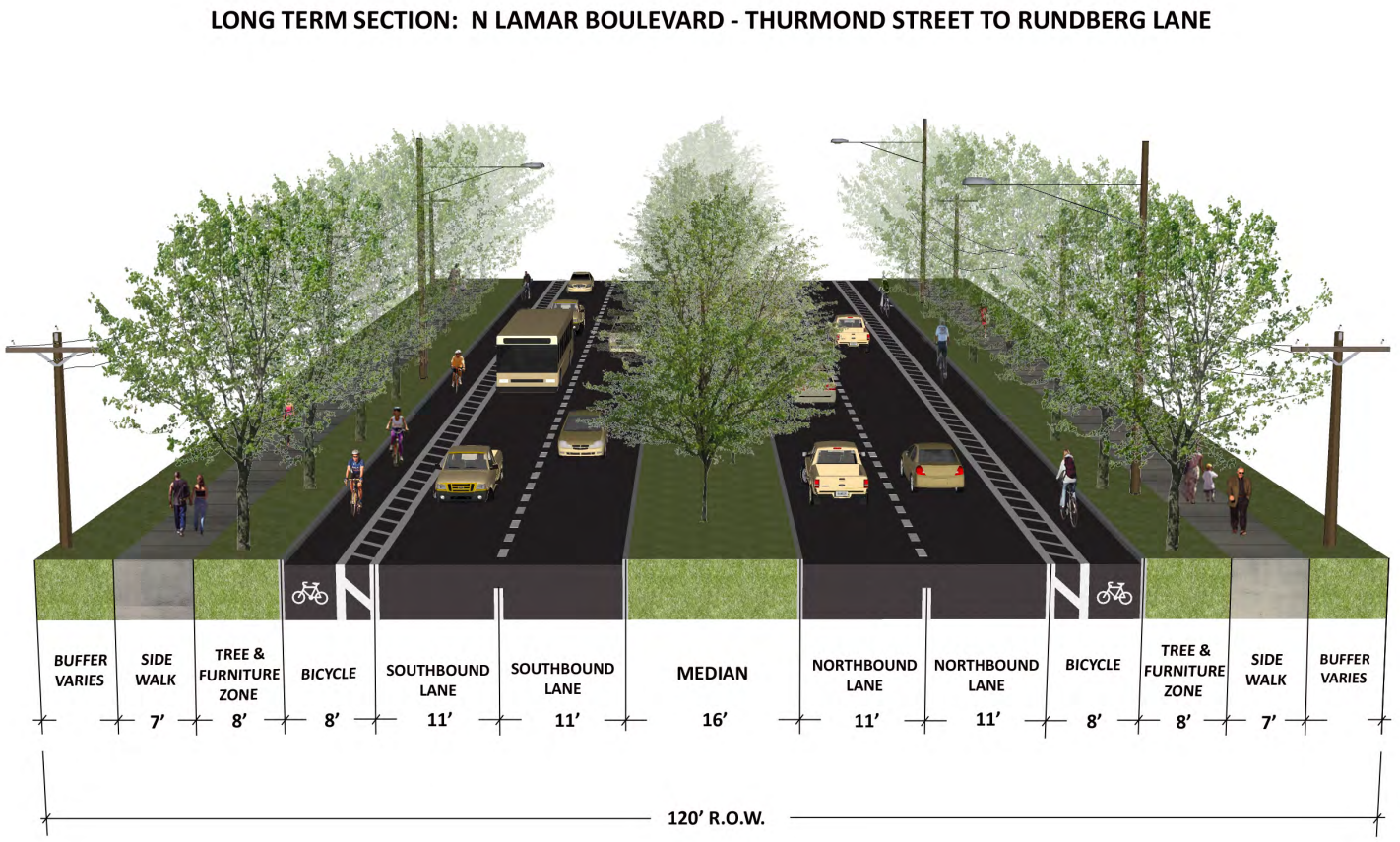
Long-Term Improvements

In the long term, it is recommended that this section of North Lamar Boulevard be reconstructed to provide pedestrian and bicycle facilities. The roadway pavement would include one 8-foot cycle track in each direction and four 11-foot travel lanes. Reconstruction would also include a 16-foot raised median with shade trees. The intersection of Burnet Road at Peyton Gin would have patterned vehicular paver crosswalks, a paver field in the intersection, and pedestrian paver landings at the corners. Minor intersection crossings would only have vehicular pavers at the crosswalks. All driveway crossings would have vehicular pavers.

The driveway density for this character sector is approximately 24 driveways per mile in the southbound direction and 39 per mile in the northbound direction. It is recommended that opportunities be explored during the design phase to reduce driveway density to no more than 22 driveways per mile. This lower density is considered optimal for vehicular, pedestrian, and bicycle mobility.

Figure 6-8 illustrates the proposed long-term section for this character area. It should be noted that **Figure 6-8** illustrates the section between Thurmond Lane and Rundberg Lane, which was surveyed as part of this project. The section between US 183 and Thurmond Lane is a transition area with tapering lanes. However, a similar theme is recommended for that cross-section as well, with the exception of the number of travel lanes and some variations in right-of-way and utility pole locations.

Figure 6-8: Thurmond Lane to Rundberg Lane



NORTH LAMAR BOULEVARD: RUNDBERG LANE TO BRAKER LANE

This character area has a relatively high amount of pedestrian traffic, due to the unique mix of residential land uses and traffic generators such as the H-E-B, China Town and numerous strip shopping centers. Roadway reconstruction is not typically a short-term recommendation. However, given the unique safety and mobility issues in this area, this is recommended for this character area. Total roadway reconstruction would allow for better accommodation for bicycles and pedestrians, improved vehicular mobility, and a new storm drain trunk line approximately 18-48 inches in diameter on one side of the roadway.

Roadway Cross-Section

The roadway pavement would include one 8-foot cycle track in each direction, two 11-foot outside travel lanes and two 10-foot inside travel lanes. Reconstruction would also include an 18-foot median with shade trees. Due to the limitations of the right-of-way in this section and the locations of the overhead utilities, the street tree / furniture zone will need to be reduced to seven feet and will include the addition of utility compatible trees in tree grates within a pedestrian paver strip. This adjustment would allow the recommended cross-section to fit within existing right-of-way, with minimal impacts to existing overhead utilities. **Figure 6-9** illustrates the proposed cross section for this area.

The Kramer Lane, Rundberg Lane and Braker Lane intersections are major intersections in this character area and it is recommended that vehicular pavers be used for crosswalks and pedestrian paver landings be installed at the corners. Other intersections in the character area would only have vehicular pavers at crosswalks. Vehicular pavers are also recommended for driveway crossings.

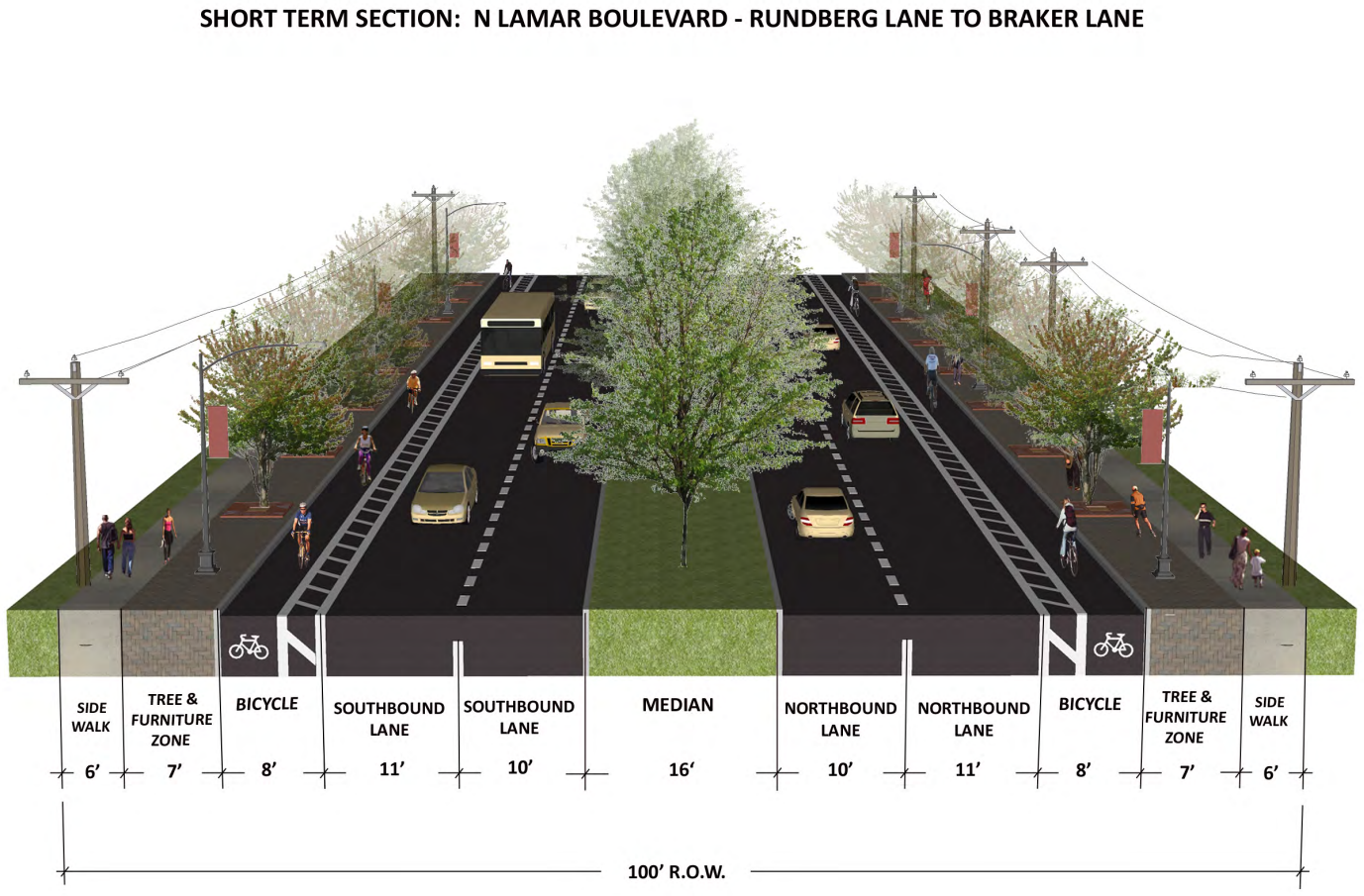
Pedestrian Crossings

Pedestrian crossing opportunities are currently only provided at signalized intersections. The spacing of these intersections is not always conducive for pedestrian mobility and the result is a significant amount of pedestrians darting unprotected across this busy street. Pedestrian crossings with pedestrian hybrid beacons are proposed for two locations in this character area. The first is between Rutland Drive and Longspur Boulevard and the second at the Ferguson Drive intersection. It is proposed that these pedestrian crossings also have vehicular paver crosswalks, pedestrian paver landings, and landscape enhancements.

