Appendix 4: Gap Analysis

Introduction

This gap analysis documents where and how the region's transportation services may be insufficient to meet the needs of its residents and workers. It builds off the Needs Assessment. Where that document looked at all of the need for transportation services in the region, this one specifically focuses on those places where that need appears not to be met. Unmet needs can present themselves in a variety of ways. One form of unmet need involves locations where service simply does not exist or does not serve the destinations that people in those areas need to get to: this can be referred to as a "spatial gap". Another type of unmet need may be one in which a service exists, but those who could benefit from the service do not know about it or can't find the information they need to use it: this can be called an "information gap". A third type of unmet need may be one in which an operator cannot access the resources necessary to meet the demonstrated need in the area they serve: a "financial gap".

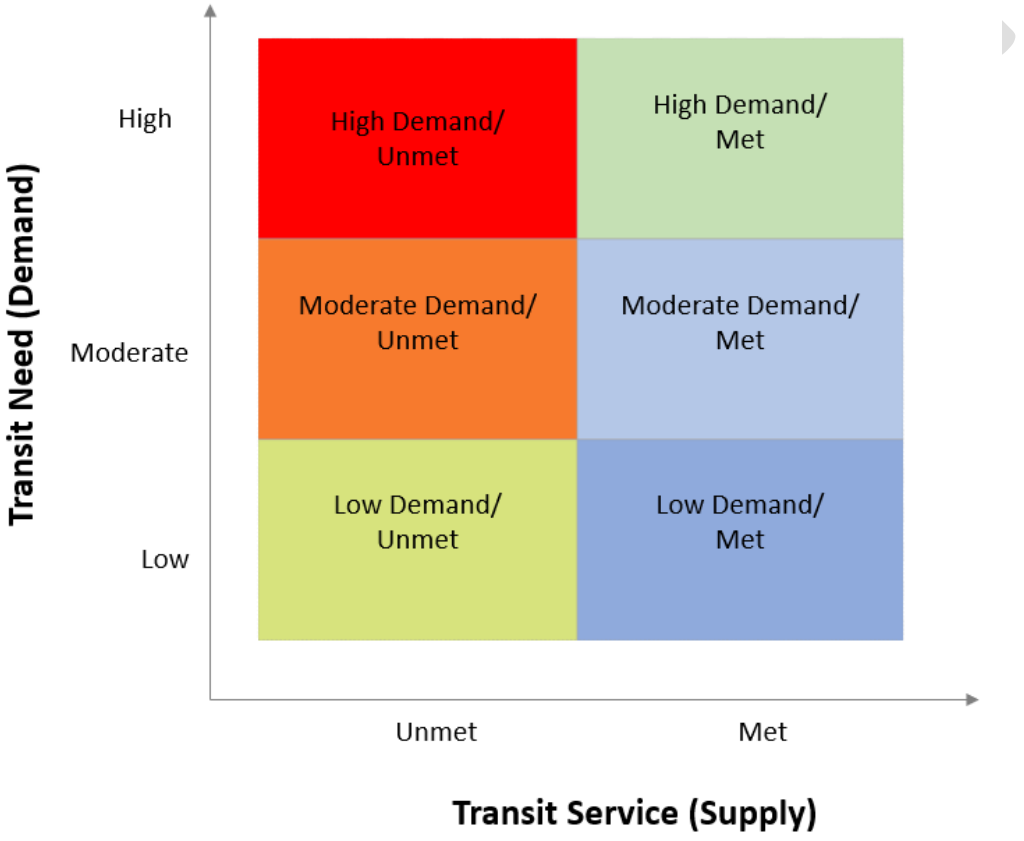
This section reviews each of the gaps listed above. It also examines the gaps reported by members of the public in the RCTP engagement process. It then summarizes these gaps into key themes and provides a list of strategies that local and regional stakeholders could use to minimize gaps. It concludes by listing the vision, goals, and objectives for this project and laying out a series of performance metrics by which progress in reaching those goals and objectives can be measured.

Spatial Gaps

The region's transportation providers operate in a funding-constrained environment. As a result, it is important to develop a strong understanding of where, when, and for whom transit is most needed and ensure these most pressing needs are met to the greatest extent possible. Where this match of transit need and transit supply does not happen, it shows up as a spatial gap in the region's transportation system: a place where service does not exist, or where existing service does not seem to meet the needs of the community.

To easily compare transit need and transit supply, this Gap Analysis uses a Transit Need Index (TNI) and a Transit Service Matrix (TSM). The TNI measures the demand for public transit in a particular area, focusing specifically on the needs of certain populations most likely to need transportation services, such as low-income people, older adults, and persons with disabilities. The TSM identifies the transit service types and frequencies necessary to meet the level of demand indicated by the TNI. Figure 1 provides a visualization of this logic. Using the TNI, this analysis will determine whether the need for transportation services in each area is high, medium, or low, while the TSM allows for each area within those three categories to be further split by whether the demonstrated level of need is met by the existing availability of transportation services.

Figure 1: Transit Need and Service Matrix



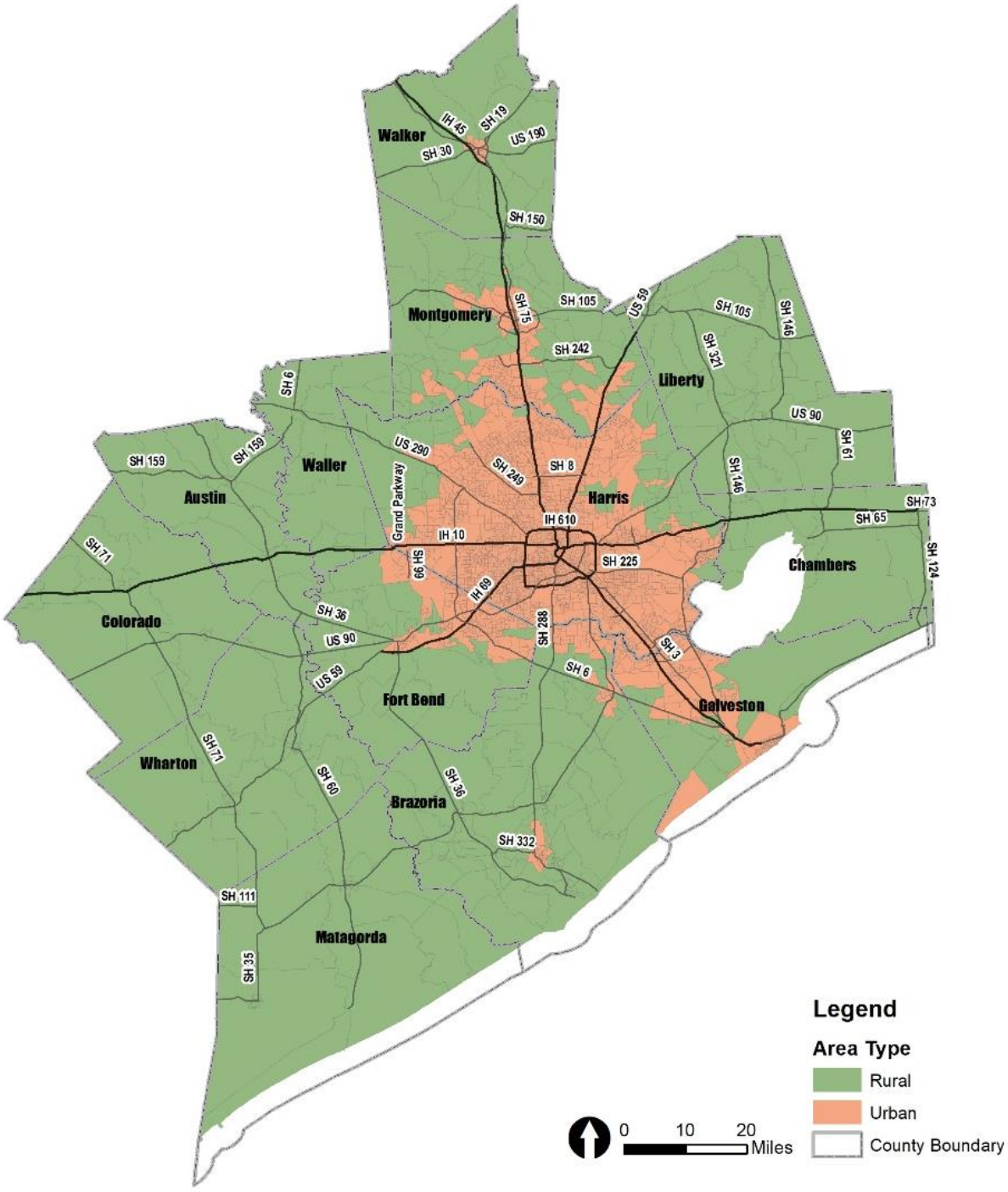
Transit Need Index

The Transit Need Index (TNI) uses demographic information from the 2019 American Community Survey (ACS) at the block group level to evaluate the need for transportation service in each area. It uses six different factors:

- Population Density
- Percent Household with Zero Automobiles
- Percent Population over 65
- Percent Household with disability
- Percent Children 6-17
- Poverty Rate

Each factor is standardized in an index, with values for each factor ranging from zero to one. Factors are given different weights depending on whether they are in an urban or rural area, with urban areas defined as all block groups within a Census-designated Urbanized Area (UZA), and rural areas defined as all block groups not located within a UZA. Figure 2 shows urban and rural designations for each block group in the region.

Figure 2: Urban and Rural Census Block Groups



Once scores are determined for each factor and properly weighted for each urban and rural block group, the weighted scores are added, and then re-indexed, with index scores again ranging from zero to one. These re-indexed scores are then divided into

three categories: those block groups with scores in the highest third are designated as areas of high transit need, block groups scored in the middle third as designated as areas of moderate transit need, and block groups with scores in the lowest third are designated as areas of low transit need.

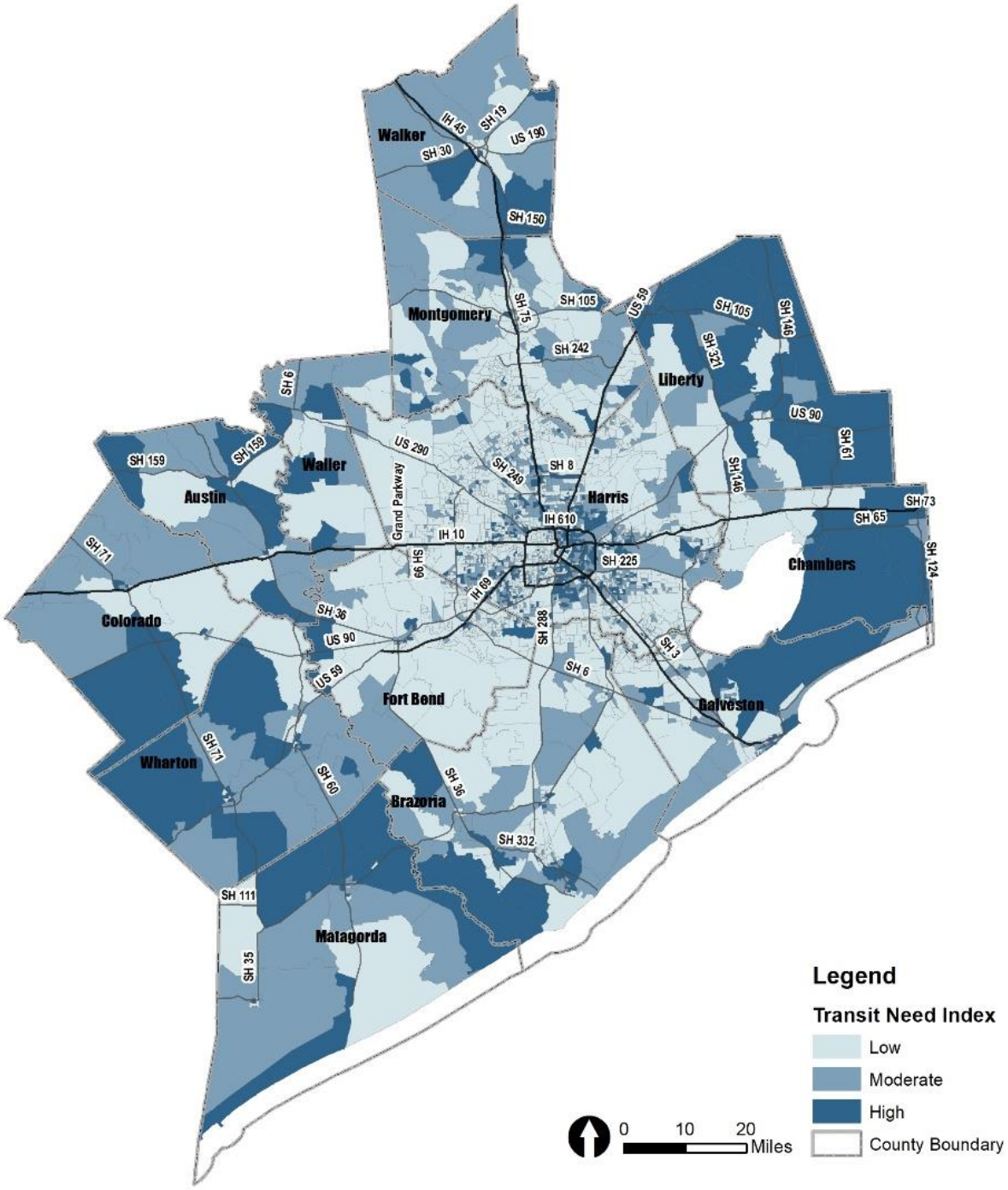
Table 1 lists how each factor is weighted for both urban and rural block groups. Urban and rural areas are weighted differently to account for the differing factors influencing transit demand in each of these areas. In urban settings, density is important to the success of higher-capacity, higher-frequency services, while it is less important for low-frequency fixed route and demand-response services that tend to predominate in rural areas, while lack of automobility also tends to promote transit use in urban settings much more than rural ones. Seniors and persons with disabilities are more heavily weighted in rural settings because these populations are critical clientele for rural transportation providers.

Table 1: Urban and Rural Weighting Factors for Transit Need Index

Factor	Urban Weight	Rural Weight
Population Density	20%	10%
Percent of Households with Zero Automobiles	20%	10%
Percent of Population Over 65 Years of Age	15%	25%
Percent of Households with an Adult with a Disability	15%	25%
Percent of Population Between the Ages of 6 and 17	10%	10%
Poverty Rate	20%	20%
Total	100%	100%

Figure 3 shows the results of this analysis. It shows high levels of transit need in urban and rural communities throughout the region. Urban communities with high TNI scores can be found in north, northeast, and southeast Houston, in southwest Houston and neighboring communities in Fort Bend County, and on Galveston Island. High TNI block groups in rural communities can be found in parts of Chambers and Liberty Counties to the east of Houston, as well as in Matagorda, Wharton, and Colorado Counties in the west of the region. Areas with low TNI mostly form a donut-shape surrounding central Houston, encompassing outlying areas of Harris County as well as parts of Fort Bend, Brazoria, and mainland Galveston Counties.

