# TRANSIT NETWORK COMPOSITION AND ANALYSIS

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South Florida Regional Transportation Authority

Chapter 11: Transit Network Composition and Analysis

December 2008
1.0 ALTERNATIVES DEVELOPMENT

The process of developing refined alternatives included in the networks is discussed in Chapter 4: High Opportunity Corridors (Screen One) dated June 2007 and Chapter 7: Screen Two (Detailed) Evaluation dated December 2007.

Figure 1 shows how alternatives advance through the screening process and ultimately into the three networks tested using four land use scenarios. A complete discussion of the land use scenario process is provided in Chapter 10: Land Use Scenarios dated January 2008.

![Figure 1 – Alternatives Development Process](image)

1.1 PRELIMINARY NETWORK COMPOSITION

Through the Screen Two Evaluation, each performance criterion was given equal weight during the scoring process, resulting in the alignments competing to perform best overall. Once Screen Two was complete, the resulting alternatives were identified and additional analysis was conducted to determine which alternatives that serve the same travel markets would be included in the Connective, Productive, and Value Networks.
Table 1 shows each corridor’s characteristics in quantitative values for each of the performance criteria categories.

Weighted Scoring
Contribution to the regional system for each alignment was weighed by emphasizing the specified criteria classification groups separately: Connective, Productive, and Value. This allowed a secondary check of the alignments and their comparative performance to one another by focusing on certain characteristics. Table 2 shows the alternatives’ weighted scores and the scores for each of the performance criteria.

Each alignment’s score was classified as low, middle, or high regarding the percentile in which their weighted score fell for the three classification groups. Figures 2, 3, and 4 show the preliminary networks that were established using only the medium and high scoring alternatives from the three specified criteria classification groups.

Preliminary Connective Network (Figure 2)
The preliminary Connective Network alternatives scored well based on the number of county lines they cross (Interjurisdictional), the number of Regional Activity Centers (RACs) served by the transit alignment, and the number of other transportation modes the alignment connects (Intermodal Connection).

Preliminary Productive Network (Figure 3)
The preliminary Productive Network alternatives scored well based on the number of new riders generated by the alignment (Incremental Trips per Mile) and trip demand in the corridor (Trip Flows).

Preliminary Value Network (Figure 4)
Alternatives included in the preliminary value network scored well based on Capital Costs per Mile (including construction costs for route, stations, and maintenance facility; vehicle purchase; and right-of-way), Annual Cost per Trip (based on operating and maintenance costs, as well as annualized construction costs), and Subsidy per Trip.
Table 1 – Raw Data

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<th>Incremental Trips/MIK on New Service (Annual)</th>
<th>Total Daily Trips</th>
<th>TriRail Trips</th>
<th>Interjurisdictional Coordinated service lines</th>
<th>Number of Regional Activity Centers (RACs) Served</th>
<th>Intermodal Connection Accessible (Steps/Wi-Fi)</th>
<th>Rail Access</th>
<th>Capital Cost per MIK (at Right-of-Way in millions)</th>
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# Chapter 11: Transit Network Composition and Analysis

## Table 2 – Weighted Scores

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<td>7.2</td>
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<td>8</td>
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<td>6</td>
<td>MID</td>
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<td>5</td>
<td>5</td>
<td>BOT</td>
<td>5</td>
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<td>5</td>
<td>BOT</td>
<td>2</td>
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<tr>
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<td>Combined DMU/Combined DMU</td>
<td>7</td>
<td>6.4</td>
<td>MID</td>
<td>2</td>
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</table>
FIGURE 2
PRELIMINARY CONNECTIVE NETWORK

Top Scoring Alternatives

Rail
- FEC Complete (30 K)
- FEC Shorter Line (30 L)
- Tri-Rail Extension to Oakland (32 J)
- FEC West Park Beach to Miami (32 A)

Bus
- North-South Premium Bus (31 A)
- Douglas Road Rapid Bus (31 S)

Medium Scoring Alternatives

Rail
- East-West Metrorail Extension with 137th Avenue Rapid Bus (31 T)
- Kendall Hybrid BRT-DELRT SW 137th Ave - Line A (32 G)
- Kendall Hybrid BRT-DELRT SW 137th Ave - Line B (32 G)

Bus
- Coral Way MAX
- Killian KAT
- Sunset KAT
- Kendall KAT
- 95X Civic Center
- 95X Norwood-Brickell
- 95X Carol City-Omni
- 95X Norwood-West
- 95X SR 7 Fast Bus

Legend

Baseline Premium Transit*
Interstate/Toll Road/US Road/State Road
Activity Centers
Superzones
Railroad
Lake Okeechobee
County

*Projects included in Baseline:
- Existing Tri-Rail service
- Existing Metrorail service
- Metrorail North Corridor
- Metrorail MIC-Earlinton Heights Corridor
- Bird Road MAX
- LuLuLum MAX
- Beach MAX
- 7th Avenue MAX

