CONTENTS

1.0 Corridor Overview ........................................................................................................ 2

2.0 Alternatives .................................................................................................................. 3

   2.1. Evaluation Criteria .................................................................................................. 4

   2.2. Alternatives Description and Evaluation .................................................................. 8

   2.3. Alignment Options Received During Scoping .........................................................15

3.0 Findings ........................................................................................................................ 27

   3.1. Final Alternatives ..................................................................................................28

4.0 Other Issues: .................................................................................................................32

   4.1. Vehicle Technology Evaluation ........................................................................... 33

   4.2. Operations .............................................................................................................37

5.0 Conclusion .....................................................................................................................38

FIGURES

Figure 1: Corridor Overview ............................................................................................ 2

Figure 2: Initial Alternatives ............................................................................................ 6

Figure 3: Suggested Alternatives ..................................................................................... 7

Figure 4: Alternatives 1 and 1a ...................................................................................... 8

Figure 5: Alternatives 2 and 2a ......................................................................................10

Figure 6: Alternative 3 ......................................................................................................12

Figure 7: Alternative 4 .....................................................................................................13

Figure 8: Alternative 5 .....................................................................................................14

Figure 9: Alternative S-6 ..................................................................................................15

Figure 10: Alternative S-7 ..............................................................................................17

Figure 11: Alternative S-8 ...............................................................................................18

Figure 12: Alternative S-9 ...............................................................................................19

Figure 13: Alternative S-10 .............................................................................................21

Figure 14: Alternative S-11 .............................................................................................22

Figure 15: Alternative S-12 .............................................................................................24

Figure 16: Alternative S-13 .............................................................................................24
TABLES

Table 1: Alternatives Evaluation Matrix .................................................................31
Table 2: Transit Technology Evaluation Matrix .......................................................35
EVALUATION OF ALTERNATIVES IDENTIFIED THROUGH SCOPING

1.0 Corridor Overview

The US 90A/Southwest Rail Corridor study area, as shown in Figure 1, is defined as beginning at South Gessner Road/FM 2234 and US 90A and generally extending northeast to the southern terminus of the existing METRORail Red Line at Fannin South Station then extending north through the Texas Medical Center (TMC) to the Wheeler Station. Maps showing study area land use and public and private property ownership can be found in Attachment A.

Figure 1: Corridor Overview

A preliminary list of transportation deficiencies in the corridor was identified and presented for discussion at the scoping meetings. The primary deficiencies identified were:

- Lack of transit connections between US 90A/Southwest Rail Corridor residential areas and major activity centers along the corridor and throughout the region,
- Traffic congestion,
- Lack of access and mobility within the corridor constrains economic development,
- Slow bus speeds due to operating in mixed traffic,
- Population and employment growth anticipated to exacerbate the problems described above.

Participants at the scoping meetings were given the opportunity to comment on these needs and to provide potential transit alternatives to respond to the needs.

As METRO addresses these corridor issues, proposed transit improvements must be examined in an equitable manner, consistent with community values and federal requirements. All potentially significant environmental impacts will be addressed, with a focus on avoiding disruption to neighborhoods, commercial districts, and historic areas.

### 2.0 Alternatives

A set of initial alternatives were developed to address the deficiencies listed above. This initial list of conceptual alternatives, shown in Figure 2, was presented during the scoping process for the purpose of stimulating discussion with the public and stakeholders. The scoping process addresses the alternatives to be considered by the Draft Environmental Impact Statement (DEIS).

The initial alternatives spurred the public to suggest their own alternatives to serve the corridor (Figure 3). The alternatives received during scoping are indicated by an S, as in S-6. In addition to using US 90A as an alignment, suggestions were made to use adjacent thoroughfares and utility rights-of-way, such as power line easements and drainage facilities, to connect to neighborhoods in the corridor. A CenterPoint Energy transmission corridor runs parallel to US 90A for a portion of the corridor and crosses several thoroughfares and could be a potential alignment. Also, a Harris County Flood Control District (HCFCD) drainage ditch parallels a portion of the CenterPoint easement and could be buried to provide space for a transit guideway for Alternatives S-8 and S-12. Coordination with CenterPoint Energy and HCFCD would be required to determine the feasibility of these alignments.
2.1. Evaluation Criteria

All alternatives were evaluated with respect to the project Purpose and Need identified in Chapter 1 of the DEIS. Key aspects of the Purpose & Need include the following:

- Increase regional transit connectivity,
- Provide additional transit capacity in the corridor,
- Provide quick, direct transit service from Missouri City to the TMC,
- Accommodate future mobility needs to reduce congestion and improve air quality,
- Serve projected population and development in the corridor.

The initial set of alternatives, as well as the suggested alternatives that came from the scoping process, were screened using broad categories stated below:

2.1.1. Criteria:

- **Neighborhood Impacts** – What does it do to the neighborhood? Will it divide it? Would it cause safety concerns, and noise and vibration concerns? Will any neighborhood be disproportionately impacted?

- **Acquisitions/Displacements** – How much property will need to be acquired? How many and what type of displacements and relocations will result?
  - *Good*: less than 50 parcels to be acquired
  - *Fair*: between 50 parcels and 100 parcels to be acquired
  - *Poor*: greater than 100 parcels to be acquired

- **Property Access** – Would alignment impede property access or emergency vehicle access? How would driveways and intersections with limited turning movements affect neighborhoods?

- **Traffic Impacts** – How would alignment affect traffic? Would roadway capacity be reduced? Is there an increased potential for traffic conflicts?

- **Hazardous Materials Locations** – What type of land use existed on properties to be acquired? Did it include potential registered hazardous materials sites? Would construction require extensive mitigation of contaminated sites? Are there contaminated sites that limit the ability of an alternative to improve mobility?

- **Direct Service to TMC** (i.e. one-seat ride) – Does the alignment allow for express trips? Would differing technologies cause a transfer? Would a transfer slow trip time?

- **Travel Time to TMC Competitive with Peak Hour Auto Traffic** – The 2035 peak period automobile travel time from Missouri City to the TMC is projected to be approximately 30 minutes. Could the proposed transit service meet travel times comparable to autos? Would numerous stations slow trip? How would reduced speed limits and numerous traffic signals affect travel times of street-running rail?
o Good: less than 27 minutes
o Fair: between 27 minutes and 30 minutes
o Poor: greater than 30 Minutes

- **Public Support for an Express Trip Between Missouri City and TMC vs. Service to Neighborhoods in the Corridor** (limited stops) – The western extent of the study area expressed a desire for quick trips to the TMC and the center of the corridor did not want the preferred alternative passing through their neighborhood without the ability to use it. Are there a sufficient number of proposed stations to serve the corridor without compromising travel times?

