Greater Northside Management District

# Pedestrian/Transit Access Master Plan

August 2013

*Prepared by*

The Goodman Corporation

# *CONTENTS*

***Chapter 5 – Funding and Implementation Strategy***



***Appendices***



*This project was funded in part through the Federal Transit Administration. The contents of this report reflect the analysis of The Goodman Corporation which is responsible for the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Federal Transit Administration.*

***Glossary***

*Chapter*

### *Figures*



### *Tables*

# *EXECUTIVE SUMMARY*

## *BACKGROUND*

The Greater Northside Management District (GNMD) is a Municipal Management District, a political subdivision of the State of Texas, created by the Texas Legislature in 2001. The GNMD was created for the purpose of supplementing services provided by Harris County and the City of Houston.

Since 2010, GNMD has completed three studies within its boundaries, as follows:

- *H-GAC Northside Livable Centers Study* (2010)
- *Airline Drive Design Study* (2011)
- *H-GAC Independence Heights/Northline Livable Centers Study* (2012)

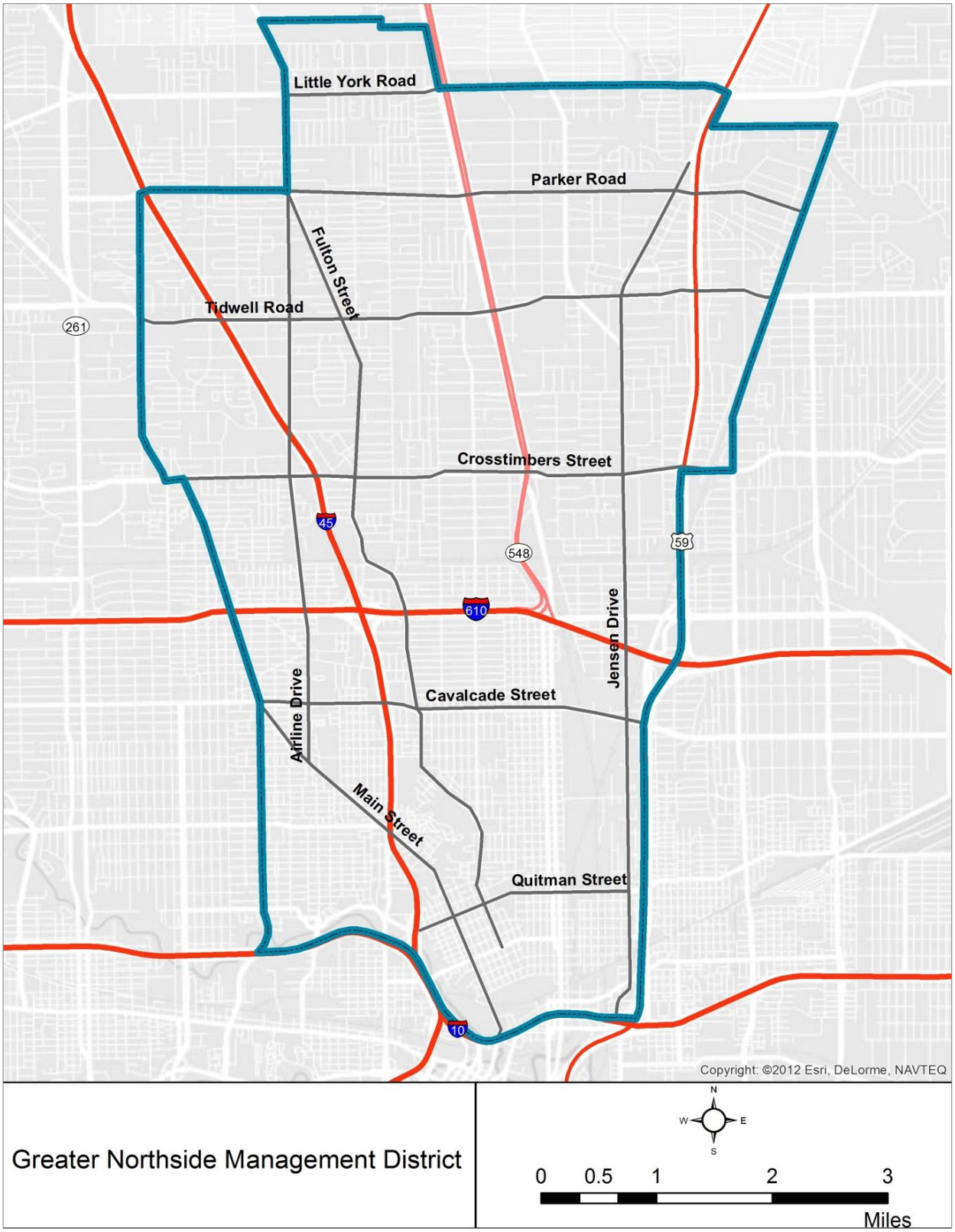
The *Pedestrian/Transit Access Master Plan* updates the information provided in these previous studies and presents an extensive review of pedestrian and transit infrastructure along 11 corridors throughout GNMD. This master plan also includes information on the benefits and costs of the proposed pedestrian/transit improvements. This information will be used in the pursuit of federal funding to implement the identified pedestrian/transit improvements.

## *LOCATION*

The Northside District is located north of Houston's downtown, covering approximately 25 square miles within metropolitan Houston. The district is bounded on the north by Little York Road, Carby Road, Cromwell Street, and Langley Road; on the south by Interstate Highway (IH) 10; on the east by US Highway 59 and Hirsch Road; and on the west by Studewood Street, Yale Street, and Main Street *(Figure ES.1)*. IH 45 and Hardy Toll Road also traverse GNMD. To the north land use is moderate- to low-income residential. To the south is downtown Houston; however, the only access routes are via IH 45 and the two underpasses located on Main Street and Elysian Street. To the east land uses are primarily industrial and include a large rail corridor. To the west is the Greater Heights, mainly a residential neighborhood, has experienced significant redevelopment in recent years.

Commercial and service land uses are concentrated around intersections along Airline, Berry, Cavalcade, Crosstimbers, Fulton, Irvington, Jensen, Main, and Tidwell. Adjacent to commercial areas are corridors of single-family homes located on small and inconsistently sized blocks. While this block structure is ideal for circulation of pedestrians, there is a general lack of contiguous sidewalks and other pedestrian amenities. There are numerous vacant or underutilized parcels throughout GNMD.

***Figure ES.1 – GNMD Boundaries***



### *ECONOMIC DEVELOPMENT*

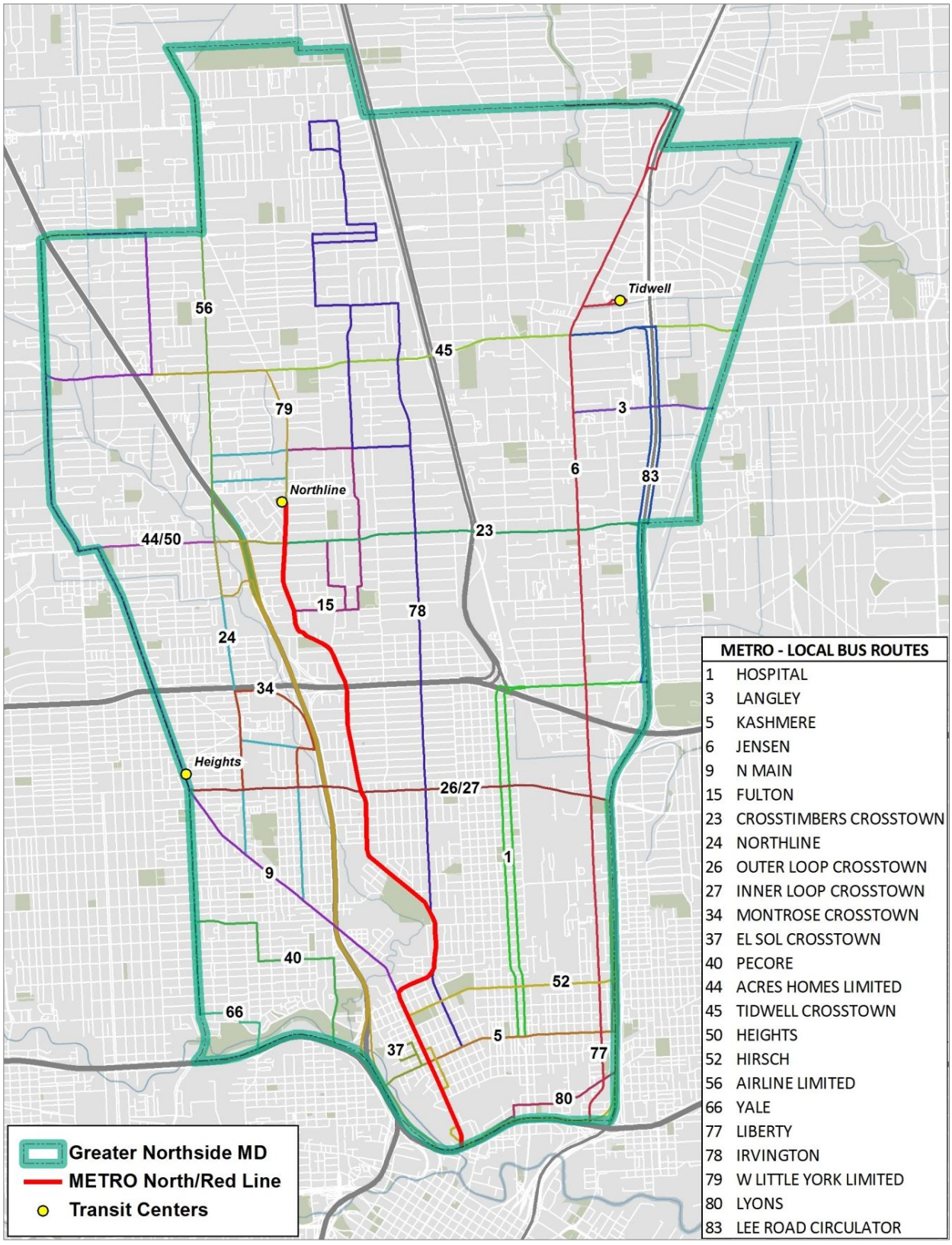
The activity centers listed above illustrate the wide breadth of economic activity that occurs within the GNMD. Infrastructure improvements such as the reconstruction of Airline Drive, expansion of the LRT, and rehabilitation and creation of the pedestrian and transit accessibility improvements documented within this plan will serve to enhance existing economic development efforts.

Providing area residents, visitors, and employees with a variety of transportation options will foster a safe and accessible environment to benefit economic growth in the area. This growth will not only affect commercial business owners, but also will aid in the development of a resilient real estate market. Individuals want to live in lively, walkable neighborhoods that provide a diverse mix of uses. The proposed improvements will help to create a livable center that will continue to make the GNMD a place where people want to live, work, shop, and play. This master plan outlines the economic benefits to be created through the recommended improvements.

### *EXISTING TRANSIT SERVICE*

Transit is an integral part of the GNMD mobility network and is served by 24 local METRO bus routes in addition to the currently under-construction METRORail North/Red Line *(Figure ES.2)*. The line bisects GNMD along Fulton Street, with nine planned stops within GNMD's boundaries, and will provide connectivity to numerous activity centers outside of GNMD, including Reliant Park, Texas Medical Center (TMC), Rice University, Hermann Park, Museum District, and Downtown Houston.

***Figure ES.2 – METRO Routes in GNMD***



### *LIVABLE COMMUNITIES INITIATIVE*

FTA LCI guidelines[1] provide a framework for the design of streetscape improvements that enhance pedestrian and transit access to transit facilities and services. Improvements such as transit shelters, sidewalks, Americans with Disabilities Act (ADA) compliant ramps, landscape barriers between pedestrians and automobile traffic, pedestrian amenities (i.e., benches and waste receptacles), pedestrian-oriented lighting, and hike & bike trails are considered eligible by the FTA for inclusion within a capital grant if improved pedestrian and transit access can be demonstrated. In addition to pedestrian support, expanded federal support of bike connectivity to transit has recently been placed into effect. The current policy allows the creation of an "LCI impact area" around nodes of transit such as transit terminals and bus stops. The impact area varies in size with a one-half mile radius to support pedestrian-related infrastructure and a three-mile radius to support bicycle transportation. This policy was updated in November 2009 and further finalized in August 2011 in an FTA publication entitled *Final Policy Statement on the Eligibility of Pedestrian and Bicycle Improvements Under Federal Transit Law*[2]. GNMD's transit system is robust in that the LCI capture area encompasses nearly the entire district.

### *STREETSCAPE INVENTORY*

A streetscape inventory was conducted targeting future pedestrian-transit access improvements within the LCI capture area of the District. Improvements to pedestrian-related infrastructure such as sidewalks, Americans with Disabilities Act (ADA) compliant ramps, landscape barriers between pedestrians and streets, and pedestrian-oriented lighting are considered eligible for FTA reimbursement if the relationship to transit is demonstrated and federal guidelines are met throughout the procurement and construction process.

The relationship between an improved pedestrian environment and its contribution to a better transit service and increased ridership has been documented in several studies nationwide. The most recent research is included in the 2009 *Quality and Level of Service Handbook*, prepared by the Florida Department of Transportation (FDOT). The handbook addresses the relationship between the pedestrian environment, which is measured in pedestrian level of service (PLOS), and the bus service performance, which is measured in BLOS. The handbook presents evidence of a positive relationship between the quality of the pedestrian environment and the quality of the bus service.

Each block face was physically inventoried wherein infrastructure elements were described, assessed, and ranked. Elements include: sidewalks, driveways, curbs, ADA-compliant ramps, crosswalks and stop bars, planting strips, and bus stop infrastructure where applicable. These rankings were totaled to represent an overall corridor pedestrian level of service grade, versus a projected PLOS grade of "A" after the recommended improvements are implemented.

[1] http://ntl.bts.gov/DOCS/livbro.html
[2] *Federal Register* / Vol. 76, No. 161 / Docket No. FTA-2009-0052 / 8-19-11.

A summary of the completed inventory is presented in *Table ES.1*.

| ***Table ES.1 - Streetscape Inventory Summary by Corridor*** | | | |
|---|---|---|---|
| ***Corridor*** | ***Termini*** | ***Distance (miles)*** | ***Average PLOS Letter Grade*** |
| Tidwell Road | IH 45 to Fulton Street | 0.9 | D |
| Berry Road | Airline Drive to Fulton Street | 0.53 | F |
| Fulton Street | Tidwell Road to Deerfield Street | 0.96 | E |
| Crosstimbers Street | Yale Street to Fulton Street | 1.42 | C |
| Cavalcade Street | Airline Drive to Irvington Boulevard | 1.26 | D |
| Quitman Street | Main Street to Hardy Street | 0.78 | D |
| Hogan/Lorraine Street | Main Street to Hardy Street | 0.64 | E |
| Brooks Street | Main Street to Hardy Street | 0.58 | E |
| Lyons Street | McKee Street to Hardy Street | 0.1 | D |
| Airline Drive | Main Street to Tidwell Road | 3.32 | F |
| Jensen Drive | Crosstimbers Street to Saunders Road | 1.12 | F |

The proposed improvements within the master plan include the following for missing or low-ranked pedestrian-transit infrastructure in need of replacement:

- Construct or replace, at minimum, 5-foot wide standard concrete sidewalks, where needed;
- Construct 6-foot wide standard concrete sidewalks, ¼ mile away from the LRT train;
- Construct or replace concrete curbs, where needed;
- Replace driveway bibs that are in sub-standard condition when affecting the pedestrian right-of-way;
- Construct or replace sidewalk ramps at applicable intersections using minimum standard specifications for ADA compliancy, where needed;
- Stripe or restripe crosswalks at applicable intersections;
- Install pedestrian-oriented street lighting where deemed appropriate by the City;
- Replace or install grass sod and/or overstory trees, where needed and desired; and
- In concert with METRO plans, install benches, waste receptacles, and concrete pads at transit stops, when needed and deemed appropriate due to high ridership.

The unit costs used to calculate the capital costs of the newly identified streetscape improvements in the master plan are presented in *Table ES.2*. These costs were derived from 2013 unit cost averages provided by TxDOT.

| ***Table ES.2 – Unit Costs for Streetscape Infrastructure*** | | |
|---|---|---|
| ***Element*** | ***Unit*** | ***Unit Cost*** |
| Concrete Sidewalks | SF | $6.95 |
| Curb and Gutter | LF | $12.58 |
| Driveway Bibs | SF | $5.05 |
| ADA Ramps [single design] | EA | $1,200 |
| Pedestrian-oriented Lighting | EA | $2,500 |
| Landscaping | | |
| Overstory Trees | EA | $430 |
| Tree Grate + Landscape Pavers | EA | $532.75 |
| Sod/Ground Cover | SF | $0.18 |
| Planting Soil | SF | $1.50 |
| Brick Pavers | SF | $5.31 |
| **Irrigation (meters, taps, controllers, conduit)** | LF | $14.20 |
| *Transit Shelters* | EA | $8,000 |
| Crosswalks | EA | $200 |
| Demolition | | |
| Demo-Sidewalk | SF | $0.55 |
| Demo-Curb | LF | $2.63 |
| Demo-Driveway | SF | $0.60 |

Costs per block face were developed by applying the unit costs to quantities needed to bring each block face to the improved standard described in the guidelines. The costs for each corridor are presented in *Table ES.3*, representing all streetscape improvements included in the master plan.

| ***Table ES.3 – Cost Per Corridor*** | |
|---|---|
| ***Corridor*** | ***Cost*** |
| Tidwell | $1,017,265 |
| Berry | $649,450 |
| Fulton | $813,527 |
| Crosstimbers | $836,623 |
| Cavalcade | $1,337,937 |
| Quitman | $780,694 |
| Hogan/Lorraine | $427,223 |
| Brooks | $397,339 |
| Airline | $3,056,223 |
| Lyons | $53,346 |
| Jensen | $2,966,890 |
| ***Total Cost All Corridors*** | **$12,336,517** |
| ADA Ramps (total for capture area) | $656,400 |
| Crosswalks (total for capture area) | $56,600 |
| ***Shared Infrastructure Cost*** | **$713,000** |
| ***Total Corridor and Shared Infrastructure Cost*** | **$13,049,517** |
| 20% Design/Admin./Construction Mgt. Cost | $2,609,903 |
| 10% Contingency | $1,565,942 |
| ***Total Cost*** | **$17,225,362** |

***BENEFITS***

The benefit criteria used in the master plan have been studied by a variety of nationally recognized authorities, including the Transit Coordination Research Program, Transportation Research Board, National Research Council, and Governmental Accountability Office, where methods have been developed for predicting and developing qualitative and quantitative benefits associated with the implementation of these types of improvements.

The proposed improvements will create benefits in the following areas:

- State of Good Repair
- Economic Competitiveness
- Livability/Sustainability
- Public Health
- Safety
- Pedestrian Level of Service (PLOS)
- Transit Ridership/Pedestrian Activity
- Emission Reductions

Pedestrian infrastructure improvements lead to fewer automobile trips in two ways: increased transit ridership and increased pedestrian activity. Every mass transit user starts and/or ends a trip as a pedestrian. Therefore, streetscape improvements make accessing transit easier, resulting in higher transit ridership as some drivers choose to use transit instead of driving. Using the difference between before and after PLOS scores, along with the ridership data provided by METRO, it is possible to calculate the expected increase in ridership at each bus stop in the inventory area due to pedestrian improvements.

Using the methodology described above, the streetscape improvements in the master plan are projected to add another 1,123 riders a day by improving the PLOS and making transit easier to access in the inventory areas. This represents a 26.69% increase in transit ridership in GNMD, attributable to improving the pedestrian realm.

The 1,123 added transit trips will result in a total of 2,246 one-way daily single-occupancy vehicle (SOV) trips removed.

The second way in which streetscape improvements lead to fewer automobile trips is by facilitating increased pedestrian activity. A high-quality pedestrian realm makes walking more feasible and appealing than it would be without the improvements. Proactive measures to facilitate pedestrian activity can result in a one-for-one replacement of auto trips of one-quarter mile or less with a pedestrian trip. Some longer auto trips may also be replaced if good pedestrian infrastructure brings desirable destination within reach, eliminating the need to drive to a location much farther away. Utilizing Texas Transportation Institute data on traffic counts

and percent mode shift, it is possible to calculate the number of pedestrian trips added due to the proposed improvements. The result is a reduction of 454 reduced vehicles.

Using Texas Transportation Institute data, average annual daily traffic counts were obtained along the corridors selected for improvement. The data for each corridor was averaged in order to obtain a reasonable number of traffic along the entire corridor. By multiplying the AADT by the percent mode shift, traffic is projected to decrease by 454 vehicles over each 24-hour period as a result of the proposed streetscape improvements. Since PLOS improvements can spur the replacement of auto trips of one-quarter mile or less with a pedestrian trip, the reduction in vehicles represents a daily VMT reduction of 113 miles. Each vehicle trip removed also corresponds to the removal of two cold starts.

***Table ES.4 – Summary of Benefits from Increased Pedestrian Activity (Daily)***

| ***Benefit*** | ***Daily Amount*** |
|---|---|
| Reduced Vehicles | 454 |
| Cold Starts | 908 |
| VMT | 113 |

### *Emissions*

Fewer automobile trips within a given area lead directly to a reduction in the amount of air pollutants that are emitted by vehicles. Thus, reduced automobile trips, through the increase in transit ridership and pedestrian activity, will ultimately bring reduced emission benefits to the region.

A summary of the combined reduced VMT and cold starts from increased transit and pedestrian activity are shown in *Table ES.5*. The transit and pedestrian activity annual VMT reductions are based on 365 days.

***Table ES.5 – Summary of Total VMT and Cold Start Reductions from Increased Transit and Pedestrian Activity***

| ***Benefit*** | ***Amount*** |
|---|---|
| Total **Daily** VMT Reduction | 11,792 |
| Total **Daily** Cold Start Reduction | 3,154 |
| Total **Annual** VMT Reduction | 4,304,080 |
| Total **Annual** Cold Start Reduction | 1,151,210 |

Environmental benefits through increased transit ridership were derived from enhanced pedestrian infrastructure, resulting in easier, safer access to transit services. Reduced cold starts and VMT also were calculated. The final step was to calculate the reductions in the three emissions of primary interest in the H-GAC region (NOx, VOC, and CO). A summary of changing reduced cold starts and VMT to reduced grams, pounds, and tons of emissions through

the use of emission factors developed by the EPA for the H-GAC region for the transit system and for pedestrian improvements is presented in *Table ES.6*.

***Table ES.6 – Emission Reductions from Transit Activity***

| ***Type of Emission*** | ***Daily VMT Reduced*** *(2 trips)* | ***Vehicle Emission Factors*** *grams/mile* | ***Net Daily Vehicle Grams Reduced*** | ***Daily Conversion to Pounds Reduced*** *(0.0022046)* | ***Daily Conversion to Tons Reduced*** *(0.0005)* | ***Annual Net Tons Reduced*** *(365)* |
|---|---|---|---|---|---|---|
| NOx | 11,679 | 0.4760 | 5,733 | 12.64 | 0.0063 | 2.31 |
| VOC | 11,679 | 0.5694 | 7,033 | 15.51 | 0.0078 | 2.83 |
| CO | 11,679 | 4.5711 | 56,601 | 124.78 | 0.0624 | 22.77 |
| ***Total*** | | | **69,367.1** | **152.9** | **0.0765** | **27.9** |

Average one-way auto trip distance - 5.2 miles
New ridership - 1,123
Each vehicle removed will result in a reduction of 2 cold starts
Source of emission factors - 2011 H-GAC/EPA
Weighted vehicle average - 70% LDGV, 20% LDGT1-4, 5% LDDV, 5% LDDT 12

### *Reduction in Fuel Consumption*

The U.S. dependence on oil is ever increasing as VMT increases. By enhancing transit facilities, the proposed project is estimated to reduce annual VMT by 4,304,080 miles. The 2010 EPA Corporate Average Fuel Economy (CAFE) standard for passenger cars is 27.5 miles per gallon (mpg) and for light-duty trucks 24.1 mpg. This analysis assumes not all vehicles will be operating at the 2010 CAFE standards. As a result, a conservative 23.5 mpg was used for calculating the decrease in fuel consumption. The proposed improvements are estimated to reduce fuel consumption by approximately 183,152 gallons per year, with a monetary value of $663,011.

### *Auto Cost Savings*

Operating a vehicle is one of the most expensive budget items for American households. The proposed project will provide the opportunity for thousands of residents to choose alternative modes of transportation, such as transit. According to the American Automobile Association, the average operating cost (minus fuel) for a vehicle in 2010 ranged from $0.14 cents to $0.17 per mile. This analysis uses $0.15 per mile for annual vehicle operating cost. The proposed project is estimated to reduce VMT by 4,304,080 annually, which will save the region approximately $645,612 annually in automobile costs.

***FUNDING AND IMPLEMENTATION***

The FTA may fund up to 80% of the qualifying costs for the proposed streetscape enhancements along the 11 selected corridors. Improvements such as sidewalks, ramps, street trees, street furniture (benches and waste receptacles), transit shelters, and pedestrian-oriented lighting are considered eligible by FTA for inclusion within a capital grant, if these elements demonstrate improved transit-pedestrian access. The total estimated cost of the improvements outlined in this plan is $17,225,362. Using an 80/20 federal funding mechanism, the federal share of this is estimated to be $13,780,290 and the local share is estimated to be $3,445,072.

Federal grants will represent a significant source of support for the project, as follows:

- Congestion Mitigation and Air Quality Improvement Program (CMAQ)
- Surface Transportation Program (STP)
- Transportation Alternatives Program (TAP)
- Discretionary Funding Opportunities (ARRA, TIGER)

Other sources of funding would include the following:

- Transportation Development Credits (TDC)
- Private Sector Funding
- GNMD General Funds
- Debt Financing

# *Chapter 1 - INTRODUCTION*

## *BACKGROUND*

The Greater Northside Management District (GNMD) is a Municipal Management District, a political subdivision of the State of Texas, created by the Texas Legislature in 2001. The GNMD was created for the purpose of supplementing services provided by Harris County and the City of Houston. Purposes of the GNMD include the following:

- Promote public safety within the district and create a safe environment;
- Attract more businesses and additional investment;
- Enhance the district's image;
- Seek additional public and private funds to invest in the district;
- Improve infrastructure and amenities; and
- Administer management of the district efficiently and effectively.

