City Mobility Planning

Houston

Heights-Northside Sub-regional Mobility Study

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City Mobility Planning

Heights-Northside Sub-regional Study
January 2015

Prepared for:
City of Houston

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In conjunction with:

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City Mobility Planning

Heights-Northside Sub-regional Study

Special Thanks to:

The residents and stakeholders within the study area that attended meetings and provided feedback throughout the process.

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I. Introduction

In 2009, the City of Houston adopted the City Mobility Plan or CMP Phase I, which proposed a new process for developing mobility solutions. These solutions focused on enhancing the capitalized investment made in transportation infrastructure projects by identifying multi-modal system improvements that could be made at the time of corridor development or redevelopment (i.e. CIP, Rebuild Houston, TIP, etc.). The idea was that as the City invested in certain utility improvements – such as sewer or storm water upgrades – a systematic approach could also be made to increase the general capacity or number of users in a corridor via multi-modal considerations.

One of the outcomes of the CMP Phase 1 was a series of technical memorandums, one of which – Technical Memorandum 3: Functional Street Classification – highlighted and further illustrated corridor considerations as they pertained to bicycle, pedestrian, freight and transit considerations. The corridor considerations were eventually adopted into Appendix 2 of the City's Infrastructure Design Manual. Similarly, this also resulted in the Model Verification and Validation process as highlighted in Technical Memorandum 4, which today is used as one of the many analytical tools for sub-regional corridor evaluations.

The City wants to move the greatest number of people and goods in the most efficient manner along its corridors. CMP Phase II focuses on sub-regional studies located throughout the City in which multi-modal classifications can be further evaluated. Although not exhaustive, Figure 1.1 represents those studies which have either been completed or are pending completion in the near future.

In short, the purpose of CMP Phase II and the sub-regional studies is to take a deeper assessment of the corridor network to ensure those recommendations developed during Phase 1 of the CMP process are appropriate at not only the regional level, but the neighborhood level as well. The project team worked extensively with sub-regional stakeholders such as local agencies, management entities and other interest groups to ensure concerns and related visions for development within the area were fully understood before recommendations were formulated. The result is an intricate set of recommendations that look at both the individual corridor (See Chapter VI. A Balanced Approach) as well as the greater transportation network as it pertains to individual systems such as the bicycle and transit networks (See Chapter VII. Outcomes).

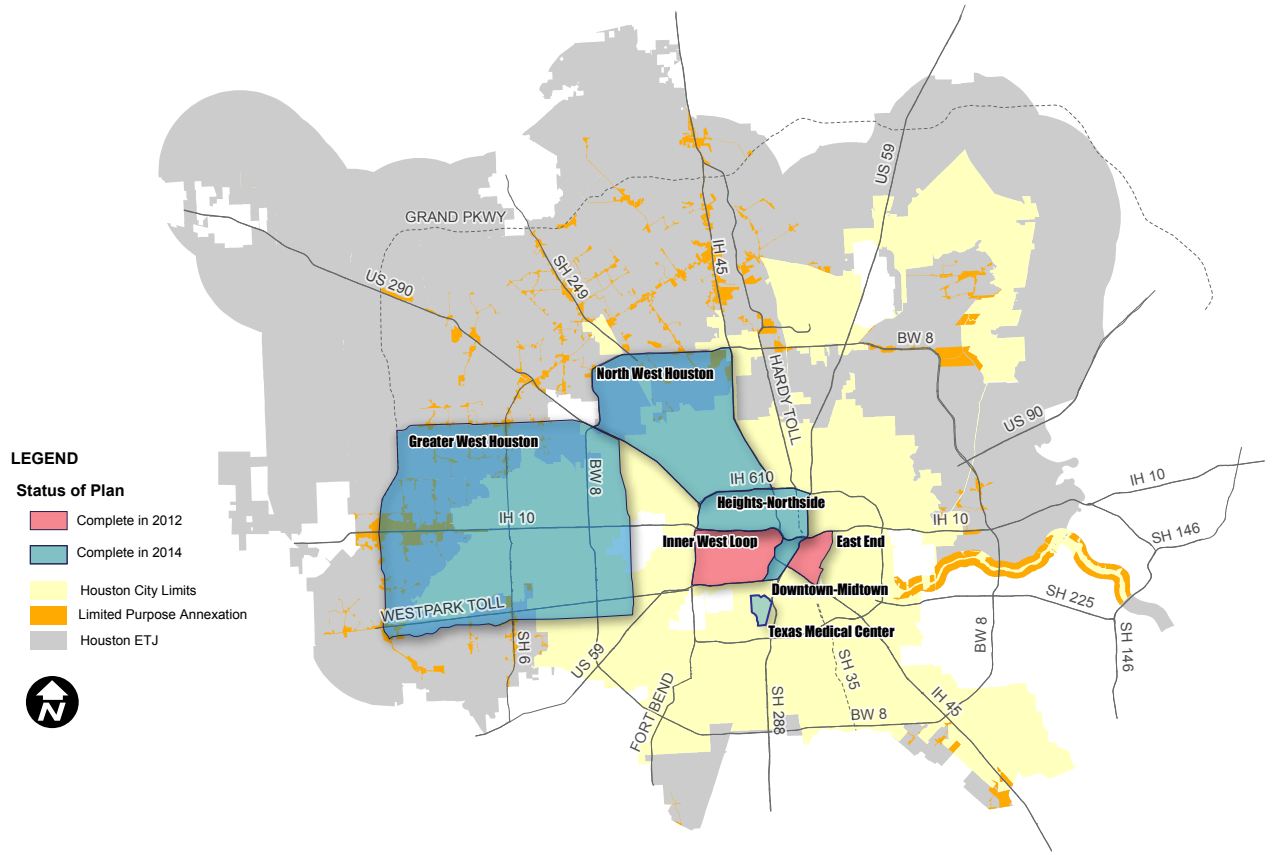


FIGURE 1.1. CMP II: SUBREGIONAL PLANS

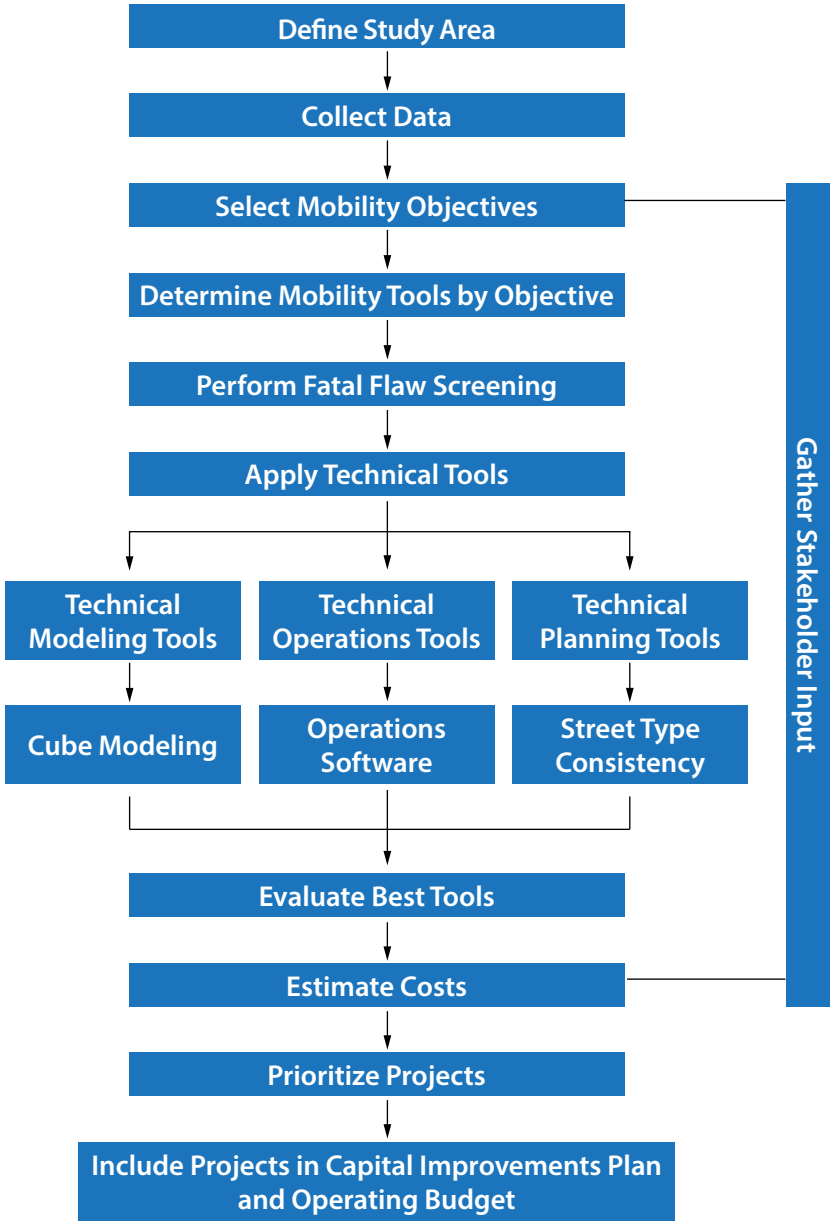


FIGURE 1.2

The flow chart on the left specifies the process to identify specific mobility projects within the Heights-Northside study area. The process starts with defining the study area and moves to data collection. Once those steps are complete, the process continues to selecting mobility objectives and mobility tools. This is followed by performing a fatal flaw screening of the selected objectives and tools. Public and stakeholder input is gathered throughout all of these steps. Once the fatal flaw screening is complete, we will use technical modeling tools, technical operations tools, and technical planning tools to develop a series of mobility options. These tools provide an opportunity to evaluate the mobility needs in the sub-area and provide additional analysis that can be used to prioritize preliminary intersection projects with respect to cost and benefit. The direct output from this process is a prioritized list of intersection improvement projects and a vision of the major thoroughfares for the sub-area that can be integrated into the Capital Improvements Plan (CIP) and operating budget.

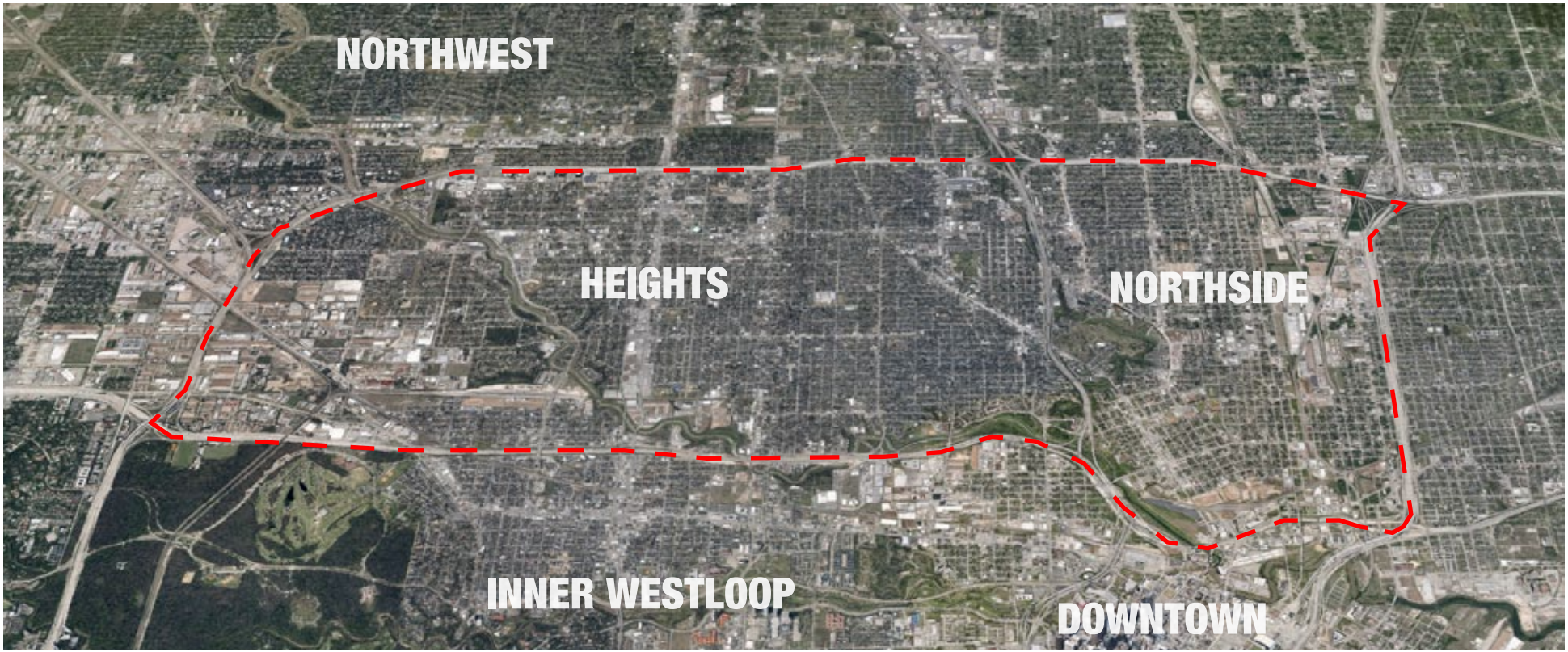
The overall project development process does not stop once funding is programmed; rather a new process for design and construction of the corridor improvements takes control of the specifics for each project. That information is beyond the scope of this planning study, however, guidelines are established later in this document that demonstrate appropriate points of stakeholder involvement in that design process.

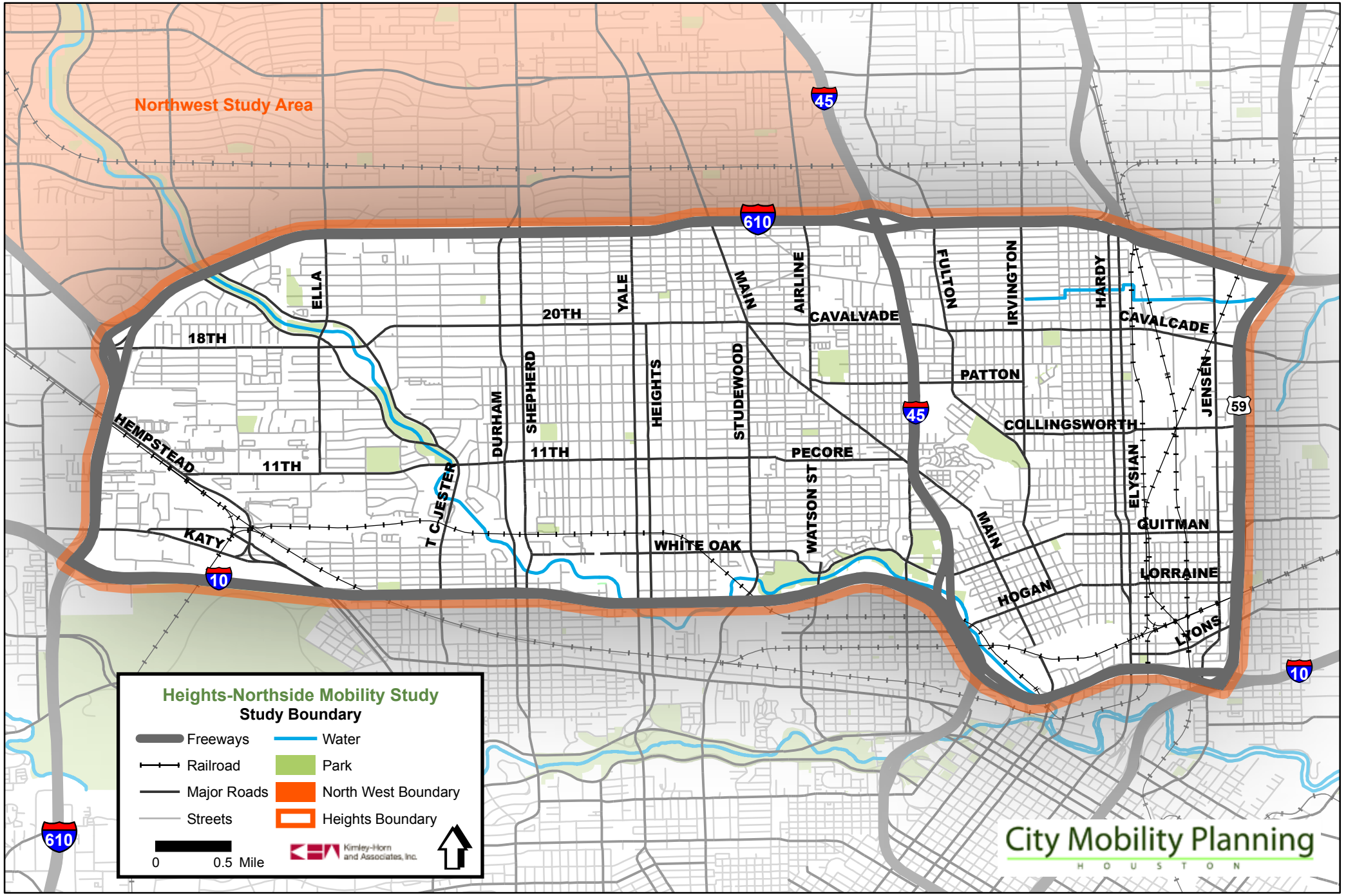
1.1 The Study Area

The Height-Northside study area is bounded by Interstate 610 (North Loop Freeway); to the south, Interstate 10 (Katy Freeway); and to the west, U.S. Highway 59 (Southwest Freeway). Interstate 45, or the North Freeway, separate the communities most commonly referred to the Heights and Northside which are located just west and east of the interstate, respectively.

The Heights-Northside area is unique in terms of its proximity to downtown, where regional automobile traffic and local competing interests (such as increasing bike and pedestrian traffic) present an interesting challenge when evaluating current and future efficiency of the greater transportation network. The challenge of this study is evaluating the best way to move automobiles while also providing options for users of other modes of transportation. Given these communities represent some of the first residential suburbs built in Houston, and its relative distance to downtown, the area bears a well-connected grid network of streets characteristic of a more urban context.

Over the next several years, the provided study area is only expected to become denser as the two communities continue to attract new residential and commercial interest to the area. However, given the relative high grid-like connectivity of the area, as well as increased connectivity via the bayou network, the study area maintains ample opportunity for multi-modal improvements and considerations.




Northwest Study Area
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Heights-Northside Mobility Study
Study Boundary
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North West Boundary
Heights Boundary
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0.5 Mile
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FIGURE 1.3

1.2 Study Area Objectives and Tools

A number of mobility objectives resulted from the 2009 City Mobility Plan (CMP) which provide the foundation to the underlining assumptions and analytical tools utilized for the purpose of this study. CMP Goals and Objectives include:

- Increased access to transit facilities
- Increased access to pedestrian facilities
- Increased access to bicycle facilities
- Improved connectivity of the system
- Better accommodations for the movement of freight
- Cost efficiency
- Minimized travel times
- Reliable commuting options
- Reduction in congestion
- Minimized conflict points within the network
- Safe and secure environment for pedestrians and bicyclists
- Neighborhood traffic
- Air quality conformity to State standard
- Improved ability to maintain infrastructure
- Maintain a system that is energy efficient
- Improved corridor aesthetics
- Enhanced pedestrian amenities
- Pedestrian-scaled streets
- Facilitation of all modes of travel

The public outreach portion of the process for this plan identified several goals from various stakeholders:

- Enhance safety
  - » At intersections
  - » For pedestrians and bicyclists
- Increase multi-modal alternatives
- Improve and increase connections to destinations

Associated tools that related to the defined goals and objectives have been sorted into three categories below:

- Technical Modeling Solutions – those that can be analyzed using the Regional Travel Demand Model;
- Technical Operations Solutions – those that can be analyzed using traffic analysis software such as SYNCHRO; and
- Technical Planning Solutions – those that are not represented well within either modeling platform whose results are often qualitative in nature.

Where appropriate, potential solutions may be geared for motorized, non-motorized, or alternative transport options such as mass transit. As list of these tool types can be seen in Figure 1.4

City Mobility Planning Toolbox

Motorized Tools

Traffic calming slows or reduces automobile traffic, improving the safety for pedestrians and cyclists. Techniques include speed humps, textured paving, curb extension, pedestrian crossing islands, traffic circles, and reduced turning radii.

Intersection design controls traffic movement where two or more streets cross. Improvements include left-turn bays, right-turn slip lanes, flared lanes to increase intersection capacity, reduced turning radii to increase intersection awareness, and protected bicycle turn spaces.

Signal timing is coordinating the sequence and timing of traffic signal phases. Signal timing can increase the efficiency of the street by allowing for the greatest number of vehicles to cross the intersection in the shortest time.

Access management techniques help increase the mobility and safety of a particular corridor by consolidating driveways and controlling access to adjacent land uses by influencing access location, design, spacing and operation.

Medians are traffic islands installed to prevent or ensure certain turning movements at intersections. They also provide a separation between opposing traffic lanes. Medians eliminate cut-through traffic, change driving patterns, beautify streets with greenery, and increase pedestrian safety for crossing streets.

Non-Motorized Tools

Sidewalks are important to the pedestrian traveler. Wider sidewalks in commercial areas facilitate a mix of uses. The addition of streetscaping can promote pedestrian use.

Bike lanes are located on the edge of a street or between the travel lanes and parking lanes. Typically, they are 5-6 feet wide and allow cyclist to have a protected space on the street.

Streetscaping refers to the use of planted areas and other beautifying techniques along corridors that can attract pedestrians and make pedestrian and bicycle use more pleasant.

Pedestrian crossings connect neighborhoods and can be at intersections or mid-block. Signal timing and pedestrian "islands" can improve safety for walkers.

Sharrows are special lane markings for roads too narrow to accomodate a separate bike lane. These markings alert drivers to the likelihood of encountering bicyclists.

Alternative Transport Tools

Rapid transit comes in two forms: Light Rail Transit (LRT) and Bus Rapid Transit (BRT). Bus Rapid Transit has the unique ability to function in either an exclusive right-of-way (ROW) or in mixed traffic. However, the most common application assumes an exclusive ROW for operational efficiency and safety.

Commuter rail service connects the large master planned communities around the region, the surrounding towns, and even nearby cities, with the urban core.

Road space rationing or reallocation reserves parking and other road uses for preferred modes such as carpools, vanpools, energy-efficient vehicles, and public transit vehicles.

Travel demand management refers to a set of strategies to reduce the use of city roadways to decrease congestion and the infrastructural burden of intense use, especially by single-occupancy vehicles.

Park and ride lots encourage transit usage for people who are not within walking distance of a transit station. These lots typically adjoin suburban bus and rail stations to reduce the number of cars in the urban core.

FIGURE 1.4

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II. Existing Conditions

The Heights-Northside Sub-regional Study provides mobility solutions for those living, working, and traveling through the study area. To better understand the mobility issues, both quantitative and qualitative data were utilized. Examples of quantitative data include an evaluation of area demographics, vehicular traffic counts, transit ridership, right-of-way evaluations, and other corridor-specific plans. Qualitative data, acquired directly through public and stakeholder feedback, was further evaluated. Examples include locations of desired bike facilities, concerns regarding safety at intersection crossings, as well as locations of perceived congestion by the public.

For more information regarding analysis not highlighted directly in this chapter, see Appendix A: Data Collection.

Based on analysis highlighted in subsequent pages of this chapter, the Heights-Northside area maintain a level of congestion that is deemed acceptable by traffic engineering standards. The study area, however, is anticipated to see a large percentage of growth both in population and development. With this growth, increase in traffic congestion is expected, but projected traffic levels allow for flexibility within the existing system where certain transportation options - such as a reduction in the existing number of lanes - may be considered. The existing bike and transit networks within the study area are well-represented; however, the location of and safety associated with associated facility type may not be appropriate.

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2.1 2013 Major Thoroughfare and Freeway Plan

The City of Houston's Major Thoroughfare and Freeway Plan (MTFP) identifies all major corridors within the City of Houston and its surrounding extraterritorial jurisdiction (ETJ). Freeways and Major Thoroughfares represent those roadways which adhere to the movement of large volumes of traffic (regardless of mode) over long distances. Collectors and Local Streets form the network that provides access to residential properties, private developments, and other neighborhood amenities such as parks, schools, or grocery stores. Based on these definitions, Freeways and Major Thoroughfares are designed to optimize mobility, while Collectors and Local Streets provide the greatest potential for increased access. The MTFP maintains the provided hierarchical classification for Major Thoroughfares and associated Collector Streets.

The Heights-Northside area is well-represented by all hierarchal street types which are mostly arranged in an elongated street grid commonly associated with historic suburban development patterns. Several corridors, however, are aligned diagonally through the corridor including:

- Hempstead Road
- Katy Road
- TC Jester Boulevard
- North Main Street
- Fulton Street

North-south movement is funneled to those Major Thoroughfares which provide for traffic movement through the study area, as well as access over or under surrounding interstates.

Two north-south couplets are in operation today: 1) Shepherd/Durham pairing in the Heights area and 2) Hardy/Elysian in the Northside. Corridors connecting the IH 610 loop to US 59 typically change name and cross section design at least once throughout the Heights and Northside areas. These two communities are ultimately separated by IH 45, which bisects the study area and limits continuous east-west flow of traffic to the following key corridors:

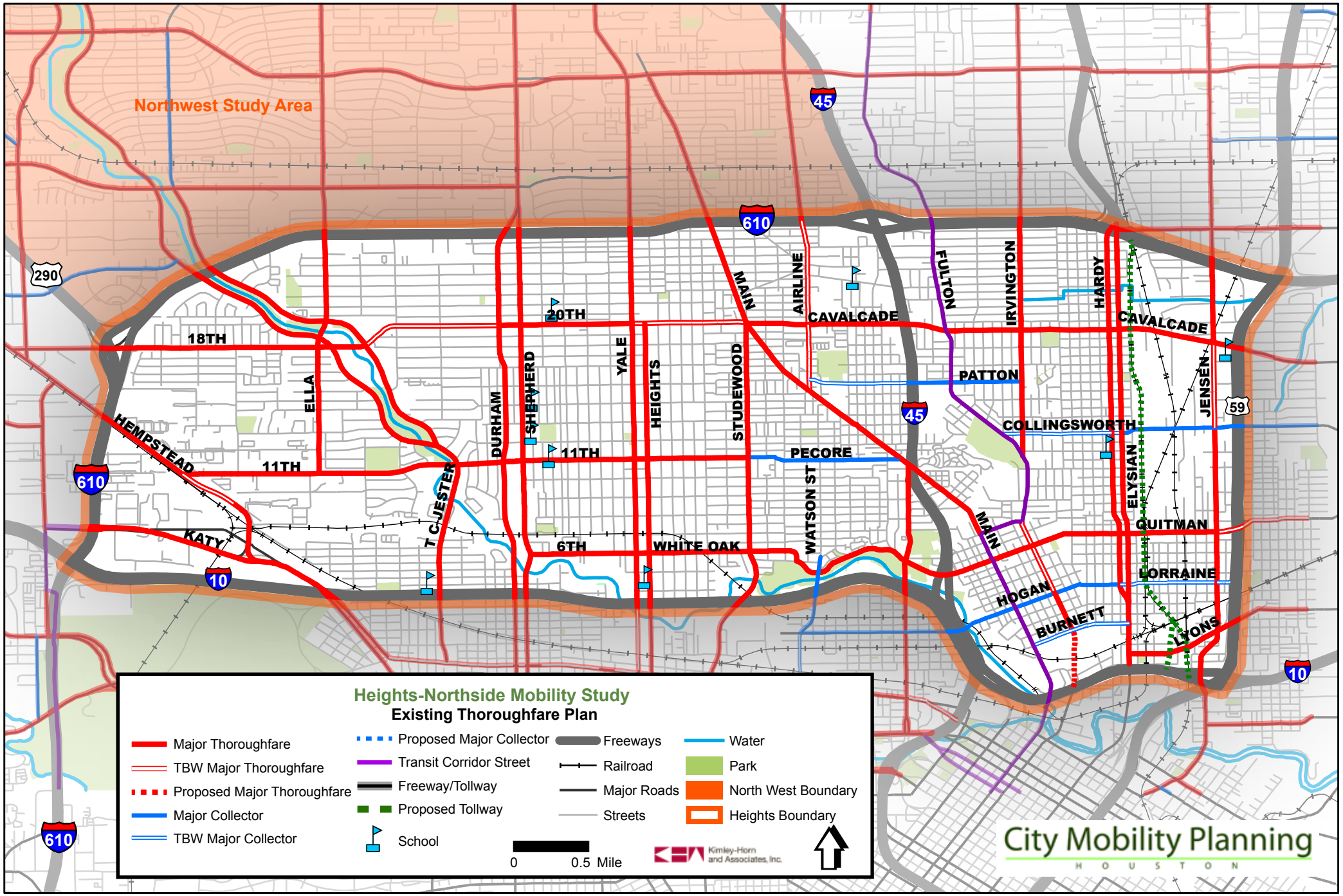
- Cavalcade/20th Street
- Patton Street
- North Main Street
- White Oak/Quitman

The White Oak Bayou transverses the study area diagonally, largely in alignment with TC Jester within the Heights area. It creates a physical barrier between Downtown and the Northside communities.

Finally, although the Hardy Toll Road does not physically occupy this study area, its primary access from Downtown is the Elysian-Hardy couplet which transcends the Northside section of this greater study area. The potential impact of the Tollway expansion within this study area will be taken into account upon evaluation of future conditions as it relates to surrounding communities.

The identified gaps in the system show a need for increased connectivity between the Heights and Northside communities, as well as enhanced connection via bayous.

The City's current MTFP identifies (as shown in Figure 2.1) the Major Thoroughfares and Major Collectors within the study area that have sufficient width (solid lines), need to be widened (double dashed line), or need to be acquired (dashed line).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Heights-Northside Mobility Study
Existing Thoroughfare Plan
Major Thoroughfare
TBW Major Thoroughfare
Proposed Major Thoroughfare
Major Collector
TBW Major Collector
Proposed Major Collector
Transit Corridor Street
Freeway/Tollway
Proposed Tollway
School
Freeways
Railroad
Major Roads
Streets
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Park
North West Boundary
Heights Boundary
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0.5 Mile
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FIGURE 2.1

2.2 Existing Transit Routes

The Metropolitan Transit Authority of Harris County (METRO) is the transit service provider for the City of Houston. Within the Heights and Northside study area there are 26 transit routes with bus stops, as shown in Figure 2.2. The majority of the corridors are served by at least one bus route. Bus routes move riders locally within the Heights and Northside areas, and regionally to destinations such as Downtown. Most routes focus on facilitating the north/south movement of passengers.

The study area is also home to the recently constructed METRO Red Line light-rail, which travels along North Main Street, Boundary Street, and Fulton Street. METRORail provides connections into the downtown area and further south to other activity centers, such as the Texas Medical Center. As the light-rail continues to expand through the year 2025, expansion of the line within the study area and placement of transit stations, must be taken into consideration during planning and development decision-making processes.

METRO is also undergoing a transit system reimagining project that takes a fresh look at the METRO bus network. Although the study is pending completion, the over aching goal is to improve and expand upon existing transit service by consolidating routes and increasing frequency. As such, all recommendations emerging from this Study Area analysis is fully vetted by participating METRO Stakeholder committee members.

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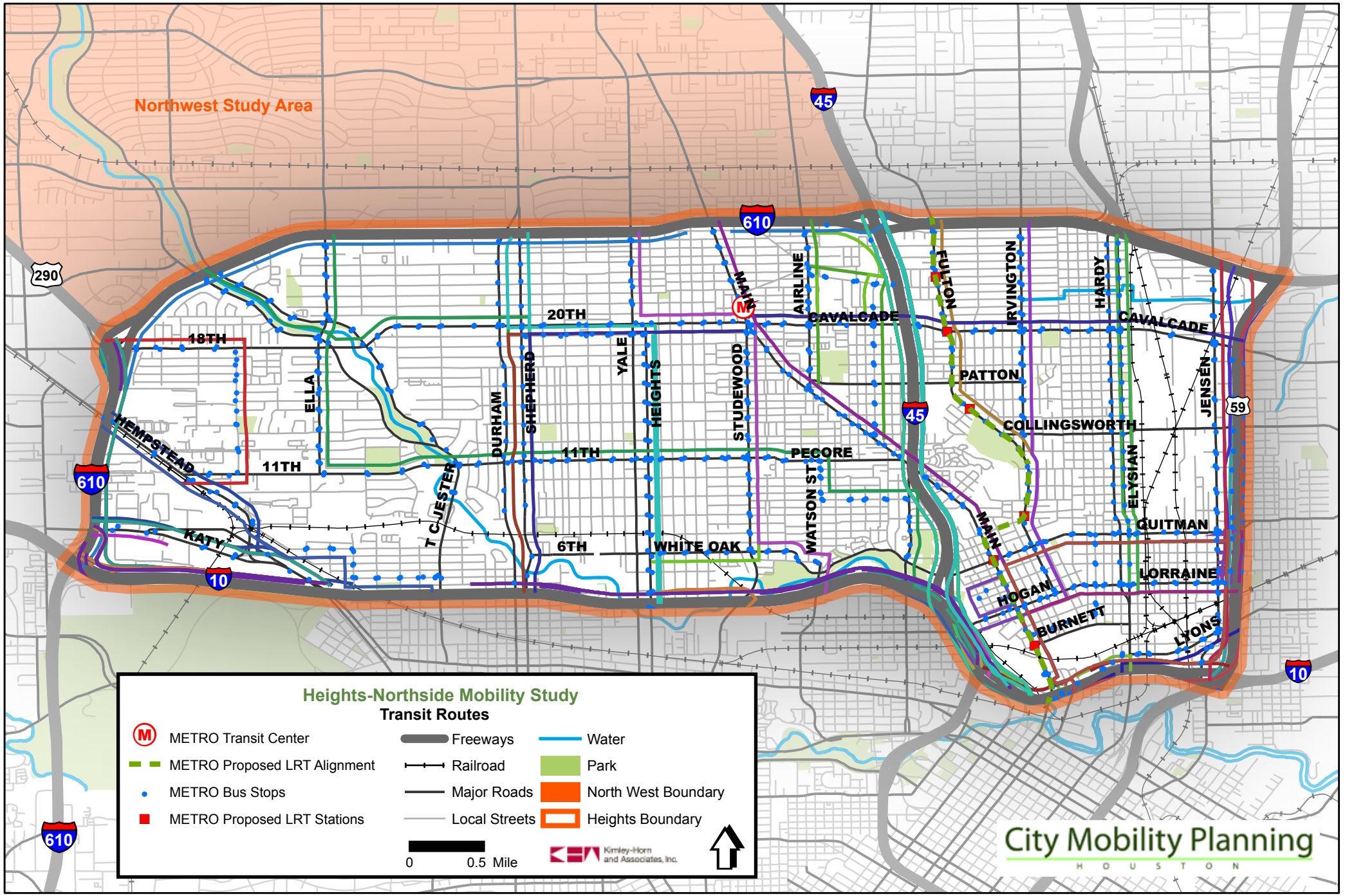
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WHITE OAK
Heights-Northside Mobility Study
Transit Routes
METRO Transit Center
METRO Proposed LRT Alignment
METRO Bus Stops
METRO Proposed LRT Stations
Freeways
Railroad
Major Roads
Local Streets
Water
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North West Boundary
Heights Boundary
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0.5 Mile
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FIGURE 2.2

2.3 Existing Bicycle Facilities

Bicycle facilities in the City of Houston are divided into four types: bike lane, shared lane (also known as a Sharrow), shared-use path/trail, and signed bike route. The existing facilities are identified in Figure 2.3. Shared lanes, are not present in this study area. As corridors transition through different road designs, bicycle facility types also change. This transition mostly occurs between designated on-street bike lanes and signed bike routes. For a more detailed description of bike facilities as defined by the City, see Chapter 5.4. Bicycle and Facility User.

Current facilities that provide a complete north/south or east/west connection are limited due to issues with underpasses at the interstates. Cavalcade and the White Oak Bayou Trail are currently the only facilities to cross under IH 45.

The White Oak Bayou Trail (shared-use path), follows the bayou as it moves from the north-west towards the downtown area. This trail provides an off-street facility for bicyclists which limits their interaction with automobiles. Connections to this trail via on-street bicycle facilities are limited. Direct connections to the White Oak Bayou exist at Ella, 11th, and TC Jester.

Initial analysis of this network indicates a strong need to increase the number of connections to the White Oak Bayou Trail. Also lacking are east-west connections for bicycles between the Heights and Northside communities. Expansion of the network for safe on-street and off-street bicycle facilities has the potential to create a well-traversed biking system for both recreational and commuting users..

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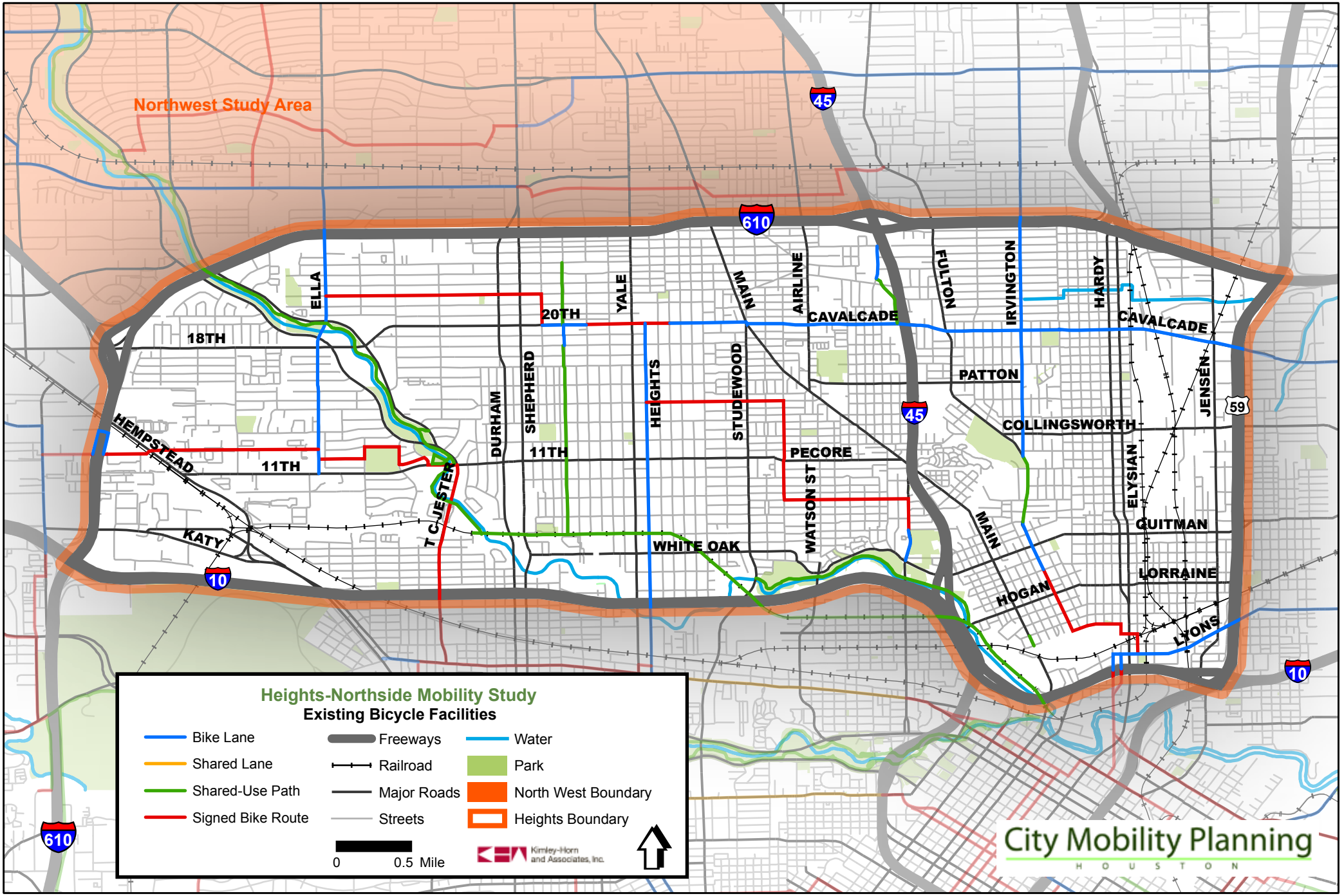
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North West Boundary
Heights Boundary
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FIGURE 2.3

2.4 Existing Sidewalk Facilities

A characteristic of the Heights-Northside area is an elongated street grid. Small, inter-connected grids are imbedded among the Major Thoroughfares, making the environment conducive to walking. Figure 2.4 represents data collected by the Greater Heights Super Neighborhood which highlights sidewalk gaps along prominent roadways Given the scope of this study, local streets were not evaluated. However, where appropriate, key connections to the greater transportation network (i.e. transit stops and bayou trails) were considered.

The system map shows that the Heights area generally has a well-connected roadway system. Missing sidewalk links are found along Major Thoroughfares creates barriers for the movement of pedestrian to and from key transit stops as well as within the neighborhood itself. The Northside area has substantially more gaps, with many on main roadways where pedestrian use is high.

The system gaps indicate a need for sidewalks along corridors that are in the vicinities of schools and other destinations, such as parks. Data for the condition of existing sidewalks is not represented on this map, but has a strong impact on the pedestrian network. The information provided may assist in the prioritization process of sidewalk construction in the near and long term.