Driveway Consolidation

The driveway density for this character sector is approximately 38 driveways per mile in the southbound direction and 27 per mile in the northbound direction. It is recommended that opportunities be explored during the design phase to reduce driveway density to a maximum of 22 driveways per mile. This lower density is considered optimal for vehicular, pedestrian, and bicycle mobility.

Figure 6-9: Rundberg Lane to Braker Lane



Rundberg Lane and Braker Lane Intersection Improvements

Turn Bays

Additional dual left-turn lanes are recommended for the eastbound and westbound approachs of North Lamar Boulevard at Rundberg Lane to improve the flow of traffic. To help accommodate the heavy vehicular movements at the intersection of North Lamar Boulevard and Braker Lane, the following additional turn bays are recommended, as illustrated in **Appendix A** (North Lamar Boulevard Sheet 8 of 15).

- Construct northbound and southbound right-turn bays
- Construct westbound right-turn bay
- Construct eastbound and westbound dual left-turn bays

Pedestrian Signal Enhancements

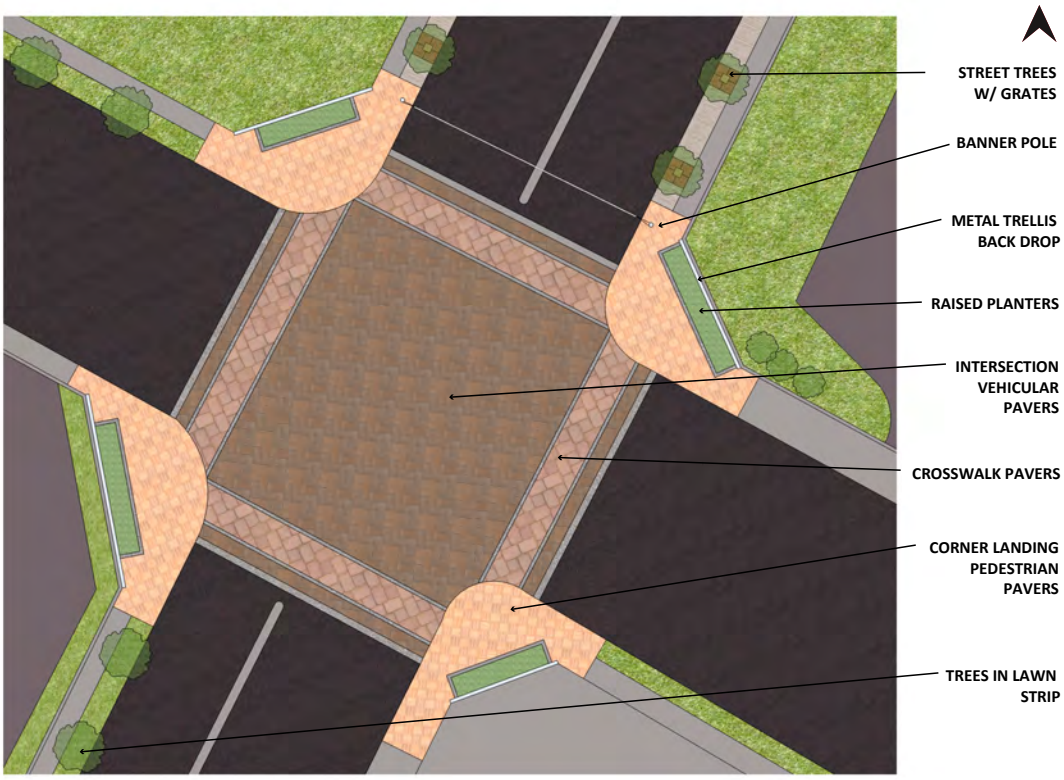
As mentioned in the previous section on corridor-wide improvements, it is recommended that pedestrian signal timing parameters be re-evaluated during project implementation to ensure adequate time for pedestrians, particularly the aged and those in wheelchairs. Also, the feasibility of implementing leading pedestrian signal intervals and exclusive pedestrian phases should be evaluated at that time.

Gateway Treatments

The Rundberg Lane intersection was identified in the neighborhood plans as the "Gateway to North Lamar" and the beginning of the "International Main Street". Proposed urban design improvements include patterned vehicular paver crosswalks, a paver field in the intersection, and pedestrian paver landings at the corners. At each corner, gateway elements of metal trellis backdrops and raised planters bring consistency to divergent treatments on the private properties. Hardy, durable plantings with drip irrigation would ensure a sustainable approach to ROW design. The gateway treatment might also include some public art, In concert with the established international theme, banner poles are proposed on either side of the street to support a horizontal banner for business/neighborhood events such as an "International Main Street Festival". These banner poles would be located on the north side of the Rundberg Lane intersection.

The Braker Lane intersection along North Lamar Boulevard is the "gateway" on the northern end of this character area and would therefore have a similar treatment as the Rundberg Lane intersection, with pavers, raised planters, trellis backdrops, and banner poles. At this intersection, the banner poles would be located on the south side of the intersection. In this way, the horizontal banners at the two gateways would "book end" a festival event. The streetscape segment in between Rundberg Lane and Braker Lane might have vertical banner poles in which each ethnicity could display banners in their own language. In this way, the banners might have Spanish, Asian, and Arabic languages demonstrating the multi-ethnic character of the surrounding neighborhoods. Implementation of the mobility and urban design enhancements will require acquisition of right-of-way corner clips. Other considerations for the detailed design phase of project implementation include the possible relocation of utility poles and wires, traffic control boxes, and utility boxes. **Figure 6-10** illustrates the potential gateway concept for the Rundberg Lane intersection.

Figure 6-10: Potential Gateway Concept for Rundberg Lane



NORTH LAMAR BOULEVARD: BRAKER LANE TO PARMER LANE

Short-Term Improvements

Short-term improvements between Braker Lane and Parmer Lane include bicycle lanes and sidewalk improvements.

Bicycle Lanes

It is recommended that in the short term, the existing pavement, where there is adequate width, be restriped to accommodate 5-foot bicycle lanes. Existing travel lanes would be striped to provide 11-foot travel lanes and a minimum of 12 feet for the two-way left-turn lane. On the Walnut Creek Metropolitan Park bridge, it is recommended that the existing pavement on the bridge to be restriped to accommodate 5-foot bicycle lanes and a 54-inch high bicycle guard rail on both sides, four 11-foot travel lanes and a flush median.

Pedestrian Facilities

New 7-foot sidewalks are recommended for both sides of the roadway at locations where there are currently no sidewalks. Where possible, these sidewalks are to be constructed consistent with where they would be located when the roadway is reconstructed in the long term. As such, where they are currently missing, sidewalks would be constructed outside the existing right-of-way. Any obstructions on sidewalks at these locations would need to be removed. Additionally, negotiations would be needed for easements or agreements in order for these streetscape elements to be constructed on

what is currently private property. A mid-block crossing with a pedestrian hybrid beacon and painted crosswalk is proposed between Little Oak Drive and Oak Brook Drive.

Intersection Improvements

Additional dual left-turn lanes are recommended for all approaches at North Lamar Boulevard and Parmer Lane, as illustrated in **Appendix A** (North Lamar Boulevard Sheet 12 of 15). These turn lane improvements would improve traffic operations for vehicles at this intersection. Crosswalks at all signalized intersections should be restriped.

Long-Term Improvements

Roadway Cross-Section

Long-term recommendations for this section of North Lamar Boulevard from Braker Lane to Parmer Lane include the total reconstruction of the roadway. The roadway pavement would include one 8-foot cycle track in each direction, two 11-foot outside travel lanes and two 10-foot inside travel lanes. Reconstruction would also include a 16-foot raised median with shade trees. Due to the limitations of the ROW in this section and the locations of the overhead utilities, the street tree/furniture zone will include utility compatible trees in a lawn strip and would be reduced to seven feet in width. The intersection of North Lamar Boulevard at Parmer Lane would have patterned vehicular paver crosswalks, a paver field in the intersection, and pedestrian paver landings at the corners. Minor intersection crossings would only have vehicular pavers at the crosswalks. All driveway crossings would have vehicular pavers. When the roadway is reconstructed, pedestrian crossings (with pedestrian hybrid beacons) should be constructed with pavers and landscape enhancements as shown in Figure 6-3.

Figure 6-11 illustrates the proposed long-term section for this character area. It should be noted that **Figure 6-11** illustrates the area between Braker Lane and the Walnut Creek Metropolitan Park which was surveyed as part of this project. The rest of the corridor is similar to this, with possible variations in right-of-way and location of utilities.

