

Gulf Coast Regionally Coordinated Transportation Plan Update



Gap Analysis

Houston-Galveston Area Council

May 2017

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Errata: This March 2017 version of the RCTP Gap Analysis document has been enhanced subsequent to the distribution of the February 8, 2017 version of the Revised Gap Analysis document. The major revisions were recommended by H-GAC staff/ management and are noted briefly below;

- The color scheme for Figure 2. Transit Travel Times to Major Employment Centers was reversed so that the core areas with the shorter travel times are represented in green and the outer areas with longer travel times are shown in red
- The RCTP Transit Financial Summary, Table 8, was modified to include actual costs and ridership data (instead of estimates) for the transit services provided in Liberty, Montgomery and Walker counties. Those 3 counties are within the Gulf Coast Planning Region and are also part of the 16-county Brazos Transit District
- The Financial Gap Estimate for Smaller Transit Providers, Table 9, was corrected to estimate the compounded growth of the incremental transit investment
- The population density maps for 2014 and 2015, Figures 8 and 9, were combined into one map with 2015 population density values that now correspond with the METRO Service Standards for Route Spacing in Table 5.



Gulf Coast Regionally Coordinated Transportation Plan

Gap Analysis

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1. Introduction

The purpose of this Gulf Coast Regionally Coordinated Transportation Plan (RCTP) Gap Analysis is to document the gaps in the regional transportation system and to use that information in the development of potential strategies to address those gaps. Gaps in regional transportation services can generally be defined as the differences between existing and desired conditions. The Federal Transit Administration provides a working definition of transit service related gaps for seniors and persons with disabilities: “When public transportation is insufficient, inappropriate or unavailable”.¹

Those terms mean different things to many people and for the purposes of this gap analysis the customers’ viewpoint is a primary concern. Therefore, some of the information that is presented in this document is based on qualitative information from various sources. In addition, geographically based information is used to highlight some generalized areas with apparent gaps in transportation services. This gap analysis is one part of a comprehensive statewide RCTP *planning process* that is designed:

“..to provide more efficient and effective public transportation services, especially for priority populations including individuals with disabilities, individuals 65 and older, people with low incomes, veterans, children, and others...The lead agency is accountable for assuring an inclusive, collaborative planning process. This includes convening stakeholder meetings to discuss and identify gaps and inefficiencies in transportation services as well as facilitating discussions for stakeholders to identify solutions for filling these gaps and correcting these inefficiencies.”²

This gap analysis is not intended to prescribe specific actions for regional transit operators nor to articulate the unique details of the Gulf Coast regional public transportation systems that have evolved over time. Due to schedule and resource constraints the information presented in this document is intended to be brief and *generally* informative.

The gaps in transportation services can also be described in various ways, including but not limited to, the following:

- Geographically
- Public comments and suggestions
- Temporally, by days of the week and times of the day
- Access measures such as travel times
- Levels of Services
- Financial Resources

¹ Federal Register Vol 79, No. 109, June, 2014.

² Regionally Coordinated Transportation Planning Guidebook, Texas Department of Transportation Public Transportation Division, 2015.

Another type of gap that was mentioned during the RCTP outreach efforts relates to infrastructure development. More research is needed to better understand current activities and plans to address the infrastructure related gaps. Relevant information from the City of Houston website is summarized below.

Infrastructure gaps refer to obstructions in the path from an individual's origin to or from a bus stop or to or from their destination. Normally, focused upon individuals with disabilities, it may be also relevant for other individuals due to safety considerations. Obstructions may include: lack of sidewalks, sidewalks on one side of the street, poorly maintained or narrow sidewalks and lack of ramps.

Well maintained sidewalks and ramps provide a clear path for persons to travel to and from bus stops. They encourage the use of fixed route bus service and mitigate the use of complementary paratransit service for those individuals with disabilities who have the ability to navigate to bus stops.

The City of Houston has implemented the Safe Sidewalk Program. Part of The Safe Sidewalks Program, The Pedestrian Accessible Review (PAR) is designed to improve the ability of persons with disabilities to navigate Houston. Administered by the Mayor's Office for People with Disabilities (MOPD), the PAR can provide an accessible path of 1,500 lineal feet from a variety of stops deemed important to an individual with disabilities' quality of life. The Metropolitan Transit Authority of Harris County (METRO) is participating as a partner in the program.

The goal of the joint effort between the City of Houston and METRO is to increase the level of accessible sidewalks and overall mobility for citizens with disabilities. Infrastructure gaps are more acute in locations outside of METRO's service areas. Sidewalks are more sporadic, as are ramps and bus stops which are often difficult to locate.³

This regional gap analysis will first highlight areas with transportation related needs (potential gaps) for essential stakeholders that were identified in the RCTP Needs Assessment process. One of the planning tools that can highlight some of those areas with potential gaps in transit services is the Transit Need Index (TNI). It was recently updated and is based on demographic data for the essential stakeholders including the factors as shown in **Table 1**.⁴

³ Source: City of Houston at <https://www.publicworks.houstontx.gov/sidewalk-programs>.

⁴ Gulf Coast Regionally Coordinated Transportation Plan, Demographic Profiles, H-GAC, July 2016.

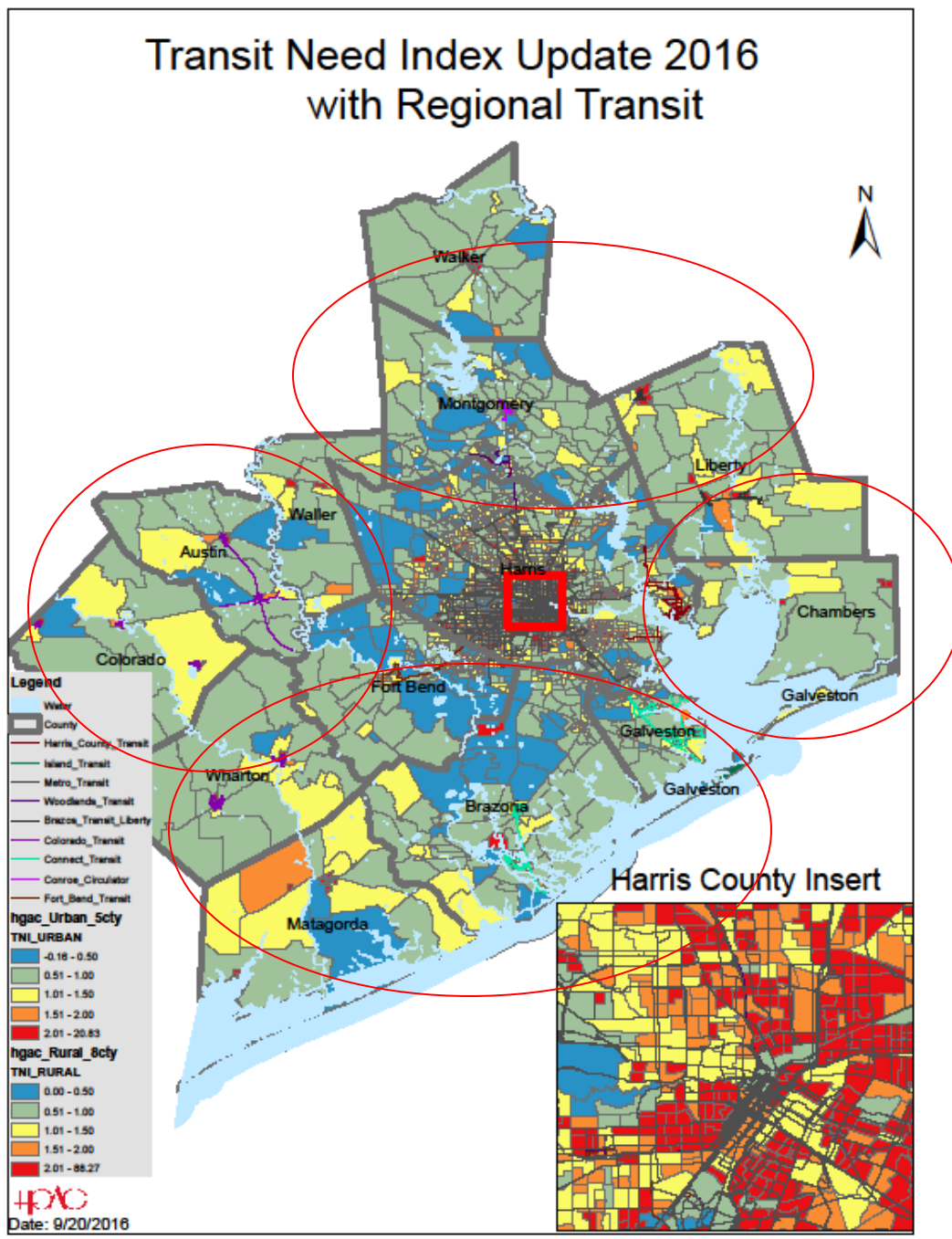
Table 1. Transit Need Index Factors and Scoring Weights

Factors	Urban Scoring Weights	Rural Scoring Weights
Population Density	20%	10%
Percent Household with Zero Automobiles	20%	10%
Population over 65	15%	25%
Persons with Disabilities 18-64	15%	25%
Children 6-17	10%	10%
Median Household Income	20%	20%
TOTAL	100%	100%

Details about the regional TNI methodology are available in the Gulf Coast RCTP Demographic Profiles report. A summary of the TNI methodology for the block-group level of geography is included in **Appendix B**.

Figure 1 presents a thematic map of the regional TNI values for urban and rural block groups within the Gulf Coast Region. More detailed analyses of the TNI values, associated factors and other conditions will be needed *within each county* to better understand the apparent gaps in transit services as indicated for areas with the higher transit needs (shown in red and orange). As shown, those areas are evident in many of the smaller cities throughout the region. The red ellipses indicate those areas generally. More detailed maps were developed recently as part of a regional transit buffer analysis of residential and employment locations. Those maps and summary tables are included in **Appendix C**.

Figure 1. Gulf Coast Transit Need Index



Section 2 contains summary information about the RCTP public comments relative to perceived gaps in the regional transportation system. That is followed by the geographic analyses in **Section 3**, starting with Harris County. The gap analysis focuses more attention on the apparent

transportation related gaps within Harris County which contains approximately 67% of the region's 6.8 million people. Additional transportation gaps outside of Harris County are also considered including the larger urbanized areas, the 8-County Transportation Management Area (TMA) and the Gulf Coast Planning Region (13 counties).

Some of the key findings from the regional gap analyses are summarized below:

- According to recent estimates, 45% of the regional population is located within ¼ mile of the regional transit system local bus routes
- The majority of the regional population (55%) is located outside of that walking distance which suggests a formidable gap in access to the regional transit services.
- 68% of regional transit trips to major employment centers take more than 90 minutes for people who walk to access transit services
- Several areas within the region with significant concentrations of employment are not served by any local bus service.

After the discussion of geographic gaps, information is provided in **Section 4** relative to Temporal Profiles and Levels of Service gaps. **Section 5** introduces a discussion about Financial Gaps and Strategies to Mitigate the Gaps are included in **Section 6**. Performance measures to evaluate effectiveness are discussed in **Section 7**.

The Gulf Coast region's transportation service providers have worked together for years to coordinate and expand public transportation where it is most needed as funding has been available. As part of the regionally coordinated transportation planning process they have worked with the Regional Transit Coordination Subcommittee (RTCS) and others to improve the transportation options for residents.

Each county's transportation system is unique in regards to its historical development patterns, the transportation related priorities that have evolved over time and the political will of the elected officials and local community leadership.

More details are provided in the following sections.

2. Summaries of Public Comments and Recommendations

Table 2 includes brief summaries of the public comments that were received through the RCTP public outreach efforts for the essential stakeholders. The summaries of comments and suggestions are described in terms of transportation related needs or gaps. Several local strategies are already in process to address many of those needs/gaps. Some of the potential strategies to mitigate those gaps are described in terms of service expansions (where feasible) and the need for additional financial resources. Following **Table 2** are brief summaries of gap related comments and suggestions that were provided in the RCTP Community Transportation Suggestion Box, the Power of Transit- Symposium/Panel Discussion and the Focus Groups.⁵

Table 2. Summary of Transportation Related Needs (Gaps) for Essential Stakeholders

Stakeholders	Transportation Related Needs	Strategies in Process	Gaps
Seniors (65+)	Travel Training/Mobility Management, Infrastructure Improvements, Complete Streets and improved access to transit, Safety Improvements.	Pedestrian Accessible Review (PAR) Program-Coordinated infrastructure planning for Complete Streets with City of Houston, METRO. METROLift Freedom Q Card and Travel Training.	Expand to outer areas as feasible. Additional Financial resources needed.
Persons with Disabilities	All the above plus Transitioning Programs for H.S. Students.	METRO Bluetooth Beacon Pilot Project, Feeder Service Pilot Project, Harris County Transition to Tomorrow. Mounting Horizons Center for Independent Living (CIL). Houston Center for Independent Living Initiatives (Brazoria and Fort Bend Counties CILs).	Additional Financial resources needed.

⁵ Gulf Coast RCTP Needs Assessment, H-GAC, October 2016

Persons with Low Incomes, Bus Riders	Improved access to jobs in outlying areas, improved on-time performance, better reliability, Restrooms at Transit Facilities	Harris County Transit initiatives in eastern and northwestern Harris County, METRO New Bus Network (NBN) enhancements.	Increased coordination with METRO, other transit service providers, local elected officials, community leaders.
Youth	Improved access to colleges, universities, jobs and training opportunities	Gulf Coast Workforce Board Disconnected Youth Pilot Project, Harris County Transition to Tomorrow, Transportation for Disadvantaged Youth Pilot Project.	Additional Financial resources needed. Closer coordination with School Districts.
Veterans	Improved access to housing, jobs and training opportunities.	METRO MVP Pass for eligible veterans. Harris County Veterans Services Programs coordinating transportation and housing initiatives for veterans transitioning from homelessness.	All trip purposes, late evenings, weekends, Veterans Travel Card or electronic Vouchers.

