DEVELOPMENT OF TRANSIT CORRIDORS
MPO TRANSIT STUDY

TECHNICAL MEMORANDUM

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BACKGROUND

In November 2006, the Hillsborough County Metropolitan Planning Organization (MPO) commenced the MPO Transit Study to assess transit service needs in Hillsborough County in the context of mobility, economic vitality and overall quality of life. Through public participation, it is intended that the study will articulate a transit vision for the county that encompasses a range of transit technologies serving activity centers and future regional transit connections.

Study findings and recommendations will be considered during the MPO Long Range Transportation Plan update. They will support updates to local government comprehensive plans and the Hillsborough Area Regional Transit (HART) Transit Development Plan, and will influence Tampa Bay Area Regional Transportation Authority (TBARTA) plans.

This technical memorandum describes the methodology for the selection of potential transit corridors and of the appropriate technology for each. A previous technical memorandum, *Transit Technology Review,* described a range of passenger transit technologies that are appropriate for the travel markets in Hillsborough County, and described the general operating characteristics of each mode. Potential transit corridors and alternative future land use concepts will be evaluated together with a set of measures of effectiveness to help determine which corridors and transit modes have the greatest potential for improving mobility in the area.

DEVELOPMENT OF POTENTIAL TRANSIT CORRIDORS

Transit corridors were identified using a variety of sources including prior and concurrent studies, an analysis of current and future land use patterns, and identification of existing transportation corridors. Prior and concurrent transit studies include:

- Iorio: Mass Transit for the Future of the Tampa Bay Region (2006)
- Strategic Regional Transit Needs Assessment (2006)
- Tampa Bay Intermodal Center (s) PD&E Study (2005)
- HART Transit Emphasis Corridors and Bus Rapid Transit Framework Plan (2005)
- HART BRT Project (2007)
- Florida High Speed Rail Authority Report to the Governor and Legislature and Tampa to Orlando High Speed Rail Environmental Impact Statement (2004)
- 2025 Long Range Transportation Plans, West Central Florida and Hillsborough (2004)
- Tampa Rail Project Environmental Impact Statement (2002)
- 2025 Long Range Transportation Plan (2001)
- 2020 Long Range Transportation Plan (1998)

- Regional Commuter Rail Feasibility Study (1993)
- Tampa Bay Commuter Rail Development Plan (1992)

Figure 1 displays the potential corridors determined from those prior and concurrent studies.

