City Mobility Planning

Houston

Heights-Northside Sub-regional Study

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City Mobility Planning

Heights-Northside Sub-regional Study
January 2014

Prepared for:
City of Houston

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City Mobility Planning

Heights-Northside Sub-regional Study

Special Thanks to:

All the residents and stakeholders within the study area that
attended the 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. 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 these 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. As such, 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).

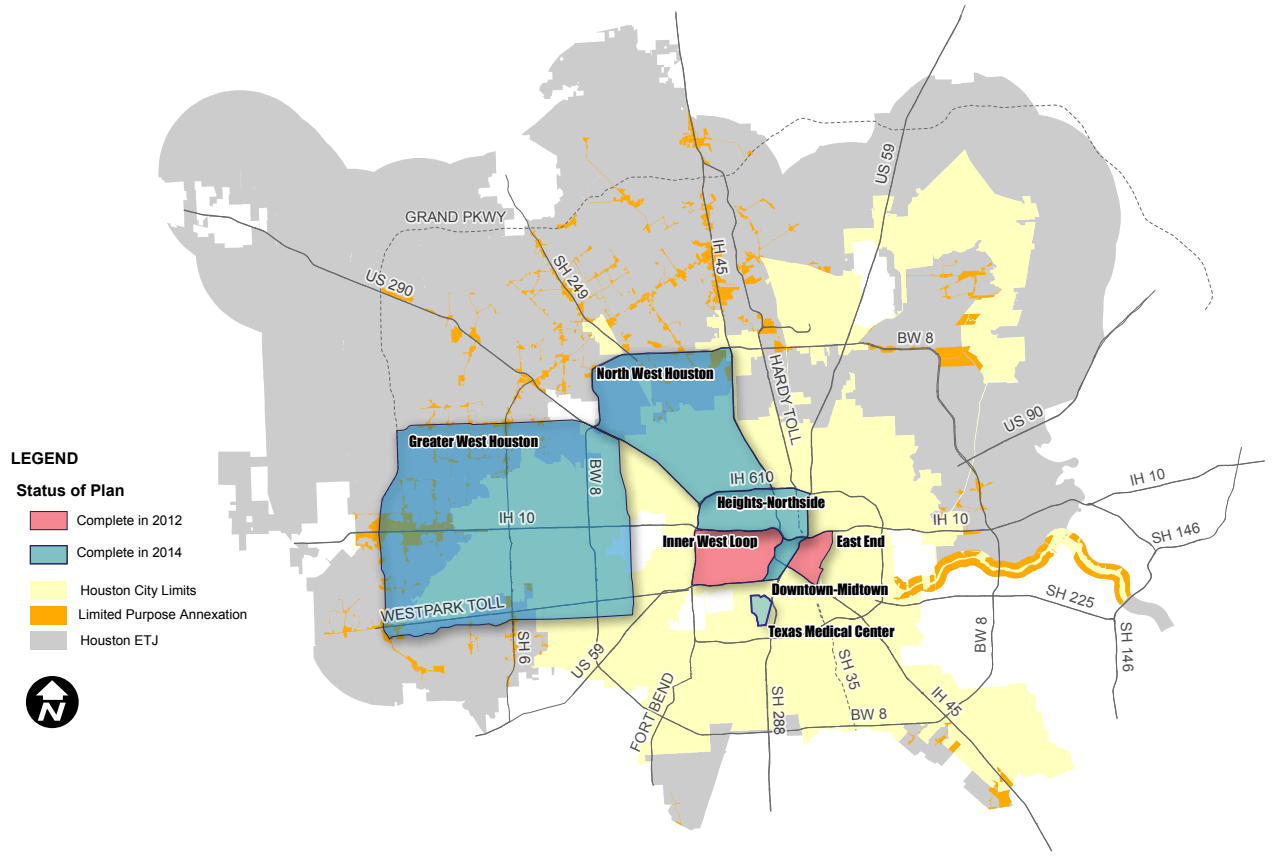


FIGURE 1.1. CMP II: SUBREGIONAL PLANS

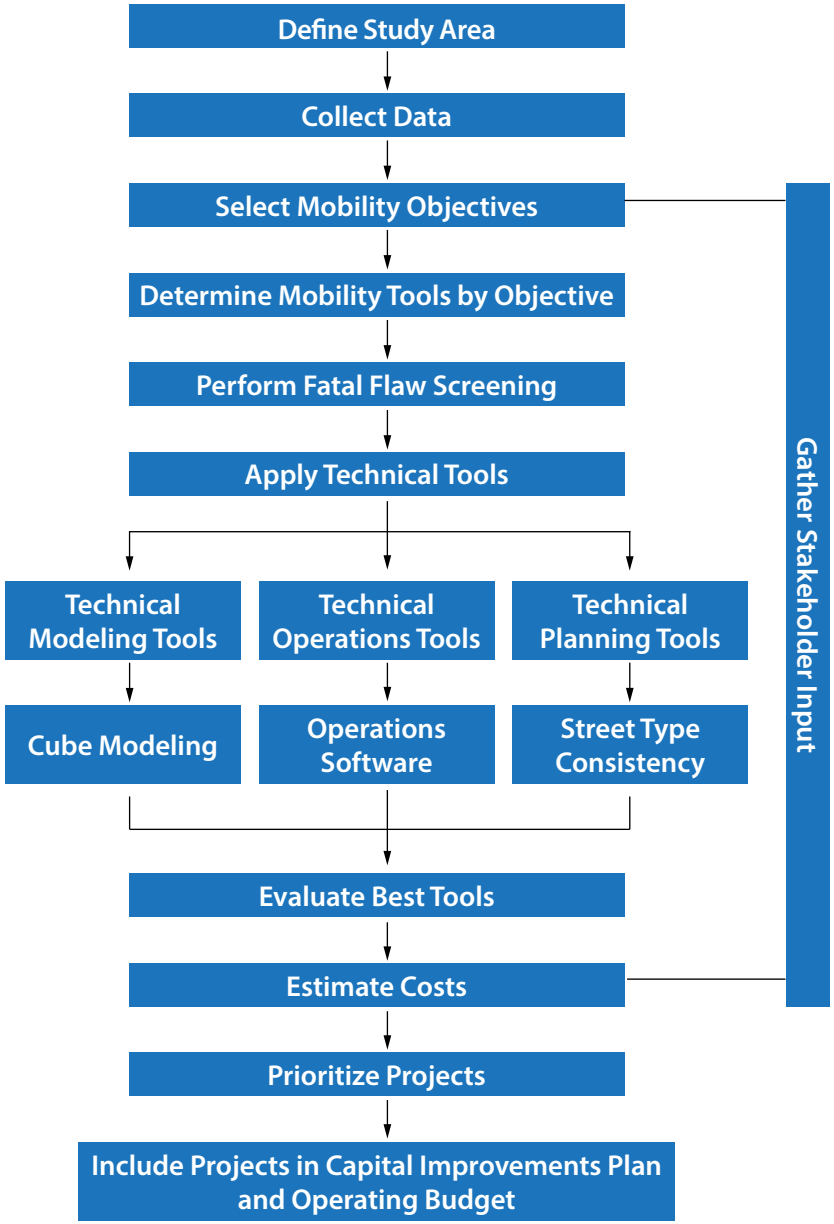


FIGURE 1.2

The flow chart on the left specifies the process to identify specific mobility projects within the Heights-Northside Sub-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 and operating budget.

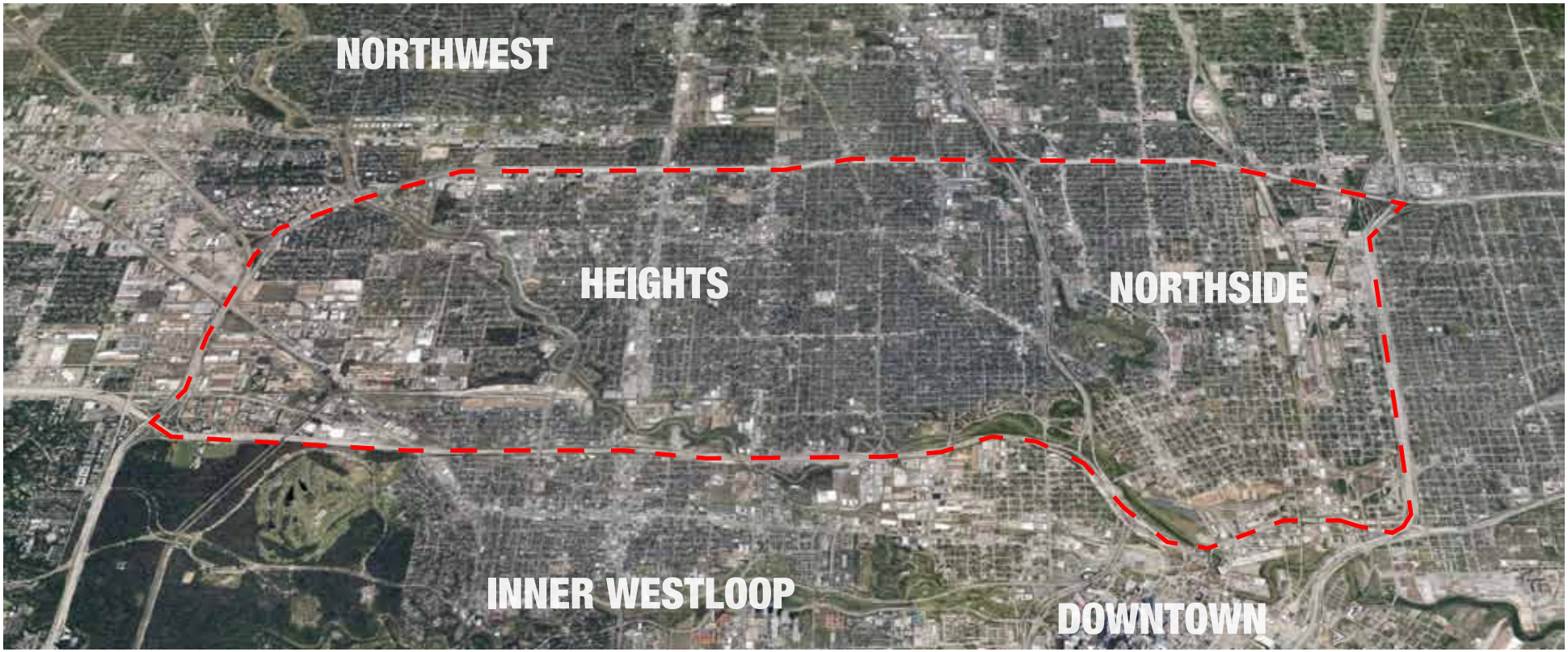
The overall project development process does not stop once funding is programmed; rather a new process for design and construction of the corridor improvements takes control of the specifics for each project. That information is beyond the scope of this planning study, however, guidelines are established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

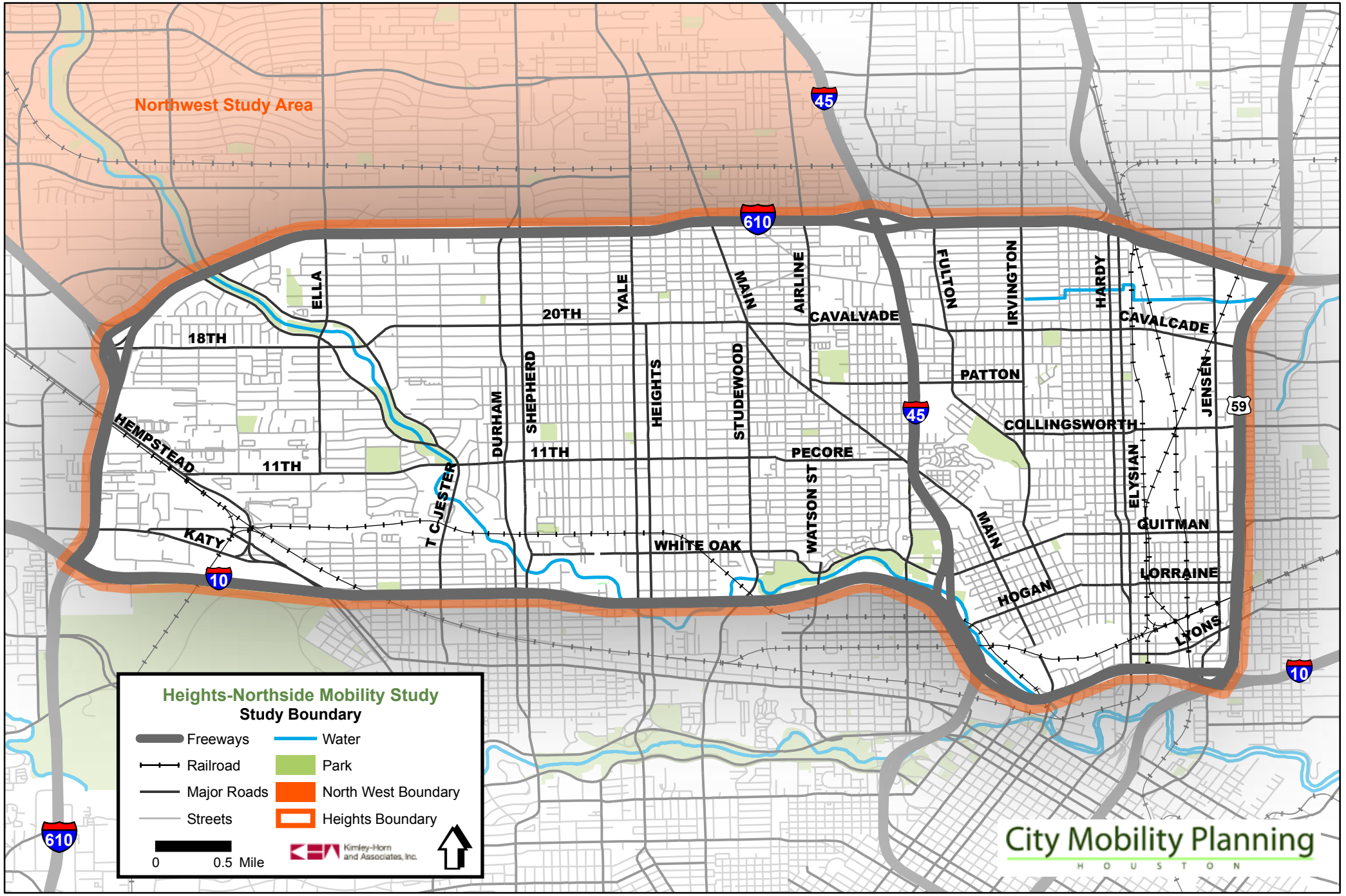
1.1 The Study Area

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 build in Houston, and its relative distance to downtown, the area bears a well-connected grid network of streets characteristics 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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FULTON
IRVINGTON
HARDY
CAVALCADE
18TH
CAVALVADE
PATTON
JENSEN
59
HEMPSTEAD
DURHAM
SHEPHERD
HEIGHTS
STUDEWOOD
COLLINGSWORTH
11TH
PECORE
T CUESTER
WATSON ST
ELYSIAN
MAIN
QUITMAN
KATY
WHITE OAK
LORRAINE
HOGAN
LYONS
10
Heights-Northside Mobility Study
Study Boundary
Freeways
Railroad
Major Roads
Streets
Water
Park
North West Boundary
Heights Boundary
0
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). Not all of the objectives generated from the 2009 CMP will relate to the needs of the Heights-Northside Study Area; therefore, one of the first tasks of this planning process is to determine which ones are applicable. 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

By addressing the goals mentioned above, the choice regarding the appropriate tools for the Study Area becomes clearer. Not all mobility tools are needed or appropriate to solve the mobility issues in the Heights-Northside Study Area, and the list of relevant tools will be refined through the planning process.

The tools selected and used are sorted into three separate categories:

- 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.

Examples of potential tools used as a means for consideration in this analysis are presented on the following page in Figure 1.4. Although this list is not exhaustive, it provides insight into the types of modes and solutions considered for this study as previously defined in other City of Houston Mobility studies of this nature.

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 Mobility Plan for the Heights-Northside Study Area is intended to develop mobility solutions for those living, working, and traveling through the area. The first step in this process is to identify the existing conditions of the Heights and Near-Northside regions. Quantitative data gathered includes, but was not limited to: demographics, turning movement counts, traffic counts, transit ridership, right-of-way, and other corridor-specific plans. We also analyze qualitative data acquired through public and stakeholder feedback. This information is paired with the existing conditions data to help design mobility alternatives and solutions to fit the needs of the community.

The existing conditions found in this chapter analyze the current state of the Study Area, while also consulting any existing future plans for development in the region (i.e. the Major Thoroughfare and Freeway Plan, a long-range planning document). Examination of the street, bicycle, pedestrian, and transit networks and other travel conditions are in this section.

PHOTO PROVIDED COURTESY CITY OF HOUSTON

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 suburb development patterns. Several corridors, however, are aligned diagonally through the corridor including:

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

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 Interstate 45 (IH 45), which bisects the Study Area and limits continuous east-west flow of traffic to the following key corridors:

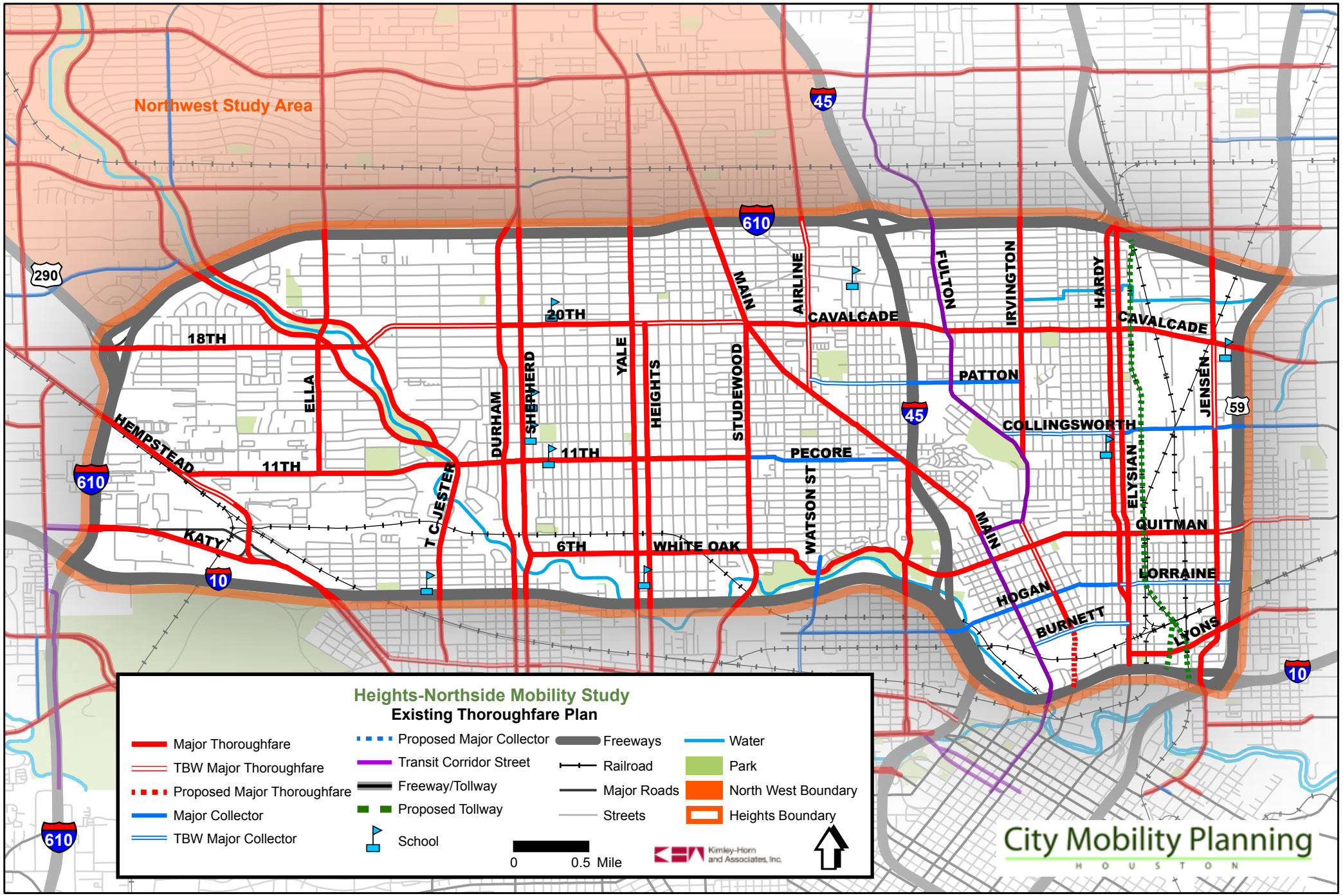
- Cavalcade/20th
- Patton
- Main
- White Oak/Quitman

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 the greater and local 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 of Houston'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).


Northwest Study Area
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STUDEWOOD
AIRLINE
FULTON
IRVINGTON
HARDY
CAVALCADE
PATTON
COLLINGSWORTH
JENSEN
ELYSIAN
QUITMAN
LORRAINE
LYONS
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PECORE
WATSON ST
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HEMPSTEAD
KATY
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
Water
Park
North West Boundary
Heights Boundary
0
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 Areas there are 26 transit routes with bus stops, as shown in Figure 2.2. The majority of the corridors have at least one bus route assigned to them. Bus routes move riders locally within the Heights and Northside areas, as well as 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 light-rail line, which travels along Main, Boundary, and Fulton. 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 this Study Area and placement of transit stations must be taken into consideration during planning and development decision-making processes.

Analysis of these existing conditions indicates special consideration should be given specifically to Metro Bus and METROrail users to increase ridership. Providing for regional connections to local light-rail (by means of bus, bicycle, and pedestrian facilities) can assist in supporting this rail line. Creating accessible and efficient routes to move persons within and outside the Study Areas is essential for a vibrant transit network.

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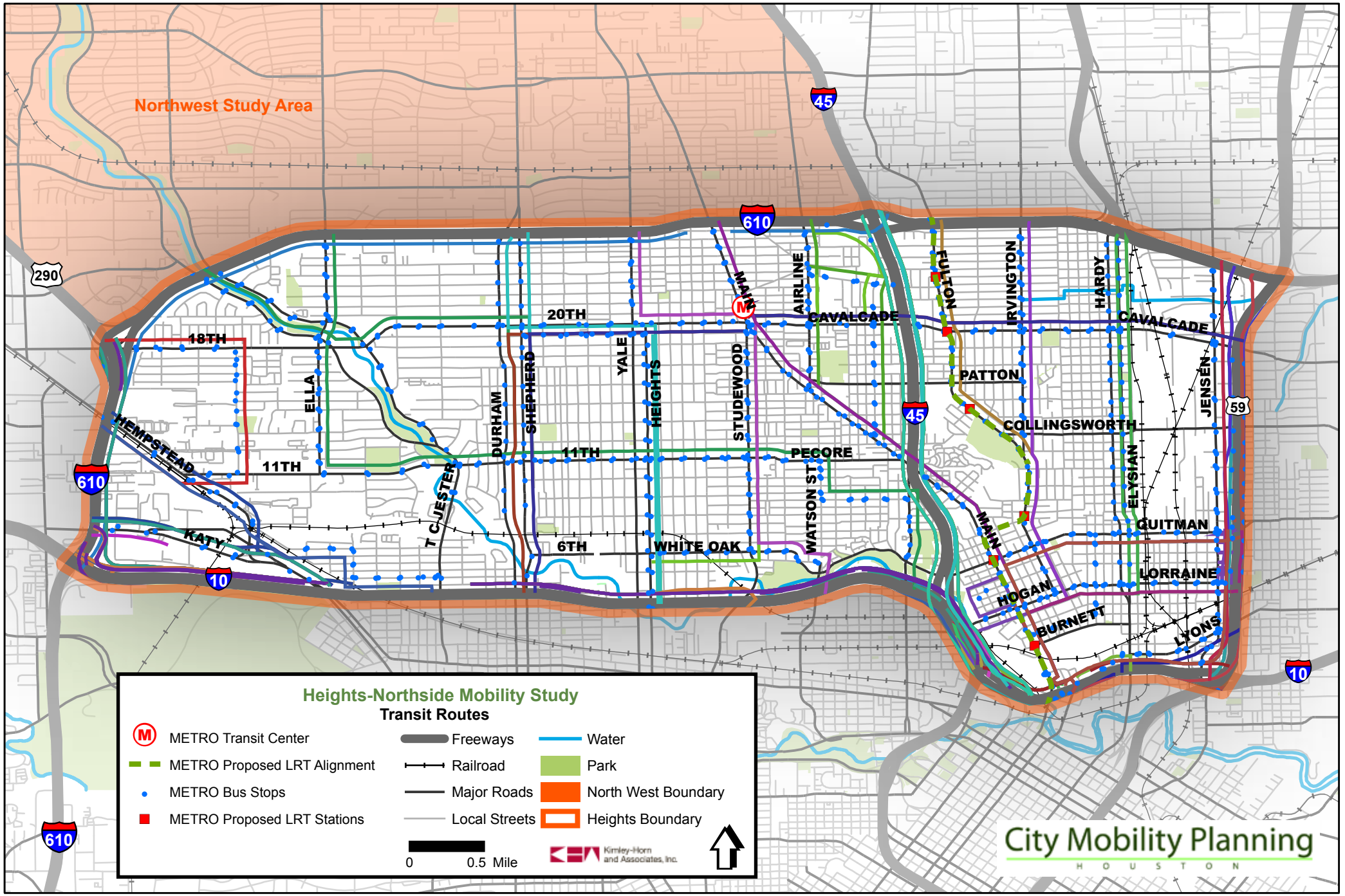
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Heights-Northside Mobility Study
Transit Routes
METRO Transit Center
METRO Proposed LRT Alignment
METRO Bus Stops
METRO Proposed LRT Stations
Freeways
Railroad
Major Roads
Local Streets
Water
Park
North West Boundary
Heights Boundary
0
0.5 Mile
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FIGURE 2.2

2.3 Existing Bicycle Facilities

Bicycle facilities for 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 of Houston, 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 and 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 areas. Expansion of the network for on- and off-street facilities has the potential to create a well-traversed bicycle system.

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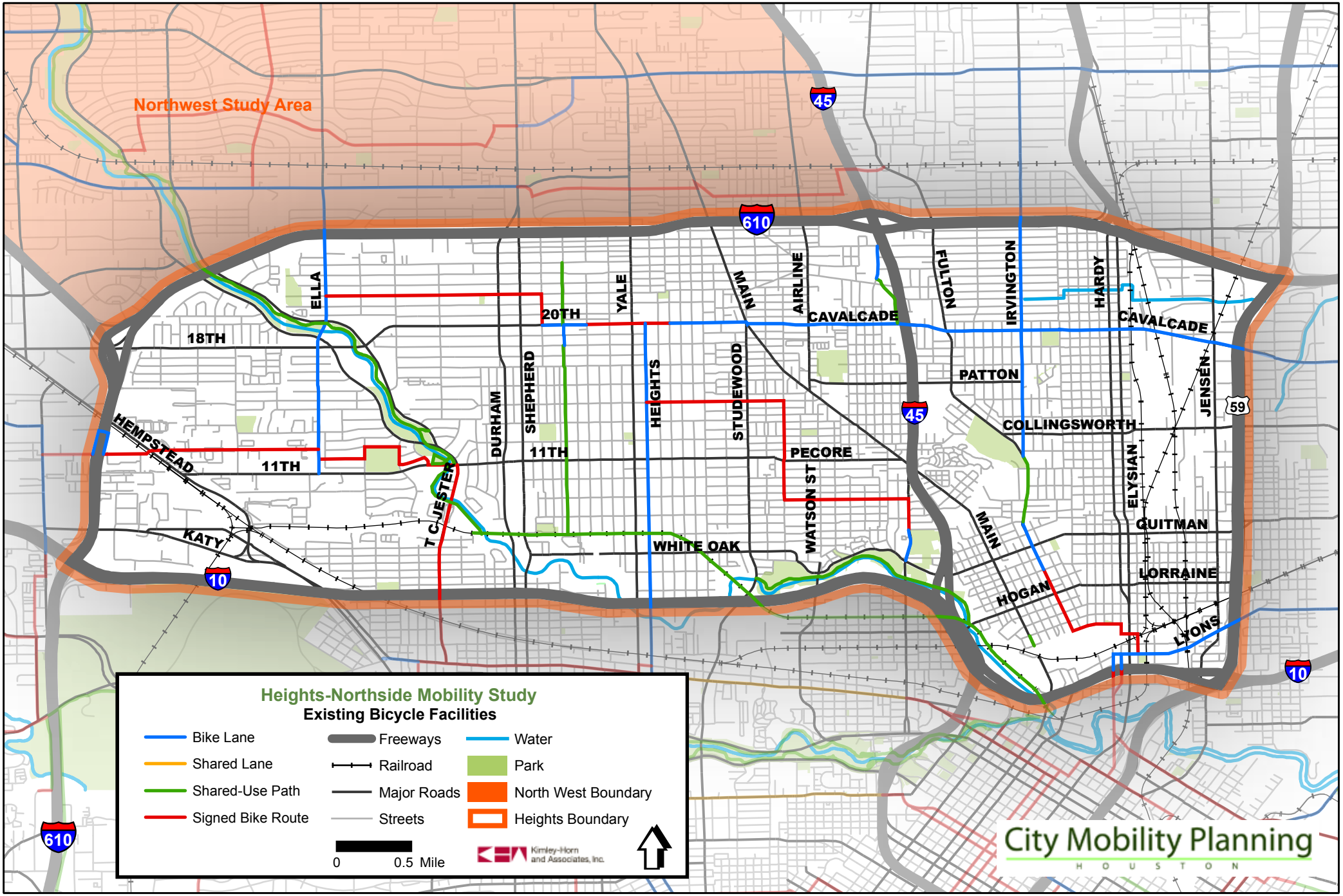
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HOGAN
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Heights-Northside Mobility Study
Existing Bicycle Facilities
Bike Lane
Shared Lane
Shared-Use Path
Signed Bike Route
Freeways
Railroad
Major Roads
Streets
Water
Park
North West Boundary
Heights Boundary
0
0.5 Mile
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FIGURE 2.3

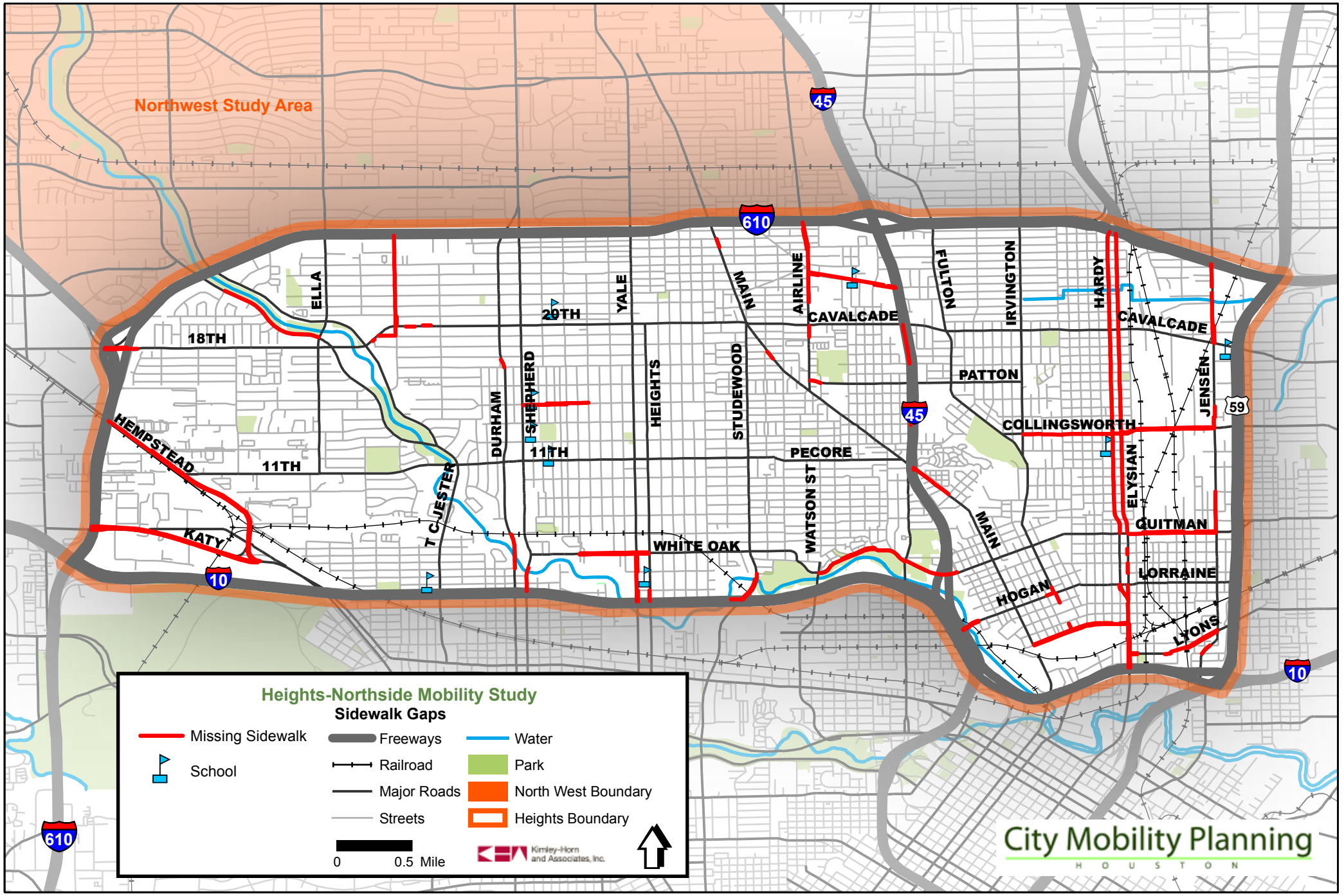
2.4 Existing Sidewalk Facilities

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. 2.4 shows the segments along the prominent roadways that are missing sidewalks, as provided by the Greater Heights Super Neighborhood. Given the scope of this study, the data provided is for prominent roadways only and does not reflect sidewalk gaps along the local street network. However, where appropriate, key connections to the greater transportation network (i.e. transit stops and bayou trails) are considered.

The system map shows that the Heights area generally has a well-connected sidewalk system. Missing sidewalk links are found along Major Thoroughfares which is problematic when considering the movement of pedestrian to and from key transit stops as well as within the neighborhood itself which is home to many popular eateries, bars and shops.. The Northside area has substantially more gaps, with many on main roadways where pedestrian use would appear to be high.

While analyzing this data, system gaps indicate a need for sidewalks along corridors that are in the vicinities of schools. Gaps are also found near destination points, 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 by this map can assist in the prioritization process of constructing sidewalks in the near and long term.

PHOTO PROVIDED COURTESY CITY OF HOUSTON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QUITMAN
KATY
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WHITE OAK
LORRAINE
HOGAN
LYONS
Heights-Northside Mobility Study
Sidewalk Gaps
Missing Sidewalk
School
Freeways
Railroad
Major Roads
Streets
Water
Park
North West Boundary
Heights Boundary
0
0.5 Mile
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FIGURE 2.4

2.5 Existing Travel Conditions by Period of Day

Intersection Congestion

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 the ongoing construction of the light-rail during the time period of this Study. The available information was divided into two periods for study: AM peak period and PM peak period, which represent when corridors are most heavily utilized by commuting traffic. Figures 2.5 and 2.6 on the following pages show the level of service (LOS) at each intersection as analyzed with available data. LOS is a measurement scale that gauges congestion on a grading scale similar to scholastic grading: A is a good rating with little or no congestion, and F is a poor rating with high levels of congestion.

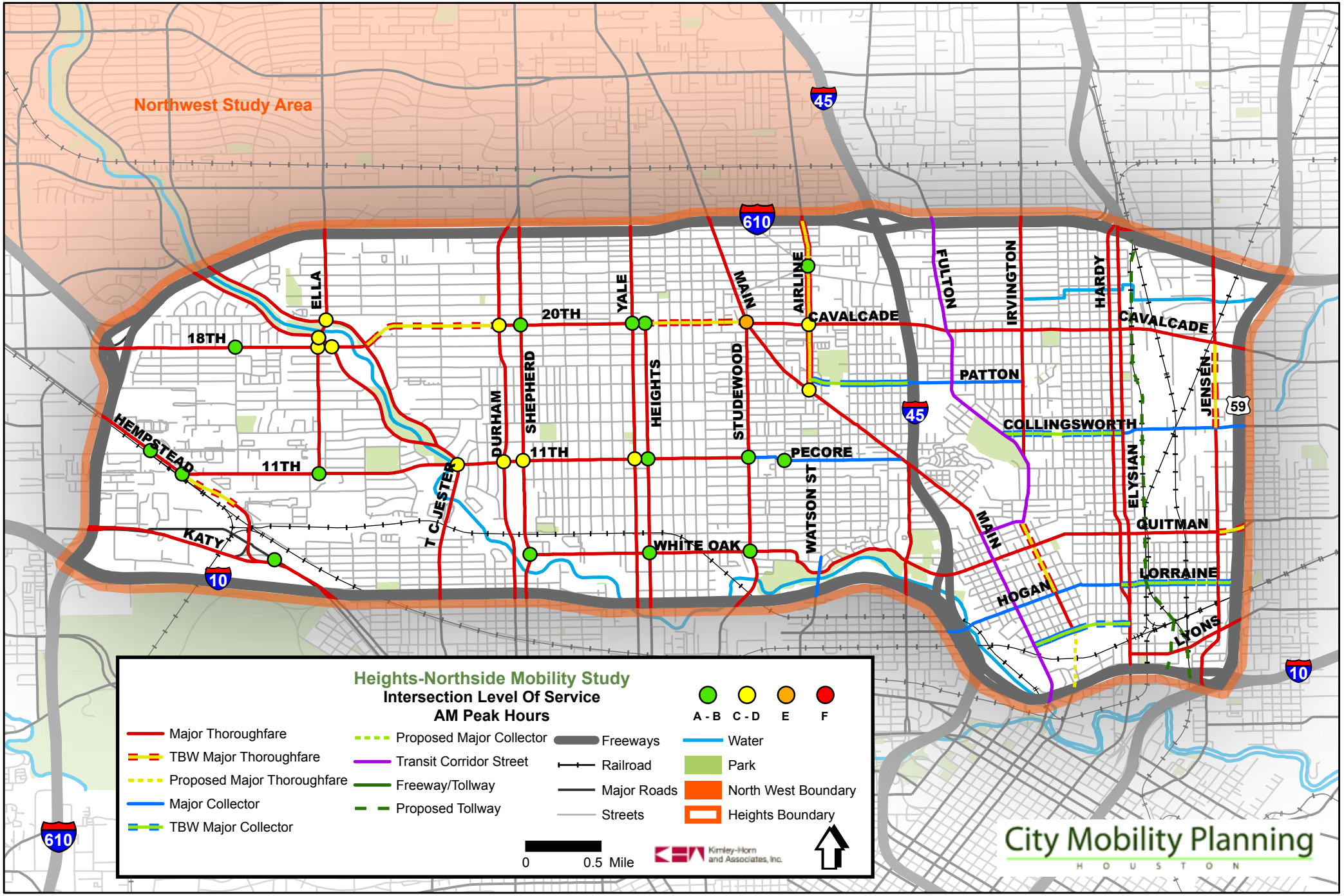
Where provided intersections are TxDOT property, future coordination with TxDOT is essential to fully understand the best treatment options available to the city of Houston (as approved by TxDOT). Similarly, where intersections are within a certain proximity of roadway, highway, or light-rail construction, intersection congestion was not evaluated because 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 A and 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.” Acceptable levels are provided as intersections such as

The intersection congestion for the study area is considered minimal where the only LOS E intersection is located at the intersection of Studewood/North Main and 20th Street. An intersection failure of LOS F does not exist at present day volumes.

Intersections with a rating of E or F, and thus representing intersections with maximum failure include:

Main at Studewood: AM = LOS E; PM = LOS E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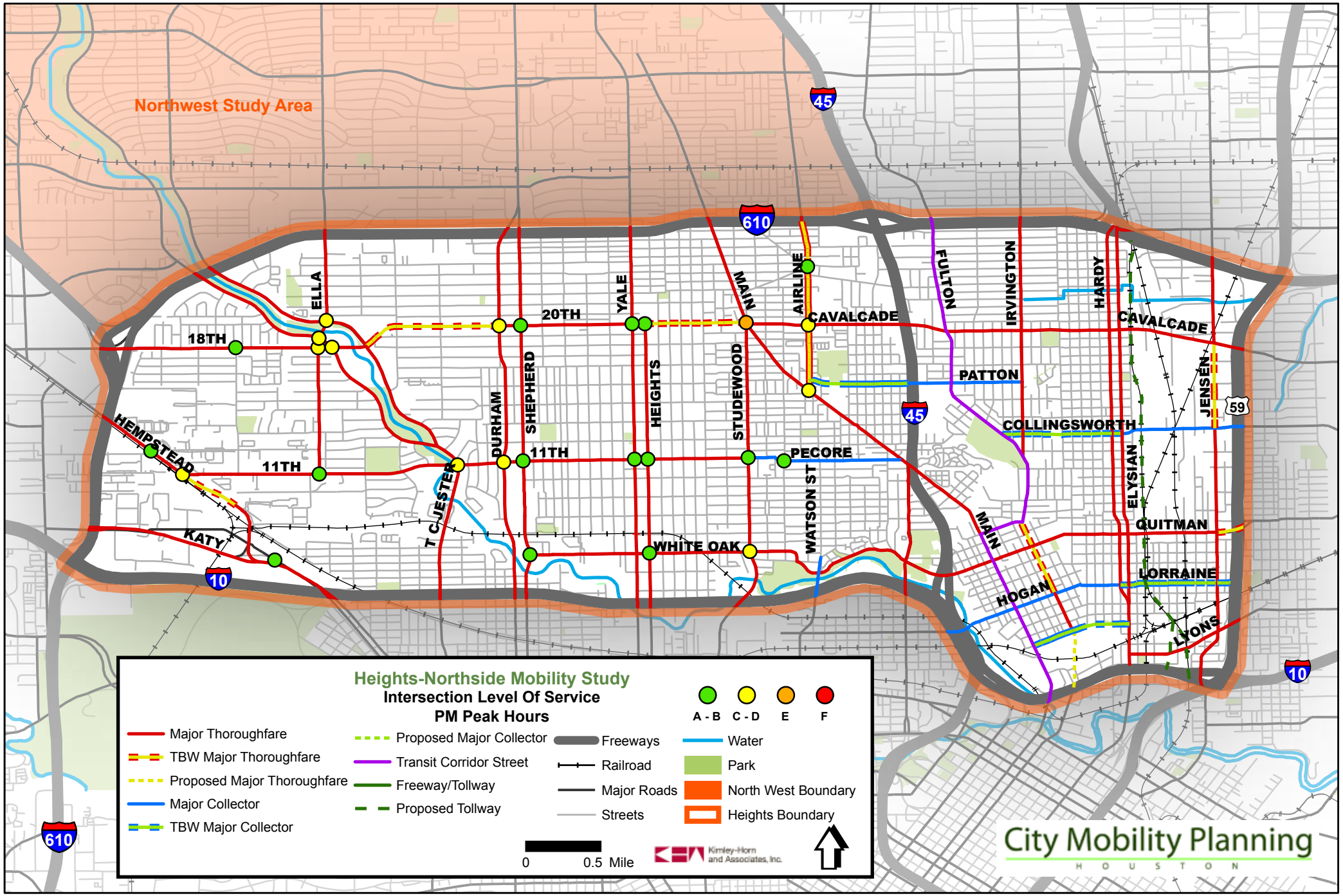
AIRLINE
CAVALCADE
FULTON
IRVINGTON
HARDY
CAVALCADE
JENSEN
59
PATTON
COLLINGSWORTH
HEMPSTEAD
11TH
DURHAM
SHEPHERD
HEIGHTS
STUDEWOOD
PECORE
ELYSIAN
QUITMAN
T C JESTER
KATY
WHITE OAK
WATSON ST
MAIN
LORRAINE
HOGAN
LYONS
10
Heights-Northside Mobility Study
Intersection Level Of Service
AM Peak Hours
A - B
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 2.5


Northwest Study Area
45
610
ELLA
18TH
20TH
YALE
MAIN
AIRLINE
CAVALCADE
FULTON
IRVINGTON
HARDY
CAVALCADE
JENSEN
59
PATTON
COLLINGSWORTH
HEMPSTEAD
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Freeways
Railroad
Major Roads
Streets
Water
Park
North West Boundary
Heights Boundary
0
0.5 Mile
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HOUSTON

FIGURE 2.6

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III. Community Involvement

Ongoing 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 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. Alternative meetings were held before the finalization of recommendations to ensure the consultant 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 released information such as maps and pictures. 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:

The first public meeting for the Heights was held on March 26, 2013 to gather public insight on issues and opportunities within the Study Area. The meeting began with a presentation of the existing conditions within the community based on data provided by the City of Houston, the Houston-Galveston Area Council, and TxDOT. During this meeting, the public was able to view boards representing the data presented, as well as additional information. After the presentation, the public commented on aerials to provide detailed information on current conditions. This information was consolidated by the Consultant Team.