- **Impacts to Wetlands and Floodplains** – Are there any wetlands or floodplains in the alignments of the alternatives being examined?

- **Economic Development Opportunities** – The potential for each alignment to help promote development and redevelopment will be examined on a comparative basis. Ease of access, available land, and proximity to commercial and residential areas are factors that could support transit-oriented development.

- **Capital Cost** – The relative costs of the alternatives will be evaluated by comparing cost drivers along the alignments such as right-of-way, utilities relocations (water, wastewater, storm sewer), roadway reconstruction, and bridge structures.
  o Good: less than $45 million/mile
  o Fair: between $45 million/mile and $90 million/mile
  o Poor: greater than $90 million/mile

Environmental categories that differentiate the alternatives were used to screen the alternatives. The alignments of most of the alternatives were in, or adjacent to, existing rights-of-way where the ground had been disturbed and development had occurred. As a result, some evaluation criteria, such as threatened and endangered species, cultural resources, and air quality would not be significantly different between alternatives. Each of these resource areas will be examined in more detail on the final alternative(s) carried forward in the DEIS.

Right-of-way acreage estimates are order-of-magnitude for comparative purposes and are subject to change with more refined analysis.

Transportation, resource, and regulatory agencies were consulted during scoping for input on the initial set of alternatives and any concerns of which they may be aware in the corridor. Subsequent to scoping, the agencies were consulted for their concerns with the alternatives that were suggested during the scoping phase. The Texas Department of Transportation (TxDOT), Union Pacific Rail Road (UPRR), and CenterPoint Energy have expressed objection to sharing their rights-of-way or easements with METRO at either the scoping meetings (TxDOT and UPRR) or in a letter (CenterPoint). Harris County Flood Control District, Harris County Toll Road Authority, and Texas Parks & Wildlife have also been consulted regarding the alternatives.
Figure 3: Suggested Alternatives

[Map showing suggested alternatives with various lines and markers indicating different routes.]

Sources: METRO, 2011; HDR Engineering, Inc., 2011
2.2. Alternatives Description and Evaluation

2.2.1. Initial Alignments Taken Into Scoping

ALTERNATIVE 1: North of UPRR through Buffalo Point – Starting in the vicinity of Cravens Road, this light rail transit (LRT) alternative would run adjacent to the northern edge of the Union Pacific Railroad (UPRR) right-of-way and south of the properties to the north. Approximately 50 acres of right-of-way would need to be acquired (88 percent from private property). The tracks are elevated over both legs of the UPRR junction on either side of Main Street. At Buffalo Speedway the alignment turns north and runs through the future Buffalo Point (formerly Buffalo Lakes) development. At W. Bellfort Road, it turns east into the median of W. Bellfort Road to Fannin Street, where it turns north to connect to the existing METRORail Red Line. Stations could be located at Cravens, Hillcroft (or Chimney Rock), S. Post Oak, in the Buffalo Point development, and Fannin South Park & Ride (P&R). Parking would be proposed at all stations.

Figure 4: Alternatives 1 and 1a
Pros
- Right-of-way adjacent to UPRR takes advantage of existing profile and grade crossings, limiting access,
- Transit-oriented development possible with Buffalo Point,
- Buffalo Point development would provide space to accommodate tracks and station,
- Lower travel time compared to other alternatives (26 minutes),
- Low capital costs relative to other alternatives (less than $45 million/mile).

Cons
- High number of properties affected for right-of-way (110 parcels), including 52 homes in Westbury South, full versus partial acquisitions in Westbury to be determined,
- Alignment would run for a short distance on W. Bellfort, possibly causing traffic impacts,

ALTERNATIVE 1a: Alternative 1 with the Hillcroft/Airport option - An option to Alternative 1 is to divert northward into the median of Hillcroft to Airport Blvd. where the alignment would turn onto Airport, extending down the median of Airport and across Chimney Rock where it would cross undeveloped land to return to run adjacent to the north side of UPRR (Figure 4). This option avoids the Westbury South properties adjacent to the UPRR and reduces the additional right-of-way needs by 5 acres of private property. Less than one acre of right-of-way would be needed on the northwest corner of the US 90A/Hillcroft intersection and the southeast corner of the Hillcroft/Airport intersection for the turn radii at those intersections and for the tracks from Chimney Rock to UPRR. A station without parking could be possible on either Hillcroft or Airport.

Pros
- Avoids impacts on Westbury South homes,
- Reduced right-of-way impacts (58 parcels),
- Sufficient right-of-way on Hillcroft & Airport for the alignment in the median,
- Medium capital costs relative to other alternatives (between $45 million/mile and $90 million/mile).

Cons
- Neighborhood wants to preserve the Hillcroft median as a park/garden,
- Mature trees in median of Airport Blvd. impacted,
- Additional right-of-way would be needed for turn at corner of Hillcroft and Airport Blvd.,
- City of Houston concerned with traffic impacts at major intersections (5 intersections),
- High travel time from street running section and tight turns (31 minutes).
ALTERNATIVE 2: North of UPRR to Fannin – Starting in the vicinity of Cravens Road, this LRT alternative would run adjacent to the northern edge of the UPRR right-of-way and the southern edge of the properties to the north. The tracks are elevated over both legs of the UPRR junction located on either side of Main Street. Approximately 65 acres of additional right-of-way would need to be acquired (91 percent private property). Stations could be located at Cravens, Hillcroft (or Chimney Rock), S. Post Oak, and Fannin South P&R. Parking would be proposed at all stations.

Figure 5: Alternatives 2 and 2a

Pros

- Right-of-way adjacent to UPRR takes advantage of existing profile and grade crossings, limiting access,
- Shorter, faster trip than most other alternatives (22 minutes),
- Low capital cost relative to the other alternatives (less than $45 million/mile).

Cons

- Right-of-way needs impacts 52 homes in Westbury South subdivision, full versus partial acquisition to be determined,
- Less street running than Alternative 1, but right-of-way needed from approximately 20 more parcels (128 total),
- Misses transit-oriented development and ridership potential of Buffalo Point development.
ALTERNATIVE 2a: Alternative 2 with the Hillcroft/Airport option - An option to Alternative 2 is to divert northward in the median of Hillcroft to Airport Blvd. where the alignment would turn onto Airport, extending down the median of Airport and across Chimney Rock where it would cross undeveloped land to return to run adjacent to the north side of UPRR (Figure 5). This option avoids the Westbury South properties adjacent to the UPRR and reduces the additional right-of-way needs by 5 acres of private property. Less than 1 acre of right-of-way would be needed on the northwest corner of the US 90A/Hillcroft intersection and the southeast corner of the Hillcroft/Airport intersection for the turn radii at those intersections and for the tracks from Chimney Rock to UPRR. A station without parking could be possible on either Hillcroft or Airport.