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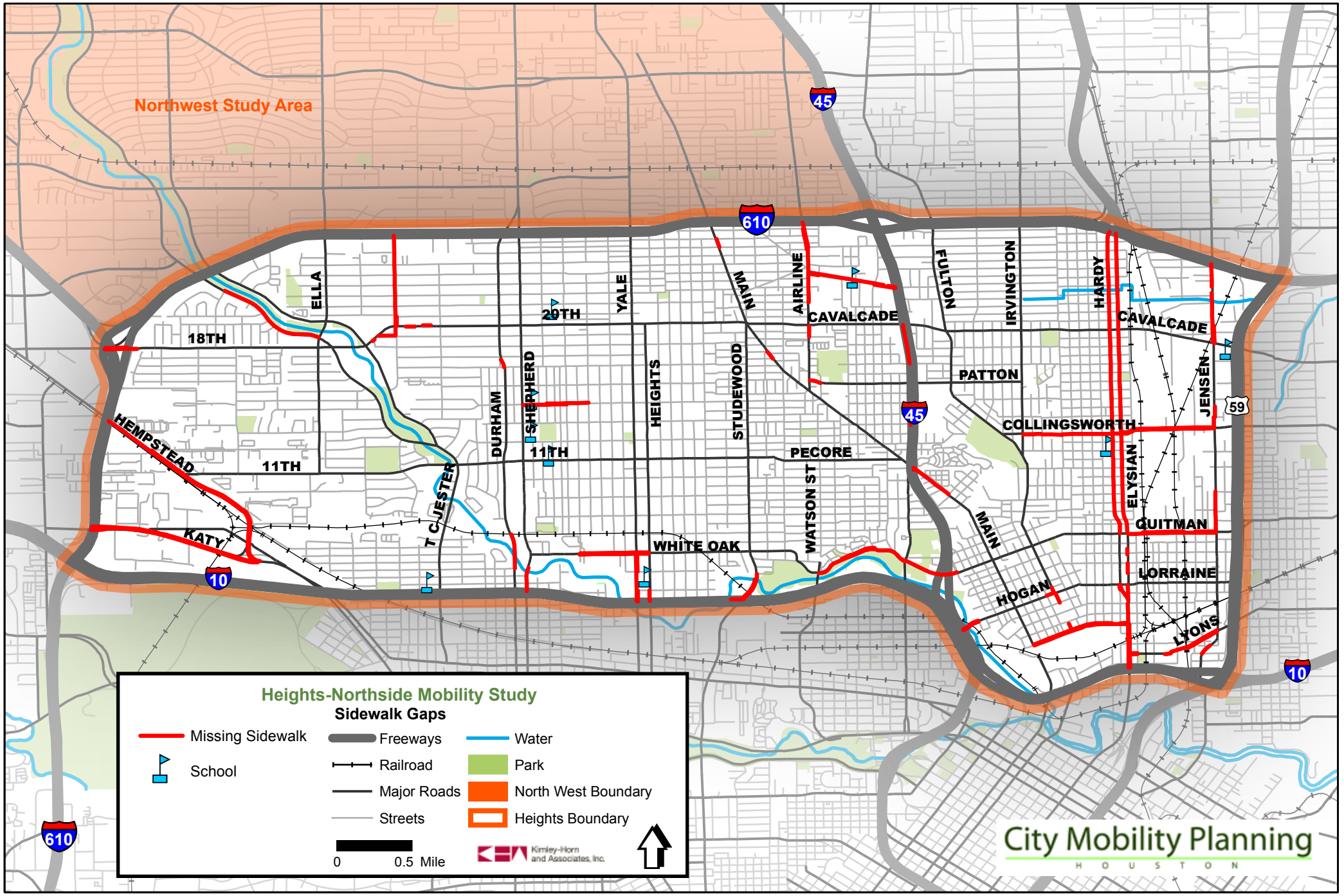
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Sidewalk Gaps
Missing Sidewalk
School
Freeways
Railroad
Major Roads
Streets
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FIGURE 2.4

2.5 Existing Travel Conditions by Period of Day

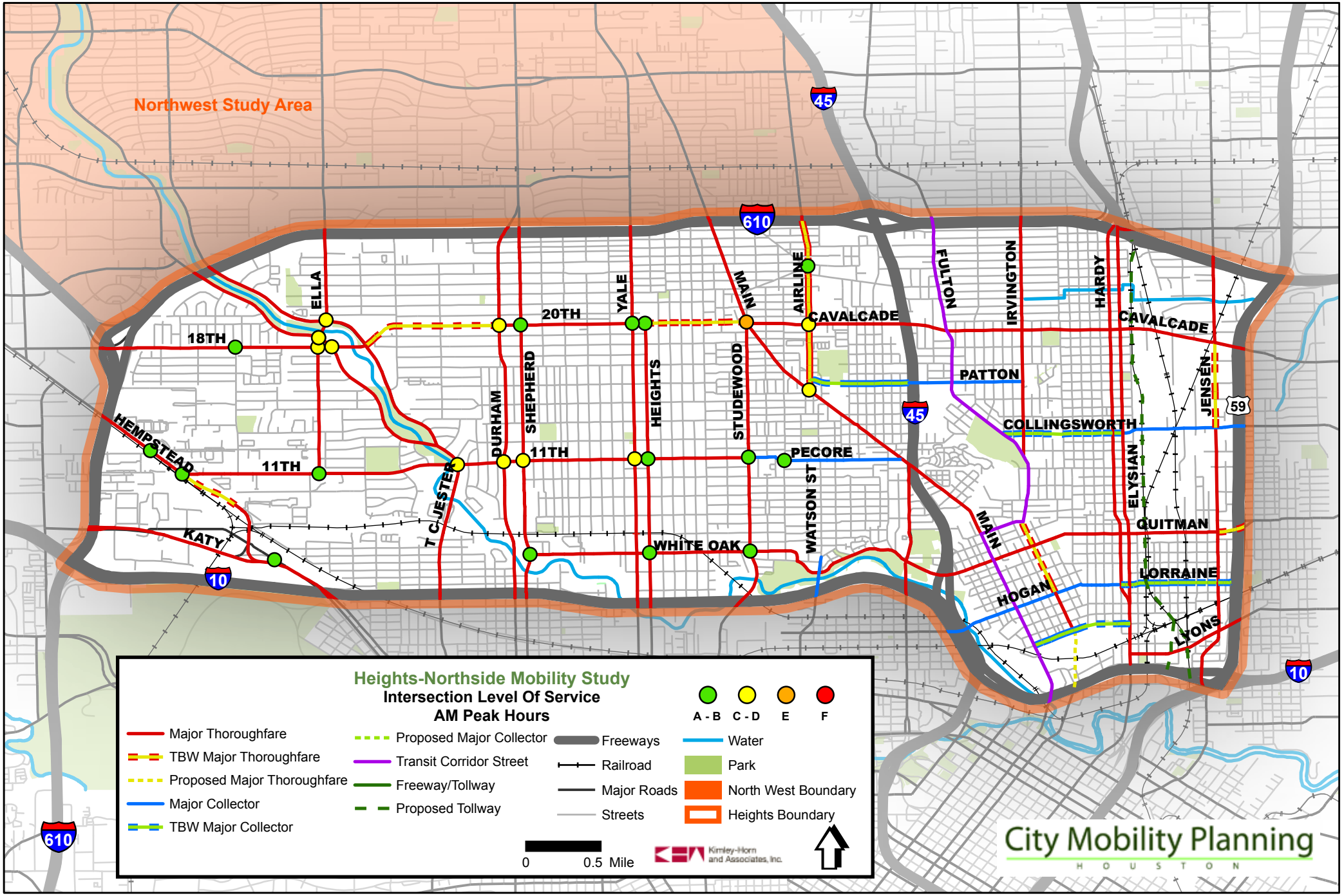
Intersection Congestion

Intersection traffic counts and signal data are limited for this study area. Twenty-six intersections within the Heights study area were analyzed, but data was not collected for the Northside area due to ongoing construction of the Red Line light-rail during the time period of this study. Available information was divided into two periods for study: AM peak period and PM peak period, when corridors are most heavily utilized by commuting traffic. Figures 2.5 and 2.6 depict level of service (LOS) at each intersection. LOS is a qualitative measure that gauges congestion on a grading scale similar to scholastic grading: LOS A represents free flowing traffic conditions with little or no delays and LOS F represents severe congestion, characterized by long queues and delays.

Certain intersections adjacent to highways are TxDOT property, and as such not within the scope of this study. Future coordination with TxDOT is essential to fully understand the best treatment options available to the City, and as approved by TxDOT. Similarly, where intersections are within a certain proximity of roadway, highway, or light-rail construction, intersection congestion was not evaluated. Current traffic patterns do not reflect (what will be) normal traffic patterns once construction is complete. Traffic patterns are expected to normalize one year after construction is complete.

Intersections within the Heights currently rate between LOS A and LOS D. These ratings are at or above the acceptable level set by the City of Houston and show that the Heights area is not categorized as “congested.”

Due to heavy volumes, Studewood/North Main and 20th Street currently, is the only intersection within the study area operating at LOS E during the peak periods. An intersection failure of LOS F does not exist at present day volumes.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Heights-Northside Mobility Study
Intersection Level Of Service
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TBW Major Thoroughfare
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Major Collector
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Proposed Major Collector
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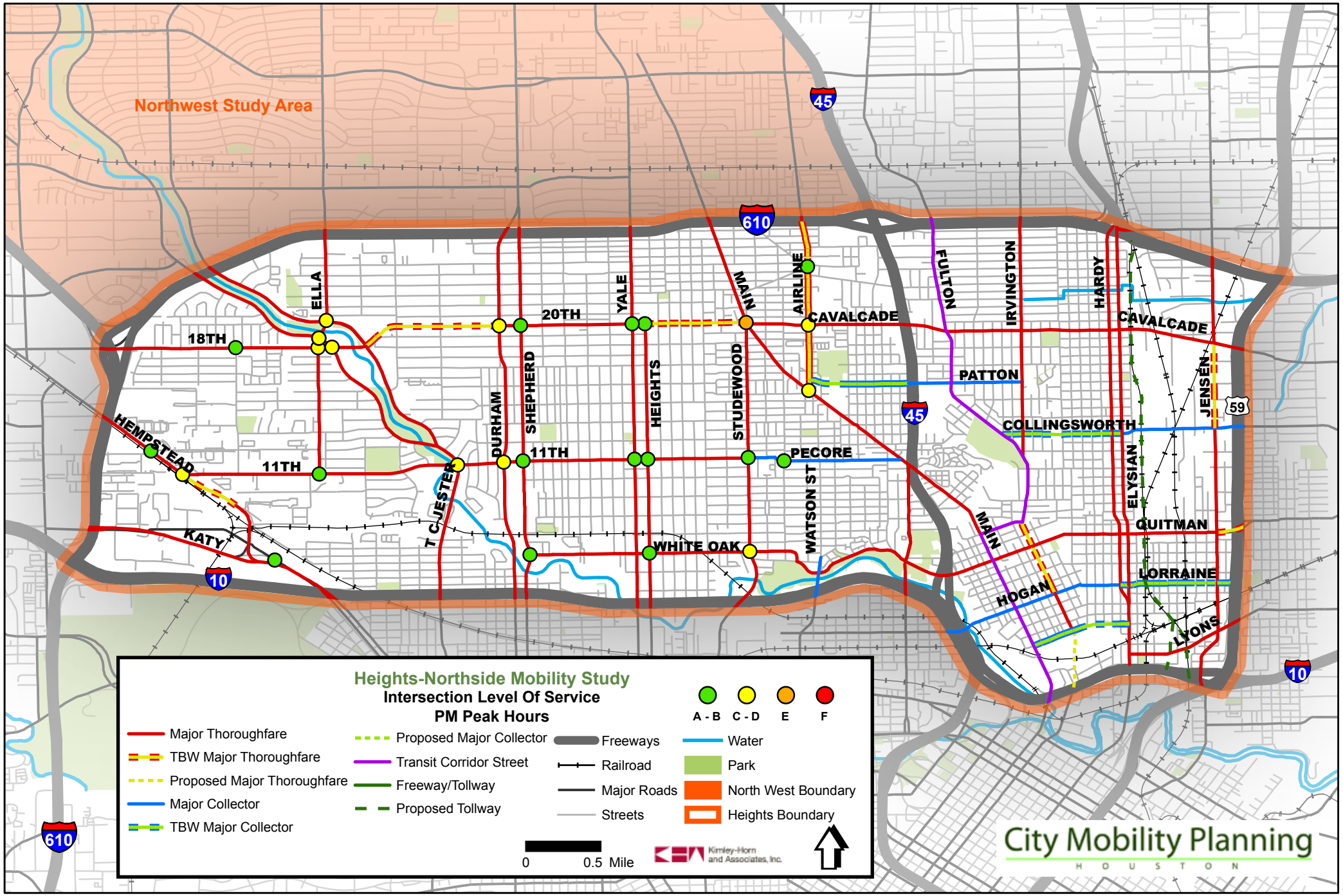
FIGURE 2.5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HARDY
CAVALCADE
JENSEN
59
PATTON
COLLINGSWORTH
HEMPSTEAD
11TH
DURHAM
SHEPHERD
HEIGHTS
STUDEWOOD
PECORE
WATSON ST
T C JESTER
KATY
10
WHITE OAK
ELYSIAN
QUITMAN
MAIN
HOGAN
LORRAINE
LYONS
Heights-Northside Mobility Study
Intersection Level Of Service
PM Peak Hours
A - B
C - D
E
F
Major Thoroughfare
TBW Major Thoroughfare
Proposed Major Thoroughfare
Major Collector
TBW Major Collector
Proposed Major Collector
Transit Corridor Street
Freeway/Tollway
Proposed Tollway
Freeways
Railroad
Major Roads
Streets
Water
Park
North West Boundary
Heights Boundary
0
0.5 Mile
Kimley-Horn and Associates, Inc.
City Mobility Planning
HOUSTON

FIGURE 2.6

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III. Community Involvement

Community and stakeholder involvement throughout the planning process was essential in developing a plan that balanced the general desires of the community with the mobility needs of the greater region. Community involvement was divided into two public meetings and two stakeholder meetings. The first set of public and stakeholder meetings were held at the beginning of the study to better understand the mobility goals and preferences of the citizens and stakeholders. Follow up meetings were held before the finalization of recommendations to ensure the project team properly reflected ideas and concerns generated by the public and stakeholder committee alike.

Additional information for the Heights area was provided through the Greater Heights Super-Neighborhood Council. This data was incorporated into the planning process for the study area.

In addition to the in-person meeting opportunities, the study also maintained an on-line platform where all interested parties could learn about the project, download related presentation material, and provide interactive comments in a blog-like format. Additionally, the public was able to provide comments on maps and preliminary corridor cross sections. Blog comments and discussions were also used interactively by citizens and stakeholders. The website for this study is http://heights-northside.org.

PHOTO PROVIDED COURTESY CITY OF HOUSTON

3.1 Public Meeting #1:

Public Meeting #1 was held March 26, 2013. The purpose was to gather public insight on transportation related issues and opportunities within the study area. The meeting began with a presentation of the existing conditions as previously defined in this report. The public was then provided the opportunity to ask questions in an open forum, and discuss ideas regarding improved modal options within their community. At the close of the meeting, participants were encouraged to document concerns, and potential ideas on a series of maps printed and made available for public review. All comments were evaluated by the project team, and summarized for review and consideration at stakeholder meetings.

3.2 Stakeholder Meeting #1:

The first stakeholder meeting was held on May 15, 2013, where participants were presented findings from the existing conditions analysis. In addition, public concerns and associated solutions as expressed during Public Meeting #1 were discussed. Given the Heights and Northside communities have a significantly different stakeholder population, the issues identified by the public varied by community. As such, stakeholders were asked to evaluate provided feedback separately to ensure a proper understanding of each area's concern.

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PHOTO PROVIDED COURTESY CITY OF HOUSTON

Specifically, stakeholders were asked to provide direction to the project team regarding public input on several key issues including:
Heights:

- Heights/Yale road cross section or improvements
- Reducing truck traffic
- Bicycle lane connections
- Pedestrian/bike crossings
- Critical pedestrian connections or improvements – neighborhood study improvements

Northside:

- Bicycle and pedestrian connections to rail
- Traffic issues associated with rail
- Transit Street designations

Utilizing this information, stakeholders worked with the project team to develop "big idea" solutions that could ultimately be tested or modeled. For more information regarding modeling results, see Chapter IV. Defining Future Mobility Conditions.

3.3 Stakeholder Meeting #2:

The second stakeholder meeting was held on August 19, 2013. Preliminary recommendations for road, pedestrian, bike, transit and intersection improvements were presented for review. Where appropriate, recommendations were revised to better reflect the issued raised during Public Meeting #1 and the first stakeholder meeting were being effectively considered.

A total of four big ideas, as presented during the first stakeholder meeting, were modeled and associated results presented. At the close of the meeting, scenarios 1 and 3 were deemed appropriate for further consideration. .

General consensus from Stakeholder Meeting #2 indicated that preliminary recommendations were on-par with public and stakeholder input, but several corridors required additional consideration. Stakeholders requested that local streets be evaluated as a potential multi-modal corridors, and not limit potential improvement to just Major Thoroughfares.


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PHOTO PROVIDED COURTESY CITY OF HOUSTON

3.4 Public Meeting #2

Public Meeting #2 was held on April 1, 2014 at the Moody Park Community Center. The project team provided a brief summary the project team's efforts between Public Meeting #1 and Public Meeting #2. To provide a more transparent understanding of the directional changes currently ensuing within Houston's greater multi-modal conversation, changing mobility considerations were highlighted (Chapter V. Changing Mobility Considerations). The summary outlined certain adopted changes, such as the Mayor's Complete Streets Executive Order, as well as other ongoing policy considerations. Key Factors for each corridor - including transit, the pedestrian, bike, on-street parking and the vehicle - were evaluated per corridor (Chapter VI. A Balanced Approach) and within individual modal system (Chapter VII. Outcomes). Individual corridor sheets, as well as outcome boards, were displayed at the public meeting where participants were given the opportunity to provide feedback regarding recommendations.

Public Meeting #2 also provided the kickoff to a 30-day public comment period further defined below.

3.5 Public Comment Period

The close of Public Meeting #2 signified the start of a 30-day public comment period on draft recommendations resulting from this study. Handwritten comments were submitted at the close of Public Meeting #2 Other avenues for public submission included the study's official e-mail address, as well as an interactive website which provided spatial representation of final system maps. Moreover, the website maintained an interactive blog where the public was encouraged to ask questions. All questions posted were answered by staff in a timely manner. Finally, all comments received were cataloged. Responses for each comment are provided by City Staff.

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IV. Defining Future Mobility Conditions

4.1 Travel Demand Forecasting

The City of Houston and the Houston-Galveston Area Council (H-GAC), through an inter-local agreement, conducted the travel demand forecasting within the study area. The Travel Demand Model (the model) is a useful tool for comparing alternative transportation scenarios. The model assists in understanding the manner in which future population and employment will cause traffic to grow. The intent is to better understand the dynamics of a complex network of streets and to test what-if scenarios of different transportation solutions.

The City, H-GAC, and the project team worked together to update the 2035 demographic forecasts. The updates included existing building permits, development trends, and traffic studies.

Forecast Results - The Scenarios

The study team created four initial scenarios for the Heights and Northside sub-areas. These scenarios were designed to test big ideas from local stakeholders, professional staff, and the consultant team. The different scenarios include:

- Scenario 1 (Base Build-Out)
- Scenario 2 (Couplets)
- Scenario 3 (Capacity Projects)
- Scenario 4 (High Frequency Transit)
- Scenario 5 (Recommendations)

The scenarios were analyzed individually to allow for a comparison between different concepts. Ultimately, a combined scenario (Scenario 5) represents final recommendations the project team feels are realistic for implementation. The provided descriptions below demonstrate what modifications were made within each Scenario. To view final 2035 projection numbers associated with each Scenario, see Appendix E: Travel Demand Model Results.

Scenario 1 (Base Build-Out)

The Base Model scenario assumes the full development of all Major Thoroughfares and Major Collectors as identified in the 2013 MTFP. The effects of such recommendations on traffic volumes and congestion levels were evaluated in this scenario. The map of this scenario is found in Figure 4.1.

Scenario 2 (Couplets)

Heights' area stakeholders requested that 19th/20th Street as well as Heights Boulevard/ Yale Street be tested as potential couplet pairings. Where excess capacity resulted, stakeholders requested a wider pedestrian realm and safer, buffered bike facilities. The map of this scenario is shown in Figure 4.2.

Scenario 3 (Capacity Projects)

Scenario 3 combines road expansion (as designated by the MTFP) and street reduction projects. The intent was to create a network that safely and reasonably supported a variety of mobility uses. This model is a more financially feasible option than the Base Model Scenario. The map of this scenario is found in Figure 4.3.

Scenario 4 (High Frequency Transit)

Scenario 4: This high frequency transit scenario included transit routes which factored in public input, population growth, job growth, activity centers, and connectivity to other destinations (such as downtown or the Galleria). The increase in service was modeled by doubling the service frequency during the peak hours. Non-peak hour headways were also increased slightly. Ultimately, however, METRO is responsible for the frequency and stop locations of all City bus routes. The map of this scenario is found in Figure 4.4.

Scenario 5 (Recommendations)

These four scenarios were analyzed separately and compared to the 2035 Base Model as provided by H-GAC (with the new 2035 demographics previously discussed). Scenario results were then taken to stakeholders for feedback. The provided input and the project team's analysis were combined to create Scenario 5. The result is a network of corridors that acknowledges the need for the expansion as well as the reduction of certain corridors (Scenario 3), increased High Frequency Transit Options (Scenario 4), and the completion of key east-west and north-south corridors as depicted on the Major Thoroughfare and Freeway Plan (Scenario 1). The map is found in Figure 4.5.

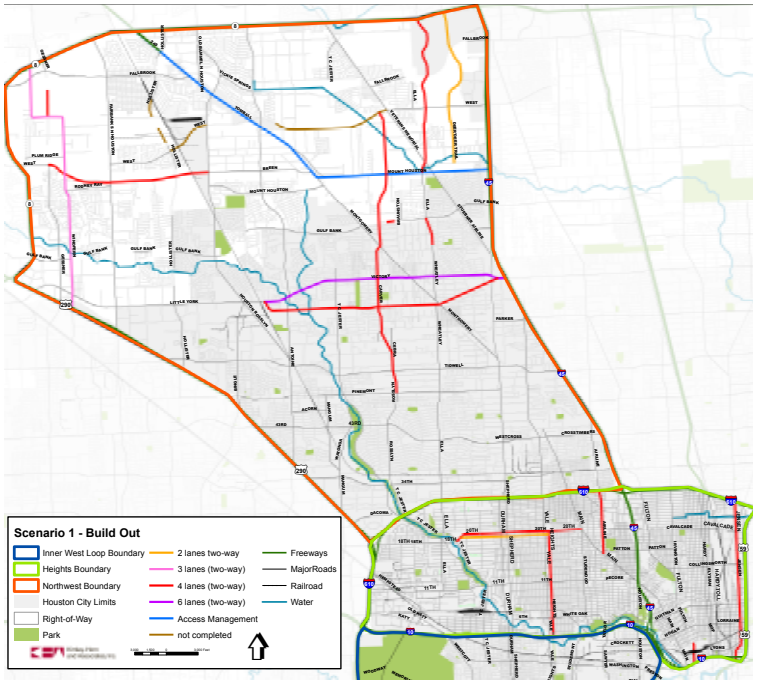

FIGURE 4.1 SCENARIO 1: BASE BUILD-OUT

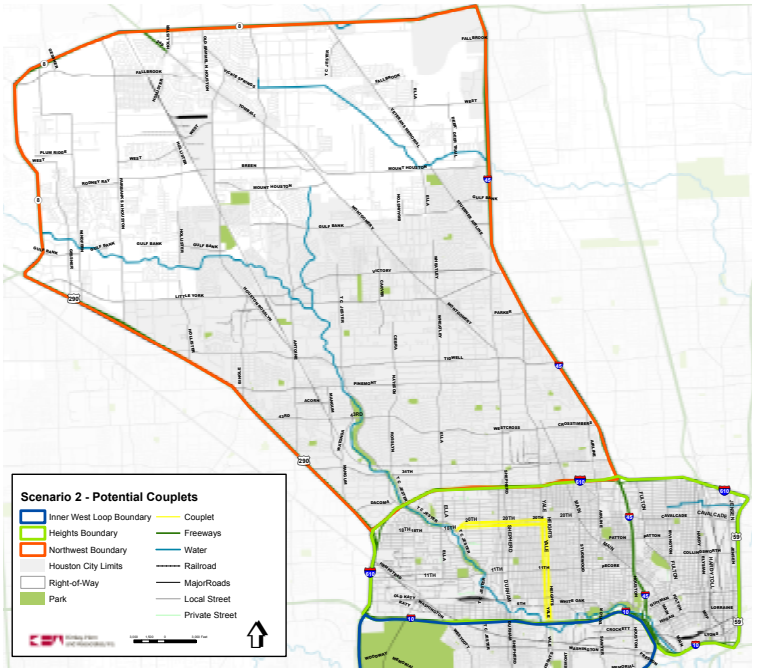

FIGURE 4.2 SCENARIO 2: COUPLETS

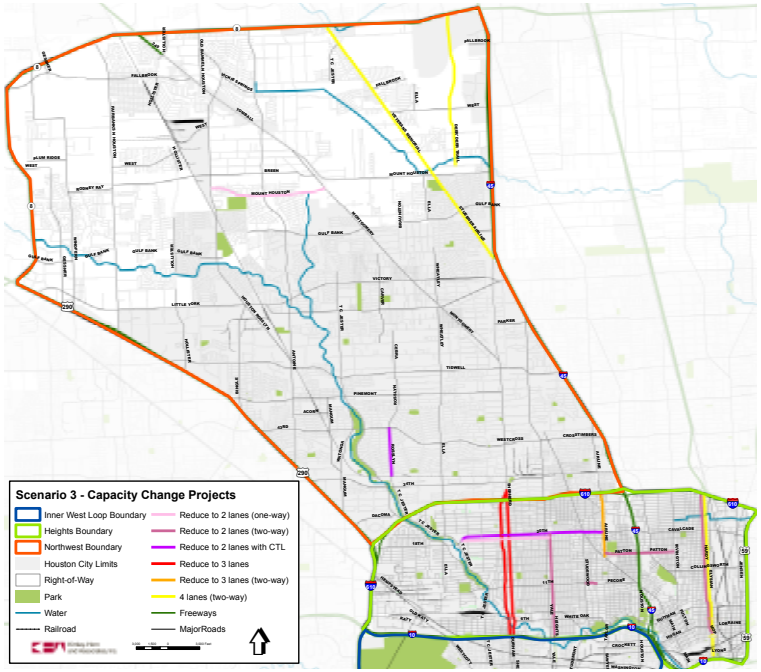

FIGURE 4.3 SCENARIO 3: CAPACITY PROJECTS

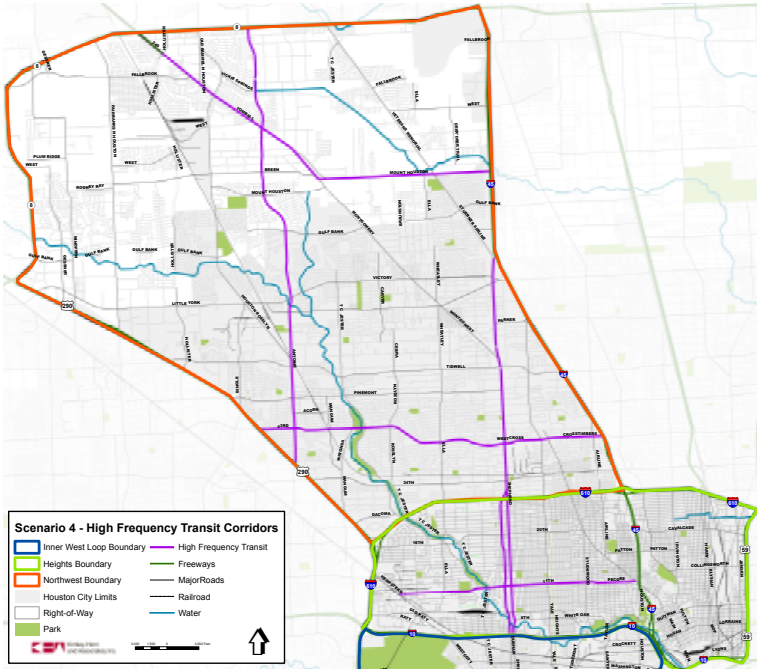

FIGURE 4.4 SCENARIO 4: HIGH FREQUENCY TRANSIT

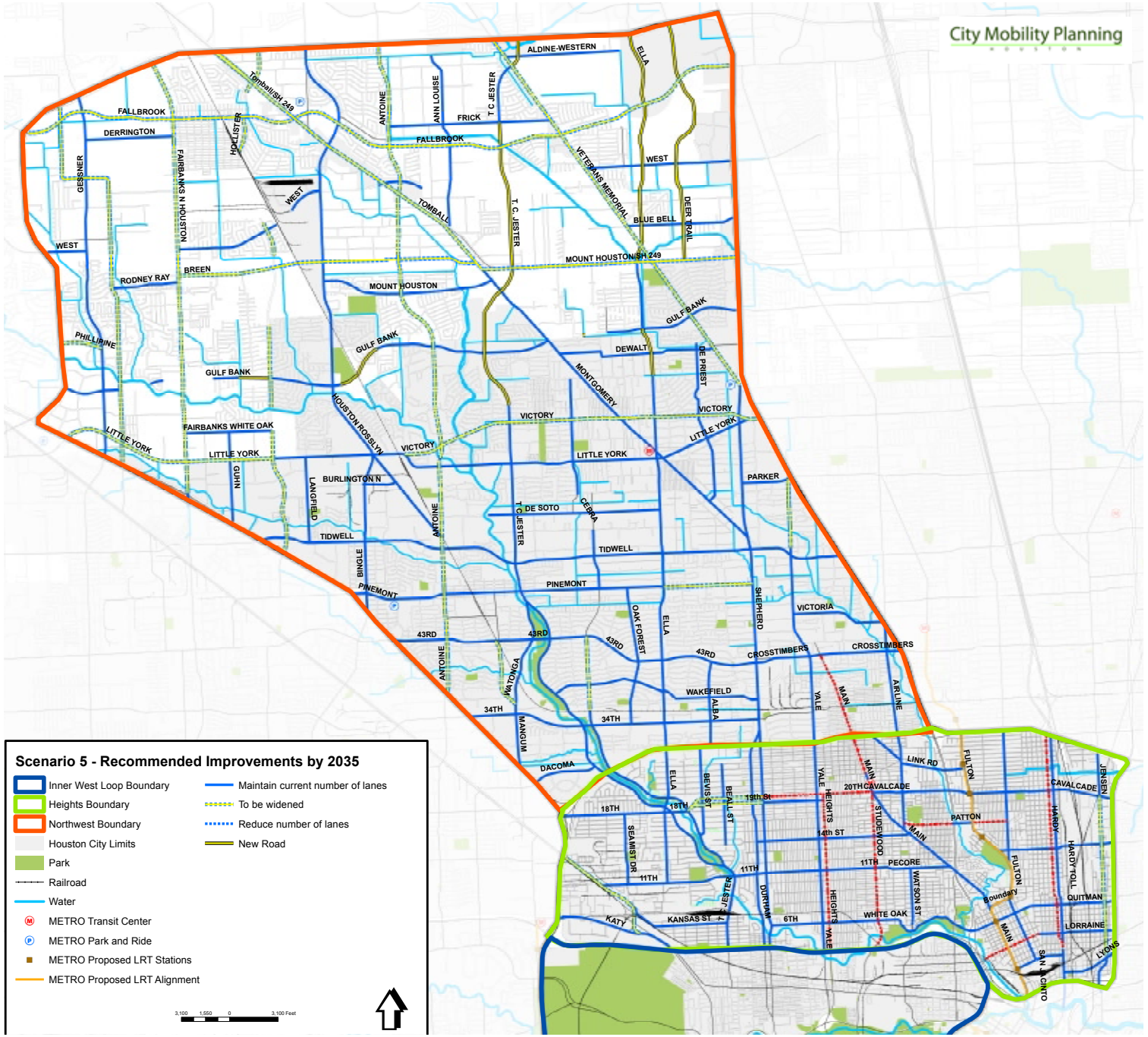

FIGURE 4.5: SCENARIO 5 - RECOMMENDATIONS

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V. Changing Mobility Considerations

5.1 Addressing the Shift in How Transportation is Viewed

During Phase I of the City Mobility Planning initiative, the City of Houston contemplated the concept of providing multi-modal transportation options within a corridor. That conversation led to the development of alternative design standards located within Appendix 2 of Chapter 10 of the Infrastructure Design Manual. These alternative cross-sections provide for a myriad of design configurations that promote multi-modal concepts in partnership with the automobile.

The City recognizes that automobile travel will continue to be a vital component of transportation within the region. This is especially true in areas with large job and population clusters of activity. The Heights-Northside study area is no exception and is expected to see an increase in automobile traffic, especially as the area continues to attract new residential and commercial development. However, as highlighted within the existing conditions chapter of this report, there are still opportunities within the network to explore new options of how to best move people in a safe and effective manner. Incorporating alternative modes of transportation into the system design before network failure, extends the capacity of the existing system by encouraging modal change of the user. By providing users with safe, alternative modal options, the burden of limited space along street corridors to be widened for automobile travel only can be balanced by alternative facility types which can accommodate more people in a smaller space (i.e. Bus transit or bicycle facilities).

The following subsection of this chapter represents various topics being contemplated across the United States and, within recent years, in the City of Houston. Although exact policies on how to best target specified topics are still under consideration by City of Houston, the provided concepts are highlighted as a platform for future conversations and related evaluation of complete system mobility.

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5.2 Complete Streets and Houston

What is a Complete Street?

The motivation for designing Complete Streets is felt by many major cities for different reasons. In some communities, traffic has become an unmanageable challenge and right-of-way is limited. In other areas, health-conscious communities have learned that using other modes of transportation benefits their social and physical health. Regardless of the motivating factor, creating corridors for more than just the automobile is a shift in policy that is gaining momentum in the United States.

Tying into the Existing Culture of Houston

Houston is known for its innovation and market driven approach to development. With this notion in mind, Mayor Annise Parker issued an Executive Order to develop a Houston Complete Streets and Transportation Plan. This initiative promotes the use of Complete Streets throughout the City of Houston. In her press release on October 10, 2013, Mayor Parker stated, “Houston is a city that embraces its diversity. This Complete Streets policy applies the same approach to our mobility system by meeting the diverse needs of all Houstonians while also creating more accessible and attractive connections to residential areas, parks, businesses, restaurants, schools and employment centers.” Houston’s can-do attitude to meet not only its transportation, but communities needs, is well suited for a new era of Complete Streets which promotes increased flexibility in street design more apt to suit Houston’s diverse market.

The development and implementation of the Complete Streets policy will be a new way of thinking for many officials and residents within Houston. When it comes to streets, Houston has relied on increasing roadway capacity (i.e. street widening) for vehicles to meet the needs of an ever-growing population. However, we “all hate Houston Traffic” is a well-known slogan in Houston and is representative of the cultural change taking place. Given complete streets is more apt to the movement of people, and not just vehicles, the community at large seems amenable to this new policy change. However, what this policy means for a car-focused community is still not greatly understood by the community

Elements of Design

Complete Streets has many design characteristics that is inclusive of the entire right-of-way including the travelway (or street), streetside and context. Within the travelway, a Complete Street provides for modal use deemed appropriate for the corridor. Travelway considerations include lane width of travel lanes, transit facilities accommodations, on-street bicycle facilities, on-street parking, medians and pedestrian crossings. Design elements for the streetside include off-street bicycle facilities, pedestrian travelways, landscaping (such as grass buffers or tree wells), and frontage zones.

The interaction of different modes (automobiles, transit vehicles, bicycles, and pedestrians) can be a complex challenge. Some modes are compatible with one another within the right-of-way, while others need specific guidelines to create a safe and harmonious corridor for the different users.

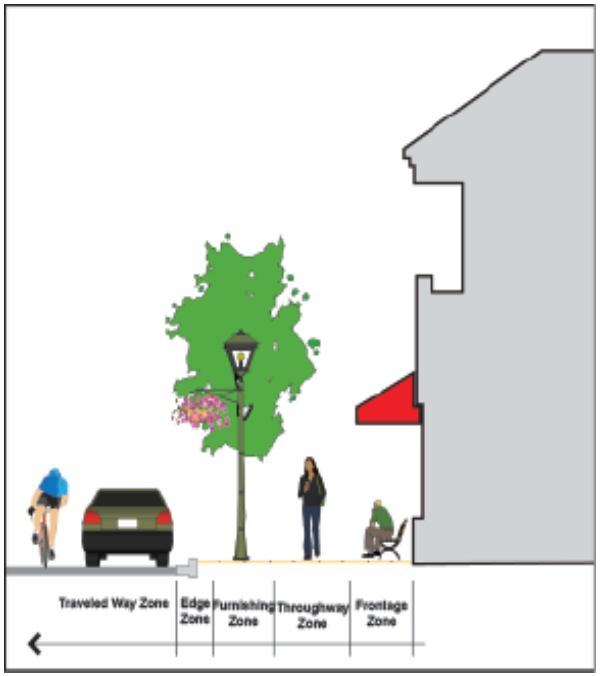


FIGURE 5.1 SOURCE: DALLAS COMPLETE STREETS MANUAL

Purpose of Complete Streets

The Purpose of Complete Streets Design

Complete Streets are intend to provide safe and accessible streets for users of all ages and abilities. In major cities and metropolitan areas, Complete Street policies are being designed to guide the future development and redevelopment of major corridors. Houston's Complete Streets Executive order states, "The Complete Street concept takes the following variables into account when providing services:

- People being served at their residence or property by other right-of-way users;
- People of all ages and abilities, including children, older adults and persons with disabilities;
- The function of the road (e.g. local collector and thoroughfare) and the level of vehicular, pedestrian, and bicycle traffic;
- Multi-Modal Classification Street Types"

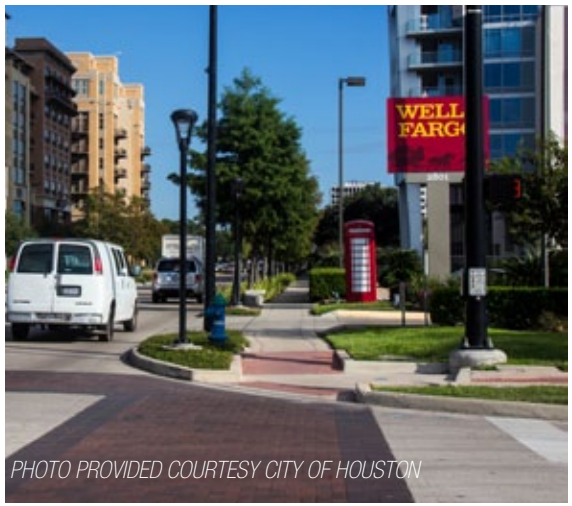
Enhanced Efficiency of All Modes

The street network of a community/city/region defines make up the skeleton of how a city is built. How streets are developed, where they are placed and how they connect to the greater transportation network influence how traffic and development interact at both the regional and local level. A well-connected network increases route options for system users. Where conflict points occur - including but not limited to traffic accidents, congestion at specific intersections, or construction - connected networks allow users to utilize existing systems for alternative route options without relatively high cost to the user. Similarly, well connected networks reduce traffic stress placed on a single corridor. How this is achieved is not limited to the roadway, but can be achieved by increasing provided connectivity and accessibility to alternative mobility networks such as off-street trails or strategically placed on-street bicycle facilities. Similarly, transit networks need to be well-connected to other lines, stations, and destination centers which utilize the placement of existing streets. Moreover, transit accessibility of vehicles, pedestrians and bicyclists plays a large role in the success of the transit system, and as such represent a vital component in system connectivity. In short, Complete Streets represents the multi-modal approach to each individual mode, as well as the connection of each mode within the greater transportation system.

Implementing Complete Streets

Many techniques which currently promote the concept of Complete Streets predate the City's Complete Street Executive Order. For instance, Chapter 10 Appendix 2 of the Infrastructure Design Manual maintains current multi-modal (MMC) design considerations. Similarly, the sub-regional mobility studies - of which this report is a part of - systematically evaluate and identify multi-modal network improvements including enhanced connectivity between various modes.

The Complete Streets Executive Order, however, takes the notion of a multi-modal approach to transportation planning a step further emphasizing the importance of final system design and moreover, implementation. As such, the City is in the process of developing its first Complete Street and Transportation Plan (HCSTP) to be completed in 2015. Although the development of the Plan is still in its infancy stages, it is anticipated to provide a framework or blueprint for the City's adoption of future transportation and mobility related policies as the concept of what a Complete Street is within the City of Houston continues to mature.



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5.3 Health in the Community

he Houston Mobility Plan and related sub-regional studies focus on encouraging multi-modal corridor design throughout the Houston area. By doing so, each study area has the potential to grow and redevelop into an environment that is friendly for both auto and non-automobile users. This process can be split into near and long-term redevelopment strategies from sidewalk repair (near-term), to multi-modal street reconstruction (long-term). Developing walkable and livable communities produces an additional outcome not traditionally stated within Houston's subregional studies, but is a direct result of an active transportation network : healthier communities.

Health and Transportation

Can the way we travel to and from destinations impact our health? This is a question that is being raised across the nation as communities seek ways to increase health and decrease risk factors that lead to obesity, asthma, and other chronic diseases resulting from unhealthy food choices and inactivity. Findings from an international survey show that the United States has some of the highest rates of car usage and the lowest rates of walking, biking, and public transportation compared to other industrialized countries. These factors were also found to directly correlate with obesity rates and related lack of physical activity.[1] Overall population health reflects these trends, where over two-thirds of Houston adults and almost one-third of children are overweight or obese, and thus at increased risk for a range of health conditions such as heart disease and diabetes.[2]

Houston & Harris County Statistics[2]

Inefficient Physical Activity

- *Adults 53%*
- *Children 77%*

Obese or Overweight

- *Adults 63 %*
- *Children 34%*

AAccording to the US Surgeon General report on physical activity and health, "30 minutes of moderate physical activity, 5 days a week, even when performed in short sessions of activity, is enough to provide health benefits such as reduction in obesity levels, coronary heart disease and hypertension."[3] Therefore, a simple shift away from driving and toward a more active commute – such as walking, walking to transit or bike riding – provides an opportunity for increased physical activity which may result in a decrease in certain risk factors often associated with limited exercise.[4]

In a study published in the American Journal of Preventative Medicine, key indicators recommended for increased physical activity include building and enhancing sidewalks, providing efficient bicycle lanes, and promoting more efficient transit service.[5] Similar evidence also indicates that individuals living in areas with a more complete, walkable network are more likely to walk to nearby amenities and transit stations. These individuals walk an average of 35-45 additional minutes per day than individuals living in less walkable environments.[6]

The desire for increased opportunities for physical activity through walking, biking and transit is also evident from Northwest public comments collected during the study. Whether expressed desires were for recreational, commute, or utilitarian purposes, one underlying concept remains the same: these are all active forms of transportation or travel.

Improvements to the built environment through the integration of complete streets at the neighborhood level can improve access to healthy food and encourage physical activity. The Harris County Food System report, published in October of 2013, highlights the need of better access to healthier food options. The study found the location of food stores and their accessibility via public transportation greatly impacts a family's access to healthy foods. For families or individuals without a car, public transportation – including safe sidewalks and bike routes - is necessary for accessing food, services, and recreation. Study findings indicate that over half (54%) of residents in one Harris County community

traveled over six miles to a grocery store, while two-thirds residents in a second community traveled over one mile to a grocery store, with an additional 20% traveling over six miles. The report identified issues that impact community health that could lead to childhood obesity, and also provided policy recommendations that would make healthy choices easier for community residents, including improvements to the built environment.

This paradigm shift in transportation as it relates to health, is fitting for the purposes of the Northwest Sub-regional Mobility Study, as well as similar sub-regional studies, and reinforces the benefits of the Complete Streets policy. In short, a well-functioning transportation network not only moves people, but also provides healthy and safe transportation options that benefit all users of the network.

Example Initiatives Include:

- Community Transformation Initiative (CTI): Aimed at enhancing community livability through enhancing connectivity, walkability, increasing access, etc. for all area residents.
- Healthy Living Matters (HLM): mission is to mobilize policy action to curb childhood obesity in Harris County which includes measures such as active living. Report: http://www.healthylivingmatters.net/why_does_healthy_living_matter/reports

PHOTO PROVIDED COURTESY KHA

[1] Pucher, J. and C. Lefevre. 1996. The Urban Transport Crisis in Europe and North America. London: Macmillan Press Ltd.

[2] Institute for Health Policy at The University of Texas School of Public Health, Houston Health Survey, 2010

[3] US Department of Health and Human Services. Physical Activity and Health: A Report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Promotion; 1996, Available at http://www.cdc.gov/nccdphp/sgr/sgr.htm, accessed 14 August 2008.

[4] Transit and Health: Mode of Transport, Employer-Sponsored Public Transit Pass Programs, and Physical Activity. Journal of Public Health Policy (2009) 30, S73-S94.

[5] Brennan-Ramirez, Laura K. et al. (2006). "Indicators of Activity-Friendly Communities: An Evidence-Based Consensus Process." American Journal of Preventive Medicine, Volume 31, Issue 6

5.4 Bicycle User and Facility

Houston is seeing a shift in how we view the bicycle user as part of the overall transportation system. Just as street design considerations do not take a "one-size fits all" approach to vehicular movement, bicycle movement varies as well. For example, what type of facility is most appropriate for a child traveling to school on a bike versus a working professional traveling to work? How might this consideration vary if the user is enjoying a leisurely bike ride (i.e. recreational user) versus someone who might be on a daily commute where speed and time play a major factor in route consideration?

User Types

Like other topics explored, the recognition of bicycle user types and variations in bicycle facility considerations is taking place across the United States. In accordance with the American Association of State Highway and Transportation Officials (AASHTO)[1] , bicycle users are best defined by level of biking experience and comfort on a specified roadway categorized in the table below.