3.2 Stakeholder Meeting #1:

The first stakeholder meeting was held on May 15, 2013 where stakeholders were able to review the feedback provided by the public during the March meeting. In addition to reviewing this material, stakeholders were given the opportunity to make comments on additional issues and opportunities within the Study Area. Since the Heights and Northside areas have a significantly different feel and stakeholder population, these two areas were studied separately for the purposes of this stakeholder meeting.

In the previous public meeting, several key issues were made apparent through the prominence of certain topics. Therefore stakeholders were asked to comment on the following issues specifically:

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PHOTO PROVIDED COURTESY CITY OF HOUSTON

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

From these questions and the open discussion allotted during this time, stakeholders worked with facilitators to develop "big idea" solutions to the issues found within the Study Area. These ideas were incorporated into the development of the Mobility Plan for the Heights-Northside areas.

3.3 Stakeholder Meeting #2:

The second stakeholder meeting was held on August 19, 2013. At this session, stakeholders viewed the preliminary recommendations for road, pedestrian, bike, transit and intersection improvements. Feedback from this meeting was used to gauge how well the recommendations lined-up with the public feedback gathered from the first public meeting, stakeholder meeting, two steering committee meetings, and data collected from the project website.

Stakeholders were presented with a summary of all feedback, bike plan recommendations, and five model scenarios (with background on how each scenario was developed). They afterwards broke into sub-committees (the Heights area and the Northside area) to review the preliminary recommended improvements and provided comments.

The feedback from this meeting indicated that many corridors were on-par with public input, but several corridors were lacking a future design that accommodated the desired modes of transportation from residents. Stakeholders acknowledged that attention to non-MTFP streets is a reasonable alternative to accommodating needed modes on Major Corridors.

PHOTO PROVIDED COURTESY CITY OF HOUSTON

PHOTO PROVIDED COURTESY CITY OF HOUSTON

3.4 Public Meeting #2 (Planned)

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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's forecasters, and the Consultant Team work together to update the 2035 demographic forecasts. This change was based on 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.

Scenario 1 (Base Build-Out)

The Base Model scenario runs the model as if all Major Thoroughfares and Major Collectors were built-out 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 on page 37.

Scenario 2 (Couplets)

A group of Heights' area stakeholders showed a desire to test diverting a few major corridors into couplets or one-way streets and see how this would affect traffic flow. There were many comments directed at 19th and 20th Street as well as Heights Boulevard and Yale Street. Traffic issues and a desire to make the corridors friendlier for bicyclist and pedestrians were frequently mentioned. The idea of making 19th/20th and Heights/Yale one-way couplets was created to improve traffic flow, but also decrease lanes in order to provide on-street bicycle facilities. The map of this scenario is shown in Figure 4.2 on page 37.

Scenario 3 (Capacity Projects)

Scenario 3 combines road expansion (as designated by the MTFP) with street reductions projects as well. The intention 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 on page 37.

Scenario 4 (High Frequency Transit)

Scenario 4: This high frequency transit scenario developed routes that were determined from a variety of factors including public comment, population growth, job growth, activity centers, and connectivity to other destinations (such as downtown or the Galleria). The increase in service was modeled by increasing headways to twice as often during the peak hours. Non-peak hour headways were also increased slightly. Ultimately, however, METRO is in charge of all bus routes, frequency and stop locations. The map of this scenario is found in Figure 4.4 on page 37.

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 the stakeholders for feedback. Their input and the project team's analysis were combined to create Scenario 5. This scenario represents the best performing projects within the Study Area. The map of this scenario is found in Figure 4.5 on page 38.

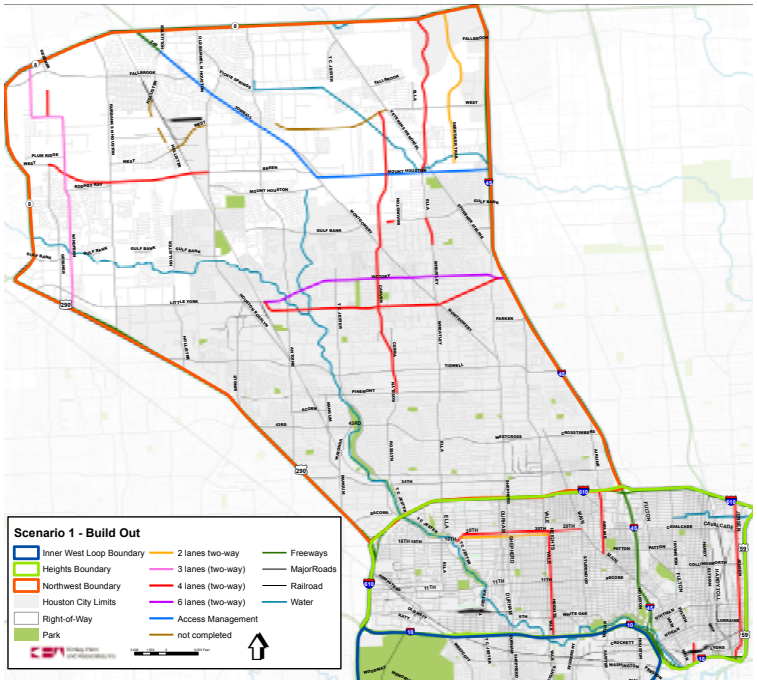

FIGURE 4.1 SCENARIO 1: BASE BUILD-OUT

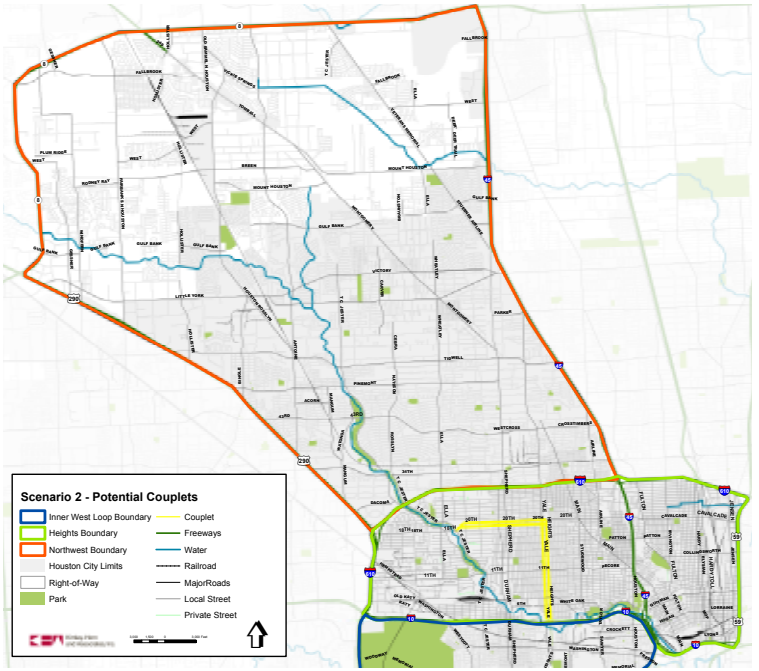

FIGURE 4.2 SCENARIO 2: COUPLETS

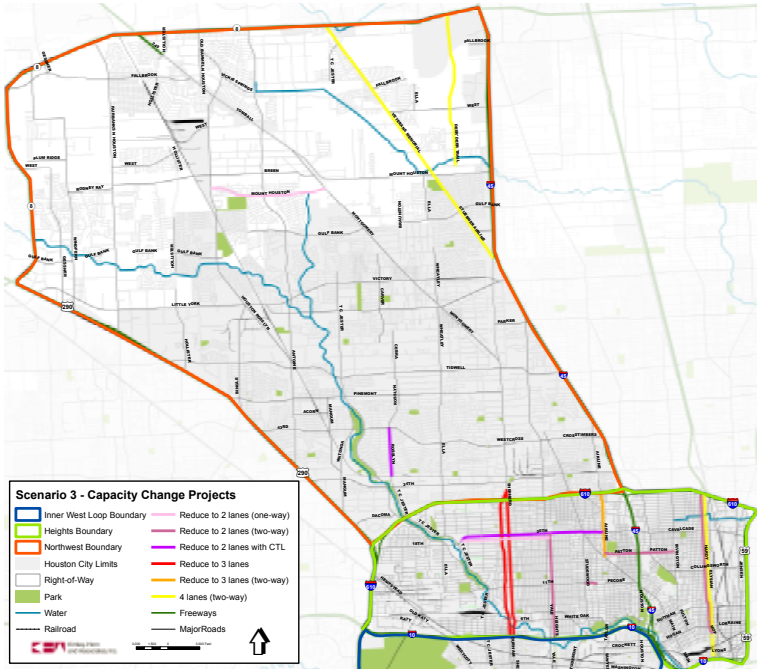

FIGURE 4.3 SCENARIO 3: CAPACITY PROJECTS

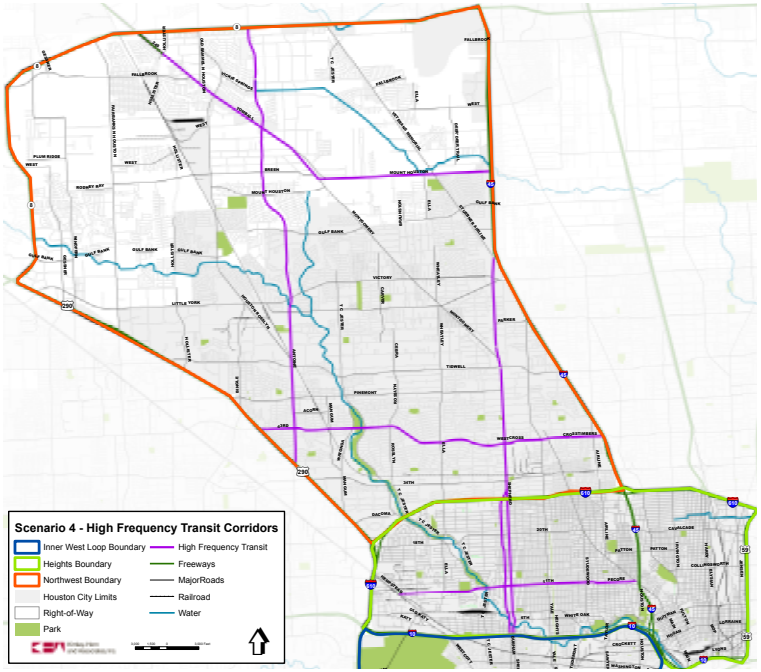

FIGURE 4.4 SCENARIO 4: HIGH FREQUENCY TRANSIT

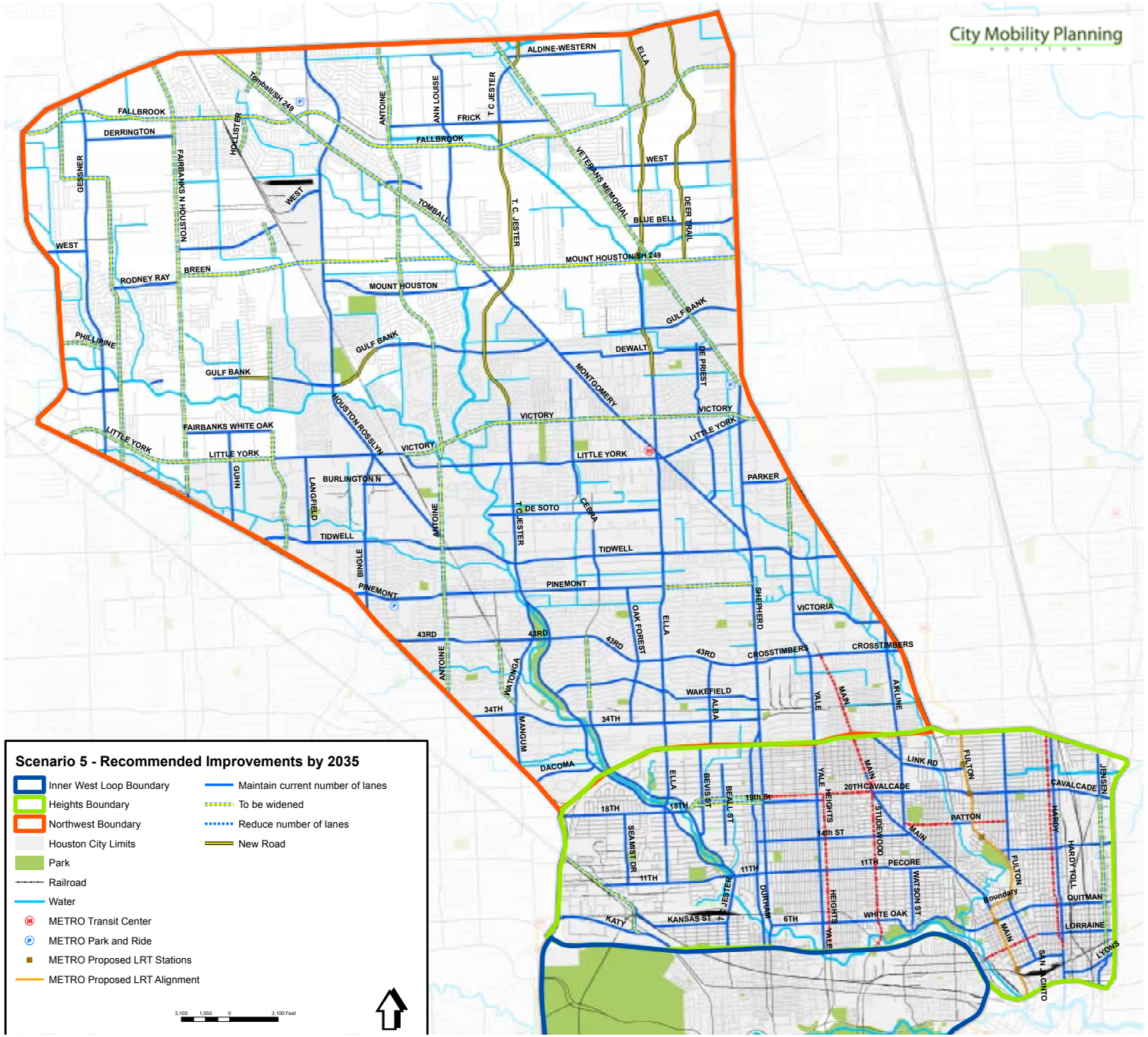

FIGURE 4.5: SCENARIO 5 - RECOMMENDATIONS

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V. Changing Mobility Considerations

5.1 Addressing the Shift in How Transportation is Viewed

During Phase One of the City Mobility Planning initiative, the City of Houston contemplated the concept of providing multi-modal transportation options within a corridor planning exercise. That conversation led to the development of the alternative design standards that are located within Appendix 2 of Chapter 10 of the Infrastructure Design Manual. These alternative cross-sections provide for a myriad of design configurations, providing options within the transportation network other than an automobile.

As the City of Houston continues to grow in population, the Heights and Northside areas are only expected to grow in popularity. 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 can potentially decrease the likelihood of failure. By providing users with more modal options, the burden on automobiles and streets can be lessened.

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 clusters of jobs and population. The Heights and Northside areas are projected to see an increase in automobile traffic throughout various corridors, especially as more people try to access the regional highway network that surrounds the Study Area. However, there is a need to shift the current approach of designing a roadway for the maximum capacity of *vehicles* to the maximum movement of *people* before a corridor before it reaches maximum capacity; this can be achieved by evaluating a corridor for all modes of transport. As a result, the following represent the change in mobility considerations that are taking place across the United States, and as seen in recent years, in the City of Houston. Although exact policies within the City have not been developed for all considerations discussed, these concepts should be continuously considered when evaluating complete system mobility. The most recent change in Houston includes the concept of Complete Streets which is discussed in more detail here.

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5.2 Complete Streets and Houston

What is a Complete Street?

The push 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, a health-conscious community has 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 policy shift that is gaining momentum.

Tying into the Existing Culture of Houston

Houston is known for its innovation and willingness to let the community grow and develop by allowing the market to influence development. With this notion, Mayor Annise Parker issued an Executive Order regarding 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 attitude towards moving with the changing times and needs of its communities is well suited for moving into a new era with Complete Streets.

However, moving to implement a 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 the roadway capacity for vehicles to manage the ever-growing population. The Complete Streets policy is focused on the movement of people along corridors, not just vehicles. Transitioning to this approach will require education and training on Complete Streets for it to be embraced, even for a community that is willing to adapt to new trends in many areas of development.

Elements of Design

Complete Streets have many design characteristics and plans for the travelway, streetside and context. Within the travelway, a Complete Street will provide for the modal uses deemed appropriate for the corridor. This includes the designs and widths of travel lanes, special transit facilities, on-street bicycle facilities, on-street parking, medians, and pedestrian crossings. Design elements for the streetside include off-street bicycle facilities, pedestrian travelway, landscaping (such as buffers or tree wells), and frontage zones.

The interaction of different modes (automobiles, transit vehicles, bicycles, pedestrians, and light-rail) 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.

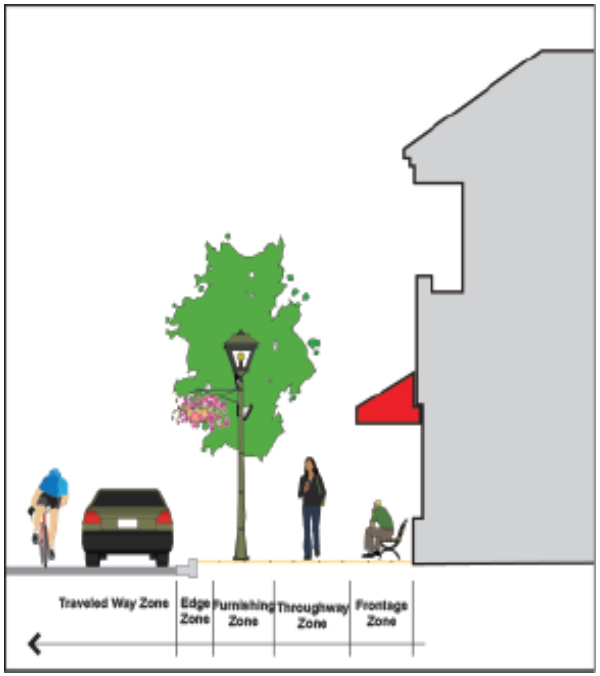

FIGURE 5.1 SOURCE: DALLAS COMPLETE STREETS MANUAL

Purpose of Complete Streets

Complete Streets intend to provide a safe and accessible street 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. An Executive Order initiated by Houston's Mayor in October of 2013 states within the definition of Complete Streets, "The Complete Street concept takes the following variables into account when providing services [corridor attributes]: 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; and
- Providing other options of transportation for different incomes."

Enhanced Networks

The street network of a community/city/region defines its structure and has the largest impact on the types of traffic challenges they face. A well-connected network can provide for many routes thereby reducing congestion levels on a single thoroughfare. Connectivity is an important factor in creating an efficient transportation network. A well-connected network provides several inlets/outlets for users to travel to their destination. This helps to reduce heavy loading on a particular corridor and does not apply singularly to automobile networks. Transit networks need to be well-connected to other lines, stations, and destination centers. This also relates to bike networks, but they have the advantage of using on- and off-street facilities to create their network.

Implementing Complete Streets

Many techniques are being employed in Houston. For instance, Chapter 10 Appendix 2 of the Infrastructure Design Manual maintains current MMC design considerations. Also, the many sub-regional plans each promote Complete Street policies. However, all planning needs to be combined with a change in policy matched with changes in the Engineering Design Manual.

The City is also embracing on its first ever Complete Street Transportation Plan. 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 such policies as the concept continues to mature within the City of Houston.

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5.3 Health in the Community

The Houston Mobility Plan and related sub-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 livable environments also produces an additional outcome not traditionally stated as a goal at the onset of mobility plans: A healthier community.

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 alarming statistics related to obesity, asthma, and other chronic diseases associated with 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, 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 of Overweight

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

According to the US Surgeon General report on physical activity and health, "30 minutes of moderate physical activity, 5 day 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 – could provide an opportunity for physical activity and decrease the risk of chronic disease for otherwise sedentary individuals.[4]

In a study published in the American Journal of Preventative Medicine, key indicators found to increase 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 walkability and bikability is also evident within public comments received for the purposes of this Report within the Northwest study area. Whether these desires are for recreational, commute, or utilitarian purposes, one underlying concept remains the same: these forms of travel are active.

Improvements to the built environment and integration of complete streets at the neighborhood level can improve access to healthy food in addition to physical activity. In a study that highlighted the need for better access to healthy choices called the Harris County Food System report (October 2013), the location of food stores and their accessibility via public transportation was found to greatly impact a family's access to healthy food and healthy choices. 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 6 miles to a grocery store, while two-thirds of

residents in a second community traveled over 1 mile to a grocery store, with an additional 20% traveling over 6 miles. The report identified issues that impact community health and can 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 Heights - Northside Mobility Study, as well as similar sub-regional studies especially

in regard to the implementation of the new Complete Streets policy. 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 Initiative 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/wp-content/uploads/2012/07/HLM-Assessment-Report-Final.pdf

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 our 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 vs. a working professional traveling to work? How might this consideration vary if the user is enjoying a nice leisurely bike ride (i.e. recreational user) vs. someone who might be on a daily commute where speed and time are a prevalent choice 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 as:

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...	• Comfort riding 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
Know traffic principals	Yes	Yes	No

FIGURE 5.2

Facility Types

The City of Houston currently does not maintain a formal process to evaluating what corridors are most appropriate for the user type as defined above, but instead evaluate facility type on a case-by-case basis as appropriate for the City and community alike. As such, the City recognizes that bike facility types most appropriate for a given corridor vary and maintain the following classifications as adopted by the City of Houston 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 offering an alternative for, but running parallel to, 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. Conventional bike lanes without protection on these types of roadways can be stressful for less confident riders.
- Two-way cycle tracks may be considered when there is not enough room for one-way cycle tracks on both sides of the street or when extra right-of-way is available only on one side. Two-way cycle tracks may be considered to optimize the ROW (such as when you remove 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 on streets with higher travel speeds, higher travel volumes, or high truck traffic.
- These facilities may be accomplished as retrofits or the reconfiguration of existing roadways with 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 that bicycles have the 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, there has been a shift in the way streets are evaluated in terms based on the time a bike facility is recommended where the following are considered:

- 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

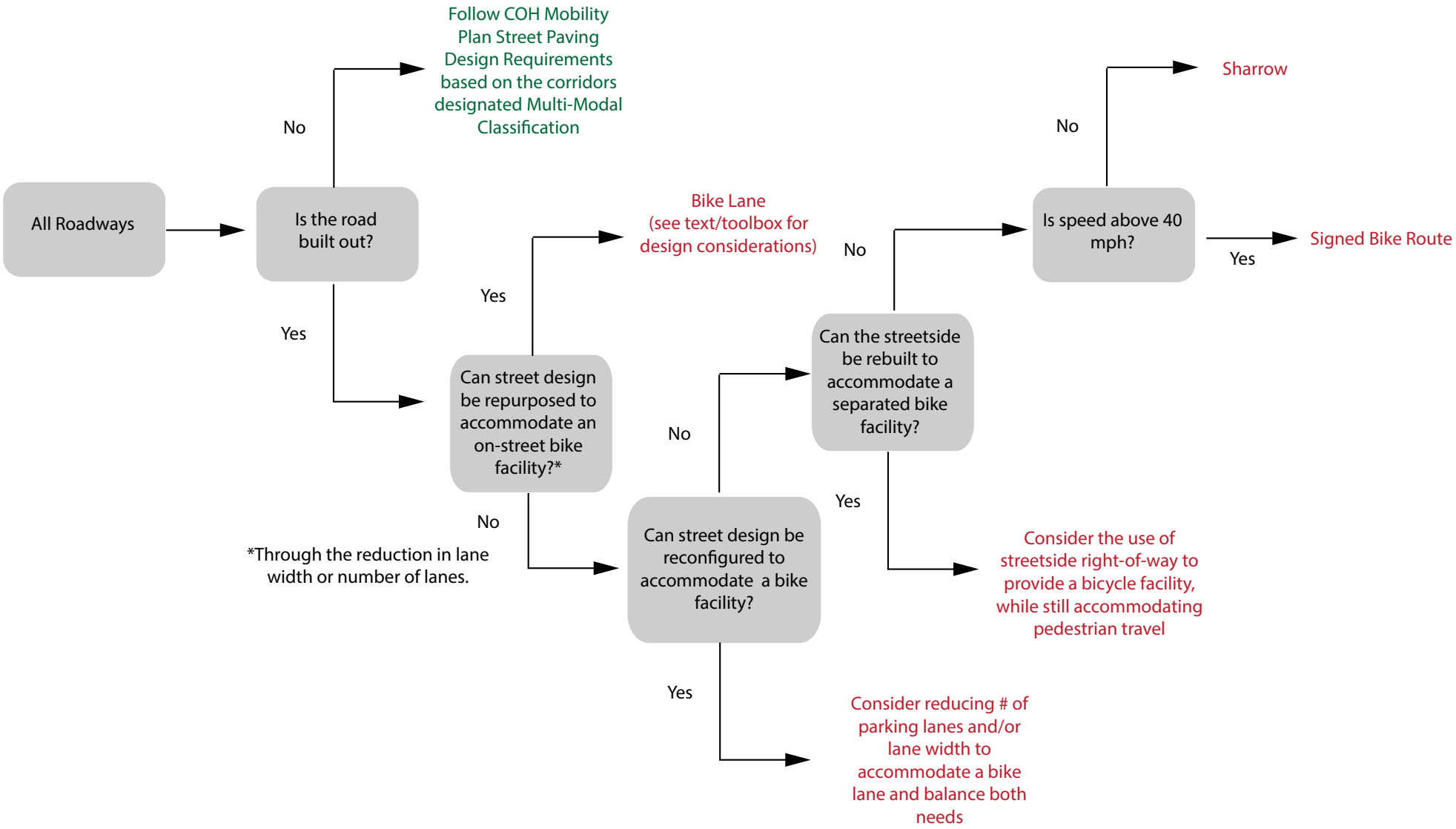
Repurpose projects typically require modifications to existing standard design cross-sections, as currently endorsed by the City, in order to meet the various transportation needs within limited right-of-way. Most repurpose projects to accommodate bicycle facilities on existing streets will be difficult to implement without special design and context considerations for each individual corridor. However, the ideal facility type may not always be able to be implemented due to various constraints.

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 view bikes can also be seen in the recent policies embraced by the City and includes:

Complete Streets Policy

The Complete Street Executive Order directs the 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, the establishment of a complete street types based upon Multi Modal Classifications is 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 drives 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 the 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 motorist to be mindful of vulnerable users during turning movements as well as diminishes the use of harassment or intimidation of vulnerable users at any time.

Houston Bike Education

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

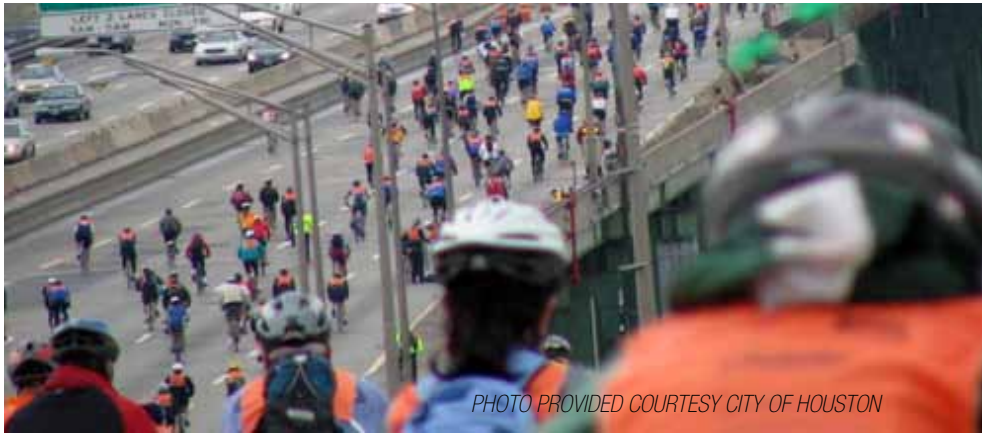


PHOTO PROVIDED COURTESY CITY OF HOUSTON

5.5 Sidewalk Design Considerations

Returning to Pedestrians as a Priority

Returning focus to pedestrian amenities is a growth trend around the Nation as the many benefits of active transportation are being publicly endorsed by health and other officials. Such benefits include:

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

Existing Policy

Within the City of Houston any new or reconstructed sidewalk must 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. This will vary based on the context of the corridor. The pedestrian zone is the streetside area between the edge of the curb and the property line of the bordering parcel. Pedestrian amenities can encourage growth in a walkable environment within the appropriate context type. The pedestrian zone can be broken into 4 subcategories: 1) edge zone, 2) furnishing zone, 3) throughway, and 4) frontage zone.

Edge Zone

The edge zone comprises 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, vendors, 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.

Throughway Zone

The 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 pedestrians' safe movements. This design element should also account for the handicapped and disabled. 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

Public transportation within the United States became increasingly polarized to a specific demographic over the past few decades. Only recently has a shift away from this stereotypical user base occurred. Bus and light-rail are no longer seen as options designed specifically for low-income communities. The benefits of using public transportation as opposed to a personal automobile are enticing a new demographic of users, not defined by their income. Younger generations are turning to public transportation for many reasons including:

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

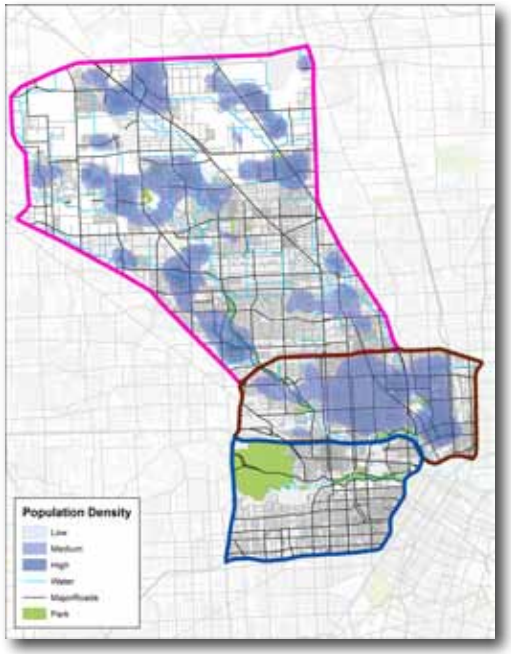
Another user base is found in persons, now residing in Houston, who emigrated from countries where public transportation is socially acceptable and widely used. As more people understand the benefits associated with public transportation, utilization will increase.

Increasing the Availability

Congestion is going to continue to increase, making transportation funding an urgent concern within the country and region. Therefore more efficient transportation alternatives are increasingly more 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 does not work in every situation and along every corridor. To identify the specific corridors and areas of Houston that transit can be the most successful in capturing riders, the following factors were analyzed and ranked in the Heights-Northside:

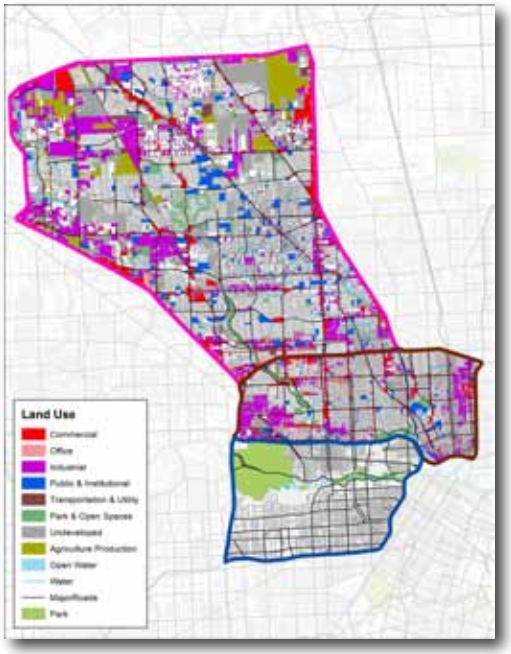
- Residential Density
- Lane Use
- Network Density
- Existing Transit Ridership
- Projected Transit Ridership

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.



Residential Density:

Residential density is an important factor for determining transit potential. The higher density an area is the more likely people will use transit. The corridors that are within or in proximity to the medium and high density locations were considered for transit locations.

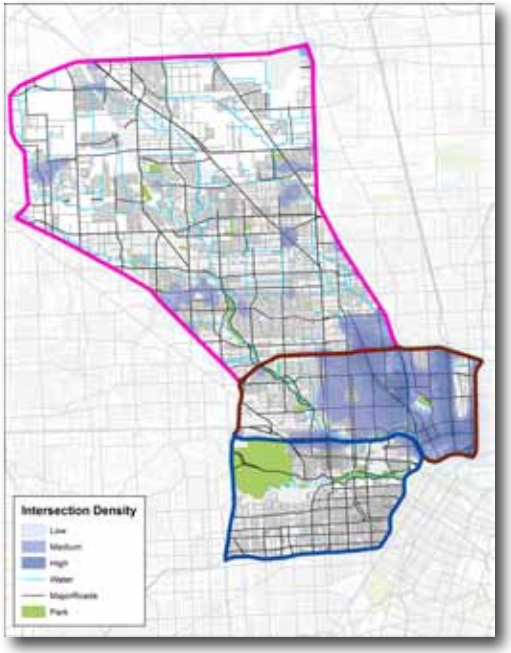


Land Use:

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.

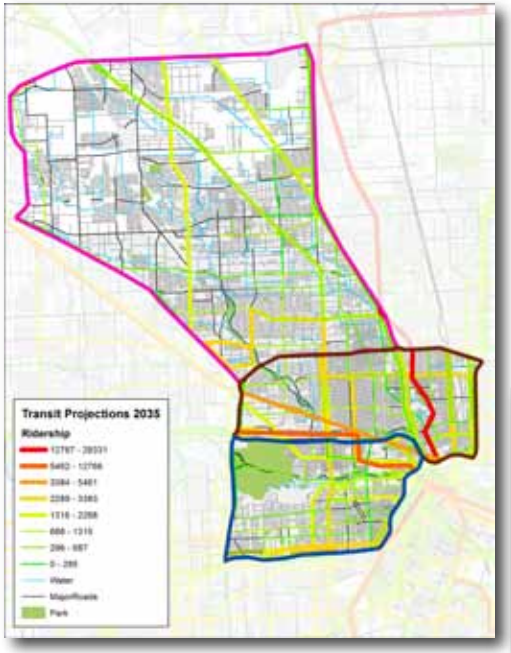
Existing Transit Ridership:

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 the ability for people to walk or bike to their destination. The less dense an area is in regards to network, the more automobile oriented it may be. Looking within the study area, the Northside has the highest density of street network.



Projected Transit Ridership:

H-GAC currently incorporates transit routes in 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, transit vehicle, bicycle, or pedestrian) is important.

5.7 Intersection Design Considerations

Changing Priorities

A strong component of a multi-modal plan is designing corridors for safe passage of automobile and non-automobile users. Creating safe realms for these users extends to all parts of the corridor, with increased importance at intersections and other types of crossings. 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, bus transit, and bicycle traffic. Although other alternative modes of transportation may exist, the provided represent the most commonly understood forms of traffic within the City of Houston and hence serve as a baseline for discussion for alternative design options for intersections.

Multi-modal Intersection Design

The following section discusses 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. Example innovative intersection improvements and specific location applications are provided to give the designers a potential framework for creating multi-modal intersections. All modes of transportation are found on the corridors within the City of Houston, including: automobile, transit, light-rail, bicycles, and pedestrians. Accommodating multiple modal types on a corridor requires an understanding of how these modes interact.

At all intersections, multi-directional movement is occurring. Planning for these movements to transpire safely requires specific design effort. For instance, the turning movements of automobiles in relation to pedestrians (or transit vehicles next to bicyclist) are a critical design feature in creating a safe environment. Intersections create many points where collisions can occur (See Figure 5.5).

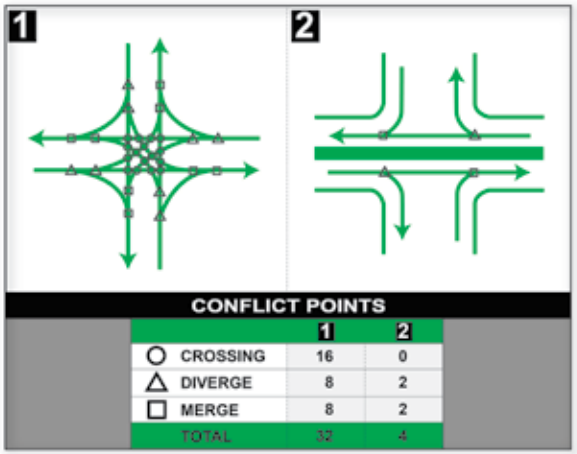


FIGURE 5.5

Basic design attributes include a variety of planning concepts. The following acknowledge only a few of the design elements listed within Figure 5.6.

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

Prioritization of these types of attributes at a particular intersection must be completed with an in-depth look at the activity occurring there. 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.

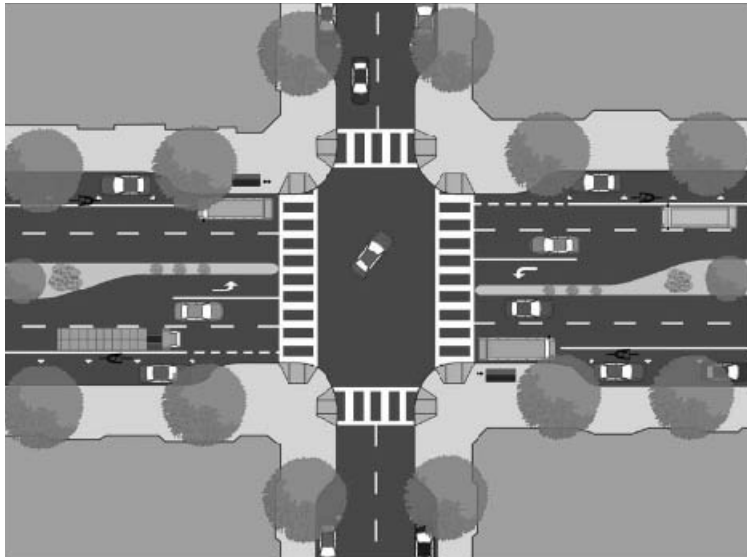


FIGURE 5.6 SOURCE: DIGITAL MEDIA PRODUCTIONS

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 of showing the 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.
- Pedestrian signalization includes several types of indicative tools or measures. For instance, at signalized intersections, there can be a gap time before cars are allowed to move that allows pedestrians the right-of-way. A signal phase singularly defined for pedestrian movement can be used at intersections with high pedestrian activity.

PHOTO COURTESY OF KIMLEY-HORN

Transit

Design for transit function at intersections also requires additional study. Transit vehicles need to maintain an efficient schedule and move safely through an area. Transit vehicles require additional planning due to their size and frequent stops. This also requires planning for the safety of the passengers waiting, as well as boarding or alighting from the transit vehicle. Focus on transit design at intersections is influenced by its interaction with other modes of transportation.

Proper **bus stop placement** is an important element in the design of intersections (See Figure 5.7). **Mid-block stops** are the least desirable because they require the most amount of curb side space. Locating bus stops at the near- or far-side of intersections is recommended. Far-side placement is recommended for signalized intersections. There are several advantages to this placement, for instance, buses are allowed to take advantage of gaps in traffic flow. This eliminates the need for buses to be at the front of the queue line at an intersection for a near-side stop. It also minimizes the conflicts between buses and right turning vehicles.

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.

PHOTO COURTESY OF KIMLEY-HORN

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.

