Appendices
Appendix A: SAC Presentations and Sign-in Sheets
SAC Meeting #1
SAC Meeting #1, January 24, 2014

Agenda
- Introduction
- Project Methodology
- Data Collection
- Summary/Survey
- Logistics
- Next Steps/Action Items

Introduction
- Project Background and Purpose
- Meeting Goals

Project Methodology
**Schedule**

**Data Collection – January/February**

**Alternatives Development Workshop – March 31st**

**Alternatives Assessment – April**
Refined Metromover Alternative - May
http://www.youtube.com/watch?v=XNiXmRgQDB

Implementation Strategies - June
- High-Level
- Capital and Operating Funding Strategy
- Immediate, Short, Medium, and Long-Term Strategies
- Steps for inclusion in Agency Plans
  - CIP
  - FDOT Work Program
  - LRTP

Deliverables
- Interim Memorandums – Throughout Project
- Report - July
- Executive Summary - July

DATA COLLECTION SUMMARY/SURVEY LOGISTICS
Reviewed Studies

2025 Downtown Miami Master Plan
Source: 2025 Downtown Miami Master Plan, October 2009

PortMiami Studies

Source: PortMiami 2035 Master Plan
PortMiami Studies

Other Study Findings
- Recommended PortMiami and Bayshore Drive Metromover Connections (MCNP)
- Brickell Extension (2035 LRTP)
- Anticipated Omni/Brickell Loop Closures (2040 LRTP)
- Signage/Lighting/Other Refurbishments (TDP)
- Trolley Connections – Coral Way/Brickell Trolley (2035 LRTP)
- Safety/Security Programs (2035 LRTP)
- Draft Literature Review - February 2014

Similar Systems Worldwide

Summary of System Review
- Matrix of Similar Systems
  - Location
  - Purpose
  - Dates of Operation
  - Technology
  - Length and Expansions
- Expanded Systems
  - Jacksonville
  - Lille, France
  - Paris, France
  - Lausanne, Switzerland

Passenger Survey

- Methodology
  - Sampling Survey
  - IPADs

- Goals
  - Origin-Destination Information Between Zones
  - Trip Purpose
  - Socio-economic Information

- Target Date - February 12th

Survey Locations

Draft Survey

NEXT STEPS/ ACTION ITEMS
Next Steps/Action Items

- Conduct Survey – February 12th
- March SAC Meeting – March 31st at DDA
  - Present Survey Results
  - Develop/Refine Alternatives
  - Present Screening Criteria

Initial Options

- Close Brickell Loop
- Extend South along Brickell
- Beach Connection
- Close Omni Loop
- Marlins Park Connection
- Omni Loop North Extension
- PortMiami Connection
### MEETING ATTENDANCE

**Date:** 1/24/2013  
**Time:** 10:00 AM  
**Subject:** SAC #1  
**Location:** Miami KHA Office

<table>
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<tr>
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<th>Company/Department</th>
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<th>Address or E-mail Address</th>
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<tr>
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<td>KHA</td>
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<td><a href="mailto:jill.capelli@kimley-horn.com">jill.capelli@kimley-horn.com</a></td>
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The meeting adjourned at: 12:00 PM
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SAC Meeting #2
SAC Meeting #2

Agenda
- Survey Summary
- Alternatives Brainstorming
- Draft Evaluation Matrix
- Next Steps/Actions Items

Final Survey
- OD Patterns
- Trip Purpose
- Access/Egress Mode
- Frequency of Use
- Extension Options
- Zip Code
- Gender

Survey Locations
Survey Summary

Are you willing to take the survey?
  – Approached 1,193 Riders
    • Yes 75% (898)
    • No 25% (295)

February 2013 Boarding Activity
  – Surveyed Stations = 22,859 boardings
    • 5.5% intercepted
    • 3.9% surveyed
  – All Stations = 32,741 boardings
    • 3.6% intercepted
    • 2.7% survey

Where did you BEGIN this one-way trip?
  a. Your Workplace (24%)
  b. Other Office/Meeting (2%)
  c. Your Home (49%)
  d. Shopping (5%)
  e. School (K-12) (1%)
  f. College/University (Students Only) (8%)
  g. Medical/Health Care (1%)
  h. Social/Recreational (4%)
  i. Other (airport, hotel, etc.) (6%)

Where did you END this one-way trip?
  a. Your Workplace (29%)
  b. Other Office/Meeting (5%)
  c. Your Home (31%)
  d. Shopping (7%)
  e. School (K-12) (1%)
  f. College/University (students only) (10%)
  g. Medical/Health Care (1%)
  h. Social/Recreational (9%)
  i. Other (airport, hotel, etc.) (7%)
Survey Summary

- How many days per week do you typically use Metromover?

