From: 2018cfp
To: Koff, Russell P.; 2018cfp
Cc: Maldonado, Yvette
Subject: RE: Travel Demand Data for Fort Bend County CFP Projects
Date: Wednesday, October 17, 2018 6:21:32 AM
Attachments: image001.png
FBC Park & Ride Data.xlsx

Russell, please see attached the data you will need to complete the benefits template for 2018 CFP. Like I said yesterday on the call please use the emissions reductions template for the transit new vehicle purchase to estimate the emissions reductions. This templates calculates emissions reductions for transit projects based on the passenger vehicle VMT reductions (based on estimate new transit users and trip length).

Thanks
Vishu Lingala
Houston-Galveston Area Council
3555 Timmons Lane, Suite 120
Houston, TX 77027
Phone: 713-993-4561
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From: Koff, Russell P. <Russell.Koff@wsp.com>
Sent: Tuesday, October 16, 2018 2:25 PM
To: 2018cfp <2018cfp@h-gac.com>
Cc: Maldonado, Yvette <Yvette.Maldonado@fortbendcountytx.gov>
Subject: Travel Demand Data for Fort Bend County CFP Projects

Hello,

Fort Bend County is submitting two projects for the 2018 Call for Projects. One of the projects is a proposed Park and Ride facility at the University of Houston – Sugar Land campus at I-69 and University Blvd. The other project would support the purchase of additional buses and funding for operations of a new commuter bus service from Fort Bend County to downtown Houston.

To complete the BCA templates for each application, can you please provide the Daily Travel Demand information on the attached BCA templates?

Can you also advise on whether an Emissions Reductions BCA template is required for the Park and Ride application? There does not appear to be an emissions template with a Park & Ride as a possible “Type of Improvement” on the template.

Thank you for your assistance and please feel free to contact me with any questions.

Best,

Russell

Russell Koff
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	Facility Name	2018PkPeriodVol	2018DailyVolume	2018PkPeriodCap	2025PkPeriodVol	2025DailyVolume	2025PkPer	2045PkPer	2045DailyV	2045PkPer	FFSpd2018	CorridorSpeed18
1	IH 69/SH50 University Blvd to Downtown Houston	100,559	212,644	139,215	111,100	237,412	144,247	130,260	283,944	144,238	68	23

2014

Seamless Regional Transit Fort Bend County to Downtown Houston

Texas A&M Transportation Institute

Seamless Regional Transit from Fort Bend County to Downtown Houston FINAL REPORT

FEBRUARY 2014

Prepared by
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Available Online
http://tti.tamu.edu/group/transit-mobility/commuteworkgrp/

Contents

USE OF TERMS

Bus Rapid Transit (BRT)—Express bus service aimed at mirroring light rail service by offering high frequency trips often with dedicated lanes and branding. Boarding and alighting take place at a street-side bus stop or transit depot. Fares are typically collected at the front interior of the bus in a farebox or at an off-vehicle ticket vending machine.

Capital Cost of Contracting (CCC)—Federal assistance with costs attributable to privately owned capital consumed during the course of contracting public services.

Common fare—Single payment method utilized and accepted by all participating regional agencies as fare media, often in the form of a smart card.

Commuter rail—Passenger train service that operates on existing freight rail right of ways. Fares are typically collected onboard the train during service or at an off-vehicle ticket vending machine and boarding occurs from low platforms.

Commuter bus service—Fixed route service with limited stops traveling longer distances; typically provided by over-the-road (motor) coaches with standardized commuter amenities (high back seats, overhead luggage racks).

Good neighbor policy—Agreement among two or more transit providers to use each other's stops or stations. The transit provider that owns the bus stop/station is responsible for posting the route numbers of the other provider using the stop/station and vice versa.

Light rail—Passenger train service that operates on urban streets or on dedicated right of ways powered by overhead electric lines. Fares are typically collected in advance of the passenger boarding process and boarding occurs on dedicated platforms.

Local bus service—Bus service with several passenger stops per mile on local streets.

Peak hours—Time of day when most transit vehicles is in operation to provide the highest level of service to the largest number of riders (as compared to other times of the day).

Seamless transit service—Any type of service (bus, rail, paratransit) coordinated and integrated across jurisdictional boundaries and agencies resulting in transit services that are coordinated, efficient, and convenient to the rider.

Smart cards—Stored-value card with built-in semiconductor chip. The chip is loaded with monetary value and used by customers in place of using cash or paper passes.

Final Report Purpose

The purpose of the final report is to document research for the Central Houston- Fort Bend County (FBC) Working Group to develop and evaluate seamless transit service from FBC to downtown Houston. Seamless transit service is coordinated across jurisdictional boundaries, typically features a single fare medium, and emphasizes customer convenience. Researchers present the final report in two sections, Phase 1 Research and Phase 2 Research. The first section describes the need for research, identifies the study partners, documents options for seamless transit service from FBC to downtown Houston, and provides a preliminary financial risk analysis. The second section of the report documents the capital plans required to implement any of the options for seamless transit service from FBC to downtown Houston, and provides an updated financial plan. An important consideration for the updated financial plan is the impact of the 2012 federal authorization bill, Moving Ahead for Progress in the 21st Century (MAP-21), on transit funding for the Houston Urbanized Area (UZA).

Phase 1 Research

Problem Statement

Transportation systems throughout the United States (U.S.) must increase coordination to meet the changing needs of riders due to long-range commuting, activity centers spread across multiple transit districts, and funding sources limited in availability and application. Through improved coordination and integration, agencies can provide seamless transit service in both urban and rural areas that is cost-effective, efficient, and beneficial for all stakeholders.

In 2010, approximately 13,700 people lived in Fort Bend County and commuted to their primary job in downtown Houston (U.S. Census, Longitudinal Employer-Household Dynamics Statistics). Currently, seamless transit service is not available for FBC residents to commute to downtown Houston.

Partners

Major partners in the study included:

- Central Houston, Inc. and the Central Houston Transportation Committee
- Chevron
- City of Sugar Land
- Fort Bend County Public Transportation Department (FBC Transit)
- Metropolitan Transportation Authority of Harris County (METRO)
- Federal Transit Administration

Working Group

The above listed partners formed an advisory Working Group to develop and evaluate seamless transit service from FBC to downtown Houston. FBC Transit engaged Texas A&M Transportation Institute (TTI) to provide background research, facilitation services, and technical support to the working group. As the project progressed, TTI posted work products to a central website for the convenience of all partners. Click here to find documents on the website:
http://tti.tamu.edu/group/transit-mobility/commuteworkgrp/

PHASE 1 OBJECTIVES

During Phase 1, researchers conducted a literature review to document industry best practices for transit provider collaboration to provide seamless transit service across jurisdictional boundaries that involve large urban, small urban, and rural providers. Researchers then estimated latent demand for commuter transit service connecting Fort Bend County residents to downtown Houston. Finally, TTI developed and independently evaluated five options associated with the most financially prudent and mutually advantageous means to develop commuter transit service from Fort Bend County to downtown Houston. The options included both one-seat rides (no transfer) and two-seat rides (one transfer) for services provided either by FBC Transit using smaller, medium-duty buses or by METRO using larger, heavy-duty commuter buses.

SUMMARY OF LITERATURE

There are many barriers to creating and maintaining seamless transportation systems, including funding conflicts, infrastructure discrepancies, and financial risk. However, "chances of success are greatly enhanced with the presence and strong action of a regional champion(s)" (Miller & Lam, 2003, p. ii) and with the presence of a common vision among all stakeholders, including non-transit agencies (Lewis C. A., Higgins, Perkins, Zhan, & Chen, 2009, p. 22).

Ease of system use by riders can help facilitate successful regional transit coordination. One way to coordinate services and diminish the complexity of transfers between transit providers is to create a common fare, which riders can use interchangeably between services. Smart cards, loaded with monetary value and used by customers in place of using cash or paper passes, can digitally store information about fares for different transit services. Smart cards facilitate seamless transit service because passenger trips and applicable fares can be tracked, making it possible to allocate revenues among multiple transit providers. (Miller & Lam, 2003, p. ii).

Transit agencies can also coordinate schedules to minimize passenger wait times at transfer points and effectively synchronize service. In addition, agencies can provide pertinent information to riders about other agencies; examples include signage, route information, and trip-planning applications that can schedule trips between multiple agencies.

Regional coordination between agencies can take various forms including consolidation to create a new regional transportation entity, creation of an umbrella agency to coordinate services between various agencies, or creation of joint agreements where autonomy is maintained (Lewis, Higgins, Perkins, Zhan, & Chen, Public Transportation Solutions for Regional Travel: Technical Report, 2008, p. 6).

Strategically coordinated regional transit service can reduce duplicative service and save financial resources (Lewis, Higgins, Perkins, Zhan, & Chen, Public Transportation Solutions for Regional Travel: Technical Report, 2008, p. 7). Agencies can save money by pooling assets such as vehicles, workers, and facilities with other regional operators, and still maintain the same level of service. Long-range and capital planning for regional transportation can also help increase connectivity and eliminate gaps in service.