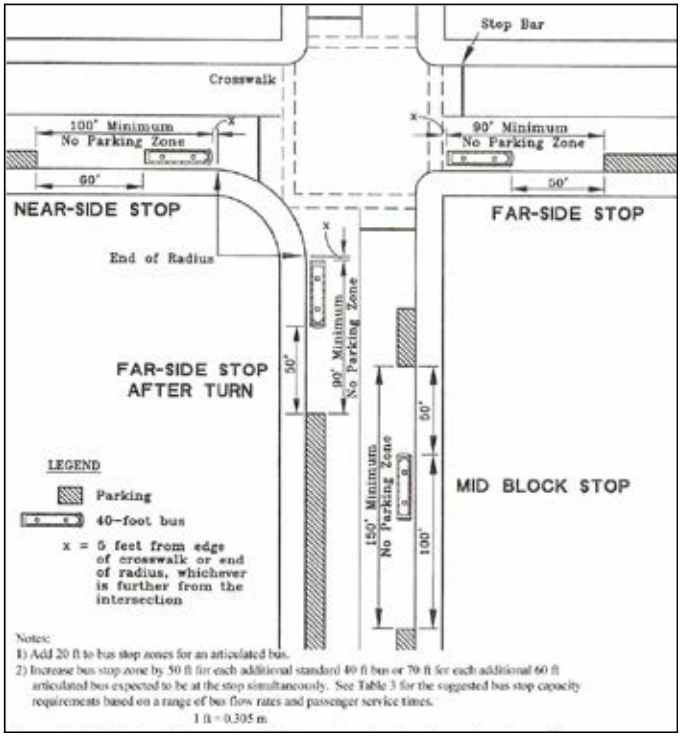


FIGURE 5.7 SOURCE: ITE MANUAL

Bike

Creating a safe environment is important for bicyclist since they typically range in their skill level and confidence. When designing bicycle facilities at an intersection or other crossing, recognizing the different skill levels assists in the creation of a path that is easy to follow.

A direct and safe path through intersections is affected by factors like the number of driveways, ramps, and other mode users. **Design features for bicycle crossings** include designated crossings, signage, designated holding patterns, stop bars, right-turn protection, and signalization.

Bike crossing markings through an intersection reinforce that priority is given to bicyclist over turning vehicles. They also facilitate in providing a safe path for bicyclist to make left-turns.

PHOTO COURTESY OF KIMLEY-HORN

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: o Pedestrian lead phases; o Scramble phases in very high pedestrian volume locations; o Restricted right turns on red when pedestrians are present during specified hours; and o 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: o Behind sidewalks (in landscaping or in building niches); o In planting strips (furnishing zone); and o 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

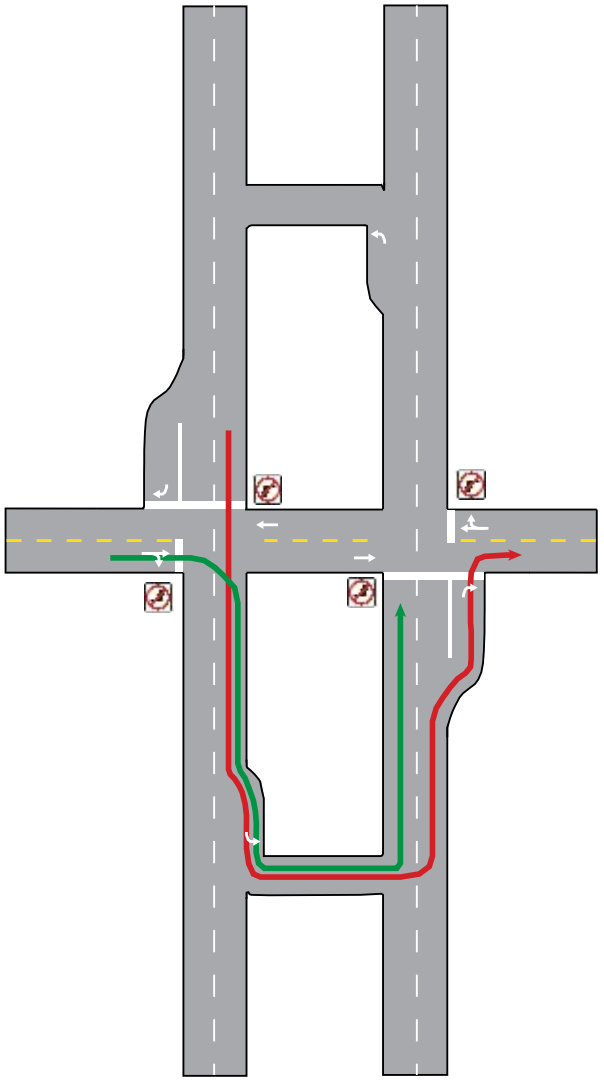


FIGURE 5.10 SAMPLE MICHIGAN U-TURN INTERSECTION

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 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 a balance of competing considerations throughout the entire network, rather than focusing on implementing all modes within a single corridor. Oftentimes, those streets that serve a heavy vehicular focus are not the best candidate for high-quality bicycle facilities given the limited Right-of-way and higher vehicle volumes/speeds. Similarly, transit vehicles are often desired in context with bicycle facilities; however, providing complementary and intersecting routes often increases the reach of transit. Quality and continuous sidewalk facilities are critical throughout this densely developed area. It is important that the allocation of space needs is in balance with the needs of the cycling community given the limited Right-of-way.

Recognizing the need for this balanced approach, the Heights-Northside Mobility Study examined the needs for each mode independently. It then overlaid those needs on one-another to identify gaps within the system, overlapping complementary concepts, and overlapping conflicts given the limited Right-of-way. These concepts were then examined within the design concepts currently available within the Infrastructure Design Manual to arrive at the proposed Multi-Modal Street Classifications highlighted on the pages that follow.

The priority elements defined for each corridor provide a guideline for the design of the corridors. The element that has priority on the corridor will be included in the design, and other elements will be included based on available right-of-way and funding opportunities.

The table on the next page provides a summary of each of the corridors that are currently classified under the existing MTFP. The table highlights several elements that were examined to from the recommendations. A summary of those elements and how they were examined follows.

Priority Elements

Parking

The continued provision of adequate vehicular capacity continues to be paramount to providing access and mobility within the study area. Permanent parking is ideal only in cases where currently exist. Non-peak hour parking is not displayed.

Transit

Promoting transit use will help to off-set some of the right-of-way constraints by increasing the person carrying capacity of the corridor.

Pedestrian

Promoting park-once areas, access to transit, and local trip options through pedestrian facilities helps to curb peak-hour traffic and provides connectivity within the transportation network.

Bicycle

Increases the reach of transit services, promotes non-motorized transportation options, can be used for recreation and commuting alternatives.

ADA Access

Highlights corridors where additional attention to ramps and street crossings that are in compliance with the American with Disabilities Act.

Automobiles

Are a priority on every corridor in Houston. The priority elements call attention to additional modes that should be promoted on a particular corridor.

Existing MTFP Classification - examines the current functional use designation and the Right-of-way.

Proposed MMC - resulting proposed sub-classification based on all of the above inputs, and the facility types that were defined in Phase 1 of the City Mobility Planning Process.

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	C-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	C-2-70	MINOR COLLECTOR	URBAN STREET			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-4-100	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-4-90; IRVINGTON TO I-45: 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 : C-3-60; FULTON TO IH45: C-4-70 WEST OF 45: C-3-70	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 AVENUE	X (Partial)		X-Express	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-Express	X
E 11TH ST	STUDEWOOD ST	MICHAUX ST	C-4-70	UNDIVIDED	70'	2	7,700	8,000	C-2-70	MINOR COLLECTOR	URBAN STREET		X	X-Express	X
PECORE ST	STUDEWOOD ST	N MAIN ST	C-2-60	UNDIVIDED	60'	2	7,800-8,100	6,500-13,000	C-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 STREET from plan	N/A				
W 6TH ST	YALE	HEIGHTS BLVD	T-2-60	UNDIVIDED	50'-60'	2	50-1,000	1,500	C-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	C-2-60	MAJOR COLLECTOR	URBAN STREET	X (Partial)	X		
WHITE OAK DR	STUDEWOOD ST	I-45	T-2-70	UNDIVIDED	70'	2	5,500-9,000	4,000-13,500	C-2-70	MAJOR COLLECTOR	URBAN STREET	X (Partial)	X		
QUITMAN ST	I-45	Fulton	T-2-60	UNDIVIDED	60	2	5200-8,000	9,500-13,500	C-2-60	MAJOR COLLECTOR	URBAN STREET	X		X-Local	X

X: THIS INDICATES A CORRIDOR WITH LIMITED RIGHT-OF-WAY, SO THE SUGGESTED BICYCLE FACILITY IS A BIKE ROUTE.*
COUPLET: A COUPLET IS A ONE-WAY PAIRING OF TWO CORRIDORS.

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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
QUITMAN ST	Fulton	US-59	T-2-50	UNDIVIDED	50'	2	5200-8,000	9,500-13,500	C-2-50	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	C-4-70	MAJOR COLLECTOR	URBAN AVENUE	X*			
LORRAINE ST	HOGAN ST	HARDY	C-4-60	UNDIVIDED	60'	2	1,800-4,500	10,500-14,000	C-4-70	MAJOR COLLECTOR	URBAN AVENUE	X*			
LORRAINE ST	HARDY	US-59	C-4-70	UNDIVIDED	60'	2	1,800-4,500	10,500-14,000	C-4-70	MAJOR COLLECTOR	URBAN AVENUE	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			
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				
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				
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 20th	X
HEIGHTS BLVD	20TH	I-10	T-4-140-150	MEDIAN	140'-150'	4	9,500	8,000-20,000	C-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-3-80	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-4-86	MAJOR THOROUGHFARE	URBAN AVENUE			X-Express	X
AIRLINE DR	I-610	N MAIN ST	T-4-70/80	UNDIVIDED	70-80'	4	5,000-8,800	3,000-17,500	T-4-80	MAJOR THOROUGHFARE	URBAN AVENUE			X-Local	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	C-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

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COUPLET: A COUPLET IS A ONE-WAY PAIRING OF TWO CORRIDORS.

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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
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	MOP	I-610	T-4-50/60 (Couplet)	X	50-60'	4	3,000-6,000	5,500-12,500	C-2-60	MINOR COLLECTOR (2WAY)	URBAN AVENUE	X	X		X
ELYSIAN ST	I-10	I-610	T-4-60	X	60'	4	4,500-8,500	9,000-15,000	T-4-60	MAJOR THOROUGHFARE (2WAY)	URBAN AVENUE			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	MAJOR THOROUGHFARE	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			
WASHINGTON AVE	HEMPSTEAD RD	I-10	T-8-120	MEDIAN	255'	4	7,500-18,000	18,000-28,000	T-8-120 (Varies)	MAJOR THOROUGHFARE	URBAN BOULEVARD	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	SUBURBAN BOULEVARD	X		X-Express	X
BURNETT ST	N MAIN ST	ELYSIAN VIADUCT	C-4-80	UNDIVIDED	60'	2	5,400	7,400	C-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	C-2-60	MAJOR COLLECTOR	URBAN STREET	X			
COLLINGSWORTH ST	ELYSIAN ST	US-59	C-4-60	UNDIVIDED		4	5,000	12,000-17,000	C-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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COUPLET: A COUPLET IS A ONE-WAY PAIRING OF TWO CORRIDORS.

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For best use, compare to Chapter 7 System Maps. Corridor Sheets are alphabetical

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 for the City of Houston.

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 Major Thoroughfare and Freeway Plan.

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
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			
MCKEE	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	WLYSIAN	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		
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				

PARTIAL: THIS INDICATES THAT ONLY A PORTION OF THE CORRIDOR NEEDS A BICYCLE FACILITY.

*Note: Table arranged geographically by location of street and not alphabetically.
For best use, compare to to Chapter 7 System Maps. Corridor Sheets are alphabetical

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 (parking, transit, pedestrian, bicycle facilities) are evaluated at a more intimate 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:

- Existing Conditions
- Identified Needs
- Future Vision
- Key Factors

Full network considerations as it relates to all modes of transportation (vehicular, transit, and bicycle) are provided in the Outcomes Chapter, or Chapter 7, of this Report.

*Note: Provided corridor sheets serve only as example treatments for potential accommodation of Priority Elements within the prescribed right-of-way. Final design will be determined upon actual construction of the roadway when and if facility improvements are warranted as deemed appropriate by a Certified Engineer; evaluation of this type is not appropriate at this high level of planning.

Corridor sheets are arranged alphabetically and compliment information provided in summary tables highlighted in Section 6.1: Highlighting Priority Elements. Summary Tables are arranged by a corridors geographic location and may be directly compared to the final system maps presented in Chapter 7 of this Report.

Priority Elements

West 6th Street

Key Factors

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

6th street is currently a 2-lane undivided road with open ditches flanking both sides. A portion of the road between Yale and Heights Blvd has curb and gutter. Residences are the prominent development type along this street. Travel speeds are typically slow. To the east, West 6th Street transitions into White Oak Drive. The portion of the street west of Rutland Street is mainly industrial with heavy truck usage, and is separated by a detention pond. The MTFP has 6th Street designated as a Major Thoroughfare.

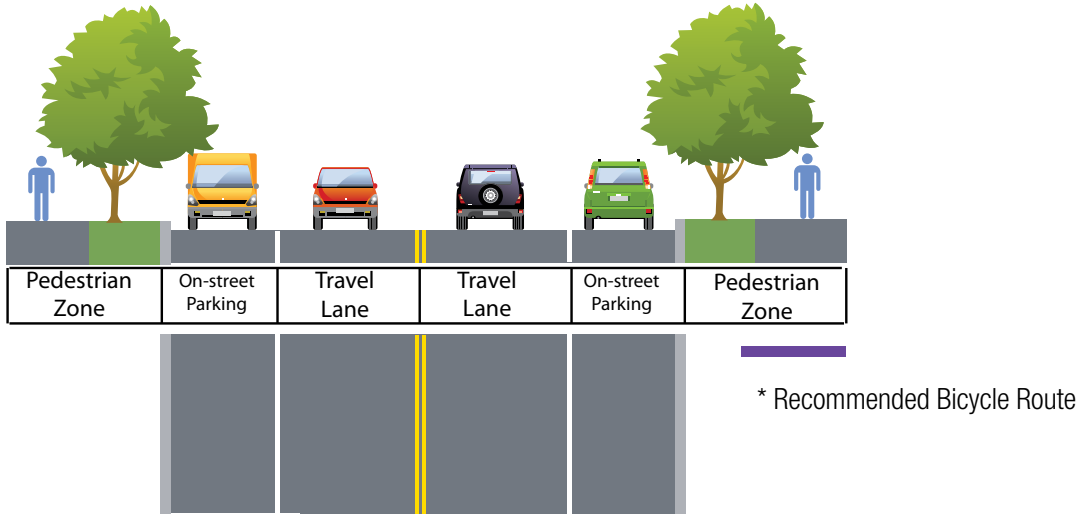
Identified Needs

During the public and stakeholder input process, suggestions for 6th Street focused on the section of road east of Rutland Street. Residents and local stakeholders would like to see enhanced pedestrian facilities along the corridor. Currently, there are no sidewalks on the south side of the street. There is a strong desire to make this a walkable neighborhood, especially as it continues into the White Oak District. There is also concern with the bicycle and jogging traffic crossing at the intersection of 6th/White Oak Drive and Heights Boulevard.

Future Vision

The portion of 6th west of Yale will be removed from the MTFP due to a recently constructed detention pond facility funded by TxDOT. Future redevelopment of 6th street should build off of the current cross section from the portion between Yale and Rutland. This would entail widening the portion of the street that is currently bounded by open ditches to be 2-lanes with on-street parking, curb and gutter, and sidewalks. It is recommended that this part of the corridor be designated as a bicycle route as it is an extension of White Oak Bayou Drive. The future Multi-Modal Classification for this corridor is designated as an Urban Street.

Possible Option(s):



* Recommended Bicycle Route

11th Street

Key Factors

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 Avenue/Street
Median/CTL/Undivided	Median/Undivided	Median/CTL/Undivided	Median/Undivided

Existing Condition

11th Street is an east/west connection from Hempstead to Studewood. The design of the corridor is 4-lanes, but is split between two different cross sections. From Hempstead to Durham, the corridor is divided by a median, while the remainder of the corridor is 4-lanes undivided. Right-of-way ranges from 70-100', with the 100' section containing the median. This 100' section contains more industrial development than the 60' section. Residences border the corridor except for the portion of 11th Street west of Ella. However, the intersection of 11th and Studewood Street is slowly changing the feel of the corridor with local restaurants and bars developing in the area. Sidewalks are consistent throughout the corridor and exist on both sides. 11th is currently classified as a Major Thoroughfare.

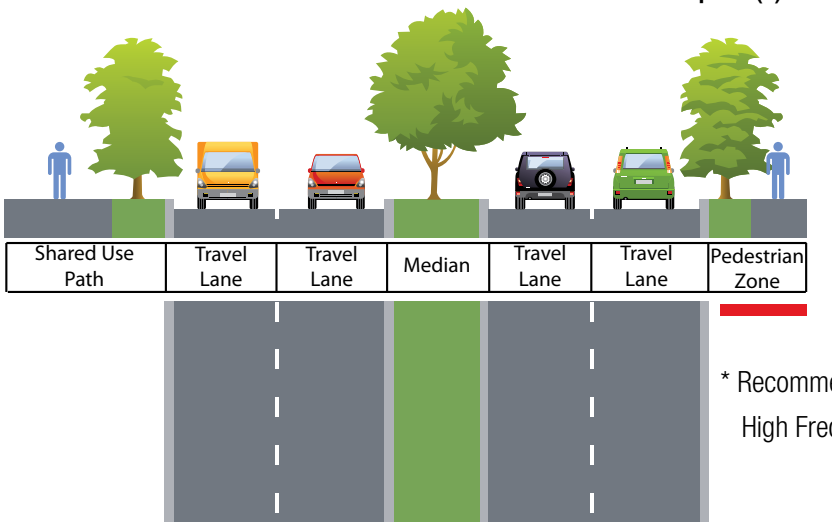
Identified Needs

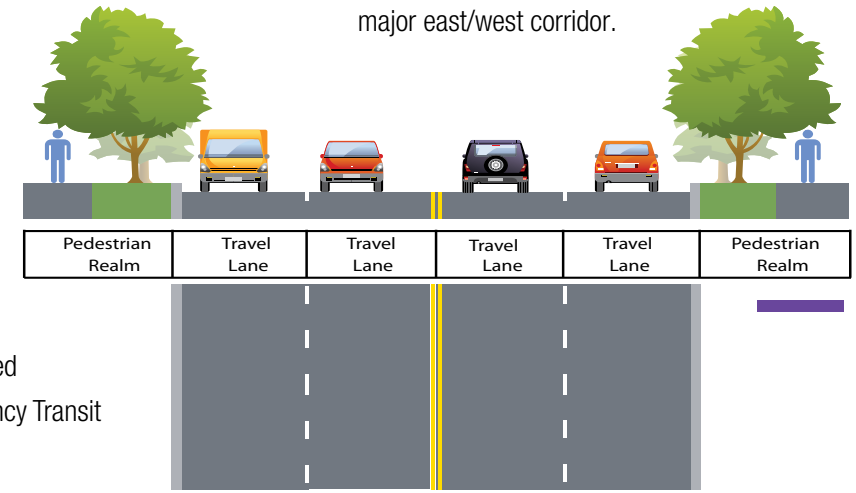
As mentioned, the atmosphere of this corridor is changing as more restaurants and bars move into the area. This is increasing the pedestrian and bicycle usage along this section of the corridor. Parking will be an issue in the future if this type of development persists. Suggestions from the public during the input process included enhancing the bicycle and pedestrian crossings to make them safer. Other comments showed a desire for a bus rapid transit or light-rail extension along 11th into the Galleria area. Corridor intersections with TC Jester, Durham and Heights Blvd were noted for perceived congestion by the public.

Future Vision

Projected volumes for this corridor create unsafe conditions for an on-street bicycle facility. Creating a shared-use path on one side of the corridor is a possible option. It would potentially provide a connection from the activity centers along 11th to the White Oak Bayou Trail. However, Right-of-way is limited, so all alternative bike facilities should be considered. The corridor should maintain its current design of 4-lanes undivided east of Shepherd and 4-lanes with a median west of Shepherd. Between Michaux and Pecore, the corridor design is in transition from 4- to 2-lanes. The recommendation is to maintain the 2-lane cross-section for this segment of the corridor. 11th Streets multi-modal classification is recommended as Urban Avenue. Evaluation of this corridor shows that a High Frequency Transit facility is warranted. This is due to the activity centers along this major east/west corridor.

Possible Option(s):

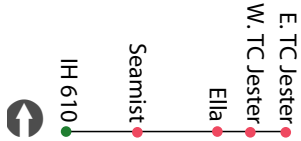




* Recommended
High Frequency Transit

18th Street

Key Factors



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

18th Street connects IH 610 to E TC Jester, before it transitions into 20th Street. Together these corridors create a major east/west connection for the Heights. 18th is a 4-lane corridor with a median and sidewalks within 100' of Right-of-way. 18th Street provides a connection to the TC Jester Trail. West of Seamist Dr. this Major Thoroughfare is mostly residential, but the east side is characterized by commercial properties.

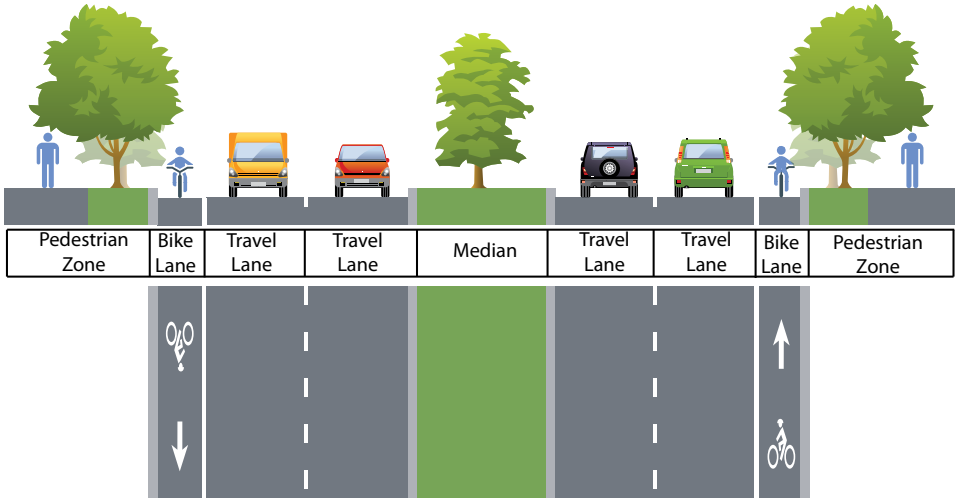
Identified Needs

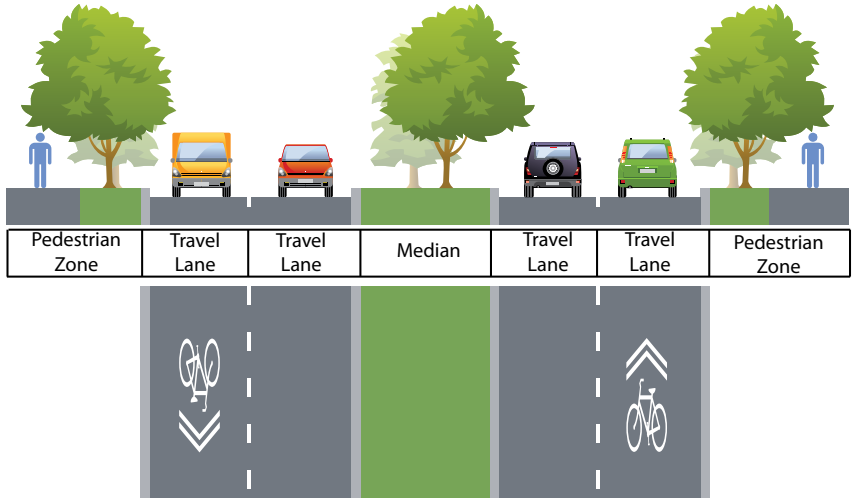
Public input for 18th focused on the intersection of 18th/20th and E TC Jester. This intersection is skewed and makes it difficult for traffic to continue onto 18th Street. Realignment of this intersection could possibly open up through traffic along 18th. Further analysis would need to be conducted to see how this would impact the community. The extension of a bike facility along 18th would be an important addition to the east/west bicycle connectivity for the Heights.

Future Vision

18th Street should maintain its current design with the addition of a bike lane facility. This will be useful in creating a full bicycle connection along the 18th/20th/Cavalcade corridors. A bike facility also provides a way to connect residences to the White Oak Bayou Trail. The future designation of the corridor is an Urban Boulevard. This design is 4-lanes divided with 100' of Right-of-way. A High Frequency Transit Route to complete the east/west connection would also benefit the corridor.

Possible Option(s):





* Recommended High Frequency Transit

19th Street

Key Factors

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	CTL

Existing Condition

19th Street is not identified on the MTFP given it's current classification of local street. Development along the corridor is commercial/retail and is expected to develop as a business corridor. Current road design has two cross-sections. From 18th to Shepherd it is a 2-lane corridor without curb and gutter. East of Shepherd, the corridor is 4-lanes with on-street parking in some places.

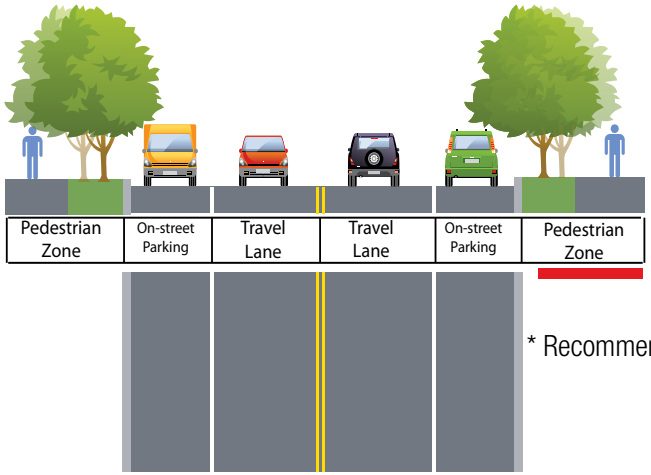
Identified Needs

19th Street is parallel to 20th Street, which is a Major Thoroughfare. 20th offers one of the few east/west connections between the Heights and Northwest communities. Given the future volumes and associated speeds anticipated on 20th Street by automobile traffic, 19th Street provides a more safe alternative for pedestrian and bicycle traffic. This is a way to enhance the pedestrian realm and walkability of the two corridors without heavily impacting the flow of automobiles.

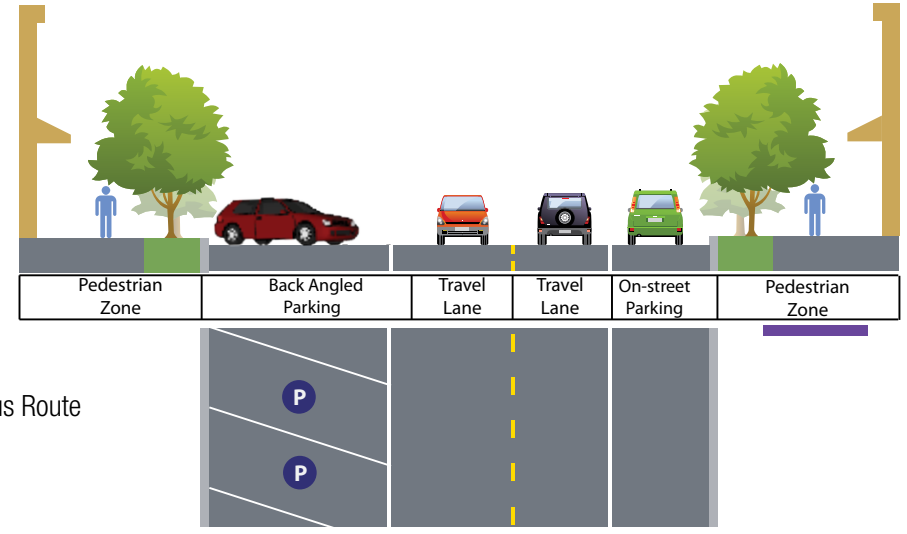
Future Vision

The future design of this Urban Street is broken into two cross-sections. These two design examples are in line with key factor considerations as seen today. The first design is 3 lanes (2 travel lanes with a center-turn lane). The provided configuration allows ample use of the pedestrian zone while maintaining the movement of two-way traffic free from the inhibition of left-hand turning movements. The section of the corridor with existing on-street parking will maintain this attribute. However, possible redesign from head-in parking to parallel parking needs to be evaluated. A bicycle route would be beneficial to the corridor. Also, a local transit route to facilitate pedestrian traffic along this corridor.

Possible Option(s):

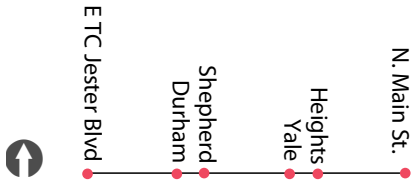


* Recommended Local Bus Route



20th Street

Key Factors



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 currently a Major Thoroughfare that travels east/west through the Heights area. The corridor is characterized by many commercial uses, which contributes to high pedestrian use between 18th and Shepherd. Surrounding uses, such as Wright-Bembry or Halbert Park, increase the desire for the corridor to the walkable. 20th begins on the west as a 4-lane undivided cross section and transitions at Cortlandt Street. Here it becomes a two lane cross section with a center turn lane and 4 foot bike lanes on both directions of travel. The 4-lane cross section is designated as a bike route. Right-of-way along the corridor is 70’.

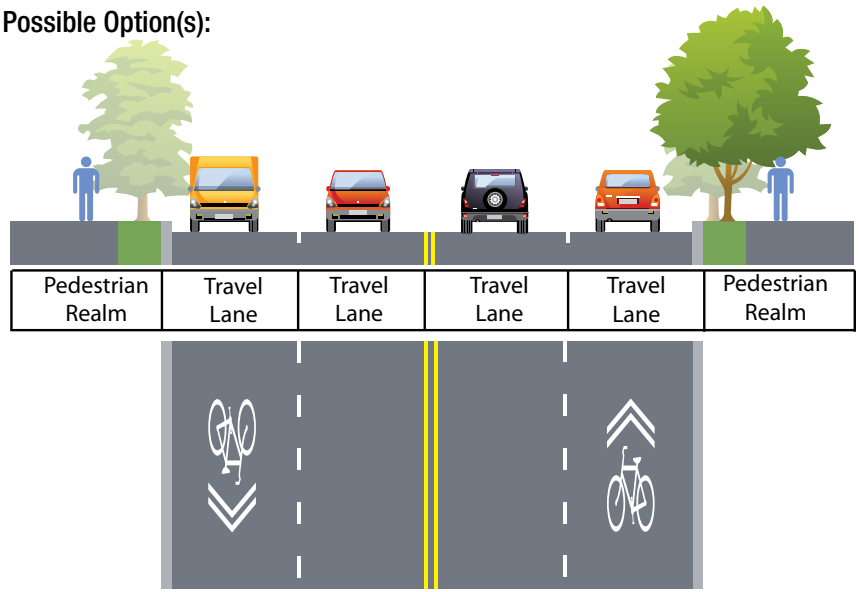
Identified Needs

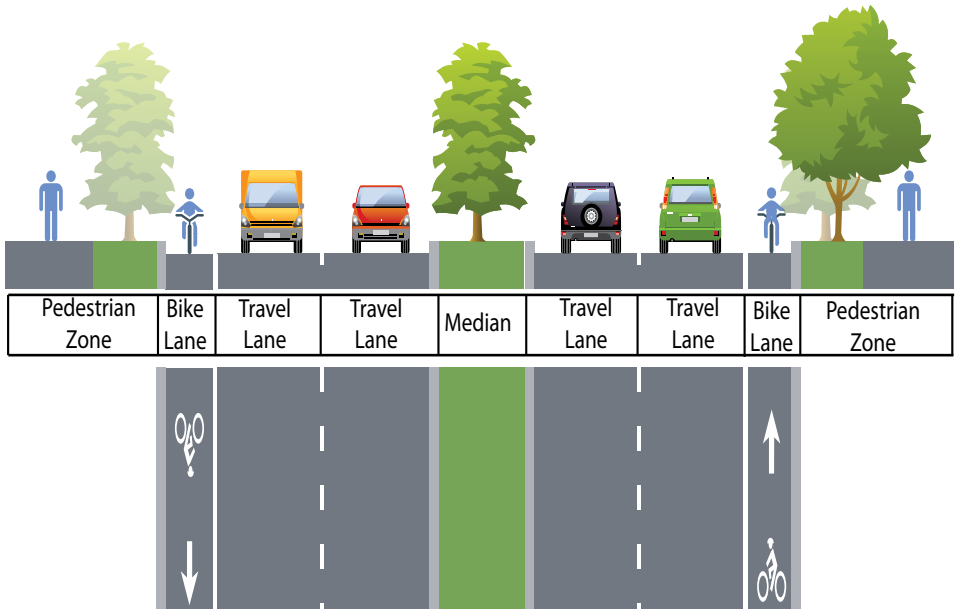
The bike lane along 20th, which continues onto Cavalcade, is very important to bicyclist within this area as it offers one of the only east/west connections between the Heights and Northside Neighborhoods. This connection is only expected to increase in popularity for cyclist as the light-rail starts operations. However, due to the narrow lanes many bicyclist do not feel safe riding on this road. Several intersections were mentioned as congested along the corridor including those at Durham, Cavalcade and E TC Jester.

Future Vision

The future design of this Urban Avenue is 4-lane corridor. An on-street bike facility is recommended. Due to the limited Right-of-way, a Sharrow is identified, but a shared-use path (where the pedestrian and bike share a wider sidewalks) should be explored. An express High Frequency Transit route 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.

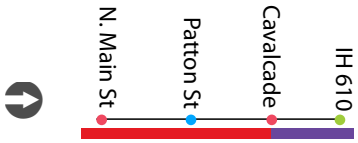
Possible Option(s):





Airline Drive

Key Factors



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	Undivided

Existing Condition

Airline Drive is a Major Thoroughfare that is designated as on the Major Thoroughfare and Freeway Plan. It is currently a 4-lane road that transitions between two cross-sections over 70'/80' of designated Right-of-way. From IH 610 to Cavalcade, Airline is a 4-lane undivided thoroughfare. From Cavalcade to North Main, it is a 4-lane road with a center turn lane.

Identified Needs

This corridor has an interesting attraction by way of the Daily Farmers Market. This market brings heavy traffic to the area, but was not designed to accommodate vehicles, pedestrians, or bicyclist traveling to and from the market. There is a desire to enhance and increase the connectivity of sidewalks through the area, as well as focus on pedestrian crossings. Repaving the road and implementing complete street concepts would enhance the feel of Airline Drive as pedestrian friendly without inhibiting the flow of vehicular traffic.

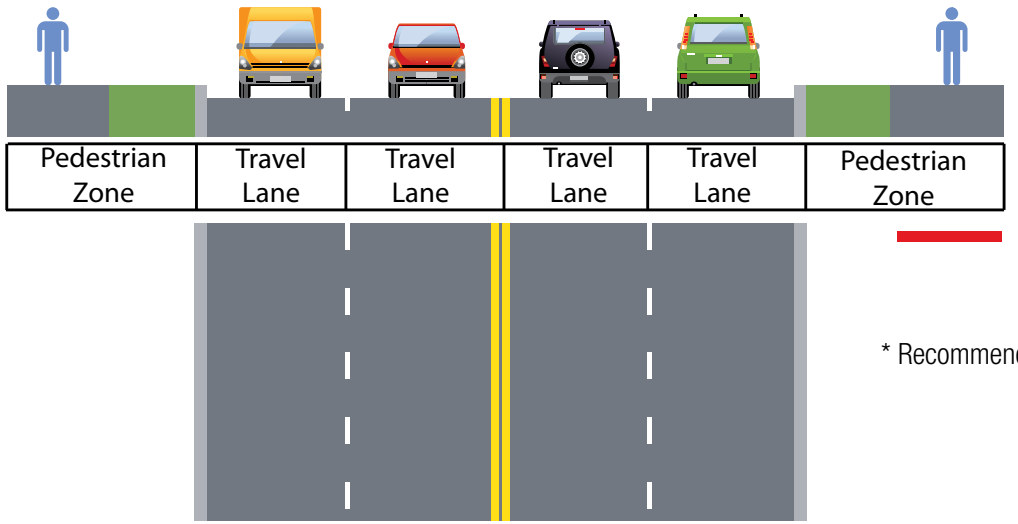
Future Vision

The future multi-modal classification of Airline Dr. is best identified as an Urban Avenue. Enhancing existing sidewalks and constructing the sidewalk gaps will be a huge benefit, especially to pedestrians traveling to and from the Farmers Market. The corridor is currently undergoing reconstruction to a 4-lane corridor.

However, the section of the corridor between IH 610 and Cavalvade is currently in design by the city's Department of Public Works with a continuous center turn lane. The activity centers along the corridor indicate that it has a need for local bus service.

A major point of concern is the need for pedestrian crosswalks. There are two locations where these special crossings would be beneficial: Aurora Street and Sylvester Road.

Possible Option(s):



* Recommended Local Bus Route

Burnett Street

Key Factors

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 currently operates as a 2-lane, undivided corridor without curb and gutter. It services local residences and a few other development types. The corridor is a connection between Hardy Street and N Main Street (which contains the light-rail extension). Burnett Street is identified as a Major Collector on the Major Thoroughfare and Freeway Plan.

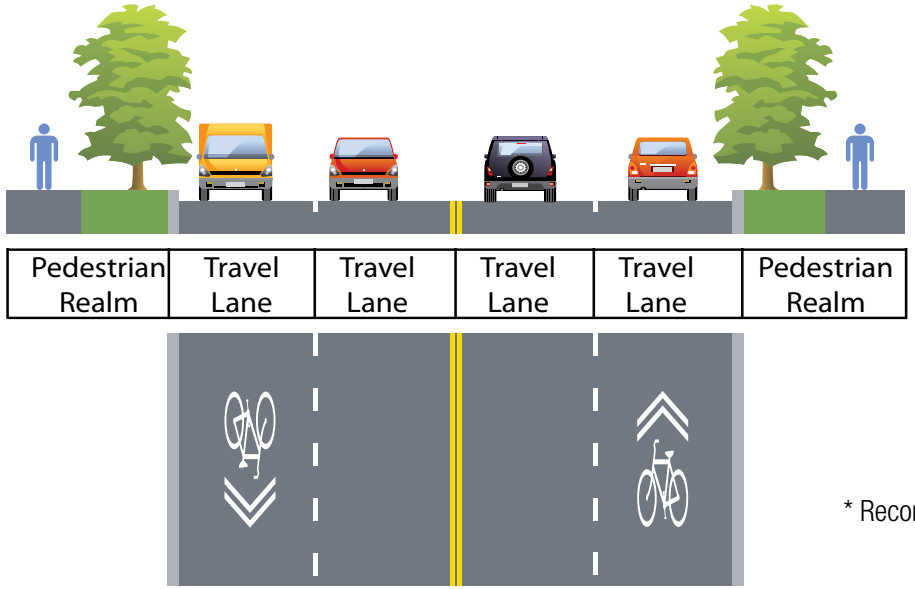
Identified Needs

As the corridor is reconstructed, pedestrian and bicycle facilities will need to be a priority. Since Burnett Street is a Major Collector, it can focus on modal uses other than the automobile.

Future Vision

The future Multi-Modal Classification for this corridor is an Urban Avenue. 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 undergone the pre-engineering stage and will be constructed as a 4-lane facility with a sharrow which will allow for a wider pedestrian realm. Finally, transit will play important role along this corridor with the addition of the Burnett Transit Center located on Burnett near Main Street. A High Frequency Transit Route for is also recommended for the corridor, due in part to its proximity to the light-rail line and local university campus.

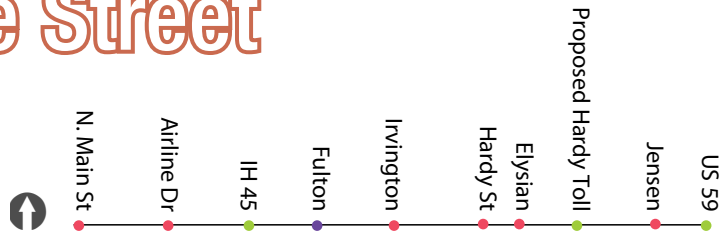
Possible Option(s):



* Recommended High Frequency Transit

Cavalcade Street

Key Factors



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 connection from the Heights area under IH 45 to the Northside neighborhood. The corridor is currently designed as 4-lanes divided within 100' of Right-of-way. Uses along the corridor transition between commercial/retail to residential. This indicates that the corridor has high pedestrian and bicycle traffic. Cavalcade has a bike lane on both directions of travel east of N. Main Street, and a signed bike route west of N. Main Street. The 18th/20th/Cavalcade corridor is the only east/west corridor within the Heights-Northside area that fully connects SH 290 with US 59. For this reason, it is classified as a Major Thoroughfare.

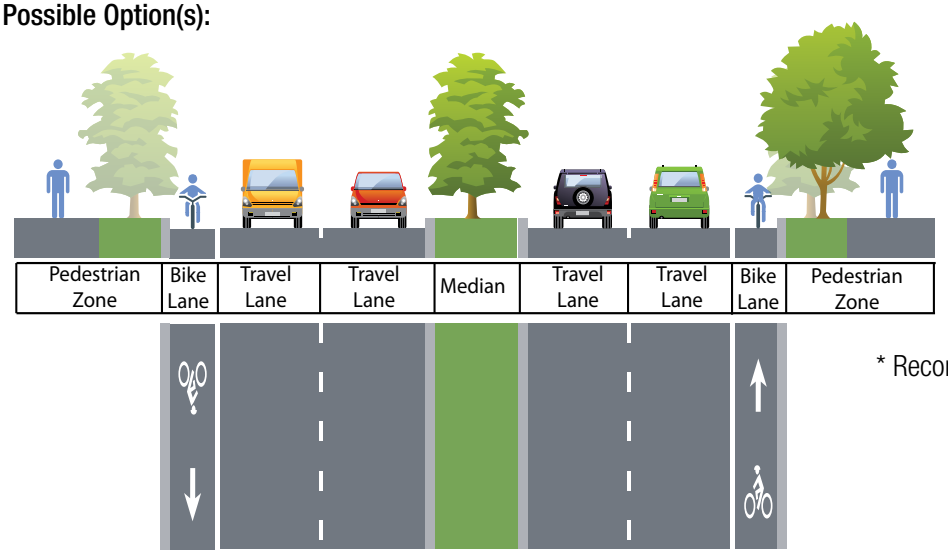
Identified Needs

The bike lane along Cavalcade was a major topic of concern from the public. Many indicated that it felt unsafe to travel along due to the bike lane width and traffic along the corridor. Future design of the corridor to make it more appealing to bicycle traffic would provide a full east/west connection for the Heights-Northside area. Intersections were also identified as issues, especially for METRO buses that have difficulty turning. Cavalcade at Fulton and the 20th/Cavalcade at N. Main/Studewood were specified as intersections causing traffic back-up, and mitigation tools should be used to evaluate them.