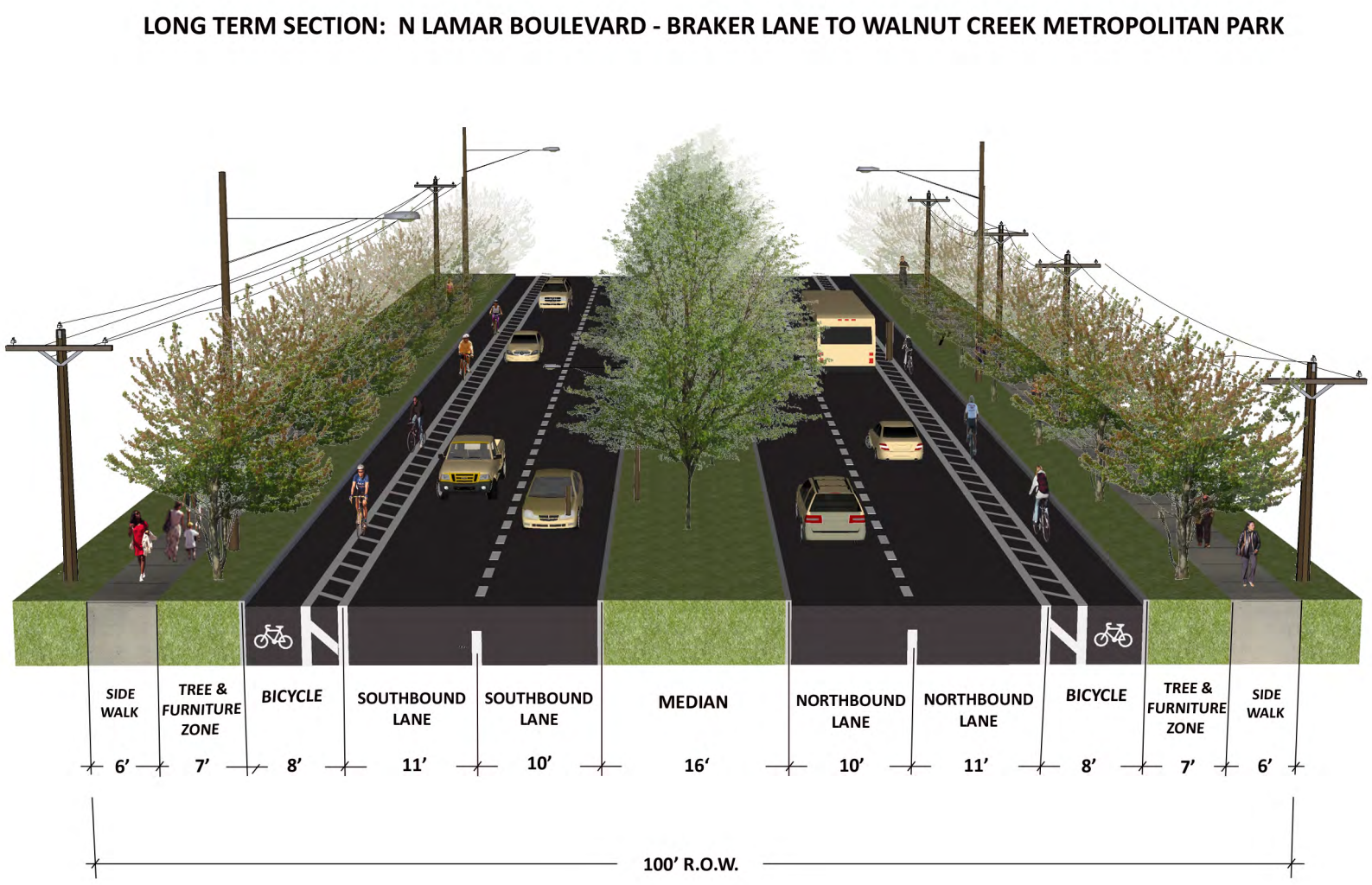
Driveway Consolidation

The driveway density for this character sector is approximately 37 driveways per mile on the southbound side of the roadway and 20 per mile on the northbound side. It is recommended that opportunities be explored during the design phase to reduce driveway density to a maximum of 22 driveways per mile. This lower density is considered optimal for vehicular, pedestrian, and bicycle mobility.

Walnut Creek Bridge

The bridge is recommended to be reconstructed to accommodate 8-foot sidewalks in each direction, an 8-foot cycle track in each direction, four 11-foot travel lanes, and a 9-foot raised median with shade trees. A 10-foot wide multi-use trail is also recommended to provide connectivity between North Lamar Boulevard and the proposed Walnut Creek Park Trail.

Figure 6-11: Braker Lane to Walnut Creek Metropolitan Park



NORTH LAMAR BOULEVARD: PARMER LANE TO HOWARD LANE

Short-Term Improvements

Short-term improvements between Parmer Lane and Howard Lane include, bicycle lanes turn lane improvements and bus stop relocation. Unlike other sections of North Lamar Boulevard, the existing roadway daily traffic is low (approximately 7,000 vehicles per day). It is therefore recommended that a road diet be implemented to reduce the travel lanes from four lanes (two in each direction) to one lane in each direction and a two-way left-turn lane.

Bicycle Lanes

It is recommended that in the short term, the existing pavement width be restriped to accommodate 5-foot bicycle lanes on both sides of the road. Existing travel lanes would be striped to provide one 11-foot travel lane each direction and a minimum of 12 feet for the two-way left-turn lane.

Pedestrian Facilities

New 7-foot sidewalks are recommended for both sides of the roadway at locations where there are currently no sidewalks. Where possible, these sidewalks are to be constructed consistent with where they would be located when the roadway is reconstructed in the long term. As such, where they are currently missing, sidewalks would be constructed outside the existing right-of-way. Any obstructions on sidewalks at these locations would need to be removed. Additionally, negotiations would be needed for easements or agreements in order for these streetscape elements to be constructed on what is currently private property. A mid-block crossing with a pedestrian hybrid beacon and painted crosswalk is proposed is proposed at two locations - the Wal-Mart south entrance and the west apartment entrance opposite the strip mall.

Bus Stop Relocation

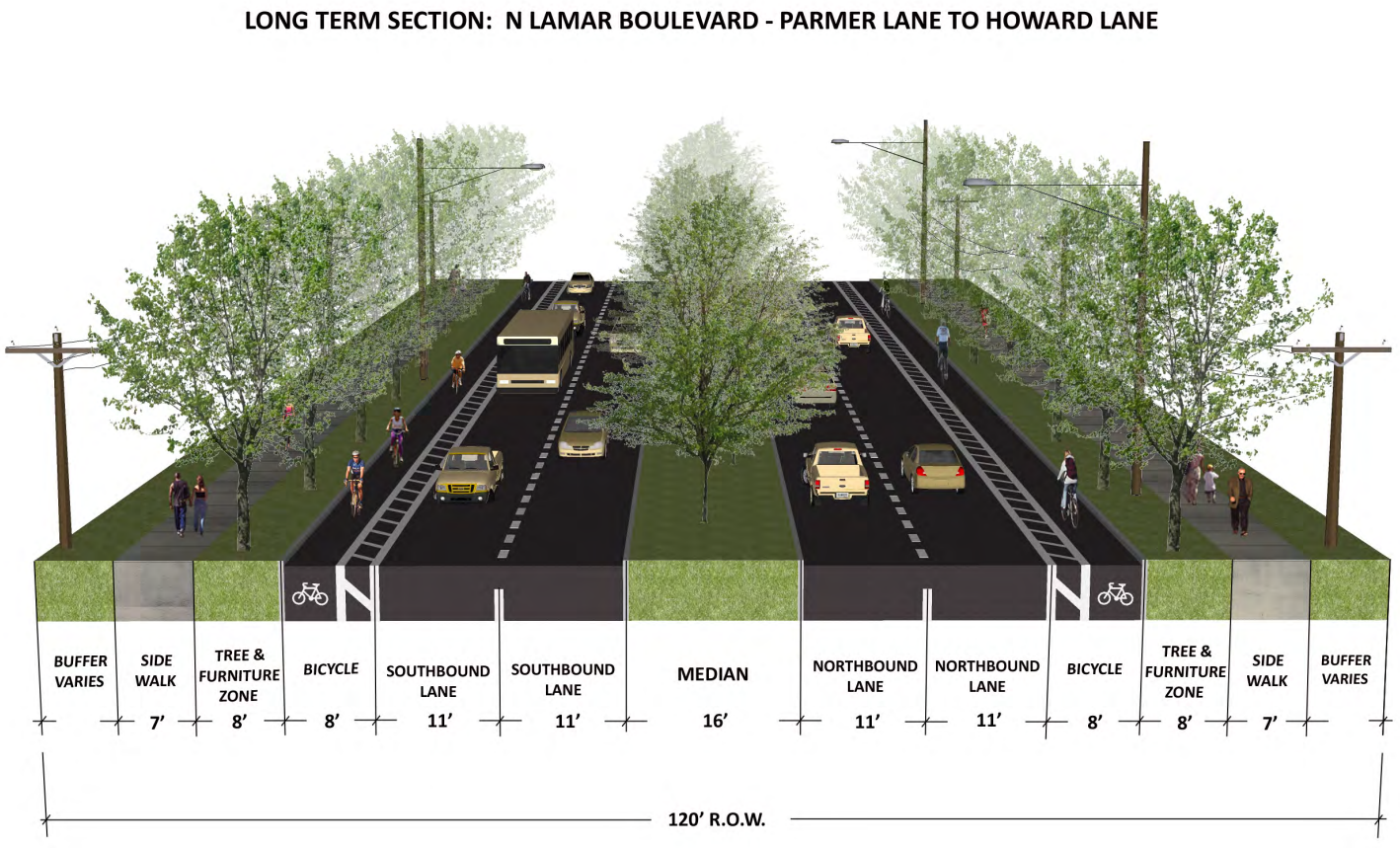
This program recommends the relocation of the Lamar/Parmer bus stop closer to the proposed crossing with pedestrian hybrid beacon at the Wal-Mart south entrance. Relocating the bus stop to this location would improve safety and convenience for pedestrians.

Long-Term Improvements

In the long term, it is recommended that this section of North Lamar Boulevard be reconstructed to provide additional pavement and sidewalks. The recommended cross section will include one 8-foot cycle track each direction, two 11-foot outside travel lanes, two 10-foot inside travel lanes, and 16-foot raised median with shade trees. Intersections would have vehicular pavers at crosswalks and driveway crossings would have vehicular pavers. The mid-block crossing would also have pavers and landscape enhancements.

