

TMC Mobility Study

Steering Committee Meeting

December 9, 2013

Presented by:

Parsons Brinckerhoff, Inc.



City of Houston Texas



Texas Medical Center

Introductions



Agenda

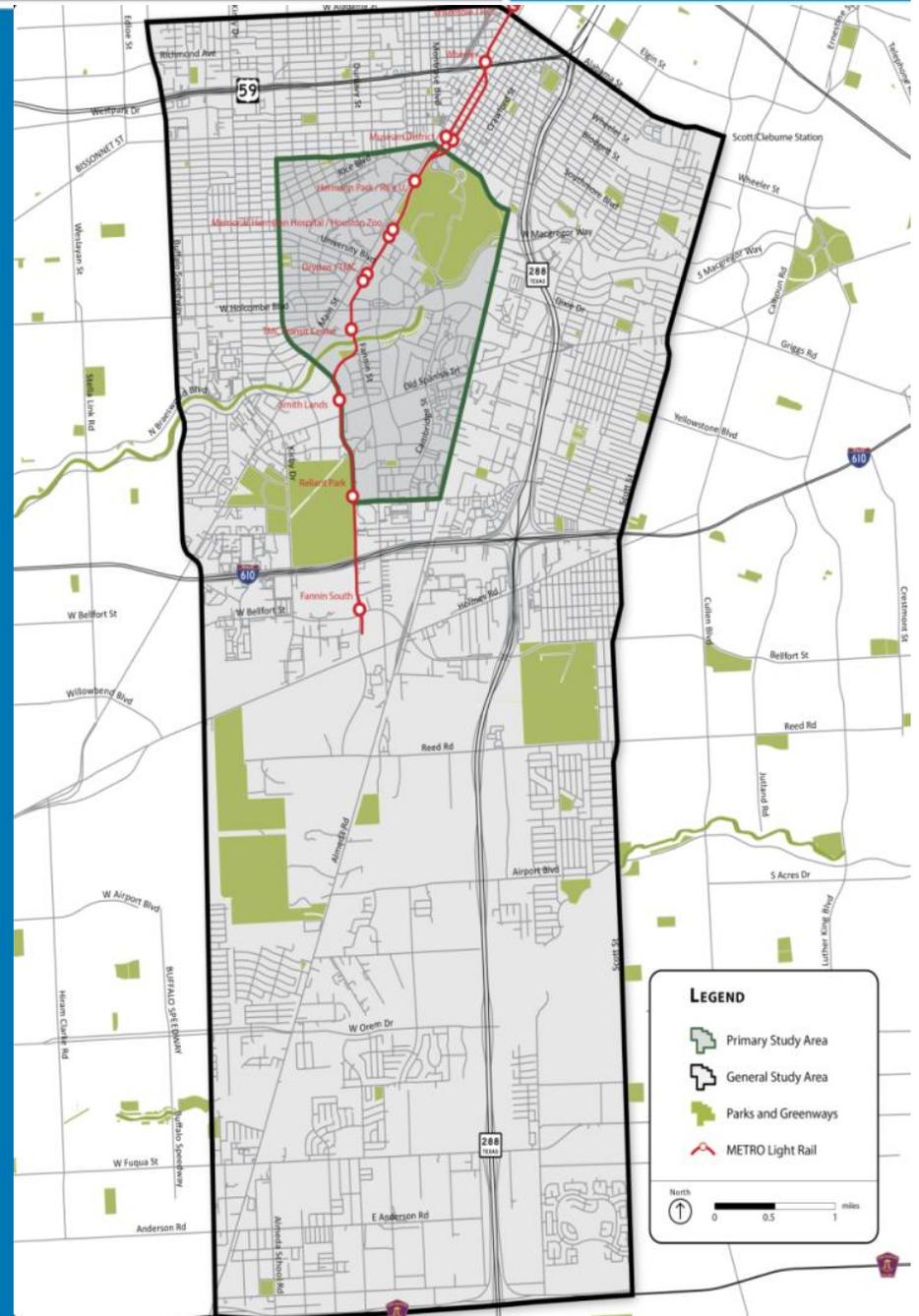
- Introductions
- Overview Study Status
 - TMC Involvement
 - Travel Demand Modeling
 - Mode-Specific Analyses
- Fannin Street Corridor Analysis
 - Existing Conditions
 - LRT Relocation Alternatives
 - Roadway/Signal System Alternatives
 - Recommendations
- Updated Schedule

Overview of Study Status

- Steering Committee composition
 - New TMC representation
- Model development
 - Calibrated model
 - Initiate system alternatives analysis
- Mode-specific analyses
 - Traffic
 - Parking
 - Transit
 - Pedestrian/Bicycle
 - TDM

Fannin Street Corridor Analysis

- Analysis of transit, roadway, and pedestrian improvements along major corridor serving TMC
- Objective to address existing traffic congestion and conflicts in corridor



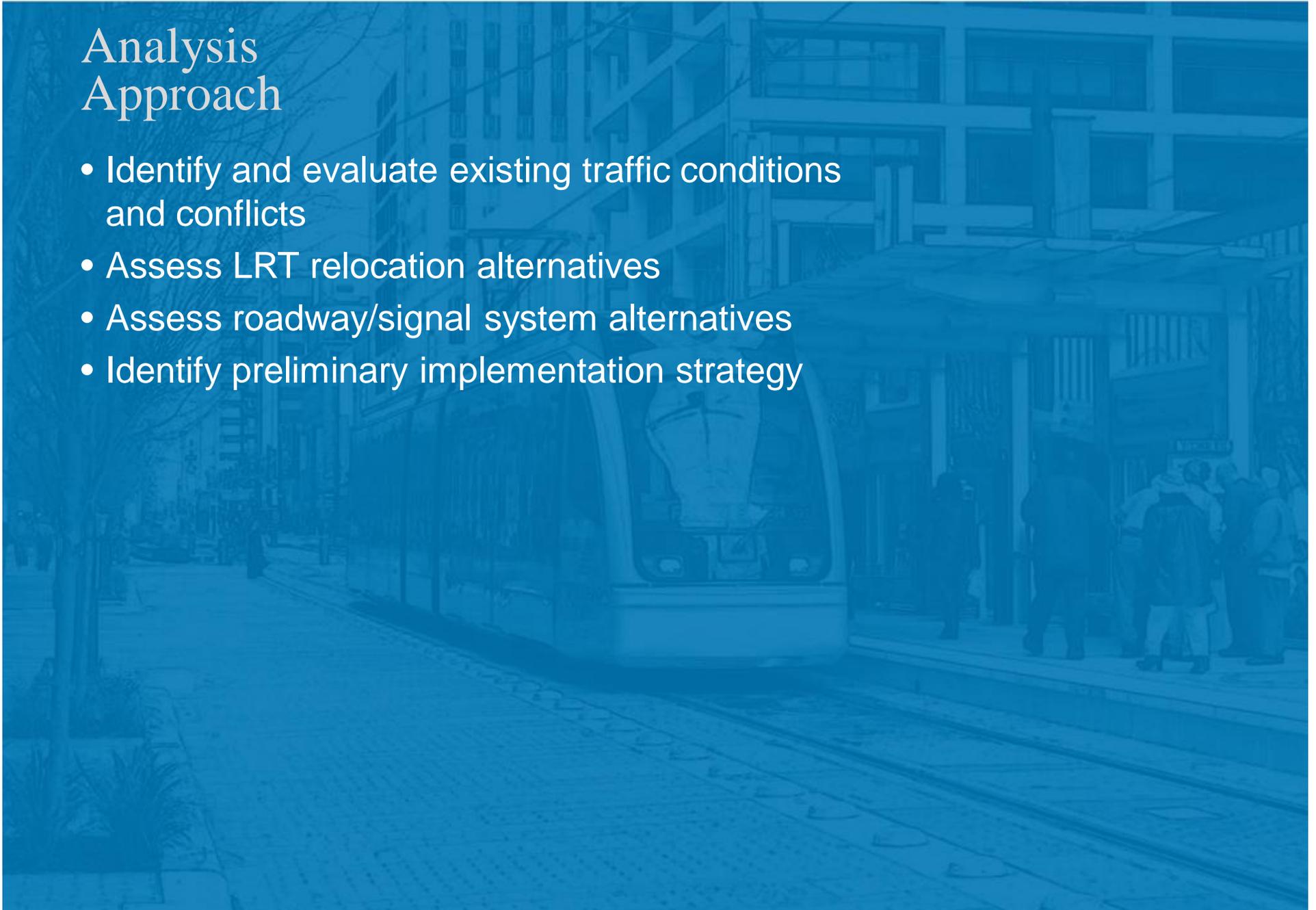
Major Corridor Issues

- Conflicts between LRT and left turns into local streets and parking garage driveways
- Inadequate signal timing
- Pedestrian channelization/ADA accessibility
- Substandard LRT platform width

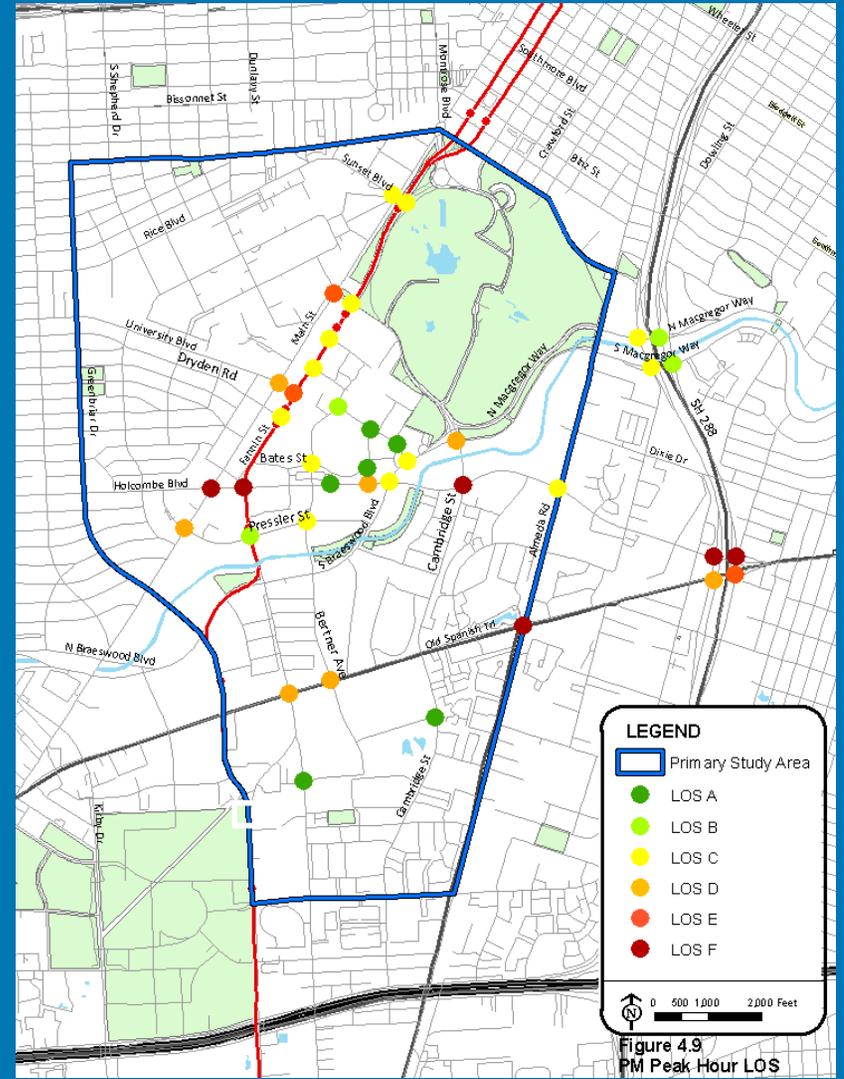
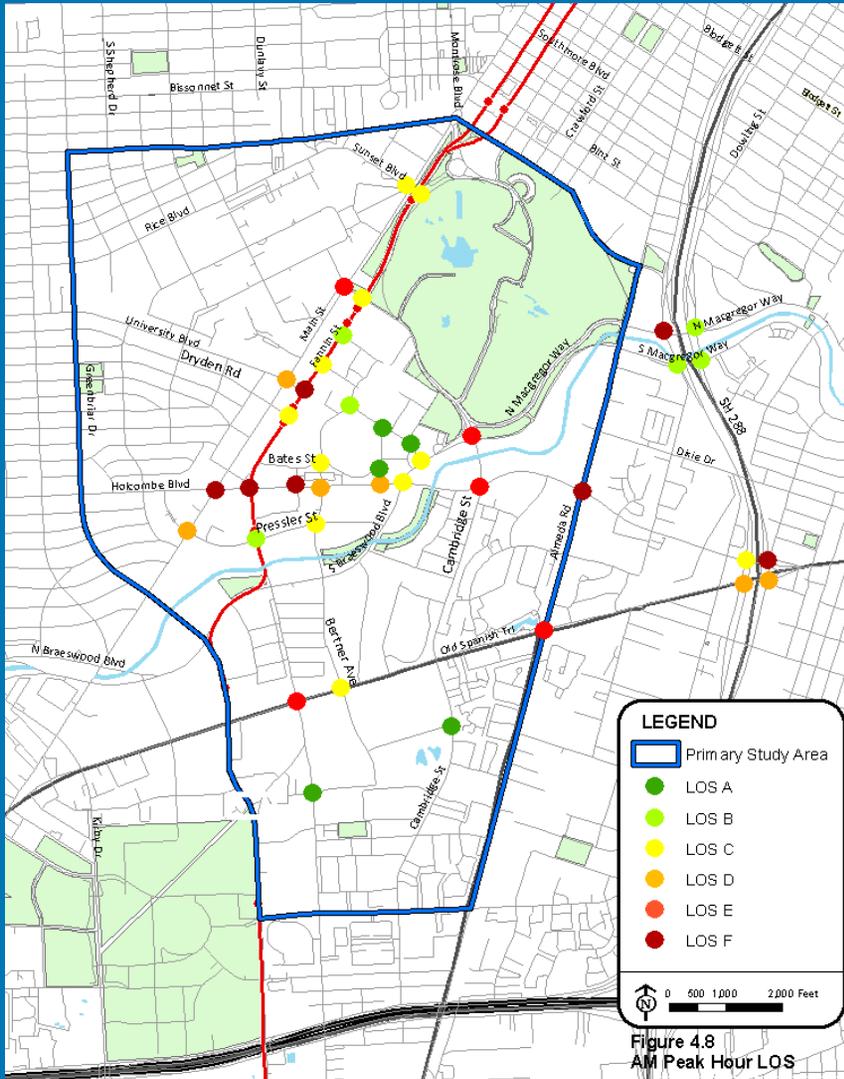


Analysis Approach

- Identify and evaluate existing traffic conditions and conflicts
- Assess LRT relocation alternatives
- Assess roadway/signal system alternatives
- Identify preliminary implementation strategy