Figure 3: Transit Need Index Results



Transit Service Matrix

Appropriate Transit Service Levels

To figure out the extent to which an area's demonstrated transit need is being met, a framework was developed to determine what an *appropriate* amount of service may be for a given area. To do this, a rubric was adapted from an internal H-GAC planning document, the *Regional Transit Framework Study 2017 Interim Report*, which was intended to help the region prioritize transit investments. Table 2 summarizes this rubric, which uses population and employment density as a basis for determining the types of transit service that may be appropriate in a location. Population and employment density are key drivers of overall transit ridership: areas with large numbers of people and jobs can generally support high-capacity, high-frequency services, while areas with low populations and few jobs can only support basic demand-response services, with areas of moderate density able to support less frequent or lower-capacity fixed-route service, or in some cases commute-oriented regional connector buses. This rubric divides densities into five classifications, ranging from High (at least 15 households or 40 jobs per acre) to Limited (fewer than three households or four jobs per acre).

Table 2: Appropriate Transit Service Types by Population and Employment Density[1]

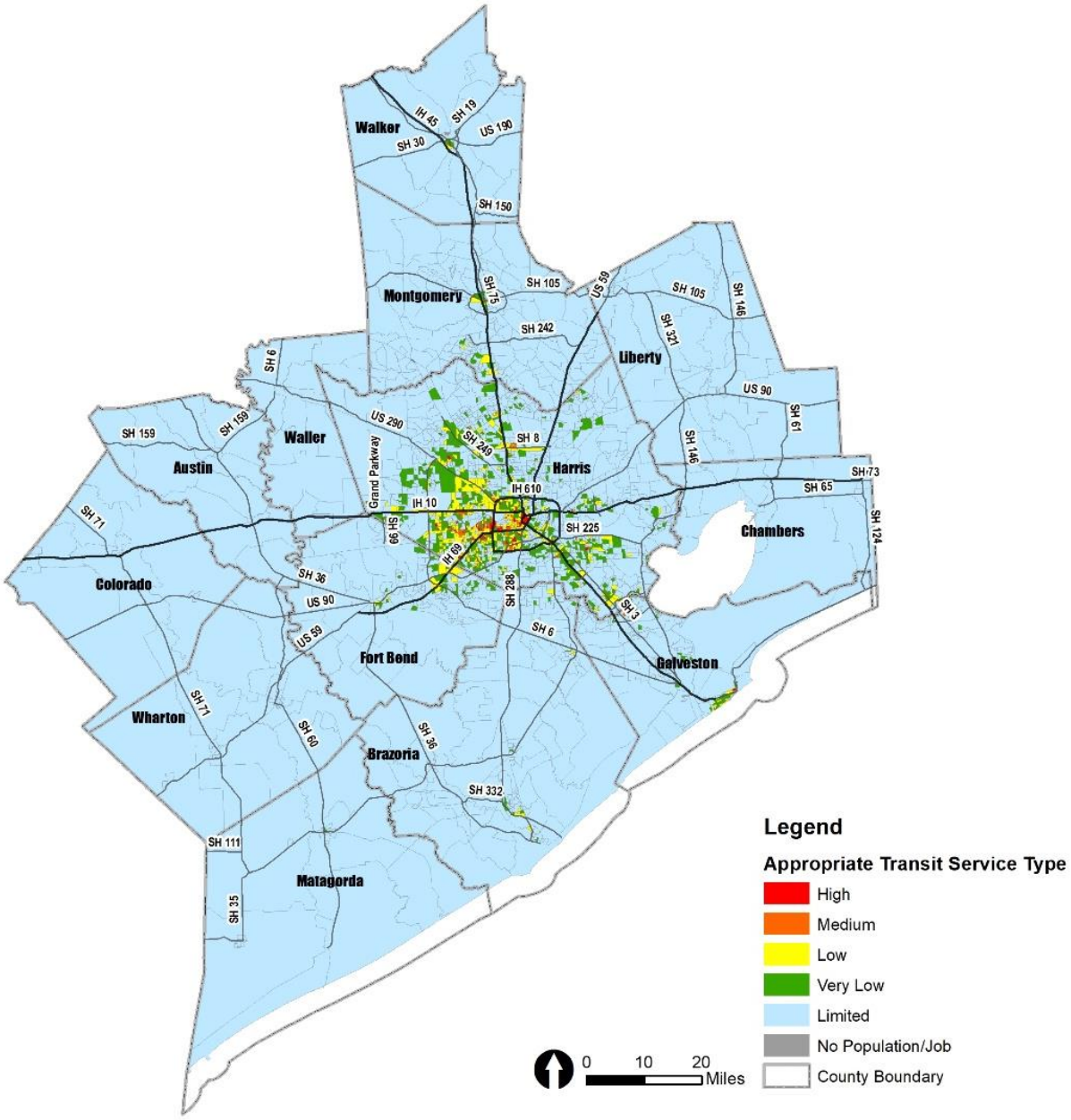
Classification	Minimum Household and Employment Density		Examples of Urban Form	Suitable Transit Service Types
	Per Acre	**Per Square Mile**		
Limited	< 3 households < 4 jobs	< 1,920 households < 2,560 jobs	Rural or large-lot residential Scattered service and retail employment	Demand response
Very Low	3 households 4 jobs	1,920 households 2,560 jobs	Small towns Suburban single-family residential Strip and big box service and retail	Demand response Regional connector bus Local fixed-route bus (low frequency)
Low	5 households 6.5 jobs	3,360 households 4,096 jobs	Single-family residential Scattered multifamily residential Retail clusters Office parks	Regional connector bus Local fixed-route bus (low-medium frequency)
Medium	11 households 28 jobs	7,200 households 17,920 jobs	Townhomes Multifamily residential Large office employment centers	Local fixed-route bus (medium-high frequency) Signature bus Express bus HCT All Day
High	15 households 40 jobs	9,600 households 25,600 jobs	Dense, walkable mixed-use neighborhoods Concentrated employment centers	Local fixed-route bus (high frequency) Signature bus Express bus HCT Peak Period HCT All Day

Figure 4 shows these classifications mapped onto each block group in the region, based on 2019 ACS data. It shows that much of the region's high-density areas can be found inside the Interstate 610 Loop, with a few additional concentrations in Southwest Houston, along the Energy Corridor, and on Galveston Island. With very few exceptions, land outside Beltway 8 is used only at the lowest levels of density. All of the land in the

[1] Adapted from *A Toolbox for Alleviating Traffic Congestion* (Institute of Traffic Engineers, 1989) and *TCRP Report 165 – Transit Capacity and Quality of Service Manual, 3rd Edition* (Transportation Research Board, 2013).

region used at densities above the lowest classification, Limited, can be found in six of the region's 13 counties: Harris, Galveston, Fort Bend, Montgomery, Walker, and Brazoria.

Figure 4: Appropriate Transit Service Type by Population and Employment Density



Existing Transit Service Levels

Once a framework was in place to determine an appropriate level of transit service in each location, existing transit services then had to be examined to determine whether they achieve this appropriate level of service. Note that only fixed-route services are included in this analysis: not only is it difficult to evaluate the availability of a demand-response service, but it is also difficult to differentiate, for the purposes of this analysis, between demand-response services that serve all residents of a given area and those that only provide service to certain groups of individuals. The sole exception to this is that Flex Zones are included, as these are geographically-defined and available to the general public. Examples of these include METRO's Community Connectors in Acres Homes and Missouri City, Fort Bend County Transit's services in Richmond and Rosenberg, and Harris County Transit's microtransit pilot in Generation Park. These Flex Zone services are available to the general public and provide point-to-point service within the zone as well as connectivity to the region's fixed-route service.

For the purposes of this analysis, existing fixed-route service was divided into six groups based on capacity and frequency:

- High-Capacity Transit, including all Bus Rapid Transit (BRT) and Light Rail (LRT) services
- Limited-stop express buses, including commuter-focused park and ride services
- Local bus services with off-peak headways of 15 minutes or less
- Local bus services with off-peak headways between 16 and 30 minutes
- Local bus services with off-peak headways between 31 and 60 minutes
- Local bus services with off-peak headways greater than 60 minutes.

Figure 5 maps these services by type, while Figure 6 shows all areas within a half-mile of one of these services, to approximate the catchment areas of transit service in the region. This represents about a ten-minute walk to transit, assuming suitable walking conditions. For the purposes of determining catchment areas, stop areas were used for park-and-ride and other express services, while routes were used for local bus services: this accounts for the fact that some of the bus services in the region do not have fixed stops. These maps show a high density of transit service within Harris County, where all of the region's high-capacity transit can be found, but in much of the region standard headways on existing service is infrequent.

Figure 5: Regional Transit Network Map by Service Type

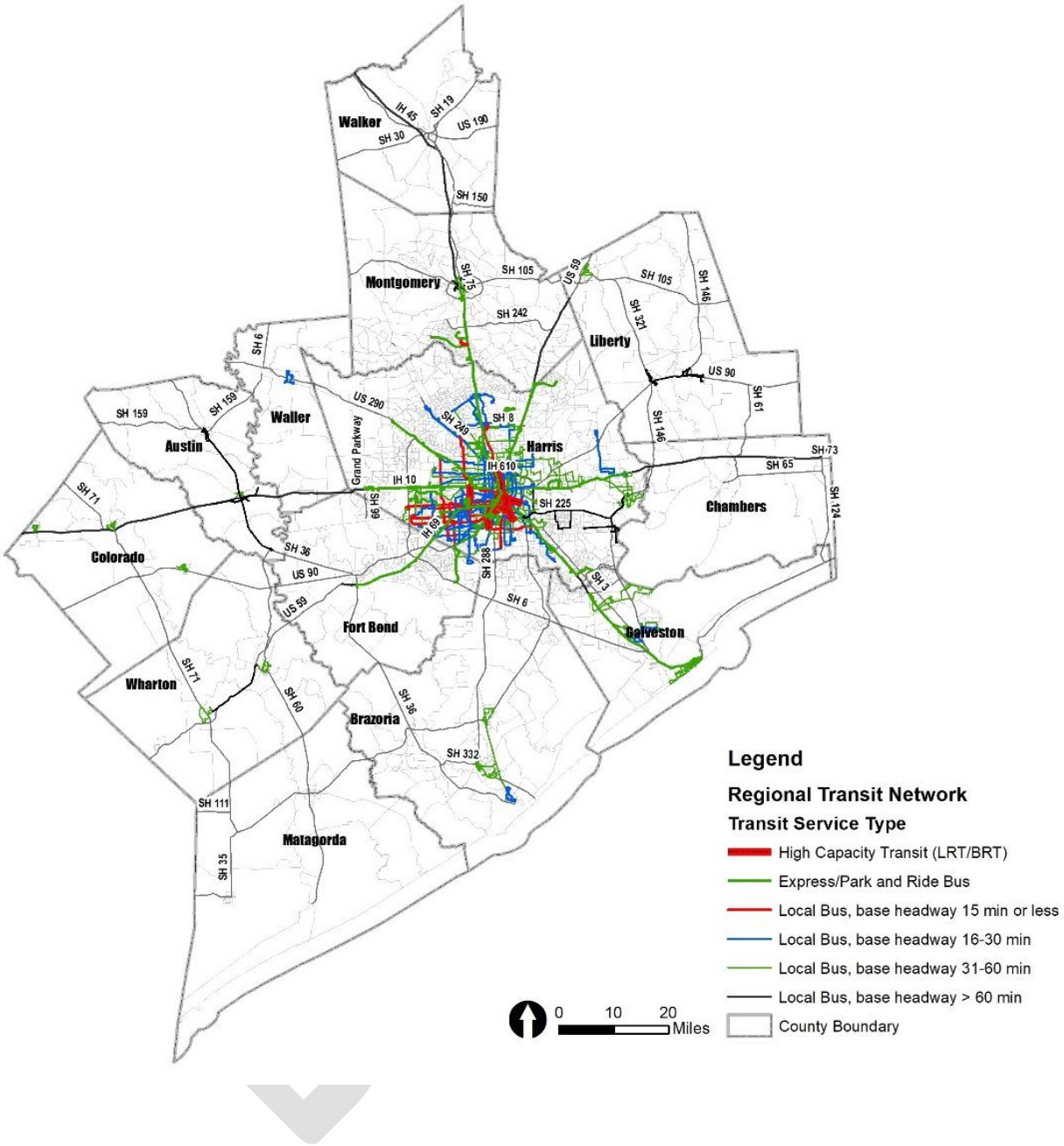
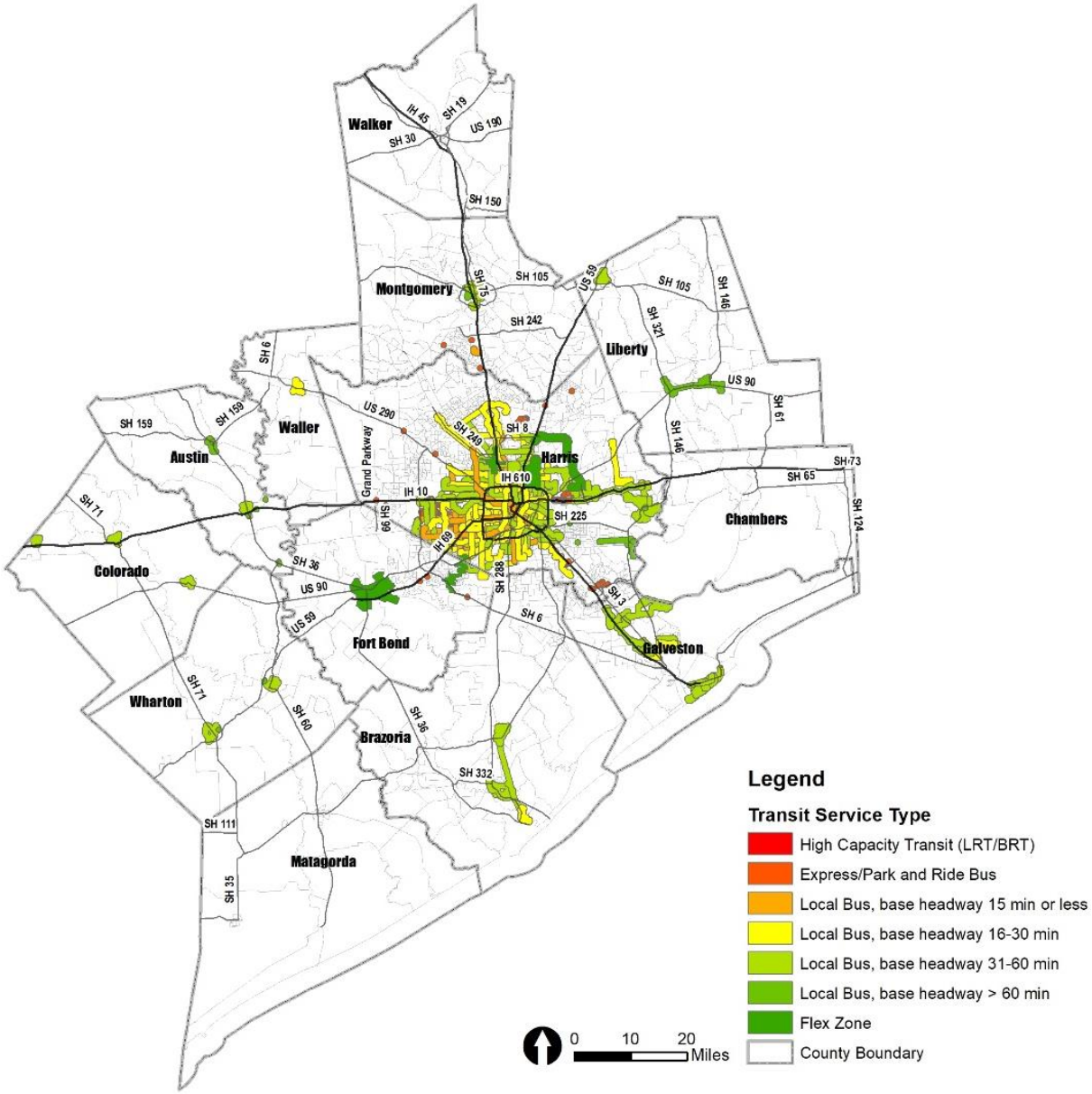