Several respondents to the RCTP Community Transportation Suggestion Box (May 2016) recommended the expansion of regional transit services as outlined below:⁶

- Expand local bus services to west of Hwy 6 (Peter Wang)
- Expand multi-modal transportation in the region, adoption of Complete Streets Policy (Linda Shead, Jay Crossley), including commuter bus options in the Energy Corridor District (Clark Martinson)
- Include passenger rail in all freeway corridors (Lynn)
- Prioritize the expansion of transit services in the Clear Lake, Bay Area, Galveston County areas (Heather Millar, Lynn Lohr, Roger Mora)
- Include more healthy (active) transportation options (Doug House)
- High speed rail connections between Houston, Dallas and San Antonio (J. Rice)
- Include non-medical transportation (all trip purposes) for seniors and persons with disabilities, Implementation of more ADA compliant vehicles (Lisa Hayes)
- Increase use of transportation vouchers for low income persons, increase carpooling options, consider city-based trolleys (Roger Mora).

Other respondents recommended refinements to the current transportation system such as:

- Enhanced public information about available transportation options (David Noffsinger, Roger Mora)
- Coordination of trip schedules with health care providers (Roger Mora)
- Extended service hours and more routes in the City of Baytown (Feni-Green Small).
- Utilize higher capacity transit vehicles in higher density areas (Michael Newton)
- Increased funding for a more balanced transportation system (Jay Crossley)

Some of the key recommendations from the Power of Transit RCTP Symposium/Panel Discussion (June 2016) are consistent with many of the RCTP public comments related to regional transportation needs and apparent gaps in the regional transportation system:

- Replicate best practices by expanding regional transit success stories
- Establish a One Call/One Click system for regional transportation information, coordination and reservations
- Develop a regional coordinated fare structure
- Utilize advances in technology to improve communication and access to information
- Set up transit information booths (or kiosks) for transit related information in multiple languages

⁶ More details are available in the RCTP Needs Assessment, Appendix C: Summary of Public Comments, H-GAC, October 2016.

- Coordinate transportation infrastructure improvements to include wheelchair and pedestrian access where feasible
- Encourage regional partnerships and collaboration between public and private entities
- Coordinate strategic transportation planning activities to include multiple disciplines
- Focus on strategies to improve access to and from higher capacity transit corridors
- Pursue Commuter Benefit Ordinances by local governments.

When participants in the RCTP Focus Groups were asked about obstacles to their routine travel the following responses are highlighted:⁷

- Extremely difficult to travel to outlying areas such as Channelview, Deer Park, Humble, Missouri City, Webster, Galveston, The Woodlands
- Lack of transportation is a major barrier to job opportunities in the industrial/energy sectors in east Harris County
- Erratic bus schedules make it difficult to get to work on time or to meet medical appointments and job interviews
- Passengers with packages, mothers with young children and strollers impacting boarding process and drivers have been impatient with them
- Recent changes by METRO resulted in routes moved out of some neighborhoods requiring longer walks and safety concerns when crossing busy streets to get to a bus stop.

⁷ Details are available in the RCTP Needs Assessment, Appendix E- Focus Groups Summary Report, October 2016.

3. Geographic Analyses

Background information relative to geographic (urban) gaps is summarized below from a 2011 study conducted by the Texas A&M Transportation Institute for the Texas Department of Transportation Public Transportation Division:

“Public transportation in Texas is funded through a combination of local, state and federal funds. Local funds typically include passenger fares, contributions from local governmental entities and, in some cases local option sales tax funds. Federal and state funding is largely distributed based upon federally defined geographic areas--urbanized areas or non-urbanized areas. For urban transit districts, federal and state funding is based upon characteristics of the entire urbanized area.

However, the transit provider in an urbanized area often has a service area boundary that differs from the urbanized area boundary. In some instances, transit is operated as part of city government and is confined to the city limits, although the urbanized area extends beyond the city limits. In other cases, portions of an urbanized area have not approved a local option tax to support a regional transit authority {such as Harris County Texas; brackets added}.

This results in “urban gaps” portions of an urbanized area that are outside the urban transit provider’s service area. The populations within these gaps face a lack of transit access.”⁸

A transit profile was developed by the Brookings Institute in 2011 that indicated that the Houston metropolitan area ranked 72 out of the top 100 metropolitan areas that were studied, when service area coverage and job access criteria were combined. In addition, the proportion of jobs accessible by transit within 90 minutes, at 30%, was the same as the average of the other 100 metropolitan areas. That research also suggested that there was a missed opportunity to improve the access to jobs by transit because 70% of those jobs could not be reached within 90 minutes.⁹

In August 2015 METRO initiated a significant change in the local bus network to improve the system through the New Bus Network (NBN). METRO reported that the NBN would double the number of people and jobs connected on the transit system by frequent routes operating 15 minutes or better. In October 2015 METRO received the Outstanding Public Transportation System Achievement Award from the American Public Transportation Association (APTA).

The award was given to METRO at APTA's annual meeting in San Francisco. The national organization bestows the award annually to transit agencies in three categories. METRO competed and won in the category for largest transit agencies, those providing 20 million or

⁸ Sizing and Serving Texas Urban Gaps, Arndt et al, Texas Transportation Institute, 2011.

⁹ Missed Opportunity: Transit and Jobs in Metropolitan America, Brookings Metropolitan Policy Program, 2011.

more passenger trips annually. The award acknowledges transit accomplishments over the past three years.



Former METRO President and CEO Shirley DeLibero made the presentation. Accepting on behalf of METRO were President and CEO Tom Lambert, Board members Christof Spieler, Diann Lewter, Sanjay Ramabhadran, and Cindy Siegel.

METRO was judged on safety, operations and maintenance, customer service, financial management, sustainability, workforce development, attendance and employee costs, minority and women advancement, marketing, policy administration, and community relations. METRO was also judged on quantitative measures including riders per hour and total passenger miles.¹⁰

Subsequent to the implementation of the NBN another research project identified some of the ongoing transit accessibility challenges in Houston.

In a recent blog by Leah Binkovitz it was reported that:

“ Among its metrics is the “AllTransit Performance Score”, an index based on transit connectivity, access to jobs and frequency of service...of the 73 US cities with populations greater than 250,000, Houston sits in the middle of the pack with a rank of 34. That’s just behind Dallas, (ranked 31), and behind other Sun Belt cities such as Miami (11), Los Angeles (20), Atlanta (25) and New Orleans (29)...The data suggests transit isn’t always an easy option for Houstonians trying to get to work. However, that finding is also likely affected by Houston’s vast size, relative to other cities”.¹¹

¹⁰ www.ridemetro.org/News Releases 2015.

¹¹ How Houston Stacks Up on Transit Equity, Binkovitz and Holeywell, urbanedge.blogs.rice.edu

Table 3 contains a summary of recent travel demand modeling results for home-based work person trips that could access major employment centers by walking or driving to a transit route. The data is aggregated by travel time bands for 60 minutes or less, between 60 and 90 minutes and more than 90 minutes. The data indicates that traveling to work by transit would take 90 minutes or more for almost 64,000 bus riders who can access the bus system by walking. Approximately 23,000 bus riders with walk access to transit services can get to major employment centers within 60 minutes. An equivalent number of riders who drive to access the transit services have similar travel time characteristics. **Figure 2** illustrates the locations that are accessible to major employment centers within the 8-County TMA area based on transit travel times for local buses and park and ride services. As shown, the core part of the greater Houston region has transit accessibility to major employment centers within 60 minutes or less (shown in green and light green). However, significant portions of counties to the north, east and south of Harris County are beyond the 90 minutes or more time band (shown in red and orange). Those areas are in the northern and eastern parts of Montgomery, Liberty and Chambers counties and the southern portions of Galveston and Brazoria counties.

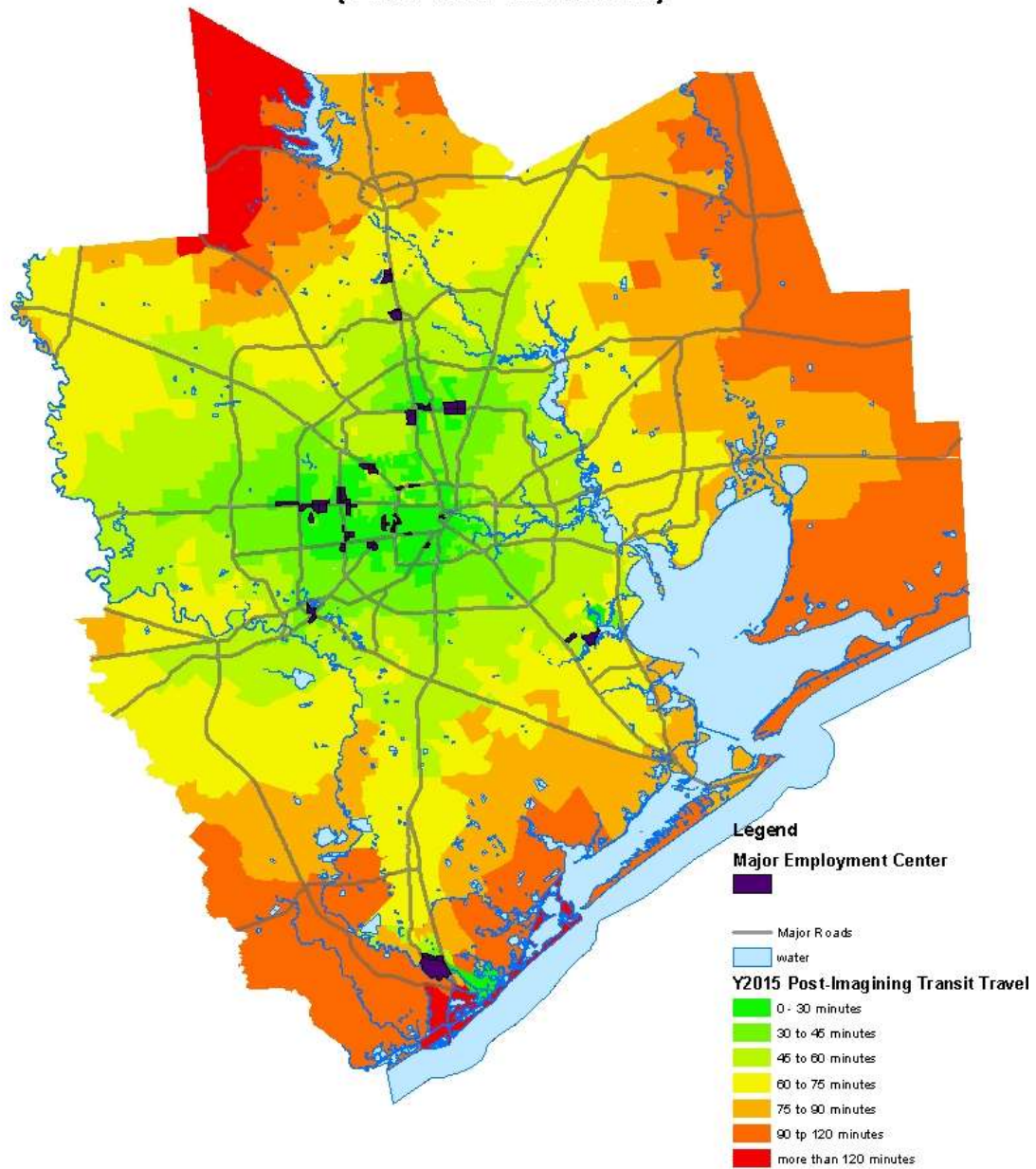
Table 3. Accessibility to Major Employment Centers by Transit Travel Times¹²

Time Bands	Walk Access	Drive Access	# Total Trips
Less than 60 minutes	23,338	23,321	46,659
60-90 minutes	7,304	8,360	15,664
90 minutes or more	63,899	25,193	89,092
Totals	94,541	56,877	151,415

¹² Source: H-GAC Regional Travel Demand Model Results, December 2016.

Figure 2. Transit Travel Times to Major Employment Centers

**Year 2015 Post-Imagining Transit Travel Time
to Nearest Major Employment Center
(PNR time included)**



Another research study by Jiao and Nichols: “points to the need for the city and region to improve other elements of its built environment, not just its mass transit. Improving sidewalk infrastructure or adding more bike lanes would also help to close transit gaps. METRO’s work to improve the region’s overall mobility isn’t done, but neither is that of the city or county.”¹³

It is understood that there are data limitations and assumptions involved in any research effort that compares information for multiple cities such as those noted above. Another source of related information is from the travel demand modeling system that simulates regional travel behavior. **Table 4** highlights related data before-and-after the New Bus Network project was implemented and confirms the *potentially positive impacts* based on transit ridership by trip purposes. That data indicates an increase of 50,245 daily weekday trips or a 16% increase after NBN implementation. The November 2016 ridership report from METRO noted that the fixed route system (local and commuter bus) average daily weekday ridership had actually decreased by 5% since November 2015, led by a 12% drop in the commuter network alone. This despite the overall network being up 0.1% for the month as weekend ridership on local bus continued to show gains.¹⁴

Table 4. Average Weekday Ridership Summary ¹⁵

Trip Purpose	Before NBN	After NBN	Change
Home Based Work	188,813	216,314	27,501
Home Based Non-Work	96,082	116,861	20,779
Non-Home Based	33,321	35,286	1,965
Totals	318,216	368,461	50,245

The difference between the travel demand model estimates and actual ridership, as reported, may be related to other factors such as recent decreases in gasoline prices and higher regional unemployment.

Many of the current gaps in access to the local bus system in Harris County have existed over an extended period of time. Large segments of eastern Harris County are outside of the METRO service area based on the results of the voter referendum that established METRO in 1978. The METRO Service Area includes 1,300 square miles of the total 1,704 square miles in Harris County, approximately 76% of the total land area. One of the key factors of the 1978 Referendum was that one percent of sales tax revenues would be available to help fund transit services within the service area. Several cities opted out of the sales tax referendum when METRO was established. Communities in eastern Harris County largely chose not to have access

¹³ Demand, supply, gap: Transit Deserts in Houston: Kinder Institute for Urban Research, updated 12/14/16 at <https://kinder.rice.edu/blog/Shelton060915/>

¹⁴ Sources: <https://www.ridemetro.org>, Kurt Luhrsen.