Pros
- Reduced right-of-way impacts (76 parcels),
- Avoid impacts on Westbury South homes,
- Fair travel time (27 minutes),
- Sufficient right-of-way on Hillcroft for the alignment in the median,
- Medium capital cost relative to the other alternatives. (Between $45 million/mile and $90 million/mile).

Cons
- Neighborhood wants to preserve the Hillcroft median as a park/garden,
- Mature trees in median of Airport Blvd. impacted,
- Additional right-of-way would be needed for turn at corner of Hillcroft and Airport Blvd.,
- City of Houston concerned with traffic impacts at major intersections (5 intersections),
- Moderate right-of-way impacts (76 parcels),
- Misses transit-oriented development and ridership potential of Buffalo Point development.

ALTERNATIVE 3: UPRR right-of-way – This commuter rail alternative begins in the vicinity of Cravens Road and US 90A and runs northeast within the UPRR right-of-way. The tracks are elevated over both legs of the UPRR junction located on either side of Main Street. At Fannin, it turns north to connect to Fannin South station and the existing METRORail Red Line. Stations could be located at Cravens, Hillcroft (or Chimney Rock), S. Post Oak, Fannin South P&R. Parking would be proposed at all stations.
Figure 6: Alternative 3

Pros
- Shorter, faster trip (22 minutes),
- Less right-of-way impacts (< 5 parcels).

Cons
- Rejected by UPRR in Agency Scoping meeting on February 14, 2011 (Scoping Results Report Appendix, pages 414-416),
- Would require Federal Railroad Administration (FRA) safety compliant vehicle that would not be able to interline with Red Line, requiring a transfer,
- High relative capital cost (greater than $90 million/mile).
ALTERNATIVE 4: Between UPRR and US 90A – This commuter rail alternative begins in the vicinity of Cravens Road and US 90A and runs northeast between the UPRR and US 90A, using right-of-way from both UPRR and the Texas Department of Transportation (TxDOT). Approximately 30 acres of right-of-way (87 percent from private property) would be needed to accommodate the guideway between the UPRR tracks and US 90A. At Buffalo Speedway the alignment becomes elevated and turns north over the existing UPRR tracks coming back to grade level through the future Buffalo Point development. At W. Bellfort Road, it turns east and follows W. Bellfort Road to Fannin Street, where connects to the existing METRORail Red Line. Stations could be located at Cravens, Hillcroft (or Chimney Rock), S. Post Oak, in the Buffalo Point development, and Fannin South P&R. Parking would be proposed at all stations.

Figure 7: Alternative 4

Pros
- Buffalo Point development would accommodate tracks and station,
- Transit-oriented development possible with Buffalo Point,
- Fair travel time (27 minutes).

Cons
- Right-of-way would be required from UPRR and/or US 90A (100+ parcels),
- Reconstruction of US 90A required, including overpasses,
- Pedestrian access to stations would be elevated or depressed, raising costs and potentially reducing ridership,
- High relative capital cost (greater than $90 million/mile).
ALTERNATIVE 5: South of US 90A – This LRT alternative begins in the vicinity of Cravens Road and US 90A and runs northeast along the south side of the US 90A right-of-way, requiring the acquisition of approximately 50 acres of right-of-way (86 percent from private property). At Buffalo Speedway the alignment becomes elevated and turns north over US 90A and the UPRR tracks coming back to grade level through the future Buffalo Point development. At W. Bellfort Road, it turns east into the median of W. Bellfort Road to Fannin Street, where it turns north to connect to the existing METRORail Red Line. Stations could be located at Cravens, Hillcroft (or Chimney Rock), S. Post Oak, in the Buffalo Point development, and Fannin South P&R. Parking would be proposed at all stations.

Figure 8: Alternative 5

Pros
- Would avoid neighborhood impacts on the north of US 90A,
- Fair travel time (27 minutes).

Cons
- Bounds US 90A on either side by tracks restricting access to adjacent properties,
- High number of acquisitions and displacements (130+ parcels and approximately 24 relocations),
- Extensive driveway modifications to replace lost access (141 driveways),
- Large number of at grade crossings would affect travel time,
Cons (continued)
- May require an access road south of the alignment, increasing cost and right-of-way impacts (6 additional parcels and 43 additional relocations),
- High relative capital cost (greater than $90 million/mile),
- Elevated option would be cost-prohibitive (approximately $175 million/mile).

2.3. **Alignment Options Received During Scoping**

**ALTERNATIVES-6 Chimney Rock option** — Starting in the vicinity of Cravens Road, this LRT alignment would run adjacent to the northern edge of the UPRR right-of-way and the southern edge of the properties to the north, requiring the acquisition of approximately 25 acres of right-of-way (100 percent from private property). At Chimney Rock the alignment turns northward to travel along the median of Chimney Rock to W. Bellfort. At W. Bellfort the alignment turns east to travel in the median of W. Bellfort to Fannin South station. Stations could be at Cravens, Hillcroft, Chimney Rock and Airport, W. Bellfort and S. Post Oak, W. Bellfort and Buffalo Speedway, and Fannin South. Parking would be proposed at all stations.

*Figure 9: Alternative S-6*
Pros

- Greater access to neighborhoods,
- Requires less additional right-of-way (75 parcels).

Cons

- Speed limits on city streets are lower than an exclusive guideway and numerous traffic signals would increase travel time (33 minutes),
- Concern with traffic impacts at major intersections (11 intersections),
- Increases route length by 0.6 miles,
- Additional station stops to serve neighborhoods, increases travel time,
- Additional right-of-way will be required at intersections and station locations,
- Impacts Westbury South neighborhood,
- High relative capital cost (between $45 million/mile and $90 million/mile).

**ALTERNATIVES-7  S. Post Oak option** – Starting in the vicinity of Cravens Road, this LRT alignment would run adjacent to the northern edge of the UPRR right-of-way and the southern edge of the properties to the north, requiring the acquisition of approximately 35 acres of right-of-way (83 percent from private property). At S. Post Oak the alignment turns northward to travel along the center of S. Post Oak to W. Bellfort. At W. Bellfort the alignment turns east to travel in the median of W. Bellfort to Fannin South station. Stations could be at Cravens, Chimney Rock, US 90A and S. Post Oak, S. Post Oak and W. Bellfort, W. Bellfort at Buffalo Speedway, and Fannin South. Parking would be proposed at all stations.
Figure 10: Alternative S-7

Pros
- Would avoid neighborhood impacts on the Greater access to commercial development,
- Requires less additional right-of-way (85 parcels).