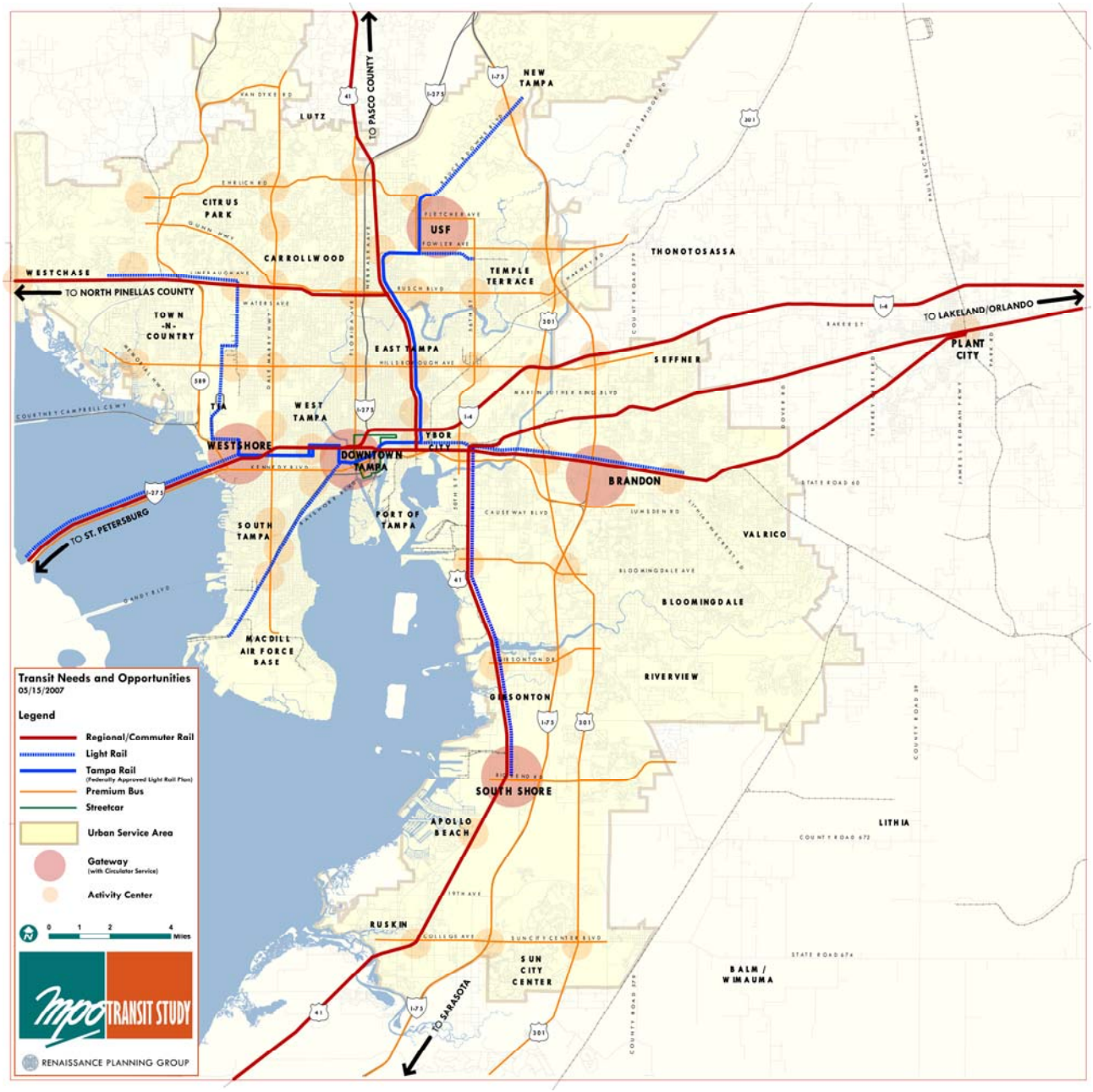

Figure 1 - Potential Corridors

An analysis of current and future expected land use patterns was also used to identify potential transit corridors. Population and employment densities by Transportation Analysis Zone (TAZ) were plotted for years 2000, 2010, 2020, and 2030 from data provided by the Hillsborough County MPO. This data was trended out to 2050, the horizon year for this study.

Major activity centers were identified from that land use density data and knowledge of the area. Major activity centers represent areas of significant volumes of person trips, volumes that transit can serve most effectively. Major activity centers include significant concentrations of population and/or employment, airports, sports venues, and major tourist attractions. The following general or specific major activity centers were identified:

Population and Employment Centers

Tampa CBD, Westshore, USF, and Brandon

South Tampa, West Tampa, East Tampa, and Ybor City

SouthShore, Plant City, and Westchase

Special Generators

Tampa International Airport (TIA), Raymond James Stadium, and Busch Gardens

Regional Connectivity

St. Petersburg via Howard Franklin or Gandy Bridge; North Pinellas County, north to Pasco County, east to Lakeland, and south toward Sarasota

Available rights-of-way within existing transportation corridors were overlaid on the plots of land use densities and corridors identified from prior and concurrent studies. Transportation corridors include highways with sufficient median for a double track rail line or railroads that could potentially support commuter rail operations or have sufficient right-of-way for light rail adjacent to the tracks (although some property acquisition may be required in locations of restricted right-of-way). Identified transportation corridors include the following:

Highway

I-4 from Tampa CBD east to county line

I-275 from Tampa CBD west to Pinellas County

Railroad

CSX SR Line from Tampa CBD north to Pasco County

CSX SY Line from North Tampa west to Westchase and North Pinellas County

CSX A Line from Tampa CBD south to South Tampa

CSX S Line from Tampa CBD through Brandon to Plant City

CSX AZA Line south to SouthShore

Together, the land use patterns, alignments identified in prior and concurrent studies, and existing transportation corridors provide reasonably clear direction for identifying potential transit corridors in the Tampa metropolitan area. All major activity centers are served by existing rail or highway corridors or by alignments identified by other studies. The primary transit corridors can be described as follows:

From the Tampa CBD:

1. Southwest to South Tampa
2. West through Westshore to St. Petersburg
3. Northwest through Westshore and TIA to Westchase and North Pinellas County
4. North to USF, with potential branch to Pasco County
5. East through Brandon to Plant City (with regional connection to Lakeland), and
6. South to SouthShore (with regional connection to Sarasota/Manatee)

Because this is a joint land use and transportation study, alternative land use scenarios were tested. Those are described in a separate document *CorPlan Land Use Analysis Technical Memorandum*.

SELECTION OF APPROPRIATE TRANSIT TECHNOLOGY FOR EACH CORRIDOR

To facilitate the selection of an appropriate transit mode for each corridor, potential alignments were separately identified for each mode, as shown in Figures 2 through 4. Criteria for the selection of potential corridors for each mode was based on available rights-of-way and the operating characteristics of each mode, described in the next section.

Light Rail Transit – Figure 2

Light Rail best serves medium to high density corridors with station spacing of ½ to 1 mile. Potential Light Rail corridors for this study follow either existing railroad or highway corridors or alignments identified in prior studies. Where they follow railroads, the light rail tracks area assumed to be located adjacent to the railroad tracks. Where in interstate highways, the light rail is assumed to be located within the median. Where located within arterial streets, the alignment may be located within the median or operate in mixed traffic on shared lanes. Potential Light Rail corridors include:

From downtown Tampa:

- South to South Tampa
- West through Westshore to St. Petersburg
- Northwest through Westshore and TIA to Westchase and North Pinellas county
- North to USF, and
- East to Brandon