¹⁵ Source: H-GAC Regional Travel Demand Model, December 2016.

to that sales tax revenue as a funding source for transit services which could also be used as local match to leverage more federal and state funding to the Gulf Coast region.

Some cities within the taxing jurisdiction of METRO which do not have local bus services have opted to receive a portion of the sales tax revenues paid by their citizens go to fund general mobility roadway project improvements. The General Mobility Program (GMP) was first approved by voters in 1988 to help fund non-transit projects in the greater Houston region. Through that program, 25% of the one cent annual sales tax revenues can be used to fund general mobility projects within those cities.

The METRO Board of Directors recently adopted a set of agency goals that would mitigate some of the gaps in services related to some of the bus riders' comments provided during the RCTP Focus Groups. The top two METRO goals are universal accessibility and enhancing the customer experience. (see Appendices E and F in the Gulf Coast RCTP Needs Assessment for more details).

This RCTP Gap Analysis will highlight some of the gaps in transit services within Harris County that are outside of the METRO service area. Those communities lack the financial resources needed (such as sales tax revenues) for improved transit services. Any improvements to the existing public transit systems resources for sustainability and/or expansion will require collaborations and partnerships with the regional transit operators, local elected officials, business and community leaders and members of the general public.

Figure 3 shows the boundaries for the METRO Service Area. Additional areas within the Metro Service Area that are outside of the METRO local route coverage area are shown in **Figure 4**. The most notable areas are in the northern and western sections of Harris County as well as areas to the east, southeast and south.

Figure 3. METRO Service Area Boundaries

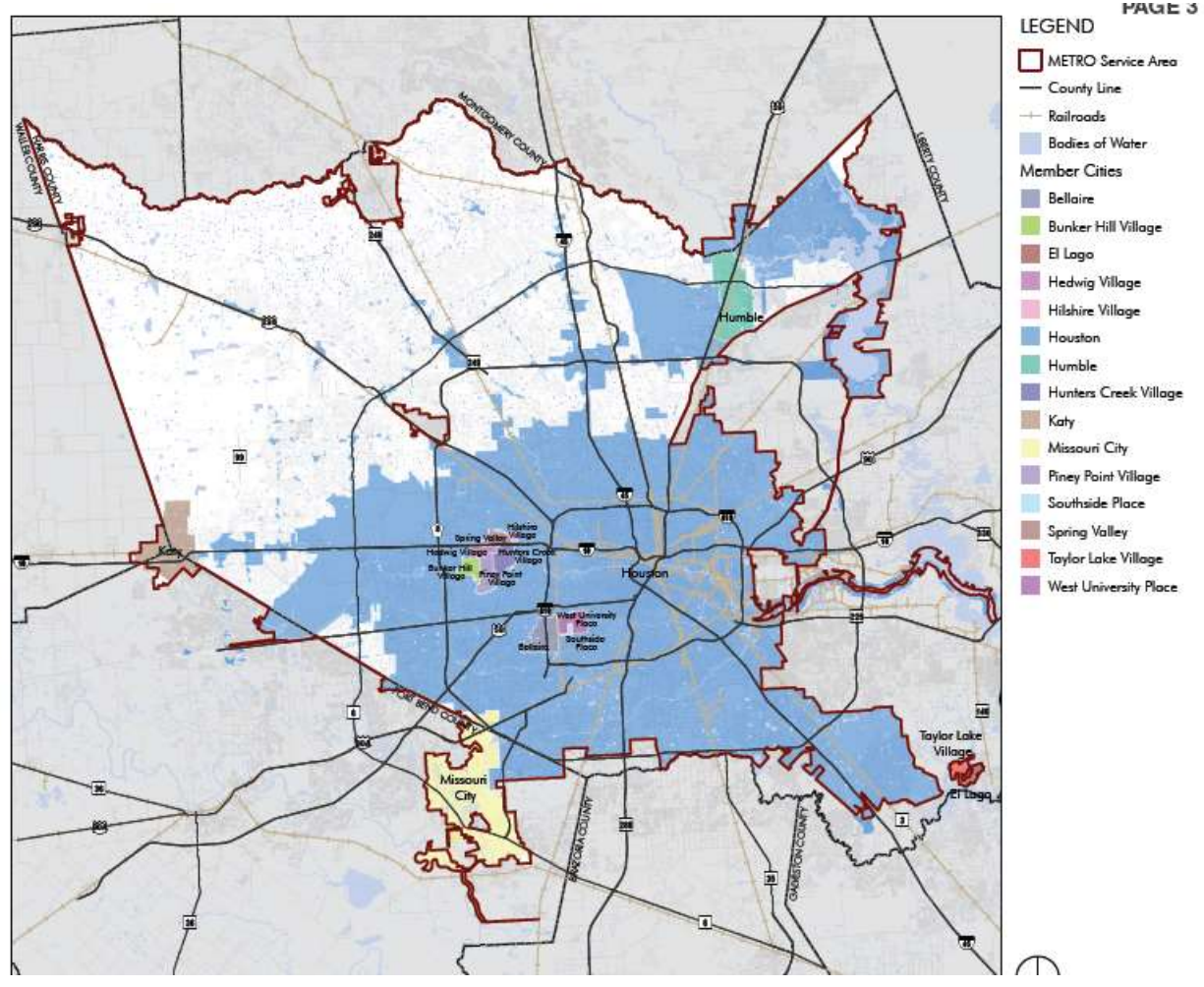
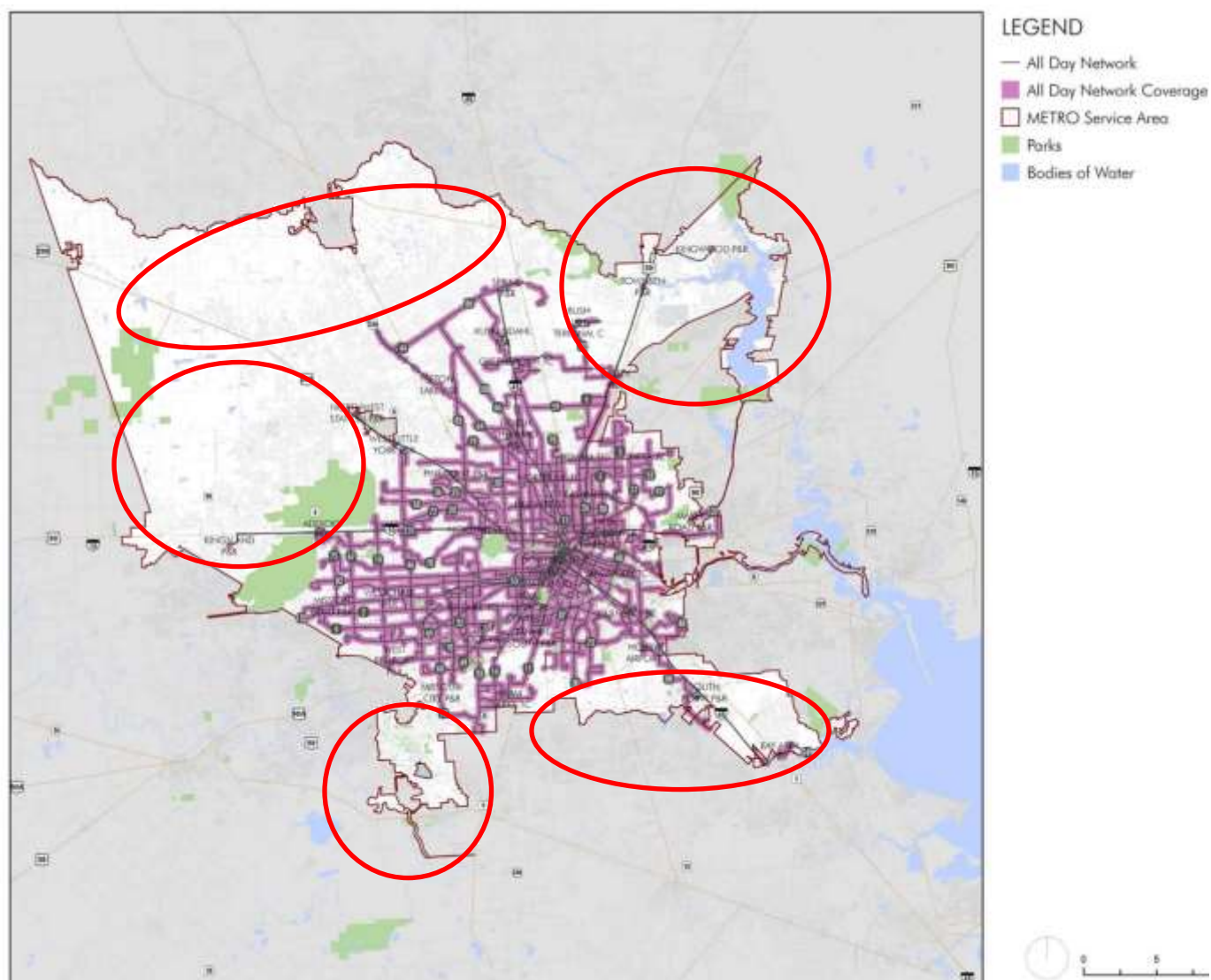


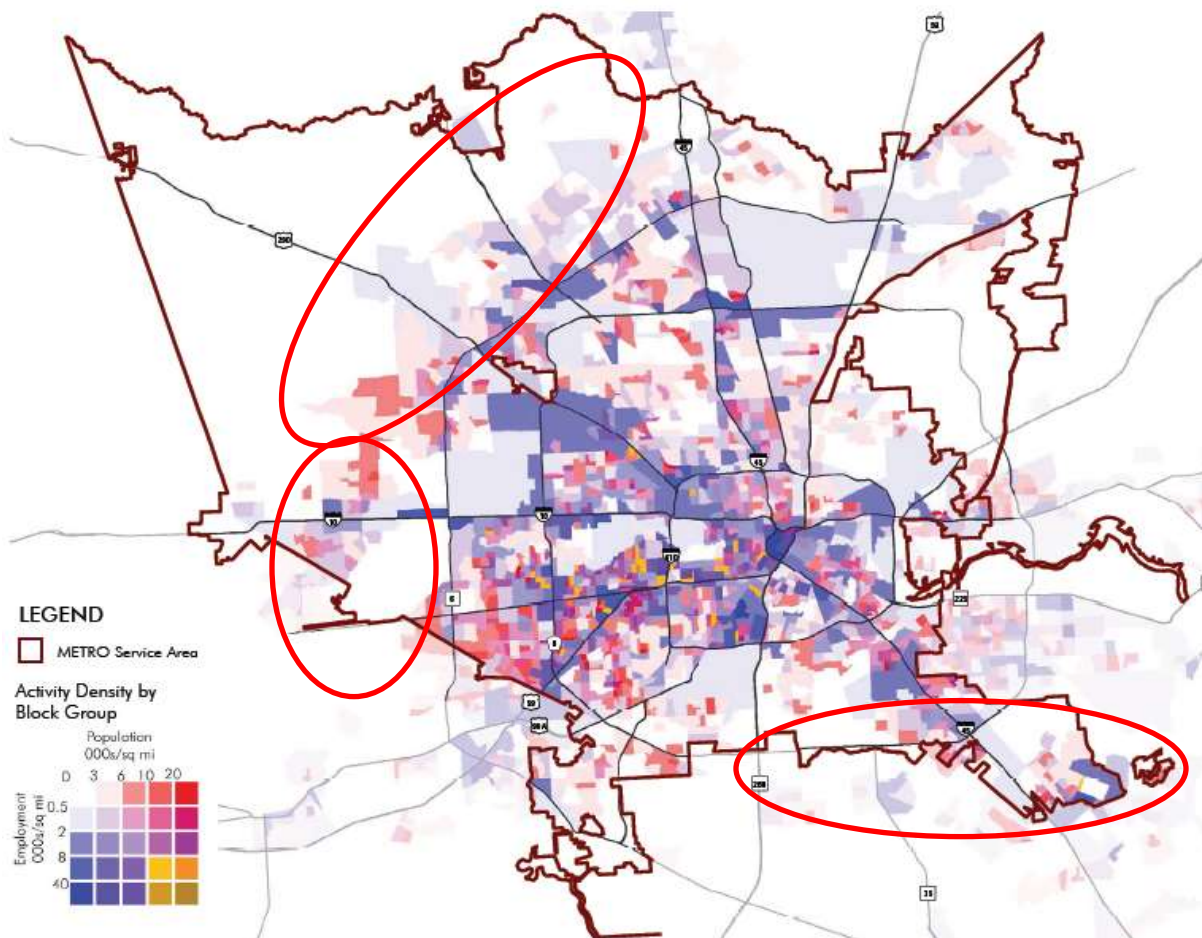
Figure 4 also shows the local bus coverage area within the ¼ mile access area before the New Bus Network was implemented which did not change significantly after the NBN was implemented. The areas within the red ellipses are *generally* within the METRO Service Area and outside of the local bus route coverage area. Those areas are generally defined for transportation planning purposes and are not intended to show precise details (as noted previously, more detailed maps are included in Appendix C. Regional Transit Buffer Analyses).

Figure 4. METRO Service Area Gaps Outside 1/4 Mile Walk Access



Generalized locations with higher density concentrations of population (in red) and employment (in blue) are shown in **Figure 5**. It is a composite map that shows the areas with higher densities per square mile.

