

**APPENDIX B:  
ENVIRONMENTAL JUSTICE ANALYSIS**

## Section I

### ENVIRONMENTAL JUSTICE ANALYSIS

#### INTRODUCTION

This section contains a description of activities in which H-GAC has engaged to ensure that the 2040 Regional Transportation Plan (RTP) meets all federal goals of Environmental Justice (EJ), as described in the guidelines of *Executive Order 12898: Federal Action to Address Environmental Justice (EJ) in Minority Populations and Low-Income Populations*. *Executive Order 12898* directs Federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of Federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law.”

In accordance with this federal guidance, H-GAC’s approach is directed toward the preparation and adoption of a RTP that:

- Avoids and minimizes disproportionate health, environmental, social, and economic impacts on the identified populations;
- Implements public outreach strategies that maximize EJ participation in transportation decision-making processes;
- Is informed by project-level analysis to identify benefits and burdens to EJ communities; and
- Sustains and promotes equitable distribution of benefits

A discussion of H-GAC’s EJ public engagement process, methodology for identifying potential impacts, and potential impacts to EJ communities follows.

Maps displaying the environmental justice indicators with the proposed transportation projects overlaid are located in *Section III* of this report.

#### EJ PUBLIC ENGAGEMENT

H-GAC’s public outreach to EJ populations was highly pro-active. The process maximized opportunities for EJ populations to participate in the planning process by employing innovative methods. These methods included providing opportunities to provide input during meetings held in EJ communities, as well as opportunities to submit comments online. In addition, meetings were often held during the regular meeting times of civic organizations at their regular meeting locations. Other innovations included making arrangements with the Houston Housing Authority to transport citizens to meetings and convening an open house in a highly-trafficked area of a university student center.

Meetings were publicized through telephone contact with community leaders and public and community agency representatives, flyers were placed in public gathering places, press releases, and notices were sent to individuals via email and U. S. Postal Service. As a result, attendance at EJ meetings exceeded 400.

## Draft

Another innovation was the administration of a survey to EJ populations during the first round of EJ meetings. The survey was completed by 170 individuals and survey results served as an input to the analysis of potential impacts.

Survey results that pertain to the transportation priorities of EJ populations are shown on **Table A**. Transportation priorities identified as part of the H-GAC regional planning process that concluded in 2013 are also shown on the table.

**Table A – EJ SURVEY RESULTS**

EJ Category	Public Transportation	Fix existing roads and highways	Build new roads and highways	Improve design and safety	Sidewalks and bikeways	Planning and coordination
	PRIORITY RANKING					
Minority Population	1	2	3	4	5	6
Low-Income	1	2	4	3	5	6
Elderly	1	2	3	5	4	6
Zero Automobile Households	1	3	4	5	2	6
Limited Educational Attainment	1	2	2	4	3	5
13-County Houston-Galveston Region	2	1	4	5	3	6

Source: H-GAC RTP Survey, 2013 and Our Great Region Plan, 2013.

Public transportation was the highest priority of the respondents in the EJ categories that could be identified, given the structure of the survey instrument. (These categories are displayed on the table.) Minorities, persons with low educational attainment, and elderly persons ranked “fix existing roads and highways” second in priority. In a tie vote, individuals with low educational attainment ranked “fix existing roads and highways” and “build new roads and highways” second. Planning and coordination consistently ranked lowest in priority.

A comparison of EJ survey results with results from the polling conducted in conjunction with the **Our Great Region 2040 Plan** alluded to earlier, indicates that region-wide, public transportation is also a high priority for respondents to that plan’s survey. “Fix existing roads and highways” ranked first in that survey, but public transportation ranked second.

## METHODOLOGY

Primary and secondary EJ indicators were used to determine whether EJ communities are likely to experience disproportionate impacts from proposed projects. Data from the U. S. Census Bureau American Community Survey (2011) was aggregated to support the process of identifying communities that can be categorized as EJ communities. The primary categories are minorities and low-income persons, as required by federal regulations. The secondary categories are elderly persons, persons with a low level of educational attainment, households that do not own an automobile, female headed households, and persons with limited English language proficiency.

To facilitate the identification of potential impacts, census tracts containing concentrations of persons and households in the seven above-named categories were mapped, and proposed projects were overlaid on these maps. Next, a review was performed to determine the proximity of projects to these populations. Community centers, colleges and universities, and hospitals were also overlaid on these maps for purposes of identifying potential improvements to access. Lastly, an inventory of major employers and survey data collected from EJ populations were reviewed and serve as inputs to the assessment.

*A detailed description of the methodology is located in Section II of this report.*

## ASSESSMENT OF POTENTIAL IMPACTS

The foregoing assessment demonstrates that a number of proposed projects may affect EJ populations, with potentially beneficial *and* potentially adverse impacts. Although this assessment is informed by data, to a significant extent, it is qualitative.

Moreover, this assessment does not take into account impacts that are not possible to definitively ascertain prior to final design. Such impacts might include displacements and land use, air quality, and environmental effects. The assessment *does* take into account mobility and access to employment centers, hospitals, and institutions of higher education, along with congestion mitigation and connectivity, as relates to EJ populations.

Finally, there is typically an overlap between the two primary categories and one or more secondary categories. For example, there is a high correlation between census tracts where there are concentrations of persons with limited English language proficiency and census tracts where there is a concentration of minorities. Also, there is a high correlation between census tracts where there is a concentration of households that do not have an automobile and census tracts where there is a concentration of low-income persons. Therefore, the assessment focuses primarily on minority and low-income concentrations.

## Public Transportation Improvements

It was demonstrated earlier that public transportation ranks high as a priority for EJ population and there are a number of proposed public transportation projects that may affect EJ populations, as shown below.

## **Draft**

These projects would enhance access to employment and other centers of activity and also possibly relieve congestion, as patrons take advantage of this alternative to private transportation. In addition, the use of new technology, such as hybrid buses, should mitigate any adverse air quality impacts.