Cons
- Speed limits on city streets are lower than an exclusive guideway and numerous traffic signals would increase travel time (32 minutes),
- Concern with traffic impacts at major intersections (10 intersections),
- Increases route length by 0.81 miles,
- Additional station stops to serve neighborhoods, increases travel time,
- Additional right-of-way will be required at intersections and station locations,
- Impacts Westbury South neighborhood,
- High relative capital cost (between $45 million/mile and $90 million/mile).
ALTERNATIVE S-8 Centerpoint easement option – Starting in the vicinity of Cravens Road, this LRT alignment would run adjacent to the northern edge of the UPRR right-of-way and the southern edge of the properties to the north. Approximately 50 acres of right-of-way would be needed (66 percent from private property). The alignment turns northward to travel along the CenterPoint easement parallel to the UPRR Terminal Subdivision. At W. Bellfort the alignment turns east to travel in the median of W. Bellfort to Fannin South station. Stations could be at Cravens, Hillcroft (or Chimney Rock), S. Post Oak, W. Bellfort and Buffalo Speedway, and Fannin South. Parking would be proposed at all stations.

Figure 11: Alternative S-8

**Pros**
- Less traffic impacts than other street running alignments.

**Cons**
- Speed limits on city streets are lower than an exclusive guideway and numerous traffic signals would increase travel time (30 minutes),
- Concern with traffic impacts at major intersections (6 intersections),
- Increases alignment length approximately 0.65 miles,
- High right-of-way impacts (104 parcels),
- Impacts Westbury South neighborhood,
- CenterPoint rejected the use of their easement (Sept. 9, 2011),
- METRORail has experienced voltage surges near high tension powerlines,
- High capital cost (greater than $90 million/mile).
ALTERNATIVE S-9 S. Main Option – Starting in the vicinity of Cravens Road, this LRT alignment would run adjacent to the northern edge of the UPRR right-of-way and the southern edge of the properties to the north, requiring the acquisition of approximately 45 acres of right-of-way (87 percent from private property). At S. Main the alignment turns northward to travel along the center of S. Main to W. Bellfort. At W. Bellfort the alignment turns east to travel in the median of W. Bellfort to Fannin South station. A station could be at Cravens, Hillcroft (or Chimney Rock), S. Post Oak, W. Bellfort and Buffalo Speedway, and Fannin South. Parking would be proposed at all stations.

Figure 12: Alternatives S-9 and S-9a

**Pros**
- Greater access to commercial development,
- Fair travel time (27 minutes).

**Cons**
- Speed limits on city streets are lower than an exclusive guideway and numerous traffic signals would increase travel time,
- Concern with traffic impacts at major intersections (5 intersections),
- Additional station stops to serve neighborhoods, increasing travel times,
- Additional right-of-way will be required at intersections and station locations,
- Impacts to Westbury South neighborhood,
- High relative capital cost (greater than $90 million/mile).
ALTERNATIVE S-9a. A variation of the S. Main option would continue northeast along S. Main from W. Bellfort to Greenbriar where it would interline with the METRORail Red Line to continue to the Smith Lands commuter lot and the TMC (Figure 12). There acreage of additional right-of-way would be the same. Stations could be at Cravens, Hillcroft (or Chimney Rock), S. Post Oak, Main at Kirby and Smith Lands station. Parking would be proposed at all stations.

**Pros**

- Greater access to neighborhoods,
- Lowest travel time of all alternatives (21 minutes).

**Cons**

- Additional right-of-way would be required at intersections and station locations,
- Concern with traffic impacts at major intersections (8 intersections),
- Challenging track geometry connecting to Red Line at Greenbriar,
- Traffic impacts to Old Spanish Trail (OST)/Greenbriar intersection,
- High relative capital cost (greater than $90 million/mile).

ALTERNATIVE S-10 Stella Link option – Starting in the vicinity of Cravens Road, this LRT alignment would run adjacent to the northern edge of the UPRR right-of-way and the southern edge of the properties to the north, requiring the acquisition of approximately 45 acres of right-of-way (87 percent from private property). At S. Main the alignment would turn north to continue in the center of S. Main to Stella Link where the alignment turns north to travel along the center of Stella Link to W. Bellfort. At W. Bellfort the alignment turns east to travel in the median of W. Bellfort to Fannin South station. Stations could be at Cravens, Hillcroft (or Chimney Rock), S. Post Oak, W. Bellfort and Buffalo Speedway, and Fannin South. Parking would be proposed at all stations.
Pros
- Greater access to neighborhoods,
- Requires less additional right-of-way.

Cons
- Speed limits on city streets are lower than an exclusive guideway and numerous traffic signals would increase travel time (29 minutes),
- Concern with traffic impacts at major intersections (6 intersections),
- High right-of-way impacts (104 parcels),
- Increases alignment approximately 0.6 miles,
- Impacts Westbury South neighborhood,
- Additional station stops to serve neighborhoods, increasing travel times,
- Additional right-of-way will be required along intersections and station locations,
- High relative capital cost (greater than $90 million/mile).
ALTERNATIVE S-11 Center of US 90A – Starting in the vicinity of Cravens Road, this LRT alignment would travel along the center of US 90A between the eastbound and westbound lanes to Fannin Street where it would exit the US 90A right-of-way via an elevated structure and touch down in the median of Fannin Street to travel to Fannin South station. The tracks are elevated over the Glidden subdivision of the UPRR tracks. Approximately 40 acres of additional right-of-way (90 percent from private property) would need to be acquired for the widening of US 90A. Stations could be located at Cravens, Hillcroft (or Chimney Rock), S. Post Oak, Fannin South P&R. Parking would be proposed at all stations. Stations would be elevated in the center of US 90A with aerial walkways to parking facilities since US 90A is a limited access freeway.

Figure 14: Alternative S-11
### Pros

- Avoids property access impacts,
- Following profile of US 90A avoids crossing traffic,
- Low travel time (22 minutes).

### Cons

- Not enough space in center of US 90A for guideway. Right-of-way would be required from UPRR or from property to the south of US 90A,
- Reconstruction of US 90A required, including overpasses,
- Access to stations would need to be elevated or depressed, raising costs and potentially reducing potential ridership,
- TxDOT rejected the concept at the Agency Scoping meeting on February 14, 2011 (Scoping Results Report Appendix, pages 426-427),
- High relative capital cost (greater than $90 million/mile).