Future Vision

Cavalcade's multi-modal classification is a Urban Boulevard with 4-lanes, divided, within 100' of Right-of-way. Bike lanes need to be widened for increased comfort of riding and added safety. To better accommodate the existing bike facility, the existing median may be narrowed providing additional Right-of-way. In order to create a constant east/west flow, this change is seen as a priority by the project team. Filling in missing sidewalk segments is also important to the future of the Cavalcade. Since the corridor is a part of a larger east/west connection (which also crosses the light-rail) a High Frequency Transit is recommended for the corridor.

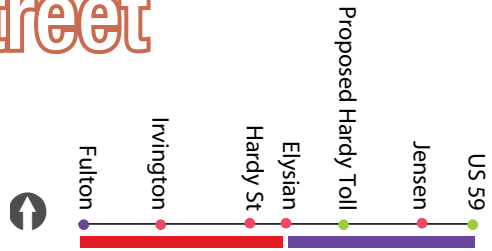
Possible Option(s):



* Recommended High Frequency Transit

Collingsworth Street

Key Factors



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 an east/west connection from the Fulton transit corridor to US 59. The corridor is currently designed in two different cross sections. From Fulton to Elysian, the corridor is 2-lane with mostly residential development. From Elysian to US 59, it is a 4-lane corridor with industrial development. Collingsworth is currently designated as a Major Collector.

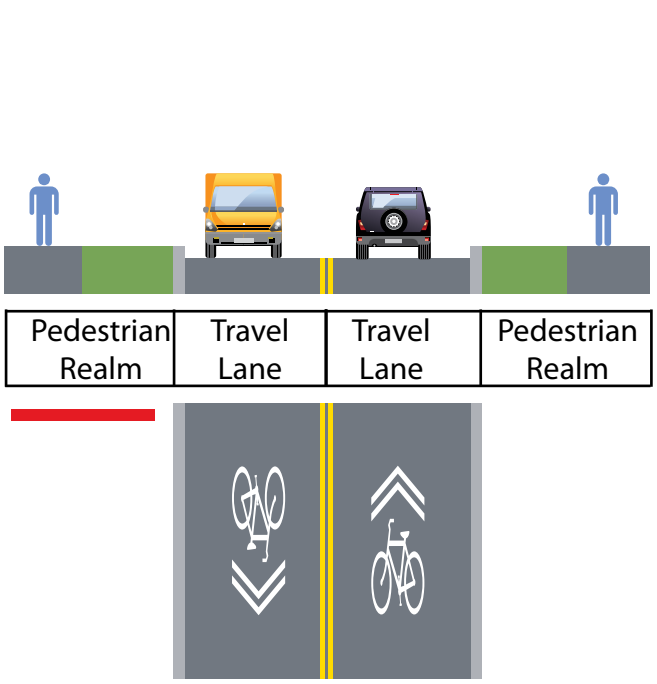
Identified Needs

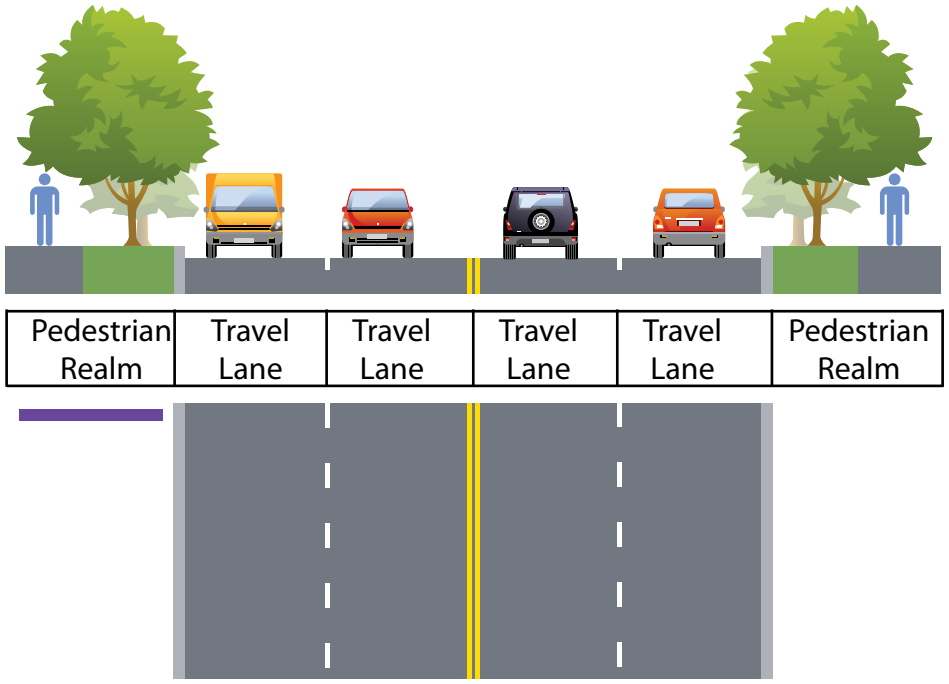
Public input revealed a desire for a bike facility along a portion of the corridor to move people out of the residential area and towards the light-rail and Moody Park.

Future Vision

It is recommended that the corridor maintains the existing 2- and 4-lane structure. Since the corridor is split, it can potentially gain the following Multi-Modal Classifications: from Fulton to Elysian, Urban Street; Elysian to US 59, Urban Avenue. From Fulton to Elysian, a bike facility is recommended.

Possible Option(s):





Durham Drive

Key Factors

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 Dr. is a Major Thoroughfare traveling south from IH 610 to IH 10, and acts as a couplet with Shepherd Drive. The majority of the corridor is 4-lanes, but reduces to 3-lanes as it crosses the bridge and exits south out of the Study Area. Local residents indicated that this corridor could be referenced as a "complete commuter street" as the majority of users are commuting through the Heights area. Vehicles move from the Northwest area into the Inner Loop/Downtown area. Right-of-way along the corridor ranges 70' at the north down to 60' at the southern end.

Identified Needs

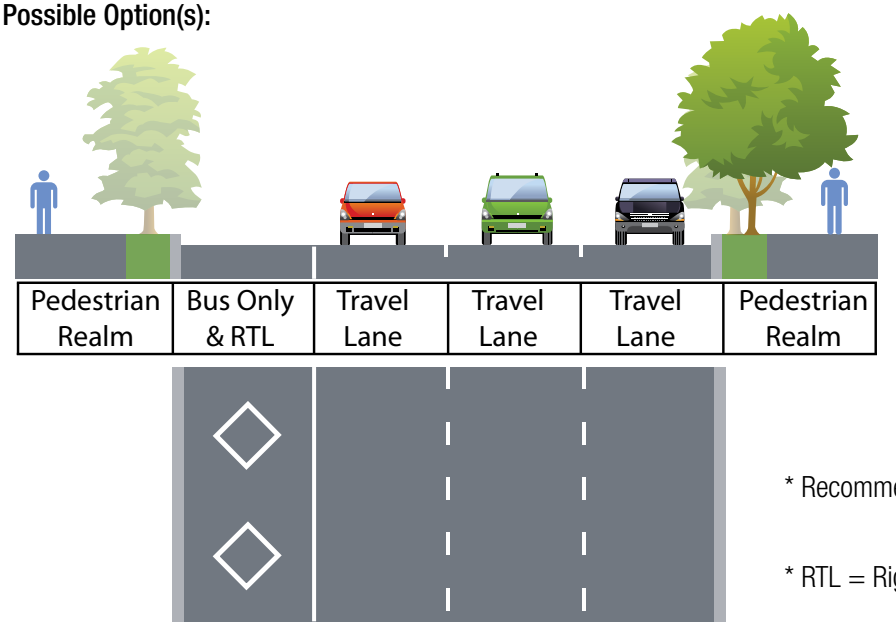
A strong desire for bike lanes and sidewalks along the corridor was expressed by the public. South of Glean Oaks Street to Darling Street there is currently no bike or pedestrian access across the bridge. Pedestrian crossings at Durham Drive are also needed. In addition to creating and connecting these pedestrian realms, aesthetic improvements, like the addition of street trees, were mentioned.

Future Vision

Durham Dr. will need to maintain its current 4-lane Couplet design to meet the capacity needs of the corridor in the future. As such, an on-street bike facility is not prudent. Focusing attention on continuous pedestrian facilities, however, is important for internal community connectivity as well as enhanced access to transit stops. Pedestrian crossings at major intersections will need attention as well.

METRO High Frequency Transit for the Durham/Shepherd Couplet is recommended. If this occurs, designating one travel lane as a bus only/right-turn lane could increase the efficiency of traffic flow along the corridor. This facility type will require that more attention is given to the pedestrian realm. Bus shelters and wider sidewalks can help create a safe and friendly area.

Possible Option(s):



* Recommended High Frequency Transit

* RTL = Right Hand Turn Lane

Ella Blvd

Key Factors

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	Suburban Boulevard
Median/CTL/Undivided	Median	Median/CTL/Undivided	Median

Existing Condition

Ella Boulevard is currently a 4-lane road with a median and bike lanes. The southern limit of the corridor is 11th Street, and the northern is IH 610. The corridor crosses E TC Jester right at the White Oak Bayou Trail. Ella is designated as a Major Thoroughfare on the MTFP.

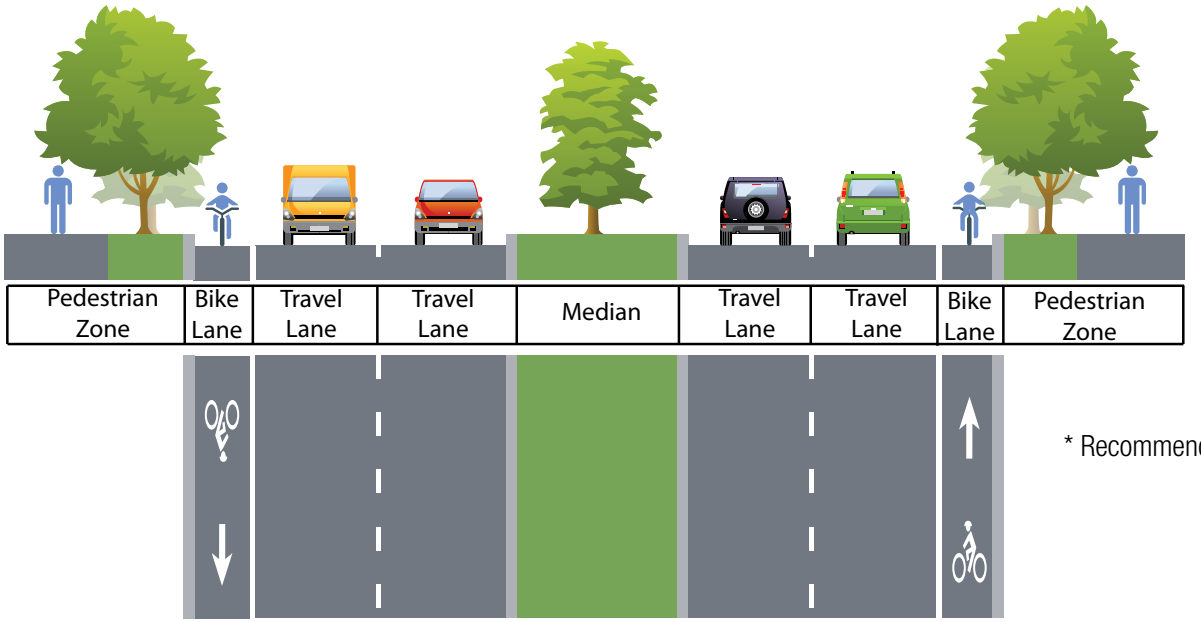
Identified Needs

Existing and projected traffic volumes are characteristic of a high-capacity facility, however operable under the current MTFP designation. Failure along the corridor does exist, however, this is in part to Ella Boulevard crossings at IH 610 as well as TC Jester. Intended intersection improvements were noted.

Future Vision

The project team recommends that Ella Boulevard maintain its current corridor design. 4-lanes may be sufficient to move vehicles through the area. This corridor also provides opportunity to alleviate the provided north/south gap within the greater bicycle network. As a north/south corridor connecting under IH 610, along with other variables, it is recommended a High Frequency Transit facility be considered for Ella. Suburban Boulevard is the recommended multi-modal classification for Ella Boulevard.

Possible Option(s):



* Recommended High Frequency Transit

Elysian Street

Key Factors

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

Existing Condition

Elysian is a one-way street that provides north-bound traffic direct access from downtown to the Hardy Toll Way just north of the Study Area. It maintains 4-lanes of undivided traffic and merges with its south-bound couplet - Hardy Toll - becoming the Elysian Viaduct. The corridor is currently classified as a Major Thoroughfare.

Identified Needs

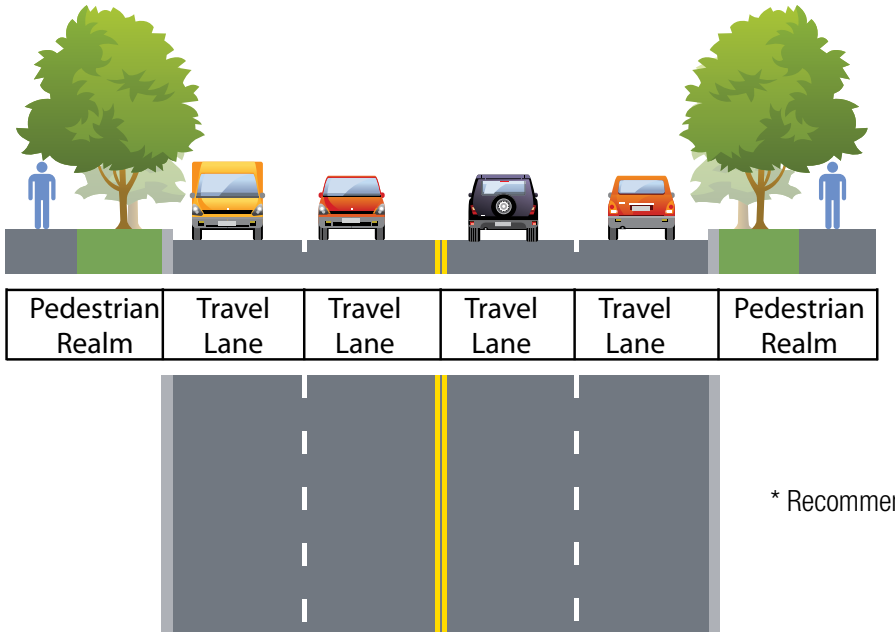
Due to the lower volumes on this road, local residents and stakeholder expressed a desire to reduce the number of travel lanes. Additionally, if the Hardy Toll Road is extended, the use of this corridor as a high-capacity thoroughfare will become even less relevant.

Future Vision

Elysian Street is recommended to change from a one-way couplet to a two-way Urban Avenue with 2-lanes of travel in both directions. This road design may permit on-street parking during off-peak hours. However, a High Frequency Transit route may be more beneficial to the corridor if allowed.

The conversion of this corridor into a 2-way facility also provides additional opportunity on Hardy, which given provided traffic flows, is considered an underutilized corridor.

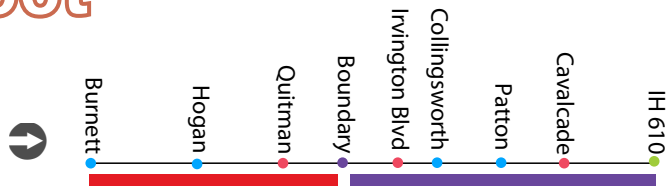
Possible Option(s):



* Recommended High Frequency Transit

Fulton Street

Key Factors



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2/4	MTFP Designation	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 has been recently redesigned to accommodate light-rail. It is now designed as the light-rail corridor for the Northside area. Reconstruction of the corridor will be completed as of December 2013. It is currently identified on the City of Houston's MTFP as a Transit Corridor.

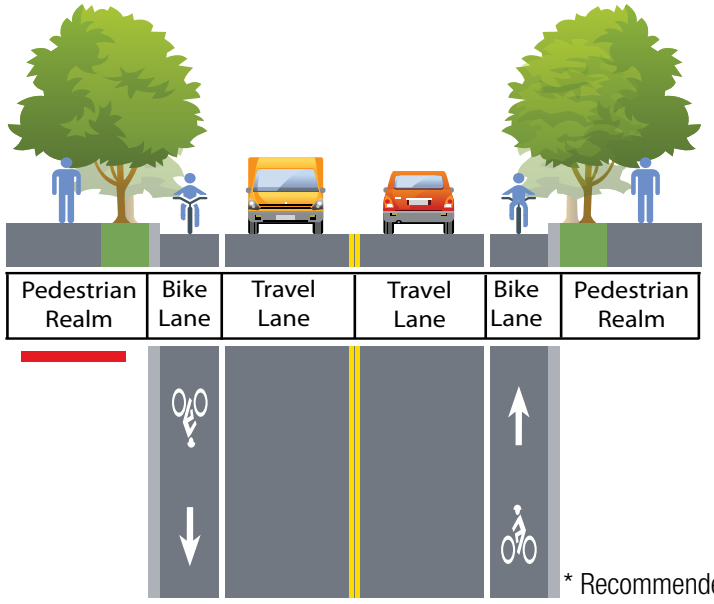
Identified Needs

The needs identified for Fulton regard the small portion of Fulton to the south that does not contain light-rail track. It is important to the residents that this portion of the corridor be designed to assist in the movement of pedestrians to the light-rail line.

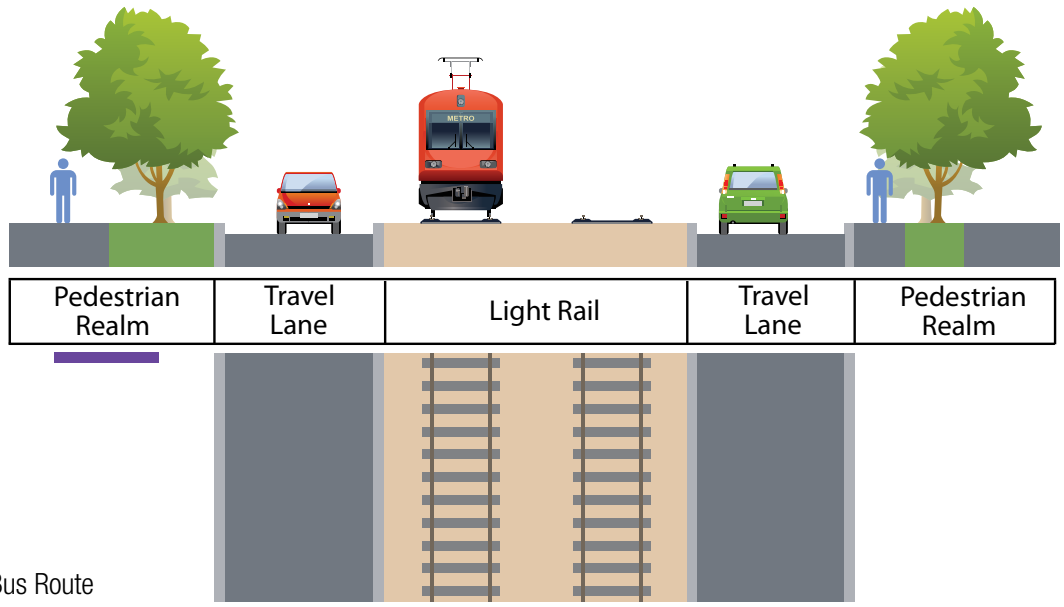
Future Vision

The design of Fulton will remain as a Transit Avenue. It will function with 2-lanes of traffic, with two-directional light-rail lines down the center of the corridor. The light-rail stops are indicated on the overall transit map. Any bus routes along this corridor should be removed to move traffic more efficiently. The southern section of Fulton (without the light-rail facility) is recommended as a 2-lane Major Collector with on-street bicycle facilities and a local bus route. It is designated as an Urban Avenue.

Possible Option(s):

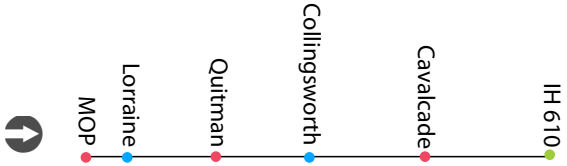


* Recommended Local Bus Route



Hardy Street

Key Factors



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	Urban Avenue
Median/CTL/Undivided	N/A	Median/CTL/Undivided	Undivided

Existing Condition

Hardy is a one-way street that moves traffic south-bound from IH 610 to IH 10 on a 4-lane corridor. It is a Major Thoroughfare that runs parallel is Elysian St, 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 essentially residential with a few other uses such as schools, and of smaller "mom and pop" commercial facilities populating the corridor.

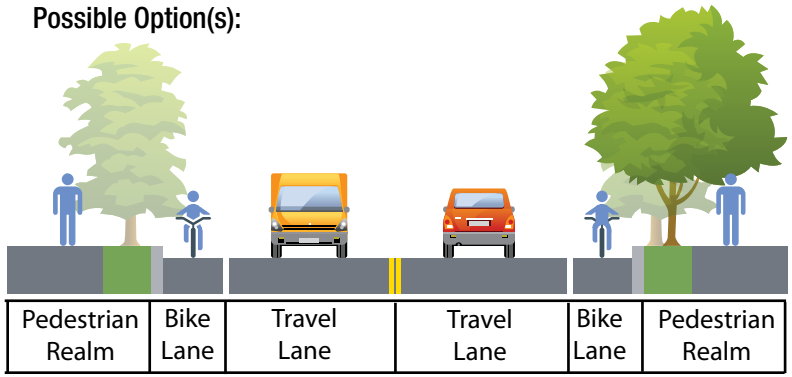
Identified Needs

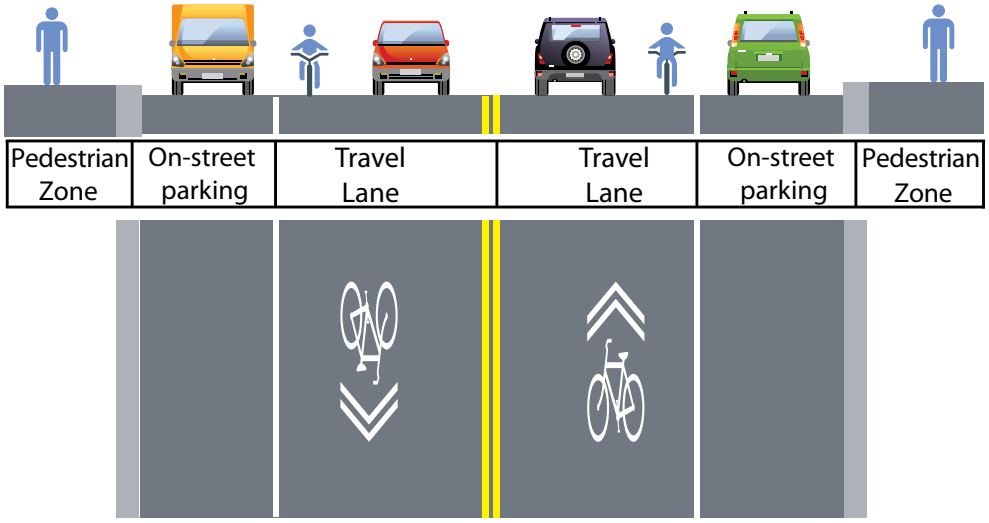
Hardy Toll Road may be extended southward in the future, and will run parallel to the current Elysian/Hardy couplet. This expansion may change the usage of the Hardy/Elysian couplet, opening it up to different options and more focus on other mobility uses. Because of the many residences and the schools found along this corridor, bike and pedestrian facilities were indicated as being a priority.

Future Vision

Given provided traffic volumes expected on the currently existing Hardy/Elysian couplet, Hardy may be repurposed and reclassified as a Collector which is more appropriate for the movement of more residential and localized traffic. Given Hardy currently maintains 4 active lanes, the use of the outside lanes may be explored as possible parking or bicycle facilities - both of which are deemed appropriate for this corridor. Given these provided attributes, Hardy is recommended as an Urban Avenue.

Possible Option(s):





Heights Boulevard

Key Factors

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 the "Complete Street" of the Heights Study Area. The corridor connects IH 10 to 20th Street. The street cross section is very different from any other Major Thoroughfare throughout the Study Area. Currently, Heights Blvd is a 2-lane divided road with on-street parking and a bike lane within 140'-150' of Right-of-way. This unique corridor also has a jogging trail down the middle of the median. Heights Blvd connects to multiple trail heads, making it a heavily used pedestrian and cyclist corridor. Currently, the corridor is designated as 4-lanes although the corridor currently operates with only 2-lanes of traffic.

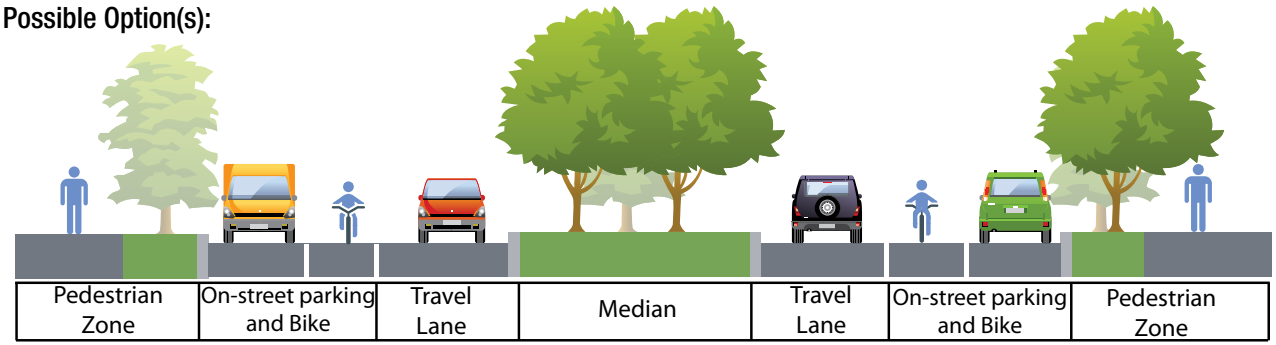
Identified Needs

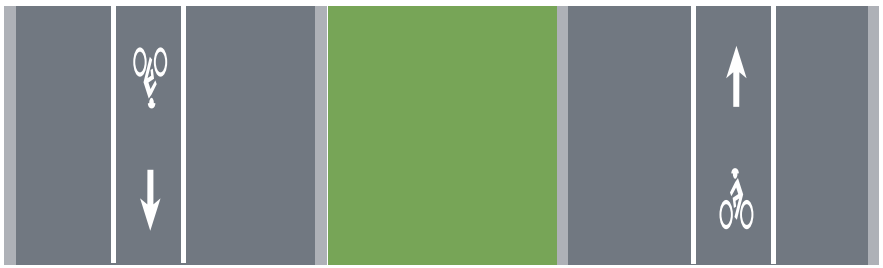
Concerns provided by the public indicate residents and stakeholders desire to the enhanced bike and pedestrian amenities unique to this corridor. However, joggers using the trail stated crossing at intersections can be tricky due to the unfamiliar interaction of drivers with the unusual design of a trail down the middle of a median.

Future Vision

Maintaining the Heights Boulevard as an example of a "Complete Street" is important for the Study Area. The corridor should be reduced to 2-lane divided Major Collector, with a wide, pedestrian oriented median. Right-of-way may stay at its current 140'-150'. One improvement to the corridor would be the implementation of Michigan U-turns, which would help to reduce automobile queuing at major intersections along the corridor. A local bus route is also recommended for the corridor. The applicable multi-modal classification for Heights Boulevard is a Urban Boulevard.

Possible Option(s):





* For more information regarding Michigan U-Turns, see the section on intersections.

* Recommended Local Bus Route

Hempstead Road

Key Factors

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 Major Thoroughfare constructed with two street cross sections. From Katy Road to West 11th Street, Hempstead Road is a 6-lane corridor with a center-turn lane within 200' of Right-of-way. As it crosses 11th and continues to Katy Rd/Washington Avenue, the corridor drops a lane on either side to become a 4-lane undivided corridor. Hempstead Road is bounded on the south by railroad tracks. The north side is home to commercial and retail development for the most part. Sidewalks are non-existent throughout the corridor, but there is a transit route (70) with frequent bus stops.

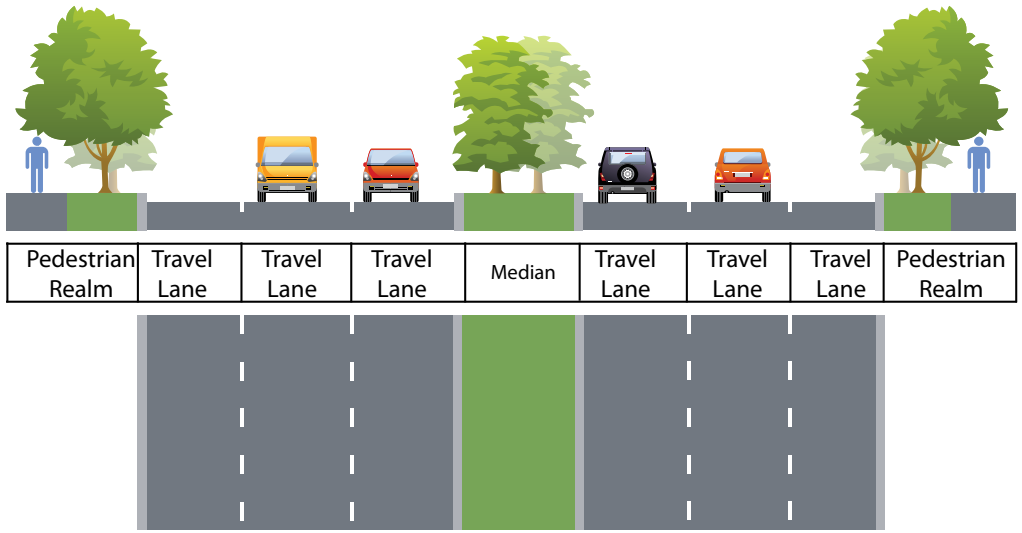
Identified Needs

Hempstead Road moves regionally from the northwest to the southeast and parallels the railroad line. This corridor is heavily traveled with through traffic. It connects with Katy Road and Washington Avenue which are 4- and 6-lane corridors, respectively. Merging Hempstead Road traffic onto these corridors would most likely benefit if the southern portion of the corridor were to widen as it connects with these roads, in order to ease the transition onto these major thoroughfares with additional traffic.

Future Vision

Hempstead Road should expand to 6-lanes to accommodate future vehicular traffic. Its design will include a median. The priority of the corridor will be to facilitate the movement of traffic, thus distinguishing it as a Urban Boulevard.

Possible Option(s):



Hogan Street

Key Factors

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 connects to Crockett Street which provides access to the Inner West Loop subregional Study Area. It maintains the same street design of 4-lanes undivided from its western limit of IH 45 to its east limit of Lorraine Street. Hogan St has 60’ of Right-of-way. Along the corridor is a mix of uses from residential to retail and commercial. Sidewalks can be found along the length of Hogan Street, though they are narrow. In some cases they also act as the entrance to commercial properties built with minimal setbacks. Hogan is an important Major Collector because it connects with N Main Street, where the light-rail has been constructed.

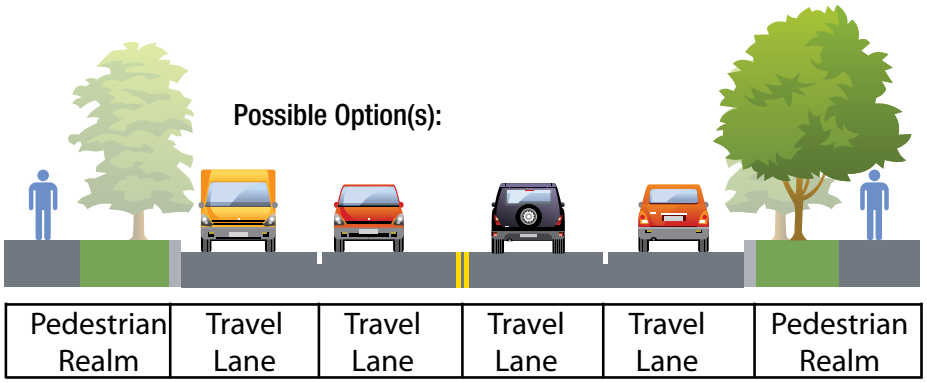
Identified Needs

Acting as a collector to move pedestrians and bicycles to the light-rail highlights the importance of enhancing these facilities with any future renovation to the corridor. Sidewalk exist, but are typically narrow and in poor condition.

Future Vision

Due to its intersection with the light-rail line, attention to the future design and use of Hogan Street is essential to creating a safe and efficient corridor. Due to limited Right-of-way, the corridor should be designated as a bicycle route. Enhancing sidewalks and crosswalks to create a safe and comfortable path to this transit line is also very important. Developing the bike network within Northside is important. In addition to the light-rail line, the University of Houston campus and the White Oak Bayou trail are major activity generators for the area. This 4-lane undivided corridor’s multi-modal classification is an Urban Avenue.

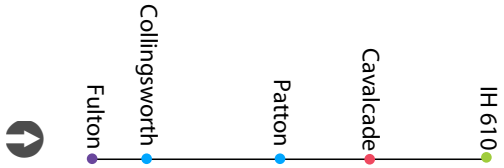
Possible Option(s):



* Recommended Bicycle Route

Irvington Blvd

Key Factors



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. It operates within 80’ of Right-of-way. The corridor provides access from 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 for north- and south-bound travel lanes.

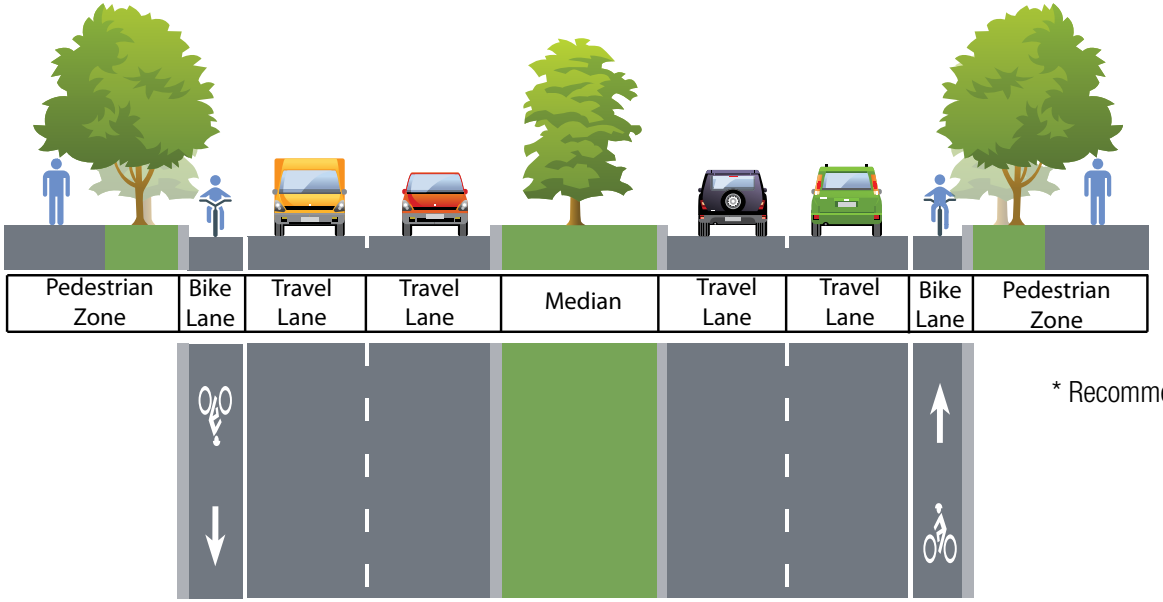
Identified Needs

The public indicated that the bike lanes on Irvington function very well. The continuous sidewalks along the corridor create a useful environment for pedestrians. However, around Moody Park, the traffic lights are confusing and misdirect bicyclist to their designated path. The METRO service along Irvington was also said to work well. The intersection with Patton, currently a T-intersection is in need of a traffic light.

Future Vision

Irvington should continue to operate within its current design. Attention should be given to the area around C. Martinez Elementary School to make sure traffic is slowed during school hours. To enhance the pedestrian realm further, pedestrian refuges with the median should be implemented. The future Multi-Modal Classification for this corridor is an Urban Boulevard. Irvington connects down to light-rail on Fulton. This along with other factors recommends that a local bus facility be a priority along the corridor.

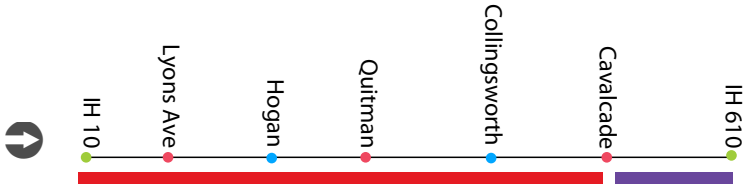
Possible Option(s):



* Recommended Local Bus Route

Jensen Drive

Key Factors



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 parallels US 59 as it moves from IH 610 to IH 10. From IH 10 to Lorraine Street, Jensen Dr. is a 4-lane road. From Lorraine to IH 610, it is a 2-lane corridor with a center turn lane. This portion of the corridor sees more commercial development than the southern segment where residences are more common. Sidewalks along the corridor are narrow and in poor condition. The MTFP classifies Jensen as a Major Thoroughfare.

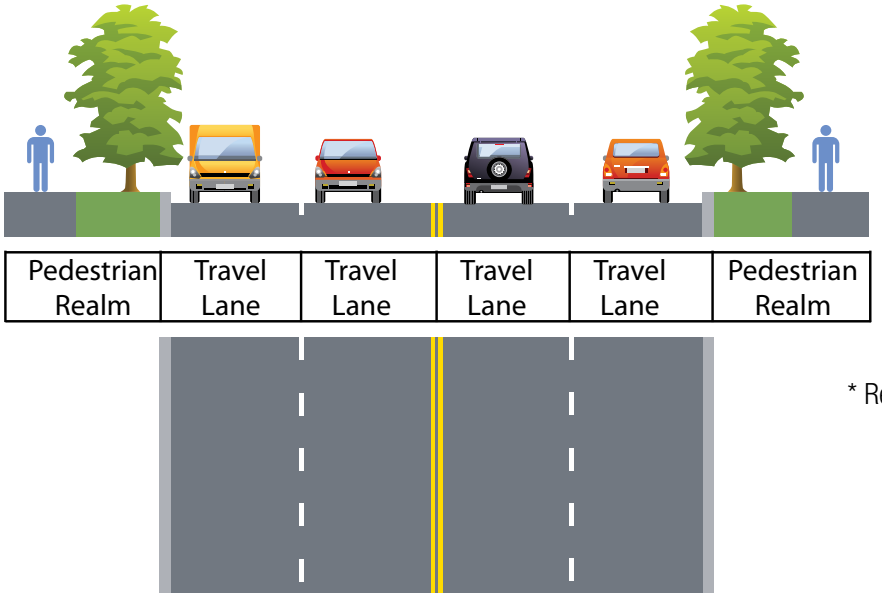
Identified Needs

Five schools are currently present on Jensen Dr. Enhancing the sidewalks and crossings at and near the schools was set as a priority for the corridor. The remainder of the corridor is also in need of improvement to pedestrian facilities as sidewalks are sporadic and in poor condition.

Future Vision

Because of the current and future development that occurs along the corridor, the multi-modal classification best suited for Jensen Drive is an Industrial Avenue and Urban Avenue for the northern portion. The current street designs of a 4-lane undivided and a 3-lane with a center turn lane are efficient for the current and projected corridor use. Pedestrian facilities should be a priority as redevelopment occurs along the corridor. A High Frequency Transit route would be beneficial for this corridor.

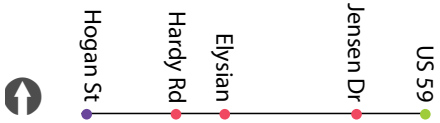
Possible Option(s):



* Recommended High Frequency Transit

Lorraine Street

Key Factors



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 is a small corridor which transitions from Hogan St. At this transition, to US 59, Lorraine Street is classified on the City of Houston's MTFP as a Major Collector. Its cross section is a 2-lane corridor with curb and gutter. The lanes are 16' wide, which allows for on-street parking currently utilized by local area residents. This is wide enough for on-street parking in front of residences. Right-of-way for Lorraine Street ranges from 60'-70'.

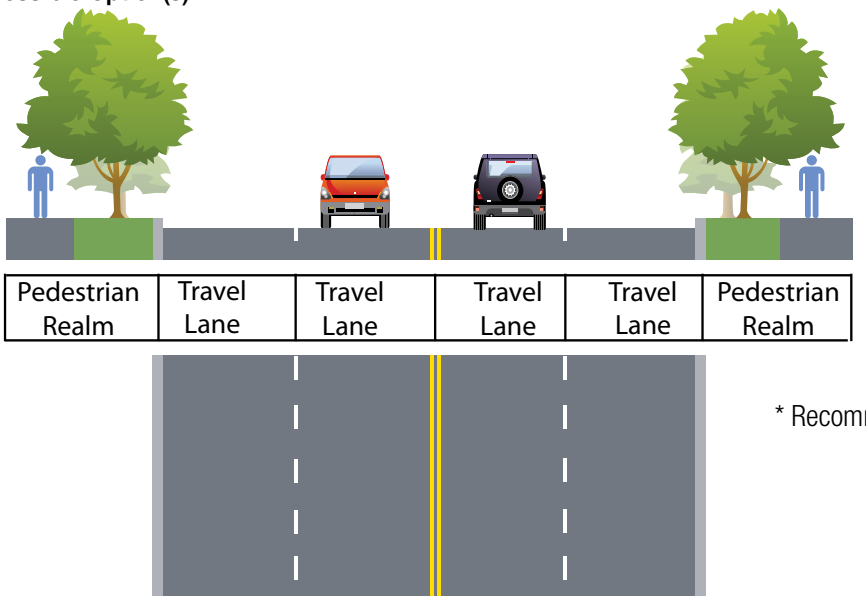
Identified Needs

Comments received from the public regarding Lorraine St were limited, and centered around the desire for an enhanced pedestrian way via local sidewalks. This is especially true as Lorraine Street crosses the railroad where existing infrastructure is limited for both bike and pedestrian users, alike.

Future Vision

The most applicable multi-modal classification for Lorraine St is an Urban Avenue. Given provided ADTs, it is recommended the MTFP designation be a C-4-70 providing a more uniformed roadway with Hogan Street which, together, forms a continuous corridor from just west of IH 10 and east of US 59. Due to limited Right-of-way, the corridor should be designated as a bicycle route, providing an essential connection to the newly developed light-rail.