However, proposed public transportation expenditures are not in alignment with the high priority placed on public transportation by EJ populations. Proposed expenditures for highways and roads outpace proposed expenditures for public transportation.

### **METRO Solutions North Corridor Extension to George Bush-IAH**

The alignment for this proposed transportation project would traverse a number of census tracts that are inhabited by members of EJ groups. This project would enhance access to George Bush-Intercontinental Airport (IAH), a major employment center. In addition, the project would improve access from Greenspoint and other communities proximate to IAH to the Houston Community College Northeast campus and to the University of Houston-Downtown campus. Connections to existing Light Rail Transit lines would further enhance access to employment centers, such as Downtown Houston and the Texas Medical Center.

### **University Corridor Light Rail Transit**

The University Corridor LRT would facilitate east-west travel within Houston and would connect to the Red Line at the Main Street and Wheeler Avenue Station. Access to the University of Houston main campus, Texas Southern University, the University of St. Thomas, Greenway Plaza, and numerous community facilities would be improved. Mobility for low-income and minority communities in the Gulfton and Third Ward areas would be enhanced.

### **Southeast Corridor Light Rail Transit Extension to Hobby Airport**

This project would benefit minority and low income communities from Houston's East End to the vicinity of Hobby Airport by providing public transportation to gain access to Hobby Airport. It would also connect communities near Hobby Airport to Downtown Houston, which is a major employment center.

### **US 90A Commuter Rail**

This proposed project would enhance access for inhabitants of majority-minority and low-income census tracts travelling to the Texas Medical Center and Downtown Houston, which are major employment centers. Access to the UH-Downtown and the Houston Community College central campus would also be enhanced.

### **U.S. Highway 290 Commuter Rail**

Persons who participated in EJ meetings held in Waller County expressed a desire for express bus or train service to Houston. This project would provide an alternative that addresses this stated preference.

## **Draft**

Moreover, adjoining the alignment are numerous census tracts that are inhabited by majority-minority populations and, to a lesser extent, low-income populations.

### **Galveston –SH 3 Commuter Rail**

As is true of Waller County EJ participants, Galveston County EJ meeting participants identified public transportation to Houston as a priority. The proposed Galveston-SH3 Commuter Rail project will connect Galveston to Houston via rail transport, enhancing access to Downtown Houston, which is a major employment center, and also to the College of the Mainland and Ellington Field. This project also has the potential to decrease congestion on IH-45 South.

## **Signature Express Bus Projects**

There are 30-plus Metropolitan Transit Authority (METRO) signature express bus projects proposed for inclusion in this 2040 Regional Transportation Plan. According to METRO, signature express bus service is designed to provide “faster travel and fewer stops aboard high-end hybrid vehicles, plus greater reliability and increased customer convenience through the use of integrated technology, infrastructure, and operational investments.” (*www.ridemetro.org*)

All of the proposed Signature Express Bus projects would enhance mobility for persons residing in census tracts with a concentration of minorities. The majority will enhance mobility for low-income persons.

The signature express buses would also improve access to employment centers and educational institutions such as Houston Community College campuses, the Texas Medical Center, Texas Southern University, University of Houston campuses, Lone Star College campuses, hospitals, and major employers.

## **Highway Projects**

The number of miles of highway improvements that are proposed for census tracts with higher than average minority populations and census tracts with average and lower than average concentrations of non-minorities are comparable. Moreover, H-GAC anticipates region-wide improvements in air quality, so it is possible that neither population group would experience adverse impacts. However, in the absence of an identification of land uses proximate to projects that will add highway capacity, it is not possible to precisely pinpoint air quality impacts.

Improvements to existing highways and roads consistently ranked high as a priority for members of EJ groups that completed the survey; thus highway improvements are likely to be well received.

Following is an inventory of selected highway improvements that would potentially affect EJ populations. These projects have the potential to increase mobility, enhance access to employment centers and community facilities, improve connectivity, and relieve congestion for EJ populations.

There are also roadway improvements that are likely to affect EJ populations, but they are too numerous to address.

## Draft

### SH288

Toll lanes construction, widening, and major interchange improvements

- **IH 610 Southbound to US 59 Eastbound/Northbound**  
Construct direct connector
- **Hardy Toll Road Extension**  
From IH 610 to US 59/IH 10
- **US 290/Hempstead Road**  
US 290/Hempstead Road managed lane construction, widening, and improvements
- **I-10 East, SH 73 East to Jefferson County Line**  
Widen existing four lane to six lanes
- **Beltway 8, SH 288 to IH 45 S**  
Widen from four to eight main lanes in sections
- **Beltway 8, SH 225 to IH 10**  
Widen from four to eight lanes by constructing a bridge across the ship channel
- **SH 146, Fairmont Parkway to Red Bluff Road**  
Widen to six lanes with two 2-lane frontage roads
- **SH 146, at BS 146E to Ferry Road**  
Construct four main lanes and grade separation

### Commuter and Light Rail Projects

EJ populations about the proposed US90A, Galveston, and Prairie View commuter rail alignments, with minority and low-income concentrations occurring most frequently. However, zero automobile households and the remaining EJ populations also would benefit. Ultimately, environmental assessments that identify potential impacts will be prepared for these projects and adverse impacts will be identified, along with mitigation measures.

All of the METRO Solutions Light Rail Transit lines have concentrations of EJ populations occurring in segments of the lines. Environmental assessments have been completed for these lines, except for the proposed extensions to Hobby and George Bush-IAH airports. Assessments that have been completed identify potential impacts, along with proposed mitigation measures.

Positive impacts of the light rail and commuter rail lines would include improved mobility, as well as enhanced access to employment, social services, educational institutions, and hospitals and other forms of health care.

## **Draft**

### **SUMMARY**

EJ populations would likely experience benefits from the proposed transportation improvements included herein. Enhanced access to employment centers, community centers, colleges and universities, and health care facilities are among the benefits that can be anticipated. It is possible that adverse impacts to air quality and land uses would also occur, but these impacts may not be disproportionate, given the distribution of proposed projects.