**ALTERNATIVE S-12 CenterPoint Easement south of US 90A** – The proposed LRT alignment would run in the CenterPoint transmission easement parallel to US 90A and located approximately ¼ mile south of US 90A from Cravens Road in Missouri City to where the easement turns northward at Hiram Clarke Road. The alignment would follow the easement north to W. Bellfort similar to alternative S-8 where it would turn east to travel in the median of W. Bellfort to Fannin South station. Stations could be at Cravens Road, Fort Bend Toll Road, S. Post Oak, US 90A, W. Bellfort at Buffalo Speedway, and Fannin South. Parking would be proposed at all stations.
Figure 15: Alternative S-12

Pros
- Fewer property access impacts,
- Low traffic impacts,
- Requires less additional right-of-way (less than 5 parcels),
- Allows use of existing METRO facility (Missouri City P&R).

Cons
- CenterPoint has expressed written opposition to the use of their easement (letter dated September 9, 2011),
- In METRO’s experience, light rail near high tension powerlines has caused voltage surges,
- Conflicts with substations and with power lines at aerial crossings over railroad tracks,
- Longest alignment, high travel time (10 miles, 32 minutes),
- High relative capital cost (greater than $90 million/mile),
- Limited options for future extension into Fort Bend County.
ALTERNATIVE S-13 Hillcroft option – Starting in the vicinity of Cravens Road, this LRT alignment would run adjacent to the northern edge of the UPRR right-of-way and the southern edge of the properties to the north, requiring the acquisition of approximately 20 acres of right-of-way, all from private property. At Hillcroft the alignment turns northward to travel along the median of Hillcroft to W.Bellfort. At W. Bellfort the alignment turns east to travel in the median of W. Bellfort to Fannin South station. Stations could be at Cravens, Hillcroft and Airport, W. Bellfort and Chimney Rock, W. Bellfort and S. Post Oak, W. Bellfort and Buffalo Speedway, and Fannin South. Parking would be proposed at all stations.

Figure 16: Alternative S-13

Pros
- Greater access to neighborhoods,
- Requires less additional right-of-way (25 parcels),
- Avoids impacts Westbury South neighborhood.

Cons
- Speed limits on city streets are lower than an exclusive guideway and numerous traffic signals would increase travel time (33 minutes),
- Concern with traffic impacts at major intersections (13 intersections),
- Additional station stops to serve neighborhoods, increases travel time,
- Additional right-of-way will be required at intersections and station locations,
Cons (continued)

- Increases route length by 0.8 miles,
- High relative capital cost (between $45 million/mile and $90 million/mile).
3.0 Findings

Upon initial review, four alternatives were deemed to have characteristics that eliminated them from consideration for the following reasons:

- **Alternative 3** – UPRR Right-of-way
  - UPRR has stated that they do not have the capacity to share their right-of-way and rejected the concept at the agency scoping meeting on February 14, 2011.

- **Alternative 4** – Between UPRR and US 90A
  - Additional right-of-way would be needed to fit the guideway between the UPRR and US 90A. UPRR has indicated that their right-of-way is not available for transit use; therefore, right-of-way would have to be purchased to the south of US 90A and the roadway shifted southward to accommodate the guideway. This would require the reconstruction of US 90A, including overpasses,
  - Pedestrian access to stations would need to be elevated or depressed, raising costs and potentially reducing potential ridership.

- **Alternative S-11** – Center of US 90A
  - Additional right-of-way would be needed to fit the guideway in the center of US 90A. UPRR has indicated that their right-of-way is not available for transit use; therefore, right-of-way would have to be purchased to the south of US 90A and the east bound lanes shifted southward to accommodate the guideway. This would require the reconstruction of the US 90A eastbound lanes, including overpasses,
  - Pedestrian access to stations would need to be elevated or depressed, raising costs and potentially reducing potential ridership,
  - TxDOT has expressed opposition to this alternative (Agency Scoping meeting, February 14, 2011).

- **Alternative S-12** – CenterPoint easement south of US 90A
  - CenterPoint has expressed written opposition to the use of their easement (letter dated September 9, 2011),
  - In METRO’s experience, light rail near high tension powerlines has caused voltage surges,
  - Conflicts with substations and with power lines at aerial crossings over railroad tracks,

After these four alternatives were eliminated, scores were used to further screen the alternatives. The alternatives were evaluated relative to each other using the criteria listed in Section 2.1.1.

Each criterion was rated on a Good-Fair-Poor basis with points assigned as follows:
- Good = 3 points
- Fair = 2 points
- Poor = 1 point

The points were summed up for each alternative. Alternatives with the higher scores, perform better and have fewer negative impacts than the lower scoring alternatives. Table 1 shows the complete evaluation matrix and scores with an explanation of the evaluation categories following.

The evaluation matrix shows the following information:
- Point totals ranged from 13 to 22 points,
- The median of the score range is 17.5,
- Alternatives scoring less than the median were eliminated, those scoring higher than the median were retained,
- Alternatives 3 and S-11 scored higher than the median but were previously eliminated in the fatal flaw analysis,
- Alternatives 1 and 2 would have an impact on the 52 properties in Westbury South neighborhood; therefore, the Hillcroft /Airport alignment option was kept as an opportunity to examine an alignment that avoided the properties.

### 3.1. Final Alternatives

The following alternatives were the highest scoring alternatives and were carried forward:
- Alternative 1 – LRT on the north side of the UPRR through Buffalo Point to W. Bellfort to Fannin South Station,
- Alternative 1a – Alternative 1 with the Hillcroft/Airport option as an avoidance alternative to reduce right-of-way impacts on Westbury South neighborhood,
- Alternative 2 – LRT on the north side of UPRR all the way to Fannin South Station,
- Alternative 2a – Alternative 2 with the Hillcroft/Airport option as an avoidance alternative to reduce right-of-way impacts on Westbury South neighborhood.

Aerial drawings of the proposed Build Alternatives are included in Attachment B.

In addition to the alternatives vetted through the screening process, a No-Build alternative and a Transportation System Management (TSM) alternative will also be included in the DEIS.

### 3.1.1. No Build Alternative

The No Build Alternative is defined as all current planned and programmed transportation improvements in the corridor except the alternative under examination. All the roadway and transit projects, except US 90A, in the 2035 Regional Transportation Plan and 2011-2014 Transportation Plan are included in the No Build Alternative. This includes the light rail lines in
METRO’s current long range plan (North, Southeast, East End, University, Uptown) and commuter rail in the US 290 and IH-45 S (Gulf Freeway) corridors. High Occupancy Vehicle/Toll (HOV/HOT) lanes as well as planned bus routes and transit facilities are included in the No Build.

The purpose of the No Build Alternative is to provide a contrast by which to compare the proposed project costs and benefits, so that with all things being equal, the impact of the project can be measured.