- Modes To/From Metromover

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<thead>
<tr>
<th>Mode</th>
<th>Access Percent</th>
<th>Egress Percent</th>
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<tr>
<td>Walk Only</td>
<td>368 (41%)</td>
<td>411 (46%)</td>
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<tr>
<td>Metrorail</td>
<td>226 (25%)</td>
<td>209 (23%)</td>
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<tr>
<td>Bus</td>
<td>187 (21%)</td>
<td>175 (19%)</td>
</tr>
<tr>
<td>Car/Taxi</td>
<td>65 (7%)</td>
<td>60 (7%)</td>
</tr>
<tr>
<td>Bicycle</td>
<td>10 (1%)</td>
<td>10 (1%)</td>
</tr>
<tr>
<td>Other</td>
<td>42 (5%)</td>
<td>33 (4%)</td>
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</table>
Would you like to see the Metromover add another stop?
- Yes 36% (315) / No 64% (564)

Top responses for Metromover Expansion:
- Beach/Miami Beach/South Beach (59%)
- Midtown (24%)
- South Extension (7%)
- North Extension (7%)
- Dadeland (4%)
Alternatives Development

- Workshop/Charette
  - Small groups
  - Concepts by zone
  - Summarize concepts on 11x17 sheets
  - Supporting GIS data
  - Favorites

Screening Matrix

<table>
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<tr>
<th>Alternative</th>
<th>Description</th>
<th>Walkability</th>
<th>Residential</th>
<th>Density</th>
<th>Transit Ridership</th>
<th>Proposed Length</th>
<th>Infrastructure</th>
<th>Constraints</th>
<th>Geometric Constraints</th>
<th>Constructability</th>
<th>Cost</th>
<th>Effectiveness</th>
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Next Steps / Action Items

- Alternatives Assessment: April/ May
- Refined Metromover Alternative: May
- Implementation Strategies: June
- Report: July
- Executive Summary: July
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Agenda
- Alternatives Assessment
- Refined Metromover Expansion Plan
- Draft Report Status
- Next Steps

Workshop
Workshop Alternatives

Activities Since Workshop
- Field Review
- Concept Development
  - North
  - South
  - East
  - West
- Metromover Expansion Master Plan
- Screening
- Refinement

Feasibility Assessment
- Qualitative Assessment
  - Infrastructure Constraints
  - Geometric Constraints
  - Constructability
  - Pedestrian Friendly Environment
- Quantitative Assessment
  - Residential Population
  - Average Corridor Density
  - Bus Ridership
  - Proposed Development
  - Relative Capital Costs
Summary of Concept Alternatives

2 North Concepts

2 South Concepts

1 West Concept

40 Workshop Alternatives

Concept Alternative, North Extension

Qualitative Assessment
- Connects Wynwood, Overtown, Design District, etc.
- Rail crossings at several locations
- Overhead utilities
- Narrow street widths
- Pedestrian environment varies
- Line-Haul route

Quantitative Assessment
- Residential Population: 8,782 people
- Average Corridor Density: 14.2 people/acre
- Bus Ridership: 5,877 boardings/alightings
- Proposed Development: 12 developments
- Relative Capital Costs: Highest

Concept Alternative, North Loop

Qualitative Assessment
- Provides access to Biscayne Boulevard and other revitalized industrial areas
- Potential challenges connecting to existing line
- Rail crossings
- Pedestrian environment varies

Quantitative Assessment
- Residential Population: 8,096 people
- Average Corridor Density: 20.36 people/acre
- Bus Ridership: 7,768 boardings/alightings
- Proposed Development: 12 developments
- Relative Capital Costs: Medium

North Loop preferred over North Extension

Concept Alternative, South Extension

Qualitative Assessment
- Least number of infrastructure constraints
- Connects to the Brickell area with a pedestrian friendly environment

Quantitative Assessment
- Residential Population: 13,332 people
- Average Corridor Density: 39.14 people/acre
- Bus Ridership: 363 boardings/alightings
- Proposed Development: 11 developments
- Relative Capital Costs: Low

SAC Meeting #3, June 30, 2014
Concept Alternative, South Loop

- Qualitative Assessment
  - Fewer infrastructure constraints
  - High-rise buildings
  - Very pedestrian friendly environment
- Quantitative Assessment
  - Residential Population: 11,572 people
  - Average Corridor Density: 41.54 people/acre
  - Bus Ridership: 2,609 boardings/alightings
  - Proposed Development: 16 developments
  - Relative Capital Costs: Lowest