Table 6
– EVALUATION OF PRELIMINARY PRODUC TIVE NETWORK WITH LAND USE SCENARIOS

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<thead>
<tr>
<th>Scenario</th>
<th>Total Capital Cost ($B)</th>
<th>Annualized Capital Cost ($M)</th>
<th>Annual O&amp;M Cost ($M)</th>
<th>Total Annual Cost ($M)</th>
<th>Annual Passenger Trips (M)</th>
<th>O&amp;M Cost Per Trip</th>
<th>Total Annual Cost Per Trip</th>
<th>Annual Fare Revenue ($M)</th>
<th>Farebox Recovery</th>
<th>Operating Subsidy Per Trip</th>
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<td>$673</td>
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<td>$12.14</td>
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<td>$0.51</td>
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Land Use Scenario 1 = 100% of employment in Activity Centers, 100% of household Superzones.
Land Use Scenario 2 = 67% of employment in Activity Centers, 33% of employment in Superzones, 33% of households in Activity Centers, 67% of employment in Superzones.

Land Use Scenario 3 = 100% of employment and households in Station Areas.

Source: South Florida Regional Transportation Authority Strategic Regional Transit Plan, 2008
FIGURE 3
PRELIMINARY PRODUCTIVE NETWORK

Top Scoring Alternatives

Rail
- Miami Beach LRT (30 F)
- Tri-Rail Split to CBD (30 J)
- FEC Shorter Line (30 L)
- Tri-Rail Extension to Dadeland (30 K)

Bus
- North-South Premium Bus (31 A)

Medium Scoring Alternatives

Rail
- East-West Metrorail Extension to FIU (31 C)
- North-South Premium Bus (31 A)

Bus
- Wellington Rapid Bus (31 K)
- Military Trail Rapid Bus (31 L)
- Pines Rapid Bus to University - Line A (31 N)

Combined Rail/Bus
- Metrorail East-West Extension with 137th Avenue Rapid Bus (31 T)
- Kendall Hybrid BRT/DLRT SW 137th Ave - Line A (31 Q)

Legend

Baseline Premium Transit
Interstate/Toll Road/US Road/State Road
Activity Centers
Superzones
Railroad
Lake Okeechobee
County

Projects included in Baseline:
- Existing Tri-Rail service
- Existing Metrorail service
- Metrorail North Corridor
- Metrorail MIC-Earlington Heights Corridor
- Bird Road MAX
- Lyttelton MAX
- 7th Avenue MAX
- Coral Way MAX
- Killian KAT
- Sunset KAT
- Kendall KAT
- 95X Civic Center
- 95X Norwood-Brickell
- 95X Carol City-Omni
- 95X Norwood-West
- Broward SR 7 Fast Bus

Source: South Florida Regional Transportation Authority, Strategic Regional Transit Plan, 2008
Top Scoring Alternatives

Rail
- Miami Beach LRT (31 F)
- FEC Short Line (31 I)
- Tri-Rail Extension to Okeechobee (32 K)

Bus
- North/South Premium Bus (31 A)
- Wellington Rapid Bus (31 N)
- Pinecrest Rapid Bus to University - Line A (31 N)
- Pinecrest Rapid Bus to FEC - Line B (31 N)
- Douglas Road Rapid Bus (31 S)

Medium Scoring Alternatives

Rail
- Tri-Rail East-west Extension with 137th Avenue Rapid Bus (31 T)
- Kendall Hybrid BRT-DELRT SW 137th Ave - Line A (32 G)
- Kendall Hybrid BRT-DELRT SW 137th Ave - Line B (32 G)

Bus
- University Drive Rapid Bus (31 D)
- Oakland Park Rapid Bus to Dntn Ft. Lauderdale - Line A (31 O)
- Oakland Park Rapid Bus to Cypress Creek - Line B (31 O)
- Kendall Drive Rapid Bus (31 Q)
- 137th Avenue Rapid Bus Line A (31 R)

Combined Rail/Bus
- MetroEast Rapid Extension with 137th Avenue Rapid Bus (31 T)
- Kendall Hybrid BRT-DelRT SW 137th Ave - Line A (32 G)
- Kendall Hybrid BRT-DelRT SW 137th Ave - Line B (32 G)

Legend

- Baseline Premium Transit®
- Interstate/Toll Road/US Road/State Road
- Activity Centers
- Superzones
- Railroad
- Lake Okeechobee
- County

Projects included in Baseline:
- Existing Tri-Rail service
- Existing Metrorail service
- Metrorail North Corridor
- Metrorail MIC-Earlton Heights Corridor
- Bird Road MAX
- Ludlam MAX
- Beach MAX
- 7th Avenue MAX

- Coral Way MAX
- Killian KAT
- Sunset KAT
- Kendall KAT
- 95X Civic Center
- 95X Norwood-Brickell
- 95X Carol City-Omni
- 95X Norwood-West
- Broward SR 7 Fast Bus

Source: South Florida Regional Transportation Authority Strategic Regional Transit Plan, 2008.
2.0 NETWORK ANALYSIS

The results of the preliminary network composition were separated into travel markets and analyzed to determine which alignment within each travel market best met the network characteristics.