3.1.2. TSM Alternative

In addition to the evaluation of Build Alternatives 1, 1a, 2, 2a, and the No Build Alternative, a detailed analysis of the performance of the TSM alternative will be done as part of the DEIS. The TSM alternative is defined as a collection of bus service improvements of low capital cost that maximizes transit service in the corridor. It may include special buses, increased frequencies, signal priority, diamond lanes, and possible ramp or access improvements. The concept is to do as much as possible short of constructing a guideway or grade-separated facility.

The TSM alternative would consist of a new express bus service providing bi-directional service between Missouri City and Wheeler Intermodal station via the Texas Medical Center. The current 170 Missouri City route would be eliminated completely. The new bus would serve the Missouri City Park & Ride before proceeding to stops at Chimney Rock, S. Post Oak Boulevard, and W. Bellfort near the Buffalo Point development. The route would continue on Main Street all the way to Wheeler station with stops in the TMC corresponding to the existing Red Line stops. The proposed service would be provided from approximately 4:00 AM to 2:00 AM, Monday through Friday. On weekends, service would be provided from 5:30 AM to 11:30 PM. Figure 16 shows the proposed TSM Alternative.
Figure 16: TSM Alternative
<table>
<thead>
<tr>
<th>Alternative</th>
<th># Stations</th>
<th>Travel Time (mins)</th>
<th>Capital cost</th>
<th>Acquisitions (parcels)</th>
<th>Utilities/Easement</th>
<th>Sensitive Receptors</th>
<th>Traffic Issues</th>
<th>Wetlands/Floodplain</th>
<th>Economic Development</th>
<th>Purpose &amp; Need</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 North of UPRR through Buffalo Lakes</td>
<td>5</td>
<td>Fair (26)</td>
<td>Good</td>
<td>Poor (110)</td>
<td>Fair</td>
<td>2</td>
<td>Fair</td>
<td>2</td>
<td>Good</td>
<td>3</td>
<td>Good</td>
</tr>
<tr>
<td>1a Alt. 1 with Hillcroft/Airport option</td>
<td>5</td>
<td>Poor (31)</td>
<td>1</td>
<td>Fair (58)</td>
<td>1</td>
<td>2</td>
<td>Fair</td>
<td>Fair</td>
<td>Good</td>
<td>3</td>
<td>Good</td>
</tr>
<tr>
<td>2 North of UPRR to Fannin</td>
<td>4</td>
<td>Good (22)</td>
<td>3</td>
<td>Poor (128)</td>
<td>1</td>
<td>2</td>
<td>Fair</td>
<td>Fair</td>
<td>Good</td>
<td>3</td>
<td>Fair</td>
</tr>
<tr>
<td>2a Alt. 2 with the Hillcroft/Airport option</td>
<td>4</td>
<td>Fair (27)</td>
<td>2</td>
<td>Fair (76)</td>
<td>2</td>
<td>Fair</td>
<td>1</td>
<td>Fair</td>
<td>Good</td>
<td>3</td>
<td>Good</td>
</tr>
<tr>
<td>3 UPRR ROW</td>
<td>4</td>
<td>Good (22)</td>
<td>3</td>
<td>Poor (&lt;5)</td>
<td>3</td>
<td>Poor</td>
<td>1</td>
<td>Good</td>
<td>Good</td>
<td>3</td>
<td>Good</td>
</tr>
<tr>
<td>4 Between UPRR and US 90A</td>
<td>4</td>
<td>Fair (27)</td>
<td>2</td>
<td>Poor (100+)</td>
<td>Poor</td>
<td>1</td>
<td>Fair</td>
<td>Good</td>
<td>3</td>
<td>Poor</td>
<td>Eliminated</td>
</tr>
<tr>
<td>5 South of UPRR A</td>
<td>5</td>
<td>Fair (27)</td>
<td>2</td>
<td>Poor (130+)</td>
<td>1</td>
<td>2</td>
<td>Fair</td>
<td>Fair</td>
<td>Poor</td>
<td>1</td>
<td>Good</td>
</tr>
<tr>
<td>S-6 Chimney Rock option</td>
<td>6</td>
<td>Poor (33)</td>
<td>1</td>
<td>Poor (75)</td>
<td>2</td>
<td>Fair</td>
<td>1</td>
<td>Poor</td>
<td>1</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>S-7 S. Post Oak option</td>
<td>6</td>
<td>Poor (32)</td>
<td>1</td>
<td>Fair (85)</td>
<td>2</td>
<td>Poor</td>
<td>1</td>
<td>Poor</td>
<td>1</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>S-8 Centerpoint easement option</td>
<td>5</td>
<td>Poor (30)</td>
<td>1</td>
<td>Poor (104)</td>
<td>1</td>
<td>2</td>
<td>Good</td>
<td>3</td>
<td>Fair</td>
<td>2</td>
<td>Poor</td>
</tr>
<tr>
<td>S-9 S. Main Option</td>
<td>5</td>
<td>Fair (27)</td>
<td>2</td>
<td>Poor (104)</td>
<td>1</td>
<td>Fair</td>
<td>2</td>
<td>Fair</td>
<td>2</td>
<td>Fair</td>
<td>Fair</td>
</tr>
<tr>
<td>S-9a S. Main Option/OST to Smith Lands</td>
<td>5</td>
<td>Good (21)</td>
<td>3</td>
<td>Poor (104)</td>
<td>1</td>
<td>2</td>
<td>Fair</td>
<td>2</td>
<td>Fair</td>
<td>2</td>
<td>Good</td>
</tr>
<tr>
<td>S-10 Stella Link option</td>
<td>5</td>
<td>Fair (29)</td>
<td>2</td>
<td>Poor (104)</td>
<td>1</td>
<td>2</td>
<td>Fair</td>
<td>2</td>
<td>Fair</td>
<td>2</td>
<td>Fair</td>
</tr>
<tr>
<td>S-11 Center of US 90A</td>
<td>4</td>
<td>Good (22)</td>
<td>3</td>
<td>Poor (100+)</td>
<td>1</td>
<td>2</td>
<td>Poor</td>
<td>1</td>
<td>Good</td>
<td>3</td>
<td>Poor</td>
</tr>
<tr>
<td>S-12 CenterPoint Easement south of US 90A</td>
<td>6</td>
<td>Poor (32)</td>
<td>1</td>
<td>Very Poor</td>
<td>1</td>
<td>2</td>
<td>Fair</td>
<td>Good</td>
<td>3</td>
<td>Poor</td>
<td>Poor</td>
</tr>
<tr>
<td>S-13 Hillcroft to W. Bellfort option</td>
<td>6</td>
<td>Poor (33)</td>
<td>1</td>
<td>Poor (25)</td>
<td>3</td>
<td>Fair</td>
<td>2</td>
<td>Poor</td>
<td>1</td>
<td>Good</td>
<td>15</td>
</tr>
</tbody>
</table>
Evaluation Category descriptions

Each alternative was evaluated in key environmental categories according to the measures described below. The purpose of the evaluation was to identify the two or three most reasonable alternatives for more detailed evaluation. Table 1 only identifies the major issues that differentiate the alternatives. The rating system presented is not part of the National Environmental Policy Act (NEPA) process. The rest of this document contains the information on environmental impacts to the level of detail required by NEPA.