Finally, EJ populations ranked public transportation as a high priority. Proposed expenditures do not reflect this priority; however, if a substantial number of the public transportation projects that are proposed are eventually built, this may change.



## **Section II**

### **ENVIRONMENTAL JUSTICE METHODOLOGY**

The following narrative describes the methodology used by H-GAC to comply with the federal directive, and at the same time, address H-GAC's goals relative to Environmental Justice.

#### **1. PUBLIC ENGAGEMENT**

Metropolitan Planning Organizations are required to provide adequate opportunity for EJ populations to provide input to Regional Transportation Plans. Moreover, H-GAC is committed to this goal.

The EJ public engagement process for the 2040 RTP featured numerous opportunities for EJ populations to participate in the planning process. H-GAC's EJ public engagement process went beyond minimum requirements in its pro-active outreach at every phase of the plan development process. The robust nature of this process enabled H-GAC to truly engage EJ communities and discover their priorities.

The public engagement process incorporated a number of methods employed to ensure maximum participation and input. These methods included the use of census data to identify concentrations of EJ populations, meetings held in EJ communities, and the provision of opportunities to submit comments online.

As described in the Environmental Justice section of this document, meetings were publicized through one-on-one telephone contact with community leaders and public agency representatives, flyers placed in public gathering places, press releases, and notices sent to individuals via email and the U. S. Postal Service.

## 2. Identification of EJ Indicators

Primary and secondary indicators, also referred to herein as categories, were chosen as inputs to the assessment of potential impacts. The two primary indicators are membership in a minority group, including African-Americans, Asians and Pacific Islanders, and persons of Hispanic/Latino origin and low-income households, defined as households below the poverty level. The minority and low-income indicators are classified as primary because they are identified in *Executive Order 12898 and the DOT and FHWA Orders on Environmental Justice*.

Five secondary indicators were chosen to identify EJ concentrations. These additional indicators were chosen on the basis that persons and households that fall in these categories are likely to be as vulnerable to disproportionate health, environmental, social, and economic impacts as minorities and low-income populations. These additional indicators expand the focus of environmental justice, augmenting an assessment that is traditionally based on minority and low-income status.

The secondary indicators are:

- **Elderly:** Persons 65 years of age and older
- **Limited Educational Attainment:** Persons age 25 and older that did not complete high school
- **Zero Automobile Ownership:** Households that do not own an automobile
- **Female Heads of Household:** Households headed by a female
- **Limited English Language Proficiency:** Persons age 5 or older that do not speak English or do not speak English well.

U. S. Census Bureau American Community Survey data was relied upon for the identification of concentrations of populations in the seven categories. The 2007-2011 American Community Survey (ACS) data was acquired in a database format that detailed the seven indicators at the census tract level. This dataset was used in lieu of the 2010 Census data because the ACS replaced the census "long form" that traditionally provided the demographic estimates included in this analysis. The tabular database containing the ACS data was joined to TIGER line/shape files at the census tract level. Performing this database join enabled the analysis to be performed in GIS. A description of each of the seven indicators appears in **Table 1**.

**Table 1: Environmental Justice Indicators**

Indicator	Description
<b>Minority Population</b>	Total population of those not listed as “White, Not-Hispanic” that includes: African Americans, American Indians, Asians, Native Hawaiians, Hispanics, other, and those of two or more races. To avoid double counting, only “non-Hispanic” whites are classified as white.
<b>Low-Income Households</b>	Households with income below poverty level as defined by the US Census Bureau
<b>Senior Population</b>	Population 65 years or older
<b>Limited Educational Attainment</b>	Population 25 years or older without a high school diploma or GED
<b>Zero Automobile Ownership</b>	Households with no vehicles available
<b>Female Head of Household</b>	Households with more than one person in which a male head of household is not present
<b>Limited English Proficiency</b>	Individuals 5 years or older that speak English “Not Well” or “Not at All”

### 3. Calculation of Regional Averages

Regional averages were calculated for the purpose of establishing benchmarks for the identification of concentrations of persons/households in the seven categories. The mean value (as a percentage of the region’s total population) and standard deviation above the average was calculated for each indicator. The equations to determine average percentages for each indicator are as follows:

**A. Equation for Minority Population as a Percentage of Total Population:**

$$\text{Minority Population by \%} = \left( \frac{["Total Population"] - ["White, Not Hispanic Population"]}{["Total Population"]} \right)$$

**B. Equation for Low-Income Households as a Percentage of Total Households:**

$$\text{Low Income Households by \%} = \left( \frac{["Households with Income Below Poverty Level"]}{["Total Households"]} \right)$$

**C. Equation for Senior Population as a Percentage of Total Population:**

$$\% \text{ Population Age 65 or Greater} = \left( \frac{["Population Above Age 65"]} {["Total Population"]} \right)$$

**D. Equation for Limited Educational Attainment (Age 25 or Older Without a High School Diploma) as a Percentage of Total Population:**

$$\begin{aligned} \% \text{ Population 25 or Older Without a Highschool Diploma by \%} \\ = \left( \frac{[\text{Population Age 25 or Older without a Diploma}]} {[\text{Total Population Age 25 or Older}]} \right) \end{aligned}$$

**E. Equation for Zero Automobile Ownership as a Percentage of Total Households**

$$\% \text{ Households with No Automobile Available} = \left( \frac{["Households with No Automobile Available"]} {["Total Households"]} \right)$$

**F. Equation for Female Head of Household as a Percentage of Total Households**

$$\% \text{ Female Headed Households} = \left( \frac{["Households with female householder"]}{"Total Households"} \right)$$

**G. Equation for Limited English Language Proficiency as a Percentage of Total Population Age 5 or Older**

$$\% \text{ Limited English Proficiency} = \left( \frac{["Population that Speaks English Not Well" + "Populaton that Speaks English Not at All"]}{"Total Population Age 5 or Older"} \right)$$

The regional averages and standard deviations for each indicator are presented below in **Table 2**.