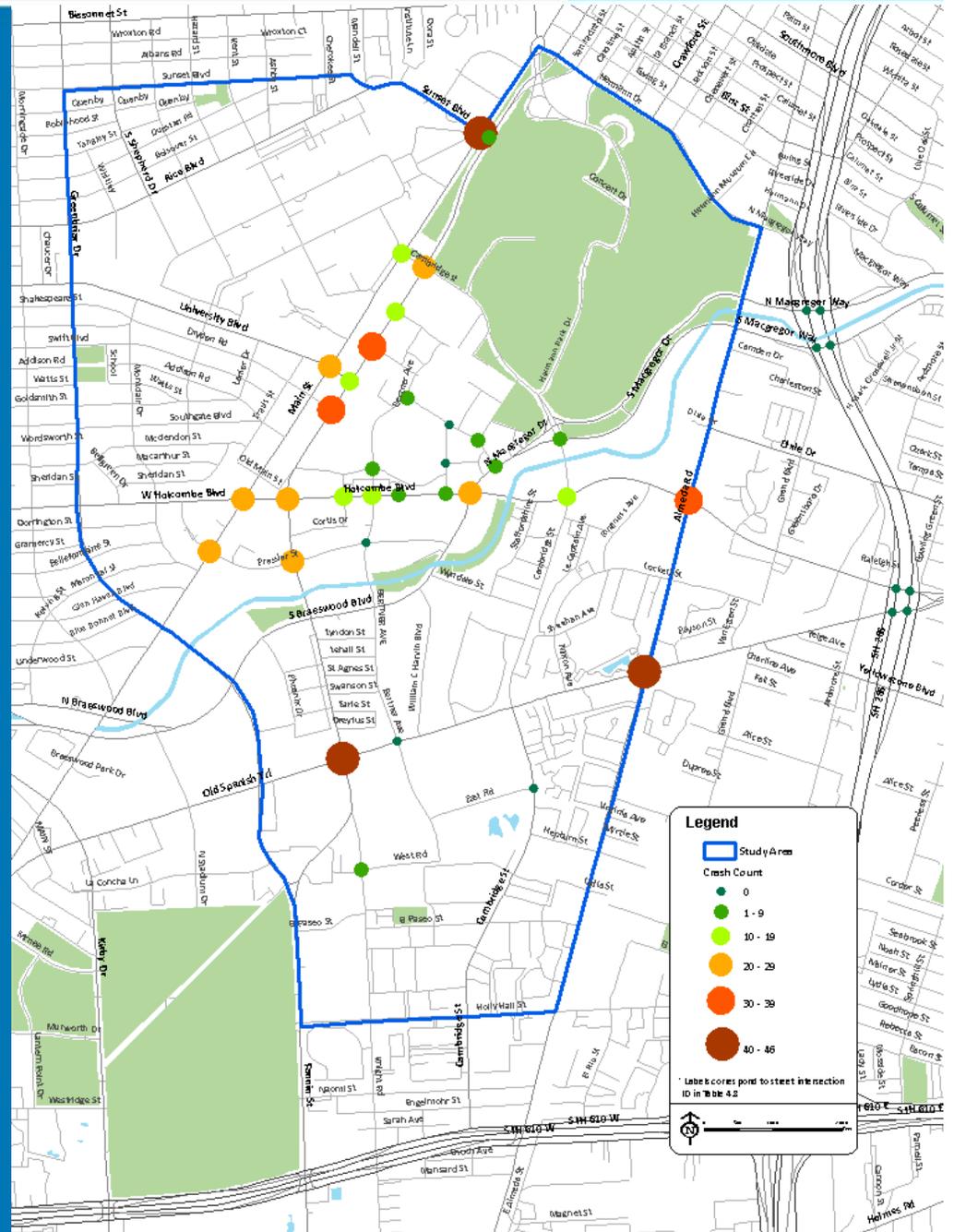


General Traffic Bottlenecks



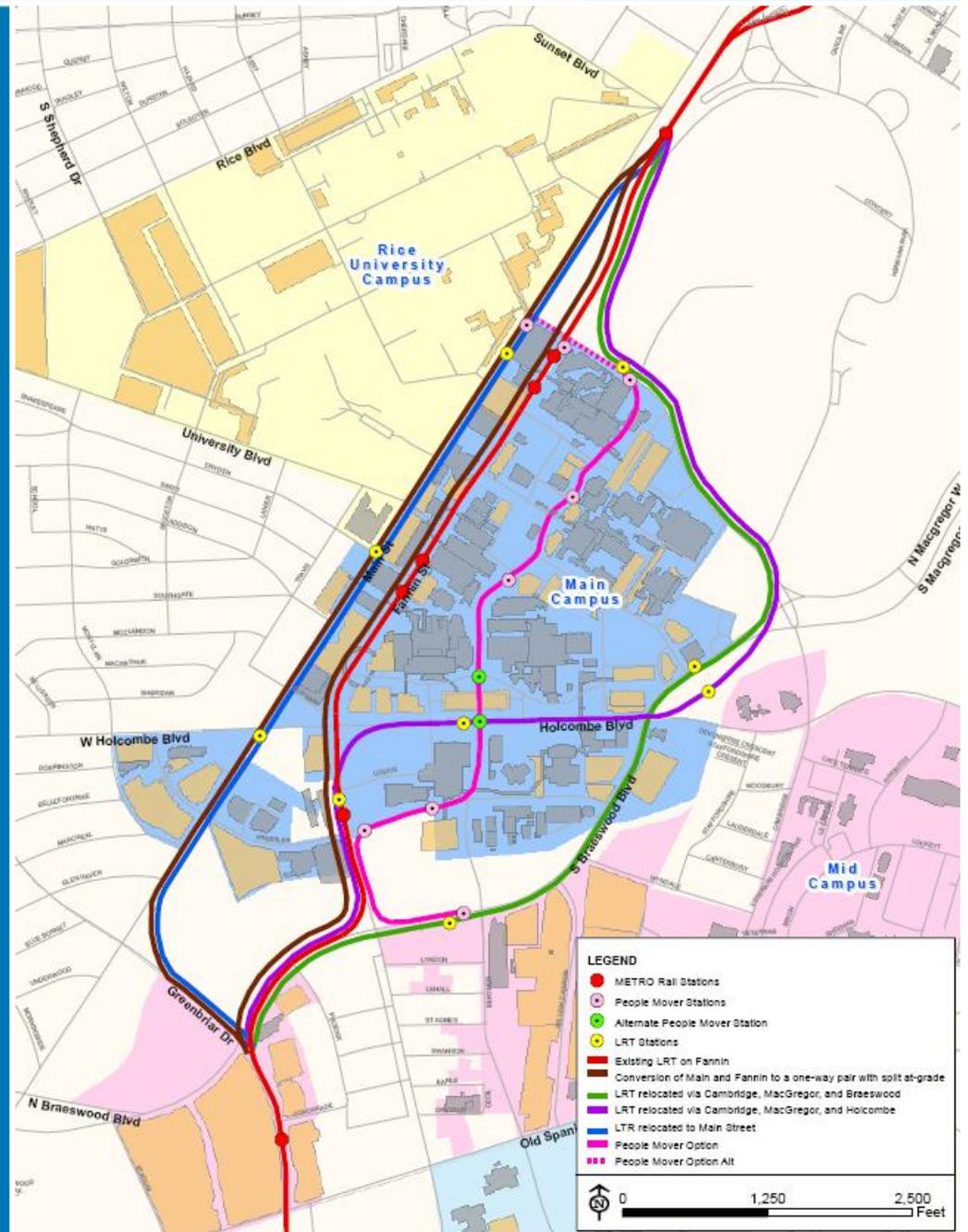
Traffic Conflicts/ Crash Experience

Intersection	Number of Crashes
Fannin @ Cambridge	28
Fannin @ University	11
Fannin @ Ross Sterling	11
Fannin @ John Freeman	30
Fannin @ Dryden	36
Fannin @ Holcombe	27
Fannin @ Pressler	28
Fannin @ Sunset	2
Fannin @ OST	46



LRT Relocation Alternatives

- West side of Fannin
- Fannin Transit/Pedestrian Mall
- Main/Fannin one-way pair with LRT on both streets (SB on Main, NB on Fannin)
- Two-way on Main
- Subway on Fannin
- Elevated on Fannin
- At-grade via Cambridge, MacGregor, Braeswood
- At-grade via Cambridge, MacGregor, Holcombe



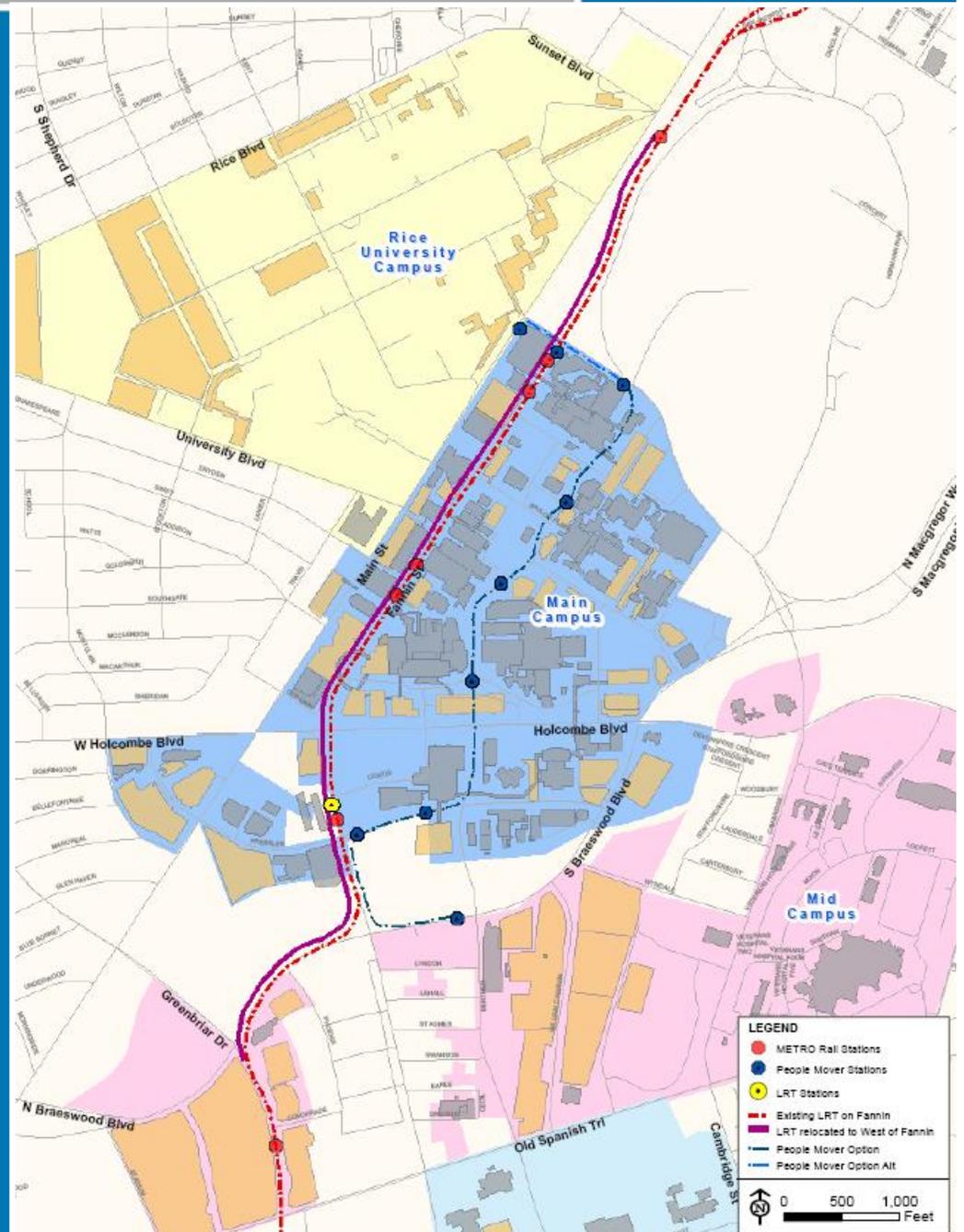
LRT on West Side of Fannin

- **Advantages**

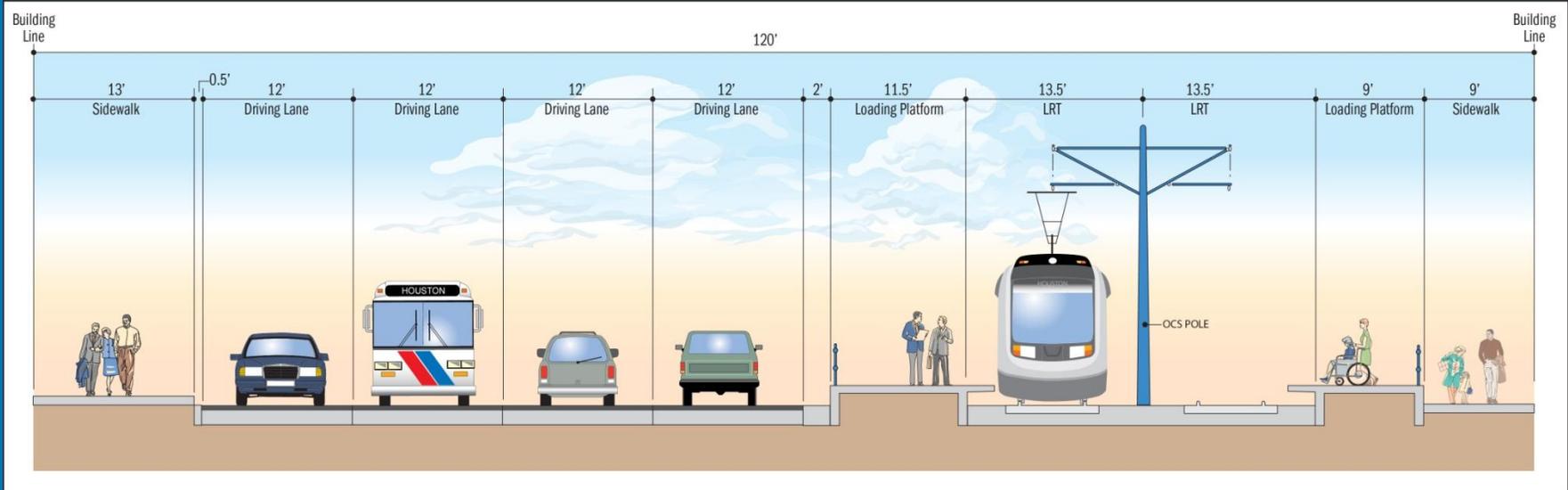
- Improve access on east side of Fannin
- Allow widening of station platforms and provision for separate left turn lanes

- **Disadvantages**

- Awkward transition north of Holcombe
- Reduced sidewalk width on west side of Fannin

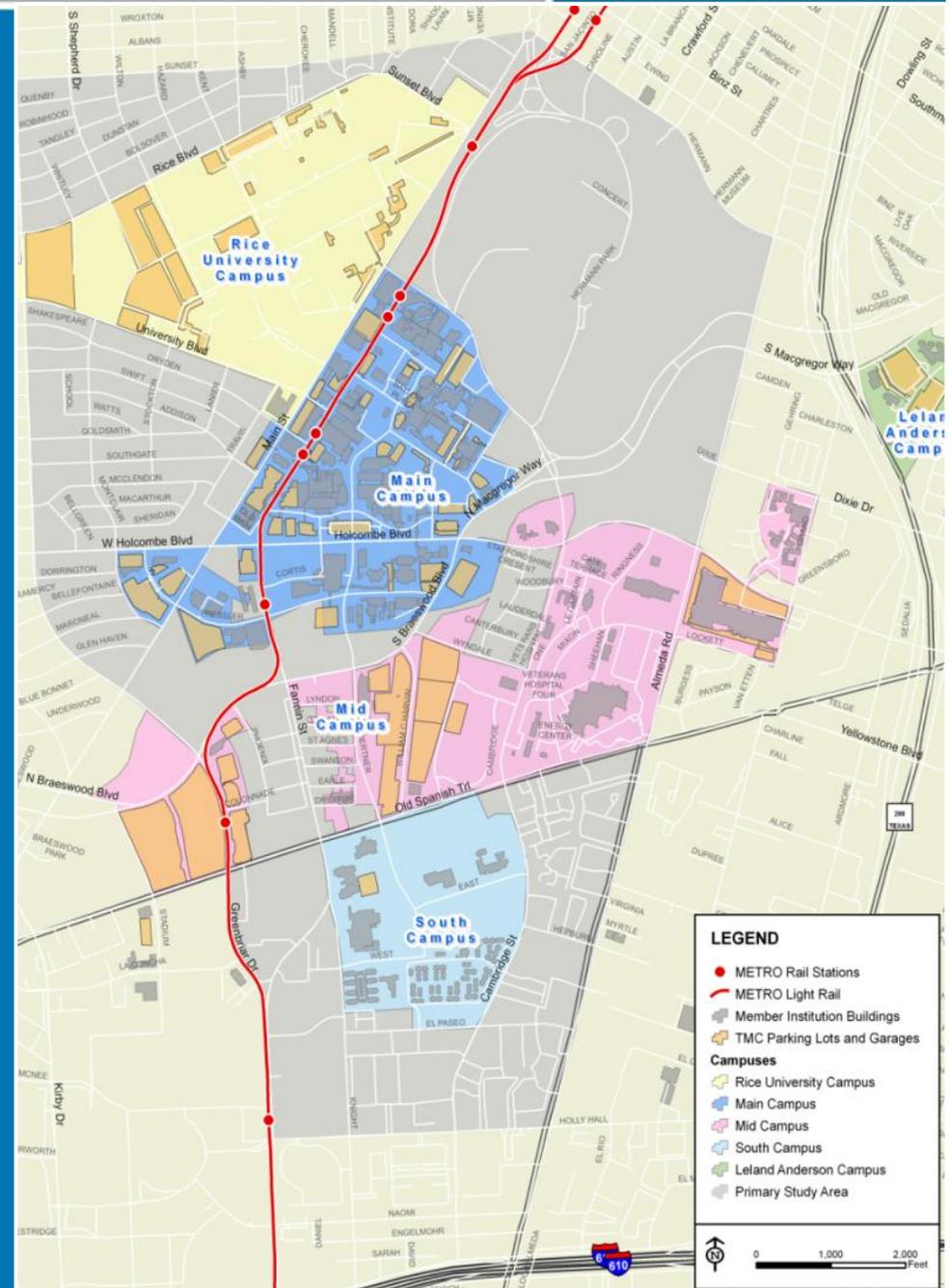


LRT on West Side of Fannin Looking Southwest

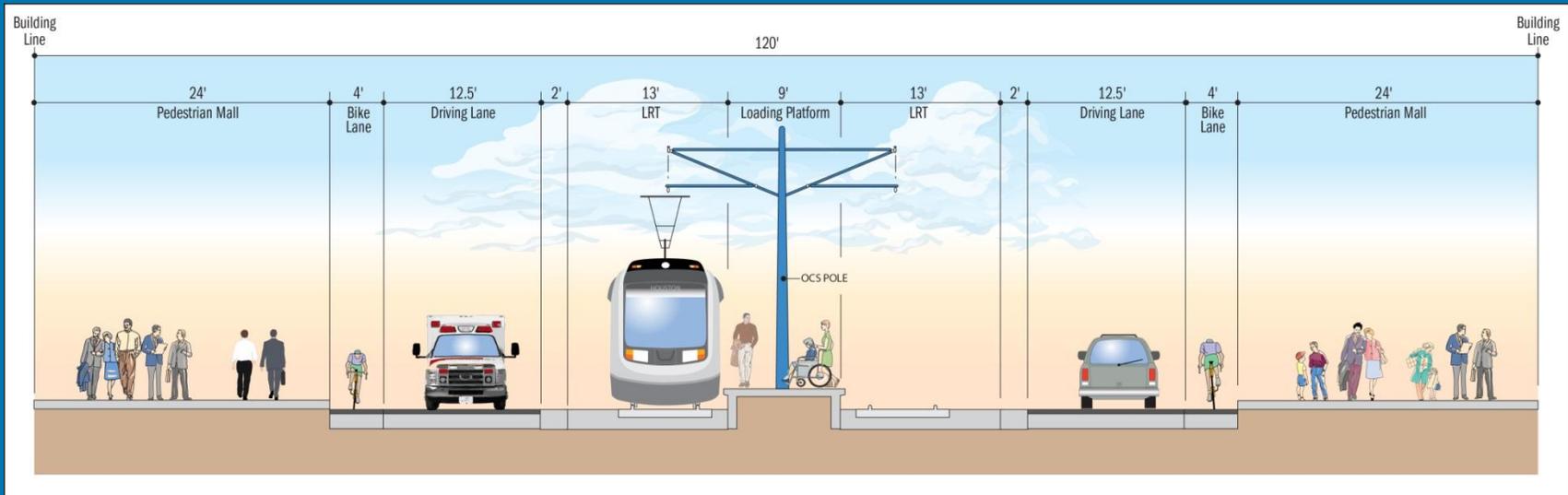


Fannin Transit/ Pedestrian Mall

- **Advantages**
 - Ample width for LRT stations and pedestrian circulation
 - Retain and improve emergency vehicle access
- **Disadvantages**
 - Increased travel distances for diverted traffic
 - Less convenient vehicular access to TMC parking and drop off/pickup locations