AASHTO Bicycle User Types

Type	**Type A** Advanced/Experienced	**Type B** Basic Adult	**Type C** Children
			
Values	• Convenience • Speed • Direct access to destination	• Comfortable experience • Low stress	• Lower complexity decision environment
Comfortable Riding on...	• Safety on all street types • High traffic • High speeds	• Designated facilities	• Residential streets • Busier streets with well-defined bike travel areas • Off-street bike paths
Confident "claiming" a narrow lane?	Probably	No	No
Understand traffic principals	Yes	Yes	No

Facility Types

The City of Houston does not currently maintain a formal process for evaluating what streets should be included in the Master Bike Plan. Similarly, the user types of the system - as previously defined - are also not systematically evaluated by facility type within the greater transportation network. Instead the city evaluates facility type on a case-by-case basis. The City recognizes that bike facility types most appropriate for a given corridor may vary, and as such, the current Master Bike Plan should be improved upon to consider all users of the system. Although not currently available, an update to the Master Bike Plan is expected in 2015 and is anticipated to provide a general framework to system design and future update of the resulting network map. The following classifications summarize the facility types currently endorsed by the City of Houston's Master Bike Plan:

Bike Lanes

- A bike lane is the portion of the roadway adjacent to the travel lane that is designed by striping, signing, and pavement marking for the preferential or exclusive use of the cyclist.
- There is no parking allowed in this lane unless otherwise indicated.

Signed-Shared Roadway

- A signed-shared roadway is designated for bicycle or motor vehicle use. The shared lane is not for simultaneous use of both vehicles. Motor vehicles traveling at a greater speed than cyclist can pass cyclist as any other slow moving vehicle using the adjacent lane.
- There are special pavement markings and signs along this lane to remind both cyclist and motorist to share the road.
- These roadways typically have lower travel speeds and traffic volumes, and also provide convenient routes to destinations.
- Shared-use lanes should not be used on roadways with speed limits below 40 mph.

Signed Bike Routes

- A signed bike route is a roadway that has been designated by signing a corridor as a preferred route for bicycle use.
- Parking may be allowed on this route and cyclist will ride to the left and around parked cars.
- Ideally these routes would still have favorable conditions for bicycling, such as low vehicle volumes, low travel speeds, or wide shoulders.
- Route signs should be placed at locations where the bike route turns at an intersection and where bike routes cross one another.
- With proper wayfinding, Bike Routes assist with guiding cyclist to more dominate roadways with safer pedestrian and bike crossings.

Trails/Shared-Use Paths

- A bikeway that is physically separated from motorized vehicular traffic by an open space or barrier, and can be located:
  - Within a highway right-of-way
  - Within an independent right-of-way, such as a retired railroad corridor
  - Along bayous and drainage easements
- Also known as "Hike and Bike Trails"
- Off-street shared-use paths attract a mix of users with a wider range of skill levels and riding speeds.
- The use of a centerline stripe is recommended on pathways with high use to designate two directions of travel.
- Shared-use paths, or sidepaths, may be located adjacent to roadways when sufficient right-of-way is present to provide additional separation from motorists. These sidepaths should follow the same design criteria as shared-use paths in independent rights-of-way.

Other definitions, however, may prove relevant to the City as it continues to grow and mature its understanding of the bikeway user. Additional facility types for consideration include:

Bicycle Boulevard

- Bicycle boulevards are designed to give priority to bicycle traffic.
- Local roads with low volumes and speeds that provide an alternative to, but running parallel with major roads.
- Offer convenient access to land use destinations.
- Signs and pavement markings are used as way finding for bicyclists.

Cycle Track

- Bicycle highways intended for commuting traffic.
- Protected cycle tracks are recommended on major arterials with high travel speeds, high traffic volumes and multiple lanes, and offer protection for less confident riders.
- Two-way cycle tracks may be considered when there is not enough room to accommodate one-way cycle tracks on both sides of the street. Two-way cycle tracks may be considered to optimize the ROW in an existing street configuration where a single element is removed, such as a row of on-street parking.
- Advance timing of signalization is recommended for cycle track facilities at signalized intersections and is a recommended best practice to reduce potential conflicts with turning vehicles.

Buffered Bike Lanes

- Buffered bike lanes are beneficial for streets with high travel speeds, high travel volumes, or high truck traffic.
- These facilities may be accomplished by reconfiguration existing roadways that under capacity and have more travel lanes than needed. Buffers should be delineated by two solid white lines at least 2 feet apart; if wider than 3 feet, diagonal hatching should also be marked.

Other treatments for consideration pertain to increasing awareness of the user and motor vehicle alike and are not focused necessarily on one bicycle facility type. Instead, provided recommendations – where appropriate – are for universal consideration.

Highlighted Conflict Points – Bike Facility Caution

- Colored pavement for bicycle use, typically green in color, may be used to increase the visibility of facilities in potential areas of conflict with motor vehicles. Colored pavement is commonly applied at intersections or driveways, in areas where motor vehicles are likely to cross over a bike lane into an adjacent turn lane or property.

Yield to Bike Signage

- “Yield to Bikes” signage should be used to reinforce bicycles’ right-of way at colored bike lane areas.

Bike Facility Design/Considerations

The appropriate design for a corridor considers certain factors such as daily traffic volume, travel speed, and related context as it pertains to area attractors and neighborhood context. However, regardless of what is desired, a corridor only maintains a certain number of feet in which it must accommodate vehicular, bike and pedestrian traffic as discussed in previous section of this Report. As such, the following questions should be considered when determining the development of a bicycle facility:

- Is the roadway a new construction?
- Is the roadway being repurposed?
- Is the roadway being reconstructed?

In short, a simple set of variables to select the most appropriate bicycle facility does not always encapsulate the complexity of Houston's streets as they pertain to facility feasibility.

1. New Construction

New roadway construction projects can typically follow the City's standard cross-sections as found in the COH Mobility Plan Street Paving Design Requirements, which include options for bicycle facilities based on the multi-modal classification of the corridor.

2. Repurpose

Repurpose projects typically require modifications to existing cross section where additional amenities - such as a bike lane - may be added to the roadway without removing a lane of traffic. This type of modification may occur where lanes are wider than needed.

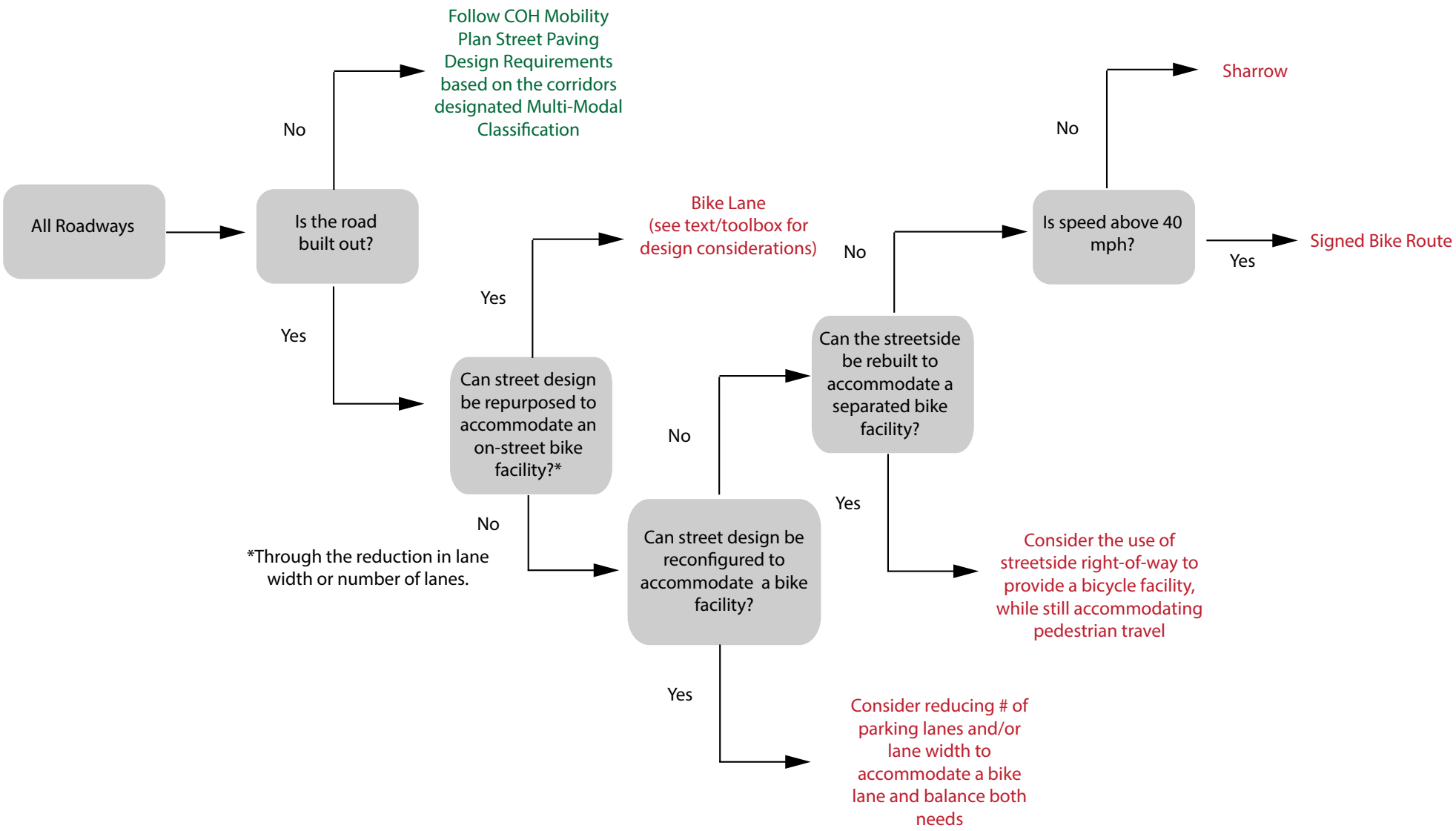
.

3. Reconfiguration

When the width of the travel way cannot be widened along a corridor, the City should evaluate whether a roadway's existing lanes can be reconfigured to provide the necessary space for a bicycle facility. Reconfiguration of a travel way may include reducing the total number of lanes when traffic volumes demonstrate an excess of roadway capacity. Another scenario would be to reduce median width to maintain vehicle travel lanes and also introduce a bike facility within the existing roadway width. On-street parking may be a high priority on some corridors and should be evaluated during roadway reconfiguration. It may be necessary to balance both parking and bicycle travel needs using an atypical cross-section. Occasionally, a wide existing streetside zone (the portion of the right-of-way dedicated to pedestrian facilities and amenities) may be repurposed to include both bicycle and pedestrian facilities separated from the roadway. These facilities would include physically buffered bike lanes or raised cycle tracks.

The following flow chart is intended to guide the facility selection process and ensure that a preferred facility is an appropriate choice for a specific corridor. This tool will not automatically provide the best solution for a roadway, but is intended to demonstrate why certain desired bike facilities might not always make sense on the ground. Given the complexities of many roadways, the City should use planning and engineering judgment in order to develop a cross-section that addresses all road users.

Bike Facility Decision Process Figure 5.4



Houston Bike Related Policies

The paradigm shift in the way Houston views bikes can also be seen in the recent policies embraced by the City which include:

Complete Streets Policy

The Complete Street Executive Order directs City efforts to achieve complete streets. A complete street is defined as a "public roadway that takes into account all users" including people on bikes. Of the objectives listed within the order, multi-modal classifications are defined – of which, bikes are considered within the modal choice for consideration. Finally, the Complete Streets Executive Order directs the development of a "Houston Complete Streets and Transportation Plan" of which one of the Plan Components must, at a minimum, include the Bikeway/Pedestrian Plan as currently maintained by the City of Houston.

Safe Passing Ordinance

Chapter 45 Article 2 of the City Codes of Ordinances was adopted by the City in April of 2013. The Ordinance requires motorists to pass or trail a cyclist, pedestrians and other non-vehicular or "vulnerable road users" at a safe distance. Although safe distance is a termed defined to take into consideration "road, traffic and weather conditions at the time, in any event, not less than 3' laterally while passing a vulnerable road user in a passenger car or light truck and not less than 6' laterally if the operator's vehicle is a truck (other than a light truck) or a commercial vehicle as defined by the Transportation Code." The code further requires motorists to be mindful of vulnerable users during turning movements as well as prohibits the use of harassment or intimidation of vulnerable users at any time.

Houston Bike Education

As the City of Houston continues to evolve in its adoption of bikes into its everyday culture, the need to educate automobile users and bicyclists becomes increasingly important. The City, and other bike advocate organizations, continuously work to educate all roadway users on the importance of proper roadway etiquette. That is to say, both cars and bikes are considered "traffic" while utilizing public roadways. Therefore, all roadway users must abide by laws that dictate what is legal for each user type. How to function on the roadway can vary slightly between a motorized and non-motorized vehicle. As such, it is necessary to not only educate users about their responsibilities, but also the responsibilities of others (i.e. What are automobiles supposed to do when they see a bike, and visa-versa?)

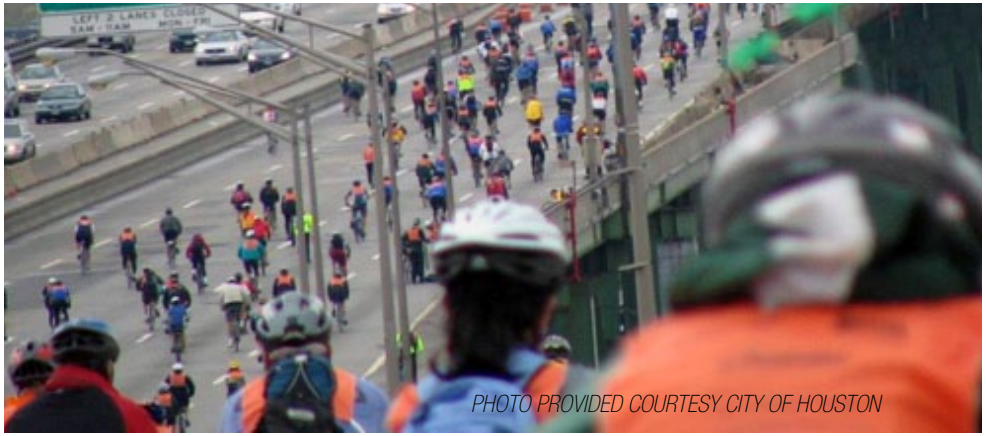


PHOTO PROVIDED COURTESY CITY OF HOUSTON

5.5 Sidewalk Design Considerations

Pedestrians as a Priority

Returning focus to pedestrian amenities is a growing trend around the nation due to the many benefits of active transportation are being publicly endorsed by health officials. Such benefits include:

- Improve physical and social health
- Reduce personal transportation costs
- Reduce carbon footprint

Existing Policy

The City of Houston requires that any new or reconstructed sidewalk be built to a 5 foot wide minimum standard. A 6 foot minimum standard is required for any sidewalks located along a transit corridor. Sidewalk improvements above the minimum standard are recommended based on a variety of factors. These factors include land use and context, traffic volumes, and transit availability along a corridor.

Design Considerations

When designing a sidewalk, the pedestrian zone should be taken into consideration and varies based on the context and intended user of the corridor. The pedestrian zone is defined as the streetside area between the edge of the curb and the property line of the bordering parcel. This provided zone can be broken into four subcategories: 1) edge zone, 2) furnishing zone, 3) throughway, and 4) frontage zone.

Edge Zone

The edge zone is comprised of the area between the curb and the furnishing zone. This zone creates a space between the recognized sidewalk area and automobiles. On corridors where on-street parking is permitted, this zone allows for door swing space. It also provides an area for pedestrians to transition between the walkway and their automobile without creating issues for other users.

Furnishing Zone

The furnishing zone provides an area for functional and artistic features within the pedestrian zone. It is also used for public services, landscaping, utilities, and as a buffer between pedestrians and the corridor. The functional features within this zone include public services, bicycle racks, utilities, fire hydrants, utility poles, sign poles, traffic signal cabinets and utility cabinets. Additional features that are functional, but also enhance the appeal of this zone are trees, shrubs and planters, landscaping, vendor space, street furniture, and decorative artwork.

The furnishing zone provides many benefits. It increases the tangible and the perceived safety of pedestrians by identifying the division between the street and pedestrian realm. When properly implemented and maintained, a furnishing zone can increase the lure, walkability and safety to pedestrians along a corridor.

Pedestrian Throughway Zone

The pedestrian throughway is the basic function of the pedestrian zone. It is located between the furnishing and the frontage zone. The throughway is the section of the sidewalk where pedestrians travel. It is critical to keep this zone clear of obstructions (including the condition of the pavement) to allow for safe pedestrian movement. This design element should also account for handicapped and disabled users. Movement of wheelchairs within the throughway zone is a critical design element.

Frontage Zone

The frontage zone is dependent on the context of uses or location of buildings along the corridor. It can serve as a buffer between the building front (if there is not a setback) and the walkable area. It can also serve as an advertisement area for storefronts. Stationary items can be placed within this area with proper licensing agreements.

PHOTO PROVIDED COURTESY KIMLEY-HORN

PHOTO PROVIDED COURTESY KIMLEY-HORN

5.6 Transit Corridor Considerations

Public Transit for the Public

The perception of bus and light rail as transportation for low-income communities is changing as more young professionals utilize mass transportation. Benefits include:

- Reduce expenses associated with personal automobile
- Reduce time spent in traffic
- Spend commuting time working via personal devices
- Environmentally friendly
- Benefits to personal health

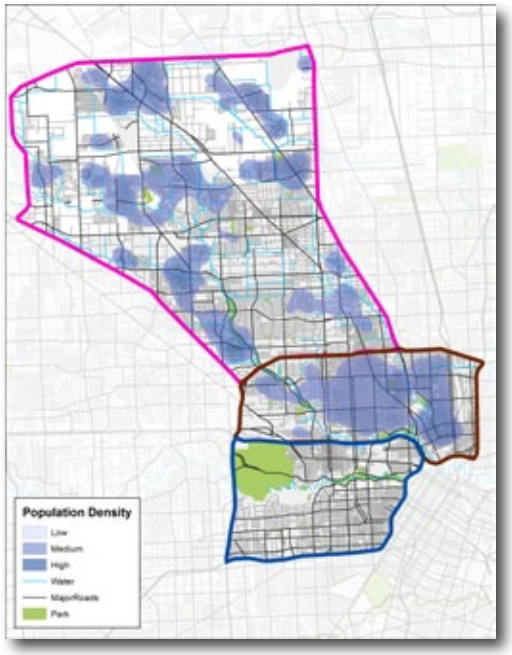
Another user base are persons that emigrated from countries where public transportation is socially acceptable and widely used. As more people understand the benefits associated with public transportation, utilization will increase.

Increasing the Availability

As congestion continues to increase, transportation funding is an urgent concern within the country and region. Therefore more efficient transportation alternatives have become increasingly attractive. Improving transportation capacity has evolved from simply moving vehicles to moving people. This shift in focus has allowed transportation planners more flexibility in identifying new technologies to increase the capacity of a corridor or a transportation network. Transit service is an efficient method of moving people, but it is not an appropriate solution along every corridor. To identify the specific corridors and areas of Houston where transit can be most successful in capturing riders, the following factors were analyzed and ranked in the Heights-Northside study area:

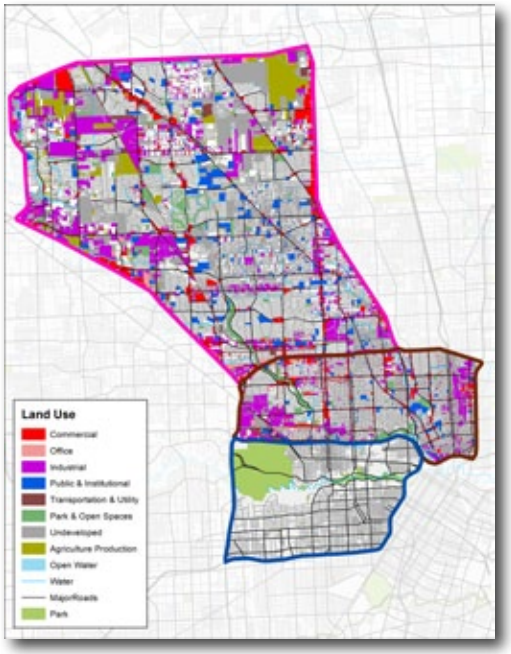
- Residential Density
- Lane Use
- Network Density
- Existing Transit Ridership
- Projected Transit Ridership

Each factor detailed below helps to determine which corridors in the study area can best accommodate transit service, primarily from a ridership perspective. Larger scales of the maps are provided in Appendix C: Transit Analysis.



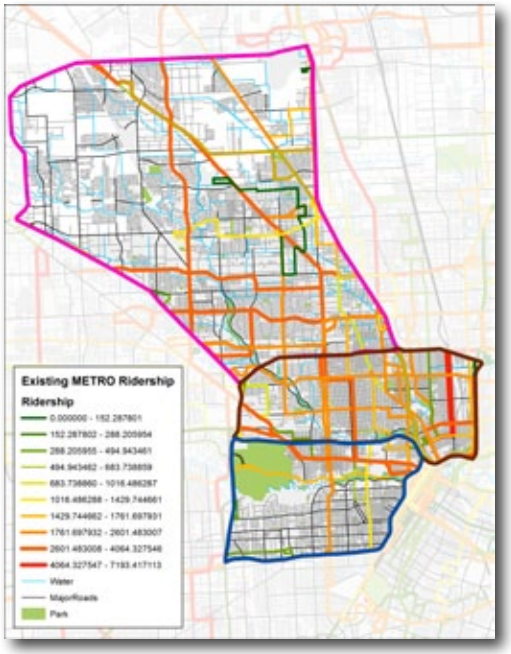
Residential Density:

Residential density is an important factor for determining transit potential. People who reside in high density areas are more likely to use transit. The corridors that are within or in proximity to medium and high density locations were considered for transit locations.



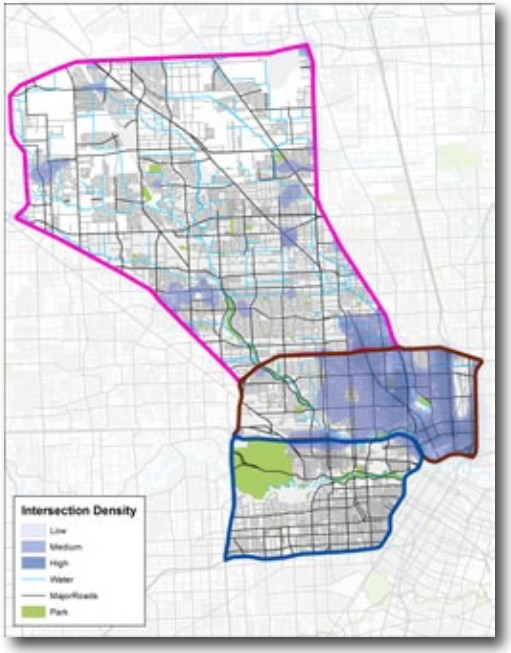
Land Use:

Identifying corridors that contain a higher amount of commercial, retail and employment activity is important for transit selection. Destinations for transit riders are shopping centers, grocery stores, and employment centers.



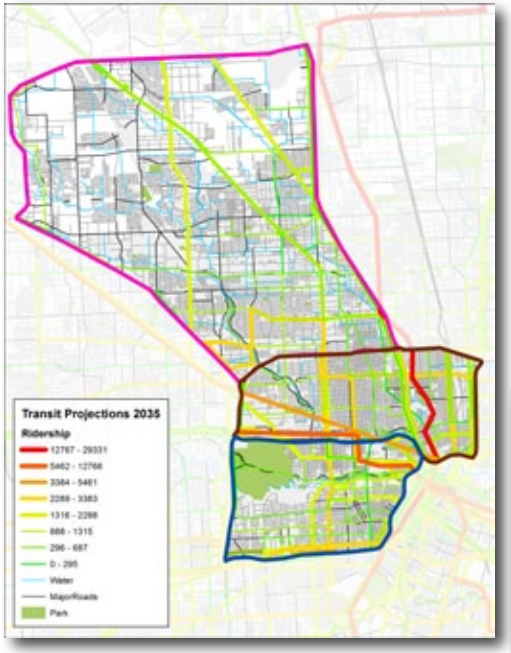
Existing Transit Ridership:

Examining existing transit patterns is an effective tool to determine potential transit corridors. Some of these routes may already be functioning as significant transit corridors but can be enhanced with improved infrastructure, shorter headways, or enhanced buses to increase ridership.



Network Density:

The density of the street network affects a person's ability to walk or bike to their destination. Less dense areas usually result in a more automobile oriented network. Both Heights and the Northside maintain a high network density. Northside, however, has the highest network density in the study area.



Projected Transit Ridership:

H-GAC currently incorporates transit routes into its 2035 travel demand model. This data is helpful to see where the transit demand is based on future demographic and traffic patterns/ congestion.

Complete Streets is not about moving vehicles only. As you can see from these maps, other forms of transportation have a large impact on the road network. Focusing on moving people (whether it be via automobile, public transit, bicycle, or pedestrian zones) is what is important.

5.7 Intersection Design Considerations

Changing Priorities

A strong multi-modal design results in the safe passage of automobile and non-automobile users through the network. Creating safe realms for these users extends to all parts of the corridor, with increased importance at intersections and other types of crossings where differing modal types overlap. All mode types should feel safe, comfortable, and experience a minimal amount of delay when passing through an intersection. However, enhancing conditions for one mode may negatively impact others. Previous intersection design focused on the quick and efficient movement of automobiles, but as other modes gain popularity (transit/bicycles) this attitude can potentially hinder the efficient flow of the overall network.

Modes for consideration within the scope of intersection design include automobile, pedestrian, bicycle, and bus transit. Although other alternative modes of transportation may exist, the provided represent the most commonly used forms of traffic within the City of Houston and serve as a baseline for discussion of alternative design options.

Multi-modal Intersection Design

The following section explains the fundamentals of multi-modal intersection design and describes the concepts of how automobiles, bicycles, pedestrians and transit vehicles can be accommodated in the design of an intersection.

At any given time, multi-directional movement is occurring at all intersections. Conflict occurs where users of the network collide. As provided in Figure 5.5, an intersection maintains a number of known conflict points. To reduce known conflict, certain design tools are available for consideration. For instance, the design of an intersection that accommodates vehicular turning movements where pedestrian and bicycle traffic are expected, may include certain design consideration that help demarcate how each mode type should transition through an intersection. Such treatments include a pedestrian only phase within a signal cycle that preempts vehicular movement by a few seconds. This provided phase helps reduce potential collision between vehicular right-hand-turning movements and a pedestrian utilizing a crosswalk. Additionally, colored pavement or stripping is often used at intersections for bicycles clearing demarcating the placement of bike vs. vehicular movement understood by both the bicyclist and motorist alike. Such design considerations help define how traffic (whether motorized or non motorized) are expected to behave.

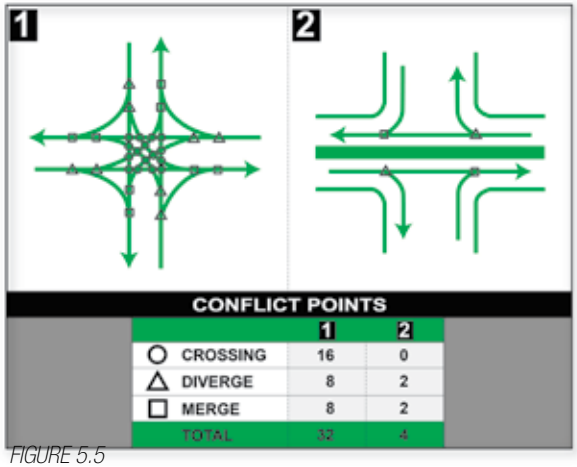


FIGURE 5.5

Other design tool examples for consideration include:

- Pedestrian signals
- Continued markings for bicycles at intersections
- Additional signage
- Designated crosswalks
- Proper bus stop placement
- Advanced stop lines
- Intersection median barriers
- Right-turn-on-red restrictions

Due to limited right-of-way, not all modes of transportation can be accommodated in a one-size-fits-all design for all intersections. The amount of traffic, speed of the roadway and the safety of the user must be addressed on a project basis. However, individual intersections should be evaluated not in silo, but in conjunction with the greater transportation network to ensure a consistent flow of all mode types within respective networks and greater transportation system. Modes with higher priority will typically take precedence in the design features of the corridor, but should not reduce the actual safety of other modes. If this should occur, priority of the modal needs on the corridor should be reevaluated.

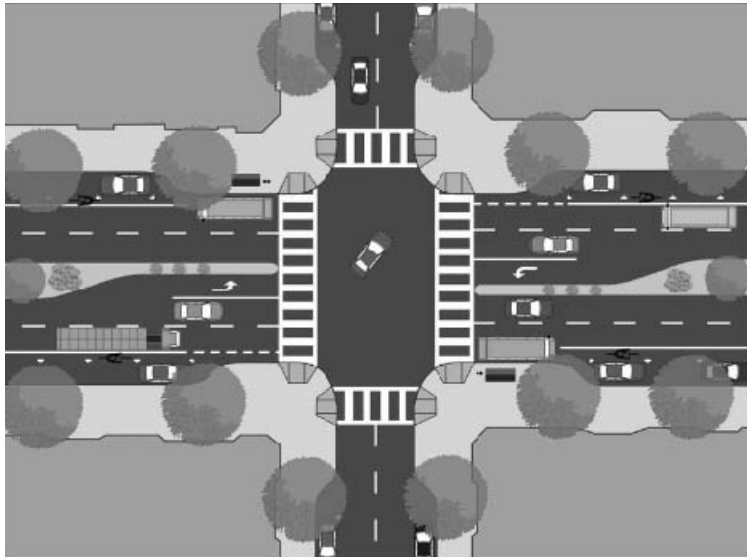


FIGURE 5.6 SOURCE: DIGITAL MEDIA PRODUCTIONS

Pedestrians

Pedestrian traffic represents the most basic form of transportation that is free of cost for the user. Intersections, or crossings in general, pose a particular challenge to pedestrian safety. Crosswalks serve two main purposes: 1) guiding pedestrians to locations where they will be visible when crossing the street, and 2) alerting drivers of pedestrian movements. At intersections, several elements affect pedestrians:

- Visibility at curbs
- ADA accessibility
- Crosswalks
- Pedestrian signals
- Pedestrian crossing refuges
- Traffic control types

PHOTO COURTESY OF KIMLEY-HORN

Several different tools can be used as visual indicators of pedestrian movements, including items such as:

- Pavers can be a different color of brick or material on the ground to indicate the path the pedestrian will be following.
- Raised crossings are also a physical technique that marks defined pedestrian realm at an intersection or crossing.
- In-street YIELD TO PEDESTRIAN signs is a way of alerting drivers of possible activity before arriving at the intersection.

PHOTO COURTESY OF KIMLEY-HORN

- Pedestrian signalization helps demarcate when a pedestrian is crossing an intersection or, if timed correctly can grant priority of crossing to the pedestrian

a

Transit

Proper **bus stop placement** is an important element in the design of intersections (See Figure 5.7). Bus stops should be located at the far-side stop of an intersection reducing wait times of drivers attempting to make right-hand turns which can become blocked at near-side stop configurations. Far-side stop configurations also help eliminate potential conflict points between vehicles as motorist attempt to jump lanes to gain access around buses for right-hand turning movements. **Mid-block stops** are least desirable and result in the highest use of curb space hindering both through and right-hand turn movements.

Other important factors to consider include the trade-offs between transit vehicles and other modes of transportation. Automobiles, bicyclists and pedestrians can potentially converge at the same intersection, and the interaction of these users is defined by the intersection design. Transit vehicles are usually large and their movements can dominate the area. Planning for the turning radius of the vehicle can assist in making their movements safe and efficient.

Where it is possible, **transit-only lanes** at intersections provide transit vehicles a dedicated space to bypass traffic, and can typically be shared with bicyclists.

Transit priority treatments provide an early green signal, or hold a green signal, for transit vehicles to cross an intersection with minimal delay. Use of this method should be evaluated based on how it will affect the overall network system.

PHOTO COURTESY OF KIMLEY-HORN

Bike

How to create a safe environment for a bicyclist can range based on confidence and skill level. Complete separation of a facility is recommended along high speed corridors where the user might have some experience (Class B User), but prefers the comfort and increased safety associated with a buffered path. Separated bike paths are recommended where the user is highly inexperienced (Class C User). Such examples include sections of corridors along a safe-route to school program or corridors leading to popular park or community center destinations. .

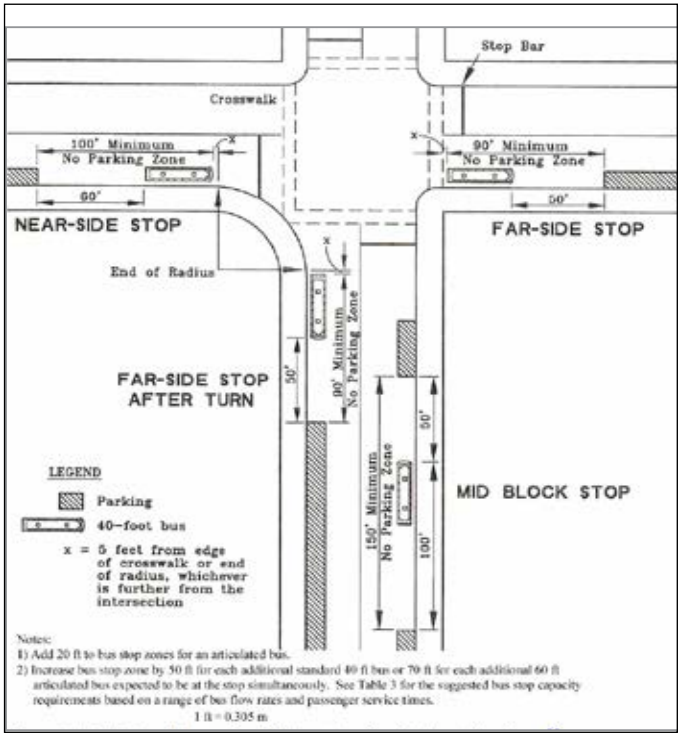


FIGURE 5.7 SOURCE: ITE MANUAL

Intersections where Class B and C users are anticipated should be designed with the same concepts in mind. Green paving or stripping can help guide novice users through an intersection. For more advanced users (Class A Users), simple treatments such as Bicycle Boxes allow bicycle traffic to be placed in front of vehicular traffic. When the signal turns green, bicycle traffic may then preempt

PHOTO COURTESY OF KIMLEY-HORN

vehicular movement for all through, right and left hand turns reducing unnecessary conflict points with the automobile. **Associated design features for bicycle crossings** include designated crossings, signage, designated holding patterns, stop bars, right-turn protection, and signalization.

Chart

Figure 5.8 is a chart that identifies pedestrian and bicycle features at signalized intersections that can be used to create safe and functional intersections.

Shorter and more visible crosswalks	• Crosswalks on all approaches; • Longitudinal markings (possible use of colored and/or textured paving); • Reduced overall street widths by reducing the number of travel and turn lanes, or narrowing travel lanes; • Curb extensions with pedestrian push buttons on extensions; and • Median refuges on wide streets (greater than 60 feet) with median push buttons.

Priority for pedestrians, bicyclist, and accessibility	• Shorter cycle lengths, meeting minimum pedestrian clearances (also improves transit travel times);
	• Longer pedestrian clearance times (based on 3.5 feet/sec. to set flashing (clearance) time and 3.0 feet/sec for total crossing time);
	• Reduced conflicts between pedestrians and turning vehicles achieved with:
	  ○ Pedestrian lead phases;
	  ○ Scramble phases in very high pedestrian volume locations;
	  ○ Restricted right turns on red when pedestrians are present during specified hours; and
	  ○ Allowing right turns during cross-street left turn phases reduces the number of right turn conflicts during pedestrian crossing phase.

Low speed channelized right turn lanes	• Adequate sized islands for pedestrian refuge; • Raised pedestrian crossing/speed table within channelized right turn lane; and • Signal control of channelized right turn in high pedestrian volumes locations.
Improved pedestrian information	• Pedestrian countdown timers; and • “Look Before Crossing” markings or signs.
Bicycle features	• Bicycle lanes striped up to crosswalk (using “skip lines” if vehicular right turns are allowed); • Bicycle detectors on high volumes routes, or bicyclist-accessible push buttons; • Adequate clearance interval for bicyclist; • Colored paving in bicycle/vehicle lanes in high-conflict areas; and • “Bike Boxes” (painted rectangle along right hand curb or behind crosswalk) to indicate potential high-conflict area between bicycles continuing through an intersection and right turning vehicles, and to allow bicyclist to proceed through intersection or turn in advance of vehicles.
High-priority transit thoroughfare elements	• Adaptive Transit Signal Priority (TSP) when transit detected; • Extended green phase on bus route (rapid transit signal priority); • Truncated green phase for cross street; • Re-order phasing to provide transit priority (transit priority not to be given in two successive cycles to avoid severe traffic impacts); • Other bus priority signal phasing (sequencing) • Queue jump lanes and associated signal phasing; and • Curb extension bus stops, bus bulbs.

Accessibility and space for pedestrians	• Properly placed pedestrian actuation buttons, with audible locator tones;
	• Detectable warnings;
	• Two curb ramps per corner depending on radius of curb return and presence of curb extensions;
	• Clear pedestrian paths (and shoulder clearances) ensuring utilities and appurtenances are located outside pedestrian paths;
	• Vertical and overhang clearance of street furnishings for the visually impaired;
	• Properly placed signal poles and cabinets:
	  ○ Behind sidewalks (in landscaping or in building niches);
	  ○ In planting strips (furnishing zone); and
	  ○ In sidewalk, at least three feet from curb ramps.

Traffic operations for safe speeds and pedestrian convenience	• Target speeds between 25-35 mph; • Signal progression at target speeds; and • Fewer very long/very short cycle lengths.
Higher priority on aesthetics	• Textured and colored material within the streetside; • Colored material within crosswalks, but avoid coarse textures which provide rough surfaces for the disabled; • Attractive decorative signal hardware, or specialized hardware; and • Attention to landscaping and integration with green street stormwater management techniques.

FIGURE 5.8

5.8 Integration of Modal Types

The following examples are generalized conceptual illustrations of different intersection configurations, along with an existing aerial photo. These images are potential solutions. Detailed engineering must be completed before any option can be considered.

Heights at 11th Street Michigan U turn concept

FIGURE 5.9: HEIGHTS AT 11TH ST. EXISTING AERIAL PHOTO

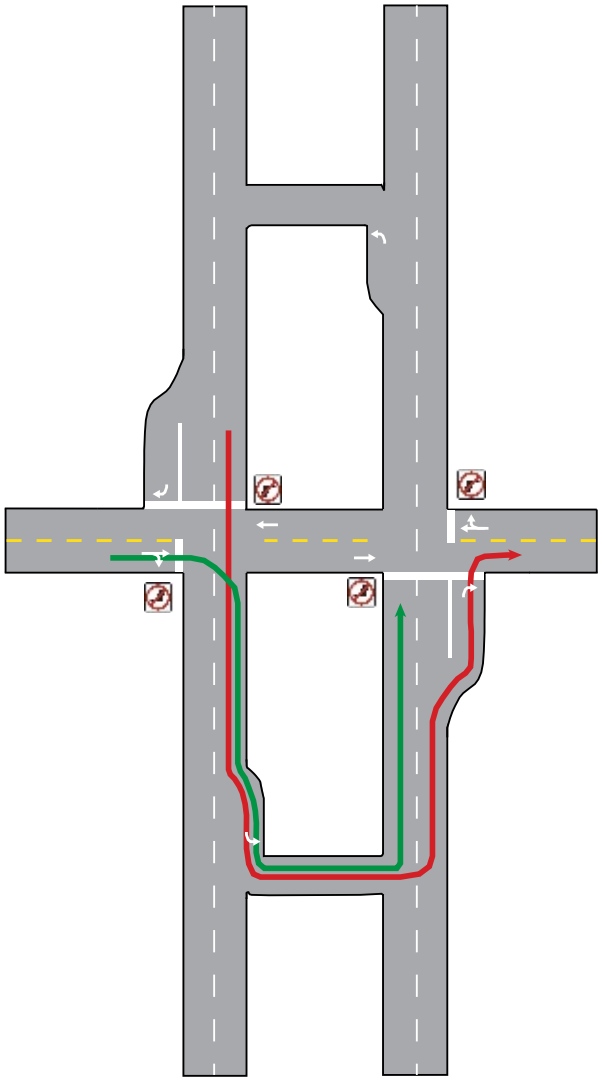


FIGURE 5.10 SAMPLE MICHIGAN U-TURN INTERSECTION

Roundabout Concept

FIGURE 5.11: 20TH/CAVALCADE AT MAIN AERIAL PHOTO

FIGURE 5.12: AIRLINE AT GIBBS/LINK AERIAL PHOTO

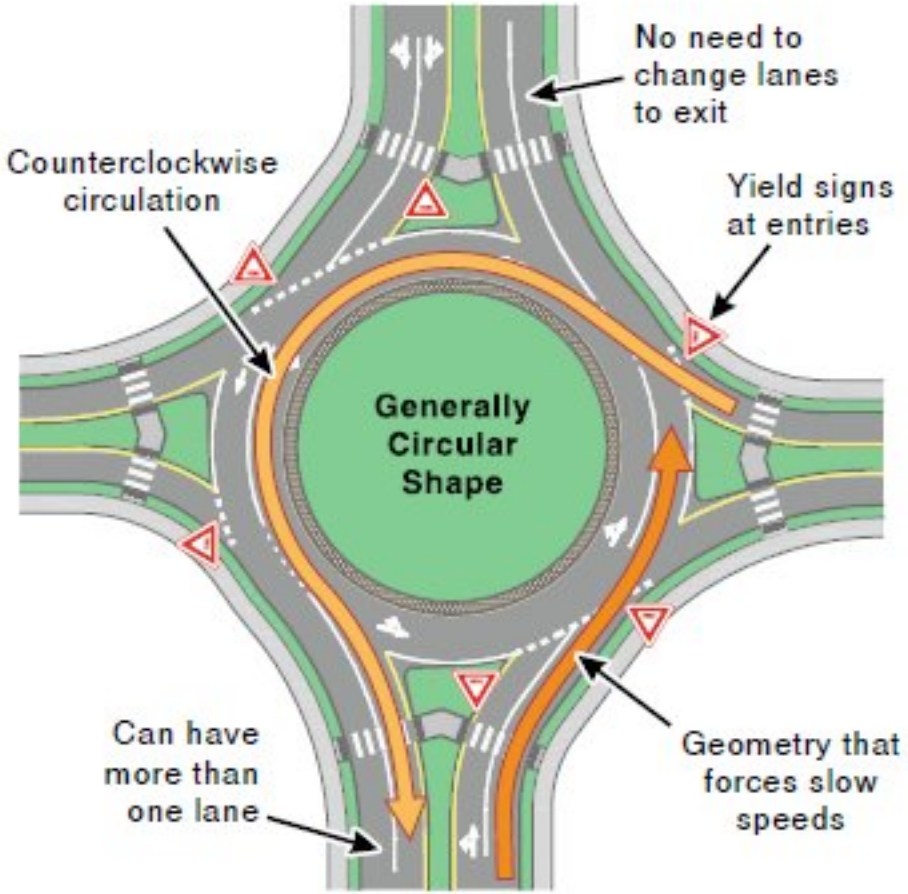


FIGURE 5.13: SAMPLE ROUNDABOUT CONCEPT

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VI. A Balanced Approach

Considering All Needs of the System

The following pages highlight a shift in the manner in which transportation can be viewed by promoting alternative transportation options, prioritizing improvements for specific corridors and locations, and examining the opportunities for connections to transportation options outside of the City's current right-of-way.

There are multiple components to planning for infrastructure needs within the study area. Those include but are not limited to:

- Understanding the needs of the community;
- Developing a plan that responds to development trends;
- Examining the travel demand model results;
- Prioritizing corridors for specific users;
- Correcting gaps within the transportation network; and
- Creating/Revising policies as appropriate.

Each of these elements are considered in the corridor designs provided in subsequent pages of the report. It is important to note, however, that the provided potential cross-sections are examples of what roadways might look like when the provided elements (bike, pedestrian, etc) are considered in addition to the automobile. Provided examples are not final designs for implementation given there has not been an examination of the engineering specifics for each of these solutions.