The driveway density for this character area is approximately 10 driveways per mile on the southbound side of the roadway and six per mile on the northbound side. No driveway consolidation is recommended for this character area. However, consideration should be given during the approval of future driveway permits to maintaining a maximum density of 22 driveways per mile. **Figure 6-12** illustrates the proposed long term section for this character area.

Figure 6-12: Parmer Lane to Howard Lane



Roundabouts for North Lamar Boulevard at Howard Lane

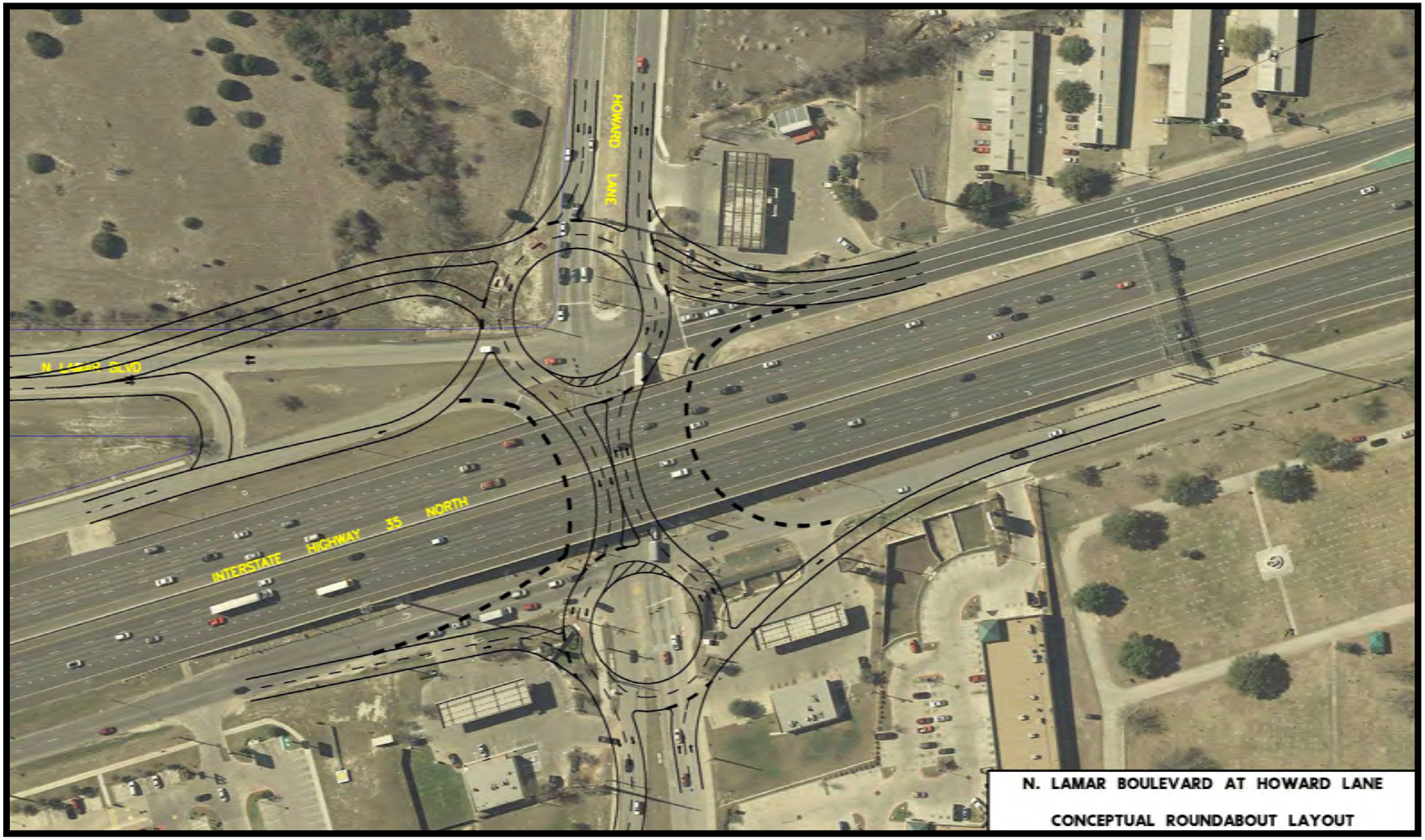
There is currently no connection from northbound North Lamar Boulevard to Howard Lane, near IH 35. A northbound connection would improve mobility for road users. This connection would also allow CapMetro buses to turn around at Howard Lane, which is currently not possible. A potential full North Lamar Boulevard/Howard Lane intersection is complicated by the proximity of IH 35 frontage lanes and intersections.

In order to provide a connection that improves mobility and accommodates the various approaches at this rather unique location, a pair of roundabouts is recommended as an innovative solution. As shown in **Figure 6-13**, two 2-lane roundabouts with inscribed diameters of 230 feet for the roundabout on the west and 150 feet for the roundabout on the east would accommodate all traffic movements at these intersections. This roundabout configuration would also provide good future level-of-service. Implementation of this recommendation would require acquisition of some additional right-of-way, the details of which would be determined in the design phase of recommended improvements.

LOW IMPACT DEVELOPMENT

An alternative treatment to a raised median with shade trees and grass might be a low impact development option. In this alternative, the median becomes the area for bio-filtration, water quality, and detention for any increased impervious cover in the long-term improvements. The typical raised median curb would be divided into segments with drainage openings for the storm water that falls on the roadway. The median itself would be lowered into a concave configuration to receive storm water for detention and purification by plant material. Drain inlets in the center of the median would be tied by laterals to the main trunk line on the side of the roadway to prevent overtopping of water from the median onto the road. The trees, shrubs, and ground cover plantings would need to be able to accept times of inundation. Considering the unique conditions present in Central Texas, low impact development also helps to relieve drought impact by conserving storm water in advance when there is rain. Detention of water is crucial to maintaining adequate groundwater recharge to endure extended drought times. Drip irrigation would also be needed for times of drought. **Figure 6-14** illustrates the alternative low impact development concept.

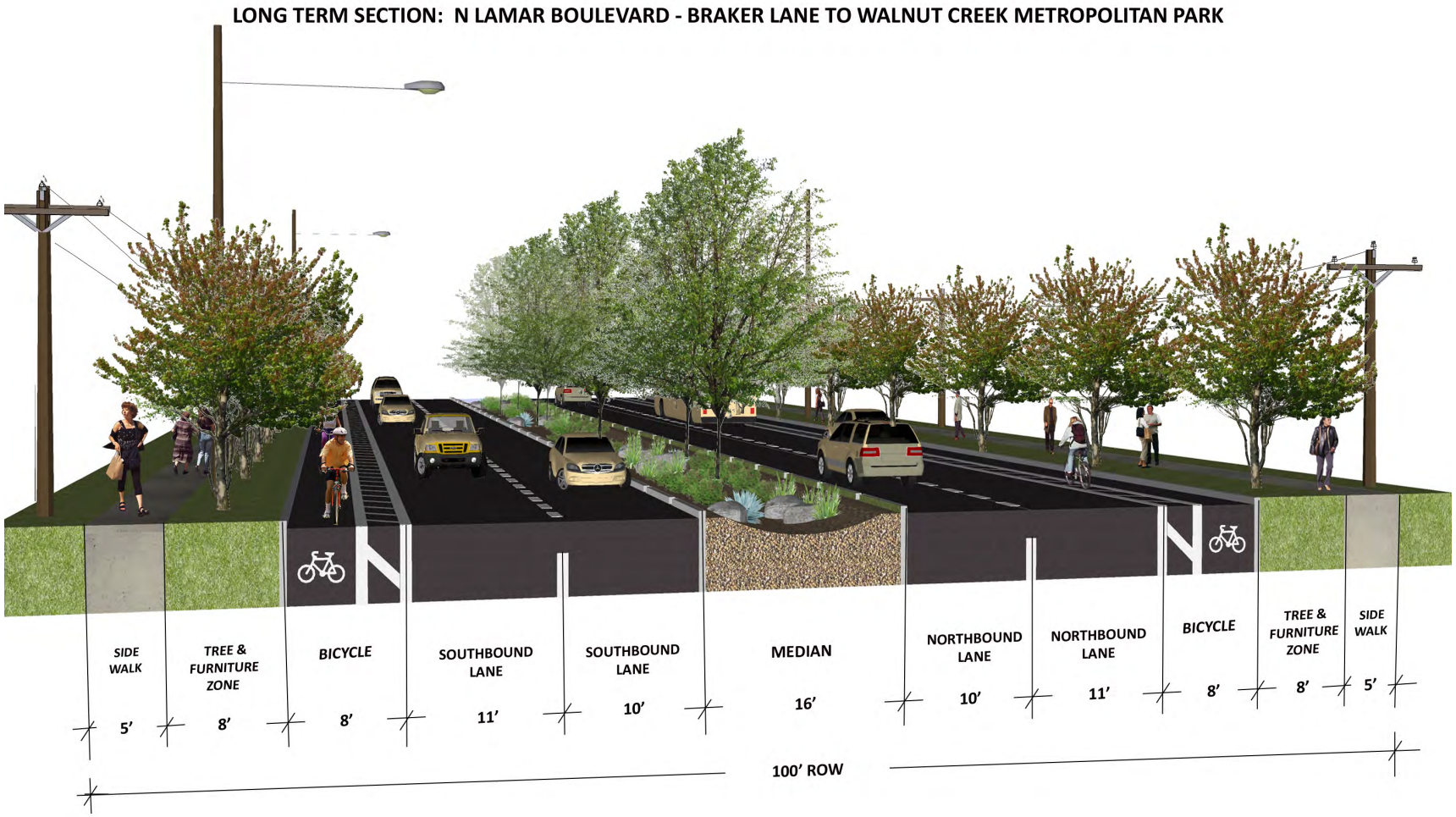
Figure 6-13: North Lamar Boulevard at Howard Lane Roundabout Option



Source: CDM Smith

Not To Scale

Figure 6-14: Low Impact Development



CHAPTER 7
PROJECT IMPLEMENTATION

This chapter describes the evaluation of the transportation improvements identified in the previous chapter and discusses how they might be implemented. The evaluation includes an estimate of benefits and costs associated with those improvements.