South Loop preferred over South Extension

Concept Alternative, East Extension

- Qualitative Assessment
  - Supports Port Miami Development Plans
  - Linear Route
  - Metrorail connection
  - Crosses Government Cut
  - Varied pedestrian environment
- Quantitative Assessment
  - Residential Population: 2,833 people
  - Average Corridor Density: 10.60 people/acre
  - Bus Ridership: 3,147 boardings/alightings
  - Proposed Development: 8 developments
  - Relative Capital Costs: High

Concept Alternative, West Extension

- Qualitative Assessment
  - Serves high transit population area
  - Miami River & I-95 crossing
  - ROW impacts anticipated
- Quantitative Assessment
  - Residential Population: 10,863 people
  - Average Corridor Density: 27.37 people/acre
  - Bus Ridership: 24,620 boardings/alightings
  - Proposed Development: 6 developments
  - Relative Capital Costs: Medium

Metromover Expansion Master Plan
REFINED EXPANSION PLAN

System Impacts

- MDT meeting, May 13, 2014
- New Maintenance Facility
- Train Control System upgrades
- Integration costs
- Reliance on existing technology

South Loop identified as Preferred Short Term Project
Simulation Analysis

ADVANCED LAND TRANSPORTATION PERFORMANCE SIMULATION

http://www.youtube.com/watch?v=XNk0YnqDBI

Costs

- Capital Costs $260M
  - Demolition $9.5M
  - Guideway $96.5M
  - Stations $22.5M
  - Vehicles $12.5M
  - Other Costs $66.0M
  - Contingency/Soft Costs $51.8M
- O&M Costs $6M / year

Funding

- FTA New Starts 50%
- Local 25%
  - Miami-Dade County
  - City of Miami
  - Special Assessment
- FDOT 25%
Implementation Plan

- Conceptual Planning
- Secure Project Funding
- Project Development/NEPA
- Engineering
- Right-of-Way
- Construction/Capital-Rolling Stock
- Secure O&M Funding

Implementation Summary

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<tr>
<th>Implementation Task</th>
<th>Budget</th>
<th>Schedule</th>
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<tr>
<td>Project Development/NEPA</td>
<td>$8M</td>
<td>2 years</td>
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<td>Engineering and Design</td>
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<td>Right of Way Acquisition (if required)</td>
<td>Market Price</td>
<td>2-3 years</td>
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<tr>
<td>Construction/Vehicle Purchase/Contingency</td>
<td>$215M</td>
<td>2-3 years</td>
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<td>Total Project (to Operation)</td>
<td>$270M</td>
<td>8 years</td>
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<tr>
<td>Operations and Maintenance</td>
<td>$6M/year</td>
<td>Annual</td>
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NEXT STEPS

Draft TPC Presentation
Next Steps/ Project Advancement

- Report status
- Funding ideas
- Implementation ideas
# Sign-In Sheet

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Appendix B: TPC Presentation
**Study Purpose**

- Study Tasks
  - Data Collection
  - Feasibility Assessment
  - Concept Alternatives/Master Plan
  - Refined Metromover Concept
  - Implementation Strategies

**Summary and Next Steps**

**DATA COLLECTION**

**Reviewed Studies**
Similar Systems Worldwide

Source: International Association of Public Transport. Observatory of Automated Metros, 2013

Data and Activities

Survey

- Origin/Destination Patterns
- Trip Purpose
- Access/Egress Mode
- Frequency of Use
- Extension Options
- Zip Code
- Gender

Survey Locations

Trip Purpose – Primary responses
- Home: Start (49%)/End (31%)
- Work: Start (24%)/End (29%)

Survey Summary

- Zip Code – Users distributed throughout the County with the highest concentration (35%) of downtown residents
- Frequency – High frequency users, 5+ days/week (66%)
- Modes – Primarily walk to stations (41-46%), but also high percentage of connections to rail (23-25%) and bus (19-21%)
Survey Summary – North Zone

- Highest movement north to west (54%)
- Relatively balanced between remaining zones

Survey Summary – South Zone

- Largest percentage remains “in zone” (50%)
- Smallest movement south to north (5%)
- Relatively balanced between east and west

Survey Summary – East Zone

- Largest movement east to west (39%)
- East to north also high (33%)
- Small percentage remains “in zone” (9%)

Survey Summary – West Zone

- Largest movement west to east (34%)
- West to south is also high (29%)

Urban Circulator
CONCEPT ALTERNATIVES

Workshop Alternatives

Field Review
Feasibility Assessment

- Qualitative Assessment
  - Infrastructure Constraints
  - Geometric Constraints
  - Constructability
- Quantitative Assessment
  - Residential Population
  - Average Corridor Density
  - Bus Ridership
  - Pedestrian Friendly Environment
  - Proposed Development
  - Relative Capital Costs