The GNMD began providing services in August 2006. Since inception, GNMD has created and implemented a service plan to improve the district. Notable accomplishments include the following:

- Implementing a general beautification program that provides a litter and graffiti abatement program;
- Creating an ongoing safety patrol program;
- Educating business owners and residents on the potential impacts of construction of Light Rail Transit (LRT); and
- Providing guidance to the Texas Department of Transportation (TxDOT) regarding community opinion on Hardy Toll Road.

## *STREETSCAPE IMPROVEMENTS TO ACCESS TRANSIT*

The Federal Transit Administration's (FTA) Livable Communities Initiative (LCI) is intended to improve integration of transit into surrounding communities. One means of accomplishing this is to provide streetscape improvements designed to improve access to the transit facilities in order to facilitate and increase transit usage and area pedestrian activity. Specifically, areas within one-half mile (2,640 feet) of a transit stop or a transit terminal are eligible for improvements. Eligible improvements include repair and installation of sidewalks, curbs, ramps, driveways, and crosswalks. Landscaping and installation of street amenities, such as transit shelters, pedestrian-oriented lighting, benches, bike racks, and waste receptacles, also are included.

## *PREVIOUS PEDESTRIAN/TRANSIT PLANS AND IMPROVEMENTS*

Since 2010, GNMD has completed three studies within its boundaries, as follows:

- *H-GAC Northside Livable Centers Study* (2010)
- *Airline Drive Design Study* (2011)
- *H-GAC Independence Heights/Northline Livable Centers Study* (2012)

These studies provided valuable information on existing conditions, demographics, and investment opportunities. This master plan updates the information from these previous studies and provides a comprehensive review of pedestrian and transit infrastructure along 11 corridors throughout GNMD. This information will be used in the pursuit of federal funding to implement the identified LCI improvements. This document presents guidelines for providing pedestrian and transit-related infrastructure improvements throughout the district to satisfy the goals set out in the planning, infrastructure, and area image components of the *GNMD Service Plan 2011-2020*.

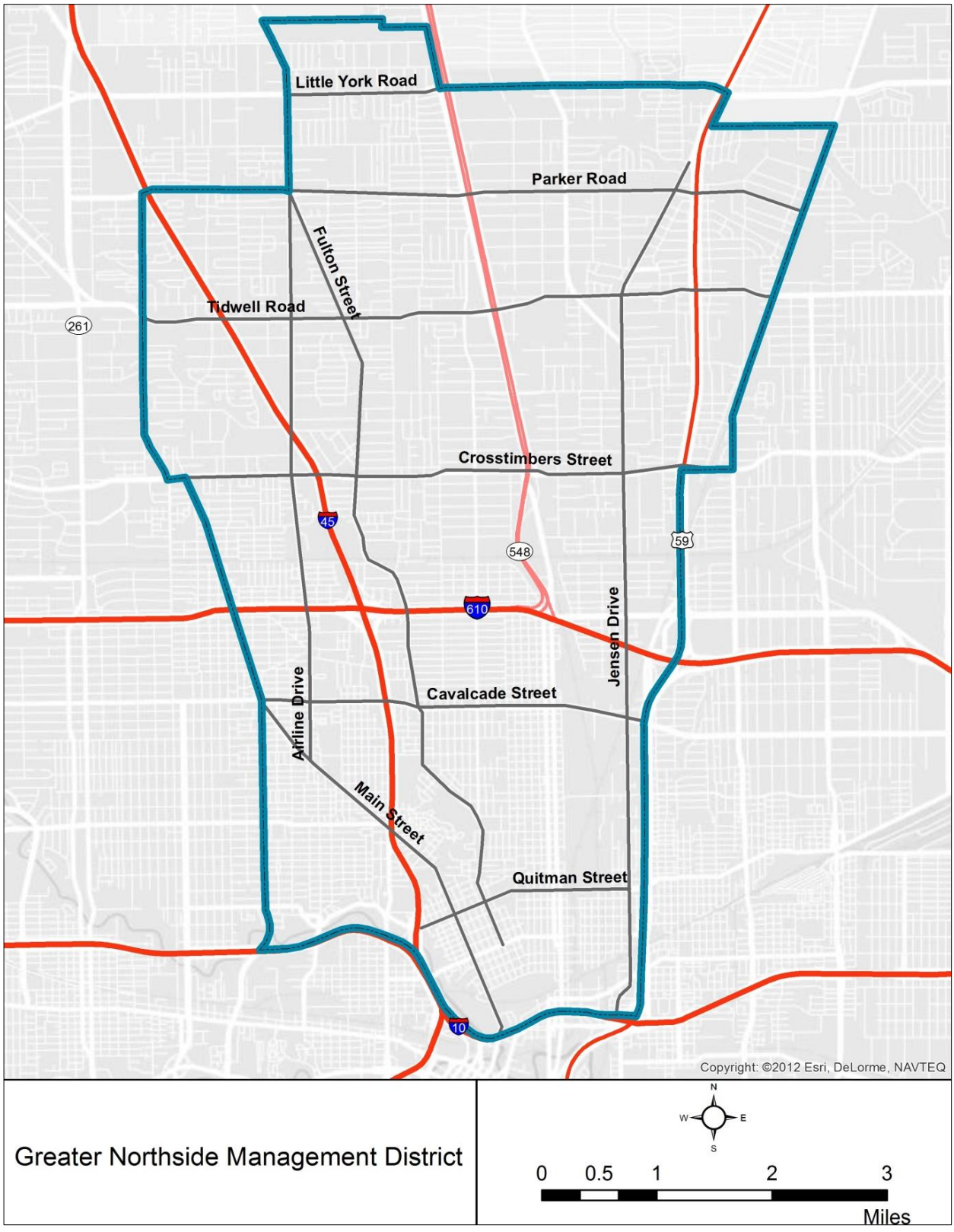
## *HISTORY, LOCATION, AND LAND USE*

The Northside neighborhood developed in the late 1880s in concert with the expansion of the Hardy Rail Yards. Growth progressed steadily until after World War II, when rail traffic and growth in the Northside neighborhood began to decline. The neighborhood still retains much of its original industrialized feel with warehousing and shipping facilities located on the southeast side. Large industrial structures are interspersed throughout the residential areas.

The Northside District is located north of Houston's downtown, covering approximately 25 square miles within metropolitan Houston. The district is bounded on the north by Little York Road, Carby Road, Cromwell Street, and Langley Road; on the south by Interstate Highway (IH) 10; on the east by US Highway 59 and Hirsch Road; and on the west by Studewood Street, Yale Street, and Main Street *(Figure 1.1).* IH 45 and Hardy Toll Road also traverse GNMD. To the west, the Greater Heights, mainly a residential neighborhood, has experienced significant redevelopment in recent years. To the east, uses are primarily industrial and include a large rail corridor. To the south is Downtown Houston; however, the only access routes are via IH 45 and the two underpasses located on Main Street and Elysian Street. To the north, land use is moderate- to low-income residential.

Commercial and service land uses are concentrated around intersections along Airline, Berry, Cavalcade, Crosstimbers, Fulton, Irvington, Jensen, Main, and Tidwell. Adjacent to commercial areas are corridors of single-family homes located on small and inconsistently sized blocks. While this block structure is ideal for circulation of pedestrians, there is a general lack of contiguous sidewalks and other pedestrian amenities. There are numerous vacant or underutilized parcels throughout the district.

***Figure 1.1 – GNMD Boundaries***



## *ACTIVITY CENTERS*

GNMD is home to the following major activity centers and notable places of interest:

***Airline Drive Corridor –*** Airline Drive is a unique place that contributes to the diversity of Houston with its ten markets, numerous restaurants, bars, and food trucks. Local favorites include Latin Specialties, Canino Produce, and El Bolillo's. The corridor draws hundreds of individuals daily.

***Gallery Furniture –*** Located on North Freeway, Gallery Furniture, established in 1981, is the sales-per-square-foot leader for independent furniture retailers in the U.S.

***Hardy Yards Development –*** Hardy Yards is an approximately 50-acre redevelopment situated on a former Union Pacific Rail Yard in the southern-most portion of the district projected to include an intermodal transit facility, 3,000 residential units, 120,000 square feet of retail, and 500,000 square feet of office space. It is anticipated that this development will act as a significant anchor for redevelopment farther north into GNMD.

***Houston Community College –*** HCC's northeast campus is located at the northern terminus of the expanded Metropolitan Transit Authority of Harris County (METRO) North/Red Line service on Fulton Street.

***Houston Foam Plastics –*** Located on Brooks Street, HFP has provided packaging solutions for industries throughout the U.S. for over 35 years.

***Mi Tienda/H-E-B –*** Located on Little York Road, this grocery offers goods catered to Hispanic customers and was named Best Hispanic Supermarket by *The Houston Press* in 2008.

***Moody Park –*** Opened in the 1920s, this park includes a community center, indoor gym, pool, 0.94-mile hike & bike trail, tennis courts, sports field, and playground.

***Northline Commons –*** One of Houston's first shopping malls in 1963, it underwent an extensive renovation in 2007 that facilitated a shift from a traditional enclosed shopping mall to an open-air shopping center. It now features 52 stores, including a Walmart, and is a hub of commercial activity for residents and visitors in GNMD.

***Shady Lane Park –*** Located near the intersection of Jensen Drive and Parker Road, this park includes an outdoor basketball pavilion, half-mile hike & bike trail, lighted sports field, and a playground.

***Shipley's Do-nut Flour and Supply Company –*** Headquartered on Main Street, this bakery company, with locations in Alabama, Arkansas, Louisiana, Mississippi, Tennessee, and Texas, originated in Houston in the 1940s.

***St. Arnold's Brewing Company –*** Texas' oldest craft brewery (and new lunch hot spot), this company is a popular attraction for residents and tourists, holding daily tours with as many as 1,600 or more individuals.

***Town in City Brewery –*** Located in the Greater Heights, this soon to open brewery will offer tours and tastings Thursday through Sunday.

***University of Houston Downtown Extension*** – UHD opened this extension south of GNMD in 2007. UHD has approximately 14,000 students in the fields of Business, Humanities, Public Service, Sciences, and Technology.

***Yellow Cab Company*** – Headquartered on Hays Street, this company is the premier taxi service in the greater Houston area.

All of the activity centers currently are served by METRO bus service or will be served by LRT when the METRO North/Red Line currently under construction has been completed.

### *ECONOMIC DEVELOPMENT*

The activity centers listed above illustrate the wide breadth of economic activity that occurs within the GNMD. Infrastructure improvements such as the reconstruction of Airline Drive, expansion of the LRT, and rehabilitation and creation of the pedestrian and transit accessibility improvements documented within this plan will serve to enhance existing economic development efforts.

Providing area residents, visitors, and employees with a variety of transportation options will foster a safe and accessible environment to benefit economic growth in the area. This growth will not only affect commercial business owners, but also will aid in the development of a resilient real estate market. Individuals want to live in lively, walkable neighborhoods that provide a diverse mix of uses. The proposed improvements will help to create a livable center that will continue to make the GNMD a place where people want to live, work, shop, and play. This master plan outlines the economic benefits to be created through the recommended improvements.

### *EXISTING TRANSIT SERVICE*

Transit is an integral part of the GNMD mobility network and is served by 24 local METRO bus routes in addition to the currently under-construction METRORail North/Red Line *(Figure 1.2)*. The line bisects GNMD along Fulton Street, with nine planned stops within GNMD's boundaries, and will provide connectivity to numerous activity centers outside of GNMD, including Reliant Park, Texas Medical Center (TMC), Rice University, Hermann Park, Museum District, and Downtown Houston.

***Figure 1.2 – METRO Routes in GNMD***

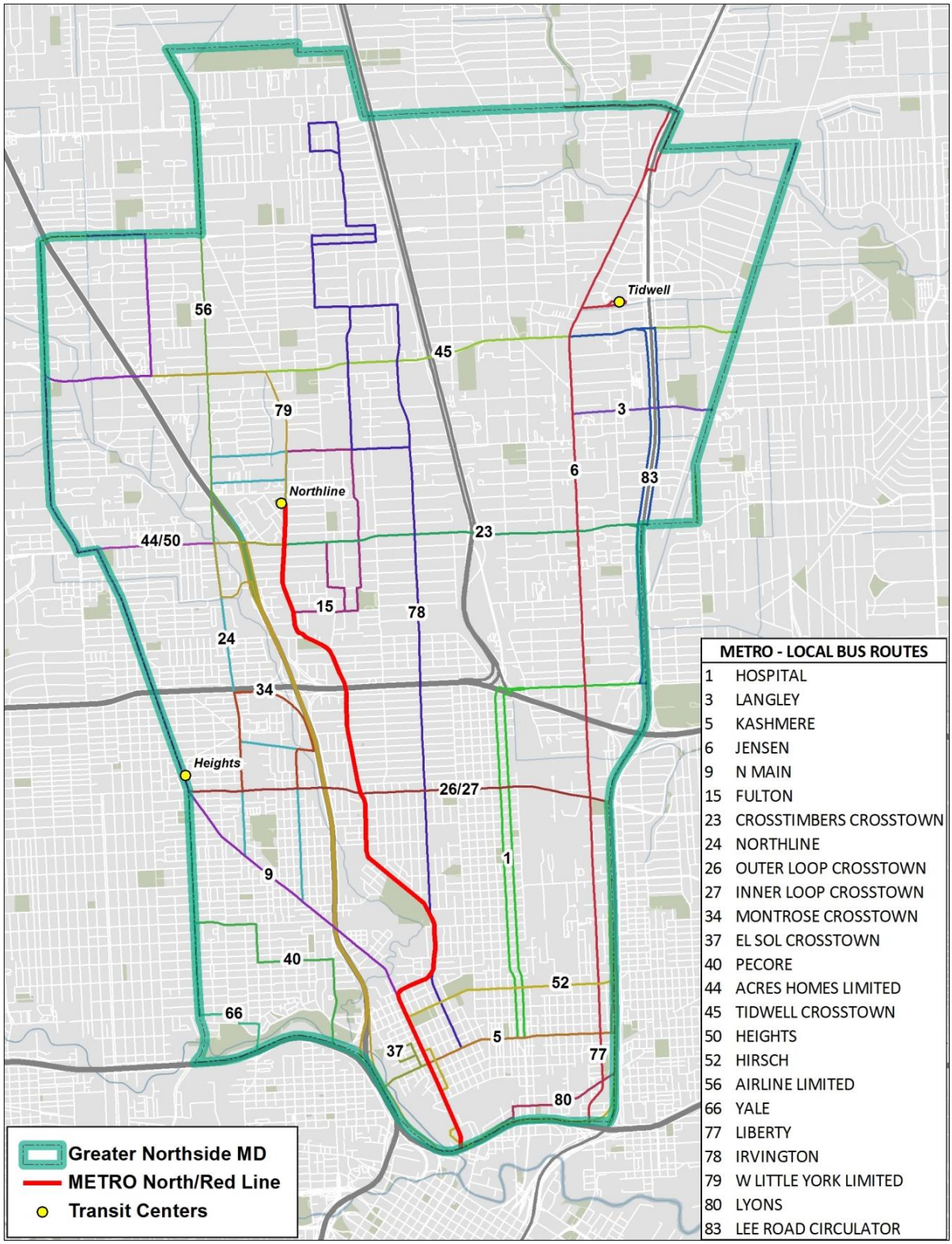


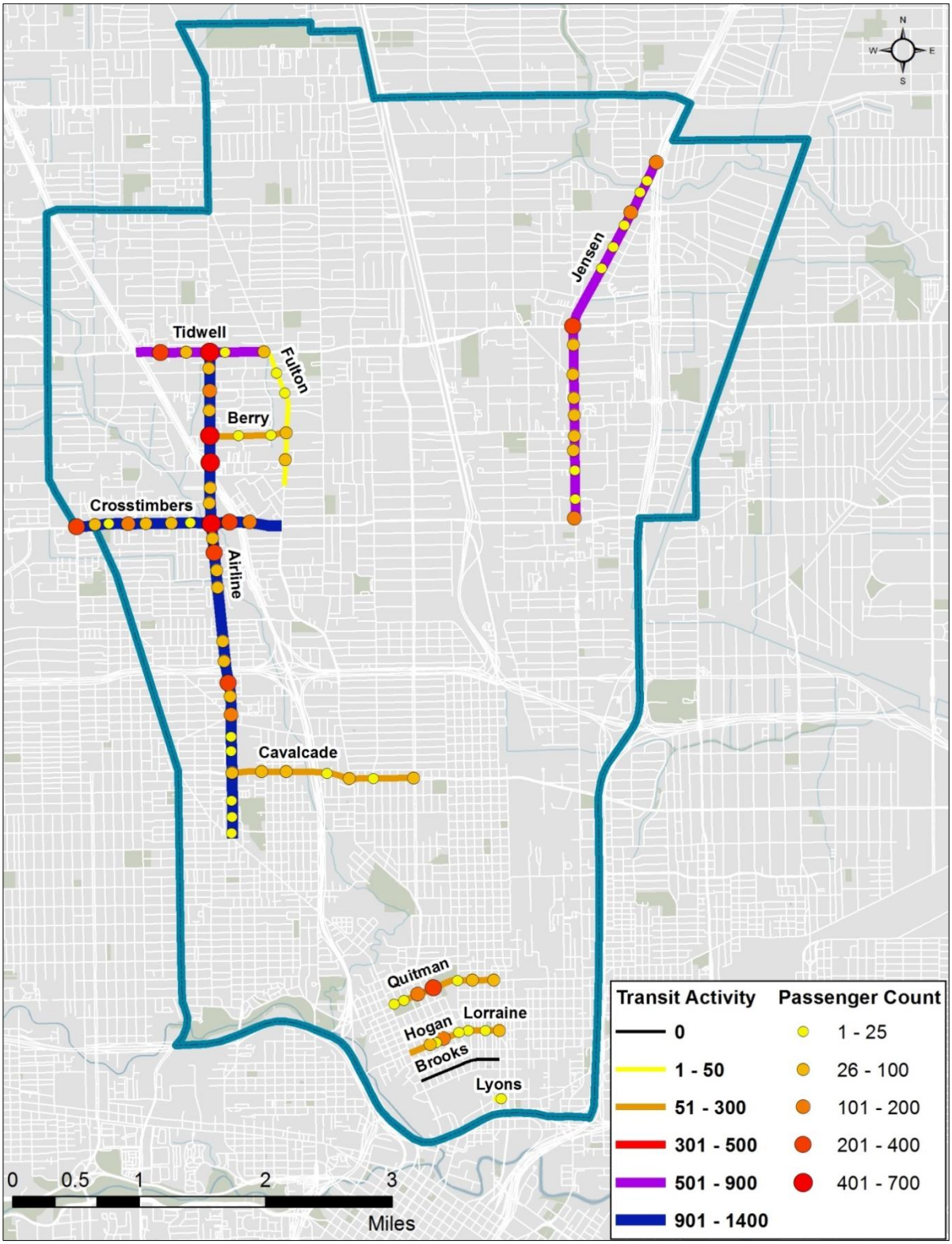
*Table 1.1* presents the top 25 METRO stops along the inventoried corridors by average daily boardings. *Table 1.2* presents total boardings per inventoried corridor.

| ***Table 1.1 – Top 25 METRO Stops in GNMD by Average Daily Boardings*** | |
|---|---|
| ***Stop (Route Street at Intersecting Street)*** | ***Average Daily Boardings*** |
| Crosstimbers at Yale (West) | 216 |
| Crosstimbers at Airline (East) | 214 |
| Jensen at Tidwell (South) | 190 |
| Airline at Tidwell (North) | 187 |
| Airline at IH 45 (North) | 171 |
| Berry at Airline (West) | 162 |
| Tidwell at Airline (East) | 160 |
| Tidwell at Airline (West) | 155 |
| Jensen at Crosstimbers (North) | 135 |
| Airline at Neyland (North) | 116 |
| Airline at IH 45 (South) | 111 |
| Crosstimbers at Airline (West) | 110 |
| Quitman at Tackaberry (East) | 101 |
| Airline at Berry (North) | 101 |
| Tidwell at Nordling (West) | 93 |
| Tidwell at Nordling (East) | 81 |
| Crosstimbers at IH 45 (East) | 76 |
| Airline at 28$^{th}$ (South) | 69 |
| Crosstimbers at IH 45 (West) | 64 |
| Jensen at Parker (South) | 58 |
| Quitman at Gentry (West) | 54 |
| Hogan at Fulton (East) | 52 |
| Jensen at Crosstimbers (South) | 44 |
| Airline at Crosstimbers (North) | 44 |
| Airline at Burress (North) | 42 |

| ***Table 1.2 – Total Daily Boardings by Corridor*** | | |
|---|---|---|
| ***Corridor*** | ***Between*** | ***Average Daily Boardings*** |
| Airline | Main and Tidwell | 1,355 |
| Crosstimbers | Yale and Fulton | 915 |
| Jensen | Crosstimbers and Saunders | 682 |
| Tidwell | IH 45 and Fulton | 545 |
| Quitman | Main and Hardy | 267 |
| Hogan/Lorraine | Main and Hardy | 178 |
| Berry | Airline and Fulton | 173 |
| Cavalcade | Airline and Irvington | 144 |
| Fulton | Tidwell and Deerfield | 37 |
| Lyons | McKee and Hardy | 0 |
| Brooks | Main and Hardy | No METRO stops |
| | ***Total*** | **4,296** |

The majority of transit ridership is present north of IH 610. The corridors south of Hogan/Lorraine were inventoried because of their importance to the pedestrian network in the GNMD. *Figure 1.3* presents the level of transit activity by corridor and frequency of boardings on METRO stops along corridors selected for pedestrian and transit improvements in the GNMD.

***Figure 1.3 – Transit Activity***

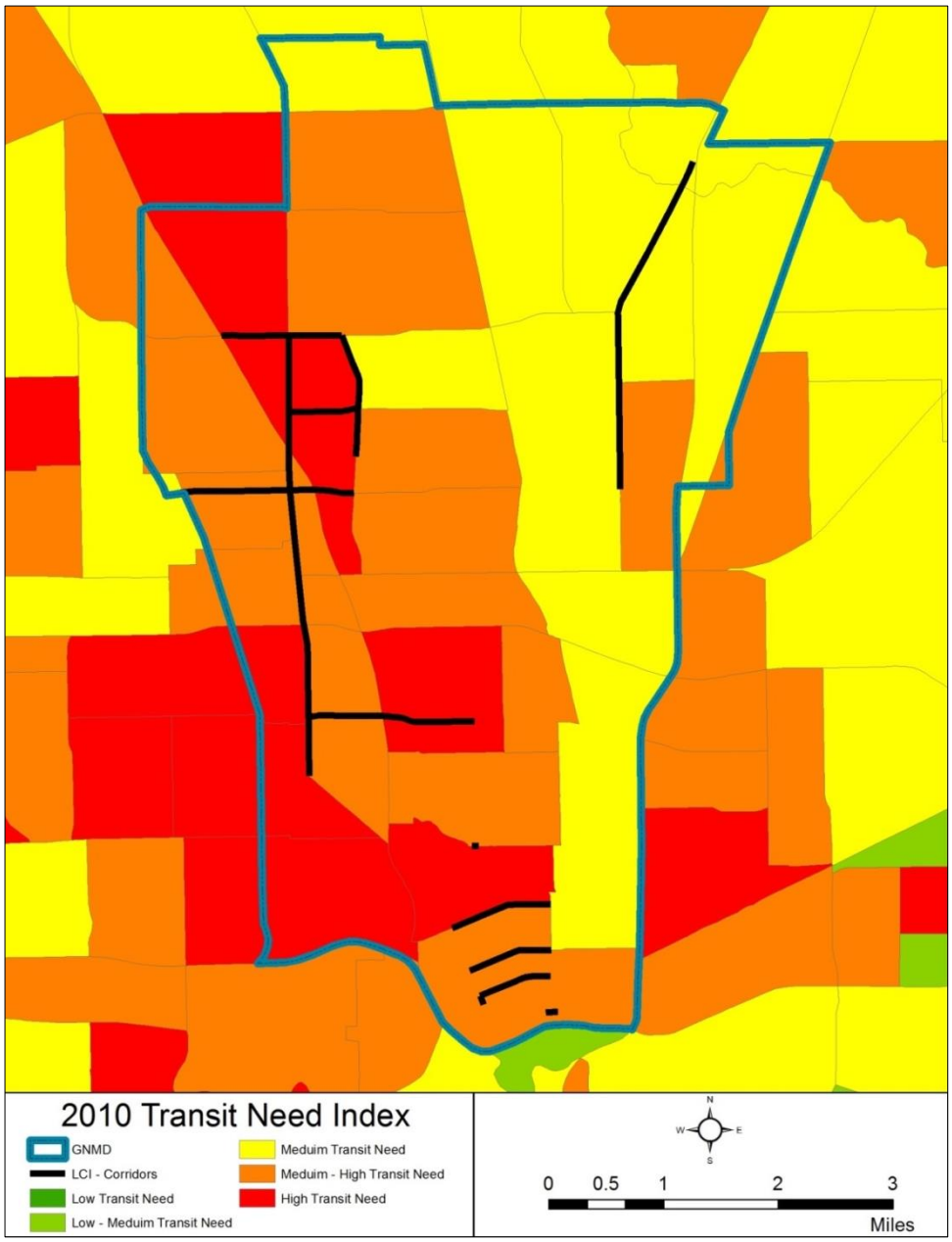


### *TRANSIT NEEDS INDEX*

The Transit Needs Index (TNI) is a tool used to assess relative transit need based on weighting demographic characteristics to formulate a score. To calculate TNI for the State of Texas, data was collected from the U.S. Census Bureau's American Community Survey (ACS) 2010 by census tract for population density, median household income, minority population, zero car households, senior population, and workforce disability. Each demographic factor was weighted according to its historical ability to generate transit demand within each census tract.