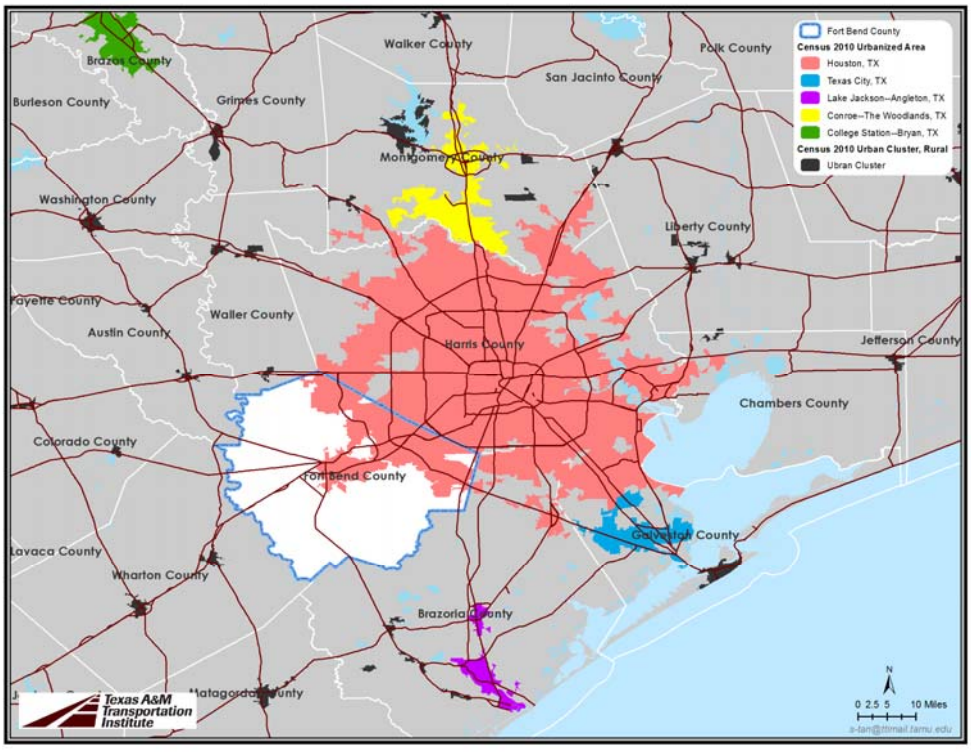
BACKGROUND: HOUSTON REGIONAL TRANSIT SERVICES

The Houston-Galveston metropolitan planning area includes eight counties and four urbanized areas. The Houston UZA and Conroe–The Woodlands UZA each have a population over 200,000 and so the Federal Transit Administration (FTA) classifies each as a "large" UZA. Table 1 provides the population and area of each county and UZA in the metropolitan planning area. Figure 1 provides a map of the counties and UZAs in the region.

Table 1. Area Population and Size

County	2000 Population	2010 Population	2010 Area (Sq Mi)
Brazoria County	241,767	313,166	1,386
Chambers County	26,031	35,096	599
Fort Bend County	354,452	585,375	875
Galveston County	250,158	291,309	398
Harris County	3,400,578	4,092,459	1,729
Liberty County	70,154	75,643	1,160
Waller County	32,663	43,205	514
Montgomery County	293,768	455,746	1,044
Total	**4,566,754**	**5,891,999**	**7,705**
Houston UZA	3,822,509	4,944,332	1,295
Conroe–The Woodlands UZA	89,445	239,938	42
Texas City UZA	96,417	106,383	59
Lake Jackson-Angleton UZA	73,416	74,830	34

Source: U.S. Census Decennial Census, 2000 and 2010



Source: 2010 U.S. Census Bureau. TTI Analysis

Figure 1. UZAs in the Houston-Galveston Region

Fixed route bus and paratransit operators in urbanized and rural areas coordinate regional transit services including co-sponsored park and rides, shared service area, and Interlocal agreements. There are several examples of regional transit service coordination in the Houston area.

- **Co-Sponsored Park and Rides**
  - Harris County sponsors and METRO operates commuter bus service from the Baytown Park & Ride to downtown Houston.
  - Gulf Coast Center Connect Transit (the transit provider in Brazoria County), the City of Pearland, and METRO are jointly exploring the possibility of building a new park & ride and operating commuter bus service from Brazoria County to the Texas Medical Center (TMC).
- **Shared Service Area**
  - FBC operates Fort Bend Express commuter bus service to destinations in METRO's service area including Uptown/Galleria, Greenway Plaza, and the TMC.
  - Brazos Transit District manages The Woodland Express commuter bus service from Montgomery County to downtown Houston, Greenway Plaza, and the TMC.
- **Interlocal Agreements**
  - Gulf Coast Center Connect Transit contracts with Galveston Island Transit to provide commuter service in Galveston from League City to Galveston Island.

CASE STUDIES OF REGIONAL TRANSIT SERVICES

TTI conducted case study research to document the most important elements of complex regional transit coordination. Table 2 highlights key elements from each case study. The project website contains more details under *Case Studies of Regional Transit Services in Other Areas*.

Table 2. Regional Coordination Case Studies

Metropolitan Region Served	Collaboration Examples	Regional Partners	Agreement Types	Services Provided under Agreement
Atlanta, GA	• Coordinated regional service • Shared infrastructure • Park and rides	• Cobb Community Transit • Metro Atlanta Rapid Transit Authority • Georgia Regional Transit Authority • Gwinnett County Transit	• Intergovernmental Agreement • Good Neighbor Policy	• Local • Express • Reverse Commute
Boston, MA to Washington, DC	• Coordinated regional service • Information coordination • Shared infrastructure • Shared commuter rail • Common fare smart card	• Metro Boston Transit Authority • Washington Metro Transit Authority • Virginia Railway Express • County Transit • Fairfax Connector • Arlington Transit • Northern Virginia Transportation Commission • Loudoun County	• Joint Use Agreement • Joint Powers Authority • Joint Fares • Good Neighbor Policy	• Bus • Commuter Rail
Dallas/ Fort Worth, TX	• Coordinated regional service	• Dallas Area Rapid Transit • Fort Worth T • Denton County Transportation Authority • City of Cleburne • Northeast Transportation Service • City of Mesquite	• Joint Powers Authority • Interlocal Agreement	• Commuter Rail • Regional bus service • Specialized service for seniors
Phoenix Tempe/Mesa, AZ	• Regional transit provider created (common fare and branding) • Coordinated regional service (buy and sell revenue miles) • Assistance to local business to meet local trip reduction goals	• Valley Metro Regional Public Transportation Authority • City of Phoenix • City of Mesa • City of Tempe • City of Scottsdale	• Consolidated Transit Service • Interlocal Agreement	• Light Rail • Local • Express • LINK • Bus Rapid Transit • Circulators • Para-transit • Carpool Vanpool
Central Puget Sound (Seattle), WA	• Regional transit provider created (Sound Transit) • Common fare smart card • Shared stops and stations	• Sound Transit • Community Transit • King County Metro • Pierce Transit • City of Auburn • Metro Transit • Everett Transit • Kitsap Transit	• Contract • Good Neighbor Policy • Interlocal Agreement	• Express • Light Rail • Commuter Rail • Feeder Service
San Diego, CA	• Regional transit provider created • Common fare • Shared structures • "511" Information sharing	• San Diego Metro Transit System • North County Transit District • Chula Vista Transit	• Consolidated Transit Service • Revenue Sharing Agreement	• Commuter Rail • Express • Bus Rapid Transit • Light Rail

Source: TTI Analysis

BEST PRACTICES FROM CASE STUDIES AND LITERATURE

TTI reviewed literature and case study findings to identify best practices for successfully implemented regionally coordinated transit services; the four elements below summarize the key findings.

Regional Service Coordination

As transportation demand leads to longer commutes across county lines, the coordination of services between agencies becomes increasingly important for regional sustainability, efficiencies, and inter-jurisdictional mobility. Examples of coordination include jointly provided service, consolidated service, and aligned routes. Agencies generally formalize jointly provided services through contracts and various types of interlocal agreements.

Shared Infrastructure

The "Good Neighbor Policy" proved to be a widely used tool to maximize infrastructure and resources among agencies coordinating regional transit services. The good neighbor policy is an agreement among two or more providers to use each other's transit stops or stations. The transit provider that owns the stop and or station is responsible for posting the route numbers of the other provider using the stop or station, and vice versa.

Common Fare

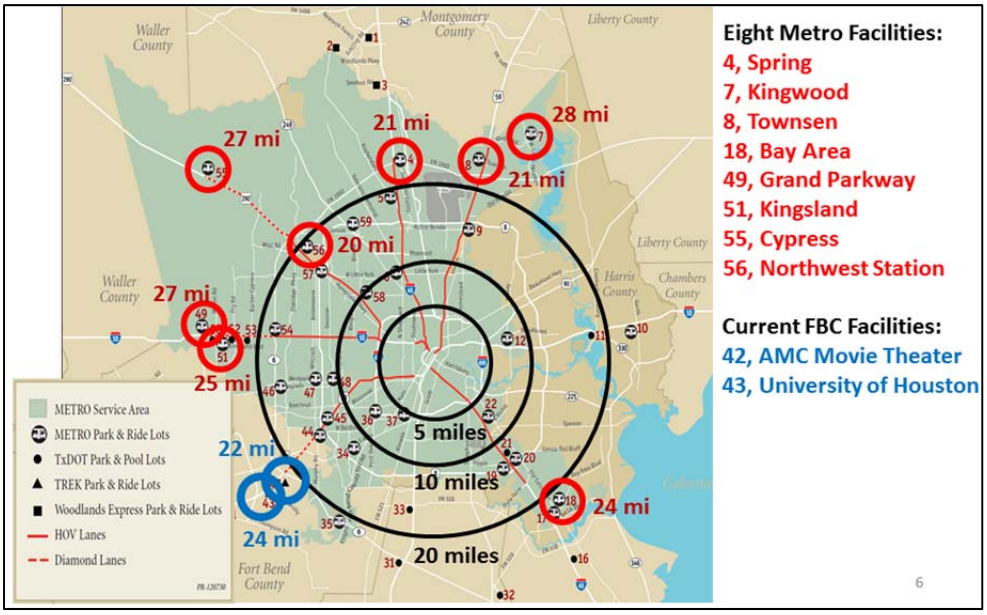
A common fare, or single payment method for riders that all participating regional agencies accept as fare media, is a hallmark of regionally coordinated transit services. In an effort to unify and modernize the fare collection process, many agencies have switched to an electronic pass system or "smart card" method of implementing a common fare. The option to use a single payment method aids in the ease of system use by riders, is easier to administer for bus operators, and can increase on-time performance. Agencies also often develop a revenue sharing agreement, tailored to operational differences, in conjunction with a common fare.