Figure 5. Activity Densities METRO Service Area

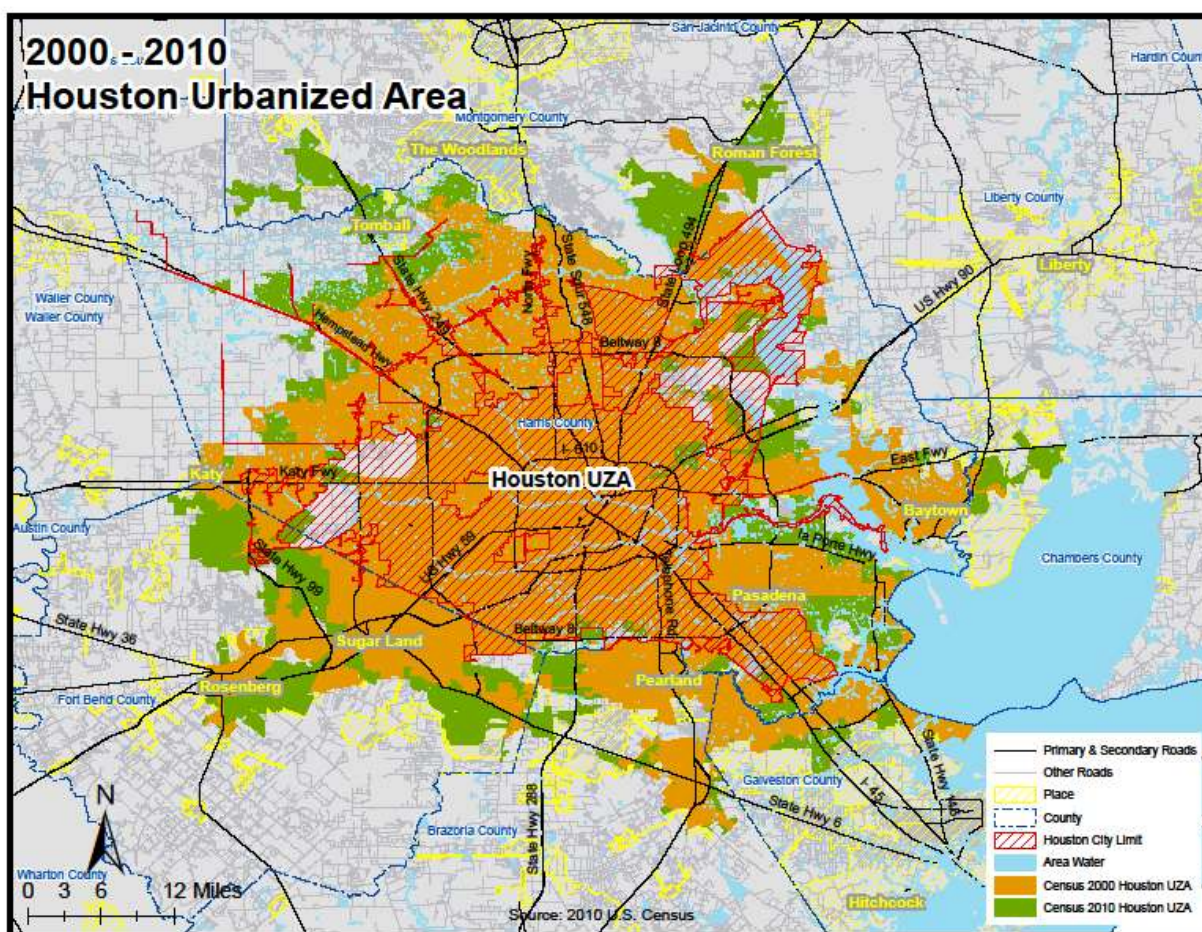


The largest concentrations of activity densities are shown within the Loop 610 area, and in the southwest and northwest quadrants of the METRO Service Area. Notably, the employment densities are concentrated along the major freeway corridors, such as IH 10 West, US 290 Northwest Freeway, IH-69 Southwest Freeway and within the largest major employment centers including but not limited to Downtown (CBD), the Texas Medical Center, the Galleria/ Uptown and Greenway Plaza. Significant employment densities are also noted in the southeast IH-45

South/ Gulf Freeway Corridor. The areas inside the red ellipses are higher activity density locations that are generally beyond the METRO local bus coverage areas noticeably along the FM 1960 and SH 6 corridors and in southeast Harris County.

Federal funding for transit services is appropriated to the Houston Urbanized Area (UZA) by a formula that considers several factors including but not limited to population densities and the levels of existing transit services. The Houston UZA boundaries are shown in **Figure 6** and include Harris County and portions of adjacent counties that are urbanizing according to the 2010 Census. The funding formulas consider the population within the entire UZA, however as noted previously, communities outside of the METRO Service Area do not have a dedicated source of funding that could be used for the non-federal share of transit funding.

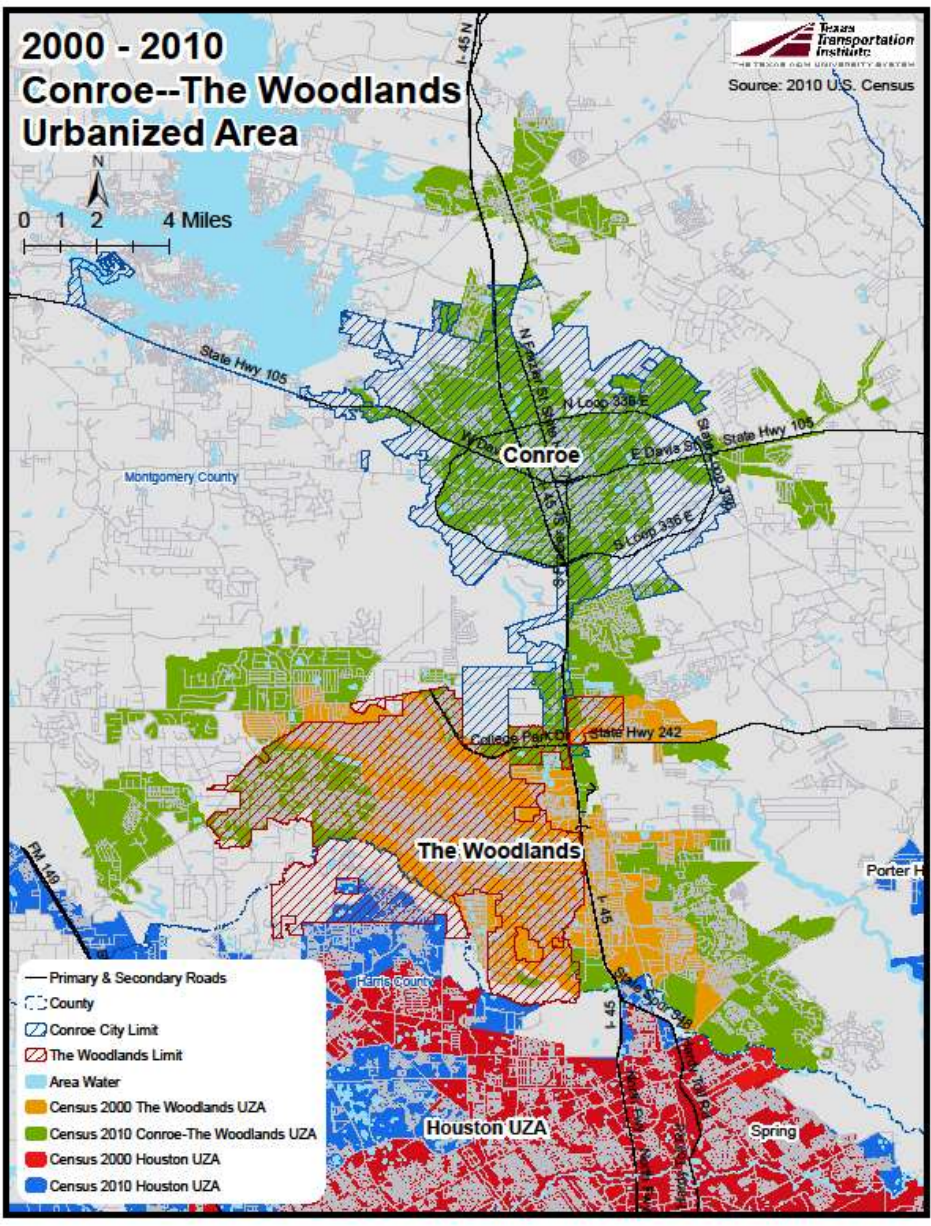
Figure 6. Houston Urbanized Area (UZA)



The Conroe-The Woodlands was designated as an additional large urbanized area in the Gulf Coast Region based on the 2010 Census. As presented in **Figure 7** the urbanizing areas in Montgomery County increased significantly between 2000 and 2010 (shown in green). In

addition, large areas of Montgomery County are outside of the UZA boundaries resulting in different funding options being available between the urban and rural communities there.

Figure 7. Conroe the Woodlands Urbanized Area (UZA)



METRO's current Service Standards, as shown in **Table 5**, indicate the general guidelines for bus route spacing, defined as the distance between parallel routes within the METRO Service Area.¹⁶

Table 5. METRO Service Standards for Route Spacing

Density Levels	People Per Square Mile	Maximum Spacing
Very High and High Density	6,001 or more	½ mile apart
Medium Density	2,001-6,000	1 mile apart
Low Density	Up to 2,000	Park and Ride recommended

Population density within the Gulf Coast Region based on 2015 data is shown in **Figure 8**. If METRO's current route spacing criteria for medium and high density areas, with 2,000 or more people per square mile, were applied within a larger regional context most of those areas highlighted in red and yellow (in **Figure 8**) would warrant fixed route bus lines one mile apart. Almost all of the highest density areas (shown in red) are located within the METRO local bus coverage area however exceptions are noticeable in each direction from downtown Houston.

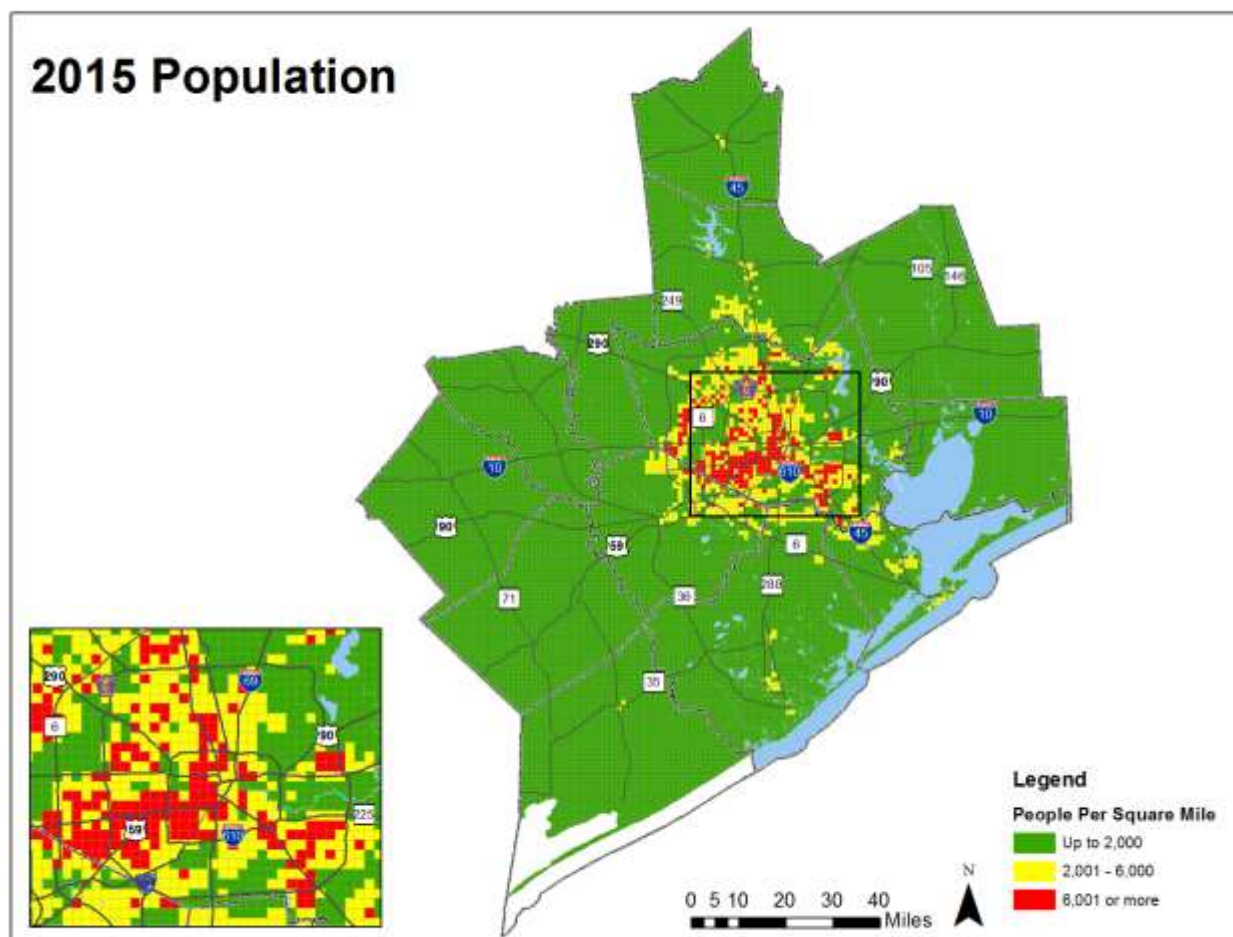
The areas that meet the medium to high density thresholds but do not have local bus services available include but are not limited to the following:

- Eastern Harris County including Pasadena (demand response services are available in Pasadena), Galena Park, Channelview and South Houston
- Central and southern Montgomery County areas adjacent to the Harris County line
- Northern Fort Bend, northern Brazoria and northern Galveston counties adjacent to the Harris County line.

Other communities shown indicate sufficient population densities for fixed route bus services. New transit services have been implemented in the past few years in Baytown, La Porte, Texas City, La Marque, City of Galveston, Lake Jackson, Angleton, Freeport, Richmond, Rosenberg and the City of Conroe.

¹⁶ METRO System Reimagining, Chapter 1 Existing Conditions.

Figure 8. Population Densities per Square Mile



Generally, the METRO Service Standards would not be used as guidelines for route spacing in the lower density small urban and rural communities and variations of those guidelines should be considered. However, as shown in **Figure 8**, there are several smaller cities around the region that have population densities that exceed 2,000 persons per square mile (shown in yellow). Those communities should be considered for future development or expansion of current transit services depending on the unmet transportation related needs, current ridership levels and the availability of new funding sources. There is not a dedicated source of regional funding to develop or to augment fixed route transit services in those areas today. A proposal has been drafted by the Texas Department of Transportation- Public Transportation Division (TxDOT-PTN) that will request additional funding for rural transit services in Texas during the upcoming 2017-2018 State Legislative session. Other innovative funding sources will be needed and some of those are identified in the RCTP Financial Plan.