GNMD TNI results indicate a medium-high to high transit need relative to the Houston-Galveston Area Council (H-GAC) region. Transit need in these census tracts is generated primarily by a higher percentage of minorities, a higher percentage of individuals living below the poverty level, and a lower median income per household. These individuals typically rely on public transit and will benefit from improvements to the pedestrian infrastructure. The TNI results for GNMD are presented in *Figure 1.4*.

***Figure 1.4 – GNMD TNI Results***

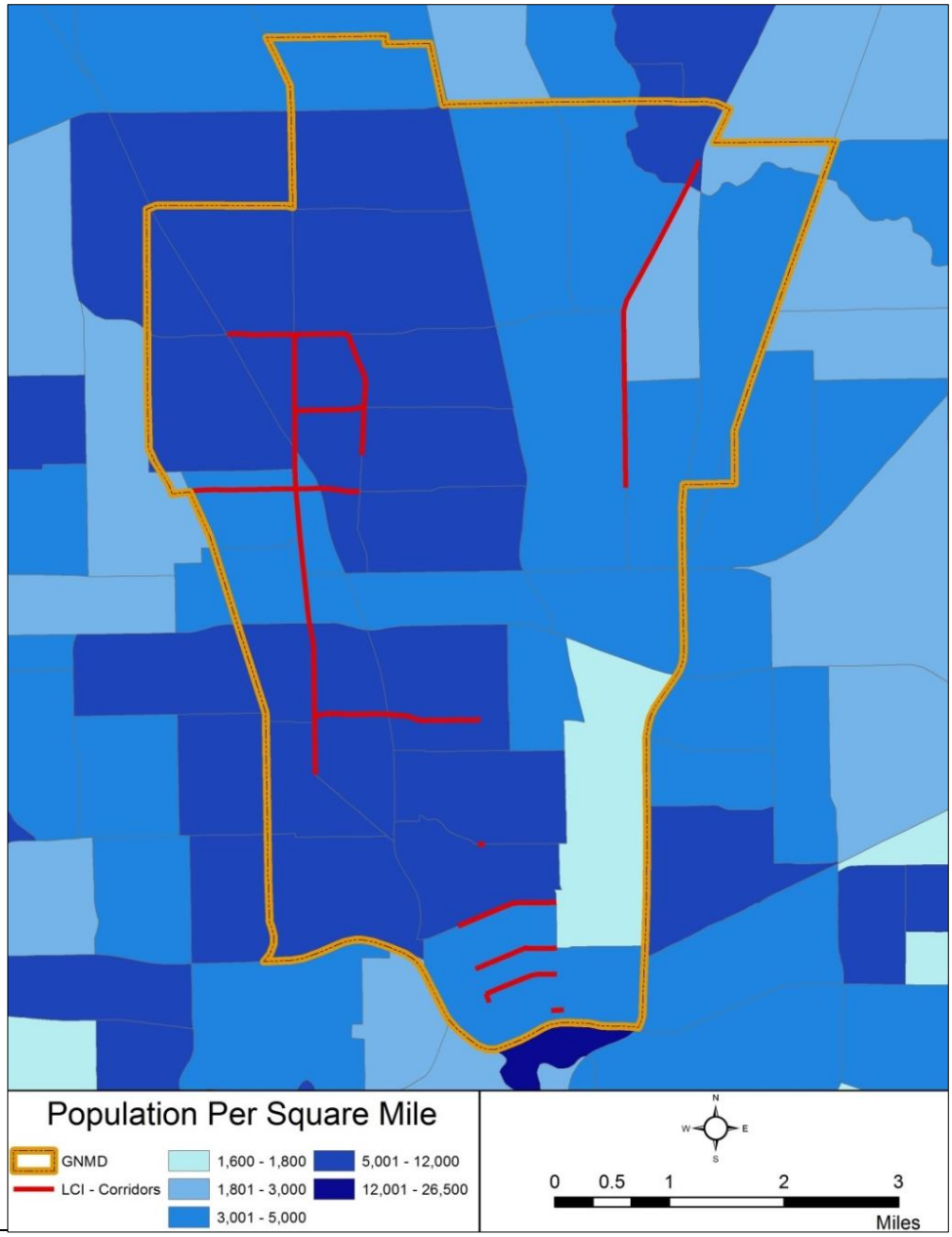


## *DEMOGRAPHICS*

### *Population*

GNMD has a total population of 139,410 residents[1] making up just over 6% of Houston's population. The population density is similar to that of the Houston region at 4,906 individuals per square mile *(Figure 1.5)*. This is reflected in the housing stock throughout the district, which is predominantly composed of single-family residences. The low density area on the east side of GNMD is comprised primarily of commercial uses, causing the density of the entire census tract to drop considerably.

***Figure 1.5 – Total Population***

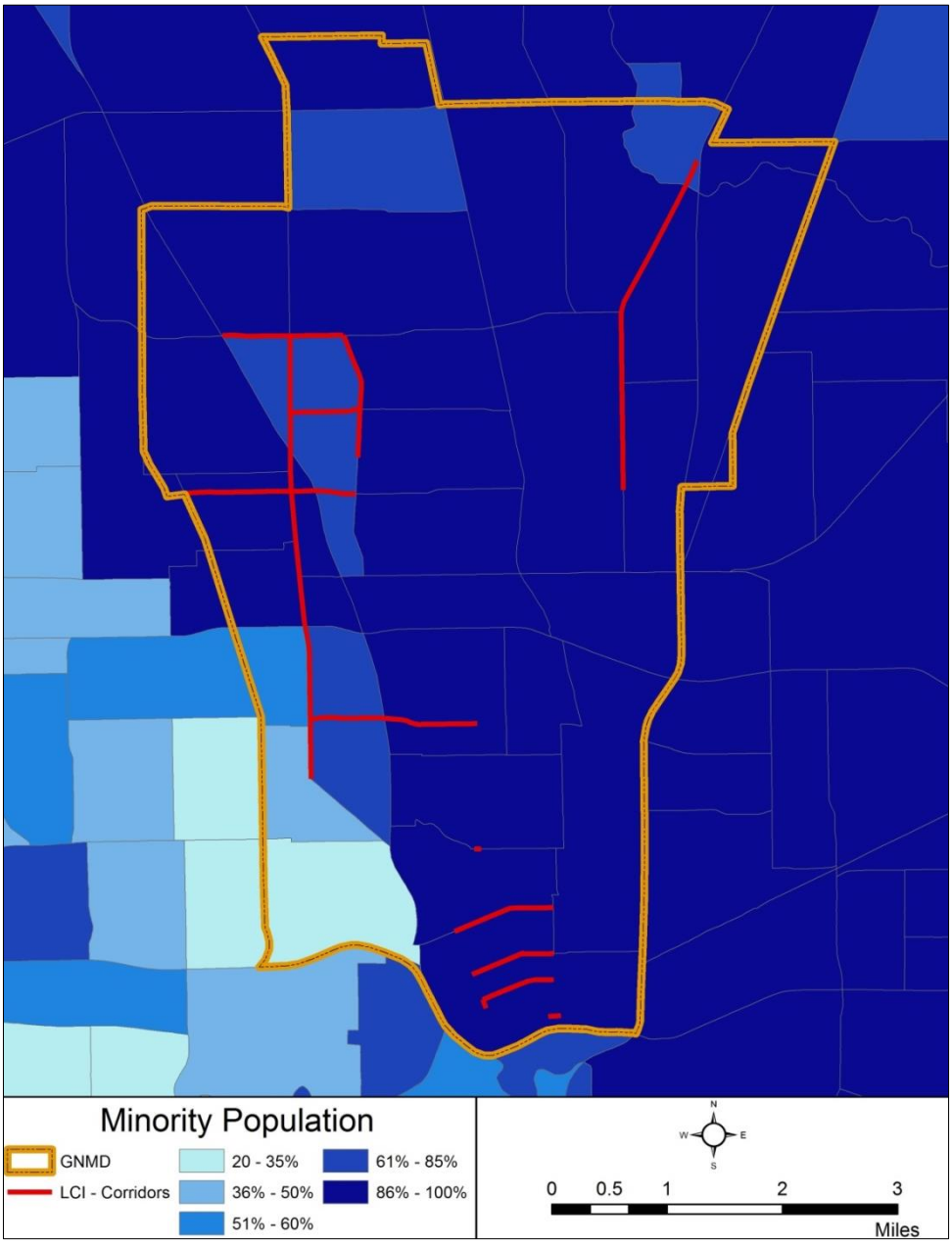



[1] Source: 2010 American Community Survey

### *Minorities*

GNMD has a predominantly Hispanic population, with a total minority population of 89%. *Figure 1.6* presents the southwest portion of GNMD near White Oak Park and Stude Park, with a much lower minority population than the majority of the district.

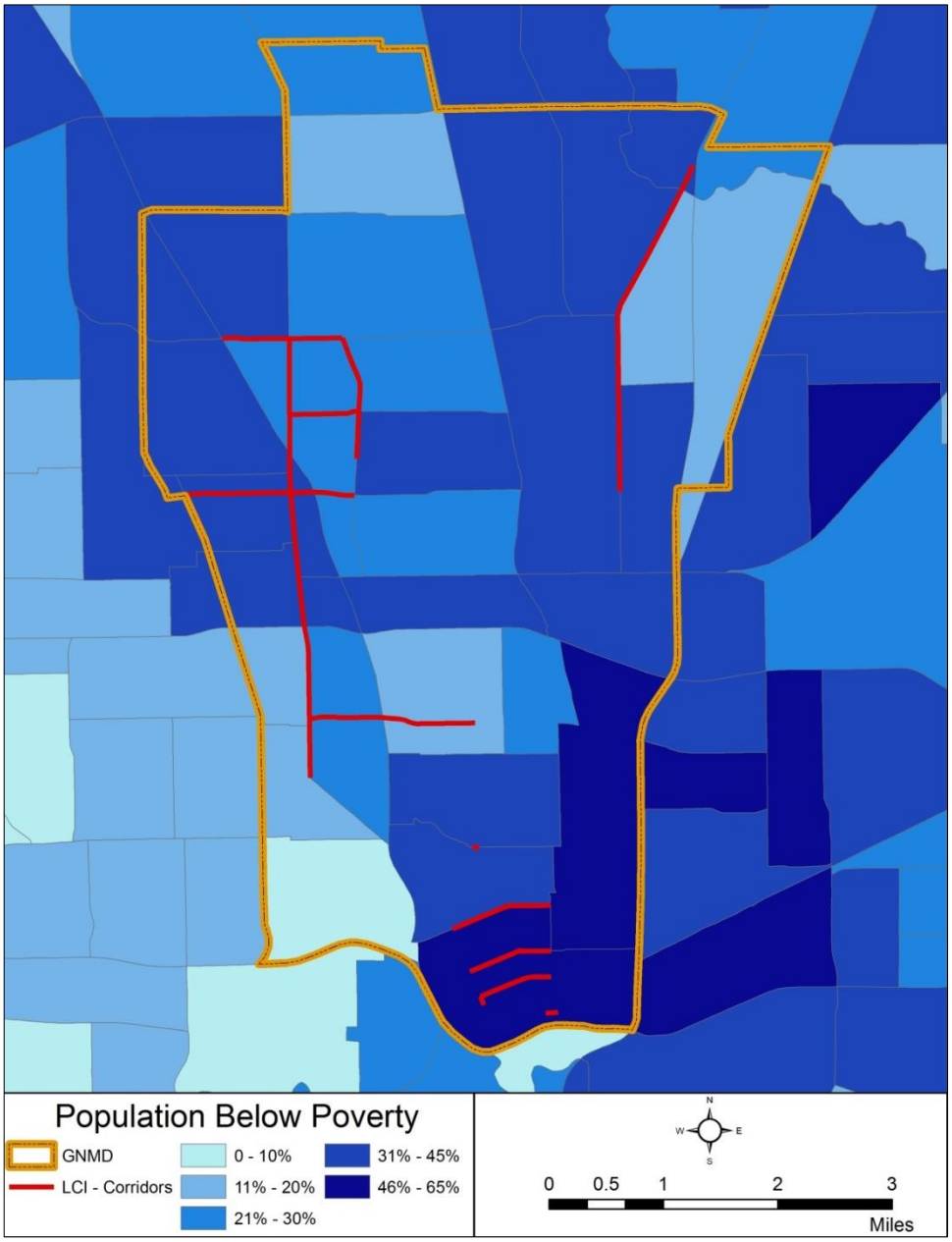
***Figure 1.6 – Minority Population***



### *Income*

GNMD residents have an average income of $32,895, lower than the rest of the greater Houston metropolitan area, at $58,345. This lower average income correlates with a higher poverty level in the area *(Figure 1.7)*. A total of 30% of households are below the federally designated poverty line which was defined as $23,550 for a family of four at the time of the 2010 census.

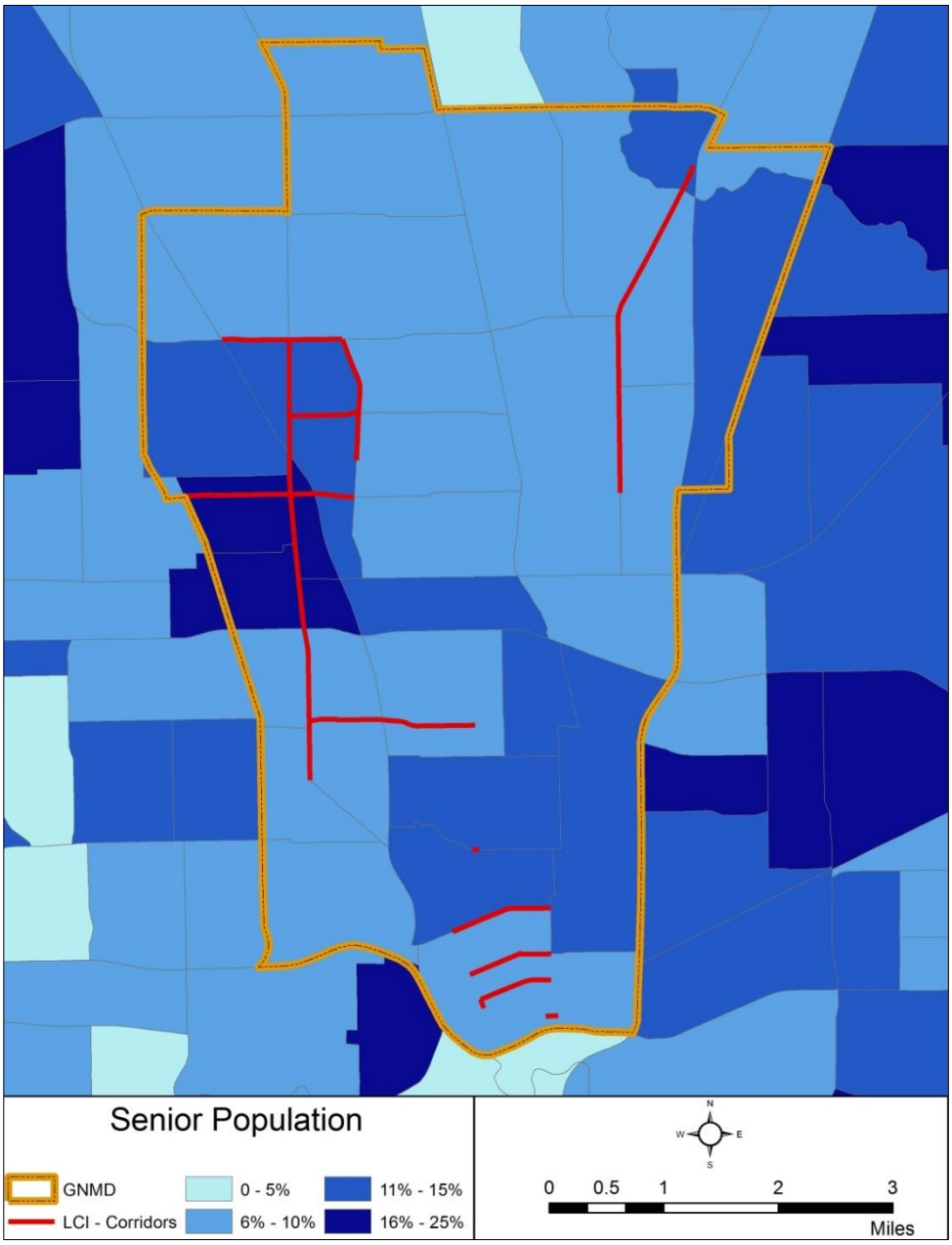
***Figure 1.7 – Population in Poverty***



### *Seniors*

The GNMD senior population is comparable to that of the greater Houston metropolitan area at 9% *(Figure 1.8)*. GNMD has several senior living complexes. Many of the individuals in these complexes are highly reliant on the walkability and transit accessibility that their neighborhoods provide.

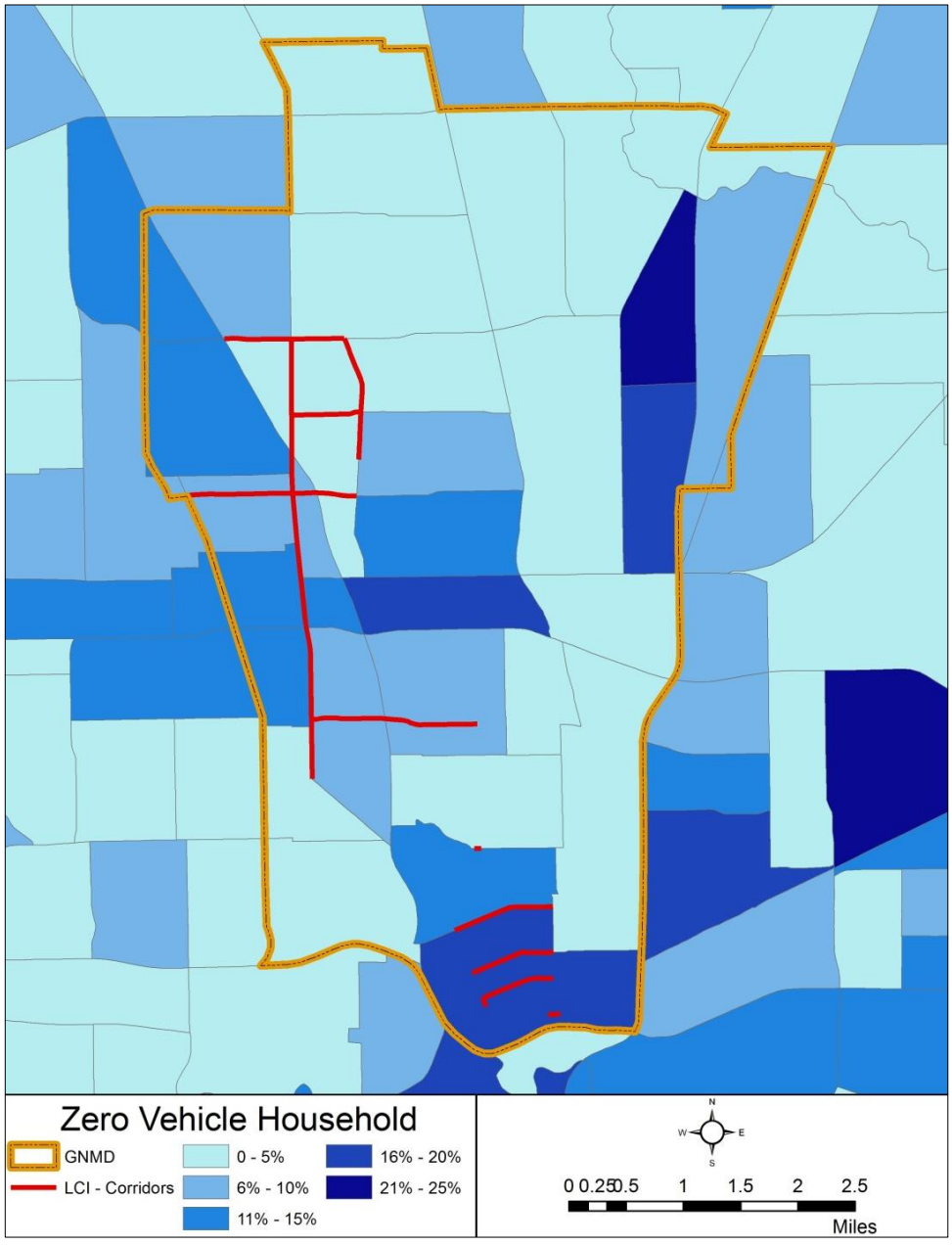
***Figure 1.8 – Senior Population***



### *Zero-Car Households*

Only 7% of households located within GNMD are considered a zero-car household *(Figure 1.9)*. This is slightly higher than the greater Houston metropolitan area average of 5%.

***Figure 1.9 – Zero-Car Population***



### *EXISTING LIVABILITY AND SUSTAINABILITY ENVIRONMENT*

There has been an increasing emphasis on the livability and sustainability of neighborhoods throughout the nation. The previous trend of urban sprawl is beginning to shift more and more toward more economically and environmentally viable growth. This type of growth is typically in the form of dense, infill development that promotes livable and sustainable places to live. This new trend has been precipitated by a variety of factors, but none more significant than the current economic conditions affecting the nation. Fiscal concerns have prompted citizens and businesses to pause and re-examine their choices for where to live, where to work, and how to travel. Gas prices, in particular, have generated a noticeable increase in the demand for more viable and accessible public transit options. Cities with limited or no public transit options are now looking at developing transit systems within their communities that may be linked to neighboring systems in order to provide effective transit solutions for their citizens.

As of June 2009, livability and sustainability initiatives now have the backing of several federally funded programs cooperatively supported by such agencies as the U.S. Department of Transportation (DOT), Department of Housing and Urban Development (HUD), and Environmental Protection Agency (EPA). Together, these agencies have formed a "Partnership for Sustainable Communities" to establish livability principles while promoting equitable development and environmental stability. Elements of the partnership agreement include enhancing integrated planning and investment; providing a vision for sustainable growth; and developing livability measures and tools. These three entities are poised to help guide the development of communities efficiently by working in a cooperative effort to encourage smart growth throughout the U.S.

The initiatives promoted by the partnership are designed to assist communities with the process of transforming their land use patterns and transportation infrastructure in ways that promote the economic and social well-being of the community. Hundreds of millions of dollars have been made available to communities through formula funds and competitive discretionary grants to promote livability and sustainability objectives. These objectives include greater transportation choice, Transit-Oriented Development (TOD) and mixed-use development, enhanced access to employment and educational opportunities, walkable neighborhoods, and improved air quality, among others.

The vision for GNMD is in line with this federally backed emphasis on livability and sustainability. The pedestrian and transit improvements proposed in this master plan will enhance the ability of GNMD visitors and residents to travel without a reliance on a single-occupancy motor vehicle); enhance commuting options; improve air quality by reducing vehicle pollution; promote TOD; and help to foster the vibrant, mixed-use development GNMD seeks.

## *PUBLIC INVOLVEMENT PROCESS*

The planning process documented within this plan involved a significant public involvement process that culminated in a public meeting held on August 22, 2013, from 6 p.m. to 8 p.m. The purpose of the meeting was to inform the public of the purpose and objectives involved in the creation of this master plan. Attendants were surveyed in order to gauge their opinions on the current state of pedestrian/transit access within GNMD. The results are presented in *Table 1.3*. Meeting sign-in sheets and invitations are included in *Appendix A*.

***Table 1.3 – Pedestrian/Transit Survey Responses***

**Which improvement would encourage you to walk more often?**

| ***Option*** | ***# Selected*** |
|---|---|
| Improved sidewalk conditions | 17 |
| Improved sidewalk connectivity | 9 |
| Safer crosswalks | 5 |
| Improved pedestrian lighting | 5 |
| Removal of barriers | 1 |

**Which improvement would encourage you to utilize public transportation more often?**

| ***Option*** | ***# Selected*** |
|---|---|
| Cleaner shelters | 13 |
| Better connectivity between stops | 9 |
| Improved sidewalk conditions around stops | 6 |
| Improved lighting near shelters | 8 |
| Safer crosswalks around stops | 2 |

**One reason why you don't walk or use transit as often as you would like?**

| ***Option*** | ***# Selected*** |
|---|---|
| I feel unsafe due to traffic | 18 |
| There are no connecting sidewalks | 13 |
| I feel unsafe because of crime | 6 |
| Sidewalks are in poor condition | 4 |


*GNMD residents view a presentation at the August 22, 2013, public meeting*


*GNMD Executive Director Rebecca Reyna addresses the crowd at the public meeting*

***REPORT ORGANIZATION***

The following chapters present an existing conditions inventory, costs, benefits, and schedule of priorities. The master plan provides supporting information and documentation necessary to obtain an FTA Letter of No Prejudice (LONP) in order to protect the pedestrian/transit infrastructure for reimbursement or as local match.

**Chapter 2 – Existing Conditions Inventory** documents the conditions, inventory, and associated improvements in conjunction with FTA's LCI. These improvements will maximize accessibility for transit users and, therefore, maximize transit ridership. The inventory of existing conditions identifies the locations that present the greatest barriers to mobility which have been targeted for improvements.

**Chapter 3 – Capital Costs** delineates the costs of implementing the recommended improvements.

**Chapter 4 – Benefits** describes the benefits to be derived from the program.

**Chapter 5 – Funding and Implementation Strategy** describes the funding program to support the improvements and the milestones for expedited implementation.

A separate **environmental analysis report**, including a request for a Categorical Exclusion (CE), was completed for the proposed **LCI improvements** to be installed throughout the study area.

# *Chapter 2 – EXISTING CONDITIONS INVENTORY*

Conducting a thorough inventory of existing conditions is the first step in recommending specific streetscape improvements that will enhance walkability and make the use of transit easier. This chapter presents an existing conditions inventory of pedestrian-related infrastructure, such as sidewalks for pedestrian/transit access to existing and future bus or rail stops, as well as associated recommended improvements. Once the program of recommended improvements has been developed, capital costs can then be estimated.