**Table 2: Regional Averages and Standard Deviation for EJ Categories**

Category	Regional Average	Standard Deviation from Regional Average	High Concentration Threshold
Minority Population	59.99%	N/A	60.00%
Low-Income Households	13.53	11.42	24.95%
Elderly Population	8.44%	5.06%	13.50%
Limited Educational Attainment	19.55%	16.68%	36.23%
Zero Automobile Ownership	6.03%	7.68%	13.71%
Female Heads of Household	28.61%	11.52%	40.13%
Limited English Proficiency	10.17%	11.01%	21.18%

As **Table 2** illustrates, census tracts where 24.95 percent of households are below the poverty level are classified as low-income households. This figure was derived by adding the regional average plus one standard deviation from the regional average.

Census tracts that contain more than 60.00% of persons that are members of a minority group are defined as having a minority concentration. This approach differs from that used to establish benchmarks for the other six categories, which is to add the regional average plus one standard deviation from the average. This different approach reflects the fact that adding the regional average plus one standard deviation yields an unreasonably high percentage of 87.88%.

#### **4. Assessment of Potential Impacts**

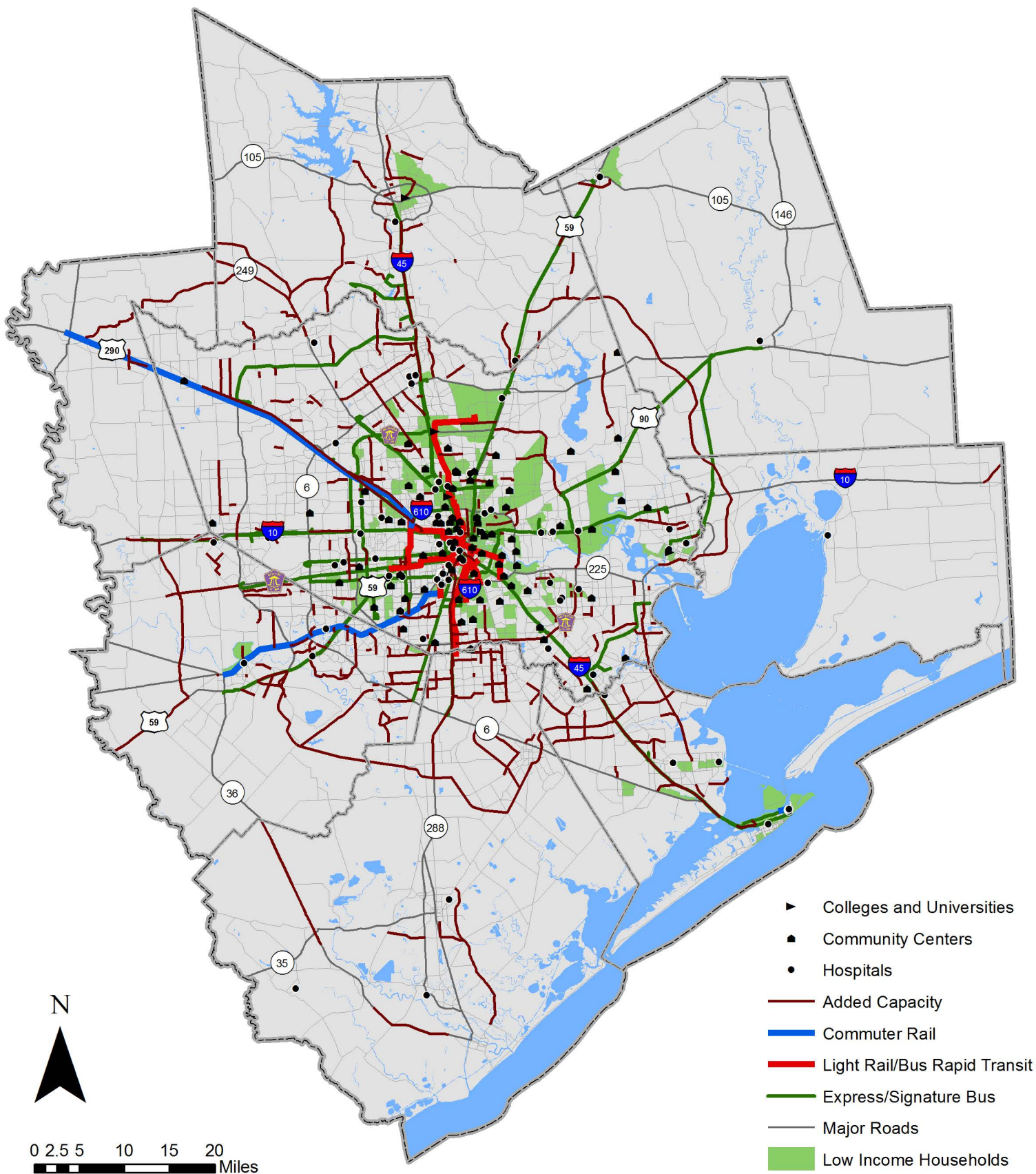
The next step was to assess potential impacts. The approach was to overlay transportation improvements that add capacity along select major roadways, signature express bus routes, commuter and light rail transit, and major investment projects onto maps that displayed concentrations of EJ populations in the seven categories. The emphasis was on analyzing potential impacts to minority and low income populations, although attention was also paid to assessing impacts to EJ populations that fall into the remaining five categories.

H-GAC's database was used to locate and overlay community centers, universities and colleges, and hospitals. The purpose of this activity was to facilitate an assessment of how proposed projects might affect access to these institutions. Lastly, the locations of major employers were identified, though not mapped, to facilitate an assessment of access to employment.

An additional input to this analysis are the survey results that were compiled and aggregated by income, elderly status, access to an automobile, and educational attainment.