Summary of Concept Alternatives

- **North Biscayne Loop**
  - Provides access to Biscayne Boulevard and other revitalized areas
  - 12 proposed developments
- **South Brickell Loop**
  - Highest average corridor density (41.54 people/acre)
  - 16 proposed developments
  - Lowest capital cost estimates
- **West Extension to Marlins Park**
  - Infrastructure challenges with I-95 and Miami River
  - Highest transit population area
- **East Extension to Port Miami**
  - Supports PortMiami development plans
  - Infrastructure challenges with Intracoastal Waterway
REFINED METROMOVER CONCEPT

Screening

- South Brickell Loop Ranked #1
- North Biscayne Loop Ranked #2
- West Extension to Port Miami Ranked #3
- East Extension to Marlins Park Ranked #4

South Loop identified as Preferred Short Term Project

Refined Metromover Concept

Simulation Analysis

http://www.youtube.com/watch?v=XNkXIYngD8I
## Costs

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<td>Guideway Construction</td>
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<td>Station Construction</td>
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<tr>
<td>Demolition</td>
<td>$9.5M</td>
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<td>Vehicles</td>
<td>$12.5M</td>
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<td>Other System Costs</td>
<td>$66.0M</td>
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<tr>
<td><strong>Sub-Total</strong></td>
<td><strong>$207.0M</strong></td>
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<td>25% Contingency and Soft Costs</td>
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<td><strong>Total Capital Costs</strong></td>
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Additional O&M Costs $6M/year

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## Implementation Plan

- Conceptual Planning ✓
- Secure Project Funding
- Project Development / NEPA
- Engineering
- Right-of-Way
- Construction/Capital-Rolling Stock
- Secure O&M Funding
- Public Participation

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**SHORT-TERM IMPLEMENTATION STRATEGIES AND NEXT STEPS**
**Funding**

- FTA New Starts 50% ($135M)
- Local 25%  
  - Miami-Dade County ($21.3M)
  - City of Miami ($20.6M)
  - Special Assessment ($20.6M)
- FDOT 25% ($67.5M)

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**Implementation Summary**

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</tr>
<tr>
<td>Total Project (to Operation)</td>
<td>$270M</td>
<td>8 years</td>
</tr>
<tr>
<td>Operations and Maintenance</td>
<td>$6M/year</td>
<td>Annual</td>
</tr>
</tbody>
</table>

THANK YOU
Appendix C: Beach Corridor Assessment Memorandum
MEMORANDUM

To: Wilson Fernandez, Miami-Dade Metropolitan Planning Organization

From: Jill Capelli
Kimley-Horn and Associates, Inc.

Date: August 31, 2014

Subject: Metromover Analysis of Beach Corridor Connection

Kimley-Horn and Associates, Inc. (KH) was retained by the Miami-Dade Metropolitan Planning Organizatzino (MPO) to perform a review of the finding and results of the Miami Beach Corridor studies including:

- Bay Link Phase 2, Miami-Miami Beach Transportation Corridor Study, 2004
- Beach Corridor Transit Connection Study, 2013

Using these findings, KH was tasked with completing a high-level analysis of using Metromover in lieu of the currently proposed streetcar technology for the Beach Corridor. The following sections summarize the analysis and recommendations.

Route Summary

The Bay Link Phase 2 study identified a Locally Preferred Alternative (LPA). During the ongoing Beach Corridor Transit Connection Study, the LPA was refined. The current Direct Connection (DC) Alignment for refined LPA is shown in Figure 1.

For purposes of this analysis, the Metromover alignment was assumed to travel from Miami Beach along the DC Connection route, but terminate at the Museum Park station. The resulting route length is approximately 5.4 miles long. This additional length more than doubles the existing 4.4-mile length of the Metromover system. The new alignment includes eight new stations and a modification to the Museum Park station to accommodate the new extension and transfers to the existing Metromover routes. It was also assumed that this system operates independent of the existing Metromover System. There is a joint station at Museum Park, but passengers will be required to transfer from the Beach Corridor Metromover system to the existing Metromover system.
Level of Service

The Beach Corridor Transit Connection Study identified an operating plan of five-minute headways for peak periods and ten-minute headways for off-peak periods. To achieve the five-minute headway, 12 trains must pass each station during the peak hour traveling in each direction and six trains must pass each station during the off-peak hours.

The overall route length (both directions) is 10.8 miles. The resulting round trip travel time is approximately 25 minutes assuming the following:

- average travel speed of 40 miles per hour (since newer APM technologies can reach higher cruise speeds of 50 mph, which is twice that of the existing Metromover vehicles),
- 30 second dwell at each stop, and
- 16 stops along the route (two end of line stations with one stop, and seven intermediate stations with a stop for trains traveling in each direction).
To accommodate the five-minute peak hour headway with the 25 minute round trip travel time, five trains are needed in the system. These fleet size requirements are estimates based on the available planning level information. Refinements in the design process could potentially reduce the system requirements substantially.