Travel Markets

Duplication of service as well as failure to provide adequate service can be detrimental to the success of a transit system. Those travel markets served by a single surviving alignment were maintained; this most often occurred with rapid bus options. To identify areas containing service duplication, the following travel markets were identified across the South Florida region:

- Miami East-West
- Miami Beach
- Broward East-West
- Jupiter Tri-Rail Extensions
- Miami Tri-Rail Extensions
- FEC (Florida East Coast Railroad)
- Kendall

Connective Network

Alternatives’ ability to maximize existing regional community assets was taken into account when analyzing the Connective Network. Alignments within travel markets were compared based on the number of RACs served and the connections to other modes and modal facilities, in addition to the ability to connect multiple jurisdictions. The following alignments were included in the final Connective Network:

- 31T Metrorail Extension plus 137th Avenue Rapid Bus
- 30F Miami Beach LRT
- 30G Broward East-West LRT
- 31U Tri-Rail Extension to the VA Hospital
- 30K FEC Complete
- 32G Kendall Hybrid BRT-DELRT SW 137th Augmented
- 31A North-South Premium Bus
- 31D University Drive Rapid Bus
- 31K Wellington Rapid Bus
Productive Network
The productive network was analyzed for performance in terms of ridership. Alignments serving similar markets were compared and services attracting fewer riders to the system were eliminated. The following alignments were included in the ultimate Productive Network:

- 30D East-West Metrorail Extension South to Kendall
- 30F Miami Beach LRT
- 30G Broward East-West LRT
- 30V Jupiter Extension
- 32K Tri-Rail Extension to Dadeland
- 32A FEC West Palm Beach to Miami
- 32G Kendall Hybrid BRT-DELRT SW 137th Augmented
- 31S North-South Premium Bus with Douglas Road
- 31K Wellington Rapid Bus
- 31L Military Trail Rapid Bus
- 31N Pines Rapid Bus
- 32O Oakland Park – Cypress Creek Rapid Bus

Value Network
Cost is a major factor when determining if a system can be built. Alignments within travel markets were evaluated to determine which alignments were most value in terms of capital costs per mile, per trip costs (including operations and annualized costs), and subsidy needed per trip (includes estimated farebox recovery). The final Value Network included the following alignments:

- 31R 137th Rapid Bus
- 30F Miami Beach LRT
- 32L Broward East-West LRT Sawgrass to CBD
- 30V Jupiter Extension
- 30L FEC Shorter Line
32Q Kendall Drive BRT Only Modified Service
31A North-South Premium Bus
31D University Drive Rapid Bus
31K Wellington Rapid Bus
31L Military Trail Rapid Bus
31N Pines Rapid Bus
32O Oakland Park – Cypress Creek Rapid Bus
32P Sample Road Modified Rapid Bus

The final networks were tested using the adopted 2030 Land Use Base; plus three alternative land use scenarios to determine how modified transit-oriented land use policies would benefit the proposed transit system. The network analysis also shows the alternatives’ performance in a comprehensive transit system versus performance as an individual alignment.

### 3.0 FINAL NETWORK COMPOSITION

Each alternative was tested individually and within a network using the adopted 2030 socio-economic data. The resulting ridership data was used to compare each alignment’s individual performance to performance in a network. If ridership showed a large increase when placed in the network, the alternative was a benefit to the complete transit system. Conversely, a large decrease in ridership demonstrated some riders were served by another project in the network.

Once the results from network testing were compared to the individual alignment results, each network was adjusted to ensure maximum performance and a comprehensive system. Additional changes to the networks resulted from outreach efforts conducted by SFRTA.

Table 3 lists the alternatives included in each network. Figures 5, 6, and 7 map the final three networks. Table 4 shows the percentage change between alternatives’ ridership performance individually and in a network.
### Table 3 – Final Network Composition

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<thead>
<tr>
<th>Alternative</th>
<th>Name</th>
<th>Mode</th>
<th>Connective</th>
<th>Productive</th>
<th>Value</th>
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<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
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<td>Miami Beach LRT</td>
<td>LRT</td>
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<td>✓</td>
<td>✓</td>
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<td>✓</td>
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<tr>
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<td>Broward E-W LRT Sewgrass to CBD</td>
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<td>✓</td>
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<td>✓</td>
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<td>BRT</td>
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<td>✓</td>
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<td>✓</td>
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<td>BRT</td>
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<td>✓</td>
</tr>
</tbody>
</table>

| Total Projects | 13 | 13 | 13 |
FIGURE 5
CONNECTIVE NETWORK

Palm Beach County Alternatives
- Wellington Rapid Bus (31 K)
- Military Trail Rapid Bus (31 L)
- Tri-Rail Extension to the VA Hospital (31 U)