RATIONALE FOR RECOMMENDED CAPACITY IMPROVEMENTS

Over the years, roadway operational improvements have traditionally focused primarily on the automobile, often to the detriment of non-motorized modes of transportation. In that paradigm, additional capacity was based on projected corridor volumes and maintaining current travel speeds. The interaction of the roadway with adjacent development was often an afterthought. However, with the rising cost of construction and right-of-way acquisition, such projects are not always implementable. Also, the desire expressed by the community through the public involvement process undertaken for this project, is for improved mobility and safety for pedestrians and bicyclists on the Burnet Road and North Lamar Boulevard corridors. This includes sidewalks, bicycle facilities, trees and other streetscape improvements, and slower vehicle speeds.

Meeting the mobility and safety needs for motorized and non-motorized transportation modes need not be mutually exclusive. No matter how wide streets are, intersections are the bottlenecks that either facilitate or constrain capacity and hinder optimum traffic flow. The balanced approach taken in the development of recommendations for these corridors, was to determine the future growth in traffic volumes and identify appropriate intersection improvements to maintain optimum traffic flow. This was done in a framework that sought to minimize right-of-way acquisition, provide well-defined pedestrian and bicycle areas, and address mobility and safety concerns for all road users.

Based on the traffic analysis conducted for the corridor, widening from four travel lanes to six lanes is not necessary for traffic flow. Optimum traffic flow can be maintained with four vehicular travel lanes while improving capacity at intersections. Widening these corridors to provide six lanes for vehicular traffic would require significant utility relocation costs and right-of-way acquisition, which would negatively impact adjacent business property along the corridors. Due to the nature of the existing roadway geometric configuration, traffic volumes, and speeds, the Burnet and North Lamar corridors are not conducive for pedestrian and bicycle use. Widening the roadway to provide more vehicular travel lanes would exacerbate this and would not be consistent with the context sensitive design approach that is necessary to achieve the goal of complete streets.

BENEFITS OF TRANSPORTATION IMPROVEMENTS

Benefits of the short-term recommendations identified in this corridor program include both qualitative and quantitative benefits. Qualitative benefits include aesthetics, quality of life, and improved safety for drivers, pedestrians, and bicyclists due to the reduction in conflict points and other geometric improvements. Quantitative benefits are quantifiable parameters such as improved traffic operations and reduction in crash cost and vehicle emissions.

INTERSECTION LEVEL-OF-SERVICE (LOS)

As described in Chapter 3, Level-Of-Service (LOS) is a qualitative measure of operating conditions based on control delay for intersections. LOS is given a letter designation from A to F, where LOS A represents free-flow conditions and LOS F represents heavy congestion. The recommended improvements for the these corridors were evaluated using the existing conditions traffic operations model. The impacts of recommended improvements on intersection delay and level-of-service along the Burnet and North Lamar corridors are summarized in **Tables 7-1** and **7-2**. Details of the traffic analysis evaluation are provided in **Appendix F**.

Traffic operations for the intersections of Burnet Road at Koenig Lane, Braker Lane, and Kramer Lane would improve from LOS E/F to LOS B. The intersection of North Lamar Boulevard at Braker Lane would improve from LOS E to LOS D with the recommended improvements. Other intersections along North Lamar Boulevard for which traffic operations are projected to improve include Parmer Lane and Howard Lane/IH 35.

Despite the recommended improvements, some intersections are projected to have vehicular operating conditions less than LOS D. An example is the intersection of North Lamar Boulevard at Rundberg Lane. Recommendations for this intersection include dual left-turn lanes on both the eastbound and westbound Rundberg Lane approaches. These capacity improvements would help reduce high vehicular delay but would not improve the LOS during the PM peak hour. The recommendations for this intersection would improve total intersection vehicular delay from approximately 183 seconds per vehicle during the PM peak hour to 91 seconds per vehicle. Although this is a 50 percent reduction, delay is still equivalent to LOS F. Rundberg Lane would need to be widened to provide additional through lanes or a grade-separation constructed to provide significantly improved vehicular level-of-service. Both of those improvements would worsen conditions for non-motorized road users and would not be consistent with the vision for the corridor. Therefore, other than turn lanes, no additional vehicular capacity improvements are recommended for this intersection. Similarly, no additional improvements are recommended for the intersection of North Lamar Boulevard at Parmer Lane. At this intersection, the recommendations in this report would improve total intersection vehicular delay from approximately 113 seconds per vehicle to 85 seconds per vehicle during the PM peak hour, equivalent to a 25 percent improvement.

Table 7-1: Burnet Road Intersection LOS

INTERSECTION	AM INTERSECTION LOS		PM INTERSECTION LOS	
	WITHOUT IMPROVEMENTS	WITH IMPROVEMENTS	WITHOUT IMPROVEMENTS	WITH IMPROVEMENTS
Burnet Rd at Allandale Rd/Koenig Ln	E	D	E	D
Burnet Rd at Romeria Dr	A	A	A	A
Burnet Rd at White Horse Trail	A	A	A	A
Burnet Rd at Justin Ln/Pegram Ave	A	A	B	B
Burnet Rd at Greenlawn Pkwy	A	A	C	A
Burnet Rd at Richcreek Rd	A	A	A	A
Burnet Rd at Northcross Dr/St. Joseph Blvd	B	B	B	B
Burnet Rd at W. Anderson Ln	D	D	D	D
Burnet Rd at Steck Ave	B	B	C	C
Burnet Rd at Buell Ave/Ohlen Rd	B	B	B	B
Burnet Rd at Rockwood Ln	A	A	B	B
Burnet Rd at US 183 EB Frtg Rd	F	F	F	F
Burnet Rd at US 183 WB Frtg Rd	D	D	F	F
Burnet Rd at Waterford Centre Blvd	A	A	A	A
Burnet Rd at Longhorn Blvd	A	A	B	A
Burnet Rd at Rutland Dr	B	B	C	C
Burnet Rd at W. Braker Ln	F	D	E	D
Burnet Rd at Kramer Ln/Alterra Pkwy	C	C	F	B
Burnet Rd at Esperanza Crossing	A	A	A	A
Burnet Rd at IBM Dwy/Palm Way	A	A	A	A
Burnet Rd at Gault Ln	A	A	C	C

Table 7-2: North Lamar Boulevard Intersection LOS

INTERSECTION	AM INTERSECTION LOS		PM INTERSECTION LOS	
	WITHOUT IMPROVEMENTS	WITH IMPROVEMENTS	WITHOUT IMPROVEMENTS	WITH IMPROVEMENTS
North Lamar Blvd (SB) at US 183 EB Frtg Rd	D	D	B	B
North Lamar Blvd (NB) at US 183 EB Frtg Rd	B	B	C	C
North Lamar Blvd (NB) at US 183 WB Frtg Rd	B	B	B	B
North Lamar Blvd (SB) at US 183 WB Frtg Rd	B	B	B	B
North Lamar Blvd at Thurmond St	A	A	A	A
North Lamar Blvd at Payton Gin Rd	C	C	B	B
North Lamar Blvd at W. Rundberg Ln	D	D	F	F
North Lamar Blvd at Rutland Dr	C	C	C	D
North Lamar Blvd at W. Longspur Blvd	B	A	B	C
North Lamar Blvd at Masterson Pass	C	C	B	B
North Lamar Blvd at N. Meadows Dr	A	A	A	A
North Lamar Blvd at Kramer Ln	B	C	C	B
North Lamar Blvd at W. Braker Ln	E	D	E	D
North Lamar Blvd at N. Bend Dr	A	A	A	A
North Lamar Blvd at Yager Ln	B	B	C	C
North Lamar Blvd at Parmer Ln	E	D	F	F
Howard Ln at IH 35 SB Frtg Rd	F	D	E	D
Howard Ln at IH 35 NB Frtg Rd	E	C	E	D

CRASH COST SAVINGS

Crash costs refer to the economic value of damages or losses caused by collisions. The National Safety Council publishes monetary costs per crash type (fatal, injury, and non-injury) as summarized in **Table 7-3**. These costs include wage and productivity losses, medical expenses, administrative expenses, motor vehicle damage, employers' uninsured costs, and a measure of the value of lost quality of life. The access management measures recommended for Burnet Road and North Lamar Boulevard have been shown to improve safety on roadways. The primary measures for which research has been conducted to document benefits include two-way left-turn lanes, raised medians, right-turn lanes, and left-turn lanes.

According to the Transportation Research Board Access Management Manual, studies have shown that installing a two-way left-turn can reduce the number of crashes by 35 percent. As mentioned previously, two-way left-turn lanes are not appropriate for high volumes roadway segments. Studies have shown that where two-way left-turn lanes have been replaced with raised medians, total crashes have been reduced by up to 57 percent on 4-lane roadways. The Access Management Manual also indicates that where no two-way left-turn lanes previously exist, adding a raised median can reduce total crashes by 35 percent. For turn lanes, studies have demonstrated crash reductions of 20 percent for right-turn lanes and 25 percent for left-turn lanes.

Table 7-3: Crash Cost by severity

Crash Type	Cost
Death	$4,540,678
Incapacitating injury	$228,935
Non-incapacitating evident injury	$58,395
Possible injury	$27,772
No injury	$2,534

Source: Estimating the Costs of Unintentional Injuries, National Safety Council, 2009, adjusted to 2011 Dollars

Crash savings were calculated based on the monetary values of crashes identified in **Table 7-3**, the corridor crash history for the 32-month period, and the estimated reductions in crashes due to the recommended improvements. Based on short-term improvements, the estimated annual crash savings for Burnet Road and North Lamar Boulevard are estimated as $1.1 million and $1.7 million respectively. Over the long-term, recommended improvements represent an estimated annual crash savings of $2.1 million and $4.9 million respectively (inclusive of the estimated short-term savings).