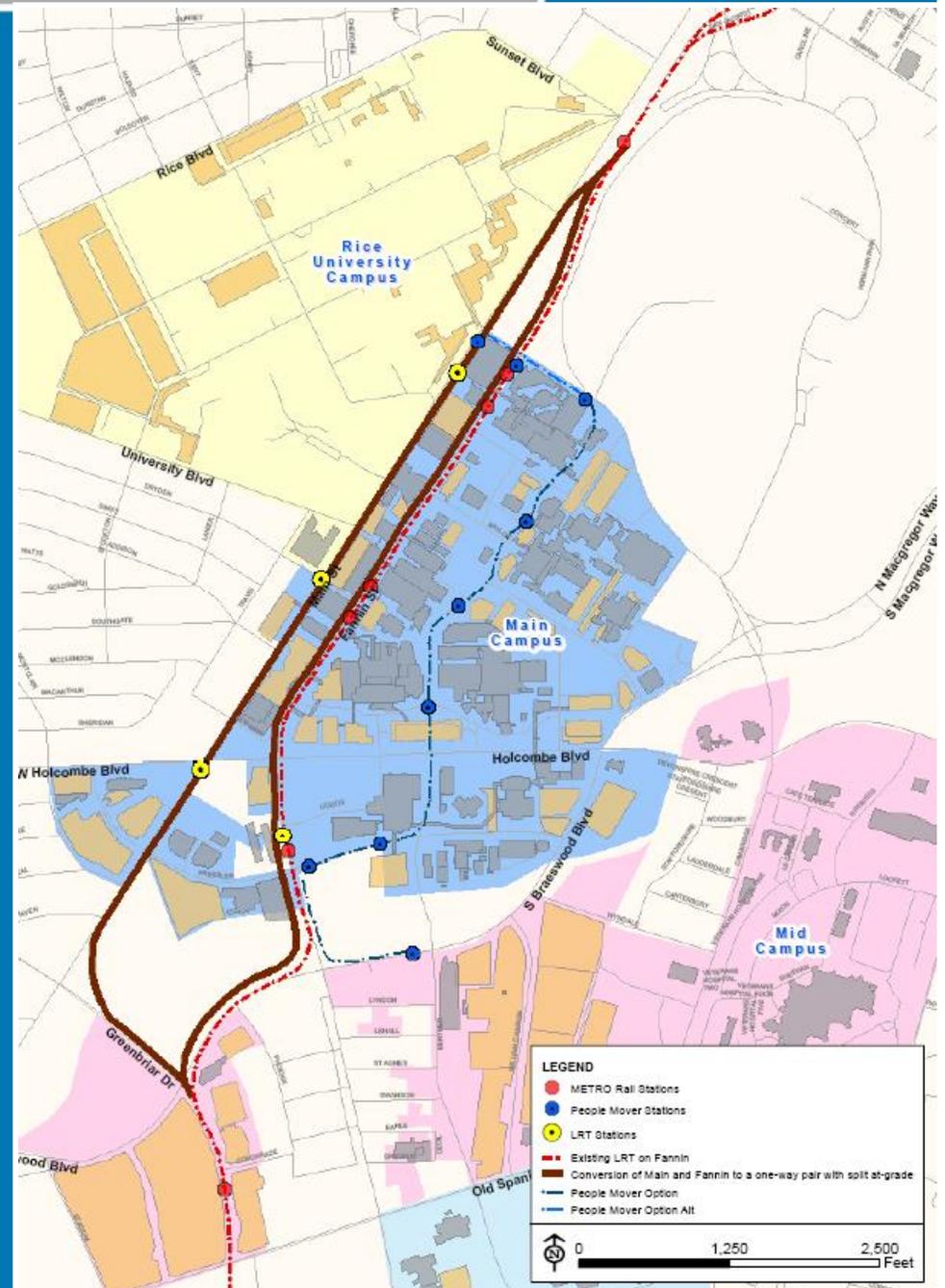


Fannin Transit/ Pedestrian Mall

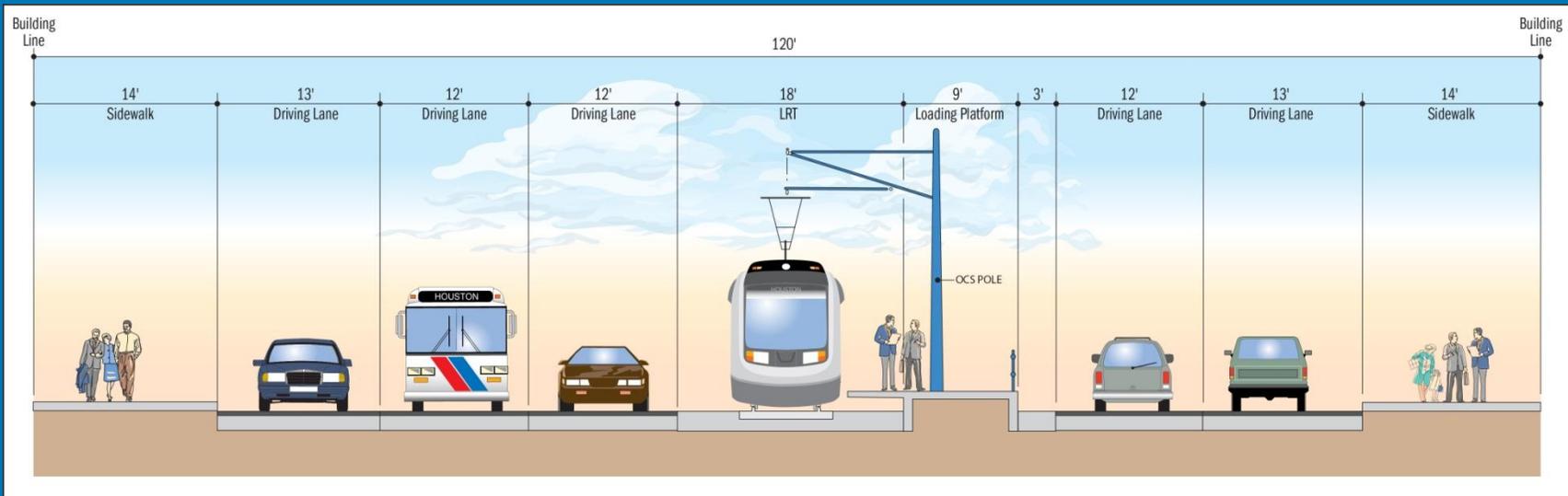


LRT on Main/Fannin One-Way Pair

- Advantages
 - Improved traffic flow on Fannin by conversion of vacated LRT lane to left turn lane.
 - Ability to widen LRT station platforms
- Disadvantages
 - Access to southbound (Main) LRT stations less convenient for most TMC destinations
 - Access to TMC Transit Center inconvenient for southbound (Main) routing
 - Increased traffic congestion on Main, although pedestrian activity and traffic turning movements are less along street
 - Impact on Hermann Park
 - Construction impacts on both Main and Fannin

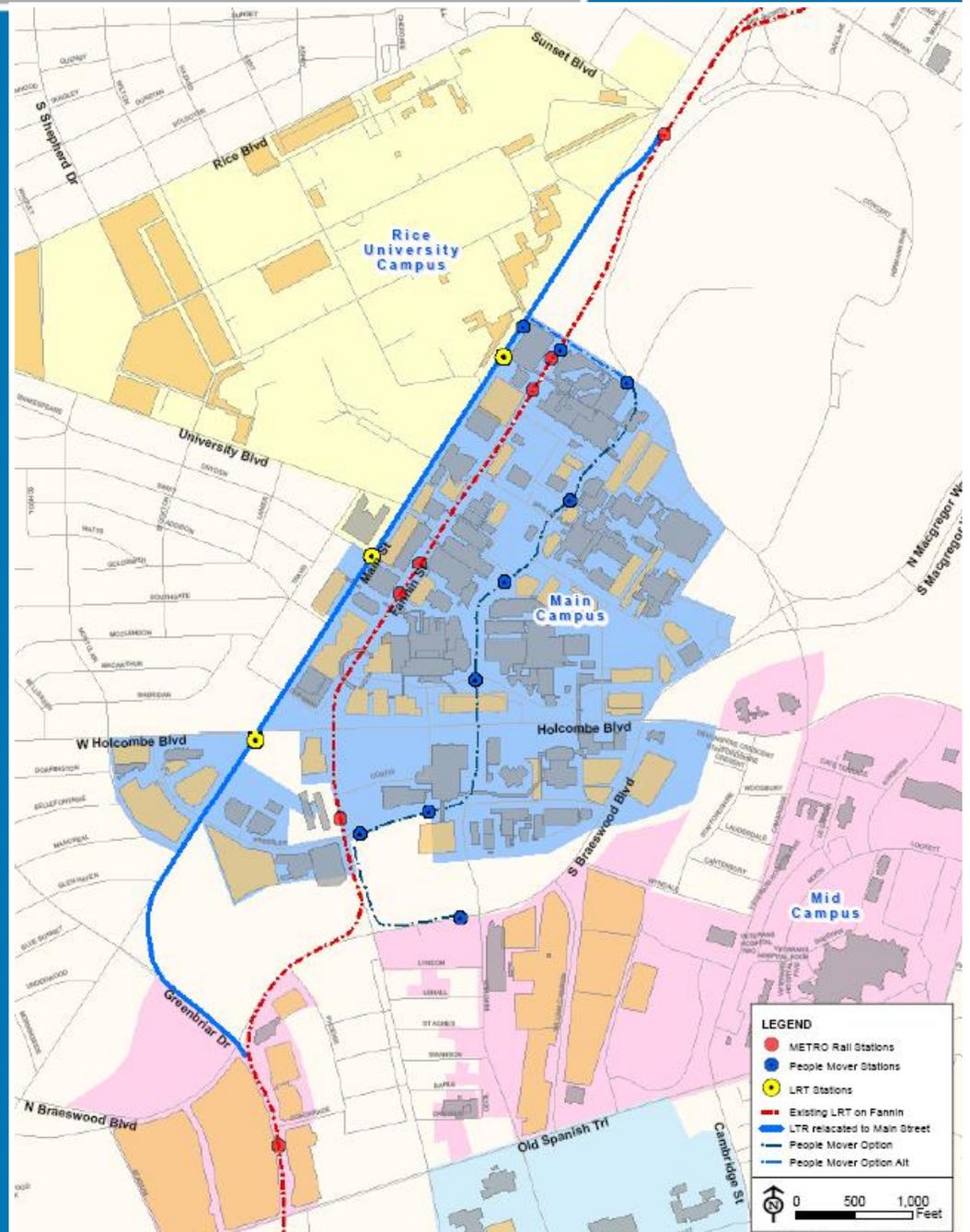


LRT on Main/Fannin One-Way Pair Looking Northeast

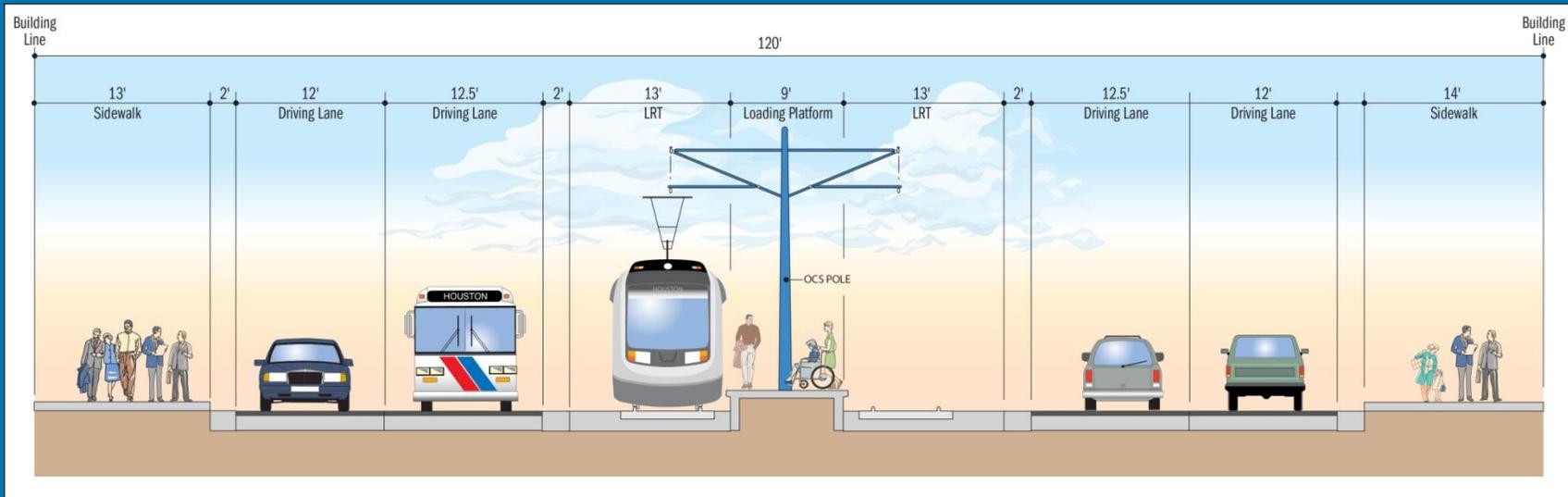


LRT on Main

- Advantages
 - Greater opportunity to develop more travel lanes and wider sidewalks on Fannin
 - Improved access to parking facilities along Fannin
- Disadvantages
 - Increased walking distances for most LRT passengers
 - Increased traffic congestion on Main, though less pedestrian activity and traffic turning movements
 - Greater impact on Hermann Park for LRT transition
 - Construction impacts on Main