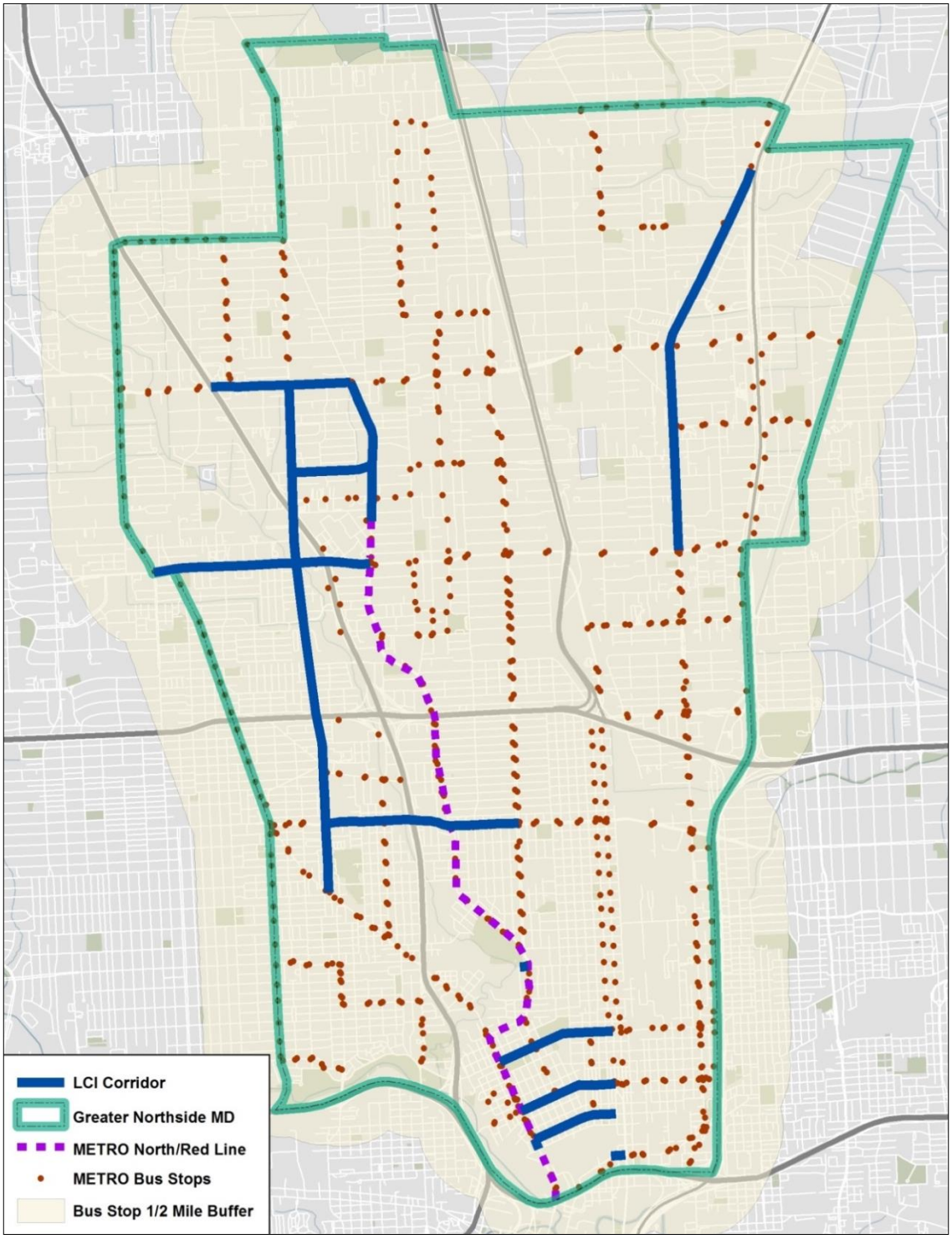
## *LIVABLE COMMUNITIES INITIATIVE*

FTA LCI guidelines[1] provide a framework for the design of streetscape improvements that enhance pedestrian and transit access to transit facilities and services. Improvements such as transit shelters, sidewalks, Americans with Disabilities Act (ADA) compliant ramps, landscape barriers between pedestrians and automobile traffic, pedestrian amenities (i.e., benches and waste receptacles), pedestrian-oriented lighting, and hike & bike trails are considered eligible by the FTA for inclusion within a capital grant if improved pedestrian and transit access can be demonstrated. In addition to pedestrian support, expanded federal support of bike connectivity to transit has recently been placed into effect. The current policy allows the creation of an "LCI impact area" around nodes of transit such as transit terminals and bus stops. The impact area varies in size with a one-half mile radius to support pedestrian-related infrastructure and a three-mile radius to support bicycle transportation. This policy was updated in November 2009 and further finalized in August 2011 in an FTA publication entitled *Final Policy Statement on the Eligibility of Pedestrian and Bicycle Improvements Under Federal Transit Law*[2].

*Figure 2.1* shows the eligible LCI area in which pedestrian and transit access infrastructure can be federally protected, which encompasses the entire proposed pedestrian enhancement area.

[1] http://ntl.bts.gov/DOCS/livbro.html
[2] *Federal Register* / Vol. 76, No. 161 / Docket No. FTA-2009-0052 / 8-19-11.

***Figure 2.1 – LCI ½-mile Eligibility Area***



## *LCI STREETSCAPE INVENTORY*

The inventory corridor segments targeted for future pedestrian/transit access improvements in the district are all within the LCI ½-mile capture area. Improvements to pedestrian-related infrastructure such as sidewalks, ADA-compliant ramps, landscape barriers between pedestrians and streets, and pedestrian-oriented lighting are considered eligible for FTA reimbursement or match if the relationship to transit is demonstrated and federal guidelines are met throughout the procurement and construction process.

The following sections describe the approach and methodology used to determine and conduct the streetscape inventory as well as provides a description of the condition of the existing pedestrian-transit access infrastructure along the chosen corridor segments.

## *METHODOLOGY*

The following considerations were used in selecting the criteria and factors used for the inventory:

- ***Identify Eligible Corridors*** – After establishing the LCI impact area, eligible corridor segments were selected and delineated into smaller sections called "block faces." A block face consists of one side of a given street between two intersections. For example, Crosstimbers Street, a major east-west arterial, has block faces on both the north and south sides of the street, delineated by intersecting north-south streets.
- ***Measure Pedestrian-Transit Infrastructure Attributes*** – Each block face was physically inventoried on foot, taking measurements of infrastructure elements as described in the next section. These measurements will help formulate the costs associated with the construction of new infrastructure, if recommended.
- ***Describe and Rank Existing Streetscape Conditions*** – Both general block face conditions and individual infrastructure elements are described and, in some instances, ranked.

## *PEDESTRIAN/TRANSIT ACCESS INFRASTRUCTURE*

The following pedestrian/transit access infrastructure elements were inventoried and ranked for each block face in the inventory area:

- ***Sidewalks and Curbs*** – The condition of the sidewalk is critical to the level of pedestrian accessibility to transit. Damaged or missing sidewalks and curbs discourage or even completely impede the ability of pedestrians to walk and access transit.
- ***Driveways*** – Where a sidewalk crosses a driveway, the driveway is actually a part of the sidewalk. As such, damaged driveways need to be repaired to ensure full pedestrian accessibility.

- ***Ramps at Street Crossings and Driveways*.** A continuous network of ramps ensures accessibility for those utilizing wheelchairs, motorized scooters, and strollers.
- ***Crosswalks and Stop Bars.*** Crosswalks should be properly striped with stop bars.
- ***Landscaping, including planting strips*.** Landscaping serves multiple purposes. It provides shade for pedestrians; contributes to a feeling of safety by providing a buffer between the street and the sidewalk; and provides for a more pleasant and aesthetically pleasing pedestrian environment. All of these factors encourage more pedestrian activity and transit use.
- ***Transit Stop Amenities*.** The presence of shelters, benches, pedestrian-oriented lighting, and waste receptacles at transit stops gives transit users a more comfortable experience while they are waiting for the bus.

Each block face could have up to 13 infrastructure items ranked depending on the applicable number of amenities.

### *PEDESTRIAN/TRANSIT ELEMENT QUALITATIVE RANKINGS*

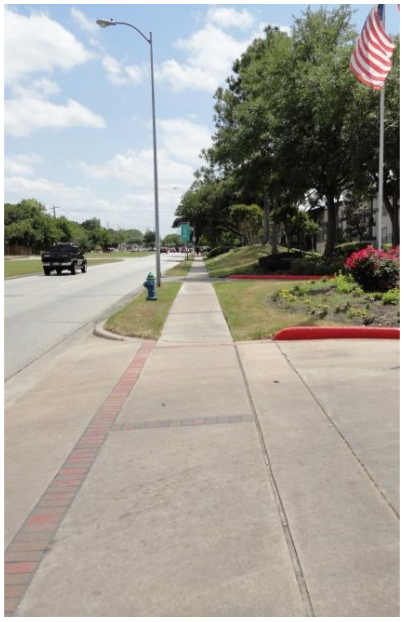
The purpose of the qualitative rankings is to determine whether or not a particular pedestrian-transit infrastructure element needs to be replaced. This determination is made from the perspective of a pedestrian or disabled individual who uses a network of sidewalks, isolated from automobile traffic, to safely access transit stops, origins and destinations. An important factor in conducting the existing conditions inventory is to determine the quality of pedestrian and transit elements listed in the previous section. For those infrastructure items that were eligible for ranking, an initial ranking score was assigned during the existing conditions inventory.

*Table 2.1* presents the qualitative scoring for individual pedestrian/transit infrastructure items as well as the corresponding numerical factor. A description of the ranking scores criteria used per infrastructure item is presented next.

***Table 2.1 – Individual Pedestrian/Transit Element Scoring***

| | | |
|---|---|---|
| **0** | = | No Treatment Necessary (Excellent)<br>**No changes or updates recommended.** |
| **1** | = | Minimum Treatment Needed (Good)<br>**No changes or updates recommended.** |
| **2** | = | Significant Treatment Needed (Fair)<br>**Complete replacement recommended.** |
| **3** | = | Maximum Treatment Needed (Poor)<br>**Complete replacement recommended.** |

**"0" No Treatment Necessary (Excellent)**: Sidewalks are of sufficient width to support both pedestrian and disabled individuals; sidewalks and curbs are unbroken and are in very good condition, fully supporting pedestrian and disabled traffic; all sidewalks meet ADA standards at driveway intersections; ADA ramps have the proper slope and design; crosswalks are properly striped with stop bars; planting strips are of the appropriate width, acting as a sufficient buffer between pedestrians and motorized vehicles; landscaping in the planting strips is appropriate to the block face and zoning in the area and has supportive irrigation. **No changes or updates recommended.**



***Example of Score 0, Excellent Condition***

**"1" Minimum Treatment Needed (Good)**: Sidewalks are of sufficient width to support both pedestrians and disabled individuals; sidewalks and curbs have minor surface damage or cracks but are unbroken and are otherwise in very good condition, needing little to no repair work; all sidewalks meet ADA standards at driveways and intersections; ADA ramps may show some wear, but have the proper slope and design; crosswalks are properly striped with stop bars; planting strips are of the appropriate width, acting as a sufficient buffer between pedestrians and motorized vehicles; landscaping in the planting strip is appropriated to the block face and zoning of the area and has supportive irrigation. **Regardless of minor flaws in infrastructure, no changes or updates recommended.**

***Example of Score 1, Good Condition***

**"2" Significant Treatment Needed (Fair)**: Sidewalks are either too narrow or have moderate damage such as holes, gaps, or large cracks, making travel difficult for both pedestrians and disabled individuals; sidewalks may be raised or lowered at driveways and intersections; utilities may be obstructing the pedestrian right-of-way; curbs are crumbling or have gaps; ADA ramps are of an outdated design or show moderate wear; crosswalk striping is faded or may not include stop bars for motorized vehicles; planting strips are too narrow and do not serve as a sufficient perceived barrier between pedestrians and motorized vehicles; landscaping in planting strip is inappropriate to the block face and zoning of the area or may lack supportive irrigation. **Complete replacement recommended.**

***Example of Score 2, Fair Condition***

**"3" Maximum Treatment Needed (Poor)**: Sidewalks are either too narrow or have major damage such as severe surface breaks or missing sections, making travel impossible for both pedestrians and disabled individuals; sidewalks may be raised or lowered at driveways and intersections; utilities may be obstructing the pedestrian right-of-way; curbs are crumbling or have missing sections; ADA ramps are badly damaged, pooling water, or missing altogether; crosswalk striping is completely faded or nonexistent without stop bars for motorized vehicles; planting strips are too narrow and do not serve as a sufficient perceived barrier between pedestrians and motorized vehicles; landscaping in planting strip is inappropriate to the block face and zoning of the area or nonexistent or lacking supportive irrigation. **Complete replacement recommended.**

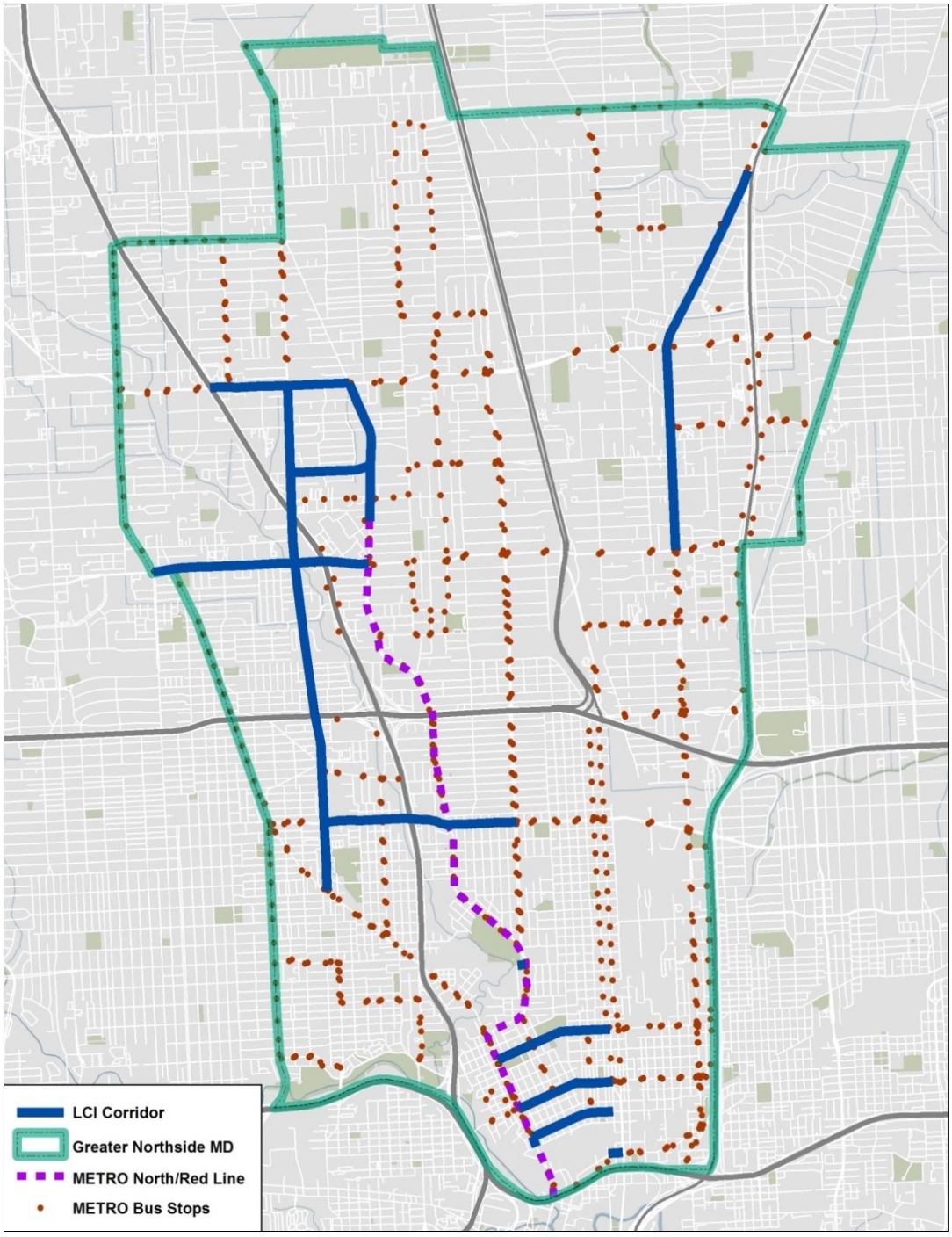
***Example of Score 3, Poor Condition***

For the purpose of this inventory, a pedestrian or transit element ranked as Excellent or Good will not be recommended for repair or replacement and will not be a part of the costing matrix. Elements that are ranked as Fair or Poor will be recommended for complete replacement and will be costed using construction figures from and the most recent TxDOT unit cost averages. Shared infrastructure elements, such as crosswalks and ADA ramps, were examined per block face and ranked without consideration of other adjoining block faces. In estimating the recommended streetscape costs, any shared infrastructure in need of replacement was listed separately, so as not to be "double counted."

When individual infrastructure scores were added, a total rating was created for the individual block face, demonstrating which block faces are in the worst condition and, therefore, require the most improvements. The cumulative rankings of unimproved block faces are presented in Chapter 4. These rankings indicate, when compared to the project block face rankings after improvements are implemented, the positive impact that can be made on pedestrian/transit access with benefits to the surrounding community.

Each block face was inventoried for the general pedestrian experience on each block face from the perspective of pedestrians or persons requiring wheelchair/stroller/scooter access. Individual measurements and observations were made by staff conducting the inventory by walking each block face.

***Figure 2.2 – GNMD LCI Corridors***



## *EXISTING CONDITIONS BY CORRIDOR*

An existing conditions inventory and general description of the corridor are provided next. The following corridor segments were included with recommendations for improvements. A total of 275 block faces were inventoried.

Two corridors were excluded from the inventory. Hays Street excluded from the inventory, as it has been recently improved and does not require improvements.

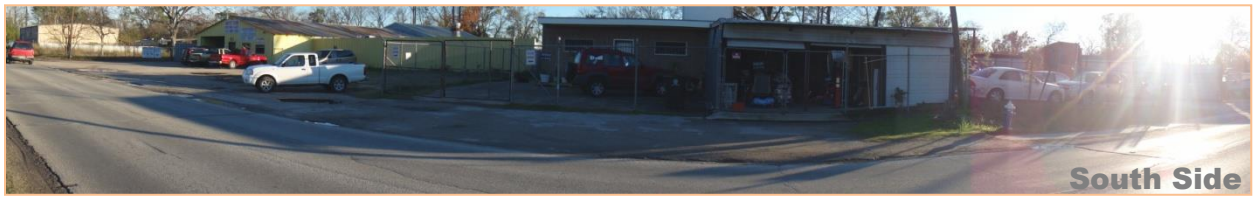
### Tidwell Road – IH 45 to Fulton Street (0.9 miles) 8 block faces


Tidwell is an east-west arterial street in the northernmost part of the inventory area. Most land uses are commercial. Although there are some recently added improvements in some infrastructure elements, most pedestrian infrastructure is in Fair condition. Many segments of the sidewalk are overgrown with grass and the planting strip consists of unkempt grass and utility poles. Some crosswalks are in Good condition. Bus stops that contain shelters are in Good condition. Most ADA ramps are in Fair to Poor condition. Corridor lacks pedestrian-oriented lighting.

***Recommendations:*** Improve pedestrian infrastructure on corridors that have failing infrastructure. Install pedestrian-oriented lighting, ADA ramps, and crosswalks, where needed.

| ***Tidwell Road Improvements*** | | |
|---|---|---|
| ***Improvement Type*** | ***Unit Type*** | ***Quantity*** |
| Sidewalk | LF | 8,840 |
| Curb | LF | 5,428 |
| Pedestrian Lighting | EA | 119 |
| Landscaping and Irrigation | LF | 8,371 |
| Transit Shelter | EA | 1 |

**Berry Road – Airline Drive to Fulton Street (0.53 miles) 6 block faces**




Berry Road is an east-west two-way street connecting Airline Drive and Fulton Street. There are several commercial areas along with some businesses located in this corridor. The majority of the corridor is in Poor condition. Sidewalks and planting strips are unmaintained and covered in debris. There is no curb between the pedestrian right-of-way and the street. These sections are very hard to navigate. Infrastructure improves near Fulton with curb in Good condition. Sidewalks are in Fair condition or non-existent. Corridor lacks pedestrian-oriented lighting.

***Recommendations:*** Improve pedestrian infrastructure on corridors that have failing infrastructure. Install pedestrian-oriented lighting, ADA ramps and crosswalks, where needed.

| ***Berry Road Improvements*** | | |
|---|---|---|
| ***Improvement Type*** | ***Unit Type*** | ***Quantity*** |
| Sidewalk | LF | 5,244 |
| Curb | LF | 4,959 |
| Pedestrian Lighting | EA | 71 |
| Landscaping and Irrigation | LF | 5,244 |
| Transit Shelter | EA | 1 |

**Fulton Street – Tidwell Road to Deerfield Street (0.96 miles) 17 block faces**


Fulton is a north-south, two-way street with a large section of the METRORail LRT running through the center of the road. This segment of Fulton is just north of the north end of the LRT construction in a residential area near a school. Most sidewalks are in Fair condition. Driveways and curbs are in Good condition. Sidewalk patching on some block faces is crumbling. Most block faces have overgrown grass and debris. Most ADA ramps are in Poor condition. Except at Fulton and at berry, block faces lack crosswalks. There is some improvements already in place near the end of METRO's LRT construction and those block faces were not inventoried. There are no pedestrian lights along the corridor.

***Recommendations:*** Improve pedestrian infrastructure on corridors that have failing infrastructure. Install pedestrian-oriented lighting, ADA ramps and crosswalks, where needed.

| ***Fulton Street Improvements*** | | |
|---|---|---|
| ***Improvement Type*** | ***Unit Type*** | ***Quantity*** |
| Sidewalk | LF | 7,808 |
| Curb | LF | 3,868 |
| Pedestrian Lighting | EA | 106 |
| Landscaping and Irrigation | LF | 5,244 |
| Transit Shelter | EA | 0 |

**Crosstimbers Street – Yale Street to Fulton Street (1.42 miles) 26 block faces**


Crosstimbers Street is a major east-west arterial street. There is a mix of residential and commercial properties. Most of the block faces along the corridor are in Good or Excellent condition with well-kept planting strips, nice sidewalks, ADA ramps with rumble strips, and crosswalk striping. Pedestrian infrastructure is in worse condition near Yale Street and at IH 45, where the infrastructure is older and less maintained. This corridor lacks pedestrian-oriented lighting.

***Recommendations:*** Improve pedestrian infrastructure on corridors that have failing infrastructure. Install pedestrian-oriented lighting, ADA ramps and crosswalks, where needed.

| ***Crosstimbers Street Improvements*** | | |
|---|---|---|
| ***Improvement Type*** | ***Unit Type*** | ***Quantity*** |
| Sidewalk | LF | 7,808 |
| Curb | LF | 3,868 |
| Pedestrian Lighting | EA | 106 |
| Landscaping and Irrigation | LF | 5,244 |
| Transit Shelter | EA | 0 |

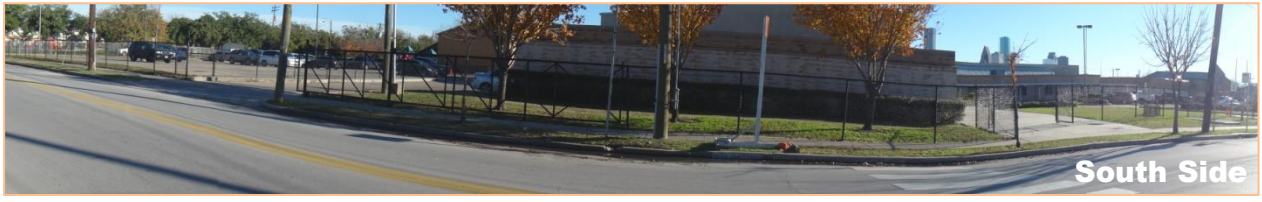
**Cavalcade Street – Airline Drive to Irvington Boulevard (1.26 miles) 37 block faces**


Cavalcade is an east-west, two-way arterial that runs throughout the district. There is a similar mix of commercial and residential land uses as on Crosstimbers. Sidewalks and driveways are in Good or Fair condition with better conditions near IH 45 and Fulton Street. A few block faces will need minimal improvements, while other, especially near Airline Drive, will need more extensive improvements. Curbs are generally in Good condition. Planting strips are in Fair condition. Several drainage and overgrowth issues occur along the corridor. Corridor lacks pedestrian-oriented lighting.

***Recommendations:*** Improve pedestrian infrastructure on corridors that have failing infrastructure. Install pedestrian-oriented lighting, ADA ramps and crosswalks, where needed.

| ***Cavalcade Street Improvements*** | | |
|---|---|---|
| ***Improvement Type*** | ***Unit Type*** | ***Quantity*** |
| Sidewalk | LF | 10,265 |
| Curb | LF | 6,871 |
| Pedestrian Lighting | EA | 152 |
| Landscaping and Irrigation | LF | 11,579 |
| Transit Shelter | EA | 2 |

**Quitman Street – Main Street to Hardy Street (0.78 miles) 22 block faces**




Quitman Street is an east-west, two-way street that operates along Jefferson Davis High School. Land use near Main Street is more commercial, while land use near Hardy Street is more residential. Pedestrian infrastructure varies block face to block face, but it generally is in better condition near Main and in poorer condition near Hardy. Curbs are in Fair condition for most of the block faces. Crosswalks are in Good to Excellent condition. There is a segment of the corridor in a residential area where the sidewalk abuts the street. Several utility poles impede the pedestrian right-of-way. Corridor lacks pedestrian-oriented lighting.