The ideas presented, therefore, will be refined through further analysis at the intersection, corridor, and the system-wide level before moving into final design and construction. The process for developing those more detailed plans is discussed within this document and will follow the City of Houston's Capital Improvement Plan process for infrastructure programs.

FIGURE 6.1

6.1 Defining the Priority Elements

The creation of a multi-modal street network requires balancing competing considerations throughout the entire transportation system, and does not encourage placing all modes on all roadways. By examining a corridor's priority elements as defined to the right, each potential user of the system is evaluated and further balanced against the need of other user types. The result is a future vision of the corridor that highlights the needs and associated wants within the existing and future transportation network. For a better understanding of these modes and related considerations, see Chapter V. Changing Mobility Considerations.

Recognizing the benefits of a balanced approach, the Heights-Northside Mobility Study examined the needs for each mode independently. Gaps and potential improvements to each network were identified as defined in Chapter VII. Outcomes. Final outcome maps were then overlaid and compared to ensure a complete and complementary transportation network inclusive of all modes. Resulting priority elements were then evaluated within each corridor's limited right-of-way and potential design concepts were developed based on defined elements.

The table on the next page provides a summary of each of the corridors that are currently classified under the existing MTFP. The table identifies what elements were prioritized per corridor; related Corridor Sheets depict potential design examples.

Automobiles

The automobile is considered a priority on all Houston streets. As such, an associated icon is not required to identify this element as a priority. Instead, defined priority elements are intended to call attention to other modes that may be incorporated within a corridor in addition to the automobile.

Priority Elements

Bicycle

Bicycle facilities increase the reach of transit services, promote non-motorized transportation options, and can be used for recreation and commuting alternatives. They can be located in the roadway as a shared traffic facility or separated from traffic as an on-street buffered facility. Additionally, facilities may be provided in the pedestrian realm, where appropriate, providing for the complete removal of the facility from vehicular traffic.

Parking

The provision of adequate vehicular capacity continues to be paramount to providing access and mobility within the study area. Where appropriate, parking may serve as a pedestrian buffer or as traffic calming treatment. Permanent parking is appropriate in certain context such as commercial retail areas upon approval of the PWE Only peak-hour parking is displayed in corridor design examples to best demonstrate the potential use of the corridor at full capacity.

Transit

Increased access to transit will help promote ridership and off-set some of the right-of-way constraints while increasing the carrying capacity of the roadway. High-frequency Transit which promotes fewer stops at greater distances, as well as local transit service were evaluated.

Pedestrian Realm

Where transit is a priority, the pedestrian network is considered an essential, complementary component where the sidewalk is encouraged to be greater than the current City standard of five feet. Pedestrians facilities are also prioritized for certain commercial/retail establishments and associated community amenities such as schools, parks or libraries or regional trail networks.

Proposed MMC

Resulting multi-modal classification recommended based the functional classification of the roadway (MTFP) and elements as defined above. Provided classification are in line with facility types

STREET NAME	FROM	TO	EXISTING FUNCTIONAL CLASS	MEDIAN/CTL/ UNDIVIDED	MTFP ROW	NUM LANE	EXIST VOLUME RANGE	2035 VOLUME RANGES	MTFP IMPROVEMENT	UPDATED FUNCTIONAL CLASS	PROPOSED MMC	BIKE FACILITY	PARKING	TRANSIT	PED REALM
W 20TH ST	E TC JESTER BLVD	SHEPHERD DR	T-4-70	UNDIVIDED	70'	2	6,600-10,000	10,000-22,000	T-4-70	MAJOR THOROUGHFARE	URBAN AVENUE	X		X-Express	X
W & E 20TH ST	SHEPHERD DR	N. MAIN ST	T-4-70	UNDIVIDED	70'	4	8,700-9,500	10,000-20,000	T-4-70	MAJOR THOROUGHFARE	URBAN AVENUE	X		X-Express	X
W 18TH ST	I-610	E TC JESTER BLVD	T-4-100	MEDIAN	100'	4	11,000-14,500	19,500-29,000	T-4-100	MAJOR THOROUGHFARE	URBAN BOULEVARD	X		X-Express	X
W 19TH ST	20TH ST	SHEPHERD DR	LOCAL 2-70	UNDIVIDED	70'	2	4,000-5,500	10,000-12,500	MN-2-70	MINOR COLLECTOR	URBAN STREET		X	X-Local	X
W 19TH ST	SHEPHERD DR	HEIGHTS BLVD	LOCAL 4-70	UNDIVIDED	70'	4	2,000-4,500	12,500	MN-2-70	MINOR COLLECTOR	URBAN STREET		X	X-Local	X
W CAVALCADE ST	N MAIN ST	AIRLINE	T-4-90	MEDIAN	90'	4	10,900	22,100	T-4-90	MAJOR THOROUGHFARE	URBAN BOULEVARD	X		X-Express	X
W CAVALCADE ST	Airline	I-45	T-4-90	MEDIAN	90'	4	10,900	22,100	T-4-100	MAJOR THOROUGHFARE	URBAN BOULEVARD	X		X-Express	X
W CAVALCADE ST	IH 45	US-59	T-4-100	MEDIAN	100'	4	15,500	24,200	T-4-100	MAJOR THOROUGHFARE	URBAN BOULEVARD	X		X-Express	X
PATTON ST	AIRLINE DR	IRVINGTON BLVD	C-4-60-70	UNDIVIDED	60'	4	3,500-7,300	5,000-9,000	IRVINGTON TO FULTON : MJ-2-60; FULTON TO IH45: MJ-4-70 WEST OF 45: MJ-2-70	MAJOR COLLECTOR	URBAN STREET	X			
W 11TH ST	HEMPSTEAD HWY	SHEPHERD DR	T-4-100	MEDIAN	100'	4	6,800-8,200	7,500-35,500	T-4-100	MAJOR THOROUGHFARE	URBAN BOULEVARD			X-Local	X
E 11TH ST	SHEPHERD DR	STUDEWOOD ST	T-4-70	UNDIVIDED	70'	4	7,700-14,400	7,500-28,000	T-4-70	MAJOR THOROUGHFARE	URBAN AVENUE			X-Local	X
E 11TH ST	STUDEWOOD ST	MICHAUX ST	C-4-70	UNDIVIDED	70'	2	7,700	8,000	MN-2-70	MINOR COLLECTOR	URBAN STREET		X	X-Local	X
PECORE ST	MICHAUX ST	N MAIN ST	C-2-60	UNDIVIDED	60'	2	7,800-8,100	6,500-13,000	MN-2-60	MINOR COLLECTOR	URBAN STREET		X	X-Local	X
W 6TH ST	SHEPHERD DR	YALE	T-2-60	UNDIVIDED	60'	2	50-1,000	1,500	N/A	Remove from MTFP	N/A				
W 6TH ST	YALE	HEIGHTS BLVD	T-2-60	UNDIVIDED	50'-60'	2	50-1,000	1,500	MJ-2-60	MAJOR COLLECTOR	URBAN STREET	~~X*~~	X		X
WHITE OAK DR	HEIGHTS BLVD	STUDEWOOD ST	T-2-60	UNDIVIDED	60'	2	5,500-9,000	4,000-13,500	MJ-2-60	MAJOR COLLECTOR	URBAN STREET	X (Partial)	X	X-Local	X
WHITE OAK DR	STUDEWOOD ST	I-45	T-2-70	UNDIVIDED	70'	2	5,500-9,000	4,000-13,500	MJ-2-70	MAJOR COLLECTOR	URBAN STREET	X (Partial)	X	X-Local	X
QUITMAN ST	I-45	Fulton	T-2-60	UNDIVIDED	60	2	5200-8,000	9,500-13,500	MJ-2-60	MAJOR COLLECTOR	URBAN STREET	X		X-Local	X
QUITMAN ST	Fulton	US-59	T-2-50/60	UNDIVIDED	50'-60'	2	5200-8,000	9,500-13,500	MJ-2-60	MAJOR COLLECTOR	URBAN STREET	X		X-Local	X
HOGAN ST	I-45	LORRAINE ST	C-4-60	UNDIVIDED	60'	4	3,000-8,500	14,000-21,500	MJ-4-70	MAJOR COLLECTOR	URBAN AVENUE	X*		X-Express	X

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*Note: Table arranged geographically by location of street. For best use, compare to Chapter VII. Outcome System Maps. Corridor Sheets are alphabetized.

STREET NAME	FROM	TO	EXISTING FUNCTIONAL CLASS	MEDIAN/CTL/ UNDIVIDED	MTFP ROW	NUM LANE	EXIST VOLUME RANGE	2035 VOLUME RANGES	MTFP IMPROVEMENT	UPDATED FUNCTIONAL CLASS	PROPOSED MMC	BIKE FACILITY	PARKING	TRANSIT	PED REALM
LORRAINE ST	HOGAN ST	HARDY	C-4-60	UNDIVIDED	60'	2	1,800-4,500	10,500-14,000	MJ-4-70	MAJOR COLLECTOR	URBAN AVENUE	X*		X-Express	X
LORRAINE ST	HARDY	US-59	C-4-70	UNDIVIDED	60'	2	1,800-4,500	10,500-14,000	MJ-4-70	MAJOR COLLECTOR	URBAN AVENUE	X*		X-Express	X
LYONS AVE	MAKEE	ELYSIAN ST	T-2-60	UNDIVIDED	60'	2	2,000-6,000	3,500-7,500	MN-2-60	MINOR COLLECTOR	URBAN STREET	X			X
LYONS AVE	ELYSIAN ST	US-59	T-2-60	UNDIVIDED	60'	2	2,000-6,000	3,500-7,500	T-2-60	MAJOR THOROUGHFARE	URBAN STREET	X			X
HEMPSTEAD RD	I-610	11TH ST	P-6-100	CTL	200'	6	15,500-16,500	35,500-36,000	P-6-100	PRINCIPAL THOROUGHFARE	URBAN BOULEVARD			X-Local	X
HEMPSTEAD RD	11TH ST	KATY RD	P-6-100 (Varies)	MEDIAN	100-200'	4	15,500-16,500	35,500-36,000	P-6-100 (Varies)	PRINCIPAL THOROUGHFARE	URBAN BOULEVARD			X-Local	X
TC JESTER BLVD	I-10	11TH ST	T-4-110	MEDIAN	120'	4	15,300	10,500-33,000	T-4-110	MAJOR THOROUGHFARE	SUBURBAN BOULEVARD	X			
E TC JESTER BLVD	11TH ST	I-610	T-4-80/120 (Varies)	MEDIAN	80-120'	4	9,000	10,500-33,000	T-4-110 (Varies)	MAJOR THOROUGHFARE	SUBURBAN BOULEVARD				
W TC JESTER BLVD	11TH ST	I-610	T-4-110	MEDIAN	110'	4	8,600	10,500-33,000	T-4-110	MAJOR THOROUGHFARE	SUBURBAN BOULEVARD				
DURHAM DR	I-10	I-610	P-4-60-70 (Couplet)	N/A	60'-70'	4	20,000-22,100	21,500-33,000	P-4-70	PRINCIPAL THOROUGHFARE	Couplet			X-Express	X
SHEPHERD DR	I-10	I-610	P-4-60/70 (Couplet)	N/A	70'	4	17,000-29,000	20,000-37,000	P-4-70	PRINCIPAL THOROUGHFARE	Couplet			X-Express	X
YALE ST	I-610	I-10	T-4-70	UNDIVIDED	70'	4	12,000-16,000	17,000-31,000	T-4-70	MAJOR THOROUGHFARE	URBAN AVENUE			X - Local I-610 to 19th	X
HEIGHTS BLVD	20TH	I-10	T-4-140/150	MEDIAN	140'-150'	4	9,500	8,000-20,000	MJ-2-140/150	MAJOR COLLECTOR	URBAN BOULEVARD	X	X	X-Local	X
STUDEWOOD ST	N MAIN ST	WHITE OAK DR	T-3-70/80	CTL (RL)	80'	3	9,000-19,600	10,500-17,500	T-2-80 with center turn lane.	MAJOR THOROUGHFARE	URBAN AVENUE			X-Express	X
STUDEWOOD ST	WHITE OAK DR	I-10	T-4-86	CTL (RL)	80'	4	9,000-19,600	10,500-17,500	T-4-80	MAJOR THOROUGHFARE	URBAN AVENUE			X-Express	X
AIRLINE DR	I-610	N MAIN ST	T-4-70/80	UNDIVIDED/ MEDIAN	70-80'	4	5,000-8,800	3,000-17,500	T-4-80	MAJOR THOROUGHFARE	URBAN AVENUE			X-Express	X
FULTON ST	I-610	BOUNDARY ST	TCS-2-75/95 (Varies)	LIGHT/RAIL	60+	4	7,700-11,400	4,000-14,000	VARIES	TRANSIT CORRIDOR STREET	TRANSIT AVENUE			X- Lightrail	X
FULTON ST	BOUNDARY ST	BURNETT ST	T-4-60/70	UNDIVIDED	60+	2	5,700	11,000-13,000	MJ-2-60/70	MAJOR COLLECTOR	URBAN AVENUE	X		X-Local	X
SAN JACINTO (FULTON ST)	BURNETT ST	I-10	T-4-Varies	N/A	N/A	N/A	N/A	9,000	T-4-80	MAJOR THOROUGHFARE	URBAN AVENUE	X		X-Local	X
IRVINGTON BLVD	I-610	FULTON ST	T-4-80	MEDIAN	80'	4	6,300-12,300	7,000-21,000	T-4-80	MAJOR THOROUGHFARE	URBAN BOULEVARD	X		X-Local	X
HARDY ST	I-610	LORRAINE ST	T-4-50/60 (Couplet)	X	50-60'	4	3,000-6,000	5,500-12,500	MJ-2-60	MAJOR COLLECTOR (COUPLET)	Couplet	X	X	X-Express	X
ELYSIAN ST	I-610	LORRAINE ST	T-4-60 (Couplet)	X	60'	4	4,500-8,500	9,000-15,000	MJ-2-60	MAJOR COLLECTOR (COUPLET)	Couplet	X	X	X-Express	X
ELYSIAN ST	LORRAINE ST	I-10	T-4-60	X	60'	4	4,500-8,500	9,000-15,000	T-4-60	MAJOR THOROUGHFARE	Couplet			X-Express	X

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*Note: Table arranged geographically by location of street. For best use, compare to Chapter VII. Outcome System Maps. Corridor Sheets are alphabetized.

STREET NAME	FROM	TO	EXISTING FUNCTIONAL CLASS	MEDIAN/CTL/ UNDIVIDED	MTFP ROW	NUM LANE	EXIST VOLUME RANGE	2035 VOLUME RANGES	MTFP IMPROVEMENT	UPDATED FUNCTIONAL CLASS	PROPOSED MMC	BIKE FACILITY	PARKING	TRANSIT	PED REALM
SAN JACINTO (FULTON ST)	BURNETT ST	I-10	T-4-Varies	N/A	N/A	N/A	N/A	9,000	T-4-80	MAJOR THOROUGHFARE	URBAN AVENUE	X		X-Local	X
IRVINGTON BLVD	I-610	FULTON ST	T-4-80	MEDIAN	80'	4	6,300-12,300	7,000-21,000	T-4-80	MAJOR THOROUGHFARE	URBAN BOULEVARD	X		X-Local	X
HARDY ST	I-610	LORRAINE ST	T-4-50/60 (Couplet)	X	50-60'	4	3,000-6,000	5,500-12,500	MJ-2-60	MAJOR COLLECTOR (COUPLET)	Couplet	X	X	X-Express	X
ELYSIAN ST	I-610	LORRAINE ST	T-4-60 (Couplet)	X	60'	4	4,500-8,500	9,000-15,000	MJ-2-60	MAJOR COLLECTOR (COUPLET)	Couplet	X	X	X-Express	X
ELYSIAN ST	LORRAINE ST	I-10	T-4-60	X	60'	4	4,500-8,500	9,000-15,000	T-4-60	MAJOR THOROUGHFARE	Couplet			X-Express	X
JENSEN DR	I-10	LORRAINE ST	T-4-60	UNDIVIDED	60'	4	5,000-7,500	10,000-12,000	T-4-60	MAJOR THOROUGHFARE	URBAN AVENUE			X-Express	X
JENSEN DR	LORRAINE ST	CAVALCADE ST	T-4-60	CTL	60'	2	4,000	6,500-7,500	T-4-60	MAJOR THOROUGHFARE	INDUSTRIAL AVENUE			X-Express	X
JENSEN DR	CAVALCADE ST	I-610	T-4-80	UNDIVIDED	80'	4	4,500-8,000	9,000-22,000	T-4-80	MAJOR THOROUGHFARE	INDUSTRIAL AVENUE			X-Express	X
N MAIN ST	I-610	CAVALCADE ST	T-4-70	UNDIVIDED	65'	4	4,500-10,000	18,000-23,000	T-4-70	MAJOR THOROUGHFARE	URBAN AVENUE	X*		X-Express	X
N MAIN ST	CAVALCADE ST	I-45	T-4-70	UNDIVIDED	65'	4	4,500-11,000	11,500-28,000	T-4-70	MAJOR THOROUGHFARE	URBAN AVENUE			X-Express	X
N MAIN ST	I-45	BOUNDARY ST	T-4-80	UNDIVIDED		4	4,500-11,000	11,500-28,000	T-4-80	MAJOR THOROUGHFARE	URBAN AVENUE			X-Express	X
N MAIN ST	BOUNDARY ST	I-10	TCS-2-varies (70-90)	N/A	70'	2	10,000-16,000	11,500-20,500	T-2-70-90	TRANSIT CORRIDOR STREET	TRANSIT AVENUE			X- Lightrail	X
KATY RD	I-610	HEMPSTEAD RD	T-4-100	MEDIAN	255'	4	7,500-18,000	18,000-28,000	T-4-100	MAJOR THOROUGHFARE	URBAN BOULEVARD	X		X-Express	X
WASHINGTON AVE	HEMPSTEAD RD	I-10	P-8-120	MEDIAN	255'	4	7,500-18,000	18,000-28,000	P-8-120 (Varies)	PRINCIPAL THOROUGHFARE	URBAN BOULEVARD	X		X-Express	X
ELLA BLVD	I-610	11TH	T-4-80	MEDIAN	80'	4	1,000-24,500	5,500-45,000	T-4-80	MAJOR THOROUGHFARE	URBAN BOULEVARD	X		X-Local	X
BURNETT ST	N MAIN ST	ELYSIAN VIADUCT	C-4-80	UNDIVIDED	60'	2	5,400	7,400	MJ-4-80	MAJOR COLLECTOR	URBAN AVENUE	X		X-Express	X
COLLINGSWORTH ST	FULTON	ELYSIAN ST	C-2-60	UNDIVIDED	55'	2	1,600	2,000-12,500	MJ-2-60	MAJOR COLLECTOR	URBAN STREET	X			
COLLINGSWORTH ST	ELYSIAN ST	US-59	C-4-60	UNDIVIDED		4	5,000	12,000-17,000	MJ-4-60	MAJOR COLLECTOR	URBAN AVENUE				
BOUNDARY ST	N MAIN ST	FULTON	TCS-2-60	UNDIVIDED	60	2	1,130	NA	TCS-2-60	TRANSIT CORRIDOR STREET	TRANSIT AVENUE			X- Lightrail	
HOUSTON AVE	N MAIN ST	I-10	T-4-60	UNDIVIDED	60	2	5,800	18,000	T-4-60	MAJOR THOROUGHFARE	URBAN AVENUE	X		X-Local	

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Additional Consideration: Minor Collectors

The following table details existing Collector Streets within the Heights-Northside that are not currently designated on the Major Thoroughfare and Freeway Plan (MTFP) for the City.

Collector Streets act as connections to and between arterials to help facilitate the movement of automobiles. These streets are more accommodating of other modes of transportation such as bicycles. In order to develop a more connected network, the streets in the following table have been proposed for an adjustment in the MTFP.

FULTON ST	FROM	TO	EXISTING FUNCTIONAL CLASS	MEDIAN/CTL/ UNDIVIDED	MTFP ROW	NUM LANE	EXIST VOLUME RANGE	2035 VOLUME RANGES	MTFP IMPROVEMENT	UPDATED FUNCTIONAL CLASS	PROPOSED MMC	BIKE FACILITY	PARKING	TRANSIT	PED REALM
FULTON ST	FROM	TO	EXISTING FUNCTIONAL CLASS	MEDIAN/CTL/ UNDIVIDED	MTFP ROW	NUM LANE	EXIST VOLUME RANGE	2035 VOLUME RANGES	MTFP IMPROVEMENT	UPDATED FUNCTIONAL CLASS	PROPOSED MMC	BIKE FACILITY	PARKING	TRANSIT	PED REALM
SEAMIST	18TH	11TH	LOCAL STREET	UNDIVIDED	60'	2		3,000-17,000	2	MINOR COLLECTOR	URBAN STREET	X			X
BEVIS	I-610	20TH	LOCAL STREET	UNDIVIDED	60'	2		2,000	2	MINOR COLLECTOR	URBAN STREET				X
BEVIS	20TH	TC JESTER	LOCAL STREET	UNDIVIDED	60'	2		6,000-8,000	2	MINOR COLLECTOR	URBAN STREET				X
BEALL	14TH	24TH	LOCAL STREET	UNDIVIDED	60'	2		3,000	2	MINOR COLLECTOR	URBAN STREET	X			
HARDY ROAD	I-10	LYONS	LOCAL STREET	UNDIVIDED	60'	2		NA	2	MINOR COLLECTOR	URBAN STREET	X			
MAKEE	I-10	LYONS	LOCAL STREET	UNDIVIDED	60'	2		NA	2	MINOR COLLECTOR	URBAN STREET	X			
KANSAS	HEMPSTEAD	TC JESTER	LOCAL STREET	UNDIVIDED	50'	2		3,000	2	MINOR COLLECTOR	URBAN STREET		X		X
LYONS AVE/ CONTI ST	MAKEE	SAN JACINTO	LOCAL STREET	UNDIVIDED	60'	2		NA	2	MINOR COLLECTOR	URBAN STREET	X			
14TH	DURHAM	MAIN	LOCAL STREET	UNDIVIDED	65'	2 (Wide)		3,500-5,500	2	MINOR COLLECTOR	URBAN STREET	X	X		
NORTH	HOUSTON	MAIN	LOCAL STREET	UNDIVIDED	60'	2		NA	2	MINOR COLLECTOR	URBAN STREET	X			
LINK	I-610	FULTON	LOCAL STREET	UNDIVIDED	50'	2		4,000-12,000	2	MINOR COLLECTOR	URBAN STREET	X			
TAYLOR/SAWYER	WATSON	I-10	LOCAL STREET	MEDIAN		4		30,000	4	MINOR COLLECTOR	URBAN STREET	X			
WATSON	PECORE	WATSON	LOCAL STREET	UNDIVIDED	60'	2		6,000-13,000	2	MINOR COLLECTOR	URBAN STREET	X			
24TH	ELLA	YALE	LOCAL STREET	UNDIVIDED	70'	2		1,200	2	MINOR COLLECTOR	URBAN STREET				

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6.2 Corridor Sheets

The purpose of this study is to recommend a network of modal facilities to efficiently move people within the study area. As such, the network is first evaluated at a system level to best understand where congestion might occur and why. Priority elements (pedestrian, parking, transit, pedestrian, and bicycle facilities) are evaluated at a more detailed level, where individual corridor examples are assessed to determine "what works" within a given scenario. Each of the Major Thoroughfares and Major Collectors are evaluated individually and can be found in alphabetical order in this chapter. Variables of this analysis include existing right-of-way, traffic counts, and current modal uses. Public comment and the traffic demand model results affect the recommendation process. Future conditions, such as the MTFP designations, projected volumes and other factors are also taken into consideration.

The corridor sheets that follow provide the following information for each corridor:

- Priority Elements identified by associated icon
- Existing Conditions
- Identified Needs
- Future Vision

Corridor sheets are arranged alphabetically and complement information provided in summary tables highlighted in Section 6.1: Highlighting Priority Elements. Summary tables are arranged by a corridor's geographic location and may be directly compared to the final system maps presented in Chapter VII. Outcomes.

Note: Provided corridor sheets define the proposed vision of the corridor and demonstrate how identified priority elements might be configured within a corridor. Corridor sheets serve as examples only. Final design is determined during the construction phase and deemed appropriate by a licensed Professional Engineer; detailed corridor design of this type is not appropriate at this high level of planning.

Priority Elements

Note: Although freight is not identified as a priority element, MMC designations of Industrial Boulevard/ Avenue/Street recommendation were considered based on area context. Examples for consideration include Jensen Drive.

Regional freight mobility, has been considered for the greater region of Houston and cross referenced for the purpose of this report. For more information, see H-GAC's Regional Goods Movement Study, Intermodal Connectors Inventory and Assessment, June 2013.

West 6th Street

Priority Elements

EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2	MTFP Designation	C-2-60
Existing Counts Range	50-1,000	Future Volume Range	1,500
Right-of-way	50'-60'	Proposed MMC	Urban Street
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	Undivided

Existing Condition

West 6th Street is a 2-lane undivided Major Thoroughfare with open ditches flanking both sides of the corridor expect for a portion of the road between Yale and Heights Blvd. Travel speeds are slow and single family homes are the prominent development type. The portion of the street west of Rutland Street, however, is mainly industrial with heavy truck usage. A detention pond recently constructed by TxDOT separates this section from the rest of the corridor.

Identified Needs

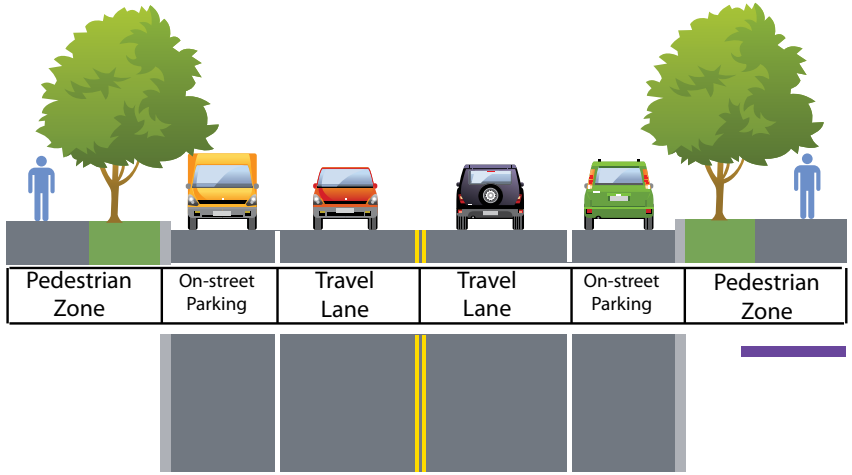
The public noted a lack of sidewalks on 6th Street east of Rutland Street. Of particular concern, is the complete lack of sidewalks along the south side of the corridor. The community expressed a strong desire to make this portion of 6th Street a more walkable neighborhood, especially where the corridor transitions into the White Oak District.

Future Vision

The portion of 6th Street west of Yale Street is recommended to be removed from the MTFP due the recently constructed detention pond between Rutland Street and Shepherd Drive. The removal of the corridor provides a nominal impact to the greater thoroughfare network as reflected in projected traffic volumes, and more accurately reflects the future condition of the network where the construction of a bridge across the detention pond is not envisioned.

The remaining portion of the corridor between Yale Street and Heights Boulevard is recommended to be reclassified as a Major Collector to further emphasis the corridor as a predominately residential connector. Similarly, the corridor is envisioned to accommodate wide sidewalks and encourage on-street parking for increase walkability. Given existing and planned development along the corridor, as well as associated priority elements mentioned, 6th Street is recommended as an Urban Street.

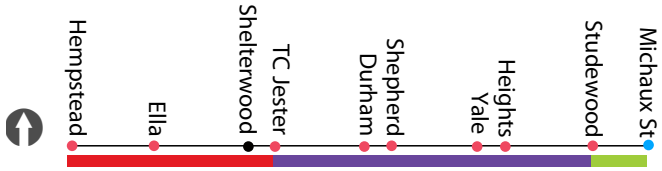
Possible Option(s):



NOTE: COLORED BAR(S) INTENDED TO CORRESPOND WITH CORRIDOR KEY AT THE TOP OF THE PAGE.

11th Street

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2-4	MTFP Designation	T-4-70/100; C-2-70
Existing Counts Range	6,800-14,400	Future Volume Range	7,500-35,500
Right-of-way	70'-100'	Proposed MMC	Urban Blvd/Ave/Street
Median/CTL/Undivided	Median/Undivided	Median/CTL/Undivided	Median/Undivided

Existing Condition

11th Street is a 4-lane, east-west Major Thoroughfare with a right-of-way that ranges from 70' - 100'. The segment between Hempstead Road and N. Shepherd Drive is 100' ROW, and 70' east of N. Shepherd Drive. Land use along the corridor varies, with a mix of residential and retail commercial uses east of Ella Blvd. A neighborhood-retail node is developing at 11th and Studewood Street with local restaurants, bakeries, and some mid-rise residential developments. Sidewalks are consistent throughout the corridor and exist on both sides.

Identified Needs

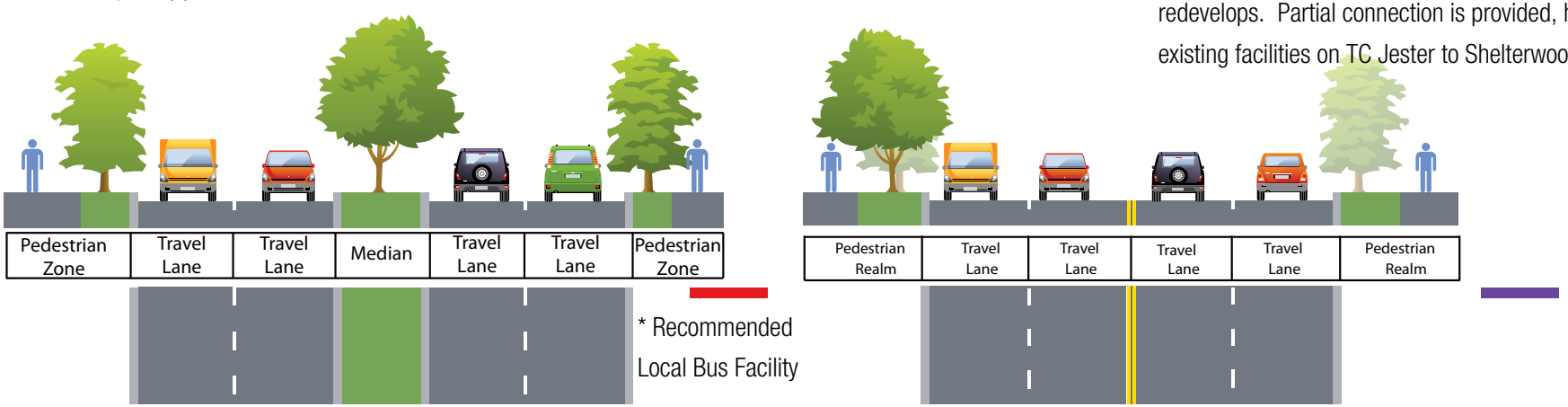
The character of this corridor is changing as more restaurants and smaller shops move into the area. The result has been an increased number of pedestrian and bicycle along the corridor. As such, bicycle safety was noted as a concern especially at existing bike facilities across 11th Street. Parking was also noted as a concern where future commercial-retail activity similar to 11th and Studewood might develop. Other comments expressed a desire for transit access along 11th Street into the Galleria area. Finally, traffic congestion along 11th Street' intersections at TC Jester Blvd, Durham Drive and Heights Blvd were noted.

Future Vision

The corridor is recommended to remain as a 4-lane Major Thoroughfare on the MTFP from Hempstead Highway to Studewood Drive given the length and diverse uses along the corridor ranging from residential to industrial uses. This portion of the corridor is also recommended as an Urban Blvd in preservation of the existing median and an Urban Avenue within the 70' right-of-way. East of Studewood the corridor is recommended as a Minor Collector and Urban Street given the corridor's 2-lane configuration and low projected traffic volumes. To better accommodate access to local residential amenities and commercial activity, a local bus service is recommended.

Due to right-of-way limitations, a bike facility is currently not recommended but, should be explored as the area redevelops. Partial connection is provided, however, from existing facilities on TC Jester to Shelterwood Drive.

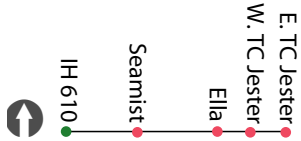
Possible Option(s):



NOTE: COLORED BAR(S) INTENDED TO CORRESPOND WITH CORRIDOR KEY AT THE TOP OF THE PAGE.

West 18th Street

Priority Elements

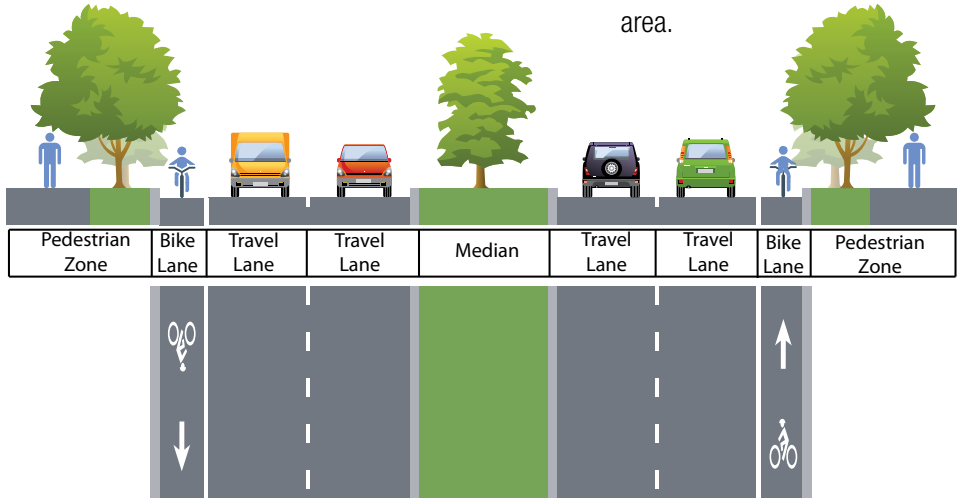


EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4	MTFP Designation	T-4-100
Existing Counts Range	11,000-14,500	Future Volume Range	19,500-29,000
Right-of-way	100'	Proposed MMC	Urban Boulevard
Median/CTL/Undivided	Median	Median/CTL/Undivided	Median

Existing Condition

West 18th Street, from IH 610 to East TC Jester, is classified as a 4-lane Major Thoroughfare with 100' right-of-way (ROW). The corridor transitions into 20th Street east of TC Jester creating a continuous east-west connector through the Heights into the Northside study area. TC Jester Park is located at East TC Jester and West 18th Street and provides access to the off-street White Oak Bayou Trail network. Land use along the corridor consists of single-family residential, multi-family residential and commercial-retail.

Possible Option(s):



Identified Needs

Public input for West 18th Street focused on the intersection of West 18th/20th and East TC Jester. the current intersection design is skewed and makes it difficult for traffic to continue onto 18th Street. Realignment of this intersection could possibly open up through traffic along 18th Street. Further analysis is needed to determine the proper redesign of this intersection.

Additional connections along West 18th Street to the off-street trail network were also expressed as a strong desire by the community. Bike facilities and transit were also noted as a potential connection to light-rail in the Northside area.

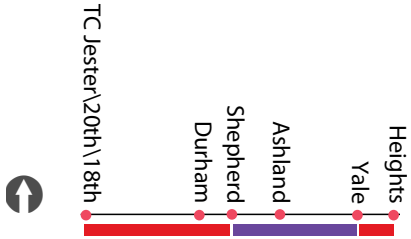
Future Vision

West 18th Street is recommended to remain a 4-lane Major Thoroughfare based on projected traffic demands. A bicycle facility is also recommended. This would provide a continuous east-west facility along the 18th/20th/Cavalcade corridors as well as the desired connection to the off-street White Oak Bayou trails. West 18th Street is recommended as an Urban Boulevard in preservation of the existing median and access management of vehicular traffic. Given existing connection to IH 610 and IH 45, High Frequency Transit is recommended along this corridor.

* Recommended High Frequency Transit

19th Street

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2-4	MTFP Designation	C-2-70
Existing Counts Range	2,000-5,500	Future Volume Range	10,000-12,500
Right-of-way	70'	Proposed MMC	Urban Street
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	Undivided

Existing Condition

19th Street is currently classified as a local street and therefore, not included in the 2014 MTFP. Existing right-of-way varies between 70' and 90'. Development along the corridor is retail-commercial and is expected to develop as a neighborhood retail corridor. A number of properties east of Shepherd Drive have developed into high density single-family townhouses. The road configuration consist of two cross-sections:

- West 18th/20th/T.C. Jester to Shepherd: 2-lanes with open ditch
- Shepherd to Heights Blvd: 2-lanes with on-street parking in some places inclusive of both head-in and parallel parking facilties.

Identified Needs

19th Street is parallel to 20th Street which is a Major Thoroughfare. Given the future volumes and associated speeds anticipated on 20th Street by automobile traffic, 19th Street may serve as a neighborhood collector for certain types of pedestrian and bicycle traffic not comfortable with traffic patterns on 20th Street. With the presence of smaller shops and restaurants closer to the street, safe crossing and slower traffic speeds were expressed by public comment as well as an enhanced pedestrian realm for increased walkability.

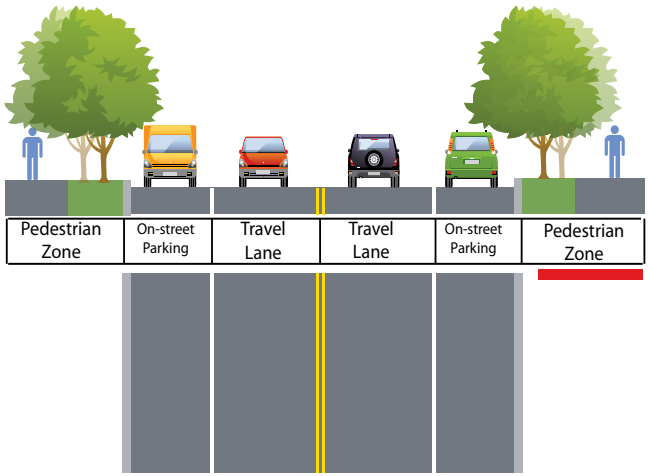
Future Vision

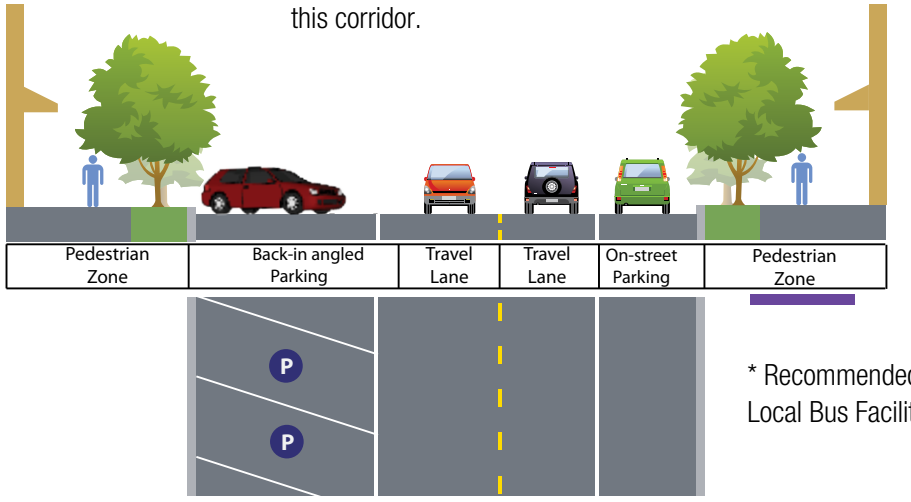
This corridor is recommended to be added to the MTFP as a Minor Collector given the existing land use and connectivity. It is also recommended to be classified as an Urban Street with two potential cross-sections which are in line with priority elements highlighted by the community:

- West of Shepherd Drive: 2-lanes of vehicular traffic with parallel parking is recommended for increased access to commercial uses along the corridor. The provided configuration allows ample use of the pedestrian zone while maintaining the movement of two-way traffic.
- Shepherd to Yale: 2-lanes of vehicular traffic with parallel parking as provided within the existing condition. However, possible redesign of existing head-in parking to angled or back-in angled parking needs to be evaluated.

Also, local transit is recommended to facilitate pedestrian traffic along this corridor.

Possible Option(s):





* Recommended Local Bus Facility

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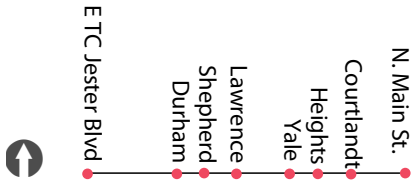
20th Street

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2-4	MTFP Designation	T-4-70
Existing Counts Range	6,600-10,000	Future Volume Range	10,000-22,000
Right-of-way	70’	Proposed MMC	Urban Avenue
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	Undivided

Existing Condition

20th Street is a Major Thoroughfare that travels east-west through the Heights area and into the Northside neighborhood as Cavalcade Street. The corridor is characterized by many commercial uses, which contributes to high pedestrian traffic between E. TC Jester and Shepherd. The corridor also serves as a residential connector to several neighborhood amenities such as the area grocery store, dental office, banks, schools and churches. 20th Street’s existing cross section transitions at several points from E. TC Jester to N. Main Street including:

- E. TC Jester: 2-lane undivided corridor with sidewalks flanking both sides of the road. Head-in parking is evident adjacent to several businesses.
- Shepherd: 4-lane undivided section with sidewalks and planting strips.
- Lawrence: 2-lane corridor divided with a center turn lane.
- Rutland: 4-lane undivided and the primary location of big box commercial along the corridor.
- Courtland: 2-lane divided with a center turn lane, and a stripped bike lanes.
- Main Street: 4-lane divided esplanade, and continued bike lane.

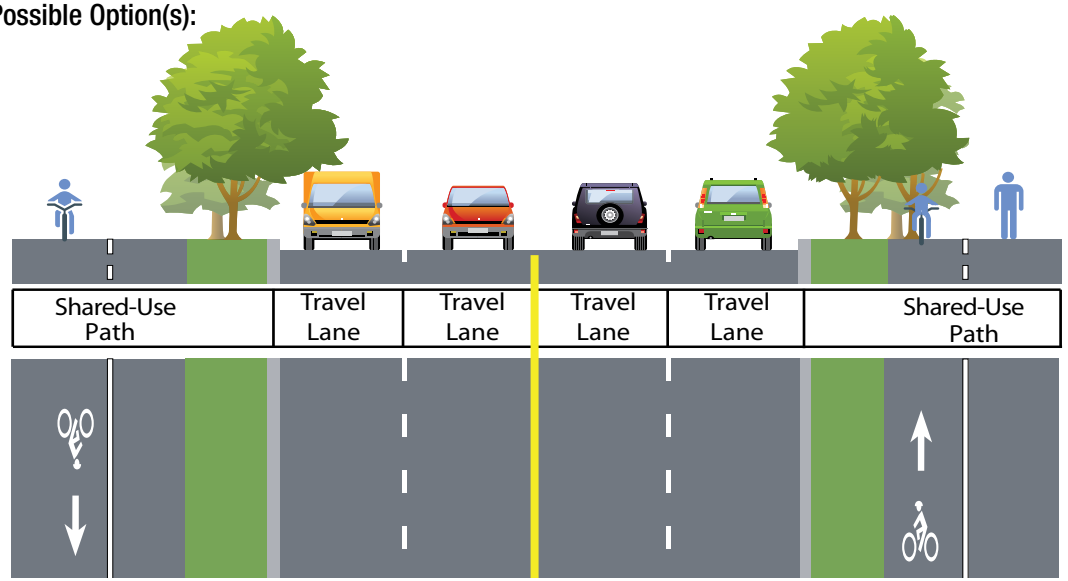
Identified Needs

The corridor is essential for vehicular movement within the study area. The bike lane along 20th Street, which continues onto Cavalcade, is very important to bicyclist and provides one of the only east-west connection for bicyclists between the Heights and Northside neighborhoods. This connection is only expected to increase in popularity for cyclists as the North Line (Red) light-rail begins operations. However, due to the narrow width of existing bike lanes many bicyclists do not feel safe riding on this road. Several intersections noted for congestion include Durham Drive, N. Main Street, and E. TC Jester Blvd.