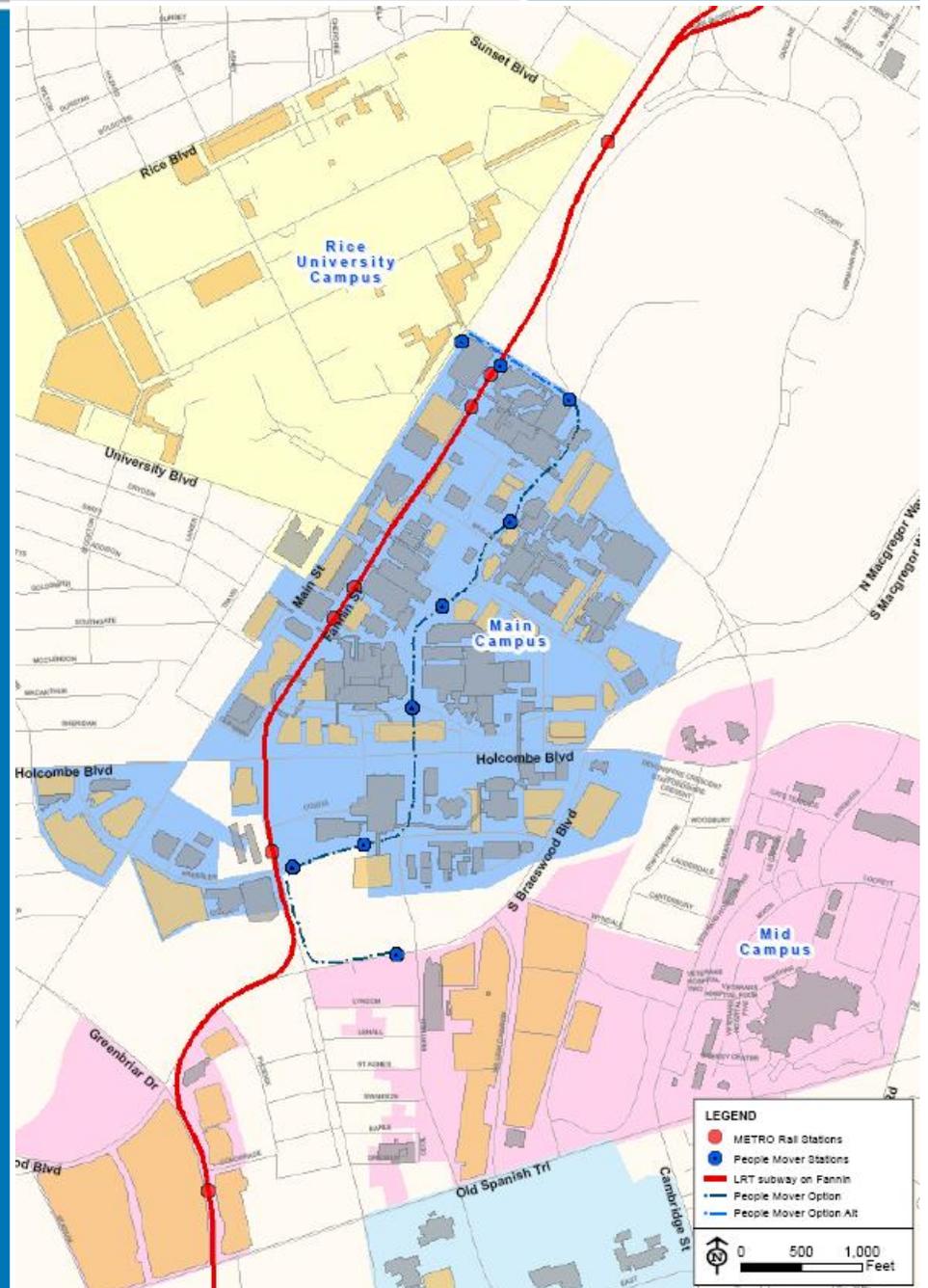


LRT on Main Looking Northeast

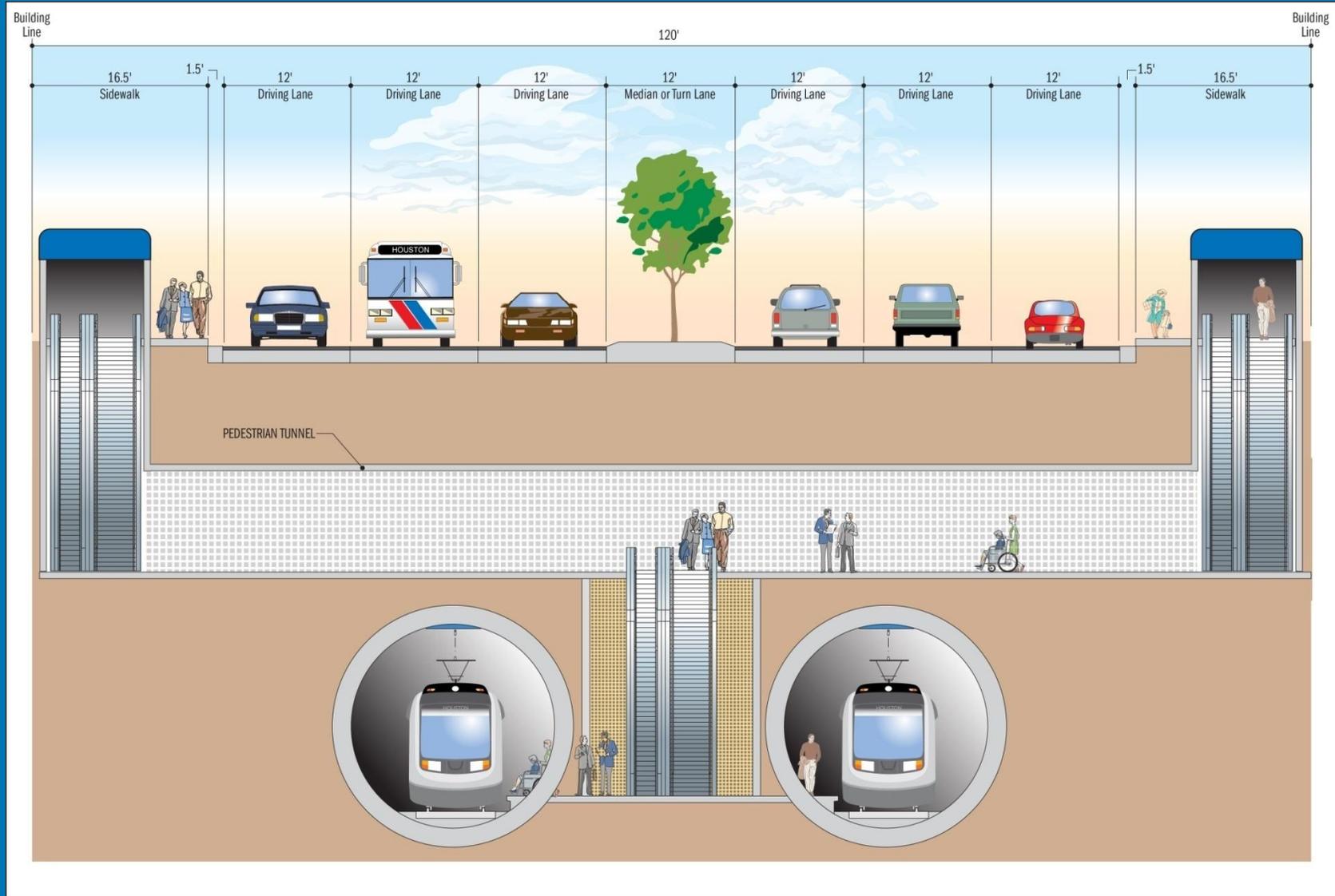


LRT in Subway on Fannin

- Advantages
 - Greater opportunity to develop more travel lanes and wider sidewalks on Fannin
 - Reduced travel time for LRT through TMC area
 - Allows separation of station passenger movements from LRT and street traffic
 - Potential direct building access from stations
 - Opportunity for wider station platforms
- Disadvantages
 - Utility relocation and flood mitigation required
 - Very high capital cost for underground construction
 - Greater construction impacts

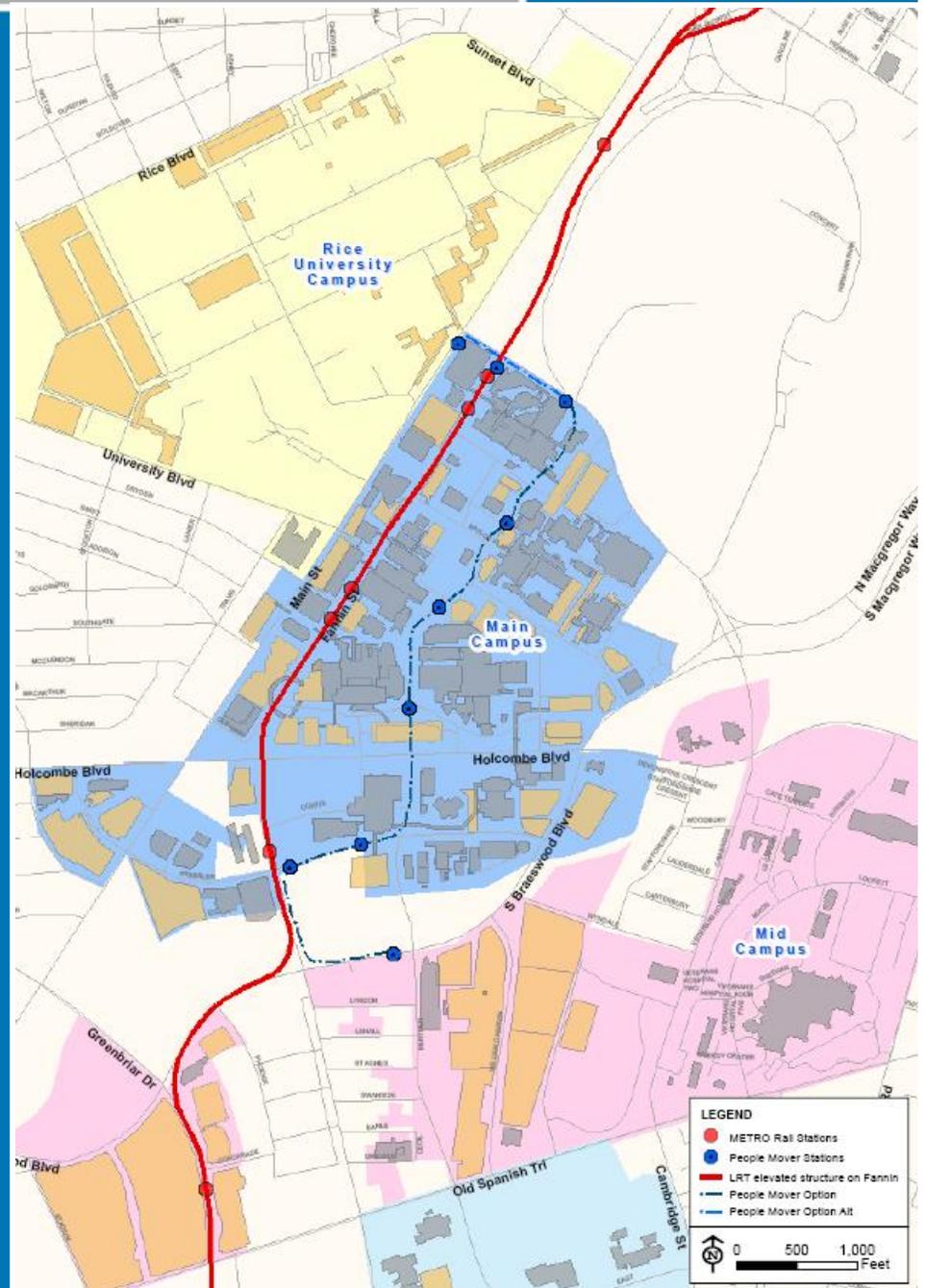


LRT in Subway on Fannin

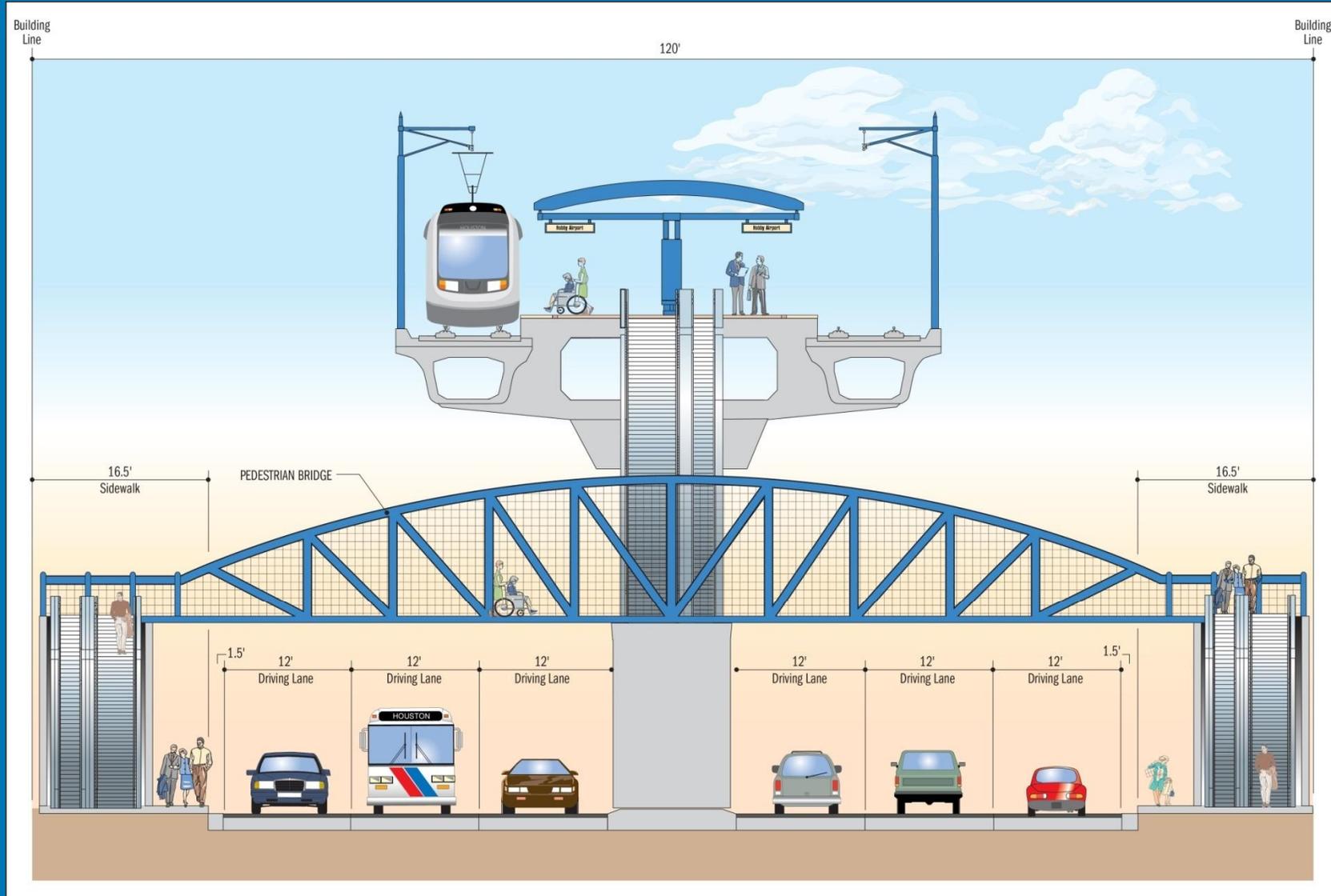


LRT on Elevated Structure on Fannin

- Advantages
 - Greater opportunity to develop more travel lanes and wider sidewalks on Fannin
 - Reduced travel time for LRT through TMC area
 - Allows separation of station passenger movements from LRT and street traffic
 - Potential direct building access from stations
 - Opportunity for wider station platforms
- Disadvantages
 - Impact on existing pedestrian overpasses on Fannin
 - Visual obstruction along street
 - Higher cost with grade-separated treatment
 - Greater construction impacts