***Recommendations:*** Improve pedestrian infrastructure on corridors that have failing infrastructure. Install pedestrian-oriented lighting, ADA ramps and crosswalks, where needed.

| ***Quitman Street Improvements*** | | |
|---|---|---|
| ***Improvement Type*** | ***Unit Type*** | ***Quantity*** |
| Sidewalk | LF | 6,110 |
| Curb | LF | 5,237 |
| Pedestrian Lighting | EA | 91 |
| Landscaping and Irrigation | LF | 5,762 |
| Transit Shelter | EA | 2 |

**Hogan Street/Lorraine Street – Main Street to Hardy Street (0.64 miles) 25 block faces**


Hogan/Lorraine is an east-west, two-way street with commercial and residential land uses. Pedestrian infrastructure is in Fair to Poor condition with segments of uneven and older sidewalks. ADA ramps vary greatly along the corridor, with some new ADA ramps and some failing ramps. Only a few crosswalks have any infrastructure. There are several instances in which ADA ramps are present for crossing Hogan/Lorraine when there is no crosswalk infrastructure or stop signs present. These ramps were installed for a Safe Routes to School program and will remain without crosswalk infrastructure due to low traffic counts on the street, in accordance with the City of Houston policy. If auto traffic increases along this corridor, crosswalk infrastructure might be considered for these block faces. Driveways are generally in Poor condition. The corridor has some drainage issues. Corridor lacks pedestrian-oriented lighting.

***Recommendations:*** Improve pedestrian infrastructure on corridors that have failing infrastructure. Install pedestrian-oriented lighting, ADA ramps and crosswalks, where needed.

| ***Hogan Street Improvements*** | | |
|---|---|---|
| ***Improvement Type*** | ***Unit Type*** | ***Quantity*** |
| Sidewalk | LF | 5,352 |
| Curb | LF | 3,262 |
| Pedestrian Lighting | EA | 0 |
| Landscaping and Irrigation | LF | 5,762 |
| Transit Shelter | EA | 3 |

**Brooks Street – Main Street to Hardy Street (0.58 miles) 22 block faces**


Brooks Street is an east-west, two-way street with mainly residential land uses. This corridor has little to no curbs. Some sidewalks are in Excellent condition, but most are in Fair condition. Sidewalks are less common closer to Hardy Street. Planting strips generally are in Poor condition with overgrown grass and ditches. ADA ramps are in Good condition. There is little to no crosswalk infrastructure. There are several instances in which ADA ramps are present for crossing Brooks when there is no crosswalk infrastructure stop signs present. These ADA ramps were installed for a Safe Routes to School program and will remain without crosswalk infrastructure due to low traffic counts on the street, in accordance with City of Houston policy. If auto traffic increases along this corridor, crosswalk infrastructure might be considered for these block faces. Corridor lacks pedestrian-oriented lighting.

***Recommendations:*** Improve pedestrian infrastructure on corridors that have failing infrastructure. Install pedestrian-oriented lighting, ADA ramps and crosswalks, where needed.

| ***Brooks Street Improvements*** | | |
|---|---|---|
| ***Improvement Type*** | ***Unit Type*** | ***Quantity*** |
| Sidewalk | LF | 5,129 |
| Curb | LF | 5,228 |
| Pedestrian Lighting | EA | 0 |
| Landscaping and Irrigation | LF | 5,240 |
| Transit Shelter | EA | 0 |

**Lyons Street – McKee Street to Hardy Street (0.10 miles) 2 block faces**


Lyons Street is an east-west, two-way street with mainly industrial land uses. Little to no pedestrian infrastructure is present. Sidewalks are nonexistent on the south side, except for a small segment. Sidewalks are in very Poor condition on the north side, being completely overgrown and unnavigable and curbs are in Fair condition. Driveways are in Poor condition. Planting strips are unmaintained and impede the pedestrian right-of-way. Crosswalk

infrastructure is nonexistent. There are some ADA ramps at Hardy, but others are mostly nonexistent. Corridor lacks pedestrian-oriented lighting.

***Recommendations:*** Improve pedestrian infrastructure on corridors that have failing infrastructure. Install pedestrian-oriented lighting, ADA ramps and crosswalks, where needed.

| ***Lyons Street Improvements*** | | |
|---|---|---|
| ***Improvement Type*** | ***Unit Type*** | ***Quantity*** |
| Sidewalk | LF | 463 |
| Curb | LF | 463 |
| Pedestrian Lighting | EA | 3 |
| Landscaping and Irrigation | LF | 463 |
| Transit Shelter | EA | 0 |

**Airline Drive – Main Street to Tidwell Road (3.32 miles) 74 block faces**


Airline is a major north-south, two-way street that spans along the length of the district. While the City of Houston intends to replace much of the pedestrian infrastructure along this corridor, it was inventoried in the event the work does not occur. Any eventual improvements along Airline will complement, and not replace or duplicate, improvements installed by the city.

Pedestrian infrastructure is generally maintained on the north end of the inventory area from Tidwell to Crosstimbers. Sidewalks, driveways, and planting strips along this segment vary from Good to Fair condition, with some sidewalks collecting debris or overgrown with grass from the planting strip. Curbs and ADA ramps are generally in Fair condition with some ramps that have impediments in the pedestrian right-of-way. Crosswalks are lined with bumps, but do not have clear striping. Most of the pedestrian infrastructure is in Fair to Poor condition between Crosstimbers and IH 610. Most ADA ramps and crosswalks are in Fair condition and need replacement or restriping. A few block faces are in better condition or have been redone recently. North of the bridge, land uses are mainly commercial and industrial; however, south of the bridge land uses are residential until IH 610. Between IH 610 and Cavalcade, some infrastructure fronting the businesses just south of IH 610 is in Good condition; however, there is a large segment that lacks pedestrian infrastructure or has non-contiguous sidewalks and curbs. Where contiguous sidewalks and curbs are present, they are in Poor condition. South of Cavalcade, surrounding land use becomes more residential. Sidewalks generally are contiguous in this segment, but are in Fair to Poor condition. Most infrastructure in this segment needs to be

replaced; however, the infrastructure fronting the storage facility and the townhomes is well maintained and in Good condition. Corridor lacks pedestrian-oriented lighting.

***Recommendations:*** Improve pedestrian infrastructure on corridors that have failing infrastructure. Install pedestrian-oriented lighting, ADA ramps and crosswalks, where needed.

| ***Airline Drive Improvements*** | | |
|---|---|---|
| ***Improvement Type*** | ***Unit Type*** | ***Quantity*** |
| Sidewalk | LF | 24,719 |
| Curb | LF | 33,665 |
| Pedestrian Lighting | EA | 379 |
| Landscaping and Irrigation | LF | 5,240 |
| Transit Shelter | EA | 1 |

**Jensen Drive – Crosstimbers Street to Saunders Road (1.12 miles) 39 block faces**


Jensen is a major north-south, four-lane street. Most of the pedestrian infrastructure north of Crosstimbers is inadequate or unsafe for use. Sidewalks are three to four feet in width, with many overgrown, covered in debris, and/or damaged. There are no delineated sidewalks along many storefronts. In other locations it appears that sidewalk was never installed and crushed limestone was used in its place. A lack of planting strips and curb barriers along most of the corridor creates an environment that is unsafe for pedestrians. The bridge south of Lakewood Drive is a safety concern as it has no pedestrian amenities and has a very narrow shoulder. The bridge is adjacent to a heavily used METRO bus stop. Few block faces have contiguous sidewalks, planting strips, or curbs. There are several instances of drainage issues along the corridor. The majority of driveways leading into businesses are in Poor condition and present serious access issues. This corridor lacks pedestrian-oriented lighting.

***Recommendations:*** Improve pedestrian infrastructure on corridors that have failing infrastructure. Install pedestrian-oriented lighting, ADA ramps and crosswalks, where needed.

| ***Jensen Drive Improvements*** | | |
|---|---|---|
| ***Improvement Type*** | ***Unit Type*** | ***Quantity*** |
| Sidewalk | LF | 25,084 |
| Curb | LF | 25,084 |
| Pedestrian Lighting | EA | 334 |
| Landscaping and Irrigation | LF | 5,240 |
| Transit Shelter | EA | 7 |

***RECOMMENDATIONS***

In addition to the corridor recommendations, recommendations for pedestrian/transit access infrastructure improvement throughout GNMD include the following:

- ***Sidewalks and Curbs*** – Sidewalks along the corridor are in varying condition, with Crosstimbers having Excellent sidewalks and Airline having no infrastructure in segments. There is no contiguous type or design of sidewalk infrastructure. For safety reasons, it is recommended that contiguous sidewalk and curbs be constructed or replaced throughout the inventory area, where applicable.
- ***ADA Ramps and Crosswalks*** – In addition to a lack of sidewalk infrastructure, the minority of ADA ramps are in Good condition, with the exception of those recently installed for the Safe Routes to Schools program and along Crosstimbers. There are few crosswalks in the inventory area. To provide safe connections to transit from block to block for pedestrians and especially disabled individuals, proper ADA ramps and well-striped crosswalks must be in place. For safety reasons, it is recommended that new ADA ramps and crosswalks be constructed, where applicable.
- ***Landscaping and Planting Strips*** – Most block faces in the inventory area have overgrown and unmaintained planting strips. For both safety and beautification reasons, it is recommended that trees be included in all applicable planting strips or installed lining the sidewalk in the inventory area, where applicable.
- ***Pedestrian-Oriented Lighting*** – There is no pedestrian-oriented lighting in the inventory area, except for one half of a block face on Fulton. Pedestrian-oriented lighting should be installed on all appropriate blocks for safe nighttime sidewalk access.

# *Chapter 3 – CAPITAL COST OF IMPROVEMENTS*

This chapter presents a summary of the costs of implementing the proposed LCI streetscape improvements recommended in this master plan. As a result of the existing conditions inventory process presented in Chapter 2, capital costs were developed for the recommended streetscape improvements. The purpose of conducting an existing conditions inventory is to establish the extent of improvements required for enhanced pedestrian and transit access. The inventory data was used to formulate capital costs that will be eligible for federal reimbursement or used as local leverage for related eligible projects. This chapter describes the methodology used to create the extent of improvements needed and the capital costs to implement. *Table 3.1* presents the estimated capital costs for the proposed program. The project total includes a 20% design/admin./construction management cost and a 10% contingency.

| ***Table 3.1 – Cost Summary of LCI Streetscape Improvements*** | |
|---|---|
| Total Corridor and Shared Infrastructure Cost | **$13,049,517** |
| 20% Design/Admin./Construction Mgt. Cost | $2,609,903 |
| 10% Contingency | $1,565,942 |
| ***Total*** | **$17,225,362** |

## *LCI STREETSCAPE DESIGN GUIDELINES*

According to FTA LCI guidelines, block faces within a one half-mile radius of a bus stop are eligible for pedestrian and transit access-related streetscape improvements. Where needed or desired, the proposed LCI streetscape improvements include the following:

- Construct or replace, at a minimum, 5-foot wide standard concrete sidewalks;
- Construct 6-foot wide standard concrete sidewalks ¼ mile from LRT line
- Construct or replace concrete curbs
- Replace driveway bibs in sub-standard condition when affecting the pedestrian right-of-way (ROW);
- Construct or replace ramps at intersections using minimum standard specifications for ADA compliancy;
- Stripe or restripe crosswalks at applicable intersections;
- Install pedestrian-oriented lighting where deemed appropriate by the City;

- Replace or install grass sod and/or overstory trees; and
- Install amenities such as benches, waste receptacles, and concrete pads at transit stops where deemed appropriate due to high ridership.

Specific costs of improvements per block face are included in *Appendix B.*

### *INFRASTRUCTURE CAPITAL COSTS 2012*

*Table 3.2* presents the unit costs used to calculate the capital costs of the proposed LCI streetscape improvements. These costs were derived from recent unit cost averages provided by TxDOT.

***Table 3.2 – Unit Costs for Streetscape Infrastructure***

| ***Element*** | ***Unit*** | ***Unit Cost*** |
|---|---|---|
| Concrete Sidewalks | SF | $6.95 |
| Curb and Gutter | LF | $12.58 |
| Driveway Bibs | SF | $5.05 |
| ADA Ramps [single design] | EA | $1,200 |
| Pedestrian-oriented Lighting | EA | $2,500 |
| Landscaping | | |
| Overstory Trees | EA | $430 |
| Tree Grate + Landscape Pavers | EA | $532.75 |
| Sod/Ground Cover | SF | $0.18 |
| Planting Soil | SF | $1.50 |
| Brick Pavers | SF | $5.31 |
| Irrigation (meters, taps, controllers, conduit) | LF | $14.20 |
| *Transit Shelters* | EA | $8,000 |
| Crosswalks | EA | $200 |
| Demolition | | |
| Demo-Sidewalk | SF | $0.55 |
| Demo-Curb | LF | $2.63 |
| Demo-Driveway | SF | $0.60 |

### *RECOMMENDED STREETSCAPE IMPROVEMENT COSTS BY CORRIDOR*

Costs per block face were developed by applying the unit costs to quantities needed to bring each block face to the improved standard described in the guidelines and are included in *Appendix B. Table 3.3* summarizes the costs per corridor, representing all of the streetscape improvements included in this master plan, utilizing the infrastructure costs in *Table 3.2*.

| ***Table 3.3 – Cost Per Corridor*** | |
|---|---|
| ***Corridor*** | ***Cost*** |
| Tidwell | $1,017,265 |
| Berry | $649,450 |
| Fulton | $813,527 |
| Crosstimbers | $836,623 |
| Cavalcade | $1,337,937 |
| Quitman | $780,694 |
| Hogan/Lorraine | $427,223 |
| Brooks | $397,339 |
| Airline | $3,056,223 |
| Lyons | $53,346 |
| Jensen | $2,966,890 |
| ***Total Cost All Corridors*** | **$12,336,517** |
| ADA Ramps (total for capture area) | $656,400 |
| Crosswalks (total for capture area) | $56,600 |
| ***Shared Infrastructure Cost*** | **$713,000** |
| ***Total Corridor and Shared Infrastructure Cost*** | **$13,049,517** |
| 20% Design/Admin./Construction Mgt. Cost | $2,609,903 |
| 10% Contingency | $1,565,942 |
| ***Total Cost*** | **$17,225,362** |

# *Chapter 4 – BENEFITS*

This chapter examines how the proposed improvements to the pedestrian and transit environment in the GNMD will create benefits in the following areas:

- State of Good Repair (SGR)
- Economic Competitiveness
- Livability/Sustainability
- Public Health
- Safety
- Pedestrian Level of Service (PLOS)
- Transit Ridership/Pedestrian Activity
- Emission Reductions

The benefit criteria have been studied by a variety of nationally recognized authorities, including the Transit Coordination Research Program (TCRP), Transportation Research Board (TRB), National Research Council (NRC), and Governmental Accountability Office (GAO), where methods have been developed for predicting and developing qualitative and quantitative benefits associated with the implementation of these types of improvements.

## *STATE OF GOOD REPAIR*

The proposed project will repair and replace damaged and non-existent pedestrian and transit infrastructure throughout the GNMD. The repair of this infrastructure to a usable level is essential in ensuring safe and effective travel to residents and visitors of the district. Additionally, the improvements outlined in this plan will generate greater utility from existing, albeit unlinked, usable infrastructure. The proposed improvements will create a fully linked environment, allowing for the existing network to be used optimally. Enhancing the linkage between existing pedestrian infrastructure and transportation facilities will allow access to public transportation throughout the entire city.

## *ECONOMIC COMPETITIVENESS*

The GNMD desires to retain and maintain a competitive business climate for all businesses located within the district. A report by the American Public Transportation Association (APTA) supports the principle that investment in transit infrastructure yields benefits from increased property and sales taxes. The report, *The Benefits of Public Transportation: Building Investment Value in Our Economy and Marketplace* studied not only large urban markets such as Portland,

Oregon, and Dallas, Texas, but also smaller markets, such as Corpus Christi, Texas, and Tampa, Florida. The results from these cities are promising. On average, property values that are within a 5-minute to 10-minute walk from high-quality transit infrastructure are being valued for 20% to 25% more than comparable properties farther away.

Most recently, APTA in association with the National Association of Realtors published a report titled, *The New Real Estate Mantra: Location Near Public Transportation.* This report compares how residential properties located in proximity to fixed-guideway transit systems (like the light rail corridor within the GNMD) compare to areas without transit access. The study spanned four years, from 2006 to 2011 and encompassed five regions across the country (Boston, Chicago, Minneapolis, Phoenix, and San Francisco). On average, areas near transit (defined as "transit sheds") had a 42% greater market value. The market resilience was bolstered even further by transit that was well connected and had high frequencies of service. The study also found that households living near transit sheds had better access to jobs and lower transportation costs than others.

The corridors selected for improvement are key corridors for pedestrian/transit access. The GNMD recognizes the importance of improving access to transit as well as local businesses. This plan, by supporting the enhancement of these corridors, will help to stimulate an improved business climate throughout GNMD. The proposed improvements would create a safe, convenient, walkable, and state-of-the-art transportation infrastructure that will help connect transit to major residential areas, essential services, and jobs. Enhancing transportation infrastructure in the GNMD's area will result in maintaining and building a strong economic climate.

### *LIVABILITY/SUSTAINABILITY*

The proposed project will also help to advance H-GAC's regional Livable Centers strategy by reflecting the goals and objectives in the analyses, recommendations, and benefits derived. The primary goal of the Livable Centers program is to improve access while reducing dependence on single-occupancy vehicles (SOV). Emphasis is placed on improving transit service in the area and narrowing the ROW for vehicles. This helps to encourage pedestrian activity through increased pedestrian comfort and safety.

H-GAC defines Livable Centers as safe, convenient, and attractive areas where people can live, work, and play with less reliance on SOVs. H-GAC's Livable Centers program is part of a regional strategy designed to address a projected population growth of 3.5 million people by 2035 and limited, already congested mobility infrastructure by improving transit access, thereby reducing the need for SOVs. The EPA classifies Harris County and other surrounding counties as in severe nonattainment, which means the region has failed to meet emission requirements as far back as 1997. The transportation infrastructure has not kept pace with current demand and will be unable to accommodate future growth because of limited ROW and funding. Consequently, a new direction is needed to improve transit access, enhance quality of life, reduce

emissions, and provide more efficient mobility alternatives. H-GAC's Livable Centers program is intended, in part, to provide this new direction. Key features of a Livable Center include the following:

- A compact and walkable environment
- Mixed land uses
- Regional connectivity
- Accessibility

Livable Centers' projects offer a number of benefits in terms of the community, mobility, environment, and economic development. These benefits are directly related to the following regional goals outlined in H-GAC's 2035 RTP:

- Improve mobility and pedestrian circulation and reduce congestion
- Improve access to jobs, homes, and services
- Increase transit options
- Coordinate transportation and land use plans
- Create a healthier environment

The proposed pedestrian-transit access improvements will assist the region in accomplishing all of the goals of H-GAC's Livable Centers program.

DOT, EPA, and HUD created the Partnership for Sustainable Communities (PSC) in June 2009. The PSC unites these three federal agencies to plan for communities that are efficient consumers of housing, transportation, and energy use. The GNMD has an opportunity to leverage this focus on smart development to improve its overall livability, provide better transit connectivity, develop more inviting streets, and create a sense of place.

The PSC has adopted six principles to guide its mission, as follows:

- Provide more transportation choices
- Promote equitable and affordable housing
- Enhance economic competitiveness
- Target resources to existing communities
- Coordinate and leverage federal policies and investments
- Value unique characteristics of communities, no matter their size

The PSC also emphasizes the importance of transportation choices, either bus, biking, walking, or rail. The FTA has created key transit elements that are encouraged under the FTA's participation in the PSC. These key elements include the following:

***Transit-Oriented Development (TOD)*** – TOD facilitates development of mixed-use high-density communities that are oriented near transit facilities. By design, TOD encourages pedestrian and bicycle activity and supports a high level of transit use.

***Joint Development*** – Where transit facilities are to be constructed, project stakeholders may have an opportunity to construct space for other transit-compatible uses. The capital cost to construct space for compatible uses can be funded, in part, with federal funding administered by the FTA.

***Intercity Bus*** – The intercity bus connects rural or suburban areas with larger regional transit systems and/or national transit systems. Intercity bus services are essential tools which allow non-urbanized residents to connect with essential services, such as specialized healthcare facilities.

***Transit Enhancements*** – Areas within ½ mile of a bus stop or transit terminal are eligible for federal funding for transit enhancements. Eligible improvements include repair and/or construction of sidewalks, curbs, ramps, driveways and crosswalks. Landscaping and installation of street amenities, such as transit shelters, pedestrian-oriented lighting, benches, bike racks, and waste receptacles also are eligible for funding. The project would include pedestrian enhancements that would create a safe, inviting connection from the surrounding development to public transportation.

***Bicycle and Pedestrian Enhancements*** – Like the transit enhancement policies, the FTA provides funding for bicycle enhancements (e.g., bike racks and lockers); however, the eligible area has been increased to three miles from a bus stop or terminal.

***Art in Transit*** – This element supports the design and placement of art within and/or near transit facilities. The FTA encourages the participation of local artists.

The proposed improvements align with the principles outlined in the Livability Partnership. The proposed improvements focus on key transit elements outlined by the FTA, which include transit improvements and pedestrian enhancements. A major goal of the proposed project is to increase livability and walkability for residents and visitors to the area.

### *PUBLIC HEALTH*

A recent study published in the *American Journal of Public Health*[1] evaluated two neighborhood environments and compared the physical activity and weight status of their residents. Residents of high-walkability neighborhoods (described as neighborhoods that have more sidewalks, greater access to public transportation and a dense urban environment) reported 70 more daily minutes of physical activity than those in low-walkability neighborhoods. Residents of the more walkable neighborhoods also had a lower prevalence of obesity than did residents of the less walkable neighborhoods. The types of improvements proposed in this master plan are designed to make GNMD a neighborhood where residents are more likely to walk and engage in physical activity on a daily basis.

Another health benefit of the improvements detailed in this master plan is a reduction in asthma and other respiratory illnesses due to decreased vehicle emissions. A meta-analysis on air pollution and asthma in children[2] found that "living or attending school near high traffic roads exposes children to higher levels of motor vehicle pollutants and increases the incidence and prevalence of childhood asthma." The decrease of SOVs resulting from increased walkability and access to transit (as evidenced later in this chapter) will help to reduce the incidence of asthma and other respiratory illnesses within the GNMD.

### *SAFETY*

Street design should be appropriate to its context (rural, rustic, urban, and suburban), the relationship with buildings, adjoining uses, and open spaces, as well as other considerations. As development becomes denser, context will become more important due to the potential conflicts between different uses and building forms. These differences may become more intense and require innovative design solutions. A thorough understanding of the context helps when identifying when it is appropriate to blend in with the surroundings or when to stand out.

The proposed project, if successfully implemented, would reflect design excellence. It would add to the identity, durability, connectivity, and walkability to the area. For example, pedestrian-oriented lighting and appropriate landscaping will increase overall safety of pedestrians and define the local character through the use of context-appropriate materials.

A report[3] by the Institute of Transportation Engineers (ITE) set the guidelines for pedestrian design. The principle of context sensitivity supports urban design that ensures the comfort and safety of all users of a particular corridor, regardless of transportation mode (i.e., automobile, bicycle, or walking).

---

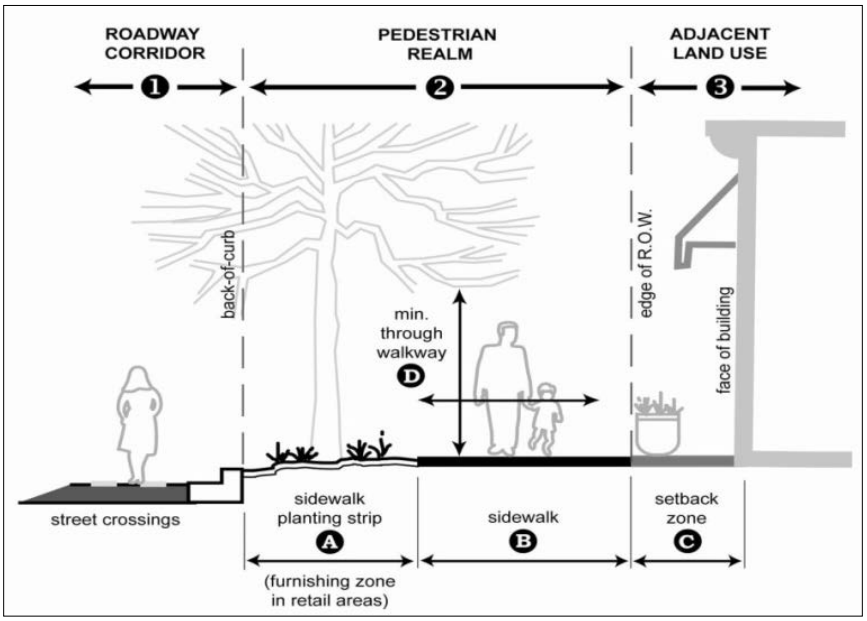
[1] *Neighborhood-Based Differences in Physical Activity: An Environment Scale Evaluation* (Saelens, Sallis, Chen) http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1448009/

[2] *Motor Vehicle Air Pollution and Asthma in Children* (Gasana, Dillikar, Mendy, Forno, Ramos) http://www.ncbi.nlm.nih.gov/pubmed/22683007

[3] *Recommended Practice, Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities*

As shown in *Figure 4.1*, the area between the curb and the buildings has several zones. These zones include areas for landscaping and/or street furniture, sidewalks, and setbacks between the edge of the public ROW and the face of the building, which property owners may use as they want. The sidewalk ideally should be wide enough to ensure maximum comfort for pedestrians. Adjustments to the zones can be made as needed, such as foregoing curbside landscaping in order to accommodate on-street parking.

***Figure 4.1 – Context Sensitivity***



***Crime Prevention Through Environmental Design (CPTED)***

CPTED guidelines will be part of the final design of the proposed facility.[4] According to the National Crime Prevention Institute, CPTED is "the proper design and effective use of the built environment which may lead to a reduction in the fear and incidence of crime, and an improvement of the quality of life." CPTED is a concept that relates certain elements of good urban design to reducing the incidence of crime. In some communities, where CPTED has been successfully implemented, criminal activity has decreased by as much as 40%. CPTED involves four broad strategies:

***Natural Surveillance*** – A design concept directed primarily at keeping potential offenders easily observable. Features would maximize visibility of people, parking areas, and building entrances; doors and windows that look out onto streets and parking areas; pedestrian-friendly sidewalks and streets; front porches; and adequate nighttime lighting.