Number of Stations
Includes both end of the line stations and designed stations on opening day. Potential future stations are not included.

Travel Time
Travel time is a factor of number of stations, station dwell time, posted speed limits, street running distance, and number of tight turns.

- **Ranges**
  - Low: < 25 mins
  - Med: 25 < 30 mins
  - High: > 30 mins

Capital Cost
The capital costs are relative based on the elements that drive the costs, such as the guideway, structures, right-of-way, and utilities.

- **Ranges**
  - Low: < $45M per mile
  - Med: $45M ≤ $90M per mile
  - High: > $90M per mile

Acquisitions/Displacements
Estimate of the number of properties that will need to be partially or fully acquired:

- **Ranges**
  - Low: < 50
  - Med: 50 ≤ 100
  - High: > 100

Utilities/Easement
The amount of utility relocation or disruption the alternative or the cost and complexity of agreements to share utility easements or rights-of-way could raise costs or cause delays.

Sensitive Receptors
Schools, churches, medical facilities, and residences in proximity to the alignment are sensitive receptors for air quality, noise & vibration, and visual impacts.

Traffic Issues
Traffic issues result from roadway crossings, street running segments, median closures, traffic signals, and turns through intersections.

Wetlands/Floodplain
Estimate of whether of wetlands and/or floodplains are present in the alignment.

Economic Development
Indicates the relative ability of the alternative to promote and support transit-oriented development and redevelopment in the corridor. The amount of developable land, degree of access, supporting land uses, and neighborhood or management district plans are indicators of economic development potential.

Purpose & Need
How well does the alternative meet the stated Purpose & Need?
4.0 Other Issues

4.1 Vehicle Technology Evaluation

Different types of rail vehicles are capable of providing the commuter service under consideration. The proposed service is intended to serve commuters with faster trips and fewer stops. The current METRORail technology is light rail, which runs on a track with an overhead electric power source. Light rail can be either in the street or in its own right-of-way and run as multi-car trains. Other technologies, such as diesel commuter rail, diesel-multiple unit (DMU), or even buses may be considered. The ability of each of these vehicle types to interline with the existing METRORail line will be examined. Below are brief descriptions of the transit technologies considered:

- **Bus Rapid Transit (BRT):** BRT is the next level of bus service above the TSM alternative. BRT is typically a bus running in a dedicated lane or guideway, mimicking rail. The stations are fewer than local bus service and would be designed similar to a rail station, with off-vehicle fare collection and synchronized operations. BRT vehicles can be larger than normal buses and can have multiple doors for quick loading and unloading.

- **Light Rail (LRT):** Light rail is a train of one or more vehicles powered by overhead electric source (currently operating on Main Street). Light rail is typically used in urban environments with smaller vehicles than commuter rail. Current light rail vehicles reach speeds of up to 66 mph, making it feasible for faster commuter service.

- **Commuter Rail (CRT):** Commuter rail is typically a series of passenger cars powered by a locomotive on freight rail tracks. Commuter rail trains are longer and the cars have a higher capacity than a light rail vehicle. The travel distance is also longer with fewer stops. Commuter rail lines usually stop at a central station where passengers transfer to buses or other rail service for distribution to their final destination.

- **Diesel-Multiple Units (DMU):** DMUs are similar to light-rail vehicles except they are powered by diesel or diesel-electric engines and can operate as light rail and commuter rail. DMU’s run on freight rail tracks or their own tracks and can be linked for multi-car trains. DMU vehicles that operate on freight rail tracks must meet all current Federal Railroad Administration (FRA) safety regulations for passenger rail and currently there are no such vehicles being manufactured.

Each of the rail technologies were evaluated on their ability to provide the required service and interface with the existing Red Line. The opportunity for transit-oriented development (TOD) was also considered. Transit-oriented development is concentrated, mixed-use development within one-quarter to one-half mile of a transit facility that provides easy walk access to public transportation. The evaluations were relative comparisons between the technologies. The following is a summary of each technology.
### 4.1.1. Transportation System Management

**Pros**
- Capital costs are relatively low because there is no major construction,
- TSM can be implemented easier than other technologies that require construction and can be modified in phases or as necessary with minimal disruption and cost,
- If circumstances require a route change, buses are flexible and able to travel alternate streets.

**Cons**
- Limited capacity, requires more vehicles and operators to meet growing demand,
- Operates in mixed traffic for a portion of the trip. Accessing stations and traveling to the TMC would require the vehicles to mix with traffic, causing delays, reducing reliability, and increasing travel time,
- Diesel or diesel-hybrid engines may create noise and air quality impacts,
- Lack of permanence does not encourage transit-oriented development.

### 4.1.2. Bus Rapid Transit

**Pros**
- Lower capital cost investment than rail,
- Higher capacity than TSM because it operates in a guideway for significant portion of the corridor,
- More likely to spur transit-oriented development than TSM.

**Cons**
- Limited capacity, requires more vehicles and operators to meet growing demand,
- Operates in mixed traffic for a portion of the trip. Traveling to the TMC would require the vehicles to mix with traffic, causing delays, reducing reliability, and increasing travel time,
- Diesel or diesel-hybrid engines may create noise and air quality impacts,
- Capital cost may be lower than rail, but still considerably more than TSM. The cost may not provide the benefit for the investment.

### 4.1.3. Light Rail

**Pros**
- Has greater capacity than TSM and BRT,
- Runs entirely in a guideway and not prone to traffic delays,
- Can interline with the METRORail Red Line, avoiding a transfer,
- System compatibility allows for flexible use of vehicles and efficient maintenance,
- No diesel or fuel emissions to address,
- More likely to spur transit-oriented development than TSM or BRT.

**Cons**
- High capital cost for right-of-way acquisition and guideway construction,
- Dedicated guideway can result in property and traffic impacts,
- Potential noise and vibration impacts could occur near residences.
4.1.4. **Commuter Rail**

**Pros**
- Has greater capacity than TSM and BRT,
- Runs entirely in a guideway and not prone to traffic delay,
- Could spur transit-oriented development.

**Cons**
- Would operate in UPRR right-of-way – contrary to UPRR stated position,
- FRA safety compliant vehicle requirement prevents interlining with METRORail Red Line,
- Would require a transfer at Fannin South station, increasing overall travel time,
- Potential noise and vibration impacts near residences,
- Diesel emissions may cause air quality issues.