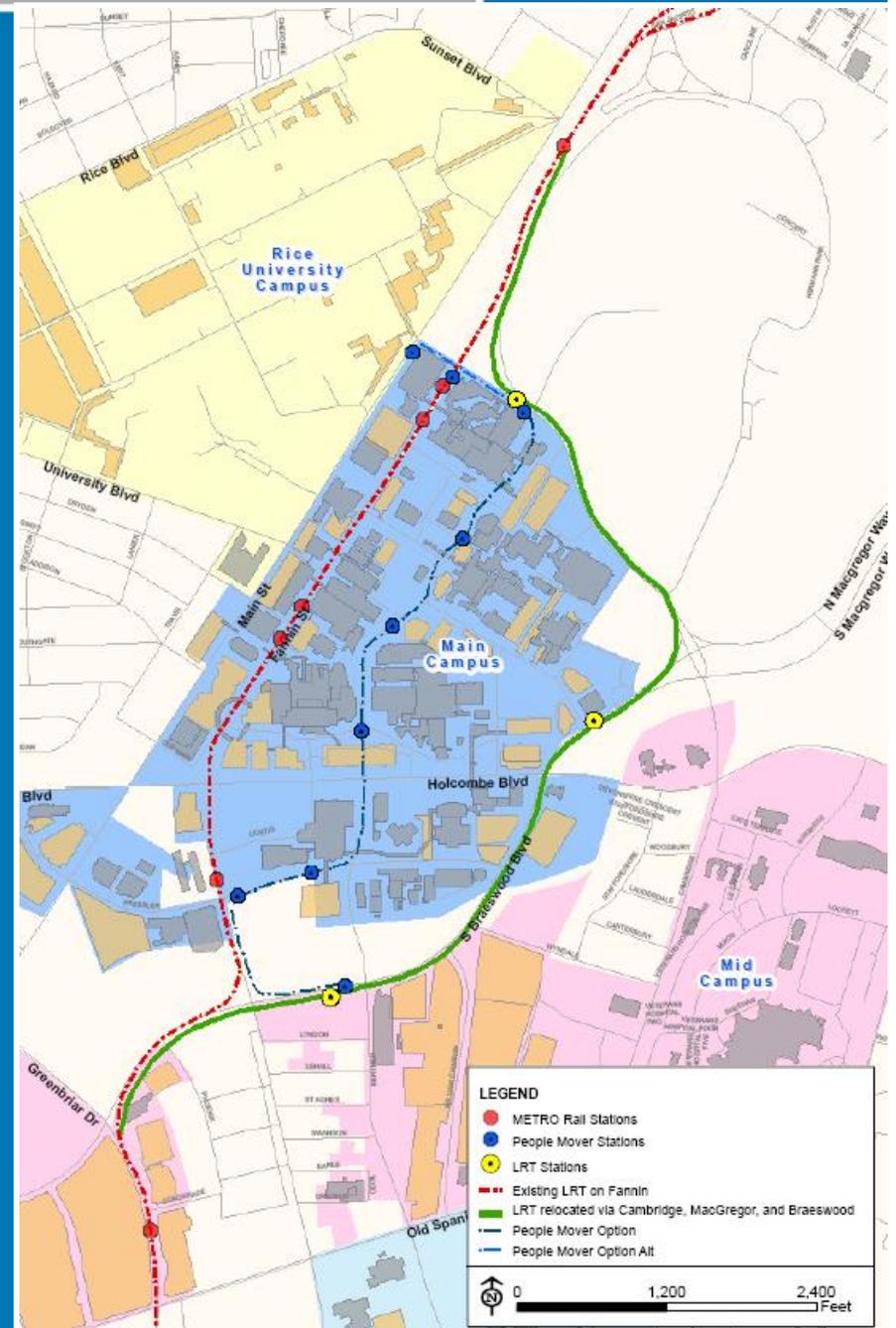


LRT on Elevated Structure on Fannin

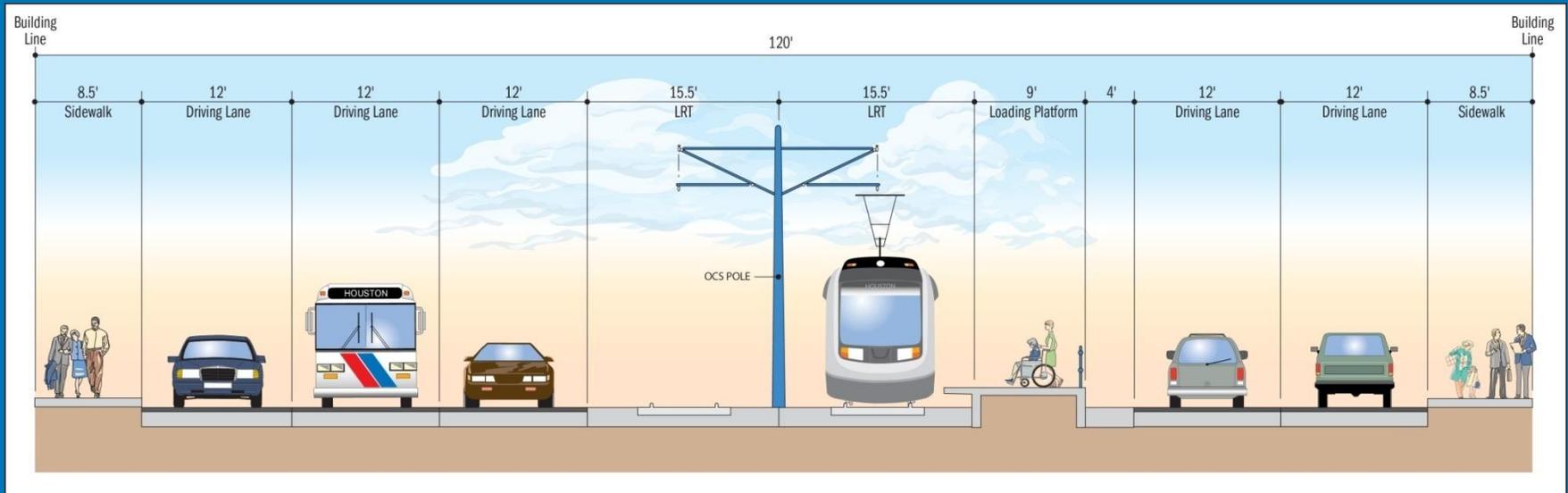


At-Grade LRT on Cambridge, MacGregor, Braeswood

- Advantages
 - Greater opportunity to develop more travel lanes and wider sidewalks on Fannin
- Disadvantages
 - Greater LRT travel time through TMC
 - Less transit passenger accessibility to TMC Main Campus
 - Impact on traffic operations on three streets
 - Potential right-of-way impact to build LRT if general traffic capacity is maintained
 - Impact on Hermann Park with Cambridge widening.

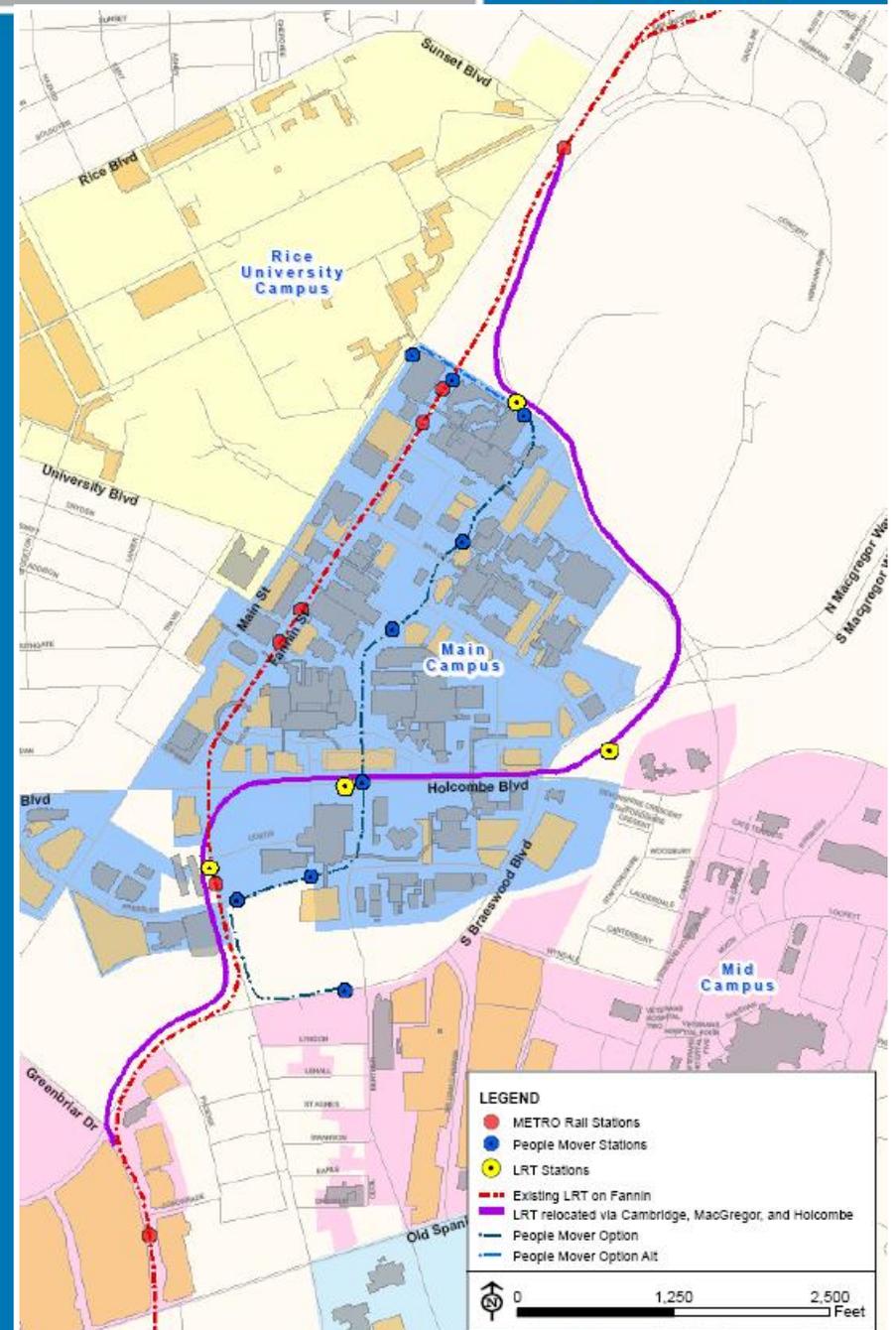


At-Grade LRT on Cambridge, MacGregor, Braeswood

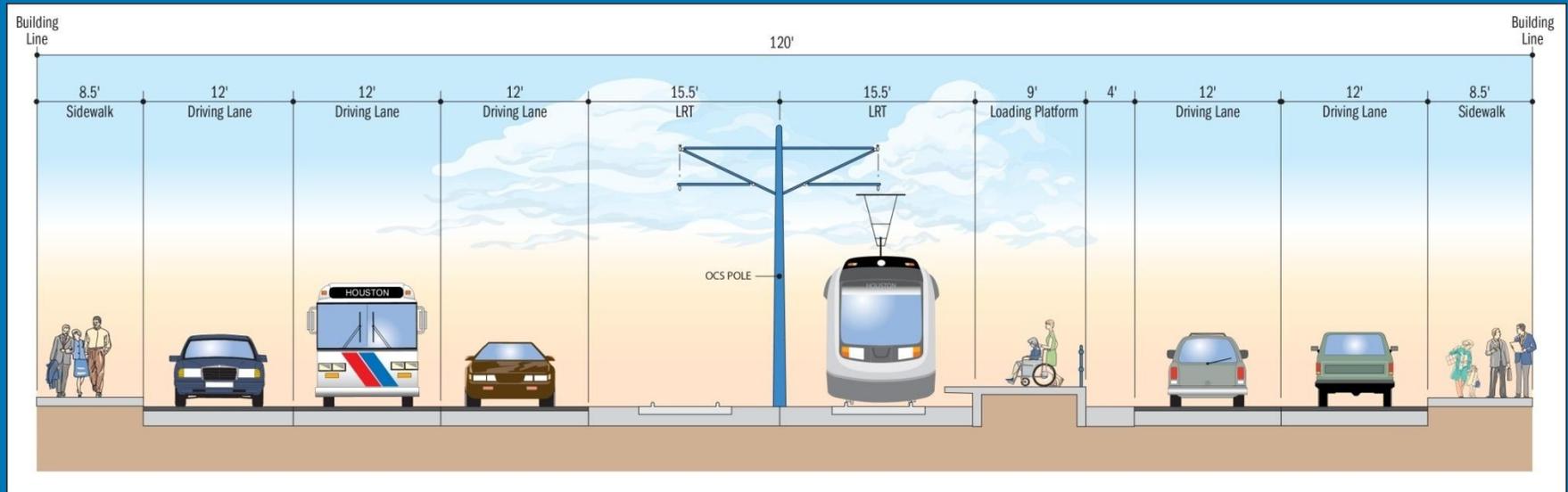


At-Grade LRT on Cambridge, MacGregor, Holcombe

- Advantages
 - Greater opportunity to develop more travel lanes and wider sidewalks on Fannin
- Disadvantages
 - Greater LRT travel time through TMC
 - Less transit passenger accessibility to TMC Main Campus
 - Impact on traffic operations on three streets
 - Potential right-of-way impact to build LRT if general traffic capacity is maintained
 - Impact on Hermann Park with Cambridge widening.

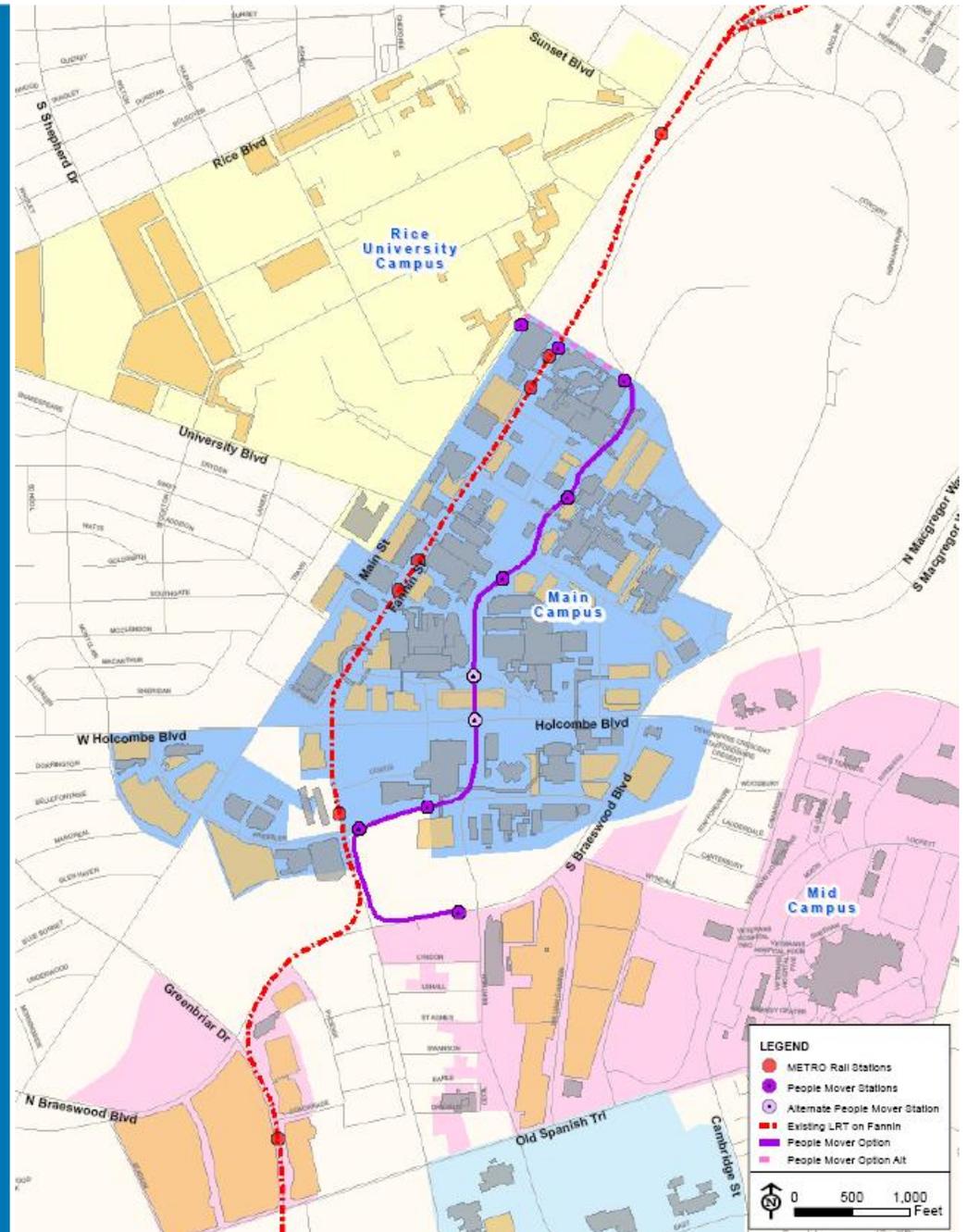


At-Grade LRT on Cambridge, MacGregor, Holcombe



People Mover Alternative

- Northern and southern ends connect with any of the LRT alternatives
- All-elevated alignment avoids traffic conflicts
- Full automation is practical, allowing high service frequency
- Alignment has physical and visual impacts on existing development and streets
- Convenient access between stations and passenger destinations is difficult
- Capital cost is significant
- Only marginal benefit to LRT on Fannin



Automated People Mover (AGT) Systems



Miami Metromover



IUPUI People Mover (Indianapolis)

Source: Wikipedia

Comparison of TSM Accessibility People Mover vs. Shuttle Bus

People Mover

- Exclusive guideway, no traffic interference
- Shorter travel times
- Greater service frequency
- Difficult alignment and station-to-destination access issues
- High capital cost