Figure 6: Regional Transit Catchment Areas



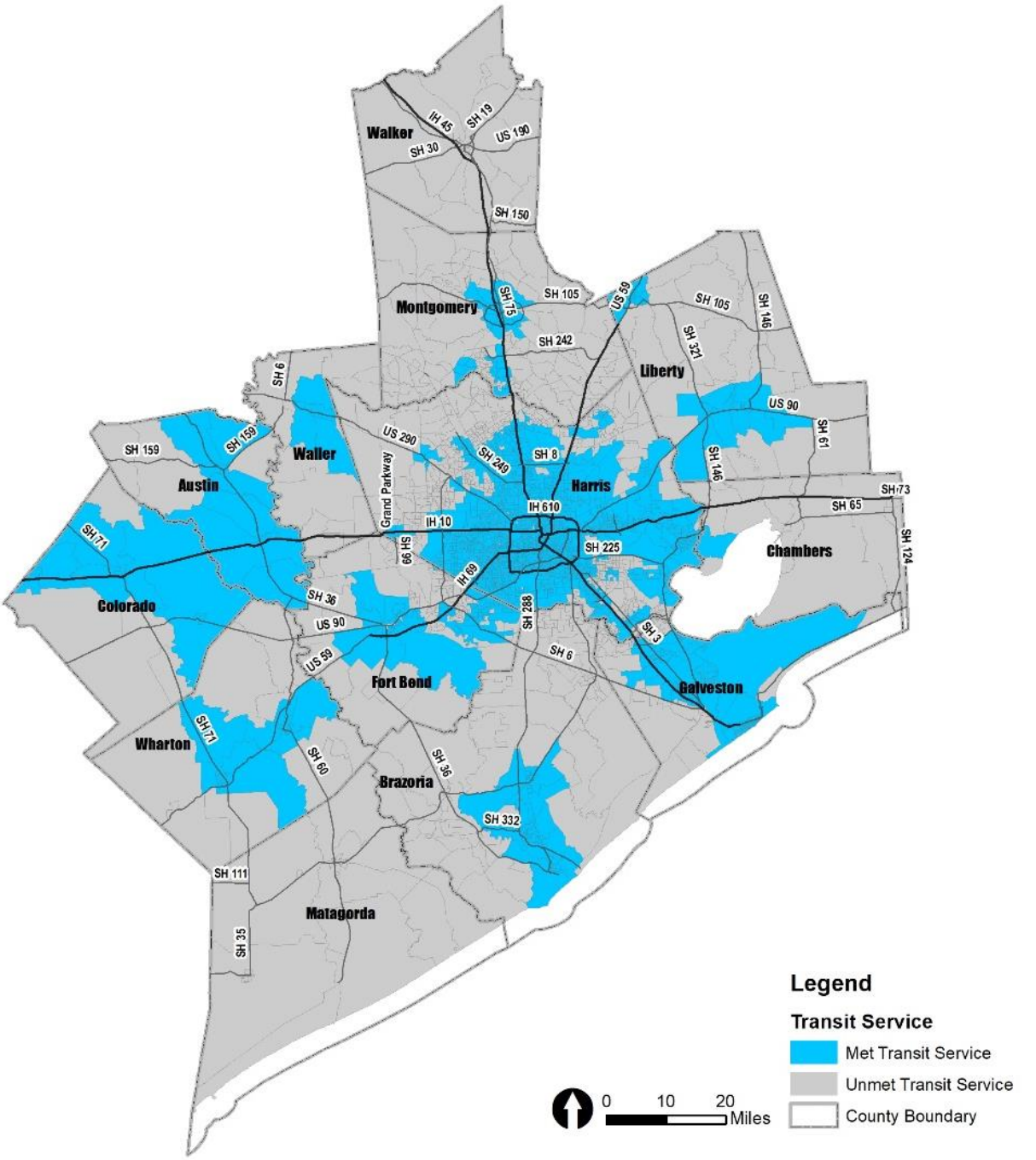
Classifying both the required level of service and the existing level of service allows an analysis of whether an area's transit need is met, by comparing existing service to the suitable level of service as determined by population and employment density. If

existing transit service includes one of the appropriate transit types for a given region's density, it is considered to have its transit need "met". For example, an area classified as "high" density for this analysis would be considered to have "met" transit need if it has high-capacity transit, an express or park and ride bus, or a local bus with base headways of 15 minutes or less. This is the Transit Service Matrix (TSM), which is summarized in Table 3. An X in each box in the table designates that an existing level of transit meets the need for transit in an area with that level of density. This information is then mapped, at the block group level, in Figure 7. Note that this analysis may under-represent transit need, as the buffers around transit routes, in some cases, extend into large block groups, which may make those block groups appear to have transit availability beyond that experienced by most of the people living in those block groups.

Table 3: Transit Service Matrix

Service Type	High	Medium	Low	Very Low	Limited
High-Capacity Transit	X	X	X	X	X
Express/Park and Ride Bus	X	X	X	X	X
Local Bus, Headway 15 Minutes or Less	X	X	X	X	X
Local Bus, Headway 16-30 Minutes		X	X	X	X
Local Bus, Headway 31-60 Minutes			X	X	X
Local Bus, Headway More than 60 Minutes				X	X
Flex Zone					X

Figure 7: Transit Service Matrix Results by Block Group



Transit Service Matrix data can then be combined with Transit Need Index data to show areas with high levels of unmet transit need. In essence, this creates a six-category system for evaluating transit need and current transit availability: each block group may have a high, medium, or low level of transit need, and each block group may also have

that need be met or unmet by current transit service. A map of every block group in the region, dividing each into one of these six categories, can be found in Figure 8. This shows areas throughout the region with unmet high transit need. Many of these areas are rural in nature, encompassing outlying areas of Liberty, Chambers, Walker, Colorado, Wharton, and Matagorda Counties. There are, however, some areas closer to the region's core that also have unmet high transit need, most notably in southeast Harris County.

Figure 8: Transit Need and Availability Classifications by Block Group

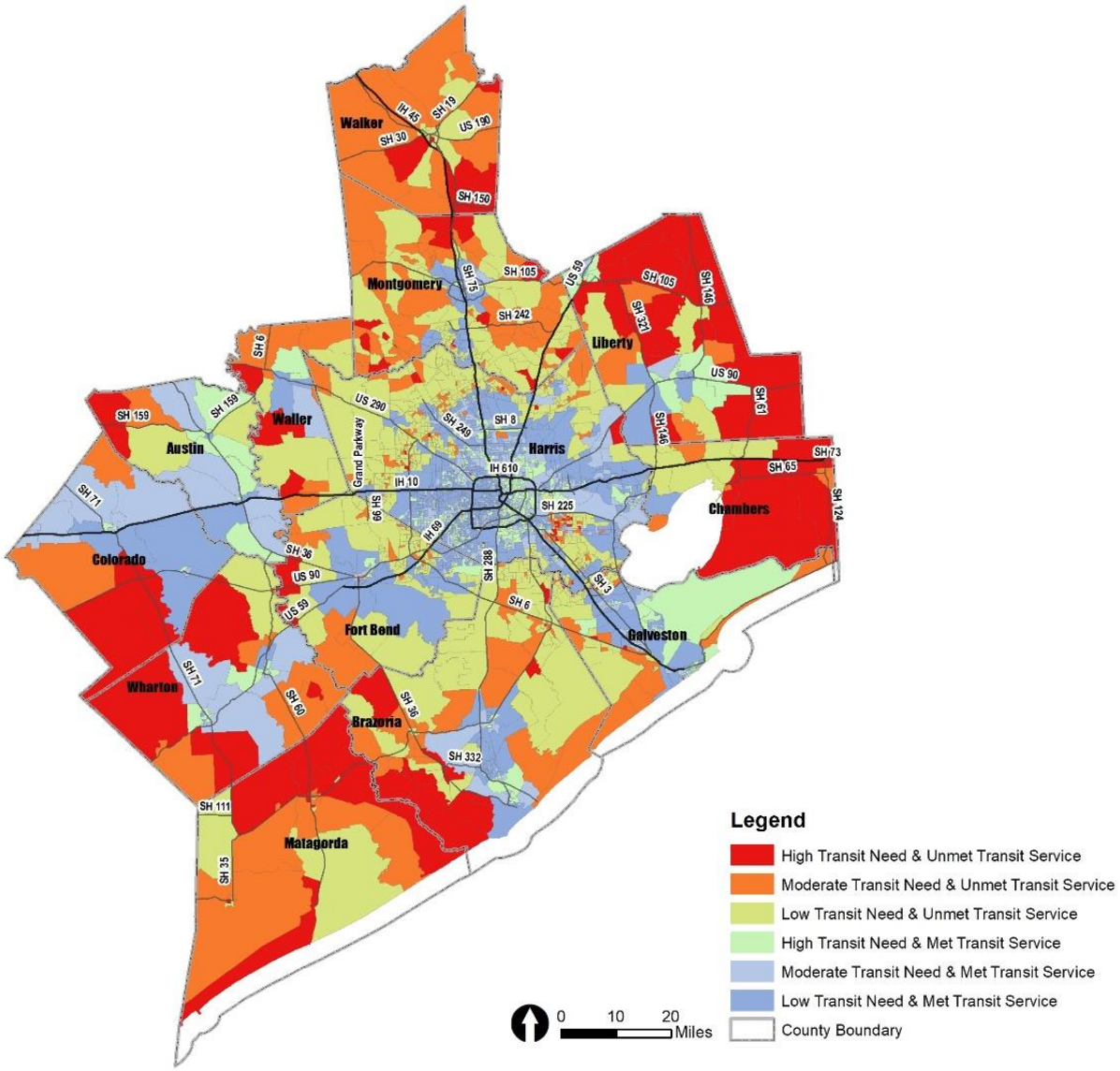


Figure 9 highlights those block groups that have high unmet transit need, denoting the appropriate level of transit service for each as laid out in the Regional Transit Framework Study rubric. While most of the block groups with high unmet transit need are classified as limited density, and thus demand-response service would be most appropriate for these areas, this is not true of all block groups with high unmet transit need. Several block groups in the region with high unmet transit may be appropriate for a higher level of service: most of these are near Interstate 610 or Beltway 8 in Harris County, with a few along the Interstate 45 corridor in Galveston County, particularly in Pasadena, which currently has no fixed-route transit service. These areas can be seen at a higher level of detail in Figure 10.

Figure 9: Block Groups with High, Unmet Transit Need by Appropriate Transit Service Level