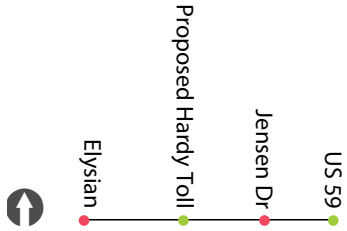
Possible Option(s):



* Recommended Bicycle Route

Lyons Avenue

Key Factors



EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	2	MTFP Designation	T-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 a short corridor within the study area. It begins from the Elysian Viaduct and crosses under US 59. This Major Thoroughfare is a 2-lane road with bike lanes on both directions of travel. From Elysian Viaduct to West Street, Lyons Avenue has curb and gutter, and intermittent sidewalks. Continuing on past West Street, the corridor loses its sidewalks and becomes open ditch on either side. Right-of-way is 60’.

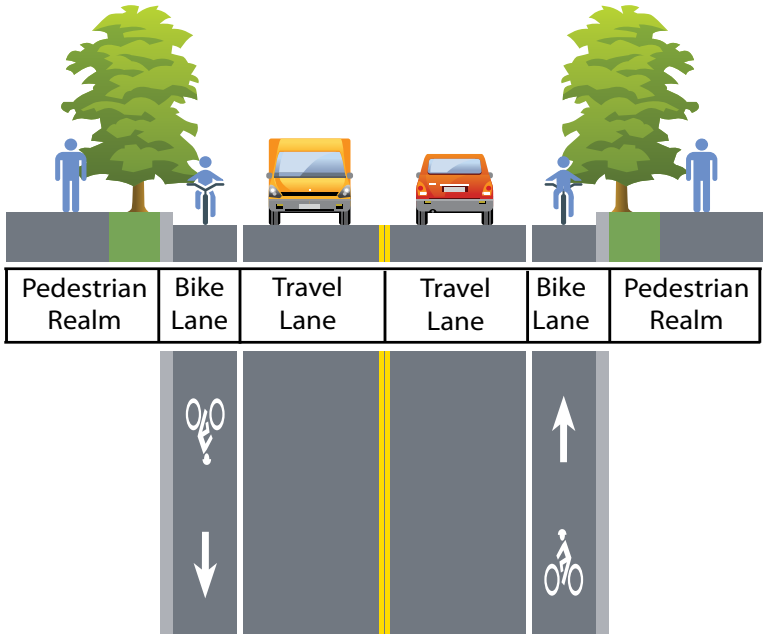
Identified Needs

Lyons Ave provides an underpass of US 59 and facilitates pedestrian and bicycle movements to the east of this study area. Due to the fact that this type of connection is limited, special attention should focus on creating a safe and friendly environment for bicyclist and pedestrians. This can be done by enhancing existing sidewalks and completing gaps within the sidewalk network.

Future Vision

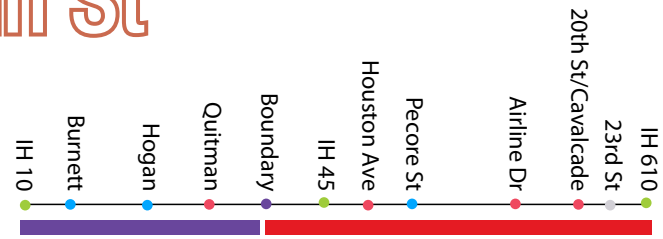
Lyons is an important corridor as it is one of four roads that pass under US 59. This Urban Street should maintain its 2-lane, undivided cross section. Improvements should be made to the existing bicycle facilities, as well as extending them to the US 59 underpass. The connection between Lyons Avenue and Conti Street should be realigned to provide a smooth transition and flow for traffic. This will potentially provide a connection to just east of N Main Street where the light-rail line is present.

Possible Option(s):



North Main St

Key Factors



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 St can be sectioned into 2 segments: IH 610 to Boundary; Boundary to IH 10. The segment from Boundary to IH 10 is part of the light-rail line. It is comprised of 2 travel lanes with 2 rail lines down the center. The remainder of the corridor is 4 lanes undivided. The current designation of North Main St on the MTFP is Major Thoroughfare.

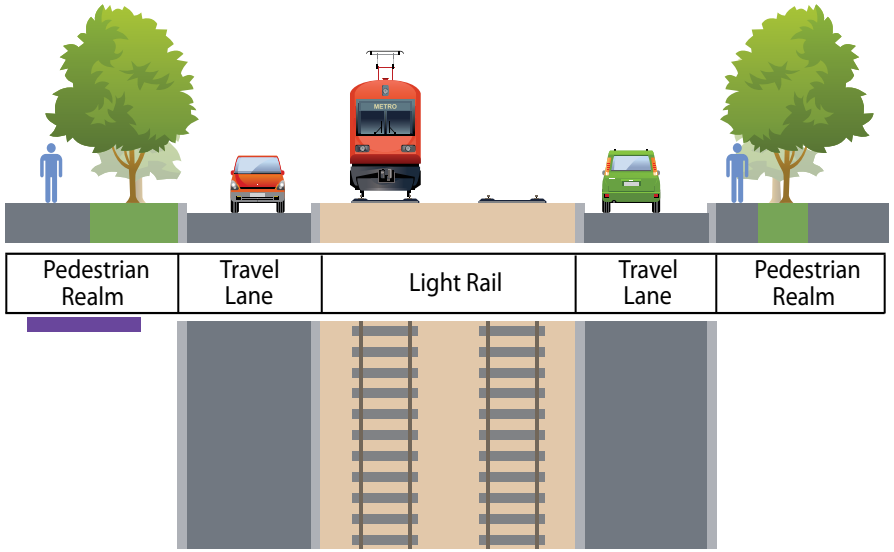
Identified Needs

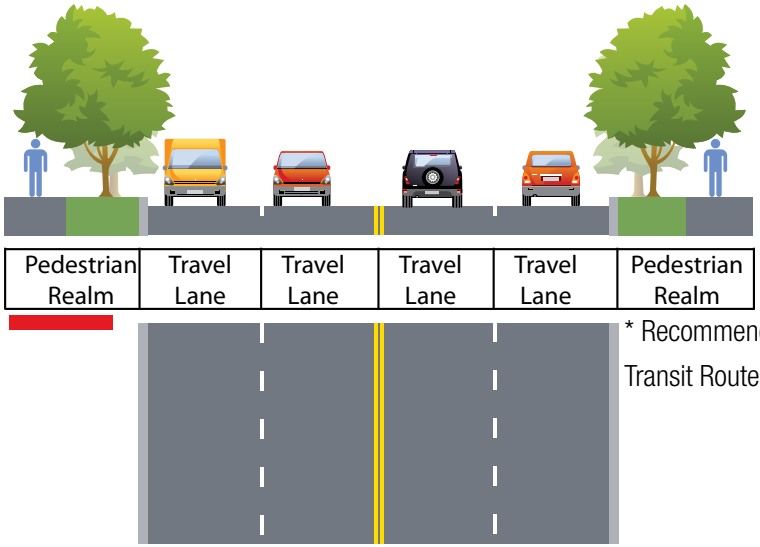
Another study conducted prior to this one contains recommendations for North Main Street from IH 10 to Boundary. The Northside - Livable Centers Study (2010), conducted by Wan Meter Willians Pollack, identified the challenges of North Main Street and the costs of recommended improvements. They recommended North main Street be redesigned to accommodate the light rail line, and 1 travel lane on each side.

Future Vision

As with Fulton, the portion of Main Street from Boundary to IH 10 will retain its classification as a Transit Avenue. The remainder of the corridor is recommended to maintain its 4-lane design and function and Urban Avenue designation. The portion of the corridor without light rail is recommended to have a High Frequency Transit Route. A bicycle route should also be considered for the portion of the corridor from 20th/Cavalcade to IH 610 due to the limited Right-of-way.

Possible Option(s):





* Recommended High Frequency Transit Route and Bicycle Route

Katy Road/Washington Avenue

Key Factors

EXISTING CONDITIONS:		FUTURE CONDITIONS:	
Existing Lanes	4	MTFP Designation	T-4-255; T-8-120
Existing Counts Range	7,500-18,000	Future Volume Range	18,000-28,000
Right-of-way	255’	Proposed MMC	Urban Boulevard
Median/CTL/Undivided	Median	Median/CTL/Undivided	Median/CTL

Existing Condition

Katy Road transitions into Washington Avenue at Hempstead Road. Washington’s limits are from Hempstead Road to IH 10. This corridor has a large amount of designated Right-of-way - 255’. However, current pavement-to-pavement width is only 100’. This Major Thoroughfare is constructed as 4-lanes with a median and wide shoulders on both sides.

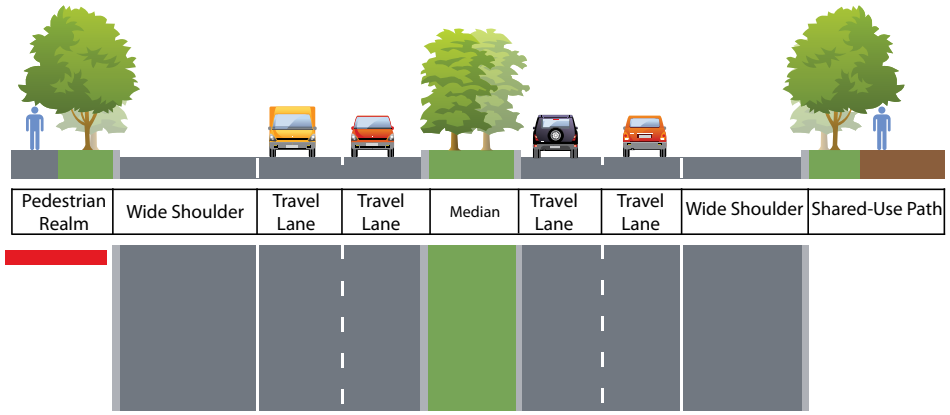
Identified Needs

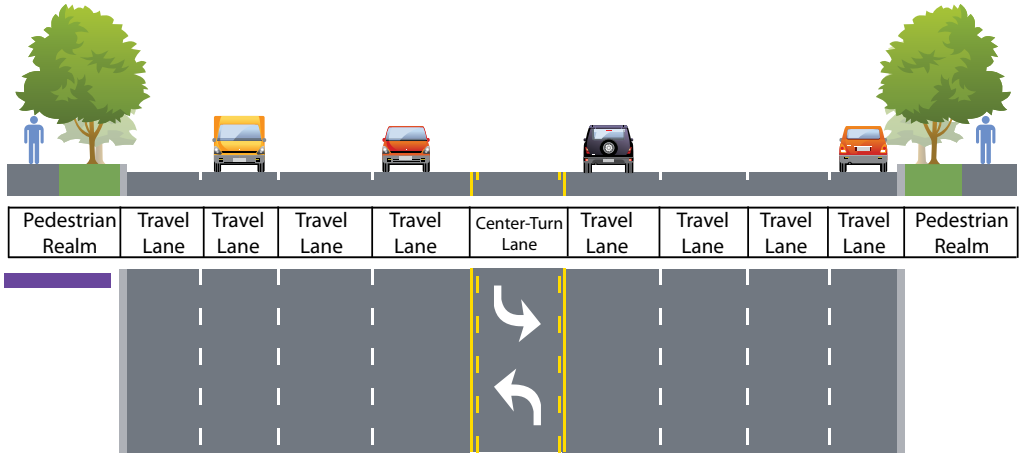
Volumes along the corridor are projected to double by 2035. However, the current 4-lane design can efficiently serve the needs placed on Katy Road. The wide shoulders currently found on Katy Road should be preserved within the Right-of-way for future lane expansion or transit accommodation as future volumes right-of-way.

Future Vision

The recommendation for the corridor is to maintain its current 4-lane divided design. Enhancements along the corridor will be in conjunction with any developments of the transit network. The multi-modal classification is Urban Boulevard. A bicycle facility along the corridor is a priority, but may be more appropriate as an off-street facility. Special attention will need to be given to the design of the underpass at IH 10.

Possible Option(s):





Patton Street

Key Factors

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

Existing Condition

Patton Street is an east/west Major Collector connecting Airline Drive with Irvington Boulevard. Patton Street is a 4-lane undivided corridor with 60’ of designated Right-of-way. Due to its low volumes, many residents along this corridor also park on the street. Patton does not have any transit routes presently.

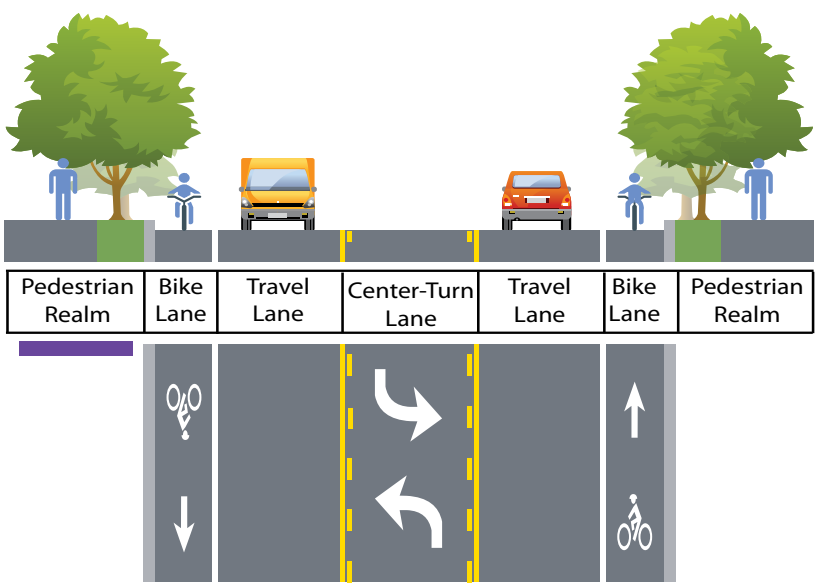
Identified Needs

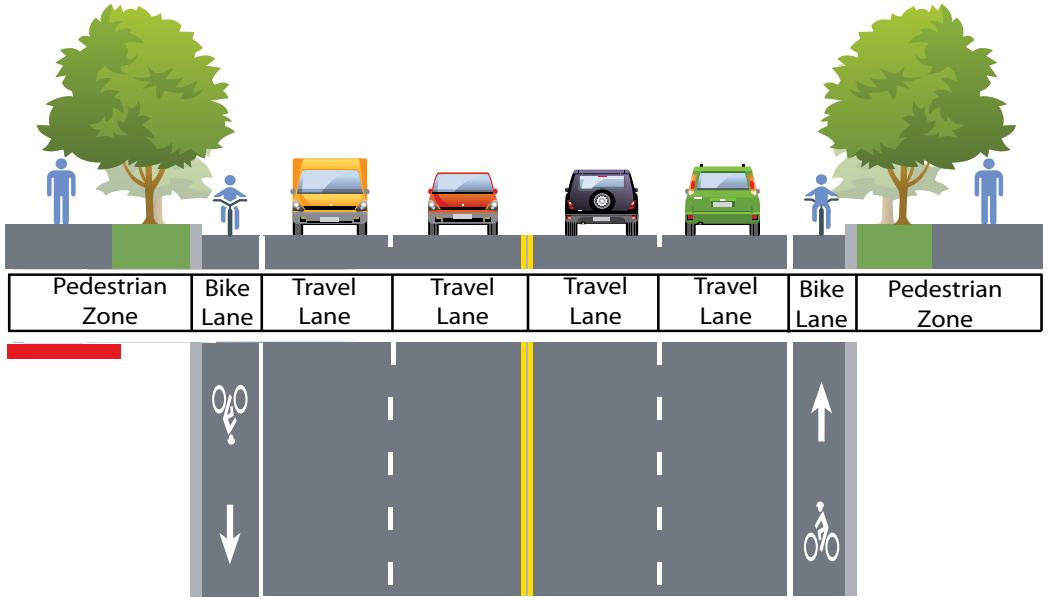
Sidewalks along the corridor, like most in the study area, are scarce and in poor condition. Patton Street crosses under IH 45 and crosses the new transit corridor, Fulton Street. Because of this, Patton Street could benefit from enhanced pedestrian facilities as well as a bike facility to provide access to this light-rail corridor. The intersection with Irvington Boulevard needs a light as Patton Street (a 4-lane road) crosses over Irvington Boulevard (a 4-lane divided road) into an apartment complex. On-street parking also exists along this corridor, although not specifically permitted.

Future Vision

Patton Street is currently underutilized for the number of existing lanes. It is recommended that it is reconfigured to two different cross-sections. From IH 45 to the light-rail, the corridor should maintain its 4-lane undivided cross-section. The remaining sections of the corridor are recommended to be reduced to 3-lanes with a bicycle facility. Reducing the lanes from 4 to 3 and using this additional Right-of-way to create a friendly multi-modal corridor would be beneficial to stakeholders. The multi-modal classification assigned to this corridor is an Urban Street.

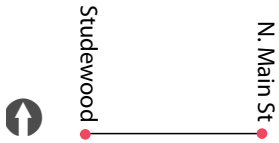
Possible Option(s):





Pecore Street

Key Factors



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 a small corridor that connects to 11th Street at Michaux Street. It is a 2-lane, undivided corridor with on-street parking on both sides. Sidewalks are also on both sides within the 60’ of designated Right-of-way. Pecore Street is classified as a Major Collector on the City of Houston’s MTFP. A portion of Pecore is currently on bus route 40, but this route does not provide access to the light-rail.

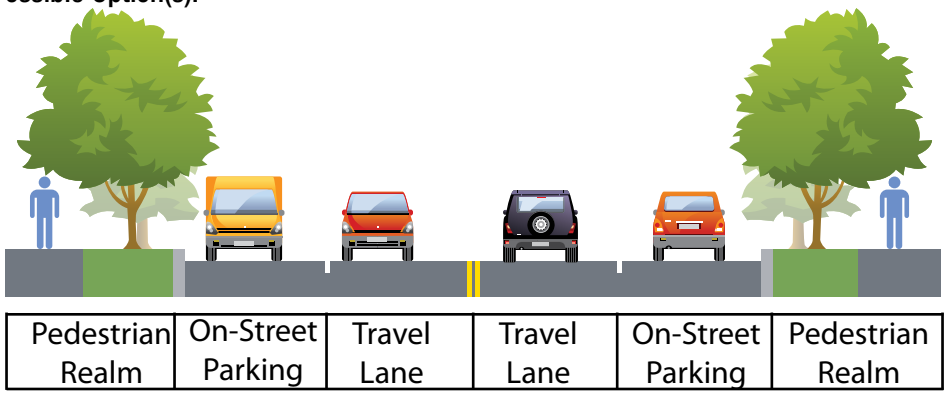
Identified Needs

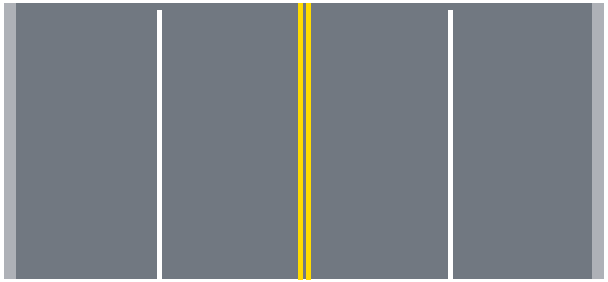
Comments received from the public regarding Pecore Street reference the lack of pedestrian and bicycle facilities along the corridor. Residents are unable to use a transit route or a path to connect to the light-rail without having to travel in their automobile.

Future Vision

Urban Street is the multi-modal classification best suited for Pecore Street. The corridors current operation on a 2-lane road works efficiently, and does not require expansion. Due to this, Pecore Street should be downgraded on the MTFP from a Major Collector to a Minor Collector. The corridor is recommended to have a local bus facility on it.

Possible Option(s):

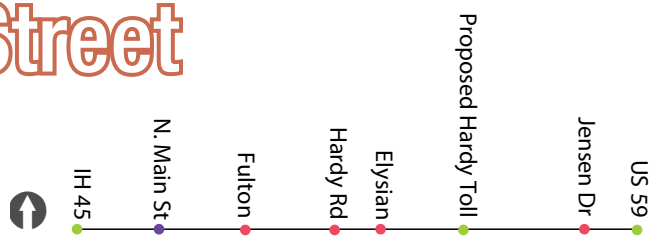




* Recommended Local Bus Route

Quitman Street

Key Factors



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 runs east/west in the Northside area as a 2-lane undivided corridor. It operates within 50'-60' of Right-of-way with 16' wide lanes. It is identified on the MTFP as Major Thoroughfare. Quitman Street intersects with North Main, where METRO has established a "Kiss and Ride" drop-off facility for the newly constructed light-rail. The corridor also provides an underpass to US 59 and T's into Liberty Road just outside of the Study Area.

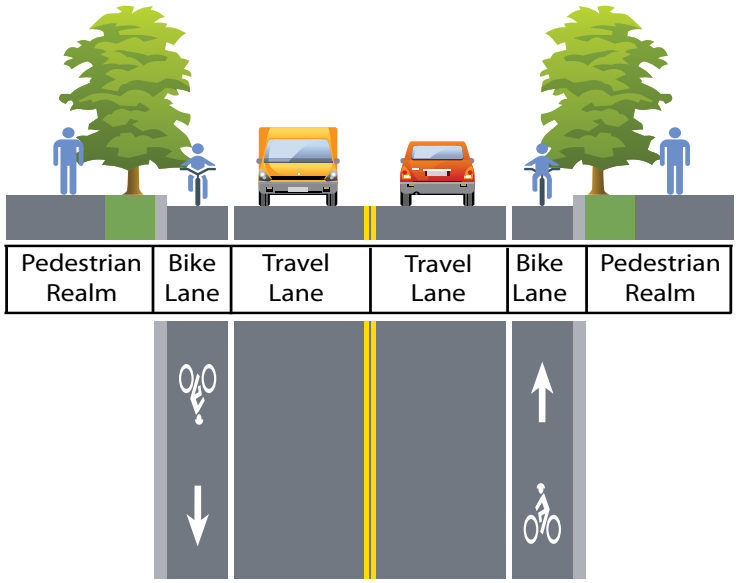
Identified Needs

Public input regarding Quitman Street was vast and diverse. Most intersections along the corridor need improvement, especially at Tackleberry. This intersection needs enhanced crosswalk features in front of Jeff Davis High School and Marshall Middle School. Other comments referred to a need to enhance pedestrian facilities along the corridor. This can de done by widening sidewalks and enriching the zone with pedestrian scaled lighting, and cleaning up overgrown foliage. Creating better means for pedestrians (and potentially bicyclist) to travel to the schools and connect to the light-rail at North Main Street is essential to the future development of the corridor. Traffic calming devices and truck regulations along the corridor would have an impact on the flow and safety of the corridor.

Future Vision

Given the future volume ranges it is recommended that this corridor be reclassified on the MTFP as a Major Collector. Additionally, focus on improving Quitman Street will revolve around pedestrian facilities. Improving and widening sidewalks to create a safe and comfortable environment for pedestrians is key along this corridor. Landscaping should be added to help slow speeding traffic along the corridor. A bike lane facility is recommended given related traffic calming affects and surrounding context. The provided bike facility will benefit residents and stakeholders of this corridor traveling to local schools, businesses and the light-rail line. The multi-modal classification for Quitman Street is an Urban Street. A local bus facility is recommended for the corridor.

Possible Option(s):



* Recommended Local Bus Route

Shepherd Drive

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

Key Factors

Existing Condition

Shepherd Drive is a northbound corridor moving from IH 10 to IH 610. It acts as a Couplet with Durham Drive, which facilitates the southward movement of vehicles. The current street is designed as 4-lanes undivided in 70’ of Right-of-way. Sidewalks are consistent along the length of the corridor, but are fair to poor in quality. The corridor is lined with retail and commercial properties, creating many driveways and openings along this stretch of road. Shepherd Drive is a Major Thoroughfare.

Identified Needs

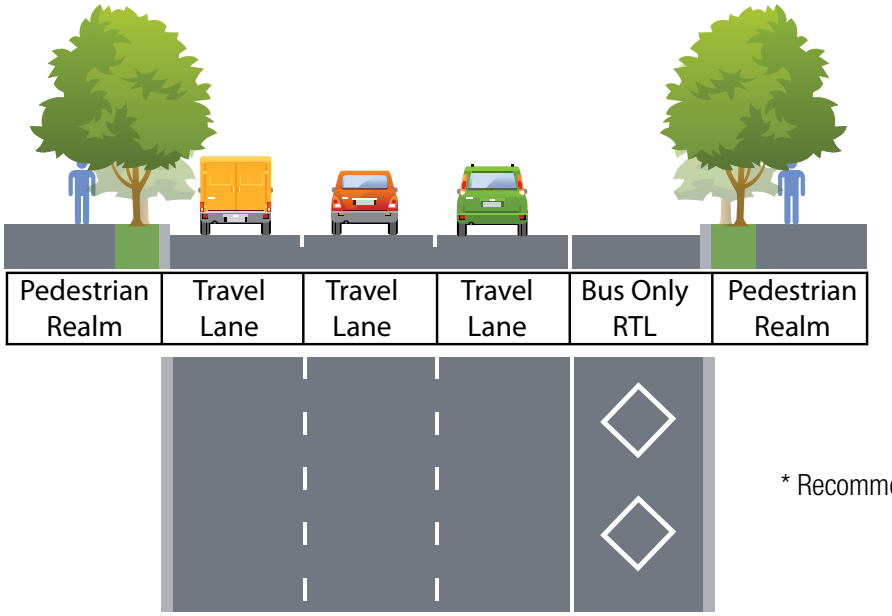
Comments received from the public identified crossings to be a major concern. Vehicles have difficulty crossing due to limited sight-distance by fences. Pedestrians and bicyclist have trouble crossing at 11th Street and across the IH 10 bridge. Residents and stakeholders voiced a desire to have a bike facility along Shepherd Drive that would connect to the White Oak Bayou Trail.

Future Vision

Shepherd Drive will need to maintain its current 4-lane design to meet the capacity needs of the corridor in the future. This indicates that an on-street bike facility is not prudent. Focusing attention on continuous pedestrian facilities is important to provide another mobility option for the corridor. This should be done by enhancing sidewalks and promoting their connectivity. Pedestrian crossings at major intersections will need attention as well.

Including a METRO High Frequency Transit for the Durham/Shepherd Couplet is recommended. If this occurs, designating one travel lane as a bus only/right-turn lane could increase the efficiency of traffic flow along the corridor. This will assist in creating a pedestrian friendly corridor. A BRT will require that more attention is given to the pedestrian realm. Bus shelters and wider sidewalks can help create a safe and friendly area.

Possible Option(s):



* Recommended High Frequency Transit

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

Key Factors

Existing Condition

Studewood Street is a north/south continuation of Studemont St from IH 10 to the 6-leg intersection with E 20th, N Main Street, and W Cavalcade Street. Both corridors are identified as Major Thoroughfares on the MTFP. The Studemont Street segment of the corridor is a 4-lane corridor without pedestrian or bicycle facilities. North of White Oak Drive, Studewood Street is a 3-lane corridor, with the center lane acting as a contra-flow lane. This reversible lane designates the use of the center lane depending on traffic pattern needs. The corridor has sidewalks in good condition on both sides of the corridor behind wide buffers.

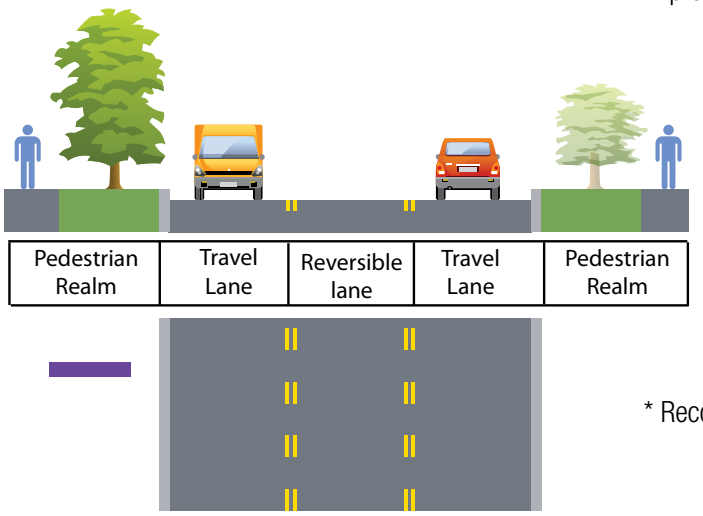
Identified Needs

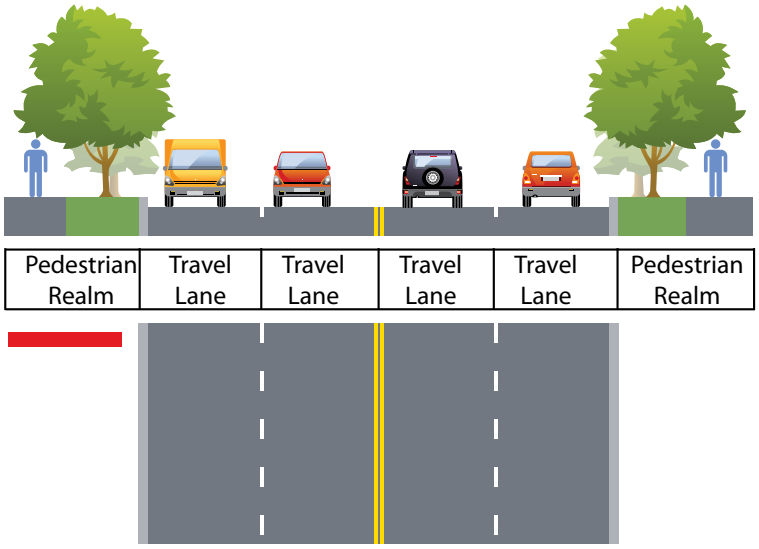
Pedestrian facilities along Studewood Street are in great condition, but currently bicycle facilities do not exist. To the south, Studemont Street is in need of pedestrian facilities. This is evident by the foot paths seen on either side, created by numerous pedestrians traversing the corridor. A portion of the corridor is a bridge, and lacks any form of pedestrian amenities, including sidewalks. The contra-flow lane confuses drivers who are not use to 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. Public transportation (one route currently runs the length of Studewood Street) along the corridor is said to need improvement.

Future Vision

Maintaining the current structure of Studewood Street is an acceptable recommendation for the corridor. The reversible lane can continue to function as a contra-flow lane, but additional signage should be installed to assist unfamiliar drivers with rules for using said lane. Reconstruction will need to take place at the 6-legged intersection with E 20th/N Main Street/W Cavalcade Street. Studewood Street identifies with the Urban Avenue multi-modal classification. It is also recommended that a High Frequency Transit route be considered for the corridor.

Possible Option(s):

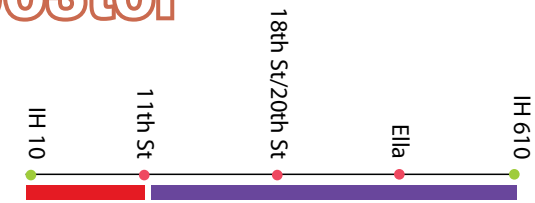




* Recommended High Frequency Transit

E&W TC Jester

Key Factors



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 runs from IH 610 to IH 10 as a 4- to 6- lane divided corridor. 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 directional flow in lieu of the bayou which the roads transcend. TC Jester Blvd is designated as a Major Thoroughfare for all segments with 120' of Right-of-way. Sidewalks are present on both sides, but a bike facility is not available for the corridor. However, a trailhead to the White Oak Bayou Trail occurs at the intersection with W 11th Street, with other entrances to the Trail occurring along the corridor.

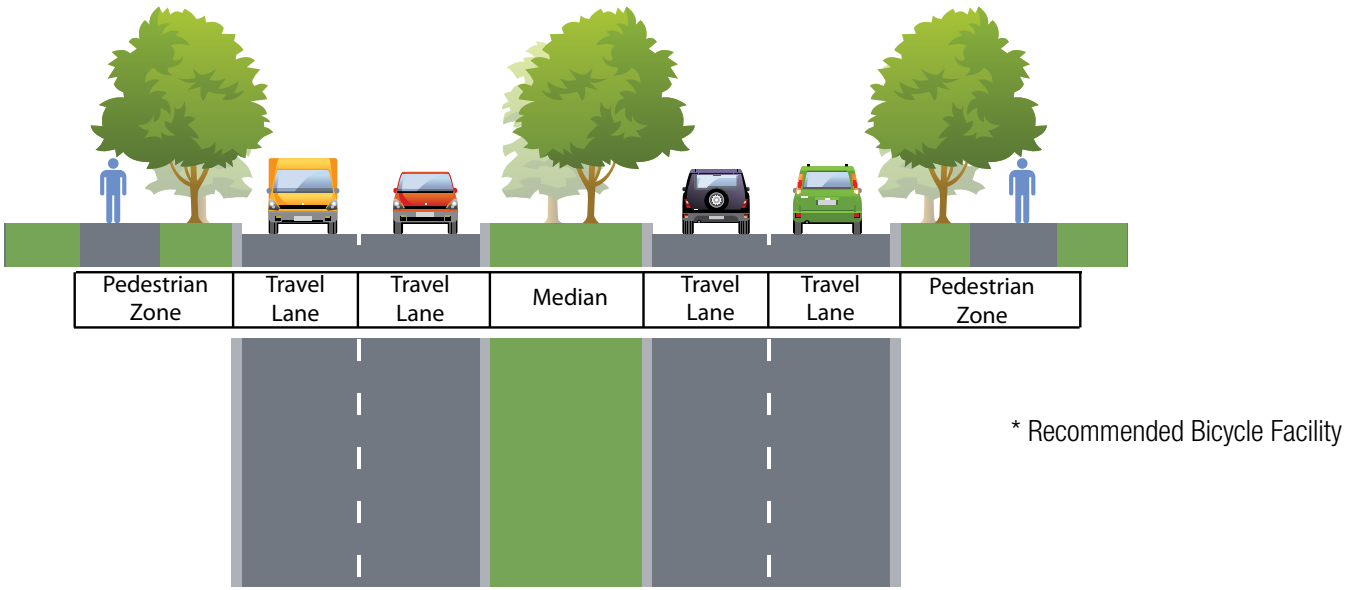
Identified Needs

Traffic issues were identified via public input regarding several intersections along the corridor. The 18th/20th/ TC Jester Blvd intersections are positioned relatively close to one another, and further analysis of their overall design should occur to enhance the flow and safety of traffic.

Future Vision

TC Jester will continue to function according to its current design of a 4-ane divided corridor. The multi-modal classification that most adequately describes this corridor is 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 ETC Jester Boulevard with 19th and 20th Street should be further evaluated for efficiency. A bicycle facility is recommended for TC Jester between IH 10 and 11th Street.

Possible Option(s):



* Recommended Bicycle Facility

White Oak Drive

Key Factors

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 Major Thoroughfare that extends from Heights Boulevard to IH 45. The corridor transitions from W 6th Street, to Quitman Street at IH 45. Between Heights Boulevard and Usener Street, the corridor is 2-lanes undivided with parallel parking occurring on both sides of the street. From Usener Street to IH 45, the corridor loses the side parking and becomes just 2-lanes with the majority of the corridor being open ditch on either side.

Identified Needs

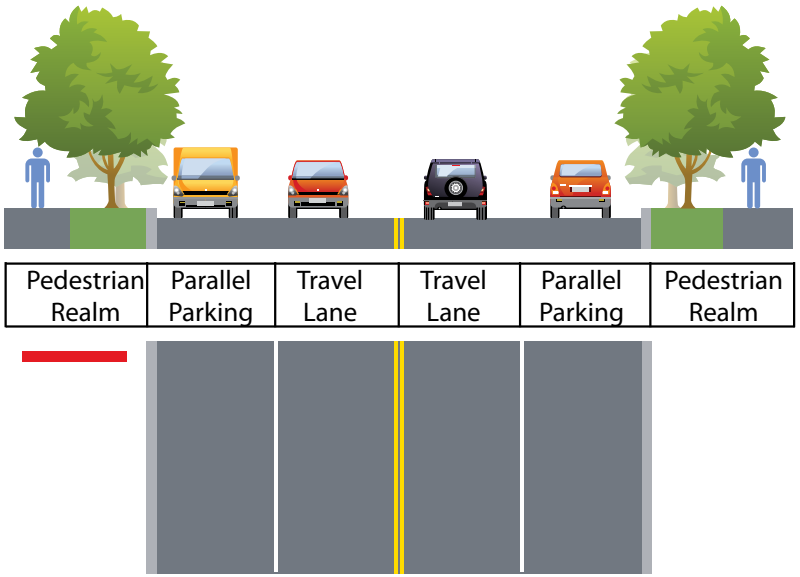
White Oak Drive is turning into a destination corridor with local restaurants developing at key intersections. Parking along the sides of the street will continue to be needed in the future, along with an on-street bicycle facility.

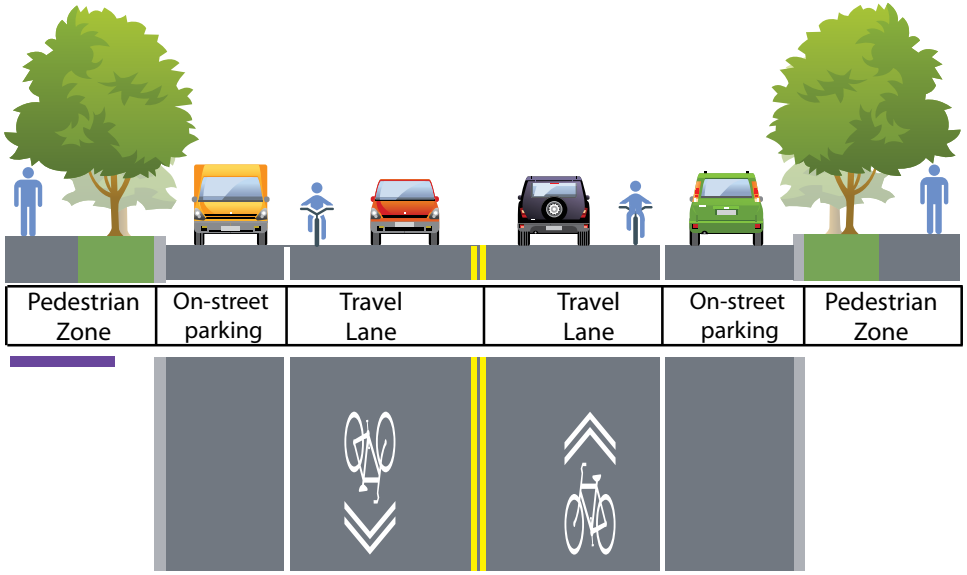
Public input indicated that the intersection with Usener is difficult to understand. The intersection with Heights could potentially use signal timing adjustments to assist in bike crossings.

Future Vision

It is suggested that the corridor is downgraded from Major Thoroughfare on the MTFP to a Major Collector. White Oak Drive should maintain its 2-lane, undivided set up with on-street parking. Along the portion of the corridor from to Michaux Street, striping to accommodate on-street parking and a bike lane should be instituted. Striping similar to that of Heights Boulevard would be effective for this highly traversed portion of the corridor. With this, the multi-modal classification of White Oak Drive is an Urban Street. The remainder of the corridor from Michaux to Quitman does not require striping for on-street parking. The bike lane can transition to the White Oak Bayou Trail via the entrance to Stude Park.

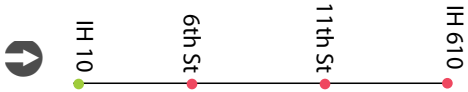
Possible Option(s):





Yale Street

Key Factors



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 north/south Major Thoroughfare connecting IH 610 with IH 10. Currently, it is a 4-lane undivided corridor. Sidewalks flank both sides of the corridor, which has both residential and commercial/retail development. The intersection of W 20th Street and Yale Street is home to a large commercial and retail node. Right-of-way for Yale Street is 70’.

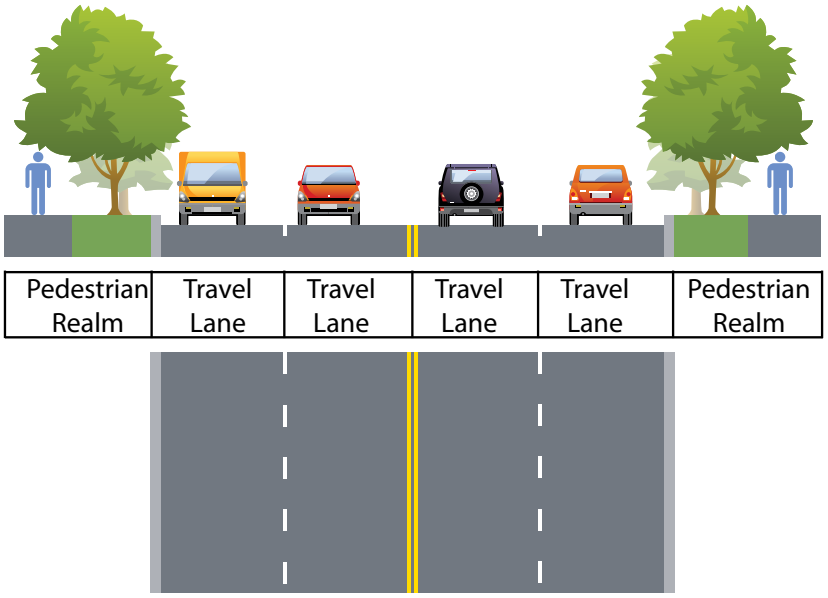
Identified Needs

The connection at Yale and IH 10 is difficult for drivers due to signal timing, and this causes major back-up along the corridor. Another factor contributing to traffic issues is the striping at Yale Street/Heights Boulevard. Travelers going eastbound on W 11th St are confused where to go. Residents are concerned with bicycle and pedestrian safety. Moving from residential to commercial properties is difficult due to the poor condition of sidewalks and poor crosswalks. Stakeholders asked for an increase in signage to encourage people to commute downtown via bike.

Future Vision

Future volumes along Yale range between 17,000-31,000 vehicles. These higher volume demands indicate the need to maintain a high level of mobility for automobiles. The Multi-Modal Classification for Yale is Urban Avenue. Priorities for this corridor will focus on enhancing the pedestrian realm.

Possible Option(s):



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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 roadmap, identifying projects, funding needs, and priorities would be difficult.