Future Vision

20th Street is recommended to remain as a 4-lane Major Thoroughfare based on projected traffic volumes and function as the primary east-west vehicular corridor within the study area. Given the existing context the corridor is further recommended as an Urban Avenue. A bike facility is also recommended. A shared-use path (where the pedestrian and bike share a wider sidewalks) should be explored. A High Frequency Transit facility would greatly benefit the corridor, due to its east-west connection. Additional focus should be given to the pedestrian realm to create a safe and walkable corridor.

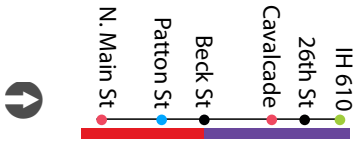
Possible Option(s):



* Recommended High Frequency Transit

Airline Drive

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4	MTFP Designation	T-4-80
Existing Counts Range	5,000-8,800	Future Volume Range	3,000-17,500
Right-of-way	70'/80'	Proposed MMC	Urban Avenue
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	Median/CTL/ Undivided

Existing Condition

Airline Drive is a 4-lane Major Thoroughfare with 70' to 80' right-of-way. During the time of this study, reconstruction of the corridor commenced. The provided cross section will be constructed as, a 4-lane corridor. Variations include:

- N. Main Steet to Cavalcade: 4-lane undivided corridor. The surrounding landuse is comprised of mainly commercial and industrial uses. The corridor is also home to the a local outdoor farmers market north which is a neighorhood attractor for all mode types.
- Cavalcade to IH 610: 4-lane corridor with center turn lane.

On-street parking is not anticipated, however, sidewalks will be provided on either side of the corridor.

Identified Needs

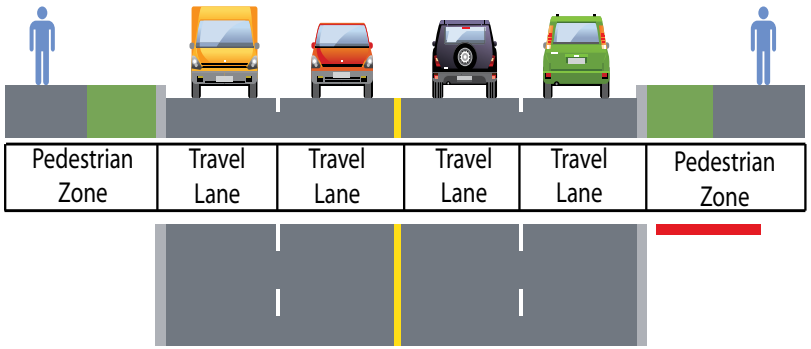
This corridor has a daily farmers market that brings heavy traffic to the area ranging from 18 wheeler trucks and passenger vehicles mixed in with pedestrians and bicyclists. There is a desire to enhance and increase the connectivity of sidewalks with a particular focus on pedestrian crossings.

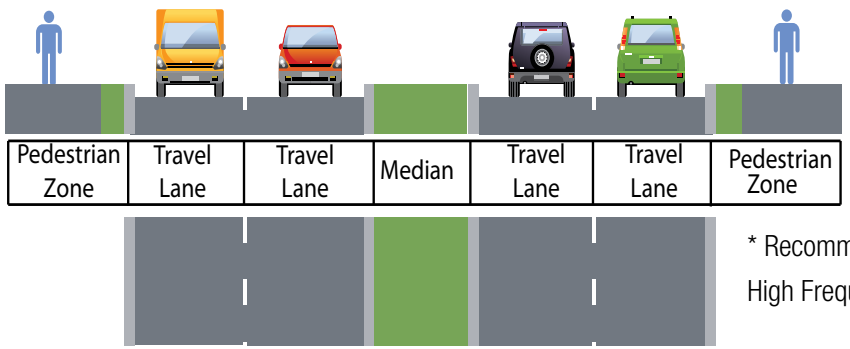
Future Vision

Airline Drive is recommended to remain as 4-lane Major Thoroughfare on the MTFP given projected traffic volumes and the diversity of use along the corridor. Given the provided context, the corridor is further recommended to be classified as an Urban Avenue. Enhancing the pedestrian realm across Airline Drive will be a huge benefit, especially to pedestrians traveling to and from the farmers market. Two locations where raised crosswalks with special design considerations would be beneficial include: Aurora Street and Sylvester Road.

The activity centers along the corridor indicate a need for High Frequency Transit. Due to constraints within the right-of-way, a bike facility is not recommended.

Possible Option(s):





* Recommended High Frequency Transit

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Burnett Street

Priority Elements

EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2	MTFP Designation	C-4-80
Existing Counts Range	5,400	Future Volume Range	7,400
Right-of-way	60'	Proposed MMC	Urban Avenue
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	Undivided

Existing Condition

Burnett Street is a 2-lane undivided Major Collector without curb and gutter. It services local residences and a few other development types. The Red Line light rail stop, Burnett Transit Center Casa De Amigos, is also located along the eastern side of the corridor just before Main Street.

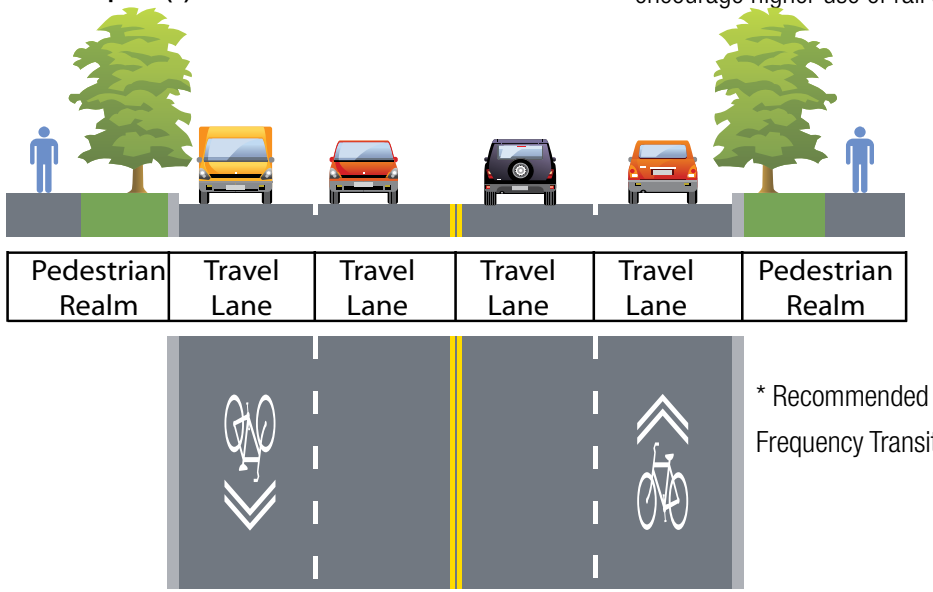
Identified Needs

Hardy Yards is an approximately 50-acre site slated for a major mixed use development on the southern border of Burnett Street. As such, various sidewalk and roadway improvements are expected with this provided development, as well as additional connection into Downtown from the Northside area. As Burnett Street is reconstructed, pedestrian and bicycle facilities with parking consideration will need to be a priority to enhance safety along the corridor. These improvements will also encourage higher use of rail and bus transit.

Future Vision

Burnett Street is recommended to remain as Major Collector. However, due to anticipated traffic volumes and expected development along the corridor, it is recommended to be increased from a 2-lane to 4-lane Major Collector with 80' right-of-way. Further, it is recommended to be classified as an Urban Avenue given anticipated context change associated with the Hardy Yards development. Moving bicyclist and pedestrians to and from the neighborhoods, the White Oak Bayou Trail, the University of Houston Campus and the downtown area will be a key attribute for this small corridor. The corridor has already been designed, and is engineered to be constructed as a 4-lane facility with wider outside lanes to be shared with bicyclists and motorists. The provided design allows for a wider pedestrian realm which is beneficial in a retail-focused environment. Finally, transit will play important role along this corridor with Burnett Transit Center located on Burnett near Main Street. Although an alternative facility is also recommended on Hogan Street just north of this corridor, Burnett Street provides a more direct access to light rail and expected commercial developments. Given the corridors current condition, however, transit turning movements are more appropriately accommodated on Hogan Street today.

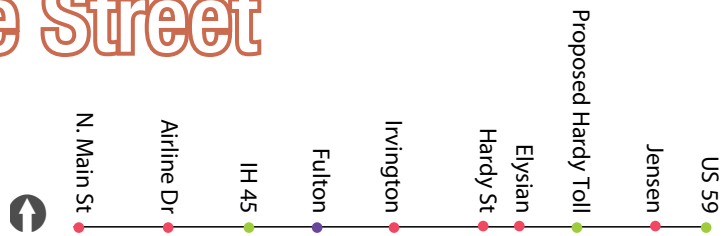
Possible Option(s):



* Recommended High Frequency Transit

Cavalcade Street

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4	MTFP Designation	T-4-90/100
Existing Counts Range	10,900-15,500	Future Volume Range	22,100-24,200
Right-of-way	90/100'	Proposed MMC	Urban Boulevard
Median/CTL/Undivided	Median	Median/CTL/Undivided	Median

Existing Condition

Cavalcade is an east-west regional connector from the Heights area across IH 45 to the Northside neighborhood continuing westward into Houston's 5th Ward. The corridor is currently designed as a 4-lane divided Major Thoroughfare with 90'-100' right-of-way. Uses along the corridor transition between commercial/retail to residential with evidence of high pedestrian activity. Irvington Park is also directly adjacent to the corridor and is heavily used for its athletic facilities and picnic areas. A striped bike lane is also provided east of N. Main Street. METRO's Red Line also maintains the Calvalcade light rail stop at Fulton.

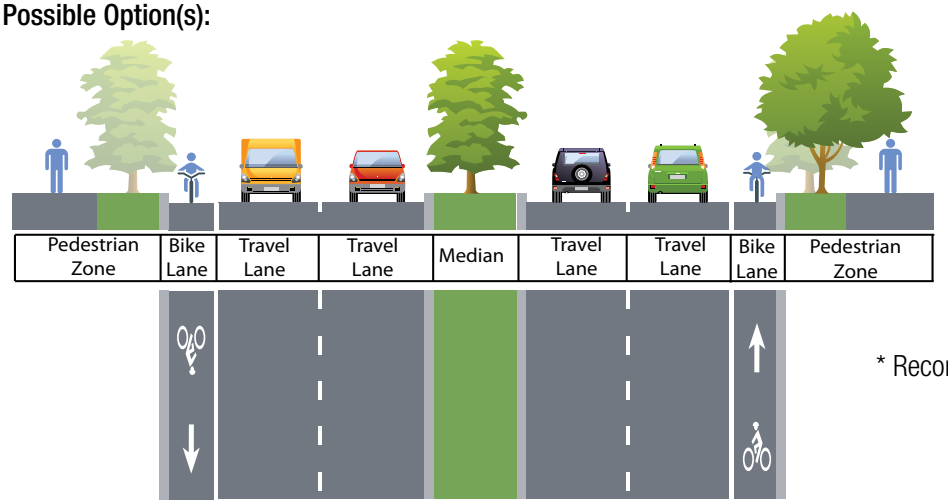
Identified Needs

The public expressed concern regarding the existing bike lane along Cavalcade as being too narrow given the travel speeds and traffic along Cavalcade. The continuation of a wider bike lane into the Heights area was also requested where current facilities were regarded as not clearly visible west of Main Street. Intersection designs with inadequate turning radii for buses were noted as a concern. Traffic delays were identified at the intersection at Fulton Street and the five way intersection at 20th Street/Calvacade Street, N. Main Street and Studewood Street.

Future Vision

Cavalcade Street is recommended to remain as Major Thoroughfare on the MTFP and be further classified as an Urban Boulevard in preservation of the esplanade. Bike lanes are also recommended to be widened for increased safety. To accommodate a wider facility, the existing median may be narrowed. Given the location of the Cavalcade Red Line Metro Stop, as well as a number of neighborhood amenities, completing sidewalk gaps is also recommended. High Frequency Transit is also recommended for this corridor.

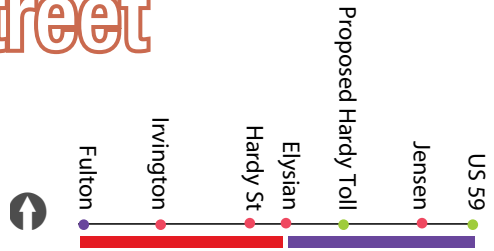
Possible Option(s):



* Recommended High Frequency Transit

Collingsworth Street

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2/4	MTFP Designation	C-2/4-60
Existing Counts Range	1,600-5,000	Future Volume Range	2,000-17,000
Right-of-way	55'	Proposed MMC	Urban Ave/St
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	Undivided

Existing Condition

Collingsworth Street is a Major Collector that provides access to US 59 and the METRO rail facilities on Fulton Street. Moody Park is a regional and neighborhood attractor located at the terminus of Collingsworth and Fulton providing such amenities as an outdoor swimming pool, workout facilities, and community meeting rooms. The corridor is currently designed in two different cross sections:

- Fulton to Elysian: 2-lane, undivided with mostly residential development.
- Elysian to US 59: 4-lane corridor with industrial development.

Identified Needs

Public input expressed a desire for a bike facility along a portion of the corridorto connect the residents to the light-rail and Moody Park.

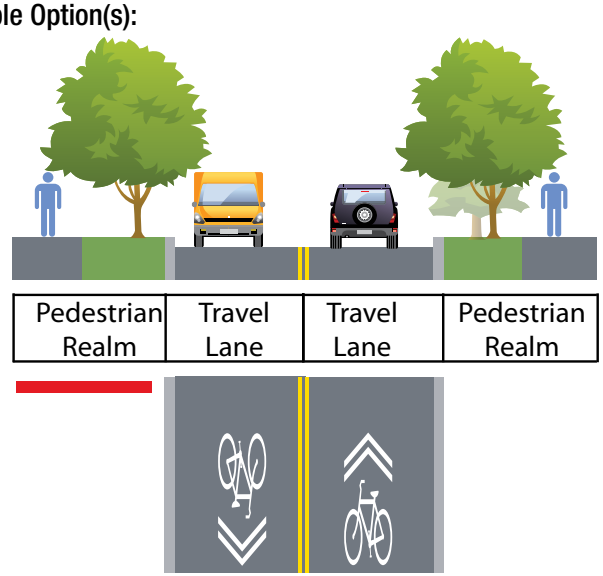
Future Vision

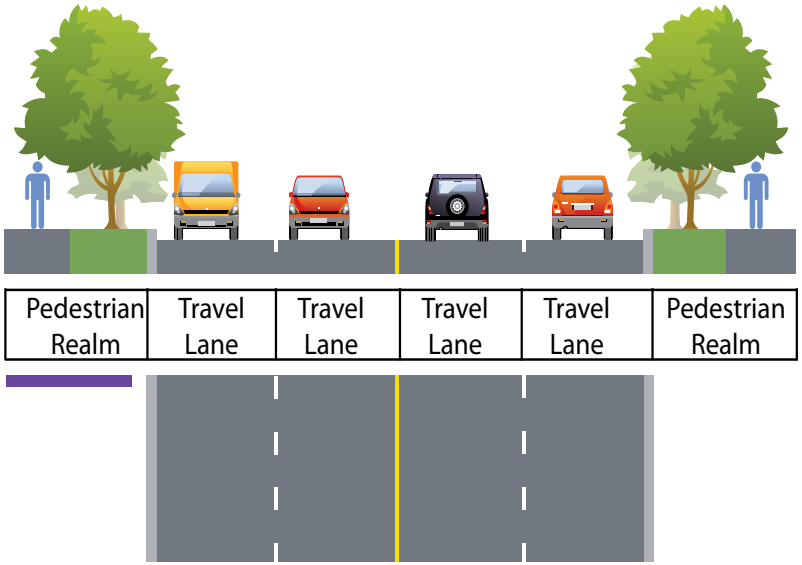
The existing 2- and 4-lane Major Collector designation are recommended to be maintained for proper accommodation of projected traffic demands. Given the provided context of the corridor, multi-modal classifications are recommended as:

- Fulton to Elysian: Urban Street
- Elysian to US 59: Urban Avenue.

TTo better provide multi-modal accessibility to and from Moody Park as well as the light rail, a bike facility is also recommended from Fulton to Elysian.

Possible Option(s):





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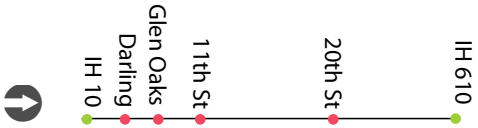
Durham Drive

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4	MTFP Designation	P-4-70
Existing Counts Range	20,000-22,100	Future Volume Range	21,500-33,000
Right-of-way	60'/70'	Proposed MMC	Couplet
Median/CTL/Undivided	N/A	Median/CTL/Undivided	N/A

Existing Condition

Durham Drive is a southbound, one-way Principal Thoroughfare from IH 610 to IH 10 that operates as a couplet with Shepherd Drive for northbound traffic. The majority of the corridor is 4-lanes. Local residents referred to this corridor as a "complete commuter street" as the majority of users are regional in nature passing through the Heights to IH 45 or south to the Montrose area. The corridor does maintain sidewalks, but the condition is degraded and not continuous along both sides of the corridor. The corridor maintains a 4-lane bridge across White Oak Bayou. A narrow sidewalk is apparent along one-side of the bridge, but is insufficient.

Identified Needs

A strong desire for bike lanes and sidewalks along the corridor was expressed by the public. The corridor's bridge across White Oak Bayou is also seen as a barrier for non-vehicular traffic where existing facilities are too narrow. The public noted the existing sidewalk facility is not safe for a pedestrian, much less a bike. Pedestrian crossings across Durham Drive are also needed. In addition to creating and connecting these pedestrian realms, aesthetic improvements, like the addition of street trees, were mentioned.

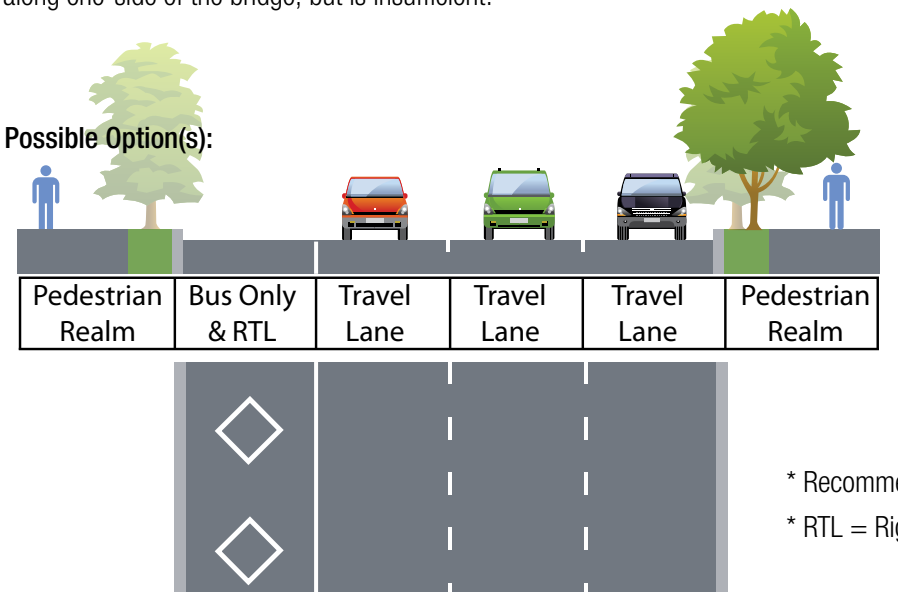
Future Vision

Durham Drive is recommended to maintain its current 4-lane Couplet design to meet current and future vehicular capacity needs. As such, an on-street bike facility is not recommended. Wider, continuous pedestrian facilities are important for internal community connectivity as well as enhanced access to transit stops. Pedestrian crossings at major intersections and the provided bridge should be further evaluated for proper design.

High Frequency Transit for the Durham/Shepherd Couplet is recommended. Given the importance of this corridor as a regional connector, it is recommended that one travel lane be designated as a bus only lane, and where appropriate, right-turn only lane for increased efficiency. As a designated High Frequency Transit facility, importance of the pedestrian realm is further prioritized for this corridor. Bus shelters, wider sidewalks and properly placed cross walks at intersections near transit stops are recommended for a more safe and pedestrian-friendly area.

For more information regarding associated design standards for northbound traffic, see the Shepherd Corridor Sheet.

Possible Option(s):



* Recommended High Frequency Transit
* RTL = Right Turn Lane

Ella Blvd

Priority Elements

EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4	MTFP Designation	T-4-80
Existing Counts Range	1,000-24,500	Future Volume Range	5,000-45,000
Right-of-way	80’	Proposed MMC	Urban Boulevard
Median/CTL/Undivided	Median	Median/CTL/Undivided	Median

Existing Condition

Ella Blvd is currently a 4-lane Major Thoroughfare with a median and 80’ right-of-way. Ella is currently striped for a bike lane, and is the only north-south corridor in the Heights area to provide a bicycle facility to IH 610. Irvington Blvd provides the next potential bicycle facility across IH 610 and is located 4 miles west of Ella Blvd. The corridor also provides access to the White Oak Bayou Trail at East TC Jester.

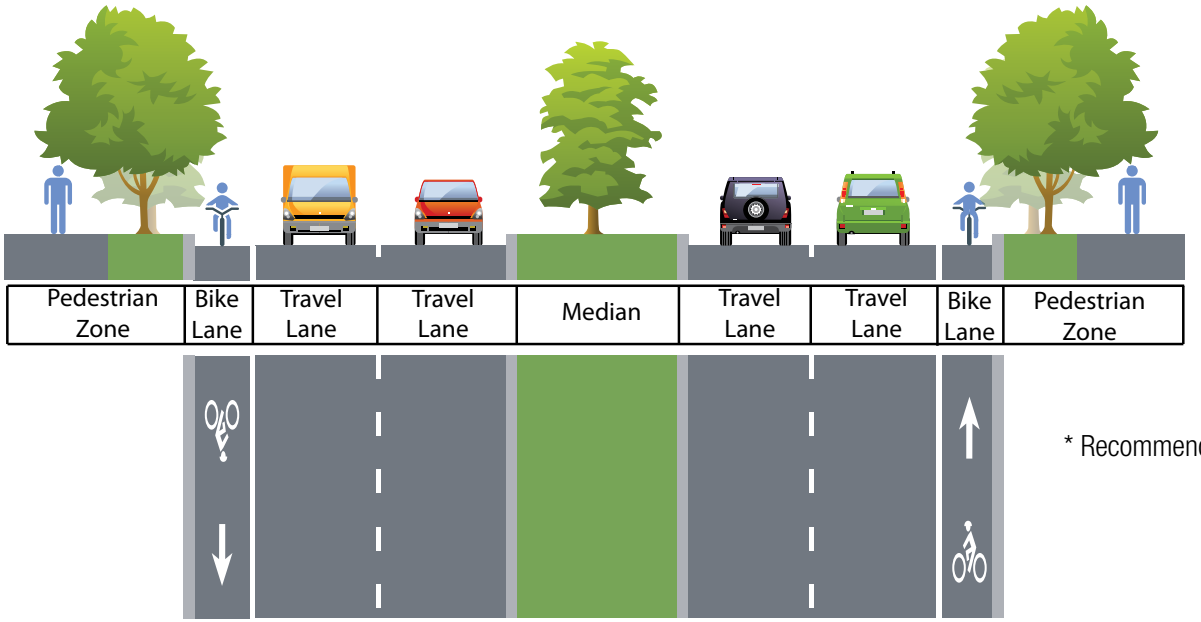
Identified Needs

Model results indicate that Ella Blvd maintains significant vehicular demands to warrant a Principal Thoroughfare designation on the MTFP. However, due to the existing context and residential nature of the corridor, a Major Thoroughfare is a more appropriate designation. Public comment indicates pedestrian crossings are the main point of concern for area residents. Primary intersections where pedestrian crossing were noted concerns include TC Jester and IH 610.

Future Vision

It is recommended that Ella Blvd continue to operate as a 4-lane Major Thoroughfare for sufficient movement of vehicles. A Urban Boulevard designation is recommended for this corridor in preservation of the median. Median breaks should be further evaluated to improve traffic flow while ensuring maximum access management. Similarly, it is recommended that the provided bike facility remain for needed connectivity of the bike network under IH 610 as well as access to the White Oak Bayou off-street trails. Where appropriate, however, it is recommended that the median be reduced slightly to allow for wider bike lanes. A local bus facility is also recommended to ensure a greater number of stop locations along the corridor.

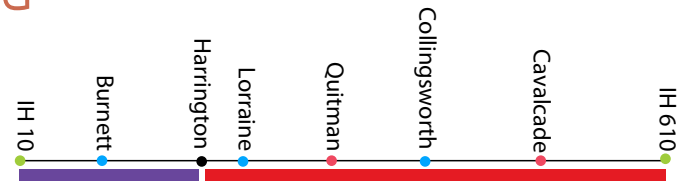
Possible Option(s):



* Recommended Local Bus Facility

Elysian Street

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4	MTFP Designation	C-2-60; T-4-60
Existing Counts Range	4,500-8,500	Future Volume Range	9,000-15,000
Right-of-way	60’	Proposed MMC	Couplet
Median/CTL/Undivided	N/A	Median/CTL/Undivided	Undivided

Existing Condition

Elysian Street is a one-way, 4-lane undivided Major Thoroughfare for northbound traffic traveling from downtown to the Hardy Toll Road. The corridor merges with its southbound couplet, Hardy Road, just south of Lorraine Street. In total, the Elysian-Hardy couplet maintains 8-lanes of vehicular travel lanes. Landuse along the corridor is primarily residential, however, light industrial is evident closer to the Hardy Toll Road entrance ramp.

Identified Needs

The posted speed limit along Elysian is 35 mph. However, public comment indicates that traffic travels at speeds much greater than the posted limit due to the corridor’s connection to the Hardy Toll Road. The public also noted that on-street parking is a desire. Finally, with the potential introduction of the Hardy Toll Road extension along the western boundary of the study area, residents expressed a need for greater connectivity of local streets into downtown.

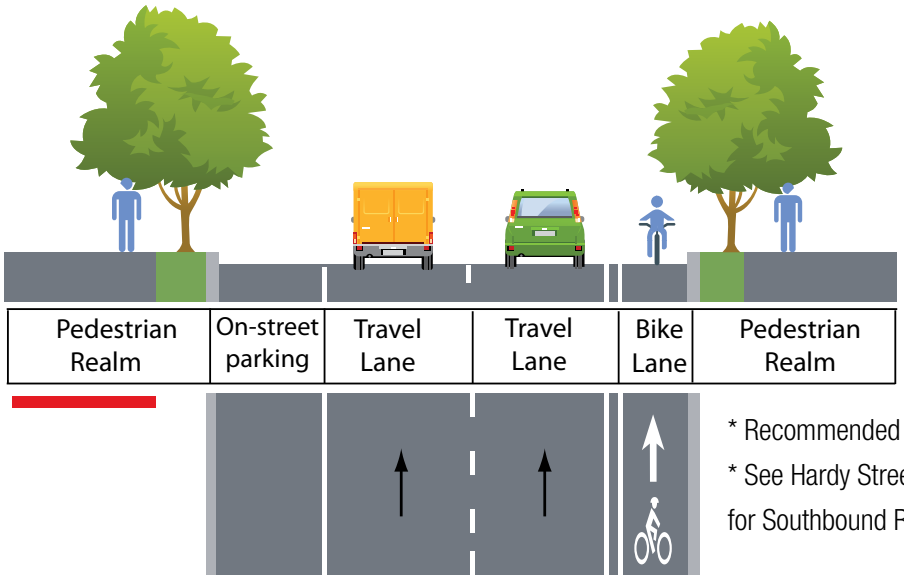
Future Vision

Elysian Street, from Harrington Street to IH 610, is recommended to remain as a one-way, northbound Urban Couplet. It is also recommended this section of Elysian Street be reclassified as a Major Collector. With the proposed extension of the Hardy Toll Road, the carrying capacity required is anticipated to decrease. As such, the number of lanes are also recommended to be reduced from 4- to 2-lanes of vehicular traffic. As a couplet, a potential design solution may include on-street parking along one side of the corridor and a buffered bike lane on the other; Hardy is intended to mirror this design for southbound traffic. Elysian Street, south of Harrington Street, is recommended to remain as a 4-lane Major Thoroughfare to sufficiently capture traffic from the Elysian-Hardy Couplet and Hardy Toll Road.

A High Frequency Transit facility is also recommended and is consistent with METRO’s System Reimagining Plan.

For more information regarding associated design standards for southbound traffic, see the Hardy Corridor Sheet. Alternative options considered for the Urban Couplet pairing may be viewed in Appendix D: Hardy-Elysian Option Considerations of the report.

Possible Option(s):

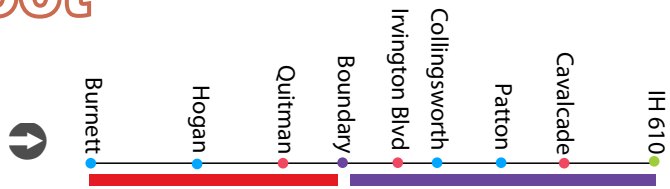


* Recommended High Frequency Transit
* See Hardy Street Corridor Sheet for Southbound Recommendation

NOTE: COLORED BAR(S) INTENDED TO CORRESPOND WITH CORRIDOR KEY AT THE TOP OF THE PAGE.

Fulton Street

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2/4	MTFP Designation	TCS-2-varies; C-2-60/70
Existing Counts Range	5,700-11,400	Future Volume Range	4,000-14,000
Right-of-way	55-60+	Proposed MMC	Transit/Urban Avenue
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	N/A

Existing Condition

Fulton Street was redesigned to accommodate light-rail north of Boundary Street and is designated as a Transit Corridor Street on the MTFP, including 2-lanes with varying right-of-way widths (80'-100'). Reconstruction of the corridor was completed in December 2013. Fulton, south of Boundary Street, is designated as a 4-lane Major Thoroughfare. Although some residential landuse exist, the corridor is also aligned with retail-commercial uses. Moody Park, a city park located directly adjacent to Fulton Street, is a neighborhood and amenity inclusive of a pool, work out facilities, conference rooms and recreational event spaces.

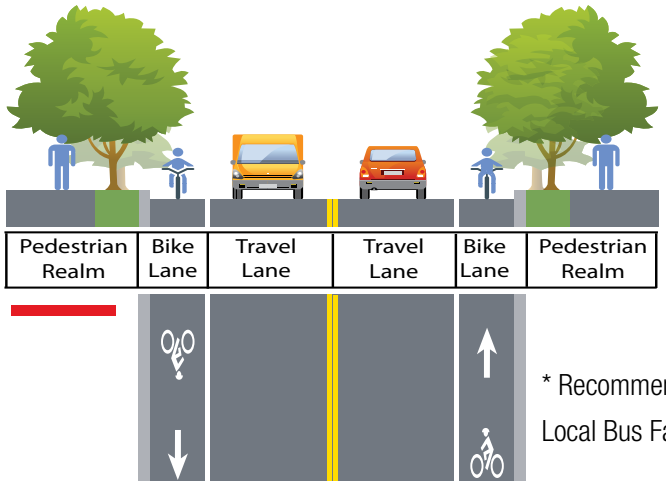
Identified Needs

The light rail was noted as a benefit for the community. However, concerns regarding safe crossing of the corridor to Moody Park as an issue. Similiary, designated crosswalks to light rail stations is also lacking along some portions of the corridor. The portion of the corridor south of Boundary Street currently functions as a 2-lane Collector Street. However, with the onset of a relatively large commercial development - Hardy Yards - south of Burnett Street, traffic is only anticipated to increase. Given the length of the corridor and the relative neighborhood context, current functional classification does not accurately reflect the intended traffic needs of the corridor.

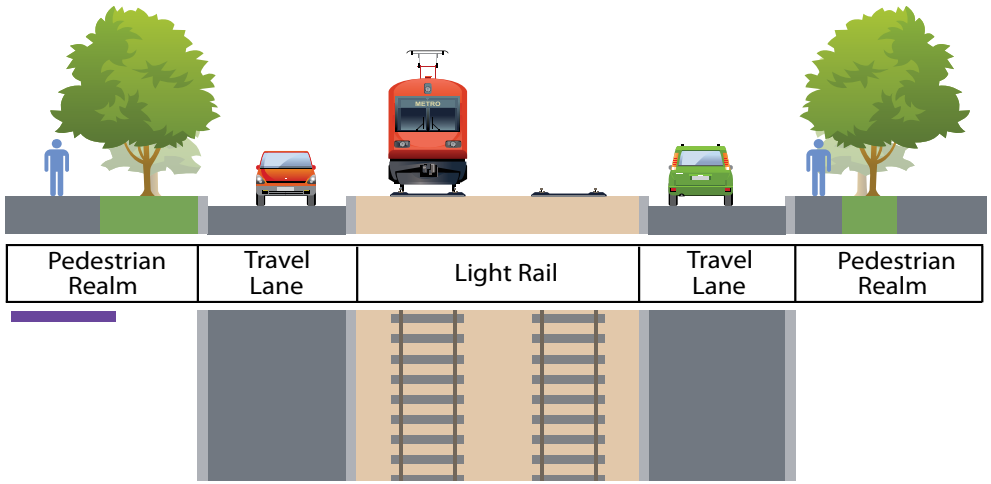
Future Vision

Fulton Street is recommended to remain as a Transit Avenue north of Boundary Street. Future volume is anticipated to increase south of Boundary Street, however, indicate that 4-lanes of vehicular traffic are not warranted. As such, the corridor is recommended to be classified as a 2-lane Major Collector. To improve access to light rail, as well as provide a multi-modal connection to the anticipated Hardy Yard development and future connection to downtown, designated bike lanes are recommended along this portion of the corridor. Fulton Street is also recommended to be classified as an Urban Avenue south of Boundary Street.

Possible Option(s):



* Recommended Local Bus Facility



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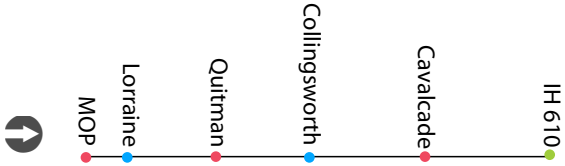
Hardy Street

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4	MTFP Designation	C-2-60
Existing Counts Range	3,000-6,000	Future Volume Range	5,500-12,500
Right-of-way	50'/60'	Proposed MMC	Couplet
Median/CTL/Undivided	N/A	Median/CTL/Undivided	Undivided

Existing Condition

Hardy Street is a one-way, 4-lane undivided Major Thoroughfare that moves traffic southbound from IH 610 to IH 10. It runs parallel to Elysian Street, which together, operate as an 8-lane couplet through the study area. Hardy Street fluctuates between 50'-60' of right-of-way along its length. Development along the corridor is residential with a few other uses including schools, and smaller "mom and pop" commercial facilities.

Identified Needs

The Travel speed along Hardy is 35 mph. However, public comment indicates that traffic travels at speeds much greater than the posted limit due to the corridor's connection to the Hardy Toll Road directly north of the study area. The public also noted that on-street parking is a desire. Finally, with the potential introduction of the Hardy Toll Road extension along the western boundary of the study area, residents expressed a need for greater connectivity of local streets into downtown.

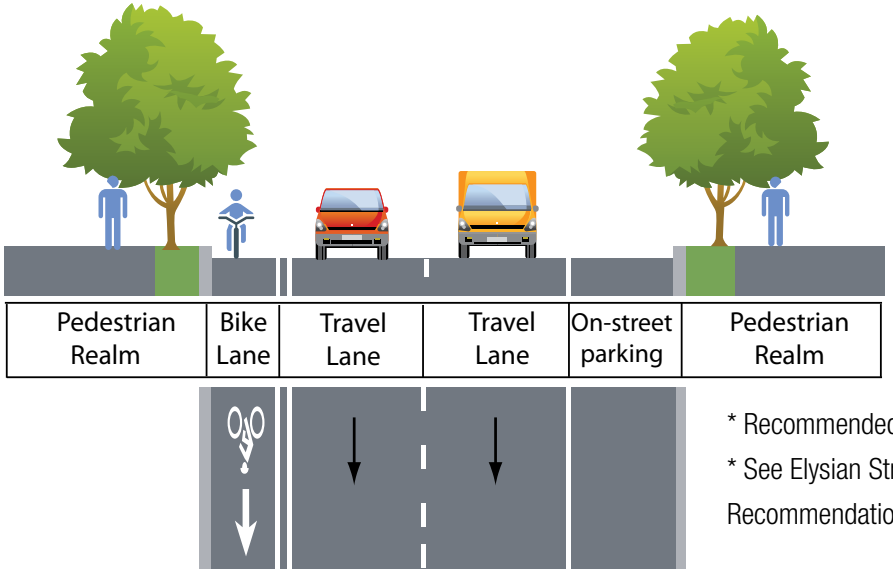
Future Vision

Hardy Street is recommended to remain as a one-way, southbound Urban Couplet. It is also recommended Hardy Street be reclassified as a Major Collector. With the proposed extension of the Hardy Toll Road, the carrying capacity required of this street is anticipated to decrease. As such, the number of lanes are also recommended to be reduced from 4- to 2-lanes of vehicular traffic. As a couplet, a potential design solution may include on-street parking along one-side of the corridor and a buffered bike lane on the other; Elysian is intended to mirror this design for northbound traffic.

A High Frequency Transit facility is also recommended and mimics METRO's System Reimagining Plan.

For more information regarding associated design standards for northbound traffic, see the Elysian Corridor Sheet. Alternative options considered for the Urban Couplet pairing may be viewed in Appendix D: Hardy-Elysian Option Considerations of the Report.

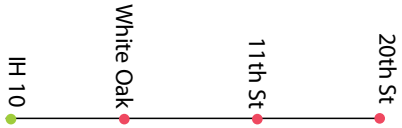
Possible Option(s):



* Recommended High Frequency Transit
* See Elysian Street Corridor Sheet for Northbound Recommendation

Heights Boulevard

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4 (2-Operational)	MTFP Designation	C-2-140'-150'
Existing Counts Range	9,500	Future Volume Range	8,000-20,000
Right-of-way	140'-150'	Proposed MMC	Urban Boulevard
Median/CTL/Undivided	Median	Median/CTL/Undivided	Median

Existing Condition

Heights Boulevard is classified as a 4-lane divided Major Thoroughfare with 140'-150' right-of-way. Operationally, however, the corridor only maintains 2-lanes of vehicular traffic between IH 10 and 20th Street. The remaining travel lanes have been restriped to accommodate on-street parking and a bike lane. Parking is removed, however, at intersections to accommodate left-hand turning movements. A jogging trail is also located down the middle of the corridor's wide median. Pedestrian and bicycle activity are high along this corridor and appear to accommodate both the recreational and commute users.

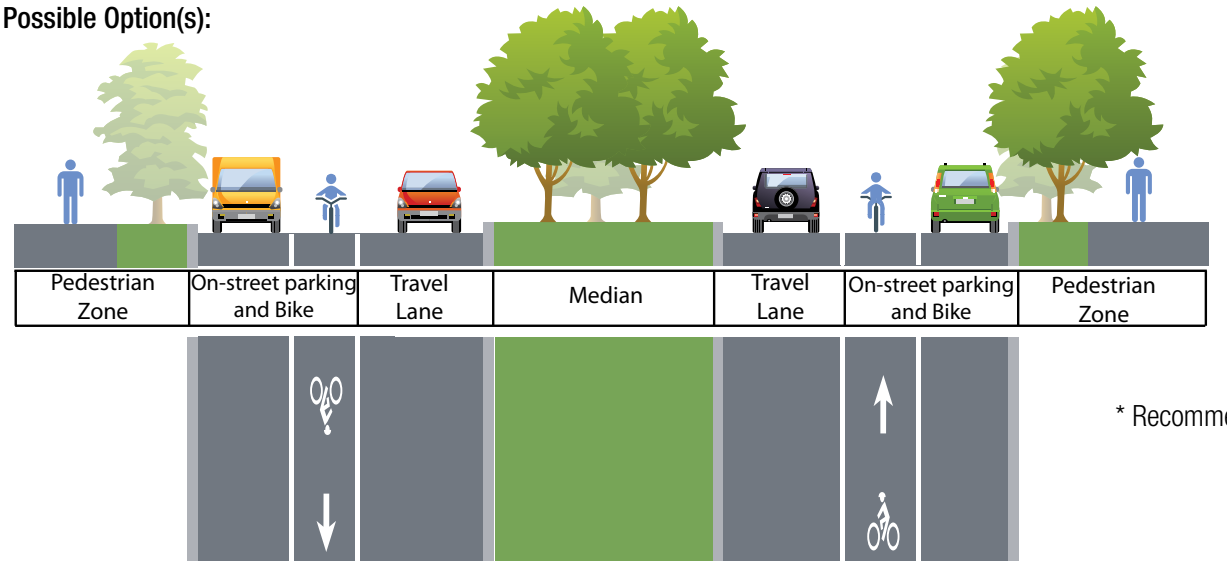
Identified Needs

The public envisions Heights Boulevard as the one "Complete Street" of the Heights' study area. The public expressed a desire to expand bike and pedestrian amenities found on Heights Blvd to other corridors. However, joggers using the trail provided in the existing median, noted that crossing between medians at existing intersections can create confusing and unsafe conditions. Colored paving was suggested as a treatment to better delineate how motorists, bicyclists and pedestrians (including joggers) should interact at these junctions.

Future Vision

Future volume ranges for Heights Blvd north of 6th Street/White Oak Drive indicate a reclassification of the corridor to a 2-lane divided Major Collector with 140'-150' right-of-way may be warranted. The corridor is also recommended as an Urban Boulevard in preservation of the existing median. The provided recommendation is not intended to change the existing condition of the corridor, but rather preserve it. To improve the functionality of intersections, however, one potential improvement includes the implementation of Michigan U-turns which would result in u-turns in lieu of left-hand turning movements at intersections (See Chapter V. Section 5.8 Integration of Modal Types). A local bus facility is also recommended for the corridor.

Possible Option(s):



* Recommended Local Bus Facility

Hempstead Road

Priority Elements

EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4/6	MTFP Designation	P-6-100
Existing Counts Range	15,500-16,500	Future Volume Range	35,500-36,000
Right-of-way	100'-200'	Proposed MMC	Urban Boulevard
Median/CTL/Undivided	Median/CTL	Median/CTL/Undivided	Median/CTL

Existing Condition

Hempstead Road is a 6-lane Principal Thoroughfare. Current development is restricted to the corridor's northern boundary due to the Union Pacific Railroad tracks which runs in parallel to its south. Existing cross sections include:

- Katy Road to West 11th St: designated and functions as a 6-lane corridor divided by a center-turn lane with a 200' right-of-way.
- West 11th St to Katy Rd/Washington Ave: designated as a 6-lane Principal Thoroughfare, but currently functions as a 4-lane undivided corridor.

Sidewalks are non-existent throughout the corridor, but there is a transit route (70) with frequent bus stops.