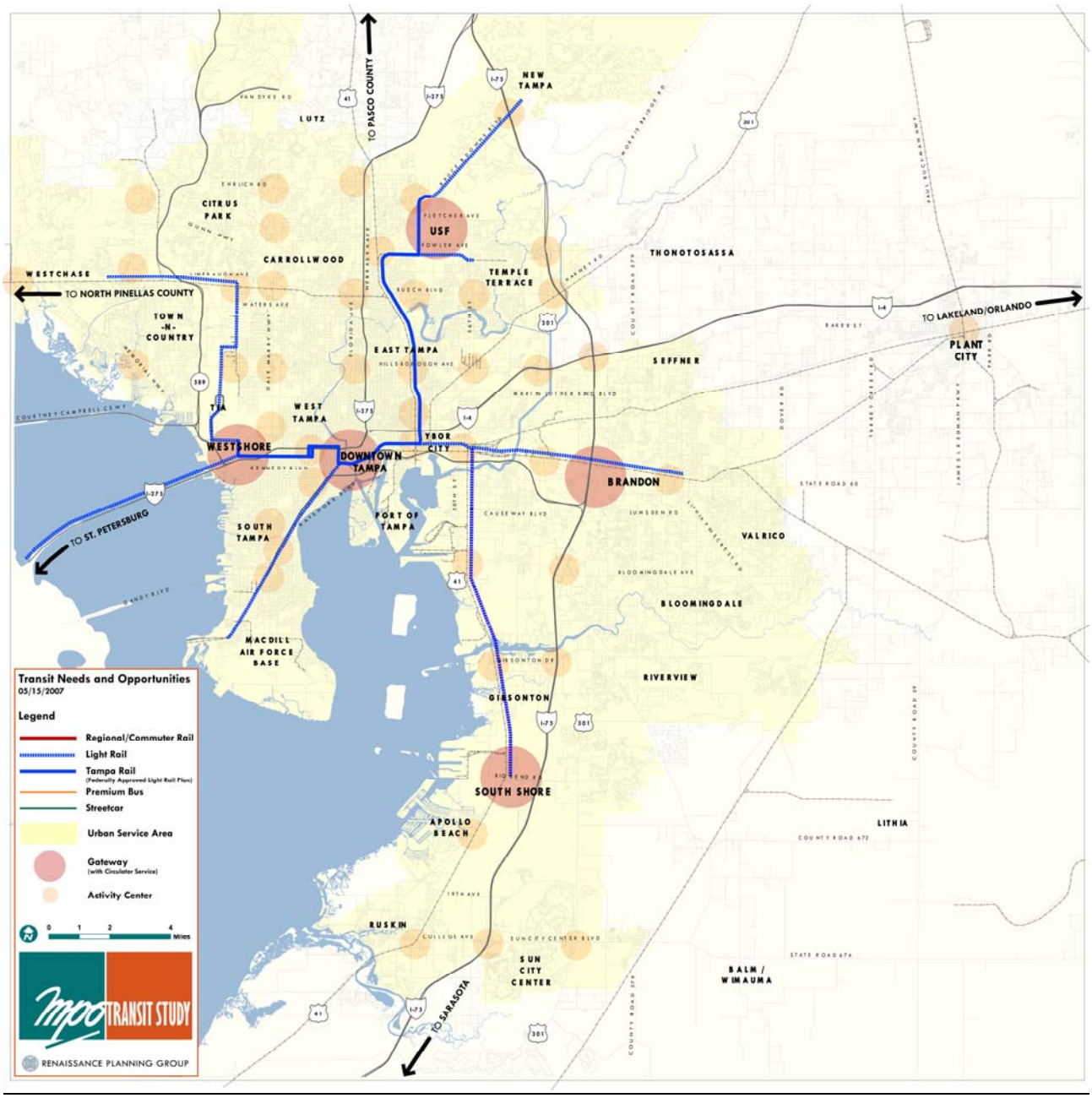

Figure 2 – Potential Light Rail Transit Corridors

Commuter Rail Transit – Figure 3

Commuter rail best serves outlying communities with a central business district, with a station spacing of 2-3 miles. Regional rail describes service connecting larger communities within a region, and was also included in this study under the banner of commuter rail with the understanding that Hillsborough County exists within the larger region.

To maintain reasonable capital costs, all potential commuter rail alignments follow existing railroad lines and are assumed to operate on the same tracks as freight service. The one exception is east along I-4 which was identified in the Tampa to Orlando High Speed Rail Environmental Impact Statement (2004) as the preferred alignment for a regional rail system connecting Tampa with Orlando. Potential commuter rail corridors include:

- Northwest to Westchase and North Pinellas County
- North through North Tampa to Pasco County
- East along three routes:
  - I-4 to Lakeland
  - CSX A Line to Plant City and Lakeland
  - CSX S Line through Brandon to Plant City and Lakeland, and
- South to SouthShore and Sarasota

Bus Rapid Transit – Figure 4

Bus Rapid Transit comes in several forms, from express bus using off-board fare collection, new stop amenities, and new buses, to larger, articulated buses operating on new dedicated exclusive guideway providing a ride comparable to light rail. The majority of BRT systems in this country fall near the middle of the range, although there are good examples at both ends of the spectrum.

The majority of BRT lines proposed for Tampa in other studies, most notably the BRT Framework Plan conducted by HART, comprise express buses using new vehicles, upgraded stations, and better branding. Station spacing is similar to light rail at ½ to 1 mile. Potential BRT corridors include:

- North-South along Florida Avenue
- North-South along Dale Massey Highway to Kennedy Boulevard to CBD
- North-South along US 301 North to CBD
- North-South along US 301 South to CBD
- East-West along Hillsborough Avenue
- East-West along I-4