Shuttle Bus

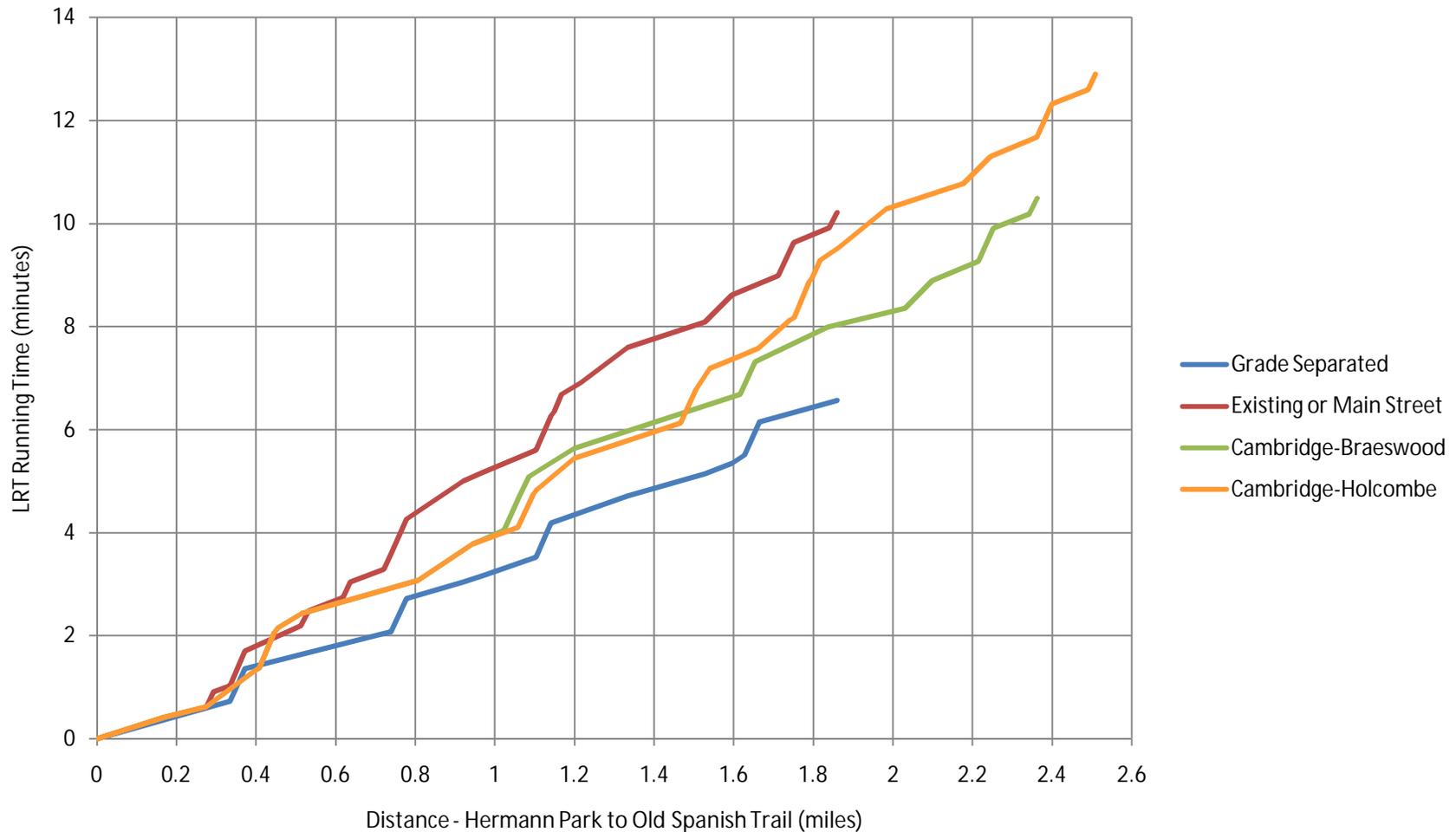
- Broader coverage of parking and TMC destinations
- Facility-specific routings
- Impeded by traffic conflicts
- Labor-intensive operation

LRT Relocation Evaluation Criteria

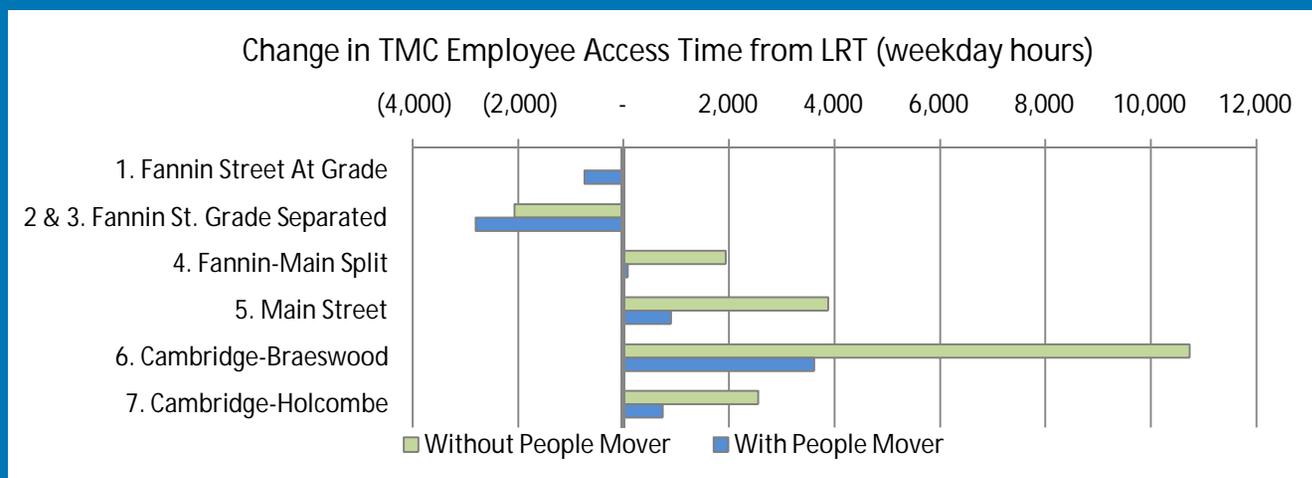
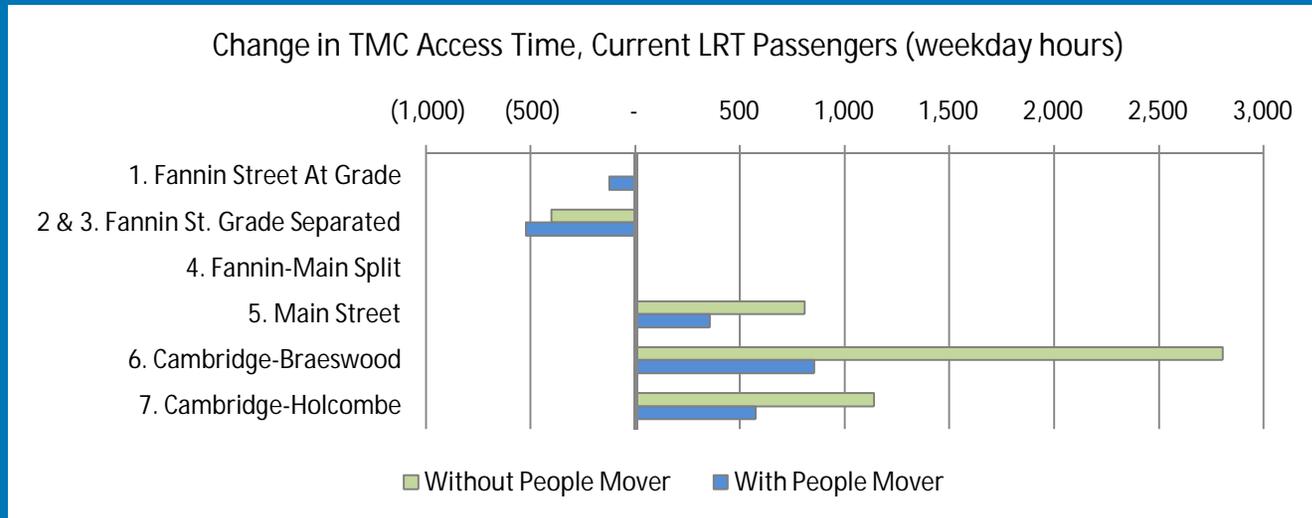
- LRT train running time
- Traffic operations
- Traffic conflicts
- “Order-of-magnitude” costs
 - Capital
 - Operations/maintenance
- TMC Main Campus access times
 - For current LRT passenger trips to/from stations
 - For current TMC Main Campus employment
- Right-of-way requirements
- Environmental impact
- Constructability

Estimated LRT Running Times and Distances

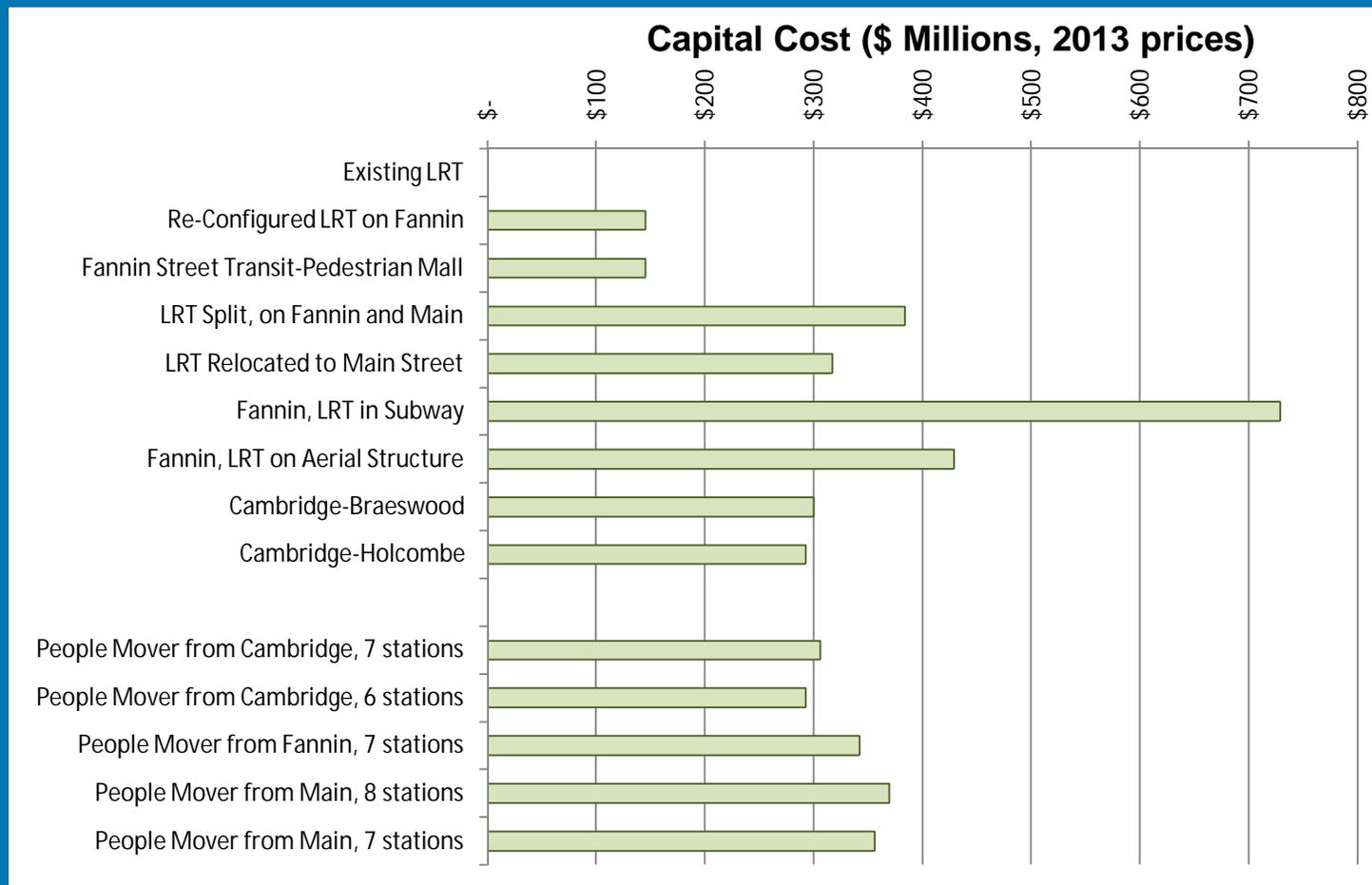
Estimated LRT Running Times and Distances for TMC Alternatives



Effects on LRT Access Times in the TMC



Order of Magnitude Capital Cost Estimate

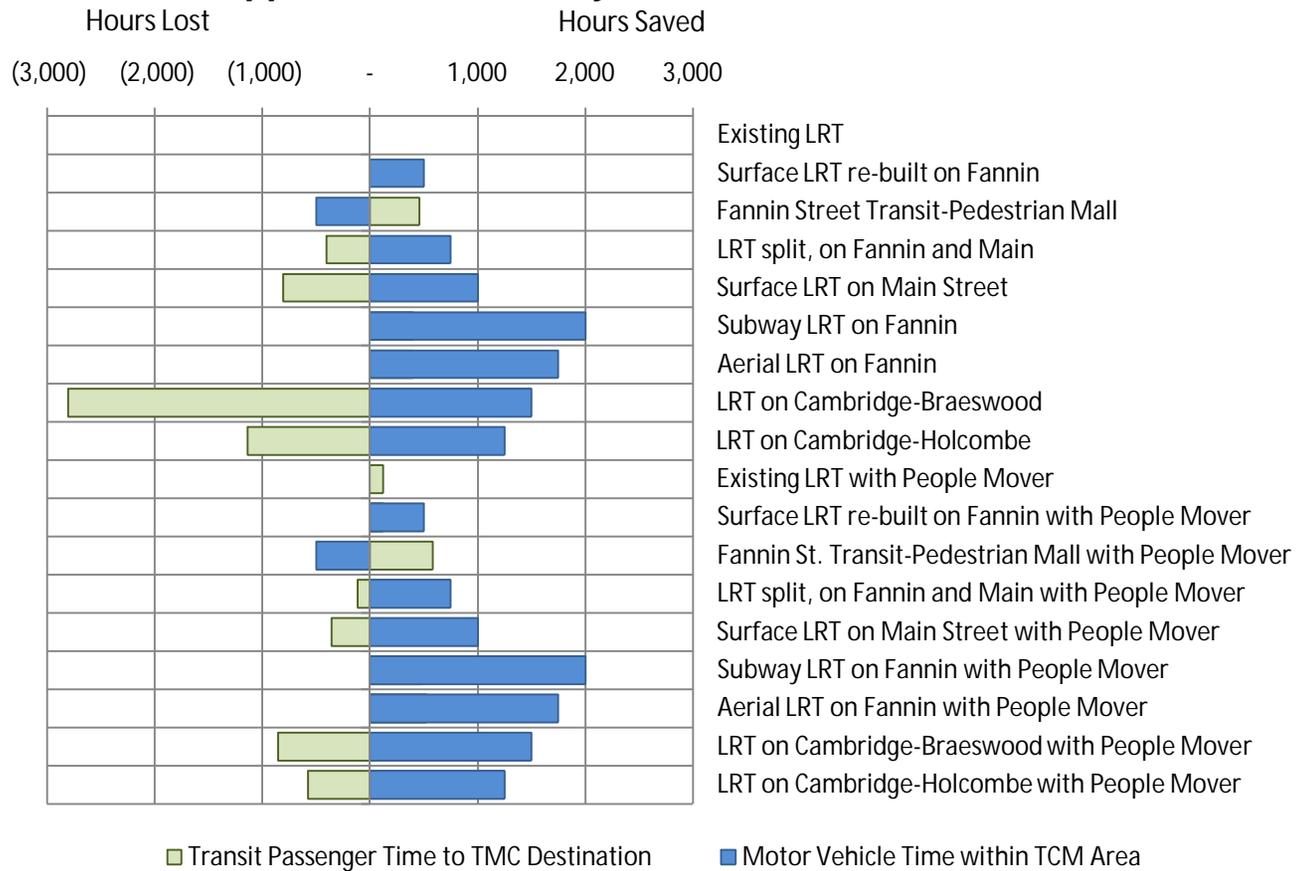


Past Crash Experience Along Alternate Alignments

Alternative	Number of Crashes (2007 – 2011)
Westside of Fannin	171
Main/Fannin one-way pair with LRT on both streets	250
Two-way on Main	79
Subway on Fannin	171
Elevated on Fannin	171
At-grade via Cambridge, MacGregor, Braeswood	64
At-grade via Cambridge, MacGregor, Holcombe	151

Weekday User Travel Time Saved or Lost

Approximate Weekday User Timed Saved or Lost



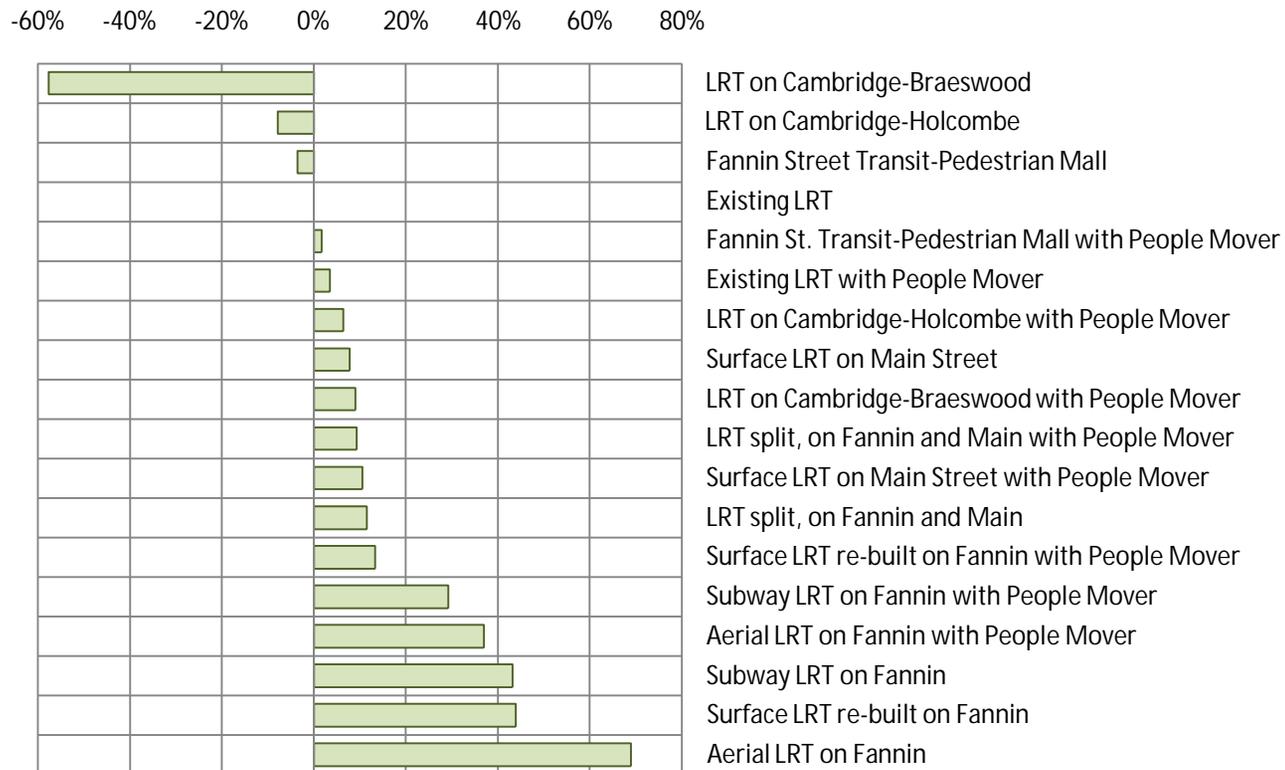
Annualized Cost and Travel Time Benefits