The Bay Link Phase 2 LPA Report (dated September 2004) projected 20,075 daily boardings (Year 2025) for the Beach Corridor. The peak hour was assumed to comprise approximately 20% of the daily boardings, or 4,015 boardings per hour. Each Metromover vehicle has a capacity of approximately 100 passengers. To accommodate the peak hour boardings and meet the 5-minute headway, four-car trains are required. This results in a capacity of 400 people per train, for a total peak hour capacity of 4,800 people. An alternative to the four-car trains is running additional, two-car trains with an increased service level (i.e. shorter headways). With an increased service level, the ridership may further increase resulting in a future need for longer trains. Again, the design process would evaluate these requirements in more detail and may substantially reduce the system requirements and corresponding costs.

The trains will connect to the Metromover Station at Museum Park. To accommodate this connection additional passenger accumulations may be required, especially if the headways are not consistent between the Beach Corridor and the existing Omni Loop. This will result in the need for an expanded Transfer Station at Museum Park. In addition, if four-car trains are implemented the stations will need modification to accommodate the longer train length. A separate station for the new system with a short connecting walkway between stations is envisioned to accommodate both the old and new technologies. The modified Museum Park station could be modified vertically with the new station directly over the existing Museum Park station.

**Capital Costs**

Based on the proposed route, budgetary capital costs were developed and are summarized in Table 1. The construction costs summarized within this table are based on recent construction costs for APM projects with similar technologies for projects within the US and represent conceptual, high-level costs for planning purposes. A description of each of the cost categories follows the table summary. These costs are conservative and consistent with information available at this planning stage. Refinements in the design process could substantially reduce the system requirements and corresponding capital costs.
### Table 1: Order of Magnitude Cost Estimate, Preferred Concept

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Units</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
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<tr>
<td><strong>Demolition</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guideway and Columns Demolition at Museum Station 500 LF $5,000</td>
<td>500</td>
<td>LF</td>
<td>$5,000</td>
<td>$2,500,000</td>
</tr>
<tr>
<td>Demolition at Column Locations 368 EA $50,000</td>
<td>368</td>
<td>EA</td>
<td>$50,000</td>
<td>$18,400,000</td>
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<tr>
<td>Future Station Location Demolition 8 EA $250,000</td>
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<td>EA</td>
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<tr>
<td><strong>Guideway</strong></td>
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<tr>
<td>Foundations and Columns 368 EA $150,000</td>
<td>368</td>
<td>EA</td>
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<td>Elevated Guideway – Difficult Construction at Water Crossings 5,900 LF $40,000</td>
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<td>LF</td>
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<td>$236,000,000</td>
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<td>Elevated Guideway – Average Construction 22,500 LF $15,000</td>
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<td>LF</td>
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<td><strong>Stations</strong></td>
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<td>5,000 sf Station with Escalator, Elevator, Utilities, Communications/Security, Site Improvements 8 EA $7,500,000</td>
<td>8</td>
<td>EA</td>
<td>$7,500,000</td>
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<td>Modified/Expanded Museum Park Station 1 EA $10,000,000</td>
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<td>EA</td>
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<td><strong>Vehicles</strong></td>
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<tr>
<td>New Four-Car Trains (including spares) 7 EA $5,000,000</td>
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<td>EA</td>
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<td>$35,000,000</td>
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<td><strong>Other Costs</strong></td>
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<td>Maintenance Facility 1 EA $25,000,000</td>
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<td>Propulsion Power Substation 6 EA $4,000,000</td>
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<td>Traffic Control 28,400 LF $500</td>
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<td>LF</td>
<td>$500</td>
<td>$14,200,000</td>
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<td>Miscellaneous: Utility Relocations, Landscape, Power/Communication Conduits and Cable, Security, Lightning Protection, Roadway Improvements 28,400 LF $2,500</td>
<td>28,400</td>
<td>LF</td>
<td>$2,500</td>
<td>$71,000,000</td>
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<td>System Costs (Automatic Train Control, Running Surface, Guide Beams, Communication, Power, Switch Gear, etc.) 57,300 LF $5,000</td>
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<td>LF</td>
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<td><strong>Sub-Total</strong></td>
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<td>25% Contingency and Soft Costs</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$1.5B</strong></td>
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</table>
DEMOLITION COSTS

The demolition costs consist of three, separate components: future station demolition, existing station demolition, and column demolition. Demolition will be required at each of the new stations. In addition, limited demolition will be required to modify the existing Museum Park station. An estimate of 500 linear feet of guideway demolition was included to account for the reconfiguration.