***Territorial Reinforcement*** – Physical design can create or extend a sphere of influence. Users then develop a sense of territorial control, which discourages potential offenders who perceive this control. Features would define property lines and distinguish private spaces from public spaces through the use of landscape plantings, pavement designs, gateway treatments, and fences.

***Natural Access Control*** – This is a design concept that attempts to decrease criminal opportunity by denying access to targets and creating a perception of risk in potential offenders. This is achieved by designing streets, sidewalks, building entrances and neighborhood gateways to clearly indicate public routes and by discouraging access to private areas through the use of structural elements.

***Target Hardening*** – This design principle recommends the installation of features that prohibit entry or access to high-risk entryways, such as window locks, dead bolts for doors and interior door hinges.

These strategies can be implemented in slightly different ways depending on the land use (i.e., single-family residential, multi-family residential, office, retail, industrial, parking). Specific guidelines for implementation are widely available from the International CPTED Association and other organizations.

[4] "Crime Prevention Through Environmental Design." CPTED Security Training. http://cptedsecurity.com/cpted_design_guidelines.htm

### *PEDESTRIAN LEVEL OF SERVICE*

Knowing the existing conditions of the transit needs, pedestrian infrastructure and the bus level of service in the area is important in selecting priority projects, both pedestrian and transit; however, the relationship between the pedestrian infrastructure and the Bus Level of Service (BLOS) directly affects transit ridership and environmental benefits. A report prepared for the TCRP, TRB, and NRC, in association with Texas Transportation Institute (TTI), states the following:[5]

Quality of service directly measures passengers' perception of the availability, comfort, and convenience of transit service. There are a number of factors that measure pedestrian and transit quality of service:

- Service coverage (near one's origin and destination)
- Pedestrian environment
- Scheduling: frequency of service
- Amenities
- Transit information
- Transfers
- Total trip time
- Cost
- Safety and security
- Passenger loads
- Appearance and comfort
- Reliability

Of the factors listed above, the following items address pedestrian quality of service:

***Pedestrian Environment*** – Even if a transit stop is located within a reasonable walking distance of the origin and destination, the areas around the transit stop must provide a comfortable walking environment for transit users. The proposed project would enhance the pedestrian environment surrounding the project area.

***Amenities*** – The amenities that are provided within the walking distance of transit stations and bus stops help make transit more comfortable and convenient for transit users. Typical amenities include benches, shelters, informational signage, and waste receptacles. Amenities that will be beneficial to pedestrians and transit riders will be included.

***Safety and Security*** – Passenger perception of safety must be considered in addition to actual conditions. Transit corridors and stops must be well lit. Planting strips can provide barriers between pedestrians and vehicles. Development of the proposed pedestrian improvements would

[5] "Transit Capacity and Quality of Service Manual" TRB, Kittelson and Associates, Inc. Accessed 10-6-12 http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp100/part%200.pdf

use a multidisciplinary approach to deterring criminal behavior through environmental design, as discussed previously in the section on safety.

***Appearance and Comfort*** – Having aesthetically pleasing and comfortable transit stops with amenities, pedestrian lighting, and landscaping improves transit's image, which is especially important when trying to attract choice riders, who are riders that choose not to drive. The proposed infrastructure development will include amenities such as pedestrian-oriented lighting, and landscaping.

The relationship between an improved pedestrian environment and its contribution to a better transit service and increased ridership has been documented in several studies nationwide. The most recent research is included in the 2009 *Quality and Level of Service Handbook*, prepared by the Florida Department of Transportation (FDOT). The handbook addresses the relationship between the pedestrian environment, which is measured in pedestrian level of service (PLOS), and the bus service performance, which is measured in BLOS. The handbook presents evidence of a positive relationship between the quality of the pedestrian environment and the quality of the bus service.

Five general infrastructure elements were ranked during the inventory, along with up to four ADA ramps, and up to four crosswalks, meaning a total of 13 individual elements could be ranked per block face. Each element of the existing pedestrian infrastructure was given a ranking and summed per block face PLOS outline in Chapter 2. Each individual infrastructure element is totaled to represent the overall block face PLOS grade versus a projected PLOS grade of A after the recommended improvements are implemented *(Appendix B)*. In a few instances, the block faces are already at an acceptable level of service for pedestrians and cannot achieve a post-improvement grade of A.

*Table 4.1* lists the conversion table from cumulative individual infrastructure rankings to PLOS per block face, depending on the number of total applicable infrastructure items that required rankings. If a given block face had less applicable infrastructure items eligible for rankings, a different ranking scale was used.

***Table 4.1 – PLOS Ranking Scale***

| | ***Full Infrastructure Treatment*** | ***Removed Inventory Element (-1 to -2)*** | ***Removed Inventory Element (-3 to -4)*** | ***Removed Inventory Element (-5 to -6)*** | ***Removed Inventory Element (-7 to -8)*** | ***Removed Inventory Element (-9 to -10)*** |
|---|---|---|---|---|---|---|
| ***PLOS Grade*** | ***Total Rank*** | | | | | |
| A | 0 to 6 | 0 to 5 | 0 to 4 | 0 to 3 | 0 to 2 | 0 to 1 |
| B | 7 to 13 | 6 to 11 | 5 to 9 | 4 to 7 | 3 to 5 | 2to 3 |
| C | 14 to 19 | 12 to 16 | 10 to 13 | 8 to 10 | 6 to 7 | 4 |
| D | 20 to 286 | 17 to 22 | 14 to 18 | 11 to 14 | 8 to 10 | 5 to 6 |
| E | 27 to 32 | 23 to 27 | 19 to 22 | 15 to 17 | 11 to 12 | 7 |
| F | 33 to 39 | 28 to 33 | 23 to 27 | 18 to 21 | 13 to 15 | 8 to 9 |

PLOS scores were created for the differential improvement between the existing conditions and after the recommended improvements in this master plan, resulting in a ranking score of A. The full listing of PLOS rankings for all 275 block faces in the inventory is included in *Appendix B. Tables 4.2 and 4.3* summarize the number of block face per PLOS grade and average corridor rankings, respectively.

***Table 4.2 – Summary of PLOS Rankings***

| *PLOS Letter Grade* | *Number of Block Faces* |
|---|---|
| A | 5 |
| B | 9 |
| C | 23 |
| D | 50 |
| E | 83 |
| F | 66 |

***Table 4.3 – Average Existing Conditions PLOS Rankings by Corridor***

| *Corridor* | *Average PLOS Grade* |
|---|---|
| Tidwell | D |
| Berry | F |
| Fulton | E |
| Crosstimbers | C |
| Cavalcade | D |
| Quitman | D |
| Hogan/Lorraine | E |
| Brooks | E |
| Airline | D |
| Lyons | F |
| Jenson | F |

According to the FDOT methodology, the level of PLOS improvement results in a corresponding increase in transit ridership which triggers the following community benefits.

## *TRANSIT RIDERSHIP/PEDESTRIAN ACTIVITY*

Pedestrian infrastructure improvements lead to fewer automobile trips in two ways: increased transit ridership and increased pedestrian activity. Fewer automobile trips within a given area lead directly to a reduction in the amount of air pollutants that are emitted by vehicles. This section discusses how reduced automobile trips, through the increase in transit ridership and pedestrian activity, will ultimately bring reduced emission benefits to the region.

Every mass transit user starts and/or ends a trip as a pedestrian. Therefore, streetscape improvements make accessing transit easier, resulting in higher transit ridership as some drivers choose to use transit instead of driving.

The close relationship between an improved pedestrian environment and its contribution to be better transit service and increased ridership has been documented in several studies nationwide. The 2009 Quality and Level of Service Handbook, prepared by FDOT has established a relationship between the quality of the PLOS and bus ridership, designated BLOS, as shown in *Table 4.4*.

***Table 4.4 – PLOS Adjustment Factors on BLOS***

| *PLOS Grade* | *Adjustment Factor on BLOS* |
|---|---|
| A | 1.15 |
| B | 1.10 |
| C | 1.05 |
| D | 1.00 |
| E | 0.80 |
| F | 0.55 |

The difference between a PLOS A (1.15) and a PLOS B (1.10), as shows in *Table 4.4*, is a BLOS adjustment of 5%. This 5% increase in BLOS translates directly to a 5% increase in transit ridership. The expected ridership increases for each possible PLOS change are similarly calculated.

Using the difference between before and after PLOS scores, along with the ridership data provided by METRO, it is possible to calculate the expected increase in ridership at each bus stop in the inventory area due to pedestrian improvements. Using the methodology described above, the streetscape improvements in this master plan are projected to add another 1,123 riders per day by improving the PLOS and making transit easier to access in the inventory areas. This represents a 26.69% increase in transit ridership in the district, attributable to improving the pedestrian realm.

The 1,123 added transit trips will result in a total of 2,246 one-way daily SOV trips removed. According to APTA's 2010 *Public Transportation Fact Book*, the average vehicle trip length is 5.2 miles. For 2,246 removed vehicle trips, this equates to a daily reduction of 11,679 Vehicle-Miles Traveled (VMT) (1592*5.2).

| ***Table 4.5 – Summary of Benefits from Increased Transit Activity (Daily)*** | |
|---|---|
| ***Benefit*** | ***Daily Amount*** |
| Additional Transit Users | 1,123 |
| Trips Removed | 2,246 |
| Cold Starts Reduced | 2,246 |
| VMT Reduction | 11,679 |

The second way in which streetscape improvements lead to fewer automobile trips is by facilitating increased pedestrian activity. A high-quality pedestrian realm makes walking more feasible and appealing than it would be without the improvements. Proactive measures to facilitate pedestrian activity can result in a one-for-one replacement of auto trips of one-quarter mile or less with a pedestrian trip[6]. Some longer auto trips may also be replaced if good pedestrian infrastructure brings desirable destination within reach, eliminating the need to drive to a location much farther away.

An acceptable equation for emission benefits from improved bike and pedestrian facilities outlined in the Texas Guide to Accepted Mobile Source Emission Reduction Strategies takes into account the following factors:

- Average Annual Daily Traffic (AADT)[7]
- Percent Mode Shift (PMS) from Driving to Bike/Pedestrian[8]
- Length of Facility (L)
- Length of segments (0.25 miles)
- Emission Factor (EF)

[6] "Texas Guide to Accepted Mobile Source Emission Reduction Strategies." TxDOT Aug07. http://moser.tamu.edu/docs/Texas.Guide.to.Accepted.Mobile.Source.Emission.Reduction.Strategies_Aug07.pdf
[7] "2011 Houston District Transit Map." TxDOT Accessed 10-7-12 http://ftp.dot.state.tx.us/pub/txdot-info/tpp/traffic_counts/2011/hou_base.pdf
[8] "Texas Guide to Accepted Mobile Source Emission Reduction Strategies." TxDOT Aug07. Accessed 10-6-12. http://moser.tamu.edu/docs/Texas.Guide.to.Accepted.Mobile.Source.Emission.Reduction.Strategies_Aug07.pdf

The recommended formulas are the following:

***AADT * PMS = Daily Reduced Automobile Trips***

***AADT * PMS * L * EF = grams per day emission benefit***

Using TTI data, average annual daily traffic counts were obtained[9] along the ten corridors selected for improvement. The data for each corridor was averaged in order to obtain a reasonable number of traffic along the entire corridor. The corridor averages were then aggregated. The result is 113,572 daily trips. By multiplying the AADT by the percent mode shift, traffic is projected to decrease by 454 vehicles over each 24-hour period as a result of the streetscape improvements included in this master plan. Since PLOS improvements can spur the replacement auto trips of one-quarter mile or less with a pedestrian trip, a reduction of 454 vehicles each making a quarter-mile trip represents a daily VMT reduction of 113 miles. Each vehicle trip removed also corresponds to the removal of two cold starts. The VMT and cold starts reductions that result from increased pedestrian activity are summarized in *Table 4.6*.

***Table 4.6 – Summary of Benefits from Increased Pedestrian Activity (Daily)***

| *Benefit* | *Daily Amount* |
|---|---|
| Reduced Vehicles | 454 |
| Cold Starts | 908 |
| VMT | 113 |

### *EMISSION REDUCTIONS*

The combined reduction in VMT and cold starts from increased transit ridership and increased pedestrian activity are shown in *Table 4.7*. The transit and pedestrian activity annual VMT reductions are based on 365 days.

***Table 4.7 – Summary of Total VMT and Cold Start Reductions from Increased Transit and Pedestrian Activity***

| *Benefit* | *Amount* |
|---|---|
| Total **Daily** VMT Reduction | 11,792 |
| Total **Daily** Cold Start Reduction | 3,154 |
| Total **Annual** VMT Reduction | 4,304,080 |
| Total **Annual** Cold Start Reduction | 1,151,210 |

[9] http://ttihouston.tamu.edu/hgac/trafficcountmap/

Estimates of the emission benefits due to increased transit ridership and increased pedestrian activity are based on two methodologies that make use of the calculated reductions in VMT and cold starts. These reductions are converted into reduced emission of three types of air pollutants. These are Nitrogen Oxides ($NO_x$), Volatile Organic Compounds (VOC), and Carbon Monoxide (CO).

These estimates are derived from the combination of emission factors from light duty gasoline vehicles and trucks (with a 3:1 ratio). These two separate factors were then compared at speeds of 30 mph (for city averages) and 2.5 mph (for heavy traffic), again at a 3:1 ratio. These were then averaged out between two peak traffic hours (8:00 AM and 6:00 PM) to find the air pollutants totals.

Environmental benefits through increased transit ridership derive from enhanced pedestrian infrastructure resulting in easier, safer access to transit services. The methodology by which reduced cold starts and VMT are calculated was presented earlier. The final step is to calculate the reductions in the three emissions of primary interest in the H-GAC region (NOx, VOC, and CO). *Tables 4.8, 4.9* and *4.10* present the calculations moving from reduced cold starts and reduced VMT to reduced grams, pounds, and tons of emissions through the use of emission factors developed by the EPA for the H-GAC region for the transit system and for pedestrian improvements.

***Table 4.8 – Emission Reductions from Transit Activity***

| ***Type of Emission*** | ***Daily VMT Reduced*** *(2 trips)* | ***Vehicle Emission Factors*** *grams/mile* | ***Net Daily Vehicle Grams Reduced*** | ***Daily Conversion to Pounds Reduced*** *(0.0022046)* | ***Daily Conversion to Tons Reduced*** *(0.0005)* | ***Annual Net Tons Reduced*** *(365)* |
|---|---|---|---|---|---|---|
| NOx | 11,679 | 0.4760 | 5,733 | 12.64 | 0.0063 | 2.31 |
| VOC | 11,679 | 0.5694 | 7,033 | 15.51 | 0.0078 | 2.83 |
| CO | 11,679 | 4.5711 | 56,601 | 124.78 | 0.0624 | 22.77 |
| ***Total*** | | | **69,367.1** | **152.9** | **0.0765** | **27.9** |

Average one-way auto trip distance = 5.2 miles
New ridership = 1,123
Each vehicle removed will result in a reduction of (2) cold starts
Source of emission factors 2011 H-GAC/EPA
Weighted vehicle average (70% LDGV, 20% LDGT1-4, 5% LDDV & 5% LDDT 12)

| ***Table 4.9 – Emission Reductions from Pedestrian Activity*** | | | | | | |
|---|---|---|---|---|---|---|
| ***Type of Emission*** | ***Daily VMT Reduced (2 trips)*** | ***Vehicle Emission Factors grams/mile*** | ***Net Daily Vehicle Grams Reduced*** | ***Daily Conversion to Pounds Reduced (0.0022046)*** | ***Daily Conversion to Tons Reduced (0.0005)*** | ***Annual Net Tons Reduced (365)*** |
| NOx | 227 | 0.4760 | 178 | 0.39 | 0.00020 | 0.07 |
| VOC | 227 | 0.5694 | 284 | 0.63 | 0.00031 | 0.11 |
| CO | 227 | 4.5711 | 2,337 | 5.15 | 0.00258 | 0.94 |
| ***Total*** | | | **2,799.5** | **6.2** | **0.00309** | **1.1** |
| Average one-way pedestrian trip distance = 0.25 miles<br>New pedestrian activity = 454<br>Source of Emission factors 2011 H-GAC/EPA, Cold Starts Included | | | | | | |

| ***Table 4.10 – Summary of Emission Benefits*** | | | | | | |
|---|---|---|---|---|---|---|
| ***Type of Emission*** | ***Pedestrian Benefits Reducd Emissions (grams)*** | ***Transit Benefits Reduced Emissions (grams)*** | ***Grams Reduced Daily*** | ***Conversion to Pounds Reduced (0.0022046)*** | ***Conversion to Tons Reduced (0.0005)*** | ***Annual Net Tons Reduced (365)*** |
| NOx | 178 | 5,733 | 5,910 | 13.03 | 0.0065 | 2.37 |
| VOC | 284 | 7,033 | 7,317 | 16.13 | 0.0081 | 2.95 |
| CO | 2337 | 56,601 | 58,937 | 129.93 | 0.0650 | 23.72 |
| ***Total*** | **2,799** | **69,367** | **72,164** | **159.09** | **0.0795** | **29.04** |

As presented in *Table 4.10* combining of the emissions reduction from both transit and pedestrian sources results in a total annual savings of 29 tons of $NO_x$, VOC, and CO.

### *REDUCTION IN FUEL CONSUMPTION*

By enhancing transit facilities, the proposed project is estimated to reduce annual VMT by 4,304,080 miles. The 2010 EPA Corporate Average Fuel Economy (CAFE) standard for passenger cars is 27.5 miles per gallon (mpg) and for light-duty trucks 24.1 mpg. This analysis assumes not all vehicles will be operating at the 2010 CAFE standards. As a result, a conservative figure of 23.5 mpg was used for calculating the decrease in fuel consumption. The proposed improvements are estimated to reduce fuel consumption by approximately 183,152 gallons annually.

***Annual Fuel Reduction = 183,152 gallons***
***Annual Fuel Cost Savings ($3.62/gal) = $663,011***

### *AUTO COST SAVINGS*

Operating a vehicle is one of the most expensive budget items for American households. The proposed project will provide the opportunity for thousands of residents to choose alternative modes of transportation, such as transit. According to the American Automobile Association (AAA), for a vehicle in 2010, the average operating cost (minus fuel) ranged from 14¢ to 17¢ per mile. The analysis in this master plan used 15¢ per mile for average vehicle operating cost. The proposed project is estimated to reduce VMT by 4,304,080 annually, which will equate to a savings of region approximately $645,612 annually in automobile cost.

***Annual Savings from Reduced Automobile Use = $645,612***

# *Chapter 5 – FUNDING AND IMPLEMENTATION STRATEGY*

As the process of acquiring funding for the implementation of pedestrian and transit access projects begins, it is essential that GNMD staff have the financial resources necessary for program success. GNMD will pursue federal and state programs to supplement local resources, which will be used as the required match. This chapter provides an overview of potential sources of federal and state funding with a focus on maximizing the leveraging of local dollars against available federal and state funding resources. The net result is a comprehensive and flexible funding plan that will assist decision-makers in implementing enhanced pedestrian access to transit services within the district. Implementation of the phasing plan will occur as funding becomes available with phasing divided into annual increments over five years.

## *QUALIFYING COSTS*

The FTA may fund up to 80% of the qualifying costs for the proposed streetscape enhancements along the 11 selected corridors.[1] Improvements such as sidewalks, ramps, street trees, street furniture (benches and waste receptacles), transit shelters, and pedestrian-oriented lighting are considered eligible by the FTA for inclusion within an LCI capital grant, if these elements demonstrate improved transit/pedestrian access. The estimated cost of the improvements proposed in this master plan is $17,225,362. Using an 80/20% federal funding strategy, the federal share of this is estimated to be $13,780,290 and the local share is estimated to be $3,445,072.

***Table 5.1 – Federal/Local Share***

| *Element* | *Federal Share (80%)* | *Local Share (20%)* | *Total Capital Cost (100%)* |
|---|---|---|---|
| Pedestrian Enhancements | $13,780,290 | $3,445,072 | $17,225,362 |

## *PROJECT PHASING*

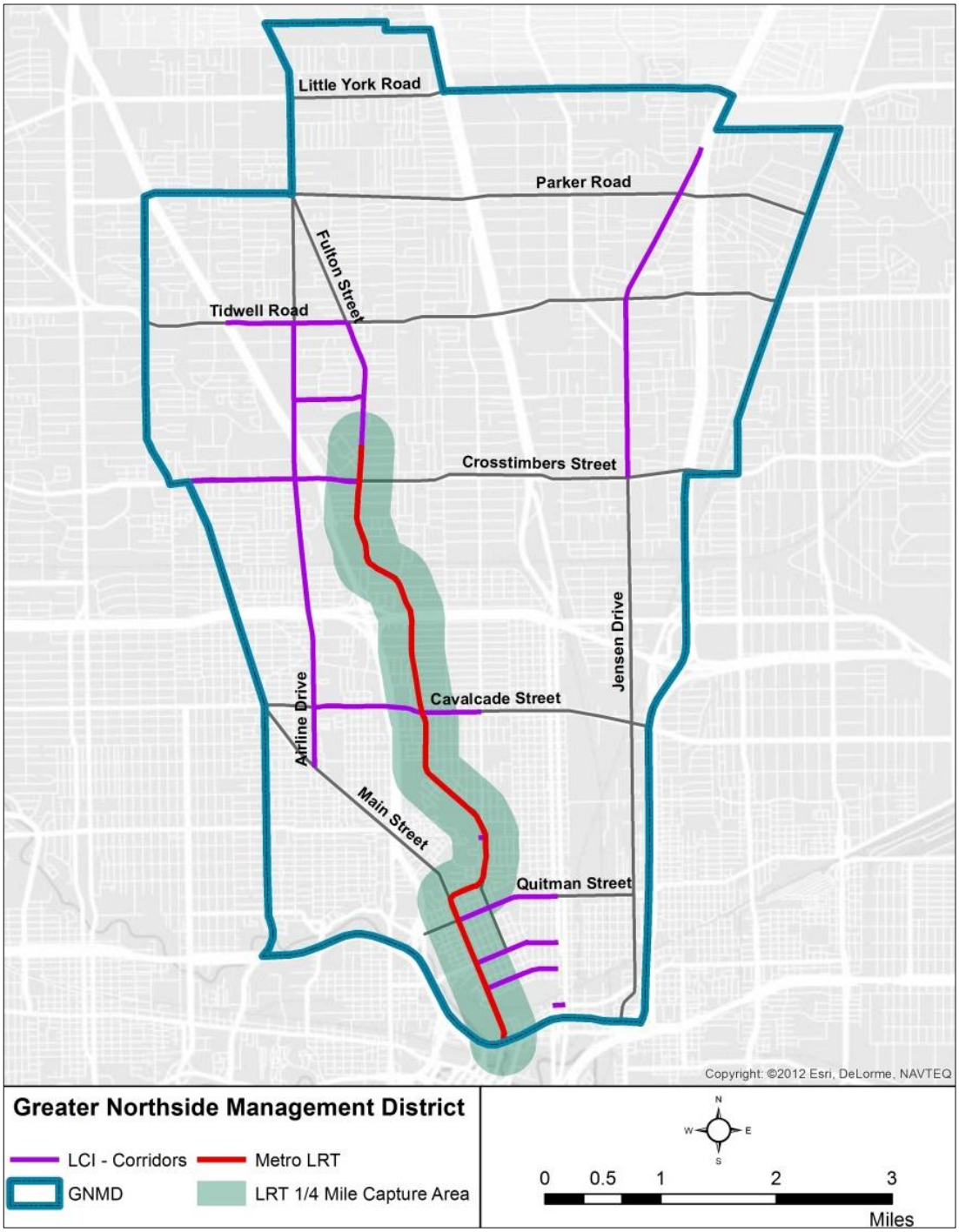
The corridor phasing schedule was developed by analyzing the following factors:

- Existing PLOS scores A through F;
- Number of additional transit boardings derived as a result of improved BLOS and total number of transit boardings**;**

[1] Applications that decrease federal share and increase local share are more competitive.

- Improvements cost and equitable distribution of improvements; and
- Connectivity of corridors and the METRO LRT North/Red Line *(Figure 5.1).*

***Figure 5.1 – Corridors in Relation to METRO's LRT North/Red Line***



| ***Table 5.2 – Phasing Data*** | | | | |
|---|---|---|---|---|
| ***Corridor*** | ***Total Transit Boardings with Improvements*** | ***Incremental Increase of Boardings with Improvements*** | ***Corridor Improvement Cost*** | ***Existing Condition PLOS*** |
| Airline | 1663 | 308 | $3,056,223 | D |
| Berry | 276 | 103 | $649,450 | F |
| Brooks | 0 | 0 | $397,339 | E |
| Cavalcade | 192 | 49 | $1,337,937 | D |
| Crosstimbers | 1029 | 114 | $836,623 | C |
| Fulton | 50 | 13 | $813,527 | E |
| Hogan/Lorraine | 262 | 83 | $427,223 | E |
| Jensen | 919 | 326 | $2,966,890 | F |
| Lyons | 0 | 0 | $53,346 | F |
| Quitman | 310 | 43 | $780,694 | D |
| Tidwell | 626 | 82 | $1,017,265 | D |

The phasing plan in *Table 5.4* reflects a balanced funding approach that also allows for the grouped implementation of projects. Implementation on Crosstimbers and Cavalcade will allow for immediate east/west connectivity to the LRT line. The implementation of Fulton, Berry, and Tidwell in 2015 will create coordinated connectivity on the northern side of the District. Jensen and Airline, respectively planned for 2016 and 2017, will create large walkable areas on the east and west ends of the district. The improvements planned for 2018 will enhance connectivity to the METRO LRT North Line on the south end of the district and coincide with the development slated to occur near the Hardy Yards area.

| ***Table 5.3 – Project Phasing Plan*** | | | |
|---|---|---|---|
| ***Year*** | ***Corridor*** | ***Cost*** | ***Annual Corridor Cost*** |
| 2014 | Crosstimbers | $836,623 | |
| 2014 | Cavalcade | $1,337,937 | **$2,174,560** |
| 2015 | Fulton | $813,527 | |
| 2015 | Berry | $649,450 | |
| 2015 | Tidwell | $1,017,265 | **$2,480,242** |
| 2016 | Jensen | $2,966,890 | **$2,966,890** |
| 2017 | Airline | $3,056,223 | **$3,056,223** |
| 2018 | Lyons | $53,346 | |
| 2018 | Brooks | $397,339 | |
| 2018 | Hogan/Lorraine | $427,223 | |
| 2018 | Quitman | $780,694 | **$1,658,602** |

## *FEDERAL SHARE*

Federal grants will represent a significant source of support for the project. These include the following.