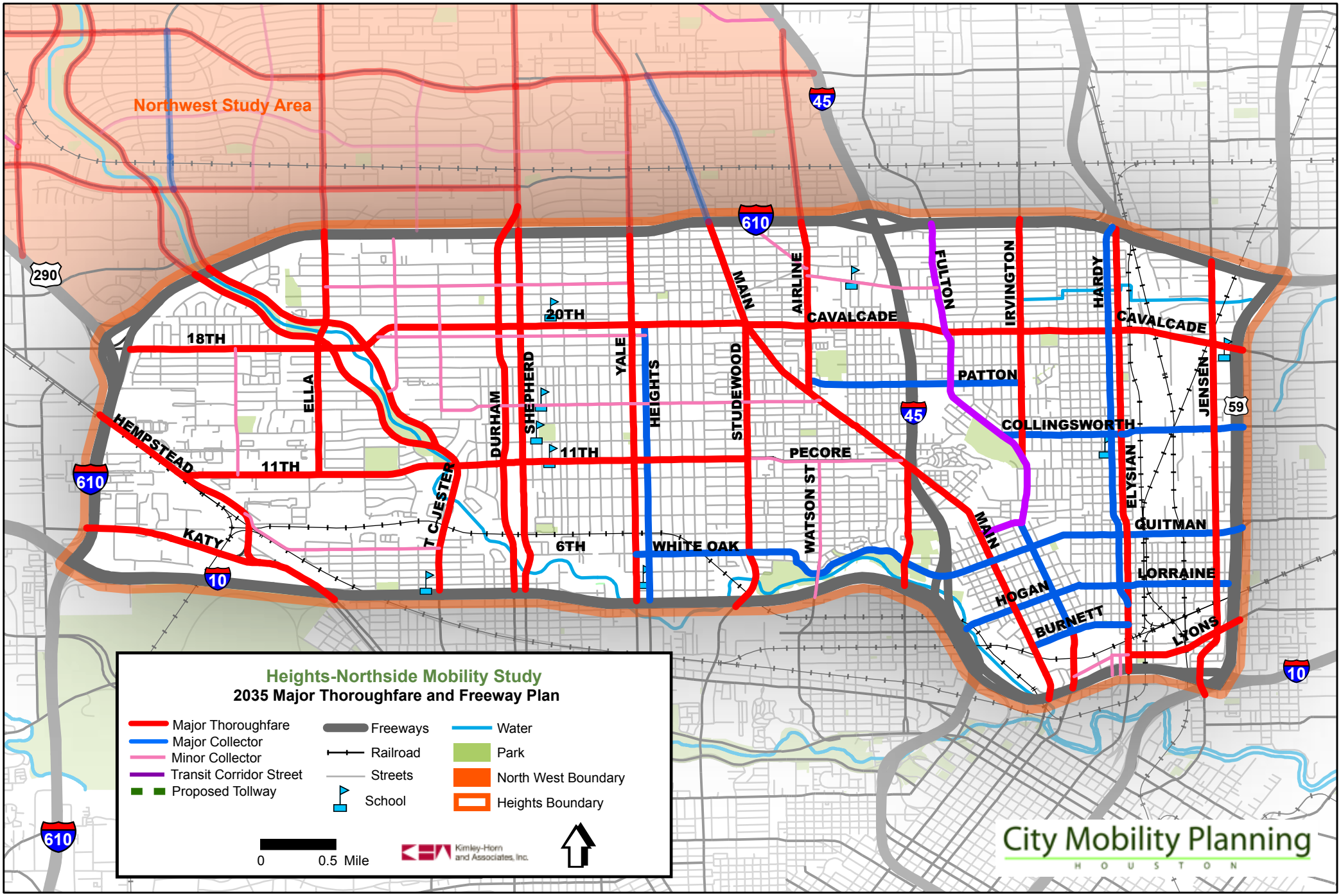
The Heights and Northside areas are both 'built-out', meaning the likelihood of constructing additional or new roads is low. The network within these two Heights and Northside areas is a well developed grid pattern. The updated MTFP looks at ways to adjust the existing corridors to better suit the communities' needs. This is accomplished by reclassifying certain corridors and 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. Although not exhaustive, the provided table provides a quick snapshot of the prominent changes recommended for the MTFP, but does not highlight those corridors where only ROW designations were recommended. 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.

Corridor	Current	Proposed Improvement
Heights Blvd	T-4-140/150	T-2-140/150
Patton	C-4-60/70	-Irvington to Fulton: C-3-60 -Fulton to IH 45: C-4-60 -West of IH 45: C-3-70
11th Street (Studewood - Michaux)	C-4-70	C-2-70
W 6th Street (Shepherd - Yale)	T-2-60	Removed from MTFP
W 6th Street (Yale-Heights)	T-2-60	C-2-60
Quitman	T-2-50/60	C-2-50/60
Fulton	T-4-60/70	C-2-60/70
White Oak	T-2-70	C-2-70
Hardy	T-4-50/60 (Couplet)	C-2-50/60 (2-way Traffic)
Elysian	T-4-60 (Couplet)	T-4-60 (2-way Traffic)

Minor Collectors

- 30 roadways identified
- Predominately local streets reclassified


Northwest Study Area
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KATY
WHITE OAK
CAVALCADE
PECORE
PATTON
FULTON
IRVINGTON
HARDY
JENSEN
COLLINGSWORTH
ELYSIAN
QUITMAN
LORRAINE
HOGAN
BURNETT
LYONS
Heights-Northside Mobility Study
2035 Major Thoroughfare and Freeway Plan
Major Thoroughfare
Major Collector
Minor Collector
Transit Corridor Street
Proposed Tollway
Freeways
Railroad
Streets
School
Water
Park
North West Boundary
Heights Boundary
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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

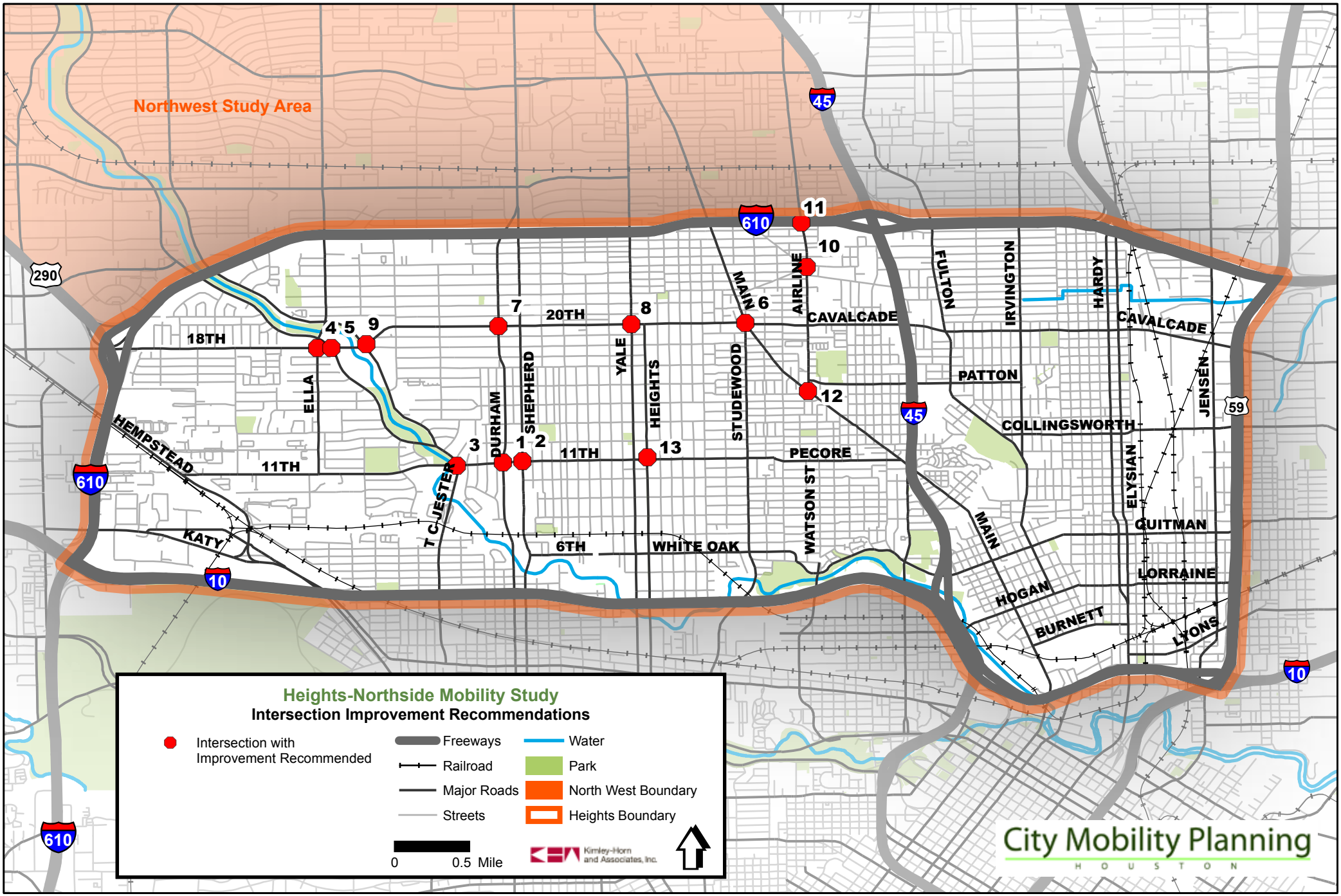
The mitigation opportunities for the 2035 scenario are limited by the existing and proposed right-of-way available for the Heights area. LOS ratings for these intersections were only slightly enhanced by mitigation. Any significant change would require physical improvements and likely involve right-of-way 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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Major Roads
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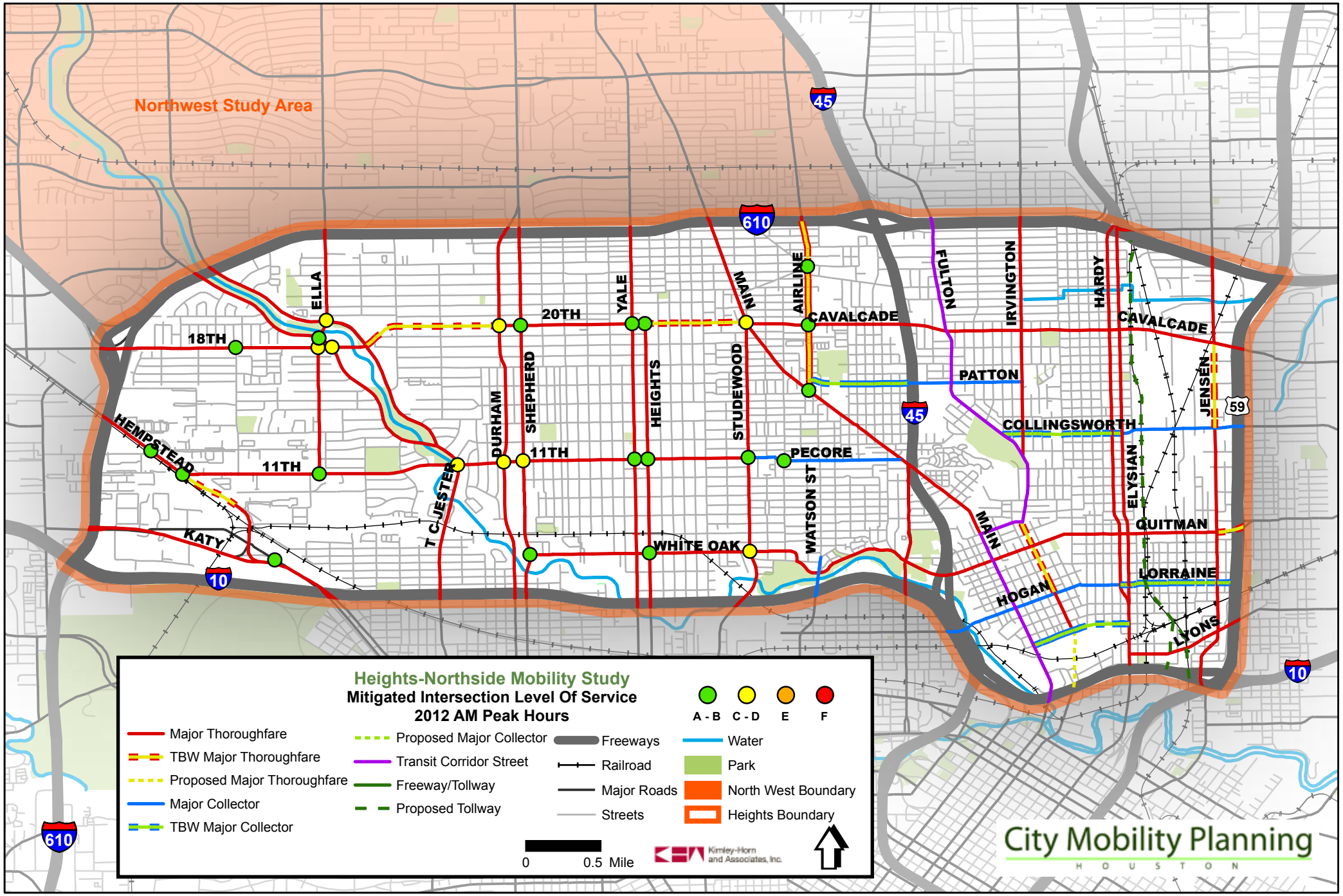
FIGURE 7.2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TBW Major Thoroughfare
Proposed Major Thoroughfare
Major Collector
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Proposed Major Collector
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Freeway/Tollway
Proposed Tollway
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FIGURE 7.3

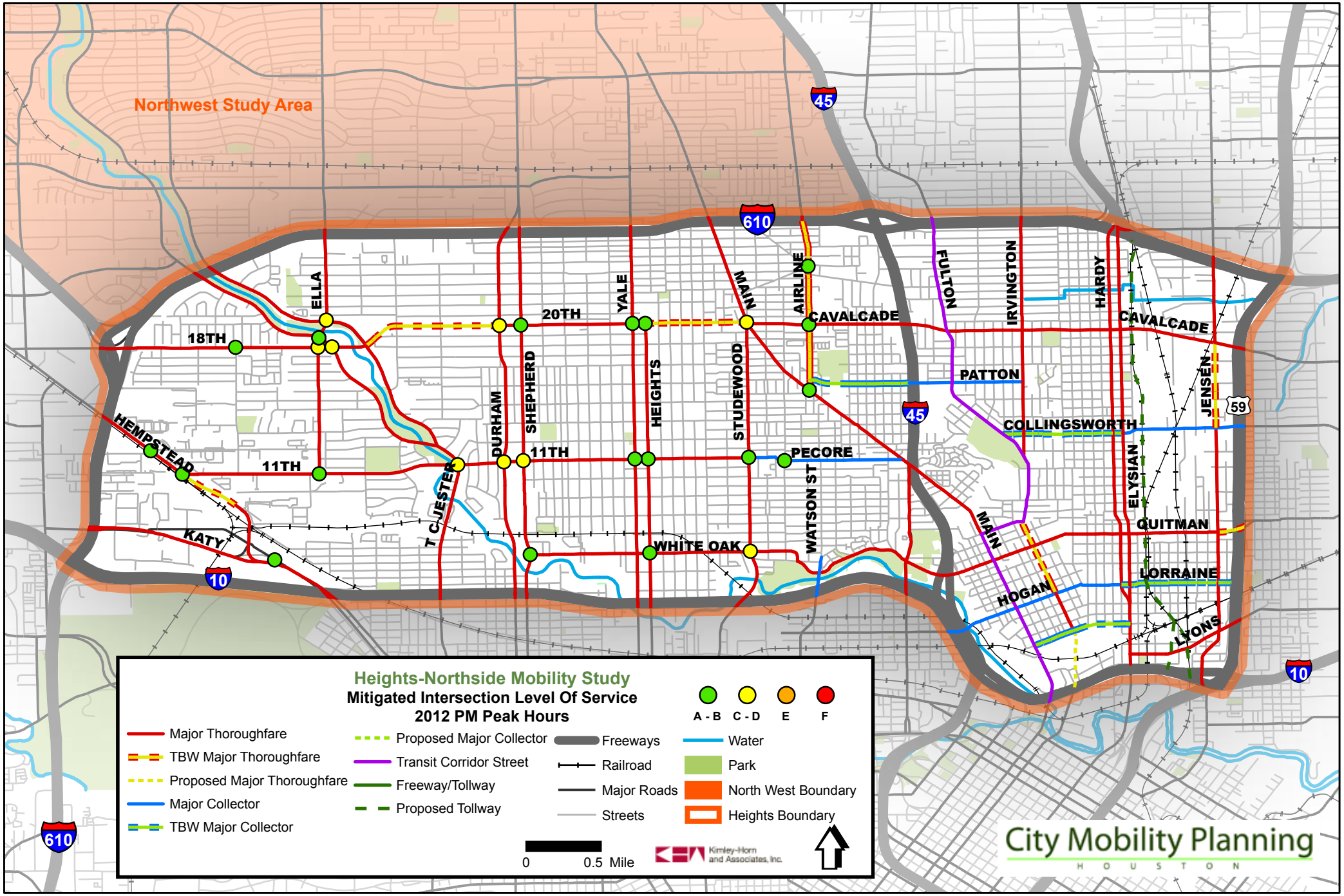
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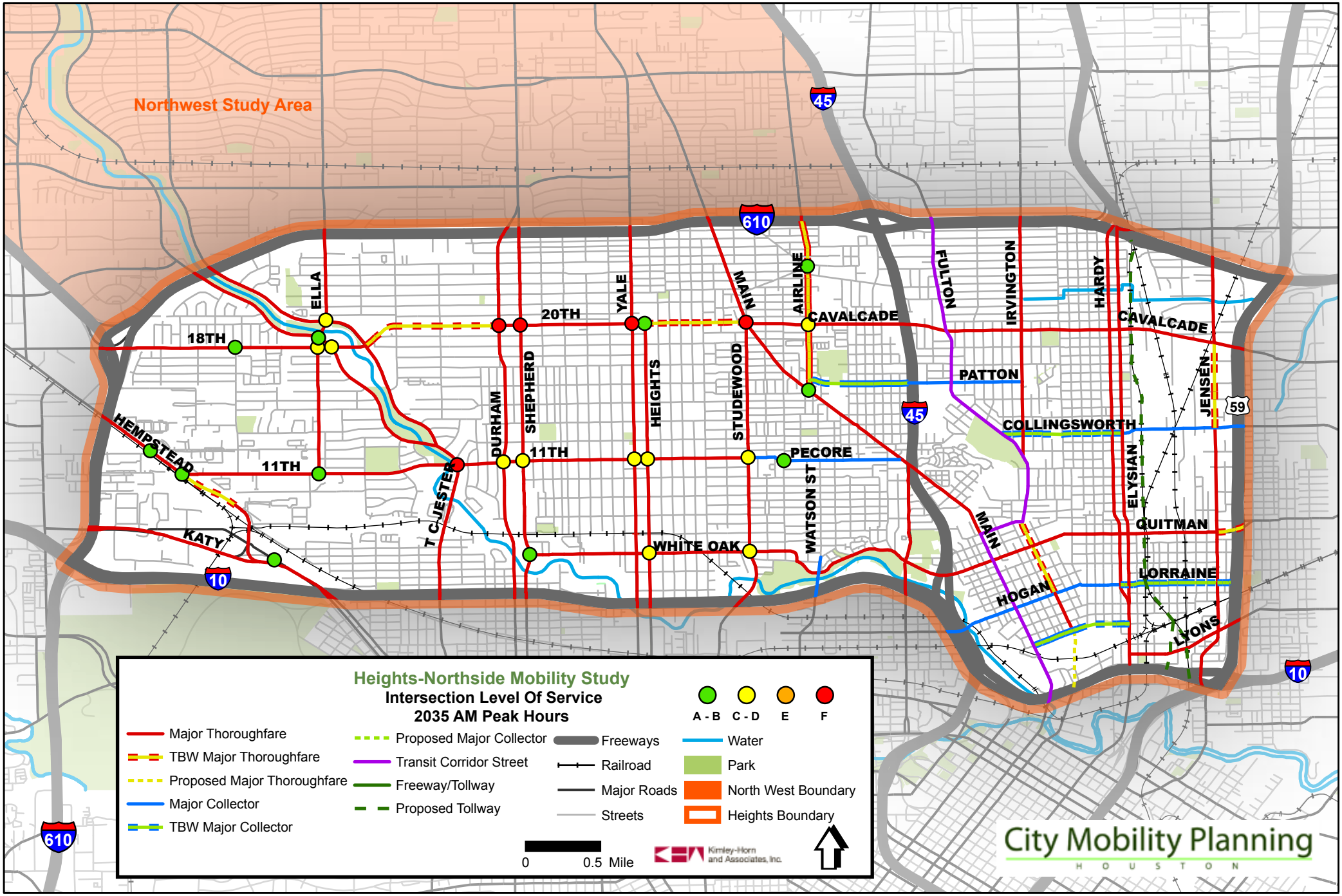
FIGURE 7.4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Proposed Major Thoroughfare
Major Collector
TBW Major Collector
Proposed Major Collector
Transit Corridor Street
Freeway/Tollway
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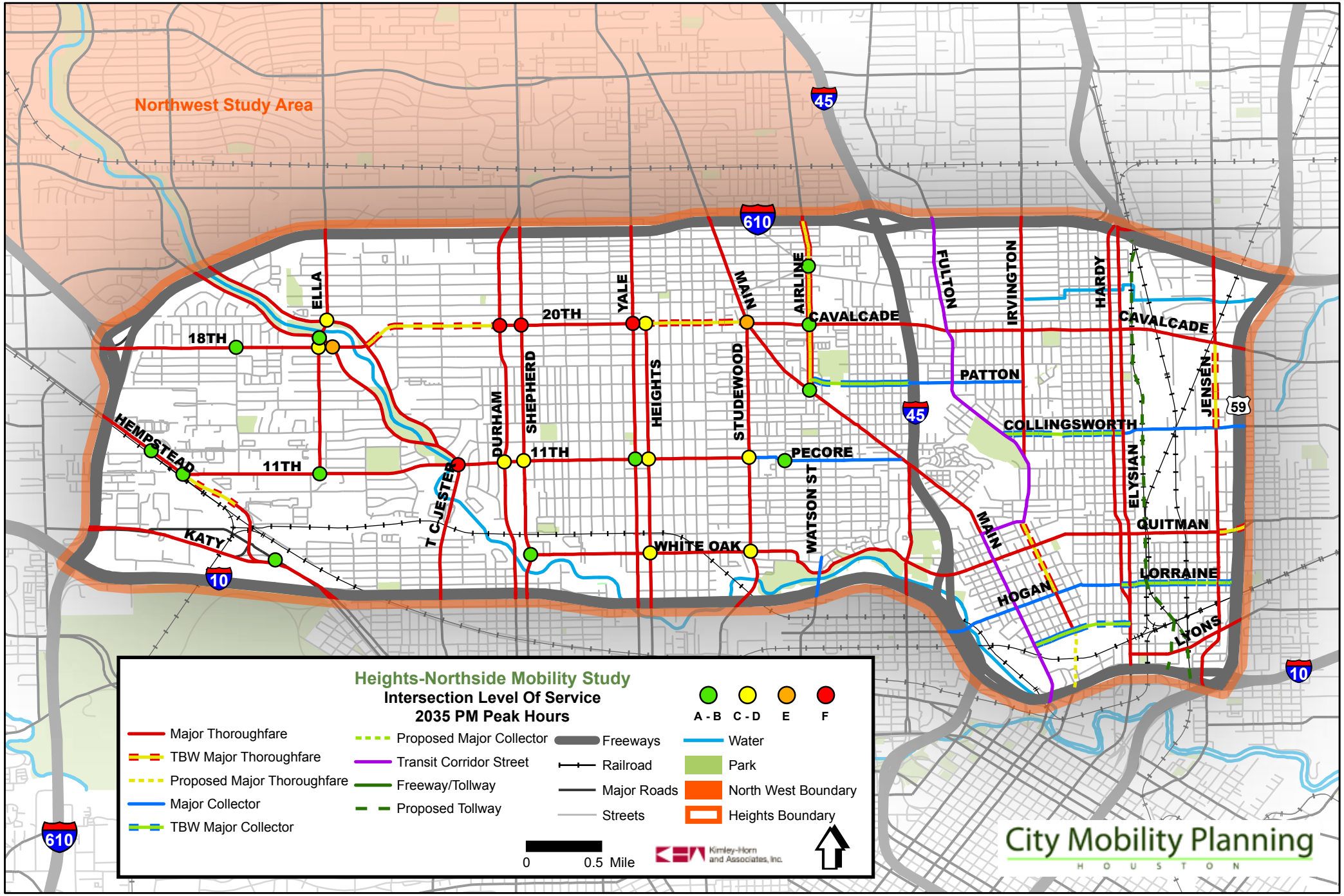
HOUSTON

FIGURE 7.5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Heights-Northside Mobility Study
Intersection Level Of Service
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TBW Major Thoroughfare
Proposed Major Thoroughfare
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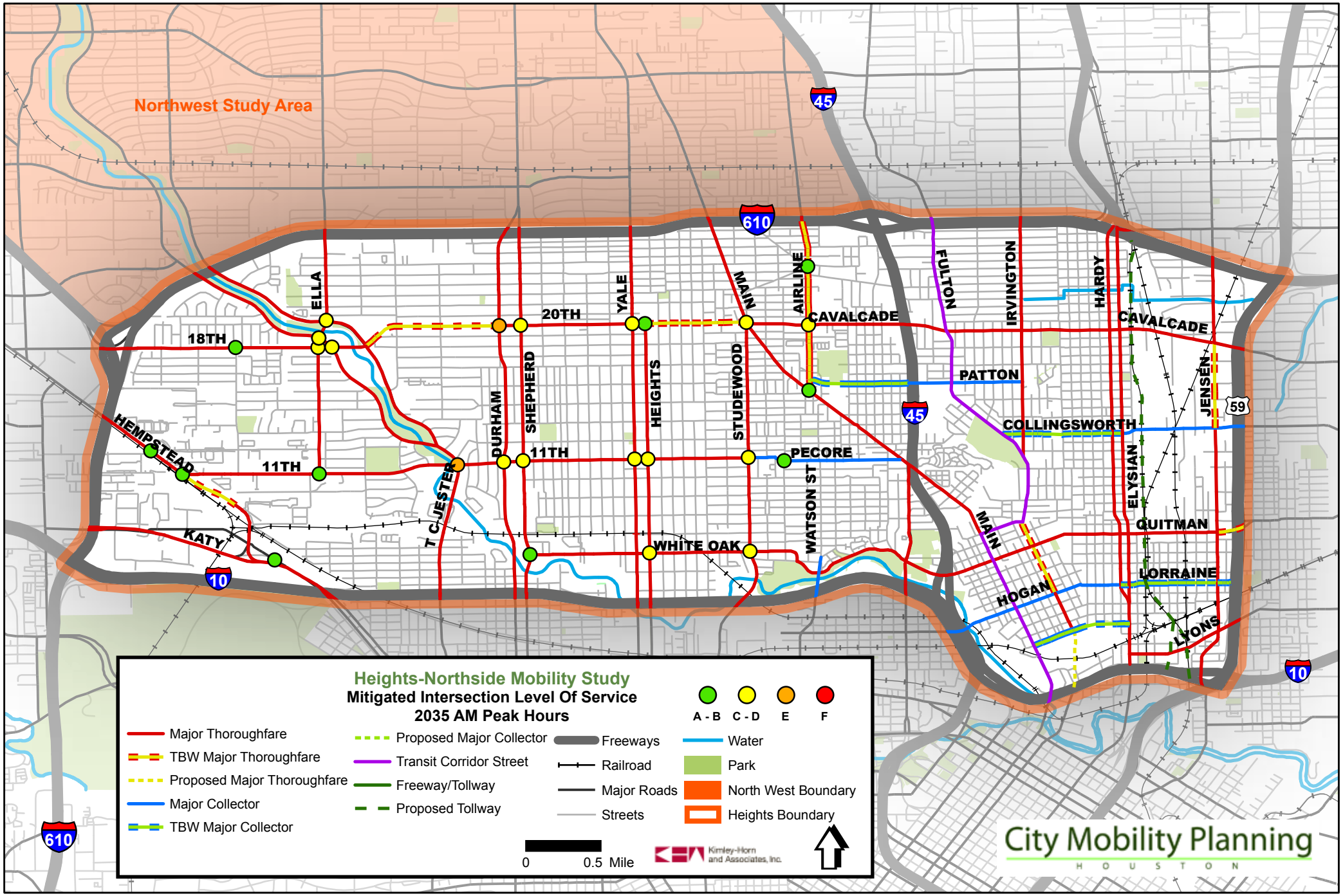
FIGURE 7.6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610
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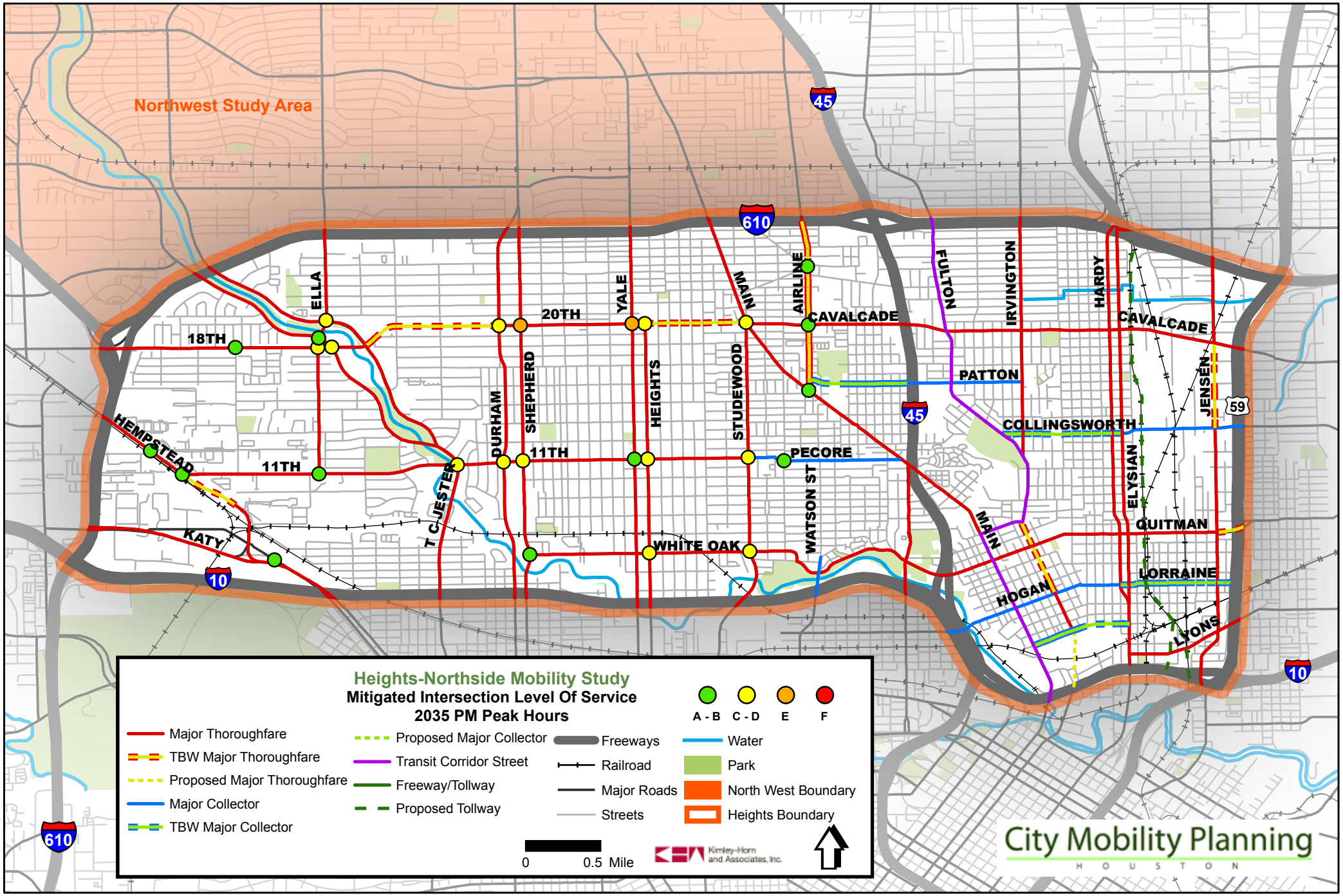
18TH
20TH
YALE
MAIN
AIRLINE
CAVALCADE
FULTON
IRVINGTON
HARDY
CAVALCADE
JENSEN
59
PATTON
COLLINGSWORTH
HEMPSTEAD
11TH
DURHAM
SHEPHERD
HEIGHTS
STUDEWOOD
PECORE
WATSON ST
T C JESTER
KATY
10
WHITE OAK
MAIN
ELYSIAN
QUITMAN
HOGAN
LORRAINE
LYONS
Heights-Northside Mobility Study
Mitigated Intersection Level Of Service
2035 AM 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 7.7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Heights-Northside Mobility Study
Mitigated Intersection Level Of Service
2035 PM Peak Hours
A - B
C - D
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Major Thoroughfare
TBW Major Thoroughfare
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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
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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 - or 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 bicycle facilities. Unlike many communities, the Heights has embraced the use of bicycles for commuter purposes in addition to recreational. Local residents encourage the expansion of the network in this area.
The Heights area is well suited for developing an extensive bike network since the White Oak Bayou Trail cuts through the middle of the community. Bike facilities are able to connect to this existing trail to assist in the movement of bicyclist.

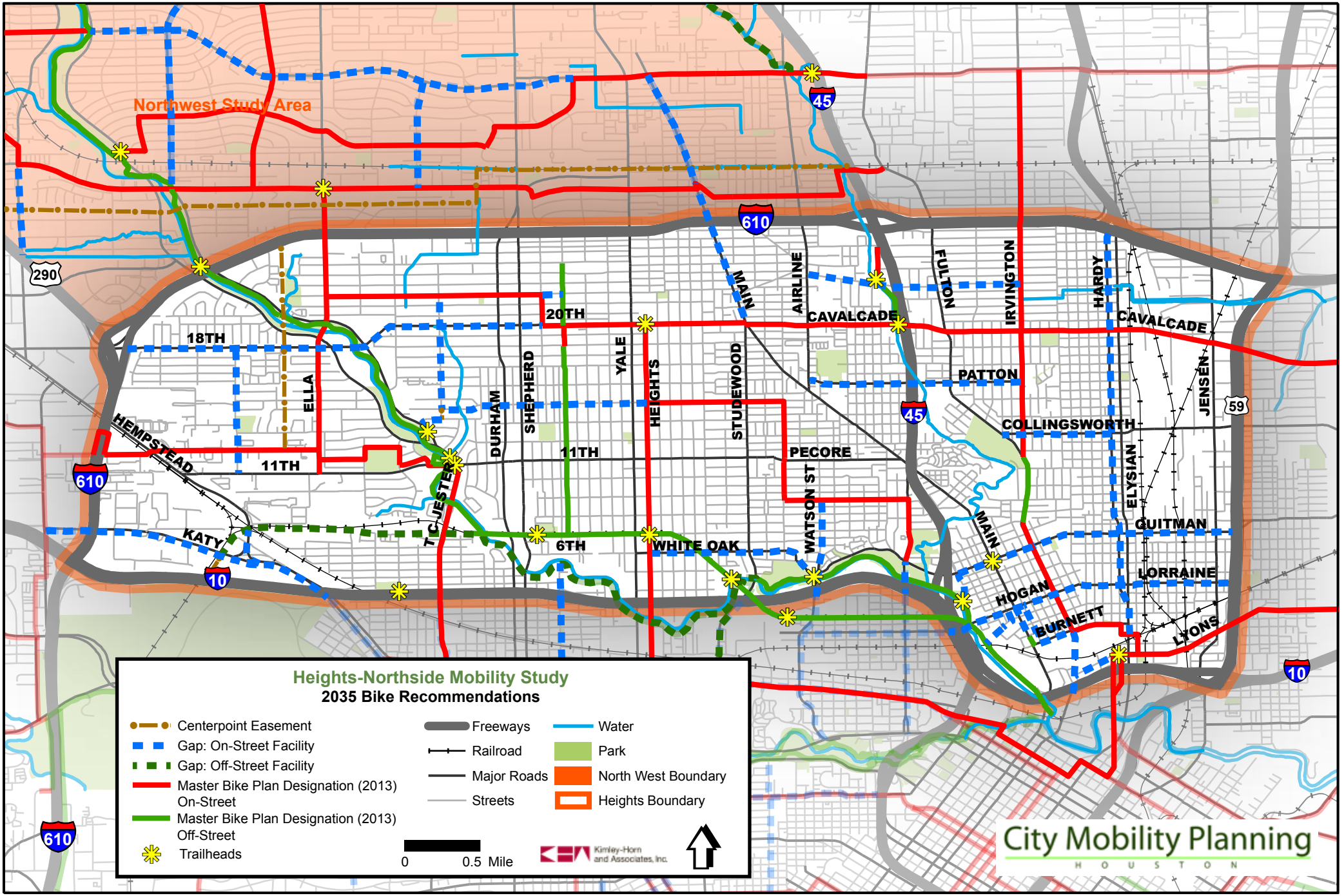
Northside area

The Northside area has several on-street bike facilities as well. Local residents were vocal in their desire to expand the bike network within their area. The area has many neighborhoods and schools that could benefit by having some type of bicycle facility connecting them. With this, the expansion of the bike network is seen in the adjoining map.

Due to restricted right-of-way in both of these sub-areas, special consideration of facility type needs to be undertaken when deciding which is most appropriate for a corridor. The proposed bicycle facilities indicated in this map are described in Chapter VI, Bicycle Facility considerations.

PHOTO PROVIDED COURTESY CITY OF HOUSTON.


PHOTO PROVIDED COURTESY CITY OF HOUSTON


Northwest Study Area
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STUDEWOOD
AIRLINE
CAVALCADE
FULTON
IRVINGTON
HARDY
JENSEN
PATTON
COLLINGSWORTH
PECORE
WATSON ST
ELYSIAN
QUITMAN
LORRAINE
HOGAN
BURNETT
LYONS
HEMPSTEAD
KATY
T C JESTER
WHITE OAK
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
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 7.9

7.4 New Transit and Pedestrian Vision Map

In addition to the automobile and bicycle, two other forms of transportation are heavily used within the Heights and Northside. Pedestrians and transit riders are found abundantly throughout the Study Areas.

The light-rail line within the Northside area is a great draw for local commuters. The opening of this extension in December of 2013 encourages residents to commute to work and other destination centers via a mode other than the personal automobile.

The transit network within the Heights area is already extensive, as seen in Chapter II, Existing Conditions. In order to identify if any changes should be recommended, the sub-region underwent the analysis found in the Transit Analysis section of Chapter VI. From that process, the resulting map identified the areas in high need of transit facilities. Based on that data (and the Scenario 5 street network), recommendations for Local Bus Routes (standard bus routes with many stops) and Bus Rapid Transit (BRT) (routes that facilitate the movement of larger numbers of persons across greater distances with less stops) are provided in Figure 7.10.

With the expansion of the transit network (including the opening of the light-rail line) enhancements to pedestrian facilities within the Study Area are also important. Pedestrian facilities are necessary on the corridors with high transit use (recommended facilities). The motivation behind this concept is that every transit user (whether bus or light-rail) is a pedestrian at some point. This means that they will have to travel additional distances on-foot to arrive at their intended destination. This study's recommendations on wider sidewalks can be found in Chapter VI.