The final demolition cost is associated with the columns to support the elevated guideway throughout the new sections. The number of columns was estimated based on assumed 80 foot spacing between columns for the new guideway. It was assumed that one column support could support the dual guideway, but there will likely be some additional places where additional columns are required. Each column will require demolition of the footprint area to accommodate the new column.

GUIDEWAY COSTS

New double track guideway is required for the 5.4-mile extension to Miami Beach. In addition, the proposed route includes two water crossings that will increase the guideway costs. A small amount of guideway was also included to accommodate the modifications at the existing Museum Park Station. The costs also include the individual column construction for guideway support and storm drainage at each column location to accommodate storm water run-off.

STATION COSTS

As shown in Figure 1, eight new stations are proposed with the route. Consistent with the existing Metromover stations, the stations were assumed to be open-air stations sized approximately 5,000 square feet each. The station costs include estimates for elevators and escalators, as well as other general station amenities. An estimate for the modified Museum Park station was also included.

VEHICLE COSTS

A total of seven new Metromover trains were anticipated for the proposed Beach Corridor. It is assumed that five, four-car trains will be in operation, with two spares provided. The estimates for vehicle costs are based upon the recently completed MIA Mover cited in a previous MPO Study but were increased to account for four-car trains versus two-car trains.

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1 Transit Options to Port Miami Feasibility Study, Miami-Dade MPO, June 2013
OTHER COSTS

A series of other, miscellaneous costs were also tabulated. These other costs include a new maintenance facility and propulsion power substations. The new substations are anticipated based on the additional guideway length being added. A line item cost is also included for traffic control along city streets throughout the construction zone, often called Maintenance of Traffic (MOT). This is a conservative estimate that accounts for the dense urban environment that exists along the corridor. Because of the busy environment, extensive MOT may be required to accommodate construction.

A line item for system costs was also added. These system costs are based on a linear foot of new guideway track being added and include automatic train control costs. The 57,300 quantity is based on dual guideways along 28,400 linear feet plus the 1,000 feet of modified guideway at the Museum Park Station. Finally the miscellaneous line item accounts for additional items such as landscaping, utility relocations, security, communications, etc.

ALLOWANCES

A 25% allowance was added for soft costs (design, permitting, construction engineering and inspection, etc.) and contingency.

COMPARATIVE COSTS

The overall alignment for the proposed Beach Corridor Connector is 5.4 miles. As a point of comparison, the length compares well to the Phoenix Sky Harbor International Airport APM system, the PHX Sky Train, with an ultimate length of 5 miles and a full build out construction cost of $1.6B. The first phase of the PHX Sky Train is now in operation.

The $1.5B capital cost estimates well exceed the capital cost estimates of $532M associated with the DC Connection (Source: Beach Corridor Transit Connection Study, PEC Meeting Presentation, April 2, 2014).
O&M Costs

A 2011 Peer Review Study provided annual O&M costs data for 2004 through 2010. Using this data, an average, annual operational cost of $4.77M per mile and an average, annual maintenance cost of $2.57M per mile was determined. This results in an average, annual O&M cost of $7.34M per mile. The additional O&M costs for the 5.4-mile proposed extension are estimated to be approximately $39.5M per year based on this O&M estimate. This exceeds the O&M estimates of $22M associated with the DC Connection (Source: Beach Corridor Transit Connection Study, PEC Meeting Presentation, April 2, 2014).

General Constructability

An elevated guideway improves the constructability with respect to at-grade traffic compared to streetcar type technology. An elevated guideway crosses over the traffic and intersections with the footprint impact limited to the columns as shown in Figure 2. Along the proposed corridor, the location for guideway columns is a challenge, but there are some locations with existing medians that can accommodate the center columns. Due to the dense environment there may also be utility impacts and some larger spans associated with the intersection crossings, such as at Washington and 5th.

The alignment is long, but this could lead to some potential cost savings with economy of scale. Most of the guideway alignment could be built using common size support columns and guideway beams that could be pre-fabricated and installed on site (rather than constructed on site) which has the potential to reduce overall costs. Except for the water crossings, the profile should remain relatively flat so column spacing could also be uniform. Pre-fabricated steel columns and guideways may be more cost competitive than concrete, although special care of steel members would be required due to the marine environment of the area.

Public Perception is a potential disadvantage. Such a long extension of the Metromover may not be supported by the local residents. There may be concerns about the blocked views associated with the aerial alignment or the change in the beach environment associated with the corridor.