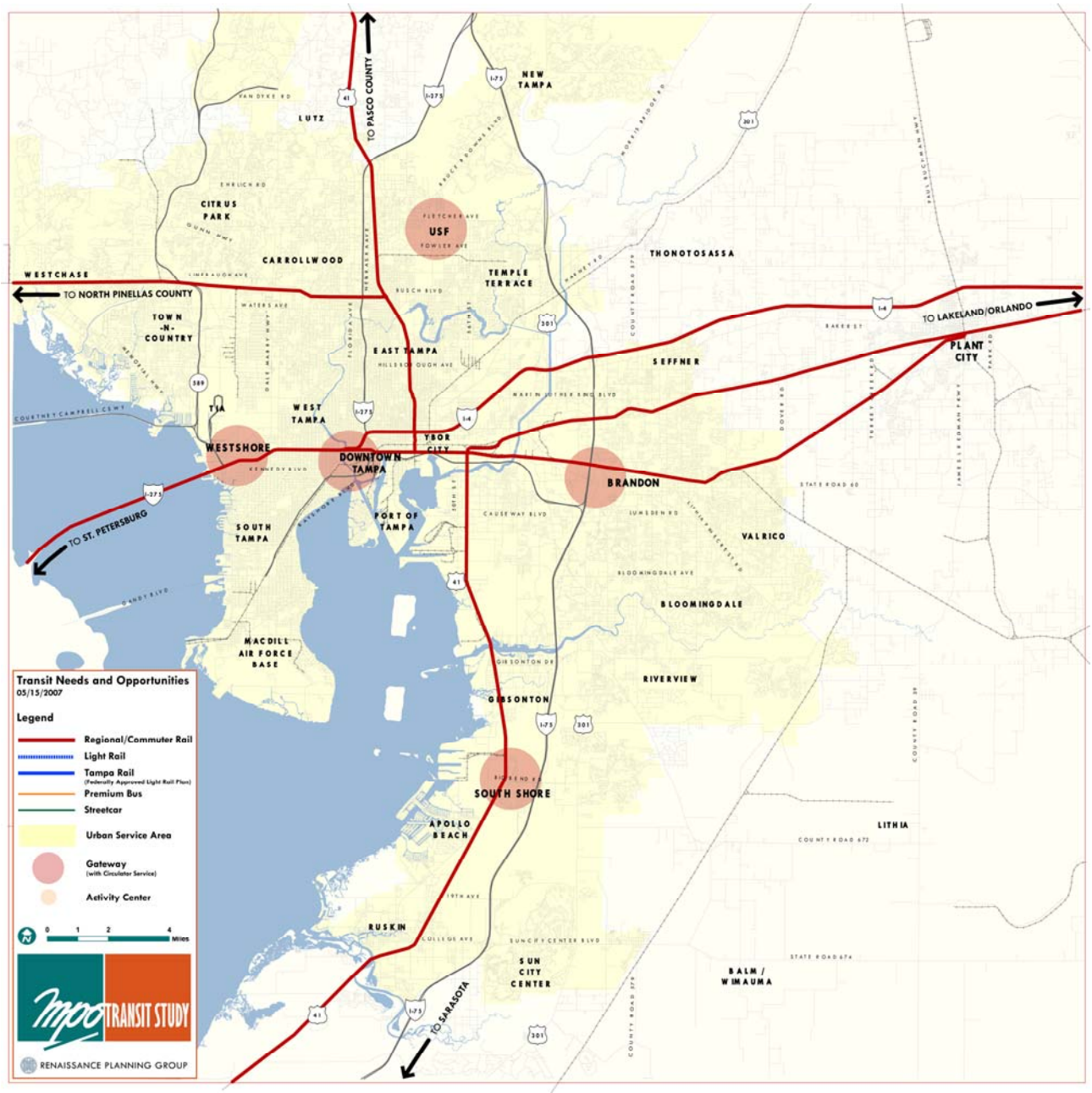

Figure 3 – Potential Commuter Rail Transit Corridors

Figure 4 – Potential Premium Bus Transit Corridors

Selection of Most Appropriate Mode for Each Corridor

As described in the companion memorandum *Transit Technology Review,* the selection of a passenger technology for a corridor and related track/alignment design criteria is typically based on several interrelated factors, including:

- Type of passenger service to be provided: urban transit, commuter, or regional. What market is being served?
- Expected ridership
- Desired passenger loadings: are standees allowed?
- Desired service frequency: is there a minimum frequency of service
- Desired speed or travel time between major activity centers
- Station spacing
- Station design: platform length and height; will there be feeder bus?
- Alignment constraints
- Freight traffic on commuter and regional rail operations, and
- Cost

The final selection of transit vehicle technology and design criteria will likely be a compromise of these elements as the operating agency strives to provide the best service at a reasonable cost relative to the market being served. As more planning and engineering is performed, the greater level of detail will define the constraints within which the technology and criteria must fall within. Some technologies will then be viewed as inappropriate. Table 1 provides a summary of the characteristics of different transit modes.

Table 1: MPO Transit Study: Summary of Mode/Technology Characteristics

Mode	Vehicle/ Consist Capacity	Service Configuration	Average Travel Speed	Typical Peak Period Headways	Average Station Spacing	Typical Infrastructure Unit Cost (excluding r/w)	Typical Vehicle Unit Cost (per vehicle)	Operating / Maintenance Costs*
Local Bus	50 / 70	Line service on city streets	10 - 15 mph	3 – 30 min	2 – 4 blocks	Runs on existing streets	$350,000 - $600,000 per vehicle	$5 - $9 per vehicle revenue mile
Bus Rapid Transit	75 / 150	Urban trunk line service on major routes	15 – 25 mph	3 – 10 min	¼ – 1 mile	$1M - $85M per mile Avg = $23M	$0.5M - $1M per vehicle	$3 - $10 per vehicle revenue mile
Commuter Bus	40	Radial Service to CBD on expressways	30 – 50 mph	30 – 60 min	Selected stops at each trip end	Runs on existing streets	$400,000 - $500,000 per vehicle	$8 - $9 per vehicle revenue mile
Light Rail Transit	100 - 200	Urban trunk line service on major routes	15 – 25 mph	5 – 10 min	¼ – 1 mile	$28M - $100M per mile avg=$42M	$2M - $4M per vehicle	$14 per vehicle revenue mile
Commuter Rail (Diesel Push-Pull)	200 / 1800	Radial service connecting suburbs to CBD	25 – 50 mph	20 – 40 min	2 – 5 miles	$15M - $35M per mile	$2M- $4M per Car and $4M - $6M per Locomotive	$11 - $12 per vehicle revenue mile
Commuter Rail (Electrified)	200 / 1800	Radial service connecting suburbs to CBD	25 – 50 mph	20 – 40 min	2 – 5 miles	$25M - $45M per mile	$2M - $4M per vehicle	$12 - $16 per vehicle revenue mile
Regional/Commuter Rail (DMU)	200 / 1800	Connecting suburbs to suburbs or suburbs to CBD	25 – 50 mph	20 – 40 min	5 – 20 miles	$15M - $35M per mile	$2M - $4M per vehicle	$7.00 per vehicle revenue mile

Source: National Transit Database, PB, and various transit agencies

** 2007 dollars*

Note: capital costs vary widely by the specific characteristics of each corridor and the amount of aerial structure and tunnel.

For this study, an appropriate technology was selected for each corridor for the purpose of travel demand modeling. The selection, shown in Figure 5, was based on the criteria above as described below:

From the Tampa CBD:

1. Southwest to South Tampa – Light rail was selected for this corridor because of the relatively short distances. Commuter rail could possibly work if combined with a run-through operation with service on the east side, such as the Plant City service, but there is room on the west side of the existing CSX track for a double-track light rail line. Frequent service and ease of boarding offered by light rail will be more attractive to passengers.
2. West through Westshore to St. Petersburg – Light rail is appropriate for this corridor because of light rail's ability to accommodate tight curves and steep grades, both necessary to transition between downtown Tampa to I-275. Light rail was also selected because of this corridor's connection with the next corridor through TIA to Westchase. Light rail is the only rail mode suitable for running through the airport. Light rail was also selected because of its vehicle capacity, necessary to meet the expected passenger demands in this corridor.
3. Northwest through Westshore and TIA to Westchase and North Pinellas County – Light rail was selected because of its ability to accommodate tight curves and steep grades, both necessary to traverse the airport terminal area and the streets within the Westshore area. Light rail was also selected because of its vehicle capacity, necessary to meet the expected passenger demands in this corridor.
4. North to Pasco County – Commuter rail is appropriate for this corridor because of an existing rail line and passenger volumes are not expected to be as high as in other areas.
5. North to USF – Light rail was selected because of its ability to accommodate tight curves and steep grades, both necessary to traverse the alignment through the university campus area. Light rail was also selected because of its vehicle capacity, necessary to meet the expected passenger demands in this corridor.
6. East through Brandon to Plant City (with regional connection to Lakeland) – both light rail and commuter rail were selected for this corridor. Light rail extends only through Brandon, with frequent station spacing to serve area residences and businesses. Commuter rail extends out to Plant City and possibly east to serve outlying areas and to provide the regional rail connectivity. Only a few commuter rail stations would be built between Brandon and downtown Tampa to provide connections with the Brandon area. The CSX "S" Line was selected as the preferred commuter rail corridor (vs. the "A" Line) because of its proximity to higher density development.

7. South to SouthShore (with regional connection to Sarasota) – Commuter rail is appropriate for this corridor because population and employment densities are concentrated in distinct and relatively distant areas. Passenger volumes are not expected to be as high as in other areas to warrant light rail. Premium bus along I-75 is also being considered, but may prove redundant.
8. The BRT routes are all included to augment the fixed rail routes.