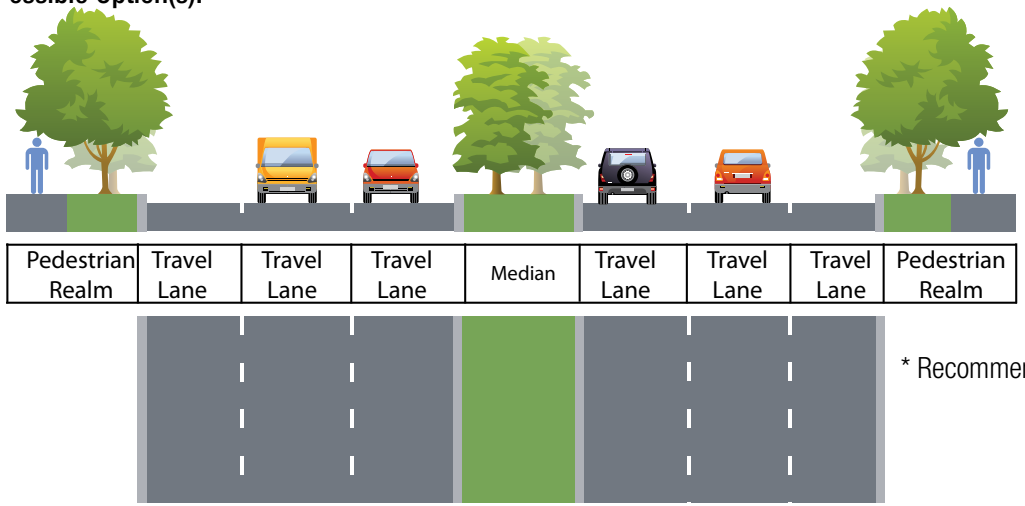
Identified Needs

Hempstead Road is a regional corridor from Jersey Village/FM 529 to the Inner West Loop study area located within the City of Houston's 610 Loop. This corridor is heavily traveled by vehicular traffic, and transitions into Katy Road and Washington Avenue which are 4- and 6-lane corridors, respectively. Although the corridor does not have a strong pedestrian realm, footpaths are evident along the side of the corridor, especially in locations where METRO bus stops are located. Where bicyclist exist, safety is a concern. Vehicular traffic congestion was expressed as a concern at the southern portion of the corridor within the 610 Loop.

Future Vision

Hempstead Road is recommended to remain as a 6-lane Principal Thoroughfare for the extent of the corridor. A median is further recommended for consistency along the length of the corridor, access management and increased aesthetic appeal. The corridor is also recommended as an Urban Boulevard. To accommodate access to the multiple commercial and industrial properties abutting the northern boundary of the corridor, local bus transit is recommended. Given the importance of the corridor for existing and future transit service, the pedestrian realm should be strengthened to encourage access to bus stop locations. Due to existing safety concerns, a bicycle facility is not recommended along this corridor. Although alternative route options should be explored where appropriate.

Possible Option(s):



* Recommended Local Bus Facility

Hogan Street

Priority Elements

EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4	MTFP Designation	C-4-70
Existing Counts Range	3,000-8,500	Future Volume Range	14,000-21,500
Right-of-way	60’	Proposed MMC	Urban Avenue
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	Undivided

Existing Condition

Hogan Street is a 4-lane undivided Collector with a 60’ right-of-way that extends from Taylor/Sawyer Street across IH 45 as Crockett Street. Although the corridor transitions three name changes (Hogan Street, Lorraine Street, Crockett Street), the 4-lane designation on the MTFP is consistent. Sidewalks can be found along the length of Hogan Street, but they are narrow and at times in poor condition. Existing land use consists of commercial properties with limited setbacks, and some residential.

Identified Needs

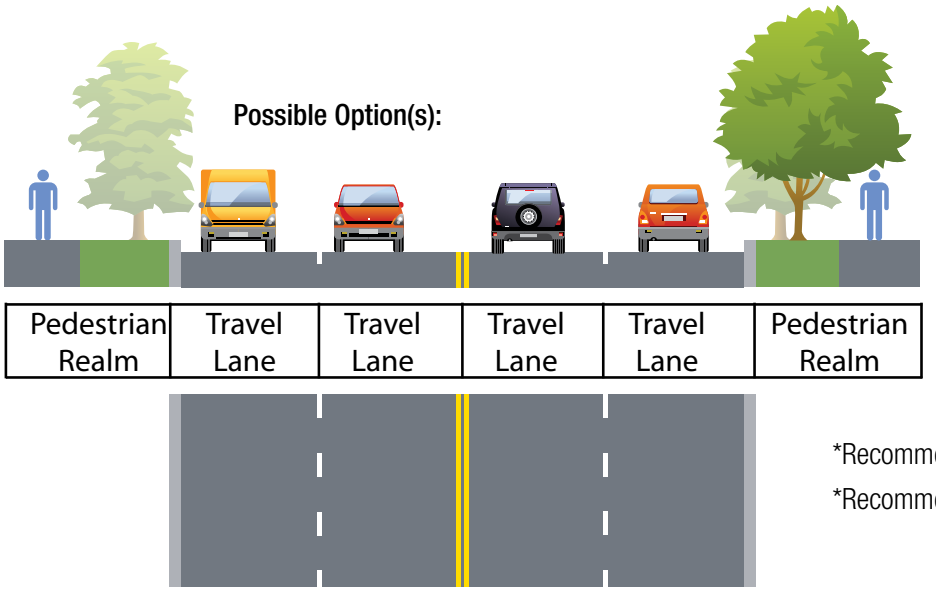
Hogan Street transitions across IH 45 as an overpass with 4-lanes of traffic and a sidewalk abutting its northern side. As a neighborhood connector between the area known as the Inner West Loop and the Northside study area, the provided bridge is seen as inefficient, and a wider, safer crossing for pedestrian and bicycle traffic across the bridge is desired. Similarly, sidewalks along Hogan exist, but are typically narrow and in poor condition. Finally, Hogan Street provides access to Main Street and METRO’s Red Line Rail Station.

Future Vision

Hogan Street is recommended as a 4-lane Major Collector with a 70’ right-of-way. Given the existing context, the corridor is further recommended to be classified as an Urban Avenue. A bike facility is recommended on Hogan Street given the corridor’s neighborhood appeal, direct access to the light rail on Main Street, and access across IH 45 and US 59. However, due to limited right-of-way, the corridor is recommended as a bicycle route where future bicycle options may be explored as right-of-way becomes available. Enhancing sidewalks and crosswalks to transit, however, is recommended as a priority for this corridor.

Based on the project team’s transit analysis detailed in Chapter V. Section 5.6 Transit Corridor Considerations, Hogan is recommended as a High Frequency Transit facility from Elysian Street to N. Main Street in line with METRO’s System Reimagining. Burnett Street, just south of Hogan Street, may also serve as a potential High Frequency Transit facility providing direct access to the Burnett Transit Center located on Burnett near Main Street. As the area continues to develop, facilities should be reexamined to determine the best facility or joint facility where appropriate.

Possible Option(s):

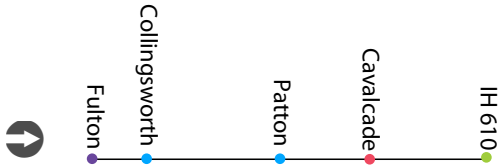


*Recommended High Frequency Transit

*Recommended Bicycle Route

Irvington Blvd

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4	MTFP Designation	T-4-80
Existing Counts Range	6,300-12,300	Future Volume Range	7,000-21,000
Right-of-way	80’	Proposed MMC	Urban Boulevard
Median/CTL/Undivided	Median	Median/CTL/Undivided	Median

Existing Condition

Irvington is a 4-lane divided Major Thoroughfare and operates within 80’ of right-of-way. The corridor provides access under IH 610 and terminates at the Fulton intersection located adjacent to Moody Park. Residential is the primary land use located along the corridor consisting of both single and multi-family developments. Currently, a striped bike lane exists along north- and southbound travel lanes.

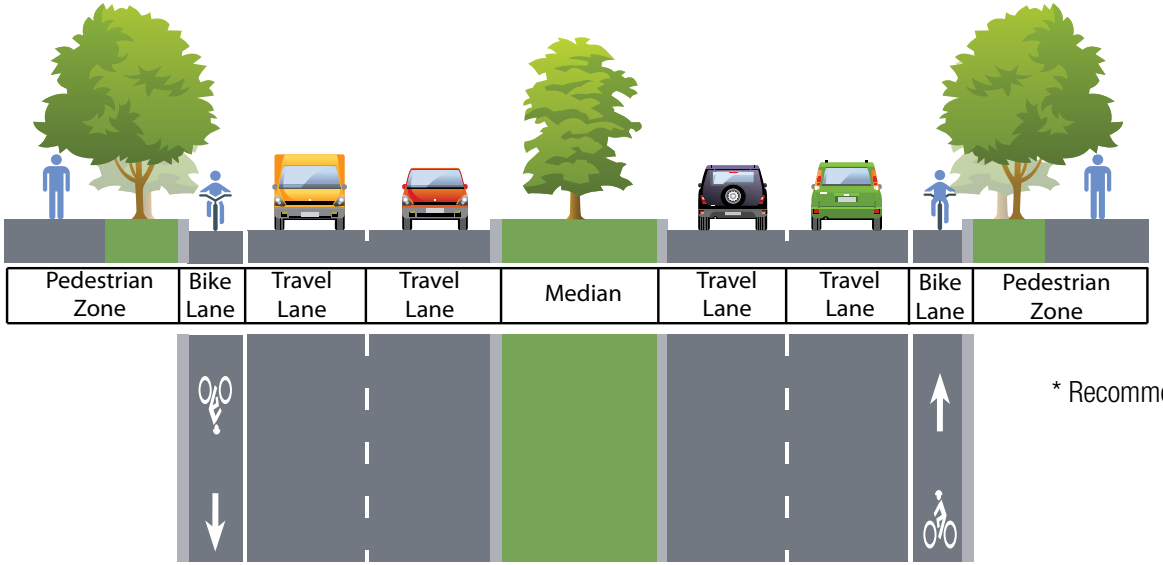
Identified Needs

Public comment indicates bike lanes on Irvington Blvd. are adequate. Similarly, sidewalks along Irvington Blvd. are safe and continuous providing an ideal environment for pedestrians. Additionally, the community indicated satisfaction for the METRO bus service along the corridor. However, around Moody Park, the traffic lights were noted as confusing and often misdirect bicyclist to their designated path. The public also identified a need for a traffic light at the T-intersection at Patton Street.

Future Vision

Irvington Blvd is recommended to remain as a 4-lane Major Thoroughfare given the length of the corridor and regional connection across IH 610. Similarly, the corridor provides a parallel route to the Hardy Toll Road providing an alternative route for both local and regional vehicular traffic, alike. It is also recommended that it be classified as an Urban Boulevard in preservation of the esplanade. To encourage safer pedestrian crossings, pedestrian refuges should be placed within medians. This is especially true for esplanades located near C. Martinez Elementary School as well as at other prominent crossing along the corridor. Local bus service is recommended along this corridor. Finally, intersections should be designed to urban thoroughfare standards as detailed in Chapter 10 of the Infrastructure Design Manual.

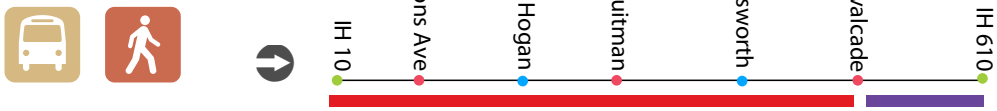
Possible Option(s):



* Recommended Local Bus Facility

Jensen Drive

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2/4	MTFP Designation	T-4-60; T-4-80
Existing Counts Range	4,000-8,000	Future Volume Range	6,500-22,000
Right-of-way	60'/80'	Proposed MMC	Industrial/Urban Avenue
Median/CTL/Undivided	Undivided/CTL	Median/CTL/Undivided	Undivided

Existing Condition

Jensen Drive is a 4-lane Major Thoroughfare that transitions between an 80' and 60' of right-of-way north and south of Cavalcade Street, respectively. The corridor runs in parallel to US 59 from IH 610 to IH 10. Although classified as a 4-lane corridor, Jensen Drive's existing travel lanes are striped as follows:

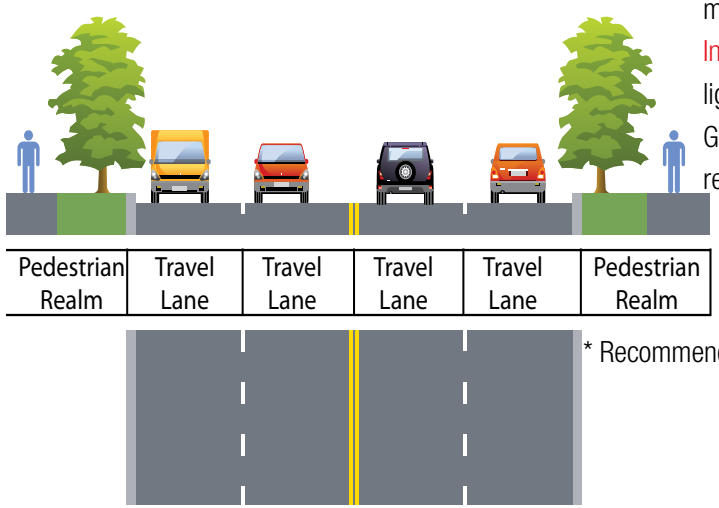
- IH 610 to Cavalcade: 4-lane undivided corridor. This portion of the corridor is largely light industrial with some residential and commercial uses.
- Cavalvade to Lorraine St: 2-lane corridor with a center-turn lane. This portion of the corridor is largely commercial with a more prevalent presence of residential land uses south of Collingsworth.
- Lorraine St to IH 10: 4-lane undivided corridor. Land use is largely undeveloped with some public and institutional facilities north of Lyons Avenue. The corridor transitions into downtown as a 4-lane bridge with sidewalks flanking both sides of the corridor.

Sidewalks are provided for the length of the corridor, but are narrow and in poor condition along several portions of the corridor.

Identified Needs

Five educational centers are currently present on Jensen Drive and the majority are for grade school aged children. Enhancing sidewalks and crossings at and near the schools was set as a priority for the corridor. Similarly, the corridor's connection across IH 10 and US 59 was expressed as a needed and continued connection into downtown. Currently, existing access into downtown from the Northside is limited throughout the study area. The public expressed a desire to maintain and further improve the pedestrian realm across the interstate which is currently minimal. Bicycles were also noted as a use along the corridor, but not emphasized as a priority.

Possible Option(s):



* Recommended High Frequency Transit

Future Vision

It is recommended Jensen Drive remain a 4-lane Major Thoroughfare due to the corridor's length and regional connection north of IH 610 into Downtown. As parcels of undeveloped land continue to mature south of Lorraine Street, the importance of this corridor and its connection into Downtown is only expected to increase. Although the corridor is recommended for preservation of the 4-lane vehicular movement, the segment from Cavalcade to Lorraine Street is recommended remain as a 2-lane corridor with a center turn lane to be reexamined as development increases along the corridor. The existing and future development of the corridor's context multi-modal designation is characteristic of an Urban Avenue with a mix of residential and commercial residential land uses. Industrial Avenue is more appropriate for more established light industrial and commercial uses north of Cavalcade. Given the direct connection to Downtown, the corridor is recommended as a High Frequency Transit Facility.

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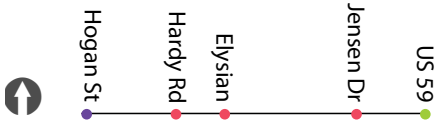
Lorraine Street

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2	MTFP Designation	C-4-70
Existing Counts Range	1,800-4,500	Future Volume Range	10,500-14,000
Right-of-way	60'/70'	Proposed MMC	Urban Avenue
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	Undivided

Existing Condition

Lorraine Street a 4-lane undivided Major Collector with 60' and 70' of right-of-way east and west of Hardy Road, respectively. The corridor is an extension of Crockett and Hogan Street to the west. Although the corridor transitions three name changes, the 4-lane designation on the MTFP is consistent. The portion of the corridor designated as Lorraine Street, however, is currently striped for 2-lanes, and not 4-lanes of vehicular traffic. Existing lanes are fairly wide providing ample room for on-street parking. Landuse along the corridor consist of some single-family residential with light commercial and abandoned property directly abutting the corridor; a number of vacant lots are also apparent.

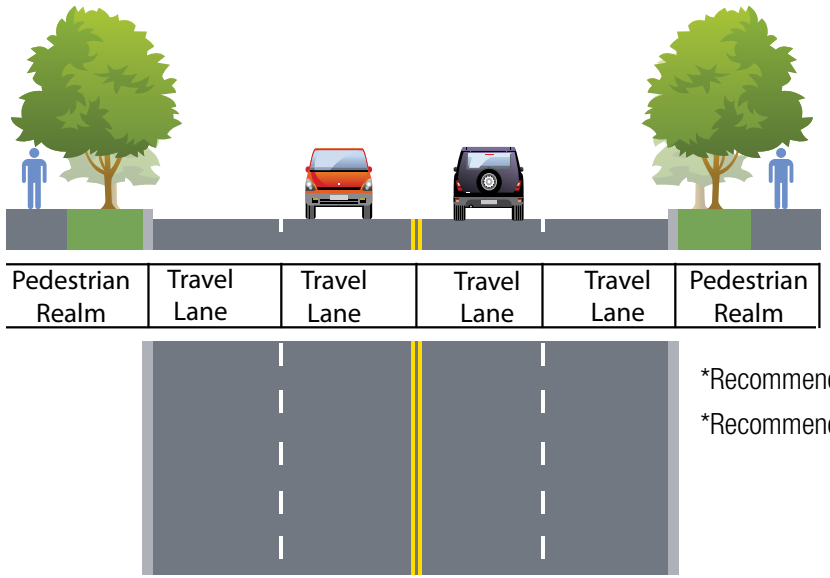
Identified Needs

Comments received from the public regarding Lorraine Street were limited, and centered around the desire for an enhanced pedestrian realm. This is especially true at railroad crossings where existing infrastructure is limited for both bike and pedestrian users, alike. The corridor is identified as a primary east-west corridor north of IH 10 inclusive of all modal types similar to Quitman and Cavalcade streets by the project team.

Future Vision

Given the provided length of the corridor, and to provide continuity with Crockett and Hogan Streets, Lorraine Street is recommended as a Major Collector with a 70' ROW. The corridor is further recommended as an Urban Avenue. Due to limited right-of-way, the corridor is recommended as a bicycle route, providing an essential connection to the newly developed light-rail. However, as the area continues to developed, improvements to the bicycle facility should be explored. As an extension of Hogan Street recommendations, Lorraine Street is also recommended as High Frequency Transit facility.

Possible Option(s):

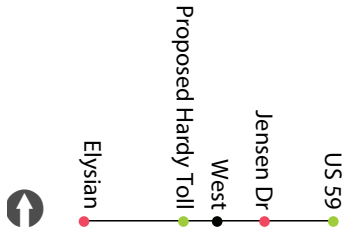


*Recommended High Frequency Transit

*Recommended Bicycle Route

Lyons Avenue

Priority Elements

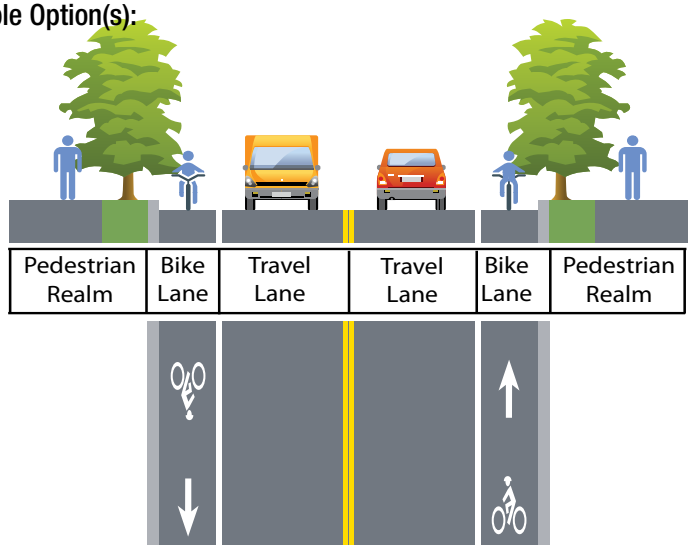


EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2	MTFP Designation	T-2-60; C-2-60
Existing Counts Range	2,000-6,000	Future Volume Range	3,500-7,500
Right-of-way	60’	Proposed MMC	Urban Street
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	Undivided

Existing Condition

Lyons Ave is classified as a 2-lane Major Thoroughfare with a 60’ right-of-way and provides access from the Elysian Viaduct and to US 59. Sidewalks are present along both sides of the corridor from the Elysian Viaduct to West Street; the remainder of the corridor is open ditch with no pedestrian nor bicycle facilities. The exception can be found at Saint Arnold’s Brewery which is one of Houston’s oldest and largest microbreweries. The brewery directly abuts Lyons Ave and is considered a major regional attractor for tourist and residents alike. Existing bicycle lanes and pedestrian facilities are present.

Possible Option(s):



Identified Needs

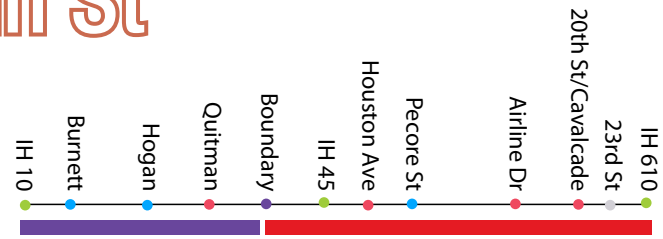
Lyons Ave provides an underpass at US 59 that facilitates existing pedestrian and bicycle movements to the east of the study area even with degraded to non-existent facilities. Given connections across interstates are limited, special attention should focus on creating a safe environment for bicyclist and pedestrians to further enhance and encourage existing non-vehicular use along the corridor. This can be done by enhancing existing sidewalks and reducing gaps within the sidewalk network.

Future Vision

Future traffic volumes along the Lyons Ave are nominal, and as such is recommended as a 2-lane thoroughfare. However, Lyons Ave is recommended to remain a Major Thoroughfare east of Elysian Street given its length, direct connection into the 5th Ward, and current function as one of four corridors with access across US 59. Also, McKee Street is one of the local streets within the study area recommended to be added to the network as a Minor Collector. This, in association with the Hardy Yards retail-commercial development just north of Conti Street, is anticipated to increase connectivity of the local network as well as traffic along Lyons Avenue. West of Elysian, however, Lyons avenue is recommended to be reclassified as a Minor Collector to allow for the preservation of the right-of-way while promoting a more localized network of neighborhood streets with minimized regional vehicular traffic. Given the area context, the corridor is also recommended as an Urban Street. Pedestrian and bicycle facilities are considered a priority given the importance of the street as a residential connector across US 59 as well as the importance of access to and from Saint Arnold’s Brewery. Finally, the connection between Lyons Avenue and Conti Street at McKee Street should be realigned to remove the offset intersection. This will potentially provide a connection to the proposed extension of San Jacinto Street.

North Main St

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2/4	MTFP Designation	T-4-70/80; T-2-70/90
Existing Counts Range	4,500-16,000	Future Volume Range	11,500-28,000
Right-of-way	65'/70'	Proposed MMC	Urban /Transit Avenue
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	Undivided

Existing Condition

North Main Street maintains two separate designations on the MTFP:

- IH 10 to Boundary: 2-lanes of vehicular travel and METRO's light rail line within the existing median classified as Transit Corridor Street.

-Boundary to IH 610: is 4 lanes undivided and classified as a Major Thoroughfare.

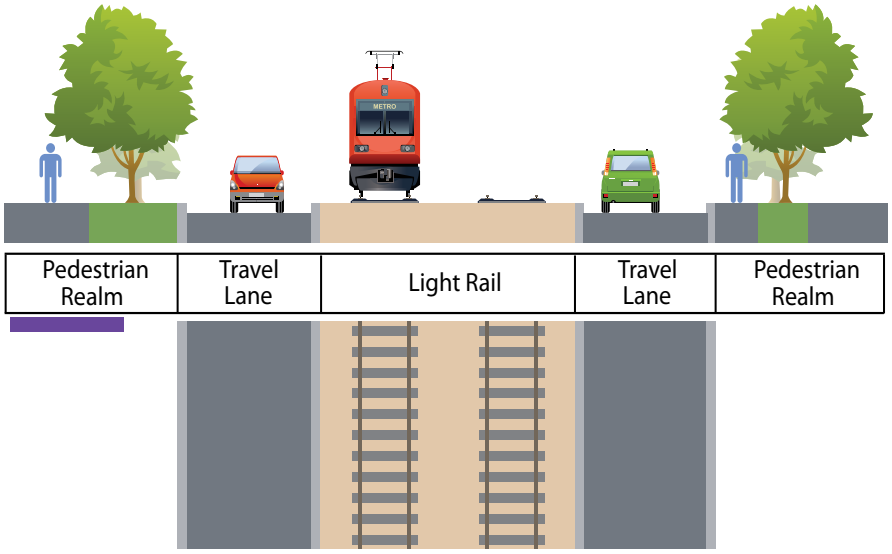
Identified Needs

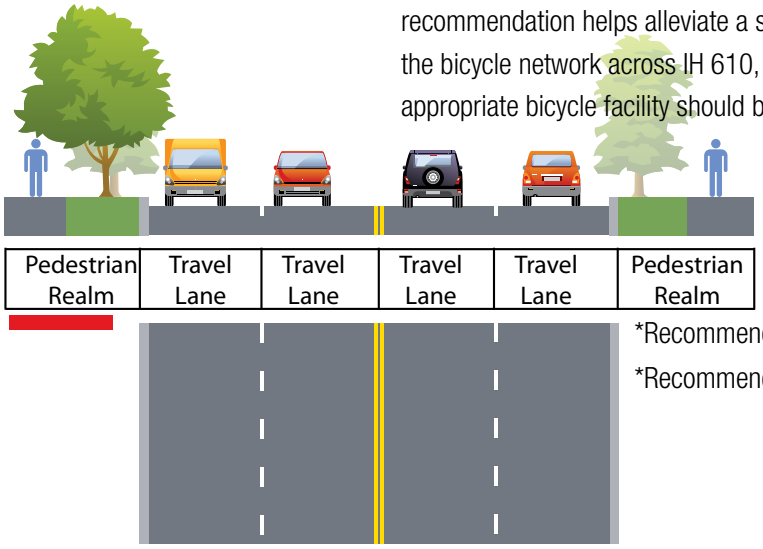
The provided corridor maintains a high volume of traffic that warrants the full use of the 4-lane corridor as designated on the MTFP. East of Ella Blvd, the Heights study area is challenged with a significant gap within the existing bicycle network across IH 610. Given current right-of-way constraints along N. Main St, a separated bike facility is not feasible. Pedestrian crosswalks at major intersections, such as N. Main Street at E. 20th Street/ W. Calvacade Street and Studewood Street, were noted as a concern by the public.

Future Vision

Main Street from Boundary Street to IH 10 is recommended to maintain its current classification as a Transit Avenue. The remainder of the corridor is recommended as a Major Thoroughfare. Given the area context, the corridor is further recommended as an Urban Avenue. The portion of the corridor without light rail is recommended for High Frequency Transit providing direct access to the Heights Transit Center at North Main and Studewood. A bicycle route should also be considered for the portion of the corridor from 20th/Cavalcade to IH 610 due to limited right-of-way. Although the provided recommendation helps alleviate a substantial gap within the bicycle network across IH 610, a safer and more appropriate bicycle facility should be explored as the

Possible Option(s):





*Recommended High Frequency Transit

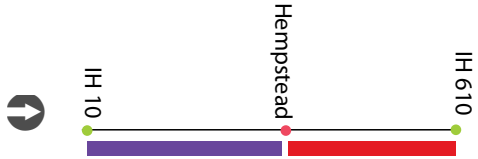
*Recommended Bicycle Route

NOTE: COLORED BAR(S) INTENDED TO CORRESPOND WITH CORRIDOR KEY AT THE TOP OF THE PAGE.

Katy Road/Washington Avenue

EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4 -6	MTFP Designation	T-4-100; P-8-120
Existing Counts Range	7,500-18,000	Future Volume Range	18,000-28,000
Right-of-way	250’	Proposed MMC	Urban Boulevard
Median/CTL/Undivided	Median	Median/CTL/Undivided	Median/CTL

Priority Elements



Existing Condition

Katy Road/Washington Ave provide east-west connectivity between the Northwest Transit Center to the Washington Avenue corridor across IH 10. The current MTFP designations include:

- Katy Road: Major Thoroughfare with 4-lanes of traffic and 250’ right-of-way. The corridor is currently striped as 4-lanes with a planted median. The corridor also has wide shoulders, but no sidewalks. Shoulders, however, become less prominent as the corridor begins transition to Washington Ave.
- Washington Ave: Principal Thoroughfare with 8-lanes of traffic and 120’ right-of-way. Current stripping is provided for 6 lanes. Sidewalks are apparent, and TxDOT has recently provided striped bike lanes.

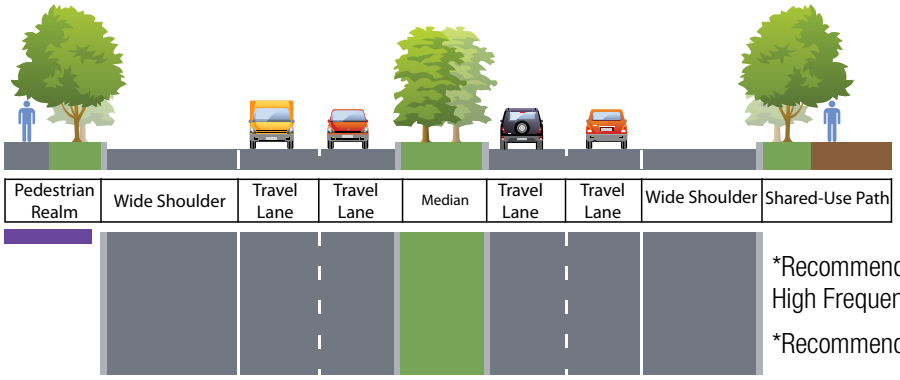
Identified Needs

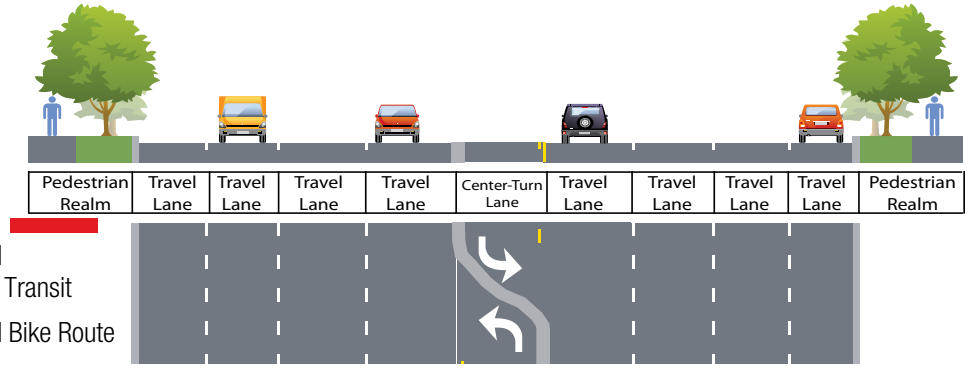
Volumes along the corridor are projected to double by 2035 but are sufficient for a 4-lane corridor. The wide shoulders currently found on Katy Road should be preserved within the right-of-way to accommodate future capacity improvements or transit expansions. Transit connectivity along this corridor is essential in recognition of the proposed Bus Rapid Transit (BRT) facility along Post Oak Boulevard with a tie-in at Northwest Transit Center. Bicyclists along the corridor were expressed as a growing concern. Although wide shoulders are currently used by cyclist, safety is an ongoing concern.

Future Vision

It is recommended that both Katy Road and Washington Avenue maintain their current MTFP designations as a Major and Principal Thoroughfare, respectively. To manage access and preserve of the median, the corridor is recommended as an Urban Boulevard. Enhancements along the corridor are in conjunction with any developments of the transit network. Given proximity to the Northwest Transit Center, the corridor is recommended as a High Frequency Transit facility. A bicycle facility along the corridor is also a priority, but due to safety concerns, may best serve the user as an off-street facility known as a shared-use path. To accommodate multiple modes, the intersection at IH 10 should be redesigned to include better pedestrian and bicycle facilities.

Possible Option(s):





*Recommended High Frequency Transit

*Recommended Bike Route

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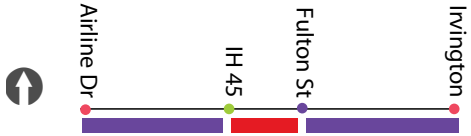
Patton Street

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4	MTFP Designation	C-2-60/70; C-4-70
Existing Counts Range	3,500-7,300	Future Volume Range	5,000-9,000
Right-of-way	60’	Proposed MMC	Urban Street

Existing Condition

Patton Street is an east-west 4-lane Major Collector with 60’ right-of-way that connects Airline Drive to Irvington Boulevard. The corridor serves as a neighborhood connector providing access under IH 45 and increased connectivity between the Heights and Northside neighborhoods. The corridor consist of largely residential uses except at IH 45 where commercial, including a grocery store, exist. Along noncommercial sections of the corridor, many residents use the outside lanes for on-street parking and bicycling. Patton does not have any transit routes presently.

Identified Needs

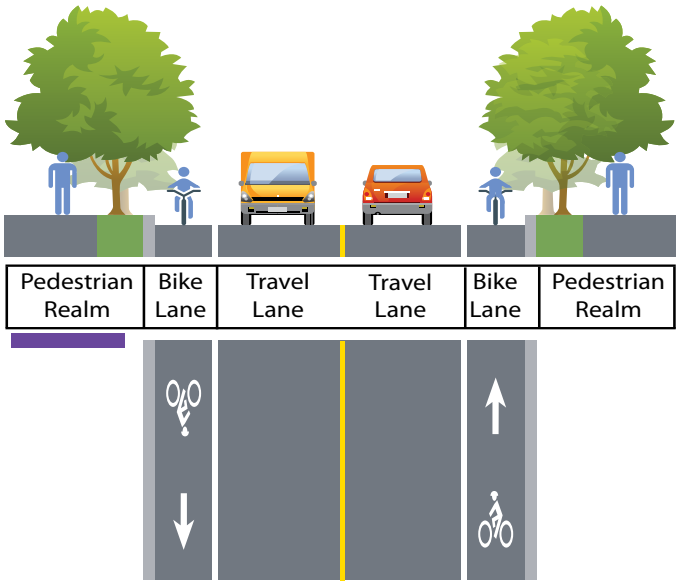
Sidewalks along the corridor are provided on both sides of the corridor, but are narrow and in poor condition. Patton Street crosses under IH 45 and also intersects the new transit corridor, Fulton Street. The community expressed that Patton Street could benefit from enhanced pedestrian facilities and a bike facility for increased access to the new METRO Red Line. The corridor terminates at Irvington Boulevard where a large multi-family complex is located. To help alleviate congestion, the community expressed need of a traffic signal to assist residents in and out of the complex.

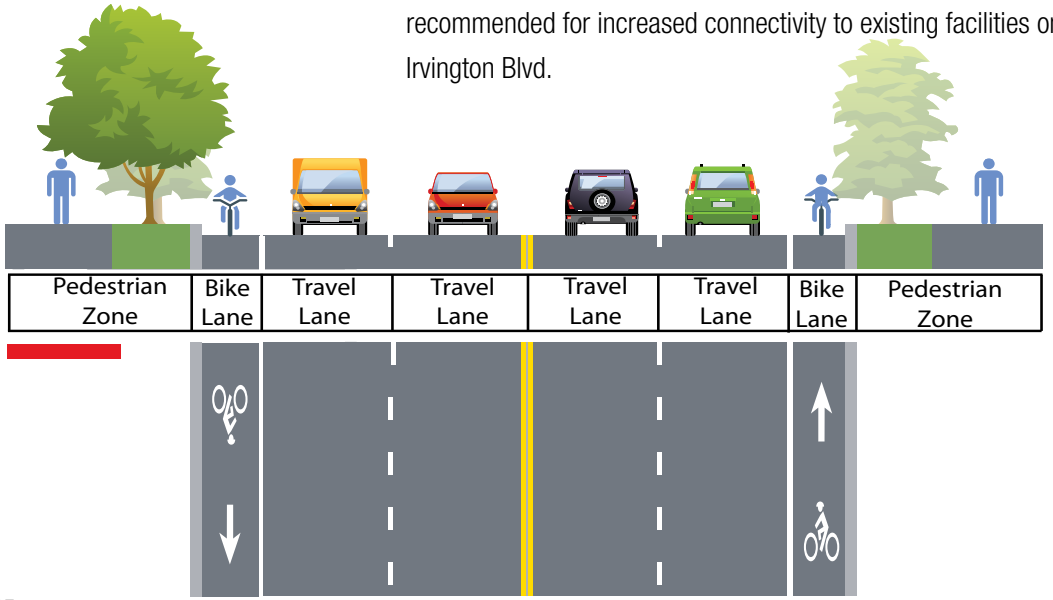
Future Vision

Patton Street is an important multi-modal corridor that connects the Heights to the Northside, and is recommended as an Urban Street. Given the lower traffic speeds and projected traffic volumes, the following is recommended:

- Airline to IH 45: 2-lane Major Collector; bike lanes recommended for increased connectivity to Montie Beach Park and existing bike facilities on 14th Street.
- IH 45 to Fulton (light-rail): 4-lane Major Collector intended to serve heavier commercial traffic and regional traffic accessing IH 45. Safe bike lanes are recommended for continuation along this stretch.
- Fulton to Irvington: 2-lanes Major Collector; bike lanes recommended for increased connectivity to existing facilities on Irvington Blvd.

Possible Option(s):





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Pecore Street

Priority Elements

EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2	MTFP Designation	C-2-60
Existing Counts Range	7,800-8,100	Future Volume Range	6,500-13,000
Right-of-way	60’	Proposed MMC	Urban Street
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	Undivided

Existing Condition

Pecore Street is 2-lane undivided Major Collector with 60’ right-of-way. Outside lanes are wide enough to accommodate on-street parking where certain parts of the corridor are striped to indicate as such. Sidewalks flank both sides of the road and are separated from traffic by a planting strip. The provided land use is mainly single family residential with short lot faces. Pecore terminates at N. Main Street which connects across IH 45 and Houston Avenue which provides direct access to Downtown. A portion of Pecore is currently on bus route 40, but does not cross IH 45.

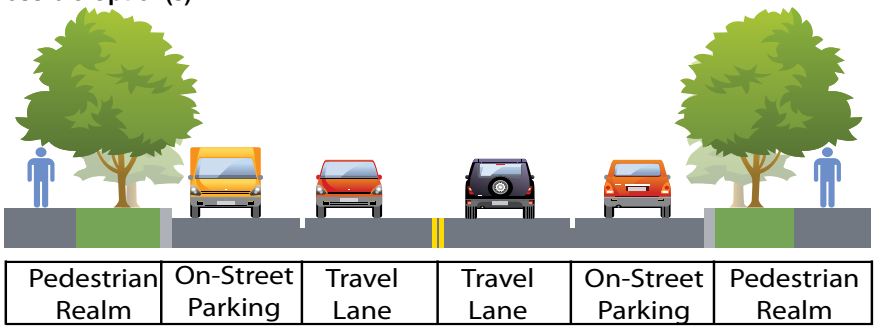
Identified Needs

The community expressed a desire to access transit, especially the light rail service provided on the Northside neighborhood. A lack of bicycle facilities and pedestrian amenities across IH 45 and on N. Main Street were noted a barrier to access the light rail. Residents noted the only way to access such service is by automobile which defeats the intended use of the transit system within a more urbanized context.

Future Vision

Given the relative short length of Pecore Street as well as a nominal increase in projected traffic volumes, it is recommended this street be reclassified as a Minor Collector. It is also recommended it be classified as an Urban Street given the surrounding context and neighborhood locality of the traffic. As expressed by the public, N. Main Street presents several challenges in the accommodation of bicycle traffic. Similarly, due to limited right-of-way 11th Street is also considered unsafe for cyclist. As such, Pecore Street is not recommended as a bicycle facility given the lack of connectivity to greater bicycle network. A local bus facility is recommended along a portion of the corridor.

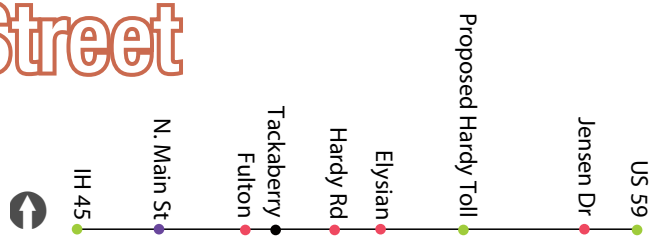
Possible Option(s):



* Recommended Local Bus Facility

Quitman Street

Priority Elements

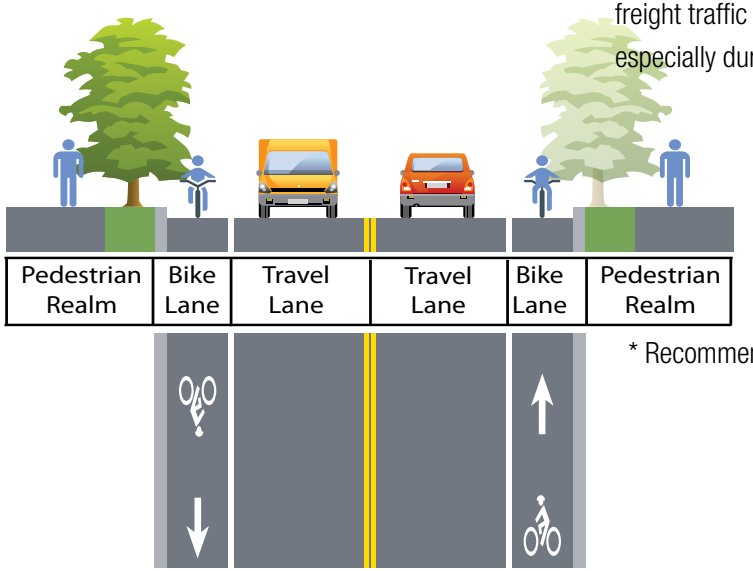


EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2	MTFP Designation	C-2-50/60
Existing Counts Range	5,200-8,000	Future Volume Range	9,500-13,500
Right-of-way	50'/60'	Proposed MMC	Urban Street
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	Undivided

Existing Condition

Quitman Street is a 2-lane undivided Major Thoroughfare with a 50'-60' right-of-way. It is an east-west corridor in the Northside area from IH 45 to US 59; west of IH 45 the corridor is known as White Oak Drive and transitions to Liberty Road east of US 59. Jefferson Davis High School and A. John Castillo Park directly abut the corridor just north of Tackaberry Street. Further south, Ketelsen Elementary is located near N. Main Street. Quitman Station, a METRO rail stop, is located near the N. Main Street intersection where METRO has established a "Kiss and Ride" vehicle drop-off facility.

Possible Option(s):



* Recommended Local Bus Facility

Identified Needs

Public input regarding Quitman Street was vast and diverse. Most intersections along the corridor were identified as needing improvement, but the intersection at Tackaberry was highlighted given the high foot pedestrian and vehicular traffic associated with Jefferson Davis High School. Marshall Middle school was also noted as a concern where Tackaberry or Cochran Street might serve as potential crosswalk locations if properly signaled. Quitman is seen as one of the most vital streets in Northside, and the community expressed a desire to enrich the pedestrian zone and increased sense of safety by widening sidewalks, providing pedestrian scaled lighting, and cleaning up overgrown foliage. Traffic calming, especially during school day hours, were also expressed as a need. freight traffic was raised as a safety and congestion issue especially during school drop-off and pick-up hours.

Future Vision

Quitman is unique given the importance of the corridor to the community as a true neighborhood amenity. Given the area context and projected volumes of the corridor, it is recommended it be reclassified as a Major Collector and the multi-modal classification identified as an Urban Street. Additionally, it is recommended that special attention be given to improving the safety and accessibility of Quitman Street by widening sidewalks, providing a buffered landscaped strip between the roadway and the sidewalk, and providing pedestrian level lighting where appropriate. A bike lane is recommended to increase neighborhood accessibility to schools, the light rail, surrounding parks, and existing trails. Finally, a local bus facility is also recommended for the corridor.