VEHICLE EMISSIONS

The term "emissions" generally refers to gases and particles introduced into the air as pollutants. The United States Environmental Protection Agency describes air pollution as the contamination of air by the discharge of harmful substances. These harmful substances include hydrocarbons (HC), carbon monoxide (CO), and nitrogen oxides (NOx). Ozone is not directly emitted, but is rather formed from other emissions including HC and CO. The concentration of these air pollutants is related to traffic congestion. Lower speeds associated with traffic congestion tend to result in higher levels of pollutants. It is estimated that the short-term recommended improvements would result in a two percent reduction in emissions along Burnet Road, and a reduction of seven percent along North Lamar Boulevard.

COST ESTIMATES

A summary of estimated costs associated with the short and long-term improvements identified in the preceding sections is provided in **Table 7-4**, **7-5, 7-6,** and **7-7**. Cost estimate details are provided in **Appendix B**. It is estimated that the total cost for short-term improvements is $24.7M for Burnet Road and $22.6M for North Lamar Boulevard. In the long-term, the estimated costs for construction are $52.4M for Burnet Road and $53.2M for North Lamar Boulevard.

FUNDING OPPORTUNITIES

Austin voters approved funds in November 2010 for corridor development program to identify short, medium, and long-term transportation improvements to improve safety; increase mobility and accessibility for drivers, pedestrians, bicycles and transit users; and improve quality of life for the users and neighbors of these corridors.

Typically these improvements could be funded by several funding sources. These include the State Infrastructure Bank, traffic impact fees, the Livable Communities Initiative, and others.

State Infrastructure Bank - This is a banking system set up by TxDOT with federal and state funds and is designed to encourage local entities to pay a larger share of the cost for highway projects. Local entities may apply for loans, lines of credit, letters of credit, bond insurance, and capital reserves for roadway improvement projects.

Traffic Impact Fees on New Development - Traffic impact fees ensure that new development pays its fair share of the cost to improve the transportation system so as not to exacerbate existing transportation problems.

Community Development Block Grants (CDBG) - One of the longest-running programs of the U.S. Department of Housing and Urban Development, funds local community development activities such as affordable housing, anti-poverty programs, and infrastructure development

Job Access/Reverse Commute (JARC) - The JARC grant program assists States and localities in developing new or expanded transportation services that connect welfare recipients and other low-income persons to jobs and other employment related services.

Livable Communities Initiative (LCI)- The Federal Transit Administration (FTA) has recognized the need for a new emphasis in its programs to make communities and neighborhoods move livable. To meet this need, the FTA is initiating technical assistance activities to help communities understand the principles of the Livable Communities Initiative and introduce more community-oriented transit facilities and services. This initiative will demonstrate how transit facilities and services can be physically and functionally related to community needs when the community plans an active role in the local planning and design process for such facilities and services.

Table 7-4: Burnet Road Short-Term Improvements

Project Number	Project Description	Improvement Type	Project Cost
Pilot Project (Complete Reconstruction from Koenig Lane to Anderson Lane)			
1	Driveway Reconstruction	Operational	$1,152,000
2	Pocket Parks (Pedestrian Pavers, Raised Planters, Trees, Top Soil, Fencing/Vines)	Safety	$155,000
3	ROW Improvements-Trees and Tree Grates	Safety	$2,675,000
4	Median Landscaping-(Sod & Trees)	Safety	$395,000
5	Irrigation (Includes 1-year Maintenance)	Safety	$270,000
6	Sidewalk Improvements	Safety	$1,059,000
7	Cycle Track	Safety	$31,000
8	Drainage Improvements	Operational	$6,188,000
9	Roadway Reconstruction	Operational	$7,332,000
10	ROW Acquisition-Koenig and Anderson Corner Clips	Operational	$232,000
11	Minor Intersection Improvements-Pedestrian Pavers	Safety	$255,000
12	Pedestrian Pavers, Raised Planters & Gateway Elements	Safety	$458,000
Landscape Improvements			
13	ROW Landscaping-Anderson Lane to US 183 (Sod)	Safety	$38,000
14	ROW Landscaping-US 183 to Braker Lane (Sod & Trees)	Safety	$445,000
15	ROW Landscaping-Braker to MoPac (Sod & Trees)	Safety	$439,000
Pedestrian Improvements			
16	Sidewalk Improvements (No drainage improvements required)-Anderson Lane to MoPac	Safety	$422,000
17	Corridorwide bus pad improvements-Burnet	Safety	$19,000
18	Mid-block Crossings with Pedestrian Hybrid Beacons	Safety	$545,000
Bicycle Improvements (Lane Diet and Restriping)			
19	Anderson Lane to US 183	Safety	$22,000
20	US 183 to Braker Lane	Safety	$22,000
Intersection Improvements			
21	Optimize Traffic Signal Timing	Operational	$150,000
22	Turn Bay Improvements-Koenig Lane	Operational	$102,000
23	Turn Bay Improvements-Braker Lane	Operational	$133,000
Arterial Improvements			
24	Anderson Lane to US 183-Microsurfacing	Operational	$184,000
25	US 183 to Braker Lane-Microsurfacing	Operational	$204,000
26	Braker Lane to MoPac-Microsurfacing	Operational	$192,000
27	Street Lighting	Safety	$1,036,000
Total Cost of Improvements			$24,155,000
Total Cost of Improvements with 2% Inflation			$24,639,000

Table 7-5: Burnet Road Long-Term Improvements

Project Number	Project Description	Improvement Type	Project Cost
Complete Reconstruction			
1	Driveway Reconstruction	Operational	$1,711,000
2	Median Improvements-Trees, Sod & Tree Grates	Safety	$3,558,000
3	Irrigation (Includes 1-year Maintenance)	Safety	$207,000
4	Cycle Track-Anderson Lane to US 183	Safety	$23,000
5	Cycle Track-US 183 to Braker Lane	Safety	$22,000
6	Cycle Track-Braker Lane to MoPac	Safety	$20,000
7	Drainage Improvements	Operational	$17,046,000
8	Roadway Reconstruction-Anderson Lane to US 183	Operational	$4,543,000
9	Roadway Reconstruction-US 183 to Braker Lane	Operational	$6,182,000
10	Roadway Reconstruction-Braker Lane to MoPac	Operational	$6,131,000
11	Minor Intersection Improvements-Pedestrian Pavers	Safety	$341,000
12	Pedestrian Pavers, Raised Planters & Gateway Elements	Safety	$686,000
13	ROW Acquisition-US 183 to Braker Road Widening	Operational	$3,906,000
14	ROW Acquisition-Braker to MoPac Road Widening	Operational	$1,605,000
15	Overhead Transmission & Distribution Line Relocation (Longhorn to MoPac)	Operational	$3,709,000
Pedestrian Improvements			
16	Sidewalk Improvements-Anderson to Lane US 183	Safety	$219,000
17	Sidewalk Improvements-US 183 to Braker Lane	Safety	$542,000
18	Sidewalk Improvements-Braker Lane to MoPac	Safety	$279,000
Intersection Improvements			
19	Optimize Traffic Signal Timing	Operational	$150,000
20	Turn Bay Improvements-Braker Lane	Operational	$204,000
21	Turn Bay Improvements-Kramer Lane	Operational	$48,000
22	Turn Bay Improvements-US 183	Operational	$172,000
23	Turn Bay Improvements-MoPac	Operational	$24,000
Total Cost of Improvements			$51,328,000
Total Cost of Improvements with 2% Inflation			$52,355,000

Table 7-6: North Lamar Boulevard Short-Term Improvements

Project Number	Project Description	Improvement Type	Project Cost
Pilot Project (Complete Reconstruction from Rundberg Lane to Braker Lane			
1	Driveway Reconstruction	Operational	$1,039,000
2	ROW Improvements-Trees and Tree Grates	Safety	$2,318,000
3	Median Landscaping-(Sod & Trees)	Safety	$334,000
4	Irrigation (Includes 1-year Maintenance)	Safety	$245,000
5	Sidewalk Improvements	Safety	$1,176,000
6	Cycle Track	Safety	$29,000
7	Drainage Improvements	Operational	$5,025,000
8	Roadway Reconstruction	Operational	$6,557,000
9	ROW Acquisition-Rundberg Lane and Braker Lane Corner Clips	Operational	$237,000
10	ROW Acquisition-Braker Lane Turnbay Addition	Operational	$46,000
11	Minor Intersection Improvements-Pedestrian Pavers	Safety	$213,000
12	Pedestrian Pavers, Raised Planters & Gateway Elements	Safety	$458,000
Landscape Improvements			
13	ROW Landscaping Braker Lane to Parmer Lane (Trees)	Safety	$477,000
14	ROW Landscaping Parmer Lane to Howard Lane (Trees)	Safety	$411,000
Pedestrian Improvements			
15	Sidewalk Improvements (Not requiring drainage improvements) -183 to Rundberg Lane & Braker Lane to Howard Lane	Safety	$224,000
16	Corridor-wide bus pad improvements-Lamar	Safety	$120,000
17	Mid-block Crossings with Pedestrian Hybrid Beacons	Safety	$742,000
18	Cantilevered Pedestrian Bridge at US 183	Safety	$119,000
Bicycle Improvements			
19	US 183 to Rundberg Lane	Safety	$25,000
20	Braker Lane to Parmer Lane	Safety	$32,000
21	Parmer Lane to Howard Lane	Safety	$20,000
Intersection Improvements			
22	Optimize Traffic Signal Timing	Safety	$117,000
23	Turn Bay Improvements-Rundberg Lane	Safety	$48,000
24	Turn Bay Improvements-Braker Lane	Safety	$211,000
25	Turn Bay Improvements-Parmer Lane	Safety	$94,000
Arterial Improvements			
26	US 183 to Rundberg Lane-Microsurfacing	Operational	$227,000
27	Braker Lane to Parmer Lane-Microsurfacing	Operational	$291,000
28	Parmer Lane to Howard Lane-Microsurfacing	Operational	$128,000
29	Street Lighting	Safety	$1,169,000
Total Cost of Improvements			$22,132,000
Total Cost of Improvements with 2% Inflation			$22,575,000