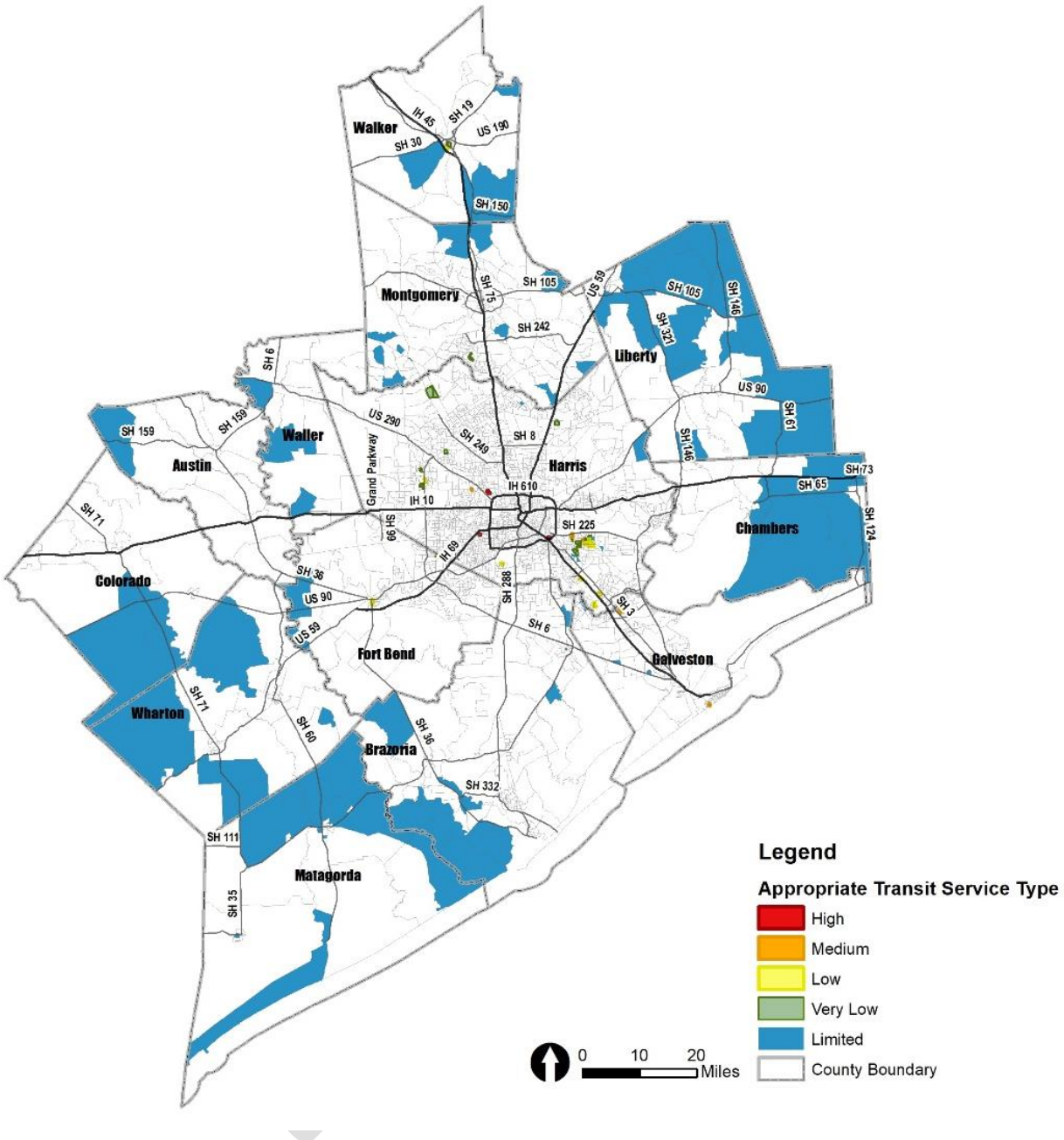
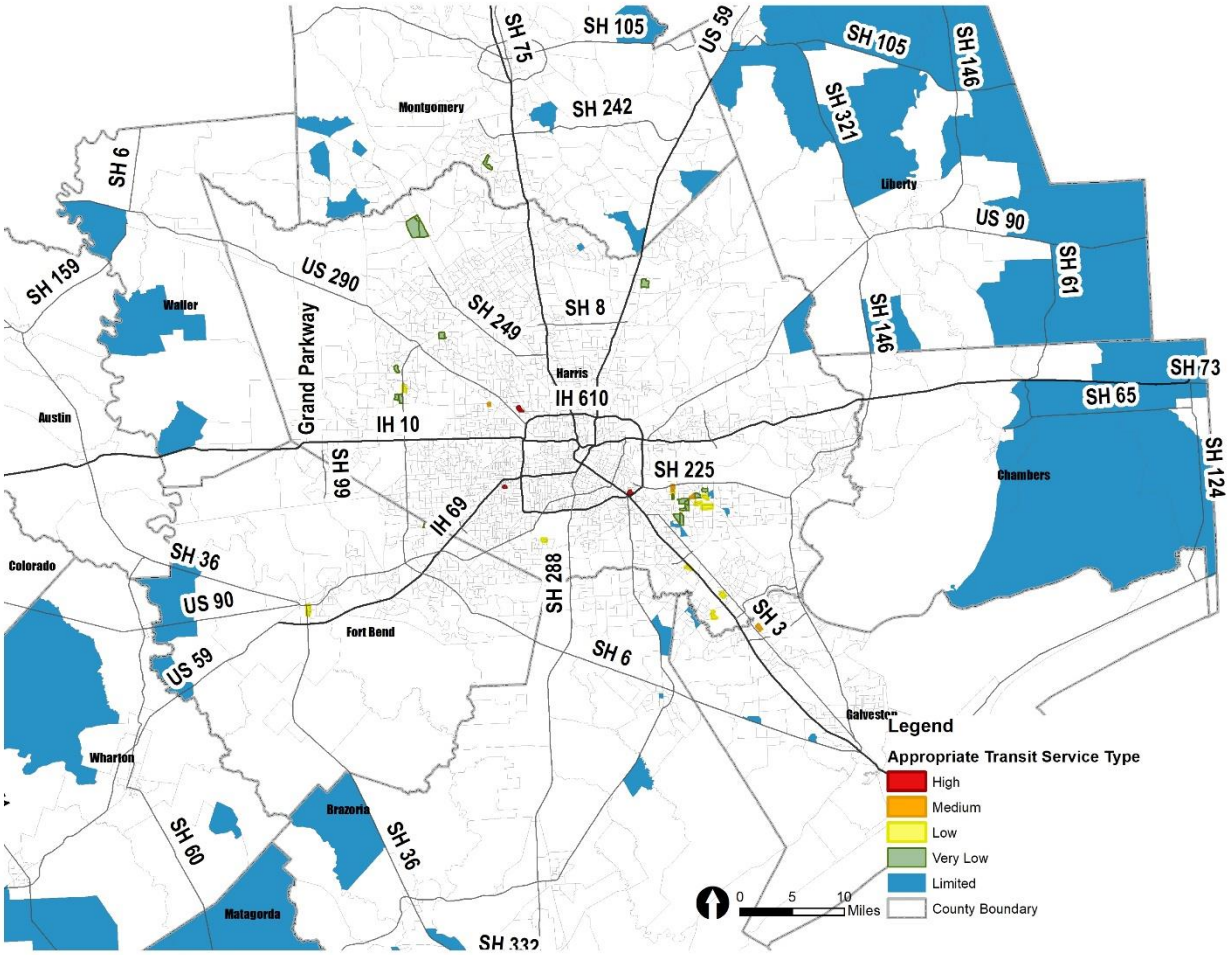
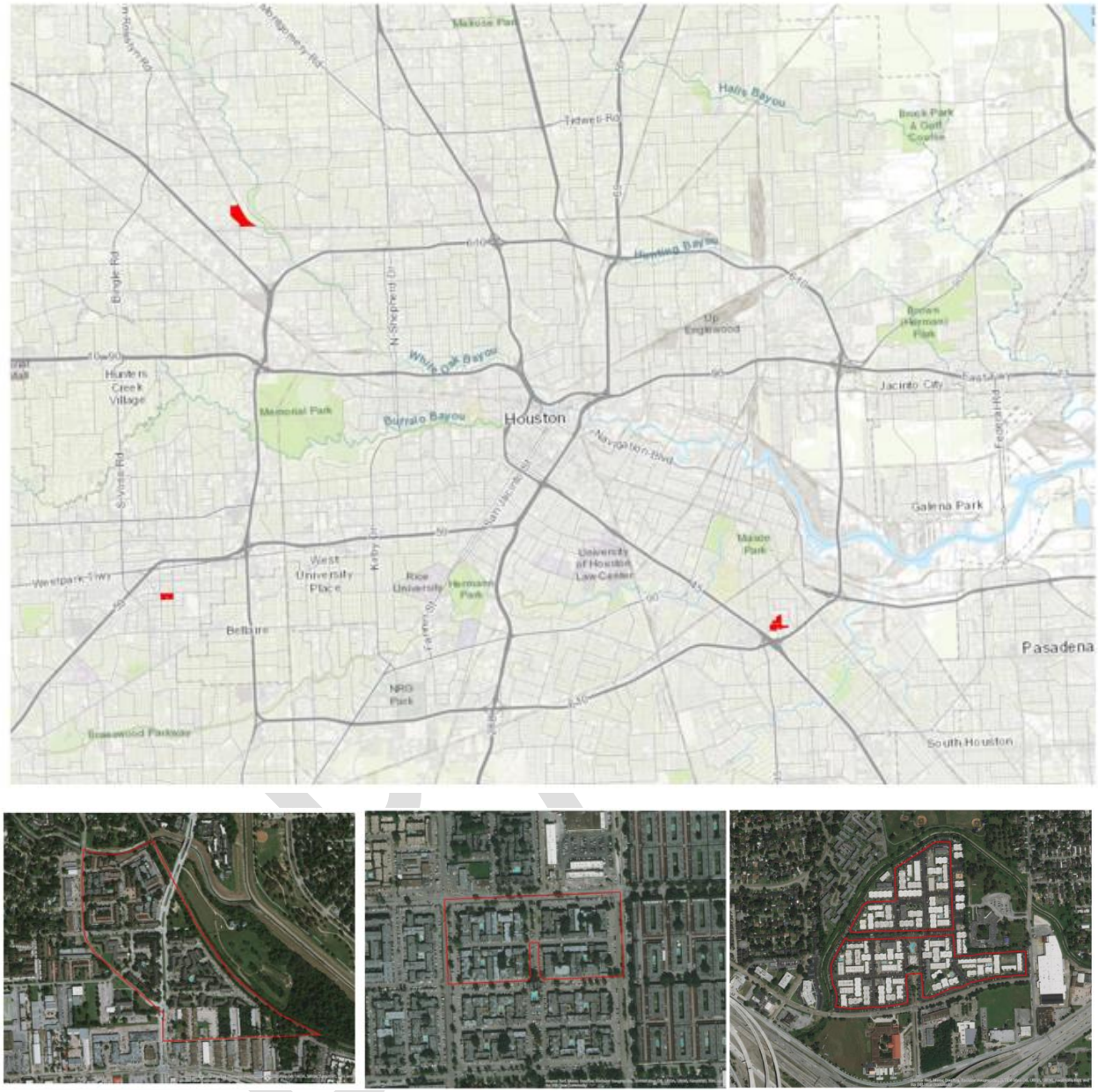


Figure 10: Block Groups Near the Region's Core with High, Unmet Transit Need by Appropriate Transit Service Level



Only three block groups in the region show up as having high levels of unmet transit need with enough density to justify high-capacity, high-frequency services. All of these are located in Harris County: one in Northwest Houston, one in Southwest Houston, and the third in Southeast Houston. While all three are in proximity to a METRO bus route, the existing frequencies on those routes (30 to 60 minutes) may not be adequate, given the densities of these block groups. Figure 11 focuses on these block groups and shows an aerial satellite image of each. All three have very similar built forms: each comprises one or more low-rise or mid-rise apartment complexes, a built form found commonly throughout Houston and the 13-county region. This analysis, in combination with high levels of projected population and job growth in the coming years, indicates that there are likely to be more block groups like these in the future, and transit services will need to expand to meet increasing transit need.

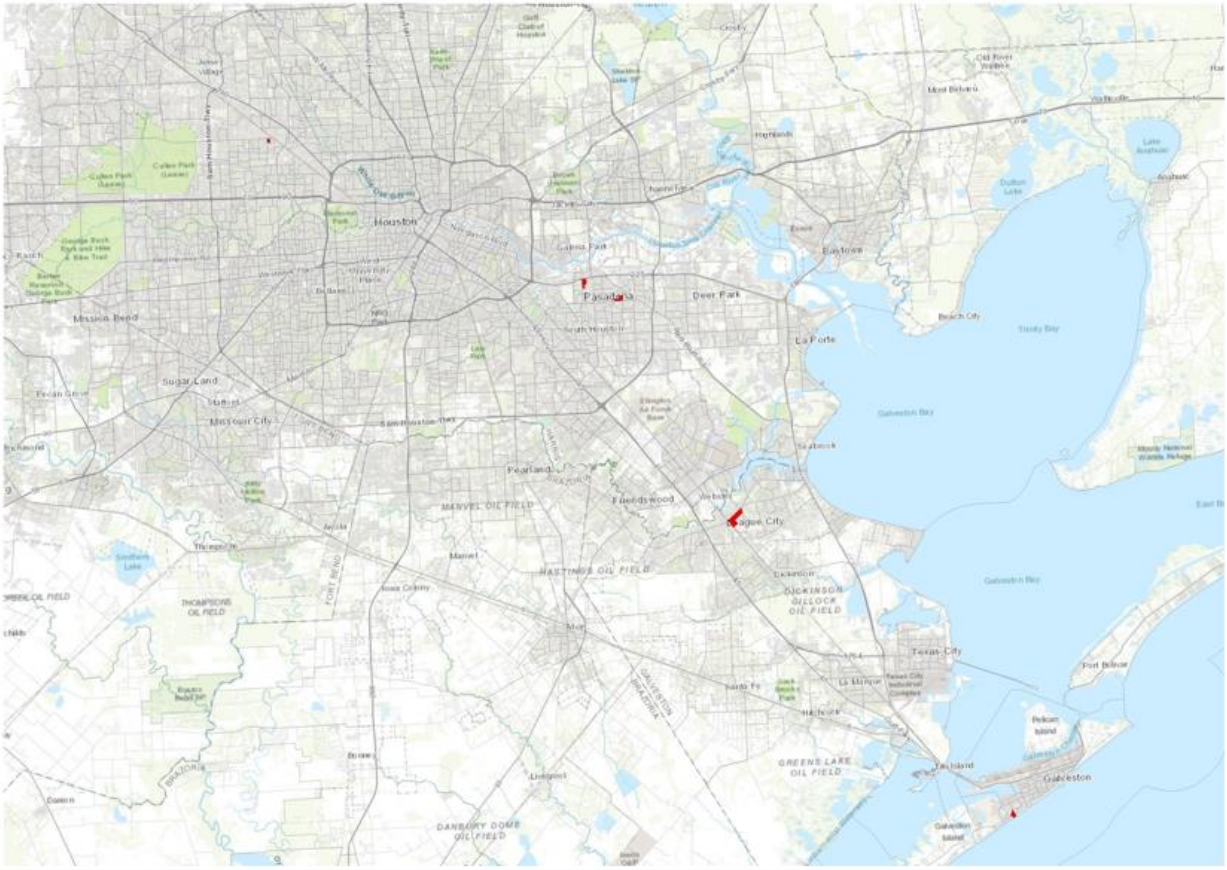
Figure 11: Block Groups with High Unmet Transit Need, Justifying High-Frequency and High-Capacity Services



Block groups designated as “medium” density, with unmet transit need, are shown in Figure 12. There are five of these in the region, with three in Harris County and two in Galveston County. These areas are characterized by a mixture of multi-family residential and other land uses, including single-family homes, commercial and industrial uses, and open space. Some of these areas have limited transit access, while others, such as the two block groups in Pasadena, have no transit access at all. Similar to the denser areas discussed above, population growth will likely lead to the creation of

more areas like this, suggesting a need for improving transit service in many areas throughout the region.

Figure 12: Block Groups with Medium Unmet Transit Need



Information Gaps

Information gaps can be a crucial barrier to overcome to ensure that everyone has access to transportation services. Individuals cannot use transportation options they don't know about. Even if an individual is aware of a transportation option, if they cannot easily gather key information about how to use it, they will not be able to take advantage of that option. Getting the most out of an investment in transportation resources requires that information about those resources be readily available and easy to find.

Addressing information gaps requires an understanding of what information about transportation options needs to be made available, as well as where and how to communicate that information in a way that ensures it is easy to access and understand

by members of the general public. There is little existing research on these issues, as most existing publications on transit information focus on graphics and branding standards. This Gap Analysis will lay the groundwork for establishing a minimum standard for information about transit resources and will review the region's transit information to understand if these standards are being met regarding communicating information about available service to the general public.

Vital Transportation Information

To start, it's important to define the minimum information that a person needs to be able to plan and execute a trip on transit, and what purpose that information serves for the potential rider. Overlapping, but not identical, information needs will present themselves depending on whether the transportation service in question is fixed-route, demand-response, or paratransit. A Transit Cooperative Research Program report identifies several key pieces of information a public transit user needs in order to plan and complete their trip, including the location of the nearest bus stop, the routes that travel to the desired destination and transfer locations, fare, and time of departure and approximate duration of the trip[2]. However, this report looks exclusively at fixed-route services: in order to make this applicable to other types of transportation services, these information needs must be broadened.

One can look at the informational needs of a transportation user as a series of questions they will need to answer to plan and carry out a trip on a transportation service. These questions include:

- What services exist in my community?
- Am I eligible to use this service?
- Does this service operate near both my origin and my destination(s)?
- Does this service operate at the time of day and day of week that I want to travel?
- How and where can I access this service?
- Is there a cost involved? If so, what is that cost and how do I pay it?
- How long will it take me to get from my origin to my destination using this service?
- What conditions can I expect while using this service? What amenities, if any, does this service provide?

[2] Transportation Research Board., & Texas Transportation Institute. (1999). Passenger Information Services: A Guidebook for Transit Systems. Transit Cooperative Research Program (TCRP) Report 45, published by Transportation Research Board, Washington.

- How difficult is it to use the service? What obstacles might I encounter trying to complete this trip on this service?

From there, the information needs of a transportation user can be broken down by examining what the user needs to know to answer these questions. Table 4 contains a matrix of key pieces of information needed to answer these questions.

Table 4: Matrix of Transportation User Information Needs

Information	Question Answered
Name and contact information for existing transit services	What services exist in my community?
Service eligibility requirements	Am I eligible to use this service?
Route and stop information	Does this service operate near both my origin and my destination(s)? How and where can I access this service?
Headway and/or schedule information	Does this service operate at the time of day and day of week that I want to travel? How long will it take me to get from my origin to my destination using this service?
Fare and fare payment information	Is there a cost involved? If so, what is that cost and how do I pay it?
Vehicle and stop amenity information	What conditions can I expect while using this service? What amenities, if any, does this service provide?