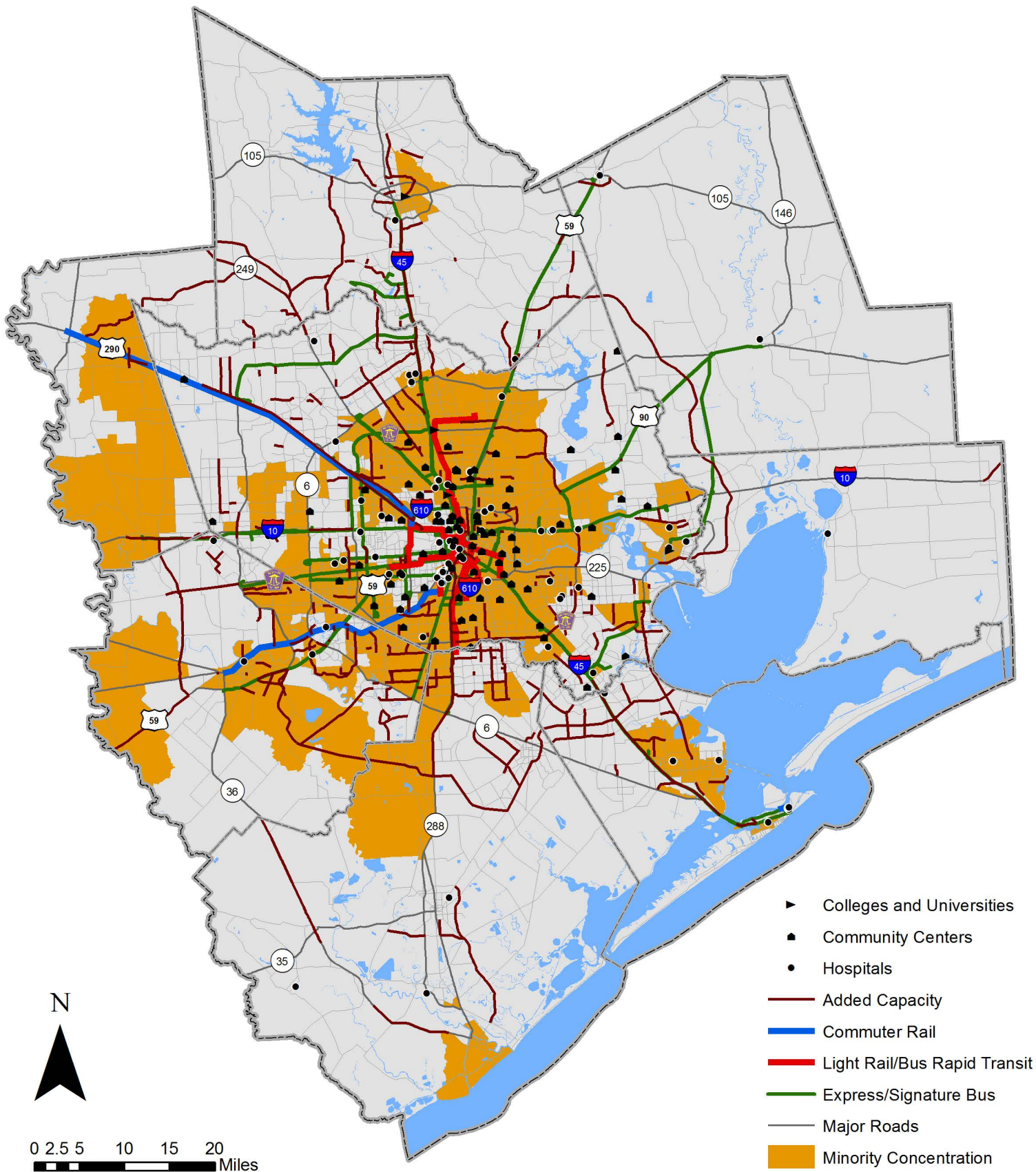
The maps included in **Section III** of this appendix represent the visuals that supported the assessment of potential impacts.