Table 7-7: North Lamar Boulevard Long-Term Improvements

Project Number	Project Description	Improvement Type	Project Cost
Complete Reconstruction			
1	Driveway Reconstruction	Operational	$1,652,000
2	Median Improvements-Trees, Sod & Tree Grates	Safety	$4,349,000
3	Irrigation (Includes 1-year Maintenance)	Safety	$253,000
4	Cycle Track-US 183 to Rundberg Lane	Safety	$26,000
5	Cycle Tracks-Braker Lane to Parmer Lane	Safety	$32,000
6	Cycle Tracks-Parmer Lane to Howard Lane	Safety	$20,000
7	Drainage Improvements	Operational	$23,506,000
8	Roadway Reconstruction-US 183 to Rundberg Lane	Operational	$4,817,000
9	Roadway Reconstruction-Braker Lane to Parmer Lane	Operational	$5,956,000
10	Roadway Reconstruction-Parmer Lane to Howard Lane	Operational	$3,827,000
11	Roadway Reconstruction-Roundabout at Howard Lane	Operational	$1,994,000
12	ROW Acquisition-Roundabout at Howard Lane	Operational	$1,237,000
13	Minor Intersection Improvements-Pedestrian Pavers	Safety	$171,000
14	Pedestrian Pavers, Raised Planters & Gateway Elements	Safety	$686,000
15	Walnut Creek Bridge	Operational	$1,685,000
Pedestrian Improvements			
16	Sidewalk Improvements-US 183 to Rundberg Lane	Safety	$260,000
17	Sidewalk Improvements-Braker Lane to Parmer Lane	Safety	$684,000
18	Sidewalk Improvements-Parmer Lane to Howard Lane	Safety	$563,000
Intersection Improvements			
19	Optimize Traffic Signal Timing	Safety	$117,000
20	Turn Bay Improvements-Rundberg Lane	Safety	$94,000
21	Turn Bay Improvements-Kramer Lane	Safety	$48,000
22	Turn Bay Improvements-Parmer Lane	Safety	$172,000
Total Cost of Improvements			$52,149,000
Total Cost of Improvements with 2% Inflation			$53,192,000

Statewide Transportation Enhancement Program (STEP) - The goal of the STEP program is to encourage diverse modes of travel, increase the community benefits to transportation investment, strengthen partnerships between State and local governments, and promote citizen involvement in transportation decisions.

Transportation and Community and System Preservation (TCSP) - The TCSP provides funding for grants and research to investigate and address the relationship between transportation and community and system preservation. States, local governments, tribal governments, and MPOs are eligible for discretionary grants to plan and implement strategies which improve the efficiency of the transportation system, reduce environmental impacts of transportation, reduce the need for costly future public infrastructure investments, ensure efficient access to jobs, services and centers of trade, and examine development patterns and identify strategies to encourage private sector development patterns which achieve these goals.

Special Improvement District - This is a defined area within which residents and businesses pay an additional tax or fee in order to fund improvements within the district's boundaries. The funds could be used to provide services, such as cleaning streets, providing security, making capital improvements, construction of pedestrian and streetscape enhancements, and marketing the area.

CONTEXT SENSITIVE DESIGN AND CORRIDOR JURISDICTION

Context sensitive solutions (CSS) is a collaborative, interdisciplinary approach that involves all stakeholders in providing a transportation facility that fits its setting. It is an approach that leads to preserving and enhancing scenic, aesthetic, historic, community, and environmental resources, while improving or maintaining safety, mobility, and infrastructure conditions[21]. Context sensitive design (CSD) seeks to ensure that the character of the transportation facility is appropriate to this surroundings.

TxDOT currently has jurisdiction of Burnet Road from US 183 to MoPac and the entirety of the North Lamar corridor. The TxDOT Commission adopted rules that includes context sensitive design concepts to be included as part of project development. Significant revisions were made to the Project Development Process Manual (6-09) in order to reflect the department's goal of incorporating local and regional planning and policy goals into the project development process as early as possible. These revisions also aim to create ongoing local partnership feedback mechanisms to achieve sustainable urban contexts around roadways and transportation networks for appropriate corridors or projects. The manual update includes an overview of the CSS principles with reference to the Context Sensitive Solutions in Design Major Urban Thoroughfares for Walkable Communities, 2005 - The Institute of Transportation Engineers (ITE) and the Congress for the New Urbanism (CNU)[22].

This corridor development program implemented a multi-disciplinary approach to the project development process that is consistent with the TxDOT Project Development Process Manual. However, the roads that TxDOT owns are subject to the design criteria provided in the TxDOT Roadway Design Manual, 2010. The criteria contained in that manual are applicable to all classes of TxDOT highways from freeways to two-lane roads. The vision for the Burnet and North Lamar corridors expressed by members of the public and through the neighborhood and master plans that have been developed is generally for these corridors to be complete streets that add to the unique character of the area. TxDOT's highway design standards are focused primarily on maximizing

21 AASHTO / FHWA Context Sensitive Solutions Strategic Planning Process, Summary Report, March 2007
22 http://contextsensitivesolutions.org/content/gen/state-profiles/TX, accessed in November 2012

vehicular throughput on the corridors and are not necessarily consistent with the community vision for these two corridors.

The recommendations outlined in this report are based on the vision of complete streets that enhance safety and mobility for all road users. The design criteria for improvements such as lane widths and sidewalks are consistent with City of Austin standards but are not what TxDOT would permit for highways. The City of Austin should attempt to work with TxDOT to obtain a variance for the context sensitive designs proposed in this program. If a design variance is not granted by TxDOT, reconstruction of these two corridors to implement the vision will likely require the City to request that TxDOT transfer jurisdiction of the roads. However, if the City takes over the jurisdiction of the corridors, it is expected for the City to be responsible for added operational and maintenance costs in the future.

CHAPTER 8
LAND USE MANAGEMENT

STRATEGIES FOR FUTURE DEVELOPMENT

The character, intensity, and form of future development along the Burnet and North Lamar corridors is intrinsically connected to the design and operation of these roadways. Building orientation, nature and intensity of driveway access, and location of parking have an impact on safety and mobility for all transportation modes along the corridors.

Greater coordination in access control and site design for the Burnet and North Lamar corridors would help reduce congestion, improve safety, create a more predictable and user-friendly environment for both motorized and non-motorized travel, and help provide a more organized and stable environment for economic development.

Some previously developed principles and policies are applicable to the Burnet and North Lamar corridors. These include the City of Austin Design Standards and Mixed Use Ordinance and the Burnet Gateway Master Plan. In addition, a set of corridor-wide development principles have been identified as part of this North Lamar/Burnet Corridor Development Program.

CORRIDOR-WIDE DEVELOPMENT PRINCIPLES

Corridor-wide development principles have been designed to support future multimodal safety and mobility along the Burnet and North Lamar corridors.

Preserve Intersection Functional Area

Do not allow driveways within the functional area of an intersection. The functional area refers to the area beyond the physical intersection within which vehicles are stored and within which drivers make decisions and maneuvers to stop, go through the intersection, or turn. Additional conflicts in this area caused by cars entering and leaving driveways increase safety risk and reduces mobility. There are many cases along both corridors where existing driveways are located within the intersection functional area. However, as redevelopment occurs and driveway permits are sought for new development, it is recommended that this principle be applied in the evaluation process, and driveway distances from the intersection brought up to code.

Minimize Driveway Access

As indicated previously in this document, the optimal access condition for the Burnet and North Lamar corridors is 22 access points per mile. Crash rates for all transportation modes increase as access density increases. Access density should be a consideration for new and redeveloping properties. Adjacent property owners should be encouraged to share driveway access, developing internal road circulation where feasible.

Minimize Visual Clutter

Promote shared signage and coordinated aesthetic treatments in the right-of-way to reduce visual clutter and aid in orientation of road users.

Accommodate Non-motorized Road Users

Consistent with the short and long-term recommendations identified previously in this document, accommodations for pedestrian and bicycle mobility and safety should be maintained and continually enhanced, particularly in areas of commercial and institutional activity. Opportunities to connect multi-use trails and paths to existing and proposed sidewalks should be explored to enhance pedestrian and bicycle connectivity.

Provide for Transit Users

Capital Metro is currently planning for bus rapid transit (BRT) along the Burnet and North Lamar corridors. Transit service is most effective where land development patterns are compact, densely populated, and include a mix of uses. Transit service also requires direct pedestrian connections between transit stops and origins and destinations. As such, considerations for pedestrians should coincide with development considerations for transit users.

Existing bus stops that don't have shelters but which meet CapMetro guidelines were identified in Chapter 6. Consideration should be given to future upgrades for all bus stops to facilitate transit use. Offering certain facilities and other amenities to transit users may greatly enhance the transit experience in order to further promote transit usage. This includes lighting for bus stops to improve safety for night-time transit use.

Promote Sustainable Water Resources Practices

Water has become increasingly scarce and more valuable as expanding built environment, population growth, and climate change may affect our ability to obtain sufficient and clean water resources. Sustainable water resources practices mean to utilize the water resources without affecting the ability of future generations to use them. If we could treat water efficiently, we would reduce the demand for water or the need to build more water supply infrastructure. It is thus of paramount importance to consider sustainable water resources practices in a planning process.

Sustainable landscaping is a way to implement sustainable water resources practices, which could reduce or prevent pollution, conserve natural resources, and maintain ecological functions. Plants that thrive in the conditions of the local climate should be selected. In Austin, it is better to select drought tolerant plants to fit the local climate. This could reduce the planting and maintenance costs including water resources and by not providing invasive species also protect the ecological system. The City of Austin should recognize the importance of promoting sustainable water resources practices by implementing sustainable landscaping.