4. Temporal Profiles and Levels of Services

Public comments in response to various planning initiatives have indicated a need (gap) for expanded regional transit services including longer time spans; later evening services for 2nd shift workers and added weekend services. **Figure 9** summarizes the core services provided by days of the week for fixed route services such as local and commuter bus. METRO operates its system of bus routes and light rail lines almost 24 hours each weekday and on the weekends. Island Transit in the City of Galveston also operates services for extended later hours during the weekdays and on weekends. Harris County (CSD) Transit provides fixed route services that operate primarily from 6:00 AM to 6:00 PM during weekdays and 8:00 AM to 6:00 PM on Saturdays. Demand response services through the Harris County RIDES program are available daily (24/7/365) for passengers that utilize the taxi-cab voucher system. Most of the smaller transit service providers in the Gulf Coast region operate their services weekdays from approximately 6:00 AM to 6:00 PM (12 hours per day). Details for each service provider are noted in **Table 6**. Efforts are in process to increase the spans of services for smaller transit operators in other parts of Texas up to 12 hours.

Figure 9. Gulf Coast Transit Services by Days of the Week

	FIXED-ROUTE TRANSIT																				
	Commuter Bus				Light Rail				Trolley-Replica Bus				Local Bus								
	M	T	W	Th	F	Sat	Sun	M	T	W	Th	F	Sat	Sun	M	T	W	Th	F	Sat	Sun
Brazos Transit District																					
BTD RTD																					
BTD UTD (BCS)																					
BTD UTD (Conroe)																					
BTD UTD (The Woodlands)																					
Colorado Valley Transit District																					
CVTD RTD																					
Galveston County Transit District																					
GCTD RTD (Gulf Coast Center)																					
GCTD RTD (City of Galveston)																					
GCTD UTD																					
GCTD RTD (Island Transit)																					
Gulf Coast Connect Transit																					
GCC RTD (Gulf Coast Center)																					
GCC UTD (Gulf Coast Center) Southern Brazoria County																					
Fort Bend County Transit																					
FBC																					
Metropolitan Transit Authority of Harris County (METRO)																					
METRO																					
Harris County Transit (HCT)																					
HCT																					
RIDES																					

Note: Each District is represented as rural and/or urban transit district (RTD or UTD).

Table 6. Time of Day Profiles**Brazos Transit District (BTD)**

Provider	Service Type	Span of Service
BTD (RTD)	Local Bus ADA Paratransit Demand Response	Mon. – Fri. 5:00 a.m.- 7:00 p.m. Mon. – Fri. 6:00 a.m. – 6:00p.m. Mon. – Fri. 5:00 a.m.- 7:00 p.m.
BTD (RTD) SPC	Local Bus (community circulator)	Mon. – Fri. 9:00 a.m. – 4:00 p.m.
BTD (UTD) B/CS	Local Bus ADA Paratransit Demand Response	Mon. – Fri. 5:00 a.m.- 7:00 p.m. Mon. – Fri. 5:00 a.m. – 7:00p.m. Mon. – Fri. 6:00 a.m.- 6:00 p.m.
BTD (UTD) Conroe Connection	Local Bus ADA Paratransit	Mon. – Fri. 7:00 a.m. - 7:00 p.m. Mon. – Fri. 7:00 a.m. – 7:00p.m.
BTD (UTD: The Woodlands)	Commuter Trolley Replica Waterway Cruiser	Mon. – Fri. 5:00 a.m. - 9:00 p.m. Every Day - 10:00 a.m.- 8:00 p.m. Fri. 2:00 pm – 9:00p.m. Sat.& Sun. 12:00 p.m. – 10:00 p.m.

Colorado Valley Transit District (CVT)

Provider	Service Type	Span of Service
CVT RTD	Flexible Transit Service (LOOP) Demand Response Vanpool/Carpool	Mon. – Fri. 6:30 a.m. - 6:00 p.m. Mon. – Fri. 6:00 a.m. - 6:00 p.m. Varies among vanpool groups

Table 6. Time of Day Profiles (cont'd)**Galveston County Transit District (GCTD)**

Provider	Service Type	Span of Service
GCTD (RTD)	Demand Response (rural areas of mainland Galveston County)	Mon. – Fri. 7:00 a.m. – 5:00p.m.
GCTD (RTD) Island Transit)	Commuter Bus (League City)	Mon. – Fri. 5:30 a.m. – 9:45a.m. Mon. – Fri.12:30 p.m.- 8:25 p.m.
	ADA Paratransit Service (DART)	Mon. – Sat. 6:00 a.m.- 11:30 p.m. Sun. – 8:00 a.m.- 7:00 p.m.
	Local Bus (Seven fixed bus routes within the city limits of Galveston)	Mon. – Sat. 6:00 a.m.- 11:30 p.m. Sun. – 8:00 a.m.- 7:00 p.m.

Gulf Coast Center (GCC) – Rural and Urban Districts

Provider	Service Type	Span of Service
GCC (RTD)	Demand Response	Mon. – Fri. 7:00 a.m. –5:00p.m.
GCC (UTD) Southern Brazoria Lake Jackson-Angleton Freeport UZA	Local Bus	Mon. – Fri. 5:45 a.m.- 6:00 p.m. Sat. – 9:00 am- 7:00 pm
	ADA Paratransit	Mon. – Fri. 6:00 a.m. – 6:00p.m. Sat. – 9:00 a.m.- 7:00 p.m.
	Harris County RIDES Program	24/7
GCC (UTD) Texas City, La Marque, Dickinson	Local Bus	Mon. – Fri. 6:00 a.m. -6:15 p.m. Sat - 9:00 a.m. – 7:00 p.m.
	ADA Paratransit	Mon. – Fri. 6:00 a.m. – 6:00p.m. Sat - 6:00 a.m. – 6:00 p.m.
	Harris County RIDES Program	24/7

Table 6. Time of Day Profiles (cont'd)**Fort Bend County Transit (FBC)**

Provider	Service Type	Span of Service
FBC	Commuter Bus	Mon. – Fri. 5:00 a.m. –10:00 a.m.
	Special Service	Mon. – Fri. 3:00 p.m.- 8:30 p.m. Mon. – Fri. 11:00 a.m.- 1:00 p.m.
	Demand Response	Mon. – Fri. 8:00 a.m.- 5:00 p.m.
	Flexible Transit	Mon. – Fri. 8:00 a.m.- 5:00 p.m.

Note: Each District is represented as rural and/or urban transit district (RTD or UTD).

Metropolitan Transit Authority of Harris County (METRO)

Provider	Service Type	Span of Service
METRO	Fixed Route Service	Mon. – Fri. 3:41 a.m. –2:58 a.m. Sat. - 3:50 a.m. - 2:01 a.m. Sun. - 3:50 a.m.- 1:59 a.m.
	Light Rail	Mon. – Thur. 3:35 am- 12:53am Fri. – 3:35 a.m. – 3:04 a.m. Sat. - 4:18 a.m. – 3:04 a.m. Sun. – 4:18 a.m. – 1:39 a.m.
	ADA	Mon. – Thur. 3:30 a.m.- 2:10 a.m. Fri. - 3:35 a.m. – 2:50 a.m. Sun. – 3:35 a.m. – 2:10 a.m.

Table 6. Time of Day Profiles (cont'd)**Harris County Transit (HCT)**

Provider	Service Type	Span of Service
HCT	Local	Mon. – Fri. 6:00 a.m. –6:00p.m. Sat. -8:00 a.m.- 6:00 p.m.
	Commuter	Mon – Fri. – 4:10 a.m. – 7:10 p.m.
	Demand Response	Rides Program provides 24/7 365 days' service through taxi program
RIDES Program		

Some of the smaller transit service providers have implemented weekend services for the general public including Harris County CSD, Island Transit and GCC Connect. Colorado Valley Transit provides some weekend services using vans. As more funding becomes available, the smaller transit service providers could extend their typical services from 12 to 16 hours on weekdays and also provide some weekend services *if feasible*.

Fixed Route service levels usually vary between large urban and small urban transit systems. Resource levels and demand are substantial reasons for the variances. As a result, the span of service for fixed route services is usually greater in large urban systems as noted in **Table 7** which uses information from the Transit Capacity and Quality of Service Manual.¹⁷

The levels of service in that TCRP report are scored on an “A” to “F” scale based on the number of hours of revenue service provided.

¹⁷ Transit Capacity and Quality of Service Manual-2nd Edition, Transit Cooperative Research Project, 2003.

Table 7. Level of Service - Fixed Route

LOS	Hours of Service	Comments
A	19-24	Night or “owl” service provided
B	17-18	Late evening service provided
C	14-16	Early evening service provided
D	12-13	Daytime service provided
E	4-11	Peak hour service/limited midday service
F	0-3	Very limited or no service

The level of service metric is better suited for larger systems, but does illustrate the limited level of service that riders in smaller systems face.

Does scoring a D, E or an F for transit span indicate a gap in transit for a small urban transit system? Not likely. What it indicates is that from the customers’ point of view the service span is not optimal. Given the practical limitations of small urban transit finances, densities and ridership, service spans of approximately 12 hours are common throughout Texas and the United States (LOS D). It is less a gap than a practical reality requiring a substantive shift in funding and/or priorities to change.

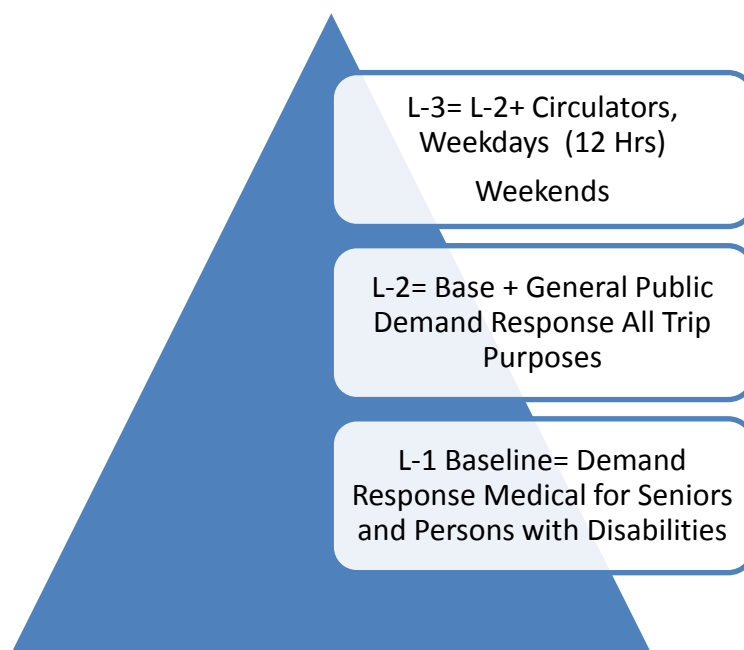
Lower cost alternatives exist to increase service spans. In Houston, METRO and Harris County RIDES contract with cab companies and shared-ride service providers for after-hours services at a discounted rate to customers.

The City of Abilene through its Evening City Link service provides 5.75 hours of demand response transit service between 6:15 PM and midnight. While fares are generally 4 times as high as regular fares (\$6.00 versus \$1.50) and one-day advance notice is required, it is a means of addressing the gaps in service. For additional information regarding the City Link program, see the link: <http://www.abilenetx.com/city-hall/departments/transportation-services/citylink/evening-service>

Figure 10 describes a hypothetical hierarchy of potential levels of transit services for small urban and rural communities (outside the METRO Service Area). It begins with a basic level of service that provides demand response medical transportation for seniors and persons with disabilities. Chambers County is the only county within the Gulf Coast region that does not have that basic level of service provided by a designated public transportation provider. A strategy to

mitigate that gap would involve the development of a cooperative agreement between the neighboring transit districts under the leadership of the counties' Commissioners Courts.

Figure 10. Recommended Levels of Transit Services



The recommended levels of transit services *concept* would prioritize Chambers County and others without county-wide demand response transit services available for the general public, for all trip purposes. Some potential guidelines are noted below:

- L-1 Minimum level of service=countywide demand response medical transportation for seniors and persons with disabilities
- L-2 Moderate level of service=countywide demand response services for general public, all trip purposes
- L-3 Intra-county circulators (fixed routes) in higher density/urbanizing areas with complimentary paratransit services (within $\frac{3}{4}$ mile of fixed routes).
- L-4 (not shown) Inter-county connections to cities/towns in adjacent counties and/or nearby METRO Park and Ride lots and/or transit centers.
- L-5 (not shown) Higher capacity transit -modes may include express bus, park and ride services to connect to the METRO Light rail stations, central Houston and/or other major employment centers.

5. Financial Gaps

The following section includes a brief summary of current transit expenditures in the Gulf Coast region based on readily available data. More detailed financial data and analyses will be presented in the Gulf Coast RCTP Financial Plan. **Table 8** shows the total expenditures for the largest transit agencies with estimates of their operations, capital costs and ridership.

Table 8-Gulf Coast Annual Financial Summary-Largest Transit Operators 2014¹⁸

Agency	Operating Expenses	Capital Expenses	Total Expenses	Ridership
METRO	\$ 454,397,826	\$ 369,878,818	824,276,644	85,369,587
Brazos Transit District¹⁹	\$ 380,000		\$ 380,000	26,000
BTD Conroe-Woodlands²⁰	\$ 8,513,198		\$ 8,513,198	817,069
Fort Bend County Transit	\$ 6,517,549	\$ 720,310	7,237,859	389,272
Gulf Coast Center	\$ 5,345,456	\$ 625,653	5,971,109	334,195
Island Transit	\$ 4,441,171	\$ 659,322	5,100,493	862,335
Harris County CSD Transit	\$ 3,922,093	\$ 60,674	3,982,767	172,862
Totals	\$ 483,517,293	\$371,944,777	\$ 855,462,070	89,253,184

Total regional transit expenditures are estimated at \$855 million per year as summarized in **Table 8**. While METRO will continue to maintain the METRO Transit System with the existing resources it has access to, significant system expansion will require additional funding.