Once the information needs of a public transportation user have been established, the next step is to examine when those needs arise. Some of this information will be a pre-

requisite for planning a trip but will not be particularly useful while the person is in the vehicle on their way to their destination. A 2007 study of public transportation users' information needs divides the process of planning and completing a transit trip into four stages, each with unique navigation needs:

1. **Pre-trip** information from origin to destination;
2. **At-stop** information;
3. **Onboard** vehicle information;
4. Pre-trip information for **return trip**.[3]

Table 5 expands on the matrix shown above, including not only the information needs, but also when each piece of information is needed.

Table 5: Matrix of Transportation User Information Needs, by Trip Phase

Information	Trip Stages Required
Name and contact information for existing transit services	Pre-trip
Service eligibility requirements	Pre-trip
Route and stop information	Pre-trip, at-stop, on-board, return trip
Headway and/or schedule information	Pre-trip, at-stop, on-board, return trip
Fare and fare payment information	Pre-trip, at-stop
Vehicle and stop amenity information	Pre-trip

H-GAC's public engagement process demonstrated that information gaps play a noteworthy role in discouraging the use of public service transportation in the Houston Gulf Coast region. In most of the virtual interactive outreach events, participants struggled to find basic information online about the transportation services they would need to use to make a trip on transit in their area. Online survey data demonstrated that web-based sources are where the region's residents are most likely to look for information about transportation options. Half of survey respondents reported that they

[3] Caulfield, Brian, O'Mahony, Margaret. (2007). An Examination of the Public Transport Information Requirements of Users. IEEE Transactions on Intelligent Transportation Systems, Volume 8, Issue 1, pp 21-30.

were either unaware of any transportation services available in their community, or that they didn't have enough information about those options to make use of them, while one in five survey respondents reported that they would use transportation services more often if they had a better understanding of the available options.

These responses indicate that information gaps in the Houston Gulf Coast region are a significant barrier to using existing transportation resources. They also suggest that these information gaps are not necessarily caused by vital information not being available, but by vital information being difficult to find, or not available in the forms or media in which they are most needed. Improving access to information about transportation could have help improve mobility in the region, filling these information gaps and making existing services easier to use for more people.

To understand how to improve access to information about transportation services, it's important to start with a review of how the region currently communicates information about its services. This Gap Analysis will look at two important tools the region uses to communicate with riders, websites and bus stop signage, using the framework laid out above for understanding riders' information needs.

Bus Stop Signage

In the previous section, there were three vital pieces of information that were found to be necessary for riders to have access to at a bus stop: headway/schedule information, route and stop information, and fare and fare payment information. This section analyzes bus stop signage at fixed transit stops for all public transportation services, in the 13-County Region. For each category of information required, signage is graded on a 1-3 scale. These scores are based on the questions listed in Table 4: signage receives a score of 3 if the relevant question can be completely answered by the information available on the signage, a score of 2 if the relevant question can be partially answered by the information available on the signage, and a score of 1 if the relevant question cannot be answered at all by the information available on the signage. A total score is then calculated by adding these three scores together, with a minimum of 3 and a maximum of 9. Analysis is based on photos of signs at fixed route stops for each transit provider in the region, with images either provided by the agency or

photographed by H-GAC staff. Note that this analysis does not take into account the percentage of a provider's stops that have signage, as this data is not available. These findings are summarized in Table 6, and the rationale for each score is described below.

Table 6: Score Summaries for Bus Stop Signage by Fixed-Route Transit Provider

Agency Signage	Headway/Schedule Information Score	Route and Stop Information Score	Fare and Fare Payment Information Score	Total Score
City of Conroe	1	2	1	4
Fort Bend Transit	1	1	1	3
Gulf Coast Transit District	1	1	1	3
Harris County Transit	3	3	2	8
Island Transit	1	1	1	3
METRO	3	3	2	8
The Woodlands Township	3	3	1	7

City of Conroe

Figure 13: Conroe Connection Bus Stop Signage

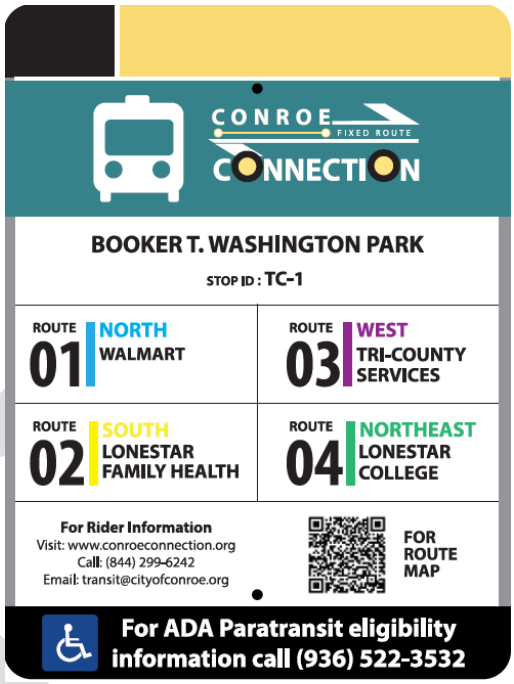


Figure 13 shows a sample Conroe Connection bus stop sign. It provides information about the routes that serve the stop, as well as their destination point(s). It also provides a stop name and ID, as well as contact information for the agency and a QR code which offers a link to the route map on the agency's website. This signage provides some, but not all, of the information required at a bus stop to complete a transit trip: it provides clear information about the stop location, the routes serving the stop, and the endpoint of each of those routes. However, information about intermediate stops is only available to users with an internet-enabled mobile device. Additionally, it provides no information about fares, nor does it provide information about schedules or headways, which would enable a rider to know when to expect a bus at that stop.

Fort Bend Transit

Fort Bend Transit has fixed stops only for its commuter services. These signs consist solely of the agency's logo and contact information, as shown in Figure 14. Missing are the routes serving the stop, the destinations those routes serve, schedules and fare information

Figure 14: Image Used on Fort Bend Transit Signs

Gulf Coast Transit District

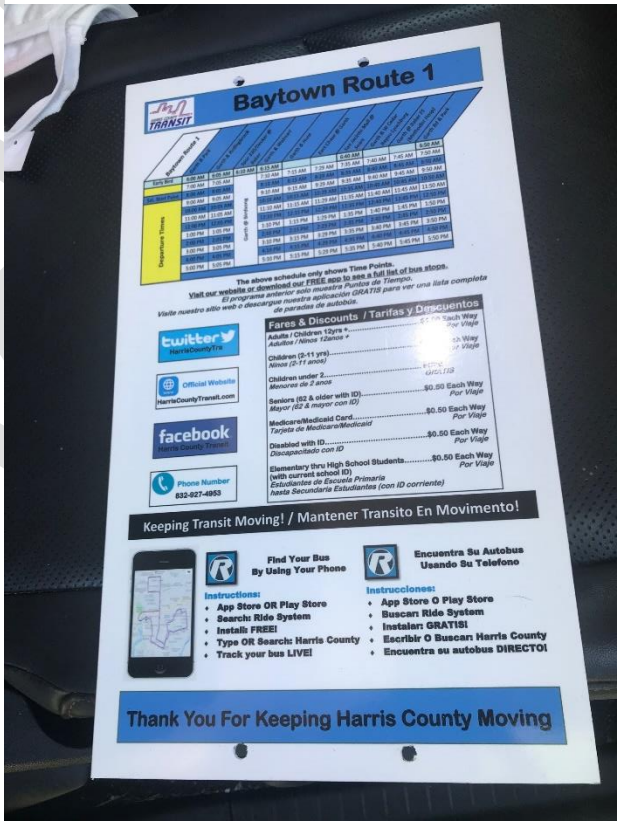
Gulf Coast Transit District is a new provider, having taken over services in parts of Galveston and Brazoria Counties in May 2021. Their predecessor organization, Gulf Coast Center, lacked the resources to provide signage at its stops, leaving that responsibility to the various jurisdictions in which it operated. As a result, GCTD signage has not yet been standardized systemwide, and the existing signage at its stops only offers the agency's phone number and website. As a result, the agency reports receiving roughly 125 calls per day asking for basic route and stop information, and the agency reports that the need for staff to answer these calls and provide assistance is a significant burden which prevents GCTD from doing more to promote its services. The agency is currently in the process of designing new signage for all its stops, which will provide more information to riders, reducing their need to call the agency and allowing GCTD to reallocate its resources and better serve existing and potential users.

Harris County Transit

Signage used by Harris County Transit at their bus stops can be seen in Figure 15 and Figure 16. These signs provide a wealth of useful information to riders. Route and stop information provided allows riders to know what routes serve the stop and the timepoint stops (though not all stops) served. Schedule information allows riders to know exactly when to expect a bus at this stop, and when the bus will arrive at other timepoint stops. Fare information is also provided, though this does not include information about what fare payment methods are accepted. A bus stop number and agency contact information are also provided, and most information is provided in both English and Spanish.

Figure 15: Harris County Transit Bus Stop Signage

Figure 16: Harris County Transit Bus Stop Signage, Route Information



Island Transit

Island Transit bus stop signage includes a bus icon, as well as a no-parking sign for drivers. No information is provided about the routes serving the stop or the destinations

served. There is also no information about schedules or fares, nor is contact information for the transit agency provided. A photo of this signage can be found in Figure 17.

Figure 17: Island Transit Bus Stop Signage

Houston METRO

Houston METRO provides a substantial amount of vital information through its bus stop signage. In addition to a stop number and agency contact information, signage indicates the routes that serve a given stop, their destinations, and whether or not the route is a part of the agency's frequent network. Additionally, signage communicates headway information, for both peak and off-peak periods for each route, and also provides a strip map so riders can see intermediate destinations on the route as well, though this map does not indicate every stop on the route. Headway information is reinforced by the different colors used on signage for various routes: red is used for routes operating with headways of 15 minutes or less, blue is used for routes with 20-to-30-minute headways, while green is used for routes with 60-minute headways. This color-coding scheme allows riders to understand basic information about frequency at a distance. This signage does not include fare information, though it does inform riders of the agency's mobile ticketing app. Samples of METRO's bus stop signage can be found in Figure 18 and Figure 19.

Figure 18: Metro Bus Stop Signage

The Woodlands Township

The Woodlands Transit provides signage for its park and ride services. Signs indicate stop locations on the Houston end of the route and provide schedule information for both inbound and outbound trips. Agency contact information is also provided. Signage does not include any information about fares or fare payment methods. A sample of the signage can be found in Figure 20 and Figure 21.

Figure 19: Metro Bus Stop Signage with Strip Map

Figure 20: Woodlands Transit Bus Stop Signage Schedule Information

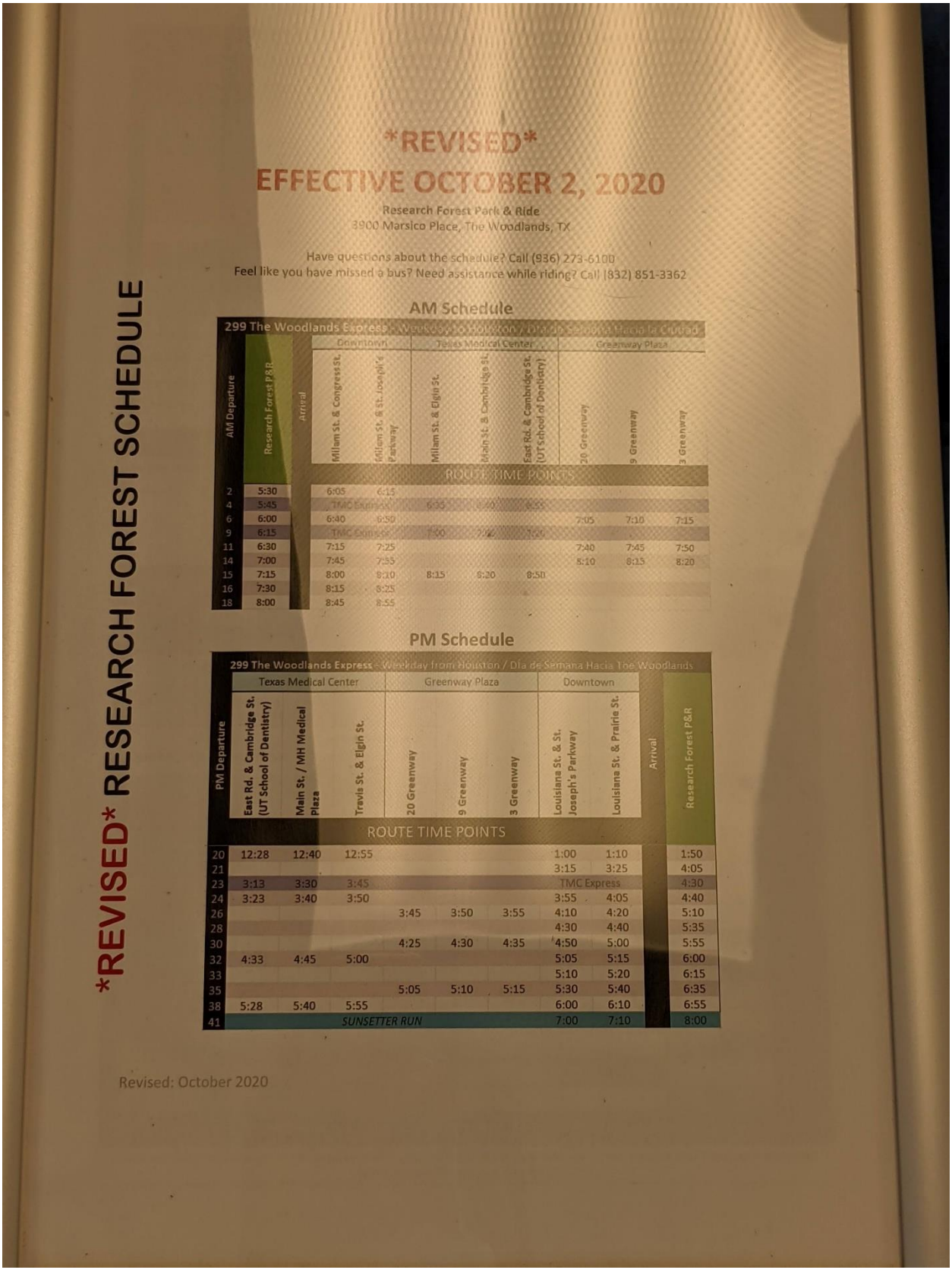


Figure 21: Woodlands Transit Bus Stop Signage Route and Stop Information

Websites

The public outreach process indicated that transit provider websites are the most commonly used source of information about public transit, so it is important that the region's providers have vital travel information available and easily found on their websites. To evaluate the effectiveness of the public transit websites in our region, this study applied two questions to each of the key information types listed in Table 4:

1. Is the information needed to plan a transit trip available on the agency's web site?
2. How easy is it to find the information?

To evaluate these questions in a quantifiable way, the study team developed a site scoring process. In this process, a website is awarded three points for each piece of vital information available on its website, or two points if only some of that information is available, or if it only available for some of the services offered by that provider. One point is also deducted for broken links. Starting from each website's home page, for each click after the first two required to access that information, one point is deducted from that score. This test rewards agencies that meet the "Three-Click Rule", a common method for evaluating a website's ease of use. This rule holds that all vital information on any website should be accessible within three clicks from the home page. The maximum score an agency's website could receive is 18.