BUS RAPID TRANSIT (BRT)

LIGHT-RAIL

LOCAL BUS

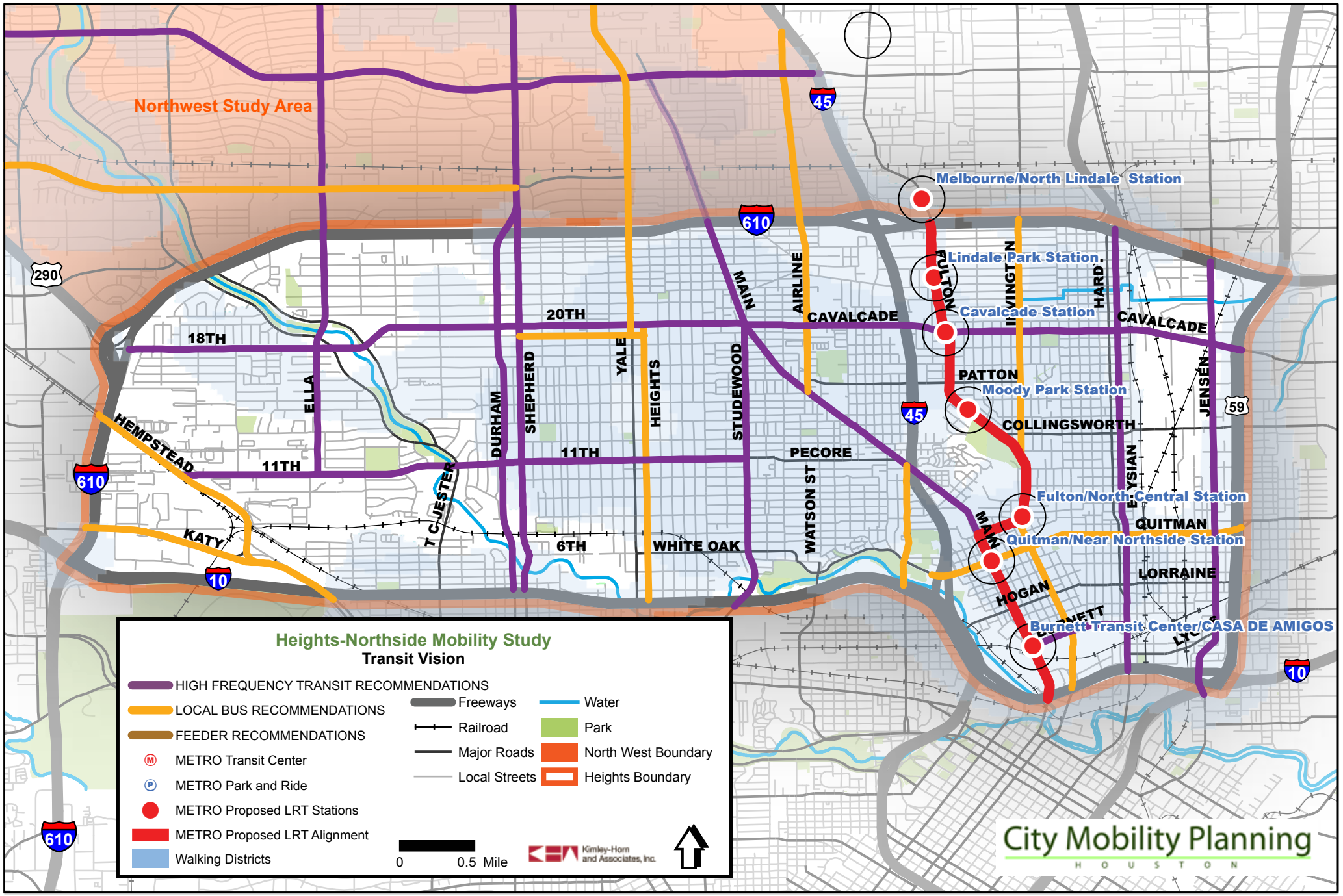

Northwest Study Area
Melbourne/North Lindale Station
Lindale Park Station
Cavalcade Station
Moody Park Station
Fulton/North Central Station
Quitman/Near Northside Station
Burnett Transit Center/CASA DE AMIGOS
20TH
18TH
11TH
6TH
CAVALCADE
PATTON
COLLINGSWORTH
PECORE
QUITMAN
LORRAINE
WHITE OAK
HEMPSTEAD
KATY
ELLA
DURHAM
SHEPHERD
YALE
HEIGHTS
STUDEWOOD
WATSON ST
AIRLINE
MAIN
FULTON
IRVINGTON
HARDY
JENSEN
EASTEX
HOGAN
T C JESTER
290
610
45
59
10
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
Freeways
Railroad
Major Roads
Local Streets
Water
Park
North West Boundary
Heights Boundary
0
0.5 Mile
Kimley-Horn and Associates, Inc.
City Mobility Planning
HOUSTON

FIGURE 7.10

7.5 Multi-Modal Classification Map

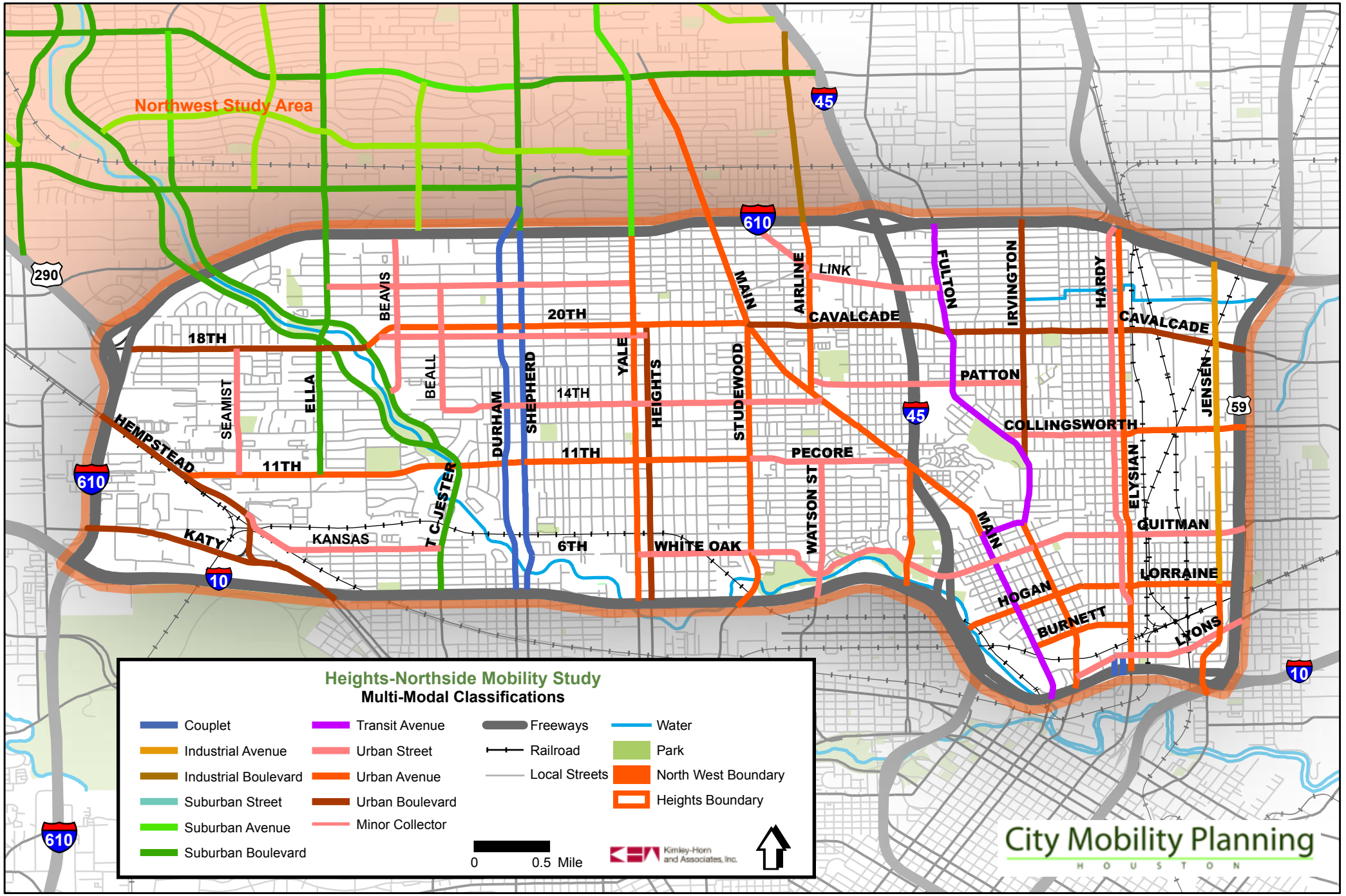
The multi-modal Classification (MMC) Map is a product of the first Houston Mobility Study. In that study, new classifications were developed for corridors based on right-of-way, modal types, and volumes. The multi-modal Classifications can be found in Chapter 10 of the Design Manual for Street Paving Design Requirements.

Each corridor within the Study Area was evaluated based on public input, model analysis, and other variables. These variables culminated to create a plan for the major corridors from the consultant and project teams evaluation, and can be viewed in the section with the Corridor Design Example sheets. With this information, the project team evaluated and determined the Multi-modal Classification best suited for the future of the corridor.

The Multi-modal Classification identifies the options for widths of the road based on the modal uses. These considerations were developed along with the City of Houston's Public Works and Engineering Department (PWE) and Planning and Development Department (PDD) to identify a realistic design example for the corridor.

Corridors with limited right-of-way and no foreseeable acquisition of additional right-of-way need flexibility in their design. These can be seen on a corridor-by-corridor basis in Chapter 7..The MMC Map shown in Figure 7.11 is representative of the 2035 MTFP network and not the existing roadway network.

During evaluation of the corridors, it became apparent that the existing definitions currently located in Chapter 10, Appendix 2 of the City of Houston Infrastructure Design Manual needs to be updated to more accurately reflect the design considerations as they pertain to the City of Houston. Specific considerations for Right-of-Way distinctions should be specifically addressed, where ROW of 100' does not necessarily properly reflect required designations of a "Boulevard" nor does 80' ROW necessarily designate an "Avenue".


Northwest Study Area
290
610
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10
18TH
20TH
14TH
11TH
6TH
BEAVIS
BEALL
ELLA
SEAMIST
HEMPSTEAD
DURHAM
SHEPHERD
YALE
HEIGHTS
MAIN
AIRLINE
LINK
STUDEWOOD
WATSON ST
FULTON
IRVINGTON
HARDY
CAVALCADE
PATTON
COLLINGSWORTH
PECORE
JENSEN
ELYSIAN
QUITMAN
LORRAINE
HOGAN
BURNETT
LYONS
KATY
KANSAS
T CUESTER
WHITE OAK
Heights-Northside Mobility Study
Multi-Modal Classifications
Couplet
Industrial Avenue
Industrial Boulevard
Suburban Street
Suburban Avenue
Suburban Boulevard
Transit Avenue
Urban Street
Urban Avenue
Urban Boulevard
Minor Collector
Freeways
Railroad
Local Streets
Water
Park
North West Boundary
Heights Boundary
0
0.5 Mile
Kimley-Horn and Associates, Inc.
City Mobility Planning
HOUSTON

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 Heights-Northside Study Areas. 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 projects and 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. It is the intent of this study, as well as other mobility studies in which the City is a partner, to develop a set of project and policy recommendations that can be used in determining sub-regional priorities to be examined within the broader citywide capital programming and pre-engineering process.

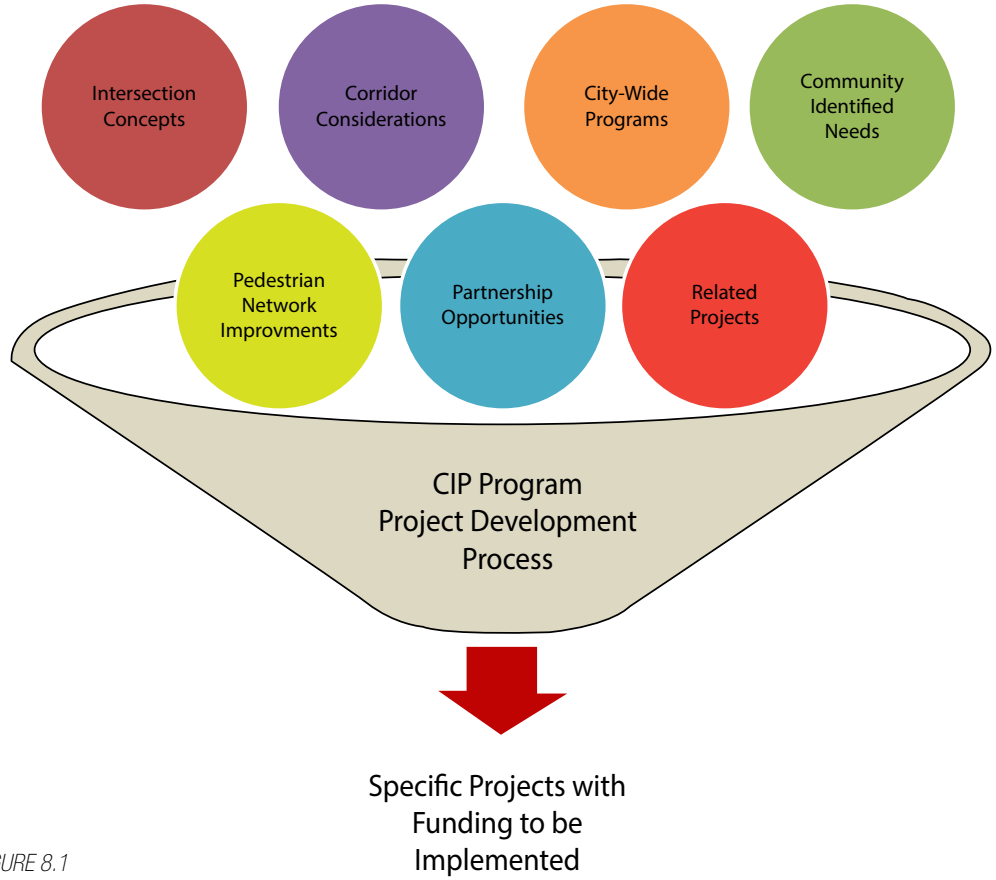


FIGURE 8.1

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 and will be the Department 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 during Rebuild Houston. 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 Planning Capital 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 tudy may be examined within 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, and as such offers an intuitive platform for incorporation of 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 and the project concepts. The graphics shown are representative of graphics found in Version 3.0 of the above referenced manual.

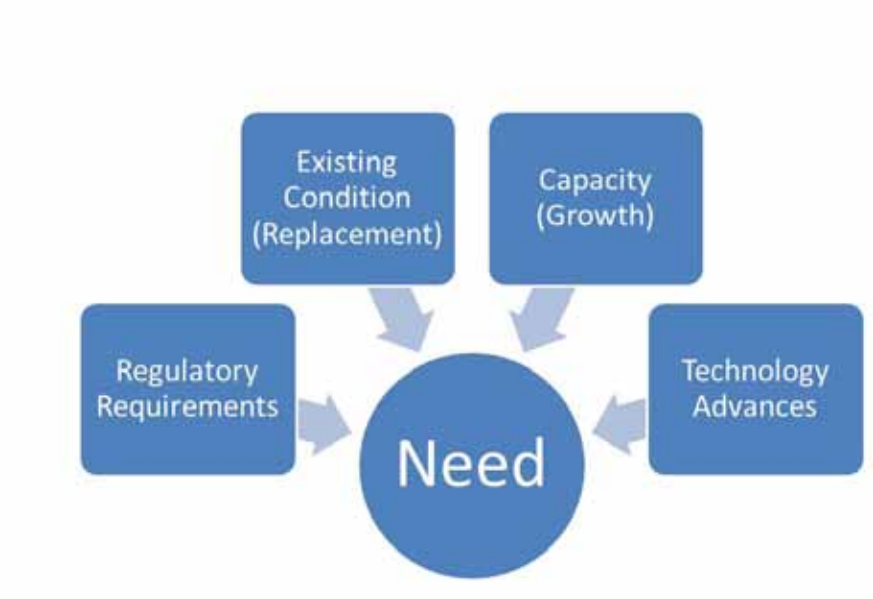


FIGURE 8.2

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 roadway's focused project infrastructure considerations which include such projects 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.

It is important to note, however, that as projects at the top of the prioritization list become Candidate Needs and then are passed into the solution development step. 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 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.

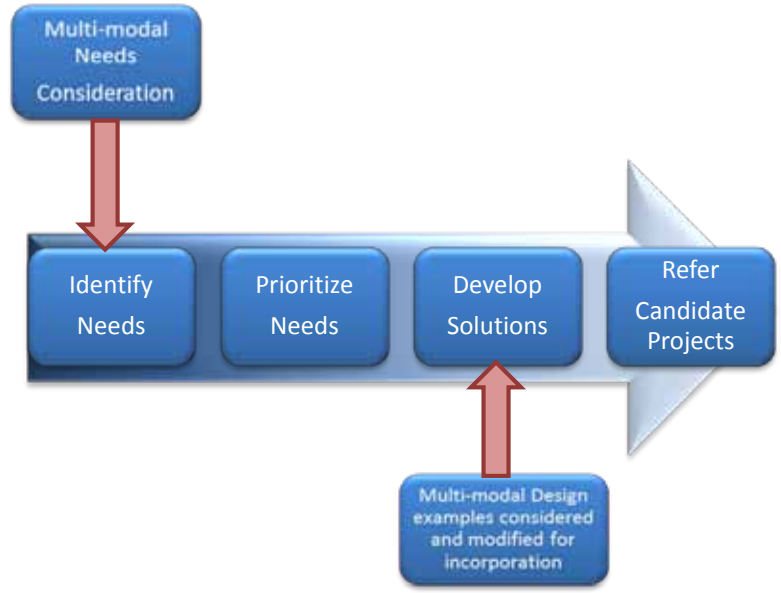


FIGURE 8.3

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 several streets that currently act as collectors but are not defined on the MTFP as such.
- 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. That is to say, a sidewalk project that completes an identified gap in the network has 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 of others, and include non-motorized connections within other planning and design activities. 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 the appropriate policy revisions to define the proposed Multi-modal Classification System. Revisions to the main body of policies that define the application of the MTFP would prove 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 corridors can begin to utilize the Multi-modal Classification System without adversely impacting the remaining elements of the code.

Coordination with Other Entities

One of the most critical components of moving the concepts discussed in this document forward is the continued coordination of efforts between many groups. The Planning and Development Department is often a reviewing agency for several groups that are moving specific projects forward and as such, a review early and often by the Planning Department of project concepts - whether roads, transit, pedestrian, or bicycle related, will help to ensure that the overall direction of the concepts discussed herein.

Another important component of the coordination efforts that need to be enhanced throughout the project development process related to the concepts discussed in the previous sections of this Report is the integration of these concepts into plans that are being developed by agencies other than the City of Houston. Most often, those projects

would be 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 a city-wide project prioritization process into which the project concepts defined through this effort will enter.

In addition, the Department of Public Works and Engineering (PWE) has established criteria by which the intersections 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 to receive funding through either a Capital Improvements Plan (CIP), a coordinated project with one of the Management Districts or TIRZs within the Study Area, or outside funding source such as a Private Sector Partner or State and Federal funding opportunities.

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 to meet the mobility needs of the future. 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 examined as appropriate.

X. Appendix A

Data Collection

- Transportation Network: Planned and Existing (2012)
- Population

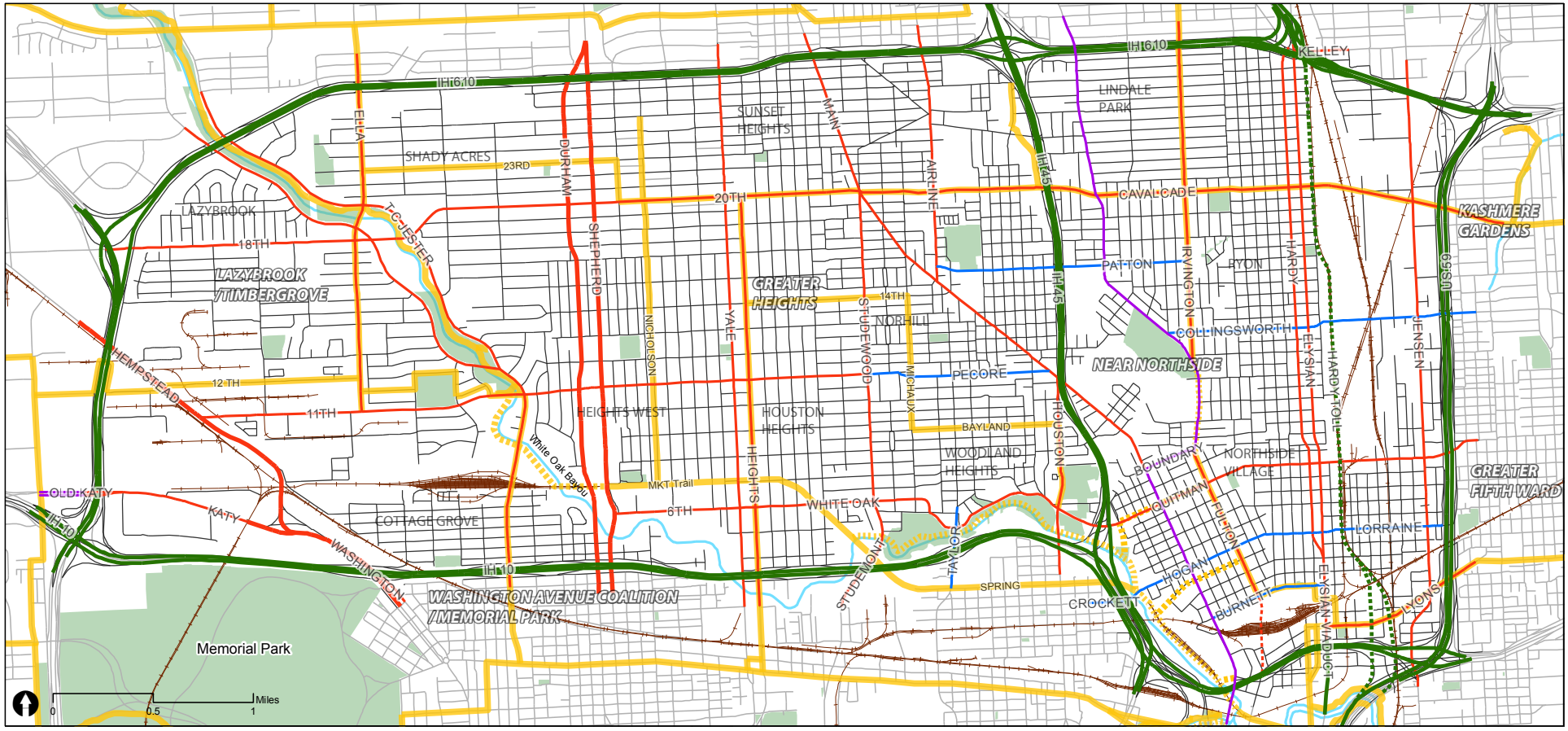
  Population Change (1990 - 2010) & Projection (2018 - 2035)

  Population Density (2010)
- Employment

  Employment Change (2002 - 2010) & Projection (2018 - 2035)

  Employment Density (2011)
- Population Density Change by TAZs (2010-2035)
- Employment Density Change by TAZs (2010-2035)
- Land Use (2011)
- METRO Transit Network and Ridership (2012)
- Street Connectivity (2012)

Transportation network: Planned and Existing (2012)



LEGEND

COH MTFP

- Freeway
- Principal Thoroughfare
- Major Thoroughfare
- Major Collector
- Transit Corridor Street
- Local Street
- Proposed
- COH Bikeway
- COH Bikeway (proposed)
- Railroad
- Bayou
- City of Houston Parks

PLANNING & DEVELOPMENT DEPARTMENT

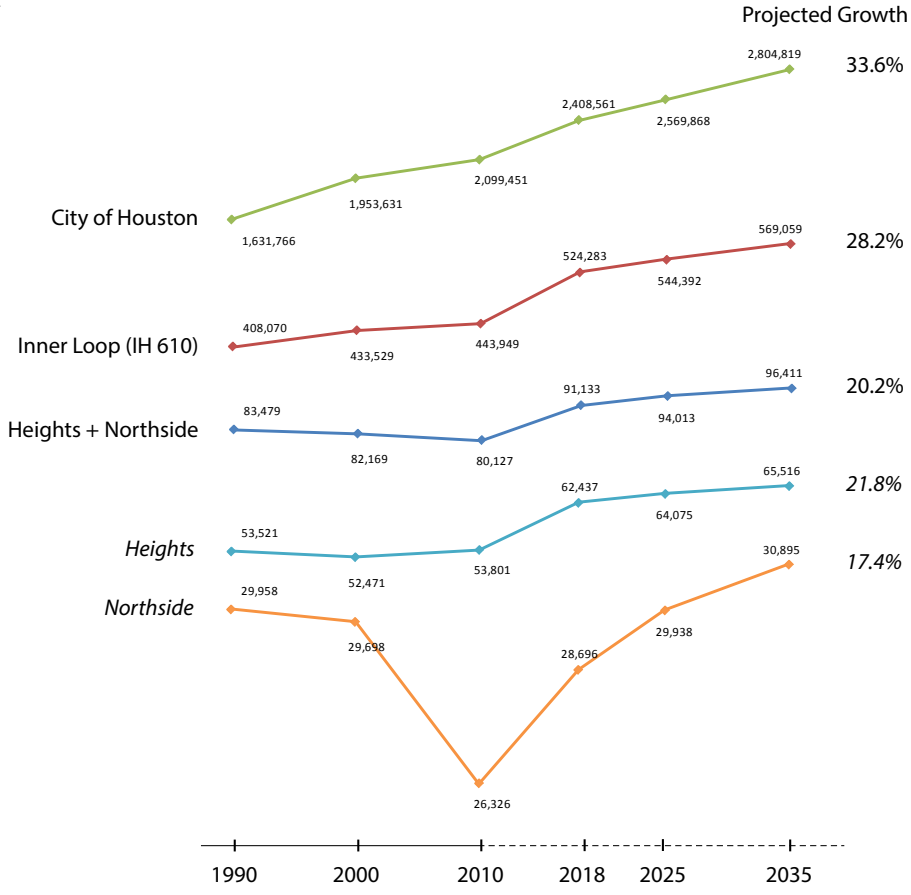
Population

Population Change (1990 - 2010) & Projection (2018 - 2035)

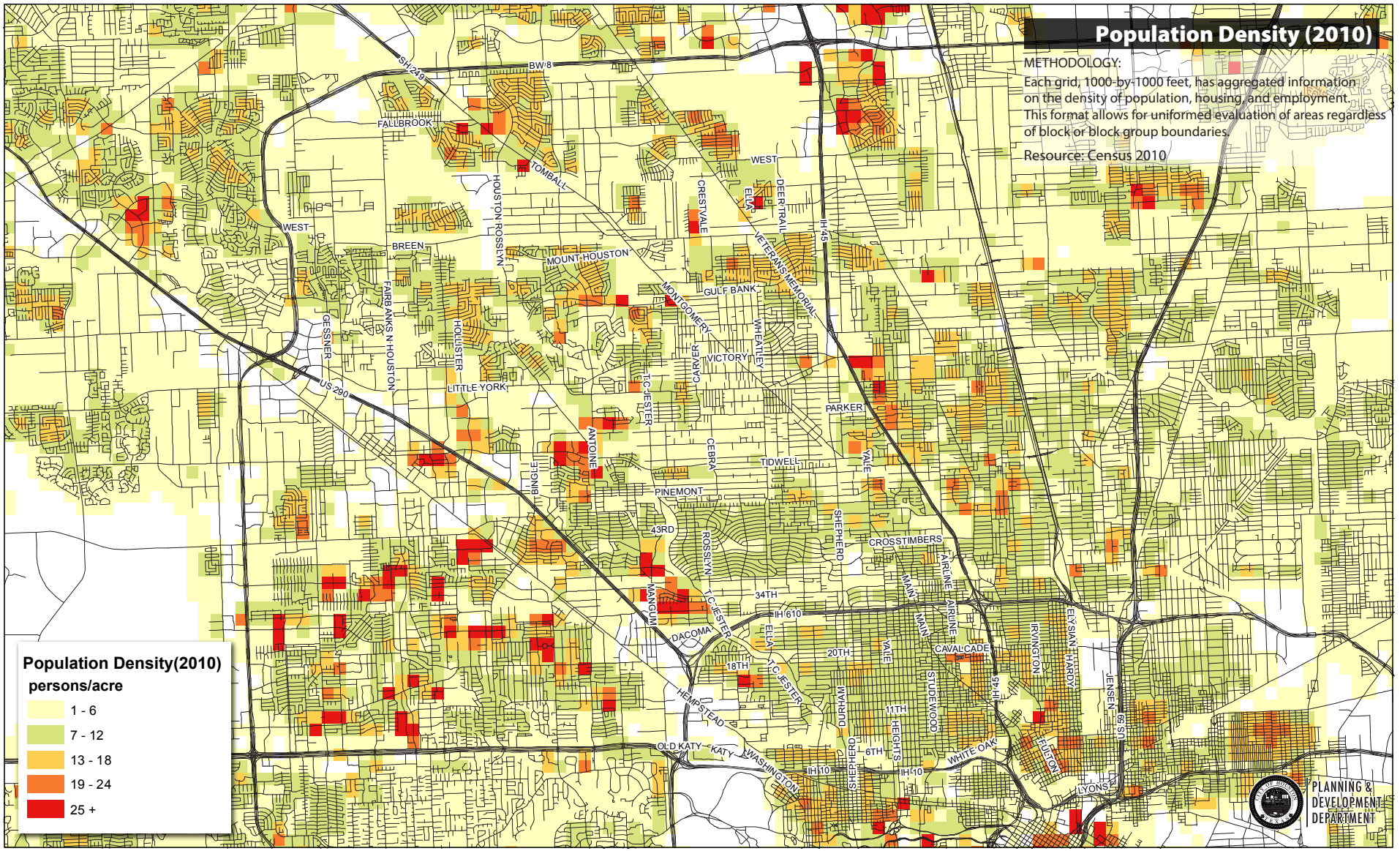
* CAGR: Compound Annual Growth Rate

Year	Heights-Northside	CAGR*	*Heights*	*CAGR**	*Northside*	*CAGR**	Inner Loop (IH 610)	CAGR*	City of Houston	CAGR*
1990	83,479		*53,521*		*29,958*		408,070		1,631,766	
2000	82,169	-0.2%	*52,471*	*-0.2%*	*29,698*	*-0.1%*	433,529	0.6%	1,953,631	2.0%
2010	80,127	-0.2%	*53,801*	*0.3%*	*26,326*	*-1.1%*	443,949	0.2%	2,099,451	0.7%
2018	91,133	1.9%	*62,437*	*2.2%*	*28,696*	*1.3%*	524,283	2.2%	2,408,561	1.5%
2025	94,013	0.5%	*64,075*	*0.4%*	*29,938*	*0.6%*	544,392	0.5%	2,569,868	1.0%
2035	96,411	0.3%	*65,516*	*0.2%*	*30,895*	*0.3%*	569,059	0.5%	2,804,819	0.9%

Resource: Population Change (1990-2010), US Census
Projection (2018 - 2035), H-GAC



PLANNING & DEVELOPMENT DEPARTMENT



HEIGHTS-NORTHSIDE/NORTHWEST MOBILITY STUDY

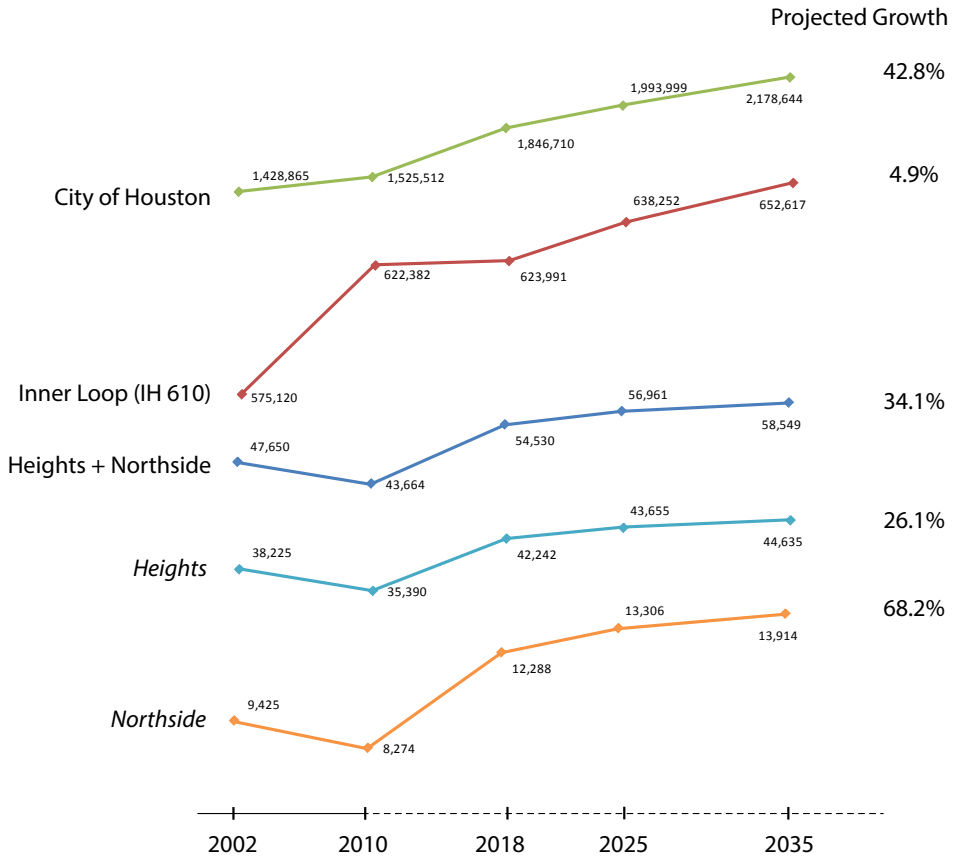
Employment

Employment Change (2002 - 2010) & Projection (2018 - 2035)

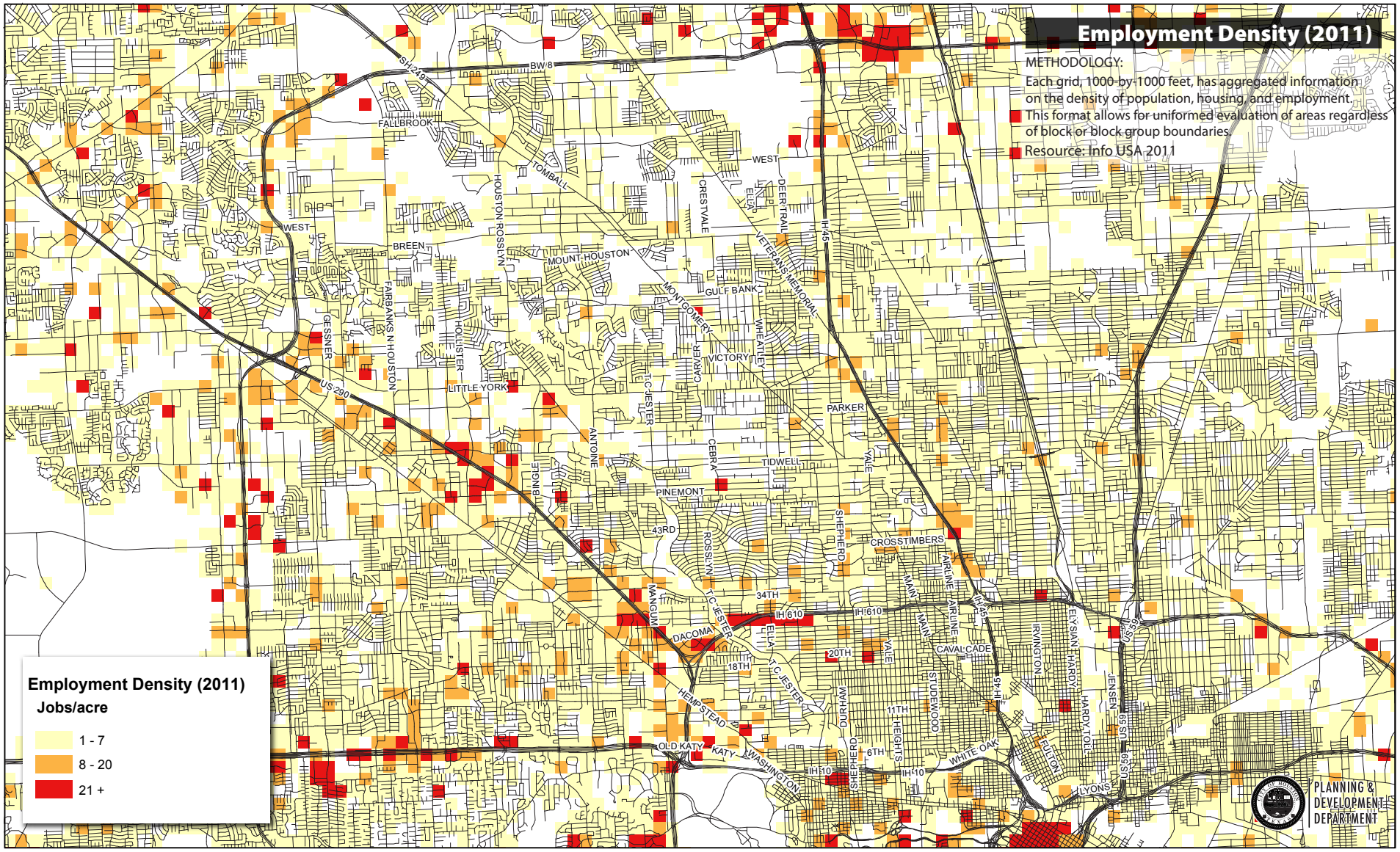
* CAGR: Compound Annual Growth Rate

Year	Heights-Northside	CAGR*	*Heights*	*CAGR**	*Northside*	*CAGR**	Inner Loop (IH 610)	CAGR*	City of Houston	CAGR*
2002	47,650		*38,225*		*9,425*		575,120		1,428,865	
2010	43,664	-0.8%	*35,390*	*-0.7%*	*8,274*	*-1.2%*	622,382	0.8%	1,525,512	0.7%
2018	54,530	0.9%	*42,242*	*0.4%*	*12,288*	*2.6%*	623,991	0.8%	1,846,710	1.6%
2025	56,961	0.6%	*43,655*	*0.5%*	*13,306*	*1.2%*	638,252	0.3%	1,993,999	1.1%
2035	58,549	0.3%	*44,635*	*0.2%*	*13,914*	*0.5%*	652,617	0.2%	2,178,644	0.9%

Resource: Employment Change (2002-2010), US Census
Projection (2018 - 2035), H-GAC

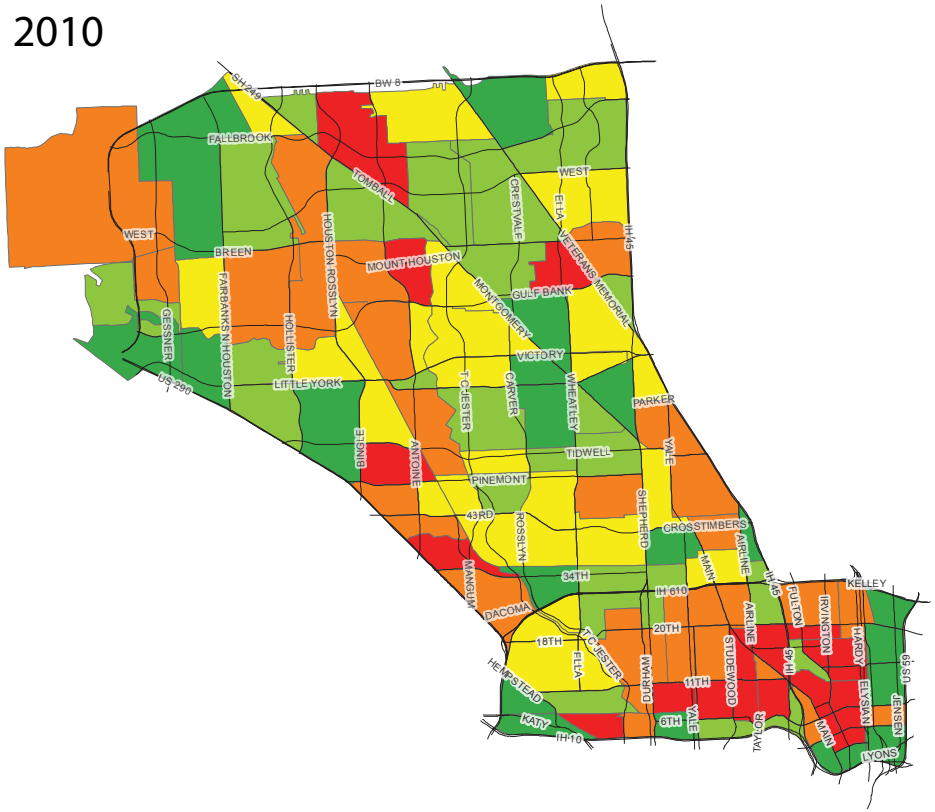


PLANNING & DEVELOPMENT DEPARTMENT

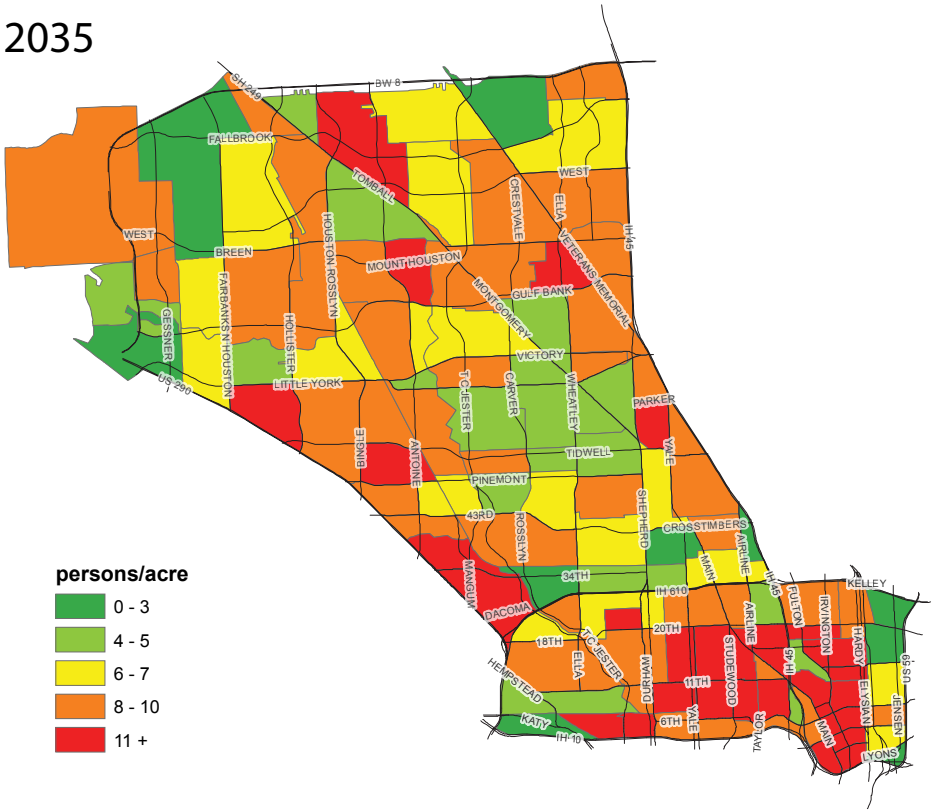

Employment Density (2011)
METHODOLOGY:
Each grid, 1000-by-1000 feet, has aggregated information on the density of population, housing, and employment.
This format allows for uniformed evaluation of areas regardless of block or block group boundaries.
Resource: Info USA 2011
Employment Density (2011)
Jobs/acre
1 - 7
8 - 20
21 +
0
2.5
5
Miles
PLANNING & DEVELOPMENT DEPARTMENT
HEIGHTS-NORTHSIDE/NORTHWEST MOBILITY STUDY
ISH-45
BW 8
FALLBROOK
TOMBALL
WEST
HOUSTON ROSSLYN
CRESTVALE
DEER TRAIL
ELLA
IH 45
VETERANS MEMORIAL
BREEN
MOUNT HOUSTON
GULF BANK
MONTGOMERY
WHEATLEY
VICTORY
CAROLINE
T C JESTER
GESSNER
FAIRBANKS N HOUSTON
HOLLISTER
LITTLE YORK
US 290
PARKER
ANTOINE
CEBRA
TIDWELL
YALE
PINEMONT
43RD
SHEPHERD
CROSSTIMBERS
ROSSLYN
MANGUM
34TH
IH 610
AIRLINE
MAIN
CAVALCADE
DACOMA
ELLA
20TH
18TH
IRVINGTON
ELYSIAN
HARDY
JENSEN
US 59
HEMPSTEAD
PINEHURST
STUDEMONT
11TH
HEIGHTS
OLD KATY
KATY
WASHINGTON
DURHAM
6TH
WHITE OAK
FULTON
LYONS

Population Density Change (2010-2035)