Park and Ride

Park and ride facilities and the associated services facilitate an integrated transportation network by attracting commuters to leave single occupant vehicles and use public transportation services. Customers are attracted to the seamless service and limited stops. Commuters traveling long distances to and from employment are the primary park and ride rider; park and ride facilities and services are, therefore, often evident in instances of regionally coordinated services.

ESTIMATED DEMAND FOR COMMUTER SERVICE FROM FORT BEND COUNTY TO DOWNTOWN

TTI analyzed METRO Park & Ride service along all major freeway corridors. TTI selected services that are about the same distance to downtown Houston as the existing FBC Transit Park and Ride lots at the AMC Movie Theater and University of Houston Sugar Land. TTI identified eight METRO Park & Rides that met the above listed criteria in the area, including Spring, Kingwood, Townsen, Bay Area, Grand Parkway, Kingsland, Cypress, and Northwest Station (Figure 2). For comparison to the Sugar Land area, the Katy, Cypress, and Kingwood Park & Ride markets have the most similar demographics.



Source: TTI Analysis; (locations labeled with miles to downtown Houston)

Figure 2. Location of METRO Case Study Facilities

The Houston- focused park and ride case study included the eight METRO Park & Rides shown in Figure 2. A summary of findings from the Houston-focused park and ride case study is below:

- Average distance to downtown Houston: **24.3 miles**
- Average A.M. peak inbound riders to downtown: **726**
- Average number of inbound bus trips: **25**
- Average boardings per bus trip at park and ride: **27.9**

TTI combined METRO route and ridership data with the U.S. Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) data to estimate the latent demand for commuter service connecting FBC residents to downtown Houston. In short, TTI compared known ridership for each peer facility to known worker flows to downtown to generate a park and ride mode share rate:

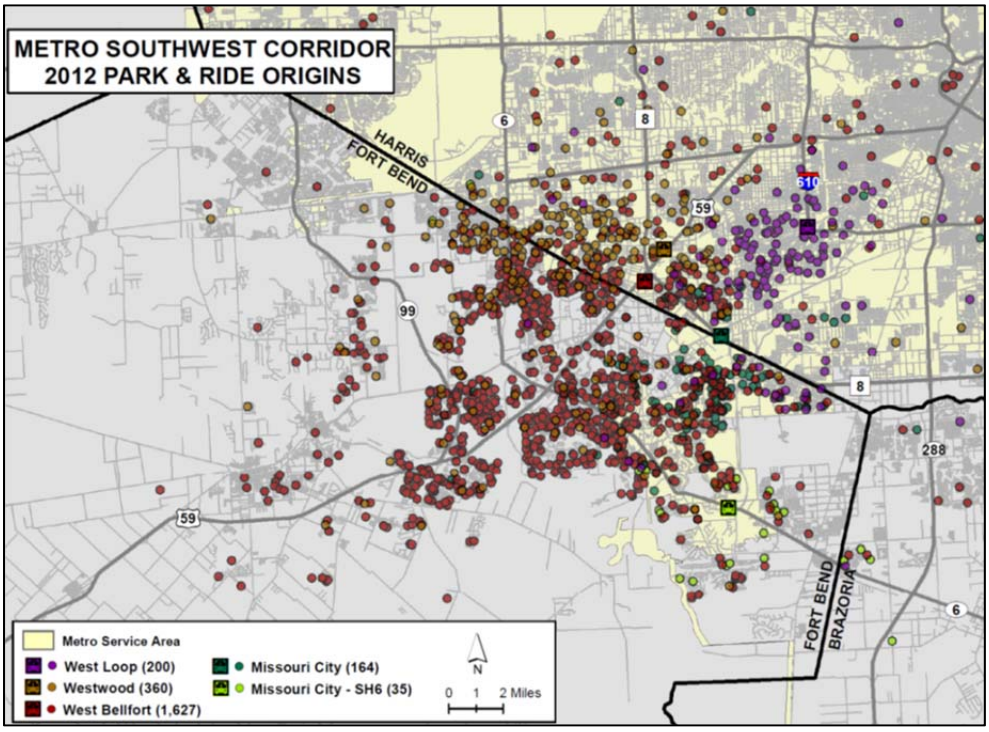
- Average METRO A.M. peak inbound riders to downtown from each park and ride: **726 riders**
- Number of workers in catchment area that work downtown (2010 LEHD): **4,087 workers**
- TTI divided ridership by total workers to calculate estimated mode share rate for METRO-like commuter service to downtown:
    - Low estimate of mode share capture **10.7 percent (lowest three case study facilities)**
    - Medium estimate of mode share capture **17.8 percent (average of all eight facilities)**
    - High estimate of mode share capture **28.2 percent (highest three case study facilities)**

The Central Houston – Fort Bend Commute Working Group decided that in order to estimate potential demand for commuter service from Fort Bend County to downtown Houston, TTI should assume a hypothetical park and ride located near the University of Houston Sugar Land. Using LEHD data from the Census Bureau in 2010, approximately 3,100 workers traveled from the catchment area of the hypothetical new facility to downtown Houston each day. If every commuter used the park and ride in the future, the target market would translate to about 6,200 transit trips per day. However, only a portion of the population will decide to use commuter transit service for their commute. TTI used the METRO case study mode share rates to estimate total latent demand for METRO-like commuter service from Fort Bend County to downtown Houston:

- **Low:** 10.7% capture rate X 6,200 transit trips = demand for 665 commuter trips per day
- **Medium:** 17.8% capture rate X 6,200 transit trips = demand for 1,100 commuter trips per day
- **High:** 28.2% capture rate X 6,200 transit trips = demand for 1,747 commuter trips per day

The population and demographic characteristics of Fort Bend County in the capture area most closely resemble the three METRO Park & Rides in the high scenario, suggesting a latent demand of 1,700 commuter trips per day.

TTI also reviewed the data from a 2012 license plate survey of cars parked at METRO Park & Ride facilities, provided courtesy of METRO. The Westwood and West Bellfort Park & Ride facilities are located along the US 59 corridor. Both Park & Rides afford FBC residents the opportunity to drive several miles, park, and ride an express route into downtown Houston. Figure 3 depicts the general distribution of existing METRO Park & Ride users' home origins. The majority of origins are in Sugar Land or the surrounding neighborhood communities.



Source: METRO

Figure 3. 2012 METRO Park & Ride Origins along US 59 Corridor

The METRO 2012 license plate survey of West Bellfort and Westwood Park & Ride corroborate the estimate of latent demand in FBC. A substantial share of current METRO Park & Ride users, nearly 50 percent, drive from Sugar Land in FBC (e.g., First Colony, Commonwealth, North Sugar Land) or from the city's extra-territorial jurisdiction (e.g., New Territory, Greatwood) to METRO's Westwood and West Bellfort Park & Ride facilities in order to ride transit to downtown Houston.

The Working Group agreed with TTI's estimate of latent demand and decided to assume the high scenario during the development and evaluation of service options. The working group relied on both the METRO license plate analysis from 2012 and the TTI analysis of the similarity demographics in the Sugar Land/FBC capture area as compared to the three METRO Park & Ride services in the high scenario. The commuter service (schedule, vehicle, amenities, etc.) influences residents' willingness to use of the service; the estimate of demand detailed in the service options section assumes similar, high-quality commuter service to the METRO Park & Ride sites studied.

SERVICE OPTIONS

Currently, the FBC Transit-operated Greenway Route stops at METRO West Bellfort Park & Ride to allow for passenger transfers to METRO Route 265. Riders pay FBC Shuttle fare and then pay METRO's Route 265 fare to travel to downtown Houston. TTI and the Working Group developed and evaluated four options for peak-hour commuter service between Fort Bend County and downtown Houston. Table 3 details the key elements of each option.

Table 3. Options for Analysis

Options	***2***	***3***	***4***	***5***
Description	*Fort Bend Shuttle*	*Extension METRO 262*	*New Fort Bend Route*	*New METRO Route*
Type of Vehicle				
Operator	FBC (Contractor)	METRO	FBC (Contractor)	METRO
Type of Service	Shuttle from FBC to West Bellfort Park & Ride	Commuter Express with stops at Westwood Park & Ride	Park and ride	Park and ride
Service Description	Buses operate from park and ride in FBC on a schedule to meet METRO Route 262 West Bellfort Park & Ride	Selected bus trips on the METRO Route 262 start/end at park and ride in FBC	Buses operate from park and ride in FBC directly to downtown Houston	Buses operate from park and ride in FBC directly to downtown Houston
Average Travel Time per Trip	60 minutes	50 minutes	40 minutes	40 minutes
Required Transfers	1	0	0	0
Estimated Daily Passenger Boardings in Year 4	299	667	1,708	1,708
Assumed Vehicle Fleet	7	18	28	17
Cost Model	Current FBC contract with First Transit	METRO cost model for Baytown Park & Ride	Current FBC contract with Contractor	METRO cost model for Planned Brazoria Park & Ride
Fare Assumptions	$1.00 for shuttle to West Bellfort Park & Ride, $3.25 METRO fare	$4.50 METRO fare from Sugar Land to downtown	$4.00 FBC fare from Sugar Land to downtown	$4.50 METRO fare from Sugar Land to downtown

Source: TTI Analysis

Working with METRO and FBC Transit, TTI designed service levels and schedules for each option. Detailed schedules are on the shared website under *Descriptions and Analysis of Service Options.* Morning peak hours are 6:01 a.m. to 8:30 a.m. and afternoon peak hours are 3:31 p.m. to 6:30 p.m.

The options comparison includes an assessment of route alignments, stops, schedules, target markets, operating costs, and required capital costs (if any). TTI used the previously described ridership estimations to determine required revenue hours, miles and vehicles to meet expected demand. Additionally, each transit agency's cost structure was used to calculate operating costs and federal, state, and local funding strategies.