# Low Income Households



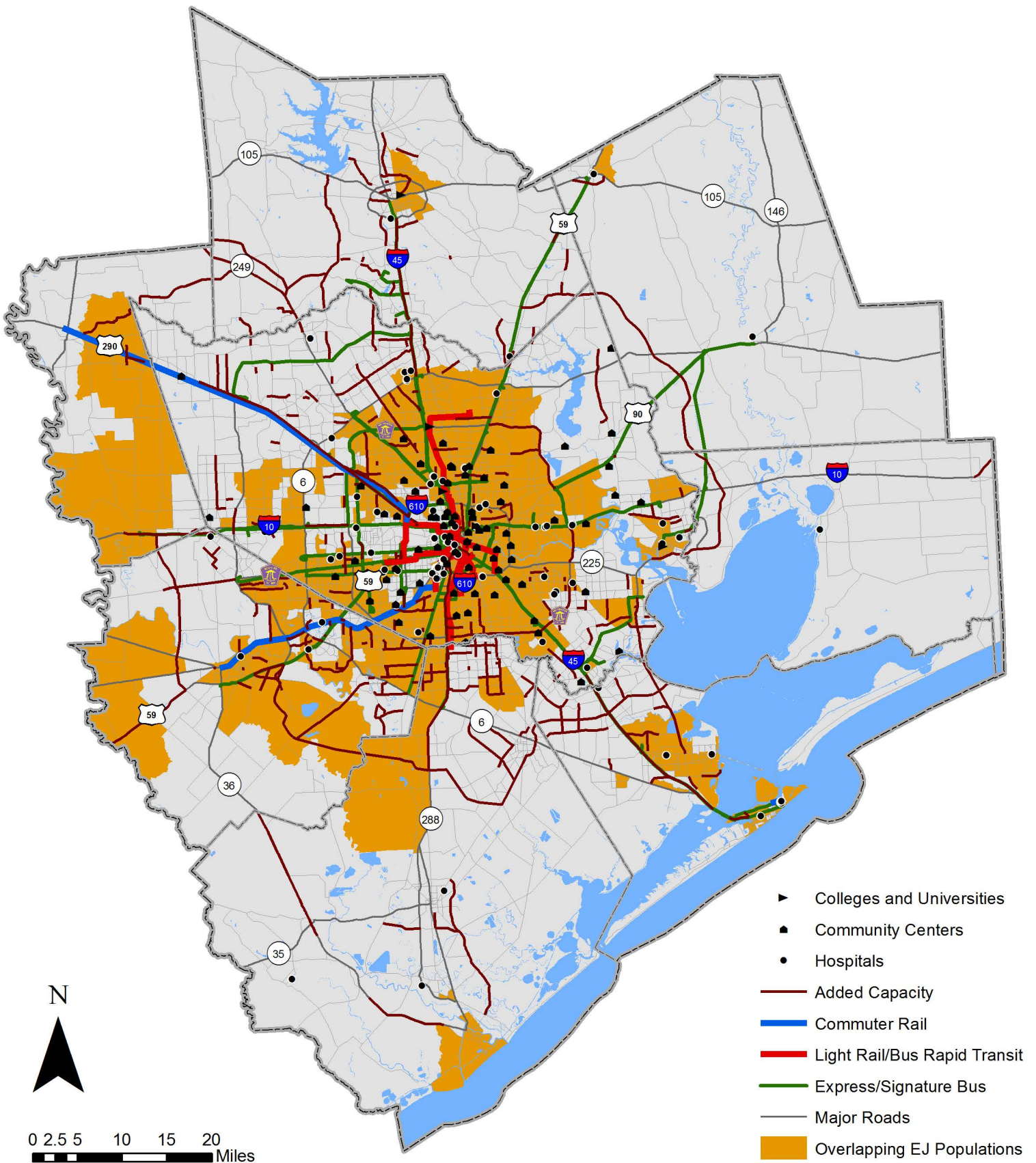


# Minority Concentration



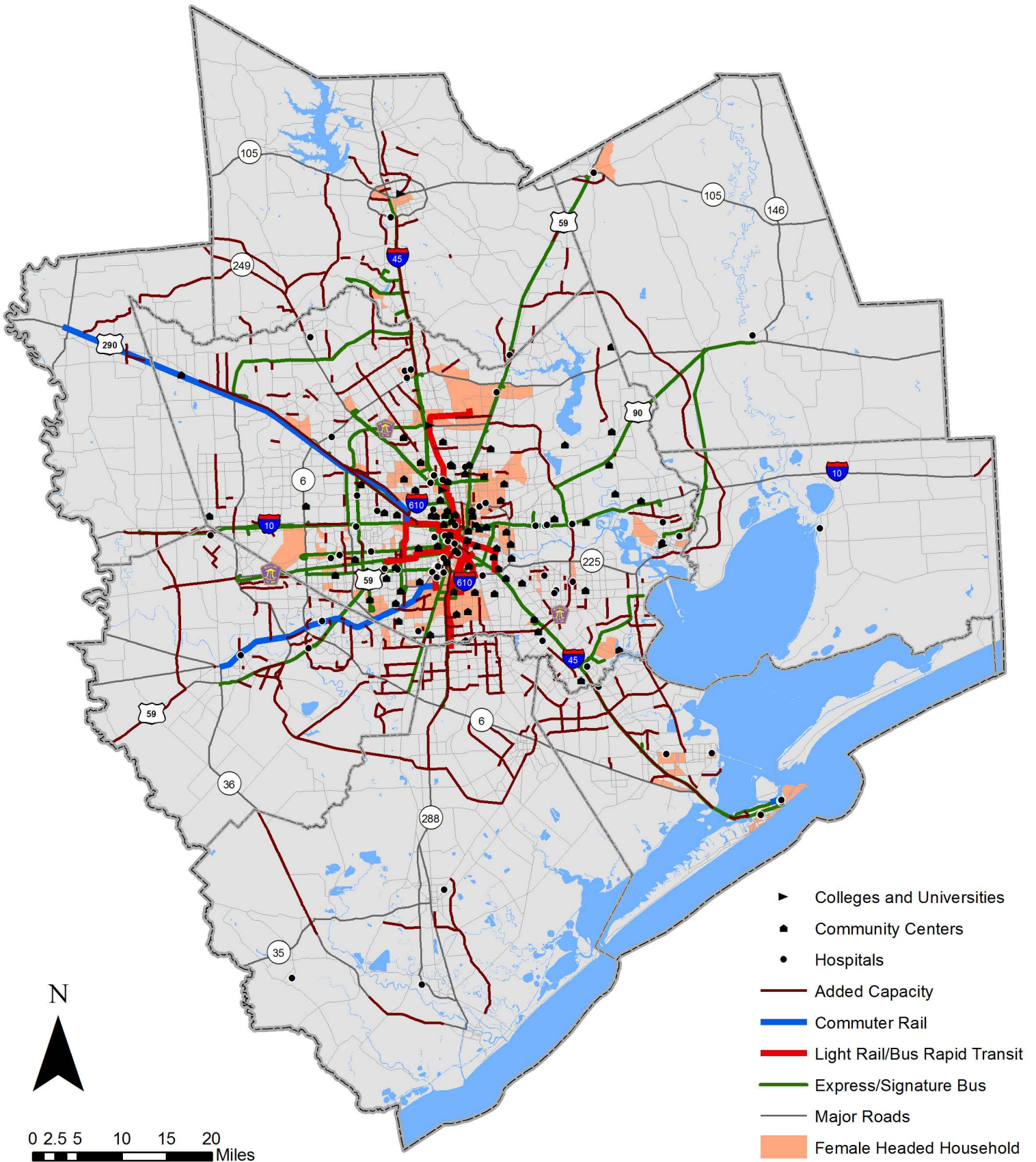