Costs and Transportation User Time-Savings Benefits of the Guideway Transit Alternatives (millions, 2013 prices)



Benefit/ Cost Ratio

BENEFIT/COST RATIO OF GUIDEWAY TRANSIT ALTERNATIVES



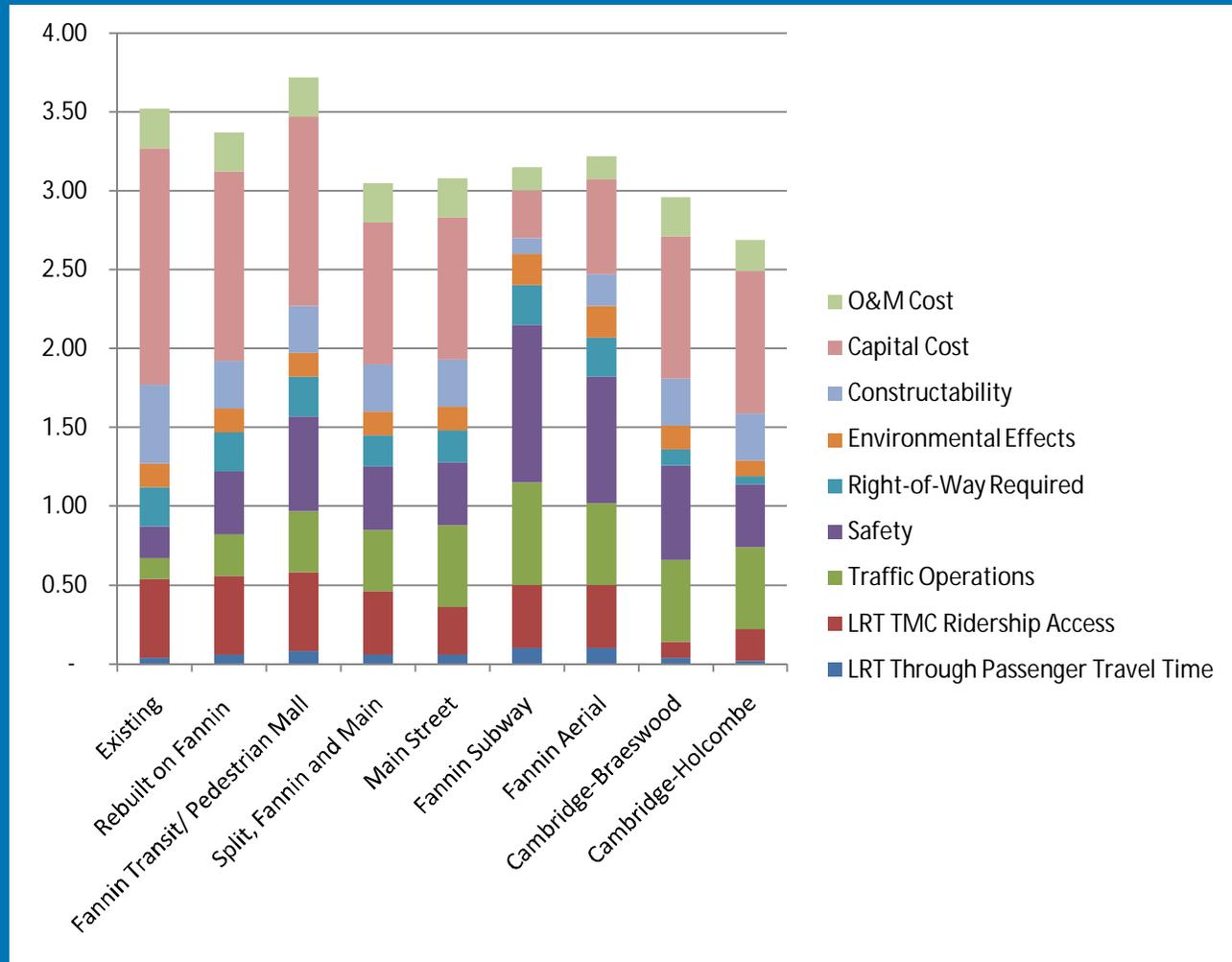
Benefit estimates are for travel times only and do not include value of effects such as possible reductions in crashes, benefits due to induced travel or future growth in travel, and indirect benefits such as economic impact of construction

Overall LRT Alternatives Comparison

- Each criterion scored 1-5
- Nine criteria used

IMPORTANCE WEIGHTING (Assumed by Study Team)	
LRT Through Passenger Travel Time	2%
LRT TMC Ridership Access	10%
Traffic Operations	13%
Safety	20%
Right-of-Way Required	5%
Environmental Effects	5%
Constructability	10%
Capital Cost	30%
O&M Cost	5%
WEIGHTED SCORE (highest is best)	100%

Overall LRT Alternatives Comparison



Questions?

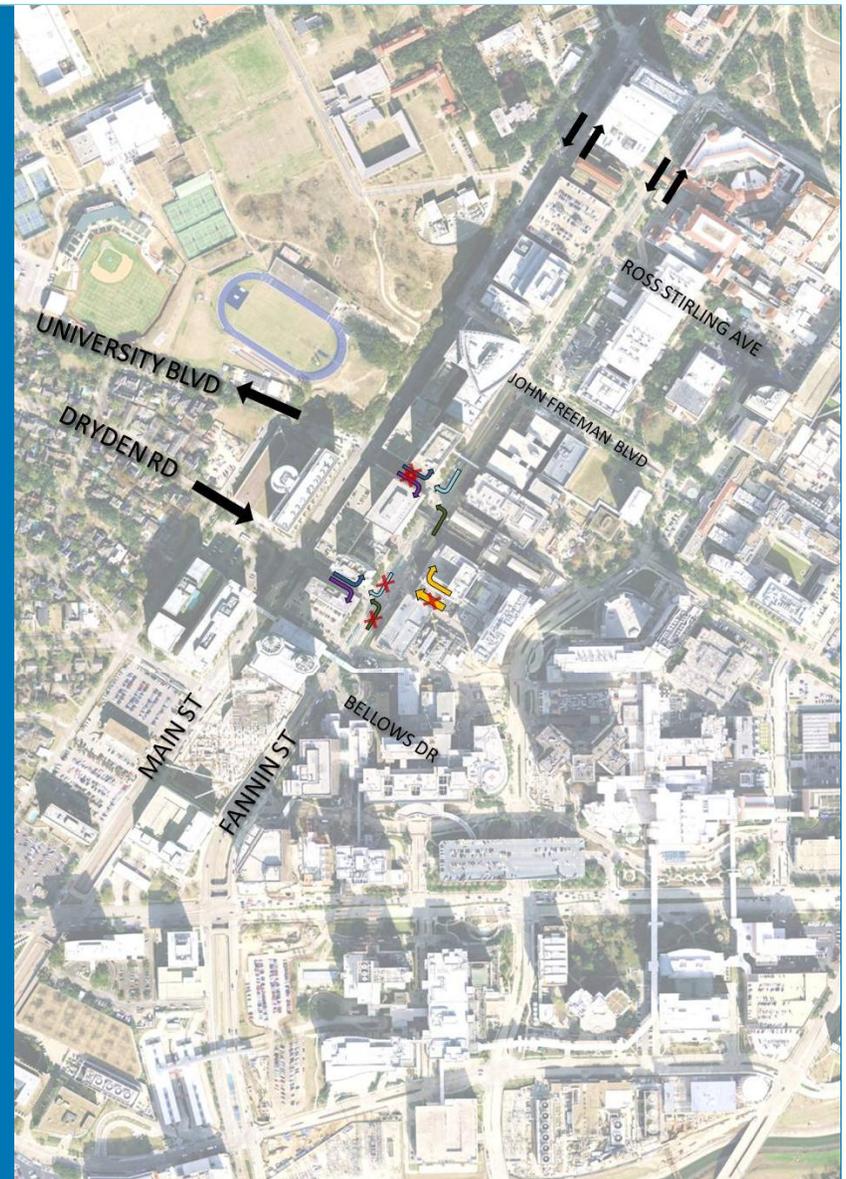
Roadway/Signal System Alternatives

- University/Dryden One-Way Pair
- Signal removal at Ross Sterling and Bellows
- Alternatives 1 and 2 combined



University/Dryden One-Way Pair

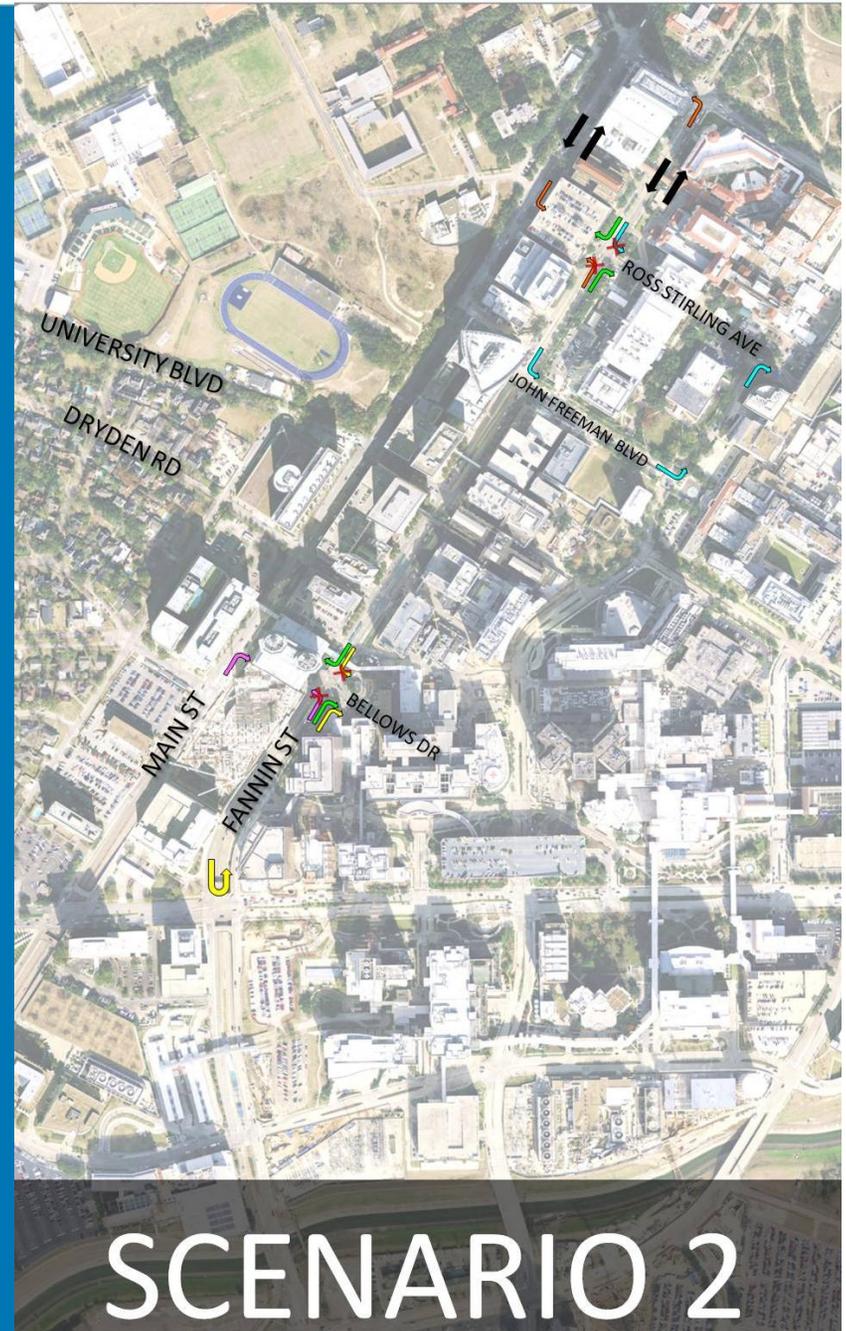
- **Dryden - EB one-way**
 - NB approach - NB Left movement eliminated
 - SB approach - No modification
 - WB approach - Only left and right turns are allowed
 - Thru movement eliminated
 - EB approach - 4 lane approach
- **University - WB one-way**
 - WB, NB and SB approaches no modifications
 - EB approach converted to WB lanes



SCENARIO 1

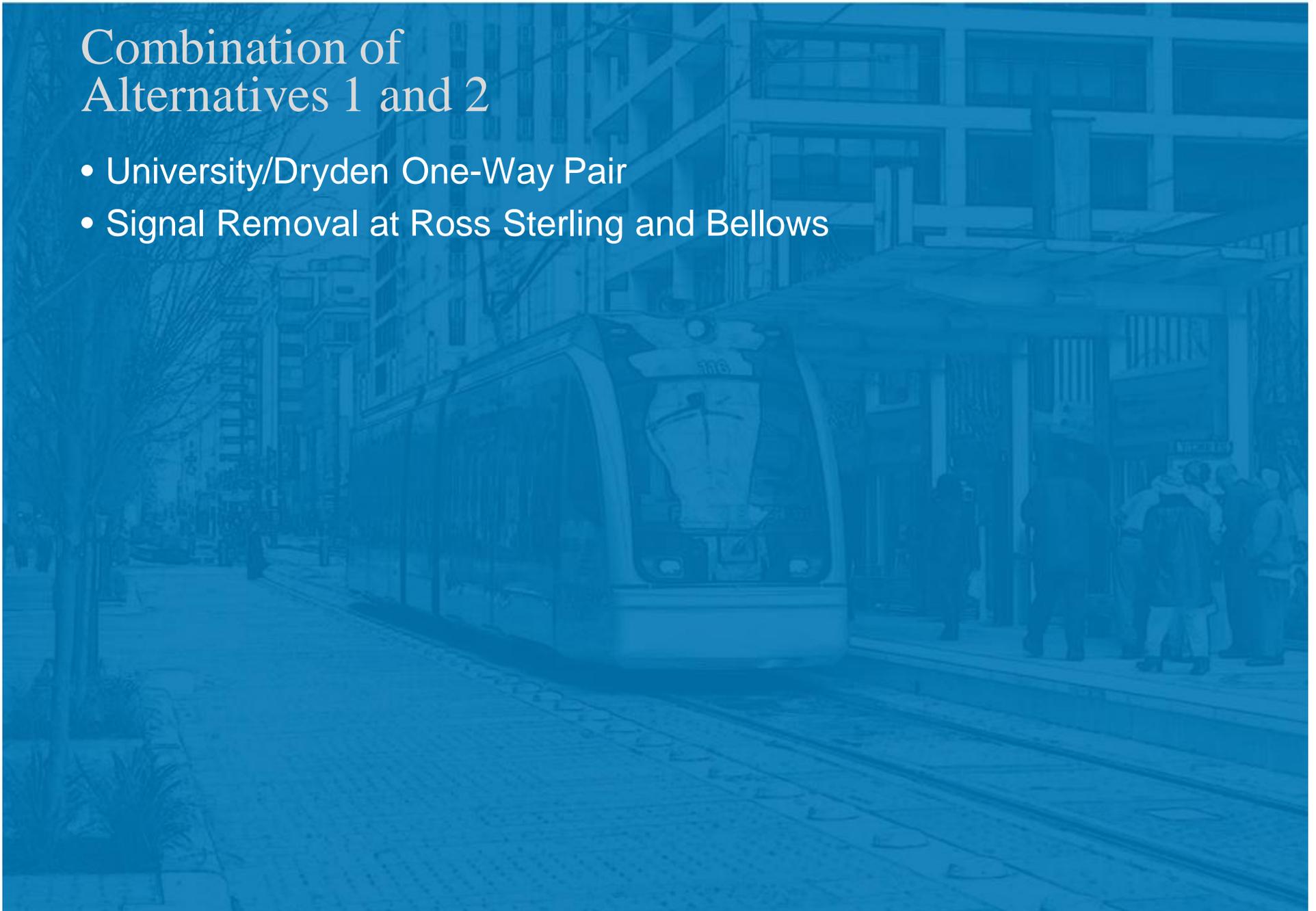
Signal Removal at Ross Sterling and Bellows