Option 1 Current FBC Transit Service

The FBC Transit-operated Greenway Route stops at METRO West Bellfort Park & Ride to allow for passenger transfers to METRO Route 265. Riders pay FBC Shuttle fare and then pay METRO's Route 265 fare to travel to downtown Houston.

FBC Transit is currently testing a smart card fare collection system. The vendor believes that METRO's smart card (Q Card) readers will also be able to read FBC Transit's smart cards, but the assumption is not verified. The options below assume that FBC Transit has purchased its new system and that interoperability with METRO's Q Card system is possible. Under the current fare collection system, riders pay two separate fares—a $1.00 fare on the FBC Transit portion of the trip and a Zone 2 fare of $3.25 on the METRO portion of the trip. Without smart card integration, riders would need two smart cards (one for METRO and one for FBC Transit). The total fare would be the same as it is under the current system. To achieve a seamless fare for riders of the current service, FBC Transit would need smart card readers on all buses used for Uptown and Greenway services. One smart card would be used and the fare would be collected on the FBC buses. Riders transferring to the 265 West Bellfort would tap their cards and the transfer would not require another passenger fare. Fare allocation would require negotiation between METRO and FBC.

Another alternative is to treat the first part of the trip like a local bus trip, wherein a transfer to an upgraded service only requires paying the differential. In that case, $1.00 would be deducted at the FBC Transit lots when a passenger boards and the difference between Zone 2 and $1.00 ($2.25) would be deducted when the transfer is made. In this case, the total fare would be $3.25 per trip.

Option 2 Additional Trips on Existing Service, Operated by FBC Transit (Revise Existing FBC Transit Service)

Service from Fort Bend County to downtown would be provided by a transfer between FBC Transit buses and METRO buses at either METRO's 265 West Bellfort or 262 Westwood Park & Ride lot. The option assumes use of existing Park and Ride sites in FBC and 32-seat "shuttle" vehicles, similar to the vehicles currently operated by FBC Transit. The transfer between FBC Transit service and METRO routes will require riders to pay two fares, as they would be using two different transit systems or one fare if a unified fare system exists in the future. Seamless fare collection would require smart card readers on all FBC Transit buses used to provide the shuttle service. Again, fare levels and revenue allocation between METRO and FBC Transit would need to be determined.

Option 3 Extension of METRO Route 262 into Fort Bend County (Extend METRO Service)

METRO Westwood Route 262, the existing route connecting riders from their transfer point at the West Bellfort Park & Ride to downtown Houston, would extend to provide commuter service from existing FBC Transit Park and Ride lots into downtown Houston under contract to FBC Transit. A transfer is not required. The option assumes adequate park and ride spaces in an undetermined location along the US 59 corridor in Sugar Land—approximately 24 miles from downtown Houston. The service would use vehicles similar to current METRO Park & Ride vehicles. Riders would pay one fare to METRO and travel into and out of downtown. Since Option 3 uses METRO buses that already have Q Card readers, riders would simply pay with a Q card. The agencies would need to negotiate fare levels and revenue allocation.

Option 4 FBC Transit-Owned and Operated Commuter Service (New Service)

Option 4 service connects riders from Fort Bend County into downtown Houston on a service operated by FBC Transit. The option assumes adequate park and ride spaces in an undetermined location along the US 59 corridor in Sugar Land—approximately 24 miles from downtown Houston. The service would use vehicles similar to the current 32-seat vehicles in the FBC fleet. Riders would pay one fare and travel directly into and out of downtown. Since no transfer or interconnection with METRO service is needed, no fare system interoperability is required. FBC would need to establish what fare it would charge from each lot and how it planned to collect the fares. FBC would use its own smart card fare collection system to collect fares.

Option 5 Fort Bend County-Owned, METRO-Operated Commuter Service (New Service)

Option 5 service connects riders from Fort Bend County into Downtown Houston on a service operated by METRO. The option assumes adequate park and ride spaces in an undetermined location along the US 59 corridor in Sugar Land—approximately 24 miles from Downtown Houston. METRO would use FBC Transit's Park and Ride lot and would therefore enter into a contract with FBC Transit for this purpose. The service would use vehicles similar to current METRO Park & Ride vehicles. Riders would pay one fare and travel directly into and out of downtown. Option 5 is similar to what METRO is proposing to operate from the park and ride lot under consideration in Pearland to the TMC. Since Option 5 option uses METRO buses that already have Q Card readers, riders would simply pay with a Q card. The agencies would need to negotiate fare levels and revenue allocation.

COST ESTIMATIONS

Researchers made careful assumptions to estimate the costs associated with each option. Costs considered included the vehicle capital, maintenance, supervision, and marketing costs of each service option. Researchers also estimated each option's potential daily passengers, fare revenue and recovery, and the amount of local funds required to match the federal contribution. The Working Group ultimately decided that the local share element was the most important factor. Detailed operating cost estimations, including the local share requirements, for each option is on the project website under the heading *Comparative Summary: Local Share and Advantages/Disadvantages*. Researchers also include a summary of operating and capital cost scenarios in Table 20.

TTI developed a comparative summary of the local share required for each option. From there, TTI performed a comprehensive risk analysis to evaluate all options independently and against each other. The risk analysis examined the risk of operating costs rising by 25 percent and passenger ridership (or revenues) decreasing by 25 percent, or both, using constant dollars over a four year period of service starting and reaching ridership maturity. Table 4 details the effect of the risk analysis on local share dollars in years 1 and 4 of service operation for each option. In terms of total local share, option 2 is always the least costly because it adds the least amount of additional service, as compared to the other three options.

Table 4. Local Share in Total Annual Dollars

Option	Description	Year 1		Year 4	
		Low	High	Low	High
Option 2	Additional trips on existing FBC Transit service, operated by FBC Transit	$69,000	$92,500	$69,000	$102,250
Option 3	Extension of METRO Route 262 into Fort Bend County	$428,000	$735,025	$413,000	$861,488
Option 4	FBC Transit owned and operated commuter service	$212,000	$708,630	($88,000)	$662,160
Option 5	FBC Transit Owned, METRO operated commuter service	$414,000	$1,038,705	$161,000	$1,093,435

Source: TTI Analysis

Table 5 details the effect of the risk analysis on local share funding needed per boarding passenger in years 1 and 4 of service operation for each option. In terms of local share/boarding, any of the four options could be the most cost-effective service, depending on the year and the risks encountered. Option 3 is generally the least cost effective as it has the higher cost of METRO service without the higher ridership generated by Options 4 and 5.

Table 5. Local Share per Boarding

Option	Year 1		Year 4	
	Low	High	Low	High
Option 2	$2.16	$3.85	$1.30	$2.57
Option 3	$4.20	$7.21	$2.44	$5.10
Option 4	$0.81	$2.70	$0.00	$1.53
Option 5	$1.58	$3.96	$0.37	$2.52

Source: TTI Analysis

Comparison of Service Options

Researchers considered several elements in the review of the proposed options and their respective advantages and disadvantages, including:

- Current riders (convenience, comfort, cost)
- Future riders (ability to attract new riders)
- Transit operator (supervision of service quality, time and effort to manage, marketing)
- Operating cost (operating cost/unit, local share required)
- Capital cost (vehicle investment, park and ride)
- Other (parking capacity at FBC lots; midday bus capacity downtown)

Tables 6, 7, and 8 list all known advantages and disadvantages of each proposed service option.

Table 6. Current Service Option 1: Advantages and Disadvantages

Option	Advantages	Disadvantages
Option 1– Current service	• No additional oversight by transit agencies • No additional operating cost • No additional vehicles • No capital investment • FBC Transit stop at West Bellfort Park & Ride adds opportunity for riders to board for destinations at Greenway Plaza	• Requires riders to transfer to reach downtown • Requires passenger to pay two fares ($1 to FBC and $3.25 to METRO) • Capacity for riders transferring to downtown ~50 each peak period without adding additional service; some FBC Transit bus trips to/from Greenway reach seated capacity with transfers • Riders may be required to wait for transfer to FBC Transit bus at West Bellfort Park & Ride in afternoon due to less frequent FBC Transit bus trips • Not marketed as Fort Bend County to downtown service • No standardized commuter amenities onboard FBC Transit vehicles

Source: TTI Analysis

Table 7. Short Term Options, 2 & 3: Advantages and Disadvantages

Option	Advantages	Disadvantages
Option 2– Additional trips on existing service, operated by FBC Transit	• Increases Option 1 passenger capacity for transfers from FBC Transit vehicles to METRO at West Bellfort Park & Ride • Provides more frequent service to METRO West Bellfort Park & Ride than Option 1 • Lower operating cost/hour for FBC Transit-operated service than Option 3 • Lower local share than Option 3 due to lower unit costs and FBC Transit's ability to draw down additional federal funds	• Requires riders to transfer to reach downtown (No improvement as compared to Option 1) • Requires passenger to pay two fares (No improvement as compared to Option 1) • Lower projected ridership than Option 3 • Requires additional FBC Transit operating supervision to ensure timely performance • Requires additional FBC Transit vehicles to operate the shuttle; vehicles are small buses with seated capacity 32-riders • Increased demand may exceed available parking capacity at existing FBC Transit parking lots • No standardized commuter amenities onboard FBC vehicles • METRO would likely incur costs to meet increased demand
Option 3– Extension of METRO Route 262 into Fort Bend County with service operated by METRO	• One seat ride for riders from Fort Bend County to Downtown Houston (no transfers) • Passenger pays one fare (to METRO) • Vehicles are METRO commuter buses with additional passenger amenities and comfort • Higher projected ridership than Option 2 • METRO price based on incremental revenue hours at direct operating cost • Minimal incremental management and supervision by METRO • Marketing and customer service shared responsibility of FBC Transit and METRO • Recognizable, branded as service from Fort Bend County to Downtown	• Higher operating cost per hour for METRO service as compared to FBC operation in Option 2 • Higher local share as compared to Option 2 due to higher METRO unit costs and FBC Transit cannot apply additional federal funds • Increased demand may exceed available parking capacity at existing FBC Transit parking lot at UH • Requires METRO to assign more buses in peak periods • Requires space to park midday buses near downtown; METRO midday lot at or near capacity