# Overlapping Minority and Low Income Populations

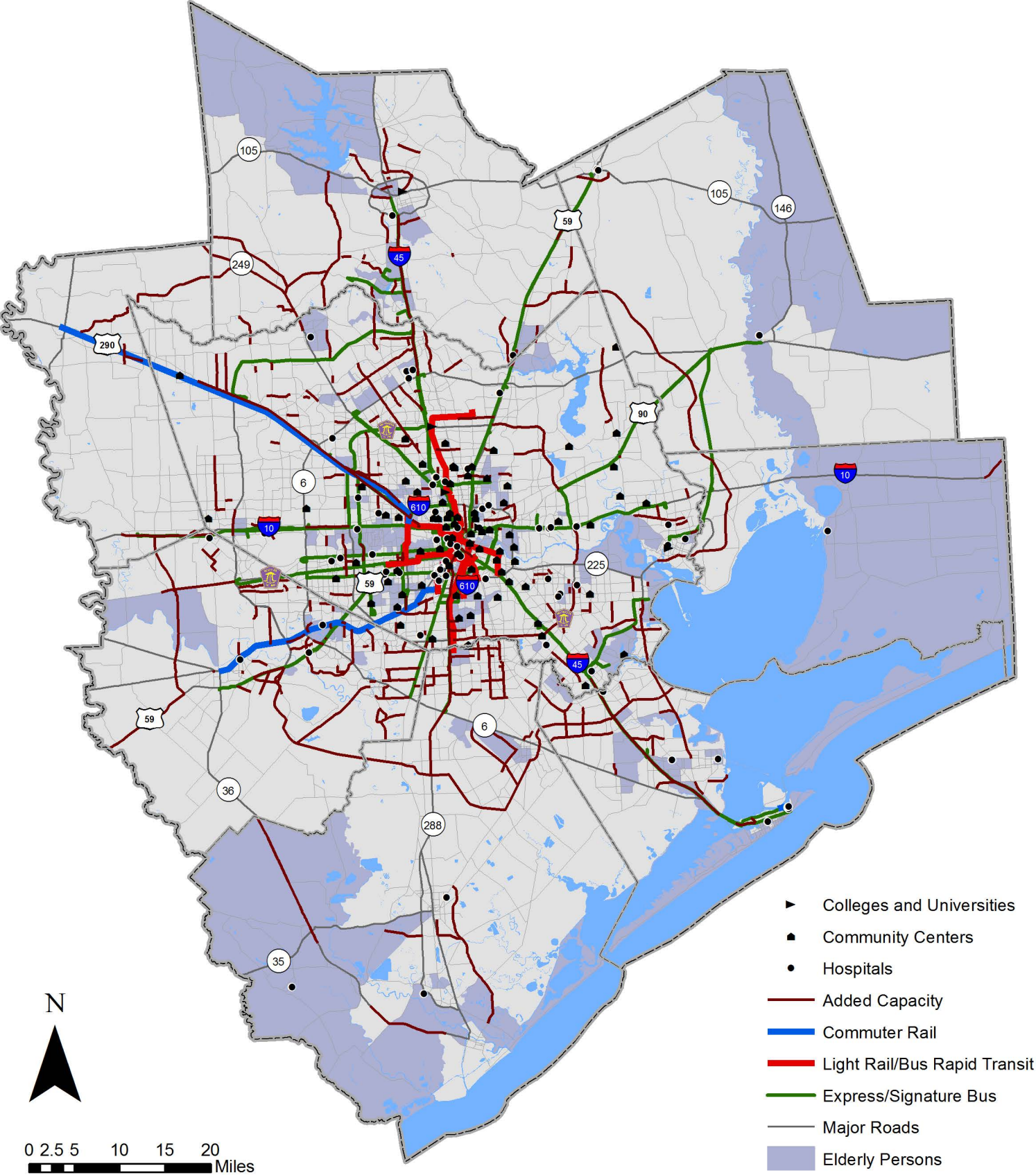




# Female Headed Households

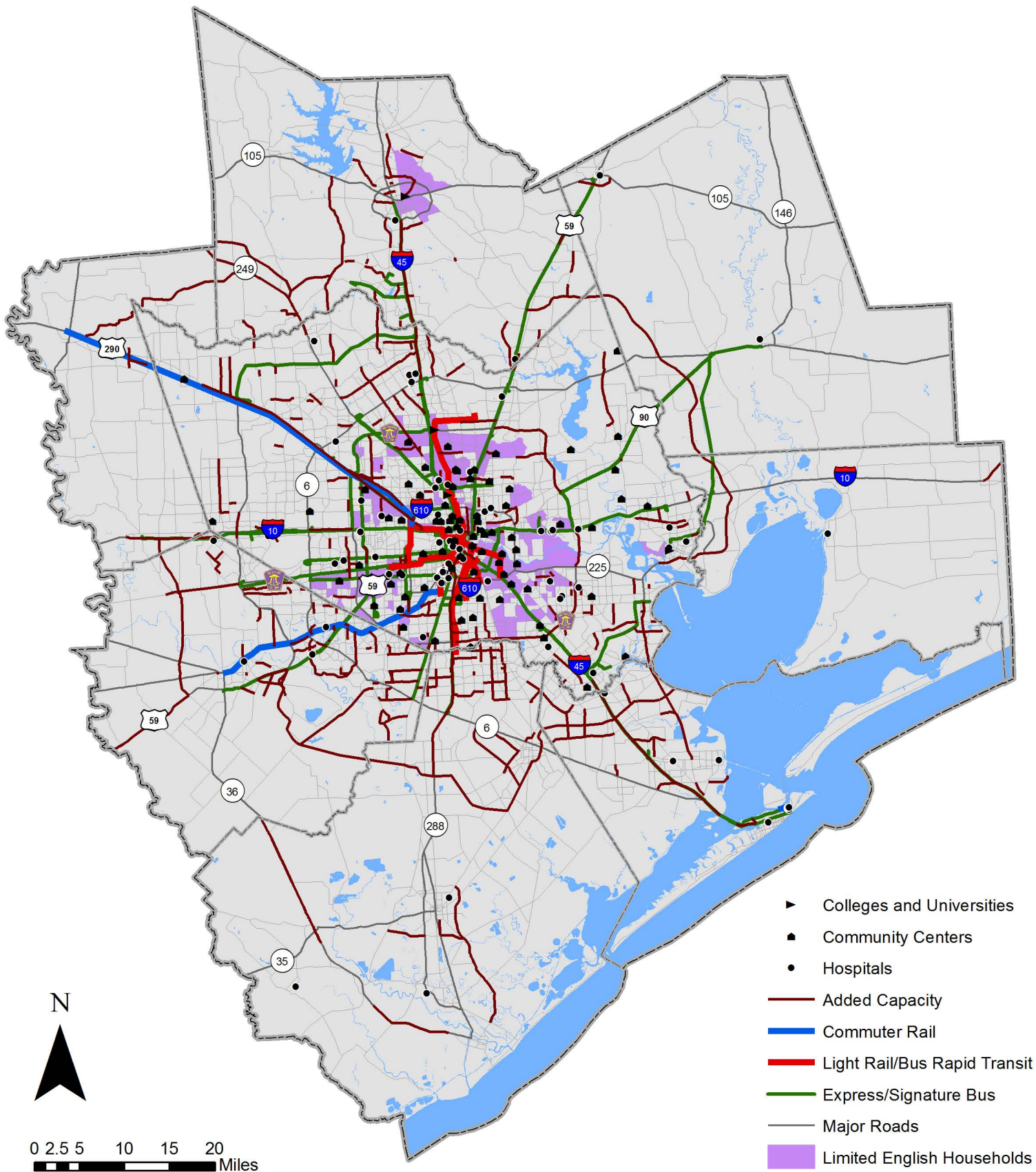