- Median closure both intersections
- Right in-Right out only movements allowed
- Bellows
 - SB left turning vehicles have to make U-turn at Holcombe
 - NB left turning vehicles have to use Main Street to access
- Ross Sterling
 - SB left turning vehicles have to make left turn at John Freeman
 - NB left turning vehicles have to turn left at Cambridge to access the parking garage from Main Street



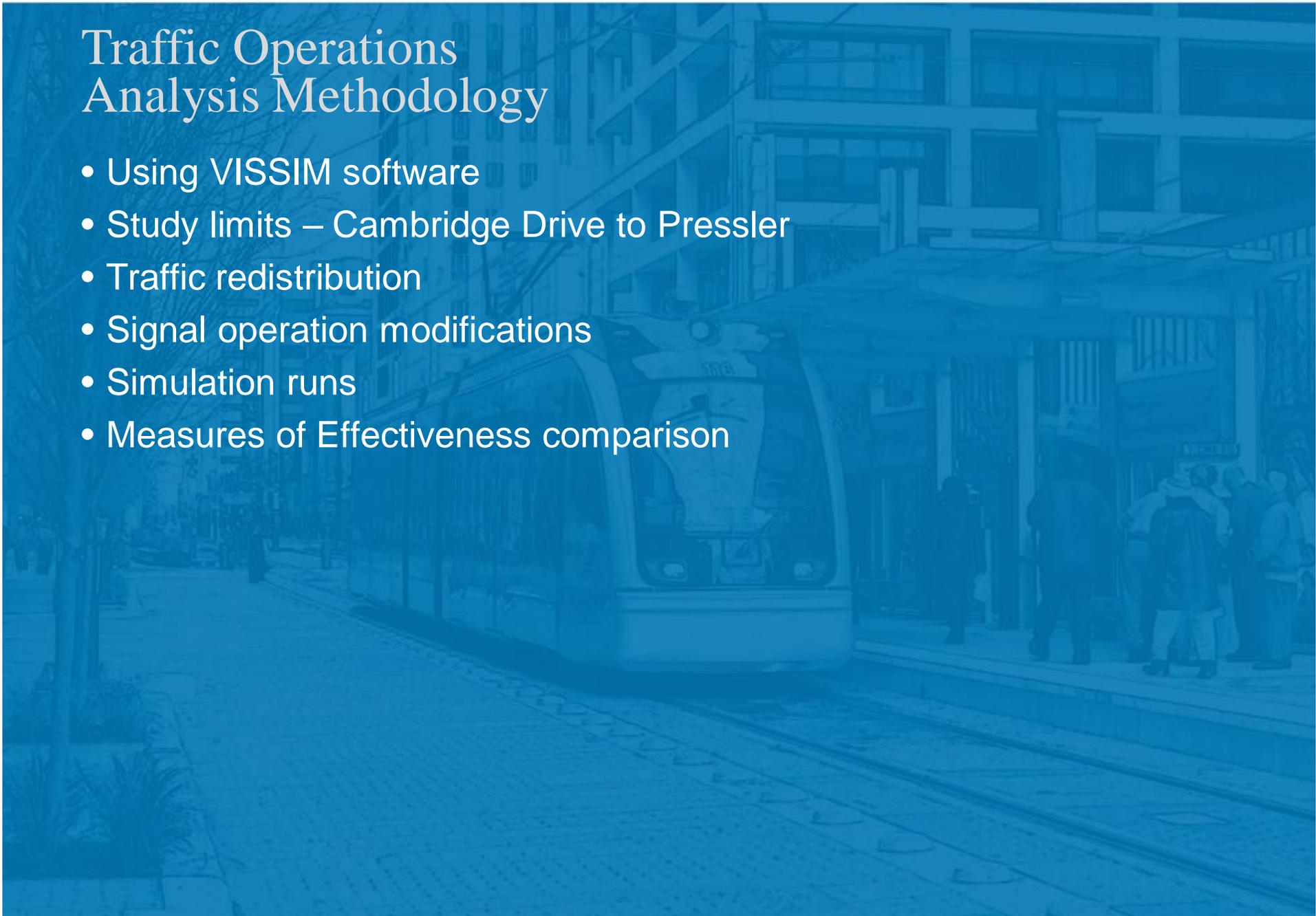
Combination of Alternatives 1 and 2

- University/Dryden One-Way Pair
- Signal Removal at Ross Sterling and Bellows



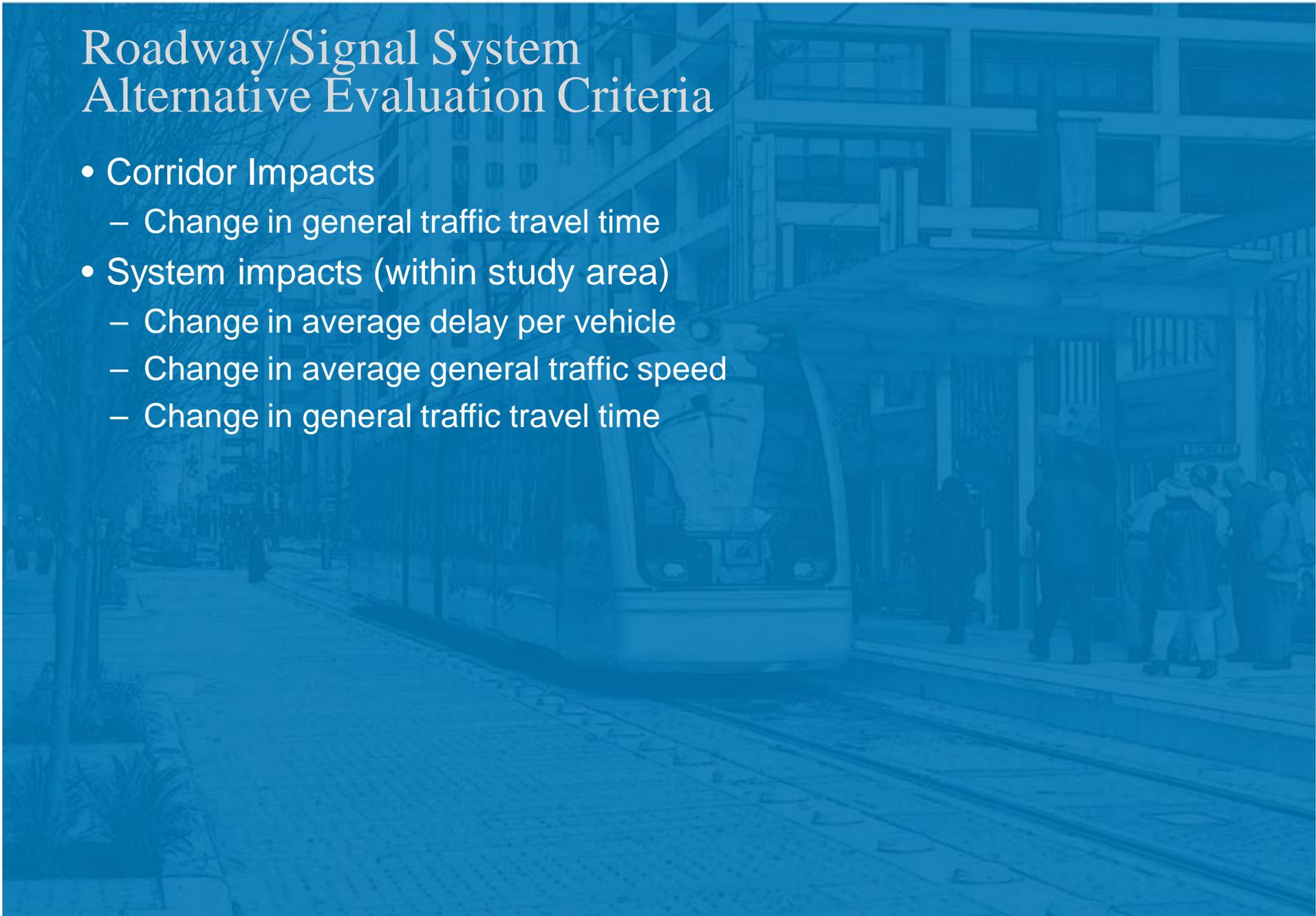
Traffic Operations Analysis Methodology

- Using VISSIM software
- Study limits – Cambridge Drive to Pressler
- Traffic redistribution
- Signal operation modifications
- Simulation runs
- Measures of Effectiveness comparison

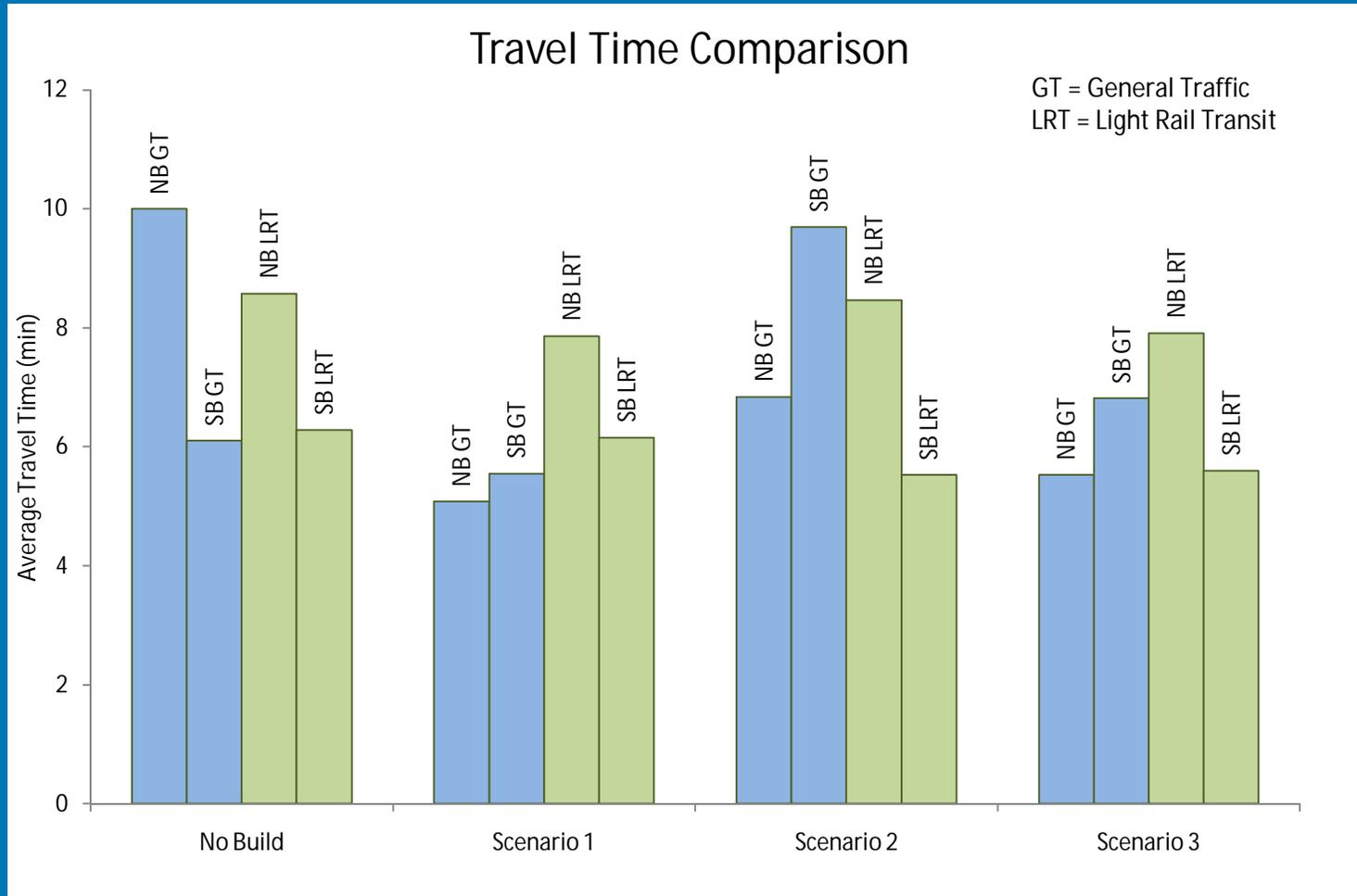


Roadway/Signal System Alternative Evaluation Criteria

- Corridor Impacts
 - Change in general traffic travel time
- System impacts (within study area)
 - Change in average delay per vehicle
 - Change in average general traffic speed
 - Change in general traffic travel time

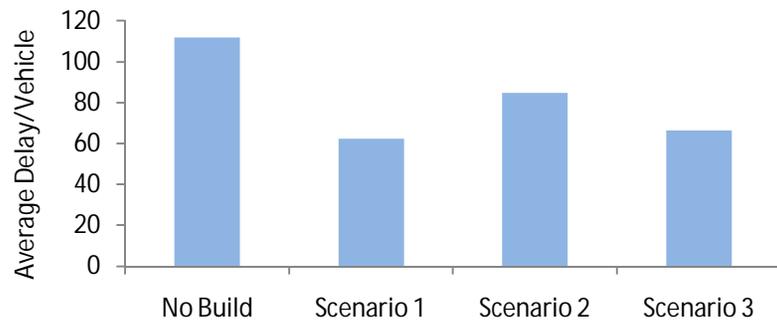


Corridor Impacts

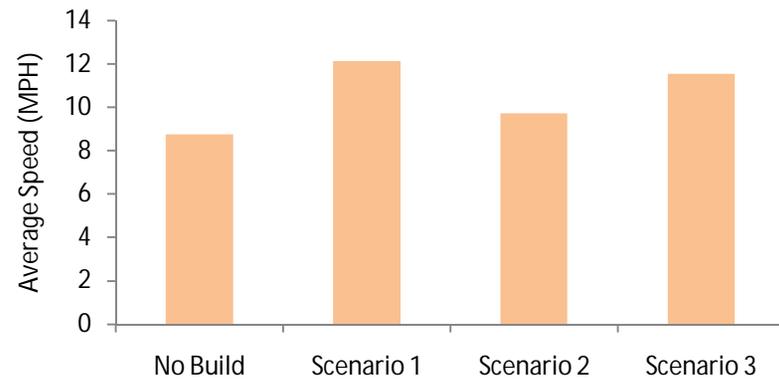


System Impacts

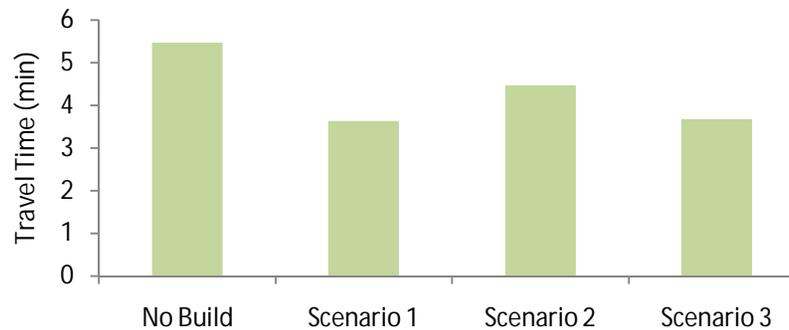
Average Delay/Vehicle Comparison



Average Speed Comparison



Total Travel Time Comparison



VISSIM Video Screen Capture
University/Dryden One-Way Pair
Existing Weekday AM Peak

VISSIM Video Screen Capture
University/Dryden One-Way Pair + Signal Removal
Existing Weekday AM Peak

Conclusions

- Fannin St. provides best accessibility to TMC Main Campus
- LRT relocation alternatives are all expensive
- Lower cost roadway and signal system options effective
 - Consider conversion of University/Dryden to one-way pair
 - Signal removal at Ross Sterling and Bellows
 - ADA accessibility improvements at intersections

Updated Schedule

- Regional Modeling Results – December
- Tech Memo – Modal Analysis – January 2014
- Tech Memo – System Alternatives Analysis – February 2014
- Next Steering Committee Meeting – February 2014
- Second Stakeholders Meeting – February 2014
- Second Public Meeting – March 2014
- Final Report - April 2014

Committee Involvement

- Facilitate Data Collection - Complete
- Identify Issues and Needs - Complete
- Review of Goals and Objectives and Evaluation Framework – Complete
- Review Preliminary List of Projects - Complete
- Identify and Evaluate System Alternatives - Ongoing
- Review Draft Mobility Plan

Questions?

A blue-tinted photograph of a streetcar at a station. The streetcar is in the center, with the number 116 visible on its front. Several people are standing on the platform to the right, waiting. The background shows a multi-story building and trees. The entire image is overlaid with a semi-transparent blue filter.