Source: TTI Analysis

Table 8. Long Term Options, 4 & 5: Advantages and Disadvantages

Option	Advantages	Disadvantages
Option 4– Newly-created, FBC Transit-owned and -operated commuter service	• One seat ride for riders from Fort Bend County to downtown Houston (no transfers) • Passenger pays one fare (to FBC Transit) • Higher projected ridership than Options 2 and 3 • Lower operating cost/hour for FBC Transit-operated service than Option 5 • Lower local share than Option 5 due to lower unit costs and FBC Transit ability to draw down additional federal funds • Recognizable, branded as service from Fort Bend County to downtown	• Vehicles operated by FBC Transit; small bus with 32-seats and fewer passenger amenities, less comfortable bus for longer distance commute • Requires more peak buses than Option 5 due to smaller capacity • Significant expansion of service requires additional FBC Transit management, supervision, marketing, and customer service • No facility to park midday buses downtown Houston; operating costs includes miles/hours for buses to return to Fort Bend County midday • Long-term project to develop park and ride facility (same as Option 5)]
Option 5– Newly-created, Fort Bend County-owned, METRO-operated commuter service	• One seat ride for riders from Fort Bend County to downtown Houston (no transfers) • Passenger pays one fare (to METRO) • Vehicles are METRO commuter buses with additional passenger amenities and comfort • Higher projected ridership than Options 2 and 3 • METRO price based on revenue hours at direct operating cost • Incremental increase in management and supervision by METRO • Marketing and customer service shared responsibility of FBC Transit and METRO • Recognizable, branded as service from Fort Bend County to downtown	• Higher operating cost/hour for METRO service as compared to FBC Transit operation in Option 4 • Higher local share as compared to Option 4 due to higher METRO unit costs and FBC Transit cannot apply additional federal funds • Requires METRO to assign more buses in peak periods than Option 3 • Requires space to park midday buses near downtown; METRO midday lot at or near capacity • Long-term project to develop park and ride facility (same as Option 4)

Source: TTI Analysis

PHASE 1 SUMMARY

Phase 1 findings indicate significant demand for commuter service from Fort Bend County to downtown Houston and as detailed in the preceding sections, each of the four options proposed is financially viable given the assumptions during the study. Based on the above evaluation and discussions with other stakeholders regarding the risks, advantages, and disadvantages associated with each option, the Working Group preferred a phased implementation of Option 4 with certain assumptions.

Option 4 has many advantages, most notably the development of a one-seat, single fare ride connecting the most commuters from Sugar Land residents to downtown Houston (as compared to Options 2 and 3). The current operating environment has changed since research began. METRO is "re-imagining" current services and possible changes in priorities may affect the viability of Options 3 and 5. Specifically, METRO may limit its service levels in jurisdictions outside of the current service area due to cost recovery concerns.

Additionally, FBC Transit's funding has changed under the new federal authorization MAP-21. Funding changes likely limits FBC Transit' ability to contribute to the local share cost of operating new service. Under any option implemented, FBC Transit will need a plan to mitigate new restrictions on the use of funds for operating. Such a plan may affect a local share contribution to the implementation of Option 4 from stakeholders.

PHASE 2 RESEARCH

PHASE 2 OBJECTIVES

Since the project began in June 2012, several developments have changed the financial climate. In particular, federal funding authorization MAP-21 changed the eligible use of federal funds for operating for Fort Bend County. MAP-21 and other local financial and policy considerations also affect METRO funding. The original scope did not include a task to evaluate the cost of a park and ride facility for the long-term.

Fort Bend County Transit and Central Houston agreed to expand the scope of work for the Fort Bend downtown Commute Study to include additional tasks. Phase 2 objectives included:

- Documenting the provisions of MAP-21 and how the new federal authorization impacts the options for funding transit in the Houston urbanized area with focus on effects on commuter service between Fort Bend County and downtown Houston.
- Documenting a financial plan for capital and operating costs for a commuter service between Fort Bend County and downtown Houston to support applications for additional sources of funding.

MAP-21

MAP-21 is the two-year federal transportation authorization that approves funding for U.S. public transportation and highway projects through Fiscal Year (FY) 2014 (September 30, 2014). MAP-21 funds transit at $21.27 billion over two years, effective July 6, 2012 (A Summary of Public Transportation Provisions, 2012).

The FTA distributes transit funding and provides technical support and oversight for the Department of Transportation. The FTA distributes funds through formula and discretionary (competitive grant) programs. The portion of funding allocated via formulas increased under MAP-21 and now exceeds 80 percent of transit funds distributed through formulas.

Major Transit Programs

In a briefing paper on MAP-21 (available on the project website), researchers address the purpose, eligible activities, and changes under MAP-21 for four major transit programs which affect transit funding in the Houston UZA. Table 9 summarizes the four programs and presents the FY 2013 Houston UZA apportionment. Shading in Table 9 indicates discretionary funding.

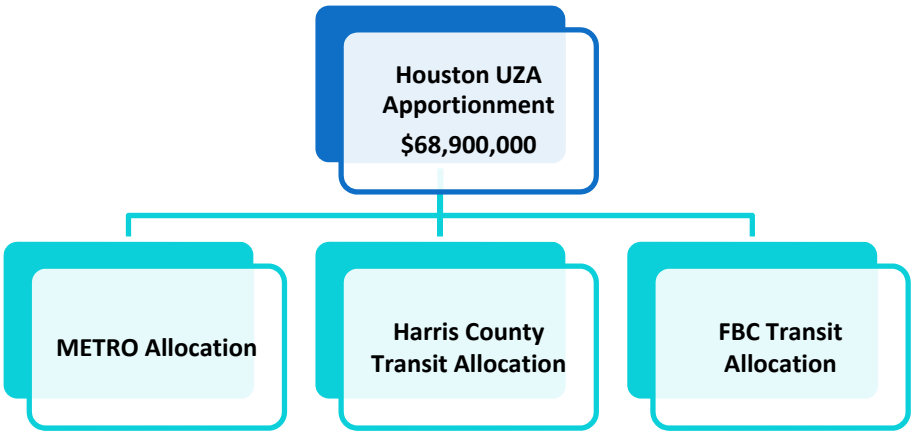
Table 9. Four Major Transit Programs in MAP-21 Effecting Houston UZA

Section	Program	Description	Houston UZA Apportionment FY 2013 ($M)
5307	Urbanized Area Formula Program	Formula funding to urban areas for capital costs, Job Access Reverse Commute (JARC), maintenance, and some operating expenses.	$68.9
5337	State of Good Repair	Formula funding for fixed guideway systems more than seven years old and high intensity motorbus programs.	$9.3
5339	Bus and Bus Facilities	Formula funding for states and transit agencies for purchase, rehabilitation, and repair of buses and bus related facilities.	$7.5
5309	Fixed Guideway Capital Investments	Discretionary funding for Core Capacity, Bus Rapid Transit, Fixed Guideway, and Small Starts projects.	$189

Source: FTA, TTI Analysis

The Urbanized Area Formula Program (Section 5307) is the largest source of transit funding and uses a formula to authorize transit funds to 497 UZAs in the U.S. An UZA is a contiguous urbanized area of 50,000 or more population that meets criteria administrated by the U.S. Census Bureau. FTA apportions UZA formula funds to designated recipients, which then allocate funds to state and local governmental authorities, including public transportation providers (Fact Sheet: Urbanized Area Formula Grants).

The FTA apportions 5307 funds to the Houston UZA as shown below in Figure 4. The designated recipient for the Houston UZA is METRO. The metropolitan planning organization (MPO), Houston-Galveston Area Council (H-GAC), must approve METRO's intended use of funds. FBC Transit and Harris County Transit are direct recipients. The three parties negotiate distribution.



Source: TTI Analysis

Figure 4. Allocation to Local Operators

Changes under MAP-21

Table 10 highlights how MAP-21 modifies the four programs and the subsequent effects on Houston transit operators. Changes to the Urban Area Formula, the new State of Good Repair (SOGR) program, Fixed Guideway Capital Investment, and Bus and Bus Facilities program have the greatest effect on transit funding in Houston.

Table 10. MAP-21 Program Changes and Effects on Houston UZA

New Program	Change to the Program	Funding under MAP-21
UZA Formula	Small fixed route operators (with fewer than 100 buses) can use only a portion of transit funds for operating	FBC Transit can only use 75% of its 2% attributable share of formula funds based on revenue hours for operating expenses; results in operating deficit to FBC Transit as a small provider in a large urban area
SOGR	Fixed guideway definition no longer includes high occupancy vehicle (HOV); HOV funds in new State of Good Repair category "High Intensity Motor Bus"	$1.4 M less in formula funds; METRO receives approximately $4 million less in SOGR funds
Bus and Bus Facilities Formula	Smaller, formula program; Transit agencies can no longer pursue discretionary funds for specific projects	METRO receives $3.6 million less in 2013 than 2012 for bus related grants
Fixed Guideway Capital Investments	Discretionary, subject to national competitive process for New Starts. More competition due to addition of Core Capacity Projects and fewer funds	METRO faces increased competition for New Starts

Source: MAP-21, TTI Analysis

As a small fixed route operator in a large region, FBC Transit is negatively impacted by provisions of MAP-21 for eligible uses of Section 5307 funds. MAP-21 limits the Section 5307 funds that FBC Transit can use for operating expenses at 75 percent of FBC Transit's attributable share of Section 5307 funds. Fort Bend County's attributable share (2 percent) is based on its percent share of all revenue hours by all transit operators in the UZA. The restriction on use of Section 5307 funds for operating creates an $857,000 deficit for FBC Transit in FY 2013 given existing service levels.