# Elderly Persons



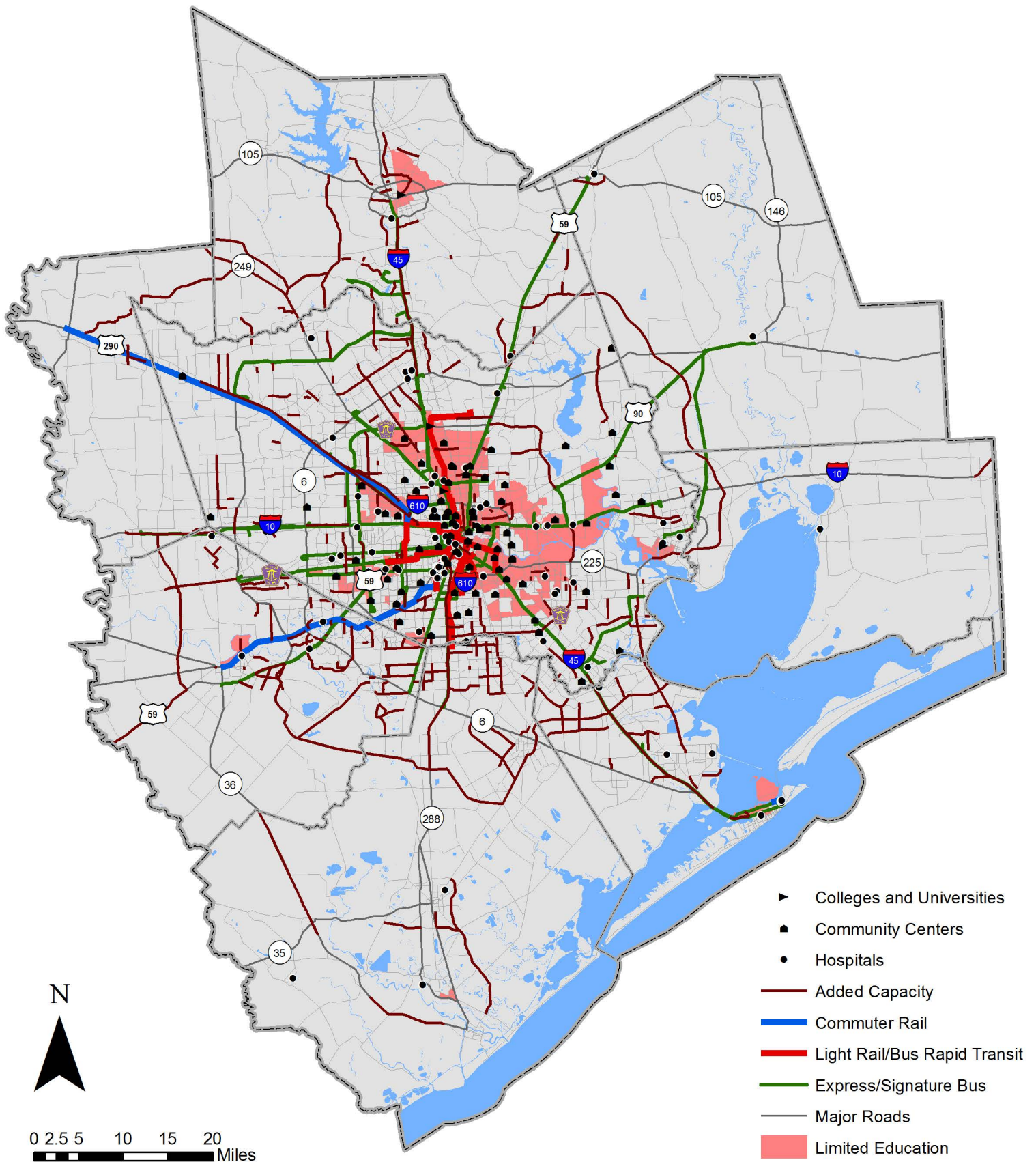


# Households with Limited English Proficiency





# Limited Educational Attainment



# Zero-Auto Households