2010



2035



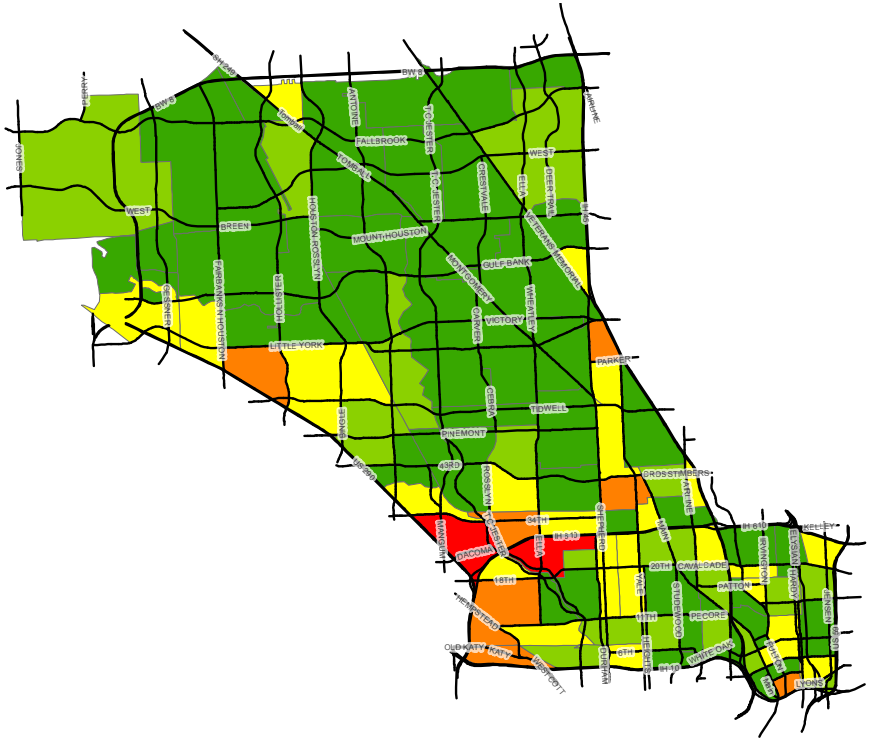
Average Density (persons/acre)

Year	2010	2035
Total	6.1	7.4
Heights-Northside	7.4	8.9
Heights	7.4	9.0
Northside	7.4	8.6
Northwest	5.8	7.0

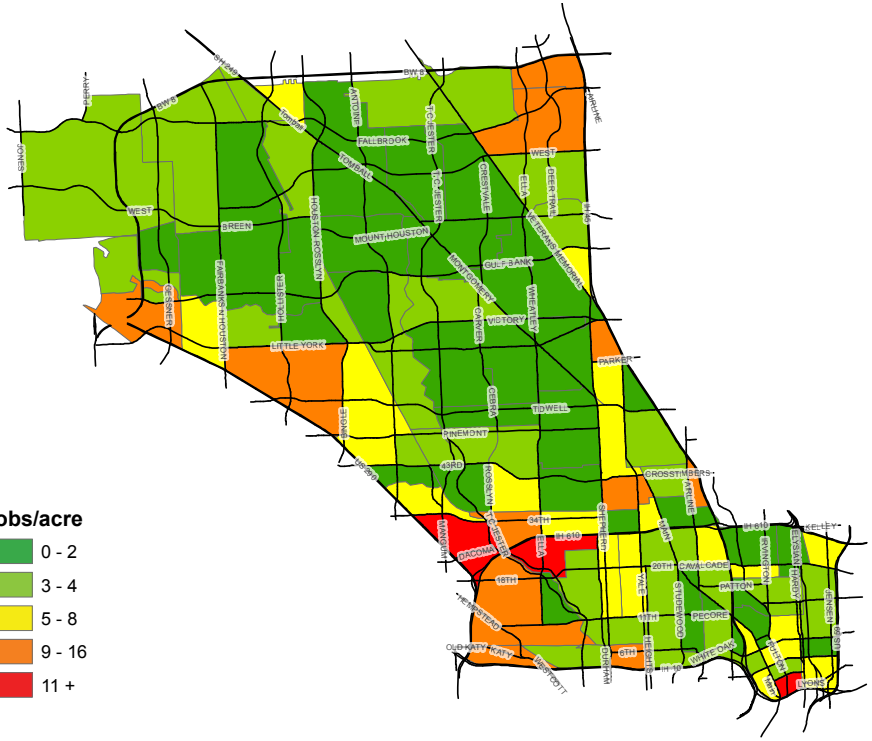
PLANNING & DEVELOPMENT DEPARTMENT

Employment Density Change (2010-2035)

2010



2035



Jobs/acre

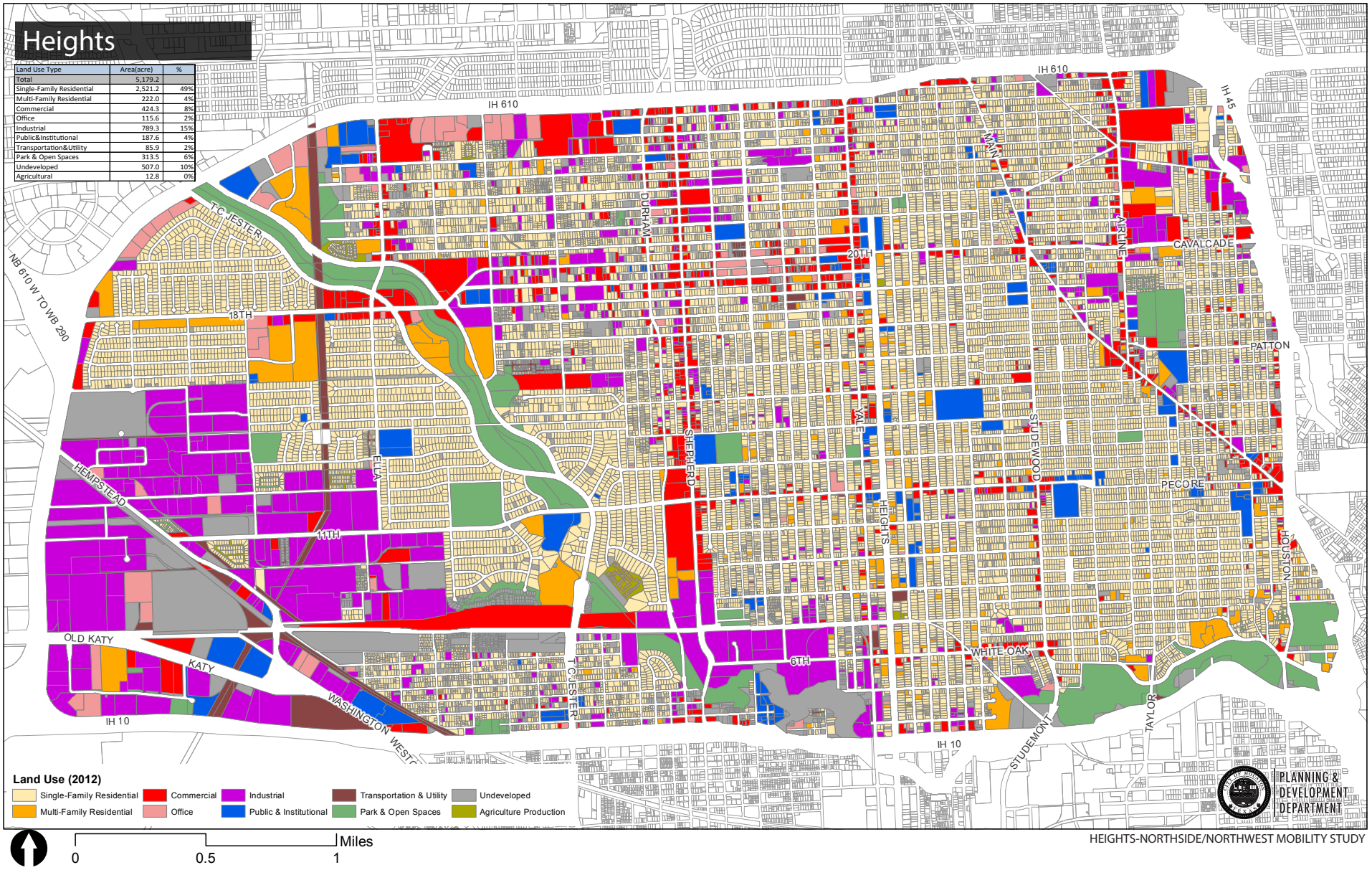
- 0 - 2
- 3 - 4
- 5 - 8
- 9 - 16
- 11 +

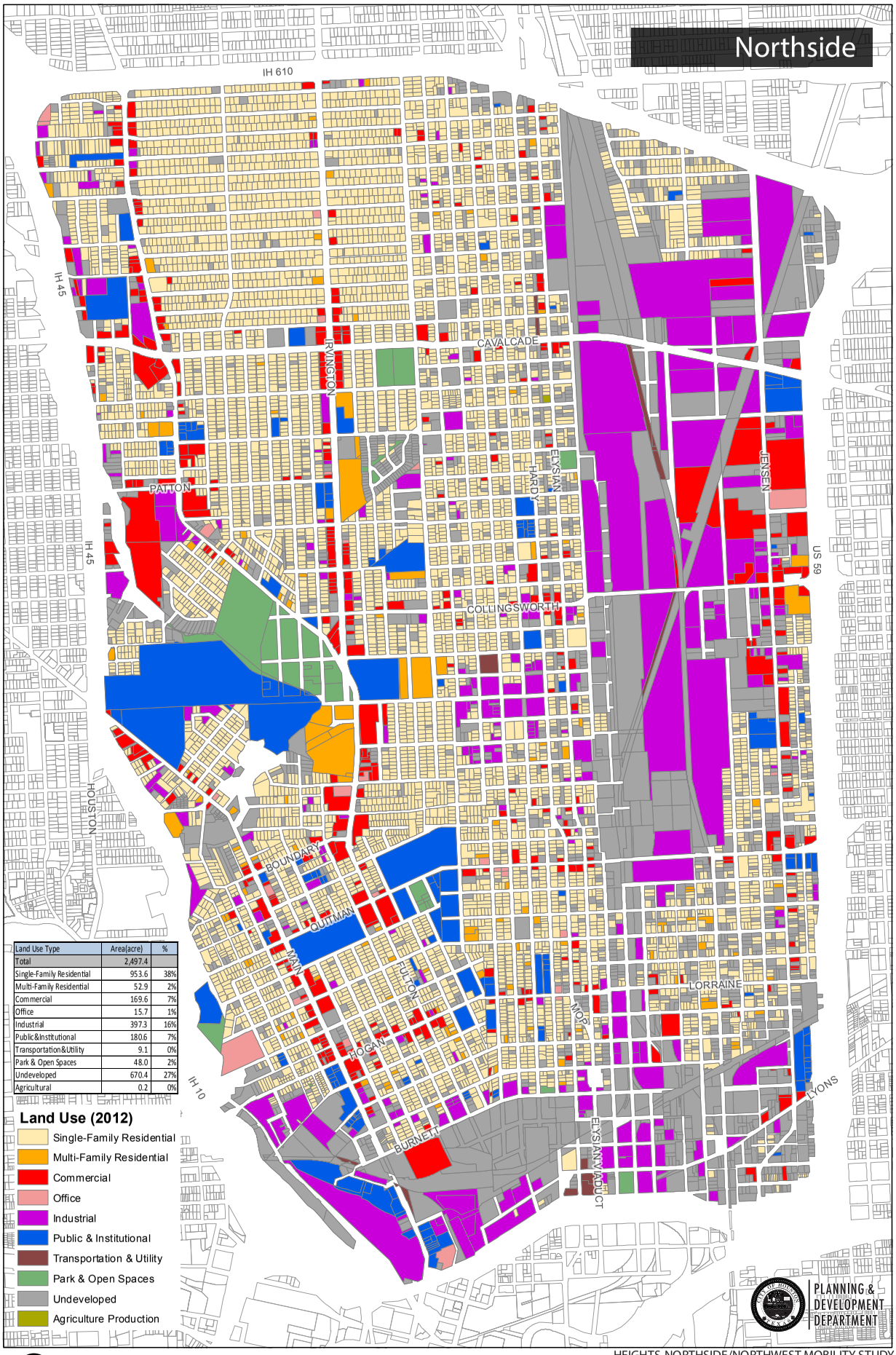
Average Density (jobs/acre)

Year	2010	2035
Total	2.9	3.6
Heights-Northside	4.7	5.4
Heights	5.7	6.1
Northside	2.8	3.9
Northwest	2.4	3.2

PLANNING & DEVELOPMENT DEPARTMENT

Land Use (2011)



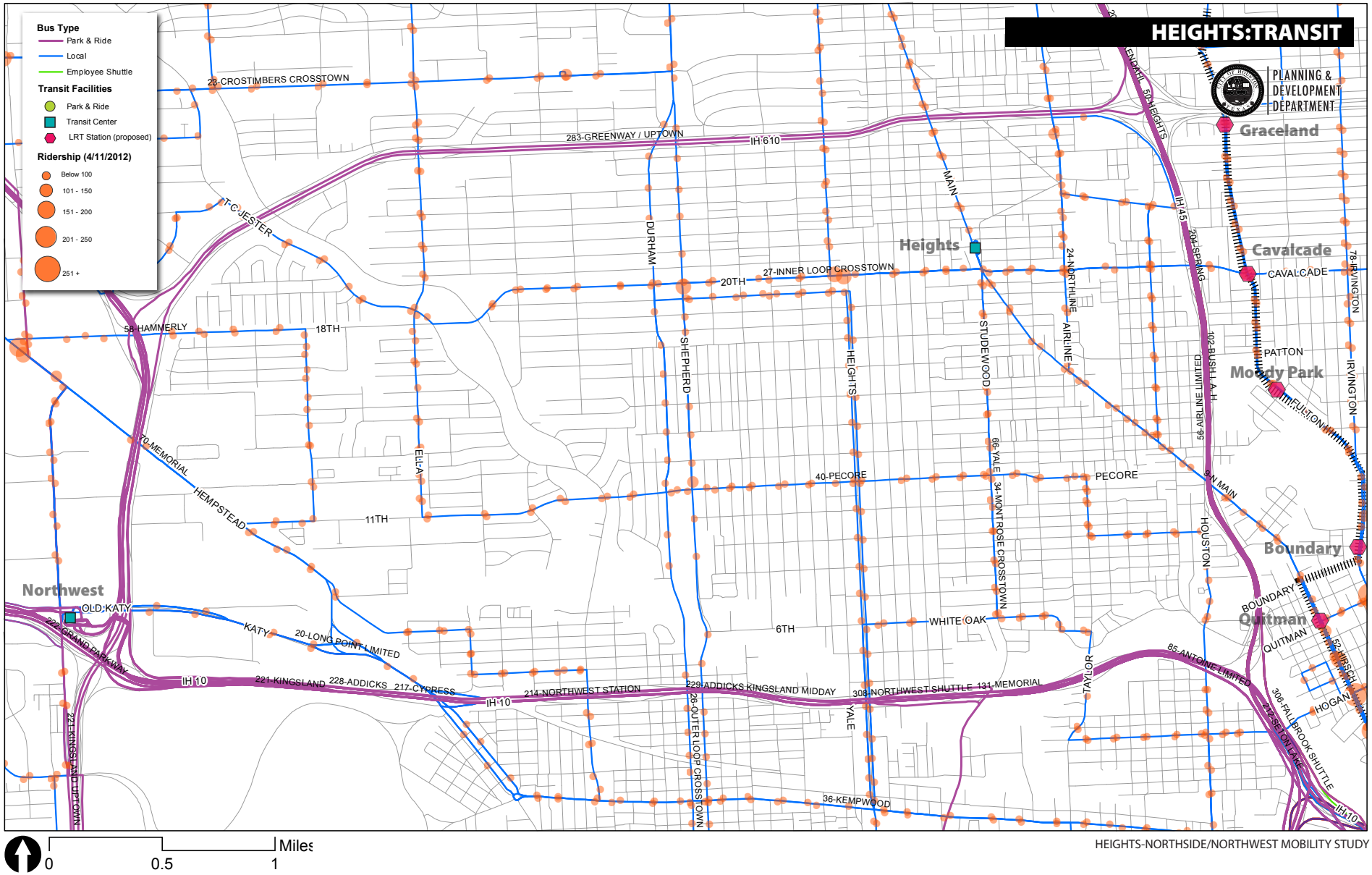


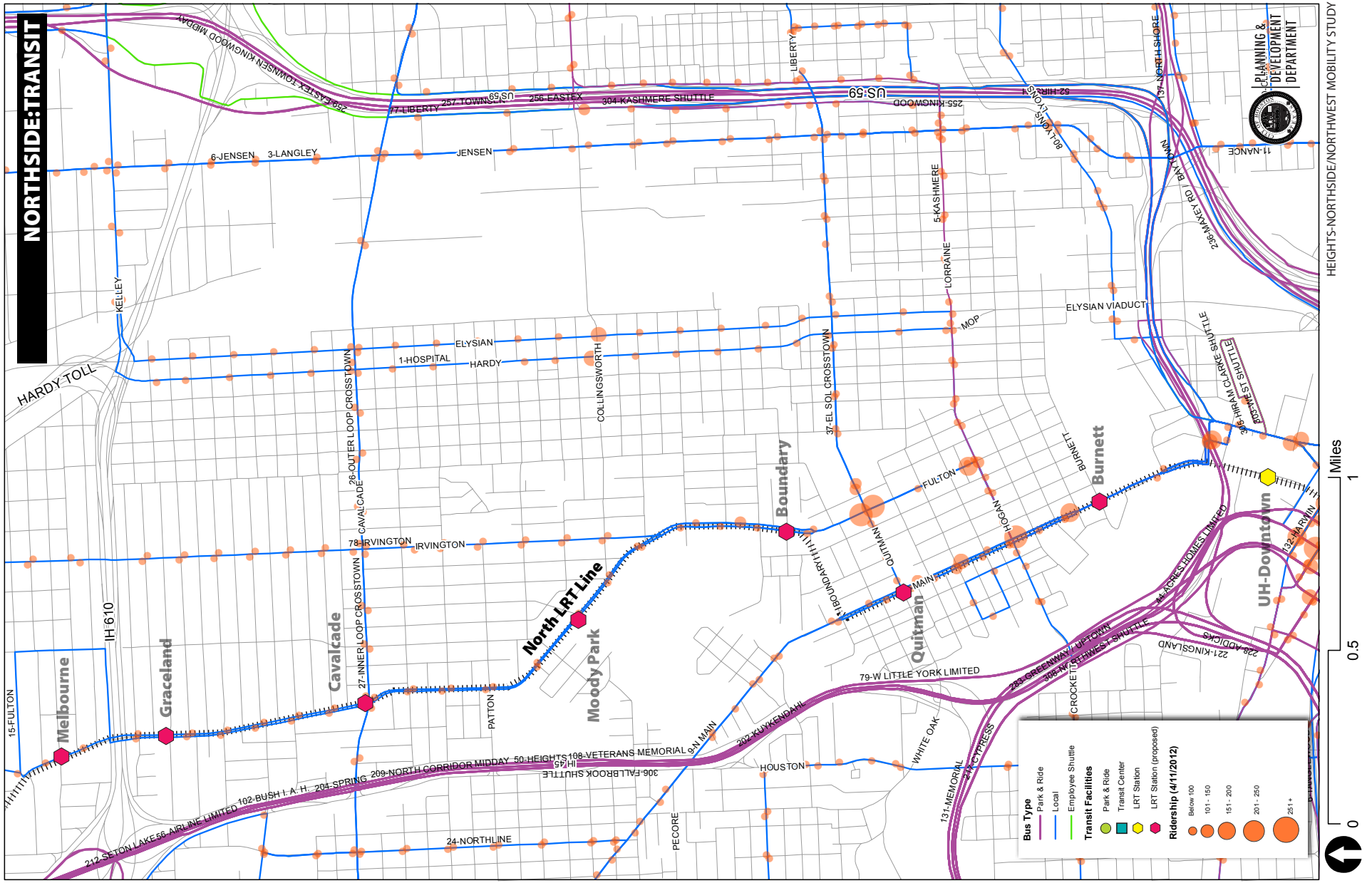
Land Use Type	Area(acre)	%
Total	2,497.4	
Single-Family Residential	953.6	38%
Multi-Family Residential	52.9	2%
Commercial	169.6	7%
Office	15.7	1%
Industrial	397.3	16%
Public&Institutional	180.6	7%
Transportation&Utility	9.1	0%
Park & Open Spaces	48.0	2%
Undeveloped	670.4	27%
Agricultural	0.2	0%

Land Use (2012)

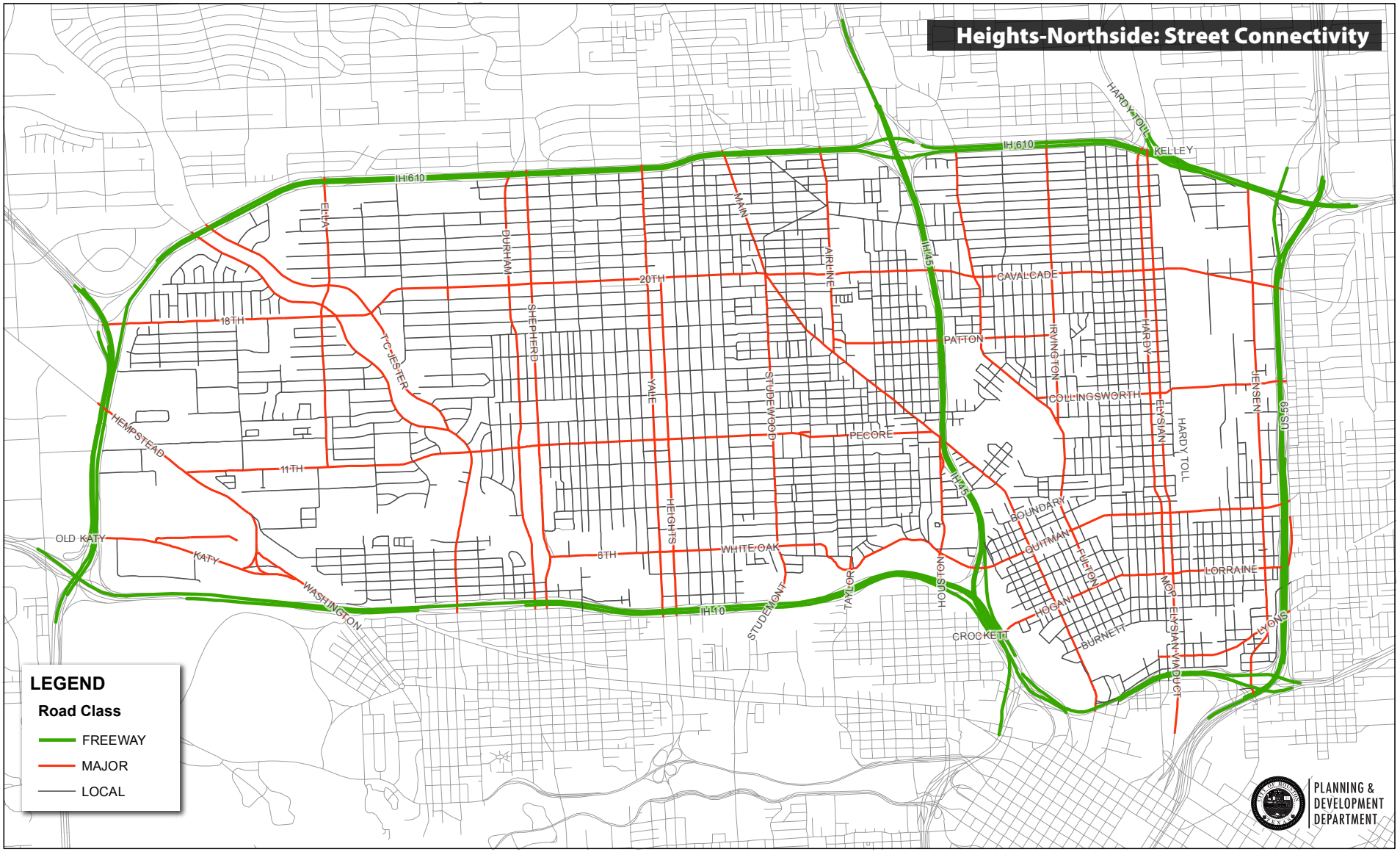
- Single-Family Residential
- Multi-Family Residential
- Commercial
- Office
- Industrial
- Public & Institutional
- Transportation & Utility
- Park & Open Spaces
- Undeveloped
- Agriculture Production

METRO Transit Network and Ridership 2012)




NORTHSIDE:TRANSIT
HEIGHTS-NORTHSIDE/NORTHWEST MOBILITY STUDY
PLANNING & DEVELOPMENT DEPARTMENT
Miles
0
0.5
1
North LRT Line
Melbourne
Graceland
Cavalcade
Moody Park
Quitman
Boundary
Burnett
UH-Downtown
IH 610
US 59
HARDY-TOLL
ELYSIAN VIADUCT
HOUSTON
JENSEN
ELYSIAN
HARDY
IRVINGTON
FULTON
MAIN
LIBERTY
LORRAINE
COLLINGSWORTH
PATTON
PECORE
WHITE OAK
KELLEY
CAVALCADE
QUITMAN
HOGAN
BURNETT
MOP
Bus Type
Park & Ride
Local
Employee Shuttle
Transit Facilities
Park & Ride
Transit Center
LRT Station
LRT Station (proposed)
Ridership (4/11/2012)
Below 100
101 - 150
151 - 200
201 - 250
251 +

Street Connectivity (2012)



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X. Appendix B

Thoroughfare Types

The following pages are provided as reference for the reader. This information was developed during Phase 1 of the City Mobility Planning exercise, and led to the development of the Alternative Cross Sections presented in Chapter 10, Appendix 2 of the **Infrastructure Design Manual**. This information is intended to clarify the distinction of Boulevards, Avenues, and Streets within the Urban and Suburban Areas. This nomenclature is less about street name or functional classification and is focused on the context in which the corridor is intended to operate.

Freeway/Expressway/Parkway

Freeways are high speed (50 mph +), controlled-access thoroughfares with grade-separated interchanges and no pedestrian access. (Includes tollways) Expressways and parkways are high- or medium-speed (45 mph +), limited-access thoroughfares with some at-grade intersections. On parkways, landscaping is generally located on each side and have a landscaped median. Truck access on parkways may be limited. In most cases the freeways and tollways are TxDOT or HCTRA controlled facilities and the design elements of those roads are dictated by the State's Design Manual. The parkways are City facilities that function at high speeds. In many cases grade separated limited access facilities.

ALLEN PARKWAY

Urban Boulevard

Urban Boulevards are walkable, lower speed (35 mph or less) divided thoroughfare in urban environments designed to carry both through and local traffic, bicyclists and pedestrians. Urban Boulevards may be long corridors, typically 4 to 6 lanes, but are sometimes wider, serve longer trips and provide limited access to land. Boulevards may be high ridership transit corridors. Boulevards are primary goods movement and emergency response routes and use access management techniques. Urban Boulevards are different from Suburban Boulevards in that the pedestrian and context realms are oriented towards the pedestrian and building frontages. Most often the buildings are close to the street with wide sidewalks and tree wells forming space where a pedestrian feels comfortable and safe. The building height to street ratio often exceeds a 3:1 ratio which creates a comfort level for pedestrians to cross often wide thoroughfares.

POST OAK

Suburban Boulevard

Suburban Boulevards are high speed (40 to 45 mph) divided thoroughfare in suburban environment designed to carry primarily higher speed, long distance traffic and serve large tracts of separated single land uses (for example, residential subdivisions, shopping centers, industrial areas and business parks). High speed suburban boulevards may be long corridors, typically 4 to 8 lanes and provide very limited access to land. They may be transit corridors and accommodate pedestrians with sidewalks or separated paths, but some high speed boulevards may offer limited pedestrian facilities. Suburban boulevards emphasize traffic movement, and signalized pedestrian crossings and cross-streets may be widely spaced. In the context realm, buildings or parking lots adjacent to suburban boulevards typically have large landscaped setbacks. They are routes for primary goods movement and emergency response and widely use access management techniques.

KIRBY

Transit Boulevard/Avenue

Much like the Urban Boulevards, Transit Boulevards are very walkable, lower speed (35 mph or less) divided thoroughfare in urban environments designed to carry both through and local traffic, pedestrians and bicyclists. Transit Boulevards may be long corridors, typically 4 to 6 lanes but sometimes wider, serve longer trips and provide limited access to land. Transit Boulevards are designed to provide space in the median for transit facilities. Transit Boulevards are extremely oriented towards providing the pedestrian with more space and building frontages. Most often the buildings are close to street with wide sidewalks and tree wells forming space where a pedestrian feels comfortable and safe. The building height to street ratio often exceeds a 3:1 ratio which creates a comfort level for pedestrians to cross often wide thoroughfares.

MAIN

Urban Avenue

Urban Avenues are walkable, low-to-medium speed (30 to 35 mph) urban arterials or collector thoroughfare, generally shorter in length than boulevards, serving access to abutting land. Urban Avenues serve as primary pedestrian and bicycle routes and may serve local transit routes. Urban Avenues do not exceed 4 lanes and access to land is a primary function. Goods movement is typically limited to local routes and deliveries. Some Avenues feature a raised landscaped median. Urban Avenues may serve commercial or mixed-use sectors and often provide curb parking. The pedestrian realm is normally a continuous sidewalk from the back of curb to the building face with tree wells spaced near the curb lines.

WEST GRAY

Suburban Avenue

Suburban Avenues are walkable, low-to-medium speed (30 to 35 mph) suburban arterial or collector thoroughfare, generally shorter in length than boulevards, serving access to abutting land. Suburban Avenues serve as primary bicycle and pedestrian routes and may serve local transit routes. Suburban Avenues do not exceed 4 lanes and access to land is a primary function. Goods movement is typically limited to local routes and deliveries. Some Suburban Avenues feature a raised landscaped median. Suburban Avenues may serve commercial or mixed-use sectors and sometimes provide curb parking. The pedestrian realm is usually distinguished by a landscape buffer separating the street from the sidewalk with street trees located outside of the sidewalk area.

YOAKUM

Urban Street

Urban Streets are walkable, low speed (30 mph) thoroughfare in urban areas primarily serving abutting property. A Urban Street is designed to connect residential neighborhoods with each other, connect neighborhoods with commercial and other districts, and connect local streets to arterials. Streets may serve as the main street of commercial or mixed-use sectors and emphasize curb parking. Goods movements are restricted to local deliveries only.

WEST DALLAS

Suburban Street

Suburban Streets are walkable, low speed (30 mph) thoroughfare in suburban areas primarily serving abutting property. A Suburban Street is designed to connect residential neighborhoods with each other, connect neighborhoods with commercial and other districts, and connect local streets to thoroughfares. Suburban Streets may serve as the main street of commercial or mixed-use sectors and emphasize curb parking. The context realm is defined by a landscape buffer, trees with a separated sidewalk. Goods movements are often restricted to local deliveries only.

DUNLAVY

Industrial Boulevard and Avenue

Industrial Boulevard and Avenues vary in speed from 30 to 45 mph in both urban and suburban areas. An industrial street is designed to connect heavy vehicles to and from major highways to industrial areas. These streets have wide travel lanes with large turning radii. Most often have limited pedestrian elements. Medians are optional for Industrial Boulevards.

NAVIGATION

One-Way Couplets

One-Way Couplets are pairs of one-way streets that function as a single higher-capacity street. Couplets are usually separated by one city block, allowing travel in opposite directions. One-Way Couplets serve many different areas of Houston from higher-density commercial and mixed-use areas such as Downtown and regional centers to lower-density residential areas and Main Streets.

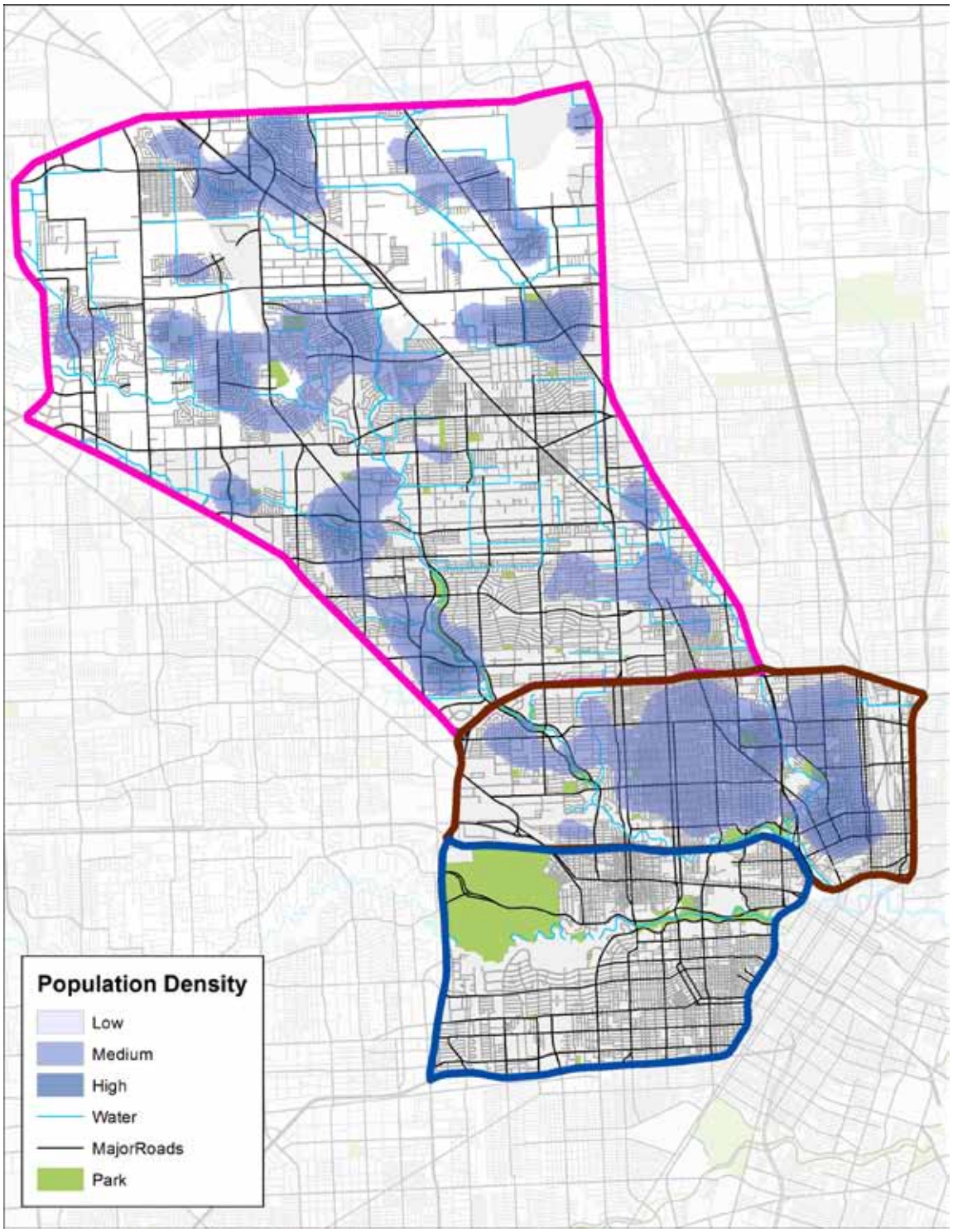
One –Way Couplets are designed to have a higher transportation capacity than an equivalent two-way street. Both parallel and angled parking are appropriate for these streets.

PRAIRIE

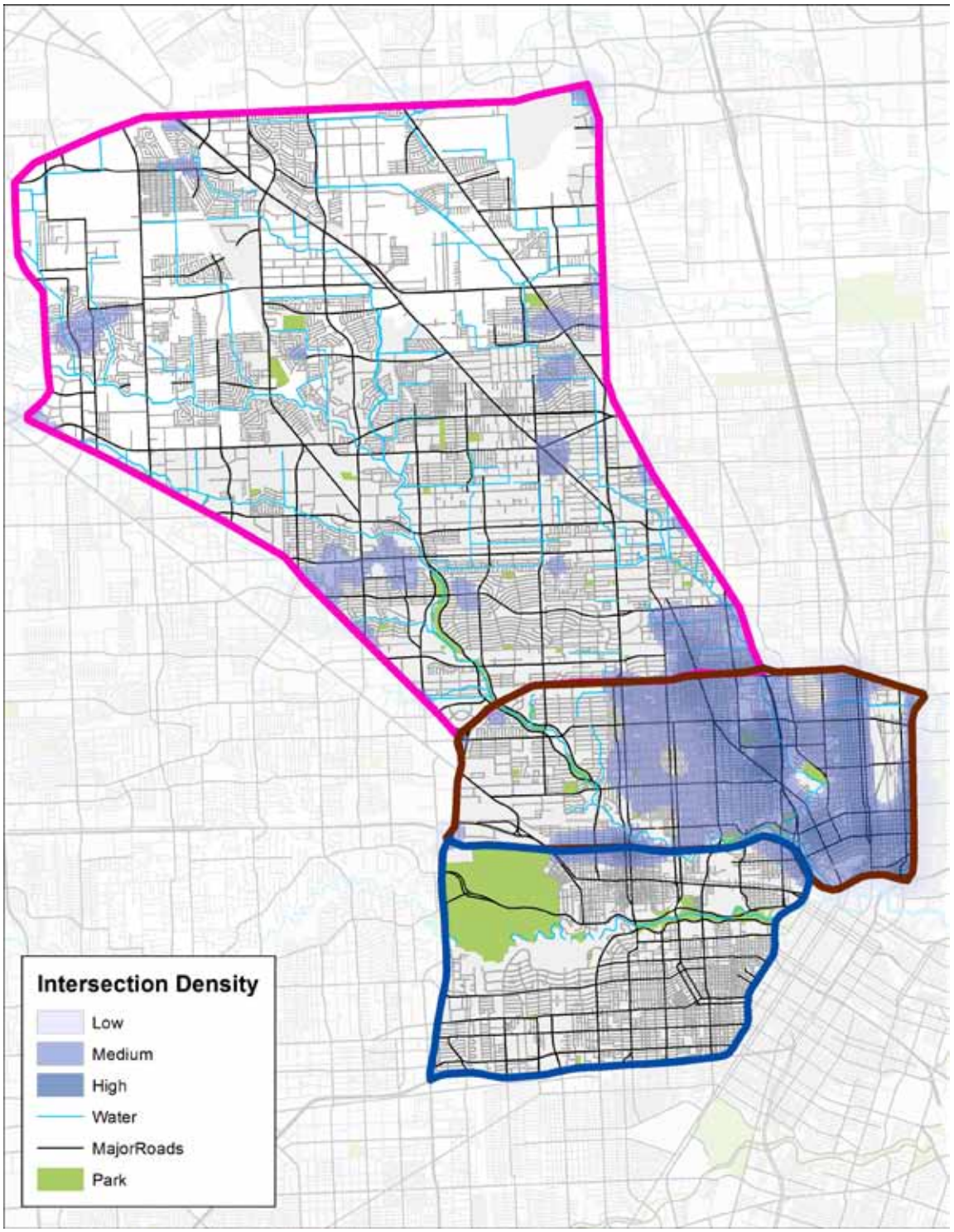
X. Appendix C

Transit Corridor Selection Analysis Maps

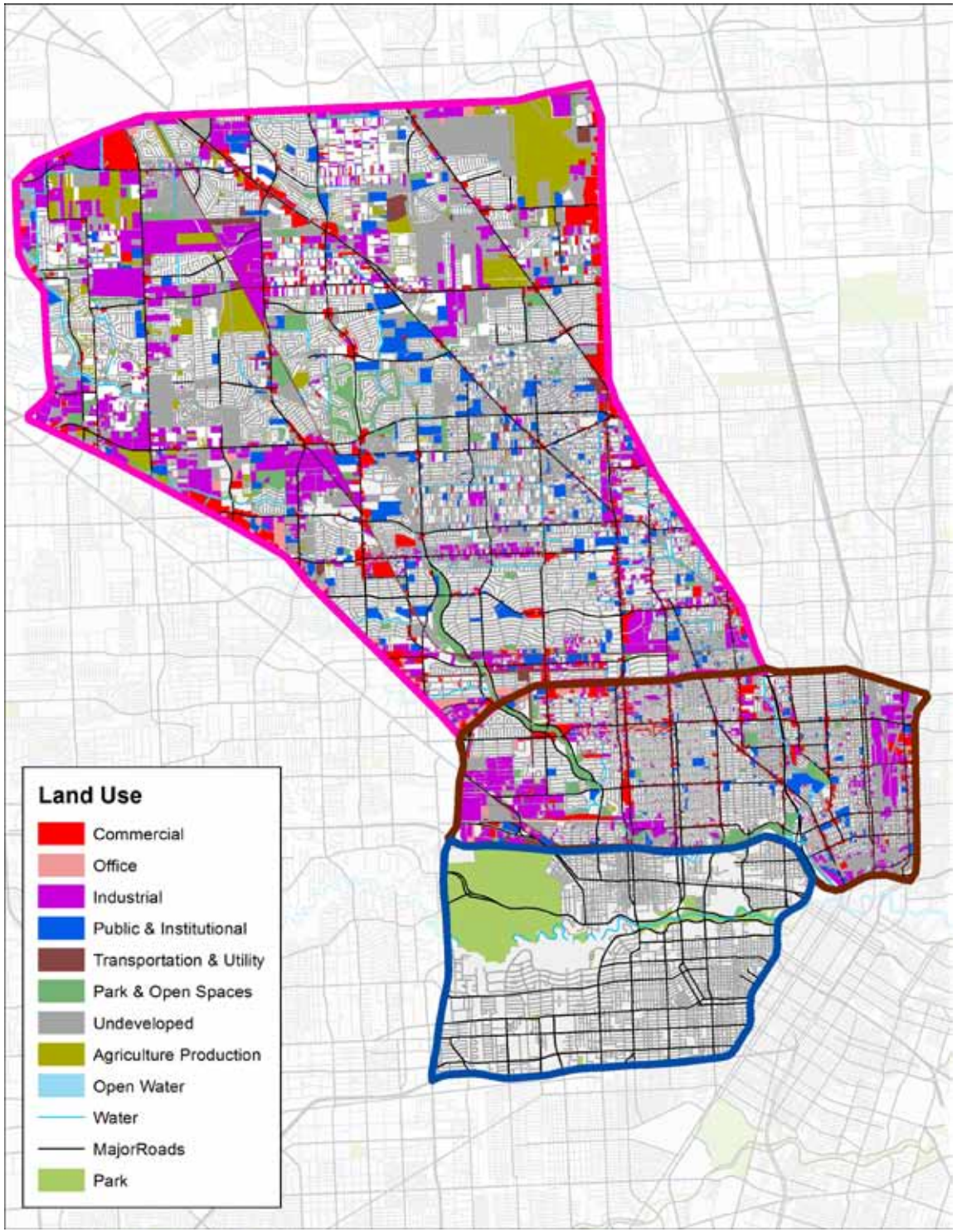
Population Density



Intersection Density



Land Use


Land Use
Commercial
Office
Industrial
Public & Institutional
Transportation & Utility
Park & Open Spaces
Undeveloped
Agriculture Production
Open Water
Water
MajorRoads
Park

Transit Projections 2035