Shepherd Drive

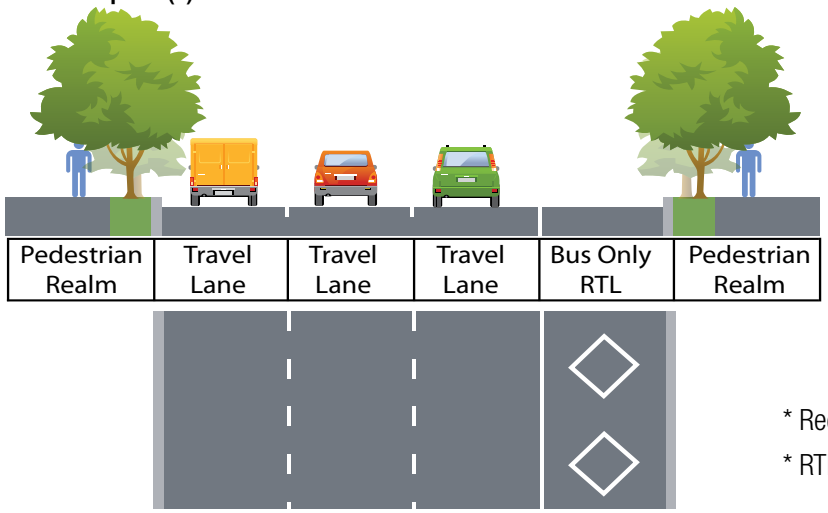
Priority Elements

EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4	MTFP Designation	P-4-70
Existing Counts Range	17,000-29,000	Future Volume Range	20,000-37,000
Right-of-way	70’	Proposed MMC	Couplet
Median/CTL/Undivided	N/A	Median/CTL/Undivided	N/A

Existing Condition

Shepherd Drive is a 4-lane undivided Principal Thoroughfare with 60’-70’ of right-of-way and provides one-way movement of vehicular traffic from IH 10 to IH 610. It acts as a Couplet with Durham Drive, which facilitates the southward movement of vehicles. Sidewalks are consistent along the length of the corridor, but are narrow. The corridor is lined with retail and commercial properties, creating many driveways and openings along this stretch of road. The corridor maintains two 4-lane bridges across White Oak Bayou north of Larkin Street and south of 6th. Both bridges have a sidewalk along one-side of the bridge, but is insufficient.

Possible Option(s):



* Recommended High Frequency Transit

* RTL = Right Turn Lane

Identified Needs

Comments received from the public identified crossing over Shepherd Drive to be a major concern. Limited sight distance for drivers due to fences was also expressed as a concern. Pedestrians and bicyclist identified the 11th Street intersection and IH 10 bridge as potential locations for enhanced crosswalks. Residents and stakeholders voiced a desire to have a bike facility along Shepherd Drive that would connect to the White Oak Bayou Trail.

Future Vision

Shepherd Drive is recommended to maintain its current 4-lane Couplet design adequate for future vehicular capacity needs. As such, an on-street bike facility is not recommended. Wider, continuous pedestrian facilities are important for internal community connectivity as well as enhanced access to transit stops. Pedestrian crossings at major intersections as well as across the bridge should be further evaluated for proper design.

High Frequency Transit for the Durham/Shepherd Couplet is recommended. Given the importance of this corridor as a regional connector, it is recommended that one travel lane be designated as bus only, and where appropriate, right-turn only lane for increased efficiency. As a designated High Frequency Transit facility, importance of the pedestrian realm is further prioritized for this corridor. Bus shelters, wider sidewalks and properly placed cross walks at intersections near transit stops are recommended for a more safe and pedestrian-friendly area.

For more information regarding associated design standards for southbound traffic, see the Durham Corridor Sheet.

Studewood Street

EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	3/4	MTFP Designation	T-3/4-80
Existing Counts Range	9,000-19,600	Future Volume Range	10,500-17,500
Right-of-way	80’	Proposed MMC	Urban Avenue
Median/CTL/Undivided	CTL (RL)	Median/CTL/Undivided	Reversible Lane

Priority Elements

Existing Condition

Studewood Street is classified as a Major Thoroughfare with varying laneage and right-of-way designations:
- N. Main Street to White Oak Dr: 3-lane Major Thoroughfare with a center turn lane and an 70’-80’ right-of-way. The center lane acts as a contra-flow lane which is a reversible lane that designates the directional flow of traffic depending on the time of day. This segment of the corridor has sidewalks in good condition with wide planting strips both sides of the corridor. Small commercial and retail development as well as some residential with short setbacks are characteristic of uses along the corridor.
- White Oak Dr to IH 10: 4-lane Major Thoroughfare with an 80’ right-of-way. The existing pedestrian realm is limited with a narrow sidewalk along some portions of the corridor. Just north of IH 10 to Stude Street is a 4-lane bridge over the White Oak Bayou that currently has no pedestrian amenities.

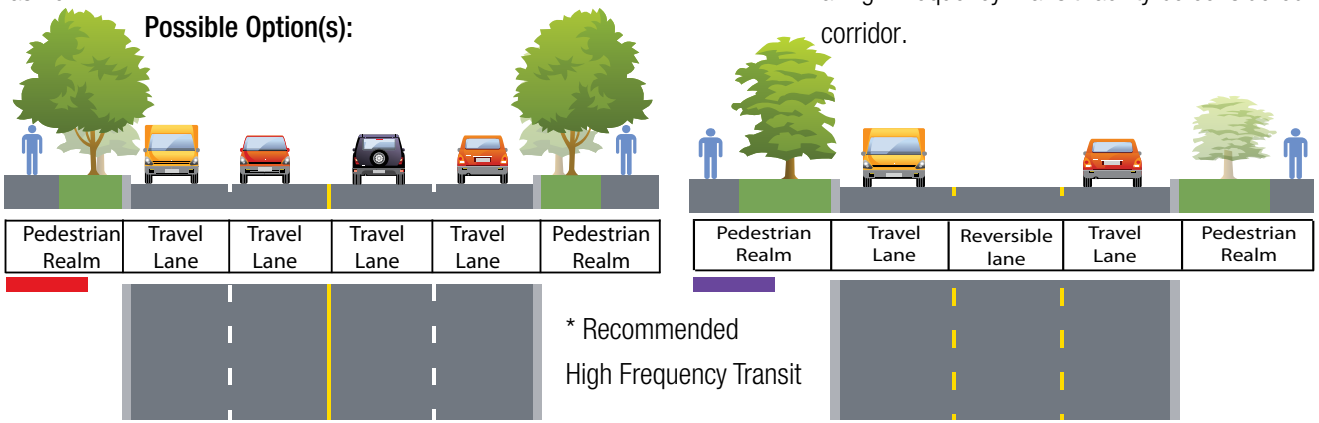
Identified Needs

Pedestrian facilities along Studewood Street are in great condition north of White Oak Drive, but virtually nonexistent along the 4-lane segment of the roadway south of White Oak Drive which includes a 4-lane bridge. However, the use of this segment by pedestrians is evident by foot paths flanking both sides of the corridor. The contra-flow lane confuses drivers who are not familiar with its function, and additional signage could help mitigate this issue. The contra-flow lane also causes problems at major intersection due to the lack of protected lefts. At its northern boundary, the corridor terminates into a 6-legged intersection with E 20th/N Main Street/W Cavalcade Street. The current intersection configuration creates confusion, particularly for the pedestrians and bicyclists to navigate.

Future Vision

It is recommended that Studewood Street remain a 3- and 4-lane Major Thoroughfare where currently designated. Given the provided context, it is recommended the corridor also be designated an Urban Avenue. The center or contra-flow lane provided along the 3-lane portion of the corridor is recommended to remain based on projected traffic flows. However, additional signage is recommended to better inform unfamiliar drivers when to use the lane. Due to the deterioration of the roadway, reconstruction will be needed at the 6-legged intersection with E 20th/N Main Street/W Cavalcade Street. It is recommended that more adequate pedestrian and bicycle facilities be developed that demarcate proper flow of non-vehicular users through the intersection. It is also recommended that a High Frequency Transit facility be considered for the corridor.

Possible Option(s):



* Recommended High Frequency Transit

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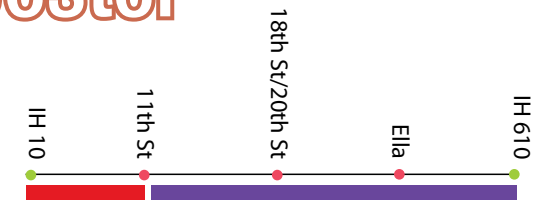
E & W TC Jester

Priority Elements



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4	New MTFP Designation	T-4-110
Existing Counts Range	8,600-15,300	Future Volume Range	10,500-33,000
Right-of-way	80'-120'	Proposed MMC	Suburban Boulevard
Median/CTL/Undivided	Median	Median/CTL/Undivided	Median

Existing Condition

TC Jester Blvd, E. TC Jester Blvd and W. TC Jester Boulevard makeup a series of thoroughfares that meander through the study area from IH 610 to IH 10. Designations are as follows:

- TC Jester - From IH 10 to 11 St: 4-lane Major Thoroughfare with 110' right-of-way. Although designated as 4-lanes, the segment between Union Pacific Railroad and IH 10 is 6-lanes. This segment is designated as a bike route.
- TC Jester - From 11 St to E. and W. TC Jester Split: 4-Lane Major Thoroughfare with 80' right-of-way. A shared-use path extends along White Oak Bayou between E. and W. TC Jester.
- E. TC Jester - T.C. Jester to 20th Street: 4-Lane Major Thoroughfare with 80' ROW.
- E. TC Jester - 20th Street to IH 610: 4-Lane Major Thoroughfare with 120' right-of-way.
- W. TC Jester - T.C. Jester to IH 610: 4-Lane Major Thoroughfare with 110' right-of-way.

From IH 10 to W 11th St, TC Jester operates as a single, 2-way facility. However, north of this intersection the roadway splits into East TC Jester and West TC Jester. Although not a couplet, these two corridors offer north/south vehicular circulation on both sides the bayou. Sidewalks are present on both sides, but an on-street bike facility does not exist. However, access to the White Oak Bayou trail is provided at 11th Street and Ella Blvd.

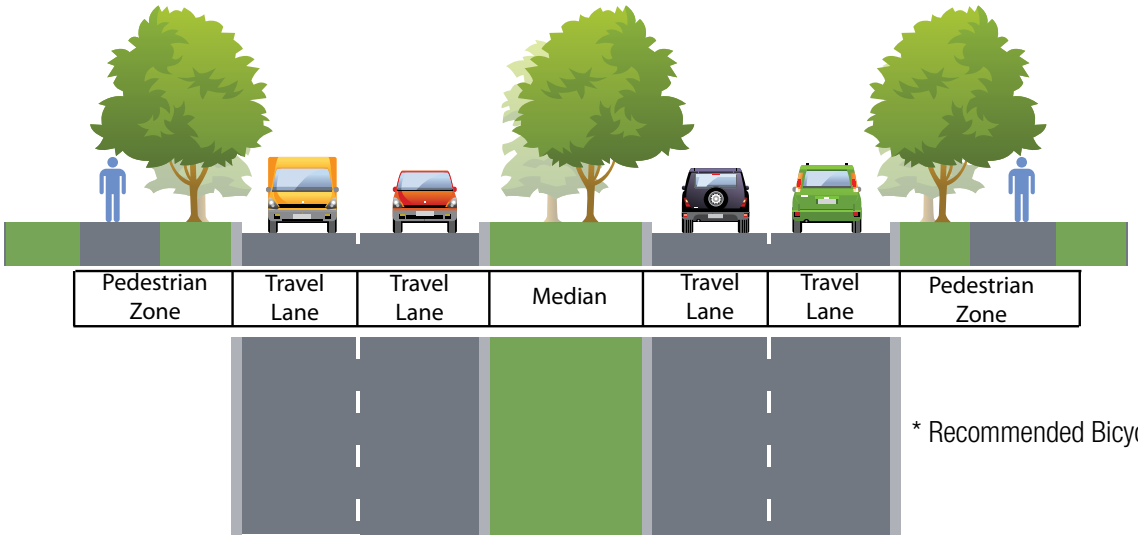
Identified Needs

The White Oak Bayou is located between E. and W. TC Jester. This segment of the Bayou is part of the City's popular off-street trail network attracting both commuting and recreational users. The community expressed concerns regarding safe crossings to the Bayou across both E. and W. TC Jester Boulevard. Additionally, the 18th/20th/TC Jester Boulevard intersection was also noted as a main public concern for safety and congestion. Speeds along the corridor were also expressed as an issue where motorist tend to use the corridor as an internal highway traveling much faster than posted speed limits.

Future Vision

TC Jester, E. TC Jester and W. TC Jester are recommended to remain as Major Thoroughfares as currently classified on the MTFP. In preservation of the existing median and provided context, the corridor is further recommended to be classified as a Suburban Boulevard. Modifications to TC Jester will be the near-term solution of retiming the intersection with 11th Street. Reconfiguration of the intersection of E. TC Jester Boulevard with 19th and 20th Street should be further evaluated for efficiency. A dedicated bicycle facility is recommended for TC Jester between IH 10 and 11th Street providing increased access to the off-street trail network along the White Oak Bayou.

Possible Option(s):



* Recommended Bicycle Facility

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White Oak Drive

Priority Elements

EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2	MTFP Designation	C-2-60/70
Existing Counts Range	5,500-9,000	Future Volume Range	4,000-13,500
Right-of-way	60'/70'	Proposed MMC	Urban Street
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	Undivided

Existing Condition

White Oak Drive is a 2-lane Major Thoroughfare that extends from Heights Boulevard to IH 45 and becomes Quitman Street in the Northside study area. Variation in the corridor are as follows:

- Heights Boulevard to Usener Street: 2-lanes undivided with parallel parking on both sides of the street.
- Usener Street to IH 45: 2-lanes undivided with no parking and open ditch on either side.

Identified Needs

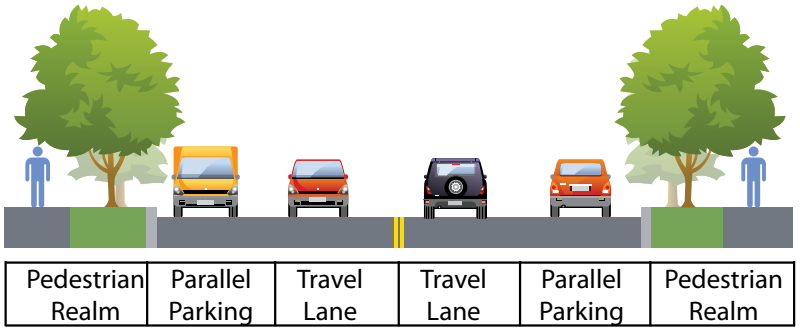
White Oak Drive is turning into a destination corridor with local restaurants developing at key intersections. Parking along the sides of the street will continue to be needed in the future, along with an improved pedestrian environment and on-street bicycle facility.

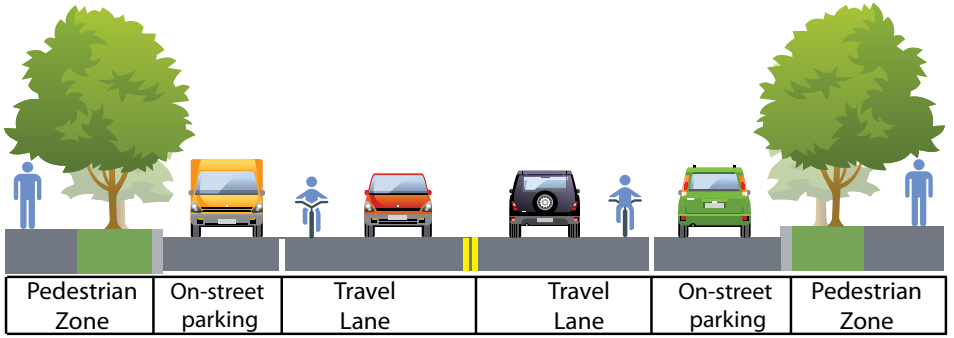
Public input indicated that the intersection of White Oak Drive and Usener Street is difficult to understand. Similarly, the signal timing at Heights Blvd was recommended for adjustment to better accommodate

Future Vision

It is recommended that White Oak Drive be reclassified from Major Thoroughfare to a Major Collector. Given the existing context, the corridor is further recommended as an Urban Street. The existing cross section as a 2-lane undivided facility with parallel on-street parking is recommended to remain. A Sharrow or shared-use bicycle facility between Heights Blvd and Usener Street, is recommended given the limited right-of-way and the close proximity of the buildings to the back of the curb. The intent of this facility is to connect bicycle facilities on Heights Blvd to the White Oak Bayou off-street trail network accessible through Stude Park. Local Bus service is recommended.

Possible Option(s):





* Recommended Local Bus Facility

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Yale Street

Priority Elements

EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4	MTFP Designation	T-4-70
Existing Counts Range	12,000-16,000	Future Volume Range	17,000-31,000
Right-of-way	70’	Proposed MMC	Urban Avenue
Median/CTL/Undivided	Undivided	Median/CTL/Undivided	Undivided

Existing Condition

Yale Street is a 4-lane undivided Major Thoroughfare with 70’ right-of-way connecting IH 610 to IH 10. Sidewalks flank both sides of the corridor, and serve a mix of residential and commercial/retail developments. The intersection of W 20th Street and Yale Street is home to a large commercial and retail node.

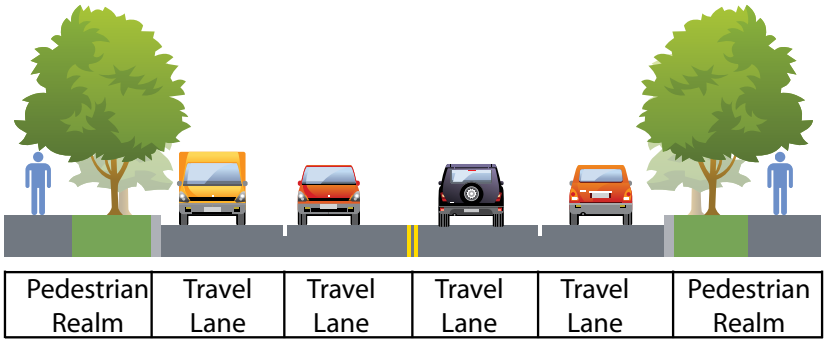
Identified Needs

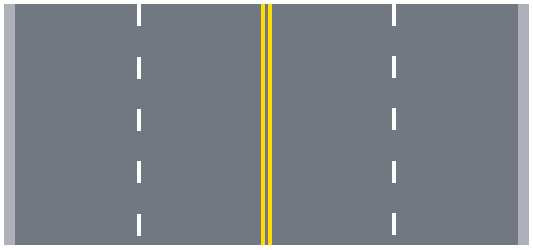
The public perceives signal timing as the major cause of congestion along the corridor. As a regional vehicular connector, signals are dispersed along the corridor to encourage to encourage traffic movement. As such, the provided spacing is not intended to accommodate multiple, close-knit pedestrian crossing points across the corridor. Public comment indicate a desire for pedestrian beacons along some portions of the corridor as well as safer crosswalks at existing signalized intersections. Stakeholders asked for an increase in signage to encourage people to commute downtown by bike.

Future Vision

Future volumes along Yale Street range between 17,000-31,000 vehicles. These higher volume demands indicate the need to maintain the current Major Thoroughfare classification. The multi-modal classification for Yale Street is recommended as an Urban Avenue. Priorities for this corridor will focus on enhancing the pedestrian realm; due to projected traffic volumes and associated speed of vehicular traffic, a bicycle facility is not recommended, and instead is encouraged on Heights Boulevard. However, connection of the bicycle network across IH 610 is recognized as a noted barrier, and further analysis is encouraged to determine the proper solution to this provided gap within the bicycle network A local bus facility is recommended for increased access across IH 610 north of 19th Street.

Possible Option(s):





* Recommended Local Bus Facility

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VII. Outcomes

The previous chapter explored design examples and related key factors for consideration at a micro level. However, how these recommendations translate to the greater system is more evident at the macro level where various systems interact. As such, this chapter of the Report represents the system improvement recommendations for the study area as it pertains to the subregional network. The resulting "network maps" represent a plan that identifies system gaps and highlights potential modifications for improvements both on the MTFP and MMC classifications. The resulting networks depicted work to connect the different facilities to enhance the efficient movement of people throughout the study area, achieving the purpose of this study.

The following sections represent the new networks for automobile, pedestrian, bicycle, and transit facilities. The maps listed below are shown on the following pages and present a comprehensive look at the Heights and Near-Northside areas.

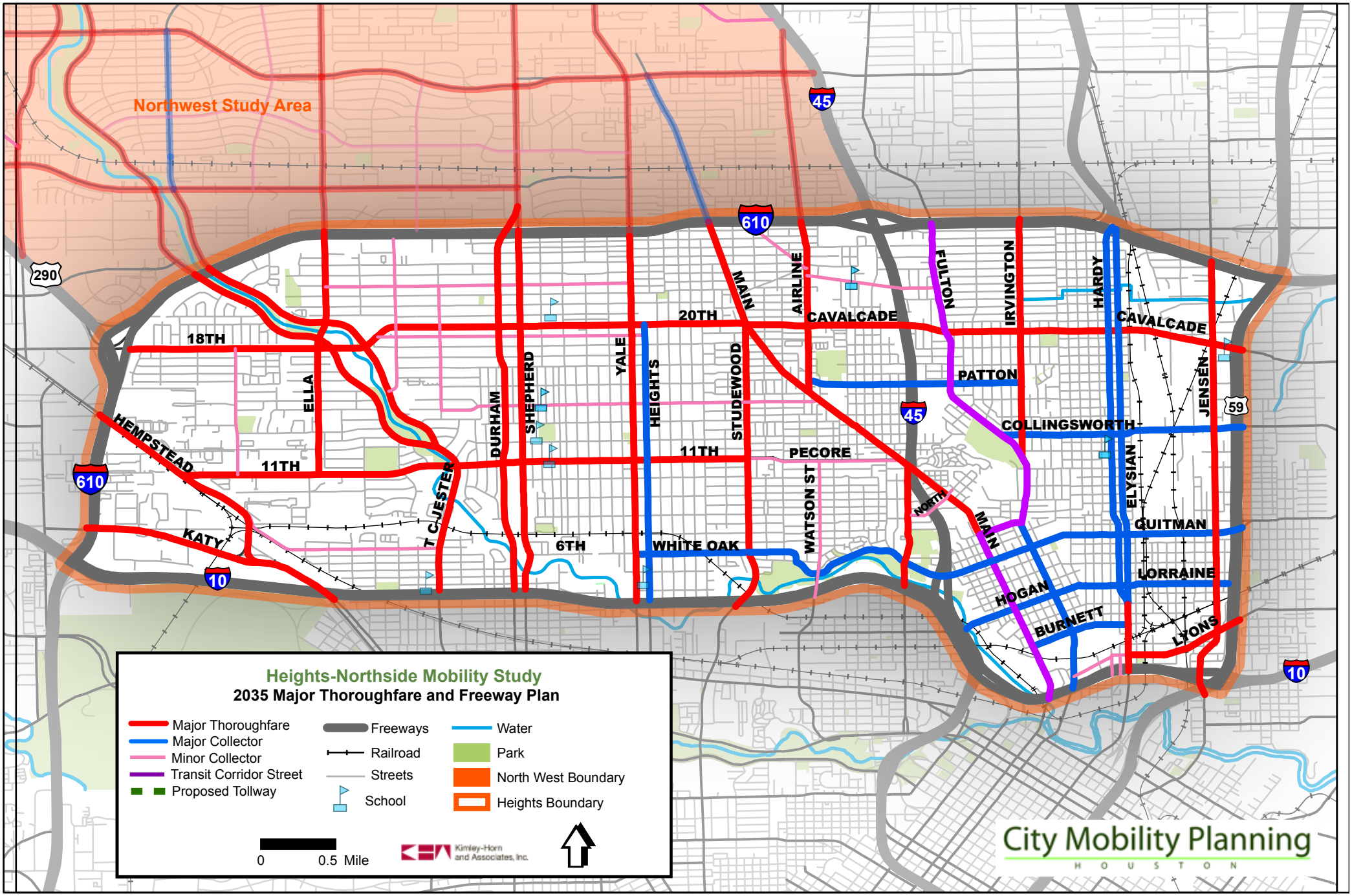
- 2035 Major Thoroughfare and Freeway Plan
- Bike Vision Map
- Intersection Analysis
- Transit and Pedestrian Vision Map

7.1 2035 Major Thoroughfare and Freeway Plan

As explained in the Existing Conditions section of this report, the Major Thoroughfare and Freeway Plan (MTFP) is the City of Houston's guiding document for future corridors. Based on the provided function classification, the MTFP provides the City with essential data regarding the future capacity need of the corridor. Without this road map, identifying projects, funding needs, and priorities would be difficult.

The Heights and Northside areas are both 'built-out', meaning the likelihood of constructing additional or new roads is low. The network the Heights and Northside areas is a well-developed grid pattern. The updated MTFP looks at ways to adjust the existing corridors to better serve the communities' needs. This is accomplished by reclassifying or by planning for the expansion of corridors by adding or re-purposing lanes.

An updated Major Thoroughfare and Freeway Plan is shown in the adjoining map. For a full list of recommendations, please visit the detailed corridor sheets and associated matrix provided in Chapter VI. A Balanced Approach of this Report.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Heights-Northside Mobility Study
2035 Major Thoroughfare and Freeway Plan
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Minor Collector
Transit Corridor Street
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FIGURE 7.1

7.2 Intersection Analysis

Development of Future Intersection Conditions

The traditional traffic engineering approach for growing traffic volumes across a network of streets is to simply start from a point in time at which intersection-specific information is collected, and then grow volumes at a consistent growth rate over the planning horizon. The largest challenge to this approach - within a study area of this larger size - is that over time redevelopment and traffic patterns shift. This causes the steady rate of growth to be over/under estimated for more localized conditions. This study attempts to estimate the future operating conditions at the intersections by using the existing traffic counts as a baseline, and growing them based upon the growth witnessed in the travel demand model. Doing so may allow for intersection improvements to be made that meet future needs.

Intersection data for the Northside area was not collected for this study as the area was undergoing light-rail construction during the time frame of this Report. Count-based recommendations are not provided. Intersection analysis for the Heights area can be found in the following charts. Additionally, analysis of the intersections with the bounding Interstates and State Highways was not included in the scope of this study due to ongoing major reconstruction projects along US 290 and IH 610. Additionally, the IH 45 corridor is currently being studied by TxDOT for a future consideration. As such, this study acknowledges that intersections with the freeways are typically congested and in need of mitigation, but projections for these intersections will be altered greatly once reconstruction is completed. This is due to many factors, including that traffic patterns typically normalize one-year after construction is finished.

Analyzing Future Conditions

The general level of congestion within larger corridors suggests that overall intersection level of service will be manageable in 2035. Figure 7.5 illustrates the intersection congestion levels for the AM peak in 2035. Due to its grid network, intersections within the Heights area operate well. Future Mitigated AM peak has only one major signalized intersection rating an LOS of E. The remaining intersections are ranked A-D. The PM peak period show a similar result. However, there are a few more intersections graded at LOS C-D for the 2035 Mitigated PM Peak Hours. The intersection of North Main/ Studewood and 20th/Cavalcade for the 2035 Mitigated PM Peak hours also has the LOS rating of E. This is a six-prong intersection of two major corridors. Further analysis of this intersection can be found in the intersection policy section.

Mitigating the Near Term Conditions

Specific projects have been identified for the near term at intersections to help mitigate congestion that exist today. These planning-level concepts are provided with specific recommendations and their improvements will help with congestion levels during peak hours and throughout the day as well.

Mitigating the Long Term Conditions

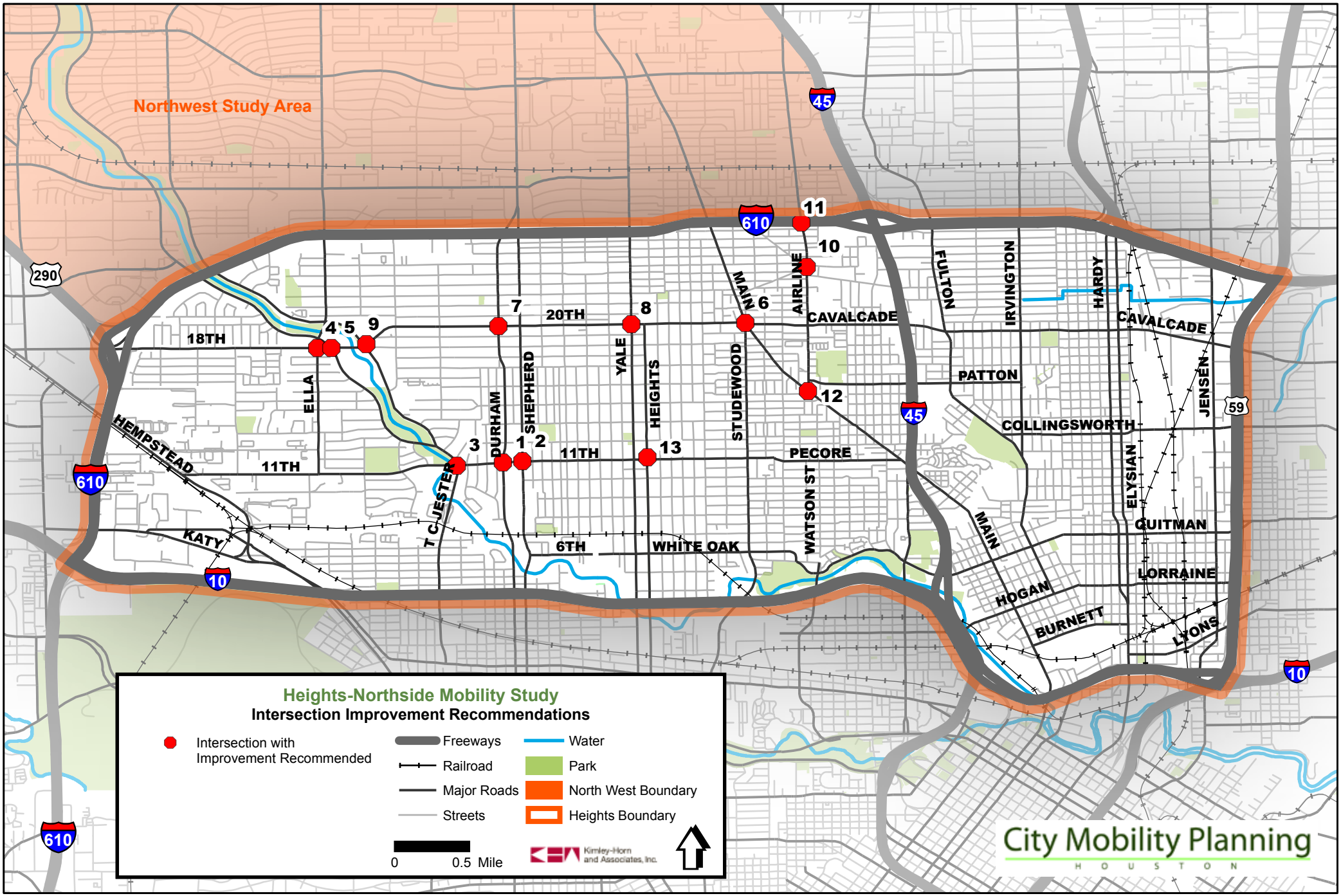
The mitigation opportunities for the 2035 scenario are limited by the existing and proposed right-of-way available for the Heights area. LOS ratings for these intersections were only slightly enhanced by mitigation. Any significant change would require physical improvements and likely involve right-of-way acquisition.

Intersection Improvement Recommendations

Figure 7.1 and the adjoining table indicate the intersections with recommended near- and long-term mitigation improvements. The project team identified improvements based on several variables which include growth rates, existing traffic counts, projected traffic volumes, land use, and the MTFP. The labeled intersection corresponds to the ID number on the following tables.

ID Number	Intersection	Proposed Near Term Mitigation	Proposed Long Term Mitigation	Alternative Mitigation Improvements
1	11th @ Durham	Optimize Offsets Optimize Splits Modify Westbound left-turn phase to permissive/protected on 11th St		
2	11th @ Shepherd	Optimize Offsets Optimize Splits Modify Eastbound left-turn phase to permissive/protected on 11th St		
3	11th @ TC Jester	Optimize Offsets Optimize Splits	Add Westbound right-turn bay on 11th St Add additional Southbound left-turn bay to make dual left-turns on TC Jester	
4	18th @ Ella	Optimize Offsets		
5	18th @ TC Jester		Add Northbound right-turn bay on 18th St	
6	20th/Cavalcade @ Main/Studewood	Optimize Offsets Optimize Splits Modify East and Westbound left-turn phases to permissive/protected phases on 20th/Cavalcade St	Add additional Southbound thru lane on Main St	Installation of 2 lane roundabout could be considered at this intersection
7	20th @ Durham	Optimize Offsets Optimize Splits	Add Additional Westbound thru lanes on 20th St Add two additional Eastbound thru lanes on 20th St Add Eastbound thru lane on 20th St Add exclusive right-turn lane on 20th St	
8	20th @ Yale		Add additional Westbound thru lane on 20th Add Westbound right-turn bay on 20th St Add exclusive left-turn lane on 20th St Add exclusive right-turn lane on 20th St	Add additional Eastbound thru lane on 20th St Add additional Northbound thru lane on Yale Add additional Southbound thru lane on Yale
9	20th @ E TC Jester	Installation of signal for intersection		
10	Gibbs @ Airline			Installation of 2 lane roundabout could be considered at this intersection
11	Service @ Airline			Installation of 2 lane roundabout could be considered at this intersection
12	N Main @ Airline			Consider realigning Airline Drive to avoid the offset at the intersection
13	Heights at 11th			Analysis of a Michigan U-Turn concept

TABLE 7.1 SHORT-TERM INTERSECTION IMPROVEMENTS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Heights-Northside Mobility Study
Intersection Improvement Recommendations
Intersection with Improvement Recommended
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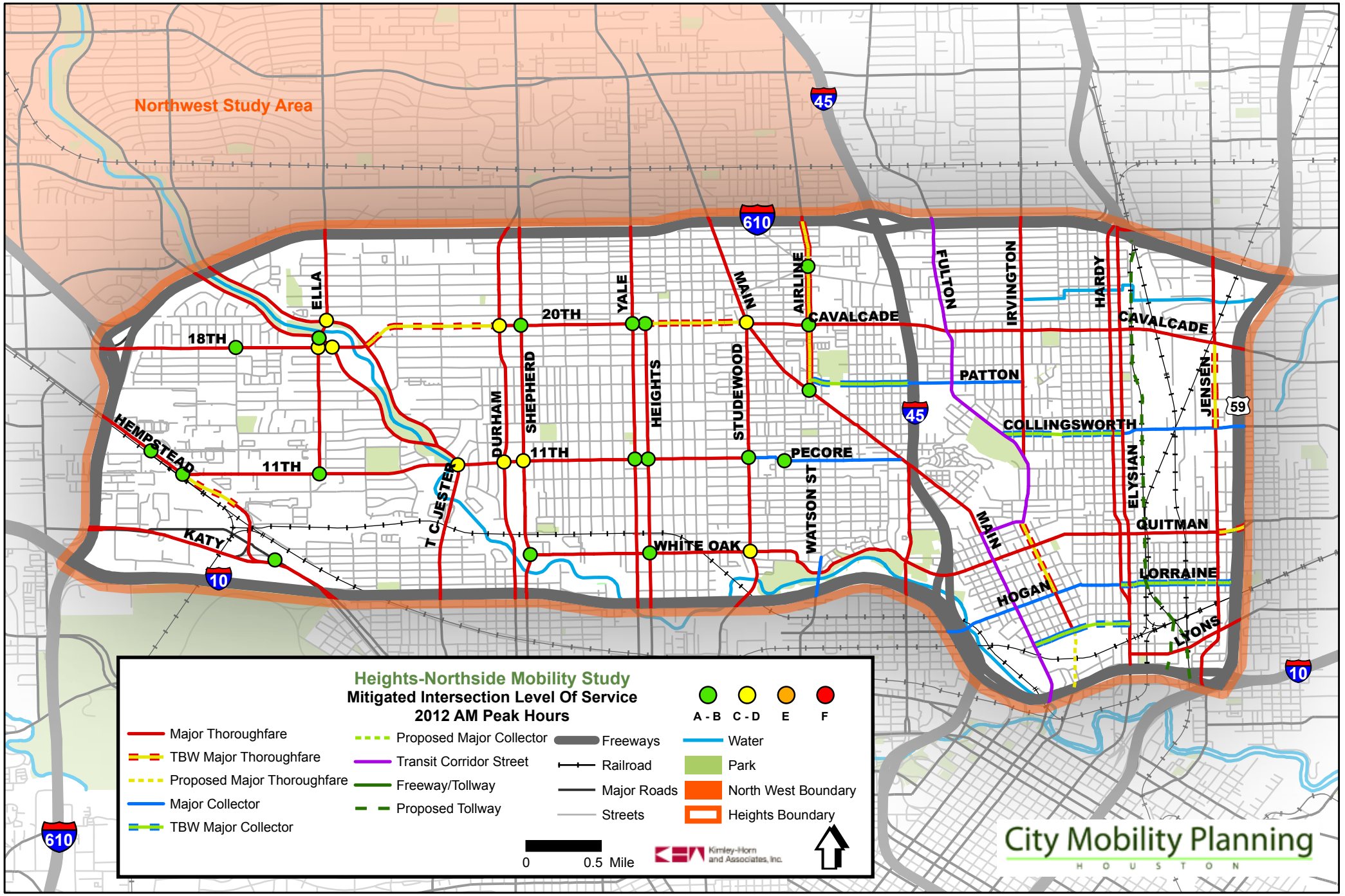
FIGURE 7.2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Heights-Northside Mobility Study
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Kimley-Horn and Associates, Inc.
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FIGURE 7.3

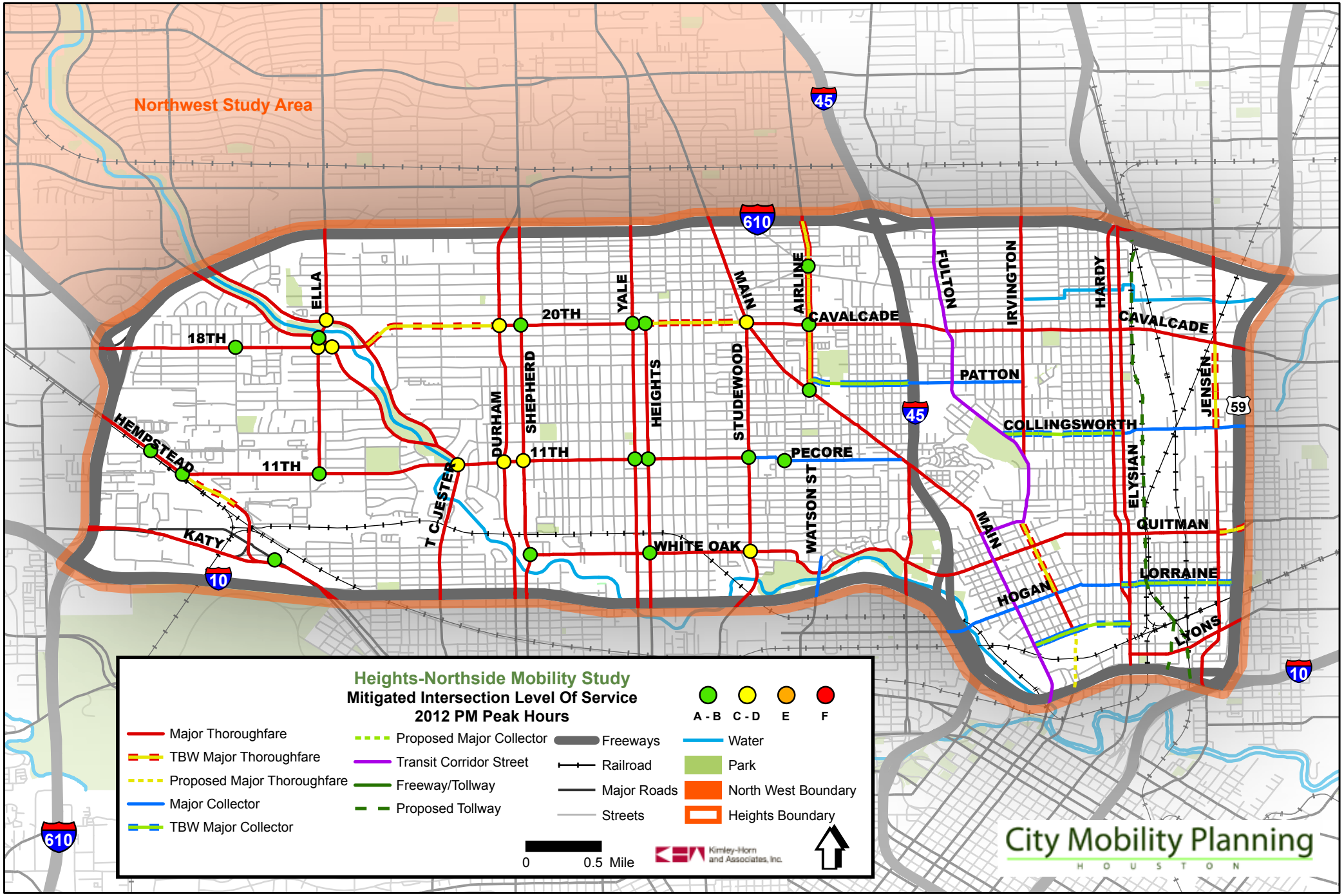
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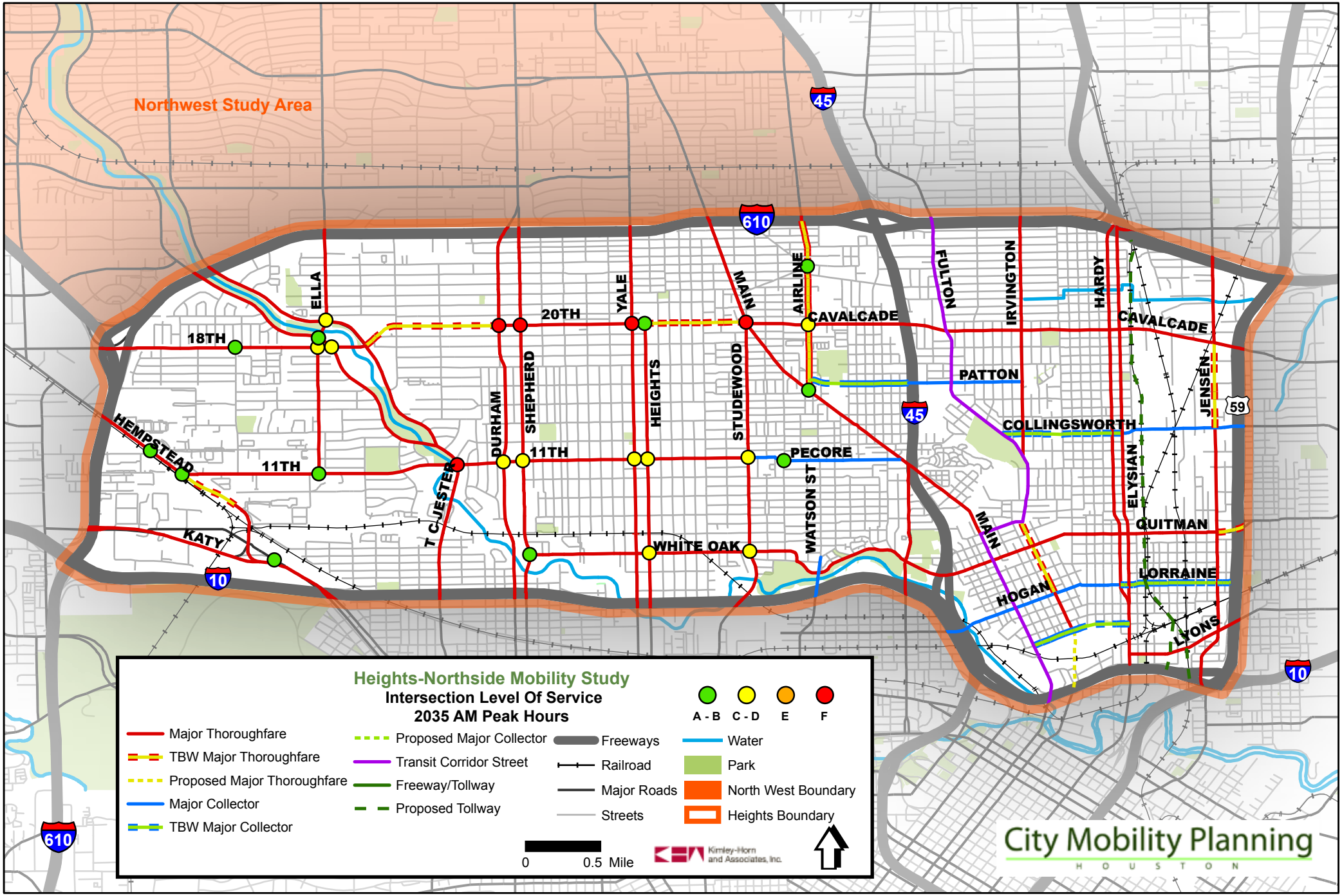
FIGURE 7.4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Kimley-Horn and Associates, Inc.
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FIGURE 7.5