METRO received $4 million fewer dollars under the MAP-21 SOGR program than under the previous Fixed Guideway Modernization program due to the exclusion of HOVs from the Fixed Guideway definition. METRO also received $3.6 million fewer dollars under the new, smaller Bus and Bus Facilities Formula Program, which was previously discretionary funding. The competitive Fixed Guideway Capital Investment Program (formerly New Starts) is reduced under MAP-21 with more flexible project eligibility meaning less money available and more competition.

Changes to the programs listed in Table 10 reduced formula funds for transit to the Houston urbanized area and reduced the local flexibility for how local operators can use funds.

POPULATION

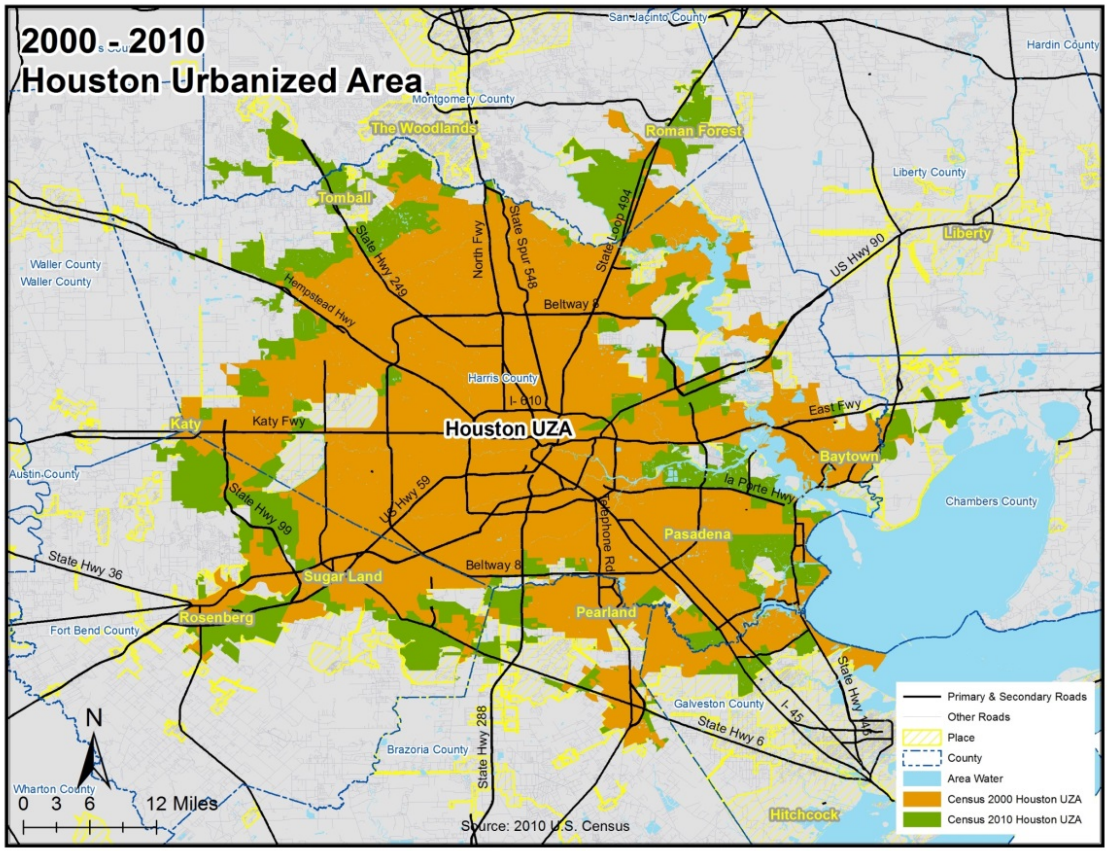
The Census Bureau defines urbanized and non-urbanized (rural) areas after each decennial census. The FTA apportions 5307 funds by formula to UZAs and 5311 funds to rural areas. Table 11 shows that the population in the Houston UZA increased from 3.8 million in the 2000 Census to 4.9 million in 2010 (29 percent increase). The Houston UZA is the seventh largest UZA in the U.S.. The FTA distributes more than 91 percent of Federal urban transit funding through the Urbanized Area Formula program to UZAs with populations over 200,000.

Table 11. Houston UZA Population and Size

UZA	2000 Population	2010 Population	Growth from 2000 to 2010	2000 Area (Sq Mi)	2010 Area (Sq Mi)	Area Change from 2000 to 2010 (Sq Mi)
Houston	3,822,509	4,944,332	1,121,823	1,295	1,660	365

Source: U.S. Census

Figure 5 shows the growth in the Houston UZA change from the 2000 to the 2010 Census.



Source U.S. Census Bureau. TTI Analysis

Figure 5. 2000 to 2010 Houston Urbanized Area

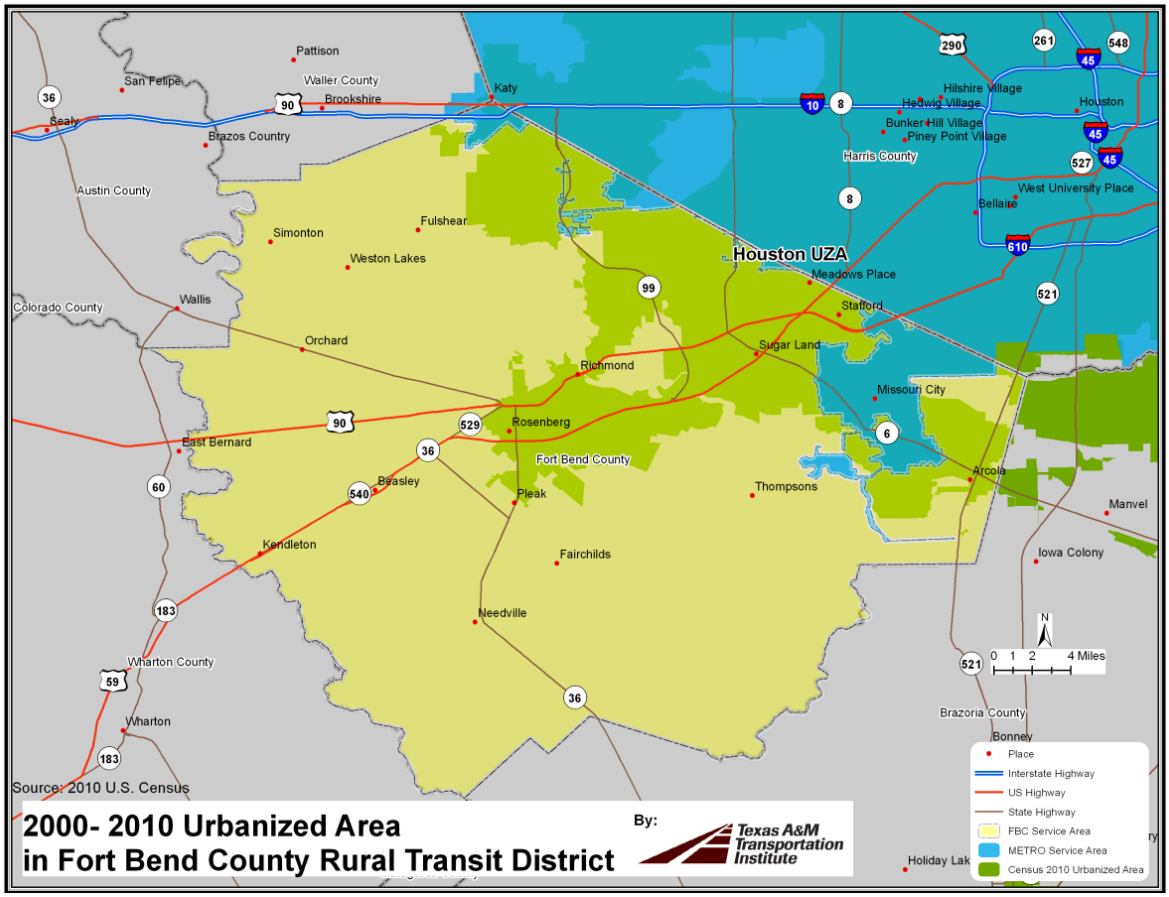
There was significant growth in Fort Bend County's UZA land area and population between 2000 and 2010 (Table 12). Fort Bend County UZA population accounted for 8 percent of the Houston UZA total in 2000 and increased to 11 percent in 2010. The overall county population, urban and rural, increased from 354,452 in 2000 to 585,375 in 2010—a 65 percent increase.

Table 12. Houston UZA and FBC Growth 2000 to 2010

Houston UZA		Census 2000		Census 2010		Change 2000 – 2010	
		Number	*Percent of County Total*	*Number*	*Percent of County Total*	*Number*	*Percent Change*
		3,822,509	**-**	**4,944,332**	**-**	**1,121,823**	**29.3%**
FORT BEND COUNTY	Houston UZA	316,561	89.3%	547,198	93.5%	230,637	72.9%
	Percent of UZA	8.3%	-	11.1%	-	-	-
	Non-urbanized	37,891	10.7%	38,177	6.5%	286	0.8%
	County Total	354,452	100%	585,375	100%	230,923	65.1%

Source: Census 2000 and 2010; TTI analysis.

Figure 6 shows the FBC Transit service area (in yellow) and the Census 2010 urbanized area (in green). The blue portion represents the METRO service area.



Source: U.S. Census Bureau. TTI Analysis

Figure 6. 2000-2010 Urbanized Area in Fort Bend County

VEHICLES

Researchers estimate that Option 4 service requires 28 medium duty, small, 32-passenger buses to accommodate ridership. TTI estimates that FBC Transit will need 34 total vehicles, including six spares. However, if FBC Transit uses larger transit buses (Option A) the service would require 21 vehicles, including spares, due to greater seating capacity. Researchers present two vehicle options below in Table 13. All costs are in 2013 dollars.