This test should be understood as a starting point, rather than a comprehensive evaluation. One key factor it misses is accessibility: for instance, it does not test whether a website can be easily navigated by individuals using screen readers. It also does not test the website's useability on mobile devices: all tests done for this analysis were conducted on a Windows PC, using the Microsoft Edge browser. Further research and testing are needed to help each agency develop the most complete possible understanding of their website's strengths and deficiencies.

This test was conducted for the websites of each public transit provider listed in the Provider Inventory. A summary of scores is found in Table 7, and following that, a score breakdown for each website, and an explanation of that score.

Table 7: Transit Provider Website Evaluation Score Summary

Agency Website	Total Score
Brazos Transit District	17
City of Conroe	16
Colorado Valley Transit	16
Fort Bend Transit	16
Gulf Coast Transit District	15
Harris County Transit	13
Island Transit	15
Houston Metro	14
R Transit	15
The Woodlands Township	16
Regional Average	**15**

Brazos Transit District

Table 8: Brazos Transit District Website Evaluation Score

Information	Question Answered	Score
Name and contact information for existing transit services	What services exist in my community?	3
Service eligibility requirements	Am I eligible to use this service?	3
Route and stop information	Does this service operate near both my origin and my destination(s)? How and where can I access this service?	2
Headway and/or schedule information	Does this service operate at the time of day and day of week that I want to travel? How long will it take me to get from my origin to my destination using this service?	3
Fare and fare payment information	Is there a cost involved? If so, what is that cost and how do I pay it?	3
Vehicle and stop amenity information	What conditions can I expect while using this service? What amenities, if any, does this service provide?	3
	Total Score	**17**

Upon visiting the Brazos Transit District's home page (http://www.btd.org/), a box pops up on screen providing information about how to book a demand-response trip online or over the phone. Additionally, the agency's phone number is listed both at the top and bottom of the home page. Most information available on the website is easily located in two clicks or fewer, though a few vital pieces of information are harder to find. For example, the fixed-route services operated by BTD within the 13-county region are flag-stop services, which riders can access by waving down the vehicle as it passes at any point along its route. This information is only available on the PDF route map and schedule, which requires three clicks to access.

City of Conroe

Table 9: City of Conroe Website Evaluation Score

Information	Question Answered	Score
Name and contact information for existing transit services	What services exist in my community?	3
Service eligibility requirements	Am I eligible to use this service?	3
Route and stop information	Does this service operate near both my origin and my destination(s)? How and where can I access this service?	3
Headway and/or schedule information	Does this service operate at the time of day and day of week that I want to travel? How long will it take me to get from my origin to my destination using this service?	3
Fare and fare payment information	Is there a cost involved? If so, what is that cost and how do I pay it?	2
Vehicle and stop amenity information	What conditions can I expect while using this service? What amenities, if any, does this service provide?	2
	Total Score	**16**

The Conroe Connection website provides all necessary information for using both fixed-route and ADA paratransit services, easily accessible in two clicks or less from its home page (https://www.cityofconroe.org/departments/transit). What is harder to find is information about commuter services operating between Conroe and Houston: much of this information is only available on METRO's website, which is linked to on the Conroe Connection site. Additionally, information about vehicle amenities is very detailed, but does not state explicitly whether the amenities (e.g., bike racks) available on local fixed-route services are also available on the commuter service as well.

Colorado Valley Transit

Table 10: Colorado Valley Transit Website Evaluation Score

Information	Question Answered	Score
Name and contact information for existing transit services	What services exist in my community?	3
Service eligibility requirements	Am I eligible to use this service?	3
Route and stop information	Does this service operate near both my origin and my destination(s)? How and where can I access this service?	2
Headway and/or schedule information	Does this service operate at the time of day and day of week that I want to travel? How long will it take me to get from my origin to my destination using this service?	2
Fare and fare payment information	Is there a cost involved? If so, what is that cost and how do I pay it?	3
Vehicle and stop amenity information	What conditions can I expect while using this service? What amenities, if any, does this service provide?	2
	Total Score	**16**

Colorado Valley Transit's website (http://gotransit.org/) provides most transit information in an easy to access format. It loses points for a few reasons. Some of the links to stop and schedule information on the site are broken, though there are other links on other pages on the website that provide the same information. Additionally, information about vehicle amenities for demand-response service is limited, though this information is easily accessible for fixed-route services. One particularly useful feature of the site is its dedicated page of services (and accompanying helpful links) for each county in which it operates: however, these county-by-county pages are only accessible through the page

on which riders can reload their fare cards, which means these are unlikely to be seen by riders who do not already have fare cards.

Fort Bend Transit

Table 11: Fort Bend Transit Website Evaluation Score

Information	Question Answered	Score
Name and contact information for existing transit services	What services exist in my community?	3
Service eligibility requirements	Am I eligible to use this service?	3
Route and stop information	Does this service operate near both my origin and my destination(s)? How and where can I access this service?	2
Headway and/or schedule information	Does this service operate at the time of day and day of week that I want to travel? How long will it take me to get from my origin to my destination using this service?	2
Fare and fare payment information	Is there a cost involved? If so, what is that cost and how do I pay it?	3
Vehicle and stop amenity information	What conditions can I expect while using this service? What amenities, if any, does this service provide?	3
	Total Score	**16**

Fort Bend Transit's website (https://www.fortbendcountytx.gov/government/departments/county-administration/public-transportation) provides easily accessible information about its services. All information provided is available within three clicks or less. Some details about services that riders may need are not available on the website. For the agency's commuter services to the Uptown/Galleria area, stop information is provided, but the route used to access those stops is not provided on the service map. Additionally,

website users are not able to get a projected travel time for a trip on the demand-response service. While this is difficult information to offer given the unpredictability of this type of service; the lack of this information is notable, given that this is the primary offering for intra-county trips, and this information will be vital for some riders in determining whether or not to use the service.

Gulf Coast Transit District

Table 12: Gulf Coast Transit District Website Evaluation Score

Information	Question Answered	Score
Name and contact information for existing transit services	What services exist in my community?	3
Service eligibility requirements	Am I eligible to use this service?	2
Route and stop information	Does this service operate near both my origin and my destination(s)? How and where can I access this service?	3
Headway and/or schedule information	Does this service operate at the time of day and day of week that I want to travel? How long will it take me to get from my origin to my destination using this service?	3
Fare and fare payment information	Is there a cost involved? If so, what is that cost and how do I pay it?	2
Vehicle and stop amenity information	What conditions can I expect while using this service? What amenities, if any, does this service provide?	2
	Total Score	**15**

Gulf Coast Transit District's website (https://www.gulfcoasttransitdistrict.com/) provides much, but not all, of the information required to use District services. Contact information for the agency is easily accessible, and all information on the website is easy to find and accessible in two clicks or fewer. Service maps for fixed-route service

provide locations of each stop and scheduled stop times at timepoints. However, a few key pieces of information are missing: vital information about ADA paratransit services, including service eligibility and vehicle/stop amenity information, is not included on the website. Additionally, for fixed-route services, fare costs are clearly described, but acceptable fare payment methods are not: While the website lists prices for coupon books in various parts of its service area, the services on which those coupon books can be used are not described, meaning that many riders may find themselves unable to figure out whether coupon books can be used on each of the various services GCTD offers.

Harris County Transit

Table 13: Harris County Transit Website Evaluation Score

Information	Question Answered	Score
Name and contact information for existing transit services	What services exist in my community?	3
Service eligibility requirements	Am I eligible to use this service?	3
Route and stop information	Does this service operate near both my origin and my destination(s)? How and where can I access this service?	0
Headway and/or schedule information	Does this service operate at the time of day and day of week that I want to travel? How long will it take me to get from my origin to my destination using this service?	2
Fare and fare payment information	Is there a cost involved? If so, what is that cost and how do I pay it?	2
Vehicle and stop amenity information	What conditions can I expect while using this service? What amenities, if any, does this service provide?	3
	Total Score	**13**

Harris County Transit's website (https://transit.harriscountytx.gov/Pages/default.aspx) offers a wide variety of services to residents of eastern Harris County and provides the information riders need on its website. Where the website loses points in this scoring rubric, is where it requires many clicks to find that information. For instance, riders seeking to use the Harris County RIDES discounted taxi program will be able to find information about the service and its costs within two clicks: however, the information required to make a reservation to use this service requires six additional clicks to uncover. Similarly, the point it loses for headway and schedule information, is lost because it requires three clicks to access schedules for fixed-route services. The one-

point deduction for fare and fare payment information is the result of a similar issue: this information is found in the same place as bus schedule information.

Island Transit

Table 14: Island Transit Website Evaluation Score

Information	Question Answered	Score
Name and contact information for existing transit services	What services exist in my community?	3
Service eligibility requirements	Am I eligible to use this service?	3
Route and stop information	Does this service operate near both my origin and my destination(s)? How and where can I access this service?	3
Headway and/or schedule information	Does this service operate at the time of day and day of week that I want to travel? How long will it take me to get from my origin to my destination using this service?	2
Fare and fare payment information	Is there a cost involved? If so, what is that cost and how do I pay it?	3
Vehicle and stop amenity information	What conditions can I expect while using this service? What amenities, if any, does this service provide?	2
	Total Score	**15**

Island Transit's website (https://galvestontx.gov/393/Transportation) provides most of the information riders need to access the service. Agency contact information is found on the home page, as is a map of services (including all stops). Fare information is easily accessible as well. Potential information access concerns include the fact that bus schedules are only available in Microsoft Excel spreadsheet format, making them harder to read and more difficult to use for many riders. Additionally, information about

conditions at fixed-route stops and on-board buses is not provided, though this information is provided for paratransit services.

Houston METRO

Table 15: Houston METRO Website Evaluation Score

Information	Question Answered	Score
Name and contact information for existing transit services	What services exist in my community?	3
Service eligibility requirements	Am I eligible to use this service?	2
Route and stop information	Does this service operate near both my origin and my destination(s)? How and where can I access this service?	3
Headway and/or schedule information	Does this service operate at the time of day and day of week that I want to travel? How long will it take me to get from my origin to my destination using this service?	2
Fare and fare payment information	Is there a cost involved? If so, what is that cost and how do I pay it?	2
Vehicle and stop amenity information	What conditions can I expect while using this service? What amenities, if any, does this service provide?	2
	Total Score	**14**

Houston METRO's website (https://www.ridemetro.org/Pages/index.aspx) provides most of the information needed to use its services on its website, though it loses points for information that is incomplete or unnecessarily difficult to find. For instance, it loses a point on paratransit service eligibility requirements due to the number of clicks required to find these eligibility requirements. Additional points are lost on headway and schedule information, as well as on fare and fare payment information, due to inconsistencies on how it provides that information for its fixed-route buses. For some routes, this

information is provided in an easy-to-use PDF which also contains a map of the route and other helpful information for riders. For others, this information is provided in the form of a table with no accompanying information, though this may be due to the need for rapid schedule changes resulting from the impacts of the COVID-19 pandemic. While the agency does provide an online trip planning tool, printed schedules may still be a better choice for some riders, and these are often insufficient.

R Transit

Table 16: R Transit Website Evaluation Score

Information	Question Answered	Score
Name and contact information for existing transit services	What services exist in my community?	3
Service eligibility requirements	Am I eligible to use this service?	3
Route and stop information	Does this service operate near both my origin and my destination(s)? How and where can I access this service?	2
Headway and/or schedule information	Does this service operate at the time of day and day of week that I want to travel? How long will it take me to get from my origin to my destination using this service?	2
Fare and fare payment information	Is there a cost involved? If so, what is that cost and how do I pay it?	2
Vehicle and stop amenity information	What conditions can I expect while using this service? What amenities, if any, does this service provide?	3
	Total Score	**15**

RTransit (https://friendsofeldercitizens.org/matagorda-county-rtransit) provides demand-response service in Matagorda County. Information provided on its website is substantial, and easy to find, but not complete, and occasionally unclear. For example,

while the website does indicate that service is demand-response, it also contains references to vehicle operators calling out stops for transfer locations and timepoints, which may lead users to believe that there are also fixed-route services. Additionally, while fare costs are provided, information about how this fare can be paid is not.

The Woodlands Township

Table 17: The Woodlands Township Website Evaluation Score

Information	Question Answered	Score
Name and contact information for existing transit services	What services exist in my community?	3
Service eligibility requirements	Am I eligible to use this service?	3
Route and stop information	Does this service operate near both my origin and my destination(s)? How and where can I access this service?	3
Headway and/or schedule information	Does this service operate at the time of day and day of week that I want to travel? How long will it take me to get from my origin to my destination using this service?	3
Fare and fare payment information	Is there a cost involved? If so, what is that cost and how do I pay it?	2
Vehicle and stop amenity information	What conditions can I expect while using this service? What amenities, if any, does this service provide?	2
	Total Score	**16**

The Woodlands Transit's website (https://www.thewoodlandstownship-tx.gov/96/Transportation) provides most of the information riders need, and the information provided is generally easy to find. Headway and schedule information is provided for all services, and maps with all stops clearly marked are provided for all services as well. The points deducted from its score are due to missing information

related to its park-and-ride commuter services: while instructions to download and use its mobile app are provided, information about the fares these services charge is not provided, nor is information about vehicle and stop amenities provided for this service.

In previous Regionally Coordinated Transportation Plan Updates, H-GAC has worked to improve access to information about transportation services: for example, Mobility Links, H-GAC's One-Click program to connect individuals to transportation resources, was recommended in the 2017 RCTP, and has since been implemented. However, the results of the public outreach process demonstrated that there is still work to be done to ensure that everyone in the region has access to the information they need to plan and execute a trip on a public transportation resource.

One way to reduce information gaps may be to improve the existing Mobility Links system. A 2016 report from the National Cooperative Highway Research Program lays out a five-level continuum of One-Call/One-Click services like Mobility Links, as shown in Figure 22.[4] On this continuum, Mobility Links rates as a level two: it provides a list of transportation resources, and it allows users to use search criteria to narrow the results shown to them, but it does not provide trip-planning or trip-booking assistance, nor does it offer a provider portal for transportation providers to update their information. The ongoing Regional Transit Connectivity Initiative, an effort to establish a regional fare, associated mobile application, and data management system for the region's transit providers, will provide users of public transportation a trip planning service that will integrate many of the region's public transit operators. However, this service is planned to be separate from Mobility Links and would not include specialized transportation providers, including for-profit and non-profit providers. Additionally, while the region's new ConnectSmart mobility as a service platform, introduced in 2021, may include future integration with Mobility Links, there is no set timetable for inclusion of this feature in ConnectSmart. Both the creation of a provider portal and the integration of trip-

[4] National Academies of Sciences, Engineering, and Medicine. 2016. State DOTs Connecting Specialized Transportation Users and Rides Volume 1: Research Report. Washington, DC: The National Academies Press. https://doi.org/10.17226/23506.

planning assistance into the existing Mobility Links system would improve access to information about transportation in the region.