2 An Analysis of Miami-Dade Transit’s Operating Cost Efficiency; Volume One, Peer Review, Center for Urban Transportation Research, November 7, 2011
In summary, although a Metromover extension for the Beach Corridor may have some constructability benefits, the significantly higher capital and O&M costs make the Metromover a less feasible option than the currently proposed streetcar. However, traffic congestion may be a significant factor in efficient streetcar operations and travel times, with grade separated transit providing higher reliability of travel times and higher passenger service levels. If fares are involved, then higher levels of passenger service of a grade separated system may be worth an additional fare to the average person.
Appendix D: Scanned Workshop Concept Alternatives
North Workshop Concept Alternatives
South Workshop Concept Alternatives
A) Close Loop; Possible new station but need to take into consideration Brickell CitiCentre improvements.

B) Extend South along Brickell

C) Beach Connection - Separate Line, elevated or integrated to Miami Beach/Convention Center

D) Close Loop - close loop west and use mezzanine level as east/west platform at Government Center

E) Go west directly to Marlins Stadium, no stops

F) PortMiami Connection

Legend
- Metromover Stations
- Metrorail Stations
- Metromover Route
- Metrorail
  - Green
  - Orange
  - Orange/Green

Bus Ridership
- 1 - 100
- 101 - 250
- 251 - 500
- 501 - 1259
- Bus Routes
East Workshop Concept Alternatives
West Workshop Concept Alternatives
Appendix E: Photo Log
Photo 19: SE 14th Street, East Terminus

Photo 20: Jade at Brickell Bay Seawall

Photo 21: Jade at Brickell Bay Seawall

Photo 22: Brickell Bay Drive

Photo 23: Jade at Brickell Bay Seawall

Photo 24: Brickell Bay Drive
Photo 25: Dade Heritage Trust, Historic Preservation

Photo 26: Brickell Bay Drive

Photo 27: Brickell Bay Drive

Photo 28: Brickell Bay Drive

Photo 29: Brickell Bay Drive

Photo 30: Brickell Bay Drive
Photo 31: On-Street Parking, Brickell Bay Drive

Photo 32: Brickell Bay Drive

Photo 33: Brickell Key Drive

Photo 34: Brickell Key Drive

Photo 35: Brickell Key Drive

Photo 36: Brickell Key Drive
Photo 43: Decorative Crosswalk

Photo 44: 8th Street Metromover Station

Photo 45: Brickell Key Drive

Photo 46: Brickell Key Drive

Photo 47: NW Corner of Brickell Avenue and Brickell Key Drive

Photo 48: Guideway South of 8th Street Metromover Station
Photo 55: NW 14th Avenue

Photo 56: NW 14th Avenue

Photo 57: End of Line, School Board Metromover Station

Photo 58: End of Line, School Board Metromover Station

Photo 59: End of Line, School Board Metromover Station

Photo 60: NW 2nd Avenue
Appendix F: ALPS Information
Advanced Land Transportation Performance Simulation (ALPS)

Kimley-Horn formulates the right technical solutions to fit your situation, based on a thorough understanding of your needs and goals. The multi-faceted capabilities of the ALPS software can meet your needs for modeling and simulation of complex multi-modal environments.

ALPS ALLOWS YOU TO

- Model
- Plan
- Simulate
- Analyze

- Airports
- Activity Centers
- Parking Facilities
- Arterials
- Freeways
- Transit
- Pedestrians
- Rail Vehicles

Person-Trip Modeling Across Multiple Modes at Varying Levels of Detail

- Multi-modal assignment
- Multi-modal trip distribution
- Path-finding across modal options
- Dynamic routing and traffic assignment
- Faster than real-time simulation
- Macro-meso link interfaces

Mesoscopic Analysis
- Statistical Data by Traffic Illustration
- Macroscopic Analysis
- Statistical Data for Traffic Flow

Person Trip Standard Model
- Urban Land Use and Development (Changements)
Simulate Future Conditions for Detailed Alternatives Analysis

- Regional planning
- Urban district planning
- Facility planning
- Concept of operations
- Capital forecasting
- Evacuation planning
- Feasibility studies
- Construction phasing
ALPS Meso and Micro Simulation Capabilities Speed the Analysis Process

- Thousands of times faster than microscopic-only simulation
- Run 10x more case studies
- Integrated genetic algorithm calibration tool
- Automated case study manager

Oversaturated Conditions Simulated to Study Cascading Congestion Impacts
Integrated Performance Analysis Tools for Rapid Case Study Comparisons

- Time-dependent route assignment for a 24-hour day
- "Pivot table" report capability
- Dynamic 2-D and 3-D animations
- Integrated graphs, charts, and summary statistics
- Delays, throughput, transit metrics, and traveler trip times

Analyze Transit Systems from A to Z

- Vehicle performance modeling
- Fixed and moving block signaling
- Headway-based operations
- Signal priority
- Schedule-based operations
- Intermodal linkage
- Dynamic demand-dispatch of vehicles (buses or PRT)
- Propulsion modeling
- At-grade BRT and LRT systems
Comprehensive Airport Landside Simulations Driven by Flight Schedules
- Terminal operations
- Security lines
- Baggage and ticketing systems
- Curbside pick-up/drop-off
- Parking shuttles and rental cars
- Inter-terminal transit
- Methods also applicable to rail, ferry, and cruise terminals