### *Congestion Mitigation and Air Quality (CMAQ) Improvement Program*

The purpose of CMAQ is to fund transportation projects or programs that contribute to the attainment or maintenance of the National Ambient Air Quality Standards (NAAQS) for ozone and $CO_2$. The construction of transit facilities, such as park & rides and terminals, is eligible for up to three years of federal assistance under CMAQ. In addition, the construction of bicycle and pedestrian facilities is eligible under CMAQ. CMAQ-funded projects are selected on a competitive basis by the area Metropolitan Planning Organization (MPO), in this case, H-GAC, on a semi-annual basis, in conjunction with the development of the three-year Transportation Improvement Program (TIP). The MPO reviews and ranks CMAQ project requests and recommends selections based on a variety of factors, including air quality benefits (cost per pound of pollutants reduced), system connectivity, environmental justice, and regional significance). Project readiness, which includes prior inclusion in the Regional Transportation Plan (RTP), local share commitment, completion of preliminary engineering, environmental analysis, and right-of-way acquisition also are prerequisites for full consideration. The CMAQ program traditionally is funded on an 80% federal/20% local basis. However, sponsors are able to improve project scores by increasing the percentage of local share participation.

### *Surface Transportation Program (STP)*

STP provides flexible funding that can be used by states and localities for projects on any federal-aid highway, bridge projects and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intracity and intercity bus terminals and facilities. STP is the largest Federal Highway Administration (FHWA) flexible funds program. Like CMAQ, funding is 80% federal and may be used for all projects eligible for funds under current FHWA and FTA programs.

Due to the high level of competition and current general preference towards using STP funding on road construction and maintenance, it is unlikely that any STP funding will be applied towards the improvements outlined within this plan. However, it is possible that STP funding will be used for projects within the GNMD in the future.

### *Transportation Alternatives Program (TAP)*

The current transportation bill, Moving Ahead for Progress in the 21st Century (MAP-21), established TAP. TAP combines and replaces funding from several pre-MAP-21 programs, such as Transportation Enhancements, Recreational Trails, Safe Routes to School, and several other discretionary programs. TAP funding can be used for a variety of projects and activities that are related to surface transportation. Acceptable uses that support the implementation activities outlined in this document include the following:

- Construction, planning, and design of on-road and off-road trail facilities for pedestrians, bicyclists, and other non-motorized forms of transportation, including sidewalks, bicycle infrastructure, pedestrian and bicycle signals, traffic calming techniques, lighting and other safety related infrastructure, and transportation projects to achieve compliance with the Americans with Disabilities Act of 1990.
- Construction, planning, and design of infrastructure-related projects and systems that will provide safe routes for non-drivers

TAP projects are administered by the State (TxDOT); however, in urbanized areas, with populations over 200,000, the MPO will select TAP projects through a competitive process in consultation with TxDOT. Therefore, H-GAC will select projects for funding within the Houston area. Projects undertaken with TAP funding will be funded at an 80%/20% split. As this program is still in its infancy, additional federal guidance will be provided prior leading up to future funding announcements.

### *Other Discretionary Federal Funding Opportunities (ARRA, TIGER)*

Within recent years there have been several examples of special funding opportunities made available for transportation needs. The American Recovery and Reinvestment Act (ARRA) of 2009 provided $48.1 billion in transportation-related investments and spurred the creation of the Transportation Investment Generating Economic Recovery (TIGER) Program, for which Congress has continued to allocate funding. The strict timelines these programs operated under made it impossible for local units of government to utilize funding for unplanned projects. In the event another one-time funding announcement is made, the projects listed within this document have already undergone preliminary planning and justification and will be immediately ready to move into a preliminary engineering and design phase.

## *LOCAL SHARE MATCH FUNDING ALTERNATIVES*

### *Federal Non-Transportation Related Sources: Community Development Block Grant (CDBG) Program*

As a CDBG entitlement community, Houston is eligible to use several CDBG assistance programs. The CDBG program was developed to promote viable urban communities, by providing decent housing and a suitable living environment, and by expanding economic opportunities, principally for persons of low and moderate income. One of the advantages of CDGB is the ruling that allows these funds to be used as the local match for other federal grant programs referenced in this chapter. The Section 108 Loan Guarantee Program and Brownfield Economic Development Initiative (BEDI) are programs of CDBG.

- ***Section 108 Loan Guarantee Program.*** Section 108 is the loan guarantee provision of the CDBG program. Eligible activities for Section 108 financing include acquisition of real property and construction of public facilities (including street, sidewalk, and other site improvements).

The Section 108 Loan program allows communities to transform a small portion of its CDBG funds into federally guaranteed loans large enough to pursue physical and economic revitalization projects that can renew entire neighborhoods. However, Section 108 loans are not risk free, local governments borrowing funds guaranteed by Section 108 must pledge their current and future CDBG allocations to cover the loan amount as security for the loan.[2]

- ***Brownfield Economic Development Initiative.*** BEDI is designed to assist cities with the redevelopment of abandoned, idled, and underused industrial and commercial facilities where expansion and redevelopment is burdened by real or potential environmental contamination. BEDI grant funds are primarily targeted for use with a particular emphasis upon the redevelopment of brownfield sites in economic development projects and the increase of economic opportunities for low- and moderate-income persons as part of the creation or retention of businesses, jobs, and increases in the local tax base. BEDI funds are used to enhance the security or to improve the viability of a project financed with a new Section 108 guaranteed loan commitment.

### *Transportation Development Credits (TDC)*

A state may use toll revenues that are generated and used by public, quasi-public, and private agencies to be used as a credit toward the non-federal share requirement for any funds made available to perform eligible DOT-related capital projects. As of December 2012, the responsibility of allocating TDCs was given to the MPO by TxDOT. H-GAC is still in the process of developing the criteria for dissemination of these funds currently.

### *Private Sector or Nonprofit Funds*

Private foundations are a potential source of support for non-transit related costs. The Foundation Center is a good research resource for agencies seeking foundations that may support their projects (http://foundationcenter.org).

### *General Funds*

GNMD may choose to fund a portion of required local share match for the proposed multimodal terminals and related streetscape improvements within its own general fund budget. For example, if a $1.9 million capital program is desired for local share, then GNMD could dedicate $1.9 million of local funds. Additionally, the successful acquisition of an LONP will allow for the GNMD to fully fund improvements and then use that funding amount as match towards another federally funded project.

[2] U.S Department of Housing and Urban Development:
http://www.hud.gov/offices/cpd/communitydevelopment/programs/108/#intro. Retrieved Feb 18, 2010

### *Debt Financing*

Debt financing allows faster development of projects than is possible under a "pay-as-you-go" approach by improving short-term cash flow. However, debt has its downside, it must be repaid, with interest, and there are other debt service fees and costs as well. Issuers of debt generally charge a one-time fee, typically approximately two percent of the loan amount, to cover underwriting costs. In addition, debt tends to be more expensive for small government entities rather than for larger entities because one-time projects are less attractive to investors and smaller operations generally have less experience managing debt.

Debt can be issued through a variety of channels, as follows:

- ***Commercial Loans***

  Pros: Low to moderate transaction costs and greater flexibility (debt structure, restructuring, interest deferral, grace periods)

  Cons: Moderate to high interest rates, often short-term (bridge financing), greater exposure to interest rate risk

  *Example:* Community Transportation Association of America (CTAA)
  Community Development Transportation Lending Services (CDTLS)

- ***Government Loans***

  Pros: Low-to-moderate interest rate, low transaction costs, generally high flexibility, no exposure to interest rate risk, can be structured as either short or long-term debt

  Cons: Can require a balloon payment at maturity; financial reporting requirements are fairly significant

  *Example:* Section 108 Loan Guarantee Program, Transportation Infrastructure Finance and Innovation Act (TIFIA) program loans

- ***Tax-exempt Bonds***

  Pros: Generally low to moderate interest (depending upon the security and the rating)

  Cons: Moderately higher transaction costs, little financial flexibility (grace periods, interest deferral, re-structuring), external approval can constrain the project, can be a claim on general operations funds, can include substantial covenants that may affect operations (reserve funds, ability to take on additional debt), financial reporting requirements are very significant

  *Example:* Tax-exempt bond

### *Capturing and Protecting Local Value: FTA Letter of No Prejudice (LONP)*

The LONP federal pre-award authority mechanism is a valuable tool to an FTA grantee. Under an approved LONP, an eligible capital project can be protected for local match or federal reimbursement for up to five years. This tool allows eligible recipients to advance project activities with local funds, building local share credit toward the overall project, and allowing for subsequent federal reimbursement should Discretionary, CMAQ, TAP, or other funds be made available. Examples of successful projects within the Houston-Galveston region that utilized the LONP mechanism include: The Woodlands Town Center Pedestrian/Transit Corridor; Midtown Pedestrian/Transit Master Plan; Galveston Island Rail Trolley; and Galveston LCI. In order to receive an LONP, and protect its local investments, a project sponsor must meet FTA environmental clearance and advanced/preliminary engineering planning requirements, obtain approval of the LONP by the FTA Regional Office, and procure all bids for design, engineering, and construction in accordance with federal requirements, including advertisement for bids, Davis-Bacon wage rates in contractual documents, and debarment and lobbying certifications.

### *SUMMARY*

A successful strategy for the implementation of capital improvements under the federal paradigm must be premised on the following factors:

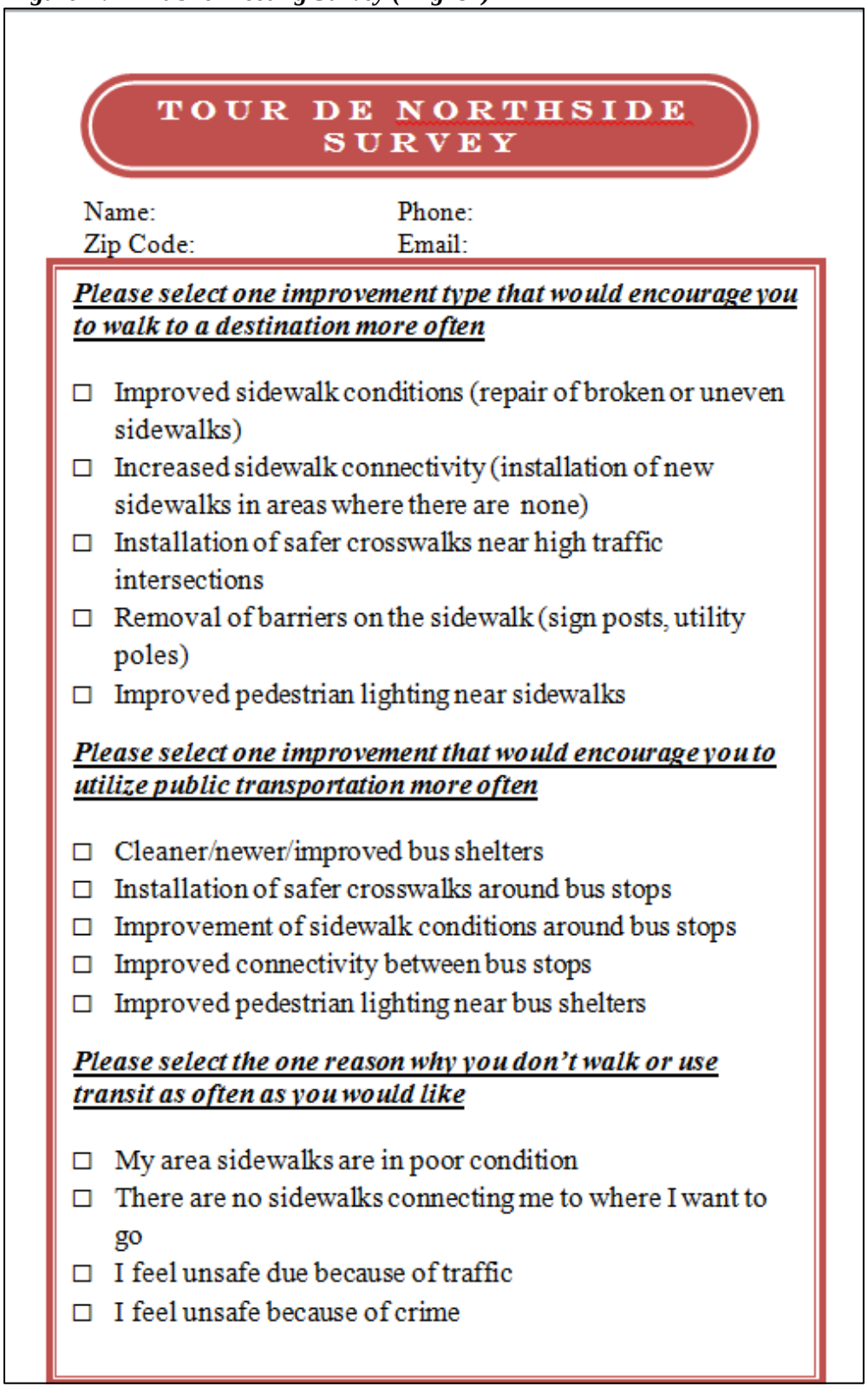
- Identification of potential federal funding resources, and timing for availability of such funds through various calls for projects at the regional level, or cyclical state or federal discretionary program opportunities. In some cases, a given project or phase may be eligible for more than one source of funding.
- Identification and allocation of local share resources to be dedicated to meeting federal match requirements.
- Consensus by the local sponsor to commit to move the program forward. This requires a multi-year commitment by GNMD's leadership to follow the project phasing plan.

# *Appendix A – Public Meeting Materials*

# *Appendix A – Public Meeting Materials*

***Figure A.1 – Public Meeting Invitation***

***Figure A.2 – Public Meeting Survey (English)***



**TOUR DE NORTHSIDE SURVEY**

Name: Phone:
Zip Code: Email:

***Please select one improvement type that would encourage you to walk to a destination more often***

- ☐ Improved sidewalk conditions (repair of broken or uneven sidewalks)
- ☐ Increased sidewalk connectivity (installation of new sidewalks in areas where there are none)
- ☐ Installation of safer crosswalks near high traffic intersections
- ☐ Removal of barriers on the sidewalk (sign posts, utility poles)
- ☐ Improved pedestrian lighting near sidewalks

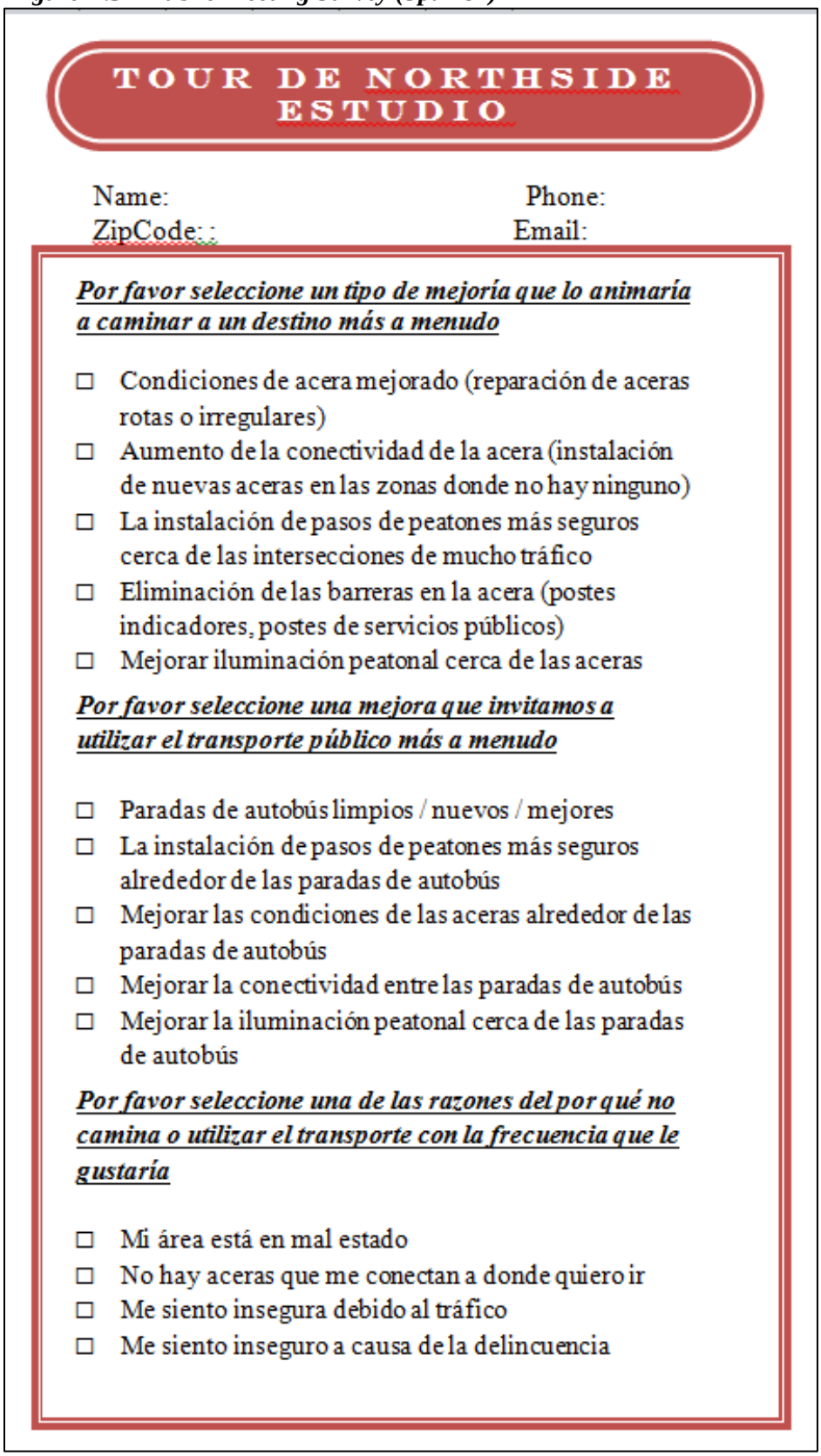
***Please select one improvement that would encourage you to utilize public transportation more often***

- ☐ Cleaner/newer/improved bus shelters
- ☐ Installation of safer crosswalks around bus stops
- ☐ Improvement of sidewalk conditions around bus stops
- ☐ Improved connectivity between bus stops
- ☐ Improved pedestrian lighting near bus shelters

***Please select the one reason why you don't walk or use transit as often as you would like***

- ☐ My area sidewalks are in poor condition
- ☐ There are no sidewalks connecting me to where I want to go
- ☐ I feel unsafe due because of traffic
- ☐ I feel unsafe because of crime

***Figure A.3 – Public Meeting Survey (Spanish)***



**TOUR DE NORTHSIDE ESTUDIO**

Name: Phone:
ZipCode: : Email:

***Por favor seleccione un tipo de mejoría que lo animaría a caminar a un destino más a menudo***

- ☐ Condiciones de acera mejorado (reparación de aceras rotas o irregulares)
- ☐ Aumento de la conectividad de la acera (instalación de nuevas aceras en las zonas donde no hay ninguno)
- ☐ La instalación de pasos de peatones más seguros cerca de las intersecciones de mucho tráfico
- ☐ Eliminación de las barreras en la acera (postes indicadores, postes de servicios públicos)
- ☐ Mejorar iluminación peatonal cerca de las aceras

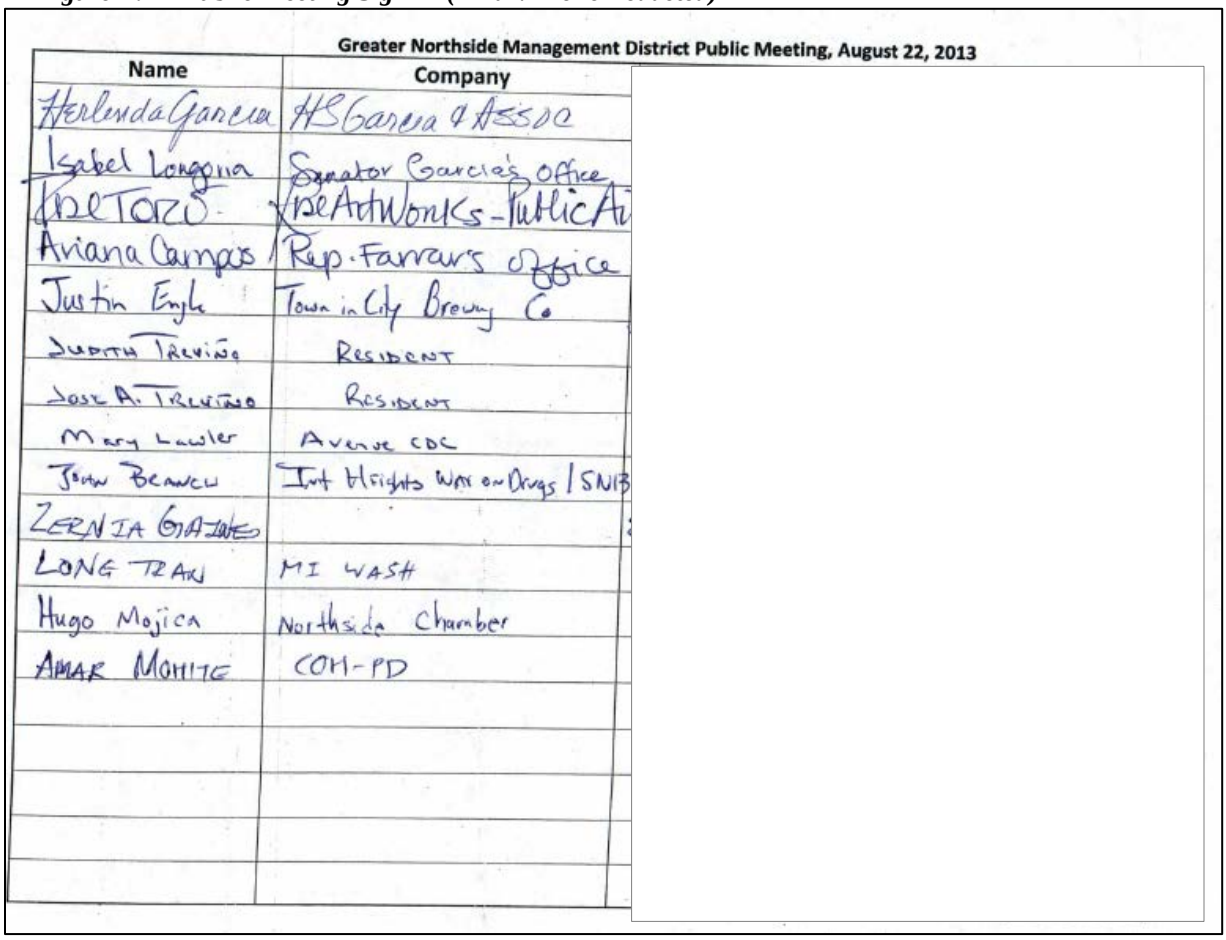
***Por favor seleccione una mejora que invitamos a utilizar el transporte público más a menudo***

- ☐ Paradas de autobús limpios / nuevos / mejores
- ☐ La instalación de pasos de peatones más seguros alrededor de las paradas de autobús
- ☐ Mejorar las condiciones de las aceras alrededor de las paradas de autobús
- ☐ Mejorar la conectividad entre las paradas de autobús
- ☐ Mejorar la iluminación peatonal cerca de las paradas de autobús

***Por favor seleccione una de las razones del por qué no camina o utilizar el transporte con la frecuencia que le gustaría***

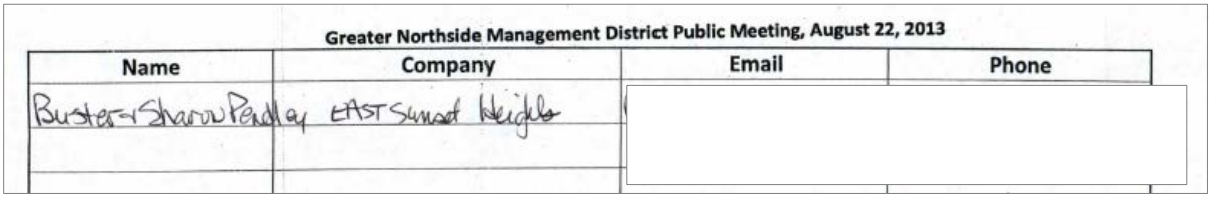
- ☐ Mi área está en mal estado
- ☐ No hay aceras que me conectan a donde quiero ir
- ☐ Me siento insegura debido al tráfico
- ☐ Me siento inseguro a causa de la delincuencia

***Figure A.4 – Public Meeting Sign In (Email/Phone Redacted)***



**Greater Northside Management District Public Meeting, August 22, 2013**

| Name | Company |
|---|---|
| Herlinda Garcia | HS Garcia & Assoc |
| Isabel Longoria | Senator Garcia's Office |
| Joe Torres | ArtWorks - Public Art |
| Ariana Campos | Rep. Farrar's Office |
| Justin Engle | Town in City Brewing Co |
| Judith Trevino | Resident |
| Jose A. Trevino | Resident |
| Mary Lawler | Avenue CDC |
| John Beauch | Int Heights War on Drugs / SNIP |
| Zernia Gaines | |
| Long Tran | MI WASH |
| Hugo Mojica | Northside Chamber |
| Amar Mohite | COH-PD |



**Greater Northside Management District Public Meeting, August 22, 2013**

| Name | Company | Email | Phone |
|---|---|---|---|
| Buster + Sharon Pendley | EAST Sunset Heights | | |