Three County Alternatives
- North-South Premium Bus - Dadeland South (31 A)
- North-South Premium Bus - Palmetto Line B (31 A)
- North-South Premium Bus - Palmetto Line A (31 A)
- North-South Premium Bus - Sawgrass to Boca (31 A)
- FEC Complete (30 K)

Broward County Alternatives
- University Drive Rapid Bus (31 D)
- Pines Rapid Bus to University - Line A (31 N)
- Pines Rapid Bus to FEC - Line B (31 N)
- Oakland Park Rapid Bus to Dntn Ft. Lauderdale - Line A (32 O)
- Oakland Park Rapid Bus to Cypress Creek - Line B (32 O)
- Broward East-West LRT (30 G)

Miami-Dade County Alternatives
- Miami Beach LRT (30 F)
- Tri-Rail Split to Miami CBD (30 J)
- Kendall Hybrid BRT-DLRT SW 137th Ave - Line A (32 G)
- Kendall Hybrid BRT-DLRT SW 137th Ave - Line B (32 G)
- Metrorail East-West Extension with 137th Avenue Rapid Bus - Line A (31 T)
- Metrorail East-West Extension with 137th Avenue Rapid Bus - Line B (31 T)

Legend
- Baseline Premium Transit *
- Interstate/Toll Road/US Road/State Road
- Activity Centers
- Superzones
- Railroad
- Lake Okeechobee
- County

*Projects included in Baseline:
- Existing Tri-Rail service
- Existing Metrorail service
- Metrorail North Corridor
- Metrorail MIC-Earlington Heights Corridor
- Bird Road MAX
- Ludlam MAX
- Beach MAX
- 7th Avenue MAX

Source: South Florida Regional Transportation Authority Strategic Regional Transit Plan, 2007
FIGURE 6
PRODUCTIVE NETWORK

Palm Beach County Alternatives
- Wellington Rapid Bus (31 K)
- Military Trail Rapid Bus (31 L)
- Tri-Rail Extension to Jupiter (30 V)

Three County Alternatives
- Douglas Road Rapid Bus (31 S)
- FEC West Palm Beach to Miami (32 A)

Broward County Alternatives
- Pines Rapid Bus to University - Line A (31 N)
- Pines Rapid Bus to FEC - Line B (31 N)
- Oakland Park Rapid Bus to Dntn Ft. Lauderdale - Line A (32 O)
- Oakland Park Rapid Bus to Cypress Creek - Line B (32 O)
- Broward East-West LRT (30 G)

Miami-Dade County Alternatives
- East-West Metrorail Extension to Kendall (30 D)
- Miami Beach LRT (30 F)
- Tri-Rail Split to Miami CBD (30 J)
- Tri-Rail Extension to Dadeland (32 K)
- Kendall Hybrid BRT-DLR7 SW 137th Ave - Line A (32 G)
- Kendall Hybrid BRT-DLR2 SW 137th Ave - Line B (32 G)

Legend
- Baseline Premium Transit *
- Interstate/Toll Road/US Road/State Road
- Activity Centers
- Superzones
- Railroad
- Lake Okeechobee
- County

*Projects included in Baseline:
- Existing Tri-Rail service
- Existing Metrorail service
- Metrorail North Corridor
- Metrorail MIC-Elarton Heights Corridor
- Bird Road MAX
- Ludlam MAX
- Beach MAX
- 7th Avenue MAX

- Coral Way MAX
- Killian KAT
- Sunset KAT
- Kendall KAT
- 95X Civic Center
- 95X Norwood-Brickell
- 95X Norwood-West
- Broward SR 7 Fast Bus

Source: South Florida Regional Transportation Authority Strategic Regional Transit Plan, 2007
FIGURE 7
VALUE NETWORK

Palm Beach County Alternatives
- Wellington Rapid Bus (31 K)
- Military Trail Rapid Bus (31 L)
- Tri-Rail Extension to Jupiter (30 V)

Three County Alternatives
- North-South Premium Bus - Dadeland South (31 A)
- North-South Premium Bus - Palmetto Line B (31 A)
- North-South Premium Bus - Palmetto Line A (31 A)
- North-South Premium Bus - Sawgrass to Boca (31 A)

Broward County Alternatives
- University Drive Rapid Bus (31 D)
- Pines Rapid Bus to University - Line A (31 N)
- Pines Rapid Bus to FEC - Line B (31 N)
- Broward East-West LRT - SR 7 to Dtn Ft. Lauderdale and SFEC to US 1 (New Alt)
- Oakland Park Rapid Bus to Dtn Fl Lauderdale- Line A (32 O)
- Oakland Park Rapid Bus to Cypress Creek - Line B (32 O)
- Sample Road Modified Rapid Bus - Line A (32 P)
- Sample Road Modified Rapid Bus - Line B (32 P)