Figure 22: Continuum of One-Call/One-Click Services for Specialized Transportation

Level	Name	Functionality	Description
1	Central Repository	Creation of, or linkage with, existing centralized repository of transportation resources	Static, hard-copy listing of services and programs distributed or accessed via phone or website
1A	Provider Portal	+ provider portal	Service providers can update their information at any time
2	Matching Assistance	+ ways to narrow down service and program options	Customers supply search criteria or answer "triage questions" asked by mobility specialist (call-taker) or prompted by an online system to reduce providers to viable options
3	Trip Planning Assistance	+ trip planning assistance	Customers use online system or call mobility specialist to get detailed ways to make a particular trip
4	Trip Booking Assistance	+ trip booking by mobility specialists	Mobility specialist call provider to book trip on behalf of customer
5	Direct Trip Booking	+ trip booking by customer	Trip booking via links to paratransit systems (one system allows a scheduler from one partnering organization to schedule trips onto another partner's vehicle runs)

Deeper study is needed to determine the information needs of both current and potential transit users. This may also include the development of more detailed matrices to determine the information needs of transportation users, and the development of a rubric to evaluate public transit providers on the quality and ease of access of information about transportation. This evaluation would enable H-GAC to provide resources and planning support that would fill the most vital information gaps. This evaluation would need to be tailored to each agency: while some agencies provide information to their riders mostly through electronic resources, including agency websites, mapping applications like Google Maps, text messages, and social media, at least one public transit agency in the region reports that it interacts with riders primarily via phone calls, as its riders may not necessarily have access to or want to use electronic resources.

Financial Gaps

Table 18 summarizes the capital and operating expenses for the region's transit providers, based on 2019 National Transit Database data (the most recent data available) and projects operating expenses through 2026, when the Regionally Coordinated Transportation Plan will next be updated. Capital expenses vary greatly from year to year depending on the status of projects, capital funding, rolling stock purchases and additional factors. Hence, the distribution is quite different for capital projects and may change greatly from one year to the next, making these more difficult to project. For example, Fort Bend Transit reported more than $22 million in capital expenses in 2019, but should be expected to have lower capital expenditures in future years, as its high capital outlays in 2019 covered several major projects. Future capital expenditures will also depend in part on pending federal and state legislative initiatives.

METRO generated over $574 million in operating expenses in 2019, or 95% of all transit operating expenditures in the region. In the 13-county region, no other transit providers' operating expense exceeded $10 million. Total operating expense for all agencies in the region was $606 million.

Operating expense projections assume a 3% annual cost increase each year from 2019 to 2023, followed by a 5% annual cost increase each year from 2023 to 2026. These assumptions reflect the 5.9% annualized growth rate in operating expenses for the region's transit operators from 2015 to 2019, with the impacts of the pandemic expected to temporarily slow implementation of new programs and services. While ridership has declined regionwide since the start of the COVID-19 pandemic, depressing farebox revenue, these projections assume that agencies will return to 2019 ridership levels in 2023 and increase 5% annually through 2026. These projections indicate that the cost of operating the region's transit systems will increase by more than $183 million by 2026, a 30% increase over 2019 expenses.

While some of the region's operators have cash reserves, these reserves may not be enough to cover expected operating cost growth. For example, as of FY 2020, METRO had cash reserves of $386,968,000. It projects that reserve to drop by almost half, to $185,854,000, by FY 2025, despite projecting operating cost growth of just 1.6%

annually in that time frame[5]. If operating cost growth stays closer to recent norms, this indicates that the region's transit providers may need to find new sources of revenue, or make more efficient use of existing revenue, to prevent the development of financial gaps that may prevent these agencies from meeting projected transportation need. The Financial Analysis examines the revenue and expense challenges transit providers face in greater detail.

Table 18: Transit Operator Capital and Operating Expense Summary

Transit Operator	Operating Expense ($)	Capital Expense ($)	Total Expense ($)	Ridership
City of Conroe	1,754,849	234,160	1,989,009	45,008
Fort Bend Transit	8,047,621	22,417,974	30,465,595	407,714
Gulf Coast Transit District	4,935,543	367,965	5,303,508	250,041
Harris County CSD	5,478,842	1,060,770	6,539,612	229,899
Island Transit	3,989,195	23,735	4,012,930	407,979
METRO	574,298,124	163,005,979	737,304,103	89,951,217
The Woodlands Township	6,172,215	15,360	6,187,575	604,068
Total 2019	604,676,389	187,125,943	791,802,332	91,895,926

[5] Metro FY 2021 Business Plan and Budget. Available at https://www.ridemetro.org/Pages/FABudgets.aspx, Accessed 12/22/2021.

Transit Operator	Operating Expense ($)	Capital Expense ($)	Total Expense ($)	Ridership
Estimate 2023	680,568,603			91,895,926
Estimate 2024	714,597,033			96,490,722
Estimate 2025	750,326,885			101,315,258
Estimate 2026	787,843,229			106,381,021

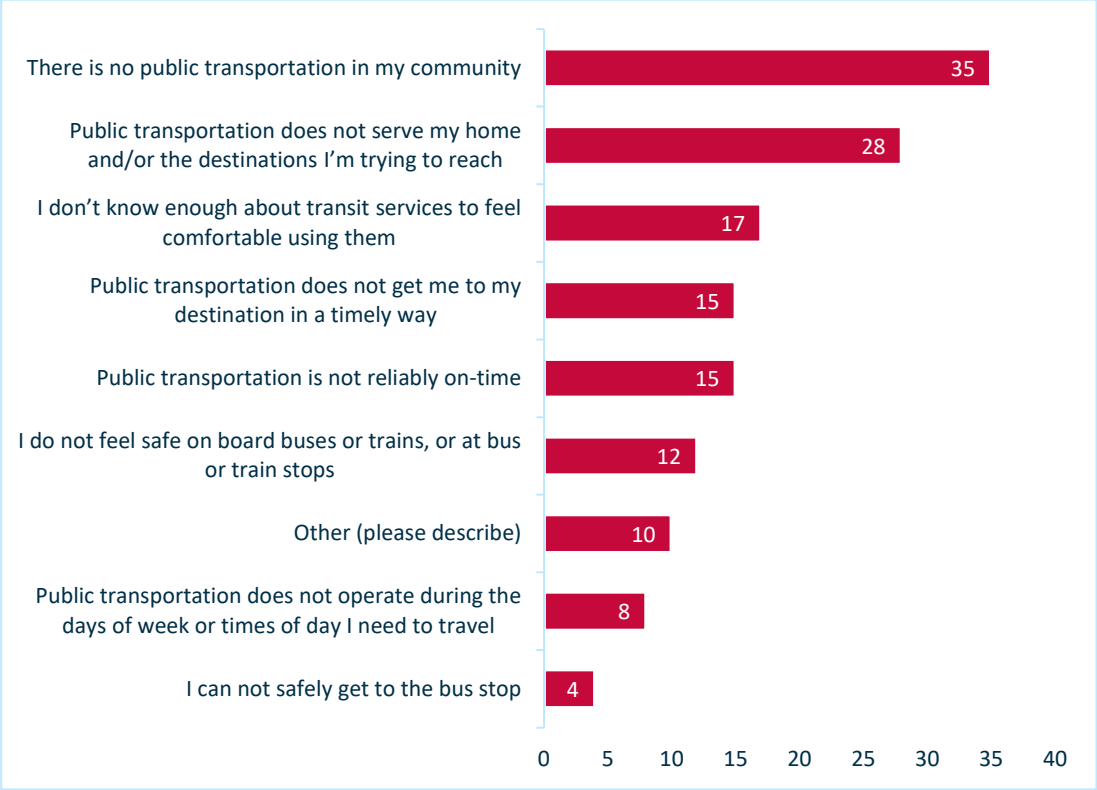
Gaps Reported in Public Outreach

Throughout the RCTP public outreach process, participants have noted gaps in the region's transportation system. These gaps prevent trips from taking place or make trips more difficult and time-consuming. Two phases of public outreach have been conducted: phase one included a set of virtual interactive events, an online survey, and a mapping activity. The second phase consisted of a set of focus groups. Each of these activities explored various aspects of the region's transportation need and barriers to transportation use.

The online survey indicated that the spatial gaps in transit service—the places where service does not exist or does not serve the places people need to travel to—is a key barrier to using transportation services in the region. 55% of survey takers reported never using public transit in their communities. These participants were asked to choose from a list of reasons they do not use public transit. As shown in Figure 23, participants were most likely to cite "There is no public transportation in my community" and "Public transportation does not serve my home and/or the destinations I am trying to reach" as reasons they do not use transportation services. These responses indicate that

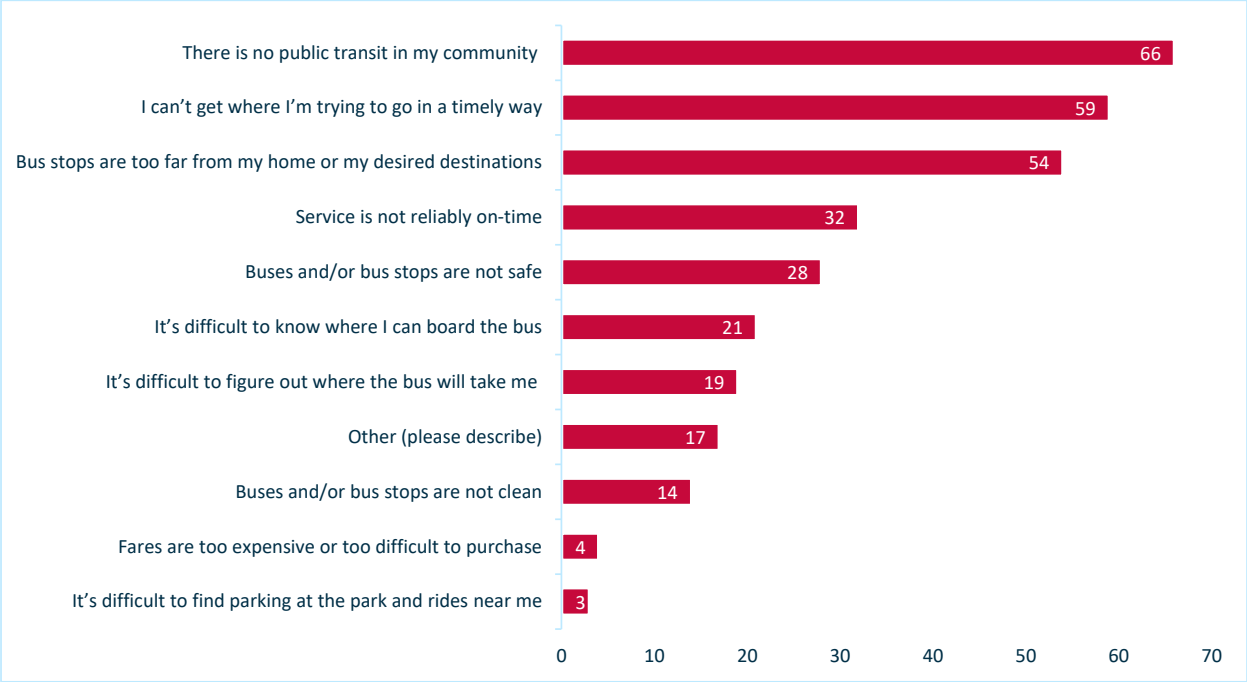
providing more transit services and serving the destinations people are trying to get to, would reduce barriers and enable more people to use transportation services.

Figure 23: Survey Participant Reasons for Not Using Transit



In addition to this question, all survey respondents, including those who use transportation services in the region, were asked to choose from a list of their key concerns about the region's transit systems. Again, an absence of service, as well as a lack of service to key origins and destinations, was the most common theme among the answers cited, as shown in Figure 24, along with a lack of timely service. These responses indicate that more service, and more frequent service, could address transportation gaps and make transit service more useful for more people.

Figure 24: Survey Participant Primary Concerns about Transit



The virtual events demonstrated how information gaps prevent people from using transportation services in the region. In the virtual events, participants were asked to work together to figure out how to use existing transit services to plan and complete a trip on transit between two points provided by the moderator. Participants repeatedly struggled to find basic information about the services that they needed to use: they had difficulty navigating through providers' websites, and third-party sites like Google Maps often offered incorrect information, or no information at all. At several of the events, representatives from the transit agency in question needed to explain to participants which routes and stops they would need to use to complete the assigned trip. These results point to the importance of information gaps in limiting transit use in the region: if participants in these virtual events struggled to find the information they need to use transit for a trip, it is likely that many members of the public also have similar difficulties.

The focus groups showed ways in which transportation services in the region fail to meet the needs of individuals that depend on them. Of particular note was the focus group for individuals with disabilities. In this focus group, participants detailed how paratransit and non-emergency medical transportation (NEMT) services targeted to them do not meet their needs. Among the issues they reported were slow, unreliable

service, service that required them to navigate unsafe or uncomfortable environments, and service that made it nearly impossible to complete trips that require crossing jurisdictional boundaries. These barriers made them less able to access job and educational opportunities, as well as medical care and other vital services.

Also of note was the focus group for students in the region. Several participants who rarely or never use transit expressed an interest in using transit more often, noting that the cost of gas was a significant strain on their tight budgets. The barriers they noted to using transit more often included a lack of knowledge about the options available to them, a lack of availability of service on nights and weekends, and a lack of service near their home or school. This illuminates how people in the region who could benefit from transit can be kept from riding by spatial and information gaps.

Strategies to Mitigate Gaps

This section synthesizes several key findings illuminated by the various elements of the Regionally Coordinated Transportation Plan. Those key findings serve as organizing themes for recommendations, which provide a set of tools to mitigate each of the issues demonstrated by these key findings. For each recommendation, an expected outcome and suggested locations for implementation are also provided.

Finding #1: Transit Service Improvements

The 13-county region has seen significant growth in population and jobs since the previous RCTP update. This growth has been strongest in areas just outside Harris County, including parts of Montgomery, Waller, Chambers, and Fort Bend Counties. Current projections indicate that this growth will continue. Existing transportation options are insufficient for many in the region: the Needs Assessment indicated that many populations disproportionately likely to need transportation services live in places like northwestern Harris County where minimal transit service is available, while the Gap Analysis demonstrated unmet transportation need in both rural and urban parts of the region. Participants in the public outreach process also indicated that a lack of service to their desired origins and destinations was a key factor preventing them from using transit in their communities. The quantity and quality of transportation services in the

region must improve, both to meet existing unmet demand and to keep pace with population growth in the region.

Finding #2: Transit Information Gaps

Information gaps were found to be key barriers to using existing transportation services throughout the region. Participants in the public outreach process for this project were largely unaware of transportation options available to them, and/or struggled to find the vital information they need to use these services. In Phase I public outreach, both the online survey and the virtual events offered opportunities to capture these information gaps. In the survey, 19% of respondents reported knowing about a transportation service in their community but not knowing how to use it, while 24% of respondents who reported never using transit cited their lack of knowledge about transportation options as a primary reason they don't use transit. Furthermore, at almost all of the events, participants struggled to find and interpret the basic information they needed to plan a trip on transit. Additionally, analyses of bus stop signage and transit provider websites showed room for improvement in how the region communicates with the public about public transit services. While research on the information needs of transportation users is limited, the region must do more to better understand the informational needs of travelers in the region, and work to better meet those needs.