Approximately \$31 million of the total regional expenditure amount (4%) is associated with the smaller transit operators. For RCTP planning purposes it is assumed that the current annual funding levels will remain constant over time and that any incremental service expansions will require additional funding, particularly for the smaller transit operators. An annual growth rate of 6.5% per year is used to estimate the gap in expenditures for the smaller transit operators (see **Table 9**) based on projections of operations and capital funding needs provided to TxDOT-PTN.²¹

¹⁸ Federal Transit Administration National Transit Database Agency Profiles 2014.

¹⁹ Includes BTD rural services in Liberty, Montgomery and Walker counties only.

²⁰ Source-TxDOT PTN District Profiles, 2016

²¹ Source: Public Transportation Operating and Capital Funding Needs, 2012-2035, Appendix D, by Texas A&M Transportation Institute for the Texas Department of Transportation Public Transportation Division, 2016.

Table 9. Financial Gap Estimate for Smaller Transit Providers²²

Current Expenses	Average Annual Growth Rate (Gulf Coast)	Increased Funding (first year)	5 Year Financial Gap	10 Year Financial Gap	20 Year Financial Gap
\$31 million	6.5 %	\$ 2.027 m	\$2.734 m	\$ 3.688 m	\$ 6.710 m

The Texas Department of Transportation-Public Transportation Division (TxDOT-PTN) has drafted a Legislative Appropriations Request for the upcoming legislative session. In that request \$3.5 million is being requested annually to “offset the loss of purchasing power and population growth in rural areas” in Texas.²³

More local funds would be needed to enhance transit services in the Gulf Coast region in the future. Potential sources of those funds will be explored further in the Gulf Coast RCTP Financial Plan.

²² Compounded annual growth applied to the incremental cost, calculated using the Excel FV function for the future value of a lump sum investment.

²³ Exceptional Item Request Schedule 85th Regular Session, Agency Submission, Version 1 Automated Budget and Evaluation System of Texas (ABEST).

6. Strategies to Mitigate Gaps (Gap Fillers)

During the past few years the transit operators in the Gulf Coast Region have implemented many new initiatives to improve their services and to make them more responsive to the transportation related needs in the region. The highest priorities for regional transit coordination are included in the Regional Transit Coordination Subcommittee Action Plan which was approved in October 2015 and is included in the RCTP Needs Assessment as Appendix A. Many new transit initiatives were summarized in that same document as Appendix F-New Transportation Initiatives for METRO and Harris County Transit. A summary of the RTCS Action Plan is included as Appendix A in this document.

The highest priority gaps as identified in the Gulf Coast RCTP Needs Assessment and Gap Analysis are the lack of adequate transit services in some higher density areas in Harris County and adjacent counties. Other high priority gaps include the lack of baseline transit services in some rural counties.

Strategies to close gaps;

- Collaborations with local elected officials, and community leaders,
- Public Private Partnerships for transportation enhancements,
- Innovative Funding Options (see the RCTP Financial Plan).

Expected Outcomes:

1. Transit Expansion to suburban areas within Harris County;

- with higher than average TNI values,
- without fixed route transit services,
- in areas >2,000 people per square mile.

2. Transit development and/or expansion (if feasible) in suburban and rural counties;

- Recommended baseline--county-wide demand response service for the general public, for all trip purposes,
- Route extensions or new routes as warranted based on TNI values, current services, local support, financial resources (such as local match) and the results of a benefit-cost assessments (TBD if feasible).

Some additional ideas for further consideration are noted below:

Expanded Harris County Transit;

- Regional Mobility Manager,

- Public, Private Partnerships (PPP) with private sector providers including but not limited to HC RIDES Shared Ride Contractors, Yellow Cab, Uber, Lyft and Bridj among others,
- User side subsidy model using transportation e-vouchers (debit cards) for a portion of the fare.

Harris County cities inside METRO Service Area without bus services;

- Utilize portion of general mobility funding to supplement costs for transit expansion,
- Coordinated with METRO and other adjacent transit providers.

Urban and Rural Transit Districts;

- Incremental expansion from basic levels of services,
- Extended hours per weekdays,
- Weekend Services.

Seek to Implement/Expand Community Transit to Counties and Cities with Limited Service (order may be different depending upon circumstances);

- Develop rapport with area stakeholders and community leaders;
- Set up local/county coordination process to facilitate existing resources;
- Identify partner closely with local area “champions”
- Assess local financial resources especially alternatives to general funds
- Conduct targeted planning activities including coordination, feasibility, action and implementation plans as appropriate
- Consider alternate modes to traditional transit including Transportation Network Companies.

7. Performance Measures to Evaluate Effectiveness

The Regional Transit Coordination Subcommittee (RTCS) approved the use of selected transit related goals and performance measures from the 2040 Regional Transportation Plan (RTP) in July 2015. Those were combined with the RTCS purpose statements as strategies for the development of the RCTP update. The transit related goals and performance measures were chosen to be consistent with the parallel planning processes for the RTP and the RCTP Update:

2040 RTP Transit Related Goals and Performance Measures:

- Improve Safety-Reduce Crash Rates.
- Manage and Mitigate Congestion-Increase Bus On-Time Performance, Increase Reliability.
- Ensure Strong Asset Management and Operations-Incident Response, System Condition.
- Strengthen Regional Economic Competitiveness-Commute Mode Split.
- Conserve and Protect Natural and Cultural Resources-Reduce impacts requiring mitigation (such as vehicle emissions).

The RTCS Purpose statements (recommended as RCTP Strategies) are shown below:

RTCS Purpose:

- Provide guidance related to the implementation of regional transit coordination pilot projects that were identified in the regional transit coordination Action Plan (see Appendix B).
- Assist with tasks related to the development of regional transit planning initiatives that focus on identifying opportunities for expanding transit services in the region for all, as well as improving the efficiency and effectiveness of the current regional transit system.
- Promote regional coordination among existing and future public and private transportation providers, social service and health and human service agencies.

For the RCTP Gap Analysis two of the 2040 RTP metrics are recommended because they correlate with some of the regional transit challenges that have been identified by RCTP public comments.

- % transit--commute mode split
- % on-time performance-- increase reliability

It is recommended that the regional percent (%) of transit measure be augmented to include other alternative modes of transportation such as carpool, vanpool, bike and pedestrians. Users of those alternative modes could share access and transit infrastructure facilities. For example, people could walk or bike from a residential area to a nearby transit center or park and ride lot. From

there they could take a bus or join a carpool or vanpool if spaces for coordinated staging and empty seats were available.

On-time performance related challenges were identified during the RCTP Focus Groups and were described as unreliable bus schedules for work trips, job interviews and medical appointments. One of the most challenging aspects of maintaining on-time schedules is the impact of routine peak period traffic congestion which can become worse when incidents happen that result in crashes. Recent improvements to the local bus system in Houston through the New Bus Network have significantly improved the frequency of buses along major corridor routes.

Table 10 displays the recommended performance measures and suggestions for the collection, maintenance and assessment of those values by coordinating the development of a RCTP/RTP Performance Monitoring database. **Table 11** shows similar information for the Statewide Metrics.

Table 10. RCTP Performance Measures

Data Items	Collect	Maintain	Assess
Percent Transit	Online-Review Annually	RCTP/RTP Performance Monitoring (PM) Database	3,5, 10 year intervals
On-time Performance	Online-Review Annually	PM Database	3,5, 10 year intervals

Table 11. RCTP Statewide Metrics

Data Items	Collect	Maintain	Provide Data
Collaborations	# Partnerships # Stakeholder Organizations # Individuals	Performance Monitoring (PM) Database	3-5 year intervals
Identification of Gaps and Inefficiencies	# Gaps/inefficiencies identified	PM Database	5 year intervals

Resolution of Gaps and Inefficiencies	# Gaps/inefficiencies resolved	PM Database	5-10 year intervals
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The regional modal split, or the share of transit trips, is expected to increase over time with improved and expanded regional transit services. **Figure 11** illustrates the current modal shares and **Table 12** details the modal share data for each county. Interestingly, the percentage for drive-alone travel is similar for each county, ranging from 79% to 85%. The percentages of carpool, vanpool and walk trips is higher in those counties that also have lower percentages of transit trips. That data suggests the potential for increased benefits to the region, such as improved air quality and reduced traffic congestion growth, by incentivizing multi-modal transportation investments. One strategy to accomplish that objective could be to include walking, biking, carpooling, vanpooling and public transit facilities in corridors along major roadway infrastructure investments, when feasible.

Figure 11. Gulf Coast Modal Shares

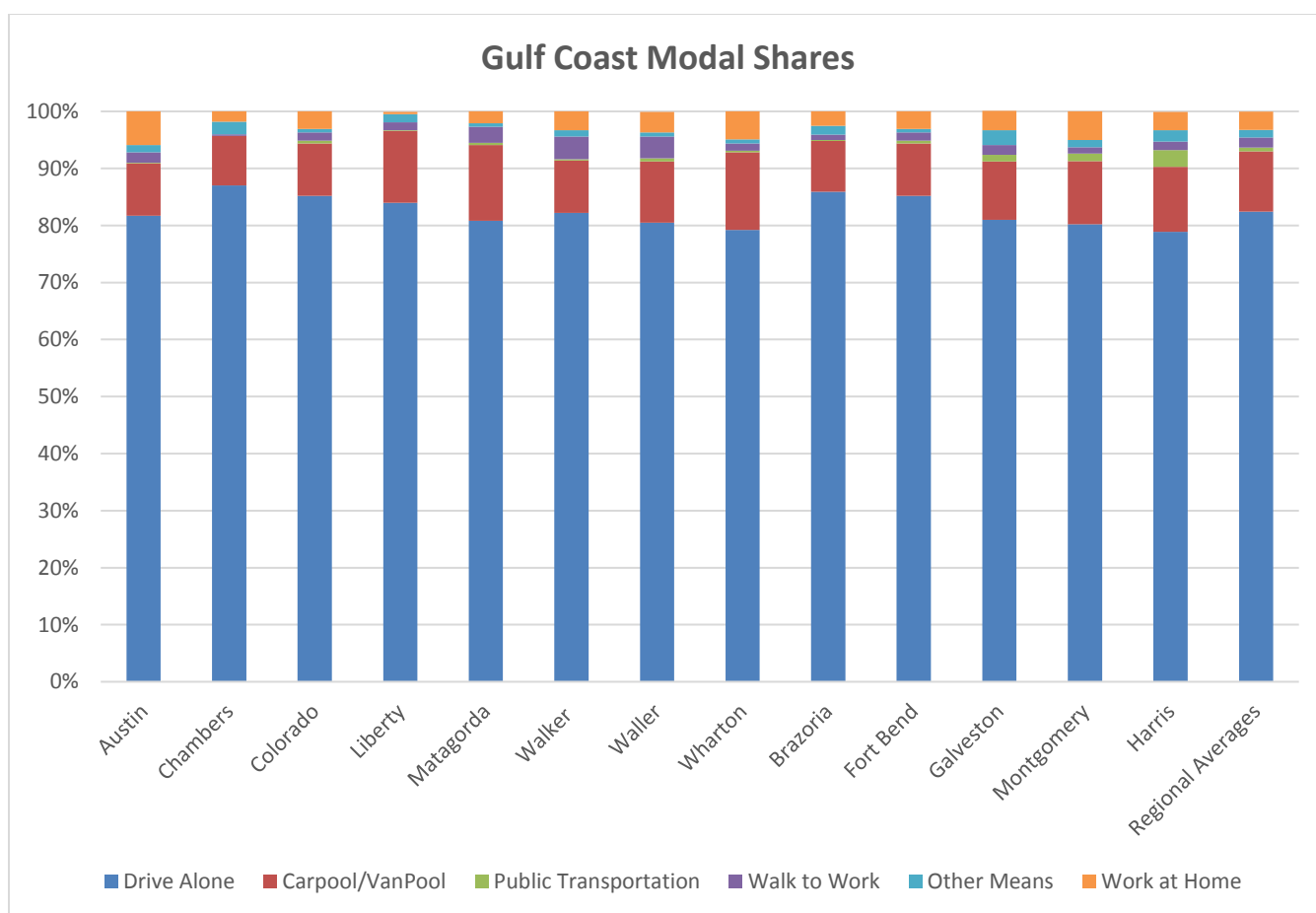


Table 12. Gulf Coast Modal Shares by Counties²⁴

	Commuter Trips	Drive Alone	Carpool/VanPool	Public Transportation	Walk to Work Other Means	Work at Home
Rural Counties						
Austin	13,338	81.7%	9.2%	0.1%	1.8%	5.9%
Chambers	14,874	87.0%	8.7%	0.0%	0.3%	1.8%
Colorado	9,097	85.2%	9.2%	0.5%	1.4%	3.1%
Liberty	27,025	84.0%	12.6%	0.1%	1.4%	0.4%
Matagorda	15,450	80.8%	13.3%	0.4%	2.8%	2.1%
Walker	22,364	82.2%	9.2%	0.2%	4.0%	3.3%
Waller	19,687	80.5%	10.7%	0.6%	3.8%	3.6%
Wharton	18,342	79.2%	13.6%	0.3%	1.3%	4.9%
Suburban Counties						
Brazoria	152,425	85.9%	8.9%	0.2%	0.9%	2.5%
Fort Bend	309,678	85.2%	9.2%	0.5%	1.4%	3.1%
Galveston	141,247	81.0%	10.2%	1.2%	1.7%	3.4%
Montgomery	226,576	80.2%	11.1%	1.3%	1.1%	5.0%
Urban County						
Harris	2,045,927	78.9%	11.4%	2.9%	1.5%	3.2%
Regional Total	3,016,030					

²⁴ U.S. Census Factfinder, Income, Selected Economic Characteristics, Commuting to Work, workers 16 and older, 2015

METRO has a system in place to monitor on-time performance and sample data from that system is shown in **Table 13**. More research is needed to document comparable monitoring systems used by the smaller transit operators in the region however it is understood that each agency sets its own goals related to on-time performance. For the RCTP planning process that measure is recommended for ongoing monitoring.