Two County Alternatives
- FEC Shorter Line (30 L)

Miami-Dade County Alternatives
- Miami Beach LRT (30 F)
- 137th Avenue Rapid Bus (31 R)
- Kendall Drive BRT Only - Modified (32 Q)

Legend
- Baseline Premium Transit*
- Interstate/Toll Road/US Road/State Road
- Activity Centers
- Superzones
- Railroad
- Lake Okeechobee
- County

*Projects included in Baseline:
- Existing Tri-Rail service
- Existing Metrorail service
- Metrorail North Corridor
- Metrorail MIC-Earlton Heights Corridor
- Bird Road MAX
- Ludlam MAX
- Beach MAX
- 7th Avenue MAX
- Coral Way MAX
- Kendall KAT
- Sunset KAT
- 95X Civic Center
- 95X Norwood-Brickell
- 95X Norwood-West
- Broward SR 7 Fast Bus

Source: South Florida Regional Transportation Authority Strategic Regional Transit Plan, 2008
Table 4 – Daily Trips Percentage Change (Network vs. Independent) – Tested Alternatives

<table>
<thead>
<tr>
<th>Name</th>
<th>Mode</th>
<th>Productive</th>
<th>Connective</th>
<th>Cost-Effective</th>
<th>Capital Cost per Mile (w/ Right-of-Way) (in millions)</th>
<th>Capital Cost per Mile (w/o Right-of-Way) (in millions)</th>
<th>Annual Cost per Trip</th>
<th>Subsidy per Trip</th>
<th>Total Capital Cost (w/ Right-of-Way) (in millions)</th>
<th>Total Capital Cost (w/o Right-of-Way) (in millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>39P</td>
<td>East-West Metrorail Extension South to Kendall</td>
<td>Metrorail</td>
<td>37.375</td>
<td>35.680</td>
<td>3.8%</td>
<td>$144.25</td>
<td>$120.49</td>
<td>$31.70</td>
<td>$3.50</td>
<td>$2,077.14</td>
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<tr>
<td>39H</td>
<td>137th Rapid Bus</td>
<td>BRT</td>
<td>8.981</td>
<td>8.915</td>
<td>0.5%</td>
<td>$23.25</td>
<td>$15.33</td>
<td>$3.89</td>
<td>$0.29</td>
<td>$548.76</td>
</tr>
<tr>
<td>39L</td>
<td>Metrorail Extension plus 137th Avenue Rapid Bus</td>
<td>Combined Metrorail/BRT</td>
<td>40.416</td>
<td>36.832</td>
<td>10.4%</td>
<td>$181.38</td>
<td>$56.53</td>
<td>$23.26</td>
<td>$2.21</td>
<td>$1,556.93</td>
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<tr>
<td>39J</td>
<td>Miami Beach LRT</td>
<td>LRT</td>
<td>14.303</td>
<td>13.536</td>
<td>0.3%</td>
<td>$66.74</td>
<td>$40.80</td>
<td>$12.14</td>
<td>$1.89</td>
<td>$487.94</td>
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<tr>
<td>39K</td>
<td>Broward East-West LRT</td>
<td>LRT</td>
<td>23.009</td>
<td>20.416</td>
<td>11.3%</td>
<td>$75.16</td>
<td>$59.34</td>
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<td>$505.78</td>
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<tr>
<td>39N</td>
<td>Broward LRT to Crosstown Expressway</td>
<td>LRT</td>
<td>16.364</td>
<td>22.336</td>
<td>-17.0%</td>
<td>$82.67</td>
<td>$80.23</td>
<td>$19.56</td>
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<td>$419.09</td>
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<tr>
<td>39V</td>
<td>Jupiter Extension (7 Stations)</td>
<td>Commuter Rail</td>
<td>28.083</td>
<td>32.312</td>
<td>-13.2%</td>
<td>$41.60</td>
<td>$25.75</td>
<td>$23.38</td>
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<td>$547.36</td>
</tr>
<tr>
<td>39U</td>
<td>Tri-Rail Extension to VIA Hospital</td>
<td>Commuter Rail</td>
<td>16.835</td>
<td>26.629</td>
<td>-37.1%</td>
<td>$44.67</td>
<td>$23.12</td>
<td>$23.87</td>
<td>$1.11</td>
<td>$126.92</td>
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<tr>
<td>39B</td>
<td>Tri-Rail Extension to Oakland</td>
<td>Tri-Rail</td>