Finding #3: Unmet Needs Among ADA Paratransit and NEMT Users

Throughout the public outreach process, members of the public described the services targeted at seniors and persons with disabilities as insufficient, and not meeting the needs of a highly transit-dependent population. This was best illuminated by the participants in the focus group targeted to persons with disabilities. Participants in this group struggled to find transportation services that met their needs. Existing options do not provide reliably on-time service, do not provide services across jurisdictional boundaries, and often forced users into unsafe or unhealthy situations. These problems made it more difficult for the users of these services to acquire and hold jobs, to meet their educational goals, and to access medical care and other vital services. For most of these individuals, overcoming barriers to transportation access required either very long trips or very expensive mode choices, and in many instances those barriers could not

be overcome at all. To ensure that seniors, individuals with disabilities, and others who rely on ADA paratransit and NEMT services can participate fully in the economic and social life of the region, these services must improve.

Finding #4: Insufficient Coordination with Non-Profit and For-Profit Transportation Providers

Over the course of this planning process, reaching transportation providers other than public transit agencies proved difficult. To contact the region's providers, H-GAC staff relied on the database of transportation providers that powers the agency's Mobility Links service, as this is the most complete listing of transportation providers in the region. However, many of the providers in that database were unreachable or no longer providing transportation services, resulting in very low response rates. Among providers that could be reached and who responded to the provider survey, many of the non-profit providers, and all of the for-profit providers, expressed frustration with the state of coordinated transportation planning in the region, explaining that they did not feel included in planning processes that affected the areas they serve. Non-profit and for-profit providers can be a key element of meeting the need for transportation in the region. To get there, the region must do a better job of reaching out to these providers and ensuring that they are included in relevant planning processes.

Table of Recommendations

RCTP recommendations are listed in **Error! Reference source not found.** below. They are divided into four categories, based on which of the four findings listed above they are expected to address. For each recommendation, there is also an expected outcome as well as suggested locations for implementation.

Table 19: List of Recommendations, Expected Outcomes, and Suggested Implementation Locations

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
Transit service is non-existent or does not meet transportation needs.	Add new fixed-route services and/or extend existing fixed-route services, in areas with moderate or high Transit Need Index scores and unmet transit need, where fixed-route services are justified by population or employment density.	New and expanded fixed-route transit services will improve access to transportation services for those living in areas currently not served by transit.	North, northwest, and southeast areas of Harris County, Montgomery County, northern Galveston County.	5307, CMAQ	Transit agencies, local governments
	Add new demand-response services and/or increase capacity of existing demand-response services, in areas	New and improved demand-response services will improve access	Matagorda County, Chambers County, Liberty County, and Colorado County.	5307, CMAQ	Transit agencies, local governments

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
	with moderate or high Transit Need Index scores, where fixed-route services are not justified by population or employment density.	to transportation services for those living in areas currently not served by transit.			
	Implement demand-response services in parts of the region with no transit service, to ensure a baseline level of transportation availability for all residents of the region.	Introduction of demand-response service in locations with no existing transportation options will provide a mobility alternative for individuals in	Areas with no existing transportation service, including Chambers County, the Pearland area of Brazoria County, and Waller County.	5307, CMAQ	Transit agencies, local governments

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
		unserved parts of the region.			
	Implement pilot projects to test microtransit and other emerging transit technologies, and expand implementation where pilots are successful.	Emerging transit technologies will help fill transportation gaps in places where more traditional transit services are unworkable or less efficient.	A pilot is already underway in the Generation Park area of Harris County, and additional pilots could be conducted in other emerging population and employment centers.	5307, 5310, CMAQ	Transit agencies, local governments
	Expand frequency and hours of operation on existing transit services to increase capacity in	Improvements in the quality of transportation service will make transit a viable	Areas with existing transit services, regionwide.	5307, CMAQ	Transit agencies, local governments

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
	areas currently served by transit.	option for more trips.			
	Help transportation providers build capacity to flexibly take advantage of emerging funding streams and meet demand for fixed-route and demand-response services.	Transportation providers will be well-prepared to capitalize on opportunities to expand service and meet local demand for service.	Regionwide	Federal Transportation Planning Funds, Surface Transportation Block Grant planning funds, CMAQ, 5304, local funds	H-GAC, local governments
	Implement community van programs to expand access to transportation services beyond the hours of operation of existing services, and	Community van programs will provide additional transportation options in communities where	Regionwide	5310, CMAQ, state and local funds	Local governments, community-based organizations

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
	to improve access to destinations currently not served by transit.	transportation need is not being met, enhancing mobility for individuals whose travel choices are currently limited by insufficient transportation options.			
	Capitalize on existing regional carpool, vanpool, and TDM programs to provide additional tools to meet demand for transportation services.	The region's residents will be able to take advantage of existing carpool and vanpool programs to help meet their	Regionwide	Federal Transportation Planning Funds, CMAQ, local funds	H-GAC (Commute Solutions Program)

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
		transportation needs where possible.			
	Use targeted investments to improve pedestrian and bicycle infrastructure near transit corridors to improve access to existing transportation services.	Safe, easy-to-use walking and cycling routes will improve access to transportation by strengthening first and last mile connections.	Areas near existing transit corridors where pedestrian and bicycle infrastructure are currently missing or insufficient.	5310, state and local funds	H-GAC, transit agencies, local governments
Travelers don't know about transportation services available to them and/or are	Conduct additional studies to better understand information needs of travelers in the 13-county region.	Planners will understand information needs of travelers and will know more about	Regionwide	Federal Transportation Planning Funds, Surface Transportation Block Grant	H-GAC

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
unable to easily find vital information about transportation services available in their community.		the strengths and deficiencies of existing sources of transportation information.		planning funds, CMAQ, 5304, local funds	
	Develop evidence-based regional best practices for transportation information that center rider needs.	Transportation providers in the region will understand the most effective tools and methods for sharing vital information about their services.	Regionwide	Federal Transportation Planning Funds, Surface Transportation Block Grant planning funds, CMAQ, 5304, state and local funds	H-GAC
	Support initiatives to help transit providers	Transit providers will more	Regionwide	Federal Transportation	H-GAC

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
	better communicate with the public about their transportation services, including improvements to websites, signage, and community outreach.	effectively disseminate information about the services they offer and will increase their capacity to inform the public about their services.		Planning Funds, Surface Transportation Block Grant planning funds, 5304, state and local funds	
	Improve Mobility Links service by developing a portal for transportation providers to add and update information about the services they offer.	Transit providers will be able to easily use Mobility Links to distribute current information about their services to	Regionwide	Federal Transportation Planning Funds, Surface Transportation Block Grant planning funds, CMAQ, 5304,	H-GAC

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
		potential riders, allowing riders to more easily learn about the transportation options available to them.		state and local funds	
	Improve Mobility Links service by implementing a trip planning tool for users to better understand all the services available to them for a given trip.	Users of transportation services will be able to use Mobility Links to understand all of the transportation options available to them and compare options to determine	Regionwide	Federal Transportation Planning Funds, Surface Transportation Block Grant planning funds, CMAQ, 5304, local funds	H-GAC

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
		which one best meets their needs.			
	Implement a regional Transportation Ambassador program, providing community leaders and other volunteers with the tools they need to spread information about transportation services via word-of-mouth.	Community leaders will be knowledgeable about the transportation options in their community, and better able to help members of those communities learn about and access existing transportation options.	Regionwide	Federal Transportation Planning Funds, Surface Transportation Block Grant planning funds, CMAQ, 5304, state and local funds	H-GAC

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
	Supplement Mobility Links with a regional Mobility Manager program, allowing individuals to call and speak with a regional transit expert who can help them navigate transit trips that cross jurisdictional boundaries.	Residents of the Houston Gulf Coast region will be more easily able to find information about transportation options across the entire region, enabling them to use transportation services for more cross-jurisdictional trips.	Regionwide	Federal Transportation Planning Funds, Surface Transportation Block Grant planning funds, CMAQ, 5304, local funds	H-GAC, Harris County, other transportation providers and local governments

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
	Continue implementation of Regional Transit Connectivity project, including regional fare, regional trip planning tool, mobile app, data management tool and development of GTFS feeds for participating providers.	Free, easy-to-use tools will enable trip planning across jurisdictional boundaries, enabling riders to use transportation services for more of their trips.	Regionwide	Federal, state, and local planning funds	H-GAC
Existing specialized services for seniors and individuals with disabilities do	Create a regional advisory workgroup comprised of paratransit and NEMT users, and representatives of	Paratransit and NEMT users will be able to regularly participate in conversations	Regionwide	Federal Transportation Planning Funds, Surface Transportation Block Grant	H-GAC

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
not provide timely or reliable service, and trips that require crossing service area boundaries are difficult or impossible.	organizations that provide these transportation services, to promote collaborative efforts to meet the transportation needs of persons with disabilities, and to encourage providers to work together for more efficient dispatch and cost-sharing.	that ensure the transportation services they rely on will more effectively meet their needs, and providers of transportation services will be able to collaborate to provide more efficient and higher-quality services.		planning funds, state and local funds	
	Expand access to subsidized taxi and TNC services for seniors and persons	Seniors and persons with disabilities will have access to	Regionwide, potentially starting with existing Harris	5310, state and local funding	Transit agencies, local governments

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
	with disabilities in areas where existing fixed-route and demand-response transit services do not meet the needs of seniors and persons with disabilities, and work with providers and users to ensure these services meet those riders' transportation needs.	reasonably priced services that enable them to access the places they need to go.	County RIDES program.		
For-profit and non-profit transportation providers do not feel	Increase collaboration with non-profit and for-profit transportation providers, pro-	Transportation providers in the region will be more aware of planning efforts	Regionwide	Federal, state, and local planning funds	H-GAC, local planning bodies, transit agencies

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
included in regional transportation planning and co-ordination efforts.	actively reaching out to them and including them as key stakeholders in future regional and sub-regional transportation studies.	happening within their service area and will have ample opportunity to participate in those planning processes.			
	Work with regional partners to update Mobility Links provider database.	Transportation users will have easy access to an up to date one-click database of all transportation resources in the region, and transportation providers will be	Regionwide	Federal, state, and local planning funds	H-GAC, Harris County Transit

Gap Category	Recommendation	Expected Outcome	Suggested Locations for Implementation	Potential Funding Sources	Implementing Agencies
		engaged in a way that helps more people take advantage of their services.			

Vision, Goals, Objectives, and Performance Metrics

The vision and goals of the Regionally Coordinated Transportation Plan were developed with an eye towards expanding the many benefits of public transportation services throughout the region. These goals were then connected to several specific objectives that the RCTP seeks to accomplish. Finally, potential performance measures were developed for each objective, and data sources that could be used to monitor those performance measures were identified. This will allow the region to track its progress towards improved transportation services and overall quality of life. Each goal is assigned a number and a color, and these numbers and colors are used below to connect goals with objectives and performance metrics. For each objective, the data needed for evaluation is also listed.

Vision

The vision for the Houston-Galveston Area Council's Regionally Coordinated Transportation Plan is as follows:

Equitable access to jobs, healthcare, and other opportunities will be guaranteed to everyone in the Gulf Coast Region, through the provision of abundant, safe, reliable, and well-connected public and human service transportation.

Goals

1. Increase the percentage of residents in the region with access to public transportation services
2. Improve the safety of transportation services in the region
3. Enable the region's public and human service providers to provide a longer span of service
4. Reduce emissions caused by transportation in the region

Objectives and Performance Metrics

Table 20: Summary of Objectives and Performance Metrics

Objective	Related Goals	Performance Metrics	Data Needs
Increase awareness among officials and public of need for increased transit and human transportation services in Gulf Coast region	1, 2, 3, 4	• Number of meetings and presentations to public and elected bodies. • Visits to H-GAC and transit agency websites. • Number of PSAs promoting transit run on traditional and social media. • Number of members of the public reporting being better informed about public and human services transportation	• Materials from meetings with public and elected officials (agendas, minutes, etc.) • Website and social media metrics reports (hits, click-throughs, likes, shares, etc.) • Pre- and post-event surveys from transportation-related public events, including transit ambassador events and events hosted by public transit providers
Seek to initiate new fixed route transit services or expand in areas where it is identified as needed	1, 4	• Number of new local fixed route miles added.	• Updated route maps, schedules, GTFS feeds, press releases, and/or announcements from transit agencies.

Objective	Related Goals	Performance Metrics	Data Needs
Seek to start demand response service in area where it is identified as needed	1, 4	• Number of new demand response services added.	• Updated route maps, schedules, press releases, and/or announcements from transit agencies.
Endeavor to enhance regional coordination for transit and human service transportation where possible	1	• Number of examples of inter-agency coordination, including but not limited to Regional Fare Initiative, cooperative purchasing initiatives, and shared Operations and Maintenance facilities. • Number of meetings held between H-GAC and human service providers. • Number of partnerships	• Press releases, announcements, and other reports from transit agencies and other providers.

Objective	Related Goals	Performance Metrics	Data Needs
		between transit agencies and other regional transportation providers.	
Meet gaps with appropriate or innovative human and social transportation services in areas where service by adequate transit is difficult or not feasible	1, 4	• Number of new or expanded human or social transportation services in identified areas of need.	• Announcements and press releases from transportation providers.
Identify additional means of funding transit, human and social service transportation services	1, 3	• Number of sources of funding for transit agencies and other transportation providers. • Amount of capital and operating funds available to transit agencies and other	• Press releases, announcements, and/or financial reporting from transit agencies and other transportation providers.

Objective	Related Goals	Performance Metrics	Data Needs
		transportation providers.	
Improve the level of service and span of existing providers	3, 4	• Number of existing routes with an increase in weekday span of service. • Number of existing routes with an increase in weekend span of service. • Number of routes with off-peak headways of 15 minutes or less. • Number of routes with off-peak headways of 60 minutes or more. • On-time performance for existing services.	• Schedules, GTFS feeds, press releases, and/or announcements provided by transit agencies.
Develop innovative means to fund alternate mobility solutions such	1, 3	• Number of new alternate or innovative mobility solutions and services	• Announcements and press releases from transit agencies and other transit providers.

Objective	Related Goals	Performance Metrics	Data Needs
as microtransit - considering alternate funding sources and public private partnerships		inaugurated in the region.	
Adjust and adapt to the evolving situations that occur as they relate to the COVID -19 pandemic.	2	• Service changes and mitigation measures taken by transit operators to protect riders and operators. • Number of riders using transit during and following the pandemic.	• Transit agency responses to periodic H-GAC coronavirus survey.
Facilitate the use of electric and zero emissions vehicles in the development of new transit services	4	• Percentage of electric and ZEVs in regional transit fleet. • Progress towards meeting federally required NOx and VOC emissions reductions	• Periodic fleet reports from the region's transit agencies. • HGAC Transportation Performance Management annual reports

Key Takeaways

- Areas with high transit need and insufficient transit service can be found throughout the 13-county region, and these areas should be expected to grow in number as the region's population and employment continue to expand.
- More needs to be done to ensure that vital transportation information is easily available to everyone in the region, but more work needs to be done to better understand the information needs of the region's travelers.
- The region's transportation providers will likely need substantial growth in funding to meet their growing operating expenses.
- Public engagement demonstrated that spatial gaps and information gaps are key barriers to transit use in the region.
- Persons with disabilities could be served better by the transportation services targeted to them: these services were noted as slow and unreliable by many patrons in this study, sometimes put their users in situations that feel unsafe, and can make it difficult to take trips that cross jurisdictional boundaries.