Table 13. Vehicle Options for Option 4 Service

Option	Vehicle Type	Passenger Seating	Purchase Cost	Fuel Economy (Commuter)	Useful Life	Maintenance and Servicing
A	Over the road, heavy duty commuter bus	55	$600,000	5.92	12 years, 500,000 miles	Propulsion system, engine, axles, transmission, suspension, and brakes may need major servicing and or/replacement one or more times over the life of the vehicle
B	Small, medium duty bus	32	$146,000	14.21	7 years, 200,000 miles	Servicing is simpler than a heavy duty transit bus, can be performed on smaller shop equipment

Source: Greater Lynchburg Transit Company Comparison of Large and Small Buses, Altoona Vehicle Test Reports, METRO and FBC Transit vehicle cost data, FTA Useful Life

Option A:

Option B:

Option A is a heavy duty, commuter transit bus. METRO estimates that the capital cost of one heavy-duty diesel bus is $600,000, based on METRO's most recent purchase. Capital costs include all on-board equipment such as cameras, farebox, and other communications systems. A 21-vehicle fleet (including spares) would cost $12.6 million dollars.

Option B is a medium duty small bus, similar to the vehicle currently operated by FBC Transit. FBC Transit estimates the capital cost of one medium small diesel bus is $146,000. Capital costs include all on-board equipment including cameras, farebox, and the vehicle "wrap" for branding. A 34-vehicle fleet (including spares) would cost $5.0 million dollars.

Table 14 contains amortized vehicle costs. A $600,000 Option A bus amortized over a 12-year service life is $50,000 per bus per year for the full vehicle cost. The annual cost for the 21-bus fleet is $1.1 million for the full vehicle cost. The 20 percent local share investment cost is $10,000 per bus per year. The annual cost for the 21-bus fleet is $210,000 for the local investment.

A $146,000 Option B bus amortized over a 7-year service is $21,000 per bus per year for the full vehicle cost. The annual cost for the 34-bus fleet is $710,000 for the full vehicle cost. The 20 percent local share investment cost is $4,171 per bus per year. The annual cost for the 34-bus fleet is $142,000 for the local investment.

Table 14. Amortized Costs

Option	Per Bus Cost	Number of Buses	Service Life	Annual Full Vehicle Cost per bus	Annual Full Vehicle Fleet Cost	Annual (20%) Local Share Vehicle Cost per Bus	Annual Local Share Fleet Cost
A	$600,000	21	12 years	$50,000	$1,100,000	$10,000	$210,000
B	$146,000	34	7 years	$21,000	$710,000	$4,171	$142,000

Source: TTI Analysis

Life Cycle Costs

Researchers estimate each bus will operate 139 miles per day (35,000 miles per year), including non-revenue mileage. Researchers used data from the Greater Lynchburg Transit Company Comparison of Large and Small Buses study to determine annual operating costs. The buses used in the Greater Lynchburg study operate 33,000 miles per year, similar to Option 4 service. Though FBC Transit's Operations and Maintenance Contractor builds the cost of maintenance, parts, labor, fuel, and insurance into the hourly operating rate, the Contractor passes maintenance costs through to FBC Transit.

Options

Table 15 compares the life cycle cost of the Option A (transit bus) and Option B (small bus) vehicle. All costs are presented in 2013 dollars. FBC Transit provided commuter service require 21 Option A buses and 34 Option B buses. Using FTA Useful Life Standards, the Option A bus has a 12-year useful life and the Option B bus has a seven-year useful life.

Capital Costs

The Option A bus purchase cost is $600 and the Option B bus purchase cost is $146,000. The Option A bus is $50,000 per year, amortized over a 12-year useful life. The Option B bus is $21,000 per year, amortized over a seven-year useful life. The 21-bus Option A fleet is $12.6 million and the 34-bus Option B fleet is $5 million. The Option B 34-bus fleet replacement cost is $5 million in year seven, based on a seven-year useful life. The Option A fleet total capital investment is $12.6 million and the Option B total capital investment is $10 million. The Option A total fleet service life is 12 years and the Option B total fleet service life is 14 years (two, seven-year fleets due to useful life replacement in year seven). The Option A fleet amortized cost per year is $1 million and the Option B fleet amortized cost per year is $700,000.

Operating Costs

An Option A bus costs $29,000 per year to operate and an Option B bus costs $21,000 per year to operate. Operating costs include:

- Maintenance labor cost per mile
- Parts cost per mile
- Tire cost per mile
- Outside repair cost per mile
- Fuel cost per mile

The cost to operate the 21-bus Option A fleet is $609,000 and the cost to operate the 34-bus Option B fleet is $714,000 per year.

The Option A bus total cost (capital and operating) is $79,000 per year. The Option B bus total cost is $42,000 per year. The Option A total fleet cost per year is $1.7 million and the Option B total fleet cost per year is $1.4 million.

Table 15. Life Cycle Cost Comparison (2013 Dollars)

OPTION	**A**	**B**
Type of vehicle	**Transit bus**	**Small bus**
Number of vehicles	**21**	**34**
Service life in years	**12**	**7**
Capital		
Purchase cost per bus	$600,000	$146,000
Amortized cost per bus per year	$50,000	$21,000
Fleet purchase cost	$12,600,000	$4,964,000
Fleet replacement cost (Year 7)		$4,964,000
Total capital investment	$12,600,000	$9,928,000
Total fleet service life in years	12	14
Fleet amortized cost per year	$1,050,000	$709,000
Operating		
Cost per bus per year	$29,000	$21,000
Fleet cost per year	$609,000	$714,000
Total Cost (Capital and Operating)		
Total cost per bus per year	$79,000	$42,000
Total fleet cost per year	$1,659,000	$1,428,000

Source: TTI Analysis

MAINTENANCE FACILITY

FBC Transit currently maintains, fuels, washes, and parks 47 vehicles daily at a leased facility. The existing FBC Transit maintenance facility is at capacity and cannot accommodate the additional 34 buses required for Option 4 service. In addition, the existing maintenance facility cannot accommodate larger, heavier duty commuter buses vehicle (bay size, lift capacity, etc.).

Researchers explored three options to maintain and park the expanded fleet as shown in Table 16. All costs are in 2013 dollars.

Table 16. Maintenance Facility Options

Option	Description	Construction Assumptions	Facility Sq Ft	Site Area	Facility Cost
A	Expand existing maintenance facility	• Add 40 bus capacity to existing 45 bus facility • Add 3 new maintenance bays (16,000 sq ft) • Expand Administration and Operations space (6,000 sq ft) • Add bus parking area for new fleet vehicles (110,000 sq ft; 2.5 acre minimum) • Add 40 space employee parking area (16,000 sq ft)	22,000 addition	3.4 acres	$9.2M
B	Build new satellite facility	• 40 bus capacity with future expansion capabilities • 3 maintenance bays (16,000 sq ft) • Chassis wash (2,500 sq ft) • Wash bay (2,000 sq ft) • Administration and Operations (12,000 sq ft) • Bus parking for 40 (110,000 sq ft) • Fuel island (included in bus parking area) • Car parking for 40 (16,000 sq ft)	32,500 new, stand-alone facility	3.6 acres	$11.8M
C	Build new consolidated facility	• 85 bus capacity with future expansion capability • 7 maintenance bays (34,000 sq ft) • Chassis Wash (2,500 sq ft) • Wash bay (2,000 sq ft) • Administration and Operations (18,000 sq ft) • Bus parking for 85 (230,000 sq ft) • Fuel Island (included in bus parking) • Car parking for 85 (42,500 sq ft)	56,500 new, stand-alone facility	7.6 acres	$20.2M

Source: TTI
**Square footage and cost estimates provided to TTI by LHB Architects and Engineers*

Each option requires other recurring costs, including:

- Facility maintenance
- Permits
- Insurance
- Utilities
- Landscaping and irrigation
- Security

PARK AND RIDE FACILITY

As a short term parking solution for Option 4 service, the AMC First Colony has offered to lease FBC Transit up to an additional 1,000 spaces per month. Researchers provide short-term park and ride facility costs below. Costs assume leased space is $7,000 per month or $84,000 per year. Fort Bend County Transit assumes an unlimited contract term at the end of the lease.

Researchers analyzed three options for a long-term park and ride facility. Assumptions in Table 17 include the need for 1,500 spaces. Researchers present all costs in 2013 dollars. LHB Architecting and Engineering firm provided cost estimates and noted that construction costs increase an average of six percent per year.

Researchers estimated land cost at $7,728 per acre using the 2012 nominal price data from the Texas A&M Real Estate Center's Rural Land Database. Costs represent an average of the regional size-adjusted averages of medians weighted by the percentage of land in each area in Austin, Brazoria, Chambers, Fort Bend, Galveston, Hardin, Harris, Jefferson, Liberty, Montgomery, Orange, San Jacinto, Walker, and Waller Counties. Data is accessible at http://www.recenter.tamu.edu/data/rland/rlt28.asp.

Table 17. Park and Ride Facility Options

Option	Description	Components	Parking Capacity	Details	Estimated Acres	Estimated Land Cost	Estimated Facility Cost	Total Estimated Cost
A	Surface parking lot	• Surface lot • Lighting • Cameras	1,500 surface lot spaces	• 1,500 stalls @ 325 = 487,500 sq ft • 15% open space factor (73,125 sq ft)	13	$100,000	$15.5M	$15.6M
B	Multilevel parking structure	• Above grade parking structure • Bus canopy and loading berths • Transit island (passenger waiting) • Lighting • Elevator • Cameras • Operator restroom • Fare vending	1,500 structured parking spaces	• 1500 stalls @ 325 = 487,500 sq ft • Three story structure = 162,500 per floor • 5% circulation factor in the building for stairs, elevators, amenities, access ramp, custodial, mechanical, electrical spaces = 24,375 sq ft • Total building footprint = 186,875 sq ft • 15% open space factor (28,031 sq ft)	5	$39,000	$31M	$31.4M
C	Combination surface lot and multilevel parking structure	• Bus loading berths • Transit waiting area (island) • Restrooms • Driver layover • Surface lot • Above grade parking structure • Open space	500 space surface parking lot 1,000 space garage	• 122,745 sq ft building (including transit berths and amenities) • 9.6 acres of site area developed • 4.6 ac. surface lot parking – 500 spaces • 1 ac. transit island and bus circulation • 4 ac prep for building& green space	10	$77,000	$25M	$25.7M

Source: METRO, LHB Architects and Engineering, and the Texas A&M Real Estate Center's Rural Land Database[1]

[1] Estimates are guidelines only to be used for basic planning purposes.