<td>28.083</td>
<td>32.312</td>
<td>-13.1%</td>
<td>$39.67</td>
<td>$23.73</td>
<td>$11.92</td>
<td>$0.78</td>
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<tr>
<td>30K</td>
<td>FEC-Complete</td>
<td>Commuter Rail</td>
<td>46.800</td>
<td>48.490</td>
<td>0.8%</td>
<td>$41.13</td>
<td>$25.29</td>
<td>$27.81</td>
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<td>30L</td>
<td>FEC-Shooter Line</td>
<td>Commuter Rail</td>
<td>30.061</td>
<td>32.438</td>
<td>-4.7%</td>
<td>$40.25</td>
<td>$24.41</td>
<td>$18.71</td>
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<td>$1,604.05</td>
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<tr>
<td>30Q</td>
<td>FEC-West Palm Beach to Miami</td>
<td>Commuter Rail</td>
<td>39.545</td>
<td>38.347</td>
<td>3.1%</td>
<td>$41.20</td>
<td>$25.36</td>
<td>$27.49</td>
<td>$3.30</td>
<td>$3,723.51</td>
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<tr>
<td>31A</td>
<td>North-South Premium Bus</td>
<td>BRT</td>
<td>16.728</td>
<td>18.589</td>
<td>-9.9%</td>
<td>$7.15</td>
<td>$3.98</td>
<td>$11.82</td>
<td>$0.68</td>
<td>$703.65</td>
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<tr>
<td>31B</td>
<td>North-South Rapid Bus with Douglas Road</td>
<td>BRT</td>
<td>19.063</td>
<td>17.027</td>
<td>10.4%</td>
<td>$7.25</td>
<td>$4.68</td>
<td>$15.38</td>
<td>$1.57</td>
<td>$870.36</td>
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<tr>
<td>31C</td>
<td>University Drive Rapid Bus</td>
<td>BRT</td>
<td>8.072</td>
<td>10.842</td>
<td>-27.9%</td>
<td>$22.73</td>
<td>$14.81</td>
<td>$7.91</td>
<td>$1.52</td>
<td>$522.78</td>
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<tr>
<td>31G</td>
<td>Wellington Rapid Bus</td>
<td>BRT</td>
<td>12.787</td>
<td>7.487</td>
<td>18%</td>
<td>$22.73</td>
<td>$14.81</td>
<td>$9.69</td>
<td>$1.96</td>
<td>$728.36</td>
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<tr>
<td>31E</td>
<td>Military Trail Rapid Bus</td>
<td>BRT</td>
<td>12.787</td>
<td>7.487</td>
<td>18%</td>
<td>$22.73</td>
<td>$14.81</td>
<td>$9.69</td>
<td>$1.96</td>
<td>$728.36</td>
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<tr>
<td>31F</td>
<td>Pinecrest Rapid Bus</td>
<td>BRT</td>
<td>11.957</td>
<td>10.868</td>
<td>4.6%</td>
<td>$23.17</td>
<td>$15.26</td>
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<td>$378.73</td>
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<td>31J</td>
<td>Oakland Park - Cypress Creek Rapid Bus</td>
<td>BRT</td>
<td>8.070</td>
<td>10.232</td>
<td>-21.1%</td>
<td>$15.84</td>
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<td>$19.75</td>
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<td>32A</td>
<td>Cypress Road Modified Rapid Bus</td>
<td>BRT</td>
<td>8.070</td>
<td>8.089</td>
<td>-0.4%</td>
<td>$15.60</td>
<td>$12.84</td>
<td>$15.75</td>
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<td>$371.40</td>
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<tr>
<td>32B</td>
<td>Kendall Hybrid BRT-DLR LRT SW 137th Augmented</td>
<td>Combined BRT/DLR/BRT</td>
<td>13.033</td>
<td>11.976</td>
<td>9.6%</td>
<td>$65.69</td>
<td>$21.15</td>
<td>$12.29</td>
<td>$0.95</td>
<td>$515.87</td>
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<tr>
<td>32C</td>
<td>Kendal BRT/DLR Only</td>
<td>BRT</td>
<td>11.008</td>
<td>9.835</td>
<td>21.2%</td>
<td>$23.24</td>
<td>$15.32</td>
<td>$8.29</td>
<td>$0.00</td>
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</table>