4.1.5. **Diesel Multiple Unit**

**Pros**
- Has greater capacity than TSM and BRT,
- Runs entirely in a guideway and not prone to traffic delays,
- With specially designed vehicles it could interline with the Red Line, avoiding a transfer,
- Eliminates need for overhead catenary system.
- More likely to spur transit-oriented development than TSM.

**Cons**
- High capital cost for right-of-way acquisition and guideway construction,
- Vehicle suitable for interlining with METRORail Red Line not currently manufactured,
- Lack of compatibility with existing LRT system, requires special maintenance facilities,
- Diesel or diesel-hybrid engines may create noise, vibration, and air quality impacts.
Table 2 summarizes the evaluation for each type of vehicle technology using the Good-Fair-Poor point system used in the alternatives evaluation. The primary impacts differentiating the technologies were air quality and property acquisition.

- TSM has the lowest capital costs because less right-of-way acquisition and construction is required, but it rates poorly on travel time and travel demand because it operates entirely in mixed traffic.
- BRT has greater travel demand potential than TSM, but has a higher capital cost due to the construction of a guideway or dedicated lane and the need for additional right-of-way.
- The travel time for BRT is better than TSM because most of the trip would be in a guideway or designated lane; however, the travel time would not be as good as the rail alternatives because a portion of the BRT trip would be in mixed traffic, or a transfer would be required at Fannin South station.
- LRT, CRT, and DMU have the higher travel demand potential because they would operate in a guideway, but they would also have the highest capital costs.
- LRT and DMU would have a better travel time than CRT because LRT and DMU could interline with the Red Line, while CRT would require a transfer at Fannin South station.
- LRT produces no emissions and has slightly better air quality benefits than the other vehicle technologies which produce some level of diesel exhaust.
- TSM would require the least amount of additional right-of-way and would have fewer property impacts than the other transit technologies; however, approximately 20-25 parcels of property would be needed for TSM park and ride lots. The number of parcels that would be required for the BRT, LRT, CRT, and DMU technologies range from 58 to 128, depending on the alternative alignment.

Table 2: Transit Technology Evaluation Matrix

<table>
<thead>
<tr>
<th>Technology</th>
<th>Travel Time</th>
<th>Capital Cost</th>
<th>Travel Demand</th>
<th>Air Quality</th>
<th>Acquisitions</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSM</td>
<td>Poor 1</td>
<td>Good 3</td>
<td>Poor 1</td>
<td>Fair 2</td>
<td>Fair 2</td>
<td>9</td>
</tr>
<tr>
<td>BRT</td>
<td>Fair 2</td>
<td>Fair 2</td>
<td>Fair 2</td>
<td>Fair 2</td>
<td>Poor 1</td>
<td>9</td>
</tr>
<tr>
<td>LRT</td>
<td>Good 3</td>
<td>Poor 1</td>
<td>Good 3</td>
<td>Good 3</td>
<td>Poor 1</td>
<td>11</td>
</tr>
<tr>
<td>CRT</td>
<td>Fair 2</td>
<td>Poor 1</td>
<td>Good 3</td>
<td>Fair 2</td>
<td>Poor 1</td>
<td>9</td>
</tr>
<tr>
<td>DMU</td>
<td>Good 3</td>
<td>Poor 1</td>
<td>Good 3</td>
<td>Fair 2</td>
<td>Poor 1</td>
<td>10</td>
</tr>
</tbody>
</table>

Based on this evaluation, light rail (LRT) ranks highest and is the recommended technology because it is compatible with the existing rail system, has the capacity to handle potential future travel demand, and has the fewest air quality impacts compared to all the other technologies.
4.2. Operations

Over the course of the DEIS and the refinement of the remaining alternatives several operational issues will be addressed. Since the proposed new rail line would interface with the existing METRORail Red Line, the type of interface and the operations of the two lines will need to be addressed. The two options for connecting to the Red Line are interlining or transferring. Interlining would have the rail cars from the US 90A line merging with the existing Red Line at the Fannin South station and sharing tracks to the TMC. A transfer would occur if the transit technology on the US 90A line is not compatible with the light rail tracks and stations on the Red Line. The US 90A service would terminate at the Fannin South station forcing passengers to transfer to the Red Line light rail. Each of these interface options affects the operations of both lines.

- If the proposed line on US 90A interlines with the Red Line at Fannin South station, what do the headways need to be to optimize capacity and reliability?
- If the primary destination for projected users is the TMC, how far up the line does the interlined operation extend? Possible turnback locations at the Hermann Park/Rice University station and the Wheeler Station will be investigated, as well as completely integrating rail operations from Missouri City to the northern terminus of the Red Line.
- Using bus shuttles between the Smith Lands lot and the TMC has been examined as an option to provide additional capacity. The effect of the interlined service from the new line on the need for the existing shuttle will be examined.
- Adding additional service and decreasing the headways on the Red Line through the TMC could adversely affect traffic by altering traffic signal timing and synchronization.
- The capacity of the Red Line to accommodate transferring passengers at Fannin South station and the effect a transfer has on travel time, will be considered.

4.2.1. Interlining Options

Hermann Park/Rice Station turnback

- Limited space for pocket track would impact dedicated park land;
- Ridership potential from connectivity with the proposed University Line at the Wheeler Station would not be realized, and;
- Potential traffic impacts through the TMC to Hermann Park/Rice Station.

Wheeler Station turnback

- More space for crossovers and storage track;
- Greater connectivity to the proposed University Line and ridership potential;
- Increased distance could affect operations and number of vehicles needed;
- Potential traffic impacts through the TMC to Wheeler Station;
• Complex design at a busy rail crossing.

Full Interline
• Developing an operating plan combining express service with local distribution;
• Potential traffic impacts from increased service and decreased headways;
• Coordinating headways among Red Line and extensions, north and south;
• Estimating vehicle requirements attributable to the US 90A line.

5.0 Conclusion
The US 90A/Southwest Rail Corridor Draft EIS will examine the following alternatives:

• No-build
• TSM
• **Alternative 1** – LRT north of UPRR through Buffalo Point
• **Alternative 1a** – Alternative 1 with the Hillcroft/Airport alignment option
• **Alternative 2** – LRT north of UPRR along Holmes Road
• **Alternative 2a** - Alternative 2 with the Hillcroft/Airport alignment option

The transit technology for the build alternatives will be light rail compatible with the existing METRORail Red Line.

Wheeler Station turnback and full interline will be examined in the DEIS. The turnback at the Hermann Park/Rice station has been eliminated from consideration because it would require additional right-of-way, causing impacts to the park.