Option A

Missouri Department of Transportation Surface Lot

Option B

METRO Cypress Park and Ride

Option C

Downtown Minneapolis

Ongoing Facility Maintenance Costs

TTI worked with Foothill Transit to estimate monthly and annual and monthly park and ride facility maintenance costs. The costs listed in Table 18 correspond to the long-term, multilevel structured facility (Option B). A surface parking lot would have lower monthly maintenance costs.

Table 18. Monthly Park and Ride Facility Maintenance Costs

Item	
Landscaping	
Pest control	
Elevator maintenance	
Exterior maintenance	
Security cameras	
A/C maintenance	
Building insurance	
Fire alarm monitoring	
Fire sprinkler test	
Fire pump inspection	
Fire alarm inspection	
Sprinkler test	
Fire extinguisher maintenance	
Electricity	
Water	
Total Monthly	**$7,000**
Total Annual	**$86,000**

Source: Foothill Transit

Other park and ride facility amenities affect cost and include:

- Seating
- Covered or enclosed waiting areas
- Canopy
- Information kiosk
- Bike Racks
- Vending machines
- Telephone
- Bus operator restrooms
- Public restrooms
- Security booth
- Fare kiosk
- Lockers
- Water fountains
- Climate controlled waiting areas
- Trash/recycling receptacles

Facility Location

The City of Sugar Land's staff proposed two long-term site options, subject to formal approval.

The first option is shared use of the City's Regional Festival Site. The Regional Festival Site would serve parking needs of festival visitors during events (primarily on weekends), and UH students and Option 4 Park and Ride users on weekdays. The planned site is along the Brazos River located along the Northbound Frontage Rd. of US 59 at the Brazos River U-Turn. The Regional Festival Site will have a surface parking lot with 2,600 spaces.

The second option is a transit oriented development (TOD) in Sugar Land's Tract 5 Area. The City is working with the developer to turn the Tract 5 Area into a high-density, mixed-use area. The City plans to build a 7,000 seat Performing Arts Center and a parking structure or combined structure/surface lot could serve visitors (primarily in the evenings and on weekend) and Option 4 commuter service customers on weekdays. Texas Instruments is building a parking structure for its employers, and there is space to develop an additional parking structure or surface lot.

Bus Stop Amenities

Option 4 service will require new bus stop signs and shelters. For shelters, costs depend on construction complexity. If sidewalks need minor repairs, construction costs per bus stop are estimated at $7,000 to $12,000 per stop (VOLPE, 2011).

As complexity increases, so does the cost. Enhanced bus stops include lighted shelter, a bench, and trashcans. The electricity requires coordination with the utility and increased monthly maintenance costs but also enhances safety. "Trenching to provide electricity, permits, replacing and fixing portions of sidewalks and installing signs and posts, can cost over $30,000 per stop for construction (VOLPE, 2011)."

Bus stop signs are also required for new service. Bus stop signs typically include information about routes that service the stop, frequency, and agency contact information. Researchers estimate bus stop signs will cost $100 per sign.

Federal funds may be available to help the cost of new commuter service from FBC to downtown Houston. This section describes federal funding sources, eligible use of funds, restrictions, and the local match requirement in five difference scenarios, given different funding constraints.

Federal Funding Sources

Federal sources FBC Transit may use to pay for the cost of commuter service include:

- FTA formula funds for transit investment in the Houston UZA
- Congestion Mitigation and Air Quality (CMAQ) funds from the Federal Highway Administration to the Houston-Galveston region to implement new transit service
- Transportation Development Credits (TDCs)

FBC Transit may use Urbanized Area Formula Program (Section 5307) funds for the Houston UZA. FBC Transit is a direct recipient, subject to funding approval by H-GAC and METRO, the designated recipient. Eligible uses of the funds may include:

- Capital cost of vehicles (80 percent); and
- Maintenance cost eligible for reimbursement at the capital rate (80 percent).

Or

- Capital Cost of Contracting for a turnkey contract (50 percent of 80 percent).

The Congestion Mitigation and Air Quality program may be a source of operating funds for Option 4 service and vehicles. The CMAQ program provides a flexible funding source for transportation projects and programs to address air quality; the Federal Highway Administration and the FTA jointly administer the program. Funds are apportioned to State Departments of Transportation and MPOs. H-GAC administers CMAQ funds through several programs, including the Commute Solutions program, Clean Vehicles Program, and a new Pilot Transit Program. Evaluation criteria are established and administered by H-GAC and subject to Transportation Policy Council approval.

Three broad transit project categories are eligible for CMAQ funding including new transit service. CMAQ cannot be a permanent source of funding. The general guideline for determining eligibility is whether the agency expects an increase in transit riders and decrease in emissions.

Option 4 service must meet several general conditions to be eligible for operating assistance under the CMAQ program. Operating assistance can include all costs related to ongoing provision of new transportation services including, but not limited to, labor, administrative costs and maintenance.

Operating assistance is limited to new transit services and new or expanded transportation demand management strategies for a maximum of three years. CMAQ funding for operating costs is estimated at 70 percent in year one, and 50 percent in years two and three. CMAQ funding for capital costs is estimated at 50 percent of 80 percent of the federal share.

Local Match

All projects require a "local match" to leverage federal funds. The normal matching ratio for capital projects is 80 percent federal, 20 percent "local match." Operating grants have a 50/50 ratio and if eligible, are limited.

One potential source of local match is Transportation Development Credits (TDCs). States earn TDCs from the federal government when states use local and state funds to develop, construct, implement, improve, or maintain toll facilities. TDCs are a credit, not cash, so a federal project that uses TDCs as match effectively becomes 100 percent federally funded.

Phase 1 financial projections included the hourly rate ($60.24) for a FBC Transit Contractor owned vehicle, operated by the contractor. All dollars are 2013 dollars. Phase 2 financial projections include many scenarios with the FBC Transit hourly rate (49.54). In Phase 2, researchers analyzed five scenarios (A-E) to estimate service costs and local share requirements given different funding scenarios. The following service assumptions are the same for all five scenarios. Researchers list any other varying assumptions in Table 19 under the respective scenario.

Table 19. Service Assumptions used in Financial Scenarios

Vehicle Type	32 passenger bus
Peak vehicles used	28
Inbound trip length	23 miles
Inbound service trips	56
Outbound trip length	24 miles
Outbound service trips	57
Service miles per day	2,679
Service hours per day	150

Source: TTI Analysis

Operating and Capital Cost Scenarios for Service

Researchers analyzed five scenarios within funding source constraints shown in Table 20. Depending on assumptions about eligible funding from FTA formula funds or CMAQ, researchers estimate FBC Transit operated commuter service requires an annual local match between $296 thousand (highest federal contribution) and $3.2 million (lowest federal contribution), including vehicles and the short-term park and ride facility lease. [2]

[2] Excludes long-term park and ride facility

Table 20. Summary Operating and Capital Cost Over Five Years

	SCENARIO A		SCENARIO B		SCENARIO C		SCENARIO D		SCENARIO E	
ASSUMPTIONS										
Basis for Operating Cost	FBC provides Vehicles		FBC provides Vehicles		Contractor Operated/Vehicles		Contractor Operated/Vehicles		Contractor Operated/Vehicles	
CMAQ Operations	70% Year 1, 50% Years 2 & 3		70% Year 1, 50% Years 2 & 3		70% Year 1, 50% Years 2 & 3 after 5307/Capital Cost of Contracting (CCC)		$0		70% Year 1, 50% Years 2 & 3	
CMAQ Capital	50% of 80% of vehicle		$0		$0		$0		$0	
Section 5307 Capital	50% of 80% of vehicle		80% of vehicle		CCC 80% of 50% of operating		CCC 80% of 50% of operating		$0	
	Dollars	**%**	**Dollars**	**%**	**Dollars**	**%**	**Dollars**	**%**	**Dollars**	**%**
Total Operating Cost	$9,911,000		$9,911,000		$11,800,000		$11,800,000		$11,800,000	
Vehicle Capital Purchase	$4,964,000		$4,964,000		$0		$0		$0	
TOTAL COST	**$14,875,000**		**$14,875,000**		**$11,800,000**		**$11,800,000**		**$11,800,000**	
Total FBC Local Share	$2,907,800	19.5%	$2,907,800	19.5%	$296,000	2.5%	$716,000	6.1%	$3,204,000	27.2%
Fares	$6,825,000	45.9%	$6,825,000	45.9%	$6,825,000	57.8%	$6,825,000	57.8%	$6,825,000	57.8%
Total CMAQ	$3,156,600	21.2%	$1,171,000	7.9%	$420,000	3.6%	$0	0.0%	$1,771,000	15.0%
Total Section 5307	$1,985,600	13.3%	$3,971,200	26.7%	$4,259,000	36.1%	$4,259,000	36.1%	$0	0.0%
TOTAL REVENUE	**$14,875,000**	100%	**$14,875,000**	100%	**$11,800,000**	100%	**$11,800,000**	100%	**$11,800,000**	100%

Source: TTI Analysis

PHASE 3 RESEARCH

PHASE 3 OBJECTIVES

TTI will continue to provide technical assistance and stakeholder facilitation to the Working Group for additional tasks as needed, beginning February 2014. Additional tasks may include:

- Develop a phased implementation plan
- Expand financial plan for costs including: vehicles, park and ride, and maintenance facility
- Develop financial plan for layover locations
- Determine additional research needs for advertising revenue potential
- Research alternative fueled vehicles