South Florida Regional Transportation Authority
Chapter 11: Transit Network Composition and Analysis
December 2008
4.0 LAND USE ANALYSIS

The forecast for growth in the South Florida Region through the year 2030 shows a fairly even distribution of employment and residential development. To determine if changing existing land use policies to better serve transit would create higher ridership, each of the resulting preliminary networks was tested using three alternative land use scenarios for the year 2030: Scenario 1, RACs or Community Redevelopment Areas (CRAs); Scenario 2, RACs and CRAs; and Scenario 3, Transit Station Areas (SAs).

The land use scenarios were designed using Donor Zones and Receiving Zones. A portion of the growth in population and employment in the South Florida region between the base year of 1999 and horizon year of 2030 is considered transferable from Donor Zones to Receiving Zones that relates to the proposed land use policies. Three types of planning areas are considered to be desirable for an increase in population and/or employment: RACs, CRAs, and SAs.

While the construction of the Alternative Land Use Scenarios are exaggerated realities, the results show concentrating growth, through any of the scenarios, produced a higher propensity for transit use.

Regional Activity Centers

Demographic data for the Year 2030 was used to identify major destinations with potential as transit hubs. Traffic Analysis Zones (TAZs) representing geographic areas that exhibited multi-use trip generation characteristics were grouped together to form Regional Activity Centers (RACs). Areas with a high concentration of jobs in 2000, and those that were projected to experience significant employment growth between the years 2000 and 2030 were designated as major employment centers. Furthermore, Developments of Regional Impact were also mapped to assist in identifying multi-use trip generators.

Eighteen RACs and 22 employment centers were initially identified in the South Florida region. Because approximately 90 percent of the initial RACs overlapped employment centers, they were subsequently merged and their boundaries restructured. Twelve additional RACs were added to the initial list based on preliminary model outputs from Southeast Regional Planning Model, Version 5 (SERPM V). In conclusion, the study identified 34 RACs in the region. Nine of the 34 RACs are found in Palm Beach County, seven in Broward County, and 18 in Miami-Dade County.

Community Redevelopment Areas

A CRA is designated by the state as an instrument for local governments to initiate the process of redevelopment. Areas designated as CRAs within the South Florida region were identified as areas subject to redevelopment in the future.

Transit Station Areas

SAs consist of those stations attributed to fixed guideway transit with dedicated rights-of-way, including some bus rapid transit, commuter rail, light rail, and Metrorail.
4.1 Land Use Methodology

Varying distributions of population and employment demonstrate the effect of concentrating growth as well as the effect of mixed use development on transit ridership. Areas that are not designated as RACs, CRAs, or SAs are designated as potential Donor Zones. Of these potential Donor Zones, only zones that demonstrate growth between the base year 1999 and horizon year 2030 contribute a portion (25%) of their growth, aggregated into a Donor Pool, then allocated as specified in each of the three scenarios. Allocation to the Receiving Zones is proportionate in all CRAs, all RACs, or all SAs relative to their respective employment and household characteristics in 1999. To ensure a realistic analysis, employment and households allocations remained within the county from which they were donated.

Scenario 1 – Regional Activity Centers or Community Redevelopment Areas Scenario

In this scenario, all zones designated as CRAs receive 100% of the Donor Pool’s household contributions, while those designated as RACs receive 100% of the employment contributions. Other Receiving Zones (SAs) do not receive anything from the Donor Pool.

Scenario 2 – Regional Activity Centers and Community Redevelopment Areas Scenario

In this scenario, zones designated as CRAs receive 67% of household contributions and 33% of employment contributions, while RACs receive 33% of household contributions and 67% of employment contributions.

Scenario 3 – Transit Station Areas Scenario

In this scenario, 100% of the household and employment contributions are allocated to SAs throughout the region.

Tables 5, 6, 7, and 8 show the cost performance of each network using the 2030 Base Land Use Scenario and three additional Scenarios.

5.0 Summary

Based on the network analysis using the 2030 Base Land Use Scenario, the Value Network is recommended as a starting point for a Preferred Network. The Value Network demonstrated ridership similar to other networks, while maintaining lower capital costs. While portions of each network could be modified to perform better or accommodate locally recommended changes, the Value Network will be presented to the SFRTA PTAC and Board for discussion.
Table 5 – Evaluation of Three Networks: No Changes in 2030 Land Use (Preliminary Networks)

<table>
<thead>
<tr>
<th></th>
<th>Connective</th>
<th>Productive</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Total Capital Cost ($B)</td>
<td>$10.8</td>
<td>$10.9</td>
<td>$8.5</td>
</tr>
<tr>
<td>Annualized Capital Cost ($M)</td>
<td>$809</td>
<td>$809</td>
<td>$654</td>
</tr>
<tr>
<td>Annual O&amp;M Cost ($M)</td>
<td>$97</td>
<td>$99</td>
<td>$72</td>
</tr>
<tr>
<td>Total Annual Cost ($M)</td>
<td>$907</td>
<td>$907</td>
<td>$726</td>
</tr>
<tr>
<td>Annual Passenger Trips (M)</td>
<td>41.2</td>
<td>40.3</td>
<td>37.6</td>
</tr>
<tr>
<td>O&amp;M Cost Per Trip</td>
<td>$2.36</td>
<td>$2.46</td>
<td>$1.91</td>
</tr>
<tr>
<td>Total Annual Cost Per Trip</td>
<td>$22.00</td>
<td>$22.52</td>
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</tr>
<tr>
<td>Annual Fare Revenue ($M)</td>
<td>$22.9</td>
<td>$22.3</td>
<td>$20.8</td>
</tr>
<tr>
<td>Farebox Recovery</td>
<td>23%</td>
<td>23%</td>
<td>29%</td>
</tr>
<tr>
<td>Operating Subsidy Per Trip</td>
<td>$1.53</td>
<td>$1.60</td>
<td>$1.15</td>
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</table>
### Table 6 – Evaluation of Preliminary Connective Network with Land Use Scenarios