# *Appendix B – PLOS Rankings*

**Appendix B**
**GNMD LCI - Pedestrian Level of Service (PLOS)**

| BLOCKFACE | Face | Existing Rank | Existing PLOS | Future PLOS | Delta |
|---|---|---|---|---|---|
| Blockface on: Tidwell Road | | | | | |
| Blockface between: (IH 45 Frontage Road Northbound and Nordling Road) | *N* | 26 | E | A | 0.35 |
| Blockface on: Tidwell Road | | | | | |
| Blockface between: (IH 45 Frontage Road Northbound and Nordling Road) | *S* | 23 | F | A | 0.6 |
| Blockface on: Tidwell Road | | | | | |
| Blockface between: (Nordling Road and Barrett Street) | *N* | 20 | D | A | 0.15 |
| Blockface on: Tidwell Road | | | | | |
| Blockface between: (Nordling Road and Barrett Street) | *S* | 16 | D | A | 0.15 |
| Blockface on: Tidwell Road | | | | | |
| Blockface between: (Barrett Street and Airline Road) | *N* | 17 | D | A | 0.15 |
| Blockface on: Tidwell Road | | | | | |
| Blockface between: (Barrett Street and Airline Road) | *S* | 17 | D | A | 0.15 |
| Blockface on: Berry Road | | | | | |
| Blockface between: (Airline Drive and Meta Street) | *N* | 30 | F | A | 0.6 |
| Blockface on: Berry Road | | | | | |
| Blockface between: (Airline Drive and Meta Street) | *S* | 30 | F | A | 0.6 |
| Blockface on: Berry Road | | | | | |
| Blockface between: (Meta Street and Madie Drive) | *N* | 24 | F | A | 0.6 |
| Blockface on: Berry Road | | | | | |
| Blockface between: (Meta Street and Madie Drive) | *S* | 24 | F | A | 0.6 |
| Blockface on: Berry Road | | | | | |
| Blockface between: (Madie Drive and Fulton Street) | *N* | 22 | E | A | 0.35 |
| Blockface on: Berry Road | | | | | |
| Blockface between: (Madie Drive and Fulton Street) | *S* | 25 | F | A | 0.6 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Tidwell Road and Veenstra Street) | *W* | 18 | D | A | 0.15 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Tidwell Road and Vandel Street) | *E* | 14 | D | A | 0.15 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Veenstra Street and De Boll Street) | *W* | 17 | E | A | 0.35 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Vandel Street and Ben Drive) | *E* | 15 | E | A | 0.35 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Ben Drive and De Boll Street) | *E* | 15 | E | A | 0.35 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (De Boll Street and Burress Street) | *W* | 15 | E | A | 0.35 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (De Boll Street and Burress Street) | *E* | 21 | F | A | 0.6 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Burress Street and Fichter Avenue) | *W* | 19 | F | A | 0.6 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Burress Street and Fichter Avenue) | *E* | 19 | F | A | 0.6 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Fichter Avenue and Berry Road) | *W* | 24 | F | A | 0.6 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Fichter Avenue and Feuhs Lane) | *E* | 21 | F | A | 0.6 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Feuhs Lane and Grothe Lane) | *E* | 19 | F | A | 0.6 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Grothe Lane and Berry Road) | *E* | 22 | E | A | 0.35 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Berry Road and Lyerly Street) | *W* | 22 | E | A | 0.35 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Berry Road and Meadow Lea Drive) | *E* | 25 | F | A | 0.6 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Lyerly Street and Deerfield Street) | *W* | 0 | A | A | 0 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Meadow Lea Drive and Julia Street) | *E* | 18 | F | A | 0.6 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Julia Street and Rebecca Street) | *E* | 12 | C | A | 0.1 |
| Blockface on: Fulton Street | | | | | |
| Blockface between: (Rebecca Street and Deerfield Street) | *E* | 0 | A | A | 0 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Yale Street and Harvard Street) | *N* | 24 | E | A | 0.35 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Harvard Street and N Main Street) | *N* | 15 | D | A | 0.15 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Yale Street and N Main Street) | *S* | 30 | E | A | 0.35 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (N Main Street and Haygood Street) | *N* | 12 | C | A | 0.1 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (N Main Street and Heiti Street) | *S* | 7 | B | A | 0.05 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Heiti Street and Herridge Street) | *S* | 1 | A | A | 0 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Herridge Street and Haygood Street) | *S* | 5 | B | A | 0.05 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Haygood Street and Oxford Street) | *N* | 7 | B | A | 0.05 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Haygood Street and Oxford Street) | *S* | 8 | B | A | 0.05 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Oxford Street and Busiek Street) | *N* | 3 | A | A | 0 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Oxford Street and Cadmus Street) | *S* | 2 | A | A | 0 |
| Blockface on: Crosstimbers Street | | | | | |

**Appendix B**
**GNMD LCI - Pedestrian Level of Service (PLOS)**

| BLOCKFACE | Face | Existing Rank | Existing PLOS | Future PLOS | Delta |
|---|---|---|---|---|---|
| Blockface between: (Cadmus Street and Busiek Street) | *S* | 0 | A | A | 0 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Busiek Street and Castor Drive) | *N* | 6 | B | B | 0 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Busiek Street and Cornell Street) | *S* | 0 | A | A | 0 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Cornell Street and Castor Drive) | *S* | 8 | B | B | 0 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Castor Drive and Airline Drive) | *N* | 11 | B | B | 0 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Castor Drive and Delhi Street) | *S* | 8 | C | B | 0.05 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Delhi Street and Europa Street) | *S* | 7 | B | B | 0 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Europa Street and Rodgers Street) | *S* | 8 | C | B | 0.05 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Rodgers Street and Airline Drive) | *S* | 14 | C | B | 0.05 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Airline Drive and IH 45 Frontage Road Southbound) | *N* | 19 | C | A | 0.1 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (Airline Drive and IH 45 Frontage Road Southbound) | *S* | 20 | D | A | 0.15 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (IH 45 Frontage Road Southbound and IH 45 Frontage Road Northbound) | *N* | 11 | D | A | 0.15 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (IH 45 Frontage Road Southbound and IH 45 Frontage Road Northbound) | *S* | 11 | D | A | 0.15 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (IH 45 Frontage Road Northbound and Fulton Street) | *N* | 23 | D | A | 0.15 |
| Blockface on: Crosstimbers Street | | | | | |
| Blockface between: (IH 45 Frontage Road Northbound and Fulton Street) | *S* | 21 | D | A | 0.15 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Airline Drive and Northwood Street) | *N* | 35 | F | A | 0.6 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Airline Drive and Emir Street) | *S* | 25 | F | A | 0.6 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Emir Street and Northwood Street) | *S* | 27 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Northwood Street and Tabor Street) | *N* | 27 | F | A | 0.6 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Northwood Street and Tabor Street) | S | 21 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Tabor Street and Walton Street) | *N* | 20 | F | A | 0.6 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Tabor Street and Walton Street) | *S* | 14 | D | A | 0.15 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Walton Street and Enid Street) | *N* | 15 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Walton Street and Enid Street) | *S* | 15 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Enid Street and Cordell Street) | N | 15 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Enid Street and Cordell Street) | S | 15 | D | A | 0.15 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Cordell Street and IH 45 Frontage Road Southbound) | N | 15 | D | A | 0.15 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Cordell Street and IH 45 Frontage Road Southbound) | *S* | 17 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (IH 45 Frontage Road Southbound and IH 45 Frontage Road Northbound) | *N* | 10 | C | B | 0.05 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (IH 45 Frontage Road Southbound and IH 45 Frontage Road Northbound) | *S* | 10 | C | B | 0.05 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (IH 45 Frontage Road Northbound and Fisk Street) | *N* | 20 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (IH 45 Frontage Road Northbound and Bristol Street) | *S* | 18 | D | A | 0.15 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Bristol Street and Fisk Street) | S | 16 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Fisk Street and Sharman Street) | *N* | 17 | D | A | 0.15 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Fisk Street and Sharman Street) | *S* | 20 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Sharman Street and Fulton Street) | *N* | 13 | C | B | 0.05 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Sharman Street and Fulton Street) | *S* | 13 | C | A | 0.1 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Fulton Street and McEwan Street) | N | 16 | C | A | 0.1 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Fulton Street and McEwan Street) | *S* | 12 | C | A | 0.1 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (McEwan Street and Siegel Street) | *N* | 16 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (McEwan Street and Siegel Street) | *S* | 17 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Siegel Street and Beggs Street) | *N* | 15 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Siegel Street and Beggs Street) | *S* | 16 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |

**Appendix B**
**GNMD LCI - Pedestrian Level of Service (PLOS)**

| BLOCKFACE | Face | Existing Rank | Existing PLOS | Future PLOS | Delta |
|---|---|---|---|---|---|
| Blockface between: (Beggs Street and Hain Street) | *N* | 16 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Beggs Street and Hain Street) | *S* | 17 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Hain Street and Averill Street) | *N* | 16 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Hain Street and Averill Street) | *S* | 16 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Averill Street and Edison Street) | *N* | 16 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Averill Street and Edison Street) | *S* | 15 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Edison Street and Irvington Boulevard) | N | 21 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Edison Street and Billingsley Street) | S | 16 | E | A | 0.35 |
| Blockface on: Cavalcade Street | | | | | |
| Blockface between: (Billingsley Street and Irvington Boulevard) | S | 25 | E | A | 0.35 |
| Blockface on: Hays Street | | | | | |
| Blockface between: (Irvington Street and Fulton Street) | N | 0 | A | A | 0 |
| Blockface on: Hays Street | | | | | |
| Blockface between: (Irvington Street and Fulton Street) | S | 0 | A | A | 0 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (N Main Street and Freeman Street) | N | 15 | C | A | 0.1 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (N Main Street and Chestnut Street) | S | 16 | C | A | 0.1 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Freeman Street and Freeman Street) | S | 0 | A | A | 0 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Freeman Street and Everett Street) | N | 15 | D | A | 0.15 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Freeman Street and Chestnut Street) | S | 0 | A | A | 0 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Everett Street and Chestnut Street) | N | 24 | E | A | 0.35 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Chestnut Street and Gentry Street) | N | 26 | E | A | 0.35 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Chestnut Street and Gentry Street) | S | 20 | D | A | 0.15 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Gentry Street and Fulton Street) | N | 18 | D | A | 0.15 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Gentry Street and Fulton Street) | S | 11 | C | A | 0.1 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Fulton Street and Tackaberry Street) | N | 15 | D | A | 0.15 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Fulton Street and Tackaberry Street) | S | 12 | C | A | 0.1 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Tackaberry Street and Cochran Street) | N | 19 | C | A | 0.1 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Tackaberry Street and Cochran Street) | S | 18 | C | A | 0.1 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Cochran Street and Gano Street) | N | 15 | D | A | 0.15 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Cochran Street and Gano Street) | S | 17 | D | A | 0.15 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Gano Street and Chapman Street) | N | 15 | E | A | 0.35 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Gano Street and Chapman Street) | S | 14 | D | A | 0.15 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Chapman Street and Terry Street) | N | 21 | E | A | 0.35 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Chapman Street and Terry Street) | S | 26 | F | A | 0.6 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Terry Street and McKee Street) | N | 20 | E | A | 0.35 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (Terry Street and McKee Street) | S | 23 | F | A | 0.6 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (McKee Street and Hardy Street) | N | 21 | E | A | 0.35 |
| Blockface on: Quitman Street | | | | | |
| Blockface between: (McKee Street and Hardy Street) | S | 22 | E | A | 0.35 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (N Main Street and Freeman Street) | N | 16 | C | A | 0.1 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (N Main Street and Freeman Street) | S | 12 | C | A | 0.1 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Freeman Street and Everett Street) | N | 19 | F | A | 0.6 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Freeman Street and Everett Street) | S | 18 | F | A | 0.6 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Everett Street and Chestnut Street) | N | 21 | E | A | 0.35 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Everett Street and Chestnut Street) | S | 22 | E | A | 0.35 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Chestnut Street and Gentry Street) | N | 18 | F | A | 0.6 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Chestnut Street and Gentry Street) | S | 20 | F | A | 0.6 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |

**Appendix B**
**GNMD LCI - Pedestrian Level of Service (PLOS)**

| BLOCKFACE | Face | Existing Rank | Existing PLOS | Future PLOS | Delta |
|---|---|---|---|---|---|
| Blockface between: (Gentry Street and Fulton Street) | N | 22 | E | A | 0.35 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Gentry Street and Fulton Street) | S | 29 | F | A | 0.6 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Fulton Street and Common Street) | N | 23 | E | A | 0.35 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Fulton Street and Common Street) | S | 19 | E | A | 0.35 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Common Street and Marion Street) | N | 13 | D | A | 0.15 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Common Street and Marion Street) | 0 | 13 | D | A | 0.15 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Marion Street and Cochran Street) | N | 14 | D | A | 0.15 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Marion Street and Gano Street) | S | 20 | F | A | 0.6 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Cochran Street and Gano Street) | N | 15 | E | A | 0.35 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Gano Street and Chapman Street) | N | 15 | E | A | 0.35 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Gano Street and Chapman Street) | S | 19 | F | A | 0.6 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Chapman Street and Terry Street) | N | 18 | F | A | 0.6 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Chapman Street and Terry Street) | S | 20 | F | A | 0.6 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Terry Street and McKee Street) | N | 20 | E | A | 0.35 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (Terry Street and McKee Street) | S | 21 | E | A | 0.35 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (McKee Street and Hardy Street) | N | 17 | D | A | 0.15 |
| Blockface on: Hogan Street/Lorraine Street | | | | | |
| Blockface between: (McKee Street and Hardy Street) | S | 14 | D | A | 0.15 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (N Main Street and Freeman Street) | N | 20 | E | A | 0.35 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (N Main Street and Freeman Street) | S | 14 | D | A | 0.15 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Freeman Street and Everett Street) | N | 17 | E | A | 0.35 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Freeman Street and Everett Street) | S | 16 | E | A | 0.35 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Freeman Street and Chestnut Street) | N | 17 | E | A | 0.35 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Everett Street and Chestnut Street) | S | 17 | E | A | 0.35 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Chestnut Street and Gentry Street) | N | 15 | E | A | 0.35 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Chestnut Street and Gentry Street) | S | 19 | F | A | 0.6 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Gentry Street and Fulton Street) | N | 17 | E | A | 0.35 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Gentry Street and Fulton Street) | S | 17 | E | A | 0.35 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Fulton Street and Common Street) | N | 16 | E | A | 0.35 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Fulton Street and Common Street) | S | 23 | F | A | 0.6 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Common Street and Gano Street) | N | 21 | F | A | 0.6 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Common Street and Gano Street) | S | 21 | F | A | 0.6 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Gano Street and Chapman Street) | N | 17 | E | A | 0.35 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Gano Street and Chapman Street) | S | 19 | F | A | 0.6 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Chapman Street and Terry Street) | N | 21 | F | A | 0.6 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Chapman Street and Terry Street) | S | 18 | F | A | 0.6 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Terry Street and McKee Street) | N | 21 | F | A | 0.6 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (Terry Street and McKee Street) | S | 21 | F | A | 0.6 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (McKee Street and Hardy Street) | N | 21 | F | A | 0.6 |
| Blockface on: Brooks Street | | | | | |
| Blockface between: (McKee Street and Hardy Street) | S | 24 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (610 and E. 29th Street) | W | 16 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (610 and E. 29th Street) | E | 20 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E. 29th Street and E. 28th Street) | W | 18 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E. 29th Street and E. 28th Street) | E | 23 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |

**Appendix B**
**GNMD LCI - Pedestrian Level of Service (PLOS)**

| BLOCKFACE | Face | Existing Rank | Existing PLOS | Future PLOS | Delta |
|---|---|---|---|---|---|
| Blockface between: (E. 28th Street and E. 27th Street) | W | 24 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E. 28th Street and E. 27th Street) | E | 23 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E. 27th Street and E. 26th Street) | W | 24 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E. 27th Street and Sylvester Road) | E | 24 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E. 26th Street and Aurora Street) | W | 17 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Aurora Street and Gibbs Street) | W | 28 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Sylvester Road and Service Street) | E | 22 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Service Street and Link Road) | E | 20 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Gibbs Street and E. 24th Street) | W | 16 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E. 24th Street and E. 23rd Street) | W | 18 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E. 23rd Street and Nadine Street) | W | 22 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Link Road and Nadine Street) | E | 23 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Nadine Street and Adele Street) | W | 22 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Adele Street and Louise Street) | W | 22 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Louise Street and Robbie Street) | W | 23 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Robbie Street and Cavalcade Street) | W | 24 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Nadine Street and Cavalcade Street) | E | 27 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Cavalcade Street and Kern Street) | W | 24 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Kern Street and Clio Street) | W | 20 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Cavalcade Street and Idylwild Street) | E | 24 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Dunbar Street and Clio Street) | W | 0 | A | A | 0 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Idylwild Street and Redwing Place) | E | 17 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Redwing Place and Beck Court) | E | 13 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Beck Court and Wailing Street) | E | 19 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Wailing Street and Coronado Street) | E | 21 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Coronado Street and Clio Street) | E | 17 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Clio Street and Main Street) | W | 22 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Clio Street and W Patton Street) | E | 20 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (W Patton Street and Fenwick Street) | E | 21 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Fenwick Street and Main Street) | E | 19 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Tidwell Road and Fosbank Street) | W | 17 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Tidwell Road and Veenstra Street) | E | 16 | C | A | 0.1 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Veenstra Street and De Boll Street) | E | 15 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Fosbank Street and E Rodgers Street) | W | 14 | D | B | 0.1 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (De Boll  Street and Burress Street) | E | 13 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Burress Street and Farrell Street) | E | 21 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E Rodgers Street and E Burress Street) | W | 17 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E Burress Street and I 45) | W | 22 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Farrell Street and Wellford Street) | E | 16 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Wellford Street and Berry Road) | E | 22 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Berry Road and Lyerly Street) | E | 25 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Lyerly Street and I 45) | E | 22 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (I 45 and I 45) | W | 17 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |

**Appendix B**
**GNMD LCI - Pedestrian Level of Service (PLOS)**

| BLOCKFACE | Face | Existing Rank | Existing PLOS | Future PLOS | Delta |
|---|---|---|---|---|---|
| Blockface between: (I 45 and I 45) | E | 0 | A | A | 0 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (I 45 and E Whiteney Street) | W | 21 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (I 45 and Crosstimbers Street) | E | 26 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E Whiteney Street and Crosstimbers Street) | W | 17 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Crosstimbers Street and Simsbury Street) | W | 18 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Crosstimbers Street and Johnson Street) | E | 21 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Simsbury Street and Barkley Street) | W | 18 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Barkley Street and Johnson Street) | W | 17 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Johnson Street and Neyland Street) | W | 18 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Johnson Street and Neyland Street) | E | 16 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Neyland Street and Westfield Street) | W | 16 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Neyland Street and Riggs Road) | E | 9 | B | A | 0.05 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Westfield Street and E 40th 1/2 Street) | W | 25 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (Riggs Road and E 40th 1/2 Street) | E | 22 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E 40th 1/2 Street and E 40th Street) | W | 18 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E 40th 1/2 Street and E 40th Street) | E | 21 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E 40th Street and E 34th Street) | W | 0 | A | A | 0 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E 40th Street and E 34th Street) | E | 0 | A | A | 0 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E 34th Street and E 33rd Street) | W | 20 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E 34th Street and E 33rd Street) | E | 17 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E 33rd Street and E 32nd 1/2 Street) | W | 15 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E 33rd Street and E 32nd 1/2 Street) | E | 19 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E 32nd 1/2 Street and E 32nd Street) | W | 16 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E 32nd 1/2 Street and E 31st Street) | E | 19 | F | A | 0.6 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E 32nd Street and 610 Frontage North) | W | 20 | D | A | 0.15 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (E 31st Street and 610 Frontage North) | E | 22 | E | A | 0.35 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (610 Frontage South and 610 Frontage North) | W | 9 | C | A | 0.1 |
| Blockface on: Airline Drive | | | | | |
| Blockface between: (610 Frontage South and 610 Frontage North) | E | 10 | C | A | 0.1 |
| Blockface on: N Main Street | | | | | |
| Blockface between: (Brooks Street and Burnett Street) | W | 0 | A | A | 0 |
| Blockface on: N Main Street | | | | | |
| Blockface between: (Brooks Street and Burnett Street) | E | 0 | A | A | 0 |
| Blockface on: Lyons Avenue | | | | | |
| Blockface between: (Mckee Street and Hardy Street) | N | 29 | F | A | 0.6 |
| Blockface on: Lyons Avenue | | | | | |
| Blockface between: (Mckee Street and Hardy Street) | S | 22 | E | A | 0.35 |
| Blockface on: Tidwell Road | | | | | |
| Blockface between: (Airline Road and Fulton Street) | N | 26 | D | A | 0.15 |
| Blockface on: Tidwell Road | | | | | |
| Blockface between: (Airline Road and Fulton Street) | S | 17 | D | A | 0.15 |
| | | | | | |

**Appendix B**
**GNMD LCI - Pedestrian Level of Service (PLOS)**

| BLOCKFACE | Face | Existing Rank | Existing PLOS | Future PLOS | Delta |
|---|---|---|---|---|---|
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (McDaniel and Crosstimbers) | *E* | 25 | E | A | 0.35 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (McDaniel and Worthington) | *E* | 24 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Worthington and Sadler) | *E* | 24 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Sadler and Bostic) | *E* | 24 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Bostic and Berry) | *E* | 24 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Berry and Luell) | *E* | 30 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Luell and Laura Koppe) | *E* | 30 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Laura Koppe and Sherwick) | *E* | 30 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Sherwick and Firnat) | *E* | 24 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Firnat and Wimberly) | *E* | 24 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Wimberly and Hohl) | *E* | 24 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Hohl and Hurley) | *E* | 24 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Hurley and Tidwell) | *E* | 21 | D | A | 0.15 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Tidwell and Turner Rd) | *E* | 24 | E | A | 0.35 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Turner Rd and Turner Dr) | *E* | 24 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Turner Dr and Skippy) | *E* | 22 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Skippy and Hage) | *E* | 24 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Hage and Trout) | *E* | 24 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Trout and Hitchcock) | *E* | 24 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Hitchcock and Folger) | *E* | 24 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Folger and Topping) | *E* | 24 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Topping and Parker) | *E* | 30 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Parker and Wiley) | *E* | 30 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Wiley and Ramp) | *E* | 27 | F | A | 0.6 |
| Blockface on: Jensen Drive | | | | | |
| Blockface between: (Saunders and Lakewood) | *W* | 28 | E | A | 0.35 |
| Blockface on: Jensen Drive | | | | | |

**Appendix B**
**GNMD LCI - Pedestrian Level of Service (PLOS)**

| BLOCKFACE | Face | Existing Rank | Existing PLOS | Future PLOS | Delta |
|---|---|---|---|---|---|
| **Blockface between: (Lakewood and Parker)** | ***W*** | 33 | F | A | 0.6 |
| **Blockface on: Jensen Drive** | | | | | |
| **Blockface between: (Parker and Folger)** | ***W*** | 30 | F | A | 0.6 |
| **Blockface on: Jensen Drive** | | | | | |
| **Blockface between: (Folger and Trout)** | ***W*** | 24 | F | A | 0.6 |
| **Blockface on: Jensen Drive** | | | | | |
| **Blockface between: (Trout and Turner)** | ***W*** | 24 | F | A | 0.6 |
| **Blockface on: Jensen Drive** | | | | | |
| **Blockface between: (Turner and Tim)** | ***W*** | 24 | F | A | 0.6 |
| **Blockface on: Jensen Drive** | | | | | |
| **Blockface between: (Tim and Tidwell)** | ***W*** | 32 | F | A | 0.6 |
| **Blockface on: Jensen Drive** | | | | | |
| **Blockface between: (Tidwell and Aldine Westfield)** | ***W*** | 31 | F | A | 0.6 |
| **Blockface on: Jensen Drive** | | | | | |
| **Blockface between: (Aldine Westfield and Berry)** | ***W*** | 26 | F | A | 0.6 |
| **Blockface on: Jensen Drive** | | | | | |
| **Blockface between: (Berry and Keeland)** | ***W*** | 30 | F | A | 0.6 |
| **Blockface on: Jensen Drive** | | | | | |
| **Blockface between: (Keeland and Bostic)** | ***W*** | 24 | F | A | 0.6 |
| **Blockface on: Jensen Drive** | | | | | |
| **Blockface between: (Bostic and Sadler)** | ***W*** | 24 | F | A | 0.6 |
| **Blockface on: Jensen Drive** | | | | | |
| **Blockface between: (Sadler and Deams)** | ***W*** | 24 | F | A | 0.6 |
| **Blockface on: Jensen Drive** | | | | | |
| **Blockface between: (Deams and McDaniel)** | ***W*** | 24 | F | A | 0.6 |
| **Blockface on: Jensen Drive** | | | | | |
| **Blockface between: (McDaniel and Crosstimbers** | ***W*** | 29 | E | A | 0.35 |

The Goodman Corporation is a nationally recognized transportation and urban planning consulting firm possessing a wide range of planning skills complemented with a unique understanding of the governmental processes for funding and implementing complex publicly sponsored transportation and land use initiatives. Since 1980 TGC has specialized in assisting public and private clients in planning, funding, and implementing land use and mobility projects. In addition to a strong reputation in innovative planning, TGC is accomplished in leading multi-disciplinary teams to prepare various planning products to support successful development and redevelopment initiatives. Public involvement is the cornerstone of TGC's approach to transportation and urban planning. TGC is exceptionally adept at engaging elected leadership, staff, and the community-at-large to actively participate in the planning process. TGC is very aware of how strong community support can be a catalyst for securing available public funding resources.

Members of TGC staff directly involved in the publication of this report include the following:

Barry M. Goodman, President
Bryan Brown, Vice President, Project and Governmental Affairs
Greg Goodman, Vice President
Laware Kendrick, Product Development Director
Jim Webb, Associate Administrator of Project Development
Kara McManus, Associate Planner
Sam Norman, Associate Planner

3200 Travis Street, Suite 200 • Houston, Texas 77006 • 713-951-7951 • www.thegoodmancorp.com