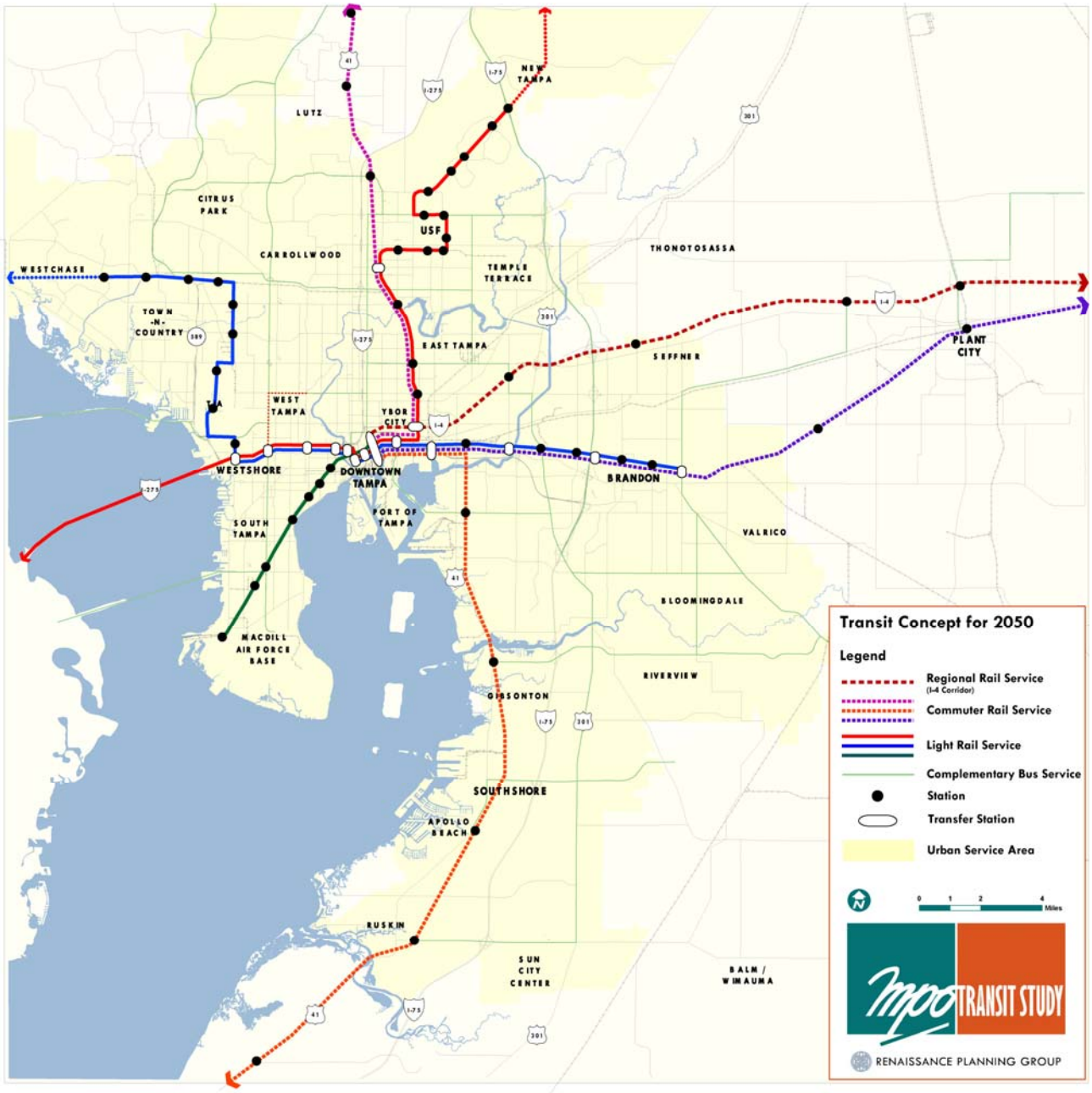

Figure 5 – Preferred Scenario for 2050

Operating Characteristics of Transit Corridors

Based on expected land use densities and travel patterns, the following transit routes and frequencies are suggested. These were used for the travel demand modeling. When each line is actually designed and constructed, more rigorous analysis of passenger volumes and operating costs will be conducted to derive more suitable frequencies if appropriate.

Express Bus

Corridor/ Line Termini	Peak Headway	Base Headway	Evening Headway	Average Speed
Florida Ave. Corridor USF to CBD	10 min	12 min	15 min	9 mph in CBD 13-18 mph outside CBD
Hillsborough Ave. Corridor Town and Country to Seffner	10 min	12 min	15 min	same
Dale Massey Hwy Corridor Lutz Lake Fern Rd., Dale Massey Hwy, Kennedy Blvd. to CBD	15 min	20 min	15 min	Same except 18-25 exurban
US 301 South Corridor Sun City Center to CBD via US 301, SR 618 (Crosstown Exy) to Morgan St.	15 min	20 min	15 min	Same except 50 on highway
US 301 North Corridor McIntosh Rd, US 301, I-4, Ashley Dr. to CBD	15 min	20 min	15 min	Same except 50 on highway
I-4 Corridor Plant City to CBD via I-4, Ashley Dr.	15 min	20 min	15 min	Same except 50 on highway

Light Rail Transit

Line Termini	Peak Headway	Base Headway	Evening Headway	Average Speed
Tampa Int. Airport to USF spur	15 min	20 min	30 min	10 mph in CBD
Westchase to New Tampa	15 min	20 min	30 min	15-20 mph outside CBD
St. Petersburg to Brandon	10 min	12 min	15 min	same
MacDill AFB to CBD	10 min	12 min	15 min	same

Commuter/Regional Rail

Line Termini	Peak Headway	Base Headway	Evening Headway	Average Speed
Pasco Co to CBD (1-way)	30			26 mph near CBD 33 mph outside CBD *Assumes 2-3 mile station spacing*
N. Pinellas Co to CBD (1 way)	30			
Lakeland to Tampa CBD (2-way)	30	60		
Sarasota to Tampa CBD (2-way)	30	60		