Table 13. METRO On-Time Performance Sample Data²⁵

MONTHLY PERFORMANCE REPORT November 2016 Performance Statistics													Benchmark Met	Benchmark Missed		
Fiscal Year 2017													Current Month Target	FY2017 YTD Actual	FY2017 YTD GOAL	
SERVICE & RELIABILITY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	≥		≥	
On-Time Performance													≥ 75%		≥ 75%	75%
Local Bus	74.6%	74.6%											≥ 75%		≥ 75%	75%
Park & Ride	77.7%	84.0%											≥ 75%		≥ 75%	75%
Weighted Average Bus	75.8%	78.3%											≥ 75%		≥ 75%	75%
METROLift	91.3%	92.0%											≥ 90%		≥ 90%	90%
Rail - Red Line OTP	80.2%	85.3%											≥ 90%		≥ 90%	90%
Rail - South East Purple Line OTP	90.0%	86.9%											≥ 90%		≥ 90%	90%
Rail - East End Green Line OTP	91.7%	94.9%											≥ 90%		≥ 90%	90%
MDBF (Mean Distance Between Mechanical Failures) - All Buses	9,765	11,479											≥ 9,500		≥ 9,500	8,625
MDBF (Mean Distance Between Mechanical Failures) - METROLift	20,378	18,980											≥ 19,000		≥ 19,000	19,000
MDBSI (Mean Distance Between Service Interruptions) - METROrail	30,228	39,664											≥ 12,000		≥ 12,000	12,000
Average Peak HOT Lanes Speed (mile per hour)													≥		≥	
I-45 North HOV	53	52											≥ 45		≥ 45	45
I-45 South HOV	50	50											≥ 45		≥ 45	45
US-290 HOV	56	55											≥ 45		≥ 45	45
US-59 North HOV	61	61											≥ 45		≥ 45	45
US-59 South HOV	48	49											≥ 45		≥ 45	45

On-Time Performance

- On-time performance for Local Bus routes did not meet the minimum performance standards for the month or the year-to-date.
- On-time performance for Park & Ride routes met the minimum performance standards for the month and for the year-to-date.
- METROLift met the on-time performance goals for the month and the year-to-date goal.

METROrail On-Time Performance

- Rail (red line) missed the benchmark for both the month and the year-to-date.
- Rail (purple line) missed the benchmark for both the month and the year-to-date.

²⁵ Source: www.ridemetro.org

Gulf Coast RCTP Gap Analysis

Appendices:

- A. RTCS Action Plan Summary
- B. Transit Need Index Block Group Methodology
- C. Transit Buffer Analyses- Proximity to Residential and Employment Locations

Appendix A. RTCS Action Plan Summary

PROJECT	DELIVERABLES	EXPECTED OUTCOMES
1 –Regional Public Transportation Alliance & Public Information Campaign for Elected Officials and Business Leaders	Regional Public Transportation Alliance Group (RPTA) Share information – Workshops, Forums, etc. Identify transit champion(s) Create informational brochure	Raise awareness of transit as a viable and necessary mode of transportation and ensure that voices of public transportation authorities and their supporters are heard at the national and local levels.
2 –Regional Mobility Manager (RMM) - Improve Coordination	Regional Mobility Management (RMM) Plan and Assessment Best practices assessment of RMM efforts of region’s and across the nation Implementation Plan	Regional Mobility Management Program that will result in - Coordinated services Operations cost savings More transportation options Increased transit ridership
3-Seamless Fare Policy & Phased Implementation Plan	Work in progress – Mobile Ticketing Solution – BY METRO Regional seamless fare policy agreements (phase I) Identification and implementation of appropriate fare media for the region (Phase II)	Seamless regional fare policy that better integrates fare collection processes Increased coordination among transit operators Reduction in fare evasion Increase in fare-box returns Improved customer experience Seamless regional fare collection system
4- Regional Maintenance Program	Regional Shared Maintenance Plan	Improved maintenance options for smaller transit service providers.
5- Regional Transit Information – Google Transit +	Online resource for trip planning purposes	A web-based GIS Trip Planning Application with Interactive Online Resource Guide
6- Local Match Fund – Transit Worker Initiative- Local Development Council	Local Development Council- Worker Transit Fund	A more stable and sustainable source for local matching funds.
7- Development of a Regional Volunteer Driver Voucher Program	Regional baseline transit service Program Regional volunteer driver voucher program	Expanded transit service options in areas where traditional transit services are not available or not adequate.

Appendix B. Transit Need Index Methodologies

Two different and complimentary methodologies were used for the Transit Needs Index (TNI). The first was developed at the county-level as part of the RCTP Demographic Profiles.²⁶

County-Level TNI

1. Calculate Peer Group Averages for each county (urban, suburban, rural) for each Demographic Factor (6 factors).
2. Calculate Standard Deviations from peer group average values (means) for each Demographic Factor.
3. Estimate variances from means and associate with TNI Scores:
 - a. One Standard Deviation Above the mean=High TNI = 3
 - b. Within one Standard Deviation= Moderate TNI= 2
 - c. One Standard Deviation Below the mean=Low TNI= 1
 - d. Adjust TNI scores to reflect the weighting factors
4. Calculate Total TNI Scores for each county=Sum (TNI Scores for each demographic factor).

Block Group Level TNI

1. Urban counties are: Brazoria, Fort Bend, Galveston, Harris, Montgomery.
2. Rural counties: Austin, Chambers, Colorado, Liberty, Matagorda, Waller, Wharton, and Walker.
3. TNI factor calculation:

$TNI_POP_DEN = BG \text{ population density} / \text{region population density}$

$TNI_MED_INC = (-1) * (BG \text{ Median Income} - \text{Region Median Income}) / \text{Region Median Income}$

$TNI_ZERO_CAR = \text{Percent BG zero car household} / \text{percent of regional zero car households}$

$TNI_CHILD = \text{Percent BG children} / \text{percent region children}$

$TNI_SENIOR = \text{Percent BG seniors} / \text{percent regional seniors}$

$TNI_DISABLED = \text{Percent BG disabled population} / \text{percent regional disabled population}$

²⁶ Houston-Galveston Area Council Regionally Coordinated Transportation Plan Demographic Profiles, July 2016.

4. Urban Transit Need Index = 20% TNI_POP_DEN + 20% TNI_ZERO_CAR + 15%TNI_SENIOR + 15%TNI_DISABLED + 10%TNI_CHILD + 20%TNI_MED_INC

5. Rural Transit Need Index = 10%TNI_POP_DEN + 10%TNI_NO_CAR + 25%TNI_SENIOR + 25%TNI_DISABLED + 10%TNI_CHILD + 20%TNI_MED_INC

6. Rural regional percentage:

Rural Region Population Density	Rural Region No Car Households Percentage	Rural Region Senior Population Percentage	Rural Region Children Percentage	Rural Region Median Household Income	Rural Region Disabled Population Percentage
45.9889	0.0509	0.1292	0.1727	45,908	0.0679

7. Urban regional percentage:

Urban Region Population Density	Urban Region No Car HHS Percentage	Urban Region Senior Percentage	Urban Region Children Percentage	Urban Region Median Household Income	Urban Region Disabled Percentage
967.0909	0.0599	0.0913	0.1976	62,667	0.0494

Appendix C- Regional Transit Buffer Analyses

Gap Analysis: Transit Need, Population and Employment within Proximity to Local Fixed-Route Transit

This analysis focuses on local fixed-route (or deviate-upon-request) bus and rail services in the 13-County H-GAC Planning Region. This analysis includes Complementary ADA Paratransit because it is required to be provided within $\frac{3}{4}$ mile of any local fixed-route transit service. This analysis does not consider other demand responsive services, or express and park and ride services.

Summary Table: Transit Need, Population and Employment within Specified Buffers

	Within 1/4 mile of frequent local service ¹		Within 1/4 mile of any local service		Within 1/2 mile of any local service		Within 3/4 mile of any local service ²	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Within Urban Counties³								
High TNI Population ⁴	977,679	37.06%	1,849,548	70.12%	1,922,828	72.90%	1,978,172	74.99%
Total Population	1,289,428	21.43%	2,917,243	48.48%	3,106,258	51.62%	3,232,320	53.72%
Total Employment	1,257,084	39.49%	2,173,171	68.27%	2,219,679	69.73%	2,269,581	71.30%
Within Rural Counties⁵								
High TNI Population ⁴	0	0.00%	45,925	35.44%	45,925	35.44%	45,925	35.44%
Total Population	0	0.00%	100,852	28.47%	100,852	28.47%	107,329	30.29%
Total Employment	0	0.00%	44,345	37.12%	46,626	39.03%	46,778	39.15%
Within Entire Region								
High TNI Population ⁴	977,679	35.33%	1,895,473	68.49%	1,968,753	71.14%	2,024,097	73.14%
Total Population	1,289,428	20.24%	3,018,095	47.37%	3,207,110	50.33%	3,339,649	52.41%
Total Employment	1,257,084	38.06%	2,217,516	67.14%	2,266,305	68.62%	2,316,359	70.13%

Sources: US Census ACS 2014 5-Year Estimates (by Blockgroup), 2016 Q1 H-GAC forecast (by TAZ), Statewide Analysis Model

1. Defined as base headway of 15 minutes or less; includes METRORail
2. 3/4-Mile ADA Paratransit buffer; available only to eligible riders, not the general public
3. Brazoria, Fort Bend, Galveston, Harris and Montgomery Counties
4. Transit Need Index of 1.5 or higher
5. Austin, Cambers, Colorado, Liberty, Matagorda, Wharton, Walker and Waller Counties

Note that these estimates overstate the number of people or jobs within a given distance of transit service because they include everybody living in any block group, TAZ or SAM zone that falls within a given distance of transit service, even if there are areas of that block group that are geographically outside that buffer. These estimates also do not account for actual stop locations,

nor the ability to physically access those stops (i.e. street grid, sidewalk conditions, natural and man-made barriers, etc.).

That being said, this analysis (and the corresponding maps) indicate the following major observations with regard to transit gaps:

- The more frequent a service is, the more useful it is for the greater number of people. This is because the time waiting for a bus or train to arrive is less onerous, transfers between services are easier, and people do not have to plan their lives around transit schedules (they can “show up and go”). However, frequent service – defined as headways of 15 minutes or better – is only provided by METRO and is available almost exclusively in Harris County. Almost 80% of the region’s residents, and over 60% of the region’s jobs, are outside a quarter-mile (five-minute walk) to frequent bus service.
- About two-thirds of the region’s jobs and population in areas of high transit need (TNI of 1.5 or greater) are within a quarter-mile of a local transit route of any frequency. However, less than half of the region’s overall population is within a quarter-mile of local transit service on any frequency.
- About half of the region’s population, and just under a third of the region’s jobs, are outside of a half-mile (ten-minute walk) to a local transit route of any frequency. Walks of ten minutes are more are considered to be onerous, especially to the mobility-impaired. Therefore, areas outside of a half-mile of a local fixed route are not considered to be effectively served by transit.
- The difference between the percentage of urban populations within one-half mile of transit (51.6%) and the percentage of rural populations within one-half mile of transit (28.5%) is especially stark. Part of the reason is because there is no local fixed-route transit service whatsoever in Chambers, Matagorda, Waller and Walker Counties. These four counties contain 187 thousand residents and 67 thousand jobs.
- There are several communities and developments of high transit need in the region that currently have little or no local service whatsoever, including: Alvin, Anahuac, Atascocita, Bay City, Channelview, Cinco Ranch, Clear Lake City, Copperfield, Cypress (in fact, essentially the entire SH6 corridor between IH-10 West and US 290), East Bernard, Hempstead, Huntsville, Kingwood, Mission Bend (including the “Four Corners” community in Fort Bend County), Palacios, Pasadena, Prairie View, Spring, South Houston, Winnie, and The Woodlands.
- The existence of significant transit need in affluent suburbs such as Atascocita, Cinco Ranch, Kingwood and The Woodlands might seem counterintuitive but is actually a consequence of an aging population in those areas. (This was a topic of discussion during The Woodlands Township Transit Plan effort.)
- Several areas within the region with significant concentrations of employment are not served by any local bus service. These areas include: the Clear Lake City/NASA region, the Cypress and Jersey Village areas along the US 290 corridor, the Energy Corridor west of SH

6 (including the Park Ten development), Hughes Landing in The Woodlands, Katy, Pasadena, the SH 288 and FM 518 corridors in Pearland, Springwoods (including the ExxonMobil campus), Stafford, and Sugar Land (including the First Colony/Sugar Land Town Square area).

- At least 52.4 percent of the region's population lives within an area required to be served by Complementary ADA Paratransit. In reality this percentage of population served is higher, because METROLift has an expanded service area beyond the ADA-required three-quarter mile buffer. However, it does not extend to the entire METRO service area; such as portions of Harris County north and west of SH 6.
- No bus route outside of the METRO service area operates at better than a 30-minute headway.
- Some areas that show up as areas of need on the TNI map are actually prisons (e.g. the Darrington and Wayne Scott Units in Brazoria County, the Hightower Unit in Liberty County, etc.)

The following maps are lower resolution copies of higher resolution GIS based maps that can be made available for closer reviews within specific counties or sub-areas of the region by request to H-GAC. The first map and summary tables relate to the proximity of population to fixed route transit services for block groups with higher than average Transit Need Index values. The second map and tables relate to the proximity of employment to those block groups.