<table>
<thead>
<tr>
<th></th>
<th>Original</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
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</thead>
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<tr>
<td><strong>Total Capital Cost ($B)</strong></td>
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<td><strong>Annualized Capital Cost ($M)</strong></td>
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<tr>
<td><strong>Annual O&amp;M Cost ($M)</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Annual Cost ($M)</strong></td>
<td></td>
<td>$907</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Annual Passenger Trips (M)</strong></td>
<td>41.2</td>
<td>66.0</td>
<td>64.9</td>
<td>67.4</td>
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<tr>
<td><strong>O&amp;M Cost Per Trip</strong></td>
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<td>$2.36</td>
<td>$1.48</td>
<td>$1.51</td>
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<td><strong>Total Annual Cost Per Trip</strong></td>
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<td><strong>Annual Fare Revenue ($M)</strong></td>
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<td>$35.6</td>
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<td><strong>Farebox Recovery</strong></td>
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<td>23%</td>
<td>37%</td>
<td>36%</td>
</tr>
<tr>
<td><strong>Operating Subsidy Per Trip</strong></td>
<td></td>
<td>$1.53</td>
<td>$0.76</td>
<td>$0.78</td>
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</tbody>
</table>

AC = Activity Center, CRA = Community Redevelopment Area, SA = Station Area

Land Use Scenario 1 = 100% of employment in ACs, 100% of household CRAs
Land Use Scenario 2 = 67% of employment in ACs, 33% of employment in CRAs, 33% of households in ACs, 67% of employment in CRAs
Land Use Scenario 3 = 100% of employment and households in SAs
## Table 7 – Evaluation of Preliminary Productive Network with Land Use Scenarios

<table>
<thead>
<tr>
<th></th>
<th>Original</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
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</tr>
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<td></td>
</tr>
<tr>
<td>Total Annual Cost ($M)</td>
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<td>$726</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Passenger Trips (M)</td>
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<td>O&amp;M Cost Per Trip</td>
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<td>$1.19</td>
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<tr>
<td>Annual Fare Revenue ($M)</td>
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<tr>
<td>Farebox Recovery</td>
<td>29%</td>
<td>48%</td>
<td>47%</td>
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<tr>
<td>Operating Subsidy Per Trip</td>
<td>$1.15</td>
<td>$0.50</td>
<td>$0.51</td>
<td>$0.48</td>
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</tbody>
</table>

AC = Activity Center, CRA = Community Redevelopment Area, SA = Station Area

Land Use Scenario 1 = 100% of employment in ACs, 100% of household CRAs
Land Use Scenario 2 = 67% of employment in ACs, 33% of employment in CRAs, 33% of households in ACs, 67% of employment in CRAs
Land Use Scenario 3 = 100% of employment and households in SAs
### Table 8 – Evaluation of Preliminary Value Network with Land Use Scenarios

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<td></td>
</tr>
<tr>
<td><strong>Annualized Capital Cost ($M)</strong></td>
<td></td>
<td></td>
<td>$809</td>
<td></td>
</tr>
<tr>
<td><strong>Annual O&amp;M Cost ($M)</strong></td>
<td></td>
<td></td>
<td>$99</td>
<td></td>
</tr>
<tr>
<td><strong>Total Annual Cost ($M)</strong></td>
<td></td>
<td></td>
<td></td>
<td>$907</td>
</tr>
<tr>
<td><strong>Annual Passenger Trips (M)</strong></td>
<td>40.3</td>
<td>63.7</td>
<td>62.5</td>
<td>65.1</td>
</tr>
<tr>
<td><strong>O&amp;M Cost Per Trip</strong></td>
<td>$2.46</td>
<td>$1.56</td>
<td>$1.59</td>
<td>$1.53</td>
</tr>
<tr>
<td><strong>Total Annual Cost Per Trip</strong></td>
<td>$22.52</td>
<td>$14.26</td>
<td>$14.52</td>
<td>$13.94</td>
</tr>
<tr>
<td><strong>Annual Fare Revenue ($M)</strong></td>
<td>$22.3</td>
<td>$35.5</td>
<td>$34.9</td>
<td>$35.8</td>
</tr>
<tr>
<td><strong>Farebox Recovery</strong></td>
<td>23%</td>
<td>36%</td>
<td>35%</td>
<td>36%</td>
</tr>
<tr>
<td><strong>Operating Subsidy Per Trip</strong></td>
<td>$1.60</td>
<td>$0.82</td>
<td>$0.84</td>
<td>$0.79</td>
</tr>
</tbody>
</table>

AC = Activity Center, CRA = Community Redevelopment Area, SA = Station Area

Land Use Scenario 1 = 100% of employment in ACs, 100% of household CRAs
Land Use Scenario 2 = 67% of employment in ACs, 33% of employment in CRAs, 33% of households in ACs, 67% of employment in CRAs
Land Use Scenario 3 = 100% of employment and households in SAs