Evaluate Alternative Strategies for Transportation Facilities at Major Activity Centers
- Stadiums
- Transit terminals
- Entertainment venues
- Convention centers
- Casinos
- Evacuation analysis
- Parking strategies
- Transit access
- Pedestrian usability
Person Trips are Tracked from Origin to Destination
- Dynamic pedestrian routing at intersections
- Conflicts with vehicles
- Linkage to modal trips
- Congestion effects
- Groups traveling together
- Queuing

PEDESTRIANS

Analyze Fixed Guideway Systems of Any Design and Complexity
- Light and heavy rail transit
- Passenger and freight railroad
- Fixed and moving block control
- Automated guideway — Platform passenger densities
- Failure impacts/recovery
- Headway-based operations
- Schedule-based operations

RAIL
Evaluate Parking Facilities and the Search for Parking
- Dynamic search for closest lot
- Drivers can dynamically change lot choice when full
- Parking circulation on ramps
- Integrated with multi-modal person trip modeling

Mesoscopic and Microscopic Modeling of Vehicle Traffic and Mixed-Mode Operations
- Actuated-coordinated traffic signals
- Ramp meters
- Interchanges
- Car following, lane changing, and gap acceptance algorithms
- Transit priority
- Stop-controlled intersections
Vehicles of Every Type and Class

- Cars, light trucks, and vans
- Large trucks and double trailers
- Performance characteristics by class
- Interactions with pedestrians

Phoenix Sky Harbor International Airport

- Evaluated multiple roadway/configuration alternatives
- Identified solutions for traffic choke points on-airport which were subsequently fixed
- Evaluated vertical circulation problem areas in existing facilities

- Analyzed potential traffic congestion reduction (on- and off-airport) due to installation of APM system
Minneapolis Target Field Pedestrian and Transit Simulation Modeling

- Evaluated game-day conditions for the ballpark patrons’ pedestrian and transit experience
- Simulated all roadways, parking facilities, pedestrian environments, and transit operations
- Modeled the effect of urban context with mixed-use development and new intermodal transit station
- Analytically and visually assessed alternative facilities, configurations, and operating plans

New York Jamaica Station at Kennedy International Airport

- Analyzed pedestrian activity at major intermodal rail station
- Train schedules and traffic patterns drove pedestrian operations at station
- Evaluated vertical circulation, corridor and boarding platform capacity
- Assessed AirTrain service headways and station passenger densities
**Houston Downtown Light Rail System**
- Analyzed trip generation and travel path assignment for pedestrians and street traffic
- ALPS synthesized turning movement patterns for additional traffic analyses with other tools
- Analyzed 24/7 pedestrian activity for LRT station platforms, crosswalks, and queuing areas
- Modeled pedestrian interactions with traffic, LRT, signals, and underground pedestrian tunnels

**San Antonio Downtown Bus and Pedestrian Operations**
- Analyzed 165,000 pedestrian trips through the multi-modal system over the day
- Simulated 40 converging bus routes through downtown street grid
- Evaluated boarding, alighting, and transfer activity at shared bus stops
- Compared pedestrian densities for alternative scenarios of bus route configurations
Large-Scale Multi-Modal Transportation Systems

ALPS hybrid models incorporating integrated macroscopic, mesoscopic, and microscopic modeling processes can be applied to cover large-scale multi-modal systems.

- 200,000+ pedestrians
- 200+ square city blocks of signalized intersections/street traffic
- 200+ discrete transit lines/routes with hundreds of trains, streetcars, and buses
- 100+ miles of freeways, highways, and arterials in one animated analysis
- Entire region over 24-hour day with cascading traffic congestion operations over successive time intervals

Las Vegas CityCenter — Harmon Place Porte-Cochere

- Analyzed complex front door operations in a combined traffic circle/curbfront for two hotels
- Modeled valet pick-up and drop-off with platooning (valet holding) operations
- Evaluated private automobile and taxi/limo curbfront operations
- Detailed simulation of taxi and valet vehicle queuing
Your Team of Experts
Kimley-Horn is a national leader in transportation planning, modeling, and simulation. Let our experts successfully manage your modeling application with ALPS from start to finish, or anywhere in between.

- Project management
- Turn-key modeling and analysis
- Modeling support
- Training and support
ALPS Continues to Evolve Every Year with Client Needs!

- D4™ traffic signal control
- Toll plaza modeling
- Integrated dynamic traffic assignment
- Synchro integration
- Roundabouts
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