Promote Sustainable Storm Water Practices

Stormwater management systems that mimic nature by integrating stormwater into building and site development can reduce the damaging effects of urbanization on rivers and streams. This program

recommends the promotion of sustainable storm water management through employing Low Impact Development (LID) along the medians by minimizing effective imperviousness. The City of Austin should also recognize the need for promotion of sustainable stormwater management systems Citywide. By designing vegetated drainage and porous materials into streets, alleys, rights of way, and parking lots, the city can increase on-site neighborhood stormwater capacity.

Upgrade Cross-Streets

Along with the improvement of Burnet and North Lamar corridors, cross-streets along the corridors should be brought up to the City of Austin roadway standards. Ken Street, Meadows Drive and Wagon Trail are some examples of cross streets that intersect the North Lamar Boulevard with sub standard pavement quality and poor drainage. Drainage for cross-streets should be upgraded where deficient.

System Preservation and Maintenance

In recognition of the considerable investment in the transportation system, preserving the facilities should be an important priority for the City. Roadway pavements require continual reinvestment to sustain their structural viability and to maximize the original financial investment made to build them. Roadways that lack proper maintenance experience increased failure rates, cause increases in costs overall, and contribute to safety hazards and property loss. The City should direct adequate resources toward preservation efforts to continue to meet the challenge of keeping the transportation system in good condition.

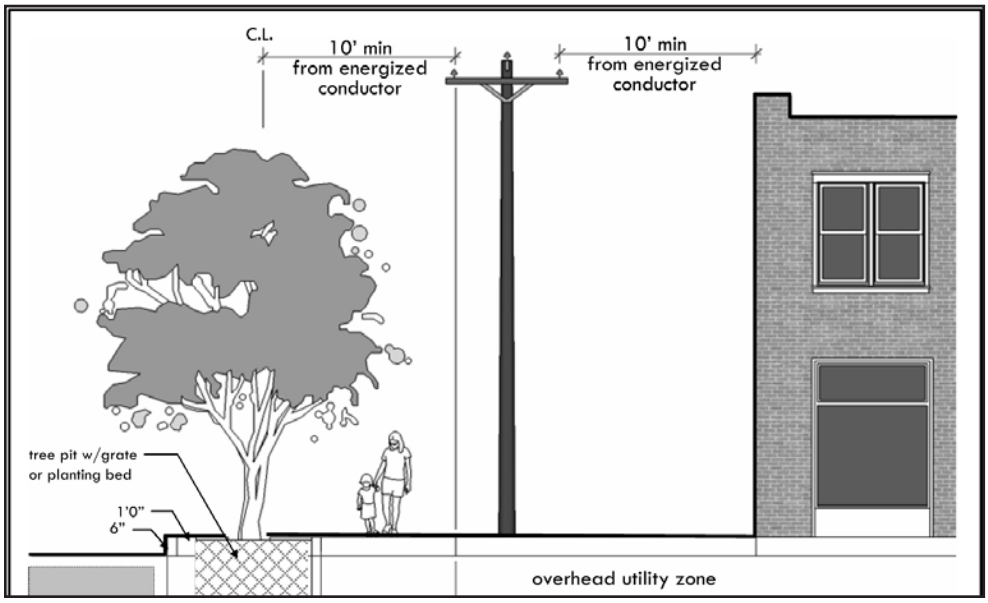
CORE TRANSIT CORRIDORS

Burnet Road from Koenig Lane to Anderson Lane and the entirety of the North Lamar corridor has been identified by the City of Austin as core transit corridors. New developments or redevelopment on core transit corridors are subject to site development standards covering a number of elements including:

- Sidewalks – issues such as location, width, shade trees, etc.
- On-street parking
- Building placement
- Supplemental zone
- Off-street parking location
- Building entryway
- Connectivity

Figure 8-1 illustrates a potential cross-section for a core transit corridor. Details of these about these standards are provided in the design guidelines set forth in the "Design Standards and Mixed Use Ordinance", last amended in March 2009.

Figure 8-1: Core Transit Corridor Cross-Section[23]



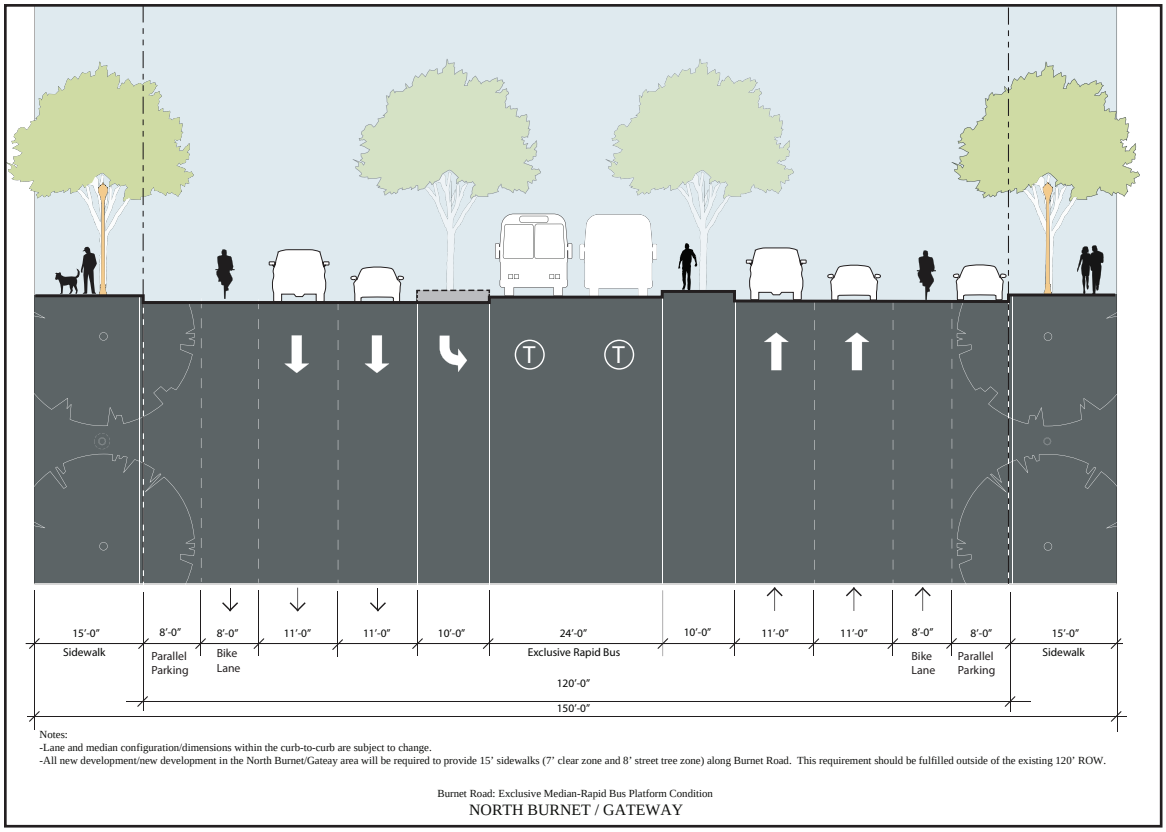
TRANSIT BOULEVARD

The Burnet Gateway Master Plan identifies Burnet Road from US 183 to MoPac as a transit boulevard. New development or redevelopment on the corridor is supposed to follow the guidelines set forth in the "Regulating Plan for the Burnet/Gateway Zoning District". The Burnet/Gateway Master Plan presents a long-term vision for the area to redevelop the existing low density, auto-oriented and industrial uses into a higher density mixed-use neighborhood that is more pedestrian-friendly and takes advantage of the links to commuter rail transit and the area's key position within Austin's Urban Core. The intent is to allow a significant number of new residents to move into the area to accommodate some of the expected population growth in the region and to provide the associated community and neighborhood services, parks, and public spaces important to making a great neighborhood.

The plan proposes Transit Oriented Development (TOD) and Commercial Mixed Uses along the corridor. TOD is the most intensively developed land use zone and will typically be expressed as high density residential or office over active ground floor uses, such as retail. This land use designation is concentrated near the Capital Metro commuter rail station on Kramer Lane. Commercial Mixed Use is a high density mixed use subdistrict in the Burnet Gateway Zoning District. It allows for development such as high density residential, high rise office and entertainment complexes, destination retail and large scale civic uses.. **Figure 8-2** illustrates the adopted cross section for Burnet Road.

23 *Design Standards and Mixed Use Ordinance, March 2009*

Figure 8-2: Adopted Cross-Section for Burnet Road[24]



NEIGHBORHOOD PLANNING

Most of the neighborhoods along the project corridors have an adopted neighborhood plan in place, except for the neighborhoods along North Lamar Boulevard that are north of Braker Lane. The purpose of Neighborhood Planning is to give residents greater ownership of the plans and policies that affect their local area. The intention is to empower local people to take a proactive role in shaping the future of the areas in which they live. City policy requires that corridor plans and affected neighborhood plans be consistent with regard to recommendations regarding land use, design guidelines, and transportation projects. This corridor development plan was developed to be compatible with existing and potential new neighborhood plans.

Neighborhood Planning will help communities to play a greater role in finding creative and imaginative ways to overcome the pressures that development can create for conservation and local services and amenities. It can also help ensure that development is in line with local needs, provides greater public amenity and more certainty for developers. To monitor progress of neighborhood plans, the actions and accomplishments need to be reviewed periodically and if necessary, changes should be made to better suit the current situation. It is recommended that plans be developed for neighborhoods that don't have any and that existing and future plans be reviewed regularly and updated as necessary.

24 City of Austin, 2011

CONCLUSION

Application of the principles and guidelines developed for the corridors and character areas as part of the project are designed to facilitate long term safety and mobility along the Burnet and North Lamar corridors. For effective implementation, supportive plans and controls at the local and county levels will need to be developed to encourage appropriate land use patterns, minimize the potential for undesirable conflicts, and control access in a manner that enhances the safety and proper functioning of the corridors.