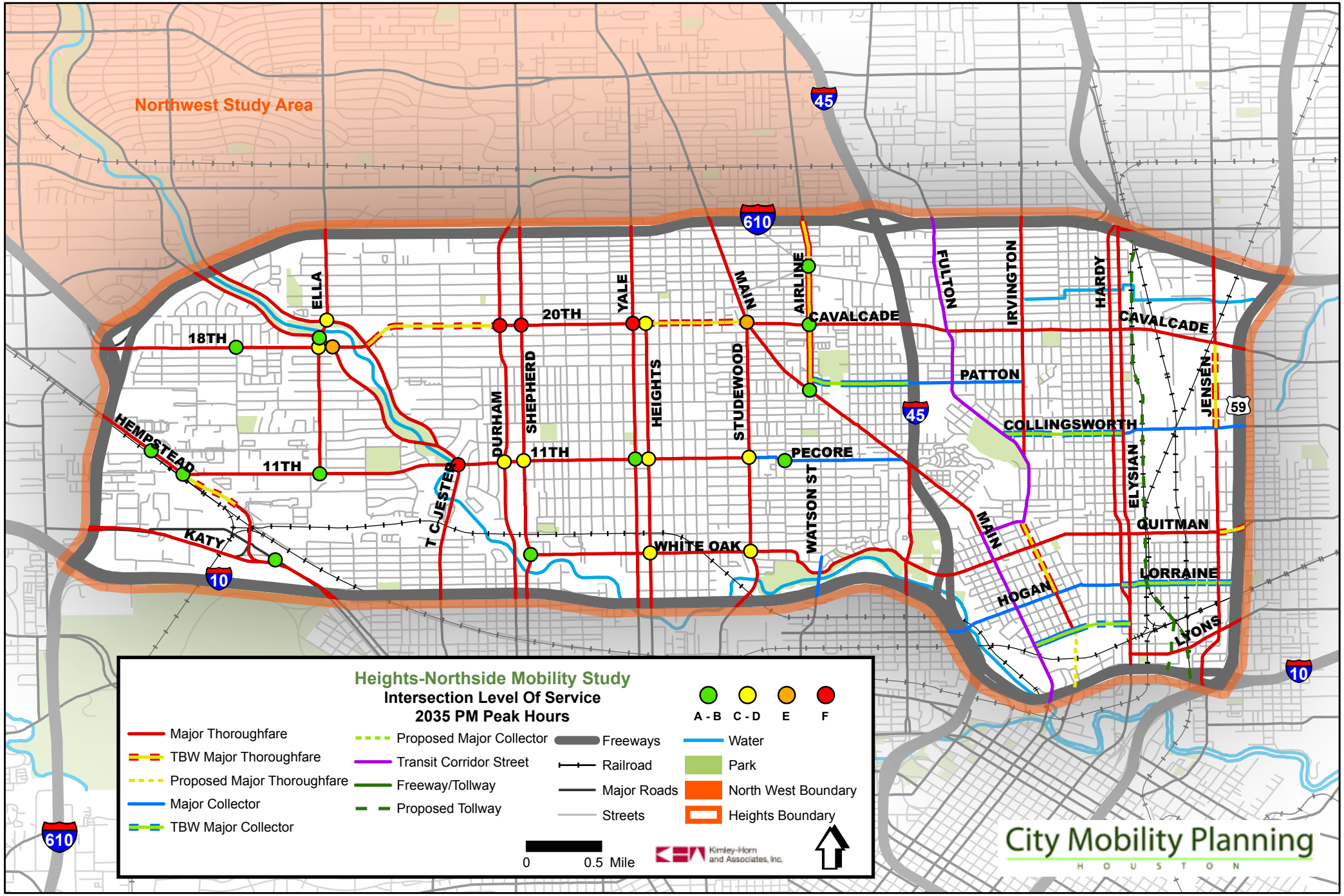
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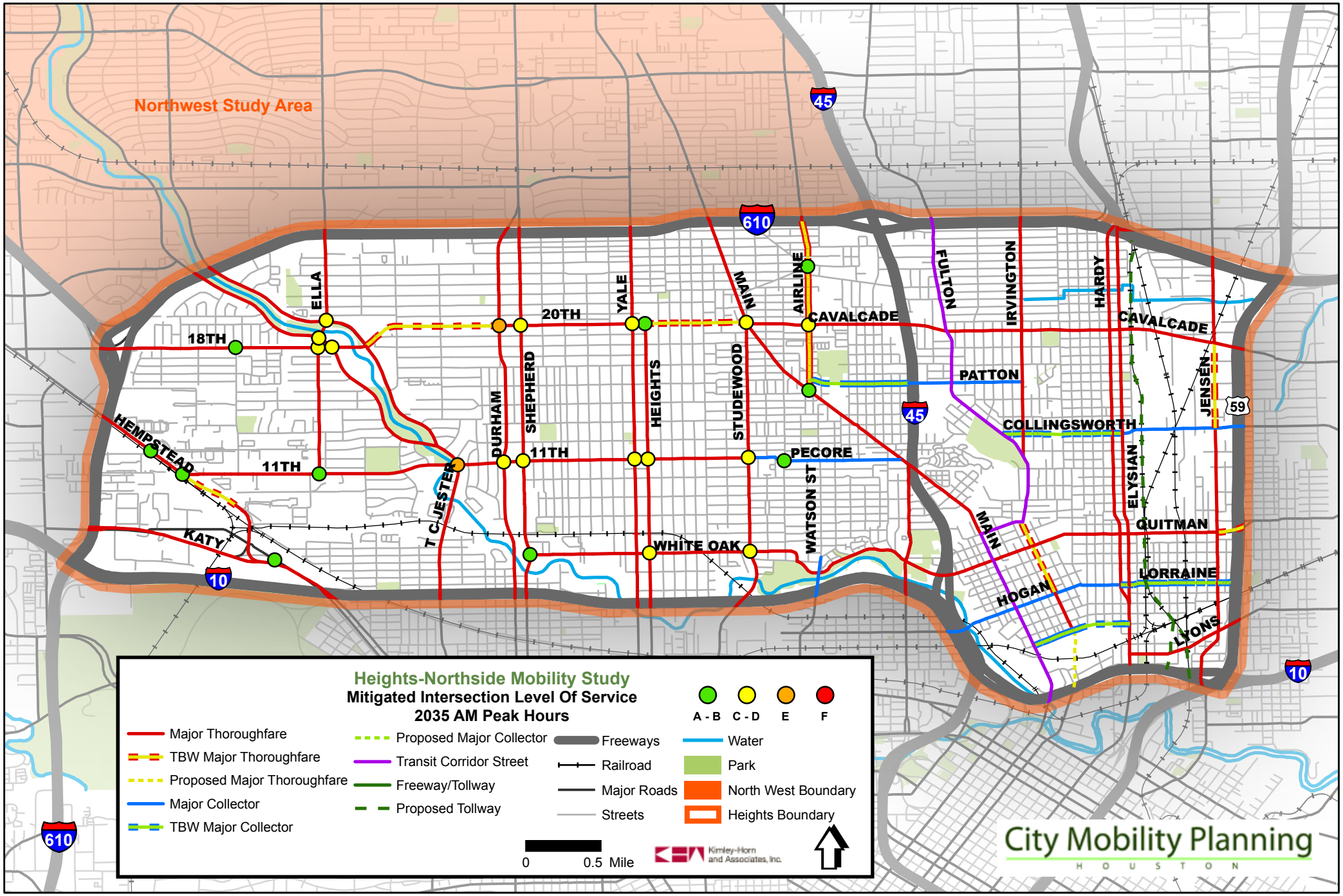
FIGURE 7.6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Kimley-Horn and Associates, Inc.
City Mobility Planning
HOUSTON

FIGURE 7.7

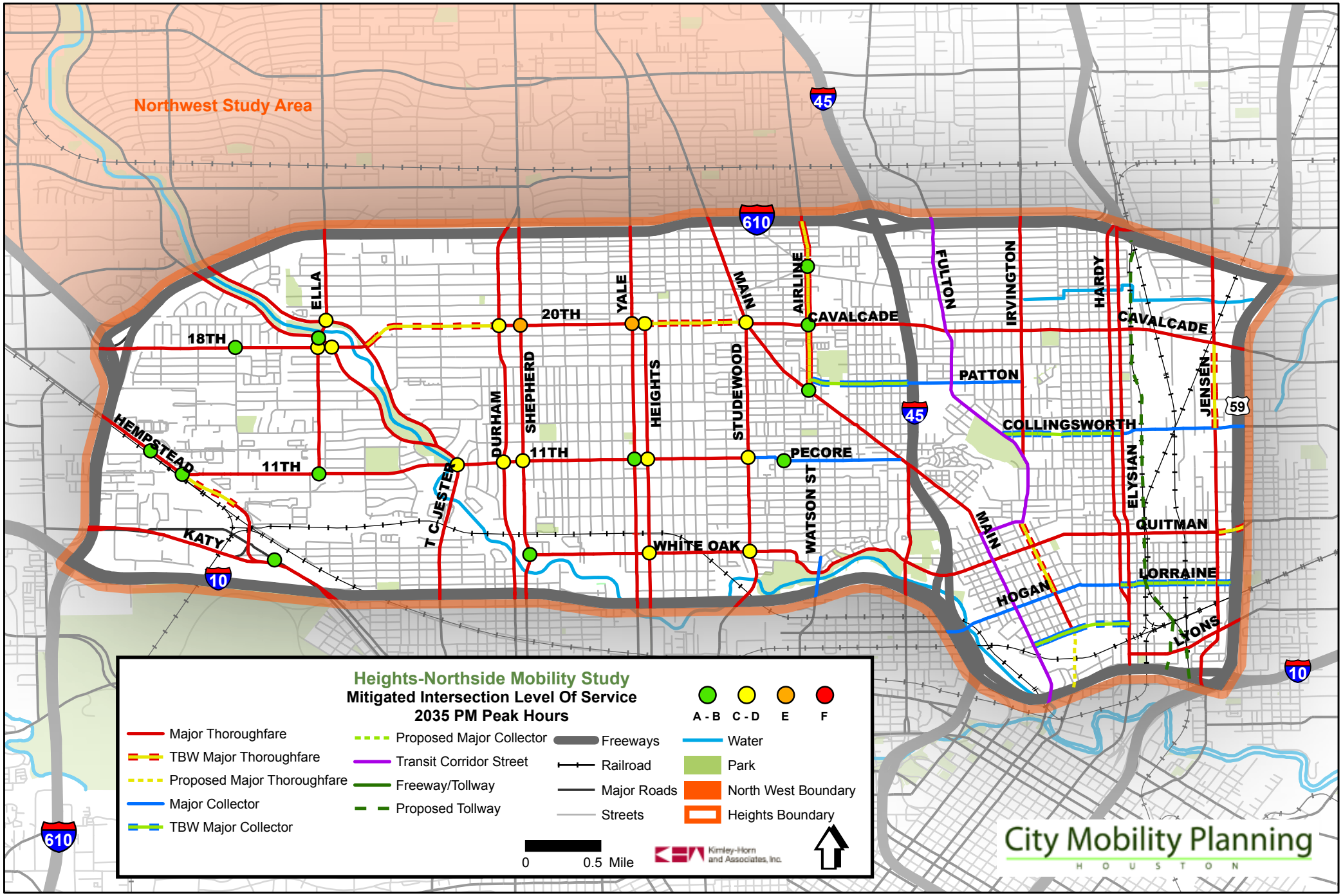
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FIGURE 7.8

7.3 Bike System Gaps and Vision

The current bicycle network within the Heights and Northside areas is apparent, but room for expansion is evident. Planning for future facilities as streets redevelop, in addition to working with existing corridor design to create viable bicycle facilities, is essential in creating a well-connected network. Trail heads - key access points from on-street to off-street biking facilities - are identified on the following system map for bike facilities; however, this list is in no way exhaustive and instead meant to start discussion concerning where and when such transition points are warranted.

Heights area

The Heights area is unique in regards to how bicycle facilities are used. Unlike many communities, the Heights has embraced the use of bicycles for commute in addition to recreational use, and encourage the expansion of the network in this area.

The Heights area is well-suited for developing an extensive bike network given that White Oak Bayou Trail cuts through the middle of the community. The IH 610 loop, north of the study area, presents a unique challenge. Although the project team acknowledges a gap between the Heights and the communities north of the IH 610 corridor, the appropriate connection across the highway is unclear. Crossings at TC Jester and Ella should be maintained, but the approximate 4-mile gap within the bicycle network between Ella Blvd and Irvington Blvd presents a large barrier in the existing bicycle network. Main Street is identified as a potential gap solution within the network, however further review is needed. Potential consideration of Durham-Shephard couplet or Yale should be further analyzed as possible connection across the IH 610 corridor.

Northside area

The Northside area has several on-street bike facilities, but are considered narrow and unsafe along many of the communities heavily traveled streets. Local residents were vocal in their desire to expand the bike network within their area, especially for increased connectivity in to the Downtown and Heights areas. Streets, such as Quitman, were also noted as ideal bicycle facilities given the number of schools located along the corridor.

The type of bicycle facility recommended is intended to provide a balance between the associated user of the facility as well as restriction provided by the existing right-of-way. Proposed bicycle facilities types are defined Chapter V, Section 5.4 Bicycle User and Facility Type.

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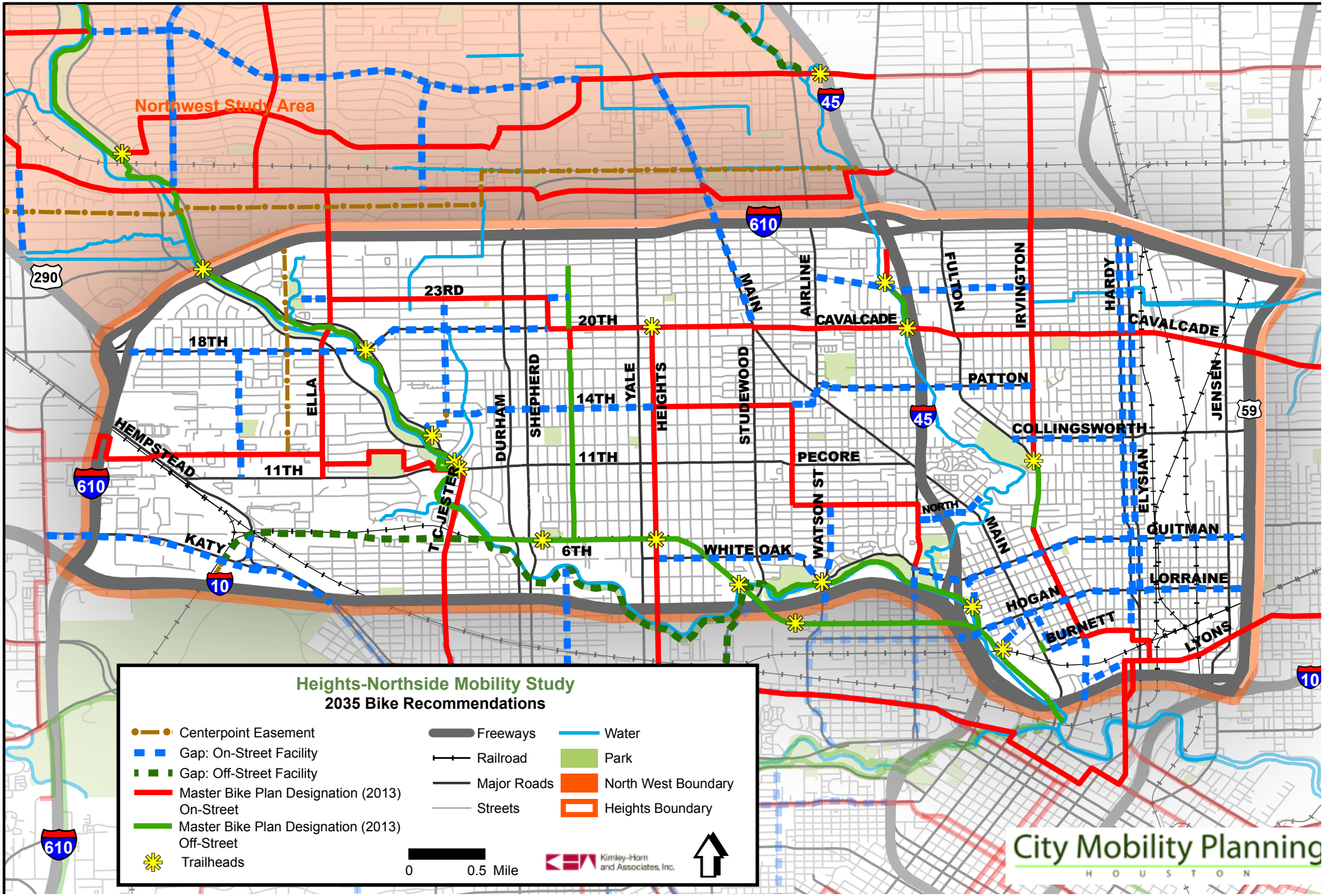
PHOTO PROVIDED COURTESY CITY OF HOUSTON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Heights-Northside Mobility Study
2035 Bike Recommendations
Centerpoint Easement
Gap: On-Street Facility
Gap: Off-Street Facility
Master Bike Plan Designation (2013) On-Street
Master Bike Plan Designation (2013) Off-Street
Trailheads
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Major Roads
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FIGURE 7.9

7.4 New Transit and Pedestrian Vision Map

The transit network within the Heights area is extensive, as seen in Chapter II. Existing Conditions. As detailed in Chapter V, Section 5.6 Transit Corridor Considerations, the project team evaluated specific corridors and areas of Houston where transit can be most successful in capturing riders, the following factors were analyzed and ranked in the Heights-Northside:

- Residential Density
- Lane Use
- Network Density
- Existing Transit Ridership
- Projected Transit Ridership

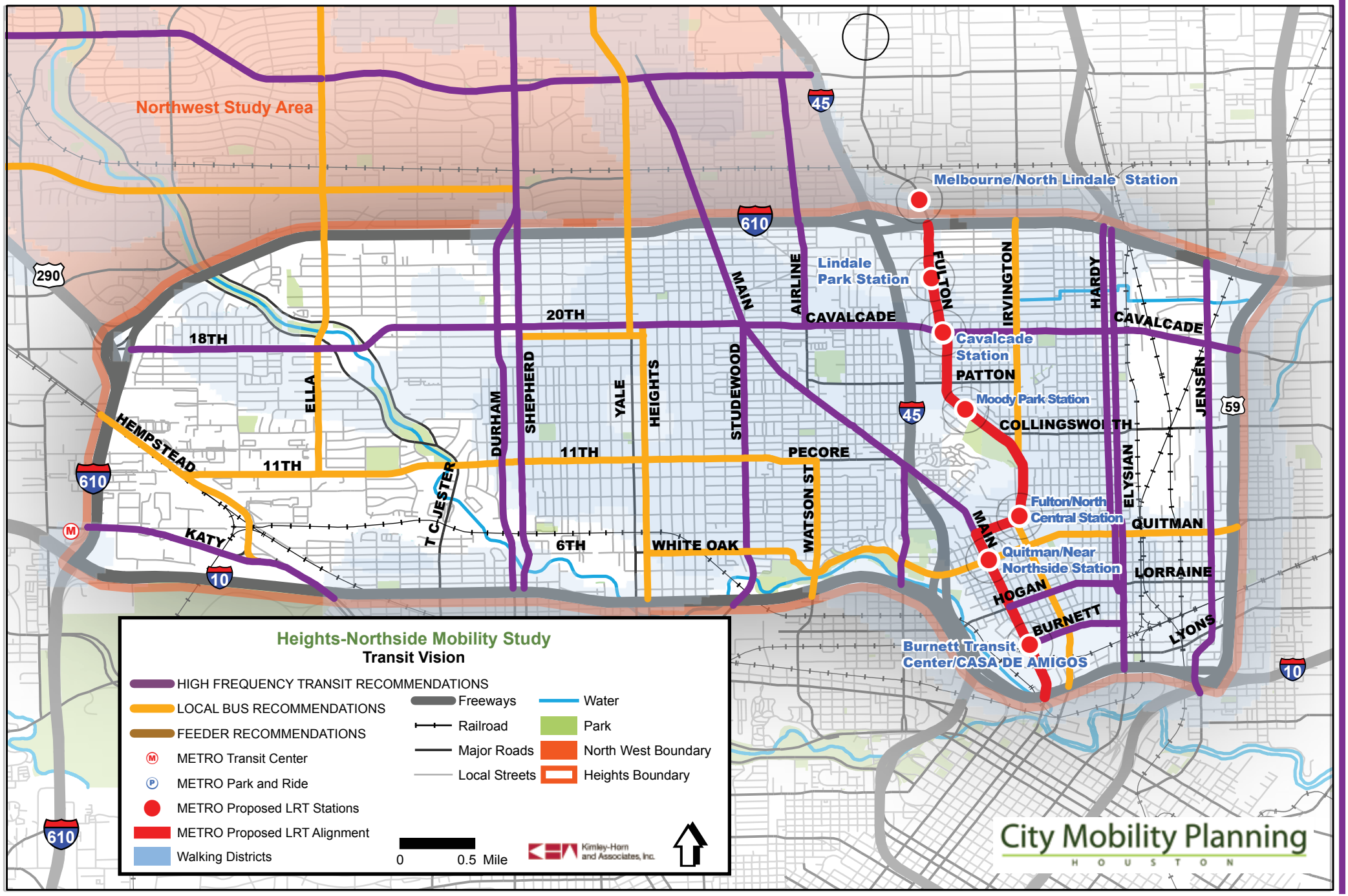
The final output from the resulting analysis (Scenario 5) , was further evaluated by METRO to ensure consistency and modifications to the system where appropriate as part of the greater METRO System Reimagining. Two transit types are depicted in final system recommendations including: Local Bus Routes and Bus Rapid Transit (BRT), or routes that facilitate the movement of larger numbers of persons across greater distances with less stops. METRO's light rail line, which came on line in December of 1013, is also depicted. See Figure 7.10 for more information.

With the expansion of the transit network (including the opening of the light-rail line) enhancements to pedestrian facilities within the study area are a priority. Specifically, it is recommended that wider sidewalks be provided on corridors with transit and corridor connecting to transit. Wider sidewalks enhance safety of the pedestrian realm which encourages increased access to transit. For more information regarding the pedestrian realm and proper facility types see Chapter VI. A Balanced Approach.

BUS RAPID TRANSIT (BRT)

LIGHT-RAIL

LOCAL BUS


Northwest Study Area
Melbourne/North Lindale Station
Lindale Park Station
Cavalcade Station
Moody Park Station
Fulton/North Central Station
Quitman/Near Northside Station
Burnett Transit Center/CASA DE AMIGOS
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Heights-Northside Mobility Study
Transit Vision
HIGH FREQUENCY TRANSIT RECOMMENDATIONS
LOCAL BUS RECOMMENDATIONS
FEEDER RECOMMENDATIONS
METRO Transit Center
METRO Park and Ride
METRO Proposed LRT Stations
METRO Proposed LRT Alignment
Walking Districts
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Railroad
Major Roads
Local Streets
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North West Boundary
Heights Boundary
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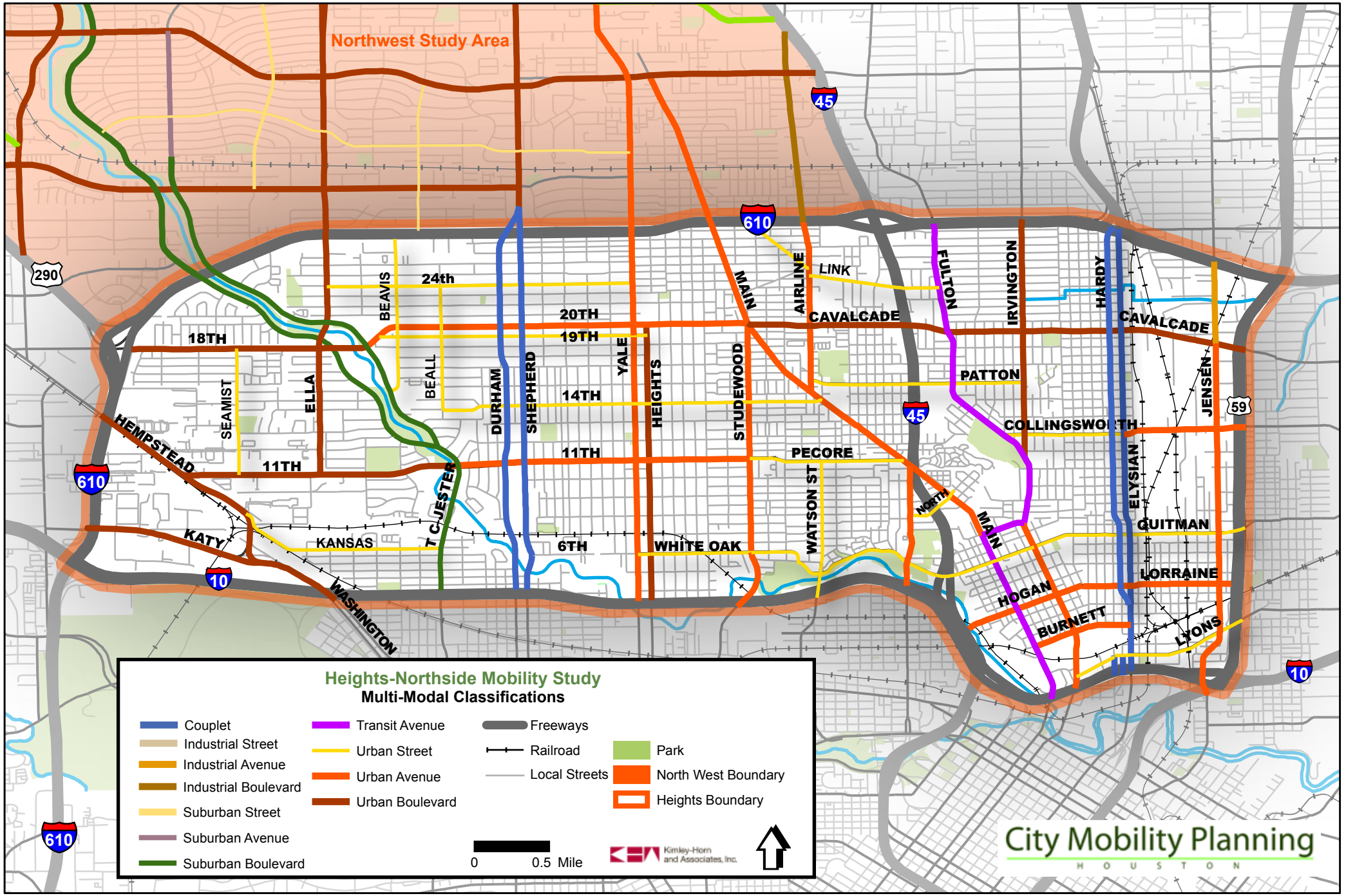
FIGURE 7.10

7.5 Multi-Modal Classification Map

The Multi-Modal Classification Map depicts a public street type classification system that takes into account the functional classification system and land use context, inclusive of right-of-way width, number of lanes, and traffic volume. The MMC can be found in Chapter 10 of the Design Manual for Street Paving Design Requirements.

The multi-modal classification identifies the options for widths of the road based on the modal uses. Corridor classifications were identified in conjunction with the City of Houston's Public Works and Engineering Department (PWE) and Planning and Development Department (PDD). Individual corridor evaluation is summarized in Chapter VI, Section 6.2 Corridor Sheets. The MMC Map shown in Figure 7.11 is representative of the 2035 MTFP network, and as such includes all existing as well as planned roads projected to be built by 2035.

Based on the evaluation of the MMC designations provided in Chapter 10, Appendix 2 of the City of Houston Infrastructure Design Manual, it is recommended that provided right-of-way designations as currently defined be reevaluated. Specific attention should be given to how a boulevard and avenue are defined where provided ROW designations of 100' or 80' do not necessarily reflect older corridors characteristic of Houston streets. Instead, it is recommended that the use of Urban and Avenue be used as a design consideration where boulevards may be used to improve or alter traffics access management.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Industrial Boulevard
Suburban Street
Suburban Avenue
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FIGURE 7.11

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VIII. Next Steps

The City of Houston has undertaken this planning level study to identify near- and long-term transportation system needs within the Northwest study area. This study sets a vision for future transportation facilities within the study area through an examination of multiple transportation modes and project concepts. This study examined project concepts that can ultimately be fed into the City's Capital Improvement Program process as described in more detail within subsequent sections of this chapter, CIP Manual Summary.

Additionally, this study promotes several concepts that are policy oriented. These items can be addressed through the annual review process that several City documents undergo, which is described in subsequent parts of this Chapter.

Finally, these recommendations are not intended to be static. The intent of this study, and other mobility studies in which the City is a partner, is to develop a set of projects and policy recommendations that can be used in determining sub-regional priorities. These priorities can be further examined within the broader citywide capital programming and pre-engineering process.

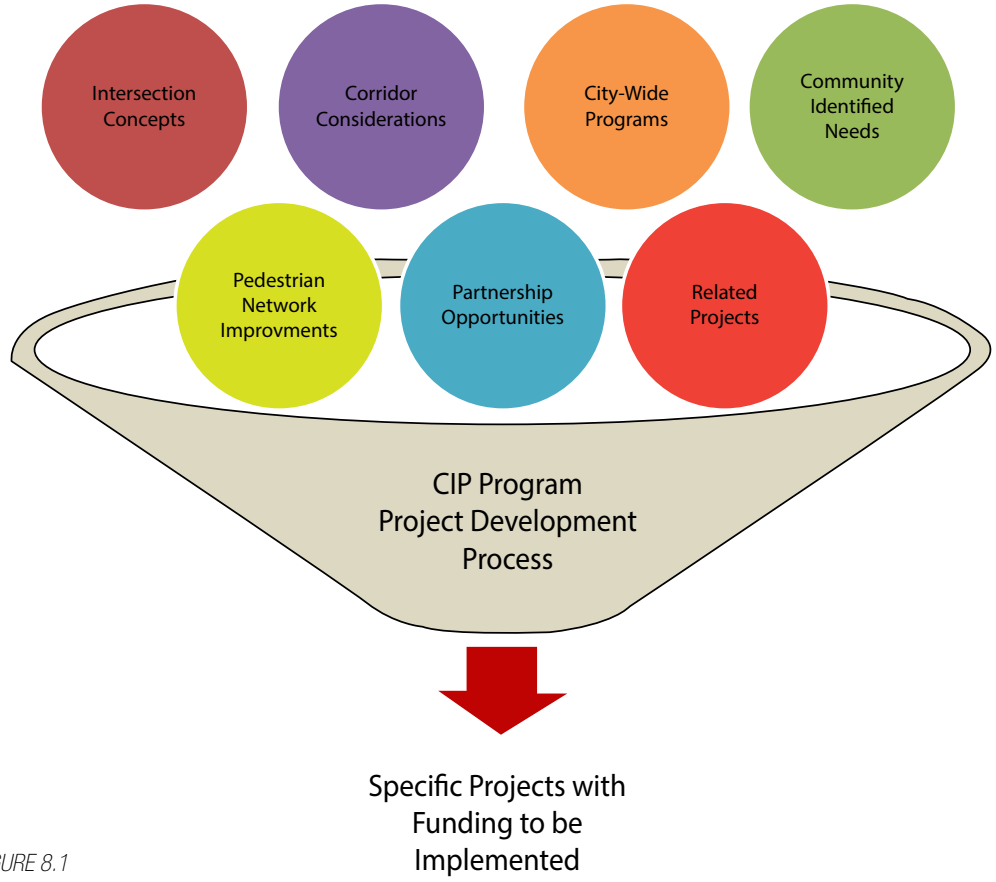

FIGURE 8.1

Outcomes of this Study

The specific project concepts identified for both the short and long-term will be analyzed through the lens of several different departments within the City which include, but are not limited to:

- Planning and Development Department can use the recommendations to ensure that right-of-way is preserved where appropriate. The Department is responsible for defining the multi-modal classification process via the MTFP.
- The Department of Public Works and Engineering will work through their annual engineering process to develop further details regarding the solutions discussed in this report for specific intersections.
- The Department of Public Works and Engineering will be responsible for analyzing the broader projects within the scope of their annual projects review process that is highlighted within the CIP Process Manual for Infrastructure Programs.

Each of these items are discussed in more detail in the following sections.

CIP Process Manual Summary

The single largest program that will be used for the implementation of the Heights-Northside Study will be the Rebuild Houston Initiative. All City departments and divisions play a role in defining projects for consideration for the Rebuild Houston process. Given the link between the street infrastructure concepts presented within this Report, Rebuild Houston provides a viable, long-term funding source for identified improvements. The process for Capital Improvement Projects (CIP) can be broken into two phases:

- Programming Phase, projects to be constructed within the next five years
- Planning Phase, projects estimated to occur within the next six to ten years.

Many of the projects identified through this study fall under the Planning Phase which involves several additional steps before funding is programmed. It is at this stage, however, where projects and related elements are first prioritized, that includes incorporating multi-modal concepts resulting from this and other mobility studies.

The following graphic provides an overview of the Planning Phase, however it is recommended that the most recent version of the Capital Improvement Plan Process Manual be examined for pertinent changes throughout the life of this document. The graphics shown are representative of graphics found in Version 3.0 of the above referenced manual.

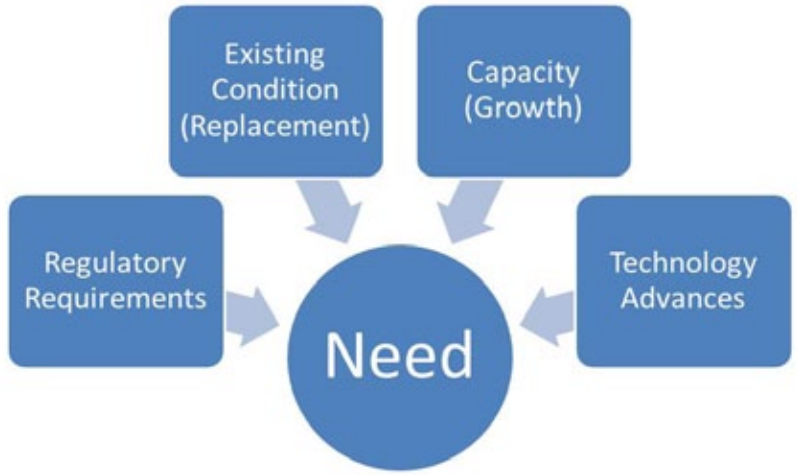

FIGURE 8.2

The planning phase of the CIP process is arranged in four distinct steps (Figure 8.3). Need identification is the first step of the planning phase and starts with a comprehensive assessment of existing conditions. A Need is determined every time that the existing infrastructure does not meet the Level of Service (LOS) defined in the City of Houston Infrastructure Design Manual (IDM). Potential infrastructure improvements result include:

- Replacement – where existing condition of the infrastructure no longer meets the standard LOS and is beyond routine maintenance, or
- Right-of-way – where demand right-of-way results in existing conditions congestion or higher capacity.

Where need is determined, multi-modal considerations, as determined by these mobility studies efforts, should be used to evaluate a roadway's project infrastructure such as sidewalks, neighborhood traffic management and commuter bicycle infrastructure. These identified elements may then be prioritized and further evaluated in the third step of the planning process where solutions, including potential roadway designs, are considered.

Project that reach the top of the prioritization list become candidate needs and moved into solution development. In this step, pre-engineering is performed to identify and develop candidate projects for inclusion in future CIPs. Candidate projects identified and developed during the planning phase are not automatically added to the CIP.

Final incorporation of candidate projects and related design considerations are determined in the Programming Phase of the CIP process.

The Project Needs are then developed further through the process including: pre-engineering, project coordination and review, coordination with other entities, additional engineering, and programming the project within the CIP and including funding for the construction of the project.

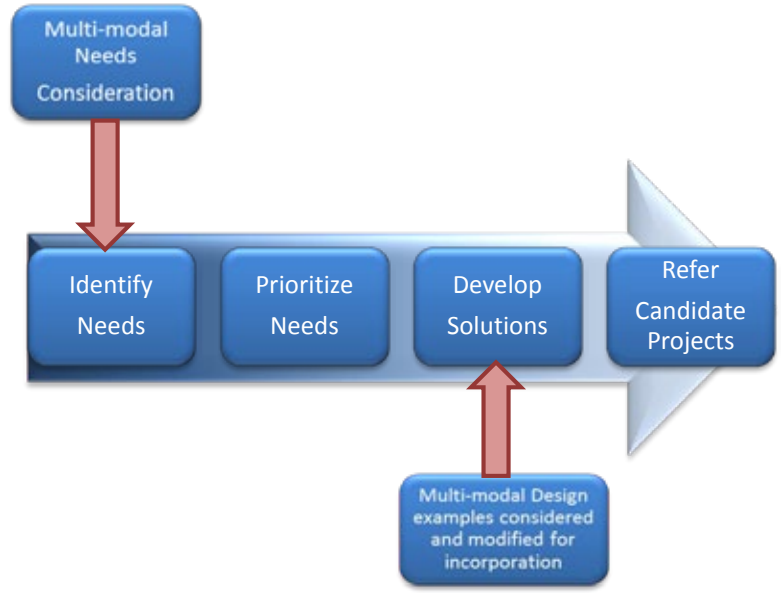

FIGURE 8.3

Potential Policy Updates

During the planning process, discussions with City staff led to the realization that there may be a need to update some of the existing City Policies related to street definitions and the application of the Alternative Cross-Sections that are defined in Chapter 10, Appendix 2 of the Infrastructure Design Manual. Most notably several gaps within the options that were identified through this process include a need to:

- Create additional cross section alternatives for 60 and 70-foot corridors that act as Urban Avenues;
- Create Transit Corridor Definitions that do not rely on exclusive lane treatments;
- Define cross sections for Urban Streets that reflect a 50 and 60-foot right-of-way pattern for streets that currently act as Collectors but are not defined on the MTFP as such; and
- Consider use of "Target Speed" instead of "Design Speed".

Additional public outreach will likely be warranted during the pre-engineering and final engineering phases of a specific project development process. These outreach activities and the level of detail covered should be governed by the complexity of the project. For example, a sidewalk project with an identified gap in the network requires a smaller sphere of additional outreach, likely only with affected property owners. Meanwhile, a corridor study to implement one of the corridor concepts identified above, should have a detailed public involvement process, as defined previously in this Report.

Updates to MTFP

The Major Thoroughfare and Freeway Plan (MTFP) is another major policy that will be used by the City's Planning and Development Department to further the multi-modal transportation concepts that were developed during this planning effort. By ensuring that roadways within the study area are appropriately classified and designated within the MTFP, Planning staff at the City have the ability to secure right-of-way, coordinate projects, and explore non-motorized connections within other planning and design activities where vehicular considerations allow. This tool also allows the staff to communicate the long-term vision of a corridor as redevelopment continues within the study area.

Additionally, there is a need to examine related policies to further define the proposed multi-modal classification system. Revisions to the main body of policies that define the application of the MTFP have proven difficult given the use of the definitions contained within the MTFP throughout sections of the Local Development Code. As such, it is recommended that a sub-classification system be established within the existing MTFP ordinance so that as sub-regions are analyzed more thoroughly the multi-modal classification system can be utilized without adversely impacting the remaining elements of the code.

Coordination with Other Entities

One of the most critical components to moving concepts and associated recommendations discussed in this document forward is coordination. It is recommended that preliminary or planning level activities be coordinated through the Planning and Development Department to ensure a consistent approach to system-level planning. Implementation of general-level planning concepts and projects, however, are more appropriately executed by Public Works and Engineering where segments of the greater system are evaluated on a project-by-project basis. To ensure consistency, it is recommended that the Planning and Development Department work with Public Works to ensure that the intent of the system-level planning is appropriately translated to on-the-ground project implementation.

Another important component of the coordination efforts includes the integration of concepts and plans being developed by agencies other than the City of Houston. Examples include those projects under design by either a Management District, a TIRZ, or a Private Sector entity.

Ensuring that the plans and projects developed by these outside partners are in line with the ideas presented by this report will help to ensure connectivity within the overall transportation system. Additionally, these coordination efforts will help to promote alternative modes of transportation within an area of the City that is currently experiencing a high rate of densification with expectations that this higher rate of density will continue throughout the planning horizon.

Project Phasing

Given the pre-engineering level of detail associated with this effort, defining project phasing and costing beyond concepts of near- and long-term is difficult. The City of Houston, through the Rebuild Houston Initiative, is in the process of developing and refining the city-wide project prioritization process which will be used to determine corridor-based projects throughout the City - corridors evaluated as part of this Study, will enter this process.

In addition, the Department of Public Works and Engineering (PWE) has established criteria by which the intersections signal upgrades are prioritized, and funded for improvement. As outlined in the 2012 Capital Improvements Plan Process Manual, intersection improvements include upgrading equipment and associated hardware and software to support traffic signal timing and coordination. In some cases reconfiguration of turning lanes or lane configuration can improve area-wide flow. Need for improvements to signalized intersections is driven by two factors, replacement of prior technologies or non-functioning equipment and intersection performance. Intersections with equipment that are not capable of being coordinated area-wide are considered a need. In the future these intersections will also be evaluated for capacity. Need for new signalized intersections will be analyzed separately by the Manual on Unified Traffic Control Devices (MUTCD) signal warrant process.

The long-term project list can be examined over the next twenty years to determine phasing that is appropriate given verified needs. As part of this study, the following were identified as critical improvement corridors. Conceptual improvements presented in this report will be analyzed to move beyond the planning stages and into preliminary and final engineering. The final step for any of these projects will be securing funding through either a Capital Improvements Plan (CIP), a coordinated project with one of the Management Districts or TIRZs within the study area, or an outside funding source such as a Private Sector Partner or State and Federal funding opportunities.

These corridors include:

- 20th
- 19th
- Shepherd
- Durham
- Main St
- Hardy
- Hempstead

These critical corridors were identified due to their impact on:

- Overall grid connectivity
- Capacity
- Intersection level of service
- Ability to accommodate additional modal uses

As opportunities arise for coordination between projects, including projects such as utility replacements (which already require the street to be reconstructed), the projects identified for near and long-term improvements will be re-examined as appropriate.