H-GAC 13-County Census Block Groups within Existing Local Fixed-Route Service

(Includes Complementary ADA Paratransit; does not include park and ride or demand responsive services)

	Within 1/4 mile of frequent local service ¹		Within 1/4 mile of any local service		Within 1/2 mile of any local service		Within 3/4 mile of any local service ²		Total in Region	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Within Urban Counties³										
TNI of 2.0 or Greater										
Block Groups	427	48.30%	730	82.58%	752	85.07%	769	86.99%	884	100.00%
Population	746,416	45.73%	1,258,529	77.11%	1,310,152	80.27%	1,348,159	82.60%	1,632,174	100.00%
TNI of 1.5 to 2.0										
Block Groups	154	27.70%	380	68.35%	392	70.50%	401	72.12%	556	100.00%
Population	231,263	23.00%	591,019	58.77%	612,676	60.93%	630,013	62.65%	1,005,585	100.00%
Any TNI value										
Block Groups	791	27.17%	1,738	59.70%	1,821	62.56%	1,833	62.97%	2,911	100.00%
Population	1,289,428	21.43%	2,917,243	48.48%	3,106,258	51.62%	3,232,320	53.72%	6,017,335	100.00%
Within Rural Counties⁴										
TNI of 2.0 or Greater										
Block Groups	0	0.00%	33	41.25%	33	41.25%	33	41.25%	80	100.00%
Population	0	0.00%	40,177	34.84%	40,177	34.84%	40,177	34.84%	115,321	100.00%
TNI of 1.5 to 2.0										
Block Groups	0	0.00%	6	50.00%	6	50.00%	6	50.00%	12	100.00%
Population	0	0.00%	5,748	40.25%	5,748	40.25%	5,748	40.25%	14,282	100.00%
Any TNI value										
Block Groups	0	0.00%	78	32.91%	78	32.91%	81	34.18%	237	100.00%
Population	0	0.00%	100,852	28.47%	100,852	28.47%	107,329	30.29%	354,289	100.00%
Within All Counties (entire region)										
TNI of 2.0 or Greater										
Block Groups	427	44.29%	763	79.15%	785	81.43%	802	83.20%	964	100.00%
Population	746,416	42.71%	1,298,706	74.32%	1,350,329	77.27%	1,388,336	79.45%	1,747,495	100.00%
TNI of 1.5 to 2.0										
Block Groups	154	27.11%	386	67.96%	398	70.07%	407	71.65%	568	100.00%
Population	231,263	22.68%	596,767	58.51%	618,424	60.64%	635,761	62.34%	1,019,867	100.00%
Any TNI value										
Block Groups	791	25.13%	1,816	57.69%	1,899	60.32%	1,914	60.80%	3,148	100.00%
Population	1,289,428	20.24%	3,018,095	47.37%	3,207,110	50.33%	3,339,649	52.41%	6,371,624	100.00%

Population source: US Census. 2014 5-Year ACS Estimates. Includes entire population within blockgroup, even if outside specified buffer

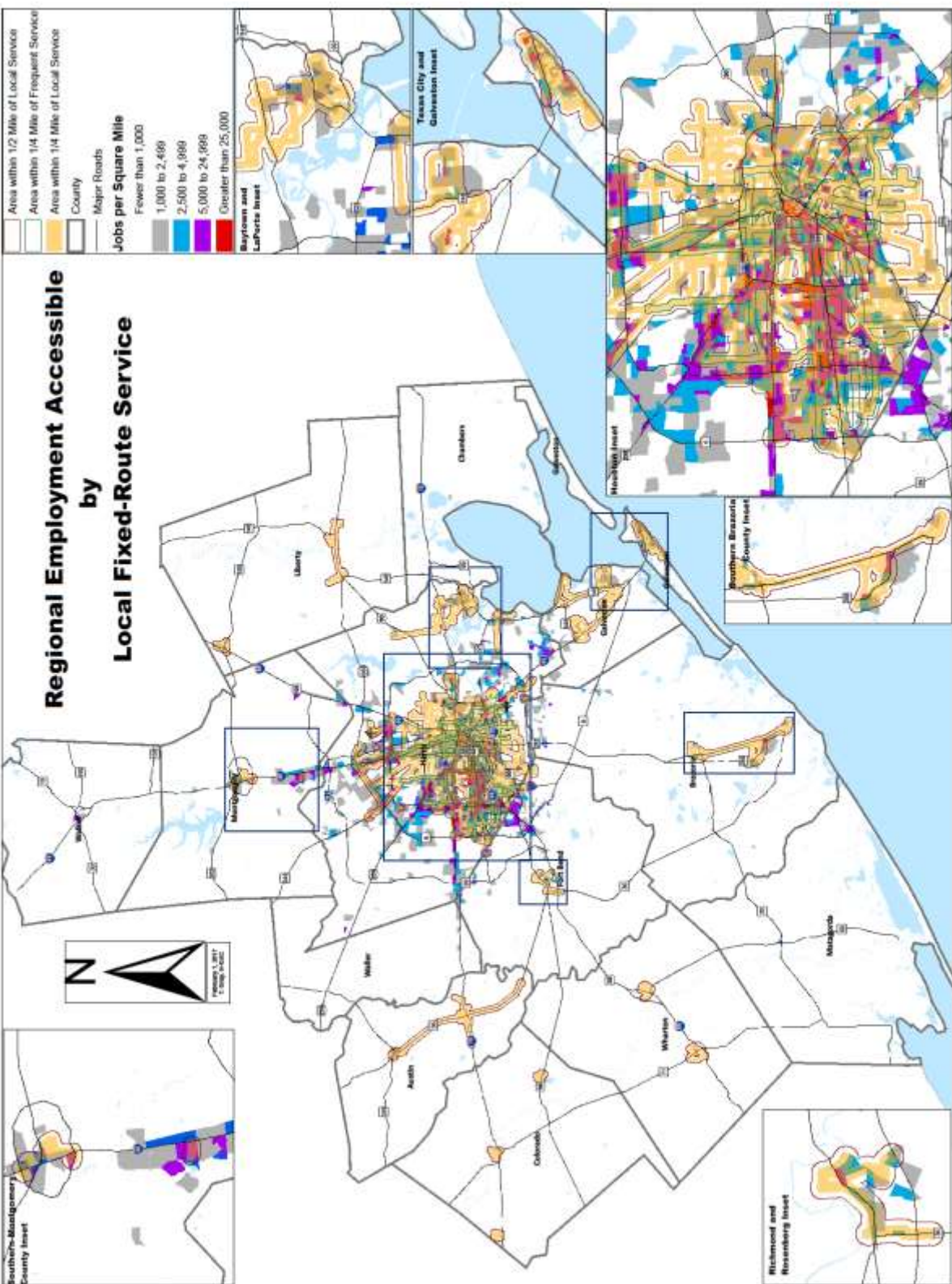
1. Defined as base headway of 15 minutes or less; includes METRORail

2. 3/4-Mile ADA Paratransit buffer; available only to eligible riders, not the general public

3. Brazoria, Fort Bend, Galveston, Harris and Montgomery Counties

4. Austin, Chambers, Colorado, Liberty, Matagorda, Walker, Waller and Wharton Counties

H-GAC 13-County Population within Existing Local Fixed-Route Service											
<i>(Includes Complementary ADA Paratransit; does not include park and ride or demand responsive services)</i>											
	Within 1/4 mile of frequent local service ¹		Within 1/4 mile of any local service		Within 1/2 mile of any local service		Within 3/4 mile of any local service ²		Total in Region		
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
Within Urban Counties											
Brazoria	0	0.00%	82,889	25.47%	83,844	25.76%	86,524	26.58%	325,477	100.00%	
Fort Bend	4,665	0.74%	110,736	17.50%	119,799	18.93%	152,732	24.13%	632,946	100.00%	
Galveston	0	0.00%	161,634	53.47%	168,383	55.71%	177,868	58.84%	302,276	100.00%	
Harris	1,284,763	30.09%	2,517,097	58.95%	2,675,143	62.66%	2,745,306	64.30%	4,269,608	100.00%	
Montgomery	0	0.00%	44,887	9.22%	59,089	12.13%	69,890	14.35%	487,028	100.00%	
Urban Subtotal	1,289,428	21.43%	2,917,243	48.48%	3,106,258	51.62%	3,232,320	53.72%	6,017,335	100.00%	
Within Rural Counties											
Austin	0	0.00%	24,244	84.40%	24,244	84.40%	25,129	87.48%	28,724	100.00%	
Chambers	0	0.00%	0	0.00%	0	0.00%	0	0.00%	36,550	100.00%	
Colorado	0	0.00%	16,100	77.51%	16,100	77.51%	16,100	77.51%	20,771	100.00%	
Liberty	0	0.00%	32,974	42.99%	32,974	42.99%	36,927	48.14%	76,707	100.00%	
Matagorda	0	0.00%	0	0.00%	0	0.00%	0	0.00%	36,611	100.00%	
Walker	0	0.00%	0	0.00%	0	0.00%	0	0.00%	68,882	100.00%	
Waller	0	0.00%	0	0.00%	0	0.00%	0	0.00%	44,825	100.00%	
Wharton	0	0.00%	27,534	66.80%	27,534	66.80%	29,173	70.78%	41,219	100.00%	
Rural Subtotal	0	0.00%	100,852	28.47%	100,852	28.47%	107,329	30.29%	354,289	100.00%	
Total Population											
Within 8-County MPO³	1,289,428	20.88%	2,950,217	47.77%	3,139,232	50.83%	3,269,247	52.94%	6,175,417	100.00%	
Within Entire Region	1,289,428	20.24%	3,018,095	47.37%	3,207,110	50.33%	3,339,649	52.41%	6,371,624	100.00%	
Source: US Census, 2014 5-Year ACS Estimates, Blockgroup level.											
Note: Includes entire population within blockgroup, even if outside specified transit service buffer											
1. Defined as base headway of 15 minutes or less; includes METRORail											
2. 3/4-Mile ADA Paratransit buffer; available only to eligible riders, not the general public											
3. Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery and Waller Counties											



H-GAC 13-County Employment within Existing Local Fixed-Route Service											
<i>(Includes Complementary ADA Paratransit; does not include park and ride or demand responsive services)</i>											
		Within 1/4 mile of frequent local service ¹		Within 1/4 mile of any local service		Within 1/2 mile of any local service		Within 3/4 mile of any local service ²		Total in Region	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Within Eight-County MPO³											
	Total Employment										
	TAZs	1,210	23.19%	2,413	46.25%	2,544	48.76%	2,635	50.51%	5,217	100.00%
	Number of Jobs	1,257,084	38.95%	2,184,060	67.68%	232,349	7.20%	2,282,768	70.74%	3,227,116	100.00%
Within Non-MPO Counties⁴											
	Total Employment										
	SAM Zones	0	0.00%	44	35.77%	44	35.77%	45	36.59%	123	100.00%
	Number of Jobs	0	0.00%	33,456	44.19%	33,456	44.19%	33,591	44.37%	75,708	100.00%
Within All Counties (entire region)											
	Total Employment										
	Geography	1,210	22.66%	2,457	46.01%	2,588	48.46%	2,680	50.19%	5,340	100.00%
	Number of Jobs	1,257,084	38.06%	2,217,516	67.14%	265,805	8.05%	2,316,359	70.13%	3,302,824	100.00%
Note: includes all employment within TAZ or SAM zone, even if outside specified buffer											
1. Defined as base headway of 15 minutes or less; includes METRORail											
2. 3/4-Mile ADA Paratransit buffer; available only to eligible riders, not the general public											
3. Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery and Waller Counties; uses 2017 H-GAC C&E employment estimates by TAZ											
4. Austin, Colorado, Matagorda, Walker and Wharton Counties; uses SAM employment data											

H-GAC 13-County Employment within Existing Local Fixed-Route Service										
<i>(Includes Complementary ADA Paratransit; does not include park and ride or demand responsive services)</i>										
	Within 1/4 mile of frequent local service ¹		Within 1/4 mile of any local service		Within 1/2 mile of any local service		Within 3/4 mile of any local service ²		Total in Region	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Within Urban Counties										
Brazoria	0	0.00%	40,057	42.49%	40,234	42.68%	41,338	43.85%	94,273	100.00%
Fort Bend	835	0.42%	21,663	10.89%	27,837	13.99%	32,512	16.34%	198,913	100.00%
Galveston	0	0.00%	72,238	68.02%	73,203	68.93%	74,033	69.71%	106,201	100.00%
Harris	1,256,249	48.34%	1,981,508	76.25%	2,014,662	77.52%	2,042,291	78.59%	2,598,792	100.00%
Montgomery	0	0.00%	57,705	31.16%	63,743	34.42%	79,407	42.88%	185,175	100.00%
Total Employment	1,257,084	39.49%	2,173,171	68.27%	2,219,679	69.73%	2,269,581	71.30%	3,183,354	100.00%
Within Rural Counties										
Austin	0	0.00%	12,413	90.30%	12,413	90.30%	12,413	90.30%	13,746	100.00%
Chambers	0	0.00%	0	0.00%	1,505	10.13%	1,505	10.13%	14,862	100.00%
Colorado	0	0.00%	7,935	91.81%	7,935	91.81%	7,935	91.81%	8,643	100.00%
Liberty	0	0.00%	10,889	75.64%	11,665	81.03%	11,682	81.15%	14,396	100.00%
Matagorda	0	0.00%	0	0.00%	0	0.00%	0	0.00%	11,857	100.00%
Wharton	0	0.00%	13,108	81.32%	13,108	81.32%	13,243	82.15%	16,120	100.00%
Walker	0	0.00%	0	0.00%	0	0.00%	0	0.00%	25,342	100.00%
Waller	0	0.00%	0	0.00%	0	0.00%	0	0.00%	14,504	100.00%
Total Employment	0	0.00%	44,345	37.12%	46,626	39.03%	46,778	39.15%	119,470	100.00%
Total Employment										
Within 8-County MPO	1,257,084	38.95%	2,184,060	67.68%	2,232,849	69.19%	2,282,768	70.74%	3,227,116	100.00%
Within Entire Region	1,257,084	38.06%	2,217,516	67.14%	2,266,305	68.62%	2,316,359	70.13%	3,302,824	100.00%
Sources: 2016 Q1 H-GAC employment forecast by TAZ (MPO Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller) Statewide Analysis Model (SAM) employment data (Collar Counties: Austin, Colorado, Matagorda, Walker, Wharton)										
Note: Includes all employment within TAZ or SAM zone, even if outside specified buffer										
1. Defined as base headway of 15 minutes or less; includes METRORail										
2. 3/4-Mile ADA Paratransit buffer; available only to eligible riders, not the general public										